Meeting Agenda

Town Council Regular Meeting

Monday, May 4, 2026
6:30 PM

Town Council Room
1005 Ridge Road, Munster, IN

1. Call To Order

2. Roll Call

3. Moment of Silence

4. Pledge of Allegiance

5. Public Hearing on Ordinance #2009: Additional Appropriations (2)

a. Ordinance #2009: Additional Appropriations (2)

6. Public Comment

All public comment is limited to 2 minutes per person with a total of 20 minutes allotted for the public comment section. All speakers must sign the Public Speaker Sign-in Form prior to speaking. Please keep all comments civil, constructive, and related to public policy issues. At their discretion, Council may allow public comment to extend past 20 minutes but is not required to do so. All rules for public comment are posted outside the Main Meeting Room.

7. Consent Agenda

a. Minutes April 20, 2026

b. Treasurer's Report, March 2026

c. Water Leak Adjustment

d. Voucher Registers

8. Old Business

Live Stream and Archived Meetings can be viewed at: https://munsterin.portal.civicclerk.com/

Chuck Gardiner	Joseph Hofferth	David B. Nellans	Jonathan Petersen	George Shinkan
Vice-President	President	Councilor	Councilor	Councilor
01/01/24 - 12/31/27	01/01/24 - 12/31/27	01/01/24 - 12/31/27	01/01/24 - 12/31/27	01/01/24 - 12/31/27

a. Ordinance #2009: Additional Appropriation (2)

b. Ordinance #2011: Amending Ordinance #1841-MPD Special Revenue Fund

9. New Business

a. Ordinance #2010: Centennial Village PUD Amendment

b. Release retainage CCMG 2024 - 2

c. Layous 501 45th St.- Release of Surety

d. Change Orders 1 and 2: Pedestrian Bridges Over Ditches

e. Supplemental Agreement #3: Main Street Design Engineering

f. CCMG 2026-2: Approval of LPA Agreement

g. Police Equipment Destruction Request

h. Main Street Paving Proposal

i. Baker Tilly Financial Analysis Services Agreement - Centennial Village Development

j. Reimbursement Agreement for Centennial Village Development Financial Services

k. Baker Tilly Financial Analysis Services Agreement - Kenmara Development

l. Reimbursement Agreement for Kenmara Development Financial Services Analysis

m. Executive Recruitment Services

10. Reports & Announcements

11. Adjournment

To: Town Council

From: Patricia Abbott, Controller

Meeting Date: May 4, 2026

Subject: Ordinance #2009: Additional Appropriations (2)

Summary

There are two funds in need of additional appropriations.

Cumulative Capital Development (CCD) is seeking $393,650.00. Council will be asked separately for authority to engage Midwestern Electric for a Utility Underground Mapping project. This initiative will provide detailed mapping of underground infrastructure, enabling the Public Works Department to locate utilities more quickly and accurately, improve efficiency, and reduce response times. The cost for this from the CCD Fund will be $70,000.00. Separately, Council will be asked to approve an agreement to prepare a Transportation Safety Action Plan at a cost of $300,000.00. This is part of the Safe Streets for All Grant (SS4A) which has a 20% matching requirement. The Town must pay the full amount and seek reimbursement from the grant. The Town will have a net spend of $60,000.00. The final item from this fund is to purchase security cameras for various locations, including Town Hall, Public Works Garage, Fire Station and various Park locations. The total cost across all locations is $23,650.00.

Riverboat Fund is seeking $31,100.00 for the installation of additional fencing at the Train Station/Depot Parking Lot. This work as requested by the Town. While the Town is responsible for paying the invoice upfront, NICTD has been invoiced to reimburse the Town the full cost.

The procedure for securing additional appropriations requires a public hearing, scheduled for May 4, 2026, and the adoption of an ordinance by the Town Council. Riverboat Fund is considered a reporting only fund, and the appropriations will go into effect upon passage of the ordinance. The CCD Fund is considered a controlled fund. Once the ordinance is adopted, the request will be submitted to the Department of Local Government Finance, which will issue a determination within ten days.

Financial Impact

Funding Source: See memo
Budgeted Amount:

Cost:

Recommended Council Action
Conduct a public hearing.

Attachments:
1. Ordinance 2009 Additional Appropriations
2. Certified Copy of Additional Appropriations 2026-2

ORDINANCE 2009

AN ORDINANCE FOR THE ADDITIONAL APPROPRIATION OF FUNDS FOR THE YEAR 2026 (2)

WHEREAS, The use and expenditure of money is required to carry on necessary governmental functions; and

WHEREAS, The amount of money to carry on necessary governmental functions is prescribed in the budget for the year 2026 as determined by the Department of Local Government Finance through their budget order; and

WHEREAS, The Town Council of the Town of Munster, Lake County, Indiana, now finds it necessary to appropriate more money than the amount prescribed in the budget for the year 2026; and

WHEREAS, There are sufficient funds available for additional appropriation; now, therefore, be it

ORDAINED, By the Town Council of the Town of Munster, Lake County, Indiana, that for the expenses of the taxing unit, the additional sums of money are hereby appropriated out of the funds named in the attached Certified Copy of Additional Appropriations subject to laws governing the same:

ORDAINED AND ADOPTED by the Town Council of the Town of Munster on the 4th day of May 2026, by a vote of _____ in favor and ____ opposed.

TOWN COUNCIL OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

_____
Joseph Hofferth, President

ATTEST:

_____
Wendy Mis, Clerk-Treasurer

CERTIFIED COPY OF ADDITIONAL APPROPRIATION
State Form 55819 (R4 / 2-19)
PRESCRIBED BY THE DEPARTMENT OF LOCAL GOVERNMENT FINANCE

Section I

When reporting the appropriation of bond proceeds, complete Section I; lines A, B, C and 5 of Section II; Section III; and Section IV.

UNIT NAME: TOWN OF MUNSTER
COUNTY NAME: LAKE

Unit Number: 0507
County Number: 45

Date of Publication *(month, day, year)*: 4/17/2026 Newspaper Name: Gateway
Date of Publication *(month, day, year)*: Newspaper Name:
Date of Public Hearing *(month, day, year)*: 5/4/2026
Date Resolution Passed *(month, day, year)*: 5/4/2026

DLGF USE ONLY
Date Received *(month, day, year)*:
Order Number:

Section II

Complete a column for each fund for which the additional appropriations are being made. Values omitted from the sheet may impact the Department's review and approval of the request. Rows A and B should be completed using the fund number and fund name as listed on the Fund Report of the Final 1782 Notice issued by the Department.

A. DLGF Fund Number	4402	4437			
B. Fund Name	Cumulative Capital Development	Riverboat			
C. Appropriation Amount Requested	$393,650.00	$31,100.00			
D. Amount by Reduction *(Enter as a positive number)*					
E. Net Amount of Increase *(C minus D)*	$393,650.00	$31,100.00	$0.00	$0.00	$0.00
1. Property Tax Levy (Line 16)	$1,138,244.00	$0.00	$0.00		$0.00
2. Levy Excess (Line 15)	$0.00	$0.00	$0.00		$0.00
3. PTRC from Local Income Tax (LIT) (Line 13A)	$0.00	$0.00	$0.00	$0.00	$0.00
4. LIT Levy Freeze Amount (Line 13B)		$0.00	$0.00		$0.00
5. Misc. Revenue (Line 8B) *(See Note #1)*	$75,576.00	$170,000.00	$0.00		
6. January 1 Cash Balance *(Include investments)*	$1,823,659.00	$827,409.00			
7. Subtotal of Funds *(Add 1 thru 6)*	$3,037,479.00	$997,409.00	$0.00	$0.00	$0.00
8. Less Circuit Breaker *(Amount From Circuit Breaker Report)*					
9. Total Funds *(7 minus 8)*	$3,037,479.00	$997,409.00	$0.00	$0.00	$0.00
10. DLGF Approved Budget (Line 1C)	$685,868.00	$145,000.00	$0.00	$0.00	
11. Encumbered Appropriations Carried Forward From Previous Year					
12. Temporary Loans Outstanding as of January 1	$0.00	$0.00	$0.00	$0.00	
13. Beginning Obligations *(Add 10 thru 12)*	$685,868.00	$145,000.00	$0.00	$0.00	$0.00
14. Surplus Funds *(9 minus 13)*	$2,351,611.00	$852,409.00	$0.00	$0.00	$0.00
15. Previous additional appropriation(s) approved since January 1, less any reductions in appropriations.	$0.00	$0.00			
16. Amount transferred to the Rainy Day Fund *(See Note #2)*	$0.00	$0.00	$0.00	$0.00	
17. Surplus Funds Remaining *(14 minus 15 minus 16)*	$2,351,611.00	$852,409.00	$0.00	$0.00	$0.00

Note #1: If amount report on Row 5 is higher than 8B amount, then a revised Budget Form 2 must be attached with the Additional Appropriation Request.
Note #2: Row 16 cannot be used for additional appropriations for the rainy day fund. Transfers to the rainy day fund are entered as miscellaneous revenues on Line 5.

Section III

Please check the requested method for the Department to inform your unit of the status of the Additional Appropriation Request.

Check One:
☐ Follow Up Via E-mail — wmis@munster.in.gov ; pabbott@munster.in.gov (E-mail Address(es))
☐ Follow Up Via Mail — (Mailing Address *(Number, Street, City, State, ZIP Code)*)

Section IV

I, Wendy Mis *(Please Print)* fiscal officer of Town of Munster *(Please Print)*, do hereby certify that the above information is true and correct.

Signature: Wendy Mis — Title: Clerk-Treasurer — Telephone Number: 219 836 6945 — Date *(month, day, year)*: 4-20-2026

Completed additional appropriation requests may be submitted to the Department via e-ma AdditionalAppropriationRequests@dlgf.in.gov or via fax (317) 974-1629.

To: Town Council

From: Wendy Mis, Clerk-Treasurer

Meeting Date: May 4, 2026

Subject: Minutes April 20, 2026

Summary

The minutes of the April 20, 2026, Town Council regular meeting are attached for approval.

Financial Impact

Funding Source: N/A
Budgeted Amount:
Cost:

Recommended Council Action

As part of the consent agenda, approve the minutes of the April 20, 2026, Town Council regular meeting.

Attachments:

1. 04-20-2026

TOWN OF MUNSTER
MINUTES OF A REGULAR MEETING OF THE TOWN COUNCIL
APRIL 20, 2026

A meeting of the Munster Town Council was held at 6:30 p.m. on Monday, April 20, 2026. Ordinance 1830 is the basis for holding electronic meetings. The announced meeting location was Munster Town Hall, 1005 Ridge Road, Munster, Indiana. Councilors, Staff, and the public had the option to participate via Zoom meeting technology.

Councilors George Shinkan, Joseph G. Hofferth, Chuck Gardiner, David B. Nellans, and Jonathan Petersen were physically present in Town Hall. Also present were Clerk-Treasurer Wendy Mis, Town Manager Jim Marino, Assistant Town Manager Dan Reyes, Police Chief Stephen Scheckel, Town Attorney Dave Westland. The news media was not represented.

President Hofferth presided, opened the meeting with a moment of silence followed by the Pledge of Allegiance.

PUBLIC COMMENT

The Town of Munster accepts public comments submitted both in-person and electronically. The public was informed, via the agenda posted at munster.org, that questions or comments about an item on the agenda were to be emailed to wmis@munster.org. All in-person public comments are limited to two minutes and limited to a total of twenty minutes for the public comment section.

Mr. Ryan Froneyberger, 9131 Columbia Avenue, shared his ongoing frustration with the traffic nuisance on Columbia Avenue and demonstrated the volume of traffic on a regular basis. The data being used for the traffic counts was requested.

Mr. Tom Jurich, 1839 Magnolia, reported he is still seeing fast speeds on Fran-Lin despite the reduced speed limit. Lead line replacement letter was not clear to some residents. Information shared at the 04/15/2026 agenda review was helpful to those in attendance. It was recommended the Town get ahead of the publicity.

No one else rose to claim the floor.

CONSENT AGENDA

APPROVAL OF MINUTES

Minutes of a regular meeting held on April 6, 2026

WATER LEAK ADJUSTMENTS 2026-20

At the April 8, 2013, meeting, the Council adopted a policy to allow water bill adjustments due to water leaks. Under the policy, the customer must sign an affidavit stating there was a leak, the leak has been repaired and request an adjustment from the Water Board. Adjustments are allowed once per 12-month period. The adjustment is based on an average of the usage over the previous twelve months.

Staff have received a request for an adjustment under this policy. The customer has completed the required form, and the request meets all the criteria for an adjustment. The average usage for this customer

is 6,000 gallons/month, and the period in question was 11,000 gallons (1 month). The original bill amounts totaled $88.40. The requested adjustment amount is $39.16, which represents water usage and sales tax. With the adjustment, the amount due for water and tax will be $49.24. The amounts listed are for water and sales tax only. All other regular charges will remain unchanged.

TREASURER'S REPORT

The February 2026 Treasurer's Report was presented.

ACCOUNTS PAYABLE VOUCHER REGISTERS

Confirmation of Voucher Register #26-2K dated 02/20/2026 in the amount of $1,535.32
Confirmation of Voucher Register #26-2L dated 02/28/2026 in the amount of $41,339.26
Approval of Voucher Register #26-2M dated 02/28/2026 in the amount of $538,214.28
Confirmation of Voucher Register #26-4D dated 04/09/2026 in the amount of $304,464.23
Confirmation of Voucher Register #26-4E dated 04/10/2026 in the amount of $60,681.17
Confirmation of Voucher Register #26-4F dated 04/10/2026 in the amount of $57,678.06
Confirmation of Voucher Register #26-4G dated 04/16/2026 in the amount of $281,450.16
Approval of Voucher Register #26-4H dated 04/20/2026 in the amount of $336,766.75
Confirmation of Voucher Register #26-4I dated 04/17/2026 in the amount of $594,628.37

Councilor Shinkan moved, with a second by Councilor Nellans, to suspend the rules, waive the readings, and adopt the Consent Agenda as presented. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed.

OLD BUSINESS

NEW BUSINESS

ORDINANCE #2009: ADDITIONAL APPROPRIATIONS (2)

Cumulative Capital Development (CCD) is seeking $393,650.00. Council will be asked separately for authority to engage Midwestern Electric for a Utility Underground Mapping project. This initiative will provide detailed mapping of underground infrastructure, enabling the Public Works Department to locate utilities more quickly and accurately, improve efficiency, and reduce response times. The cost for this from the CCD Fund will be $70,000.00. Separately, Council will be asked to approve an agreement to prepare a Transportation Safety Action Plan at a cost of $300,000.00. This is part of the Safe Streets for All Grant (SS4A) which has a 20% matching requirement. The Town must pay the full amount and seek reimbursement from the grant. The Town will have a net spend of $60,000.00. The final item from this fund is to purchase security cameras for various locations, including Town Hall, Public Works Garage, Fire Station and various Park locations. The total cost across all locations is $23,650.00.

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Councilor Shinkan moved, with a second by Councilor Petersen, to approve Additional Appropriations (2), Ordinance 2009 for second read on May 4, 2026. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed.

ORDINANCE #2011: AMENDING ORDINANCE #1841-MPD SPECIAL REVENUE FUND

The Munster Police Department has an officer assigned to HIDTA (High Intensity Drug Trafficking Areas). Through HIDTA, the officer had a take-home vehicle. HIDTA is ending their take-home vehicle program in favor of vehicle allowance. The Police Department has decided to purchase the vehicle currently assigned to the officer for his use as a take-home vehicle under the Munster Take-Home Vehicle Program. MPD has requested the vehicle allowance from HIDTA be placed in the MPD Special Revenue Fund.

Council adopted Ordinance 1841 at their October 4, 2021, meeting to create the Munster Police Department Special Revenue Fund. The fund was created to capture fees collected through the Records Office of the Police Department, namely fingerprint services, tow releases and other related fees. The revenue can be used for non-budgeted purposes of police public safety and related matters. The vehicle allowance cannot go into the MPD Special Revenue Fund as the ordinance is currently written, and an amendment is needed to allow the fund to receive these monies. If the change is not made, this revenue will go into the General Fund.

Separately, the State Board of Accounts requires all units of government to standardize their fund numbers after the MPD Special Revenue Fund was created. Ordinance 1841 makes several references to the old fund number (293), and Staff would like to update the ordinance with the new fund number.

Ordinance 2011 has been drafted to both allow the new revenue source and update the fund number. For ease of practical application, the ordinance is written to repeal the original language in its entirety and replace it with the new language.

Councilor Gardiner moved, with a second by Councilor Petersen, to approve Ordinance 2009, Additional Appropriations (2) for second reading on May 4, 2026. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed.

LANDFILL ASSURANCE TEST

The Indiana Department of Environmental Management (“IDEM”) requires documentation from the Town regarding financial assurance of the landfill. This requirement has traditionally been in place to assure IDEM that a private business owner operating a landfill site has placed financial assurance on record in case the owner closes the business without any warning, leaving behind a brownfield. The provisions in 329 IAC 10-39-2(a)(6) apply to municipalities as well, even though the same risks are not involved.

Baker Tilly has completed numerous reports on the financial status of the landfill for the Town. A letter of engagement to perform the work that must be completed to provide IDEM with the proper financial assurance has been presented.

Baker Tilly has the appropriate financial information to provide IDEM with information about the Town's general financial well-being. IDEM does not stipulate that the Town pass any further bonds or pay any sums of money at this time to comply with the financial assurance provisions. The expense of these financial analyses is set at $8,100.00 and is to be funded by the Solid Waste Management Fund.

Councilor Shinkan moved, with a second by Councilor Gardiner to approve the letter of engagement with Baker Tilly for the Annual Landfill Assurance Test in the amount of $8,100.00. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed.

RESOLUTION # 2163 FOR THE WAIVER OF FEES FOR THE 2026 NNO EVENTS

The Munster Police Department, in partnership with the Choice Community Council, is preparing for the 31st Annual National Night Out event, scheduled for August 4, 2026. As in prior years, organizers are encouraging residents to host neighborhood block parties on the Saturday preceding the main event, which will take place on Saturday, August 1, 2026 (rain date: Sunday, August 2, 2026).

Under the current Town Code, block parties require submission of an application, a $250 damage deposit, and a $100 fee for Public Works staff to deliver traffic barricades. Residents may opt to pick up and return barricades themselves at no cost. To encourage participation and reduce barriers for residents, a request has been made to waive both the damage deposit and the barricade delivery fee for this one-day event. The application process will remain unchanged, and Public Works staff will continue to provide barricade delivery.

For the past four years, the Town Council has approved similar waivers in support of National Night Out pre-events. This accommodation has contributed to strong community participation, with approximately twenty block parties being held throughout town each year. These gatherings have fostered increased neighborhood engagement, strengthened community relationships, and enhanced public safety awareness.

As part of the event, participating neighborhoods are recognized with the “Block Unity Award,” presented to top-performing blocks based on criteria such as participation, creativity, and overall neighborhood unity. Award recipients are recognized during the National Night Out celebration and receive signage to display their achievement.

To continue building on this success and promote positive interaction among residents, Resolution 2163 has been drafted to authorize the waiver of applicable block party fees and requirements for this one-day event.

Councilor Shinkan moved, with a second by Councilor Nellans, to adopt Resolution 2163 as presented. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed and Resolution 2163 was adopted as presented.

RESOLUTION #2164: MUNSTER WELLBEING IMPROVEMENT FOR SENIOR EXPERIENCE (“WISE”) COMMITTEE AND PLAN

Resolution No. 2164 formally establishes the Munster Wellbeing Improvement for Senior Experience (WISE) Committee to support and enhance the quality of life for senior residents in the Town of Munster.

The WISE Committee is intended to promote existing programs and services for seniors while also identifying new opportunities, including events, partnerships, and grant funding. The initiative reflects the Town Council’s commitment to proactively addressing the needs of an aging population and fostering stronger connections across all age groups, neighboring communities, and governmental agencies.

The Committee will consist of ten (10) members, with each Town Councilor appointing two members within fourteen (14) days of the resolution's adoption. Should a councilor not make appointments within that timeframe, the Council President will complete the appointments.

Initially, the WISE Committee will operate without a dedicated budget and will focus on identifying low-cost or self-funded initiatives.

Overall, this resolution positions the Town to take a coordinated and forward-looking approach to senior wellbeing and community engagement.

Councilor Shinkan moved, with a second by Councilor Petersen, to adopt Resolution 2167 as presented. Councilor Petersen offered to be the Council liaison. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed and Resolution 2164 was approved as presented.

UTILITY AUDIT AND MAPPING SERVICES

Midwestern Electric has submitted a not-to-exceed proposal in the amount of $98,000 to perform a comprehensive audit and mapping of the Town of Munster's traffic signal, street lighting, and fiber optic utility infrastructure. This project will provide the Town with accurate documentation of existing infrastructure assets, including location, condition, and connectivity. The resulting data will assist the Town in establishing a reliable utility asset inventory, identifying infrastructure deficiencies, improving maintenance planning and coordination, supporting future capital improvement planning, assisting with traffic signal modernization and fiber network expansion.

The mapping and audit will also allow the Town to better coordinate with contractors, utilities, and engineering firms when designing and implementing future roadway and traffic improvement projects.

Traffic signaling equipment locate and maps of cabinet (equipment & hardware), underground feeds, and compile a punch list of current and potential future issues

Lighting locate and maps and provide type of Light Fixture at each location (LED, Incandescent and wattage), underground feeds, provide location of service points for lighting feeds, put together a punch list of current and potential future issues.

Fiber locates and map including fiber travel path, fiber count, fiber schedule per hand hole, check current fiber infrastructure status, put together a punch list of current and potential future issues.

All (3) utilities will be imputed and designed by us on a live-updated mapping software which we are able to update with any future work. This will help provide digital copies of maps to help support 811.

Councilor Gardiner moved, with a second by Councilor Shinkan to approve proposal from Midwestern Electric for utility audit and mapping services in an amount not to exceed $98,000. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed.

GRANT AGREEMENT: SAFE STREETS AND ROADS FOR ALL (SS4A)

This item is for Council to consider the Grant Agreement between the Federal Highway Administration (FHWA) and the Town of Munster for the Safe Streets and Roads for All (SS4A) Grant.

January 20th, 2025, Town Council approved Public Works to apply for the SS4A grant. SEH, the Town's contracted engineering firm, wrote the grant application for a lump sum fee of $8,000. The grant was awarded in 2025 for $240,000, with a $60,000 commitment from the town, totaling $300,000 for a safety action plan. This is a reimbursement grant, meaning the town will pay the consultant and be reimbursed by FHWA as invoices come in. Per Uniform Guidance 2 CFR part 200, the Federal Regulation that controls Federal grants and awards, the Town must now complete a grant agreement before any funds can be spent on this project. Town Manager Jim Marino, Assistant Town Manager Dan Reyes, and Public Works Director Bob Valois have been in regular communication with representatives from the FHWA. The Grant Agreement has been reviewed by all parties and is ready for execution by the Town, before final execution by the FHWA.

Through the SS4A, the Town will develop a Comprehensive "Safety Action Plan," using the "Safe System Approach." Lead by an engineering firm, and a diverse stakeholders' committee, the Town will review existing and projected traffic trends, identify friction points between various roadway users (cyclists, cars, trains, pedestrians, etc.), and develop and prioritize treatments. The Town will walk away with an understanding of who its roadway users are, and a plan to ensure Town's roadways are safe and efficient for all. The Safety Action Plan is an essential first step before applying to future FHWA grants, signaling to the Federal Government that the Town understands its transportation systems, and how future projects will mitigate roadway user conflicts. The SS4A, if Federally funded in the future, has an implementation program that the Town would be able to apply for, and there are several other transportation grants (Highway Safety Improvement Program, Local Technical Assistance Program, etc., as well as non-infrastructure funding for education and outreach).

The Town will need to identify a diverse group of stakeholders to provide input for the Town as the plan develops. These members typically include a member of the Town Council, representatives from regional recreation groups, accessibility advocates, State DOT, local school districts, a member of the Chamber of Commerce, and plugged-in members of the community. Key staff are also involved providing input to Committee recommendations and coordinating with the consultants. Aside from the stakeholders group, there are also outreach events to gather public comment, anecdotal concerns, and share progress updates.

For more information about the Safe System Approach, there is a YouTube video link to the Federal Highway Administration's YouTube Channel.

Next, the Town has already developed a Request for Qualifications (RFQ) to solicit Statements of Qualification (SOQ) from qualified Engineering firms. They will be tasked with reviewing all relevant documents, statutes, Public Works standards, etc, coordinating with the stakeholders' committee, Town Council, overall project management and Plan Development. Once the Grant Agreement is signed, the Town can submit the RFQ mid-April, and begin the project formally, June 1, 2026, with a closeout date of May 31, 2028. 2028 is the final date that the Town has to closeout by, but can finish sooner.

Councilor Gardiner moved, with a second by Councilor Shinkan to approve the grant agreement between the Federal Highway Administration and the Town of Munster for the Safe Streets and Roads for All grant. Councilor Petersen provided background and insight that helped with the this grant process. Councilors Shinkan, Gardiner, Nellans, Petersen, and Hofferth voted in favor; none voted against. Motion passed.

SECURITY CAMERA PURCHASE

An initiative to upgrade and replace security cameras has been in the works for several months involving multiple departments. Originally led by the police department to address the issues with several malfunctioning cameras throughout town and to enhance the existing surveillance system, it was

discovered that cameras at park facilities were from a Chinese manufacturer that is now banned by the federal government.

Below is a list of cameras that are set to be added or replaced. The cameras being replaced are due to the removal of banned models and the enhancement of existing cameras with superior technology: replace cameras located at the Pro Shop, pool, golf cart storage building, Centennial & Community Park restrooms, add cameras at West Lakes Park, replace the camera at the Public Works gate with a multi-lens camera, add exterior cameras for general coverage of public works premises and internal coverage throughout the building, replace the camera overlooking fuel pumps, add an internal camera in the fire station that views the ambulance drug safe, replace the camera at public works overlooking the rear parking lot of Fire Station 2, add and replace cameras at various intersections throughout town.

Councilor Gardiner moved, with a second by Councilor Shinkan to approve the purchase of security cameras from Pye Barker at an amount not to exceed $191,400 as presented.

REPORTS

Clerk-Treasurer Mis shared information from the April NIRPC meeting.

Councilor Gardiner shared upcoming dates and events: Park Board Meeting on April 21, at 5 p.m., Munster Civic Foundation on April 21, at 6:30 p.m. and Earth Day on April 25.

Councilor Nellans shared information from the last Lake County Solida Waste meeting regarding plastic bags and recycling.

Councilor Hofferth celebrated the Town of Munster was recognized at World Civility Day reminded those in attendance of the upcoming Ridge Road Improvement meeting to be held on Tuesday, April 7, 2026, at the Center for Visual and Performing Arts from 2:00 p.m. – 4:00 pm and 6:00 p.m. – 8:00 p.m.

ANNOUNCEMENTS

The Town Council will hold a regular meeting on Monday, May 4, 2026. The Redevelopment Commission will hold a regular meeting immediately following. (Unless stated otherwise, all meetings of the Town Council begin at 6:30 p.m. at Munster Town Hall.)

ADJOURNMENT

There being no further business to come before the Council, and upon a motion by Councilor Nellans and seconded by Councilor Gardiner, the meeting adjourned at 7:05 p.m. by voice vote.

_____

Joseph Hofferth, President

ATTEST:

_____

Wendy Mis, Clerk-Treasurer

To: Town Council

From: Wendy Mis, Clerk-Treasurer

Meeting Date: May 4, 2026

Subject: Treasurer's Report, March 2026

Summary

Treasurer's Report, March 2026

Financial Impact

Financial Impact: See Attached

Recommended Council Action

As part of the Consent Agenda, approve the March 2026 Treasurer's Report.

Attachments:

1. Treasurer's Report

March 2026
Treasurer's Report

Fund		Cash Balance at 3/1/2026	Receipts	Disbursements	Cash Balance at 3/31/2026	Petty Cash, Cash Drawers & Investments at 3/31/2026	Total Cash, Petty Cash, Cash Drawers & Investments at 3/31/2026
GENERAL							
General Fund	1101	$ 359,718.22	$ 768,265.82	$ 774,576.54	$ 353,407.50	$ 2,550,610.00	$ 2,904,017.50
SPECIAL REVENUE							
Motor Vehicle Hwy	2201	71,577.03	117,010.43	103,225.82	85,361.64	2,252,377.14	2,337,738.78
Local Road + Street	2202	48,184.44	44,296.67	1,954.28	90,526.83	635,107.72	725,634.55
Motor Vehicle Hwy-Restricted	2203	58,087.55	52,636.38	7,312.92	103,411.01	2,376,586.87	2,479,997.88
Park	2204	96,835.12	344,102.55	177,902.82	263,034.85	1,207,324.55	1,470,359.40
Parking Meter Fund	2207	774.03	1,071.64	1,071.64	774.03	348,273.03	349,047.06
Levy Excess	2208	0.00	-	-	0.00	-	0.00
LIT Economic Development	2209	74,403.61	69,458.91	50,266.69	93,595.83	4,125,096.81	4,218,692.64
Economic Development	2216	0.00	-	-	0.00	-	0.00
Loc.Law.Enf.Cont Ed	2228	4,571.75	598.00	-	5,169.75	-	5,169.75
Unsafe Building Fund	2234	0.00	-	-	0.00	-	0.00
LIT Public Safety	2240	51,349.76	69,119.29	33,892.91	86,576.14	1,835,474.59	1,922,050.73
Excess Welfare Fund	2242	0.00	-	-	0.00	-	0.00
Rental Property Inspect	2245	1,600.00	681.35	481.35	1,800.00	156,422.79	158,222.79
LOIT Special Distribution	2248	0.00	-	-	0.00	-	0.00
Municipal Surtax Fund	2249	14,038.55	49,710.12	55,520.28	8,228.39	253,781.18	262,009.57
Municipal Wheel Tax Fund	2250	13,944.04	3,315.89	230.66	17,029.27	74,962.64	91,991.91
Opioid Unrestricted Fund	2256	3,579.12	226.12	226.12	3,579.12	73,489.28	77,068.40
Opioid Restricted Fund	2257	5,435.87	510.95	510.95	5,435.87	166,056.04	171,491.91
Donation	2300	104,111.77	1,340.27	880.09	104,571.95	-	104,571.95
Park Donation-Non Reverting	2370	32,208.38	5,054.25	841.36	36,421.27	150,869.43	187,290.70
Cares IFA Grant Fund	2401	0.00	-	-	0.00	-	0.00
CDBG-COVID Grant Fund	2402	0.00	-	-	0.00	-	0.00
ARP Coronavirus Local Fiscal Re	2403	0.00	-	-	0.00	-	0.00
Federal Grants	2410	86,945.07	34,501.55	-	121,446.62	-	121,446.62
State Grants	2451	0.00	-	-	0.00	-	0.00
Technology Fund	2547	61,275.74	17,458.65	41,822.96	36,911.43	389,541.45	426,452.88
Electric Fund	2570	27,594.47	8,770.38	11,955.73	24,409.12	-	24,409.12
Sewer Maintenance	2580	524,842.31	241,632.36	342,440.58	424,034.09	479,836.47	903,870.56
Sewer Maint Depreciation	2583	38,357.25	5,474.33	5,474.33	38,357.25	1,779,068.31	1,817,425.56
Special Asset Forfeiture NR	2590	237,026.43	988.98	835.00	237,180.41	-	237,180.41
MPD State Seizure NR	2592	13,426.60	-	138.00	13,288.60	-	13,288.60
MPD Special Revenue	2593	64,873.77	2,097.22	-	66,970.99	-	66,970.99
DEBT SERVICE							
Mun. Bond B+I	3306	16,212.04	28,463.35	28,463.35	16,212.04	1,125,124.92	1,141,336.96
Redevelopment Bond-B+I	3311	15,207.99	3,039.29	3,039.29	15,207.99	387,715.26	402,923.25
Park Bond B+I	3312	21,143.19	13,184.11	13,184.11	21,143.19	134,637.10	155,780.29
Municipal Complex	3318	57,920.02	-	-	57,920.02	-	57,920.02
EDC Bond B+I	3328	479,275.53	1,317.07	-	480,592.60	-	480,592.60
Redevelopment Reserve	3330	0.00	-	-	0.00	600,000.00	600,000.00
EDC Bond Reserve	3331	2,343,554.61	5,404.41	-	2,348,959.02	-	2,348,959.02
CAPITAL PROJECT							
CCI-Cig. Tax	4401	9,714.52	411.44	411.44	9,714.52	133,709.48	143,424.00
CCD	4402	9,308.38	24,197.99	24,484.72	9,021.65	1,765,423.34	1,774,444.99
Redevelopment Operating	4406	19,963.54	453.50	13,336.76	7,080.28	147,376.42	154,456.70
Munic.Bond Proceeds	4413	20,370.70	525,000.00	472,077.80	73,292.90	7,634,000.00	7,707,292.90
Barrett Bond Proceeds	4416	0.00	-	-	0.00	-	0.00
Redevelopment Capital IMP	4417	0.00	-	-	0.00	-	0.00
Park Bond Proceeds	4418	13,306.25	-	-	13,306.25	4,150,000.00	4,163,306.25
Riverboat Fund	4437	9,667.06	2,529.60	7,874.68	4,321.98	822,086.88	826,408.86
Rainy Day Fund	4438	0.00	1,542.53	1,542.53	0.00	501,302.37	501,302.37
Major Moves	4440	0.00	-	-	0.00	-	0.00
TIF Allocation Fund	4445	18,058.68	429,850.70	404,290.65	43,618.73	26,171,498.83	26,215,117.56
Maple Leaf Crossing TIF Allocati	4446	16,157.25	310.30	310.30	16,157.25	100,841.00	116,998.25
Lease Proceeds Fund	4675	0.00	-	-	0.00	-	0.00
EDC Bond Proceeds	4681	121,734.72	0.12	-	121,734.84	-	121,734.84
PROPRIETARY FUNDS							
ENTERPRISE FUNDS							
Water Cash Operating	6101	485,637.29	690,440.98	677,517.13	498,561.14	861,100.21	1,359,661.35
Water B + I	6102	121,281.46	121,630.71	2,964.46	239,947.71	221,227.79	461,175.50
Water Depreciation	6103	39,000.71	7,246.72	7,246.72	39,000.71	2,355,080.37	2,394,081.08
Consumers Water Dep	6104	39,641.00	5,949.00	2,905.00	42,685.00	90,000.00	132,685.00
Water Construction	6105	15,707.25	60,642.16	60,642.16	15,707.25	19,610,802.75	19,626,510.00
Water Bond Reserve	6106	24,244.00	24,244.00	-	48,488.00	96,976.00	145,464.00
Solid Waste Mgt	6604	289,417.78	265,638.32	239,468.12	315,587.98	279,435.15	595,023.13
INTERNAL SERVICE FUNDS							
Liability Ins	7704	111,047.75	171,351.86	14,240.89	268,158.72	2,295,982.87	2,564,141.59
Medical/Life Ins	7727	242,820.53	198,902.77	202,314.81	239,408.49	-	239,408.49
FIDUCIARY FUNDS							
TRUST FUNDS							
Police Pension	8802	63,979.03	71,511.72	74,300.54	61,190.21	425,817.30	487,007.51
CUSTODIAL							
Park Land Escrow	8871	4,837.49	2,472.50	4,642.70	2,667.29	803,528.70	806,195.99
Barrett Law	8879	0.00	-	-	0.00	-	0.00
Intgovt Collection	8880	264,545.62	248,927.30	223,103.96	290,368.96	-	290,368.96
Insurance Payment	8881	0.00	-	-	0.00	-	0.00
Cable TV Security	8882	0.00	-	-	0.00	-	0.00
Escrow	8883	99,874.73	4,852.95	10,626.10	94,101.58	-	94,101.58
OTHER FUNDS							
Payroll	8901	0.00	-	-	0.00	-	0.00
Totals		**$ 6,968,390.00**	**$ 4,747,837.51**	**$ 4,100,549.25**	**$ 7,615,678.26**	**$ 89,568,545.04**	**$ 97,184,223.30**

To: Town Council

From: Wendy Mis, Clerk-Treasurer

Meeting Date: May 4, 2026

Subject: Water Leak Adjustment

Summary

At the April 8, 2013 meeting, the Council adopted a policy to allow water bill adjustments due to water leaks. Under the policy, the customer must sign an affidavit stating there was a leak, the leak has been repaired, and request an adjustment from the Water Board. Adjustments are allowed one time per twelve-month period. The adjustment is based on an average of the usage over the previous twelve-months.

Staff has received a request for an adjustment under this policy. The customer has completed the required form and the request meets all the criteria for an adjustment. The average usage for this customer is 2,000 gallons/month and the period in question had 7,000 gallons (2 months). The original bill amounts totaled $57.98. The requested adjustment amount is $49.14 which represents water usage and sales tax. With the adjustment, the amount due for water and tax will be $8.84. The amounts listed are for water and sales tax only. All other regular charges will remain unchanged.

Financial Impact

Funding Source:
Budgeted Amount:
Cost: $8.84

Recommended Council Action

As part of the Consent Agenda, approve the adjustments of $8.84 to the accounts in question.

Attachments:

None

To: Town Council

From: Patricia Abbott, Controller

Meeting Date: May 4, 2026

Subject: Voucher Registers

Summary

Approval and confirmation of invoices

Financial Impact

Funding Source: Refer to Individual Voucher Registers
Budgeted Amount: Refer to Individual Voucher Registers
Cost: Refer to Individual Voucher Registers

Recommended Council Action

As part of the Consent Agenda, approve and confirm the voucher registers as presented.

Attachments:

1. Confirmation of Voucher Register #26-3K dated 3/31/2026 totaling $54,953.24
2. Approval of Voucher Register #26-3L dated 3/31/2026 totaling $199,854.06
3. Confirmation of Voucher Register #26-4J dated 4/23/2026 totaling $359,661.11
4. Confirmation of Voucher Register #26-4K dated 4/30/2026 totaling $767,806.46
5. Approval of Voucher Register #26-5A dated 5/04/2026 totaling $191,608.83
6. Confirmation of Voucher Register #26-5B dated 5/01/2026 totaling $574,278.75

Accounts Payable Voucher Register # 26-3K

PARK VOUCHERS	**03/31/26**	**$**	**12,100.91**
CIVIL TOWN VOUCHERS	**03/31/26**	**$**	**42,852.33**
TOTAL VOUCHERS CONFIRMED	**03/31/26**	**$**	**54,953.24**

I hereby certify that each of the above listed vouchers and the invoices or bills attached thereto, are true and correct and I have audited same in accordance with IC 5-11-10-1.6.

March 31, 2026

Wendy Mis
Fiscal Officer

(IC 5-11-10-2 permits the governing body to sign the Accounts Payable Voucher Register in lieu of signing each claim the governing body is allowing.)

We have examined the vouchers listed on the foregoing Accounts Payable Voucher Register, consisting of 4 pages, and except for the vouchers not allowed as shown on the Register, such vouchers are allowed in the total amount of $ 54,953.24

Approved and confirmed by the Town Council of the Town of Munster, Lake County Indiana, this 4th day of May, 2026 by a vote of _____ in favor and _____ opposed

Joseph Hofferth. President

ATTEST:

Wendy Mis, Clerk-Treasurer

FUND SUMMARY MARCH 31, 2026

FUND	DESCRIPTION		AMOUNT
1101	GENERAL FUND	$	328.38
2204	PARK & RECREATION	$	12,100.91
2580	SEWER MAINTENANCE	$	784.75
6101	WATER CASH OPERATING	$	36,268.18
6604	SOLID WASTE MANAGEMENT	$	261.59
7727	SELF-FUNDED MEDICAL/DENTAL/LIFE	$	4,472.82
8880	INTERGOVERNMENTAL ESCROW	$	736.61
	REPORT TOTAL	**$**	**54,953.24**

March 2026 Manual Checks

Fund 1101	328.38
Fund 2204	12,100.91
Fund 2580	784.75
Fund 6101	36,268.18
Fund 6604	261.59
Fund 7727	4,472.82
Fund 8880	736.61
	54,953.24

CHECK DISBURSEMENT REPORT FOR TOWN OF MUNSTER
CHECK DATE 03/01/2026 - 03/31/2026

BANK CODE: GEN, HEA, CC, TAX, LEASE (1 more) - CHECK TYPE: EFT

Check Date	Bank	Check #	Payee	Description	Account	Dept	Amount
03/31/2026	CC	117(E)*#	WORLDPAY HOLDING LLC	3/31/25 CCARD FEES	63107000	105-0100	328.38
				Fund: 1101 GENERAL FUND			**328.38**
03/31/2026	CC	117(E)*#	WORLDPAY HOLDING LLC	3/31/25 CCARD FEES	63107000	551-0100	175.92
03/03/2026	ACT	248(E)	GLOBAL PAYMENTS INC	ACTIVE NET FEES 2/9/26-2/15/26	63107A00	551-0100	396.94
03/10/2026	ACT	249(E)	GLOBAL PAYMENTS INC	ACTIVE NET FEES 2/16/25-2/22/26	63107A00	551-0100	336.00
03/16/2026	ACT	250(E)	GLOBAL PAYMENTS INC	ACTIVE NET FEES 2/23/26-3/1/26	63107A00	551-0100	585.87
03/30/2026	ACT	251(E)	GLOBAL PAYMENTS INC	ACTIVE NET FEES 3/9/26-3/15/26	63107A00	551-0100	10,083.59
03/23/2026	ACT	254(E)	GLOBAL PAYMENTS INC	ACTIVE NET FEES 3/2/26-3/8/26	63107A00	551-0100	522.59
				Fund: 2204 PARK FUND			**12,100.91**
03/31/2026	CC	116(E)*#	INVOICE CLOUD INC	3/31/25 CCARD FEES	63107000	309-0100	201.92
03/31/2026	CC	117(E)*#	WORLDPAY HOLDING LLC	3/31/25 CCARD FEES	63107000	309-0100	582.83
				Fund: 2580 SEWER MAINTENANCE			**784.75**
03/31/2026	CC	116(E)*#	INVOICE CLOUD INC	3/31/25 CCARD FEES	63107000	374-0100	403.82
03/31/2026	CC	117(E)*#	WORLDPAY HOLDING LLC	3/31/25 CCARD FEES	63107000	374-0100	1,165.65
03/17/2026	TAX	905(E)	INDIANA DEPT OF REVENUE	02/26 SALES TAX PAID	63998000	906-8100	34,698.71
				Fund: 6101 WATER CASH OPERATING			**36,268.18**
03/31/2026	CC	116(E)*#	INVOICE CLOUD INC	3/31/25 CCARD FEES	63107000	310-0100	67.31
03/31/2026	CC	117(E)*#	WORLDPAY HOLDING LLC	3/31/25 CCARD FEES	63107000	310-0100	194.28
				Fund: 6604 SOLID WASTE MANAGEMENT			**261.59**
03/06/2026	HEA	281(E)	TOWN OF MUNSTER	CLAIMS -- EAP TASC 03/06/26	61422000	935-0500	1,692.21
03/20/2026	HEA	282(E)	TOWN OF MUNSTER	CLAIMS -- EAP TASC 1/9/26	61422000	935-0500	1,107.63
03/20/2026	HEA	283(E)	TOWN OF MUNSTER	CLAIMS -- EAP TASC 3/20/26	61422000	935-0500	1,672.98
				Fund: 7727 SELF-FUNDED MED/LIFE&DENT			**4,472.82**
03/17/2026	TAX	906(E)	INDIANA DEPT OF REVENUE	02/26 SALES TAX PAID	63998000	906-8100	736.61
				Fund: 8880 INTERGOVERNMENTAL ESCROW			**736.61**
Report Total:							54,953.24

Accounts Payable Voucher Register # 26-3L

MONTHLY JOURNAL ENTRIES	**MARCH 31, 2026**	**$**	**199,854.06**
TOTAL VOUCHERS APPROVED	**MARCH 31, 2026**	**$**	**199,854.06**

I hereby certify that each of the above listed vouchers and the invoices or bills attached thereto, are true and correct and I have audited same in accordance with IC 5-11-10-1.6.

MARCH 31, 2026

Wendy Mis

Fiscal Officer

(IC 5-11-10-2 permits the governing body to sign the Accounts Payable Voucher Register in lieu of signing each claim the governing body is allowing.)

We have examined the vouchers listed on the foregoing Accounts Payable Voucher Register, consisting of 6 pages, and except for the vouchers not allowed as shown on the Register, such vouchers are allowed in the total amount of $ 199,854.06

Approved and confirmed by the Town Council of the Town of Munster, Lake County Indiana, this 4th day of May, 2026 by a vote of _____ in favor and _____ opposed.

Joseph Hofferth, President

ATTEST:

Wendy Mis, Clerk-Treasurer

FUND SUMMARY MARCH 31, 2026

FUND	DESCRIPTION		AMOUNT
1101	GENERAL FUND	$	10,940.52
2201	MOTOR VEHICLE HIGHWAY UNALLOCATED	$	6,930.24
2202	LOCAL ROAD & STREET	$	1,954.28
2203	MOTOR VEHICLE HIGHWAY RESTRICTED	$	7,312.92
2204	PARK & RECREATION	$	4,143.92
2207	PARKING METER FUND	$	1,071.64
2209	LIT-ECONOMIC DEVELOPMENT FUND	$	12,693.19
2240	LIT-PUBLIC SAFETY FUND	$	5,647.87
2245	RENTAL PROPERTY INSPECTION	$	481.35
2249	MUNICIPAL SURTAX FUND	$	780.91
2250	MUNICIPAL WHEEL TAX FUND	$	230.66
2256	OPIOID SETTLEMENT UNRESTRICTED FUND	$	226.12
2257	OPIOD SETTLEMENT RESTRICTED FUND	$	510.95
2370	PARK DONATION NON-REVERTING	$	464.25
2547	TECHNOLOGY FUND	$	1,198.66
2580	SEWER MAINTENANCE	$	1,476.47
2583	SEWER MAINTENANCE DEPRECIATION	$	5,474.33
3306	MUNICIPAL BOND B & I	$	28,463.35
3312	PARK BOND B & I	$	13,184.11
4401	CCI-CIGARETTE TAX	$	411.44
4402	CUMULATIVE CAPITAL DEVELOPMENT	$	5,475.49
4437	RIVERBOAT FUND	$	2,529.60
4438	RAINY DAY FUND	$	1,542.53
6101	WATER CASH OPERATING	$	2,926.63
6102	WATER B & I	$	680.71
6103	WATER DEPRECIATION	$	7,246.72
6104	CONSUMERS WATER DEPOSIT	$	2,905.00
6105	WATER CONSTRUCTION/IMPROVEMENTS	$	60,642.16
6604	SOLID WASTE MANAGEMENT	$	859.84
7704	SELF-FUNDED LIABILITY	$	7,064.89
8802	POLICE PENSION	$	1,511.72
8871	PARK LAND ESCROW	$	2,472.50
8880	INTERGOVERNMENTAL ESCROW	$	399.09
	REPORT TOTAL	**$**	**199,854.06**

March 2026 Journal Entries

Fund 1101	10,940.52
Fund 2201	6,930.24
Fund 2202	1,954.28
Fund 2203	7,312.92
Fund 2204	4,143.92
Fund 2207	1,071.64
Fund 2209	12,693.19
Fund 2240	5,647.87
Fund 2245	481.35
Fund 2249	780.91
Fund 2250	230.66
Fund 2256	226.12
Fund 2257	510.95
Fund 2370	464.25
Fund 2547	1,198.66
Fund 2580	1,476.47
Fund 2583	5,474.33
Fund 3306	28,463.35
Fund 3312	13,184.11
Fund 4401	411.44
Fund 4402	5,475.49
Fund 4437	2,529.60
Fund 4438	1,542.53
Fund 6101	2,926.63
Fund 6102	680.71
Fund 6103	7,246.72
Fund 6104	2,905.00
Fund 6105	60,642.16
Fund 6604	859.84
Fund 7704	7,064.89
Fund 8802	1,511.72
Fund 8871	2,472.50
Fund 8880	399.09
	199,854.06

DATE	JNL	DESCRIPTION	GL Number	REF # 2	DR	CR	TOTAL
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	1101-100-0000-65400000	0000008660	8,185.51		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	1101-100-0000-65400000	0000008660	1,097.21		
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS M TAL	1101-204-0100-61305000	0000008518	765.54		
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS D MIL	1101-204-0100-61305000	0000008519	829.33		
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS S ANT	1101-204-0100-61305000	0000008539	1,569.10		
03/01/2026	JE	REVERSE MANUAL JE: 0000008539	1101-204-0100-61305000	0000008560		1,569.10	
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS M TAL	1101-204-0100-61309000	0000008518	4.24		
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS D MIL	1101-204-0100-61309000	0000008519	4.59		
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS S ANT	1101-204-0100-61309000	0000008539	8.50		
03/01/2026	JE	REVERSE MANUAL JE: 0000008539	1101-204-0100-61309000	0000008560		8.50	
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS M TAL	1101-204-0100-61335000	0000008518	25.94		
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS D MIL	1101-204-0100-61335000	0000008519	28.16		
03/01/2026	JE	03/26 TOWN SHARE MED DENT VIS S ANT	1101-204-0100-61335000	0000008539	26.00		
03/01/2026	JE	REVERSE MANUAL JE: 0000008539	1101-204-0100-61335000	0000008560		26.00	
TOTAL FOR FUND 1101 GENERAL FUND					**12,544.12**	**1,603.60**	**10,940.52**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2201-300-0000-65400000	0000008660	6,930.24		
TOTAL FOR FUND 2201 MOTOR VEHICLE HIGHWAY					**6,930.24**	**0.00**	**6,930.24**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2202-300-0000-65400000	0000008660	1,954.28		
TOTAL FOR FUND 2202 MOTOR VEHICLE HIGHWAY					**1,954.28**	**0.00**	**1,954.28**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2203-300-0000-65400000	0000008660	7,312.92		
TOTAL FOR FUND 2203 MVH RESTRICTED					**7,312.92**	**0.00**	**7,312.92**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2204-550-0000-65400000	0000008660	4,045.99		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2204-550-0000-65400000	0000008660	97.93		
TOTAL FOR FUND 2204 PARK FUND					**4,143.92**	**0.00**	**4,143.92**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2207-580-0100-65400000	0000008660	1,071.64		
TOTAL FOR FUND 2207 PARKING METER FUND					**1,071.64**	**0.00**	**1,071.64**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2209-651-0100-65400000	0000008660	1,087.55		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2209-651-0100-65400000	0000008660	11,605.64		
TOTAL FOR FUND 2209 LIT - ECONOMIC DEVELOPMEN					**12,693.19**	**0.00**	**12,693.19**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2240-100-0000-65400000	0000008660	5,647.87		
TOTAL FOR FUND 2240 LIT - PUBLIC SAFETY					**5,647.87**	**0.00**	**5,647.87**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2245-150-0200-65400000	0000008660	481.35		
TOTAL FOR FUND 2245 RENTAL PROPERTY INSPECT					**481.35**	**0.00**	**481.35**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2249-100-0000-65400000	0000008660	780.91		
TOTAL FOR FUND 2249 MUNICIPAL SURTAX FUND					**780.91**	**0.00**	**780.91**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2250-300-0000-65400000	0000008660	230.66		
TOTAL FOR FUND 2250 MUNICIPAL WHEEL TAX FUND					**230.66**	**0.00**	**230.66**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2256-100-0000-65400000	0000008660	226.12		
TOTAL FOR FUND 2256 OPIOID UNRESTRICTED FUND					**226.12**	**0.00**	**226.12**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2257-100-0000-65400000	0000008660	510.95		
TOTAL FOR FUND 2257 OPIOID RESTRICTED FUND					**510.95**	**0.00**	**510.95**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2370-551-0100-65400000	0000008660	11.13		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2370-551-0100-65400000	0000008660	453.12		
TOTAL FOR FUND 2370 PARK DONATION-NON REVERTING					**464.25**	**0.00**	**464.25**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2547-100-0000-65400000	0000008660	1,198.66		
TOTAL FOR FUND 2547 TECHNOLOGY FUND					**1,198.66**	**0.00**	**1,198.66**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2580-300-0000-65400000	0000008660	1,476.47		
TOTAL FOR FUND 2580 SEWER MAINTENANCE					**1,476.47**	**0.00**	**1,476.47**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	2583-300-0000-65400000	0000008660	5,474.33		

DATE	JNL	DESCRIPTION	GL Number	REF # 2	DR	CR	TOTAL
TOTAL FOR FUND 2583 SEWER MAINT DEPRECIATION					**5,474.33**	**0.00**	**5,474.33**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	3306-920-0100-65400000	0000008660	361.35		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	3306-920-0100-65400000	0000008660	28,102.00		
TOTAL FOR FUND 3306 MUN B & I - NONEXEMPT					**28,463.35**	**0.00**	**28,463.35**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	3312-920-0200-65400000	0000008660	13,184.11		
TOTAL FOR FUND 3312 PARK B & I - NONEXEMPT					**13,184.11**	**0.00**	**13,184.11**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	4401-300-0000-65400000	0000008660	411.44		
TOTAL FOR FUND 4401 CCI - CIGARETTE TAX					**411.44**	**0.00**	**411.44**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	4402-300-0000-65400000	0000008660	5,475.49		
TOTAL FOR FUND 4402 CUMULATIVE CAPITOL DEV					**5,475.49**	**0.00**	**5,475.49**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	4437-300-0000-65400000	0000008660	2,529.60		
TOTAL FOR FUND 4437 RIVERBOAT FUND					**2,529.60**	**0.00**	**2,529.60**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	4438-100-0000-65400000	0000008660	1,542.53		
TOTAL FOR FUND 4438 RAINY DAY FUND					**1,542.53**	**0.00**	**1,542.53**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6101-300-0000-65400000	0000008660	2,454.57		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6101-300-0000-65400000	0000008660	472.06		
TOTAL FOR FUND 6101 WATER CASH OPERATING					**2,926.63**	**0.00**	**2,926.63**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6102-301-0000-65400000	0000008660	303.20		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6102-301-0000-65400000	0000008660	377.51		
TOTAL FOR FUND 6102 WATER B+I					**680.71**	**0.00**	**680.71**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6103-300-0000-65400000	0000008660	7,246.72		
TOTAL FOR FUND 6103 WATER DEPRECIATION FUND					**7,246.72**	**0.00**	**7,246.72**
03/31/2026	JE	TFR 03/26 APPLIED DEPOSITS TO EXPENSE	6104-373-0100-63901000	0000008621	2,905.00		
TOTAL FOR FUND 6104 CONSUMERS WATER DEPOSIT					**2,905.00**	**0.00**	**2,905.00**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6105-301-0000-65400000	0000008660	60,341.16		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6105-301-0000-65400000	0000008660	301.00		
TOTAL FOR FUND 6105 WATER CONSTRUCTION					**60,642.16**	**0.00**	**60,642.16**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	6604-300-0000-65400000	0000008660	859.84		
TOTAL FOR FUND 6604 SOLID WASTE MANAGEMENT					**859.84**	**0.00**	**859.84**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	7704-100-0000-65400000	0000008660	7,064.89		
TOTAL FOR FUND 7704 SELF-FUNDED LIABILITY					**7,064.89**	**0.00**	**7,064.89**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	8802-200-0000-65400000	0000008660	1,511.72		
TOTAL FOR FUND 8802 POLICE PENSION					**1,511.72**	**0.00**	**1,511.72**
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	8871-550-0000-65400000	0000008660	197.06		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	8871-550-0000-65400000	0000008660	991.37		
03/31/2026	JE	TRUST INDIANA 03/31/26 INTEREST	8871-550-0000-65400000	0000008660	1,284.07		
TOTAL FOR FUND 8871 PARK LAND ESCROW					**2,472.50**	**0.00**	**2,472.50**
03/31/2026	JE	CK#886132 GOODEMOOT, MIKAYLA 0400770-17	8880-374-0100-63901000	0000008615	96.97		
03/31/2026	JE	CK#886142 THOMPSON, COLIN 0700491-02	8880-374-0100-63901000	0000008616	43.21		
03/31/2026	JE	CK#886139 RONDON, ANGELY 2700085-06	8880-374-0100-63901000	0000008617	143.53		
03/31/2026	JE	CK#886041 MERCIER, BRANDON 0200470-05	8880-374-0100-63901000	0000008618	28.22		
03/31/2026	JE	CK#886045 ROBINSON, COI 1200470-015	8880-374-0100-63901000	0000008619	87.16		
TOTAL FOR FUND 8880 INTERGOVERNMENTAL ESCROW					**399.09**	**0.00**	**399.09**
03/31/2026	JE	PARKS-DAMAGE DEPOSIT REFUND JAUREGUI, M.	8883-100-9400-63901000	0000008605	250.00		
03/31/2026	JE	PARKS-DAMAGE DEPOSIT REFUND JAUREGUI, M.	8883-100-9400-63901000	0000008631		250.00	
03/31/2026	JE	PARKS-DAMAGE DEPOSIT REFUND JAUREGUI, M.	8883-100-9400-63901000	0000008632		250.00	
03/31/2026	JE	PARKS-DAMAGE DEPOSIT REFUND JAUREGUI, M.	8883-551-9300-63901000	0000008605		250.00	
03/31/2026	JE	PARKS-DAMAGE DEPOSIT REFUND JAUREGUI, M.	8883-551-9300-63901000	0000008631	250.00		

DATE	JNL	DESCRIPTION	GL Number	REF # 2	DR	CR	TOTAL
03/31/2026	JE	PARKS-DAMAGE DEPOSIT REFUND JAUREGUI, M.	8883-551-9300-63901000	0000008632	250.00		
TOTAL FOR FUND 8883 ESCROW					750.00	750.00	0.00
			Total JE:		202,207.66	2,353.60	199,854.06
			Report Total:		202,207.66	2,353.60	199,854.06

Accounts Payable Voucher Register # 26-4J

PARK VOUCHERS	**04/23/26**	**$**	**277,447.42**
CIVIL TOWN VOUCHERS	**04/23/26**	**$**	**82,213.69**
TOTAL VOUCHERS CONFIRMED	**04/23/26**	**$**	**359,661.11**

I hereby certify that each of the above listed vouchers and the invoices or bills attached thereto, are true and correct and I have audited same in accordance with IC 5-11-10-1.6.

April 23, 2026

Wendy Mis
Fiscal Officer

(IC 5-11-10-2 permits the governing body to sign the Accounts Payable Voucher Register in lieu of signing each claim the governing body is allowing.)

We have examined the vouchers listed on the foregoing Accounts Payable Voucher Register, consisting of 7 pages, and except for the vouchers not allowed as shown on the Register, such vouchers are allowed in the total amount of $ 359,661.11

Approved and confirmed by the Town Council of the Town of Munster, Lake County Indiana, this 4th day of May, 2026 by a vote of _____ in favor and _____ opposed

Joseph Hofferth. President

ATTEST:

Wendy Mis, Clerk-Treasurer

FUND SUMMARY APRIL 23, 2026

FUND	DESCRIPTION		AMOUNT
1101	GENERAL FUND	$	699.63
2204	PARK & RECREATION	$	727.17
2249	MUNICIPAL SURTAX FUND	$	338.89
2370	PARK DONATION NON-REVERTING	$	2,455.25
2547	TECHNOLOGY	$	1,132.82
2570	ELECTRIC FUND	$	7,583.40
2580	SEWER MAINTENANCE	$	634.58
4418	PARK BOND PROCEEDS	$	274,265.00
4437	RIVERBOAT FUND	$	31,100.00
6101	WATER CASH OPERATING	$	369.36
6105	WATER CONSTRUCTION/IMPROVEMENTS	$	31,531.52
7727	SELF-FUNDED MEDICAL/DENTAL/LIFE	$	8,573.49
8883	ESCROW	$	250.00
	REPORT TOTAL	**$**	**359,661.11**

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
0000461	**AT&T**					**04/23/2026**	
				112530	**PHONE SERVICE/CENTENNIAL PARK**		
		2547-114-0200-63204000	TELEPHONE				$63.63
				112531	**PHONE SERVICE/POLICE DEPT**		
		2547-114-0200-63204000	TELEPHONE				$925.98
				112532	**MAINTENANCE BUILDING / PHONE**		
		2547-114-0200-63204000	MAINTENANCE BUILDING / PHONE				$127.27
				112547	**PHONE SERVICE/WATER**		
		6101-114-0200-63204000	TELEPHONE				$119.36
					Total for AT&T		**$1,236.24**
0000283	**AT&T LONG DISTANCE**					**04/23/2026**	
				112548	**2026 AT&T LONG DISTANCE**		
		2547-114-0200-63204000	1-4 Q 2026 AT&T LONG DISTANCE				$15.94
					Total for AT&T LONG DISTANCE		**$15.94**
0002017	**BRADLEY SUSALA**					**04/23/2026**	
				112389	**REIMBURSEMENT/DRONE TEST**		
		1101-232-0100-63991000	EDUCATION/TRAINING				$175.00
					Total for BRADLEY SUSALA		**$175.00**
0002059	**BYRNE & JONES ENTERPRISES INC**					**04/23/2026**	
				112534	**PROJ S 1996-DJP/COBBLESTONES PARK COURTS IMP**		
		4418-915-2225-64247000	COB COURTS IMPROVVEMENT				$274,265.00
					Total for BYRNE & JONES ENTERPRISES INC		**$274,265.00**
0001023	**CATALYST PRODUCTIONS II**					**04/23/2026**	
				112545	**DJ FOR CAR SHOW ON 5/2/26**		
		2204-561-0700-63105000	OTHER PROFESSIONAL SERV.				$560.00

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
					Total for CATALYST PRODUCTIONS II		**$560.00**
0001162	**CROWN TROPHY**					**04/23/2026**	
				112546	**TROPHIES FOR CAR SHOW**		
		2370-561-0700-65150A00	CAR SHOW RESTRICTED				$2,455.25
					Total for CROWN TROPHY		**$2,455.25**
0002058	**DAN REYES**					**04/23/2026**	
				112392	**REIMBURSEMENT/MEAL & PARKING WHILE ATTENDI**		
		1101-110-0100-63908000	MEMBERSHIP DUES/MEET EXP				$15.00
		1101-110-0100-63203000	TRAVEL				$15.03
					Total for DAN REYES		**$30.03**
PARK REF	**EBONY MADDOX**					**04/23/2026**	
				112573	**RENTAL DEPOSIT REFUNDPERMIT 3748**		
		8883-551-9300-63901000	REFUNDS AWARDS & INDEM				$125.00
					Total for EBONY MADDOX		**$125.00**
0005628	**METROPOLITAN INDUSTRIES INC**					**04/23/2026**	
				112576	**DATA SERVICE/RIVERBEND&CALUMET PUMP ST,FISH**		
		6101-114-0200-63611000	DATA SERVICE PUMP STATION				$250.00
				112577	**DATA SERVICE/WLAKES & 45TH STREET LIFT STATIO**		
		2580-114-0200-63611000	DATA SERVICE SEWER DEPT				$90.00
				112578	**DATA SERVICE-CELLULAR TO CLOUD NICTD LIFT STAT**		
		2580-309-0100-63611000	HW/SW LICENSE/MAINTENANCE				$50.00
					Total for METROPOLITAN INDUSTRIES INC		**$390.00**
0000304	**NIPSCO**					**04/23/2026**	
				112535	**4/26 NIPSCO/8837 CAL AVE BLDG S PARKING**		
		2570-571-0100-63501000	ELECTRICITY				$269.56

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112536	**4/26 NIPSCO/8601 CALUMET**		
		2570-571-0100-63501000	ELECTRICITY				$709.15
				112537	**4/26 NIPSCO/8601 CALUMET**		
		2570-571-0100-63501000	ELECTRICITY				$413.20
				112538	**4/26 NIPSCO/1154 RIDGE-KASKE**		
		2570-571-0100-63502000	NATURAL GAS				$129.98
		2570-571-0100-63501000	ELECTRICITY				$98.74
				112549	**4/26 NIPSCO/9701 MARGO LN BLDG PUMP**		
		2570-571-0100-63501000	ELECTRICITY				$40.42
				112550	**4/26 NIPSCO/9701 CALUMET AVE**		
		2570-581-0100-63501000	ELECTRICITY				$99.83
				112551	**4/26 NIPSCO/9751 CAL AVE BLDG MAINT**		
		2570-581-0100-63502000	NATURAL GAS				$523.95
		2570-581-0100-63501000	ELECTRICITY				$630.82
				112552	**4/26 NIPSCO/O BEECH**		
		2570-571-0100-63501000	ELECTRICITY				$38.90
				112553	**4/26 NIPSCO/8837 CALUMET-POOL**		
		2570-562-0100-63502000	NATURAL GAS				$219.78
		2570-562-0100-63501000	ELECTRICITY				$519.40
				112554	**4/26 NIPSCO/8701 LION CLUB DR**		
		2570-571-0100-63501000	ELECTRICITY				$665.63
				112555	**4/26 NIPSCO/8751 COMMUNITY PARK RD-SOC CNTR**		
		2570-571-0100-63502000	NATURAL GAS				$149.66
		2570-571-0100-63501000	ELECTRICITY				$326.16
				112556	**4/26 NIPSCO/10121 CALUMET**		
		2570-581-0100-63501000	ELECTRICITY				$256.52
				112557	**4/26 NIPSCO/9751 CAL AVE AMPHITHEATRE**		
		2570-581-0100-63501000	ELECTRICITY				$369.67

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112558	**4/26 NIPSCO - 8601 CALUMET/9750 WOAK**		
		2570-571-0100-63501000	ELECTRICITY				$1,036.34
				112559	**4/26 NIPSCO/9701 MARGO LN**		
		2570-571-0100-63501000	ELECTRICITY				$165.12
				112560	**4/26 NIPSCO/1000 CENTENNIAL DR**		
		2570-581-0100-63502000	NATURAL GAS				$98.25
		2570-581-0100-63501000	ELECTRICITY				$822.32
				112561	**4/26 NIPSCO REDEVELOPMENT**		
		2249-308-0100-63531000	1-4 Q 2026 NIPSCO REDEVELOPMENT				$144.44
		2249-308-0100-63532000	1-4 Q 2026 NIPSCO REDEVELOPMENT				$194.45
		2580-319-0100-63501000	1-4 Q 2026 NIPSCO REDEVELOPMENT				$352.27
		2580-319-0100-63502000	1-4 Q 2026 NIPSCO REDEVELOPMENT				$142.31
		2204-571-0100-63501000	1-4 Q 2026 NIPSCO REDEVELOPMENT				$95.17
					Total for NIPSCO		**$8,512.04**
PARK REF	**PAULA NELLANS**					**04/23/2026**	
				112544	**SWIM LESSON CONFLICT REFUND**		
		2204-560-0000-65901000	REFUND OF OVERPAYMENT				$72.00
					Total for PAULA NELLANS		**$72.00**
0001015	**REEVES FENCE SERVICES INC**					**04/23/2026**	
				112591	**NICTD FENCE & FREIGHT**		
		4437-915-0100-64490000	FENCE AND FREIGHT				$30,400.00
				112592	**NICTD FENCE & FREIGHT**		
		4437-915-0100-64490000	FENCE AND FREIGHT				$700.00
					Total for REEVES FENCE SERVICES INC		**$31,100.00**
PARK REF	**RITZ CORTEZ**					**04/23/2026**	
				112575	**RENTAL DEPOSIT REFUND PERMIT #3729**		
		8883-551-9300-63901000	REFUNDS AWARDS & INDEM				$125.00

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
					Total for RITZ CORTEZ		**$125.00**
0001675	**SEH OF INDIANA LLC**					**04/23/2026**	
				112593	**PROJECT 179770 (183549) /WTR SYSTEM MODEL CAL**		
		6105-915-0100-63102000	LABOR FOR WATER MODEL				$31,531.52
					Total for SEH OF INDIANA LLC		**$31,531.52**
0001067	**SUN LIFE FINANCIAL**					**04/23/2026**	
				112579	**2026 LONG TERM DISABILITY & LIFE INSURANCE PRE**		
		7727-935-0600-61434000	2026 LONG TERM DISABILITY & LIFE I				$3,648.46
		7727-935-0400-61432000	2026 LONG TERM DISABILITY & LIFE I				$4,925.03
					Total for SUN LIFE FINANCIAL		**$8,573.49**
0001840	**WENDY MIS**					**04/23/2026**	
				112533	**REIMBURSEMENT/MILEAGE**		
		1101-105-0100-63203000	TRAVEL				$494.60
					Total for WENDY MIS		**$494.60**
						Overall Total	**$359,661.11**

Accounts Payable Voucher Register # 26-4K

PARK VOUCHERS	**04/30/26**	**$**	**24,003.60**
CIVIL TOWN VOUCHERS	**04/30/26**	**$**	**743,802.86**
TOTAL VOUCHERS CONFIRMED	**04/30/26**	**$**	**767,806.46**

I hereby certify that each of the above listed vouchers and the invoices or bills attached thereto, are true and correct and I have audited same in accordance with IC 5-11-10-1.6.

April 30, 2026

Wendy Mis
Fiscal Officer

(IC 5-11-10-2 permits the governing body to sign the Accounts Payable Voucher Register in lieu of signing each claim the governing body is allowing.)

We have examined the vouchers listed on the foregoing Accounts Payable Voucher Register, consisting of 8 pages, and except for the vouchers not allowed as shown on the Register, such vouchers are allowed in the total amount of $ 767,806.46

Approved and confirmed by the Town Council of the Town of Munster, Lake County Indiana, this 4th day of May, 2026 by a vote of _____ in favor and _____ opposed

Joseph Hofferth. President

ATTEST:

Wendy Mis, Clerk-Treasurer

FUND SUMMARY APRIL 30, 2026

FUND	DESCRIPTION		AMOUNT
1101	GENERAL FUND	$	41,207.51
2201	MOTOR VEHICLE HIGHWAY UNALLOCATED	$	177.00
2204	PARK & RECREATION	$	24,003.60
2240	LIT - PUBLIC SAFETY FUND	$	4,828.00
2249	MUNICIPAL SURTAX FUND	$	26,143.36
2547	TECHNOLOGY	$	14,943.95
2570	ELECTRIC FUND	$	1,310.22
2580	SEWER MAINTENANCE	$	98,226.77
2592	MPD STATE SEIZURE NON-REVERTING FUND	$	662.00
4402	CUMULATIVE CAPITOL DEV FUND	$	7,905.60
4406	REDEVLOPMENT OPERATING	$	956.25
4445	TIF ALLOCATION FUND	$	50,000.00
6101	WATER CASH OPERATING	$	296,397.24
6604	SOLID WASTE MANAGEMENT	$	8,816.67
7727	SELF-FUNDED MEDICAL/DENTAL/LIFE	$	191,685.73
8880	INTERGOVERNMENTAL ESCROW	$	167.56
8883	ESCROW	$	375.00
	REPORT TOTAL	**$**	**767,806.46**

Vouche Register

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
0001730	**AIM MEDICAL TRUST**					**04/30/2026**	
				112709	**5/26 EMPLOYEE INSURANCE - MEDICAL/DENTAL/VIS**		
		7727-935-0100-61305000	2026 MEDICAL INS PREMIUMS				$182,801.13
		7727-935-0200-61335000	2026 DENTAL INS PREMIUMS				$7,706.38
		7727-935-0700-61309000	2026 VISION INS PREMIUMS				$1,178.22
					Total for AIM MEDICAL TRUST		**$191,685.73**
0001713	**ALL CITY MANAGEMENT SERVICES INC**					**04/30/2026**	
				112634	**CROSSING GUARD SERVICES 3/22-4/4/2026**		
		2240-210-0100-63105000	CROSSING GUARDS SERVICES				$4,828.00
					Total for ALL CITY MANAGEMENT SERVICES I		**$4,828.00**
0000650	**ARCTIC ENGINEERING CO INC**					**04/30/2026**	
				112633	**4Q 2025 HVAC MAINTENANCE/CLUBHOUSE**		
		2204-581-0100-63105000	OTHER PROFESSIONAL SERV.				$557.00
					Total for ARCTIC ENGINEERING CO INC		**$557.00**
0002044	**AT&T MOBILITY**					**04/30/2026**	
				112631	**POLICE DATA LINES**		
		2547-114-0200-63205000	OTHER COMMUNICATION				$1,264.22
					Total for AT&T MOBILITY		**$1,264.22**
0000403	**B & K EQUIPMENT COMPANY**					**04/30/2026**	
				112643	**GAS PUMP PEDESTAL UPGRADE**		
		4402-305-0100-62900000	PUMP UPGRADE				$7,905.60
		2204-571-0100-62900000	PUMP UPGRADE				$768.60
		2580-309-0100-62334000	PUMP UPGRADE				$658.80
		6101-370-0100-62900000	PUMP UPGRADE				$988.20
		2580-319-0100-62334000	PUMP UPGRADE				$658.80
				112687	**4/26 FUEL TANK WALK THROUGH**		
		2201-305-0100-63601000	REPAIRS & MAINT SERVICES				$132.00

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
					Total for B & K EQUIPMENT COMPANY		**$11,112.00**
0001888	**BAKER TILLY ADVISORY GROUP LP**					**04/30/2026**	
				112689	**TAX INCREMENT FINANCING SERVICES-TIF MANAGE**		
		4406-160-0100-63105000	OTHER PROFESSIONAL SERV.				$956.25
					Total for BAKER TILLY ADVISORY GROUP LP		**$956.25**
0000599	**BUREAU OF MOTOR VEHICLES**					**04/30/2026**	
				112645	**TITLE & PLATES FOR UNIT 364**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$45.00
					Total for BUREAU OF MOTOR VEHICLES		**$45.00**
MISCVEN	**CLYDE & CO US LLP**					**04/30/2026**	
				112644	**REFUND/NO BUSINESS REGISTRATION NEEDED**		
		1101-150-0100-63901000	REFUNDS AWARDS & INDEM				$100.00
					Total for CLYDE & CO US LLP		**$100.00**
PARK REF	**CYNTHIA VELAZQUEZ**					**04/30/2026**	
				112702	**RENTAL DEPOSIT REFUND PERMIT #3787**		
		8883-551-9300-63901000	REFUNDS AWARDS & INDEM				$250.00
					Total for CYNTHIA VELAZQUEZ		**$250.00**
0002054	**ENCHANTED TALES NWI**					**04/30/2026**	
				112700	**CAPTAIN AMERICA CHARACTER FOR CAR SHOW**		
		2204-561-0700-63105000	OTHER PROFESSIONAL SERV.				$200.00
					Total for ENCHANTED TALES NWI		**$200.00**
0002008	**GLENN RHODES**					**04/30/2026**	
				112635	**REIMBURSEMENT/CONFERENCE REGISTRATION**		
		1101-150-0100-63991000	EDUCATION/TRAINING				$110.11

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112636	**REIMBURSEMENT/MEAL, GAS WHILE ATTENDING IBC**		
		1101-150-0100-63203000	TRAVEL				$52.40
		1101-150-0100-63991000	EDUCATION/TRAINING				$15.00
					Total for GLENN RHODES		**$177.51**
PARK REF	**HOLLY HILL**					**04/30/2026**	
				112704	**RENTAL DEPOSIT REFUND PERMIT #3732**		
		8883-551-9300-63901000	REFUNDS AWARDS & INDEM				$125.00
					Total for HOLLY HILL		**$125.00**
PARK REF	**MAUREEN HEATH**					**04/30/2026**	
				112617	**CLASS CANCELLATION REFUND**		
		2204-560-0000-65901000	REFUND OF OVERPAYMENT				$35.00
					Total for MAUREEN HEATH		**$35.00**
0000304	**NIPSCO**					**04/30/2026**	
				112632	**4/26 NIPSCO CHARGES**		
		1101-232-0200-63502000	1-4 Q 2026 NIPSCO CHARGES				$662.69
		1101-232-0200-63501000	1-4 Q 2026 NIPSCO CHARGES				$1,437.29
		1101-122-0100-63502000	1-4 Q 2026 NIPSCO CHARGES				$4,071.38
		1101-122-0100-63501000	1-4 Q 2026 NIPSCO CHARGES				$7,517.64
		2249-308-0100-63501000	1-4 Q 2026 NIPSCO CHARGES				$2,120.83
		2249-308-0100-63502000	1-4 Q 2026 NIPSCO CHARGES				$1,614.53
		2570-571-0100-63501000	1-4 Q 2026 NIPSCO CHARGES				$544.24
		2570-571-0100-63502000	1-4 Q 2026 NIPSCO CHARGES				$645.81
		6101-374-0100-63502000	1-4 Q 2026 NIPSCO CHARGES				$1,215.94
		2580-309-0100-63502000	1-4 Q 2026 NIPSCO CHARGES				$322.91
		6101-374-0100-63501000	1-4 Q 2026 NIPSCO CHARGES				$2,149.84
		6101-370-0100-63501000	1-4 Q 2026 NIPSCO CHARGES				$12,296.63
		2580-309-0100-63501000	1-4 Q 2026 NIPSCO CHARGES				$3,511.55
				112690	**4/26 NIPSCO/9751 CALUMET AVE**		
		2570-581-0100-63501000	ELECTRICITY				$59.36

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112691	**4/26 NIPSCO/9751 CALUMET AVE**		
		2570-581-0100-63501000	ELECTRICITY				$60.81
				112692	**4/26 NIPSCO CHARGES**		
		2580-309-0100-63501000	1-4 Q 2026 NIPSCO CHARGES				$63.06
					Total for NIPSCO		**$38,294.51**
0000251	**SCHOOL TOWN OF MUNSTER**					**04/30/2026**	
				112688	**4/26 IT SERVICES**		
		2547-114-0200-63105000	MONTHLY IT SERVICES PAYMENT				$8,800.00
		2580-114-0200-63105000	MONTHLY IT SERVICES PAYMENT				$3,520.00
		6101-114-0200-63105000	MONTHLY IT SERVICES PAYMENT				$3,680.00
					Total for SCHOOL TOWN OF MUNSTER		**$16,000.00**
UB REFU	**SHEAFFER, WAYNE**					**04/30/2026**	
				112678	**UB refund for account: 1900330-03**		
		8880-374-0100-49001000	Overpayment				$101.35
					Total for SHEAFFER, WAYNE		**$101.35**
UB REFU	**SOLAVA, JACQUELINE**					**04/30/2026**	
				112684	**UB refund for account: 0400830-09**		
		8880-374-0100-49001000	Overpayment				$36.56
				112686	**UB refund for account: 0400820-10**		
		8880-374-0100-49001000	Overpayment				$29.65
					Total for SOLAVA, JACQUELINE		**$66.21**
0001291	**THOMAS KUHLENSCHMIDT**					**04/30/2026**	
				112570	**REIMBURSEMENT/MEALS, HOTEL STAY WHILE ATTEN**		
		2592-201-0100-63991000	EDUCATION/TRAINING				$662.00
					Total for THOMAS KUHLENSCHMIDT		**$662.00**

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
0000200	**TOWN OF MUNSTER LIABILITY**					**04/30/2026**	
				112641	**4/26 LIABILITY TRANSFERS**		
		1101-930-0100-63400000	YR 2026 LIABILITY TRANSFERS				$27,241.00
		2204-930-0100-63400000	YR 2026 LIABILITY TRANSFERS				$22,408.00
		2249-930-0100-63400000	YR 2026 LIABILITY TRANSFERS				$22,408.00
		2547-930-0100-63400000	YR 2026 LIABILITY TRANSFERS				$4,879.73
		2580-930-0100-63400000	YR 2026 LIABILITY TRANSFERS				$21,166.67
		6101-930-0100-63400000	YR 2026 LIABILITY TRANSFERS				$37,131.78
		6604-930-0100-63400000	YR 2026 LIABILITY TRANSFERS				$8,816.67
					Total for TOWN OF MUNSTER LIABILITY		**$144,051.85**
0000597	**TOWN OF MUNSTER MAINTENANCE**					**04/30/2026**	
				112640	**4/26 MAINTENANCE & EQUIPMENT TRANSFERS**		
		2580-906-0200-63997000	YR 2026 MAINTENANCE & EQUIPMENT				$25,531.00
		6101-906-0300-63997000	YR 2026 MAINTENANCE & EQUIPMENT				$6,305.60
					Total for TOWN OF MUNSTER MAINTENANCE		**$31,836.60**
0000200	**TOWN OF MUNSTER TRANSFERS**					**04/30/2026**	
				112642	**4/26 WATER BOND RESERVE TRANSFERS**		
		6101-920-0100-65200000	YR 2026 WATER BOND RESERVE TRAN				$24,244.00
		6101-920-0100-65200000	YR 2026 WATER BOND RESERVE TRAN				$120,950.00
				112637	**4/26 RENT TRANSFERS**		
		6101-906-0300-63732000	YR 2026 RENT TRANSFERS				$16,109.00
		6101-906-0300-63733000	YR 2026 RENT TRANSFERS				$22,055.25
		2580-906-0200-63733000	YR 2026 RENT TRANSFERS				$10,864.88
				112638	**4/26 IN LIEU OF TRANSFERS**		
		2580-906-0100-63996000	YR 2026 IN LIEU OF TRANSFERS				$31,929.10
		6101-906-0300-63996000	YR 2026 IN LIEU OF TRANSFERS				$49,271.00
				112639	**4/26 TIF PUBLIC SAFETY TRANSFER**		
		4445-201-0100-63920000	YR 2026 TIF PUBLIC SAFETY TRANSFE				$50,000.00

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
					Total for TOWN OF MUNSTER TRANSFERS		$325,423.23
PARK REF YAYA TORRES						**04/30/2026**	
				112615	**CLASS CANCELLATION REFUND**		
		2204-560-0000-65901000	REFUND OF OVERPAYMENT				$35.00
					Total for YAYA TORRES		$35.00
						Overall Total	$767,806.46

Accounts Payable Voucher Register # 26-5A

PARK VOUCHERS	**05/04/26**	**$**	**4,830.00**
CIVIL TOWN VOUCHERS	**05/04/26**	**$**	**186,778.83**
TOTAL VOUCHERS APPROVED	**05/04/26**	**$**	**191,608.83**

I hereby certify that each of the above listed vouchers and the invoices or bills attached thereto, are true and correct and I have audited same in accordance with IC 5-11-10-1.6.

May 4, 2026

Wendy Mis

Fiscal Officer

(IC 5-11-10-2 permits the governing body to sign the Accounts Payable Voucher Register in lieu of signing each claim the governing body is allowing.)

We have examined the vouchers listed on the foregoing Accounts Payable Voucher Register, consisting of 16 pages, and except for the vouchers not allowed as shown on the Register, such vouchers are allowed in the total amount of $ 191,608.83

Approved and confirmed by the Town Council of the Town of Munster, Lake County Indiana, this 4th day of May, 2026 by a vote of _____ in favor and _____ opposed.

Joseph Hofferth, President

ATTEST:

Wendy Mis, Clerk-Treasurer

FUND SUMMARY MAY 4, 2026

FUND	DESCRIPTION		AMOUNT
1101	GENERAL FUND	$	26,108.63
2201	MOTOR VEHICLE HIGHWAY UNALLOCATED	$	16,240.81
2204	PARK & RECREATION	$	4,830.00
2209	LIT-ECONOMIC DEVELOPMENT FUND	$	28,642.50
2547	TECHNOLOGY	$	8,170.00
2580	SEWER MAINTENANCE	$	39,398.15
2590	SAFNR	$	2,425.00
4402	CUMULATIVE CAPITAL DEVELOPMENT	$	2,390.59
4437	RIVERBOAT FUND	$	19,341.32
6101	WATER CASH OPERATING	$	40,967.83
6604	SOLID WASTE MANAGEMENT	$	799.00
7704	SELF-FUNDED LIABILITY	$	2,295.00
	REPORT TOTAL	**$**	**191,608.83**

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
0000400	AAA SUPPLY CORPORATION					05/04/2026	
				112693	CUT PLATE & SQUARE TUBE		
		2201-308-0100-62303000	SMALL TOOLS & MINOR EQUIP				$915.51
					Total for AAA SUPPLY CORPORATION		$915.51
0001182	AIRGAS USA INC					05/04/2026	
				112476	OXYGEN CYLINDER RENTAL		
		1101-232-0100-63105000	OXYGEN CYLINDER RENTAL				$25.14
					Total for AIRGAS USA INC		$25.14
0001879	AUSTGEN ELECTRIC INC					05/04/2026	
				112618	ATTEMPTED TO REPLACE A LOCKING OUTLET BUT UNA		
		1101-122-0100-63609000	BUILDING MAINTENANCE				$407.48
					Total for AUSTGEN ELECTRIC INC		$407.48
0001792	BRAGGS AUTOMOTIVE INC					05/04/2026	
				112669	CHECK A/C ISSUE-COMPUTER,ADDED A/C OIL TO SYS		
		2201-305-0100-63601000	REPAIRS & MAINT SERVICES #316				$405.27
				112646	MOUNT FRONT STRUTS & MOUNTS/PD UNIT 107		
		1101-204-0100-63605000	SQUAD REPAIRS & SERVICES				$173.25
					Total for BRAGGS AUTOMOTIVE INC		$578.52
0001975	BS&A SOFTWARE					05/04/2026	
				112562	ANNUAL SERVICES & SUPPORT FEES		
		2547-114-0200-63611000	HW/SW LICENSE/MAINTENANCE				$8,170.00
					Total for BS&A SOFTWARE		$8,170.00
0001879	CHICAGO TIRE INC					05/04/2026	
				112619	TIRES/PWKS		
		2201-305-0100-62223000	TIRES				$343.40

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112647	**TIRES/PD UNIT 34**		
		1101-204-0100-62900000	TIRES				$613.44
				112679	**TIRES/PWKS**		
		2201-305-0100-62223000	TIRES				$419.18
				112705	**TIRES/FIRE DEPT**		
		4402-232-0100-62900000	TIRES #2201				$1,395.24
					Total for CHICAGO TIRE INC		**$2,771.26**
20080	**CINTAS**					**05/04/2026**	
				112458	**MEDICINE CABINET REFILL-BANDAGES,ANTIBIOTIC,S**		
		2201-308-0100-62105000	OFFICE SUPPLIES				$314.33
					Total for CINTAS		**$314.33**
0000686	**CINTAS CORPORATION #319**					**05/04/2026**	
				112563	**TOWN HALL, PD AND FIRE MAT CLEANING**		
		1101-122-0100-63609000	TOWN HALL MAT CLEANING				$611.76
				112539	**MAT CLEANING/PWKS**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$260.94
				112670	**MAT CLEANING/PWKS**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$260.94
					Total for CINTAS CORPORATION #319		**$1,133.64**
0002048	**COLUMN SOFTWARE PBC**					**05/04/2026**	
				112564	**AD: REQUEST FOR ENGINEERING SERVICES**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$32.54
					Total for COLUMN SOFTWARE PBC		**$32.54**
0002058	**D&D NAPA INC**					**05/04/2026**	
				112580	**4 TRAILER LIGHTS**		

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
		2201-305-0100-62302000	REPAIR PARTS				$28.96
				112581	**SWITCHES**		
		2201-305-0100-62302000	REPAIR PARTS				$31.20
				112582	**GREASE**		
		2201-305-0100-62303000	SMALL TOOLS & MINOR EQUIP				$43.98
				112583	**BRAKE FLUID**		
		2201-305-0100-62302000	REPAIR PARTS				$40.47
				112584	**BRAKE PARTS CLEANER**		
		2201-305-0100-62303000	SMALL TOOLS & MINOR EQUIP				$59.52
				112585	**GREASE FITTINGS**		
		2580-305-0100-62302000	REPAIR PARTS				$45.21
				112586	**TRAILER WIRE/CABLE**		
		2201-305-0100-62303000	SMALL TOOLS & MINOR EQUIP				$138.75
				112587	**BULK TRAILER WIRE**		
		2201-305-0100-62303000	SMALL TOOLS & MINOR EQUIP				$56.50
				112588	**BATTERY BOX,BATTERY**		
		2201-305-0100-62302000	REPAIR PARTS				$155.51
				112589	**PINTLE HOOK MOUNTS,PINTLE HITCHES**		
		2201-305-0100-62302000	REPAIR PARTS				$1,511.70
				112590	**BRAKE ROTOR KIT,BRAKE ROTORS,BRAKE PADS,CALI**		
		2201-305-0100-62302000	REPAIR PARTS				$568.17
				112648	**MOTOR,OIL FILTERSWEATHER STRIP ADHESIVE**		
		1101-204-0100-62900000	SUPPLIES				$170.10
				112649	**OIL FILTERS**		
		1101-204-0100-62900000	SUPPLIES				$140.16
				112650	**VIRTUAL KIT/PD UNIT 3**		
		1101-204-0100-62900000	SUPPLIES				$243.53
				112651	**HOOD BUMPERS**		

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
		1101-204-0100-62900000	SUPPLIES				$8.56
					Total for D&D NAPA INC		**$3,242.32**
0000814	**DANKO IRRIGATION**					**05/04/2026**	
				112565	**REPAIR IRRIGATION SYSTEM/8049 KOOY**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$266.18
					Total for DANKO IRRIGATION		**$266.18**
0000413	**EARL'S LOCKSMITH SHOP**					**05/04/2026**	
				112505	**PADLOCKS**		
		6604-390-0100-62900000	OTHER SUPPLIES				$324.00
					Total for EARL'S LOCKSMITH SHOP		**$324.00**
0001604	**EICHHORN & EICHHORN LLP**					**05/04/2026**	
				112620	**LEGAL SERVICES/PULLO V MUNSTER**		
		7704-107-0600-63111000	OUTSIDE LEGAL SERVICES				$2,295.00
					Total for EICHHORN & EICHHORN LLP		**$2,295.00**
0002011	**EUROFINS ENVIRONMENTAL TESTING**					**05/04/2026**	
				112504	**WATER ANALYSIS/TRIHALOMETHANES &**		
		6101-370-0100-63105000	OTHER PROFESSIONAL SERV.				$645.75
					Total for EUROFINS ENVIRONMENTAL TESTI		**$645.75**
0002060	**FBI-LEEDA INC**					**05/04/2026**	
				112652	**SUPERVISOR TRAINING FOR NEW SERGEANTS**		
		2590-201-0100-63105000	SUPERVISOR TRAINING				$795.00
				112653	**SUPERVISOR TRAINING FOR NEW SERGEANTS**		
		2590-201-0100-63105000	SUPERVISOR TRAINING				$795.00
				112654	**SUPERVISOR TRAINING FOR NEW SERGEANTS**		
		2590-201-0100-63105000	SUPERVISOR TRAINING				$795.00

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
					Total for FBI-LEEDA INC		**$2,385.00**
0000250	**FED EX**					**05/04/2026**	
				112655	**EXPRESS MAIL**		
		1101-201-0100-63202000	SHIPPING SERVICES				$49.65
				112656	**EXPRESS MAIL**		
		1101-201-0100-63202000	SHIPPING SERVICES				$49.71
					Total for FED EX		**$99.36**
0000452	**GRAINGER**					**05/04/2026**	
				112680	**12V PL STATIONARY TRLR TESTER**		
		2201-305-0100-62303000	SMALL TOOLS & MINOR EQUIP				$222.74
				112681	**LAWN GARDEN TIRES**		
		2201-305-0100-62223000	TIRES				$169.52
				112682	**CRIMPED WIRE WHEEL BRUSH**		
		1101-230-0100-62303000	WIRE WHEEL BRUSH				$47.36
				112506	**BALL VALVE,MANIFOLD PIPE FITTING COUPLING**		
		2201-305-0100-62302000	REPAIR PARTS				$104.78
				112621	**FIRE HOSE NOZZLES**		
		2201-308-0100-62900000	OTHER SUPPLIES				$177.24
				112594	**LAWN/GARDEN TIRES**		
		2201-305-0100-62223000	OTHER SUPPLIES				$169.52
					Total for GRAINGER		**$891.16**
0000602	**GUS BOCK DYER ACE HARDWARE**					**05/04/2026**	
				112595	**BULK FASTENERS**		
		2201-305-0100-62303000	SMALL TOOLS & MINOR EQUIP				$8.52
				112624	**PIPE THREADING**		
		6101-370-0100-62900000	OTHER SUPPLIES				$2.50

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112671	EPOXY,SUPER GLUE,THREAD LOCKER,CHAINSAW CHA		
		2201-305-0100-62303000	SMALL TOOLS & MINOR EQUIP				$99.94
					Total for GUS BOCK DYER ACE HARDWARE		$110.96
0000418	GUS BOCK HARDWARE					05/04/2026	
				112672	PAINT PRIMER		
		2201-308-0100-62900000	OTHER SUPPLIES				$24.93
				112673	OTTERBOX IPHONE CLIPS		
		2201-308-0100-62900000	OTHER SUPPLIES				$33.98
				112622	MUSHROOM COMPOST		
		2201-308-0100-62900000	OTHER SUPPLIES				$348.60
				112623	STRAIGHT BLADE PLUGS		
		6101-370-0100-62900000	OTHER SUPPLIES				$209.94
				112596	TABLE SAW,BLANK KEYS		
		2201-308-0100-62303000	SMALL TOOLS & MINOR EQUIP				$649.99
		6101-370-0100-62900000	OTHER SUPPLIES				$23.94
				112507	BULK FASTENERS,GLUE,BIRD SPIKE		
		2201-308-0100-62900000	OTHER SUPPLIES				$82.30
					Total for GUS BOCK HARDWARE		$1,373.68
0000103	GUS BOCK'S MUNSTER ACE					05/04/2026	
				112508	BULK FASTENERS		
		1101-230-0100-62900000	OTHER SUPPLIES				$0.60
				112509	ROPE		
		6101-370-0100-62900000	OTHER SUPPLIES				$13.98
				112510	FLASH DRIVE,GIGASTONE		
		2201-308-0100-62900000	OTHER SUPPLIES				$43.98
				112511	CABLE TIES,BELT SNAPS		
		6101-370-0100-62900000	OTHER SUPPLIES				$16.15

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112512	**BULK FASTENERS**		
		1101-230-0100-62900000	OTHER SUPPLIES				$0.15
				112625	**TOOL BOX,NIPPLES**		
		6101-370-0100-62900000	OTHER SUPPLIES				$42.34
					Total for GUS BOCK'S MUNSTER ACE		**$117.20**
0000302	**HUMANE INDIANA INC**					**05/04/2026**	
				112657	**ANIMAL SERVICES - CUSODY/CARE,SHELTER TNR SER**		
		1101-201-0100-63119000	ANIMAL SERVICES				$525.00
					Total for HUMANE INDIANA INC		**$525.00**
MISCVEN	**JORGE LOPEZ**					**05/04/2026**	
				112626	**REIMBURSEMENT/SPRINKLER REPAIR**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$271.28
					Total for JORGE LOPEZ		**$271.28**
0001056	**KROOSWYK MATERIALS INC**					**05/04/2026**	
				112513	**BLACK DIRT,GRASS SEED**		
		2201-308-0100-62900000	OTHER SUPPLIES				$577.00
				112706	**BLACK DIRT,STRAW**		
		2201-308-0100-62900000	OTHER SUPPLIES				$224.96
					Total for KROOSWYK MATERIALS INC		**$801.96**
0000637	**LAKE COUNTY PROSECUTOR'S OFFICE**					**05/04/2026**	
				112658	**2026 INDIANA 50 CRIMINAL CODE BOOKS**		
		1101-201-0100-62900000	2026 CRIMINAL CODE BOOKS				$400.00
					Total for LAKE COUNTY PROSECUTOR'S OFFI		**$400.00**
0000429	**LANSING SPORT SHOP**					**05/04/2026**	

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112659	**25 YEARS OF SERVICE STAR AWARDS**		
		1101-201-0100-62900000	AWARDS				$450.00
					Total for LANSING SPORT SHOP		**$450.00**
0000430	**LEVIN TIRE CENTER**					**05/04/2026**	
				112451	**ROAD FORCE BALANCE 4 LOOSE RIMS**		
		1101-204-0100-62900000	TIRES				$105.00
					Total for LEVIN TIRE CENTER		**$105.00**
0001170	**LINDE GAS & EQUIPMENT INC**					**05/04/2026**	
				112612	**ACETYLENE TANK RENTAL**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$206.56
					Total for LINDE GAS & EQUIPMENT INC		**$206.56**
0000551	**M E SIMPSON COMPANY INC**					**05/04/2026**	
				112613	**LEAK LOCATION SERVICES/239 ADELAIDE**		
		6101-370-0100-63105000	OTHER PROFESSIONAL SERV.				$545.00
					Total for M E SIMPSON COMPANY INC		**$545.00**
0002010	**MACQUEEN EQUIPMENT LLC**					**05/04/2026**	
				112540	**BADGES**		
		1101-230-0100-62900000	BADGES				$211.95
					Total for MACQUEEN EQUIPMENT LLC		**$211.95**
0000602	**MENARDS**					**05/04/2026**	
				112566	**TAPE,PIPE**		
		6101-370-0100-62900000	OTHER SUPPLIES				$89.95
					Total for MENARDS		**$89.95**
0000454	**MICHAEL TODD & CO INC**					**05/04/2026**	

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
				112527	**BALL FINIAL FOR 3" POLE,ALUMINUM POLES**		
		4437-308-0100-62900000	OTHER SUPPLIES				$4,790.00
				112514	**FLARED LEG BRACKETS**		
		4437-308-0100-62900000	OTHER SUPPLIES				$229.46
				112515	**BANDING**		
		4437-308-0100-62900000	OTHER SUPPLIES				$221.43
				112597	**SHEETING,OVERLAY FILM,CLEAR TRANSFER TAPE**		
		4437-308-0100-62900000	OTHER SUPPLIES				$6,719.17
				112598	**GALVPERF 14 GA SQ POSTS,12GA PERF GALV SQUARE**		
		4437-308-0100-62900000	OTHER SUPPLIES				$7,381.26
					Total for MICHAEL TODD & CO INC		**$19,341.32**
0000432	**MILNE SUPPLY CO INC**					**05/04/2026**	
				112694	**ORANGE NITRILE GLOVES**		
		6101-370-0100-62900000	OTHER SUPPLIES				$250.00
				112695	**SLOAN REPAIR KITS,VAC BREAKER REP KITS**		
		1101-122-0100-62900000	OTHER SUPPLIES				$134.46
					Total for MILNE SUPPLY CO INC		**$384.46**
0000491	**MISS PRINT**					**05/04/2026**	
				112627	**BROCHURE PRINTING/MS4 PUBLIC OUTREACH**		
		2580-309-0100-62232000	MS4 SUPPLIES				$580.00
					Total for MISS PRINT		**$580.00**
0000450	**MOTION & CONTROL ENTERPRISES LLC**					**05/04/2026**	
				112516	**CRIMP HOSE ASSEMBLIES,NUTS,MALE CONNECTORS**		
		2201-305-0100-62302000	REPAIR PARTS				$153.46
					Total for MOTION & CONTROL ENTERPRISES		**$153.46**

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
0001493	**NAPLETON RIVER OAKS**					**05/04/2026**	
				112660	**AIR INLET TUBE (- CREDIT)**		
		1101-204-0100-62900000	SUPPLIES				$247.36
				112661	**ALTERNATOR ASSEMBLY, V-BELT**		
		1101-204-0100-62900000	SUPPLIES				$700.02
				112662	**PULLEY ASSEMBLY**		
		1101-204-0100-62900000	SUPPLIES				$111.80
					Total for NAPLETON RIVER OAKS		**$1,059.18**
0002033	**NATIONAL ANIMAL CARE AND CONTRO**					**05/04/2026**	
				112665	**ANNUAL MEMBERSHIP FOR KIM NORDHOFF**		
		1101-201-0100-63908000	ANNUAL MEMBERSHIPS FOR CSO'S				$30.00
				112666	**ANNUAL MEMBERSHIP FOR HOLLY CHALOS**		
		1101-201-0100-63908000	ANNUAL MEMBERSHIPS FOR CSO'S				$25.00
					Total for NATIONAL ANIMAL CARE AND CONT		**$55.00**
0002032	**NEW PIG CORPORATION**					**05/04/2026**	
				112567	**ALL PURPOSE WIPERS,FLOOR MAT,**		
		2580-309-0100-62232000	MS4 SUPPLIES				$565.78
					Total for NEW PIG CORPORATION		**$565.78**
0002053	**NIEMEYER'S LANDSCAPE SUPPLY**					**05/04/2026**	
				112517	**PULVERIZED MULCH**		
		6101-370-0100-62900000	OTHER SUPPLIES				$348.00
					Total for NIEMEYER'S LANDSCAPE SUPPLY		**$348.00**
0000437	**P & C TRUCKING ENT INC**					**05/04/2026**	
				112518	**HAUL LEAVES AWAY**		
		6604-308-0100-63541000	REFUSE DISPOSAL				$475.00

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
					Total for P & C TRUCKING ENT INC		**$475.00**
0002045	**PHILLIP GARDIN**					**05/04/2026**	
				112674	**STORM SEWER RESTORATION AND EROSION CORREC**		
		2580-309-0100-63105000	OTHER PROFESSIONAL SERV.				$16,813.36
					Total for PHILLIP GARDIN		**$16,813.36**
0000439	**PRO AIR MIDWEST LLC**					**05/04/2026**	
				112519	**LINE VALVE REPAIR KIT,BLEEDER VALVE,7500PSI GA**		
		1101-230-0100-62302000	REPAIR PARTS				$300.00
					Total for PRO AIR MIDWEST LLC		**$300.00**
0002012	**RIDGEWAY PETROLEUM INC**					**05/04/2026**	
				112600	**2/26 CAR WASHES/BLDG**		
		1101-150-0100-63601000	REPAIRS & MAINT SERVICES				$22.00
				112601	**3/26 CAR WASHES/BLDG**		
		1101-150-0100-63601000	REPAIRS & MAINT SERVICES				$10.00
				112602	**2/26 CAR WASHES/TOWN MANAGER**		
		1101-110-0100-63105000	OTHER PROFESSIONAL SERV.				$5.00
				112667	**2/26 CAR WASHES/POLICE DEPT**		
		1101-204-0100-63605000	CAR WASHES				$686.00
				112668	**3/26 CAR WASHES/POLICE DEPT**		
		1101-204-0100-63605000	CAR WASHES				$615.00
					Total for RIDGEWAY PETROLEUM INC		**$1,338.00**
0000304	**ROTARY CLUB OF MUNSTER**					**05/04/2026**	
				112663	**2Q 2026 DUES & MEALS/STEPHEN SCHECKEL**		
		1101-201-0100-63908000	MONTHLY DUES & MEETING COSTS				$176.00
				112528	**2 Q 2026 DUES & MEALS/WENDY MIS**		

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
		1101-105-0100-63908000	MEMBERSHIP DUES/MEET EXP				$218.00
					Total for ROTARY CLUB OF MUNSTER		**$394.00**
0001737	**RYAN FIREPROTECTION INC**					**05/04/2026**	
				112529	**FIRE SPRINKLER & FIRE ALARM INSPCTION/PWKS**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$2,627.00
				112541	**FIRE SPRINKLER *& FIRE ALARM INSPECTION/THALL**		
		2201-308-0100-63105000	OTHER PROFESSIONAL SERV.				$3,478.00
					Total for RYAN FIREPROTECTION INC		**$6,105.00**
0000920	**SAFETY TRAINING SERVICES, INC.**					**05/04/2026**	
				112423	**REGULATOR,MSA CALIBRATION GAS**		
		4402-232-0100-63602000	CALIBRATE SENSIT, REGULATOR				$673.00
				112424	**CALIBRATE MULTIGAS MONITOR SENSIT,OXYGEN SEN**		
		4402-232-0100-63602000	CALIBRATE REPAIR SENSIT				$322.35
					Total for SAFETY TRAINING SERVICES, INC.		**$995.35**
0000250	**SANITARY DISTRICT OF HAMMOND**					**05/04/2026**	
				112542	**3/26 VACTOR LOADS DRYING BEDS**		
		2580-309-0100-63105000	OTHER PROFESSIONAL SERV.				$141.52
					Total for SANITARY DISTRICT OF HAMMOND		**$141.52**
0000519	**STANDARD EQUIPMENT CO**					**05/04/2026**	
				112630	**VACTOR REPAIRS TO WATER TANKS**		
		6101-370-0100-63105000	VACTOR REPAIR				$21,252.28
		2580-309-0100-63105000	VACTOR REPAIR				$21,252.28
					Total for STANDARD EQUIPMENT CO		**$42,504.56**
0001704	**STAPLES CONTRACT & COMMERCIAL IN**					**05/04/2026**	
				112568	**WALL FRAME**		

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
		1101-110-0100-62900000	MISCELANOUS OFFICE SUPPLIES				$11.99
				112569	**WATER,LETTER PADS,DAWN DISH SOAP**		
		1101-110-0100-62900000	MISCELANOUS OFFICE SUPPLIES				$34.16
					Total for STAPLES CONTRACT & COMMERCIA		**$46.15**
0000447	**SYLVIO GIANNINI CEMENT WORK INC**					**05/04/2026**	
				112696	**CEMENT WORK AT 7703 HOHMAN**		
		6101-370-0100-63105000	OTHER PROFESSIONAL SERV.				$2,400.00
				112697	**CONCRETE REPAIRS-656 FISHER & 8612 HARRISON/**		
		6101-370-0100-63105000	OTHER PROFESSIONAL SERV.				$7,400.00
				112698	**CONCRETE REPAIRS & DRIVEWAY W/WIRE MESH/13**		
		6101-370-0100-63105000	OTHER PROFESSIONAL SERV.				$7,728.00
					Total for SYLVIO GIANNINI CEMENT WORK I		**$17,528.00**
0000448	**TERPSTRA SALES & SERVICE**					**05/04/2026**	
				112599	**CONNECTOR,HOSE,PICKUP BODY**		
		2201-308-0100-62900000	OTHER SUPPLIES				$30.36
					Total for TERPSTRA SALES & SERVICE		**$30.36**
0001992	**THE BLOWHARD COMPANY LLC**					**05/04/2026**	
				112448	**RETROFIT COMBO KIT**		
		1101-230-0100-62302000	REPAIR PARTS				$828.00
				112699	**COMBO RETROFIT COMBO KIT**		
		1101-230-0100-62302000	PART FOR BLOWHARD				$828.00
					Total for THE BLOWHARD COMPANY LLC		**$1,656.00**
0000599	**THIRD DIST FIRE CHIEFS ASSOCIATIO**					**05/04/2026**	
				112629	**2Q 2026 MABAS 24 DUES & ASSESSMENTS**		
		1101-232-0100-63903000	MABAS DUES				$1,818.00

Vendor #	Vendor Name	General Ledger #	Account Title	Voucher #	Description	Due Date	Amount
					Total for THIRD DIST FIRE CHIEFS ASSOCIAT		**$1,818.00**
0000252	**TREASURER OF STATE OF INDIANA**					**05/04/2026**	
				112664	**BREATH TEST OPERATOR CERTIFICATION/BRETT SCH**		
		2590-201-0100-63105000	TRAINING				$40.00
					Total for TREASURER OF STATE OF INDIANA		**$40.00**
0000306	**WEST SIDE TRACTOR SALES**					**05/04/2026**	
				112520	**HYDRAULIC OIL**		
		2201-305-0100-62302000	REPAIR PARTS				$683.10
					Total for WEST SIDE TRACTOR SALES		**$683.10**
0001631	**WESTLAND & BENNETT PC**					**05/04/2026**	
				112521	**3/26 LEGAL SERVICES/ORDINANCE PROSECUTION**		
		1101-107-0800-63101000	ORDINANCE PROSECUTION				$4,185.00
				112522	**3/26 LEGAL SERVICES/POLICE DEPARTMENT**		
		1101-107-0100-63101000	GENERAL GOVERNMENT				$967.50
				112523	**3/26 LEGAL SERVICES/ ZONING CODE REVISIONS**		
		2209-107-0100-63101000	ZONING CODE ROLLBACK				$28,642.50
				112524	**3/26 LEGAL SERVICES/PLAN COMMISSION/BOARD O**		
		1101-107-0400-63101000	PLANNING / BUILDING				$2,790.00
				112525	**3/26 LEGAL SERVICES/PLANNING/BLDG DEPARTMEN**		
		1101-107-0400-63101000	PLANNING / BUILDING				$7,132.50
				112526	**3/26 LEGAL SERVICES/PARK BOARD**		
		2204-107-0500-63101000	PARK BOARD				$4,830.00
					Total for WESTLAND & BENNETT PC		**$48,547.50**
						Overall Total	**$191,608.83**

Accounts Payable Voucher Register # 26-5B

GROSS PAYROLL	**05/01/26**	**$**	**400,269.34**
OTHER PAYROLL RELATED EXPENSES	**05/01/26**	**$**	**174,009.41**
TOTAL PAYROLL EXPENSE CONFIRMED	**05/01/26**	**$**	**574,278.75**

I hereby certify that each of the above listed vouchers and the invoices or bills attached thereto, are true and correct and I have audited same in accordance with IC 5-11-10-1.6.

May 1, 2026

Wendy Mis
Fiscal Officer

(IC 5-11-10-2 permits the governing body to sign the Accounts Payable Voucher Register in lieu of signing each claim the governing body is allowing.)

We have examined the vouchers listed on the foregoing Accounts Payable Voucher Register, consisting of 22 pages, and except for the vouchers not allowed as shown on the Register, such vouchers are allowed in the total amount of $ 574,278.75

Approved and confirmed by the Town Council of the Town of Munster, Lake County Indiana, this 4th day of May 2026 by a vote of _____ in favor and _____ opposed.

Joseph Hofferth, President

ATTEST:

Wendy Mis, Clerk-Treasurer

FUND SUMMARY May 1, 2026

FUND	DESCRIPTION		AMOUNT
1101	GENERAL FUND	$	311,057.61
2201	MOTOR VEHICLE HIGHWAY UNALLOCATED	$	34,412.30
2204	PARK & RECREATION	$	62,601.43
2547	TECHNOLOGY	$	759.55
2580	SEWER MAINTENANCE	$	69,281.69
4406	REDEVELOPMENT OPERATING	$	6,448.70
6101	WATER CASH OPERATING	$	77,198.20
6604	SOLID WASTE MANAGEMENT	$	12,519.27
	REPORT TOTAL	**$**	**574,278.75**

Payroll . . 00000252

Pay Period End Date: 04/25/2026 Check Post Date: 05/01/2026 Bank ID: GEN

* YTD values reflect values AS OF the check date based on all current adjustments, checks, void checks

SITW_IN	11,324.19	109,981.34
SOCSEC_EE	14,030.72	132,176.27
SUP LIFE	145.09	1,305.81
UNITED WAY $	2.00	18.00

Gross Pay This Period	Deduction Refund	Ded. This Period	Net Pay This Period	Dir. Dep.	Physical Checks
400,269.34	0.00	113,903.04	286,366.30	287,217.82	192.71

Gross Pay YTD
3,893,009.54

* = Check Adjustment

PR 05.01.26 Regular

CHECK AMOUNTS BY GENERAL LEDGER FOR TOWN OF MUNSTER

For Payroll: 00000252 Check Date: 0[illegible]/2026 Pay Period End Date: 04/25/2026

GL Number	Amount
Fund: 1101 GENERAL FUND	
Department: 101-0100 TOWN COUNCIL	
1101-101-0100-61111000	1,037.51
1101-101-0100-61301000	73.42
1101-101-0100-61302000	17.15
1101-101-0100-61306000	7.66
1101-101-0100-61333000	147.32
Total Fund-Dept: 1101-61333000	1,283.06
Department: 105-0100 CLERK-TREASURER	
1101-105-0100-61112000	1,605.94
1101-105-0100-61131000	2,470.02
1101-105-0100-61151000	5,263.59
1101-105-0100-61181000	418.70
1101-105-0100-61301000	568.44
1101-105-0100-61302000	132.94
1101-105-0100-61303000	1,036.99
1101-105-0100-61305000	1,590.64
1101-105-0100-61306000	42.72
1101-105-0100-61309000	9.79
1101-105-0100-61335000	33.12
1101-105-0100-61434000	36.98
Total Fund-Dept: 1101-61434000	13,209.87
Department: 110-0100 TOWN MANAGER	
1101-110-0100-61121000	588.47
1101-110-0100-61131000	403.84
1101-110-0100-61151000	514.00
1101-110-0100-61181000	2.89
1101-110-0100-61301000	102.19
1101-110-0100-61302000	23.91
1101-110-0100-61303000	72.98
1101-110-0100-61305000	38.28
1101-110-0100-61306000	7.05
1101-110-0100-61309000	1.69
1101-110-0100-61333000	141.32
1101-110-0100-61335000	2.60
1101-110-0100-61434000	6.32
Total Fund-Dept: 1101-61434000	1,905.54
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
1101-150-0200-61131000	4,662.63
1101-150-0200-61133000	427.38
1101-150-0200-61151000	2,936.72
1101-150-0200-61181000	163.41
1101-150-0200-61301000	500.26
1101-150-0200-61302000	116.95
1101-150-0200-61303000	1,103.56
1101-150-0200-61305000	895.44
1101-150-0200-61306000	45.80
1101-150-0200-61309000	9.08
1101-150-0200-61335000	23.37
1101-150-0200-61434000	34.81

GL Number	Amount
Fund: 1101 GENERAL FUND	
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
Total Fund-Dept: 1101-61434000	10,919.41
Department: 201-0100 POLICE ADMIN	
1101-201-0100-61122000	5,799.63
1101-201-0100-61132000	13,473.95
1101-201-0100-61152000	9,605.60
1101-201-0100-61157000	2,387.20
1101-201-0100-61181000	1,442.29
1101-201-0100-61301000	757.33
1101-201-0100-61302000	458.45
1101-201-0100-61303000	1,805.37
1101-201-0100-61305000	6,677.52
1101-201-0100-61306000	151.79
1101-201-0100-61309000	48.68
1101-201-0100-61310000	3,304.08
1101-201-0100-61335000	116.96
1101-201-0100-61434000	137.52
Total Fund-Dept: 1101-61434000	46,166.37
Department: 203-0100 COMM ORIENTED POLICE	
1101-203-0100-61132000	5,071.21
1101-203-0100-61143000	16,968.00
1101-203-0100-61181000	990.38
1101-203-0100-61301000	316.43
1101-203-0100-61302000	322.06
1101-203-0100-61303000	752.89
1101-203-0100-61305000	4,879.01
1101-203-0100-61306000	117.04
1101-203-0100-61309000	37.49
1101-203-0100-61310000	4,130.10
1101-203-0100-61335000	77.98
1101-203-0100-61434000	101.37
Total Fund-Dept: 1101-61434000	33,763.96
Department: 204-0100 UNIFORM PATROL	
1101-204-0100-61132000	33,835.36
1101-204-0100-61141000	77,443.40
1101-204-0100-61181000	2,653.84
1101-204-0100-61184000	2,193.76
1101-204-0100-61302000	1,622.24
1101-204-0100-61305000	23,804.30
1101-204-0100-61306000	635.61
1101-204-0100-61309000	154.47
1101-204-0100-61310000	27,258.66
1101-204-0100-61335000	402.86
1101-204-0100-61434000	510.84
Total Fund-Dept: 1101-61434000	170,515.34
Department: 205-0100 INVESTIGATIONS	
1101-205-0100-61132000	3,748.80
1101-205-0100-61142000	9,914.40
1101-205-0100-61181000	634.61

GL Number	Amount
Fund: 1101 GENERAL FUND	
Department: 205-0100 INVESTIGATIONS	
1101-205-0100-61184000	495.72
1101-205-0100-61302000	207.91
1101-205-0100-61305000	3,386.60
1101-205-0100-61306000	66.50
1101-205-0100-61309000	20.87
1101-205-0100-61310000	3,304.08
1101-205-0100-61335000	51.99
1101-205-0100-61434000	62.84
Total Fund-Dept: 1101-61434000	21,894.32
Department: 232-0100 ADMINISTRATION	
1101-232-0100-61122000	3,923.20
1101-232-0100-61152000	2,250.40
1101-232-0100-61181000	346.15
1101-232-0100-61185000	21.10
1101-232-0100-61301000	397.07
1101-232-0100-61302000	92.86
1101-232-0100-61303000	928.80
1101-232-0100-61305000	1,109.64
1101-232-0100-61306000	33.33
1101-232-0100-61309000	9.37
1101-232-0100-61335000	25.99
1101-232-0100-61434000	28.39
Total Fund-Dept: 1101-61434000	9,166.30
Department: 301-0100 PUBLIC WORKS ADMIN	
1101-301-0100-61153000	900.29
1101-301-0100-61181000	33.66
1101-301-0100-61185000	15.59
1101-301-0100-61301000	58.52
1101-301-0100-61302000	13.69
1101-301-0100-61303000	70.12
1101-301-0100-61305000	76.56
1101-301-0100-61306000	2.73
1101-301-0100-61309000	0.42
1101-301-0100-61335000	2.59
1101-301-0100-61434000	2.04
Total Fund-Dept: 1101-61434000	1,176.21
Department: 308-0100 STREET DEPARTMENT	
1101-308-0100-61163000	603.66
1101-308-0100-61181000	13.47
1101-308-0100-61186000	16.98
1101-308-0100-61301000	37.25
1101-308-0100-61302000	8.71
1101-308-0100-61303000	90.03
1101-308-0100-61305000	274.60
1101-308-0100-61306000	3.73
1101-308-0100-61309000	1.48
1101-308-0100-61335000	4.54
1101-308-0100-61434000	2.78

GL Number	Amount
Fund: 1101 GENERAL FUND	
Department: 308-0100 STREET DEPARTMENT	
Total Fund-Dept: 1101-61434000	1,057.23
Total Fund 1101:	311,057.61

GL Number	Amount
Fund: 2201 MOTOR VEHICLE HIGHWAY	
Department: 301-0100 PUBLIC WORKS ADMIN	
2201-301-0100-61123000	2,700.52
2201-301-0100-61181000	89.00
2201-301-0100-61301000	167.75
2201-301-0100-61302000	39.23
2201-301-0100-61303000	396.12
2201-301-0100-61305000	631.02
2201-301-0100-61306000	14.34
2201-301-0100-61309000	4.04
2201-301-0100-61335000	9.55
2201-301-0100-61434000	13.00
Total Fund-Dept: 2201-61434000	4,064.57
Department: 305-0100 VEHICLE MAINTENANCE	
2201-305-0100-61163000	2,874.89
2201-305-0100-61181000	30.76
2201-305-0100-61186000	87.90
2201-305-0100-61301000	182.23
2201-305-0100-61302000	42.60
2201-305-0100-61303000	425.11
2201-305-0100-61305000	436.27
2201-305-0100-61306000	17.65
2201-305-0100-61309000	3.52
2201-305-0100-61335000	15.59
2201-305-0100-61434000	13.23
Total Fund-Dept: 2201-61434000	4,129.75
Department: 308-0100 STREET DEPARTMENT	
2201-308-0100-61163000	15,475.74
2201-308-0100-61181000	534.63
2201-308-0100-61186000	155.14
2201-308-0100-61196000	1,260.04
2201-308-0100-61301000	1,041.93
2201-308-0100-61302000	243.71
2201-308-0100-61303000	2,275.06
2201-308-0100-61305000	4,961.37
2201-308-0100-61306000	90.14
2201-308-0100-61309000	28.64
2201-308-0100-61335000	81.74
2201-308-0100-61434000	69.84
Total Fund-Dept: 2201-61434000	26,217.98
Total Fund 2201:	34,412.30

GL Number	Amount
Fund: 2204 PARK FUND	
Department: 105-0100 CLERK-TREASURER	
2204-105-0100-61131000	1,646.60
2204-105-0100-61151000	2,122.43
2204-105-0100-61181000	237.49
2204-105-0100-61301000	232.67
2204-105-0100-61302000	54.41
2204-105-0100-61303000	450.86
2204-105-0100-61305000	693.69
2204-105-0100-61306000	19.36
2204-105-0100-61309000	4.32
2204-105-0100-61335000	15.02
2204-105-0100-61434000	16.62
Total Fund-Dept: 2204-61434000	5,493.47
Department: 110-0100 TOWN MANAGER	
2204-110-0100-61121000	588.47
2204-110-0100-61131000	403.84
2204-110-0100-61151000	102.81
2204-110-0100-61181000	2.89
2204-110-0100-61301000	76.67
2204-110-0100-61302000	17.92
2204-110-0100-61303000	14.61
2204-110-0100-61305000	38.28
2204-110-0100-61306000	4.54
2204-110-0100-61309000	0.84
2204-110-0100-61333000	141.32
2204-110-0100-61335000	2.60
2204-110-0100-61434000	4.44
Total Fund-Dept: 2204-61434000	1,399.23
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
2204-150-0200-61133000	427.35
2204-150-0200-61301000	26.55
2204-150-0200-61302000	6.21
2204-150-0200-61303000	60.68
2204-150-0200-61306000	1.95
2204-150-0200-61434000	1.95
Total Fund-Dept: 2204-61434000	524.69
Department: 301-0100 PUBLIC WORKS ADMIN	
2204-301-0100-61153000	130.22
2204-301-0100-61301000	8.08
2204-301-0100-61302000	1.89
Total Fund-Dept: 2204-61302000	140.19
Department: 308-0100 STREET DEPARTMENT	
2204-308-0100-61163000	431.20
2204-308-0100-61181000	9.62
2204-308-0100-61186000	12.13
2204-308-0100-61301000	26.61
2204-308-0100-61302000	6.23
2204-308-0100-61303000	64.32
2204-308-0100-61305000	196.13

GL Number	Amount
Fund: 2204 PARK FUND	
Department: 308-0100 STREET DEPARTMENT	
2204-308-0100-61306000	2.66
2204-308-0100-61309000	1.06
2204-308-0100-61335000	3.25
2204-308-0100-61434000	1.98
Total Fund-Dept: 2204-61434000	755.19
Department: 551-0100 PARK ADMINISTRATION	
2204-551-0100-61125000	4,485.40
2204-551-0100-61155000	906.40
2204-551-0100-61181000	123.07
2204-551-0100-61301000	332.80
2204-551-0100-61302000	77.83
2204-551-0100-61303000	674.27
2204-551-0100-61305000	1,021.68
2204-551-0100-61306000	25.10
2204-551-0100-61309000	8.52
2204-551-0100-61335000	18.20
2204-551-0100-61434000	24.46
Total Fund-Dept: 2204-61434000	7,697.73
Department: 561-0400 YOUTH SPORT FITNESS	
2204-561-0400-61193000	648.50
2204-561-0400-61301000	40.23
2204-561-0400-61302000	9.40
Total Fund-Dept: 2204-61302000	698.13
Department: 561-0700 SPEC EVENTS/TRIPS/TICKETS	
2204-561-0700-61193000	131.25
2204-561-0700-61301000	8.14
2204-561-0700-61302000	1.90
Total Fund-Dept: 2204-61302000	141.29
Department: 561-0900 GENERAL RECREATION	
2204-561-0900-61135000	3,249.58
2204-561-0900-61139000	3,964.62
2204-561-0900-61155000	3,625.60
2204-561-0900-61181000	482.68
2204-561-0900-61193000	199.13
2204-561-0900-61301000	686.87
2204-561-0900-61302000	160.65
2204-561-0900-61303000	1,172.40
2204-561-0900-61305000	2,913.39
2204-561-0900-61306000	53.68
2204-561-0900-61309000	15.68
2204-561-0900-61335000	55.87
2204-561-0900-61434000	49.29
Total Fund-Dept: 2204-61434000	16,629.44
Department: 562-0100 POOL OPERATIONS	
2204-562-0100-61135000	171.02
2204-562-0100-61136000	267.67
2204-562-0100-61139000	576.01

GL Number	Amount
Fund: 2204 PARK FUND	
Department: 562-0100 POOL OPERATIONS	
2204-562-0100-61165000	626.94
2204-562-0100-61181000	50.51
2204-562-0100-61186000	40.34
2204-562-0100-61301000	104.48
2204-562-0100-61302000	24.45
2204-562-0100-61303000	246.05
2204-562-0100-61305000	321.88
2204-562-0100-61306000	9.55
2204-562-0100-61309000	1.87
2204-562-0100-61335000	8.44
2204-562-0100-61434000	7.73
Total Fund-Dept: 2204-61434000	2,456.94
Department: 571-0100 PARKS MAINTENANCE	
2204-571-0100-61136000	1,204.37
2204-571-0100-61165000	10,013.86
2204-571-0100-61181000	312.51
2204-571-0100-61186000	178.60
2204-571-0100-61196000	2,058.75
2204-571-0100-61301000	827.47
2204-571-0100-61302000	193.51
2204-571-0100-61303000	1,662.71
2204-571-0100-61305000	3,242.16
2204-571-0100-61306000	71.08
2204-571-0100-61309000	20.13
2204-571-0100-61335000	41.59
2204-571-0100-61434000	53.54
Total Fund-Dept: 2204-61434000	19,880.28
Department: 581-0100 CENT MAINTENANCE	
2204-581-0100-61136000	1,070.62
2204-581-0100-61165000	2,334.72
2204-581-0100-61181000	190.37
2204-581-0100-61196000	912.00
2204-581-0100-61301000	267.50
2204-581-0100-61302000	62.55
2204-581-0100-61303000	510.57
2204-581-0100-61305000	1,371.20
2204-581-0100-61306000	22.17
2204-581-0100-61309000	8.59
2204-581-0100-61335000	17.61
2204-581-0100-61434000	16.95
Total Fund-Dept: 2204-61434000	6,784.85
Total Fund 2204:	62,601.43

GL Number	Amount
Fund: 2547 TECHNOLOGY FUND	
Department: 110-0100 TOWN MANAGER	
2547-110-0100-61151000	616.83
2547-110-0100-61301000	38.29
2547-110-0100-61302000	8.96
2547-110-0100-61303000	87.60
2547-110-0100-61306000	3.76
2547-110-0100-61309000	1.29
2547-110-0100-61434000	2.82
Total Fund-Dept: 2547-61434000	759.55
Total Fund 2547:	759.55

GL Number	Amount
Fund: 2580 SEWER MAINTENANCE	
Department: 101-0100 TOWN COUNCIL	
2580-101-0100-61111000	741.13
2580-101-0100-61301000	52.48
2580-101-0100-61302000	12.28
2580-101-0100-61306000	5.47
2580-101-0100-61333000	105.21
Total Fund-Dept: 2580-61333000	916.57
Department: 105-0100 CLERK-TREASURER	
2580-105-0100-61112000	1,337.90
2580-105-0100-61131000	823.42
2580-105-0100-61151000	2,164.20
2580-105-0100-61181000	132.72
2580-105-0100-61301000	259.35
2580-105-0100-61302000	60.65
2580-105-0100-61303000	534.19
2580-105-0100-61305000	755.03
2580-105-0100-61306000	20.50
2580-105-0100-61309000	5.23
2580-105-0100-61335000	16.83
2580-105-0100-61434000	18.00
Total Fund-Dept: 2580-61434000	6,128.02
Department: 110-0100 TOWN MANAGER	
2580-110-0100-61121000	1,176.91
2580-110-0100-61131000	807.70
2580-110-0100-61151000	205.61
2580-110-0100-61181000	5.76
2580-110-0100-61301000	153.32
2580-110-0100-61302000	35.84
2580-110-0100-61303000	29.19
2580-110-0100-61305000	76.55
2580-110-0100-61306000	9.07
2580-110-0100-61309000	1.69
2580-110-0100-61333000	282.64
2580-110-0100-61335000	5.20
2580-110-0100-61434000	8.90
Total Fund-Dept: 2580-61434000	2,798.38
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
2580-150-0200-61131000	1,554.24
2580-150-0200-61133000	854.73
2580-150-0200-61151000	978.94
2580-150-0200-61181000	48.09
2580-150-0200-61301000	210.65
2580-150-0200-61302000	49.26
2580-150-0200-61303000	469.04
2580-150-0200-61305000	298.49
2580-150-0200-61306000	18.51
2580-150-0200-61309000	3.03
2580-150-0200-61335000	7.80
2580-150-0200-61434000	14.90

GL Number	Amount
Fund: 2580 SEWER MAINTENANCE	
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
Total Fund-Dept: 2580-61434000	4,507.68
Department: 301-0100 PUBLIC WORKS ADMIN	
2580-301-0100-61123000	2,700.39
2580-301-0100-61153000	1,593.90
2580-301-0100-61181000	189.88
2580-301-0100-61185000	46.76
2580-301-0100-61301000	274.71
2580-301-0100-61302000	64.23
2580-301-0100-61303000	606.39
2580-301-0100-61305000	860.68
2580-301-0100-61306000	22.53
2580-301-0100-61309000	5.28
2580-301-0100-61335000	17.29
2580-301-0100-61434000	19.11
Total Fund-Dept: 2580-61434000	6,401.15
Department: 305-0100 VEHICLE MAINTENANCE	
2580-305-0100-61163000	2,156.20
2580-305-0100-61181000	23.09
2580-305-0100-61186000	65.94
2580-305-0100-61301000	136.68
2580-305-0100-61302000	31.96
2580-305-0100-61303000	318.81
2580-305-0100-61305000	327.19
2580-305-0100-61306000	13.26
2580-305-0100-61309000	2.64
2580-305-0100-61335000	11.69
2580-305-0100-61434000	9.91
Total Fund-Dept: 2580-61434000	3,097.37
Department: 308-0100 STREET DEPARTMENT	
2580-308-0100-61163000	12,086.05
2580-308-0100-61181000	305.82
2580-308-0100-61186000	160.14
2580-308-0100-61301000	747.92
2580-308-0100-61302000	174.94
2580-308-0100-61303000	1,782.41
2580-308-0100-61305000	3,920.90
2580-308-0100-61306000	70.61
2580-308-0100-61309000	22.71
2580-308-0100-61335000	64.24
2580-308-0100-61434000	54.59
Total Fund-Dept: 2580-61434000	19,390.33
Department: 309-0100 STORMWATER SEWER MAINTENANCE	
2580-309-0100-61163000	10,478.91
2580-309-0100-61181000	321.15
2580-309-0100-61186000	707.05
2580-309-0100-61301000	698.10
2580-309-0100-61302000	163.29
2580-309-0100-61303000	1,634.03

GL Number	Amount
Fund: 2580 SEWER MAINTENANCE	
Department: 309-0100 STORMWATER SEWER MAINTENANCE	
2580-309-0100-61305000	2,032.35
2580-309-0100-61306000	58.41
2580-309-0100-61309000	13.00
2580-309-0100-61335000	45.71
2580-309-0100-61434000	47.23
Total Fund-Dept: 2580-61434000	16,199.23
Department: 319-0100 SANITARY SEWER MAINTENANCE	
2580-319-0100-61163000	5,890.74
2580-319-0100-61181000	188.46
2580-319-0100-61186000	146.73
2580-319-0100-61301000	378.56
2580-319-0100-61302000	88.53
2580-319-0100-61303000	884.10
2580-319-0100-61305000	972.66
2580-319-0100-61306000	32.72
2580-319-0100-61309000	6.13
2580-319-0100-61335000	25.88
2580-319-0100-61434000	26.81
Total Fund-Dept: 2580-61434000	8,641.32
Department: 374-0100 ADMINISTRATION	
2580-374-0100-61153000	741.59
2580-374-0100-61181000	57.70
2580-374-0100-61185000	3.49
2580-374-0100-61301000	48.06
2580-374-0100-61302000	11.23
2580-374-0100-61303000	113.99
2580-374-0100-61305000	212.36
2580-374-0100-61306000	4.55
2580-374-0100-61309000	1.37
2580-374-0100-61335000	3.90
2580-374-0100-61434000	3.40
Total Fund-Dept: 2580-61434000	1,201.64
Total Fund 2580:	69,281.69

GL Number	Amount
Fund: 4406 REDEVELOPMENT OPERATING	
Department: 105-0100 CLERK-TREASURER	
4406-105-0100-61112000	535.24
4406-105-0100-61131000	823.39
4406-105-0100-61181000	30.77
4406-105-0100-61301000	79.39
4406-105-0100-61302000	18.59
4406-105-0100-61303000	197.26
4406-105-0100-61305000	144.34
4406-105-0100-61306000	5.68
4406-105-0100-61309000	0.89
4406-105-0100-61335000	2.61
4406-105-0100-61434000	5.56
Total Fund-Dept: 4406-61434000	1,843.72
Department: 110-0100 TOWN MANAGER	
4406-110-0100-61121000	1,765.37
4406-110-0100-61131000	1,211.54
4406-110-0100-61181000	8.65
4406-110-0100-61301000	210.85
4406-110-0100-61302000	49.32
4406-110-0100-61305000	114.83
4406-110-0100-61306000	11.74
4406-110-0100-61309000	1.93
4406-110-0100-61333000	423.96
4406-110-0100-61335000	7.79
4406-110-0100-61434000	11.94
Total Fund-Dept: 4406-61434000	3,817.92
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
4406-150-0200-61133000	641.04
4406-150-0200-61301000	39.82
4406-150-0200-61302000	9.31
4406-150-0200-61303000	91.03
4406-150-0200-61306000	2.93
4406-150-0200-61434000	2.93
Total Fund-Dept: 4406-61434000	787.06
Total Fund 4406:	6,448.70

GL Number	Amount
Fund: 6101 WATER CASH OPERATING	
Department: 101-0100 TOWN COUNCIL	
6101-101-0100-61111000	741.15
6101-101-0100-61301000	52.48
6101-101-0100-61302000	12.28
6101-101-0100-61306000	5.50
6101-101-0100-61333000	105.26
Total Fund-Dept: 6101-61333000	916.67
Department: 105-0100 CLERK-TREASURER	
6101-105-0100-61112000	1,605.44
6101-105-0100-61131000	2,058.31
6101-105-0100-61151000	3,697.83
6101-105-0100-61181000	267.77
6101-105-0100-61301000	444.84
6101-105-0100-61302000	104.03
6101-105-0100-61303000	908.89
6101-105-0100-61305000	1,234.81
6101-105-0100-61306000	34.98
6101-105-0100-61309000	8.86
6101-105-0100-61335000	28.55
6101-105-0100-61434000	30.63
Total Fund-Dept: 6101-61434000	10,424.94
Department: 110-0100 TOWN MANAGER	
6101-110-0100-61121000	1,471.16
6101-110-0100-61131000	1,009.61
6101-110-0100-61151000	616.78
6101-110-0100-61181000	7.21
6101-110-0100-61301000	213.96
6101-110-0100-61302000	50.04
6101-110-0100-61303000	87.58
6101-110-0100-61305000	95.69
6101-110-0100-61306000	13.52
6101-110-0100-61309000	2.86
6101-110-0100-61333000	353.28
6101-110-0100-61335000	6.50
6101-110-0100-61434000	12.77
Total Fund-Dept: 6101-61434000	3,940.96
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
6101-150-0200-61131000	1,554.33
6101-150-0200-61133000	1,068.40
6101-150-0200-61151000	979.04
6101-150-0200-61181000	48.11
6101-150-0200-61301000	223.93
6101-150-0200-61302000	52.41
6101-150-0200-61303000	499.46
6101-150-0200-61305000	298.49
6101-150-0200-61306000	19.53
6101-150-0200-61309000	3.04
6101-150-0200-61335000	7.81
6101-150-0200-61434000	15.88

GL Number	Amount
Fund: 6101 WATER CASH OPERATING	
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
Total Fund-Dept: 6101-61434000	4,770.43
Department: 301-0100 PUBLIC WORKS ADMIN	
6101-301-0100-61123000	2,700.67
6101-301-0100-61153000	1,724.20
6101-301-0100-61181000	190.07
6101-301-0100-61185000	46.79
6101-301-0100-61301000	282.89
6101-301-0100-61302000	66.24
6101-301-0100-61303000	606.53
6101-301-0100-61305000	860.75
6101-301-0100-61306000	22.60
6101-301-0100-61309000	5.37
6101-301-0100-61335000	17.38
6101-301-0100-61434000	19.19
Total Fund-Dept: 6101-61434000	6,542.68
Department: 305-0100 VEHICLE MAINTENANCE	
6101-305-0100-61163000	2,156.12
6101-305-0100-61181000	23.08
6101-305-0100-61186000	65.94
6101-305-0100-61301000	136.69
6101-305-0100-61302000	31.99
6101-305-0100-61303000	318.80
6101-305-0100-61305000	327.18
6101-305-0100-61306000	13.22
6101-305-0100-61309000	2.61
6101-305-0100-61335000	11.69
6101-305-0100-61434000	9.92
Total Fund-Dept: 6101-61434000	3,097.24
Department: 308-0100 STREET DEPARTMENT	
6101-308-0100-61163000	12,257.94
6101-308-0100-61181000	309.53
6101-308-0100-61186000	164.95
6101-308-0100-61301000	758.47
6101-308-0100-61302000	177.34
6101-308-0100-61303000	1,808.00
6101-308-0100-61305000	3,999.24
6101-308-0100-61306000	71.57
6101-308-0100-61309000	22.99
6101-308-0100-61335000	65.43
6101-308-0100-61434000	55.25
Total Fund-Dept: 6101-61434000	19,690.71
Department: 370-0100 WATER OPERATIONS	
6101-370-0100-61163000	16,769.20
6101-370-0100-61181000	509.62
6101-370-0100-61186000	853.72
6101-370-0100-61301000	1,100.57
6101-370-0100-61302000	257.38
6101-370-0100-61303000	2,574.78

GL Number	Amount
Fund: 6101 WATER CASH OPERATING	
Department: 370-0100 WATER OPERATIONS	
6101-370-0100-61305000	3,085.07
6101-370-0100-61306000	93.04
6101-370-0100-61309000	19.64
6101-370-0100-61335000	72.66
6101-370-0100-61434000	75.58
Total Fund-Dept: 6101-61434000	25,411.26
Department: 374-0100 ADMINISTRATION	
6101-374-0100-61153000	1,483.20
6101-374-0100-61181000	115.39
6101-374-0100-61185000	6.94
6101-374-0100-61301000	96.14
6101-374-0100-61302000	22.48
6101-374-0100-61303000	227.99
6101-374-0100-61305000	424.72
6101-374-0100-61306000	9.11
6101-374-0100-61309000	2.72
6101-374-0100-61335000	7.79
6101-374-0100-61434000	6.83
Total Fund-Dept: 6101-61434000	2,403.31
Total Fund 6101:	77,198.20

GL Number	Amount
Fund: 6604 SOLID WASTE MANAGEMENT	
Department: 101-0100 TOWN COUNCIL	
6604-101-0100-61111000	444.69
6604-101-0100-61301000	31.49
6604-101-0100-61302000	7.38
6604-101-0100-61306000	3.29
6604-101-0100-61333000	63.15
Total Fund-Dept: 6604-61333000	550.00
Department: 105-0100 CLERK-TREASURER	
6604-105-0100-61112000	267.60
6604-105-0100-61131000	411.68
6604-105-0100-61151000	1,244.80
6604-105-0100-61181000	68.30
6604-105-0100-61185000	7.70
6604-105-0100-61301000	117.11
6604-105-0100-61302000	27.39
6604-105-0100-61303000	216.05
6604-105-0100-61305000	349.54
6604-105-0100-61306000	9.39
6604-105-0100-61309000	2.36
6604-105-0100-61335000	7.81
6604-105-0100-61434000	7.83
Total Fund-Dept: 6604-61434000	2,737.56
Department: 110-0100 TOWN MANAGER	
6604-110-0100-61121000	294.23
6604-110-0100-61131000	201.93
6604-110-0100-61181000	1.45
6604-110-0100-61301000	35.13
6604-110-0100-61302000	8.22
6604-110-0100-61305000	19.14
6604-110-0100-61306000	1.96
6604-110-0100-61309000	0.32
6604-110-0100-61333000	70.66
6604-110-0100-61335000	1.30
6604-110-0100-61434000	1.99
Total Fund-Dept: 6604-61434000	636.33
Department: 150-0200 INSPECTIONS/CODE ENFORCEM	
6604-150-0200-61133000	854.75
6604-150-0200-61301000	53.10
6604-150-0200-61302000	12.41
6604-150-0200-61303000	121.36
6604-150-0200-61306000	3.92
6604-150-0200-61434000	3.91
Total Fund-Dept: 6604-61434000	1,049.45
Department: 301-0100 PUBLIC WORKS ADMIN	
6604-301-0100-61123000	2,700.22
6604-301-0100-61153000	1,398.46
6604-301-0100-61181000	189.69
6604-301-0100-61185000	46.74
6604-301-0100-61301000	262.56

GL Number	Amount
Fund: 6604 SOLID WASTE MANAGEMENT	
Department: 301-0100 PUBLIC WORKS ADMIN	
6604-301-0100-61302000	61.33
6604-301-0100-61303000	606.31
6604-301-0100-61305000	860.63
6604-301-0100-61306000	22.49
6604-301-0100-61309000	5.24
6604-301-0100-61335000	17.25
6604-301-0100-61434000	19.05
Total Fund-Dept: 6604-61434000	6,189.97
Department: 308-0100 STREET DEPARTMENT	
6604-308-0100-61163000	293.56
6604-308-0100-61181000	9.61
6604-308-0100-61186000	48.70
6604-308-0100-61301000	21.01
6604-308-0100-61302000	4.91
6604-308-0100-61303000	49.97
6604-308-0100-61305000	109.41
6604-308-0100-61306000	1.75
6604-308-0100-61309000	0.72
6604-308-0100-61335000	1.30
6604-308-0100-61434000	1.32
Total Fund-Dept: 6604-61434000	542.26
Department: 374-0100 ADMINISTRATION	
6604-374-0100-61153000	247.21
6604-374-0100-61181000	19.22
6604-374-0100-61185000	1.16
6604-374-0100-61301000	16.04
6604-374-0100-61302000	3.76
6604-374-0100-61303000	38.00
6604-374-0100-61305000	70.79
6604-374-0100-61306000	1.52
6604-374-0100-61309000	0.44
6604-374-0100-61335000	1.30
6604-374-0100-61434000	1.14
Total Fund-Dept: 6604-61434000	400.58
Department: 581-0100 CENT MAINTENANCE	
6604-581-0100-61136000	133.82
6604-581-0100-61165000	122.88
6604-581-0100-61181000	4.33
6604-581-0100-61301000	15.24
6604-581-0100-61302000	3.57
6604-581-0100-61303000	37.07
6604-581-0100-61305000	91.49
6604-581-0100-61306000	1.65
6604-581-0100-61309000	0.56
6604-581-0100-61335000	1.24
6604-581-0100-61434000	1.27
Total Fund-Dept: 6604-61434000	413.12

GL Number	Amount
Fund: 6604 SOLID WASTE MANAGEMENT	
Total Fund 6604:	12,519.27
Report Total:	574,278.75

To: Town Council

From: Patricia Abbott, Controller

Meeting Date: May 4, 2026

Subject: Ordinance #2009: Additional Appropriation (2)

Summary

First reading on the ordinance was held at the April 20, 2026 meeting. Additional appropriations were being sought in two funds: Riverboat, and Cumulative Capital Development.

The procedure for securing additional appropriations requires a public hearing, scheduled for this evening, and the adoption of an ordinance by the Town Council. Riverboat is considered a reporting only fund, and the appropriations will go into effect upon passage of the ordinance. Cumulative Capital Development is considered a Controlled Fund. Once the ordinance is adopted, the request will be submitted to the Department of Local Government Finance which will issue its determination within ten days.

Financial Impact

Funding Source: See memo
Budgeted Amount:
Cost:

Recommended Council Action

Conduct a public hearing.

Under Old Business:

By motion and roll call vote, adopt Ordinance 2009 on second reading, as presented.

Attachments:

1. Ordinance 2009 Additional Appropriations
2. Certified Copy of Additional Appropriations 2026-2

ORDINANCE 2009

AN ORDINANCE FOR THE ADDITIONAL APPROPRIATION OF FUNDS FOR THE YEAR 2026 (2)

WHEREAS, The use and expenditure of money is required to carry on necessary governmental functions; and

WHEREAS, The amount of money to carry on necessary governmental functions is prescribed in the budget for the year 2026 as determined by the Department of Local Government Finance through their budget order; and

WHEREAS, The Town Council of the Town of Munster, Lake County, Indiana, now finds it necessary to appropriate more money than the amount prescribed in the budget for the year 2026; and

WHEREAS, There are sufficient funds available for additional appropriation; now, therefore, be it

ORDAINED, By the Town Council of the Town of Munster, Lake County, Indiana, that for the expenses of the taxing unit, the additional sums of money are hereby appropriated out of the funds named in the attached Certified Copy of Additional Appropriations subject to laws governing the same:

ORDAINED AND ADOPTED by the Town Council of the Town of Munster on the 4th day of May 2026, by a vote of _____ in favor and ____ opposed.

TOWN COUNCIL OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

_____
Joseph Hofferth, President

ATTEST:

_____
Wendy Mis, Clerk-Treasurer

CERTIFIED COPY OF ADDITIONAL APPROPRIATION
State Form 55819 (R4 / 2-19)
PRESCRIBED BY THE DEPARTMENT OF LOCAL GOVERNMENT FINANCE

Section I

When reporting the appropriation of bond proceeds, complete Section I; lines A, B, C and 5 of Section II; Section III; and Section IV.

UNIT NAME: TOWN OF MUNSTER
COUNTY NAME: LAKE

Unit Number: 0507
County Number: 45

Date of Publication *(month, day, year)*: 4/17/2026 Newspaper Name: Gateway
Date of Publication *(month, day, year)*: Newspaper Name:
Date of Public Hearing *(month, day, year)*: 5/4/2026
Date Resolution Passed *(month, day, year)*: 5/4/2026

DLGF USE ONLY
Date Received *(month, day, year)*:
Order Number:

Section II

Complete a column for each fund for which the additional appropriations are being made. Values omitted from the sheet may impact the Department's review and approval of the request. Rows A and B should be completed using the fund number and fund name as listed on the Fund Report of the Final 1782 Notice issued by the Department.

A. DLGF Fund Number	4402	4437			
B. Fund Name	Cumulative Capital Development	Riverboat			
C. Appropriation Amount Requested	$393,650.00	$31,100.00			
D. Amount by Reduction *(Enter as a positive number)*					
E. Net Amount of Increase *(C minus D)*	$393,650.00	$31,100.00	$0.00	$0.00	$0.00
1. Property Tax Levy (Line 16)	$1,138,244.00	$0.00	$0.00		$0.00
2. Levy Excess (Line 15)	$0.00	$0.00	$0.00		$0.00
3. PTRC from Local Income Tax (LIT) (Line 13A)	$0.00	$0.00	$0.00	$0.00	$0.00
4. LIT Levy Freeze Amount (Line 13B)		$0.00	$0.00		$0.00
5. Misc. Revenue (Line 8B) *(See Note #1)*	$75,576.00	$170,000.00	$0.00		
6. January 1 Cash Balance *(Include investments)*	$1,823,659.00	$827,409.00			
7. Subtotal of Funds *(Add 1 thru 6)*	$3,037,479.00	$997,409.00	$0.00	$0.00	$0.00
8. Less Circuit Breaker *(Amount From Circuit Breaker Report)*					
9. Total Funds *(7 minus 8)*	$3,037,479.00	$997,409.00	$0.00	$0.00	$0.00
10. DLGF Approved Budget (Line 1C)	$685,868.00	$145,000.00	$0.00	$0.00	
11. Encumbered Appropriations Carried Forward From Previous Year					
12. Temporary Loans Outstanding as of January 1	$0.00	$0.00	$0.00	$0.00	
13. Beginning Obligations *(Add 10 thru 12)*	$685,868.00	$145,000.00	$0.00	$0.00	$0.00
14. Surplus Funds *(9 minus 13)*	$2,351,611.00	$852,409.00	$0.00	$0.00	$0.00
15. Previous additional appropriation(s) approved since January 1, less any reductions in appropriations.	$0.00	$0.00			
16. Amount transferred to the Rainy Day Fund *(See Note #2)*	$0.00	$0.00	$0.00	$0.00	
17. Surplus Funds Remaining *(14 minus 15 minus 16)*	$2,351,611.00	$852,409.00	$0.00	$0.00	$0.00

Note #1: If amount report on Row 5 is higher than 8B amount, then a revised Budget Form 2 must be attached with the Additional Appropriation Request.
Note #2: Row 16 cannot be used for additional appropriations for the rainy day fund. Transfers to the rainy day fund are entered as miscellaneous revenues on Line 5.

Section III

Please check the requested method for the Department to inform your unit of the status of the Additional Appropriation Request.

Check One:
☐ Follow Up Via E-mail — wmis@munster.in.gov ; pabbott@munster.in.gov (E-mail Address(es))
☐ Follow Up Via Mail — (Mailing Address *(Number, Street, City, State, ZIP Code)*)

Section IV

I, Wendy Mis *(Please Print)*, fiscal officer of Town of Munster *(Please Print)*, do hereby certify that the above information is true and correct.

Signature: Wendy Mis | Title: Clerk-Treasurer | Telephone Number: 219 836 6945 | Date *(month, day, year)*: 4-20-2026

Completed additional appropriation requests may be submitted to the Department via e-ma AdditionalAppropriationRequests@dlgf.in.gov or via fax (317) 974-1629.

To: Town Council

From: Patricia Abbott, Controller

Meeting Date: May 4, 2026

Subject: Ordinance #2011: Amending Ordinance #1841-MPD Special Revenue Fund

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Summary

Ordinance 2011 had first reading at the April 20, 2026, meeting. The ordinance will allow for the vehicle stipend to go into the Munster Police Department Special Revenue Fund. The ordinance will also update the assigned fund number.

For ease of practical application, the ordinance as written will repeal the original language and replace it with the new language. Ordinance 1841 is attached for reference to the original language.

Financial Impact

None

Recommended Council Action

By motion and voice vote, adopt introduced Ordinance 2011 on second reading as presented.

Attachments:

1. Ordinance 2011: Amending Ordinance 1841 for MPD Special Revenue Fund

ORDINANCE 2011

AN ORDINANCE TO AMEND ORDINANCE 1841 WHICH ESTABLISHED THE TOWN OF MUNSTER POLICE DEPARTMENT SPECIAL REVENUE FUND

WHEREAS, the Town Council of the Town of Munster, Indiana adopted Ordinance 1841 on October 4, 2021, creating the Munster Police Department Special Revenue Fund; and,

WHEREAS, the Munster Police Department Special Revenue Fund was originally created to track monies and fees received from fingerprint service fees, towing release service fees, and any other Records services fees; and,

WHEREAS, another revenue source for the fund has been identified that is not permitted under the current Ordinance 1841; and,

WHEREAS, the fund number designation cited in Ordinance 1841 has been changed based on Indiana State Board of Accounts requirements; now, therefore, be it

ORDAINED, By the Town Council of the Town of Munster, Lake County, Indiana, that Ordinance 1841 is hereby repealed and deleted in its entirety and replaced with the following.

The Munster Police Department Special Revenue Fund 2593 is created as follows:

1. That there is hereby established that any monies received from the Fingerprint Service Fee, Towing Release Service Fee, any other Records Service Fees, and any vehicle allowance issued by the High Intensity Drug Trafficking Areas (HIDTA) be deposited into a Police Department Special Revenue Fund 2593.
2. That the monies deposited into a Police Department Special Revenue Fund 2593 shall be utilized and expended only for the non-budgeted purposes of police public safety and police public safety related matters.
3. That the Clerk-Treasurer of the Town of Munster, Indiana, is authorized and directed to take all appropriate and required steps to establish said a Police Department Special Revenue Fund 2593 in conformance and compliance with all applicable law, as amended from time to time.
4. That all existing Town Code Sections and Ordinances, or parts thereof, in conflict with the provisions of the Ordinance, are hereby deemed null, void, and of no legal effect, and are specifically repealed.
5. That if any section, clause, provision, or portion of this Ordinance shall be held to be invalid of unconstitutional by any Court of competent jurisdiction, such decision shall not affect any other section, provision, or portion of this Ordinance.
6. That this Ordinance shall be in full force and effect, from and after its passage by the Town Council of the Town of Munster, Lake County, Indiana.

ADOPTED AND PASSED this 4th day of May 2026, by a vote of ___ in favor and ___ opposed.

TOWN COUNCIL OF THE TOWN OF MUNSTER, LAKE COUNTY INDIANA

_____
Joe Hofferth, President

ATTEST:

_____
Wendy Mis, Clerk-Treasurer

To: Town Council

From: Sergio Mendoza, Community Development Director

Meeting Date: May 4, 2026

Subject: Ordinance #2010: Centennial Village PUD Amendment

Summary

The purpose of this memo is to request Town Council consideration of an Ordinance to repeal Ordinance 1659; Ordinance 1709; Ordinance 1911 and; Ordinance 1930, and replace it with Ordinance 2010, CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT DISTRICT, generally located at the northeast corner and southeast corner of Calumet Avenue and 45th Avenue, primarily impacting parcel No. 45-07-30-351-006.0000-027, Munster, IN 46321 (PC25-016).

Mr. Matthew Kimmel of Centennial Village LLC is seeking to amend the Centennial Village Planned Unit Development with proposed Ordinance No. 2010, CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT DISTRICT – initially rezoned under Ordinance No. 1598

Mr. Kimmel's proposed amendment would change the Centennial Village Design Standards by modifying the sign standards for all of Centennial Village Development. As well as the size, location, and shape of lots and buildings on lot C, to be replated as LOTS 10, 11, 12, 13 OF CENTENNIAL VILLAGE RESUBDIVISION OF LOT C to include four new buildings and uses:

- Building A = Grocer
- Building A.1 = Bank
- Building A.2 = Retail/Office
- Building A.3 = Office

Mr. Kimmel and representatives appeared before the Plan Commission on October 14, 2025 for a Preliminary Hearing, and Public Hearings were held for the proposed amendment to the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT on December 9, 2025, January 13, 2026, February 10, 2026, and March 10, 2026. No public comments were received. At the conclusion of the March 10, 2026, Public Hearing, the Plan Commission voted (6) in favor and (0) opposed to forward a favorable recommendation to the Town Council. On April 14, 2026, the Plan Commission voted to approve PC25-016 Findings of Fact and the March 10, 2026, Plan

Commission minutes.

Financial Impact

Funding Source:
Budgeted Amount:
Cost:

Recommended Council Action
The Munster Plan Commission recommends the following:

By motion and roll call vote, approve Ordinance No. 2010 thereby repealing Ordinance 1659; Ordinance 1709; Ordinance 1911; Ordinance 1930 and amending the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT by replacing it with Ordinance No. 2010: CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT DISTRICT.

The complete official record of the commission is attached.

Attachments:
1. Certification to TC of PC25-016 Record and Action - Centennial Village PUD Replacement Ord.
2. Ord. to Repeal & Replace PUD Ord- Centennial Village (2026-04-16 - FINAL)
3. Ordinance No. 1598 (July 22, 2013)
4. Ordinance No. 1659 (June 8, 2015)
5. Ordinance No. 1709 (March 6, 2017)
6. Ordinance No. 1911 (August 21, 2023)
7. Ordinance No. 1930 (December 3, 2023)
8. PUD Application and Supporting Documents
9. October PC Agenda (Preliminary Hearing)
10. October Staff Report (Preliminary Hearing)
11. October PC Minutes-Signed (Preliminary Hearing)
12. November PC Agenda (Preliminary Hearing)
13. November Staff Report (Prememinary Hearing)
14. November PC Minutes- Signed (Preliminary Hearing)
15. December PC Agenda (Public Hearing)
16. December Staff Report (Public Hearing)
17. December PC Minutes-Signed (Public Hearing)
18. January PC Agenda (Cont. Public Hearing)
19. January Staff Report (Cont. Public Hearing)
20. January PC Minutes-Signed (Cont. Public Hearing)
21. February PC Agenda (Cont. Public Hearing)
22. February Staff Report (Cont. Public Hearing)
23. February PC Minutes (Cont. Public Hearing)

24. March PC Agenda (Cont. Public Hearing)
25. March Staff Report (Cont. Public Hearing)
26. March PC Minutes-Signed (Cont. Public Hearing)
27. Centennial Village PUD Amend.CV Design Standards Revised 03.23.2026
28. April PC Agenda
29. PC25-016 Findings of Fact-Signed

CERTIFICATION OF RECORD AND ACTION
OF THE TOWN OF MUNSTER PLAN COMMISSION

The undersigned, as a duly authorized custodian of records for the Community Development Department of the Town of Munster, Lake County, Indiana, being duly sworn upon his oath, and having personal knowledge of the records attested to herein, hereby represents and certifies that the attached copies of records for which this certification is made, consisting of:

> The complete record of the Town of Munster Advisory Plan Commission Docket No. 25-016 in 1906 pages (not including this certification), are true and complete reproductions of the records that are housed in the Community Development Department of the Town of Munster, Lake County, Indiana.

I certify that the above record includes all documents before the Town of Munster Plan Commission when it took official action on March 10, 2026, at a properly noticed meeting at which a quorum of the members was present.

Sergio Carrera Mendoza
Town of Munster Planning Director and
Plan Commission Executive Secretary

TOWN OF MUNSTER, LAKE COUNTY, INDIANA

ORDINANCE NO. 2010

AN ORDINANCE REPEALING ORDINANCE NOS. 1659, 1709,1911, AND 1930, AND REPLACING WITH *AN ORDINANCE CONSOLIDATING AND UPDATING THE CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT DISTRICT DESIGN STANDARDS* APPLICABLE TO THE CENTENNIAL VILLAGE PUD DISTRICT, AS A SUPPLEMENT TO THE ZONING ORDINANCE OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

WHEREAS, the Town of Munster has established zoning regulations, which are codified in Chapter 26 of the Munster Code of Ordinances and have been amended from time to time; and

WHEREAS, on July 22, 2013, the Town Council of the Town of Munster, Indiana adopted Ordinance No. 1598 approving the Centennial Village Planned Unit Development, thereby establishing the Centennial Village Planned Unit Development District (the "PUD District"), rezoning four (4) parcels of land located generally adjacent to 9505 Calumet Avenue as depicted on the survey attached to Ordinance No. 1598; and amending the Munster Zoning Map to reflect the PUD District, which parcels have since been subdivided and are presently described as follows:

A. Common address: 9651 Calumet Avenue, Munster, IN 46321
Owner: CPV Partners, LLC
Parcel No.: 45-07-30-352-008.000-027
Legal description:

> LOT 1 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

B. Common address: 9625 Calumet Avenue, Munster, IN 46321
Owner: CV BDG D, LLC
Parcel No.: 45-07-30-352-007.000-027
Legal description:

> LOT 2 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

C. Common address: 9611 Calumet Avenue, Munster, IN 46321
Owner: CV BDG C, LLC
Parcel No.: 45-07-30-352-006.000-027
Legal description:

> LOT 3 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

D. Common addresses: 9610 N. Centennial Drive, Munster, IN 46321
Parcel Nos.: 45-07-30-353-**001**.000-027 through 45-07-30-353-**070**.000-027 (70 LOTS)
Owner: CV BDG G, LLC and various condominium owners
Legal description:

CENTENNIAL VILLAGE - BUILDING G RESIDENTIAL CONDOMINIUM UNIT PURSUANT TO THE TERMS AND CONDITIONS OF THE DECLARATION OF CENTENNIAL VILLAGE - BUILDING G RESIDENTIAL CONDOMINIUM RECORDED AS DOCUMENT 2021-53790 ON NOVEMBER 10, 2021 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA, AND LOCATED ON LOT 4 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

E. Common address: 9620 N. Centennial Drive, Munster, IN 46321
Owner: Centennial Village, LLC
Parcel No.: 45-07-30-352-011.000-027;
Legal description:

LOT 5 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

F. Common address: 9601 Calumet Avenue, Munster, IN 46321
Owner: CV BDG B, LLC
Parcel No.: 45-07-30-352-012.000-027;
Legal description:

LOT 6 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS PER PLAT THEREOF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

G. Common address: 9600 N. Centennial Drive, Munster, IN 46321
Owner: CV BDG F, LLC
Parcel No.: 45-07-30-352-013.000-027;
Legal description:

LOT 7 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS PER PLAT THEROF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

H. Common address: 9601 N. Centennial Drive, Munster, IN 46321
Owner: CV BDG I, LLC
Parcel No.: 45-07-30-352-014.000-027
Legal description:

LOT 8 IN CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS SHOWN IN PLAT BOOK 117, PAGE 60, RECORDED AS DOCUMENT NUMBER

2023-028515 ON OCTOBER 13, 2023 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

I. Common address: 9605 N. Centennial Drive, Munster, IN 46321
Owner: CV BDG M, LLC
Parcel No.: 45-07-30-352-015.000-027
Legal description:

LOT 9 IN CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS SHOWN IN PLAT BOOK 117, PAGE 60, RECORDED AS DOCUMENT NUMBER 2023-028515 ON OCTOBER 13, 2023 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

J. Common address: 9505 Calumet Avenue, Munster, IN 46321
Owner: Centennial Village, LLC
Parcel No.: 45-07-30-352-005.000-027
Legal description:

LOT "A" IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA, EXCEPTING THEREFROM, ALL OF LOT 4 AND LOT 5 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA, AND ALSO EXCEPTING THEREFROM, ALL OF LOT 6 AND LOT 7 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", AS PER PLAT THEREOF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

K. Common Address: East of Calumet Ave. & South of 45th St., Munster IN 46321
Owner: Town of Munster Municipal Center Corporation
Parcel No.: 45-07-30-352-009.000-027
Legal description:

LOT "B" IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

L. Common address: 9505 Calumet Avenue, Munster, IN 46321
Owner: CV BDG A, LLC
Parcel No.: 45-07-30-351-006.000-027;
Legal description:

LOT "C" IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

(Hereafter, jointly referred to as the "Property");

WHEREAS, Ordinance 1598 was subsequently amended by Ordinance No. 1659 (June 8, 2015), Ordinance No. 1709 (March 6, 2017), Ordinance No. 1911 (August 21, 2023) and Ordinance No. 1930 (December 3, 2023), to establish various standards for bulk, design, and uses in the PUD District;

WHEREAS, Matt Kimmel, the Managing Member of CV BDG A, LLC; CV BDG B, LLC; CV BDG C, LLC; CV BDG D, LLC; CV BDG F, LLC; CV BDG I, LLC; CV BDG M, LLC; CPV Partners, LLC; CV Development, LLC; and Centennial Village, LLC, as owner of the majority of the Properties, seeks to repeal Ordinance No. 1659 (June 8, 2015), Ordinance No. 1709 (March 6, 2017), Ordinance No. 1911 (August 21, 2023) and Ordinance No. 1930 (December 3, 2023), and replace them with a single ordinance that consolidates and updates the standards for bulk, design, and uses for all lots in the PUD District;

WHEREAS, the Plan Commission of the Town of Munster has heretofore on December 9, 2025, January 13, 2026, February 10, 2026, and March 10, 2026 held a public hearing for PC25-016 pursuant to notice as prescribed by applicable law, and after due deliberation, voted to send to the Town Council of the Town of Munster a favorable recommendation to approve Petitioner's proposed Ordinance consolidating and updating the Centennial Village Planned Unit Development District Design Standards*;* and

WHEREAS, the adoption of the proposed *Ordinance Consolidating and Updating* t*he Centennial Village Planned Unit Development District Design Standards* would be a supplement to the Town's Zoning Ordinance codified at Chapter 26 of the Munster Code of Ordinances.

NOW, THEREFORE, BE IT ORDAINED BY THE TOWN COUNCIL OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA:

1. Ordinance No. 1659, enacted June 8, 2015, is hereby repealed and deleted in its entirety.

2. Ordinance No. 1709, enacted March 6, 2017, is hereby repealed and deleted in its entirety.

3. Ordinance No. 1911, enacted August 21, 2023, is hereby repealed and deleted in its entirety.

4. Ordinance No. 1930, enacted December 3, 2023, is hereby repealed and deleted in its entirety.

5. Ordinance Nos. 1659, 1709, 1911, and 1930 are hereby replaced with the following:

   > ***AN ORDINANCE CONSOLIDATING AND UPDATING THE CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT DISTRICT DESIGN STANDARDS,*** attached hereto in fifty-two (52) pages and incorporated herein as Exhibit "A",

   and which is hereby ordained and approved and shall be codified at Chapter 26 of the Town of Munster Code of Ordinances.

6. The standards for bulk, design, and uses included in the *Ordinance Consolidating and Updating the Centennial Village Planned Unit Development District Design Standards* in Exhibit "A" shall be applicable to all lots in the Centennial Village Planned Unit Development District*,* instanter.

7. This Ordinance shall be recorded with the Office of the Lake County Recorder and shall further be identified on any subsequent Final Plat of Subdivision for any lot within the PUD District by the Ordinance Number and the Lake County Recording Number.

DULY ORDAINED and **APPROVED** by the Town Council of the Town of Munster, Lake County, Indiana, this ____ day of _____ 2026 by a vote of _____ in favor and _____ opposed.

TOWN OF MUNSTER, LAKE COUNTY, INDIANA
BY ITS TOWN COUNCIL:

By: _____
Joseph Hofferth, President

ATTEST:

_____
Wendy Mis, Clerk-Treasurer

Attachment: Ex. A - ***An Ordinance Consolidating and Updating the Centennial Village Planned Unit Development District Design Standards,*** **in 52 pages.**

I affirm under penalties of perjury that I have taken reasonable care to redact each social security number in this document, unless required by law. */s/ Nicole A. Bennett*

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017
(Subsequently approved by Munster Ord. No. 1709)

Revised August 21, 2023
(Subsequently approved by Munster Ord. No. 1911)

Revised March 23, 2026
(Subsequently approved by Munster Ord. No. _____;
repeal and replace of Ord. Nos. 1659, 1709, 1911, & 1930)

Design Standards
Centennial Village Planned Unit Development

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Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster’s 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to ensure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail/Offices – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	3	50	5	5	5
O	Hotel	5	80	5	5	5

Building Lot A, A.1, A.2 and A.3 are located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F, & I are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pennsy Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pennsy Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines, so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Structural Brick: permitted only on Lot 11
c. Natural Masonry and Architectural Cast Stone
d. Architectural Metal Panels
e. Glass & Store Front Aluminum Window & Door Frames
f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 5th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 25% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 25% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 5th Floor Level Exterior Walls. The 2nd to 5th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 5th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 75% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5h Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

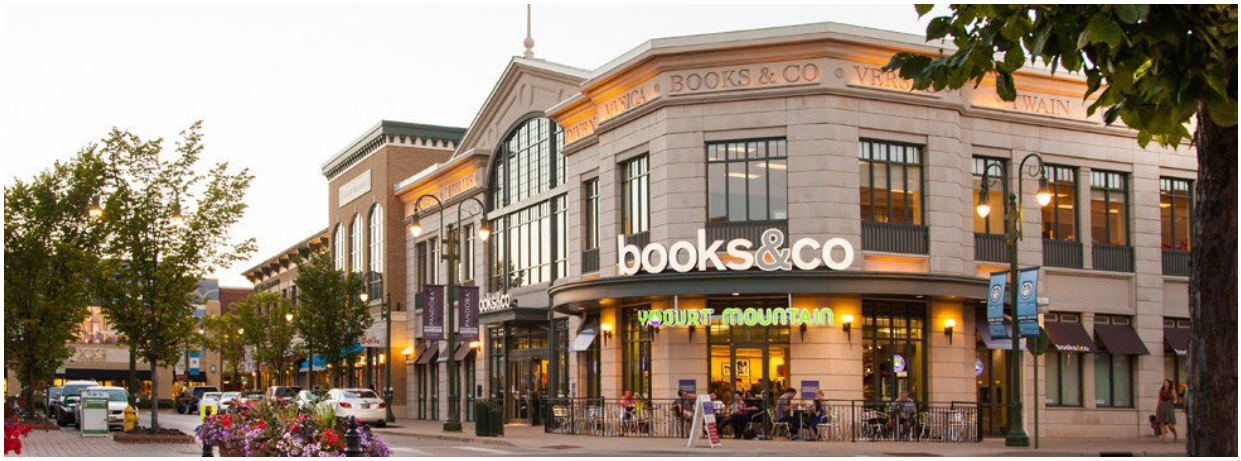
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail/Offices – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retail – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	3	Class 1 & 2	Class 3 & 4
O	Hotel	5	Class 1 & 2	Class 3 & 4

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design, and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

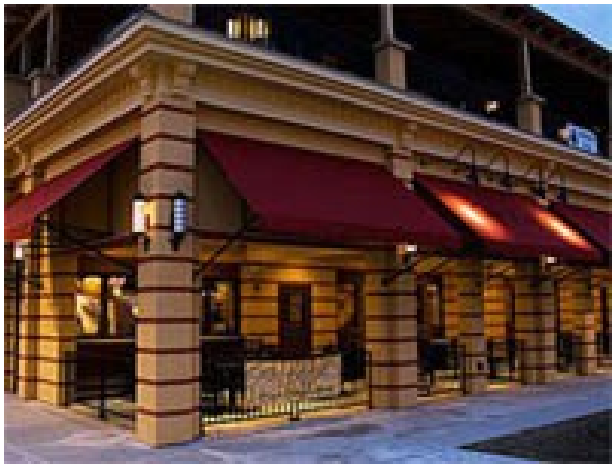
5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster’s 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster’s 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named “Centennial Drive” will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the

existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thoroughfare named “Village Parkway” extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pennsy Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pennsy Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pennsy Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

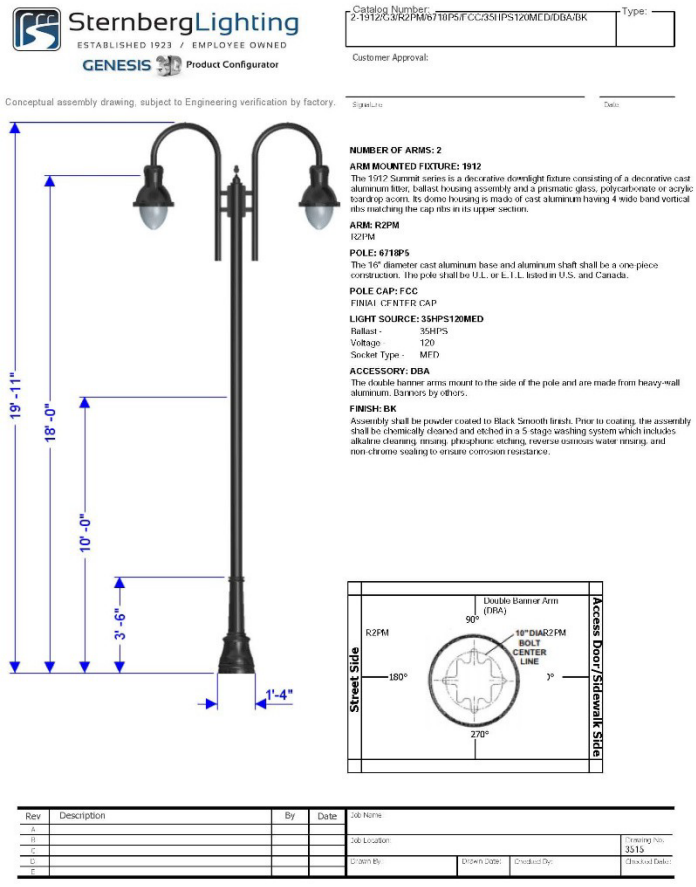
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. No “shoe box” style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. No “shoe box” style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No “shoe box” wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amelanchier Arborea
Common Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigela	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Arborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as “Invasive Species” as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3’) (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

Section 11 – Signage

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.
4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.

5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premises advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.

24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.
25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display, illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.
39. **Storefront:** The façade of a business space that contains a public entrance.

40. **Streamer**: A long, narrow flag, banner or pennant.
41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides, and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The verhcal distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any arhficial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.
2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.

3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf, and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed, and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or
        2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.
    b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.
d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **ProjecTng Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projechng sign per business and must be spaced at a minimum of 15 feet from other projechng or blade signs. Projechng signs are only permined where the business does not have a blade sign.
    a. **Small ProjecTng Sign(s)**: May only be installed on the first story of a building. Must be 8 o above the sidewalk elevahon. Sign area may not exceed 10 sf with a maximum height of 3 o and must not project more than 4 o from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
    b. **Large ProjecTng Sign(s)**: May only be installed on buildings with mulhple stories and may not be installed on the first story. Sign shall be verhcally oriented with the height greater than the projechon of the sign. Must be 12 o above the sidewalk elevahon. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 o from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.
10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.
11. **“Open” Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.
12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.
13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The material must be the general material sign standard compatible and consistent with the materials used to construct the building.
14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10”. The sign area must not exceed 75% of the canopy or awning

vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.

15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7’-8” is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3’-11” from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8”. Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side, and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.
20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings

and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.
19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required
It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit
Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits
It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code
All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code
All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance
The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs
Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.
4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.

7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.



Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsy Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NIPSCO
Gas	NIPSCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster’s administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Section 18 – Other Standards

Any standards not identified in this PUD, shall default to the Town of Munster current Ordinances and Zoning Codes, as amended.

Section 19 - Concept Site Development Plans & Building Sizes

The Centennial Village PUD building sites consist of the building sizes (sq.ft) listed below. These building sizes are approximate and can vary slightly. Each building site's final building size shall be approved during the Final Site Development Plan Approval process following Chapter 26 of the Town of Munster Land Development Code, as amended.

Building A:	23,300 sq.ft	**Building K:**	71,040 sq.ft
Building A.1:	4,300 sqf.ft	**Building L:**	5,000 sq.ft
Building A.2:	10,300 sq.ft	**Building M:**	6,950 sq.ft
Building A.3:	28,800 sq.ft	**Building N:**	34,000 sq.ft
Building B:	13,833 sq.ft	**Building O:**	98,480 sq.ft
Building C:	6,600 sq.ft		
Building D:	8,400 sq.ft		
Building E:	57,560 sq.ft		
Building F:	5,400 sq.ft		
Building G:	77,920 sq.ft		
Building H:	74,000 sq.ft		
Building I:	22,188 sq.ft		
Building J:	71,040 sq.ft		

Note: Square footage (sq.ft) of buildings listed above is the total, regardless of the number of floors in each building.

Current Overall Concept Site Development Plan



Previous Overall Concept Site Development Plan



Previous Overall Concept Site Development Plan



Previous Overall Concept Site Development Plan



Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Section 20 – Centennial Village PUD Legal Descriptions

The Centennial Village Planned Unit Development in the Town of Munster was approved and created on July 22, 2013 by the passage of Town of Munster Ordinance No. 1598. Ordinance 1598 rezoned the identified parcels of land to the Centennial Village Planned Unit Development District ("PUD District ") and the Town of Munster Zone Map was amended accordingly. With the passage of time, the parcels in the PUD District have been platted (and replatted), and as of the effective date of these PUD Design Standards, are legally described as follows:

A. Common address: 9651 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-008.000-027
Legally described as:

LOT 1 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

B. Common address: 9625 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-007.000-027
Legally described as:

LOT 2 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

C. Common address: 9611 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-006.000-027
Legally described as:

LOT 3 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

D. Common addresses: 9610 N. Centennial Drive, Munster, IN 46321
Parcel Nos.: 45-07-30-353-**001**.000-027 through 45-07-30-353-**070**.000-027 (70 LOTS)
Legally described as:

CENTENNIAL VILLAGE - BUILDING G RESIDENTIAL CONDOMINIUM UNIT PURSUANT TO THE TERMS AND CONDITIONS OF THE DECLARATION OF CENTENNIAL VILLAGE - BUILDING G RESIDENTIAL CONDOMINIUM RECORDED AS DOCUMENT 2021-53790 ON NOVEMBER 10, 2021 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA, AND LOCATED ON LOT 4 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", A PLANNED

UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

E. Common address: 9620 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-011.000-027;
Legally described as:

LOT 5 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT “A”, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

F. Common address: 9601 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-012.000-027;
Legally described as:

LOT 6 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT “A”, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS PER PLAT THEREOF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

G. Common address: 9600 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-013.000-027;
Legally described as:

LOT 7 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT “A”, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS PER PLAT THEROF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

H. Common address: 9601 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-014.000-027
Legally described as:

LOT 8 IN CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT “A”, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS SHOWN IN PLAT BOOK 117, PAGE 60, RECORDED AS DOCUMENT NUMBER 2023-028515 ON OCTOBER 13, 2023 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

I. Common address: 9605 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-015.000-027
Legally described as:

LOT 9 IN CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT “A”, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS SHOWN IN PLAT BOOK 117, PAGE 60, RECORDED AS DOCUMENT NUMBER 2023-028515 ON OCTOBER 13, 2023 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

J. Common address: 9505 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-005.000-027
Legally described as:

LOT “A” IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA, EXCEPTING THEREFROM, ALL OF LOT 4 AND LOT 5 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT A, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA, AND ALSO EXCEPTING THEREFROM, ALL OF LOT 6 AND LOT 7 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT “A”, AS PER PLAT THEREOF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

K. Common Address: East of Calumet Ave. & South of 45th St., Munster IN 46321
Parcel No.: 45-07-30-352-009.000-027
Legally described as:

LOT “B” IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

L. Common address: 9505 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-351-006.000-027;
Legally described as:

LOT “C” IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

Upon final plat approval, to be known as:

LOTS 11, 12, 13, AND 14 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT “C”, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

ORDINANCE NO. 1598

AN ORDINANCE AMENDING THE ZONING MAP OF THE TOWN OF MUNSTER AND REZONING CERTAIN REAL ESTATE PLANNED UNIT DEVELOPMENT

WHEREAS, Centennial Village, LLC has applied for rezoning of certain real estate legally described in Exhibit A and located generally adjacent to 9505 Calumet Avenue as a Planned Unit Development; and

WHEREAS, the Munster Plan Commission held a public hearing on the application of Centennial Village, LLC on June 11, 2013 to rezone the property to Planned Unit Development; and

WHEREAS, the Munster Plan Commission received master plan and specifications for the Planned Unit Development; and

WHEREAS, after reviewing the testimony, evidence and materials submitted at the public hearing, the Munster Plan Commission adopted Findings of Fact finding that the proposed Planned Unit Development meets the requirements of Munster Town Code Section 26-752, Section 26-754, and Section 26-757 for the establishment of a Planned Development; and

WHEREAS, following the public hearing and the adoption of such findings the Munster Plan Commission favorably recommended rezoning of the property to Planned Unit Development.

NOW, THEREFORE, BE IT ORDAINED by the Town Council as follows:

1. The property described in Exhibit A attached hereto is rezoned Planned Unit Development and the Munster zoning map shall be amended accordingly.

2. The Planned Unit Development shall be subject to all plans and specifications submitted as a development plan to the Munster Plan Commission which are incorporated herein.

3. Any amendment of the development plan shall require approval by the Plan Commission following public hearing and notice to all interested parties.

4. The development plan of the Planned Unit Development shall be subject to final engineering approval of the Town.

5. All phases of the development plan submitted shall be completed within five years unless said time is extended by action by the Munster Plan Commission.

PASSED AND ADOPTED by the Town Council for the Town of Munster, Lake County, Indiana, this 22nd day of July, 2013 by a vote of 4 in favor and 0 opposed.

TOWN COUNCIL OF THE TOWN OF MUNSTER, INDIANA

By: _____
President

ATTEST:

By: _____
Clerk-Treasurer

EXHIBIT A



08-315_2012-05-18 Calculations For Conservation Easement.dwg

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ROBINSON ENGINEERING, LTD.
CONSULTING REGISTERED PROFESSIONAL ENGINEERS
AND PROFESSIONAL LAND SURVEYORS
17000 SOUTH PARK AVENUE SOUTH HOLLAND, ILLINOIS 60473
(708) 331-6700 FAX (708) 331-3826
ILLINOIS DESIGN FIRM REGISTRATION NO. 184001128.

ORDINANCE NO. 1659

AN ORDINANCE AMENDING THE CENTENNIAL VILLAGE, LLC PLANNED UNIT DEVELOPMENT

WHEREAS, Centennial Village, LLC (Developer) is the owner of certain property in Munster located generally at 9505 Calumet Avenue which has previously been approved and rezoned as the Centennial Village Planned Unit Development; and

WHEREAS, Developer has requested an amendment to the approved Planned Unit Development providing for the revised Centennial Village Development Plan dated May 11, 2015; and

WHEREAS, Developer's request for Amendment to the approved Planned Unit Development was presented to the Munster Plan Commission on April 14, 2015, pursuant to public notice as required by law; and

WHEREAS, after public hearing the Munster Plan Commission voted to favorably recommend the requested amendment to the approved Planned Unit Development.

NOW, THEREFORE, BE IT ORDAINED and ENACTED that:

1. The Centennial Village, LLC Planned Unit Development previously approved by the Munster Town Council is amended to provide for development in accordance with the Centennial Village PUD Amendment #1 dated May 11, 2015; and May 11, 2015 Development Plan which are approved and adopted as the revised Planned Unit Development Plan, and are incorporated and adopted herein; and

2. All Findings of Facts adopted by the Munster Plan Commission; design details; development plan phasing plans and exhibits accepted and adopted by the Munster Plan Commission are incorporated herein and made a part of this Amendment to the Planned Unit Development.

This Amendment shall take effect upon passage.

Enacted this 8th day of June, 2015.

Town Council of the Town of Munster

President

Attest: David F. Shafer
Clerk-Treasurer

ORDINANCE NO. 1709

AN ORDINANCE AMENDING THE CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT

WHEREAS, Centennial Village, LLC (Developer) is the Owner of certain property in the Town of Munster located generally at 9505 Calumet Avenue which has previously been approved and zoned as the Centennial Village Planned Unit Development by the Town of Munster; and

WHEREAS, the Developer presented certain amendments to the approved Planned Unit Development to the Munster Plan Commission on December 13, 2016, herein referenced as the Centennial Village PUD Amendment #2; and

WHEREAS, the Centennial Village PUD Amendment #2 has proposed certain amendments to include the "Design Standards for Centennial Village – A Planned Unit Development" dated February 15, 2017 that includes the conditions and recommendations of the Munster Plan Commission and a revised Centennial Village Development Plan dated January 10, 2017; and

WHEREAS, the Munster Plan Commission voted in favor of the Design Standards and Development Plan at a Public Meeting on December 13, 2016 and voted in favor to recommend the Centennial Village PUD Amendment #2 to the Munster Town Council.

NOW, THEREFORE BE IT ORDAINED AND ENACTED THAT:

1. The Centennial Village Planned Unit Development previously approved by the Munster Town Council is amended to provide for development in accordance with the previously approved original Planned Unit Development, the Centennial Village PUD Amendment #1 and the Centennial Village PUD Amendment #2, as recommended by the Munster Plan Commission on December 13, 2016. The collective Planned Unit Development approvals along with the Centennial Village PUD Amendment #2 are hereby approved and adopted and the "Design Standards for Centennial Village – A Planned Unit Development" and Development Plan included in Amendment #2 are incorporated and adopted; herein; and

2. All Findings of Fact and Recommendations adopted by the Munster Plan Commission, including Design Standards Conditions and Exhibits are incorporated herein and made part of the Centennial Village PUD Amendment #2.

This Amendment shall take effect upon passage.

Enacted this 6TH day of MARCH, 2017

Town Council of the Town of Munster

Attest: David F. Shafer
Clerk - Treasurer

ORDINANCE NO. 1911
AN ORDINANCE AMENDING THE CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT

WHEREAS, Centennial Village, LLC (Developer) is the owner of certain property located generally at 9601 and 9605 North Centennial Drive within the Centennial Village Planned Unit Development (PUD) zoning district; and

WHEREAS, Developer has requested an amendment to the approved site plan and landscaping plan for the Planned Unit Development; and

WHEREAS, Developer's request for the amendment to the Centennial Village PUD was presented to the Munster Plan Commission under PC Docket No. 23-013 on July 11, 2023 pursuant to public notice as required by law; and

WHEREAS, after public hearing the Munster Plan Commission voted to favorably recommend the requested amendment to the approved Centennial Village PUD.

NOW, THEREFORE, BE IT ORDAINED by the Munster Town Council that:

The Centennial Village Planned Unit Development previously approved by the Munster Town Council and amended from time to time is further amended to permit the changes to the use, size, location, and shape of Buildings "I" and "M" in accordance with the revised Centennial Village Design Standards, dated July 11, 2023, attached hereto as "Exhibit A".

ORDAINED and **ADOPTED** by the Town Council of the Town of Munster, Indiana on the 21st Day of August, 2023 by a vote of 3 in favor and 0 opposed.

TOWN COUNCIL OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

Chuck Gardiner, President

ATTEST:

Wendy Mis, Clerk-Treasurer

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana


45th St
45TH STREET
CALUMET AVENUE
Drive



Modified and approved within the red hashed line - Conceptual Plan

Design Standards
Centennial Village Planned Unit Development

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Section 13: Screening of Loading & Service Areas
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Section 17: Subdivision of Land and Site Development Approval

Appendices:

1: Centennial Village PUD Final Subdivision Plat
2: Plan of Development
3: Infrastructure Development Plan Set

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All "Prohibited Uses" defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	Retail - Anchor	1	35	30	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	1	35	5	5	5
O	Retail – Single Tenant	1	25	5	5	5

Building Lot A is located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, land M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 4th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 30% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 30% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 4th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 4th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 70% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 4th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

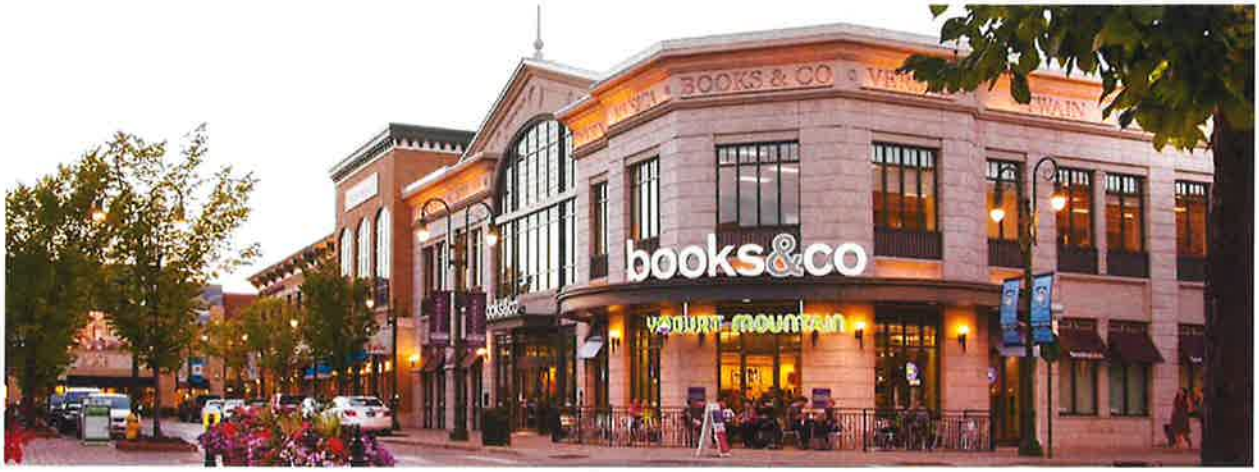
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Retail – Anchor	1	Class 1 & 2	N/A
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	1	Class 1 & 2	N/A
O	Retail – Single Tenant	1	Class 1 & 2	N/A

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

   a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
   b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
   c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
   d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.



4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.

6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No "shoe box" wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet

Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as "Invasive Species" as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current edition of the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs. Additionally, the Centennial Village Planned Unit Development building and site sign design shall comply with the following standards:

1. Prohibited signs:

    a. Signs that extend above the highest point of a roof line
    b. Billboards
    c. Signs painted or mounted upon the exterior side or rear wall of any principal or accessory structure except as otherwise identified in the Design Standards.
    d. Signs which contain blinking, pulsating, flashing, or moving lighting.
    e. Neon Lighting Signs

2. Traffic Control Signs including street name, stop signs, parking signs, directional signs and other traffic control signs that are used to implement public safety and wayfinding within the development shall be of an ornamental design similar to the site lighting posts and fixtures, following the decorative style of the Genesis Series by Sternburg Lighting.

3. No sign shall be located to block or obscure the vision of motor vehicle drivers for safe travel through streets and parking areas.

4. No sign shall be erected, located or maintained to prevent access to any door, window, public walkway or fire escape.

5. Materials and color palettes for signs shall follow the approved materials and colors defined in the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs.

6. A sign located on the main entry door or adjacent to the main entry door identifying the business name, hours of operation, address shall not exceed 6 square feet in total area.

7. Each business within multi-tenant buildings will be permitted one principal sign. Such signs may be wall mounted and with a total sign area as calculated below:

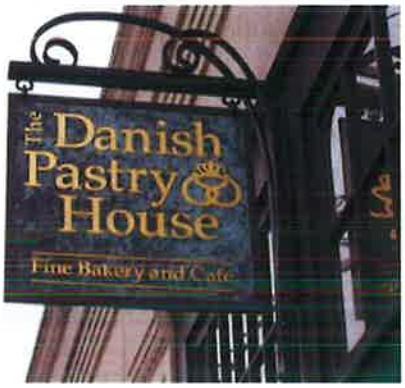
    a. The total area of all signs for each business shall not exceed 1 square foot of sign area for each 30-feet of interior retail or business space, excluding storage area. Each business shall be allowed a minimum of 12-square feet of sign area. The maximum total square footage of sign area for a business shall not exceed:
        i. 75 square feet for businesses having a total gross floor area of 0 square feet to 5,000 square feet.
        ii. 125 square feet for businesses having a total gross floor area of 5,001 square feet to 20,000 square feet.

iii. 200 square feet for businesses having a total gross floor area of 20,001 square feet and larger

8. Signs affixed to the exterior of a building shall be architecturally compatible with the style, composition, materials, colors and details of the building. Box Panel signs shall not be permitted on any building within the development.

9. The location of tenant signs shall be integrated with the building façade design and not obstruct architectural details and wall signs shall not extend more than 12-inches out from the exterior face of the building for "non-projection or non-blade" signs.

10. Projecting and Blade Signs extending perpendicular from the wall of a principal structure may be permitted so long as they do not interfere with clear vision to other adjacent business signs and do not interfere with the safe movement of vehicles and pedestrians. The Centennial Village PUD shall evaluate all requests for Projecting and Blade signs on a case by case basis and determine its approval based on the sign's design, materials and number of adjacent projecting banner signs. Projecting and Blade Signs may not extend a distance greater than 4-feet from a principal structure wall, be a minimum of 8-feet from the bottom of the sign to the top of the sidewalk below, may not exceed a total of 15 square feet and shall be counted against the total maximum business signage area.



11. Awning signs are permitted within the Centennial Village PUD following the approved sign design criteria, standards, materials and colors for awning signs defined in the Town of Munster Ordinance 1679.

12. In cases where businesses have rear or side parking lots or adjoins a public street, an additional sign developed to the same restrictions identified in Section 11 – Signage, shall be permitted only on one side or rear of the building.

13. Business signs shall be permitted to be back lighted or front lighted provided the sign illumination does not cause a nuisance to adjoining businesses and properties.

14. A sign bearing the name of a business of the principal tenant occupying space in the rear or upper floors of a building shall be allowed at the principal structure entrance to the business and the area of such sign identifying such business shall not exceed 4 square feet.

15. Free Standing Monument Signs shall be located and permitted to identify the Centennial Village PUD development areas at the locations as defined below:

    a. Lot A – Identifying the development parcel north of 45th Street
    b. Lot B – Identifying the development parcel south of 45th Street
    c. Lot E – Identifying the development parcel south of 45th Street and the Lot E use

16. Free Standing Monument Signs shall have a maximum total surface area for any display surface of 100 square feet and a maximum height of 6-feet. The calculation of display surface does not include the surface area of the sign structure that the display surface is mounted.

17. All signs and sign structures shall be maintained in good repair and safe condition. The owner of each sign shall be responsible for the proper maintenance of their respective sign. A sign shall be at all times legible, working and safe for the public.

18. No sign shall be constructed within the development unless the sign information has been reviewed and approved by the Centennial Village PUD developer and the proper permits and approvals have been granted by the Town of Munster.

Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side

of Calumet Avenue. The development's water distribution system design will provide a water supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the

45th Street Town of Munster public improvement project. It is anticipated that storm water from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 15 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
45TH STREET
CALUMET AVENUE
CENTENNIAL PARK
BLDG PAD A
70,000sf
BLDG PAD L
BLDG PAD M
BLDG PAD F
5,200sf
BLDG PAD
5,200sf
BLDG PAD B
12,830sf
BLDG PAD J
12,760sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD N
42,175sf
BLDG PAD D
8,500sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
12,760sf
BLDG PAD O
7,000sf
BLDG PAD E
17,160sf



Modified and approved within the red hashed line - Conceptual Plan

Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title "Centennial Village - Phase 1A" and "Centennial Village - Phase 1B"

ORDINANCE NO. 1930

AN ORDINANCE AMENDING THE CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT (PUD) TO THE TOWN OF MUNSTER, INDIANA

WHEREAS, Centennial Village LLC is the owner of certain property in Munster, Indiana located generally at 9615 North Centennial Drive within the Centennial Village Planned Unit Development zoning district, and

WHEREAS, Centennial Village LLC was granted rezoning of certain real estate to a Planned Unit Development, ORDINANCE NO. 1598, and

WHEREAS, Centennial Village Planned Unit Development was amended for design details, development plan, phasing plans, and exhibits, ORDINANCE NO. 1659; and

WHEREAS, Centennial Village Planned Unit Development was amended to adopt the "design Standards for Centennial Village - A Planned Unit Development" and Development Plan, ORDINANCE NO. 1709; and

WHEREAS, Centennial Village Planned Unit Development was amended to permit the changes to the use, size, location, and shape of buildings "I" and "M" generally located at 9601 and 9605 North Centennial Drive, in accordance with revised Centennial Village Design Standards, ORDINANCE NO. 1911; and

WHEREAS, Centennial Village LLC has requested an Amendment to the Centennial Village Planned Unit Development to permit the changes to the use, size, location, and shape of buildings "N" and "O" generally east of North Centennial Drive and south of 9601 and 9605 North Centennial Drive, in accordance with revised Centennial Village Design Standards, and

WHEREAS, Centennial Village LLC amendment request to the Centennial Village Planned Unit Development was presented to the Munster Plan Commission under PC23-021 on October 10, 2023 pursuant to Public Notice as required by law; and

WHEREAS, after a public hearing the Munster Plan Commission voted by a majority to favorably recommend approval for the requested Amendment to the Centennial Village Planned Unit Development; and

WHEREAS, the Munster Plan Commission voted by a majority to accept and approve the Findings of Fact for PC23-021 on November 14, 2023.

NOW, THEREFORE, BE IT ORDAINED by the Munster Town Council that:

1. The Centennial Village Planned Unit Development, generally located at 9615 North Centennial Drive and legally described on Exhibit A, attached hereto, and made part of this Amendment to the Centennial Village Planned Unit Development.

2. All Findings of Fact for PC23-021 adopted by the Munster Plan Commission on November 14, 2023 is amended in accordance with Exhibit B, attached hereto, and made part of this Amendment to the Centennial Village Planned Unit Development.

3. An amended Conceptual Site Plan identified in PC23-021, including a proposed structure location of Building O is amended in accordance with Exhibit C, attached hereto, and made part of this Amendment to the Centennial Village Planned Unit Development.

4. The Centennial Village Planned Unit Development, previously approved by the Town of Munster Town Council and amended from time to time, is further amended to permit the changes to the use, size, location, and shape of Buildings "N" and "O" in accordance with the revised Design Standards Centennial Village - A Planned Unit Development, A Mixed-Use Walkable Lifestyle Community created February 15, 2017, modified July 11, 2023, revised August 21, 2023, and attached hereto as Exhibit D, attached hereto, and made part of this Amendment to the Centennial Village Planned Unit Development.

ORDAINED and ADOPTED by the Town Council of the Town of Munster, Indiana on the

18th Day of December, 2023 by a vote of 5 in favor and 0 opposed.

TOWN COUNCIL OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

Chuck Gardiner, President

ATTEST:

Wendy Mis, Clerk-Treasurer

Exhibit A
Legal Description

LOT A AND LOT B IN CENTENNIAL VILLAGE, AS SHOWN IN PLAT BOOK 110, PAGE 11 IN THE OFFICE OF THE RECORECOREDER OF LAKE COUNTY INDIANA, EXCEPTING THEREFROM SAID LOT A, ALL OF LOT 4 AND LOT 5 IN CENTENNIAL VILLAGE FIRST RESUBDIVSION OF LOT A, AS SHOWN IN PLAT BOOK 111 PAGE 53 IN SAID RECORDER'S OFFFICE AND ALSO EXCEPTING FROM SAID LOT A ALL OF LOT 6 AND LOT 7 IN CENTENNIAL VILLAGE SECOND RESUBDVISION OF LOT A, AS SHOWN IN PLAT BOOK 111, PAGE 87 IN SAID RECORDER'S OFFICE.

Exhibit B

Findings of Fact

MUNSTER PLAN COMMISSION

Matt Kimmel
Centennial Village LLC
9601 & 9605 N. Centennial Drive
Munster, IN 46321

Docket No. PC 23-021

FINDINGS OF FACT

Applicant has requested approval of an amendment to the Centennial Village Planned Unit Development, revisions to the Centennial Village Design Standards and Site Plan to include revisions to the size, location, and shape of Buildings "N" and "O".

This matter came to be heard before the Plan Commission on October 10, 2023. Applicant presented testimony and evidence in support of the PUD amendment, with revisions to the Centennial Village Design Standards and Site Plan. The Public Hearing was opened. The Public Hearing was closed.

NOW, THEREFORE, based upon the testimony and evidence presented, the Munster Plan Commission finds as follows:

1. The Commission has considered land use, traffic impact, utility impact, urban design principles, and the public safety/services when reviewing the Applicant's Plan.

2. The Commission finds that the project is compatible with the Comprehensive Plan.

3. The Commission finds that the project is compatible with surrounding land uses.

4. The Commission finds that the development satisfies the development requirements contained within the Zoning Ordinance.

5. The Plan Commission now makes a favorable recommendation to the Munster Town Council and approves Docket No. PC 23-021 to change the size, location, and shape of the PUD including Building "O" in the Centennial Village Planned Unit Development.

WHEREFORE, based upon the above Findings of Fact, the Munster Plan Commission by a vote of six (6) in favor and zero (0) opposed voted to grant and forward a favorable recommendation of the amendment to the Centennial Village Planned Unit Development as stated above to the Munster Town Council.

Action taken on October 10, 2023. Findings of Fact approved November 14, 2023.

TOWN OF MUNSTER PLAN COMMISSION

William Baker, Chairman

ATTEST:

Sergio Mendoza, Executive Secretary

Exhibit C
Site Plan



Exhibit D

Design Standards Centennial Village

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

Created: February 15, 2017

Modified: July 11, 2023

Revised: August 21, 2023





Design Standards
Centennial Village Planned Unit Development

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Section 13: Screening of Loading & Service Areas
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Section 17: Subdivision of Land and Site Development Approval

Appendices:

1: Centennial Village PUD Final Subdivision Plat
2: Plan of Development
3: Infrastructure Development Plan Set

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All "Prohibited Uses" defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	Retail - Anchor	1	35	30	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	7065	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	7065	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	7065	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	231	5035	5	5	5
O	HotelRetail – Single Tenant	51	8025	5	5	5

Building Lot A is located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

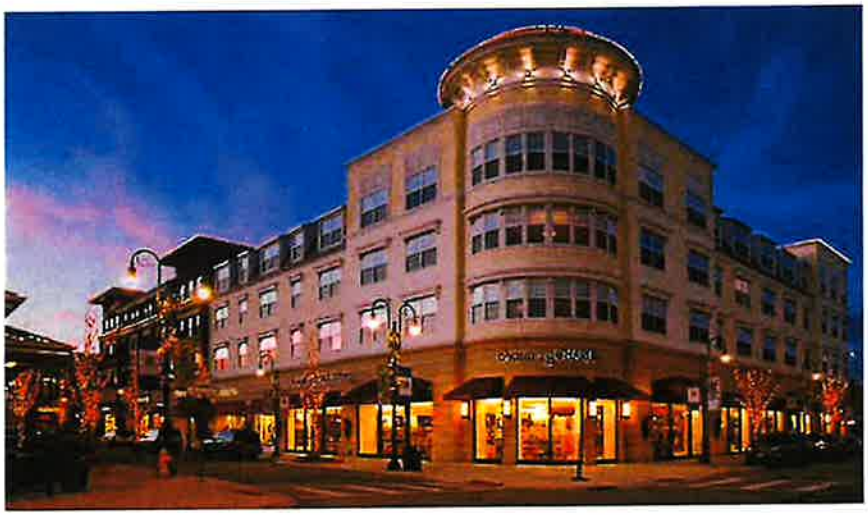
1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 54th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 2530% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 2530% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 54th Floor Level Exterior Walls. The 2nd to 54th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall, excluding parapet walls and decorative trim and cornices, wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 54th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 750% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 54th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

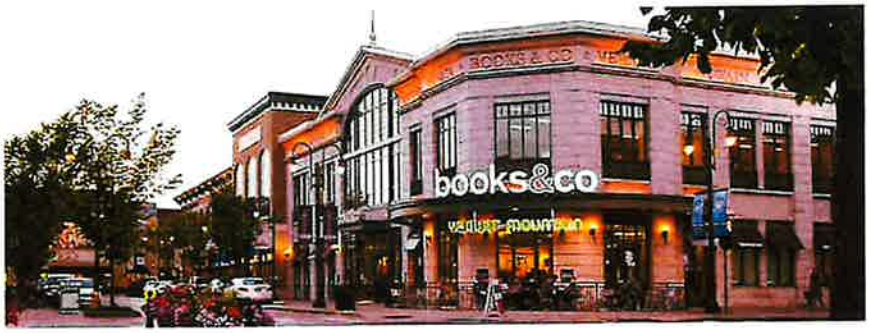
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Retail – Anchor	1	Class 1 & 2	N/A
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	2~~3~~1	Class 1 & 2	Class 3 & 4~~N/A~~
O	Hotel~~Retail – Single Tenant~~	5~~1~~	Class 1 & 2	Class 3 & 4~~N/A~~

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

   a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
   b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
   c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
   d. Parking areas shall be regularly cleaned of debris.

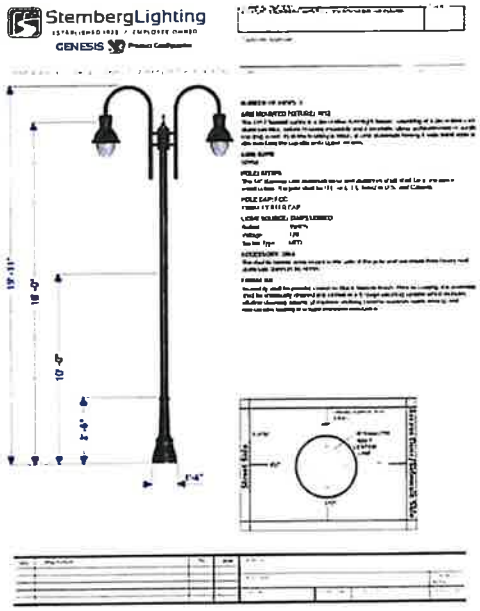
Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.



4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.

6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No "shoe box" wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as "Invasive Species" as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current edition of the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs. Additionally, the Centennial Village Planned Unit Development building and site sign design shall comply with the following standards:

1. Prohibited signs:
    a. Signs that extend above the highest point of a roof line
    b. Billboards
    c. Signs painted or mounted upon the exterior side or rear wall of any principal or accessory structure except as otherwise identified in the Design Standards.
    d. Signs which contain blinking, pulsating, flashing, or moving lighting.
    e. Neon Lighting Signs

2. Traffic Control Signs including street name, stop signs, parking signs, directional signs and other traffic control signs that are used to implement public safety and wayfinding within the development shall be of an ornamental design similar to the site lighting posts and fixtures, following the decorative style of the Genesis Series by Sternburg Lighting.

3. No sign shall be located to block or obscure the vision of motor vehicle drivers for safe travel through streets and parking areas.

4. No sign shall be erected, located or maintained to prevent access to any door, window, public walkway or fire escape.

5. Materials and color palettes for signs shall follow the approved materials and colors defined in the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs.

6. A sign located on the main entry door or adjacent to the main entry door identifying the business name, hours of operation, address shall not exceed 6 square feet in total area.

7. Each business within multi-tenant buildings will be permitted one principal sign. Such signs may be wall mounted and with a total sign area as calculated below:
    a. The total area of all signs for each business shall not exceed 1 square foot of sign area for each 30-feet of interior retail or business space, excluding storage area. Each business shall be allowed a minimum of 12-square feet of sign area. The maximum total square footage of sign area for a business shall not exceed:
        i. 75 square feet for businesses having a total gross floor area of 0 square feet to 5,000 square feet.
        ii. 125 square feet for businesses having a total gross floor area of 5,001 square feet to 20,000 square feet.
        iii. 200 square feet for businesses having a total gross floor area of 20,001 square feet and larger

8. Signs affixed to the exterior of a building shall be architecturally compatible with the style, composition, materials, colors and details of the building. Box Panel signs shall not be permitted on any building within the development.

9. The location of tenant signs shall be integrated with the building façade design and not obstruct architectural details and wall signs shall not extend more than 12-inches out from the exterior face of the building for "non-projection or non-blade" signs.

10. Projecting and Blade Signs extending perpendicular from the wall of a principal structure may be permitted so long as they do not interfere with clear vision to other adjacent business signs and do not interfere with the safe movement of vehicles and pedestrians. The Centennial Village PUD shall evaluate all requests for Projecting and Blade signs on a case by case basis and determine its approval based on the sign's design, materials and number of adjacent projecting banner signs. Projecting and Blade Signs may not extend a distance greater than 4-feet from a principal structure wall, be a minimum of 8-feet from the bottom of the sign to the top of the sidewalk below, may not exceed a total of 15 square feet and shall be counted against the total maximum business signage area.



11. Awning signs are permitted within the Centennial Village PUD following the approved sign design criteria, standards, materials and colors for awning signs defined in the Town of Munster Ordinance 1679.

12. In cases where businesses have rear or side parking lots or adjoins a public street, an additional sign developed to the same restrictions identified in Section 11 – Signage, shall be permitted only on one side or rear of the building.

13. Business signs shall be permitted to be back lighted or front lighted provided the sign illumination does not cause a nuisance to adjoining businesses and properties.

14. A sign bearing the name of a business of the principal tenant occupying space in the rear or upper floors of a building shall be allowed at the principal structure entrance to the business and the area of such sign identifying such business shall not exceed 4 square feet.

15. Free Standing Monument Signs shall be located and permitted to identify the Centennial Village PUD development areas at the locations as defined below:

    a. Lot A – Identifying the development parcel north of 45th Street
    b. Lot B – Identifying the development parcel south of 45th Street
    c. Lot E – Identifying the development parcel south of 45th Street and the Lot E use

16. Free Standing Monument Signs shall have a maximum total surface area for any display surface of 100 square feet and a maximum height of 6-feet. The calculation of display surface does not include the surface area of the sign structure that the display surface is mounted.

17. All signs and sign structures shall be maintained in good repair and safe condition. The owner of each sign shall be responsible for the proper maintenance of their respective sign. A sign shall be at all times legible, working and safe for the public.

18. No sign shall be constructed within the development unless the sign information has been reviewed and approved by the Centennial Village PUD developer and the proper permits and approvals have been granted by the Town of Munster.

Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:
    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art
2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.
3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 15 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development
Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
CALUMET AVENUE



Modified and approved within the red hashed line –

August 21, 2023Conceptual Plan



Modified and approved within the red line – November 20, 2023

Formatted: Left

Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title "Centennial Village - Phase 1A" and "Centennial Village - Phase 1B"

INSTRUCTIONS FOR FILING A PLAN COMMISSION APPLICATION

Prior to submittal of a Plan Commission application, a petitioner must attend a pre-application meeting with the Planning Director and a Site Plan Review Committee meeting.

1. FILING THE APPLICATION

a. An application for Plan Commission petition can be obtained at the Community Development Department, Town Hall, 1005 Ridge Road, Munster, Indiana, 46321.

b. The complete application must be submitted to the Community Development Department between the hours of 8:00 a.m. to 4:00 p.m., Monday through Friday, at least fifteen (15) calendar days before the date of the Plan Commission meeting. The Plan Commission meets the second Tuesday of each month at 7:30 p.m., at the Town Hall.

c. Submittal of an application with supporting documents to the Community Development Department must be accompanied by payment of a fee, which is calculated by the Community Development Department and paid at the Office of the Clerk-Treasurer.

d. If the person filing the petition is not the current owner of the property, he or she must be authorized in writing by affidavit to act on the owner's behalf, which is included in the application packet.

e. The Community Development Department staff will review the application for completeness. If determined to be incomplete, staff will notify the petitioner and the review of the application will be suspended until a complete application is received. If determined to be complete, the petition will be placed on the agenda of the next regularly scheduled Plan Commission meeting.

2. PLAN COMMISSION HEARING

a. The Plan Commission meets the second Tuesday of each month at 7:30 p.m., at the Town Hall.

b. The individual that filed the petition must be present to explain the request.

c. Meeting #1 – Preliminary Hearing: At the Plan Commission meeting in which the request is first heard, the Plan Commission will receive information about the project but will not take action to approve or deny. A preliminary hearing is not required for development plans.

d. Meeting #2 – Public Hearing: In order to take action on an application, state law requires that the Plan Commission first hold a public hearing and allow neighbors and other affected property owners of record to speak in favor or against the request.

e. Notice of the public hearing shall be given by the petitioner in the following manner:
    i. **Publication**. The petitioner shall, at petitioner's expense, publish a legal ad in the Northwest Indiana Times at least ten days prior to the public hearing.

ii. **Mailed**. The petitioner shall send notice of the public hearing by certified mail to all property owners who own property within 200 feet of the proposed subdivision at least ten days prior to the hearing. The Community Development Department will provide a list of property owners and addresses. Upon sending the certified mail, the petitioner will receive a white ticket for each letter. The white tickets, (certified mail receipts), must be submitted to the Community Development Department no later than 10 days prior to the public hearing. The read receipts, which are green tickets, must be submitted to the Community Development Department upon receipt.

iii. **Posted**. The petitioner shall post a sign with information about the public hearing prominently on the property for at least ten days prior to the public hearing using a sign provided by the Town of Munster. There is a charge for the sign and a deposit for the post which is refundable when the post is returned. The sign must be placed in plain view and legible from the street fronting the property.

iv. **Proof**. The petitioner shall be responsible for returning proof of notice to the Community Development Department no later than 24 hours prior to the public hearing. Failure to provide proof of notice will result in a tabling of the public hearing.

f. At the Plan Commission meeting during which the public hearing is held, the chairman of the Commission will open the public hearing and ask if there is anyone wishing to speak in favor or against the petition.

g. The Plan Commission may continue or close the public hearing. Continuing the public hearing to the next meeting usually means that more information is needed before a decision can be made. Closing the public hearing means that the Commission believes they have received sufficient public input.

i. In the case of a subdivision request, the Plan Commission is authorized to approve, approve with conditions, or deny.

ii. In the case of a rezoning request, the Plan Commission is authorized to forward a recommendation to the Town Council. The recommendation may be to approve, approve with conditions, or deny. The Plan Commission may also vote to forward the petition to the Town Council with no recommendation.

h. A majority of the whole seven-member Commission must vote the same way to constitute official action. In other words, four (4) members of the seven-(7) member Commission must vote to recommend either approval or denial for the motion to pass.

3. TOWN COUNCIL HEARING

In the case of a rezoning request, the Plan Commission will forward its recommendation to the Town Council for final consideration at its next meeting.

Petition PC _____-_____
Date: _____
Application Fee: $_____
Sign Fee: $_____

Town of Munster *Plan Commission Petition Application*

OWNER INFORMATION:

Matt Kimmel
Name of Owner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

APPLICANT OR PETITIONER INFORMATION (if different than above):

Matt Kimmel
Name of Applicant/Petitioner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

PROPERTY INFORMATION: Centennial Village

Business or Development Name (if applicable)

9605 N. Centennial Drive Munster, IN 46321
Address of Property or Legal Description

PUD
Current Zoning

APPLICATION INFORMATION:

Please select what this Application is for:

☒ **Subdivision** If yes, select one of the following: ☒ **Preliminary Plat** ☐ **Final Plat**

☐ **Development Plan Review**

Rezoning (including Planned Unit Development) – Proposed Zoning District

Brief Description of Project:

Re-Plat of Centennial Village PUD Subdivision. First re-subdivision of Lot C to create two individual lots for Building "A", Building "A.1", Building "A.2" & Building "A.3".

Russ Pozen, PE
Name of Registered Engineer, Architect or Land Surveyor

(219) 281-4068
Phone Number

1155 Troutwine Road Crown Point, IN 46307
Street address, City, ST, ZIP Code

rpozen@dvgteam.com
Email address

REQUIRED ATTACHMENTS

Required Attachments for Plan Commission Applications

To ensure that adequate information is provided to the Plan Commission, please check off each of these items and provide documentation to the Community Development Department at the time of submittal of the application.

ALL APPLICATIONS	Included	N/A
Narrative statement describing project		
Property owner consent (Signature page)		
Proof of Ownership (e.g. copy of tax bill)		
Current ALTA Survey		
Vicinity Plan (A dimensioned drawing to scale of the planned building(s)/improvements in the context of the surrounding properties, including existing buildings and driveways at least one block in every direction)		

The following pages list the additional attachments required for specific applications. Please refer to your type of petition request and provide the additional required attachments.

SUBDIVISION - PRELIMINARY PLAT	Included	N/A
Single-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Report		

Commercial or Multi-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Reports		
Preliminary Development Plan containing:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		

SUBDIVISION - FINAL PLAT	Included	N/A
Final Plat		
Engineering Plans		
Stormwater report		
Special Studies as required – see Site Plan Review Committee minutes		

REZONING (including PLANNED UNIT DEVELOPMENT amendments)	Included	N/A
Preliminary Development Plan containing at a minimum:		
Boundary Identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Proposed Use table		
Stormwater report		
Special Studies as Required– see Site Plan Review Committee minutes		

DEVELOPMENT PLAN	Included	N/A
Detailed Site plan including:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		
Square footage of:		
Lot or parcel		
Existing impervious surface		
Proposed total impervious (existing plus current proposal)		
Existing building		
Proposed total building (existing plus current proposal)		

Existing parking and pavement		
Proposed total parking and pavement (existing plus current proposal)		
Relevant dimensions including:		
Buildings		
Parking stalls		
Driveway widths		
Setbacks to buildings and other improvements		
Parking lot aisles, turnarounds, turning radii, etc.		
Distance from driveway to street corner if less than 200'		
Sidewalk, walkway and handicap ramp widths and locations		
Widths of abutting R.O.W.'s, roadways, and terraces.		
Full color architectural renderings of all building elevations with materials identified		
Proposed lighting for site, including:		
Photometric Plan		
Location of all light fixtures		
Pole height		
Luminaire type and manufacturer's specifications for all exterior light fixtures		
Landscaping plan drawn to scale including:		
Common and Latin plant names		
Planting specifications		
Total number of trees provided		
Total square footage of landscaped area on site and internal to the parking lot		
Identification of area used to calculate internal parking lot landscaping		
Fence detail drawing		
Dumpster enclosure detail drawing		
Sign detail drawing		
Special studies as required– see Site Plan Review Committee minutes		

NOTE: If you checked any exhibits "N/A", please explain:

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

August 21, 2023

Revised August 07,2025


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
5,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
34,000 SF


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,360 SF
BLDG O
7,000 SF


BLDG A.2
9,600 SF
BLDG A
23,299 SF
BLDG A.3
28,800 SF
BLDG A.1
4,200 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
2,000 SF
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,188 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
34,500 SF

Design Standards
Centennial Village Planned Unit Development

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Appendices:

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2: Plan of Development
3: Infrastructure Development Plan Set
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Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail – Single Story	1	25	5	5	5
A.3	Office – 2 Story	2	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	3	50	5	5	5
O	Hotel	5	80	5	5	5

Building Lot A, A.1, A.2 and A.3 are located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick or Structural Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 5th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 25% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 25% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 5th Floor Level Exterior Walls. The 2nd to 5th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 5th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 75% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5h Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

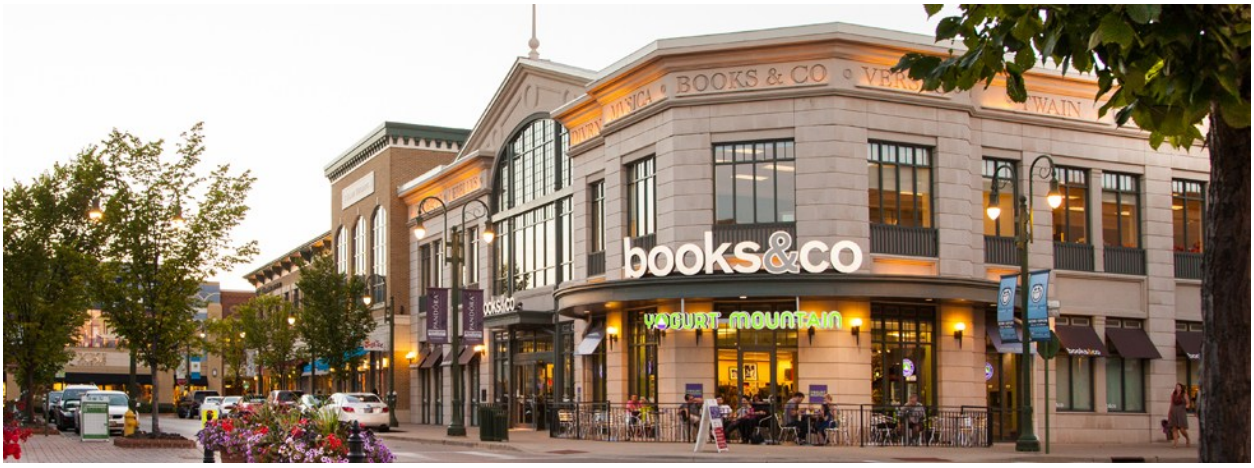
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 Story	2	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	3	Class 1 & 2	Class 3 & 4
O	Hotel	5	Class 1 & 2	Class 3 & 4

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named “Village Parkway” extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

   a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
   b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
   c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
   d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

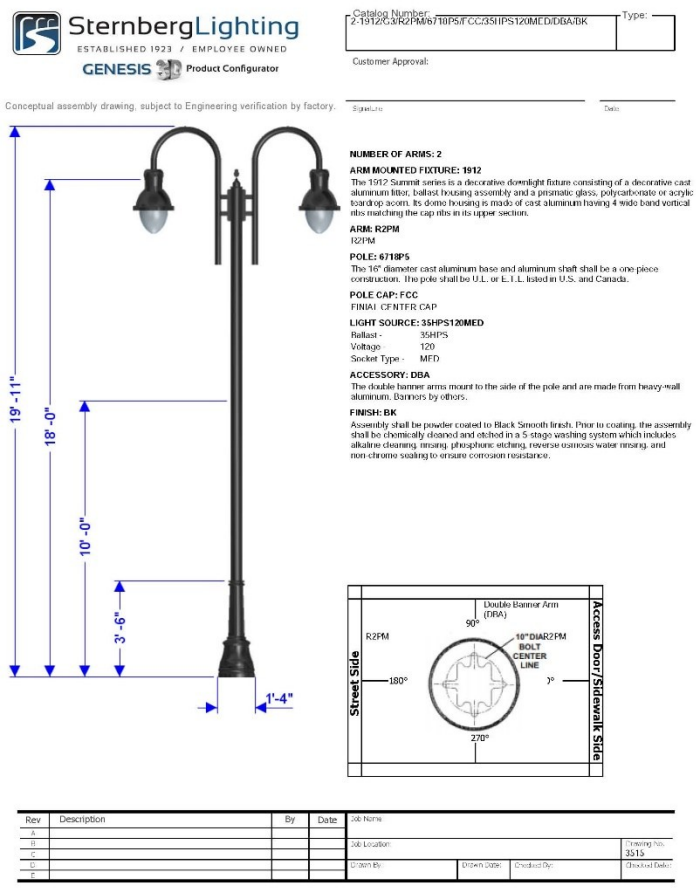
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. No “shoe box” style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. No “shoe box” style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No “shoe box” wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as “Invasive Species” as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.



Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 15 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
BLDG PAD A
70,000sf
45TH STREET
CALUMET AVENUE
BLDG PAD L
BLDG PAD M
BLDG PAD
5,200sf
BLDG PAD F
5,200sf
BLDG PAD B
12,830sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD D
17,360sf
BLDG PAD O
7,000sf
CENTENNIAL PARK



Modified and approved within the red hashed line –

August 07, 2025 Conceptual Plan



Modified and approved within the red hashed line –

August 21, 2023



Modified and approved within the red line – November 20, 2023

Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

Appendix 4 – Signage

by reference:

Sign Regulations for Centennial Village

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All permanent signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development are to be decorative with a modern design similar to the decorative style of Centennial Village and not exceed four (4) square feet in area.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public street for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. All signs must be kept in good repair and working order.
4. Conform to Town and State electrical codes.
5. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
6. 6. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign**: A sign that identifies the numerical and street address of a property or building and does not contain text identifying the occupant of a property, the use of the property or any other such advertisement.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.

4. **Awning**: An structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.
5. **Awning Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Construction Sign**: A temporary sign that is installed on a construction site during construction"
12. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
13. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
14. **Façade**: Any face or front of a building with architectural treatment.
15. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
16. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
17. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
18. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground .
19. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.
20. **Monument Sign:** A sign that is generally placed perpendicular to the road near the entry driveway so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.

21. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
22. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.

    Pillar Sign: A masonry or stone pillar that is at a minimum 2 times in height compared to it's width or depth with letters affixed, typically near or in the medium of a road, street or drive isle.

23. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
24. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
25. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and easily carried and moved by one person.
26. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
27. **Real Estate Sign**: A sign indicating the sale, rental or lease of Real Estate.
28. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
29. **Shopping Center**: A single parcel or building or multiple parcels and buildings developed and used primarily for retail businesses that share access, parking and other common features.
30. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display, illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.
31. **Storefront:** A façade of business space that contains a public entrance.
32. **Streamer**: A long, narrow flag, banner or pennant.
33. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
34. **Round-a-bout Sign**: A permanent ground or monument sign located within the center of a round-a-bout.
35. **Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.

36. **Temporary Sign**: Any sign constructed in accordance with the provisions of this Ordinance for a period not to exceed sixty (60) days.
37. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
38. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
39. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

General Provisions

A. **Measurement of Sign Area**: All signs shall be measured as per the following Sign calculation standards:
    1. Sign area:
        a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
        b. Where said display area is on a background, the background is included in the computation.
        c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
        d. The supporting structures and mounting hardware shall not be included in the area computation.
    2. Ground sign height:
        a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
        b. Any artificial berm is not to exceed 12 inches.
B. **Permitted Signs**: If materials are not specified below, they may be wood, metal, acrylic or glass with copy to be directly printed, painted, or vinyl to be applied, for each type of sign.
    1. **Ground Sign**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet.
    2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and four feet in height. The arch sign structure may not exceed 24 feet in height. These signs can be illuminated.

3. **Round-a-bout Sign(s):** One sign may be allowed for each Round-a-bout provided it does not exceed 90 square feet in area, is located 10 feet from all curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign**: _One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100sf and height is 10ft located a minimum of 10 feet from any curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal". These letters and logos can be internally illuminated.

Wall Sign Wall Sign: Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5sf of sign area per linear feet of business façade on which the signage is affixed. Sign height may not exceed 3ft.unless the business facade is >100' from curbline then the sign height may not exceed 5ft. Permitted wall signs shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.

5. **Window Sign:** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or
        2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.
    b. Window signs shall not have any moving parts.
    c. A series of windows that are separated by frames and supporting material of less than six inches in width shall be considered as a single window for the purpose of computation.
    d. No wood or acrylic sign to be hung inside of the windows and no illumination.?

6. **Projecting Sign**: A sign which is typically used in pedestrian friendly areas and may project outward from a multi-Story building at a 90-degree angle. Copy may be placed on both sides of the sign. One sign per business and must be spaced at a minimum of 15 feet from other projecting signs. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10sf with a maximum height of 3ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated. May be installed on the first floor of a building.
7. **Directory Wall Sign:** (moved to definitions) One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a

minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated?

8. **Plaque sign**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.
9. **"Open" Signs:** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.
10. **Light Pole Banners**: Each banner affixed to light poles may be allowed for a limited time not to exceed 90 days in any one calendar year.
11. **Monument, Memorial, Tablets or Cornerstone Sign:** One sign that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The material must be compatible and consistent this is subjective with the materials used to construct the building.
12. **Awning or Canopy Signs**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning vertical façade area. Metal, acrylic lettering painted or screen-printed imaging is acceptable. No illumination is allowed.
13. **Portable Sidewalk Signs**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront per facade is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal paper or wood.
14. **Blade Sign**: One blade sign may be allowed per tenant storefront for single story buildings. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated.
15. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on wall sections that do not have windows. The mural

must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.

16. **Pillar Signs:** Vertical pillar signs must be 4 ft in height and not exceed 12ft in height and must be square in plan not smaller than 3' in depth or width and not greater than 5' in depth or width. The pillar may have a maximum of 6 sf on sides and the materials can be metal, wood or acrylic. These shall be illuminated except for landscape lighting.
17. **Construction or Development Sign**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and located a minimum of 15 ft for any curb line. Material may be wood, metal, vinyl or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.

Property Sale, Lease, or Rental Signs: For Commercial property signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property the signs must be inside glass windows or mounted on balcony railings. For sales or rental of previously occupied residential property no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Commercial Posterboards, except as otherwise provided for by law.
2. Commercial Billboards, except as otherwise provided for by law.
3. Roof Signs
4. Signs on fences
5. Signs in the shape of products sold.
6. Pennants
7. Streamers
8. Signs on vehicles, boats, or trailers except for vehicles that are parked within 50' of the public entrance of a business storefront for a maximum of 4 hours per day.
9. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
10. Attraction panels with changeable letters (except when used by movie theaters or hotels)
11. Signs using reflective paints or tape.
12. Neon Signs
13. Flashing Signs
14. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.

15. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
16. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
17. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
18. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
19. Internally illuminated signs with a transparent or translucent background that transmits light.
20. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.
21. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
22. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
23. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required
It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit
Application for permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits
It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of permits the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code
All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code
All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance

The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs

Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.
4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.
7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

1. Variances from the requirements of this Regulation may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.

ALTA/NSPS
LAND TITLE SURVEY

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P - DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG" - 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG" - 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF - REBAR FOUND
PB. - PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO - NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A. - LANDSCAPE AREA
PG. - PAGE
REC. - RECORDED

- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CURB INLET
- CATCH BASIN
- TRAFFIC MANHOLE
- GUY/ANCHOR
- ROAD SIGN
- PLM ◇ PIPELINE MARKER
- GAS TEST STATION
- GAS LINE VENT
- GAS VALVE
- ICV IRRIGATION CONTROL VALVE
- bov BLOW OFF VALVE
- SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON

- W BURIED WATER LINE
- G BURIED GAS LINE
- E BURIED ELECTRIC LINE
- T BURIED COMMUNICATION LINE
- OHU OVERHEAD UTILITY WIRES
- BP BURIED BRITISH PETROLEUM PIPE LINE
- WOLVERINE BURIED WOLVERINE PIPE LINE
- SUBJECT PARCEL LINE
- ADJOINING PARCEL LINE
- SECTION/QUARTER LINE
- EASEMENT LINE
- STORM SEWER WITH FLOW DIRECTION
- SANITARY SEWER WITH FLOW DIRECTION
- WATER VALVE
- FIRE HYDRANT ASSEMBLY
- FIBER OPTIC MARKER POST
- TREE WITH SIZE
- xxx EXISTING 1-FOOT CONTOUR
- xxx.x EXISTING SPOT ELEVATION
- ADA PAD
- CONCRETE
- ASPHALT
- STONE

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF- ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY, ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL- RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT.

ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.

ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.

ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.

ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.

ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

N
0' 25' 50'
SCALE: 1" = 50'

THE ARCHITECTS PARTNERSHIP

© COPYRIGHT DVG TEAM, INC

\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

SITE DATA (BUILDING A-SPROUTS)

- USE: GROCERY
- LOT AREA: 2.355 AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 127 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2)

- USE: RETAIL
- LOT AREA: 1.176 AC
- BUILDING AREA: 9,856 SQ. FT.
- PARKING REQUIRED: 32 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 63 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3)

- USE: 2 STORY OFFICE
- LOT AREA: 2.019 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 130 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (TOTAL-ALL FOUR BUILDINGS)

- LOT AREA (TOTAL): 6.482 AC
- PARKING REQUIRED: 234 SPACES
- PARKING PROVIDED: 360 SPACES (DURING BANK HOURS) 369 SPACES (DURING NON-BANK HOURS)

LEGEND

- CONCRETE SIDEWALK
- ASPHALT PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.

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Crown Point, IN 46307
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NOT FOR CONSTRUCTION

08/07/25

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT C

PUD Site Plan

NOT FOR CONSTRUCTION

SCALE: 1" = 30'

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DESIGN BY	DATE
GMPF	08/07/25
PROJECT NO.	
25-0081	
C103	

PRELIMINARY PLAT
CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"
PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN ALL THE LOTS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF _____, 2025.

CENTENNIAL VILLAGE, LLC

BY:_____

TITLE: _____

(PRINTED NAME):_____

ACKNOWLEDGMENT

COUNTY OF _____
STATE OF _____] SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED _____ AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 2025.

_____
(SIGNATURE)

PRINTED NAME:_____
NOTARY PUBLIC
RESIDENT OF _____COUNTY

COMMISSION EXPIRES: _____

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF _____, 2025.

THE PREVIOUSLY GRANTED AND SHOWN OVERLAND FLOOD ROUTE EASEMENT BY PLAT BOOK 110, PAGE 11 IN DOCUMENT NUMBER 2017-024636 IS HEREBY VACATED AND SUPERCEDED WITH THE OVERLAND FLOOD ROUTE EASEMENT SHOWN HEREON.

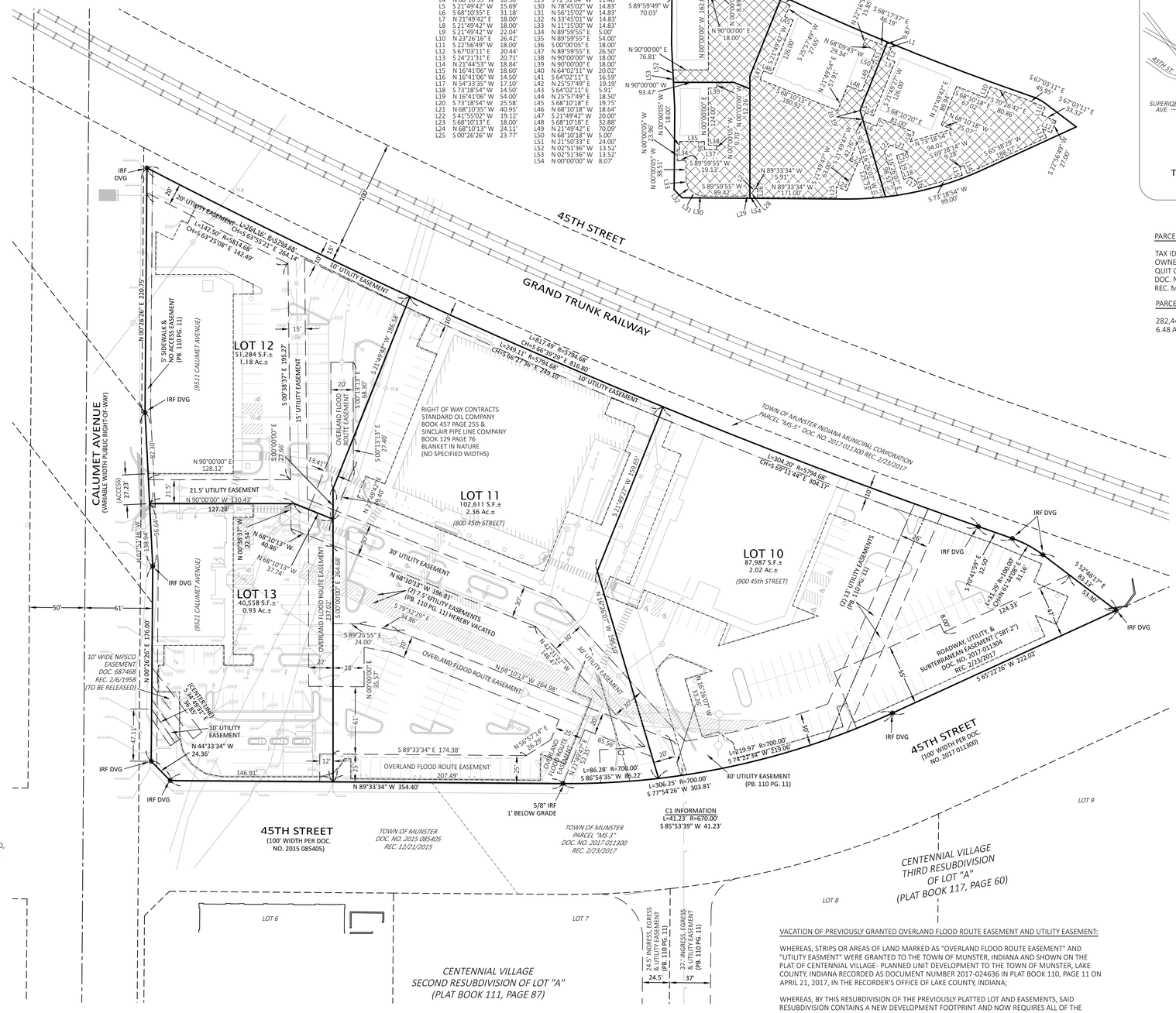
_____ _____
PRINTED NAME SIGNATURE

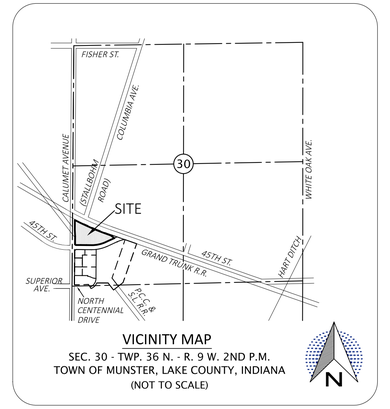
TITLE:

ATTEST:

_____ _____
PRINTED NAME SIGNATURE

TITLE:





VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SUBDIVIDER AND OWNER:

CENTENNIAL VILLAGE, LLC
631 KILLARNEY DRIVE
DYER, IN 46311

ENGINEER AND SURVEYOR:

DVG TEAM INC.
1155 TROUTWINE ROAD
CROWN POINT, IN 46307

LEGEND

- INGRESS/EGRESS AND PARKING EASEMENT
- PREVIOUSLY PLATTED UTILITY EASEMENT HEREBY VACATED
- IRS DVG 5/8" REBAR SET WITH BLUE PLASTIC CAP STAMPED "DVG TEAM INC FIRM NO. 0120"
- MAGF "MAG" NAIL FOUND WITH METAL WASHER STAMPED "DVG TEAM INC FIRM NO. 0120"

P.B. - PLAT BOOK

DEVELOPMENTAL STANDARDS:
THERE ARE DEVELOPMENTAL STANDARDS ASSOCIATED WITH DEVELOPMENT THAT ARE RECORDED AS DOCUMENT NUMBER 2017-024635 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

REFERENCE SURVEYS:
1. PLAT OF CENTENNIAL VILLAGE P.U.D. RECORDED IN PLAT BOOK 110, PAGE 11.
2. ALTA/ACSM LAND TITLE SURVEY OF PARCELS TW-1, 2, 4 AND PK-1, 3 BY PLUMB TUCKETT AND ASSOCIATES, INC. (NOW DVG TEAM, INC.), JOB NO. S15644, LAST REVISED 3/25/16, RECORDED AS DOCUMENT NUMBER 2017-015652, ON 3/9/2017.
3. CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 53.
4. CENTENNIAL VILLAGE 2ND RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 87.
5. CENTENNIAL VILLAGE 3RD RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 117, PAGE 60.

IT IS THE OPINION OF THE SURVEYOR THAT THERE ARE NO SUBSTANTIAL DIFFERENCES BETWEEN SAID SURVEYS AND THIS PLAT.

FLOOD ZONE INFORMATION:
FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCELS DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEAR TO LIE WITHIN ZONE "X": AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCELS PLOT BY SCALE ON FLOOD INSURANCE RATE MAP NO. 180139 0117 E FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, MAP EFFECTIVE DATE BEING JANUARY 18, 2012 AND REVISED TO REFLECT LOMR EFFECTIVE MARCH 18, 2016.

SURVEY NOTE:
THE EXTERIOR OF THE OVERALL SUBDIVISION BOUNDARY WAS STAKED AND THE MONUMENTS SET AND FOUND ARE SHOWN ON THE RECORDED PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT (PLAT BOOK 110, PAGE 11). IT IS THE OPINION OF THE SURVEYOR THAT IT IS PROBABLE THAT THE INDIVIDUAL LOT MONUMENTS FOR THIS RESUBDIVISION WILL BE DISTURBED BY CONSTRUCTION AND MASS GRADING. THE SETTING OF THE INDIVIDUAL LOT MONUMENTS ARE HEREBY DELAYED UNTIL AFTER CONSTRUCTION IS COMPLETE OR UP TO TWO YEARS AFTER RECORDATION OF THIS PLAT, WHICHEVER OCCURS FIRST AS PRESCRIBED BY TITLE 865 IAC 1-12-18(l).

VACATION OF PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND UTILITY EASEMENT:

WHEREAS, STRIPS OR AREAS OF LAND MARKED AS "OVERLAND FLOOD ROUTE EASEMENT" AND "UTILITY EASMENT" WERE GRANTED TO THE TOWN OF MUNSTER, INDIANA AND SHOWN ON THE PLAT OF CENTENNIAL VILLAGE- PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA RECORDED AS DOCUMENT NUMBER 2017-024636 IN PLAT BOOK 110, PAGE 11 ON APRIL 21, 2017, IN THE RECORDER'S OFFICE OF LAKE COUNTY, INDIANA;

WHEREAS, BY THIS RESUBDIVISION OF THE PREVIOUSLY PLATTED LOT AND EASEMENTS, SAID RESUBDIVISION CONTAINS A NEW DEVELOPMENT FOOTPRINT AND NOW REQUIRES ALL OF THE PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND A PORTION OF THE SAID PREVIOUSLY GRANTED UTILITY EASEMENT AS INDICATED HEREON FOR THE DEVELOPMENT OF THIS RESUBDIVISION TO BE RELEASED AND VACATED BY THE TOWN OF MUNSTER, INDIANA;

WHEREAS, BOTH SAID EASEMENTS ARE BEING RECONFIGURED TO ACCOMMODATE THE NEW DEVELOPMENT FOOTPRINT AND GRANTED ACCORDINGLY ON THIS PLAT;

NOW THEREFORE, ALL OF SAID PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND PORTIONS OF SAID PREVIOUSLY GRANTED UTILITY EASEMENT (AS INDICATED HEREON) ARE HEREBY RELEASED AND VACATED BY THE EXECUTION AND ACCEPTANCE OF THIS PLAT BY THE TOWN OF MUNSTER, INDIANA BECOMING EFFECTIVE ON THE DATE OF RECORDATION OF THIS PLAT.

SURVEYOR'S CERTIFICATION:

I, GLEN E. BOREN, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEYOR LICENSED IN COMPLIANCE WITH THE LAWS OF THE STATE OF INDIANA; THAT THIS PLAT CORRECTLY REPRESENTS A SURVEY COMPLETED BY ME ON MONTH XX, 2025 AND THAT ALL DIMENSIONS, LINEAR AND ANGULAR ARE CORRECTLY SHOWN, AND THAT ALL MONUMENTS OR MARKERS SHOWN THEREON ACTUALLY EXIST, AND THAT THEIR LOCATIONS, SIZE, TYPE AND DESCRIPTION ARE ACCURATELY SHOWN.

WITNESS MY HAND AND SEAL THIS _____ DAY OF _____, 2025.

_____
GLEN E. BOREN, P.S. NO. LS20000006

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "C"
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
PRELIMINARY PLAT

0' 25' 50'
SCALE: 1" = 50'

SPROUTS

© COPYRIGHT DVG TEAM, INC

\25-0081 Preliminary Plat.dwg	
FB/PG	FILE NO.
DRAWN BY: G.B.	DATE: 9/4/25
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 25-0081	

TOWN OF MUNSTER

PLAN COMMISSION REGULAR MEETING 10/14/25

Munster Town Hall: Main Meeting Room

Tuesday, October 14, 2025 at 07:00 PM

AGENDA

Join Zoom Webinar as a Viewer:
https://us02web.zoom.us/j/83006860776
Meeting ID: 830 0686 0776
Passcode: 138335

1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**

William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025

5. **APPROVAL OF MINUTES**
   a. September 9, 2025 PC Minutes
      Documents: 2025.09.09 PC Minutes draft
6. **PRELIMINARY HEARINGS**
   a. PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION at 9505 Calumet Avenue.
      Documents: PC 25-015 Staff Report 10.14.25 CV Prelim Sub Lot C | Ex A Application CV Premliminary Plat | Ex B ALTA Survey Parcel C | Ex C Preliminary Plat_Centennial Village 4 way | Ex D CVP Preliminary Plat- Roundabout Option | Ex E Stormwater Report Lots 10 -13 | Ex F Traffic Report
   b. PC25-016 PUD AMENDMENT- Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C at 9505 Calumet Avenue.
      Documents: PC 25-016 Staff Report 10.14.25 CV PUD Amendment | Ex A Application CV Premliminary Plat | Ex B Centennial Village PUD Amend.CV Design Standards(Revised) | Ex C ALTA Survey Parcel C | Ex D Site Plan 8.7.25 | Ex E Preliminary Plat_Centennial Village 4 way | Ex F CVP Preliminary Plat- Roundabout Option
   c. PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 Square Foot, 1-Story, Sprouts Market Building, to be commonly known as 800 45th Street.
      Documents: PC25-017 Staff Report 10.14.25 CV Sprouts Development | Ex A Application Sprouts | Ex B Renderings Sprouts | Ex C Site Civil Plan 9.16.25 Sprouts | Ex D Photometric Sprouts | Ex F Stormwater Report Lots 10 - 13 | Ex G Landscape Plan Sprouts | Ex H Photometric Sprouts
   d. PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-Story, Chase Bank Building,

to be commonly known as 9521 Calumet Avenue.
Documents: PC25-018 Staff Report 10.14.25 development plan CV Chase Bank | Ex A Application Chase Bank | Ex B ALTA Survey Parcel C | Ex C Site Plan 8.7.25 | Ex D Renderings Chase Bank | Ex E Site Civil Plan Set 9.4.25 Chase Bank | Ex F Landscape Chase | Ex G Photometrics Chase Bank | Ex H Stormwater Report Lots 10 -13

7. **PUBLIC HEARINGS**
    a. PC25-011 SUBDIVISION PRELIMINARY PLAT: Bruce Boyer on behalf of Crew Car Wash requests review of a Primary Plat for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION at 111 Ridge Road.
    Documents: PC 25-011 Staff Report 10.14.25 Crew Prelim Sub | EX A Application PC25-011 | EX B Preliminary Plat PC25-011 | EX C Site Work Plans PC25-011
    b. PC25-012 DEVELOPMENT PLAN REVIEW: Bruce Boyer representing Crew Car Wash requests approval of a Development Plan to allow onsite parking, lighting, dumpster enclosure, and emergency exit from the car wash lane at 111 Ridge Road.
    Documents: PC 25-012 Staff Report 10.14.25 Crew Development Plan | EX A Application Crew Development Plan PC25-012 | Ex B Crew Munster Eng Plan-ADDENDUM7-2025-09-12 | Ex C Landscape Design 9-15-25p | EX D Photometrics Crew PC25-012 | Ex E Lightmetrics | Ex F SPECS
    c. PC25-020 DEVELOPMENT PLAN REVIEW: Jim Glascott of WT Group representing the School Town of Munster requests review of a Development Plan for the construction of ten (10) tennis courts at 8839 Columbia Avenue.
    Documents: PC25-020 Staff Report development plan STOM tennis | Ex A PC Application | Ex B Narrative | Ex C Survey | Ex D Drainage Report | Ex E Architectural Plans | Ex F Engineering Plans | Ex G Photometrics | Ex H Parks, School Town Lease Agreement Community
8. **OTHER BUSINESS**
9. **FINDINGS OF FACT**
    a. PC25-014 REZONE: Gary Warfel, SPIN Munster, LLC c/o Saxon Partners on behalf of Kenmara Development received a favorable recommendation to the Town Council for the Rezone of 58 acres from CD-4.B. to PUD KENMARA TECHNOLOGY PARK USES for Tract 1, located at S of 400-440 Fisher Street.
    Documents: PC 25-014 Findings - Rezone to PUD-Kenmara Dev (2025-10-14)
10. **CONTINUED DISCUSSION ITEMS**
11. **NEXT REGULAR BUSINESS MEETING** November 18, 2025
12. **ADJOURNMENT**

Recorded meetings are archived at: https://www.youtube.com/channel/UCjZG8vgYLDwUr-sEWvNOSFQ

PLAN COMMISSION STAFF REPORT

To:	Members of the Plan Commission
From:	Sergio Mendoza, Planning Director
Meeting Date:	October 14, 2025
Agenda Item:	PC 25-016
Application Type:	PUD Amendment
Hearing:	Preliminary
Summary:	Matt Kimmel is requesting to requesting an amendment to the CENTENNIAL VILLAGE DESIGN STANDARDS to modify the size, location, and shape of lots and building on recorded lot C, as well as update sign standards and materials for all of Centennial Village PUD.

Applicant:	Matt Kimmel , Centennial Village Development.
Property Address:	9505 Calumet Avenue
Current Zoning:	PUD – CENTENNIAL VILLAGE
Adjacent Zoning:	North: CD 4 A – General Commercial and CD 4 R4 – Multifamily South: PUD – CENTENNIAL VILLAGE East: CD 4 R4 – Multifamily West: SD M – Manufacturing
Applicant Requesting:	Schedule Public Hearing
Action Required:	Schedule Public Hearing Review of Section 26-6.804. L. 9. k. xiii.

Staff Recommendation: Motion to set PC 25- 016 for a November 18, 2025 Public Hearing

Attachments:

1. PUD Amendment Application, Exhibit A
2. Draft PUD Design Standards, Exhibit B
3. Alta Survey, Exhibit C
4. Site Plan Exhibit D
5. Preliminary Subdivision/Replat, 4-Way *Intersection*, Exhibit E
6. Preliminary Subdivision/Replat, *Roundabout*, Exhibit F

SITE LOCATION

The proposed Subdivision/Replat is located east of Calumet Avenue, north of 45th Street, south of the Canadian National Railroad, and west of the 45th Street underpass and Canadian National Railroad bridge intersection.

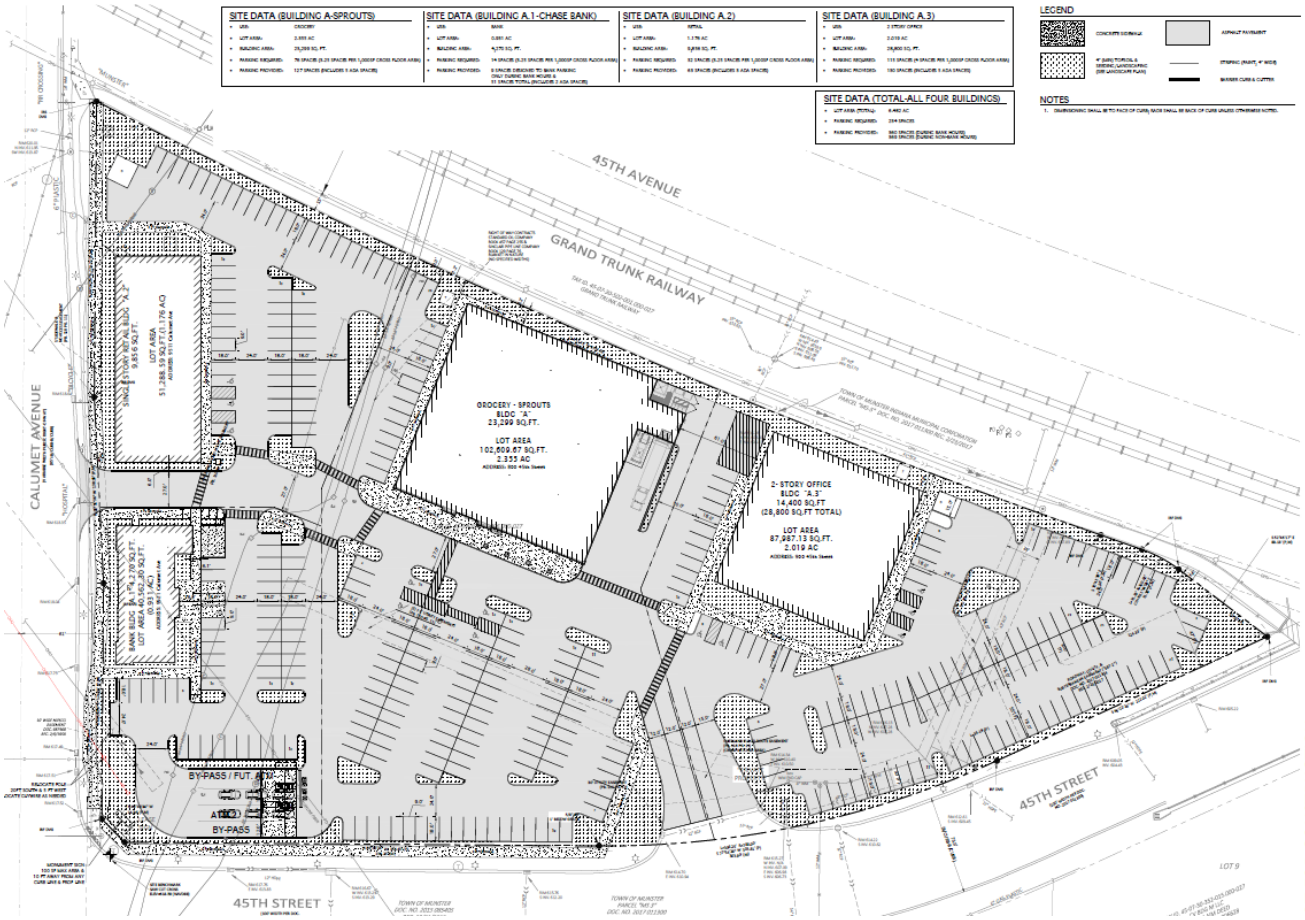


PROJECT BRIEFING

The Centennial Village PUD was approved as a development that will provide Town of Munster with a sustainable, mixed-use, walkable lifestyle community. Centennial Village was established through a Rezone action on July 22, 2013, ORDINANCE 1598. The development is currently governed by the Centennial Village PUD Design Standards and Conceptual Plan that has been amended multiple times through the following ordinances:

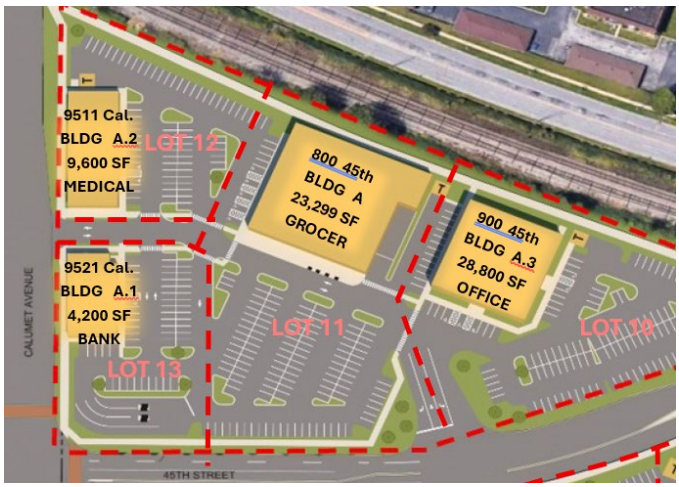
- ORDINANCE 1659, adopted June 8, 2015;
- ORDINANCE 1709, adopted March 6, 2017;
- ORDINANCE 1911, adopted August 21, 2023; and
- ORDINANCE 1930, adopted December 3, 2023.

The focus area proposed for amendment is commonly known as 9505 Calumet Avenue, Lot C in Centennial Village. The current site is approximately 6.5 acres of vacant undeveloped land zoned for mixed use development in a TIF district. Lot C was approved by the Plan Commission in March 2017 and recorded in April 2017 as CENTENNIAL VILLAGE, PB 110, PG 11, Document Number: 2017-024636. Mr. Matt Kimmel requests that the subject lot (LOT C) be replated and recognized by the Town of Munster as LOTS 10, 11, 12, 13 OF CENTENNIAL VILLAGE RESUBDIVISION OF LOT C.



In addition, Mr. Kimmel proposes amendment to the Centennial Village PUD Design Standards and Conceptual Plan which include:

- Modification to lots and buildings
  Consideration of four new buildings: A = 24,000 SF; A1 = 4,200SF; A2= 9,600 SF; A3 28,000 SF. (page 43)



- Sign standards
  Consideration to change in size size, type, material, location, and quantity. (page 48)

Sign Regulations for Centennial Village

Town of Munster

Purpose
The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All permanent signs located within the development shall conform to the following standards:

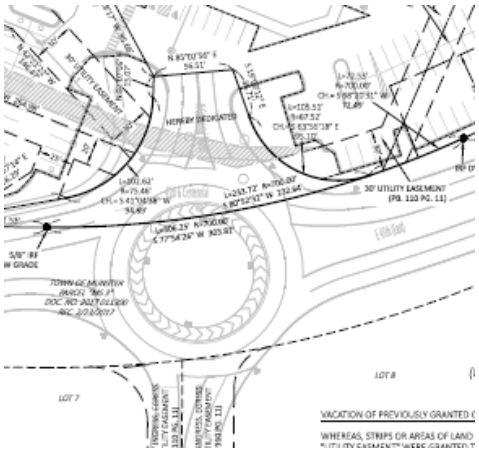
- Building use and materials
  Consideration for a grocer and financial institution, class level material location, and use of structural brick. (page 9)

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail – Single Story	1	25	5	5	5
A.3	Office – 2 Story	2	55	5	5	5

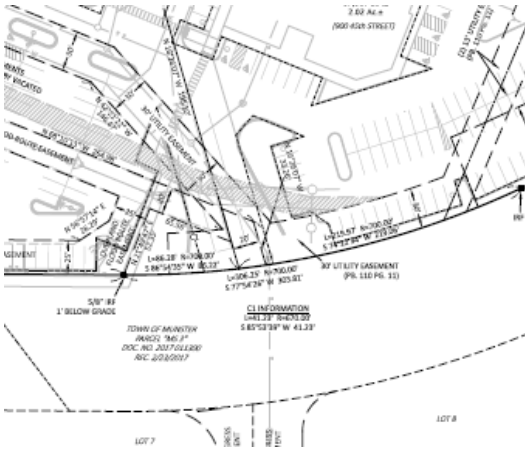
- Intersection development
  Consideration of a 4-way intersection with a traffic light at 45th Street and Centennial Drive. or a roundabout at 45th Street and Centennial Drive. (page 19, 11)

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

ROUNDABOUT



4-WAY INTERSECTION



CODE REVIEW

TOWN OF MUNSTER CHARACTER BASED ZONING CODE

Section 26-6.804. L. 9. Specifics Supplemental Provisions Related to Planned Unit Developments. (pg 402)

k. The procedure for…amending an existing SD-PUD…shall be as follows:

xiii. The Plan Commission may recommend … amendment to the SD-PUD…provided that it finds that:

I. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will not detrimentally affect present or potential property values or Uses of Adjacent property or elsewhere in Town.

II. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District adequately takes into account existing and proposed conditions and character of the land, Uses, Buildings, and Development proposed to be subject to the SD- PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and within all Adjacent Districts.

III. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will have a beneficial effect on the Town, which could not be achieved if the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District were not approved and the such Development was developed under the standards of any other District.

IV. Any deviation from the standards or requirements that otherwise would be applicable with another District is warranted by the design and amenities incorporated in the Development Plan.

V. The SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is necessary to address unique site conditions that are not characteristics of other sites in the Town and the application and Development Plan adequately address the same.

VI. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District and the Development proposed therein are:

1) either compatible with the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District or the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District can be planned in coordination with the proposed Development within such SD-PUD Planned Unit Development Special District;

2) the most desirable Development and Use(s) for which the property subject to the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is adapted; and

3) constitute responsible growth and Development.

VII. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District is in conformance with the general intent of this Article and the Comprehensive Plan.

VIII. Existing and proposed Thoroughfares are suitable and adequate to carry anticipated traffic within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and its vicinity.

IX. Existing and proposed utility services are adequate for the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District.

X. Each phase of the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District, contains the required parking spaces, and landscape and utility areas necessary for creating and sustaining a desirable and stable environment.

XI. The proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and all proposed Buildings, parking accommodations, and landscape and utility areas therein can be completely Developed within five (5) years of the initial establishment of the District.

XII. All conditions and requirements of Sections 26-6.804. L. 9. a. - .k have been satisfied.

STAFF FINDINGS AND RECOMMENDATIONS

Staff finds the applicant and interested parties have submitted a complete application and supporting document. Staff recommends compliance with SECTION 26-6.804. L. 9. k. xii. for a Public Notice and and review of SECTION 26-6.804. L. 9. k. xiii. I. - XII for a Public Hearing of the TOWN OF MUNSTER CHARACTER BASED ZONING CODE and attached CENTENNIAL VILLAGE DESIGN STANDARDS in EXHIBIT B.

MOTION

Plan Commission may consider the following motion:

Motion to schedule PC 25-016, a proposed Amendment to the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT for a November 18, 2025 Public Hearing, including all discussion and findings.

INSTRUCTIONS FOR FILING A PLAN COMMISSION APPLICATION

Prior to submittal of a Plan Commission application, a petitioner must attend a pre-application meeting with the Planning Director and a Site Plan Review Committee meeting.

1. FILING THE APPLICATION

a. An application for Plan Commission petition can be obtained at the Community Development Department, Town Hall, 1005 Ridge Road, Munster, Indiana, 46321.

b. The complete application must be submitted to the Community Development Department between the hours of 8:00 a.m. to 4:00 p.m., Monday through Friday, at least fifteen (15) calendar days before the date of the Plan Commission meeting. The Plan Commission meets the second Tuesday of each month at 7:30 p.m., at the Town Hall.

c. Submittal of an application with supporting documents to the Community Development Department must be accompanied by payment of a fee, which is calculated by the Community Development Department and paid at the Office of the Clerk-Treasurer.

d. If the person filing the petition is not the current owner of the property, he or she must be authorized in writing by affidavit to act on the owner's behalf, which is included in the application packet.

e. The Community Development Department staff will review the application for completeness. If determined to be incomplete, staff will notify the petitioner and the review of the application will be suspended until a complete application is received. If determined to be complete, the petition will be placed on the agenda of the next regularly scheduled Plan Commission meeting.

2. PLAN COMMISSION HEARING

a. The Plan Commission meets the second Tuesday of each month at 7:30 p.m., at the Town Hall.

b. The individual that filed the petition must be present to explain the request.

c. Meeting #1 – Preliminary Hearing: At the Plan Commission meeting in which the request is first heard, the Plan Commission will receive information about the project but will not take action to approve or deny. A preliminary hearing is not required for development plans.

d. Meeting #2 – Public Hearing: In order to take action on an application, state law requires that the Plan Commission first hold a public hearing and allow neighbors and other affected property owners of record to speak in favor or against the request.

e. Notice of the public hearing shall be given by the petitioner in the following manner:
    i. **Publication**. The petitioner shall, at petitioner's expense, publish a legal ad in the Northwest Indiana Times at least ten days prior to the public hearing.

ii. **Mailed**. The petitioner shall send notice of the public hearing by certified mail to all property owners who own property within 200 feet of the proposed subdivision at least ten days prior to the hearing. The Community Development Department will provide a list of property owners and addresses. Upon sending the certified mail, the petitioner will receive a white ticket for each letter. The white tickets, (certified mail receipts), must be submitted to the Community Development Department no later than 10 days prior to the public hearing. The read receipts, which are green tickets, must be submitted to the Community Development Department upon receipt.

iii. **Posted**. The petitioner shall post a sign with information about the public hearing prominently on the property for at least ten days prior to the public hearing using a sign provided by the Town of Munster. There is a charge for the sign and a deposit for the post which is refundable when the post is returned. The sign must be placed in plain view and legible from the street fronting the property.

iv. **Proof**. The petitioner shall be responsible for returning proof of notice to the Community Development Department no later than 24 hours prior to the public hearing. Failure to provide proof of notice will result in a tabling of the public hearing.

f. At the Plan Commission meeting during which the public hearing is held, the chairman of the Commission will open the public hearing and ask if there is anyone wishing to speak in favor or against the petition.

g. The Plan Commission may continue or close the public hearing. Continuing the public hearing to the next meeting usually means that more information is needed before a decision can be made. Closing the public hearing means that the Commission believes they have received sufficient public input.

i. In the case of a subdivision request, the Plan Commission is authorized to approve, approve with conditions, or deny.

ii. In the case of a rezoning request, the Plan Commission is authorized to forward a recommendation to the Town Council. The recommendation may be to approve, approve with conditions, or deny. The Plan Commission may also vote to forward the petition to the Town Council with no recommendation.

h. A majority of the whole seven-member Commission must vote the same way to constitute official action. In other words, four (4) members of the seven-(7) member Commission must vote to recommend either approval or denial for the motion to pass.

3. TOWN COUNCIL HEARING

In the case of a rezoning request, the Plan Commission will forward its recommendation to the Town Council for final consideration at its next meeting.

Petition PC _____-_____
Date: _____
Application Fee: $_____
Sign Fee: $_____

Town of Munster *Plan Commission Petition Application*

OWNER INFORMATION:

Matt Kimmel
Name of Owner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

APPLICANT OR PETITIONER INFORMATION (if different than above):

Matt Kimmel
Name of Applicant/Petitioner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

PROPERTY INFORMATION: Centennial Village

Business or Development Name (if applicable)

9605 N. Centennial Drive Munster, IN 46321
Address of Property or Legal Description

PUD
Current Zoning

APPLICATION INFORMATION:

Please select what this Application is for:

☒ **Subdivision** If yes, select one of the following: ☒ **Preliminary Plat** ☐ **Final Plat**

☐ **Development Plan Review**

Rezoning (including Planned Unit Development) – Proposed Zoning District

Brief Description of Project:

Re-Plat of Centennial Village PUD Subdivision. First re-subdivision of Lot C to create two individual lots for Building "A", Building "A.1", Building "A.2" & Building "A.3".

Russ Pozen, PE
Name of Registered Engineer, Architect or Land Surveyor

(219) 281-4068
Phone Number

1155 Troutwine Road Crown Point, IN 46307
Street address, City, ST, ZIP Code

rpozen@dvgteam.com
Email address

REQUIRED ATTACHMENTS

Required Attachments for Plan Commission Applications

To ensure that adequate information is provided to the Plan Commission, please check off each of these items and provide documentation to the Community Development Department at the time of submittal of the application.

ALL APPLICATIONS	Included	N/A
Narrative statement describing project		
Property owner consent (Signature page)		
Proof of Ownership (e.g. copy of tax bill)		
Current ALTA Survey		
Vicinity Plan (A dimensioned drawing to scale of the planned building(s)/improvements in the context of the surrounding properties, including existing buildings and driveways at least one block in every direction)		

The following pages list the additional attachments required for specific applications. Please refer to your type of petition request and provide the additional required attachments.

SUBDIVISION - PRELIMINARY PLAT	Included	N/A
Single-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Report		

Commercial or Multi-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Reports		
Preliminary Development Plan containing:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		

SUBDIVISION - FINAL PLAT	Included	N/A
Final Plat		
Engineering Plans		
Stormwater report		
Special Studies as required – see Site Plan Review Committee minutes		

REZONING (including PLANNED UNIT DEVELOPMENT amendments)	Included	N/A
Preliminary Development Plan containing at a minimum:		
Boundary Identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Proposed Use table		
Stormwater report		
Special Studies as Required– see Site Plan Review Committee minutes		

DEVELOPMENT PLAN	Included	N/A
Detailed Site plan including:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		
Square footage of:		
Lot or parcel		
Existing impervious surface		
Proposed total impervious (existing plus current proposal)		
Existing building		
Proposed total building (existing plus current proposal)		

Existing parking and pavement		
Proposed total parking and pavement (existing plus current proposal)		
Relevant dimensions including:		
Buildings		
Parking stalls		
Driveway widths		
Setbacks to buildings and other improvements		
Parking lot aisles, turnarounds, turning radii, etc.		
Distance from driveway to street corner if less than 200'		
Sidewalk, walkway and handicap ramp widths and locations		
Widths of abutting R.O.W.'s, roadways, and terraces.		
Full color architectural renderings of all building elevations with materials identified		
Proposed lighting for site, including:		
Photometric Plan		
Location of all light fixtures		
Pole height		
Luminaire type and manufacturer's specifications for all exterior light fixtures		
Landscaping plan drawn to scale including:		
Common and Latin plant names		
Planting specifications		
Total number of trees provided		
Total square footage of landscaped area on site and internal to the parking lot		
Identification of area used to calculate internal parking lot landscaping		
Fence detail drawing		
Dumpster enclosure detail drawing		
Sign detail drawing		
Special studies as required– see Site Plan Review Committee minutes		

NOTE: If you checked any exhibits "N/A", please explain:

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

August 21, 2023

Revised August 07,2025


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
5,000 SF
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,188 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
34,000 SF


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,360 SF
BLDG O
7,000 SF


BLDG A.2
9,600 SF
BLDG A
23,299 SF
BLDG A.3
28,800 SF
BLDG A.1
4,200 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
3,000 SF
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,188 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
34,500 SF

Design Standards
Centennial Village Planned Unit Development

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Section 2: Uses
Section 3: Setback & Height Requirements
Section 4: Building Materials and Architectural Design Standards
Section 5: Building Design Elements
Section 6: Site Circulation – Vehicular & Service
Section 7: Site Circulation – Pedestrian
Section 8: Parking – Site and Under Building
Section 9: Site Lighting
Section 10: Site Landscaping & Common Areas
Section 11: Signage
Section 12: Refuse & Recycling Management
Section 13: Screening of Loading & Service Areas
Section 14: Site Furniture, Fixtures & Equipment
Section 15: Utility Service
Section 16: Storm Water Management
Section 17: Subdivision of Land and Site Development Approval

Appendices:

1: Centennial Village PUD Final Subdivision Plat
2: Plan of Development
3: Infrastructure Development Plan Set
4: Sign Regulations for Centennial Village

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail – Single Story	1	25	5	5	5
A.3	Office – 2 Story	2	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	3	50	5	5	5
O	Hotel	5	80	5	5	5

Building Lot A, A.1, A.2 and A.3 are located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick or Structural Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 5th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 25% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 25% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 5th Floor Level Exterior Walls. The 2nd to 5th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 5th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 75% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5h Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

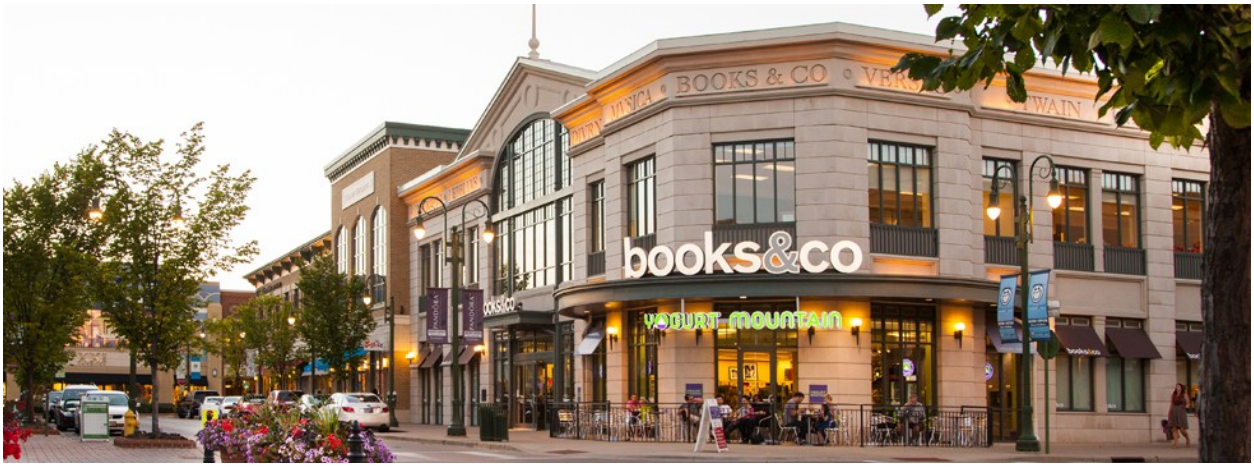
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 Story	2	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	3	Class 1 & 2	Class 3 & 4
O	Hotel	5	Class 1 & 2	Class 3 & 4

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named “Village Parkway” extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

   a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
   b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
   c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
   d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

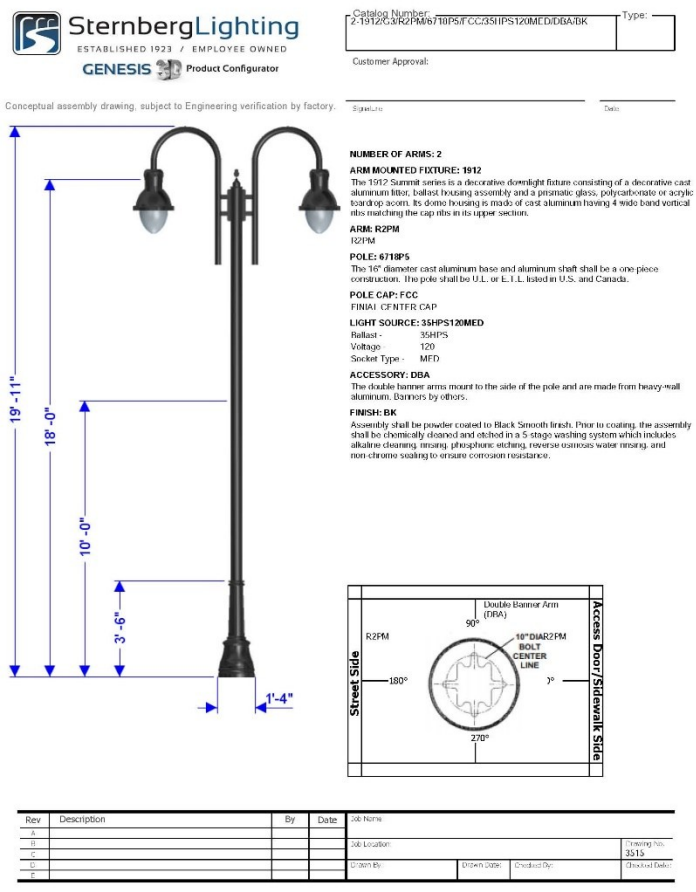
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. No “shoe box” style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. No “shoe box” style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No “shoe box” wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as “Invasive Species” as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.



Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 15 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
45TH STREET
CALUMET AVENUE
BLDG PAD A
70,000sf
BLDG PAD L
BLDG PAD M
BLDG PAD
5,200sf
BLDG PAD F
5,200sf
BLDG PAD B
12,830sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD D
17,360sf
BLDG PAD O
7,000sf
CENTENNIAL PARK



Modified and approved within the red hashed line –

August 07, 2025 Conceptual Plan



Modified and approved within the red hashed line –

August 21, 2023



Modified and approved within the red line – November 20, 2023

Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

Appendix 4 – Signage

by reference:

Sign Regulations for Centennial Village

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All permanent signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development are to be decorative with a modern design similar to the decorative style of Centennial Village and not exceed four (4) square feet in area.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public street for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. All signs must be kept in good repair and working order.
4. Conform to Town and State electrical codes.
5. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
6. 6. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign**: A sign that identifies the numerical and street address of a property or building and does not contain text identifying the occupant of a property, the use of the property or any other such advertisement.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.

4. **Awning**: An structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.
5. **Awning Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Construction Sign**: A temporary sign that is installed on a construction site during construction"
12. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
13. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
14. **Façade**: Any face or front of a building with architectural treatment.
15. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
16. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
17. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
18. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground .
19. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.
20. **Monument Sign:** A sign that is generally placed perpendicular to the road near the entry driveway so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.

21. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
22. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.

    Pillar Sign: A masonry or stone pillar that is at a minimum 2 times in height compared to it's width or depth with letters affixed, typically near or in the medium of a road, street or drive isle.

23. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
24. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
25. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and easily carried and moved by one person.
26. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
27. **Real Estate Sign**: A sign indicating the sale, rental or lease of Real Estate.
28. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
29. **Shopping Center**: A single parcel or building or multiple parcels and buildings developed and used primarily for retail businesses that share access, parking and other common features.
30. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display, illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.
31. **Storefront:** A façade of business space that contains a public entrance.
32. **Streamer**: A long, narrow flag, banner or pennant.
33. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
34. **Round-a-bout Sign**: A permanent ground or monument sign located within the center of a round-a-bout.
35. **Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.

36. **Temporary Sign**: Any sign constructed in accordance with the provisions of this Ordinance for a period not to exceed sixty (60) days.
37. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
38. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
39. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

General Provisions

A. **Measurement of Sign Area**: All signs shall be measured as per the following Sign calculation standards:
    1. Sign area:
        a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
        b. Where said display area is on a background, the background is included in the computation.
        c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
        d. The supporting structures and mounting hardware shall not be included in the area computation.
    2. Ground sign height:
        a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
        b. Any artificial berm is not to exceed 12 inches.
B. **Permitted Signs**: If materials are not specified below, they may be wood, metal, acrylic or glass with copy to be directly printed, painted, or vinyl to be applied, for each type of sign.
    1. **Ground Sign**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet.
    2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and four feet in height. The arch sign structure may not exceed 24 feet in height. These signs can be illuminated.

3. **Round-a-bout Sign(s):** One sign may be allowed for each Round-a-bout provided it does not exceed 90 square feet in area, is located 10 feet from all curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign**: _One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100sf and height is 10ft located a minimum of 10 feet from any curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal". These letters and logos can be internally illuminated.

Wall Sign Wall Sign: Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5sf of sign area per linear feet of business façade on which the signage is affixed. Sign height may not exceed 3ft.unless the business facade is >100' from curbline then the sign height may not exceed 5ft. Permitted wall signs shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.

5. **Window Sign:** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or
        2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.
    b. Window signs shall not have any moving parts.
    c. A series of windows that are separated by frames and supporting material of less than six inches in width shall be considered as a single window for the purpose of computation.
    d. No wood or acrylic sign to be hung inside of the windows and no illumination.?

6. **Projecting Sign**: A sign which is typically used in pedestrian friendly areas and may project outward from a multi-Story building at a 90-degree angle. Copy may be placed on both sides of the sign. One sign per business and must be spaced at a minimum of 15 feet from other projecting signs. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10sf with a maximum height of 3ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated. May be installed on the first floor of a building.
7. **Directory Wall Sign:** (moved to definitions) One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a

minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated?

8. **Plaque sign**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.
9. **"Open" Signs:** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.
10. **Light Pole Banners**: Each banner affixed to light poles may be allowed for a limited time not to exceed 90 days in any one calendar year.
11. **Monument, Memorial, Tablets or Cornerstone Sign:** One sign that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The material must be compatible and consistent this is subjective with the materials used to construct the building.
12. **Awning or Canopy Signs**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning vertical façade area. Metal, acrylic lettering painted or screen-printed imaging is acceptable. No illumination is allowed.
13. **Portable Sidewalk Signs**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront per facade is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal paper or wood.
14. **Blade Sign**: One blade sign may be allowed per tenant storefront for single story buildings. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated.
15. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on wall sections that do not have windows. The mural

must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.

16. **Pillar Signs:** Vertical pillar signs must be 4 ft in height and not exceed 12ft in height and must be square in plan not smaller than 3' in depth or width and not greater than 5' in depth or width. The pillar may have a maximum of 6 sf on sides and the materials can be metal, wood or acrylic. These shall be illuminated except for landscape lighting.
17. **Construction or Development Sign**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and located a minimum of 15 ft for any curb line. Material may be wood, metal, vinyl or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.

Property Sale, Lease, or Rental Signs: For Commercial property signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property the signs must be inside glass windows or mounted on balcony railings. For sales or rental of previously occupied residential property no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Commercial Posterboards, except as otherwise provided for by law.
2. Commercial Billboards, except as otherwise provided for by law.
3. Roof Signs
4. Signs on fences
5. Signs in the shape of products sold.
6. Pennants
7. Streamers
8. Signs on vehicles, boats, or trailers except for vehicles that are parked within 50' of the public entrance of a business storefront for a maximum of 4 hours per day.
9. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
10. Attraction panels with changeable letters (except when used by movie theaters or hotels)
11. Signs using reflective paints or tape.
12. Neon Signs
13. Flashing Signs
14. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.

15. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
16. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
17. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
18. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
19. Internally illuminated signs with a transparent or translucent background that transmits light.
20. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.
21. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
22. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
23. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required
It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit
Application for permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits
It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of permits the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code
All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code
All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance

The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs

Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.
4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.
7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

1. Variances from the requirements of this Regulation may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.

ALTA/NSPS
LAND TITLE SURVEY

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P - DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG" - 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG" - 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF - REBAR FOUND
PB. - PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO - NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A. - LANDSCAPE AREA
PG. - PAGE
REC. - RECORDED

- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CURB INLET
- CATCH BASIN
- TRAFFIC MANHOLE
- GUY/ANCHOR
- ROAD SIGN
- PLM PIPELINE MARKER
- GAS TEST STATION
- GAS LINE VENT
- GAS VALVE
- ICV IRRIGATION CONTROL VALVE
- bov BLOW OFF VALVE
- SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON
- W BURIED WATER LINE
- G BURIED GAS LINE
- E BURIED ELECTRIC LINE
- T BURIED COMMUNICATION LINE
- OHU OVERHEAD UTILITY WIRES
- BP BURIED BRITISH PETROLEUM PIPE LINE
- WOLVERINE BURIED WOLVERINE PIPE LINE
- SUBJECT PARCEL LINE
- ADJOINING PARCEL LINE
- SECTION/QUARTER LINE
- EASEMENT LINE
- STORM SEWER WITH FLOW DIRECTION
- SANITARY SEWER WITH FLOW DIRECTION
- WATER VALVE
- FIRE HYDRANT ASSEMBLY
- FIBER OPTIC MARKER POST
- TREE WITH SIZE
- xxx EXISTING 1-FOOT CONTOUR
- xxx.x EXISTING SPOT ELEVATION
- ADA PAD
- CONCRETE
- ASPHALT
- STONE

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF- ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY, ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL-
RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT.

ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.

ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.

ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.

ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.

ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

N
0' 25' 50'
SCALE: 1" = 50'

THE ARCHITECTS PARTNERSHIP

© COPYRIGHT DVG TEAM, INC

\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

SITE DATA (BUILDING A-SPROUTS)

- USE: GROCERY
- LOT AREA: 2.355 AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 127 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2)

- USE: RETAIL
- LOT AREA: 1.176 AC
- BUILDING AREA: 9,856 SQ. FT.
- PARKING REQUIRED: 32 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 63 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3)

- USE: 2 STORY OFFICE
- LOT AREA: 2.019 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 130 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (TOTAL-ALL FOUR BUILDINGS)

- LOT AREA (TOTAL): 6.482 AC
- PARKING REQUIRED: 234 SPACES
- PARKING PROVIDED: 360 SPACES (DURING BANK HOURS) 369 SPACES (DURING NON-BANK HOURS)

LEGEND

- CONCRETE SIDEWALK
- ASPHALT PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.

DVG TEAM INC
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NOT FOR CONSTRUCTION

08/07/25

DATE:	REVISIONS AND NOTES:

NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE - LOT C

PUD Site Plan

SCALE: 1" = 30'

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DESIGN BY	DATE
GMPF	08/07/25
PROJECT NO.	
25-0081	
C103	

PRELIMINARY PLAT
CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"
PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN ALL THE LOTS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF _____, 2025.

CENTENNIAL VILLAGE, LLC

BY:_____

TITLE: _____

(PRINTED NAME):_____

ACKNOWLEDGMENT

COUNTY OF _____
STATE OF _____] SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED _____ AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 2025.

_____
(SIGNATURE)

PRINTED NAME:_____
NOTARY PUBLIC
RESIDENT OF _____COUNTY

COMMISSION EXPIRES: _____

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF _____, 2025.

THE PREVIOUSLY GRANTED AND SHOWN OVERLAND FLOOD ROUTE EASEMENT BY PLAT BOOK 110, PAGE 11 IN DOCUMENT NUMBER 2017-024636 IS HEREBY VACATED AND SUPERCEDED WITH THE OVERLAND FLOOD ROUTE EASEMENT SHOWN HEREON.

_____ _____
PRINTED NAME SIGNATURE

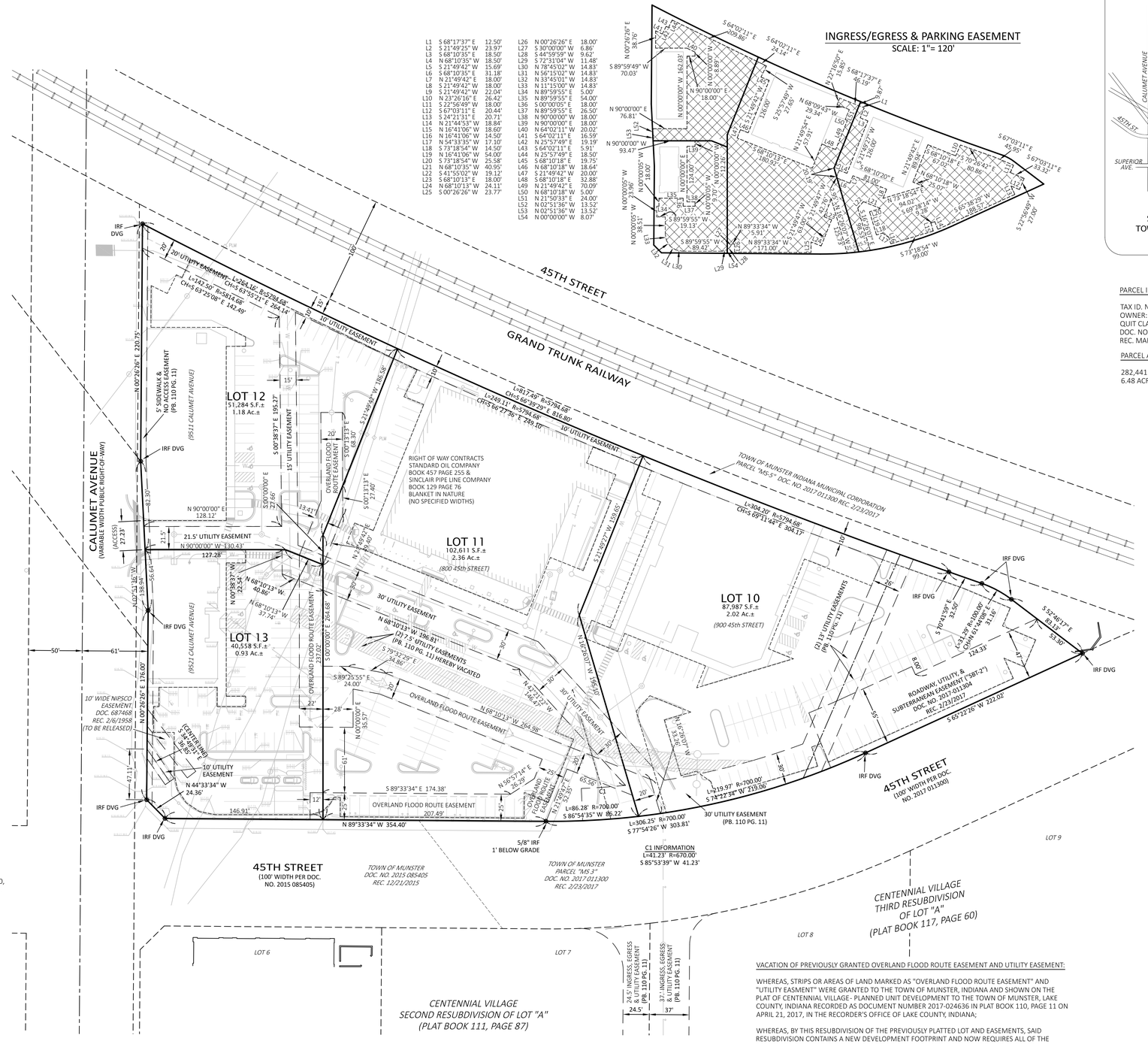
TITLE:

ATTEST:

_____ _____
PRINTED NAME SIGNATURE

TITLE:

L1	S 68°17'37" E	12.50'	L26	N 00°26'26" E	18.00'
L2	S 21°49'25" W	23.97'	L27	S 30°00'00" W	6.86'
L3	S 68°10'35" E	18.50'	L28	S 44°59'59" W	9.62'
L4	N 68°10'35" W	18.50'	L29	S 72°31'04" W	11.48'
L5	S 21°49'42" W	15.69'	L30	N 78°45'02" W	14.83'
L6	S 68°10'35" E	31.18'	L31	N 56°15'02" W	14.83'
L7	N 21°49'42" E	18.00'	L32	N 33°45'01" W	14.83'
L8	S 21°49'42" W	18.00'	L33	N 11°15'00" W	14.83'
L9	S 21°49'42" W	22.04'	L34	N 89°59'55" E	5.00'
L10	N 23°26'16" E	26.42'	L35	N 89°59'55" E	54.00'
L11	S 22°56'49" W	18.00'	L36	S 00°00'05" E	18.00'
L12	S 67°03'11" E	20.44'	L37	N 89°59'55" E	26.50'
L13	S 24°21'13" E	20.71'	L38	N 90°00'00" W	18.00'
L14	N 21°44'53" W	18.84'	L39	N 90°00'00" E	18.00'
L15	N 16°41'06" W	18.60'	L40	N 64°02'11" W	20.02'
L16	N 16°43'06" W	14.50'	L41	S 64°02'11" E	16.59'
L17	N 54°33'35" W	17.10'	L42	N 25°57'49" E	19.19'
L18	S 73°18'54" W	14.50'	L43	S 64°02'11" E	5.91'
L19	N 16°41'06" W	54.00'	L44	N 25°57'49" E	18.50'
L20	S 73°18'54" W	25.58'	L45	S 68°10'18" E	19.75'
L21	N 68°10'35" W	40.95'	L46	N 68°10'18" W	18.64'
L22	S 41°55'02" W	19.12'	L47	S 21°49'42" W	20.00'
L23	S 68°10'13" E	20.00'	L48	S 68°10'18" E	32.88'
L24	N 68°10'13" W	24.11'	L49	N 21°49'42" E	70.09'
L25	S 00°26'26" W	23.77'	L50	N 68°10'18" W	5.00'
			L51	N 21°50'33" E	24.00'
			L52	N 02°51'36" W	13.52'
			L53	N 02°51'36" W	13.52'
			L54	N 00°00'00" W	8.07'





VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SUBDIVIDER AND OWNER:

CENTENNIAL VILLAGE, LLC
631 KILLARNEY DRIVE
DYER, IN 46311

ENGINEER AND SURVEYOR:

DVG TEAM INC.
1155 TROUTWINE ROAD
CROWN POINT, IN 46307

LEGEND

- INGRESS/EGRESS AND PARKING EASEMENT
- PREVIOUSLY PLATTED UTILITY EASEMENT HEREBY VACATED
- IRS DVG 5/8" REBAR SET WITH BLUE PLASTIC CAP STAMPED "DVG TEAM INC FIRM NO. 0120"
- MAGF "MAG" NAIL FOUND WITH METAL WASHER STAMPED "DVG TEAM INC FIRM NO. 0120"

P.B. - PLAT BOOK

DEVELOPMENTAL STANDARDS:
THERE ARE DEVELOPMENTAL STANDARDS ASSOCIATED WITH DEVELOPMENT THAT ARE RECORDED AS DOCUMENT NUMBER 2017-024635 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

REFERENCE SURVEYS:
1. PLAT OF CENTENNIAL VILLAGE P.U.D. RECORDED IN PLAT BOOK 110, PAGE 11.
2. ALTA/ACSM LAND TITLE SURVEY OF PARCELS TW-1, 2, 4 AND PK-1, 3 BY PLUMB TUCKETT AND ASSOCIATES, INC. (NOW DVG TEAM, INC.), JOB NO. S15644, LAST REVISED 3/25/16, RECORDED AS DOCUMENT NUMBER 2017-015652, ON 3/9/2017.
3. CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 53.
4. CENTENNIAL VILLAGE 2ND RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 87.
5. CENTENNIAL VILLAGE 3RD RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 117, PAGE 60.

IT IS THE OPINION OF THE SURVEYOR THAT THERE ARE NO SUBSTANTIAL DIFFERENCES BETWEEN SAID SURVEYS AND THIS PLAT.

FLOOD ZONE INFORMATION:
FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCELS DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEAR TO LIE WITHIN ZONE "X": AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCELS PLOT BY SCALE ON FLOOD INSURANCE RATE MAP NO. 180139 0117 E FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, MAP EFFECTIVE DATE BEING JANUARY 18, 2012 AND REVISED TO REFLECT LOMR EFFECTIVE MARCH 18, 2016.

SURVEY NOTE:
THE EXTERIOR OF THE OVERALL SUBDIVISION BOUNDARY WAS STAKED AND THE MONUMENTS SET AND FOUND ARE SHOWN ON THE RECORDED PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT (PLAT BOOK 110, PAGE 11). IT IS THE OPINION OF THE SURVEYOR THAT IT IS PROBABLE THAT THE INDIVIDUAL LOT MONUMENTS FOR THIS RESUBDIVISION WILL BE DISTURBED BY CONSTRUCTION AND MASS GRADING. THE SETTING OF THE INDIVIDUAL LOT MONUMENTS ARE HEREBY DELAYED UNTIL AFTER CONSTRUCTION IS COMPLETE OR UP TO TWO YEARS AFTER RECORDATION OF THIS PLAT, WHICHEVER OCCURS FIRST AS PRESCRIBED BY TITLE 865 IAC 1-12-18(l).

VACATION OF PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND UTILITY EASEMENT:

WHEREAS, STRIPS OR AREAS OF LAND MARKED AS "OVERLAND FLOOD ROUTE EASEMENT" AND "UTILITY EASMENT" WERE GRANTED TO THE TOWN OF MUNSTER, INDIANA AND SHOWN ON THE PLAT OF CENTENNIAL VILLAGE- PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA RECORDED AS DOCUMENT NUMBER 2017-024636 IN PLAT BOOK 110, PAGE 11 ON APRIL 21, 2017, IN THE RECORDER'S OFFICE OF LAKE COUNTY, INDIANA;

WHEREAS, BY THIS RESUBDIVISION OF THE PREVIOUSLY PLATTED LOT AND EASEMENTS, SAID RESUBDIVISION CONTAINS A NEW DEVELOPMENT FOOTPRINT AND NOW REQUIRES ALL OF THE PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND A PORTION OF THE SAID PREVIOUSLY GRANTED UTILITY EASEMENT AS INDICATED HEREON FOR THE DEVELOPMENT OF THIS RESUBDIVISION TO BE RELEASED AND VACATED BY THE TOWN OF MUNSTER, INDIANA;

WHEREAS, BOTH SAID EASEMENTS ARE BEING RECONFIGURED TO ACCOMMODATE THE NEW DEVELOPMENT FOOTPRINT AND GRANTED ACCORDINGLY ON THIS PLAT;

NOW THEREFORE, ALL OF SAID PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND PORTIONS OF SAID PREVIOUSLY GRANTED UTILITY EASEMENT (AS INDICATED HEREON) ARE HEREBY RELEASED AND VACATED BY THE EXECUTION AND ACCEPTANCE OF THIS PLAT BY THE TOWN OF MUNSTER, INDIANA BECOMING EFFECTIVE ON THE DATE OF RECORDATION OF THIS PLAT.

SURVEYOR'S CERTIFICATION:

I, GLEN E. BOREN, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEYOR LICENSED IN COMPLIANCE WITH THE LAWS OF THE STATE OF INDIANA; THAT THIS PLAT CORRECTLY REPRESENTS A SURVEY COMPLETED BY ME ON MONTH XX, 2025 AND THAT ALL DIMENSIONS, LINEAR AND ANGULAR ARE CORRECTLY SHOWN, AND THAT ALL MONUMENTS OR MARKERS SHOWN THEREON ACTUALLY EXIST, AND THAT THEIR LOCATIONS, SIZE, TYPE AND DESCRIPTION ARE ACCURATELY SHOWN.

WITNESS MY HAND AND SEAL THIS _____ DAY OF _____, 2025.

_____
GLEN E. BOREN, P.S. NO. LS20000006

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "C"
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
PRELIMINARY PLAT

0' 25' 50'
SCALE: 1" = 50'

SPROUTS

© COPYRIGHT DVG TEAM, INC

\25-0081 Preliminary Plat.dwg	
FB/PG	FILE NO.
DRAWN BY: G.B.	DATE: 9/4/25
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 25-0081	

ROUNDABOUT OPTION

PRELIMINARY PLAT
CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"
PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN ALL THE LOTS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF _____, 2025.

CENTENNIAL VILLAGE, LLC

BY:_____

TITLE: _____

(PRINTED NAME):_____

ACKNOWLEDGMENT

COUNTY OF _____
STATE OF _____] SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED _____ AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 2025.

_____
(SIGNATURE)

PRINTED NAME:_____
NOTARY PUBLIC
RESIDENT OF _____COUNTY

COMMISSION EXPIRES: _____

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF _____, 2025.

THE PREVIOUSLY GRANTED AND SHOWN OVERLAND FLOOD ROUTE EASEMENT BY PLAT BOOK 110, PAGE 11 IN DOCUMENT NUMBER 2017-024636 IS HEREBY VACATED AND SUPERCEDED WITH THE OVERLAND FLOOD ROUTE EASEMENT SHOWN HEREON.

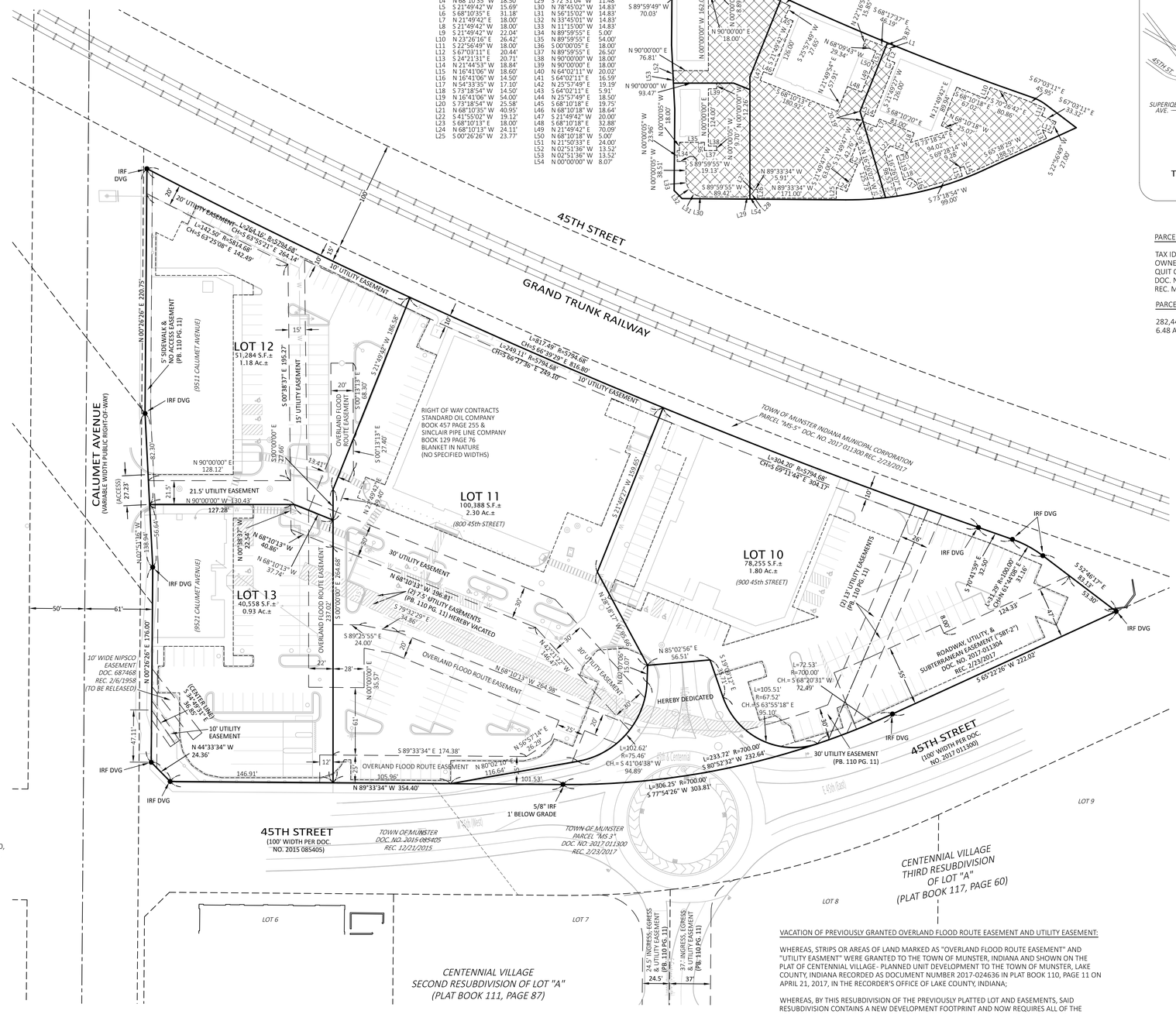
_____ _____
PRINTED NAME SIGNATURE

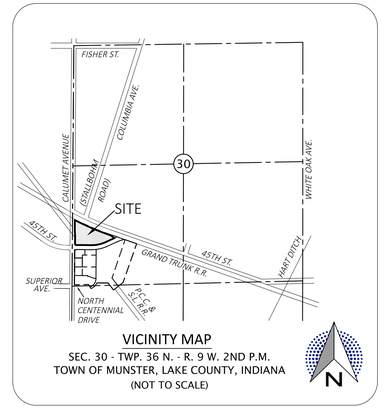
TITLE:

ATTEST:

_____ _____
PRINTED NAME SIGNATURE

TITLE:





VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SUBDIVIDER AND OWNER:

CENTENNIAL VILLAGE, LLC
631 KILLARNEY DRIVE
DYER, IN 46311

ENGINEER AND SURVEYOR:

DVG TEAM INC.
1155 TROUTWINE ROAD
CROWN POINT, IN 46307

LEGEND

- INGRESS/EGRESS AND PARKING EASEMENT
- PREVIOUSLY PLATTED UTILITY EASEMENT HEREBY VACATED
- IRS DVG 5/8" REBAR SET WITH BLUE PLASTIC CAP STAMPED "DVG TEAM INC FIRM NO. 0120"
- MAGF "MAG" NAIL FOUND WITH METAL WASHER STAMPED "DVG TEAM INC FIRM NO. 0120"

P.B. - PLAT BOOK

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3. CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 53.
4. CENTENNIAL VILLAGE 2ND RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 87.
5. CENTENNIAL VILLAGE 3RD RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 117, PAGE 60.

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SURVEY NOTE:
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VACATION OF PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND UTILITY EASEMENT:

WHEREAS, STRIPS OR AREAS OF LAND MARKED AS "OVERLAND FLOOD ROUTE EASEMENT" AND "UTILITY EASMENT" WERE GRANTED TO THE TOWN OF MUNSTER, INDIANA AND SHOWN ON THE PLAT OF CENTENNIAL VILLAGE- PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA RECORDED AS DOCUMENT NUMBER 2017-024636 IN PLAT BOOK 110, PAGE 11 ON APRIL 21, 2017, IN THE RECORDER'S OFFICE OF LAKE COUNTY, INDIANA;

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WHEREAS, BOTH SAID EASEMENTS ARE BEING RECONFIGURED TO ACCOMMODATE THE NEW DEVELOPMENT FOOTPRINT AND GRANTED ACCORDINGLY ON THIS PLAT;

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SURVEYOR'S CERTIFICATION:

I, GLEN E. BOREN, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEYOR LICENSED IN COMPLIANCE WITH THE LAWS OF THE STATE OF INDIANA; THAT THIS PLAT CORRECTLY REPRESENTS A SURVEY COMPLETED BY ME ON MONTH XX, 2025 AND THAT ALL DIMENSIONS, LINEAR AND ANGULAR ARE CORRECTLY SHOWN, AND THAT ALL MONUMENTS OR MARKERS SHOWN THEREON ACTUALLY EXIST, AND THAT THEIR LOCATIONS, SIZE, TYPE AND DESCRIPTION ARE ACCURATELY SHOWN.

WITNESS MY HAND AND SEAL THIS _____ DAY OF _____, 2025.

_____
GLEN E. BOREN, P.S. NO. LS20000006

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
10/5/25	ROUNDABOUT LINEWORK

CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "C"
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
PRELIMINARY PLAT

0' 25' 50'
SCALE: 1" = 50'

SPROUTS

© COPYRIGHT DVG TEAM, INC

\25-0081 Preliminary Plat R-1.dwg	
FB/PG	FILE NO.
DRAWN BY: G.B.	DATE: 9/4/25
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 25-0081	

MUNSTER PLAN COMMISSION
MINUTES OF REGULAR MEETING
October 14, 2025

The Munster Plan Commission held a meeting on October 14, 2025, at Munster Town Hall, 1005 Ridge Road, in the Main meeting room and could be accessed remotely via Zoom webinar, a videoconference application.

Call to Order: President Baker called the meeting to order at 7:00 pm.

Moment of Silence and Pledge of Allegiance

Roll Call:
William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025

Members in Attendance	**Members Absent:**	**Staff Present**
Rachel Branagan	Jennifer Johns	Sergio Mendoza, Planning Director
Joseph Hofferth		Nicole Bennett, Town Attorney
David Nellans		Denise Core, Administrative Assistant
Roland Raffin		
George Shinkan		
William Baker		

President Baker said we have a quorum.

Approval of Minutes: September 9, 2025, Plan Commission Minutes

Motion: Commissioner Raffin moved to approve the September 9, 2025, Plan Commission minutes as presented.
Second: Commissioner Branagan
Vote: Yes –6 No – 0 Abstain – 0. Motion carried.

Preliminary Hearings:

President Baker said we have four preliminary hearings, all of which are the same development, so he said they'd do a presentation and then work through each one individually to meet all of the public sector requirements.

PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION at 9505 Calumet Avenue.

PC25-016 PUD AMENDMENT- Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C at 9505 Calumet Avenue.

PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 Square Foot, 1-Story, Sprouts Market Building, to be commonly known as 800 45th Street.

PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-Story, Chase Bank Building, to be commonly known as 9521 Calumet Avenue.

Director Mendoza gave this briefing of all four dockets as one development project. The site is located as identified as lot C, just north of 45th Avenue and east of Calumet Avenue. They are proposing to divide this parcel into four additional lots of record. The intent is to develop two lots, Lot 11 for the Sprouts Market and lot 13 for Chase Bank as part of that. They are also going to amend the overall PUD to support this. He said they are proposing a site plan showing the structures proposed for Sprouts Market and a Chase Bank. He noted that the other two lots have not been identified, but they are proposing the additional square footage regulations as part of their PUD amendment. He showed plans and explained what the overall Lot C site would look like with the 4 lots, Lot 10, Lot 11, Lot 12, and Lot 13. They have provided development plans for Lot 11 (Sprouts) and Lot 13 (Chase). He said amendments to the overall PUD would include updates to their sign ordinance. He said they have been recently receiving additional sign requests from their tenants throughout the overall development, and the new developments will require additional signage to meet their market. They are proposing amendments to those sections as well as adding uses to include the bank and the market and proposing the add the use of structural brick. He said they are also proposing a discussion of two options they are considering for the intersection of Centennial Drive and 45th; one is a roundabout, and the other is a four-way intersection with a traffic light. He took them through the proposed development virtually as one would come off Calumet Avenue and head east into the development, showing the orientation of the new buildings and the intersection. He said they intend to complement the materials of the existing PUD. In answer to President Baker's question, he said the PUD amendment is for the overall development, particularly for the signage, so the proposed changes identified in the amendment would impact the overall development. They also have to amend the materials of the existing PUD. He concluded by saying all the process fees have been paid as of this afternoon.

Commissioner Branagan asked if these buildings had always been placed in these location or if they'd been moved, specifically the building on Lot 13. She said it is so nice that across the street on 45th,

Rosebud is right on the corner, but they are backing off from the corner with the bank. Director Mendoza said he could describe why this occurred. This discussion came up in the Site Review Committee meetings. The issue is that there are pipelines running through there and placing a building over that would cause some concern. He said they had discussed possibly flanking that intersection to complement the buildings across the way. They were told that, because of those pipelines running right through there, that this was the best. The petitioner began to speak on the various pipelines, but President Baker asked him to wait until called. He asked Commissioner Branagan if she was done; she answered, yes, that made sense. President Baker asked if the Commissioners had any further questions. When there were none, he asked the petitioner to state his name and address.

Mr. Russ Posen from DVG Team Inc., located at 1155 Troutwine Road, Crown Point, Indiana, introduced himself and said they are the civil engineers and surveyors representing Mr. Kimmel on this. He said he had both sets of architects with him, Ted Rohn representing Sprouts and Amy Ferguson representing Chase Bank. He said he would give some high-level discussion of this from the site development but would let (the architects) give a little more color of the buildings. He said Matt Kimmel, the developer, was also in attendance. He said they are trying to build four buildings here; one is the 22,000 square foot Sprouts development which the original PUD had as one 70,000 square foot grocer, so they're making that one smaller. He said it kind of fits this development and the needs of the Sprouts grocer in this area. They also have the Chase development and two other future buildings. He said with this site plan, they're providing more parking than required; they think their users would like more parking on this development. He said they made a conscious effort on pedestrian access through and into this development. On Calumet Avenue, there is a proposed 10-foot concrete pedestrian sidewalk. He said currently, there is some existing pedestrian way but as these lots develop, those will be converted to 10-foot wide. He said, as you can see on the site plan, the Chase has 10-foot. On the south, along 45th, they have a sidewalk that's 8-foot which is consistent with the way the PUD is written. He said these sidewalks come through and into the site, you can kind of see the piano key crosswalks that get every pedestrian into the area with good interconnectivity, making sure they get into where the Sprouts is. He said they have some proposed connections into one of the future lots. It would be the bike path in between the development to make sure pedestrians can get to the bike path through the site, and then along Calumet, that access way will tie into the bike path. They only have a crosswalk location at Calumet and 45th; they think that's the safest and it's already there, so that's where they want pedestrians to cross if they come from south to north or north to south. The storm water, sanitary, and all that has been submitted to the engineers, and it is satisfactory to their knowledge. He explained the pipelines in greater detail, stating that along the Chase property, and even up near the Sprouts, there are 3 BP lines. They have they have been in contact with BP, have had preliminary meetings, and are in coordination with them; the final permitting process is ongoing and will take a little bit of time. He said there is also a Wolverine pipeline and a fiber optic cable going through the property near the Chase site. He said they are working with Lumen, which used to be CenturyLink, to get the fiber optic cable rerun and relocated, so they are, we're definitely actively in conversations and in permitting with those entities. He said he would let the architects talk about the material, adding that the nice part about these buildings is they adhere to the PUD and the requirements of the area.

Mr. Ted Rohn of Rohn Associates Architects (located at 13177 Rhode Street, Cedar Lake) said Sprouts is a national tenant coming into this area. He said as many of the nationals do, they have strict prototypes that they are supposed to follow but they've been able to change their exterior design and integrate it into what they've been doing with the rest of Centennial Village. He said the renderings were essentially approved by Sprouts just recently. He said the drawings show all the different materials and the colors they're using. He said it is a full masonry building, masonry exterior bearing walls, steel frame, and

interior with steel frame roof joists. The interior of the building will follow their national prototype; it will be laid out exactly as they demand they do. He said they have approved the signage layout, as they've shown on the renderings. He said this, too, is an integration between what their needs are, what the developer wants to do, and what the Town would want for Centennial Village. He asked if there were any questions regarding the building.

Commissioner Raffin asked if the Sprout material matches the same materials as the other buildings. Mr. Rohn said they're using what's called a structural brick; it's a CMU block with a brick face on it and the colors have been selected to blend very well with the buildings across the street. He said it is not the identical brick. He said their prototype calls for full masonry CMU walls with no skin on a lot of them, so this is the best approach for them to obtain a structural integrity of the building and have a face that matches the other buildings. Commissioner Raffin said he hates laying with structural brick, it's not the most ideal product. He said you've got to really be careful when doing structural brick buildings with full load bearing and bar joists and everything. He said he's seen a lot of cracks in that stuff in the past on some of that structural brick. Mr. Rohn said they've done it several times in the past, and, like any product, it has to be installed correctly. Commissioner Raffin said he doesn't think the structural brick buildings are going to match the other buildings. Mr. Rohn said the colors are matching as close as they can; the bricks will be the same height, but they'll be 4 inches longer.

Mr. Pozen said before they had a conversation about the Chase building, he wanted to touch on the Sprouts truck dock which is an enclosure that can be seen on the top right of the rendering. He said as part of this grocery store development they need a truck dock. The truck dock is on the east side of the building and actually facing 45th. They are going to fully enclose the three sides, not the top, so you won't see a truck dock on a day-to-day basis. He said they'll obviously open it up so the truck can get in there, then they'll close it. He said that will be a nicer look for passersby; they don't have to stare at it the majority of the time. President Baker asked if it would look like the rendering; Mr. Pozen said yes.

President Baker said when Mr. Pozen started, the first thing he saw was the place for the semis to come in and out. He asked about the truck traffic for this grocery business, whether it would be in the morning and how often trucks would be coming in and out. Councilor Shinkan said he is in the business and they are in the mornings, sometimes before people wake up. Mr. Pozen showed President Baker the rendering of what would be seen when coming into the development. Commissioner Branagan said this looks different from where Jewel has semis coming in; it doesn't seem large enough for a semi. Mr. Posen said they worked with the Sprouts specifically on their semi, which is not necessarily the 70-foot-long semi. one, it is a little bit smaller. He said Sprouts has approved a semi that they'll use to come into this building, and they have done vehicle tracking to make sure they can accommodate it. Councilor Shinkan said it's a smaller truck so it will get in and out quickly.

President Baker asked Mr. Pozen to explain the requested curb cut on Calumet Avenue. Mr. Pozen said the curb cut on Calumet Avenue is currently, by plat, a no-access easement but by this plat they're proposing to vacate that no-access easement to provide a curb cut onto Calumet Avenue. They are not putting a pork chop on that drive because it is right in/right out by nature because there is a raised median there. He said that access would, in turn, be right in/right out from Calumet. President Baker said it's a challenge because they had that conversation initially about 10 years ago about the one across the street from the oil change place and that seems disruptive. He said he was interested to hear an update from either the town or the development on what kind of situation that one has caused. He said he has seen people get creative there and this one is of more of a concern since it is between 45th Avenue and the railroad tracks. Mr. Pozen said there is currently a fully raised median on Calumet.

Commissioner Raffin said he thought it was a very narrow raised median, that is, not that wide. Mr. Pozen said he thought it was 6 feet, but it had been some time since he'd looked at it. Mr. Pozen said he would have the Chase architect come up and discuss the Chase building.

President Baker raised the issue of the impact with regards to the traffic on that already pressurized intersection. He said the traffic study he saw was from '24, he asked if that was based on 65,000 square feet of new development going in or if that was that just a snapshot of what was going on in 2024. Mr. Pozen said it's based on the scope and type of these four buildings. President Baker said then (the traffic study) is determining the increase in traffic with the four proposed buildings being fully occupied. Mr. Pozen said yes. Commissioner Raffin reiterated that it's actually like a curb, it's so narrow that people pulling out of there will just jump that curb. Mr. Pozen said that can be one of the things that the Town's engineer reviews in conjunction with recommendations, even from this board, of adding delineators along that location where they are dividing the access. He said they would obviously be amenable. Commissioner Branagan asked if they were going to discuss the roundabout and asked if the roundabout is an option or if that is what they are doing. Mr. Posen said the roundabout is an option. He said both the intersection of 45th and Calumet and the intersection of North Centennial Drive and 45th have challenges no matter what. He said the traffic study looks at both options, and both options have pros and cons, so more discussion needs to be done with the town staff and the town's engineer to see which option is more preferable to the town, the engineers, and the developer. Everyone need to come together to see which option is best. He said that conversation is ongoing, so they want to make sure they present both in the PUD; they don't want to limit themselves on the what may be the best product for the town's situation. Commissioner Branagan said she personally thinks they're very successful and keep traffic moving, citing Carmel, Indiana. President Baker recognized the next presenter.

Amy Ferguson with the Architect Partnership, 680 North Lake Shore Drive, Chicago, Illinois, introduced herself and said they are the architectural firm that's doing the Chase Bank. She said they are replicating the similarities to the rest of the buildings that are around; they will be using the same brick and the same cast stone. She said one exception is, they'll be putting cast stone up at the top of the parapets and not just EIFS; Chase isn't a big fan of EIFS anymore. She said other than that, they're going to be following the color scheme and the patterning. She said they do have a few differences in the elevations. On the south elevation, there's going to be a conference room for Chase, so they've done some foam windows to help with that profile on the south. On the west elevation, they've kind of popped out an area so that they can do some signage facing Calumet Avenue; they've created an element there to break up the length of that building. She said they are making one deviation from the standard in the Centennial Village standard with their canopy over the entry door. She said the current (Centennial Village) canopy standard isn't a solid canopy that would protect you from the weather; it's more for airflow. She said over their entry, and only over their entry, they have a solid canopy, which is a Chase standard canopy , so if it's raining and somebody's standing in front of the door using card access to get into the vestibule, they're not going to get wet; otherwise, all the canopies over the windows will be following the same canopy design as the rest of the development. She said they are using the same masonry, the same brick, the same stone, and a similar pattern but there is a variety of buildings that have little nuances here and there, so they picked from those and chose what to replicate. She said the bank will have a 24-hour vestibule for ATM banking, two drive-up ATMs that are signature canopies, so it's a freestanding, small, batwing-like canopy that protects the ATM and the people using it from the weather. She said they've got a transformer enclosure on the east elevation, in keeping with the rest of the development and their trash and transformer enclosures. She said in terms of their trash, they have an agreement with Mr. Kimmel to make use of trash enclosures at another location in this lot area so they don't have to have their own, which would just create an even bigger enclosure in this area. Ms.

Ferguson clarified that there will be a total of 4 ATMs with one in the vestibule, two outside, and one in the lobby. Commissioner Nellans asked what the approximate distance is from the bank to the trash enclosure. She said they would be allowed access to the same trash containers that Sprouts has so it would be that enclosure across the parking lot.

Commissioner Raffin asked if the parapet walls are high enough to shield all mechanicals on the roof. Ms. Ferguson said that is correct, Chase uses an all-electrical VRF system, so they have a low roof area to accommodate so that unit won't be visible from the street behind the parapet. She said that one unit and the condenser is pretty much all the mechanical equipment they'll have on their roof.

President Baker said the proposal is for no drive-through banking. Ms. Ferguson clarified that is no drive-through banking with the teller, customers can drive through and do whatever they need to at an ATM, make a deposit and take out cash, but not with the teller; there will be no tubes or talking.

Commission Branagan said the plans don't show windows on the east elevation wall; it seems to be a workroom. Ms. Ferguson said that is Chase's back of house area; it is area behind the teller line, the data room, janitor's closet, all of those areas you don't want shown. She said they've done what they've done in some other developments, they have inset metal panels so they're creating that rhythm to break up that facade. She said it is a room that people are working in actively, but they are not sitting there 8 hours a day. She said this is that back of house area is where a lot of high security items are and it's just not conducive to have a window in that area for security purposes.

Commissioner Branagan said they are using the standard brick like the rest of the development is. She noted this is not necessarily a question for Ms. Ferguson; she was trying to understand why Sprouts is doing their own thing and if we are okay with them doing that. Commissioner Raffin said it is cheaper, so it is economics. Councilor Shinkan said if it is allowed by our code or by Munster standards, he is okay with it. Director Mendoza stated that CMU is not identified as a permitted use within the Standard Zoning code and it is also not permitted in the PUD zoning code for Centennial Village. He said they're asking for an amendment to that portion of the PUD zoning code for Centennial Village to include that structural brick. That structural brick is part of their request for the PUD. Mr. Rohn said It is considered a brick face, though, from the outside It looks like brick, and it is a brick finish. He said they brought some samples. Councilor Shinkan said some of his grocery stores have used them as well. Mr. Rohn said he wanted to make sure they're not confused; they are not putting up just regular CMU walls, this is a brick product, it's just the size. He said on a building of this size, at 24,000 square feet, the scale of this building is much bigger than any other buildings. On the other buildings, they're doing 8-inch CMU with a brick face. This is a much bigger building, and so we need to combine the structural brick, to get the width of wall they need for the bearing walls on the exterior. He concluded by saying this is not a new product; it has been used many times, he has done it on many buildings himself. He said it has performed well, and it works well.

PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION at 9505 Calumet Avenue.

Commissioner Raffin made a motion to set PC Docket No. 25-015 for a public hearing on the preliminary plat. Councilor Shinkan seconded the motion. President Baker asked Director Mendoza if the Town has reviewed the engineering study. Director Mendoza said they have reviewed the stormwater; they have not reviewed the traffic study. He said there are some additional items that need to occur before the

engineers review the traffic study. Councilor Shinkan asked if that will be available by the next hearing. Director Mendoza said yes, if all requirements are met for the engineers to review, they can continue moving forward with the review of that traffic study. President Baker asked Councilor Shinkan if that was an amendment or a question. Councilor Shinkan said it was a question. President Baker called Director Mendoza who called each member for their vote.

Motion: Commissioner Raffin moved to set PC Docket No. 25-015 to a public hearing.
Second: Councilor Shinkan
Vote: Yes – 6 No – 0 Abstain – 0. Motion carries.

PC25-016 PUD AMENDMENT- Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C at 9505 Calumet Avenue.

Councilor Shinkan said this is to split this into 4 buildings. Commissioner Raffin said this includes the design standards as well. Director Mendoza said this is the PUD amendment which includes or identifies the design guidelines and standards that are being requested for amendment. That is primarily what's being presented under this file number. President Baker added that this also includes what's going to happen at the intersection on 45th Avenue. Director Mendoza said that is correct.

Commissioner Raffin made a motion to table PC Docket No. 25-016. There was further discussion on the what was included in this petition. Councilor Hofferth asked if this is the one about the roundabout. Director Mendoza clarified that it is everything that's identified within this PUD amendment; it is the structural brick, the materials, and the relocation of those access points which are identified within the design guidelines and standards of the PUD. Councilor Hofferth said this is something that we're going to be consulting our engineers on, as far as the roundabout versus the 4 way. Director Mendoza said that's right, they are showing both as an option. The engineers have not reviewed the traffic. Councilor Hofferth said that's what he was saying and he seconded the motion. Director Mendoza called each member for their vote.

Motion: Commissioner Raffin moved to table PC Docket No. 25-016.
Second: Councilor Hofferth
Vote: Yes – 6 No – 0 Abstain – 0. Motion carries.

PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 Square Foot, 1-Story, Sprouts Market Building, to be commonly known as 800 45th Street.

President Baker noted this is specific only to that lot having to do with that particular user at that particular location and what that looks like.

Commissioner Raffin made a motion to table PC Docket No. 25-017. Councilor Nellans asked Commissioner Raffin what additional information (he wanted). Commissioner Raffin said we've got no access to the property yet, we don't even have the preliminary plat done yet, so we're putting the cart before the horse. He said we don't have the answers from staff and town engineer. He said that's his opinion. President Baker said there is a motion on the floor and asked if there was a second.

Commissioner Branagan seconded the motion. When there was no further discussion, Director Mendoza called each member for their vote.

Motion: Commissioner Raffin moved to table PC Docket No. 25-017.
Second: Commissioner Branagan
Vote: Yes – 6 No – 0 Abstain – 0. Motion carries.

PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-Story, Chase Bank Building, to be commonly known as 9521 Calumet Avenue.

Commissioner Raffin said once again, he'd make a motion to table PC Docket No. 25-018. He said he thinks Chase Bank looks great architecturally with their design and stuff, but I wants all the information from staff regarding the access in and out of this property before we start dividing it up and approving it. Commissioner Branagan seconded the motion. Director Mendoza called for the member votes. President Baker said this is exciting, we're looking for to it.

Motion: Commissioner Raffin moved to table PC Docket No. 25-018.
Second: Commissioner Branagan
Vote: Yes – 6 No – 0 Abstain – 0. Motion carries.

Public Hearings:

PC25-011 SUBDIVISION PRELIMINARY PLAT: Bruce Boyer on behalf of Crew Car Wash requests review of a Primary Plat for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION at 111 Ridge Road.

Director Mendoza reported that this is a request to combine 5 lots of records that have been parceled off into two parcels, or two lots of record. Their request is to combine these two parcel into one lot of record; the intent is to combine this into one lot of record is to expand or allow the ancillary uses for the primary use, which is the car wash. They are proposing to have off-street parking for employees, as well as a transformer and a dumpster on-site. This would also allow them the ability to install an emergency access in case equipment does break down. It essentially combines all of the items for a functioning car wash and necessities into one lot of record. President Baker asked if there were any questions; there were none. He said next up is somebody to speak on behalf of the petitioner; he asked that he state his name and address.

Mr. Bruce Boyer, of Boyer Construction, 9901 Express Drive, Highland, Indiana, said he can't add much to what Sergio already said. This is simply an exercise to combine these into one lot. He said Mr. Billy Schaming, the president of Crew Car Wash, was with him to answer any questions. President Baker asked if there were any questions.

President Baker clarified that this is a public hearing for this particular issue, which is for a one-lot subdivision. They're creating one lot instead of having multiple lots at this corner. That's what this particular discussion is about; there'll be a separate one that talks about the development plan, the lighting, the dumpsters, all those types of things. He said the building-specific things are separate; if they want to talk about the plat part of it, this is that opportunity.

President Baker opened the public hearing and asked anyone who would like to speak on this, to come up to the microphone and state their name and address for the record. When there were no comments on the preliminary plat, he closed the public hearing on PC25-011.

> **Motion:** Councilor Hofferth moved to approve PC Docket No. 25-011, a preliminary subdivision replat of Lot 1 of Crew Car Wash subdivision with a performance surety, determined by the town engineer for all public infrastructure, including all discussions and findings.
> **Second:** Councilor Nellans
> **Vote:** Yes – 6 No – 0 Abstain – 0. Motion carries.

PC25-012 DEVELOPMENT PLAN REVIEW: Bruce Boyer representing Crew Car Wash requests approval of a Development Plan to allow onsite parking, lighting, dumpster enclosure, and emergency exit from the car wash lane at 111 Ridge Road.

Director Mendoza showed the commissioners a revised landscape plan and site plan that had been submitted. He said the applicant has identified the restructuring of that emergency exit on the plans. He said there were some discussions this afternoon regarding the lighting ; he would let the applicant address the direction of compliance. He said this is a continued public hearing, at the last public hearing, there were questions regarding the gap in the fence. He said it sounds like the applicant has corrected that with additional landscape rock, perhaps. He said there was also some concern whether the intersection was going to be expanded, and they have shown that as part of their civil engineering plans. He said there was also a discussion about an emergency arm or a gate there, but he believed the applicant may have an alternative solution to prevent anyone from mistaking this for a continued drive for the car wash or other reasons. He said he would let the petitioner explain their alternate plan for that. President Baker asked if the commission members has any question for Director Mendoza. When there were none, he asked the petitioner to state his name and address for a PC25-012 Development Plan Review.

Mr. Bruce Boyer, Boyer Construction, 9901 Express Drive, Highland, Indiana said, as Mr. Mendoza had mentioned, they've had some discussion over the past few days on a couple of items. He said one of the items from last month was the height of the poles and the fixtures; they have corrected that. They replaced the 20-foot poles with 17-foot poles, so they are now at the recommended fixture heights. He said they had a misunderstanding regarding the fixture itself. They understand now they are not in compliance with the town code but are willing to change those fixtures and make sure that they're compliant with the coach-type style of fixture that the code requires so they're fine with that. The only other item, as Director Mendoza talked about, was the escape or emergency exit lane. He said there was a discussion about some kind of a gate or something to block that off. He said there's a temporary gravel exit lane there now and they blocked it off with a large plastic ball like the one that guides the cars through the car wash. He said that works fine but if it' the plan commission's desire that they add an actual gate and an arm there, they're willing to do that. He said Mr. Schaming wanted to make a few comments.

Mr. Billy Shaming said he serves on the support team at Crew Car Wash and represents the Crew Car Wash right down the street at 111 Ridge Road. He distributed a handout to each of the commission members. He said he has been on the support team at Crew Car Wash for 20 years now. He thanked the commissioners, saying he respected their time and would take only a few minutes to share a couple things about Crew. He explained that he had met Councilor Nellans as he was driving baid the last time he was walking the property, he had an opportunity to meet Councilor Nellans who was driving by the

property, he thought maybe he was doing his homework to address some of the concerns that were brought up at the last meeting. He said Councilor Nellans was kind enough to get out of his car, take a quick tour, and come inside. He said he shared their annual game plan, their quarterly execution, their company values, and their aspirations to be a role model for the service industry, not just the car wash industry. He said one of the components of being a role model would be the way they treat the communities where they do business; he wanted to emphasize that when they think of a business that you want in your community, he'd like them you to think of Crew Car Wash. He gave a brief history of the founders and the company philosophy. He said they have a growth goal and the opportunities they will be creating with new team members, new leadership positions, education assistance for their team members, a contributions in annual charitable giving to the communities they serve where they do business. He said one good example of that is they had their kickoff grand opening fundraiser for the Humane Society up here a month ago and they raised $11,000 over a weekend. He said they're going to have more of that. He thanked the commission for allowing him to share a little bit about the culture of Crew Car Wash; he thanked Councilor Nellans in particular for inviting him to speak. He concluded by offering to answer any question he could.

There were no further questions from the commissioners. President Baker opened the public hearing for PC25-012, which is a request of the approval of the development plan to allow for the on-site parking, lighting, dumpster enclosure, and emergency exit at the car wash located at 111 Ridge Road. He asked and asked anyone who wished to speak on this petition to state their name and address for the record.

Ms. Brenda Vander Molen of 8222 Forest Avenue said she had questions. She asked about the parking, if it was strictly just going to be parking or are they going to add vacuums later. Councilor Shinkan said there will be no vacuums. She asked if the dumpster would have the same rules as the other places have where they have to be enclosed so that it's not visible. Commissioner Raffin said yes, and it will have gates. She asked the reason for the emergency exit. Commissioner Raffin explained that if someone gets stuck in that lane but cannot go through the car wash, they can get out that way. He said there had been earlier Plan Commission discussions about putting a gate arm there to control anyone just for driving through there, and they can raise the gate up for an emergency. Ms. Vander Molen said they had lived there for over 30 years, and when Munster Car Wash was there, there was no emergency exit; she was wondering if something specific had changed since it is still just a car wash. Councilor Shinkan asked what her concern was about having an emergency exit for somebody that needs to get out of there. Ms. Vander Molen said the aesthetics was one concerns since it is right outside their front door and it would look better with a driveway going up to this back of the car wash. Councilor Shinkan said there will be parking there with beautiful landscaping. Ms. Vander Molen said they are across the street on Forest. Councilor Nellans said they just have a temporary exit, and if he recalled correctly, Munster Car Wash was open to the alley. Ms. Vander Molen said there was a house, like an apartment there, and then another business in that location but it wasn't accessible by driving. Councilor Nellans said it made sense to him and explained a few scenarios where a car may need to exit. One reason is if a vehicle gets to that point, but they can't run the car wash, a second may be that a vehicle may not be appropriate in some way; if they can't go through the wash but this is not caught before it is in line. He said they have to let those folks out and they can't back up because there are cars behind them. He said when this is finished, those vehicles will be coming out the same driveway entrance that the employees drive in to get to their parking area, so it's all it's going to be paved and landscaped. He said it makes sense but that's his opinion. Ms. Vander Moler said at the least, they would request that there be a nice-looking gate there, not just a ball. Commissioner Raffin said a gate with a traffic control arm that lets cars out or not.

Mr. Roy Vander Moler of 8222 Forest Avenue said he had one question about the lighting. There is a light right outside their bedroom window. He asked if they would shut the lights off at night at least and would there be more lights staying on. President Baker said that's a good question, we'll work on finding that answer for him. Mr. Vander Noler said when the notices are sent to their house, it tells them absolutely nothing about what's going on here, like why they are coming here. He said it should give more explanation like changing the light position and changing the lot size.

Nancy Nixon of 8004 Hohman Avenue said when they were here last time, she and her husband had said this is a large company with lots of car washes, and they know what they need when they first come into a community. She said they would have known they needed this emergency exit at this place. She said when they left the meeting the last time, they talked to someone that was in government- not anymore, but when this all started- they were told that (Crew) knew they needed it, but it was left out of the original proposal because they didn't think we would want it; they told them there was paperwork to back that up. She said she didn't know if anyone here had looked into that or not, but she doesn't think people should be able to come in the back door once they're here and then what are (the neighbors) going to say. She said everyone says they need this, but they should have done that at the beginning, and then maybe they could have had a say about something. She said it feels like the horse is out of the barn, that's it, okay, well, we have to give this to them; she doesn't like that it happened that way, and she agrees that there should, at the very least, be a gate there. She concluded by saying she appreciates that they're going to do landscaping and that sort of thing but there's a lot of traffic that comes off Ridge, down Forest and this is just another thing.

President Baker asked if anyone else wished to speak. He closed the public hearing when there were no additional comments.

Commissioner Raffin asked Mr. Boyer if the Crew Car Wash representatives would agree to having the lights off in the parking lot when business operations are off. Mr. Schaming said yes, that would be their pleasure. He said he had shared earlier that safety is their number one value, so we would request that they can keep them on until our team members are in their cars; they employ some high school kids, and they like to keep the lights on until their team members have left. He said they can turn them off 90 minutes after close. He said he can commit to the request that the lights be turned off; they're all controlled with computers and automation, and that can be programmed. He said that is a very reasonable request. He said they can absolutely put a gate in. He wanted try and put people at ease by sharing that this bailout lane might have 2 or 3 cars that use it per day, it's primarily for vehicles that come around the corner, and they realize they can't get a window up or they have too many belongings in the back of the pickup truck that we're unable to wash. Commissioner Raffin added that Corvette tires are too wide. Mr. Schaming said exactly, so occasionally their service advisors will miss the vehicle restriction, and they notice it before the car travels down the track, that's why we call it a bailout lane. Mr. Boyer said he thought that was important, as Mr. Nellans mentioned, that this is simply an extension of the driveway through the parking lot; it's not direct access out to Forest Avenue or anything like that. It's just a little bit of a driveway coming off the back of the driveway to allow cars to circumvent the car wash lane. Councilor Nellans clarified that it is not an additional curb cut. Mr. Boyer said there was a question also about the dumpster enclosure; it's a fully enclosed dumpster enclosure in the same limestone and brick materials as the building. He said it's tucked way back in the corner. Commissioner Raffin added that it has gates on it. Councilor Nellans asked if there would be some low lighting for security as opposed to total darkness. Mr. Schaming said if a parking lot has 10 lights, their standard practice is to keep two of them on, one at each end of the property, for security lighting so not a completely dark black parking lot. He said they are happy to work with the neighbors and offered to give

each of them his business card with his cell phone number. He said they want to be a welcome member of the community, they are a family business, and they want to treat everybody like family, so he'd be happy to be there to make sure the light is not intrusive into their homes or into their yards. Councilor Nellans said he brought up that point because he doesn't want them to agree there'll be no lights, and then there will be some security lighting. Mr. Boyer said there should be some security lighting, maybe just some of the building lights or something low level to light up the back of the building. He said they've got a full screening fence so someone could very easily be trying to go in the back of the building, and you'd never know if there were no lights back there. Councilor Shinkan said it's a big improvement over the Munster Car Wash. Commissioner Raffin asked Mr. Boyer if there were security cameras around the building and was told they have a lot of cameras because they photograph cars going in.

> **Motion:** Councilor Hofferth made a motion to approve PC Docket No. 25-012, Crew Car Wash Development Plan with the condition that all lighting specs comply with the Town's standards and that a guard/gate arm be installed at the proposed emergency exit drive aisle, including all discussion and findings.
> **Second:** Councilor Nellans
> **Vote:** Yes – 6 No – 0 Abstain – 0. Motion carries.

PC25-020 DEVELOPMENT PLAN REVIEW: Jim Glascott of WT Group representing the School Town of Munster requests review of a Development Plan for the construction of ten (10) tennis courts at 8839 Columbia Avenue.

Director Mendoza reported that there's a lease agreement between the Munster Parks Department and the School Town of Munster for the relocation of their tennis courts facilities to the park's facility located behind Munster High School, just northeast of the pool site. He described the location while projecting the plans on screen, noting that the new plan is more accurate than the previously seen by the BZA. He said It is just north of the trail, boarded by parking lots on the side, and then it wraps around. He said the intent is to install 10 tennis courts surrounded by a fence. The fence is 10 feet in height, so they are before the BZA for a variance. He said they are also seeking to add stadium lights at around 50 feet high which is pretty standard for what is identified as a sports complex for our zoning code. They are before the Board of Zoning Appeals for variances on those matters as well. They are proposing a platform, and they'll be using it for the school, as part of the school facility, for gym and training, etc. He noted some of the materials that the petitioners are asking for the variances from, the location from, and they fall in the current zoning, which is in the civic zone as a sports field. He said one recommendation that staff initiated was that a sports field usually is without a building on the frontage line. The recommendation is that sports field area should be established and identified with a sidewalk and/or landscaping or a combination of both and the sport complex continue to the site's frontage along the east side of the project site, adjacent to the existing parking area with a trail/sidewalk connecting the existing north trail entrance to the proposed south walkway entrance, and some landscaping to provide the frontage landscape requirements that are part of a sports complex definition or identification. He noted this is a public hearing as well.

President Baker said there will be no new parking, they are going to use the existing parking from the park and the school. Director Mendoza confirmed that is their plan based on the use. President Baker noted staff is working on landscaping. He asked if they were going to put any signage up, he didn't see any signage on the development plan. He said he had seen a previous presentation for the BZA and was curious about that. He asked about the elevated, viewing platform, he said he has seen those at other

tennis tournaments but not here. Director Mendoza said he hadn't seen anything to that effect, but this is a product that they're proposing as part of the sports complex. President Baker said it would be helpful to see how it is located and the ingress and egress details. Councilor Nellans wanted to confirm that these tennis courts would be available to the public off days and off hours like they are now. President Baker asked if that was that part of the agreement. Director Mendoz a explained that is in effect because the park was created 6 years ago under the Conservation Fund through the federal government. It is that funding through the federal government that the park has to be to be used in some capacity for public access. He said he would presume the lease agreement does reflect that with the Parks Department with agreements for shared use at specific times and dates in order to retain the grant that was issued. President Baker asked if stormwater is still outstanding. Director Mendoza said our engineers are currently reviewing the stormwater study and plans that have been submitted. He said they are proposing underground stormwater storage, as well as detention ponds in the open space. President Baker asked if Director Mendoza was familiar with the work the county is going to be doing on Schoon Ditch and if that will have any impact on what might be happening here. Director Mendoza said he was not aware of that, but we can share that with our engineers, and they can coordinate with the county engineers. President Baker said he should because the pond next to the school in a park by the fields has always been a concern. Councilor Shinkan said he had never seen it flood. President Baker said he is more concerned with drowning than with flooding. When there were no further issued raised by the commission member, President Baker invited the petitioner to introduce himself.

Mr. Jim Glascott with WT Group said they are civil engineer designing this project for the School Town of Munster. He addressed the comments and questions that were raised by the commissioner and staff as follows:

- Construction: They are proposing 10 new tennis courts with a raised viewing platform and bleachers, between the two north bays of parking, He said the six north courts and the middle two courts will both have those platforms and features between them. We are proposing a post-tension concrete tennis court system here. He said it is not a system that gets put in a lot, but the idea is they put in cables inside the concrete, and then tension goes those up after it's poured; it really helps to minimize cracking and provide a longer life for these courts. He said it is a more expensive system, but they feel that it's going to be a much better finished product, especially for a set of courts that are going to be outside in the elements.
- Stormwater and detention: They are providing underground detention and at-grade storage. He said there's going to be a storm trap underground system under the northwest five banks of courts and at-grade storage at into ponds to the southwest. He said those are all designed to be dry, they do not intend for water to be sitting in those at any time; it can all drain down to a restrictor structure. That will connect to an existing storm sewer that they are replacing; that existing storm sewer had been left in place from the tennis courts that were removed around 2015. He said there's a storm line that goes down to the parking lot; they are going to replace that pipe because they're not sure exactly what the slope it's on or what condition it's in. When it is replaced, it's going to drain down to the south so it's going to be completely separate from the pond. He said they were unable to really identify everything that went into that pond. They thought there might be some excess storage in it, but the available records made it very difficult to try and identify that. He said in order to make sure they are meeting the code and not making any of these situations worse, they're providing a separate detention system.
- Sidewalks and connections: Mr. Glascott addressed the connection to the walkway by saying they are showing a concrete walk connection to the existing trail between the pond and the tennis courts, and they're showing a sidewalk out to meet the parking lot to the east. He said there are some gas lines along the east side of the site and that's why they have the tennis

courts set back off of the parking lot a little ways. At the northwest corner of the porch, they're providing a sidewalk with some steps that is not the main accessible entrance. He said, with tennis courts, you're limited on the slope to make sure that it's playable for competition. For the connection on the east side to the connection on the northwest side, they were trying to minimize earthwork, keep the cost as low as possible, have that access be a shorter connection from the Park District parking lots, and make sure they also had the accessible route coming in through the main bleacher area.

- BZA Variance requests: Mr. Glascott said Director Mendoza mentioned the variances they have before the Board of Zoning Appeals for the fence height and the stadium lighting. He said tennis courts really need to have a taller fence to make sure the balls are staying in the courts, and the code doesn't really address that specific issue. He said they are not intending to have late night tennis tournaments or anything like that will need the stadium lighting but as light levels start to drop in the fall and early spring, the light levels aren't really there during the competition, so the stadium lighting will be there to make up the difference, effectively.
- Landscaping: Mr. Glascott said he had been in discussions with a landscape architect. They are currently looking at providing landscaping along a pathway to the north. They haven't really looked at doing a walkway along the east side, grade-wise it doesn't really work all that well to have a walkway wrap around the south. He said they do have the walkway from the community path coming down through the bleacher area. We wanted to address those since Director Mendoza had mentioned them. He said they are not showing that in these plans, but they have been in contact with the landscape architect to make sure that's something available, if requested.

Mr. Glascott said that's the overall project. In the broader scheme of things, these courts are intended to replace the existing 10 courts that are in the middle of the School Town of Munster campus, for some future projects. He said there is going to be a building addition and some circulation and parking lot improvements; they are still working out the overall master plan, but the intention is for a building addition that's going to displace these tennis courts, so they're trying to get them out of the way, so they can start moving forward with design so they can come back to this Plan Commission with those plans. He offered to answer any questions.

Commission Raffin said he said this at last meeting, it would be good for School Town of Munster to come up with a master plan showing all the things they are doing before they just come up with an addition on what you want to do. Everything needs to be a holistic master plan. President Baker added that this is the third or fourth project they have brought to the Plan Commission over the last 18 to 24 months, so they have a plan. He said it would be nice to know what that plan is so it can be coordinated with some other things; the perfect example is the drainage around here, and specifically, those ponds; this might be the opportunity to get that fixed. He said it has nothing to do with adding cost to this project, but as a part of this whole process. He said people are paying attention to it, it would be a great opportunity to have some economies of scale.

Councilor Nellans commented that his is a good interaction between the town, the parks department, and the school town, we've had that for years, where we work together and we're going to have these tennis courts back in Community Park and available for the public. He said we want to make sure things are done right and that we take care of the flooding and water retention. He said he has seen that ditch full, he's seen the water back up into the park and we don't want that ever again.

Commissioner Raffin asked Mr. Glascott is he is writing the specs for the tennis court in his bid reports. He said there are obviously strict standards when it comes to putting in tennis courts and he has seen

some tennis courts go really bad, some of them in in town. He said, as a taxpayer, he wants to make sure that any bidder is familiar with doing post-tension and construction because he's done a lot of decks for high-rises and stuff and he wants to make sure they're doing it right.

Mr. Brian Pencak, Project Architect with DLA Architects for the School Town of Munster said they will have bid specifications and a Post tension contractor qualification for them to fill out so they can vet them with the bids and make sure the qualifications are met. Commissioner Raffin said he highly encourages that because a lot of things can go wrong with that slab. . He asked if they had done soil borings on this property. Mr. Penzak said they had. Commissioner Raffin said this is a tennis town, he asked if they had talked to the parents of the tennis groups. He said they're the best people who know the tennis courts better than anyone else. He asked if they're designing it for sectionals, regional, and all that kind of stuff.

Mr. Sean Begley from the School Town of Munster said they've historically been able to host semi-state. He said it would be great to put 12 courts in, but this is at a premium and so is money. He said with the 10 courts, they would be able to host Central, Regional, and semi-state as they have before. He said they have taken that into account. He said they had originally wanted to have an angle to it because that's the way you're supposed to have it, but It's prohibited with the gas line right there and the limited space overall. He said they have been talking with a lot of people about this and, specifically about post-tension concrete to make sure they get the right contractor to do it. Commissioner Raffin said you have to meet that flat surface for tennis, adding there is a lot. Mr. Begley said he's been touring around several different places, looking at different tennis courts, and talking about different things.

Mr. Pencak said there was a question about graphics. He said around the entire perimeter of the tennis courts, they'll have windscreens. The graphics have not been developed, so they would present graphics at a different submission for review. President Baker said they are usually part of the development plan which includes the whole enchilada. He said that's why they're asking about those things; it would be helpful to see what the graphics are going to be in the next round. He asked Director Mendoza how signage works in this civic zone. Director Mendoza said there is a sign standard and they would need to comply with it. If they are going to vary from that, they would go before the Board of Zoning Appeals for a variance.

Commissioner Raffin asked about their timeline for construction. Mr. Pencak said they bid on Tuesday; it's up to the general contractor whether they want to start digging this winter, depending on the weather, to get some of the storm water done and possibly the post-tension pad then continue in the spring. Mr. Begley said they are intending to plan another season on the existing courts.

When there were no additional question, President Baker opened the public hearing. He asked if anyone wanted to speak on the subject of the School Town of Munster tennis courts, they could come to the microphone and state their name and address.

Ms. Loni Dorall of 910 Ridge Road said thank you for inviting me with a certified letter. She said she had never gotten that before. She said she had also sent a letter. She said she is a fumbling tennis player, so I was interested in this project. She said she has done some real estate as well, and there's a term called the "highest and best use of property". The issue with tennis is that it's a 6-month-a-year sport, more or less, so in that period of time where the courts are not being used, and she thought she out in her letter, she has witnessed vandalism, unfortunately, because it's sitting there, and there are a lot of students around, and she certainly should know as a teacher and administrator for years. She said it also occurred

to her, because she used to be married to a police sergeant and they have to reroute the areas where the men patrol; if you have an instance of some kind of vandalism, then you're going to ask the police to go through there. She asked if this development is important enough, adding that she was not saying it negatively at all, but is it important enough because of vandalism possibilities, that the police would have to reroute their tasks during the day and have a husband come home and tell her what had changed that day for him. She said she worked part-time, just for fun, at the Lincoln facility where they have the large community center. She didn't know if anyone here was familiar with it, you can play tennis, pickleball, and basketball. It's an indoor facility and they move things, roll it back, and they put a track around there. She said it's a community center. She was thinking since it's still under study and she knows it would be a much bigger investment, but she wondered if somehow this gentleman could help to design a building that has the courts that they're designing inside of it but it's a multi-use building, 12 months a year, more people inclined to visit it, and you don't have to worry about weather. She asked if they would be parking for this facility. President Baker said they'd be parking at the school parking at the park. Ms. Dorall said this that part's all right but what would be the cost afterwards to keep those courts up. They'll sit empty all winter, not only are you going to get dust and whatever, if you get kids coming in there with pop cans and things of that sort. She said the last question was whether they are providing windscreens. She said if any of you have tried to play tennis at all, if there's any kind of a wind, you can't play so given the 6-month, more or less, timeframe for the tennis game itself, you might even lose more time and use of that facility if it's too windy out there. She concluded by stating those were the things she was thinking about, she wrote the letter and brought them forth because you invited her. She would like to see a facility much like the one on Lincoln; it would be really nice, but that's a big investment.

Attorney Bennett noted that the letter was on the screen and would become part of the record (Exhibit A). There were no more public comments, President Baker closed the public hearing.

Commissioner Raffin said there were variances before the Board of Zoning Appeals and the BZA should weigh in on those matters next month because it may change some of this plan. He said he would table this for a month. He said staff mentioned some things in the staff report that they were asking, they wanted some direction on separation and responsibility of electric service and several meter installations, they have not received stormwater and drainage review from town engineers for the proposed underground detention areas, alternative frontage along the east project line to review, and landscaping. He said the staff report recommends that the matter be deferred upon that. President Baker added signage. President Baker asked if that was a motion. Commissioner Raffin said it is a motion to defer. Councilor Hofferth seconded the motion.

Motion: Commissioner Raffin moved to defer PC Docket No. 25-020.
Second: Councilor Hofferth
Vote: Yes –5 No – 0 Abstain – 1. Motion carries.
Commissioner Branagan abstained, she is a school employee.

President Baker asked the petitioners to work with staff on the outstanding items.

Other Business: None

Findings of Fact:

PC25-014 REZONE: Gary Warfel, SPIN Munster, LLC c/o Saxon Partners on behalf of Kenmara Development received a favorable recommendation to the Town Council for the Rezone of 58

acres from CD-4.B. to PUD KENMARA TECHNOLOGY PARK USES for Tract 1, located at S of 400-440 Fisher Street.

Motion: Councilor Nellans moved to approve the Findings of Fact for PC Docket No. 25-014.
Second: Councilor Shinkan
Vote: Yes – 6 No – 0 Abstain – 0. Motion carries.

Continued Discussion Items: None

Next Regular Business Meeting:

President Baker announced the next regular business meeting will be November 18, 2025.

Adjournment:

Motion: Councilor Nellans moved to adjourn.
Second: Councilor Shinkan
Vote: Yes – 6 No – 0 Abstain – 0. Motion carries.

Meeting adjourned at 8:29 pm

President Baker
Plan Commission

11/18/25
Date of Approval

Executive Secretary Sergio Mendoza
Plan Commission

11.18.25
Date of Approval

Exhibit A

October 13, 2025

TO Community Development Munster Town Hall
1005 **Ridge Road**
Munster, IN 46321

FROM Loni J. Dorall
910 **Ridge Road**
Munster, IN 46321

RE: PC25-020 Development Plan

The further plan to upgrade and beautify the central part of Munster is, indeed, a worthwhile plan. In my absence from northern Indiana for almost 15 years, I was not only pleased but also amazed at the development upon my return. Therefore, the intention of adding the courts is a logical move in the town's growth and improvement.

Of concern, however, is the cost to build the courts in relation to its ability to bring relative value to the public. Outside tennis is a seasonal game; therefore, the cost to build includes the realization that the project is paying for six months, more or less, of waste due to inclement weather: The outside courts will be left to that cold, wet seasonable environment, causing disintegration-even destruction-to the products used to create the "flooring" of those courts. Also, if the courts are to be usable for more than one year, then refurbishing, ongoing at a cost, must be considered in the current "cost to develop".

Next, I have seen similar locations where idle outdoor facilities have been damaged due to vandalism. If a nicely designed and then built area is to remain useful and beautiful, the one must consider the cost of security: Are the courts important enough to draw police officers away from their normal routines daily? Even in the best weather, I have seen tennis court nets cut apart and therefore become
(1) unusable and (2) in need of replacement.

In addition, I am hoping that windscreens are included in the initial cost of creation of the courts. To get the best "bang for one's buck", the courts have

to be usable daily. We have had to postpone play numerous times in the past on courts without screens because of the wind.

It is my understanding at this point that this facility is to be "outside only". I am curious as to whether or not the town has considered an indoor tennis (sports-plus) structure. Of course, the initial cost would be greater, but if you consider how varied its uses would be, its initial charge to the community is offset by its ability to serve a multitude of people in multiple ways. I am thinking that a visit to the Highland Parks and Recreation Building, especially along with its designers and community officials, might add insight into the value of your current development idea.

Loni Dorall

TOWN OF MUNSTER

PLAN COMMISSION REGULAR MEETING 11/18/25

Munster Town Hall: Main Meeting Room

Tuesday, November 18, 2025 at 07:00 PM

AGENDA

Join Zoom Webinar as a Viewer:
https://us02web.zoom.us/j/83006860776
Meeting ID: 830 0686 0776
Passcode: 138335

1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**

   William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
   Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
   Jennifer Johns, member. Appointed by: Town Council, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
   Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
   Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
   David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
   George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025

5. **APPROVAL OF MINUTES**
   a. October 14, 2025 PC Minutes
      Documents: October 14, 2025 PC Minutes Draft
6. **PRELIMINARY HEARINGS**
   a. PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue.
      Documents: PC 25-016 Staff Report 11.18.25 CV PUD Amendment | EX A Application PUD Amendment with Alta Survey | EX B Centennial Village PUD Amend.CV Design Standards Revised 10.20.25 | EX C Preliminary Plat_Centennial Village 1st Resub Lot C_9-4-25 | EX D CVP Preliminary Plat- Roundabout Option-DRAFT | EX E Roundabout_Site Eng Plan | EX F 5. Site Civil Plan Sprouts | EX G Sprouts Elevation Renderings - Updated 10-9-2025 | EX H Photometric SPROUTS | EX I Landscape Plan SPROUTS | EX J Stormwater Report SPROUT | EX K SWPPP SPROUTS | EX L Site Civil Plan Chase Bank | EX M Renderings Chase Bank | EX N Landscape Plan Chase | EX O Photometrics Chase | EX P Stormwater Report Lots 10 - 13 STMW Report | EX Q Structural Brick docs | EX R Traffic Study
   b. PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street.
      Documents: PC25-017 Staff Report 11.18.25 CV Sprouts Development | EX A Application Sprouts | EX B Centennial Village PUD Amend.CV Design Standards Revised 10.20.25 | EX C Plat with Roundabout | EX D Roundabout_Site Eng Plan | EX E Site Civil Plan Sprouts | EX F Sprouts Rendering | EX G Photometric SPROUTS | EX H Landscape Plan SPROUTS | EX I Stormwater Report SPROUT | EX J SWPPP SPROUTS | EX K Structural Brick docs | EX L Traffic Study
   c. PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to

be commonly known as 9521 Calumet Avenue.
Documents: PC25-018 Staff Report 10.14.25 development plan CV Chase Bank | Ex A Application Chase Bank | Ex B ALTA Survey Parcel C | EX C Site Plan with Roundabout | EX D Renderings Chase Bank | EX E Site Civil Plan Chase Bank | EX F Landscape Plan Chase | EX G Photometrics Chase | EX H STMW lots 10-13 | EX I Traffic Study

d. PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.
Documents: PC 25-021 Staff Report 11.18.25 Pavillion Prelim Sub | Ex A Application Preliminary Plat | Ex B Alta Surveys PC25-024 | Ex C Concept Lots PC25-024 | Ex D Lots overlay aerial | Ex E Prelim Plat

e. PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.
Documents: PC 25-022 Staff Report 11.18.25 Pavilion PUD | EX A Application | EX B PUD Standards | Ex C Alta Surveys PC25-024 | Ex D Concept Lots PC25-024 | Ex E Lots overlay aerial | Ex F Prelim Plat | Ex G Site Plan | Ex H Rendering Architecture Plan

f. PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.
Documents: PC 25-023 Staff Report 11.18.25 Pavilion Self Storage Development Plan | Ex A Application | Ex B Alta Surveys | Ex C Site Plan | Ex D Landscape Plan | Ex E Photometric | Ex F Rendering Architecture Plan | Ex G Site Eng Plans | Ex H Stormwater Report | Ex I PUD Standards | EX J Concept Lots | Ex K Lots overlay aerial | Ex L Prelim Plat

7. **PUBLIC HEARINGS**

a. PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue.
Documents: PC 25-015 Staff Report 11.18.25 CV Prelim Sub Lot C | EX A Application CV Preliminary Plat | EX B ALTA Survey Lot C | EX C CVP Preliminary Plat- Roundabout Option-DRAFT | EX D Roundabout_Site Eng Plan | EX E Centennial Village PUD Amend.CV Design Standards Revised 10.20.25 | EX F Stormwater Report Lots 10 - 13 STMW Report | EX G Traffic Study

b. PC25-020 DEVELOPMENT PLAN REVIEW: Jim Glascott of WT Group representing the School Town of Munster requests review of a Development Plan for the construction of ten (10) tennis courts at 8839 Calumet Avenue. PUBLIC HEARING CLOSED 10/14/25.
Documents: PC25-020 Staff Report 11.18.25 STOM tennis | Ex A PC Application | Ex B Narrative | Ex C Survey | Ex D Drainage Report | Ex E Architectural Plans | Ex F Engineering Plans rcvd 10-30-25 | Ex G Photometrics | Ex H Parks, School Town Lease Agreement Community

c. PC25-025 DEVELOPMENT PLAN REVIEW: Erin Gogolin of Bohler Engineering on behalf of Dutch Brothers Coffee requests review of a Development Plan for the redesign of an existing building and parking lot located at 8032 Calumet Avenue.
Documents: PC25-025 Staff Report 11.18.25 Dutch Bros | EX A Application | EX B LOI Agreement | EX C Survey | EX D Site Plan | EX E Landscape Plan | EX F Photometrics | EX G Architectural - Renderings | EX H Refuse Enclosure | EX I Signage Details | EX J Civil Set | EX K STMW Report

d. PC25-026 DEVELOPMENT PLAN REVIEW: Marc Smith of E. Anthony, Inc. on behalf of Orthopedic Specialists of Northwest Indiana (OSNI) requests review of a Development Plan for expansion of a 30,000 square foot parking lot located at 9900 Columbia Avenue.
Documents: PC25-026 Staff Report 11.18.25 OSNI | EX A Application | EX B Alta Survey | EX C Site Plan | EX D Landscape Plan | EX E Photometric | EX F Civil Plans | EX G Lighting Specs | EX H STMW Report | EX I STMW Permit

8. **FINDINGS OF FACT**

a. PC25-011 SUBDIVISION PRELIMINARY PLAT: Bruce Boyer on behalf of Crew Car Wash received approval of a Primary Plat for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION located at 111 Ridge Road.
Documents: PC 25-011 Findings - Prelim Plat - Crew Car Wash (2025-11-18)

b. PC25-012 DEVELOPMENT PLAN REVIEW: Bruce Boyer representing Crew Car Wash received conditional approval of a Development Plan to allow onsite parking, lighting, dumpster enclosure, and emergency exit from the car wash lane located at 111 Ridge Road.
Documents: PC 25-012 Findings - Dev. Plan for Crew Car Wash (2025-11-18) (002) V2

9. **OTHER BUSINESS**
10. **CONTINUED DISCUSSION ITEMS**
11. **NEXT REGULAR BUSINESS MEETING** December 9, 2025
12. **ADJOURNMENT**

Recorded meetings are archived at: https://www.youtube.com/channel/UCjZG8vgYLDwUr-sEWvNOSFQ

PLAN COMMISSION STAFF REPORT

To:	Members of the Plan Commission
From:	Sergio Mendoza, Planning Director
Meeting Date:	November 18, 2025
Agenda Item:	PC 25-016
Application Type:	PUD Amendment
Hearing:	Preliminary, continued from 10/14/25
Summary:	Matt Kimmel is requesting to requesting an amendment to the CENTENNIAL VILLAGE DESIGN STANDARDS to modify the size, location, and shape of lots and building on recorded lot C, as well as update sign standards and materials for all of Centennial Village PUD.

Applicant:	Matt Kimmel , Centennial Village Development.
Property Address:	9505 Calumet Avenue
Current Zoning:	PUD – CENTENNIAL VILLAGE
Adjacent Zoning:	North: CD 4 A – General Commercial and CD 4 R4 – Multifamily South: PUD – CENTENNIAL VILLAGE East: CD 4 R4 – Multifamily West: SD M Manufacturing
Applicant Requesting:	Schedule Public Hearing
Action Required:	Schedule Public Hearing Review of Section 26-6.804. L. 9. k. xiii.

Staff Recommendation:

Review PUD Amendment Standards
Review Engineer's Traffic Study Review
Review Engineer's Structural Brick Report
Schedule a December 9, 2025 Public Hearing

Attachments:

1. PUD Amendment Application, Exhibit A
2. PUD Design Standards (10/20/25), Exhibit B
3. Preliminary Plat without Roundabout, Exhibit C
4. Preliminary Plat with roundabout, Exhibit D
5. Site Plan with roundabout, Exhibit E
6. Lot 11 Civil Plans Sprouts Market, Exhibit F
7. Sprouts elevations/rendering, Exhibit G
8. Sprouts Photometrics, Exhibit H
9. Spouts landscape plan, Exhibit I
10. Sprouts STMW, Exhibit J
11. Sprouts SWPP, Exhibit K
12. Lot 13 Civil Plan Chase Bank, Exhibit L
13. Chase Bank elevations/renderings, Exhibit M
14. Chase Bank Landscape Plan, Exhibit N
15. Chase Bank Photometrics, Exhibit O
16. Lots 10-13 STMW Report, Exhibit P
17. Structural Brick, Exhibit Q
18. Traffic Study , Exhibit R

SITE LOCATION

The proposed Subdivision/Replat is located east of Calumet Avenue, north of 45th Street, south of the Canadian National Railroad, and west of the 45th Street underpass and Canadian National Railroad bridge intersection.

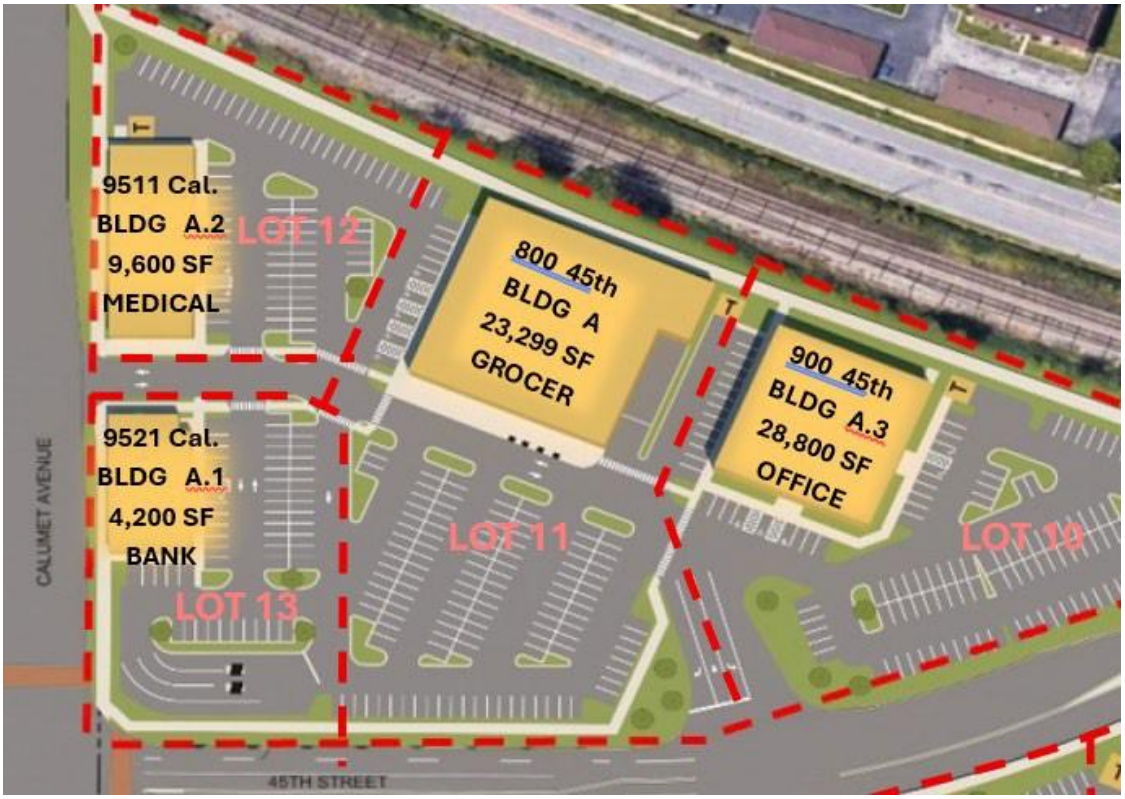


PROJECT BRIEFING

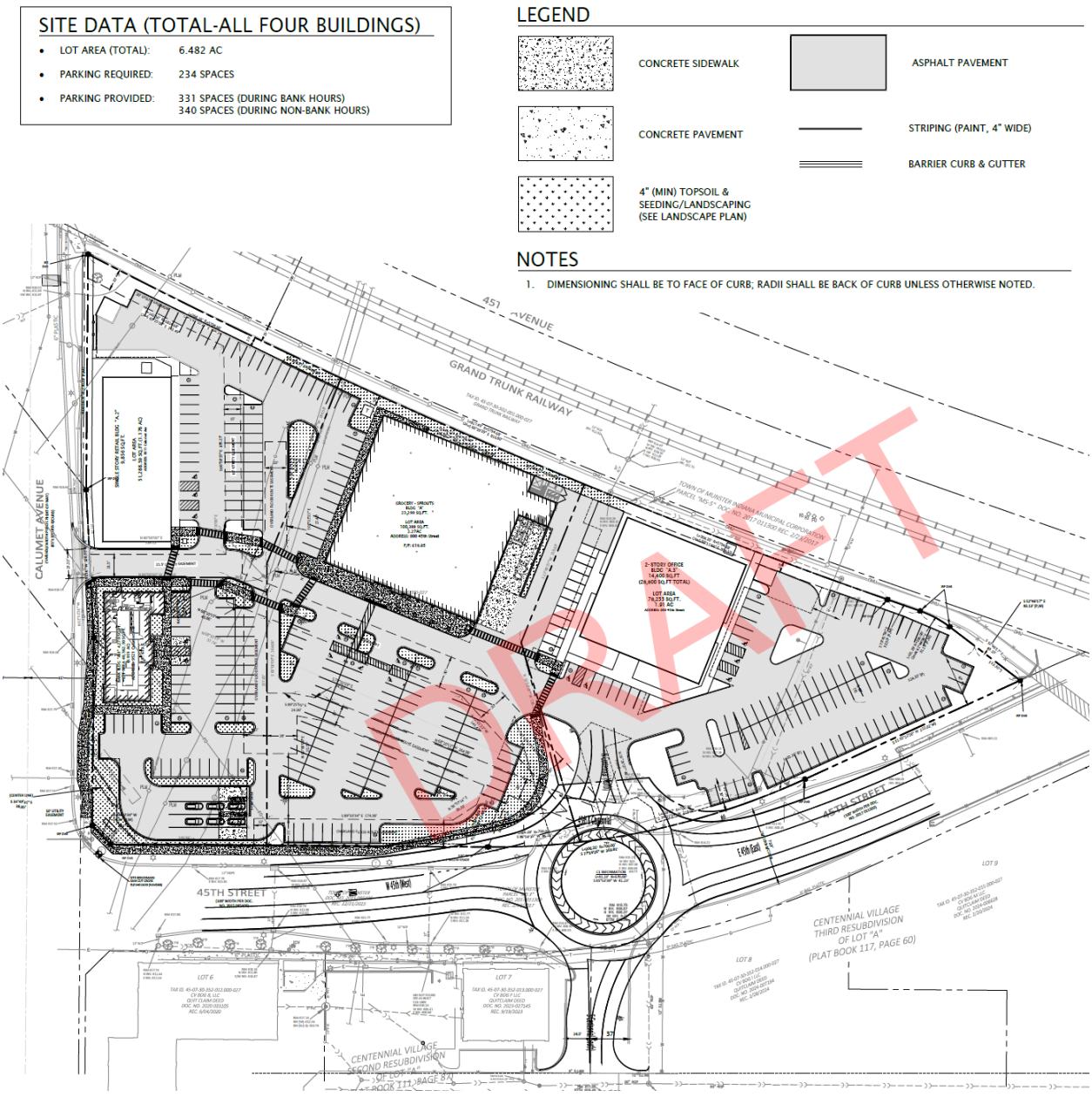
The Centennial Village PUD was approved as a development that will provide Town of Munster with a sustainable, mixed-use, walkable lifestyle community. Centennial Village was established through a Rezone action on July 22, 2013, ORDINANCE 1598. The development is currently governed by the Centennial Village PUD Design Standards and Conceptual Plan that has been amended multiple times through the following ordinances:

- ORDINANCE 1659, adopted June 8, 2015;
- ORDINANCE 1709, adopted March 6, 2017;
- ORDINANCE 1911, adopted August 21, 2023; and
- ORDINANCE 1930, adopted December 3, 2023.

The focus area proposed for amendment is commonly known as 9505 Calumet Avenue, Lot C in Centennial Village. The current site is approximately 6.5 acres of vacant undeveloped land zoned for mixed use development in a TIF district. Lot C was approved by the Plan Commission in March 2017 and recorded in April 2017 as CENTENNIAL VILLAGE, PB 110, PG 11, Document Number: 2017-024636. Mr. Matt Kimmel requests that the subject lot (LOT C) be replated and recognized by the Town of Munster as LOTS 10, 11, 12, 13 OF CENTENNIAL VILLAGE RESUBDIVISION OF LOT C. Below is modified conceptual image from the proposed PUD. However, the concept does not include a roundabout at the proposed intersection.



At the October 14, 2025 Preliminary Hearing, the Commissioners discussed whether the PUD Amendment accurately reflects the proposed subdivision of four (4) lots from Lot C and evaluated the potential impacts to the intersection at 45th Avenue and N. Centennial Drive. It was noted that two different intersection configurations were presented—one depicting a four-way intersection and the other a roundabout. Commissioners also discussed the implications of introducing structural brick as an approved construction material within the PUD. Following discussion, the Commissioners voted to defer the matter to allow the applicant to revise the PUD in accordance with the comments provided and to submit an updated intersection plan. Below is site data and draft plan with a roundabout intersection.



In addition, Mr. Kimmel proposes amendment to the Centennial Village PUD Design Standards and Conceptual Plan which include:

- Modification to lot lines and proposed buildings
  10.20.25 Design Standards, pages, 4, 9, 10, 15.

SITE DATA (BUILDING A-SPROUTS)

- USE: GROCERY
- LOT AREA: 2.27AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 116 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2)

- USE: RETAIL
- LOT AREA: 1.176 AC
- BUILDING AREA: 9,856 SQ. FT.
- PARKING REQUIRED: 32 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 63 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3)

- USE: 2 OR 3 STORY OFFICE
- LOT AREA: 1.91 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 110 SPACES (INCLUDES 5 ADA SPACES)

- Sign standards - change in size size, type, material, location, and quantity

10.20.25 Design Standards, page 49.

Sign Regulations for Centennial Village

Town of Munster

Purpose
The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All permanent signs located within the development shall conform to the following standards:

- Building materials – included the use of structural brick on lot 11 only

10.20.25 Design standards, page 11

Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
~~a.~~b. ~~or~~ Structural Brick: permitted only on Lot 11
~~b.~~c. Natural Masonry and Architectural Cast Stone
~~c.~~d. Architectural Metal Panels
~~d.~~e. Glass & Store Front Aluminum Window & Door Frames
~~e.~~f. Conventional Windows and Frames

- Intersection development reference four way or roundabout, no roundabout concept included.

10.20.25 Design standards, pages 19, 45

1. Development Area North of 45th Street:
    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

2. Development Area South of 45th Street:
    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet ~~west~~ east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

CODE REVIEW

TOWN OF MUNSTER CHARACTER BASED ZONING CODE

Section 26-6.804. L. 9. Specifics Supplemental Provisions Related to Planned Unit Developments.
(pg 402)

k. The procedure for…amending an existing SD-PUD…shall be as follows:

xiii. The Plan Commission may recommend … amendment to the SD-PUD…provided that it finds that:

I. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will not detrimentally affect present or potential property values or Uses of Adjacent property or elsewhere in Town.

II. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District adequately takes into account existing and proposed conditions and character of the land, Uses, Buildings, and Development proposed to be subject to the SD- PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and within all Adjacent Districts.

III. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will have a beneficial effect on the Town, which could not be achieved if the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District were not approved and the such Development was developed under the standards of any other District.

IV. Any deviation from the standards or requirements that otherwise would be applicable with another District is warranted by the design and amenities incorporated in the Development Plan.

V. The SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is necessary to address unique site conditions that are not characteristics of other sites in the Town and the application and Development Plan adequately address the same.

VI. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District and the Development proposed therein are:

1) either compatible with the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District or the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District can be planned in coordination with the proposed Development within such SD-PUD Planned Unit Development Special District;

2) the most desirable Development and Use(s) for which the property subject to the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is adapted; and

3) constitute responsible growth and Development.

VII. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District is in conformance with the general intent of this Article and the Comprehensive Plan.

VIII. Existing and proposed Thoroughfares are suitable and adequate to carry anticipated traffic within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and its vicinity.

IX. Existing and proposed utility services are adequate for the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District.

X. Each phase of the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District, contains the required parking spaces, and landscape and utility areas necessary for creating and sustaining a desirable and stable environment.

XI. The proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and all proposed Buildings, parking accommodations, and landscape and utility areas therein can be completely Developed within five (5) years of the initial establishment of the District.

XII. All conditions and requirements of Sections 26-6.804. L. 9. a. - .k have been satisfied.

STAFF FINDINGS AND RECOMMENDATIONS

Staff finds the applicant and interested parties have updated their supporting documents as requested by the plan commission. In addition, the applicant has submitted information regarding structural brick. Staff recommends that additional conceptual drawings depicting the roundabout be included within the Design Guidelines as part of the Public Hearing process. Finally, staff recommends compliance with SECTION 26-6.804. L. 9. k. xii. for a Public Notice and and review of SECTION 26-6.804. L. 9. k. xiii. I. - XII for a Public Hearing of the TOWN OF MUNSTER CHARACTER BASED ZONING CODE and attached CENTENNIAL VILLAGE DESIGN STANDARDS in EXHIBIT B.

MOTION

Plan Commission may consider the following motion:

Motion to schedule PC 25-016, a proposed Amendment to the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT for a December 9, 2025 Public Hearing, including all discussion and findings.

Petition PC 25 - 016
Date: _____
Application Fee: $_____
Sign Fee: $_____

Town of Munster *Plan Commission Petition Application*

OWNER INFORMATION:

Matt Kimmel
Name of Owner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

APPLICANT OR PETITIONER INFORMATION (if different than above):

Matt Kimmel
Name of Applicant/Petitioner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

PROPERTY INFORMATION: Centennial Village

Business or Development Name (if applicable)

9601 & 9605 N. Centennial Drive Munster, IN 46321
Address of Property or Legal Description

PUD
Current Zoning

APPLICATION INFORMATION:

Please select what this Application is for:

☐ **Subdivision** If yes, select one of the following: ☐ **Preliminary Plat** ☐ **Final Plat**

☐ **Development Plan Review**

☑ **Rezoning (including Planned Unit Development) – Proposed Zoning District**

PUD Amendment of Centennial Village

Brief Description of Project:

Revisions to the size, location, and shape of Buildings "A", "A.1", "A.2" and "A.3"
Revisions to sign regulations and the use of structural brick in the material sections

Russ Pozen, PE
Name of Registered Engineer, Architect or Land Surveyor

(219) 281-4068
Phone Number

1155 Troutwine Road Crown Point, IN 46307
Street address, City, ST, ZIP Code

rpozen@dvgteam.com
Email address

REQUIRED ATTACHMENTS

Required Attachments for Plan Commission Applications

To ensure that adequate information is provided to the Plan Commission, please check off each of these items and provide documentation to the Community Development Department at the time of submittal of the application.

ALL APPLICATIONS	Included	N/A
Narrative statement describing project		
Property owner consent (Signature page)		
Proof of Ownership (e.g. copy of tax bill)		
Current ALTA Survey		
Vicinity Plan (A dimensioned drawing to scale of the planned building(s)/improvements in the context of the surrounding properties, including existing buildings and driveways at least one block in every direction)		

The following pages list the additional attachments required for specific applications. Please refer to your type of petition request and provide the additional required attachments.

SUBDIVISION - PRELIMINARY PLAT	Included	N/A
Single-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Report		

Commercial or Multi-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Reports		
Preliminary Development Plan containing:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		

SUBDIVISION - FINAL PLAT	Included	N/A
Final Plat		
Engineering Plans		
Stormwater report		
Special Studies as required – see Site Plan Review Committee minutes		

REZONING (including PLANNED UNIT DEVELOPMENT amendments)	Included	N/A
Preliminary Development Plan containing at a minimum:		
Boundary Identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Proposed Use table		
Stormwater report		
Special Studies as Required– see Site Plan Review Committee minutes		

DEVELOPMENT PLAN	Included	N/A
Detailed Site plan including:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		
Square footage of:		
Lot or parcel		
Existing impervious surface		
Proposed total impervious (existing plus current proposal)		
Existing building		
Proposed total building (existing plus current proposal)		

Existing parking and pavement		
Proposed total parking and pavement (existing plus current proposal)		
Relevant dimensions including:		
Buildings		
Parking stalls		
Driveway widths		
Setbacks to buildings and other improvements		
Parking lot aisles, turnarounds, turning radii, etc.		
Distance from driveway to street corner if less than 200'		
Sidewalk, walkway and handicap ramp widths and locations		
Widths of abutting R.O.W.'s, roadways, and terraces.		
Full color architectural renderings of all building elevations with materials identified		
Proposed lighting for site, including:		
Photometric Plan		
Location of all light fixtures		
Pole height		
Luminaire type and manufacturer's specifications for all exterior light fixtures		
Landscaping plan drawn to scale including:		
Common and Latin plant names		
Planting specifications		
Total number of trees provided		
Total square footage of landscaped area on site and internal to the parking lot		
Identification of area used to calculate internal parking lot landscaping		
Fence detail drawing		
Dumpster enclosure detail drawing		
Sign detail drawing		
Special studies as required– see Site Plan Review Committee minutes		

NOTE: If you checked any exhibits "N/A", please explain:

ALTA/NSPS LAND TITLE SURVEY

PC25-016

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

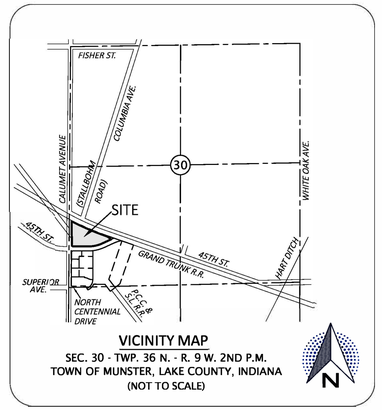
GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P- DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG"- 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG"- 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF- REBAR FOUND
PB.- PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO- NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A.- LANDSCAPE AREA
PG.- PAGE
REC.- RECORDED

- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CURB INLET
- CATCH BASIN
- TRAFFIC MANHOLE
- GUY/ANCHOR
- ROAD SIGN
- PLM PIPELINE MARKER
- GAS TEST STATION
- GAS LINE VENT
- GAS VALVE
- ICV IRRIGATION CONTROL VALVE
- BOV BLOW OFF VALVE
- SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON
- ADA PAD
- ASPHALT
- W BURIED WATER LINE
- G BURIED GAS LINE
- E BURIED ELECTRIC LINE
- T BURIED COMMUNICATION LINE
- OHU OVERHEAD UTILITY WIRES
- BP BURIED BRITISH PETROLEUM PIPE LINE
- WOLVERINE BURIED WOLVERINE PIPE LINE
- SUBJECT PARCEL LINE
- ADJOINING PARCEL LINE
- SECTION/QUARTER LINE
- EASEMENT LINE
- STORM SEWER WITH FLOW DIRECTION
- SANITARY SEWER WITH FLOW DIRECTION
- WATER VALVE
- FIRE HYDRANT ASSEMBLY
- FO FIBER OPTIC MARKER POST
- TREE WITH SIZE
- EXISTING 1-FOOT CONTOUR
- xxx.x EXISTING SPOT ELEVATION
- CONCRETE
- STONE

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF - ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL-RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT
ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.
ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.
ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.
ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.
ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657 - AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555 - AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628 - AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 20200073216- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 20200073223 - AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 20200073260 - AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 20200073261 - AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 20200073262 - AFFECTS PARCEL- NOT PLOTTABLE.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

SCALE: 1" = 50'

THE ARCHITECTS PARTNERSHIP

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DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

~~Revised~~ August 21, 2023

Revised August 07,2025

Presented October 14, 2025

Revised October 20, 2025


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
BLDG M
6,950 SF
BLDG B
BLDG F
BLDG I
22,188 SF
BLDG C
BLDG G
BLDG J
71,040 SF
BLDG O
BLDG H
BLDG K
71,040 SF
BLDG D
BLDG E
BLDG N


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,813 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG K
71,040 SF
BLDG D
6,400 SF
BLDG E
57,560 SF
BLDG O
7,000 SF


CALUMET AVENUE
45TH STREET
BLDG A2
BLDG A
BLDG A3
BLDG A1
BLDG L
BLDG M
BLDG B
BLDG F
BLDG I
BLDG C
BLDG G
BLDG J
BLDG O
BLDG H
BLDG K
BLDG D
BLDG E
BLDG N

Design Standards
Centennial Village Planned Unit Development

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Section 2: Uses
Section 3: Setback & Height Requirements
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Section 6: Site Circulation – Vehicular & Service
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Section 9: Site Lighting
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Section 13: Screening of Loading & Service Areas
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Section 17: Subdivision of Land and Site Development Approval

Appendices:

1: Centennial Village PUD Final Subdivision Plat
2: Plan of Development
3: Infrastructure Development Plan Set
4: Sign Regulations for Centennial Village

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	~~Retail – Anchor~~Grocery - Anchor	1	35	~~30~~5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	~~23~~1	50~~35~~	5	5	5
O	Hotel~~Retail – Single Tenant~~	5~~1~~	80~~25~~	5	5	5

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Building Lot A, A.1, A.2 and A.3 are~~is~~ located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

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Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
~~a.~~b. ~~or~~ Structural Brick: permitted only on Lot 11
~~b.~~c. Natural Masonry and Architectural Cast Stone
~~c.~~d. Architectural Metal Panels
~~d.~~e. Glass & Store Front Aluminum Window & Door Frames
~~e.~~f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 54th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 2530% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 2530% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 54th Floor Level Exterior Walls. The 2nd to 54th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, ~~wall~~ for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 54th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 750% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5-4th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

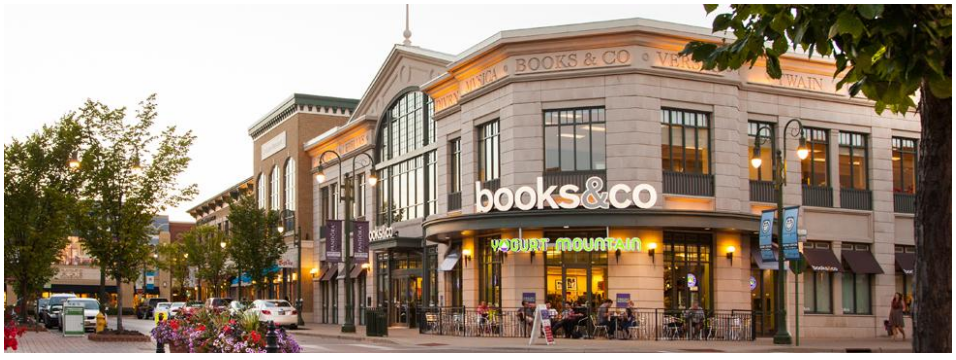
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	~~Retail – Anchor~~Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	~~2~~31	Class 1 & 2	Class 3 & 4~~N/A~~
O	Hotel~~Retail – Single Tenant~~	51	Class 1 & 2	Class 3 & 4~~N/A~~

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet ~~west~~ east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the

existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

   a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
   b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
   c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
   d. Where feasible, tandem parking spaces may be provided in under building parking garages.
   e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
   f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
   g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

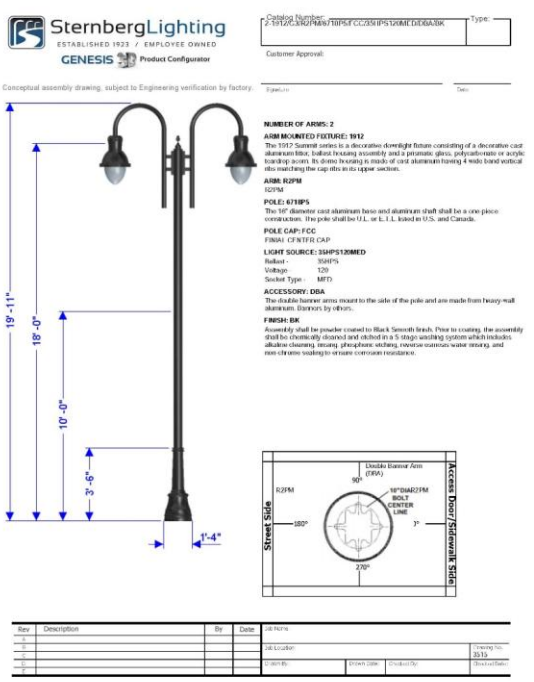
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No "shoe box" wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet

Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2
Trees for Parkway Planting

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1
Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering

Common Name	Scientific Name
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as "Invasive Species" as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3') (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.

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~~15.~~23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.~~edition of the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs. Additionally, the Centennial Village Planned Unit Development building and site sign design shall comply with the following standards:~~

~~1. Prohibited signs:~~

~~a. Signs that extend above the highest point of a roof line~~

~~b. Billboards~~

~~c. Signs painted or mounted upon the exterior side or rear wall of any principal or accessory structure except as otherwise identified in the Design Standards.~~

~~d. Signs which contain blinking, pulsating, flashing, or moving lighting.~~

~~e. Neon Lighting Signs~~

~~2. Traffic Control Signs including street name, stop signs, parking signs, directional signs and other traffic control signs that are used to implement public safety and wayfinding within the development shall be of an ornamental design similar to the site lighting posts and fixtures, following the decorative style of the Genesis Series by Sternburg Lighting.~~

~~3. No sign shall be located to block or obscure the vision of motor vehicle drivers for safe travel through streets and parking areas.~~

~~4. No sign shall be erected, located or maintained to prevent access to any door, window, public walkway or fire escape.~~

~~5. Materials and color palettes for signs shall follow the approved materials and colors defined in the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs.~~

~~6. A sign located on the main entry door or adjacent to the main entry door identifying the business name, hours of operation, address shall not exceed 6 square feet in total area.~~

~~7. Each business within multi-tenant buildings will be permitted one principal sign. Such signs may be wall mounted and with a total sign area as calculated below:~~

~~a. The total area of all signs for each business shall not exceed 1 square foot of sign area for each 30 feet of interior retail or business space, excluding storage area. Each business shall be allowed a minimum of 12 square feet of sign area. The maximum total square footage of sign area for a business shall not exceed:~~

~~i. 75 square feet for businesses having a total gross floor area of 0 square feet to 5,000 square feet.~~

~~ii. 125 square feet for businesses having a total gross floor area of 5,001 square feet to 20,000 square feet.~~

~~iii. 200 square feet for businesses having a total gross floor area of 20,001 square feet and larger~~

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8. Signs affixed to the exterior of a building shall be architecturally compatible with the style, composition, materials, colors and details of the building. Box Panel signs shall not be permitted on any building within the development.

9. The location of tenant signs shall be integrated with the building façade design and not obstruct architectural details and wall signs shall not extend more than 12 inches out from the exterior face of the building for "non-projection or non-blade" signs.

10. Projecting and Blade Signs extending perpendicular from the wall of a principal structure may be permitted so long as they do not interfere with clear vision to other adjacent business signs and do not interfere with the safe movement of vehicles and pedestrians. The Centennial Village PUD shall evaluate all requests for Projecting and Blade signs on a case by case basis and determine its approval based on the sign's design, materials and number of adjacent projecting banner signs. Projecting and Blade Signs may not extend a distance greater than 4 feet from a principal structure wall, be a minimum of 8 feet from the bottom of the sign to the top of the sidewalk below, may not exceed a total of 15 square feet and shall be counted against the total maximum business signage area.



11. Awning signs are permitted within the Centennial Village PUD following the approved sign design criteria, standards, materials and colors for awning signs defined in the Town of Munster Ordinance 1679.

12. In cases where businesses have rear or side parking lots or adjoins a public street, an additional sign developed to the same restrictions identified in Section 11 – Signage, shall be permitted only on one side or rear of the building.

13. Business signs shall be permitted to be back lighted or front lighted provided the sign illumination does not cause a nuisance to adjoining businesses and properties.

14. A sign bearing the name of a business of the principal tenant occupying space in the rear or upper floors of a building shall be allowed at the principal structure entrance to the business and the area of such sign identifying such business shall not exceed 4 square feet.

15. Free Standing Monument Signs shall be located and permitted to identify the Centennial Village PUD development areas at the locations as defined below:

a. Lot A – Identifying the development parcel north of 45th Street
b. Lot B – Identifying the development parcel south of 45th Street
c. Lot E – Identifying the development parcel south of 45th Street and the Lot E use

16. Free Standing Monument Signs shall have a maximum total surface area for any display surface of 100 square feet and a maximum height of 6 feet. The calculation of display surface does not include the surface area of the sign structure that the display surface is mounted.

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~~17. All signs and sign structures shall be maintained in good repair and safe condition. The owner of each sign shall be responsible for the proper maintenance of their respective sign. A sign shall be at all times legible, working and safe for the public.~~

~~18. No sign shall be constructed within the development unless the sign information has been reviewed and approved by the Centennial Village PUD developer and the proper permits and approvals have been granted by the Town of Munster.~~

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Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side

of Calumet Avenue. The development's water distribution system design will provide a water supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the

45th Street Town of Munster public improvement project. It is anticipated that storm water from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of ~~15~~ 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
45TH STREET
CALUMET AVENUE
CENTENNIAL PARK
BLDG PAD A
70,000sf
BLDG PAD L
BLDG PAD M
BLDG PAD F
5,200sf
BLDG PAD
5,200sf
BLDG PAD B
12,930sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD O
7,000sf
BLDG PAD D
17,360sf



Modified and approved within the red hashed line –

August 07, 2025 Conceptual Plan



Modified and approved within the red hashed line ~~.~~

August 21, 2023~~Conceptual Plan~~



Modified and approved within the red line – November 20, 2023

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Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

Appendix 4 – Signage

by reference:

Sign Regulations for Centennial Village

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.

4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.
5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised

letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.

24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.
25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display,

illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.

39. **Storefront:** The façade of a business space that contains a public entrance.
40. **Streamer**: A long, narrow flag, banner or pennant.
41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any artificial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.

2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.
3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or

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2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.

b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.

d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **Projecting Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projecting sign per business and must be spaced at a minimum of 15 feet from other projecting or blade signs. Projecting signs are only permitted where the business does not have a blade sign.

   a. **Small Projecting Sign(s)**: May only be installed on the first story of a building. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10 sf with a maximum height of 3 ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.

   b. **Large Projecting Sign(s)**: May only be installed on buildings with multiple stories and may not be installed on the first story. Sign shall be vertically oriented with the height greater than the projection of the sign. Must be 12 ft above the sidewalk elevation. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 ft from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.

9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.

10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.

11. **"Open" Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.

12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.

13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The

material must be the general material sign standard compatible and consistent with the materials used to construct the building.

14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.
15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl

or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.

20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.

19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required
It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit
Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits
It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code
All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code
All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance
The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs
Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend

beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.

4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.
7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.

PRELIMINARY PLAT

CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"

PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN ALL THE LOTS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF _____, 2025.

CENTENNIAL VILLAGE, LLC

BY:_____

TITLE: _____

(PRINTED NAME):_____

ACKNOWLEDGMENT

COUNTY OF _____
STATE OF _____] SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED _____ AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 2025.

_____
(SIGNATURE)

PRINTED NAME:_____
NOTARY PUBLIC
RESIDENT OF _____COUNTY

COMMISSION EXPIRES: _____

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF _____, 2025.

THE PREVIOUSLY GRANTED AND SHOWN OVERLAND FLOOD ROUTE EASEMENT BY PLAT BOOK 110, PAGE 11 IN DOCUMENT NUMBER 2017-024636 IS HEREBY VACATED AND SUPERCEDED WITH THE OVERLAND FLOOD ROUTE EASEMENT SHOWN HEREON.

_____ _____
PRINTED NAME SIGNATURE

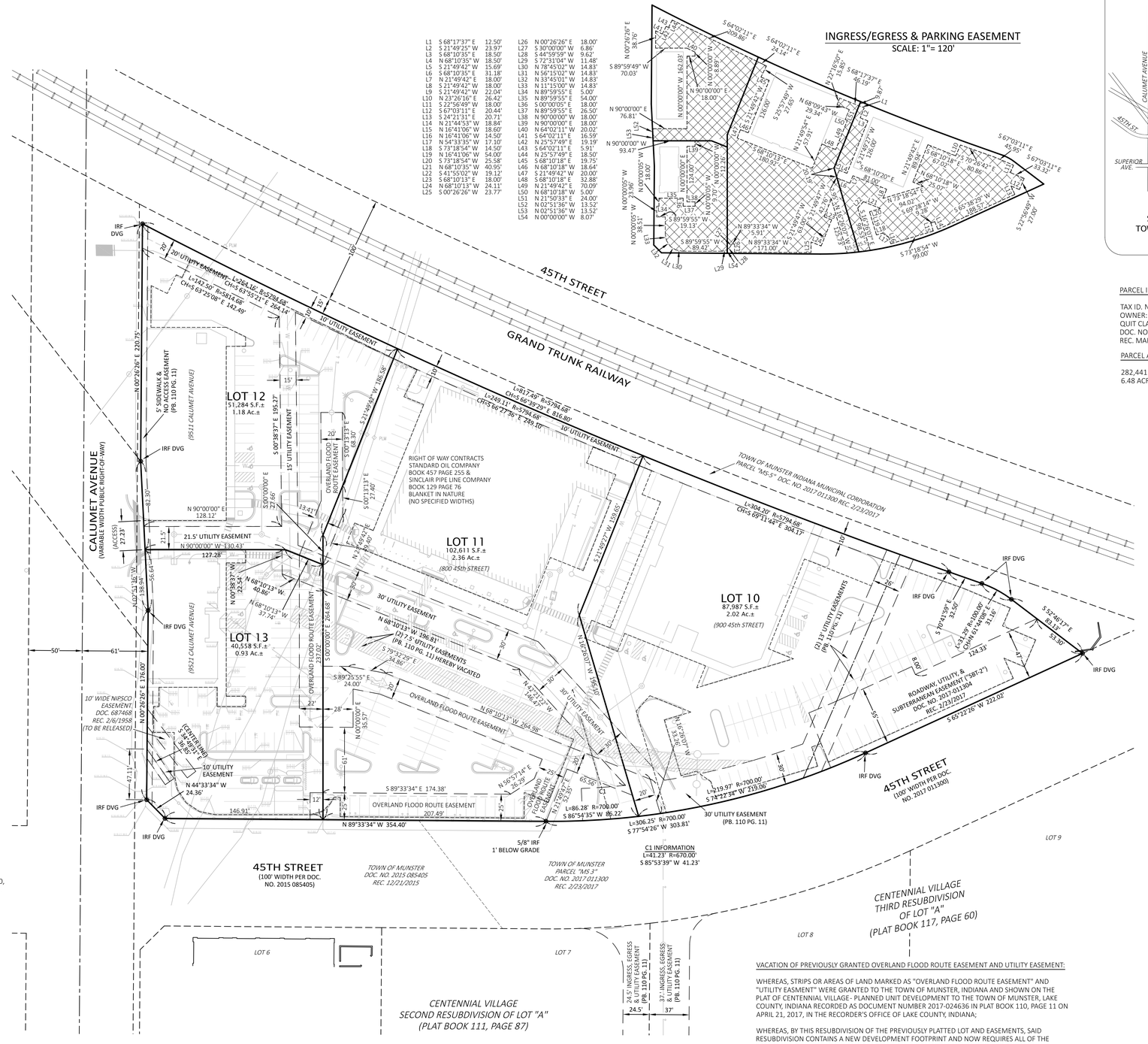
TITLE:

ATTEST:

_____ _____
PRINTED NAME SIGNATURE

TITLE:

L1	S 68°17'37" E	12.50'	L26	N 00°26'26" E	18.00'
L2	S 21°49'25" W	23.97'	L27	S 30°00'00" W	6.86'
L3	S 68°10'35" E	18.50'	L28	S 44°59'59" W	9.62'
L4	N 68°10'35" W	18.50'	L29	S 72°31'04" W	11.48'
L5	S 21°49'42" W	15.69'	L30	N 78°45'02" W	14.83'
L6	S 68°10'35" E	31.18'	L31	N 56°15'02" W	14.83'
L7	N 21°49'42" E	18.00'	L32	N 33°45'01" W	14.83'
L8	S 21°49'42" W	18.00'	L33	N 11°15'00" W	14.83'
L9	S 21°49'42" W	22.04'	L34	N 89°59'55" E	5.00'
L10	N 23°26'16" E	26.42'	L35	N 89°59'55" E	54.00'
L11	S 22°56'49" W	18.00'	L36	S 00°00'05" E	18.00'
L12	S 67°03'11" E	20.44'	L37	N 89°59'55" E	26.50'
L13	S 24°21'13" E	20.71'	L38	N 90°00'00" W	18.00'
L14	N 21°44'53" W	18.84'	L39	N 90°00'00" E	18.00'
L15	N 16°41'06" W	18.60'	L40	N 64°02'11" W	20.02'
L16	N 16°43'06" W	14.50'	L41	S 64°02'11" E	16.59'
L17	N 54°33'35" W	17.10'	L42	N 25°57'49" E	19.19'
L18	S 73°18'54" W	14.50'	L43	S 64°02'11" E	5.91'
L19	N 16°41'06" W	54.00'	L44	N 25°57'49" E	18.50'
L20	S 73°18'54" W	25.58'	L45	S 68°10'18" E	19.75'
L21	N 68°10'35" W	40.95'	L46	N 68°10'18" W	18.64'
L22	S 41°55'02" W	19.12'	L47	S 21°49'42" W	20.00'
L23	S 68°10'13" E	20.00'	L48	S 68°10'18" E	32.88'
L24	N 68°10'13" W	24.11'	L49	N 21°49'42" E	70.09'
L25	S 00°26'26" W	23.77'	L50	N 68°10'18" W	5.00'
			L51	N 21°50'33" E	24.00'
			L52	N 02°51'36" W	13.52'
			L53	N 02°51'36" W	13.52'
			L54	N 00°00'00" W	8.07'





VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SUBDIVIDER AND OWNER:

CENTENNIAL VILLAGE, LLC
631 KILLARNEY DRIVE
DYER, IN 46311

ENGINEER AND SURVEYOR:

DVG TEAM INC.
1155 TROUTWINE ROAD
CROWN POINT, IN 46307

LEGEND

- INGRESS/EGRESS AND PARKING EASEMENT
- PREVIOUSLY PLATTED UTILITY EASEMENT HEREBY VACATED
- IRS DVG 5/8" REBAR SET WITH BLUE PLASTIC CAP STAMPED "DVG TEAM INC FIRM NO. 0120"
- MAGF "MAG" NAIL FOUND WITH METAL WASHER STAMPED "DVG TEAM INC FIRM NO. 0120"

P.B. - PLAT BOOK

DEVELOPMENTAL STANDARDS:
THERE ARE DEVELOPMENTAL STANDARDS ASSOCIATED WITH DEVELOPMENT THAT ARE RECORDED AS DOCUMENT NUMBER 2017-024635 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

REFERENCE SURVEYS:
1. PLAT OF CENTENNIAL VILLAGE P.U.D. RECORDED IN PLAT BOOK 110, PAGE 11.
2. ALTA/ACSM LAND TITLE SURVEY OF PARCELS TW-1, 2, 4 AND PK-1, 3 BY PLUMB TUCKETT AND ASSOCIATES, INC. (NOW DVG TEAM, INC.), JOB NO. S15644, LAST REVISED 3/25/16, RECORDED AS DOCUMENT NUMBER 2017-015652, ON 3/9/2017.
3. CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 53.
4. CENTENNIAL VILLAGE 2ND RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 87.
5. CENTENNIAL VILLAGE 3RD RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 117, PAGE 60.

IT IS THE OPINION OF THE SURVEYOR THAT THERE ARE NO SUBSTANTIAL DIFFERENCES BETWEEN SAID SURVEYS AND THIS PLAT.

FLOOD ZONE INFORMATION:
FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCELS DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEAR TO LIE WITHIN ZONE "X": AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCELS PLOT BY SCALE ON FLOOD INSURANCE RATE MAP NO. 180139 0117 E FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, MAP EFFECTIVE DATE BEING JANUARY 18, 2012 AND REVISED TO REFLECT LOMR EFFECTIVE MARCH 18, 2016.

SURVEY NOTE:
THE EXTERIOR OF THE OVERALL SUBDIVISION BOUNDARY WAS STAKED AND THE MONUMENTS SET AND FOUND ARE SHOWN ON THE RECORDED PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT (PLAT BOOK 110, PAGE 11). IT IS THE OPINION OF THE SURVEYOR THAT IT IS PROBABLE THAT THE INDIVIDUAL LOT MONUMENTS FOR THIS RESUBDIVISION WILL BE DISTURBED BY CONSTRUCTION AND MASS GRADING. THE SETTING OF THE INDIVIDUAL LOT MONUMENTS ARE HEREBY DELAYED UNTIL AFTER CONSTRUCTION IS COMPLETE OR UP TO TWO YEARS AFTER RECORDATION OF THIS PLAT, WHICHEVER OCCURS FIRST AS PRESCRIBED BY TITLE 865 IAC 1-12-18(l).

VACATION OF PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND UTILITY EASEMENT:

WHEREAS, STRIPS OR AREAS OF LAND MARKED AS "OVERLAND FLOOD ROUTE EASEMENT" AND "UTILITY EASMENT" WERE GRANTED TO THE TOWN OF MUNSTER, INDIANA AND SHOWN ON THE PLAT OF CENTENNIAL VILLAGE- PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA RECORDED AS DOCUMENT NUMBER 2017-024636 IN PLAT BOOK 110, PAGE 11 ON APRIL 21, 2017, IN THE RECORDER'S OFFICE OF LAKE COUNTY, INDIANA;

WHEREAS, BY THIS RESUBDIVISION OF THE PREVIOUSLY PLATTED LOT AND EASEMENTS, SAID RESUBDIVISION CONTAINS A NEW DEVELOPMENT FOOTPRINT AND NOW REQUIRES ALL OF THE PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND A PORTION OF THE SAID PREVIOUSLY GRANTED UTILITY EASEMENT AS INDICATED HEREON FOR THE DEVELOPMENT OF THIS RESUBDIVISION TO BE RELEASED AND VACATED BY THE TOWN OF MUNSTER, INDIANA;

WHEREAS, BOTH SAID EASEMENTS ARE BEING RECONFIGURED TO ACCOMMODATE THE NEW DEVELOPMENT FOOTPRINT AND GRANTED ACCORDINGLY ON THIS PLAT;

NOW THEREFORE, ALL OF SAID PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND PORTIONS OF SAID PREVIOUSLY GRANTED UTILITY EASEMENT (AS INDICATED HEREON) ARE HEREBY RELEASED AND VACATED BY THE EXECUTION AND ACCEPTANCE OF THIS PLAT BY THE TOWN OF MUNSTER, INDIANA BECOMING EFFECTIVE ON THE DATE OF RECORDATION OF THIS PLAT.

SURVEYOR'S CERTIFICATION:

I, GLEN E. BOREN, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEYOR LICENSED IN COMPLIANCE WITH THE LAWS OF THE STATE OF INDIANA; THAT THIS PLAT CORRECTLY REPRESENTS A SURVEY COMPLETED BY ME ON MONTH XX, 2025 AND THAT ALL DIMENSIONS, LINEAR AND ANGULAR ARE CORRECTLY SHOWN, AND THAT ALL MONUMENTS OR MARKERS SHOWN THEREON ACTUALLY EXIST, AND THAT THEIR LOCATIONS, SIZE, TYPE AND DESCRIPTION ARE ACCURATELY SHOWN.

WITNESS MY HAND AND SEAL THIS _____ DAY OF _____, 2025.

_____
GLEN E. BOREN, P.S. NO. LS20000006

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "C"
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
PRELIMINARY PLAT

0' 25' 50'
SCALE: 1" = 50'

SPROUTS

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\25-0081 Preliminary Plat.dwg	
FB/PG	FILE NO.
DRAWN BY: G.B.	DATE: 9/4/25
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 25-0081	

PLAT EXHIBIT

CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"

PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN ALL THE LOTS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF ____________, 2025.

CENTENNIAL VILLAGE, LLC

BY:____________________________

TITLE: ___________________

(PRINTED NAME):__________________________

ACKNOWLEDGMENT

COUNTY OF _________________

STATE OF __________________] SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED ________________, AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS ______ DAY OF ___________________, 2025.

____
(SIGNATURE)

PRINTED NAME:______________________________
NOTARY PUBLIC
RESIDENT OF __________________COUNTY

COMMISSION EXPIRES: ____________________

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF ___________________, 2025.

THE PREVIOUSLY GRANTED AND SHOWN OVERLAND FLOOD ROUTE EASEMENT BY PLAT BOOK 110, PAGE 11 IN DOCUMENT NUMBER 2017-024636 IS HEREBY VACATED AND SUPERCEDED WITH THE OVERLAND FLOOD ROUTE EASEMENT SHOWN HEREON.

___________________________________ ___________________________________
PRINTED NAME SIGNATURE

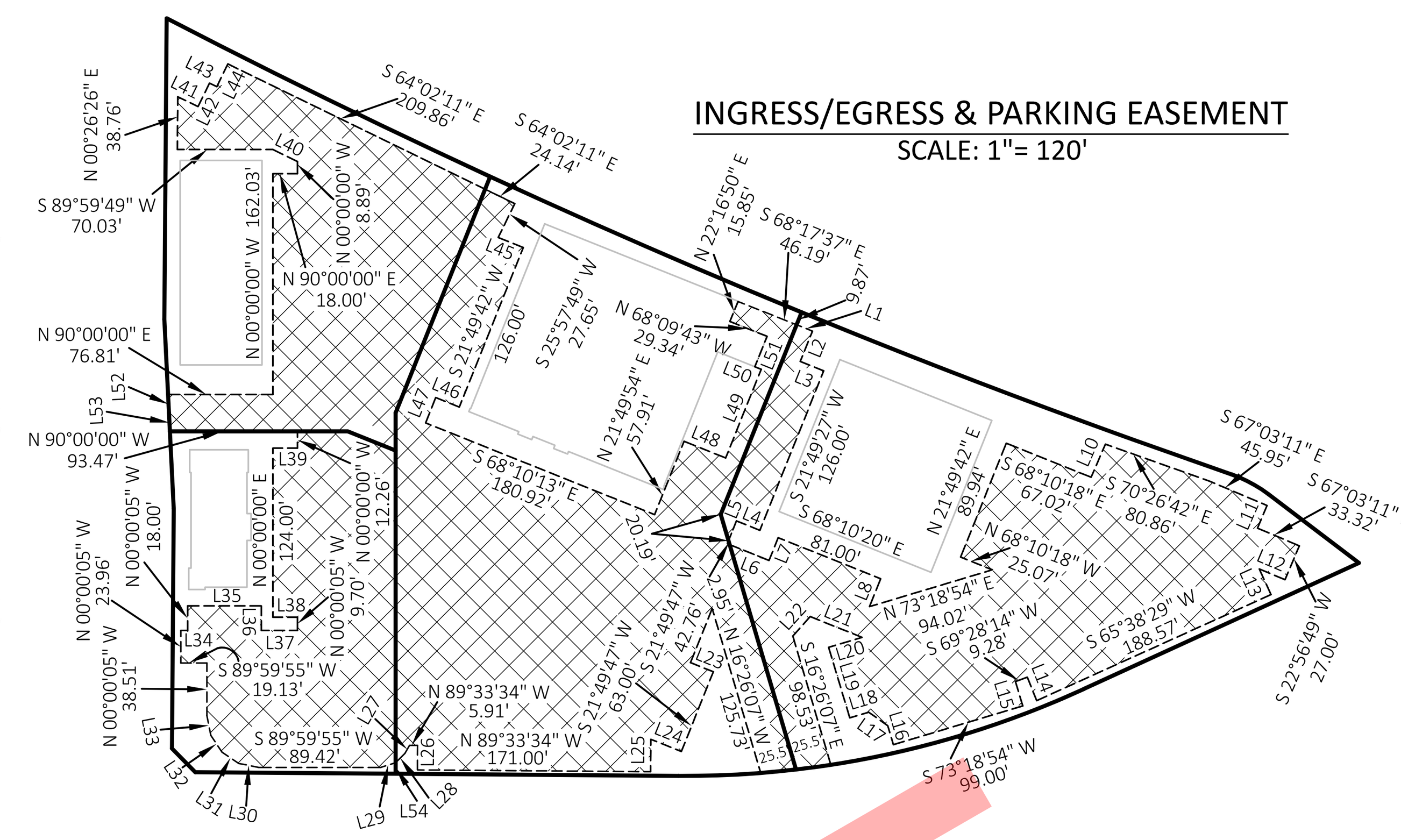
TITLE:

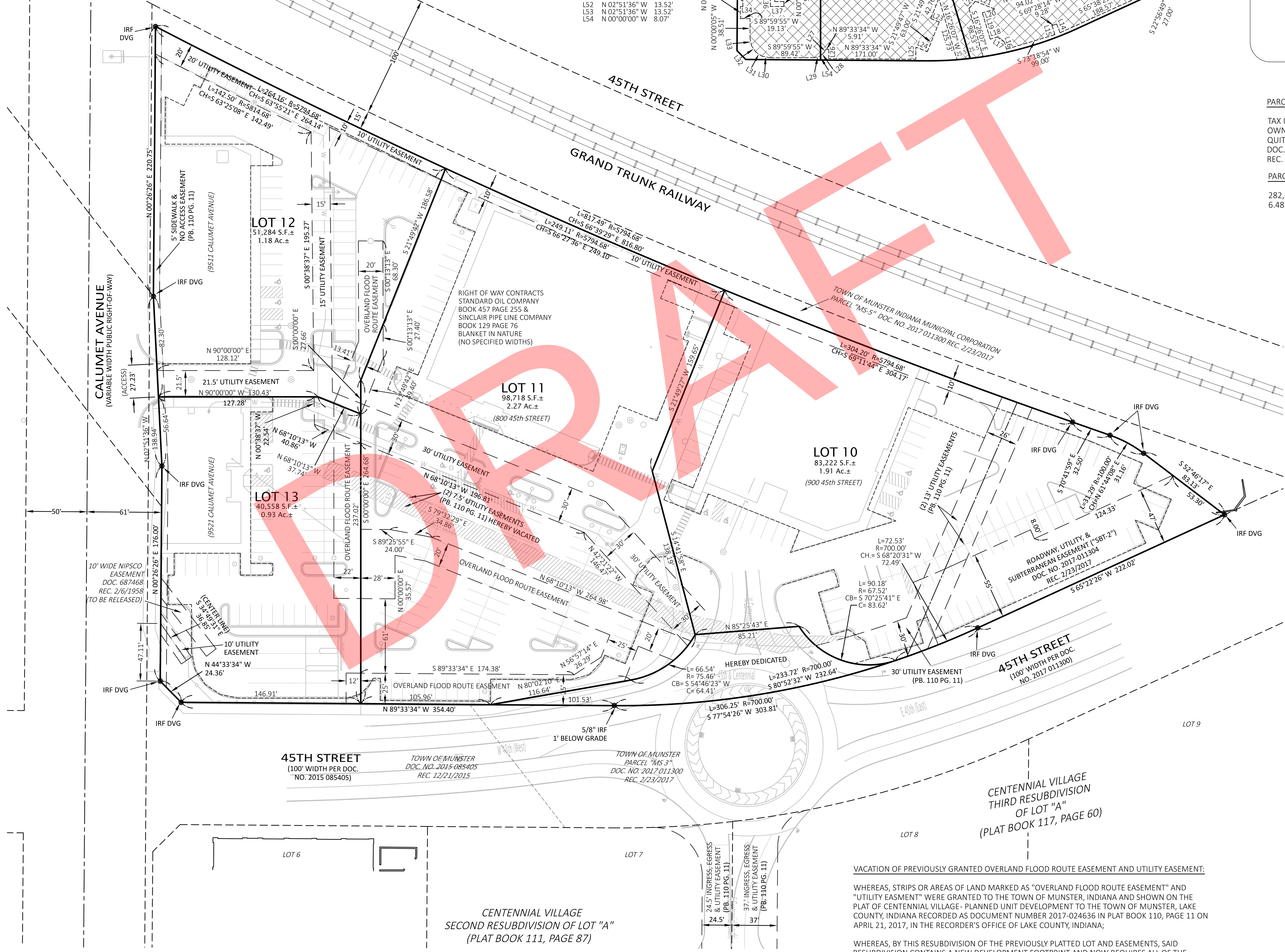
ATTEST:

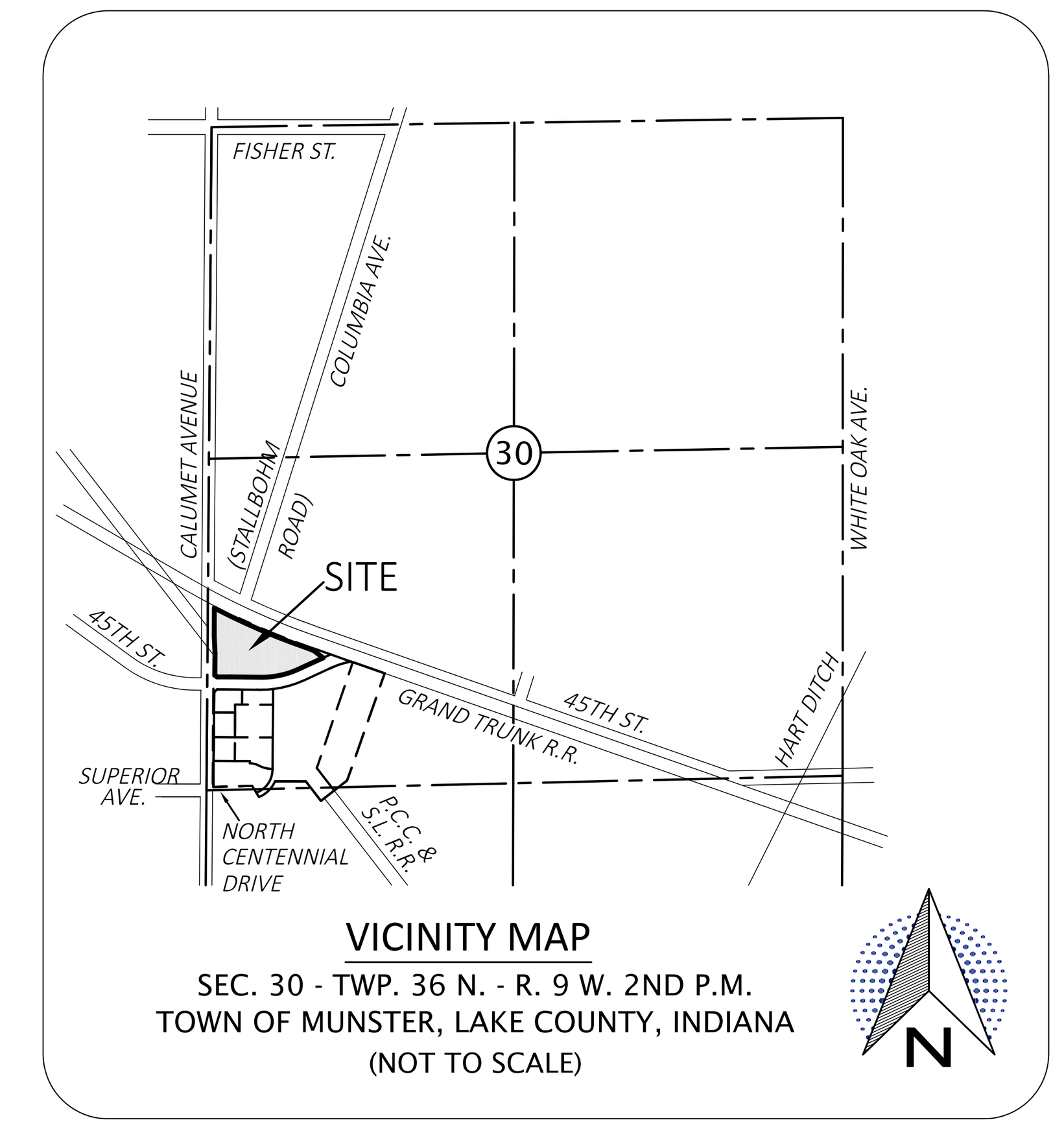
___________________________________ ___________________________________
PRINTED NAME SIGNATURE

TITLE:

L1	S 68°17'37" E	12.50'		L26	N 00°26'26" E	18.00'
L2	S 21°49'25" W	23.97'		L27	S 30°00'00" W	6.86'
L3	S 68°10'35" E	18.50'		L28	S 44°59'59" W	9.62'
L4	N 68°10'35" W	18.50'		L29	S 72°31'04" W	11.48'
L5	S 21°49'42" W	15.69'		L30	N 78°45'02" W	14.83'
L6	S 68°10'35" E	31.18'		L31	N 56°15'02" W	14.83'
L7	N 21°49'42" E	18.00'		L32	N 33°45'01" W	14.83'
L8	S 21°49'42" W	18.00'		L33	N 11°15'00" W	14.83'
L9	S 21°49'42" W	22.04'		L34	N 89°59'55" E	5.00'
L10	N 23°26'16" E	26.42'		L35	N 89°59'55" E	54.00'
L11	S 22°56'49" W	18.00'		L36	S 00°00'05" E	18.00'
L12	S 67°03'11" E	20.44'		L37	N 89°59'55" E	26.50'
L13	S 24°21'31" E	20.71'		L38	N 90°00'00" W	18.00'
L14	N 21°44'53" W	18.84'		L39	N 90°00'00" E	18.00'
L15	N 16°41'06" W	18.60'		L40	N 64°02'11" W	20.02'
L16	N 16°41'06" W	14.50'		L41	S 64°02'11" E	16.59'
L17	N 54°33'35" W	17.10'		L42	N 25°57'49" E	19.19'
L18	S 73°18'54" W	14.50'		L43	S 64°02'11" E	5.91'
L19	N 16°41'06" W	54.00'		L44	N 25°57'49" E	18.50'
L20	S 73°18'54" W	25.58'		L45	S 68°10'18" E	19.75'
L21	N 68°10'35" W	40.95'		L46	N 68°10'18" W	18.64'
L22	S 41°55'02" W	19.12'		L47	S 21°49'42" W	20.00'
L23	S 68°10'13" E	18.00'		L48	S 68°10'18" E	32.88'
L24	N 68°10'13" W	24.11'		L49	N 21°49'42" E	70.09'
L25	S 00°26'26" W	23.77'		L50	N 68°10'18" W	5.00'
				L51	N 21°50'33" E	24.00'
				L52	N 02°51'36" W	13.52'
				L53	N 02°51'36" W	13.52'
				L54	N 00°00'00" W	8.07'







VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SUBDIVIDER AND OWNER:

CENTENNIAL VILLAGE, LLC
631 KILLARNEY DRIVE
DYER, IN 46311

ENGINEER AND SURVEYOR:

DVG TEAM INC.
1155 TROUTWINE ROAD
CROWN POINT, IN 46307

LEGEND

- INGRESS/EGRESS AND PARKING EASEMENT
- PREVIOUSLY PLATTED UTILITY EASEMENT HEREBY VACATED
- IRS DVG — 5/8" REBAR SET WITH BLUE PLASTIC CAP STAMPED "DVG TEAM INC FIRM NO. 0120"
- MAGF — "MAG" NAIL FOUND WITH METAL WASHER STAMPED "DVG TEAM INC FIRM NO. 0120"

P.B.- PLAT BOOK

DEVELOPMENTAL STANDARDS:
THERE ARE DEVELOPMENTAL STANDARDS ASSOCIATED WITH DEVELOPMENT THAT ARE RECORDED AS DOCUMENT NUMBER 2017-024635 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

REFERENCE SURVEYS:
1. PLAT OF CENTENNIAL VILLAGE P.U.D. RECORDED IN PLAT BOOK 110, PAGE 11.
2. ALTA/ACSM LAND TITLE SURVEY OF PARCELS TW-1, 2, 4 AND PK-1, 3 BY PLUMB TUCKETT AND ASSOCIATES, INC. (NOW DVG TEAM, INC.), JOB NO. S15644, LAST REVISED 3/25/16, RECORDED AS DOCUMENT NUMBER 2017-015652, ON 3/9/2017.
3. CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 53.
4. CENTENNIAL VILLAGE 2ND RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 87.
5. CENTENNIAL VILLAGE 3RD RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 117, PAGE 60.

IT IS THE OPINION OF THE SURVEYOR THAT THERE ARE NO SUBSTANTIAL DIFFERENCES BETWEEN SAID SURVEYS AND THIS PLAT.

FLOOD ZONE INFORMATION:
FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCELS DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEAR TO LIE WITHIN ZONE "X": AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCELS PLOT BY SCALE ON FLOOD INSURANCE RATE MAP NO. 180139 0117 E FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, MAP EFFECTIVE DATE BEING JANUARY 18, 2012 AND REVISED TO REFLECT LOMR EFFECTIVE MARCH 18, 2016.

SURVEY NOTE:
THE EXTERIOR OF THE OVERALL SUBDIVISION BOUNDARY WAS STAKED AND THE MONUMENTS SET AND FOUND ARE SHOWN ON THE RECORDED PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT (PLAT BOOK 110, PAGE 11). IT IS THE OPINION OF THE SURVEYOR THAT IT IS PROBABLE THAT THE INDIVIDUAL LOT MONUMENTS FOR THIS RESUBDIVISION WILL BE DISTURBED BY CONSTRUCTION AND MASS GRADING. THE SETTING OF THE INDIVIDUAL LOT MONUMENTS ARE HEREBY DELAYED UNTIL AFTER CONSTRUCTION IS COMPLETE OR UP TO TWO YEARS AFTER RECORDATION OF THIS PLAT, WHICHEVER OCCURS FIRST AS PRESCRIBED BY TITLE 865 IAC 1-12-18(l).

VACATION OF PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND UTILITY EASEMENT:

WHEREAS, STRIPS OR AREAS OF LAND MARKED AS "OVERLAND FLOOD ROUTE EASEMENT" AND "UTILITY EASMENT" WERE GRANTED TO THE TOWN OF MUNSTER, INDIANA AND SHOWN ON THE PLAT OF CENTENNIAL VILLAGE- PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA RECORDED AS DOCUMENT NUMBER 2017-024636 IN PLAT BOOK 110, PAGE 11 ON APRIL 21, 2017, IN THE RECORDER'S OFFICE OF LAKE COUNTY, INDIANA;

WHEREAS, BY THIS RESUBDIVISION OF THE PREVIOUSLY PLATTED LOT AND EASEMENTS, SAID RESUBDIVISION CONTAINS A NEW DEVELOPMENT FOOTPRINT AND NOW REQUIRES ALL OF THE PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND A PORTION OF THE SAID PREVIOUSLY GRANTED UTILITY EASEMENT AS INDICATED HEREON FOR THE DEVELOPMENT OF THIS RESUBDIVISION TO BE RELEASED AND VACATED BY THE TOWN OF MUNSTER, INDIANA;

WHEREAS, BOTH SAID EASEMENTS ARE BEING RECONFIGURED TO ACCOMMODATE THE NEW DEVELOPMENT FOOTPRINT AND GRANTED ACCORDINGLY ON THIS PLAT;

NOW THEREFORE, ALL OF SAID PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND PORTIONS OF SAID PREVIOUSLY GRANTED UTILITY EASEMENT (AS INDICATED HEREON) ARE HEREBY RELEASED AND VACATED BY THE EXECUTION AND ACCEPTANCE OF THIS PLAT BY THE TOWN OF MUNSTER, INDIANA BECOMING EFFECTIVE ON THE DATE OF RECORDATION OF THIS PLAT.

SURVEYOR'S CERTIFICATION:

I, GLEN E. BOREN, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEYOR LICENSED IN COMPLIANCE WITH THE LAWS OF THE STATE OF INDIANA; THAT THIS PLAT CORRECTLY REPRESENTS A SURVEY COMPLETED BY ME ON MONTH XX, 2025 AND THAT ALL DIMENSIONS, LINEAR AND ANGULAR ARE CORRECTLY SHOWN, AND THAT ALL MONUMENTS OR MARKERS SHOWN THEREON ACTUALLY EXIST, AND THAT THEIR LOCATIONS, SIZE, TYPE AND DESCRIPTION ARE ACCURATELY SHOWN.

WITNESS MY HAND AND SEAL THIS _____ DAY OF _____________, 2025.

____
GLEN E. BOREN, P.S. NO. LS20000006

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
10/5/25	ROUNDABOUT LINEWORK

CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "C"
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
PLAT EXHIBIT

N
0' 25' 50'
SCALE: 1" = 50'

SPROUTS

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\25-0081 Preliminary Plat R-1.dwg

FB/PG	FILE NO.
DRAWN BY G.B.	DATE 10/7/25
SECTION 30-36-9	COUNTY, STATE LAKE, IN
JOB NO. 25-0081	

SITE DATA (BUILDING A-SPROUTS)

- USE: GROCERY
- LOT AREA: 2.27AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 116 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2)

- USE: RETAIL
- LOT AREA: 1.176 AC
- BUILDING AREA: 9,856 SQ. FT.
- PARKING REQUIRED: 32 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 63 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3)

- USE: 2 OR 3 STORY OFFICE
- LOT AREA: 1.91 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 110 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (TOTAL-ALL FOUR BUILDINGS)

- LOT AREA (TOTAL): 6.482 AC
- PARKING REQUIRED: 234 SPACES
- PARKING PROVIDED: 331 SPACES (DURING BANK HOURS) 340 SPACES (DURING NON-BANK HOURS)

LEGEND

- CONCRETE SIDEWALK
- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.

DRAFT

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION

10/07/25

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts
PUD Overall Site Plan w/ Roudabout

NOT FOR CONSTRUCTION

SCALE: 1" = 40'

© COPYRIGHT 2017 DVG TEAM, INC

DESIGN BY	DATE
GMPF	10/07/25
PROJECT NO.	
25-0081	

C103.2

CENTENNIAL VILLAGE-LOT 11-BUILDING "A"
SPROUTS GROCERY STORE

800 45TH STREET, MUNSTER, INDIANA

ISSUED FOR PERMIT - 09/16/2025



Location Map
(No Scale)

BENCHMARK

SAW CUT CROSS AT THE NORTHEAST CORNER OF CALUMET AVE & 45TH AVE INTERSECTION
ELEVATION = 618.59 (NAVD88)

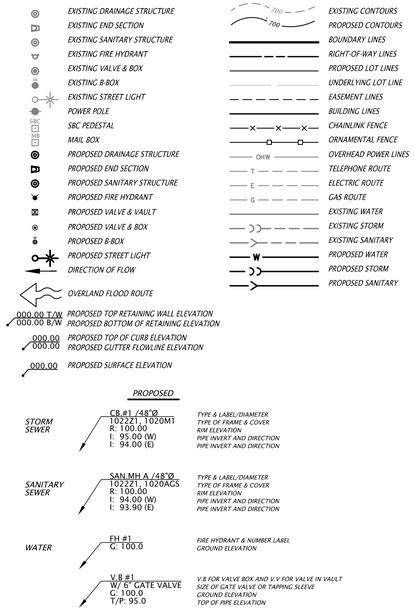
Indiana811 Know what's **below.Call** before you dig.

To Submit a Locate Request
24 Hours a Day, Seven Days a Week:
Call 811 or 800-382-5544
www.Indiana811.org

INDEX OF SHEETS

C001	Cover Sheet
C101	PUD Overall Existing Conditions
C102	PUD OVerall Demolition Plan
C103	PUD Overall Site Plan
C103A-C103B	Site Plan Sprouts
C104A-C104B	Grading Plan Sprouts
C105	PUD Overall Utility Plan
C105A-C105B	Utility Plan Sprouts
C106	Stormwater Pollution Prevention Plan (SWPPP)
C201-C204	Construction Details
C301-C304	SWPPP Details

LEGEND



PROJECT CONTACTS

SCHOOL DISTRICT
SCHOOL TOWN OF MUNSTER
8616 COLUMBIA AVENUE
MUNSTER, IN 46321
(219) 836-9111

WATER UTILITY
TOWN OF MUNSTER
WATER DEPARTMENT
1005 RIDGE ROAD
MUNSTER, IN 46321
(219) 836-6970

ELECTRIC & GAS UTILITY
NIPSCO
801 E. 86th AVENUE
MERRILLVILLE, IN 46410
(800) 464-7726

DEVELOPER/OWNER
MATT KIMMEL
631 KILLARNEY DRIVE
DYER, INDIANA 46311
MATT@MKIMMEL.COM

MUNICIPAL
TOWN OF MUNSTER
COMMUNITY DEVELOPMENT
1005 RIDGE ROAD
MUNSTER, IN 46321
(219) 836-6995

SANITARY SEWER UTILITY
TOWN OF MUNSTER
SEWER DEPARTMENT
1005 RIDGE ROAD
MUNSTER, IN 46321
(219) 836-6970

CABLE UTILITY
COMCAST
16 W. 84th DRIVE
MERRILLVILLE, IN 46410
(219) 738-2780

TELECOM UTILITY
AT&T
5858 N. COLLEGE AVENUE
INDIANAPOLIS, IN 46220
(317) 252-4007

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB ANDERSON REGISTERED 29300007 PROFESSIONAL ENGINEER STATE OF INDIANA
09/16/2025

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 11
Bldg. A-Sprouts
Cover Sheet

NO SCALE

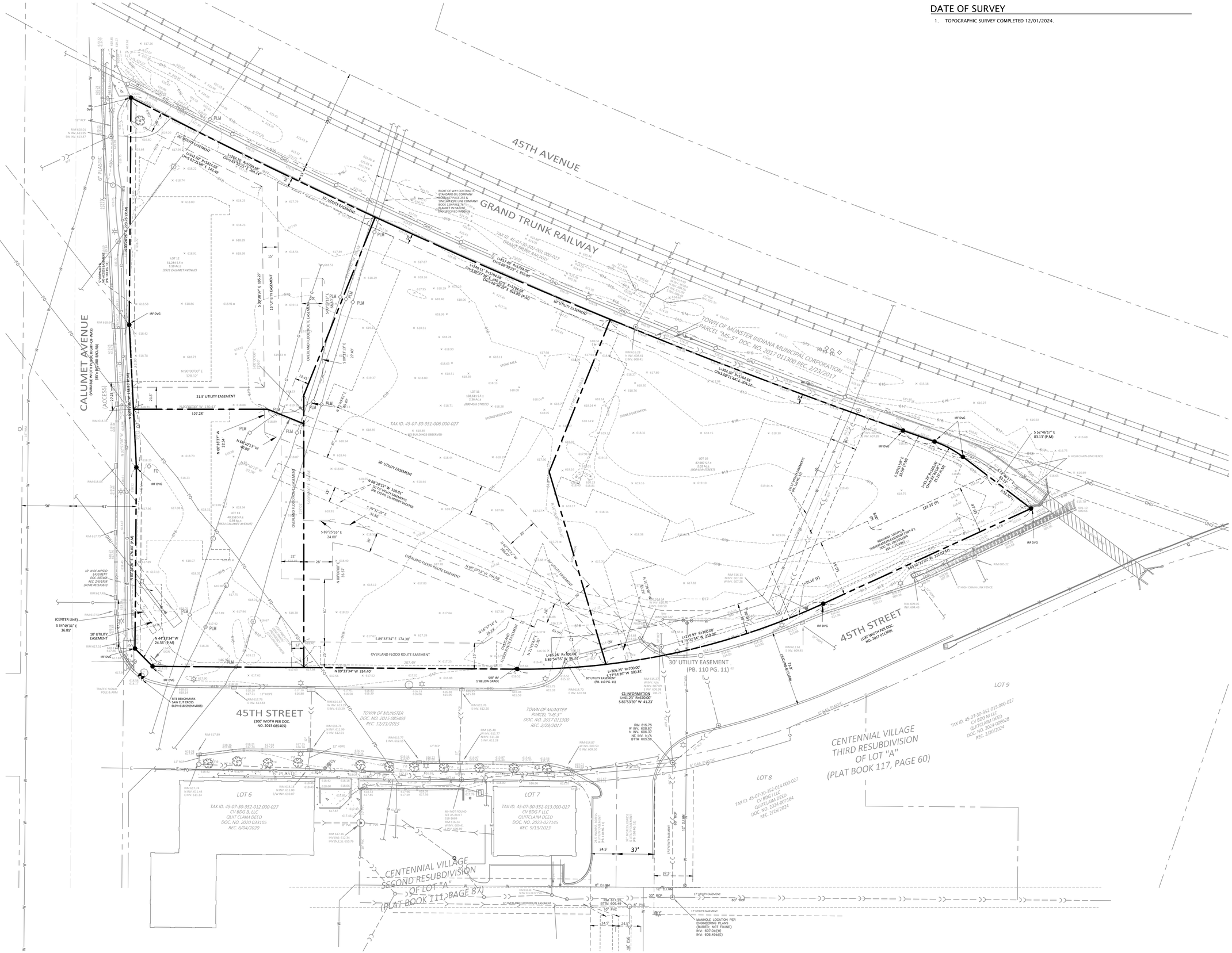
© COPYRIGHT 2017 DVG TEAM, INC

DESIGN BY	DATE
DVG	08/21/25
PROJECT NO.	
25-0081	

C001

DATE OF SURVEY

1. TOPOGRAPHIC SURVEY COMPLETED 12/01/2024.



DVG TEAM INC

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Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION

RUSSELL JACOB POZEN
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER

09/16/25

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts

PUD Overall Existing Conditions

N

0' 20' 40'
SCALE: 1" = 40'

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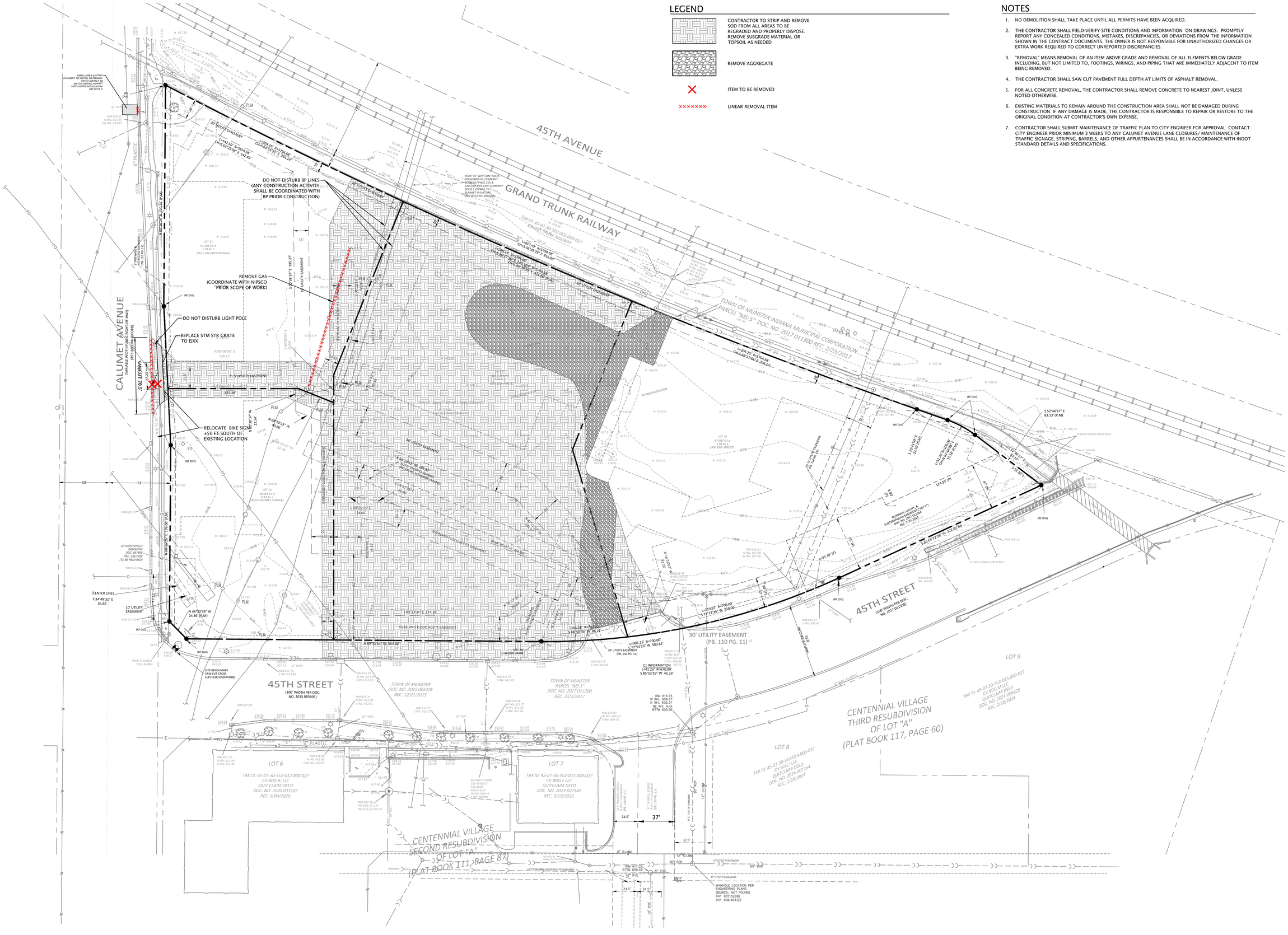
DESIGN BY	DATE
GMPF	09/16/25
PROJECT NO.	
25-0081	
C101	

NOT FOR CONSTRUCTION



LEGEND

- CONTRACTOR TO STRIP AND REMOVE SOD FROM ALL AREAS TO BE REGRADED AND PROPERLY DISPOSE. REMOVE SUBGRADE MATERIAL OR TOPSOIL AS NEEDED
- REMOVE AGGREGATE
- ITEM TO BE REMOVED
- LINEAR REMOVAL ITEM

NOTES

1. NO DEMOLITION SHALL TAKE PLACE UNTIL ALL PERMITS HAVE BEEN ACQUIRED.
2. THE CONTRACTOR SHALL FIELD-VERIFY SITE CONDITIONS AND INFORMATION ON DRAWINGS. PROMPTLY REPORT ANY CONCEALED CONDITIONS, MISTAKES, DISCREPANCIES, OR DEVIATIONS FROM THE INFORMATION SHOWN IN THE CONTRACT DOCUMENTS. THE OWNER IS NOT RESPONSIBLE FOR UNAUTHORIZED CHANGES OR EXTRA WORK REQUIRED TO CORRECT UNREPORTED DISCREPANCIES.
3. "REMOVAL" MEANS REMOVAL OF AN ITEM ABOVE GRADE AND REMOVAL OF ALL ELEMENTS BELOW GRADE INCLUDING, BUT NOT LIMITED TO, FOOTINGS, WIRINGS, AND PIPING THAT ARE IMMEDIATELY ADJACENT TO ITEM BEING REMOVED.
4. THE CONTRACTOR SHALL SAW CUT PAVEMENT FULL DEPTH AT LIMITS OF ASPHALT REMOVAL.
5. FOR ALL CONCRETE REMOVAL, THE CONTRACTOR SHALL REMOVE CONCRETE TO NEAREST JOINT, UNLESS NOTED OTHERWISE.
6. EXISTING MATERIALS TO REMAIN AROUND THE CONSTRUCTION AREA SHALL NOT BE DAMAGED DURING CONSTRUCTION. IF ANY DAMAGE IS MADE, THE CONTRACTOR IS RESPONSIBLE TO REPAIR OR RESTORE TO THE ORIGINAL CONDITION AT CONTRACTOR'S OWN EXPENSE.
7. CONTRACTOR SHALL SUBMIT MAINTENANCE OF TRAFFIC PLAN TO CITY ENGINEER FOR APPROVAL. CONTACT CITY ENGINEER PRIOR MINIMUM 3 WEEKS TO ANY CALUMET AVENUE LANE CLOSURES/ MAINTENANCE OF TRAFFIC SIGNAGE, STRIPING, BARRELS, AND OTHER APPURTENANCES SHALL BE IN ACCORDANCE WITH INDOT STANDARD DETAILS AND SPECIFICATIONS.

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION
RUSSELL JACOB POZEN
REGISTERED NO. PE10910667 STATE OF INDIANA PROFESSIONAL ENGINEER
09/16/25

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts
PUD Overall Demolition Plan

N
0' 20' 40'
SCALE: 1" = 40'

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DESIGN BY	DATE
GMPF	09/16/25
PROJECT NO. 25-0081	
C102	

NOT FOR CONSTRUCTION

SITE DATA (BUILDING A-SPROUTS)

- USE: GROCERY
- LOT AREA: 2.355 AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 125 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2)

- USE: RETAIL
- LOT AREA: 1.176 AC
- BUILDING AREA: 9,856 SQ. FT.
- PARKING REQUIRED: 32 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 63 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3)

- USE: 2 OR 3 STORY OFFICE
- LOT AREA: 2.019 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 130 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (TOTAL-ALL FOUR BUILDINGS)

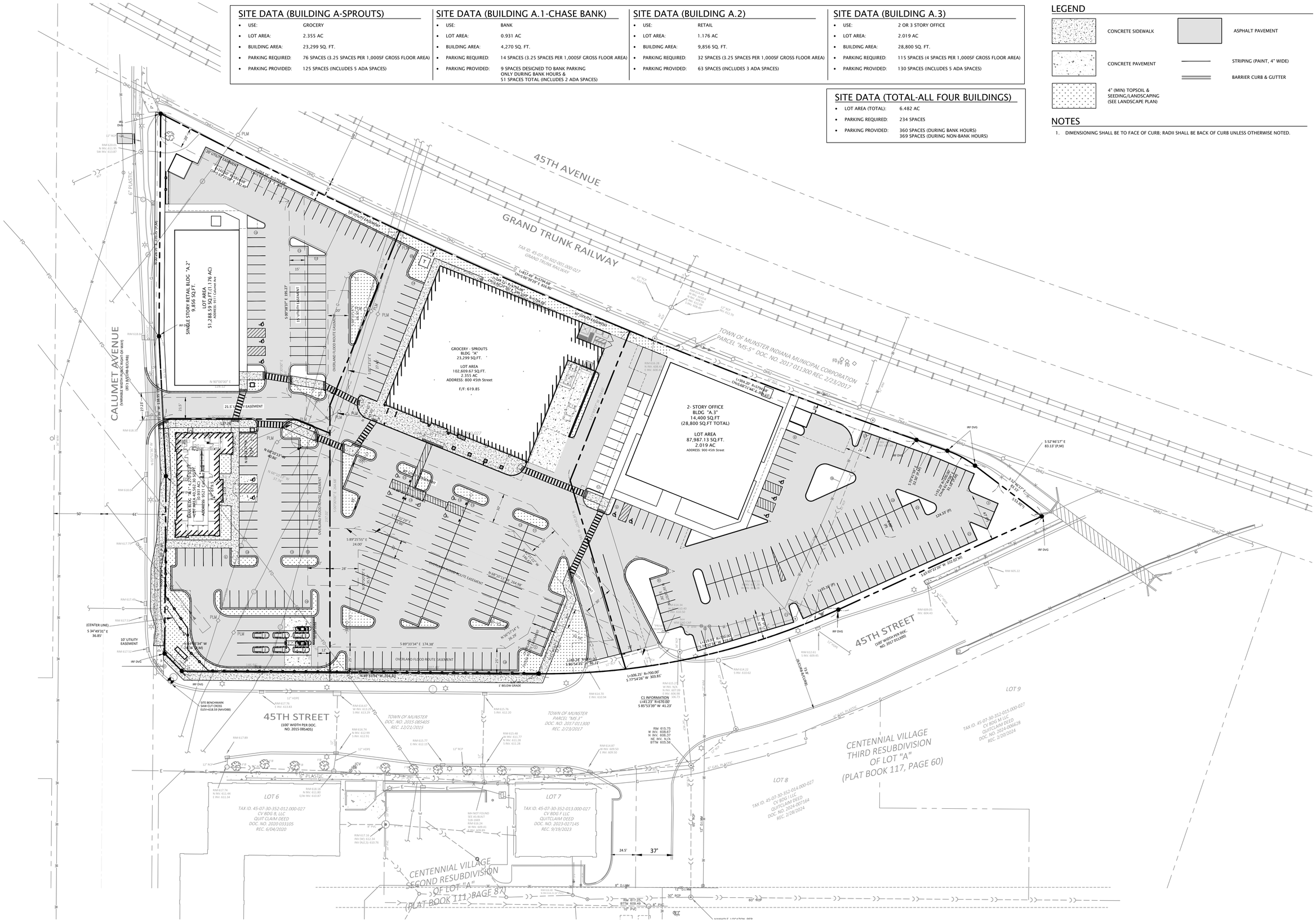
- LOT AREA (TOTAL): 6.482 AC
- PARKING REQUIRED: 234 SPACES
- PARKING PROVIDED: 360 SPACES (DURING BANK HOURS) 369 SPACES (DURING NON-BANK HOURS)

LEGEND

- CONCRETE SIDEWALK
- CONCRETE PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- ASPHALT PAVEMENT
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.



DVG TEAM INC

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NOT FOR CONSTRUCTION

09/16/25

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts

PUD Overall Site Plan

SCALE: 1" = 40'

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DESIGN BY	DATE
GMPF	09/16/25

PROJECT NO. 25-0081

C103

SITE DATA (BUILDING A-SPROUTS)

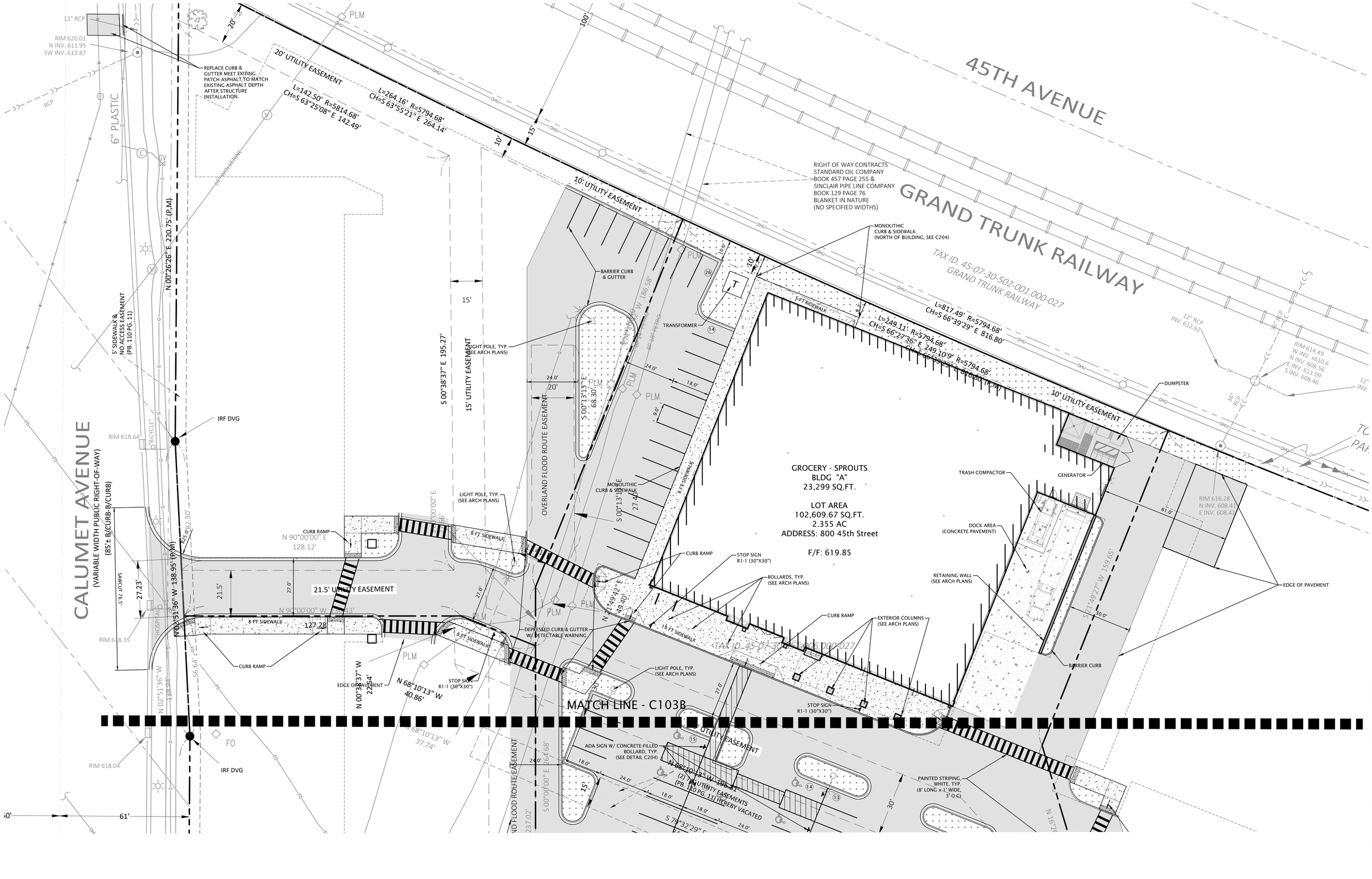
- USE: GROCERY
- LOT AREA: 2.355 AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 125 SPACES (INCLUDES 5 ADA SPACES)

LEGEND

- CONCRETE SIDEWALK
- ASPHALT PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER
- 6-INCH BARRIER CURB

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.
2. CONTRACTOR SHALL SUBMIT MAINTENANCE OF TRAFFIC PLAN TO CITY ENGINEER FOR APPROVAL. CONTACT CITY ENGINEER PRIOR MINIMUM 3 WEEKS TO ANY CALUMET AVENUE LANE CLOSURES/ MAINTENANCE OF TRAFFIC SIGNAGE, STRIPING, BARRELS, AND OTHER APPURTENANCES SHALL BE IN ACCORDANCE WITH INDOT STANDARD DETAILS AND SPECIFICATIONS.



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RUSSELL JACOB PE
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
FOR CONSTRUCTION

09/16/25

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

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Centennial Village - Lot 11
Bldg. A-Sprouts
Site Plan - Sprouts

SCALE: 1" = 20'

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DESIGN BY	DATE
GMPF	09/16/25
PROJECT NO.	
25-0081	

C103.A

SITE DATA (BUILDING A-SPROUTS)

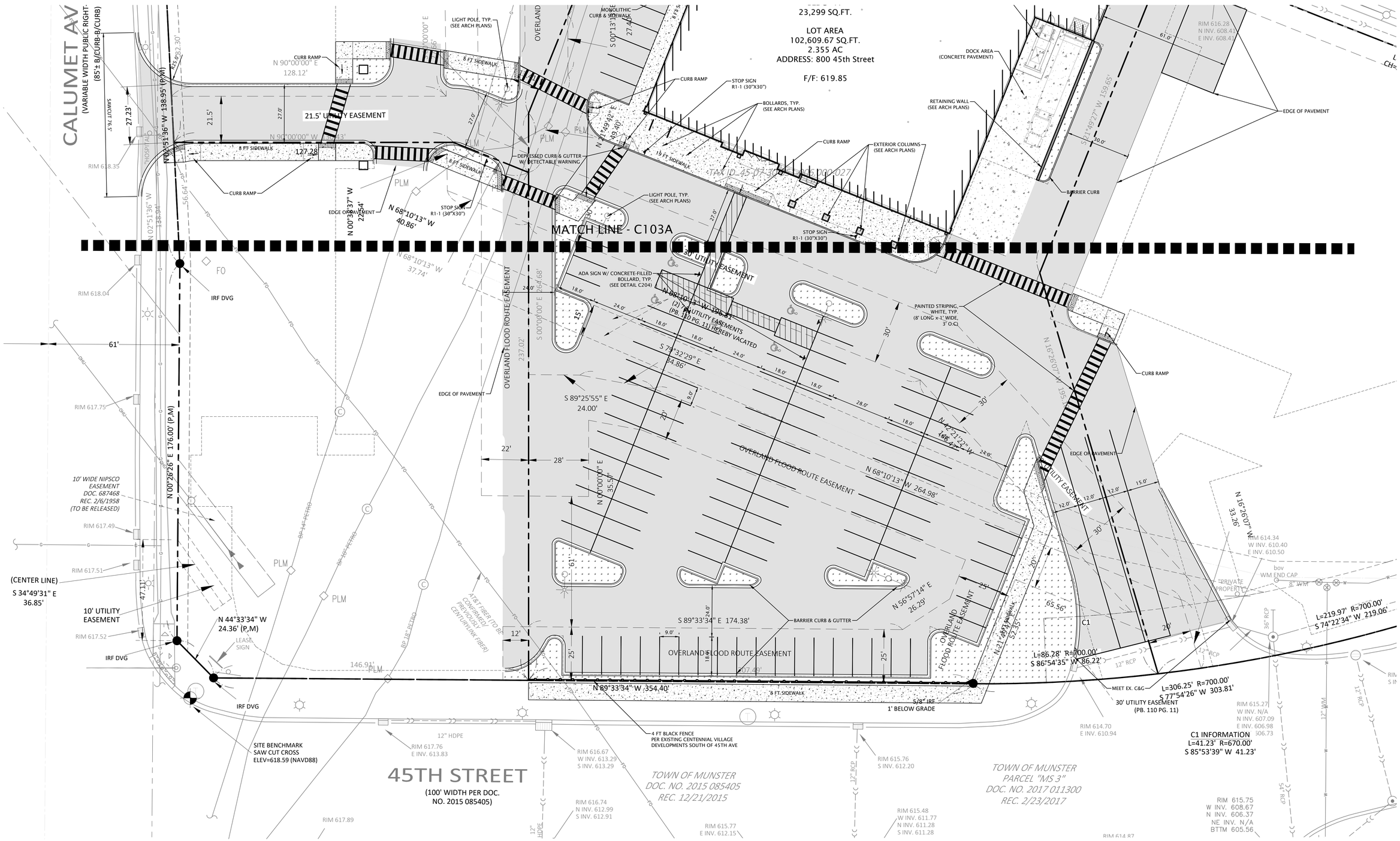
- USE: GROCERY
- LOT AREA: 2.355 AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 125 SPACES (INCLUDES 5 ADA SPACES)

LEGEND

- CONCRETE SIDEWALK
- ASPHALT PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER
- 6-INCH BARRIER CURB

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.



DVG TEAM INC

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FOR CONSTRUCTION
09/16/25

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE: REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts
Site Plan

NOT FOR CONSTRUCTION

SCALE: 1" = 20'

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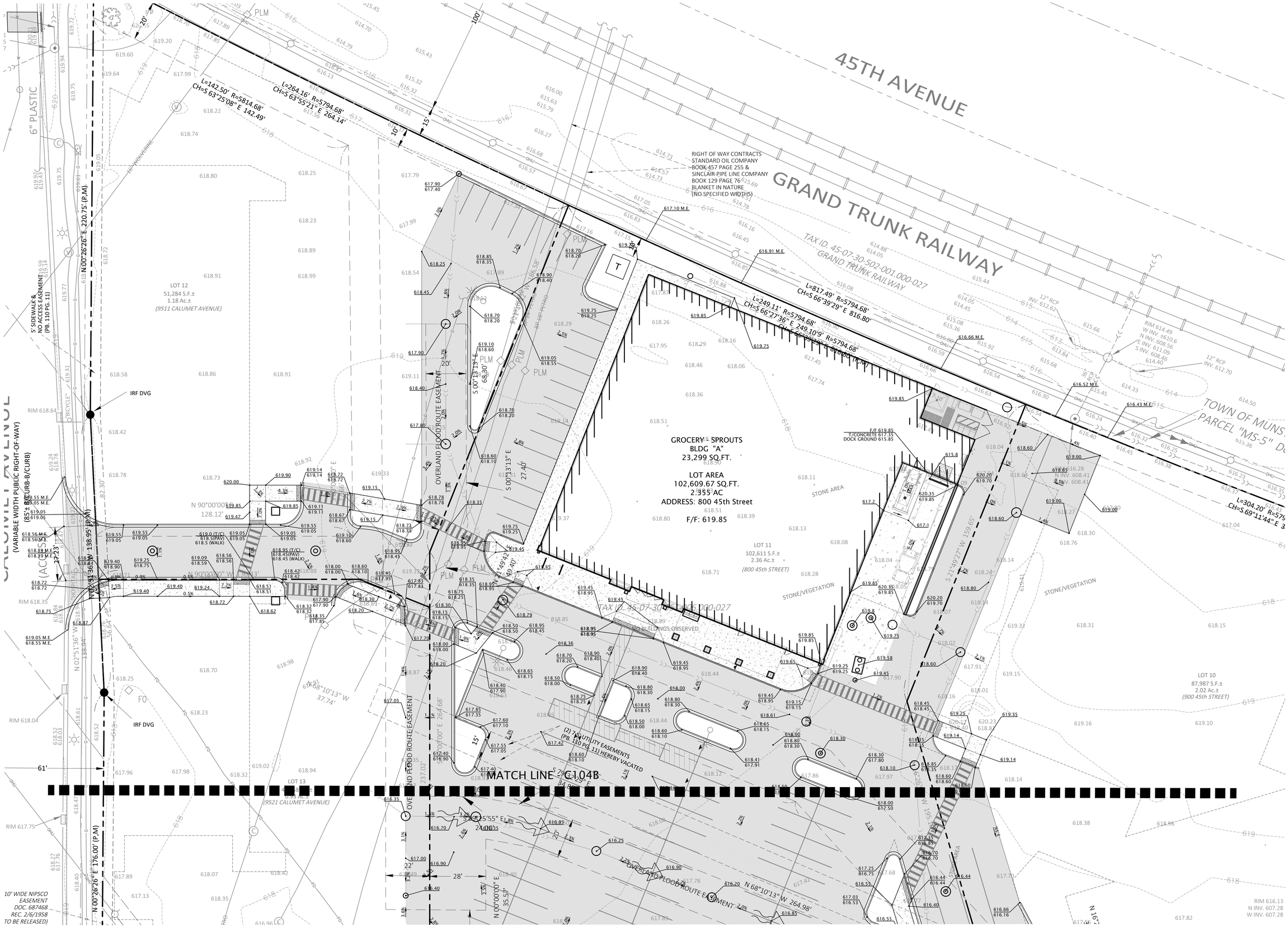
DESIGN BY	DATE
GMPF	09/16/25
PROJECT NO.	
25-0081	

C103.B



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RUSSELL JACOB POZEN
REGISTERED
NO. 10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
FOR CONSTRUCTION
09/16/25

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts
Grading Plan Sprouts

NOT FOR CONSTRUCTION

SCALE: 1" = 20'

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PROJECT NO.	
25-0081	

C104.A

MATCH LINE C104A

61'

N 00°26'26" E 176.00' (P,M)

10' WIDE NIPSCO EASEMENT DOC. 687468 REC. 2/6/1958 (TO BE RELEASED)

10' UTILITY EASEMENT

N 44°33'34" W 24.36' (P,M)

LEASE SIGN

IRF DVG

TRAFFIC SIGNAL POLE & ARM

SITE BENCHMARK
SAW CUT CROSS
ELEV=618.59 (NAVD88)

LOT 13
40,558 S.F.±
0.93 AC.±
(9521 CALUMET AVENUE)

N 89°33'34" W 354.40'

5/8" IRF 1' BELOW GRADE

(PB. 110 PG. 11) 30' UTILITY EASEMENTS HEREBY VACATED

N 42°21'22" W 146.47'

S 22°07'38" W 195.88'

30' UTILITY EASEMENT

C1

L=86.28' R=700.00'
S 86°54'35" W 86.22'

L=306.25' R=700.00'
S 77°54'26" W 303.81'

30' UTILITY EASEMENT (PB. 110 PG. 11)

30' UTILITY EASEMENT (PB. 110 PG. 11)

L=219.97' R=700.00'
S 74°22'34" W 219.06'

C1 INFORMATION
L=41.23' R=670.00'
S 85°53'39" W 41.23'

45TH STREET
(100' WIDTH PER DOC. NO. 2015 085405)

TOWN OF MUNSTER
DOC. NO. 2015 085405
REC. 12/21/2015

TOWN OF MUNSTER
PARCEL "MS 3"
DOC. NO. 2017 011300
REC. 2/23/2017

LOT 6

TAX ID. 45-07-30-352-012.000-027
CV BDG B, LLC
QUIT CLAIM DEED
DOC. NO. 2020 033105
REC. 6/04/2020

LOT 7

TAX ID. 45-07-30-352-013.000-027
CV BDG F LLC
QUITCLAIM DEED
DOC. NO. 2023-027145
REC. 9/19/2023

CENTENNIAL VILLAGE
SECOND RESUBDIVISION
OF LOT "A"
(PLAT BOOK 111; PAGE 87)

MH NOT FOUND
SEE AS-BUILT
S18-1669
RIM 616.24
W INV. 609.41
E INV. 609.89

RIM 617.16
INV (W): 612.34
INV (N,E,S): 610.76

RIM 617.74
N INV. 611.44
E INV. 611.34

RIM 618.18
N INV. 611.80
E/W INV. 610.87

RIM 617.76
E INV. 613.83

RIM 616.67
W INV. 613.29
S INV. 613.29

RIM 616.74
N INV. 612.99
S INV. 612.91

RIM 615.77
E INV. 612.15

RIM 615.76
S INV. 612.20

RIM 615.48
W INV. 611.77
N INV. 611.28
S INV. 611.28

RIM 614.87
W INV. 609.50
E INV. 609.50

RIM 615.75
W INV. 608.67
N INV. 606.37
NE INV. N/A
BTTM 605.56

RIM 614.70
E INV. 610.94

RIM 615.27
W INV. N/A
N INV. 607.09
E INV. 606.98
506.73

RIM 614.34
W INV. 610.10
E INV. 610.57

RIM 616.48
N INV 616.31 (6" PVC)

RIM 617.25
BTTM 609.49

MANHOLE LOCATION
ENGINEERING PLANS
(BURIED; NOT FOUND
INV: 607.0±(W)
INV: 606.49±(E)

24.5' INGRESS, EGRESS & UTILITY EASEMENT (PB. 110 PG. 11)

37' INGRESS, EGRESS & UTILITY EASEMENT (PB. 110 PG. 11)

37.5' UTILITY EASEMENT

17' UTILITY EASEMENT

12' OVERLAND FLOOD ROUTE EASEMENT

24.5' | 37' | 37.5' | 24.5' | 24.5'

PRIVATE PROPERTY

IRF DVG

IRF 1/4" PETRO

BP 1/4" PETRO

FO

ONU

ICV

6" PLASTIC

6" GAS, PLASTIC

12" RCP

15" RCP

18" RCP

30" RCP

36" RCP

54" RCP

60" RCP

12" HDPE

8" PVC

10" PVC

12" D.I.WM

8" D.I.WM

8" W.M.

6" W.M.

W15.86

6DV WM END CAP

12" RCP

146.92

47.11'

237.02'

195.07'

30'

2.2%

1.8%

2.3%

2.6%

3.1%

3.4%

3.6%

2.0%

1.4%

2.7%

3.2%

2.5%

DVG TEAM INC
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RUSSELL JACOB KRUSE
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER

FOR CONSTRUCTION

09/16/25

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

NOT FOR CONSTRUCTION

Centennial Village - Lot 11
Bldg. A-Sprouts
Grading Plan Sprouts

SCALE: 1" = 20'

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DESIGN BY	DATE
GMPF	09/16/25
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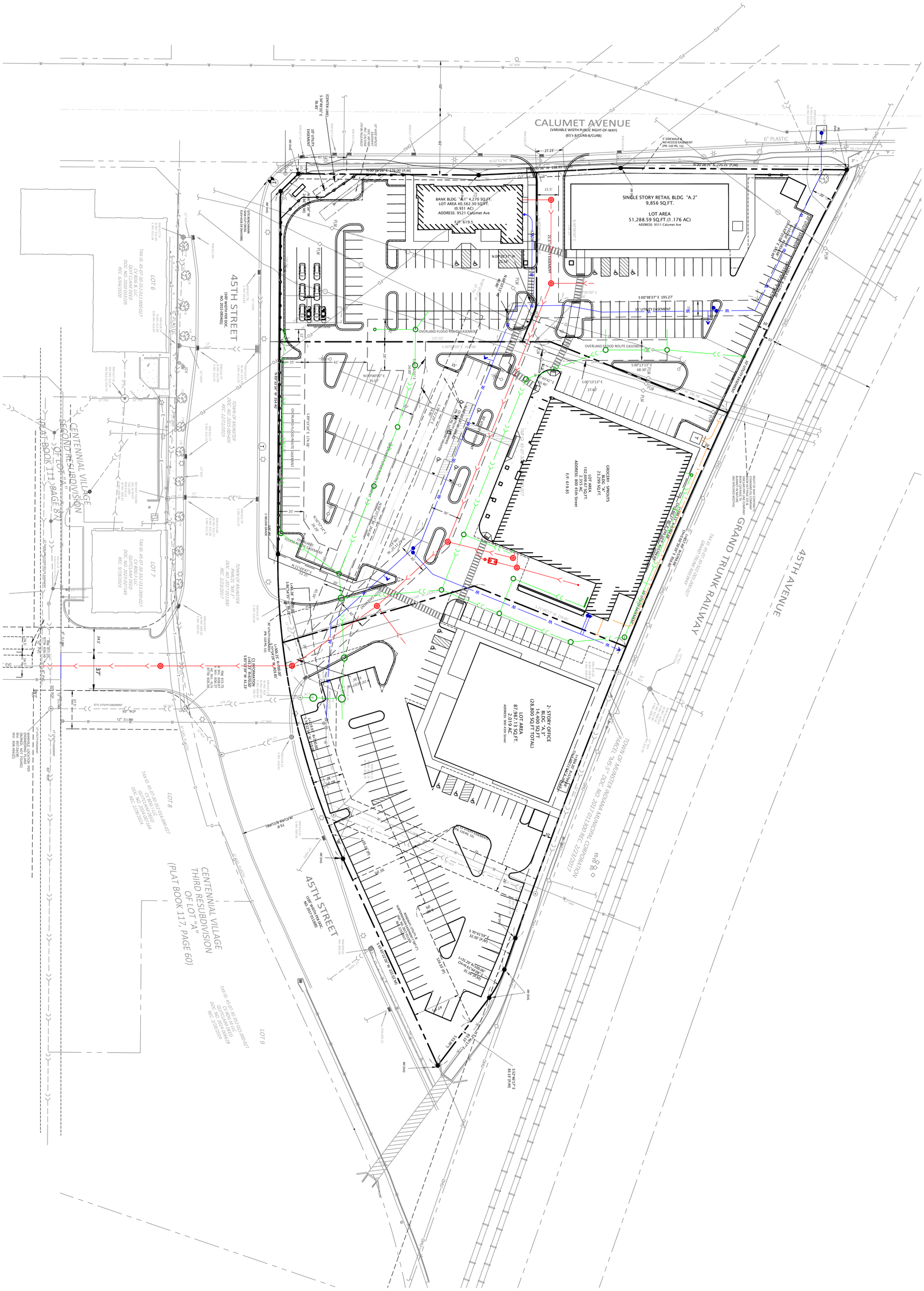
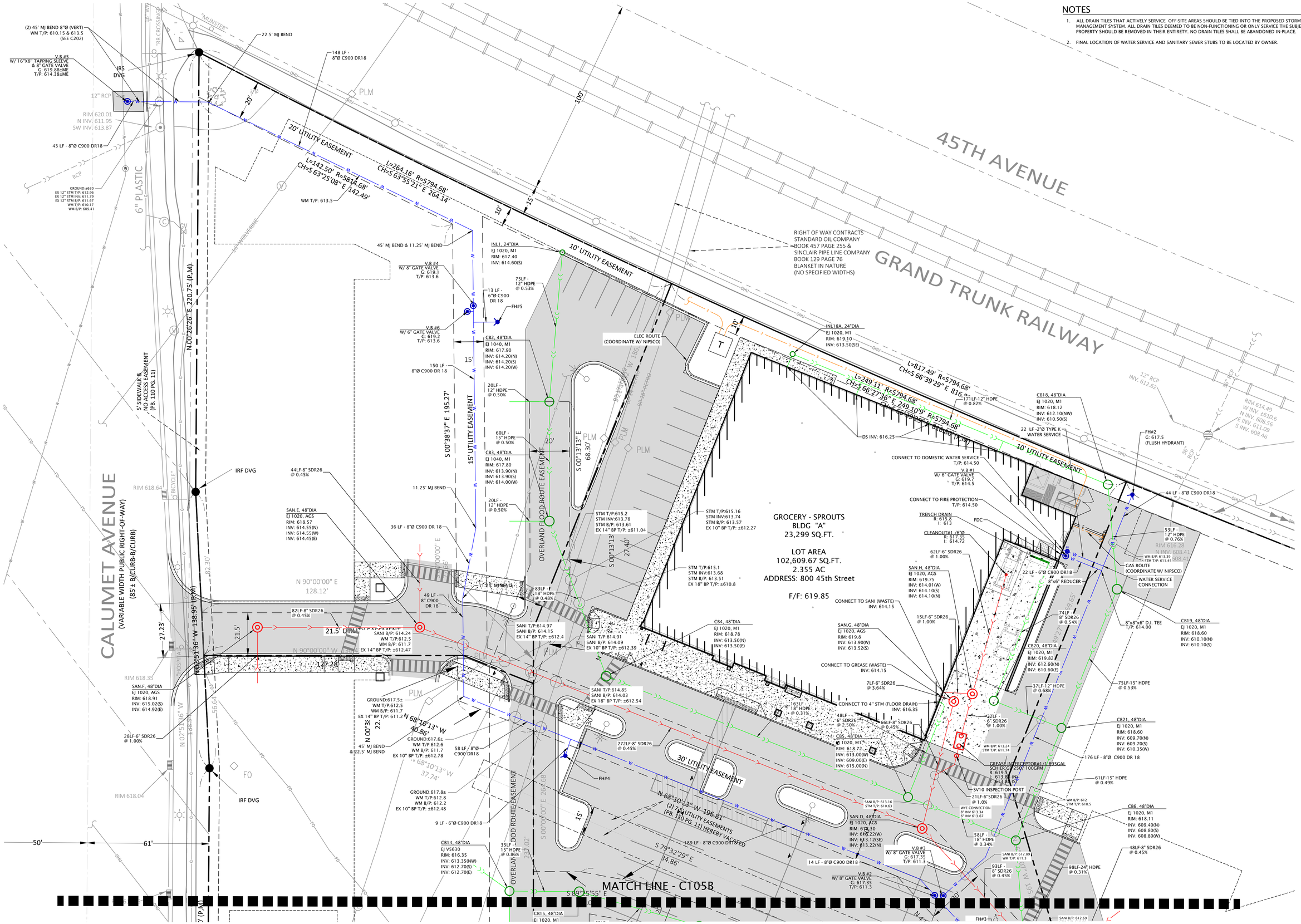
25-0081	

C104.B


CALUMET AVENUE
(VARIABLE WIDTH PUBLIC RIGHT-OF-WAY)
(R57 & R1008-B/CURB-B/CURB)
45TH STREET
45TH AVENUE
GRAND TRUNK RAILWAY
CENTENNIAL VILLAGE
SECOND RESUBDIVISION
OF LOT "A"
(PLAT BOOK 114 PAGE 87)
CENTENNIAL VILLAGE
THIRD RESUBDIVISION
OF LOT "A"
(PLAT BOOK 117, PAGE 60)
BANK BLDG. "A.1" 4,270 SQ.FT.
LOT AREA 40,562.30 SQ.FT.
(0.931 AC)
ADDRESS: 9521 Calumet Ave
F.F. 619.5
SINGLE STORY RETAIL BLDG "A.2"
9,856 SQ.FT.
LOT AREA
51,288.59 SQ.FT.(1.176 AC)
ADDRESS: 9511 Calumet Ave
GROCERY: SPROUTS
BLDG. "B"
21,339 SQ.FT.
LOT AREA
105,255.42 SQ.FT.
2.355 AC
ADDRESS: 800 45th Street
F.F. 619.85
2- STORY OFFICE
BLDG. "C"
14,400 SQ.FT
(28,800 SQ.FT TOTAL)
LOT AREA
87,781.55 SQ.FT.
2.015 AC
ADDRESS: 900 45th Street
OVERLAND FLOOD ROUTE EASEMENT
15' UTILITY EASEMENT
24' ACCESS EASEMENT
6" PLASTIC
8" PVC
12" DUCTILE IRON
TOWN OF MERRILLVILLE
TAX ID: 45-07-30-352-001.000-027
GRANTEE: BRIGHTSPEED
DOC. NO. 2020-03105
REC. 01/04/2020
TOWN OF MERRILLVILLE
TAX ID: 45-07-30-351-003.000-027
GRANTEE: BRIGHTSPEED
DOC. NO. 2021-02745
REC. 03/30/2021
TOWN OF MERRILLVILLE
DOC. NO. 2015-080580
REC. 12/22/2015
TOWN OF MERRILLVILLE
DOC. NO. 2021-043189
REC. 12/20/2021
TOWN OF MERRILLVILLE
DOC. NO. 2017-013500 REC. 2/23/2017
TAX ID: 45-07-30-352-001.000-027
GRANTEE: BRIGHTSPEED
DOC. NO. 2020-00364
REC. 2/28/2020
TAX ID: 45-07-30-352-001.000-027
GRANTEE: BRIGHTSPEED
DOC. NO. 2020-00364
REC. 2/28/2020
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10
LOT 11
S 00°38'37" E 195.27'
N 00°00'00" E 15.73'
S 00°13'13" E 68.30'
S 00°13'13" E 27.40'
S 89°45'59" E 32.50' (M)
S 89°45'59" E 533.9' (M&P)
N 89°45'59" W 538.99' (M&P)
N 89°45'59" W 538.99' (M&P)
N 00°38'37" W 195.27' (P.M)
N 00°38'37" W 195.27' (P.M)
N 00°38'37" W 195.27' (P.M)
N 00°38'37" W 195.27' (P.M)
S 00°38'37" E 195.27'
S 00°13'13" E 68.30'
S 00°13'13" E 27.40'
S 89°45'59" E 32.50' (M)
S 89°45'59" E 533.9' (M&P)
N 89°45'59" W 538.99' (M&P)
N 89°45'59" W 538.99' (M&P)
N 00°38'37" W 195.27' (P.M)
N 00°38'37" W 195.27' (P.M)
N 00°00'00" E 15.73'
N 00°00'00" E 15.73'
S 00°13'13" E 274.38'
S 00°13'13" E 274.38

NOTES

1. ALL DRAIN TILES THAT ACTIVELY SERVICE OFF-SITE AREAS SHOULD BE TIED INTO THE PROPOSED STORMWATER MANAGEMENT SYSTEM. ALL DRAIN TILES DEEMED TO BE NON-FUNCTIONING OR ONLY SERVICE THE SUBJECT PROPERTY SHOULD BE REMOVED IN THEIR ENTIRETY. NO DRAIN TILES SHALL BE ABANDONED IN-PLACE.
2. FINAL LOCATION OF WATER SERVICE AND SANITARY SEWER STUBS TO BE LOCATED BY OWNER.



DVG TEAM INC

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FOR CONSTRUCTION
RUSSELL JACOB POZEN
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
09/16/25

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts
Utility Plan Sprouts

NOT FOR CONSTRUCTION

SCALE: 1" = 20'

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PROJECT NO.
25-0081

C105.A

NOTES

1. ALL DRAIN TILES THAT ACTIVELY SERVICE OFF-SITE AREAS SHOULD BE TIED INTO THE PROPOSED STORMWATER MANAGEMENT SYSTEM. ALL DRAIN TILES DEEMED TO BE NON-FUNCTIONING OR ONLY SERVICE THE SUBJECT PROPERTY SHOULD BE REMOVED IN THEIR ENTIRETY. NO DRAIN TILES SHALL BE ABANDONED IN-PLACE.
2. FINAL LOCATION OF WATER SERVICE AND SANITARY SEWER STUBS TO BE LOCATED BY OWNER.

MATCH LINE - C105A

45TH STREET
(100' WIDTH PER DOC. NO. 2015 085405)

OVERLAND FLOOD ROUTE EASEMENT

30' UTILITY EASEMENT (PB. 110 PG. 11)

TOWN OF MUNSTER
DOC. NO. 2015 085405
REC. 12/21/2015

TOWN OF MUNSTER
PARCEL "MS 3"
DOC. NO. 2017 011300
REC. 2/23/2017

LOT 6
TAX ID. 45-07-30-352-012.000-027
CV BDG B, LLC
QUIT CLAIM DEED
DOC. NO. 2020 033105
REC. 6/04/2020

LOT 7
TAX ID. 45-07-30-352-013.000-027
CV BDG F LLC
QUITCLAIM DEED
DOC. NO. 2023-027145
REC. 9/19/2023

CENTENNIAL VILLAGE
SECOND RESUBDIVISION
OF LOT "A"
(PLAT BOOK 111, PAGE 87)

LOT 13
40,558 S.F.±
0.93 Ac.±
(9521 CALUMET AVENUE)

SITE BENCHMARK
SAW CUT CROSS
ELEV=618.59 (NAVD88)

C1 INFORMATION
L=41.23' R=670.00'
S 85°53'39" W 41.23'

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FOR CONSTRUCTION

09/16/25

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Centennial Village - Lot 11
Bldg. A-Sprouts
Utility Plan Sprouts

SCALE: 1" = 20'

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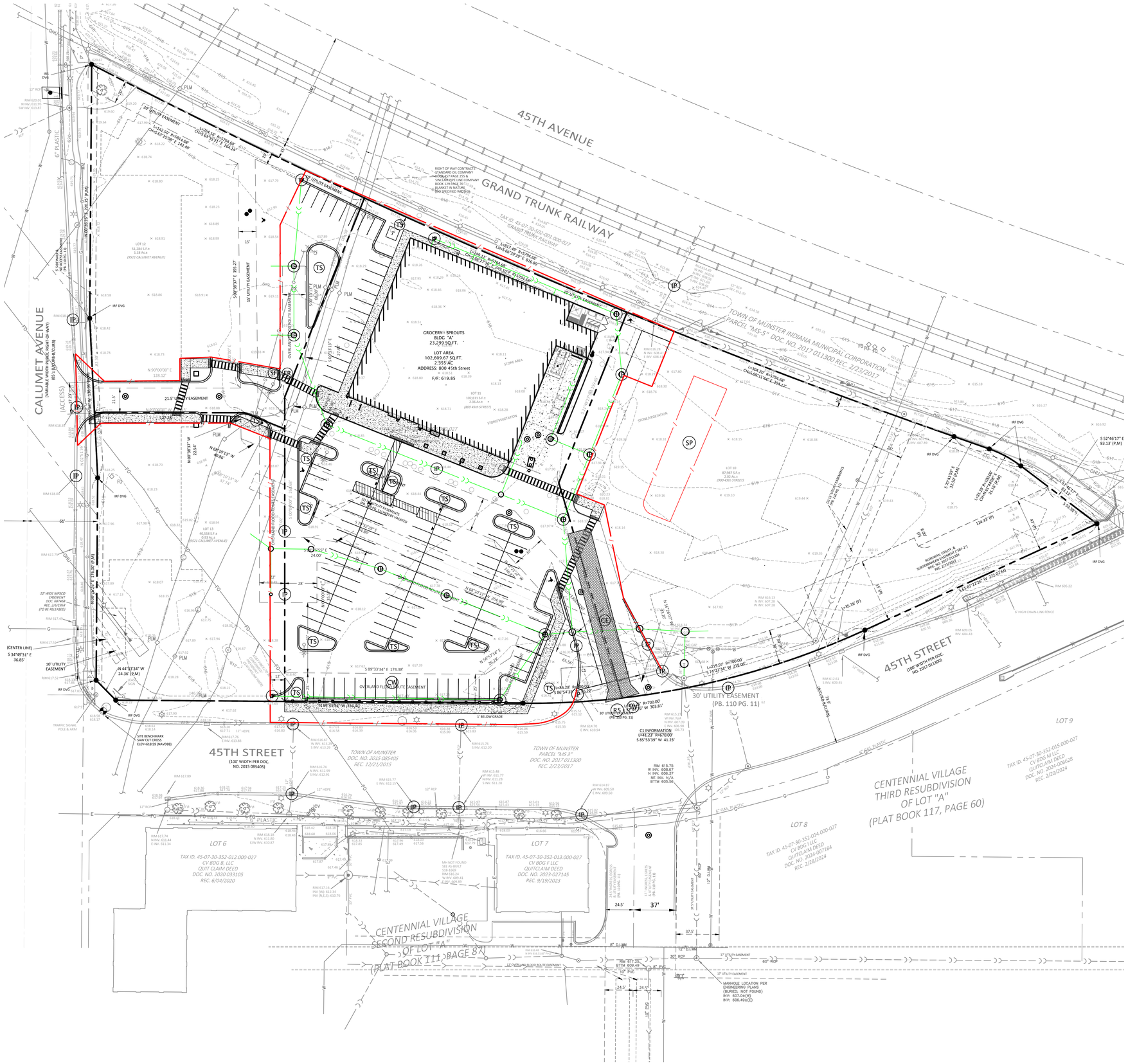

NOTES

1. THE SITE CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN DURING DEMOLITION AND CONSTRUCTION ACTIVITIES. MEASURES MUST BE IMPLEMENTED PRIOR TO BEGINNING CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE AND/OR CLEANING TO THE STRUCTURE OR FEATURE. CORRECTIVE WORK INCURRED BY THE CONTRACTOR SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
3. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH THE S.W.P.P.P. ANY FINES OR PUNITIVE MEASURES INCURRED BY THE PROJECT DUE TO FAILURE TO COMPLY WITH THE S.W.P.P.P. ARE THE RESPONSIBILITY OF THE CONTRACTOR. THESE COSTS SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT AND SHALL NOT BE CONSIDERED AN EXTRA.
4. DURING THE COURSE OF CONSTRUCTION, THE LOCAL ENFORCEMENT OF THE S.W.P.P.P. MAY REQUIRE ADDITIONAL EROSION CONTROL MEASURES TO BE INSTALLED TO ADDRESS SITE-SPECIFIC ITEMS NOT ANTICIPATED BY THIS PLAN. THESE ITEMS ARE CONSIDERED AN EXTRA TO THE CONTRACT, BUT ONLY TO THE EXTENT OF INITIAL INSTALLATION. CORRECTIVE WORK AND MAINTENANCE SHALL BE CONSIDERED INCIDENTAL AND SHALL NOT BE CONSIDERED AN EXTRA.
5. THE SITE CONTRACTOR SHALL INSTALL THE CONSTRUCTION ENTRANCE AND PLACE PERIMETER SILT FENCING/FIBER ROLLS AND INLET PROTECTION ON EXISTING STRUCTURES PRIOR TO COMMENCING ANY SOIL DISTURBANCE. SEE SITE PLAN FOR LOCATIONS. THE CONSTRUCTION ENTRANCE SHALL SERVE AS SITE ACCESS FOR ALL CONSTRUCTION TRAFFIC INGRESS AND EGRESS TO THE PROJECT SITE.
6. THE SOIL STOCKPILE SHALL BE PROTECTED BY SILT FENCE/FIBER ROLLS SURROUNDING THE PILE AND THE PILE SHALL BE TEMPORARILY SEEDED IF THE STOCKPILE REMAINS DORMANT FOR GREATER THAN 7 DAYS. THE PILE SHALL BE STABILIZED WITHIN 14 DAYS.
7. DURING SOIL-DISTURBING ACTIVITIES, THE CONTRACTOR SHALL CREATE DIVERSION SWALES AND INSTALL DITCH CHECKS SO THAT ALL SITE RUNOFF PASSES THROUGH AN EROSION CONTROL MEASURE PRIOR TO BEING DISCHARGED OFF-SITE.
8. UPON COMPLETION OF THE ROUGH GRADING, ALL AREAS AFFECTED BY CONSTRUCTION SHALL BE TEMPORARILY SEEDED IF THEY WILL REMAIN DORMANT FOR GREATER THAN 7 DAYS. THESE AREAS SHALL BE STABILIZED WITHIN 14 DAYS OF REMAINING DORMANT AND EROSION CONTROL BLANKETS SHALL BE INSTALLED ON SIDE SLOPES AS SHOWN ON THE PLANS.
9. CONTRACTOR SHALL PERFORM STREET SWEEPING WHENEVER TRACKING OF MUD, DIRT, AND CONSTRUCTION DEBRIS OCCURS ON THE PUBLIC ROAD.

LEGEND

CE	TEMPORARY CONSTRUCTION ENTRANCE	SW	STREET SWEEPING
IP	INLET BARRIER PROTECTION	CW	CONCRETE WASHOUT
TS	TEMPORARY/PERMANENT SEEDING	RS	BUILDING & STORMWATER PERMITS
SF FR	SILT FENCE/FIBER ROLLS (MAY BE USED INTERCHANGABLY WHERE REQUIRED)	SP	STOCKPILE

CONCRETE WASHOUT ONLY

CONCRETE WASHOUT SIGNAGE

TOTAL DISTURBANCE AREA = 3.06 ac

DVG TEAM INC
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Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION

RUSSELL JACOB POZEN
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER

09/16/25

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 11
Bldg. A-Sprouts
Storm Water Pollution Prevention Plan

N

0' 20' 40'
SCALE: 1" = 40'

NOT FOR CONSTRUCTION

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DESIGN BY	DATE
GMPF	09/16/25
PROJECT NO.	
25-0081	
C106	

SITE DEVELOPMENT
COMMON EXCAVATION AND EARTHWORK
GENERAL SPECIFICATIONS

A Geological Investigation report by the OWNER shall be considered a part of this plan set.

1.0 Quality Assurance:
1. Contractor shall notify the Construction Manager, Architect, Engineer and testing laboratory inspector when common excavation and earthwork is scheduled. Earthwork operations which require inspecting and testing by testing laboratory inspector shall not be performed unless testing laboratory inspector is present.
2. Contractor shall provide a 1-year warranty against settlement and damage caused by settlement for common excavation and earthwork.
3. If settlement occurs within 1 year after the date of Substantial Completion, the Contractor shall remove the affected surface feature, provide additional suitable fill, thoroughly compact and restore the surface feature to its original undisturbed condition.

2.0 Testing:
1. An inspector from the Owner's soils testing laboratory shall, during the common excavation work operations, provide the following services:
   a. Test & Classify on-site excavated soils for reuse as topsoil, common site fill, embankment fill and structural fill.
   b. Test materials furnished from any off-site sources to verify compliance with specified requirements.
   c. Observe proofing rolling of exposed subsoil in areas where grades will be raised and provide recommendations for soil correction to ensure that unstable materials have been removed.
   d. Inspect placement and compaction of common site fill, embankment fill and structural fill to ensure the material being compacted is in accordance with specified requirements. For each lift, a minimum of 1 density test for every 10,000 square feet of lawn surface area, and 5,000 square feet of paved surface area, and 500 square feet of proposed building area is required.
   e. Density tests are required for all subgrade/subsoil in areas that have been cut to rough grade elevations, after soils have been compacted to ensure soil compaction density is in accordance with the specified requirements. Test frequency shall be as described above in sub-paragraph 1.d..
2. Tests and analysis of fill materials shall be performed in the laboratory in accordance with ASTM D1557.
3. Testing shall be performed as directed by the Soils Report Engineer. Compaction Testing shall be performed in accordance with ASTM D2922 and D3017.

3.0 Special Weather Protection:
1. Construction shall be limited during cold weather to prevent the formation of frost and snow accumulation to occur in materials used for site fill or in soils where site excavation is taking place. All areas that are scheduled for excavation activity shall be protected from freezing and snow accumulation. Any frozen material shall be removed and disposed of off site.

4.0 Clearing & Grubbing:
1. Contractor shall provide all clearing, grubbing, removal and disposal of all vegetation and debris related to the existing site conditions.
2. Vegetation debris shall be removed from site and transported to a local and state authorized disposal sites.

5.0 Top Soil Stripping:
1. The project has a depth of topsoil variation throughout the site. The geotechnical report shows the topsoil depths at several locations throughout the project site. The Contractor shall strip and stockpile all topsoil at the location designated in the Site Development Drawings or as directed by the owner.
2. Topsoil removal material shall consist of fertile, friable, organic surface soil stripped from the site and shall be free of subsoil, brush, turf grasses, weeds, roots, stumps, stones larger than 1-inch in diameter and other contaminated matter."
3. Topsoil shall be stockpiled so that it may be reused and re-spread on site over Lawn and Landscaped areas.
4. The topsoil stockpile area shall be properly protected against soil erosion into the adjacent drainage system.

6.0 Borrow Material/Embankment & Structural Fill Material:
1. Borrow material for structural fill shall be first excavated from on site source locations as defined by the Soils Report Engineer.
2. Structural fill material shall be placed under all utility trench corridors, building pad locations, paved parking, driveway, sidewalk and roadway areas.
3. Common site and embankment fill shall be placed under lawn, landscape and detention pond areas.
4. Maintain moisture content of structural fill within plus or minus 3 percent of the optimum moisture content as determined by the Modified Proctor Test.
5. Contractor shall provide subgrade conditions meeting the design grades for pavements, exterior walks, curbs and building pads.
6. Contractor shall only place approved fill material under proposed building pads and parking areas
7. Contractor shall undercut any areas that do not meet the requirements for structural fill and shall replace with structural fill.

7.0 Excavation:
1. Protect all existing natural features on site.
2. Install soil erosion prevention measures in accordance with local and state ordinances and in accordance with the soil erosion control project drawings.
3. All proposed contours shown on this set of plans are proposed surface elevation. All fill shall be placed as structural fill for buildings and parking lots.
4. Prior to excavation an on-site Pre-construction Meeting shall be held between the Engineer, Owner/Owner's Representative and General Contractor to discuss earthwork protocol.
5. During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if ordinarily encountered at the site, the party discovering such conditions shall promptly notify the Owner/Owner's Representative/General Contractor and the Engineer in writing of the specific differing conditions. Upon written notification, the Engineer and Owner/Owner's Representative/General Contractor will investigate the conditions, and determine if adjustments to the Construction Documents and/or to the Contract are warranted. No contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice of a changed condition.

8.0 Compaction:
1. Exercise care when compacting exposed soils relative to water table, rain or other moisture conditions.
2. Maintain moisture content of embankment material and structural fill material near optimum as recommended by the soils testing laboratory and Soil Boring Engineer. Maintain optimum moisture content of backfill and fill material to attain the required compaction density.
3. Backfill common site fill, embankment fill, structural fill and utility trenches to contours and elevations defined on the project site development plans.
4. Systematically backfill to allow maximum time for optimum compaction and do not backfill over porous, wet or spongy subgrade surfaces.
5. Employ a soils placement and compaction method that does not disturb or damage work performed and that maximizes soil compaction.
6. All common site, embankment and structural fill shall be place and compacted in continuous layers/lifts not exceeding 8-inches loose depth.
7. Compact subsoil for structural fill to 95% of the Modified Proctor Maximum Dry Density (ASTM D1557) beneath all building pad locations.
8. Compact subsoil for structural fill to 95% of Modified Proctor Maximum Dry Density (ASTM D1557) beneath all pavement areas and utility corridor trenches.
9. Compact subsoil for common site fill and embankment fill to 90% of the Modified Proctor Maximum Dry Density (ASTM D1557) beneath all lawn, landscape and detention pond areas.
10. Compact subsoil under building pad area to achieve soil-bearing capacities of 3,000 psf at a distance of 4-feet below the proposed finish floor elevations of all building ads.
11. If tests indicated work does not meet specified requirements, all sub-standard work shall be immediately removed, replaced and retested at no expense to the Owner.

GENERAL NOTES

1. Town of Munster, DVG Team, Inc. (Engineer) and any Utility Company affected must be notified at least two working days prior to commencement of work. Prior to construction the contractor is to call INDIANA 811.

2. Elevation Datum is U.S.G.S.

4. The locations of existing underground utilities, such as water mains, sewer, gas lines, etc., as shown on the plans have been determined from the best available information and is given for the convenience of the contractor. However, the engineer and the owner do not assume responsibility for the accuracy of the locations shown. It shall be the responsibility of the contractor to contact all utility companies and their facilities shall be located prior to commencement of any work.

5. Wherever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that alteration in the plans is required, the engineer shall be notified prior to any changes and any changes shall only be as approved via written instruction by the Engineer and the local Municipal Engineer.

6. As-built drawings shall be prepared by the contractor and submitted to the engineer as soon as the project is completed. Any change in the length, location or alignment shall be shown in red. "AS BUILT" drawings shall be forwarded to the appropriate utility organizations. Four (4) copies shall be submitted to the Municipal Engineer.

7. All proposed sanitary sewer, storm sewer, water main and service lines under and within 2' of pavement, curbs, and sidewalk shall be backfilled with crushed limestone (INDOT #53) or material consistent with Class I or II material as described in ASTM D2321 placed in 8" maximum layers and mechanically compacted to 95% modified proctor density. Slag is not permitted.

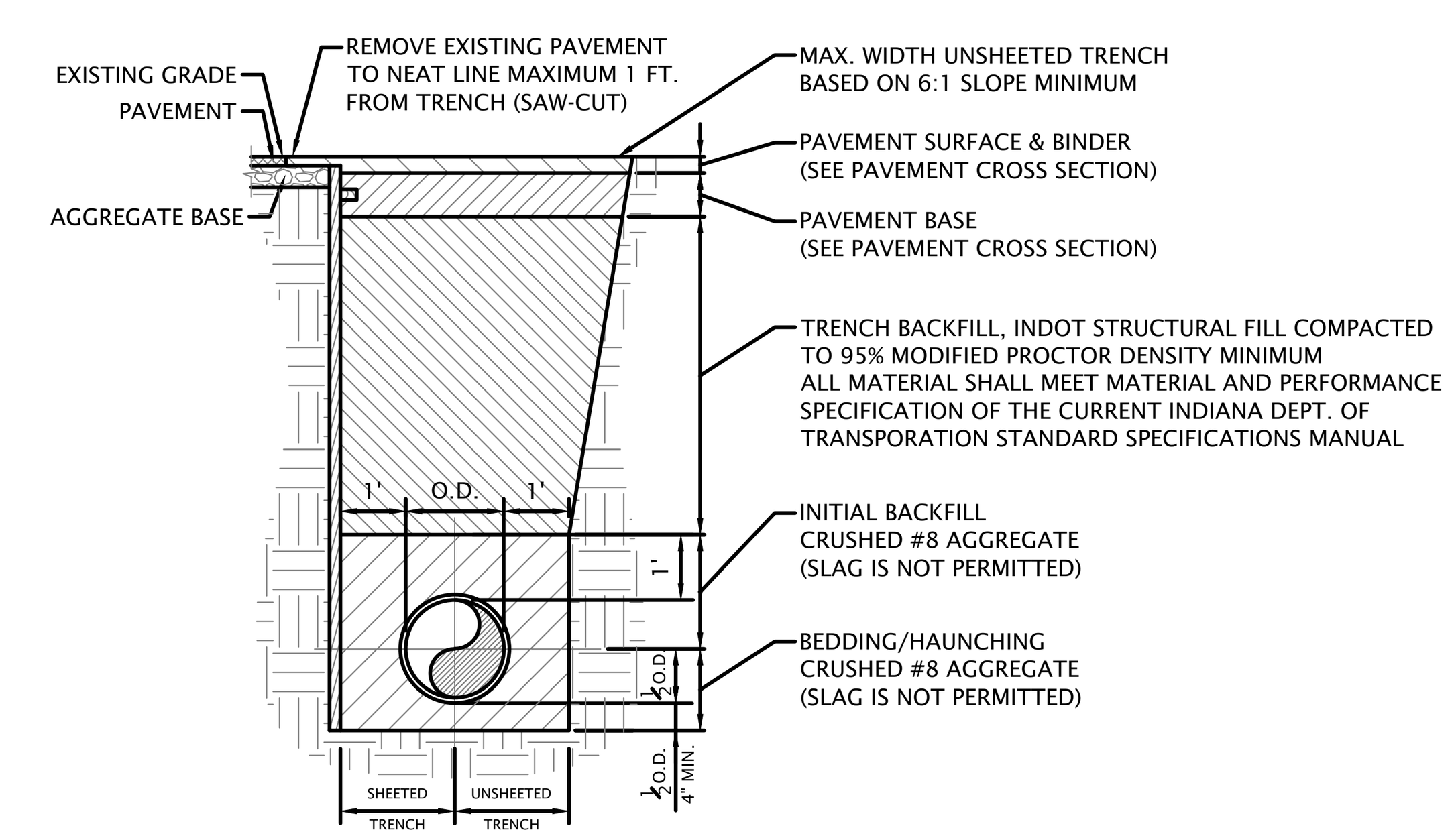
8. Materials used for water, sanitary sewer, storm sewer and streets shall conform to the Town of Munster standards and specifications.

9. Any existing public improvements (sidewalks, curb and gutter, etc.), disturbed during construction shall be replaced in kind, or per current of Town of Munster specifications as directed by the Municipal Engineer.

10. All public street construction shall meet performance standards of the current edition of the Indiana Department of Transportation Standard Specifications.

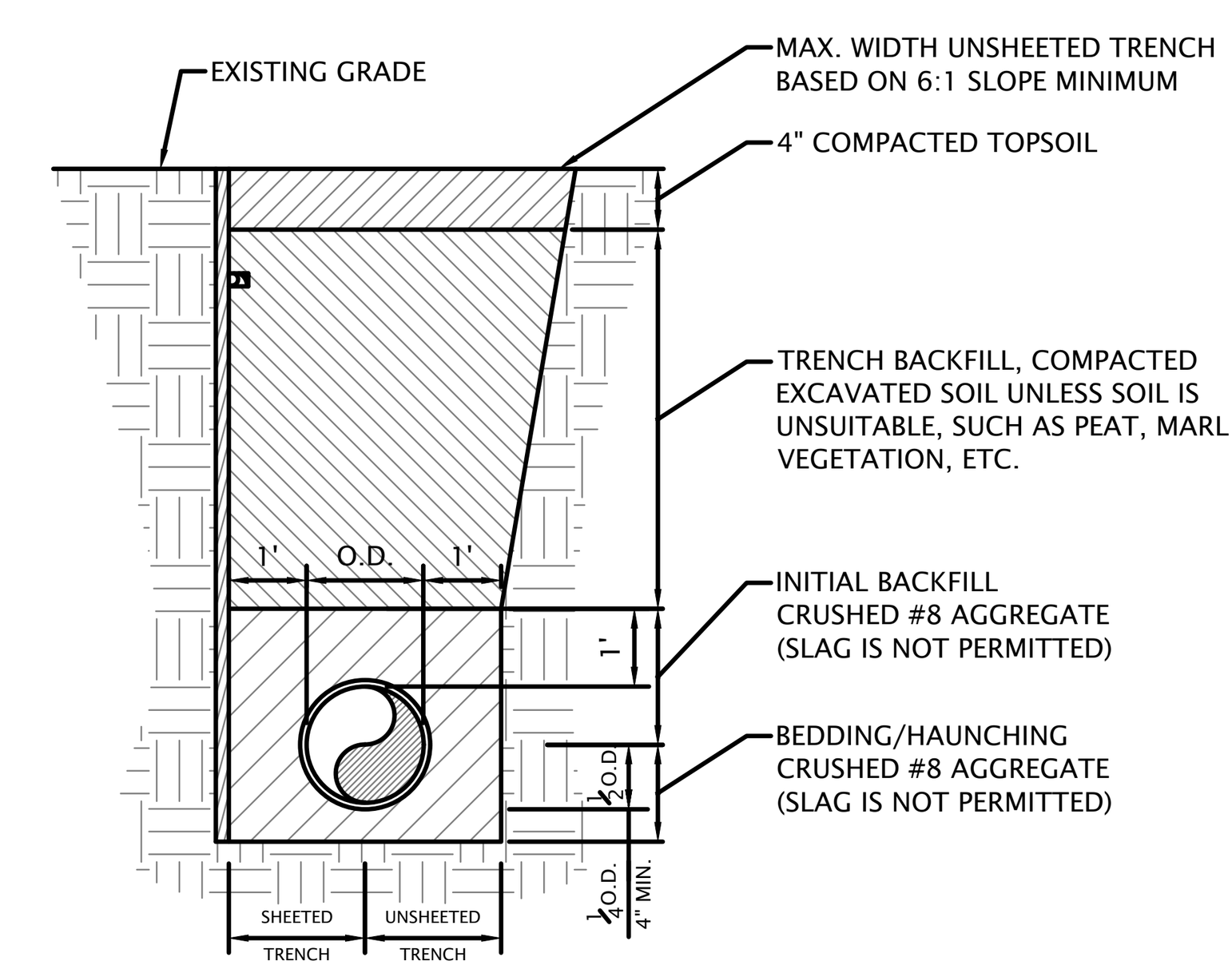
11. Street signage shall be included in accordance with the MUTCD requirements applicable at the time of construction.

12. The Owner/General Contractor shall be responsible for any and all utility new customer form submissions. Utility company review typically cannot begin until all new customer forms have been submitted.



PIPE BEDDING/TRENCH BACKFILL
(NOT TO SCALE)

FOR TRENCH IN PAVEMENT AREAS



PIPE BEDDING/TRENCH BACKFILL
(NOT TO SCALE)

FOR TRENCH IN GRASS/LANDSCAPED AREAS

SANITARY SEWER GENERAL NOTES

1. All Floor Drains shall discharge to the sanitary sewer.

2. Sanitary sewer pipe shall be PVC (SDR 26) ASTM D-3034 with push-on rubber gasket joints and shall be in accordance with ASTM C-3212, unless otherwise noted on the plans for portions to be PVC (SDR 21).

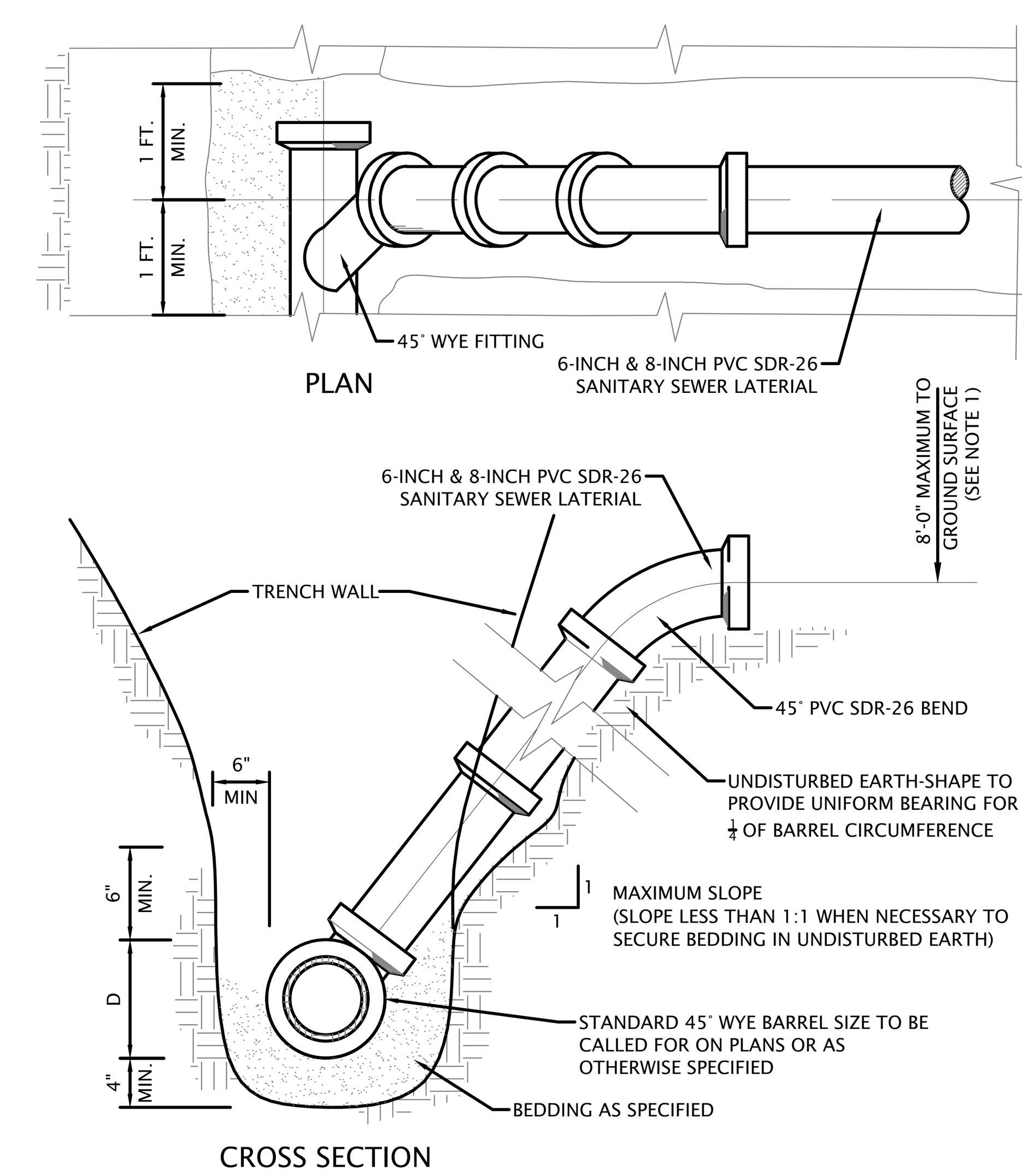
3. All sanitary sewer manholes shall be air tested for leaks in accordance with ASTM C1244-93 and Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test.

4. Where ductile iron pipe is used for sanitary sewer, the pipe shall be in accordance with ANSI A-21.51 and the joints in accordance with ANSI A-21.11.

5. A deflection test shall be performed on each flexible pipe following the elapse of thirty (30) days after the placement of the final backfill. No pipe shall exceed a deflection of five percent (5%) or greater. The diameter of the rigid ball or mandrel used for a deflection test shall be no less than ninety-five percent (95%) of the base inside diameter of the pipe to be tested dependent on what is specified in the corresponding ASTM standard. The test shall not be performed with the aid of a mechanical pulling device.

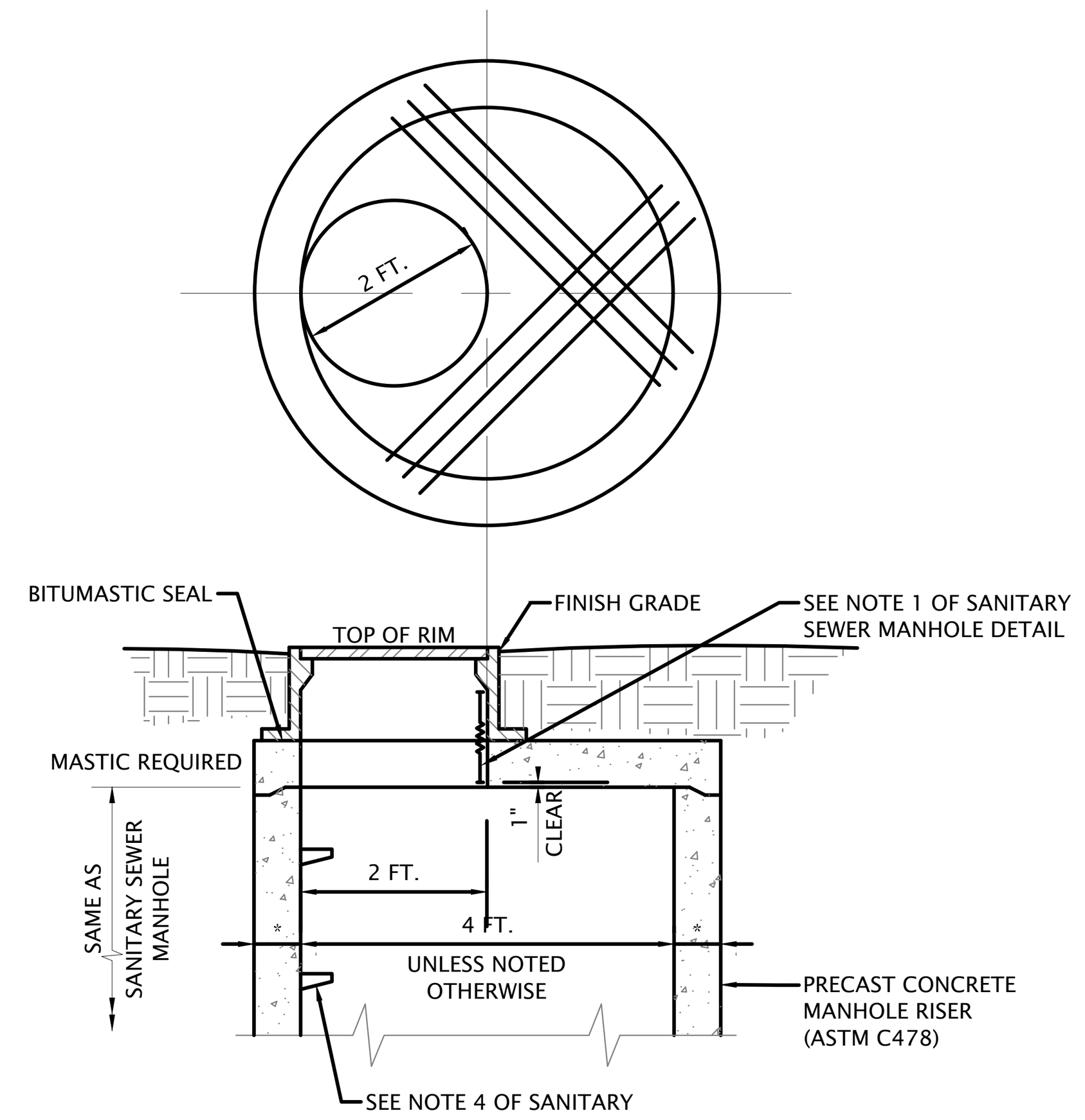
6. A leakage test shall be performed using one of the following leakage test types.
   a.) A hydrostatic test shall be performed with a minimum of two (2) feet of positive head. The rate of exfiltration or infiltration shall not exceed two hundred (200) gallons per inch of pipe diameter per linear mile per day.
   b.) An air test shall conform to ASTM F1417-92, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air, for plastic pipe.

7. All sanitary sewer shall be inspected by the Town of Munster.



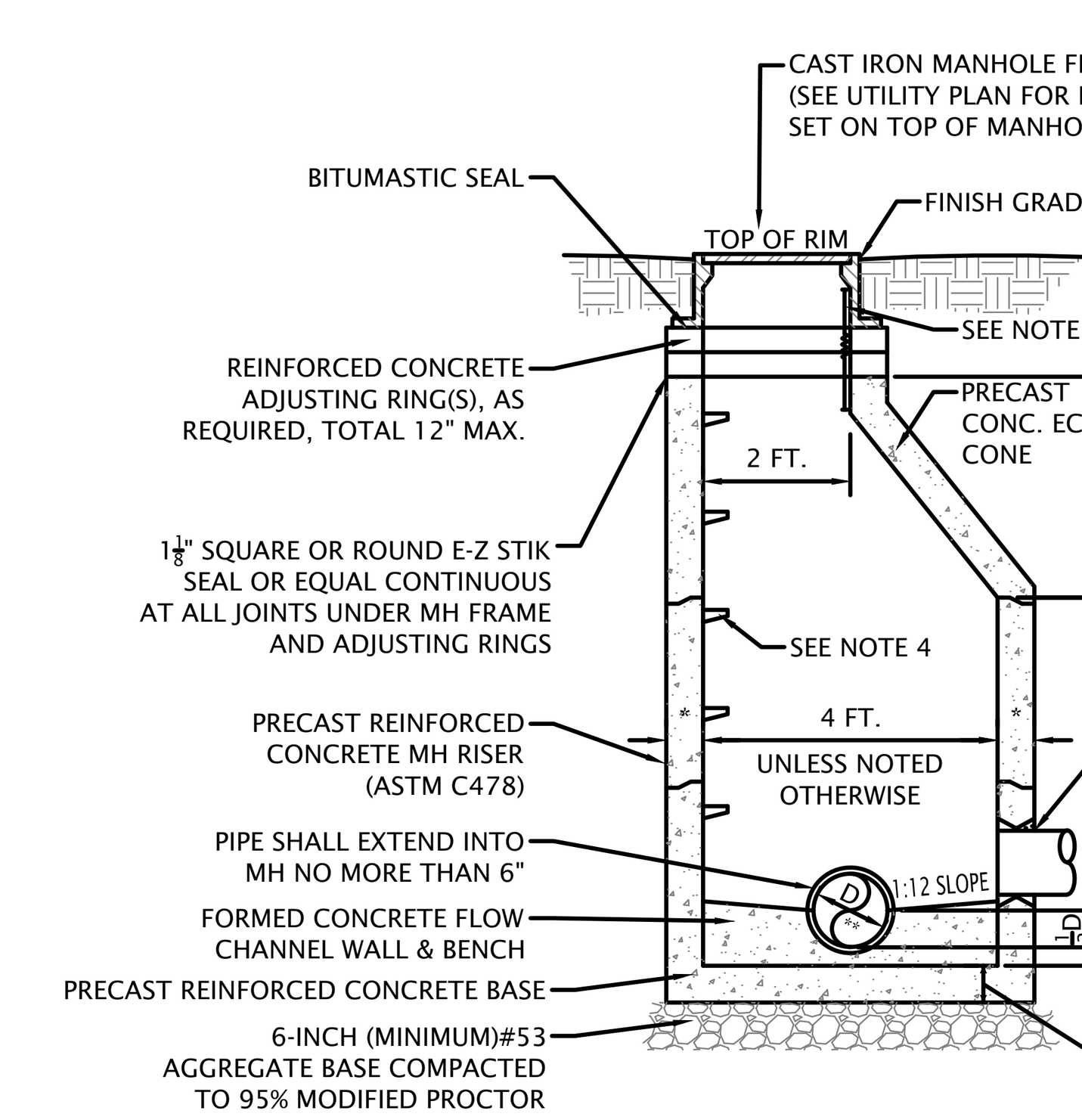
NOTES:
1. RISERS TO BE CONSTRUCTED IN LIEU OF WYES WHERE SEWER DEPTH EXCEEDS 10 FEET. FOR PIPE MATERIAL AND CONCRETE, SEE SPECIFICATIONS.
2. ALL SANITARY SEWER SERVICE LATERALS SHALL BE PLUGGED WITH A WATERTIGHT CAP AND SHALL BE LOCATED WITH 4-INCH x 4-INCH WOOD MARKERS TO IDENTIFY LATERAL END.

SANITARY SEWER SERVICE
(NOT TO SCALE)



MANHOLE TOP (FLAT TOP)
(NOT TO SCALE)

USED WHERE RESTRICTED HEAD ROOM WILL NOT ALLOW FOR TAPERED WALLS
SEE SANITARY MANHOLE NOTES



MAIN SEWER		MANHOLE
24" & UNDER (DIA.)	=	48" (DIA.)
27" TO 42" (DIA.)	=	60" (DIA.)
ABOVE 42" (DIA.)	=	AS SPEC.

FOR ALL SANITARY SEWER STRUCTURES
1. HEAVY-DUTY (WATERTIGHT) FRAME & COVER FOR TRAFFIC AREAS.
2. MEDIUM-DUTY (WATERTIGHT) FRAME & COVER FOR NON-TRAFFIC AREAS.

NOTES:
1. INTERNAL MH FRAME-CHIMNEY SEAL AS MANUFACTURED BY CRETEX SPECIALY PRODUCTS OR EQUAL REQUIRED FOR ALL MANHOLES.
2. WHERE DEPTH FROM TOP OF CASTING TO INVERT IS LESS THAN 5 FT., USE FLAT TOP MANHOLE TYPE IN LIEU OF ECCENTRIC CONE.
3. WATERTIGHT SEAL IS REQUIRED BETWEEN PRECAST RISER AND SEWER PIPE.
4. CO-POLYMER/STEEL MH STEPS AS BY M.A. INDUSTRIES OR EQUAL, AT 16" O.C. (MAX.)
5. CONTRACT UNIT PRICE FOR STRUCTURES SHALL INCLUDE THE FRAME AND GRATE SPECIFED.

** FOR PIPE SIZES RANGING FROM 8" TO 30" IN DIAMETER

* MANHOLE WALL THICKNESS TABLE

MH I.D.	WALL THICKNESS
48"	5"
60"	6"
72"	7"

SANITARY SEWER MANHOLE
(NOT TO SCALE)

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RUSSELL JACOB POZEN
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/16/2025

DATE: | REVISIONS AND NOTES:

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

CENTENNIAL VILLAGE - LOT 11
Bldg. A-Sprouts
Construction Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25

PROJECT NO.
25-0081

C201

SPECIFICATION NOTES

(1) 4" FPT inlet/ outlet with 4" plain end fittings
(2) Unit weight: 236 lbs. For wet weight, add 2,310 lbs. For traffic-rated cover(s), add 90 lbs per cover. For pedestrian cover(s), add 7 lbs per cover.
(3) Maximum operating temperature: 150º F continuous
(4) Liquid Capacity: 277 gal
Grease Capacity (100 GPM): 1,895 lbs (260 gal)
Grease Capacity (200 GPM): 1,196 lbs (164 gal)
Solids Capacity: 69 gal
(5) This unit doesn not require flow control for 100 GPM applications, but a built in flow control is provided for 200 GPM; for series installations only install flow control on the first unit if necessary
(6) For gravity drainage applications only
(7) Do not use for pressure applications
(8) Cover placement allows full access to tank for proper maintenance
(9) Vent not required unless per local code
(10) Engineered inlet and outlet diffusers with inspection ports are removable to inspect / clean piping
(11) Integral air relief / Anti-siphon / Sampling access
(12) Cover adapters provide an adjustable height range of 5"
(13) Designed for below-grade, above-grade, indoor or outdoor installations
(14) Safety Star® (450 lbs load capacity) is an access restrictor built into each cover adapter to prevent accidental entry into tanks

CERTIFIED PERFORMANCE

Great Basin® hydromechanical grease interceptors are third party performance-tested and listed by IAPMO to ASME A112.14.3 and CSA B481.1 grease interceptor standards and greatly exceed requirements for grease separation and storage. They are compliant to the Uniform Plumbing Code and the International Plumbing Code.

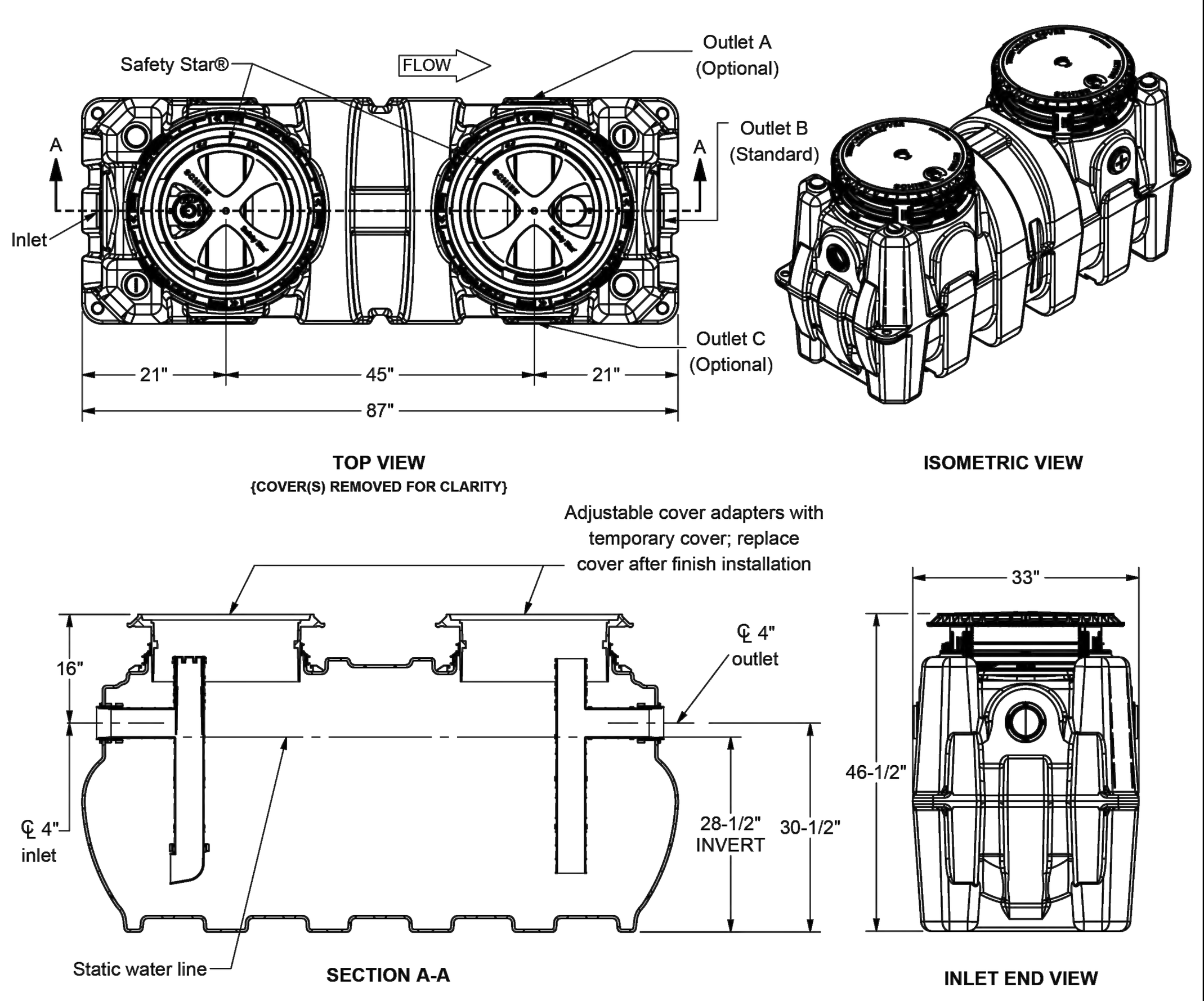
ENGINEER SPECIFICATION GUIDE

Schier Great Basin® grease interceptor model GB-250 shall be lifetime guaranteed and made in USA of seamless, molded polyethylene with minimum 3/8" uniform wall thickness. Interceptor shall be furnished for above or below-grade installation with adjustable cover adapter, Safety Star® access restrictor built into each cover adapter, and built in flow control (for 200GPM only) and three outlet options. This unit is certified for hydromechanical performance to ASME A112.14.3 (Type D for 100 GPM and Type C for 200 GPM) and CSA B481.1. Interceptor flow rate shall be 100 GPM or 200GPM. Interceptor grease capacity shall be 1,895 lbs @100 GPM or 1,196 lbs @200 GPM.

COVERS SOLD SEPARATELY

This unit is provided with temporary cover(s) intended for the duration of jobsite installation. Purchase one of the following finish covers.

- T24-GI (8044-000-01): Traffic-rated cast iron cover shall provide water/gas-tight seal and have a minimum of 16,000 lbs load capacity. For outdoor installation.
- P24-GI (8045-000-01): Pedestrian-rated poly cover shall provide water/gas-tight seal and have a minimum of 2,000 lbs load capacity. For indoor installation.



SPECIFICATION SHEET

SCHIER 6455 Woodland Dr Shawnee, KS 66218 tel: 913-951-3300 fax: 913-951-3399 schierproducts.com Made in the U.S.A.		
MODEL NUMBER	GB-250	
PART NUMBER	4055-300-01	
DESCRIPTION	GB-250 GREASE INTERCEPTOR 100 GPM / 200 GPM, 4" PLAIN/FPT CONNECTIONS	
DRAWN BY	C.FINCHAM	
DATE	05/15/2025	REV A / ECO 00104

UPC ® C UPC ®

PROPRIETARY AND CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SCHIER PRODUCTS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SCHIER PRODUCTS IS PROHIBITED.

GREASE INTERCEPTOR DETAIL

(NOT TO SCALE)

NOTES

1. *4" plain end inlet/outlet*
2. *Field modifiable to 6" plain end inlet/outlet*
3. *Unit weight - 9 lbs.*
4. *Maximum operating temperature: 150º F continuous*
5. *Offset connections*
6. *2 rolls of 33" x 2" butyl mastic tape provided for sealing build-your-own riser joints*

ENGINEER SPECIFICATION GUIDE

Schier Sewer Viewer™ sampling port model # SV10 shall be lifetime guaranteed and made in USA of seamless, rotationally-molded polyethylene. Sampling port shall be furnished for above or below grade installation. Cover shall provide water/gas-tight seal and have minimum 16,000 lbs. load capacity.

ACCESSORIES:

• Field Cut Risers for extending cover to grade

NOTES

1. *Unit weight: 6 lbs*
2. *Riser not designed to hold water*

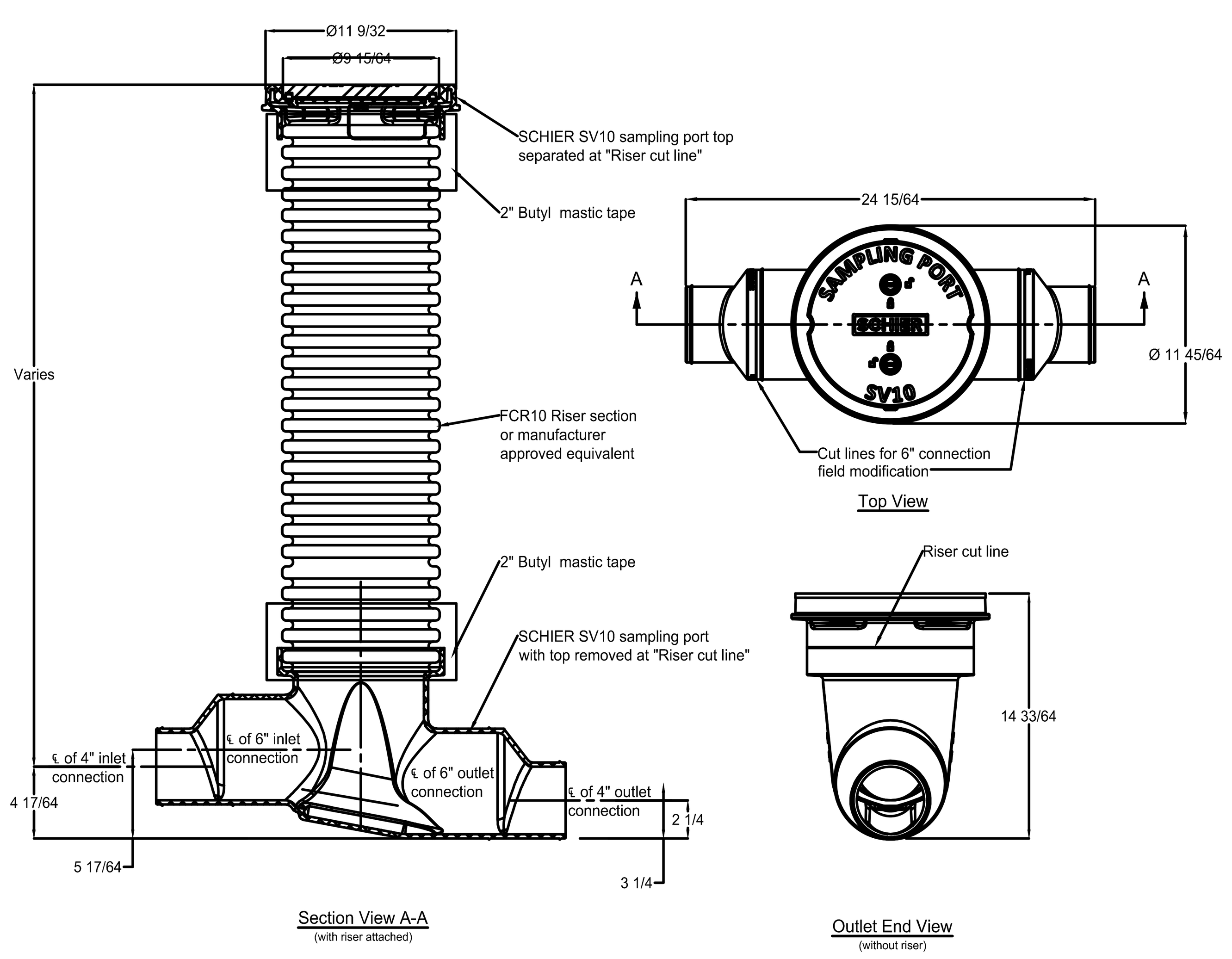
ENGINEER SPECIFICATION GUIDE

Field-cut adjustable riser system to consist of 8" nominal diameter polyethylene corrugated drainage pipe and coupling, and a butyl mastic tape for riser joints. Riser shall allow field adjustability of cover to grade.

INSTALLATION NOTE

Riser system may be stacked no more than three units high to a maximum of 97" extension.

RISER HEIGHT NEEDED	RISERS REQUIRED
0" - 31"	FCR10
>31" - 64"	FCR10 (x2)
>64" - 97"	FCR10 (x3)



SAMPLING PORT DETAIL

(NOT TO SCALE)

NOTES:

1. SAMPLING PORT SHALL BE SCHIER SV10 AS SHOWN ABOVE OR APPROVED EQUAL.

WATERMAIN GENERAL NOTES

1. All water mains, fittings, and valves shall be ductile iron cement lined pressure class 350 with rubber gasket push-on joints in accordance with ANSI A-21.51 & AWWA C 151 and be Polyethylene Encased per IAC 8-3.2-8. Water main joints shall conform to the requirements of AWWA C 111. Mechanical joints shall be restrained and shall use Meg-A-Lug as manufactured by EBAA Iron Sales (or equal). Watermain may be PVC C900, DR 18 only if noted on the plans.

2. Water mains shall be laid at least 10' horizontally from any existing or proposed sanitary sewer, storm sewer, sewer manhole, drain or service connection as measured from outside edge of the water main to outside edge of the sewers or manhole. If local conditions prevent horizontal separation of 10 feet, then the SEWER SHALL BE CONSTRUCTED OF WATER MAIN QUALITY REQUIREMENTS as specified in the IAC 8-3.2 Sections 8, 9 and 17(a).

3. When water mains cross any existing or proposed sanitary or storm sewers (sewers), there shall be at least 18 inches vertical separation between the outside edge of the water main and the outside edge of the sewer. This shall be the case where water mains cross above or below sewers. This crossing must be at a minimum angle of forty-five (45) degrees measured from the centerline of each. All these conditions specified shall be maintained for a minimum distance of ten (10) feet from either side of the water main. If vertical separation specified herein cannot be met, then the SEWER SHALL BE CONSTRUCTED OF WATER MAIN QUALITY REQUIREMENTS as specified in the IAC 8-3.2 Sections 8, 9 and 17(a).

4. For additional separation requirements between water mains and sewers, the Contractor shall refer to the Indiana Administrative Code 327 IAC 8 and IAC 3.

5. All water main shall be installed in accordance with IAC 8-3.2-17. The contractor shall provide pressure and leak testing results conforming to IAC 8-3.2-17(a).

6. All water main shall be disinfected in accordance with IAC 8-3.2-18.

7. Restraints of PVC pipe shall be provided using Series 1500 Bell Retainers with Type 316 Stainless STELL Bolts, as manufactured by Ebba Iron Sales Co. The glands shall be the Wedge Action Mega Lug gland for use on PVC pipe as manufactured by Ebba Iron Sales Co.

8. A #8 Gauge insulatred copper tracer wire shall be installed with both the main line piping nad all service piping regardless of size and/or type of pipe used. The tracer wire shall be terminated at each hydrant assembly approximately 2 inches above grade with 3 wraps around the hydrant.

9. All joint restraint systems using bolts shall use Type 316 Stainless Steel Bolts and shall be approved prior to use by the Director of Operations Town of Munster.

RESTRAINED PIPE LENGTH
(FEET)

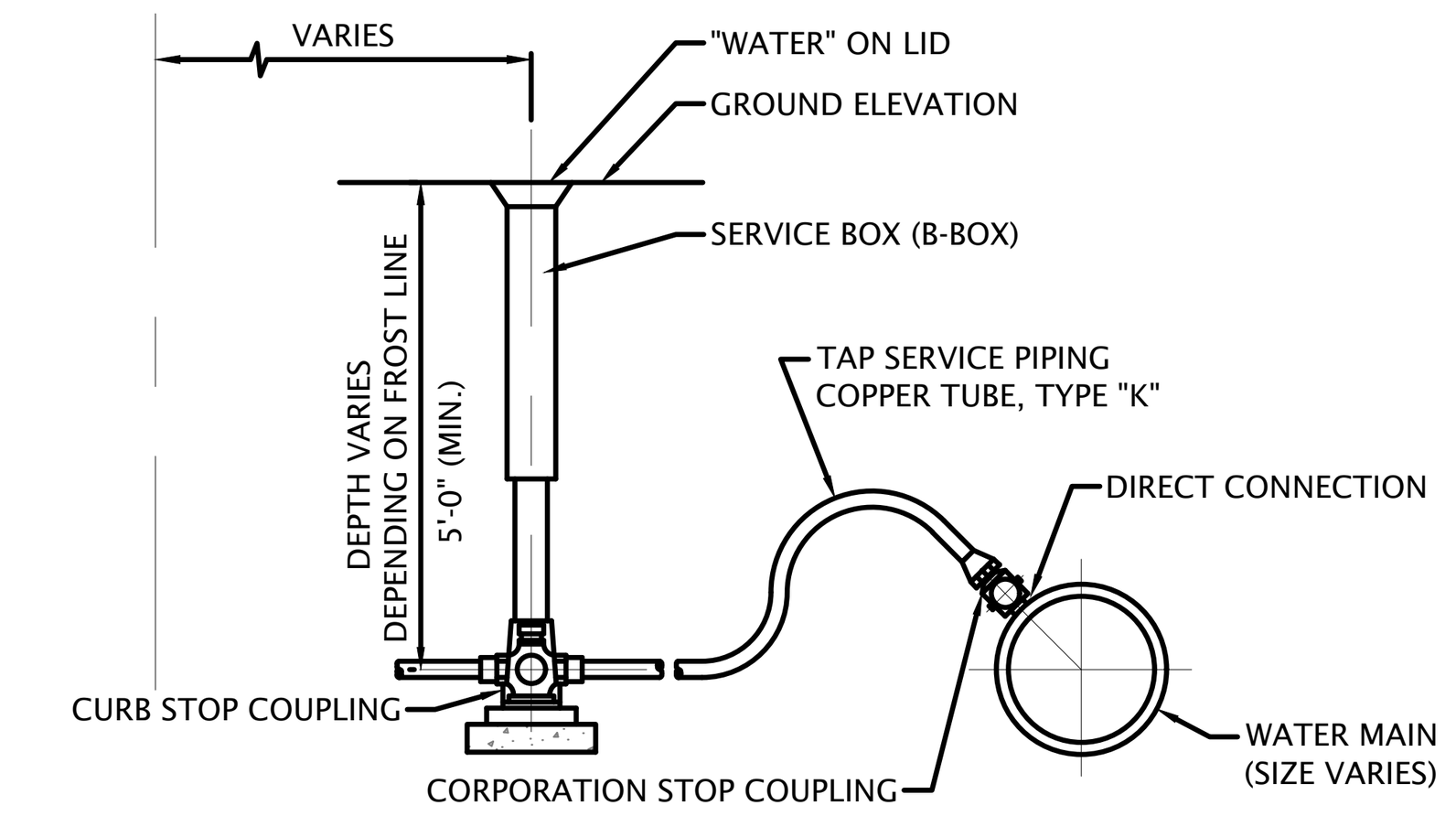
PIPE SIZE (INCHES)	TEE* BRANCH	90˚ ELBOW	45˚ ELBOW	22 1/2˚ ELBOW	11 1/4˚ ELBOW	DEAD ENDS
4	0	15	6	3	2	20
6	9	22	9	4	2	28
8	18	27	11	5	3	37
10	25	33	14	7	3	44
12	33	39	16	8	4	52
14	41	44	18	9	4	60
16	48	50	21	10	5	68
18	56	55	23	11	5	75
20	63	61	25	12	6	82
24	77	71	29	14	7	96
30	97	86	36	17	8	116
36	116	100	41	20	10	135

* ONE FULL LENGTH (18') OF PIPE ON BOTH SIDES OF BRANCH TO BE RESTRAINED.

INCREASE ALL LENGTHS IN TABLE BY 75% FOR USE ON POLYETHYLENE WRAPPED DUCTILE IRON PIPE OR PVC PIPE.

TEST PRESSURE BASED ON 150 PSI.

RESTRAINED PIPE LENGTH TABLE

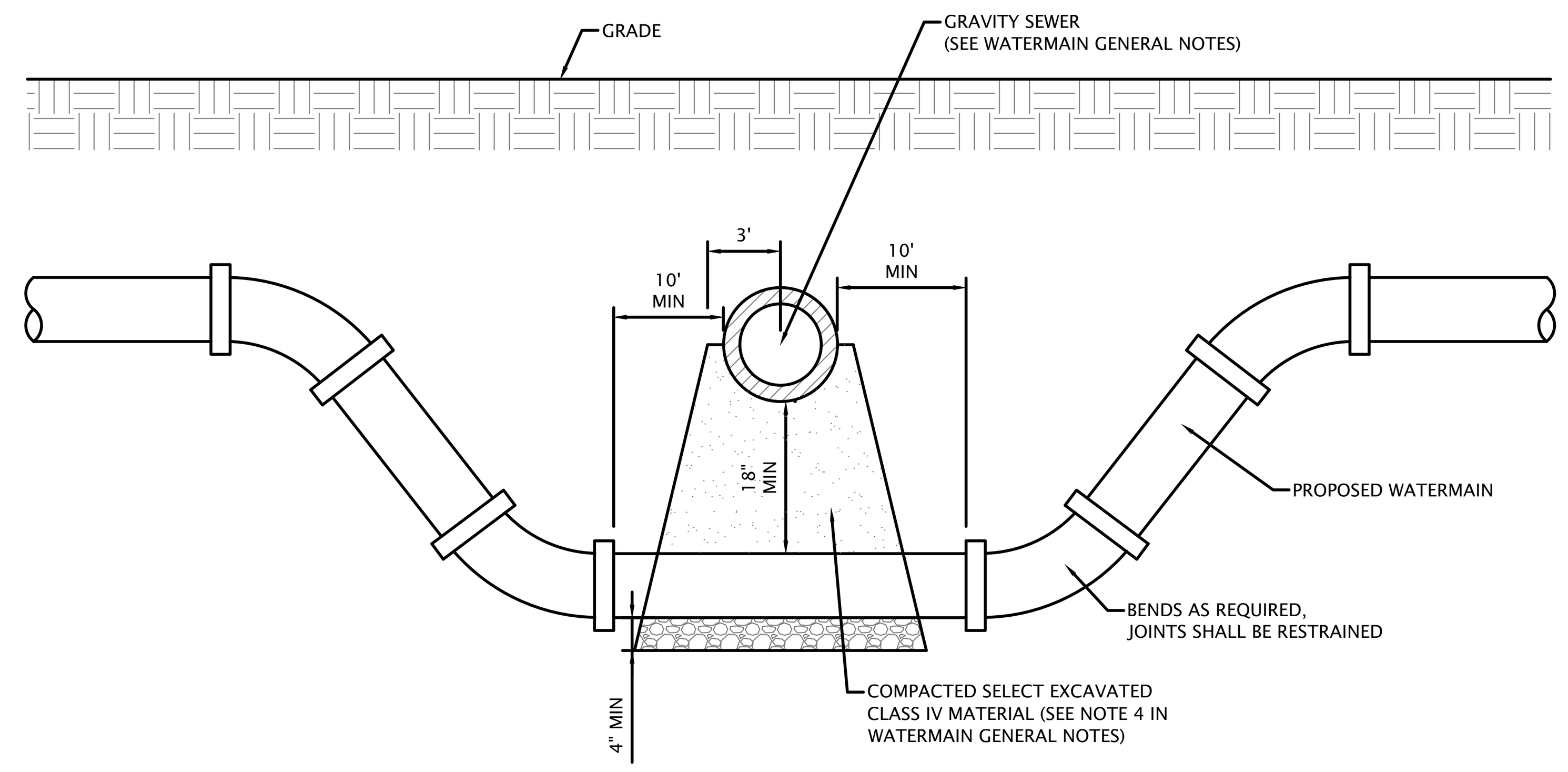


TYPICAL B-BOX & TAP SERVICE PIPING

(NOT TO SCALE)

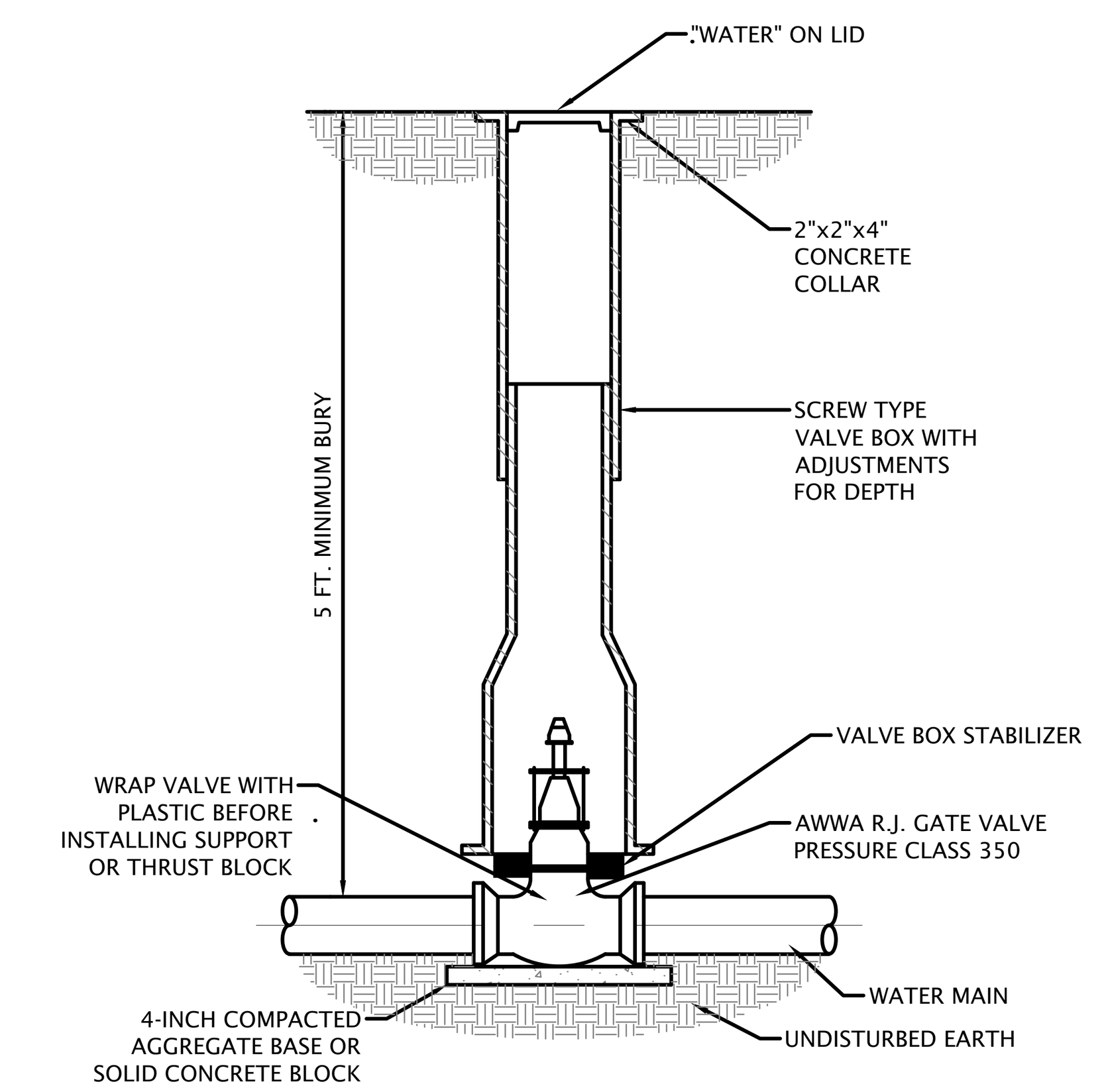
NOTES:

1. FULL CIRCLE TYPE 316 STAINLESS STEEL TAPPING SADDLES SHALL BE USED AS FOLLOWS:
   1.A. FOR ALL TAPS ON DUCTILE IRON PIPE OF 10" NOMINAL DIAMETER AND LESS
   1.B. FOR ALL TAPS MADE ON POLYVINYL CHLORIDE PIPE OF ANY NOMINAL DIAMETER.
   1.C. FOR ALL TAPS MADE ON HIGH DENSITY POLYETHYLENE PIPE OF ANY DIAMETER.



SANITARY/STORM SEWER & WATERMAIN CROSSING

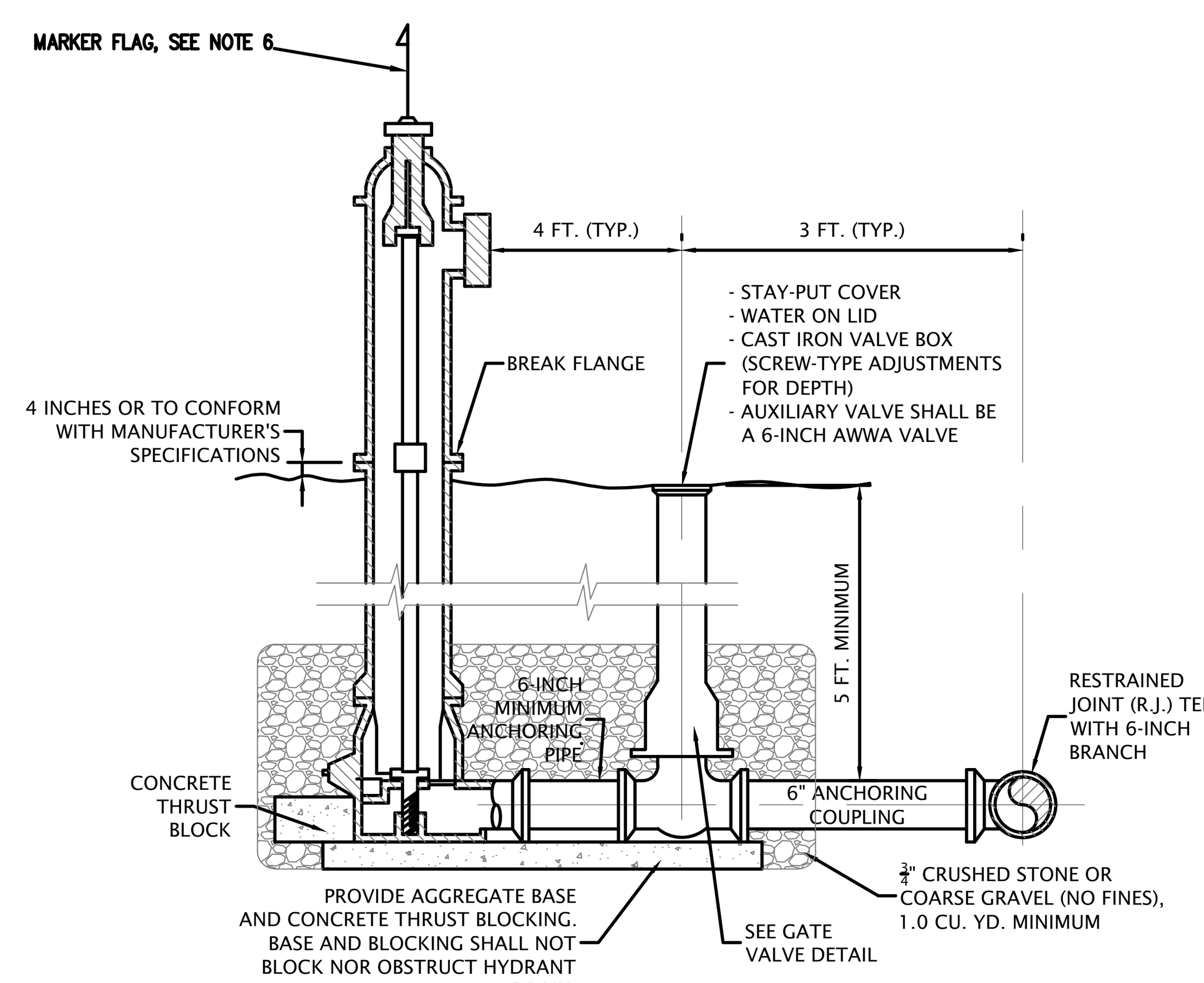
(NOT TO SCALE)



GATE VALVE & BOX (12-INCH OR SMALLER)

(NOT TO SCALE)

USE IF DUCTILE IRON IS USED FOR WATER SERVICE

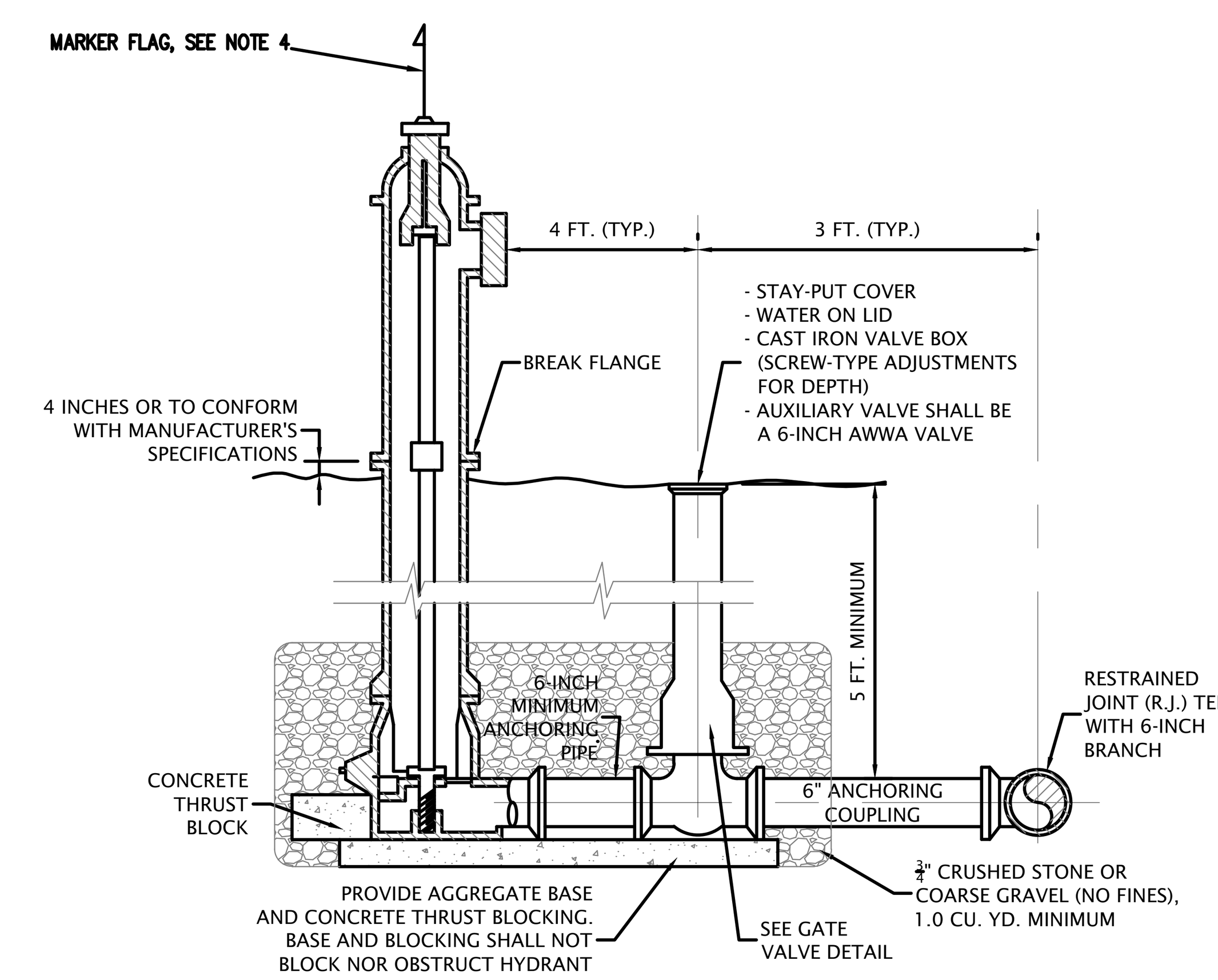


DEAD END FIRE HYDRANT

(NOT TO SCALE)

NOTES:

1. AN AUTOMATIC FLUSHING DEVIVE SHALL BE INCLUDED.
2. ACCEPTABLE MANUFACTURES AND MODELS INCLUDE:
   2.A. ECLIPSE #2 POST HYDRANT BY KUPEFERLE FOUNDRY
   2.B. MUELLER A-411 2-1/8" POST TYPE FIRE HYDRANT
3. HYDRANT TYPE SHALL BE ANY OF ABOVE, 3-NOZZLE WITH 5" STORZ CONNECTION.
4. NEAREST PART OF HYDRANT NOT LESS THAT 1.5 FT. FROM BACK OF CURB.
5. ALL JOINTS SHALL BE RESTRAINED BY RETAINER GLANDS OR RODDING, AS APPROVED BY THE ENGINEER.
6. HYDRANT COLOR SHALL BE RED AND INCLUDE MARKER FLAG PER TOWN OF MUNSTER FIRE DEPT REQUEST.



FIRE HYDRANT ASSEMBLY (TYPE "A")

(NOT TO SCALE)

NOTES:

1. HYDRANT TYPE SHALL BE KENNEDY, 3-NOZZLE WITH 5" STORZ CONNECTION.
2. NEAREST PART OF HYDRANT NOT LESS THAT 1.5 FT. FROM BACK OF CURB.
3. ALL JOINTS SHALL BE RESTRAINED BY RETAINER GLANDS OR RODDING, AS APPROVED BY THE ENGINEER.
4. HYDRANT COLOR SHALL BE RED AND INCLUDE MARKER FLAG PER TOWN OF MUNSTER FIRE DEPT REQUEST.

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1155 Troutwine Road
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RUSSELL JACOB POZEN REGISTERED NO. PE10910667 STATE OF INDIANA PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/16/2025

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 11
Bldg. A-Sprouts
Construction Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25
PROJECT NO.	
25-0081	
C202	

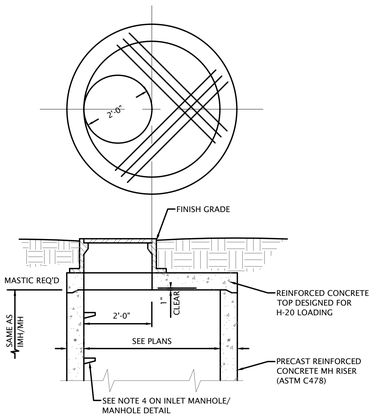
STORM SEWER GENERAL NOTES

1. Footing drains, sump pump drains and outside drains shall discharge to the storm sewer where storm sewer is provided.

2. The maximum allowable rate of infiltration or exfiltration shall not exceed 100 gallons, per 24 hours per inch-diameter per mile of sewer pipe.

3. Storm sewers shall be as noted on the plans. If approved by the Engineer, an alternative storm sewer pipe 12 inches and larger can be reinforced concrete minimum Class III, wall B conforming to ASTM C-76; Corrugated High-Density Polyethylene Pipe with smooth interior (ADS N-12) conforming to AASHTO M-294; Corrugated Polypropylene Pipe with smooth interior conforming to AASHTO M-330 (ADS HP STORM); Corrugated High-Density Polyethylene Pipe with smooth interior (PRINSCO, GOLDFLO) conforming to AASHTO M-294 or other INDOT, Type 2 storm sewers as approved by the Engineer.

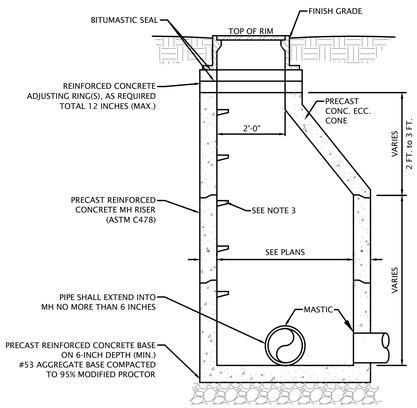
4. All HDPE storm sewer pipe shall be tested with a mandrel. Maximum deflection shall meet ASTM C1244-93 and Standard Test Method for Concrete Sewer Manholes 30 days after backfill, and should be performed without the aid of a mechanical pulling device. The deflection testing shall meet all requirements of IDEM section 327 IAC 3-6-19(a) (b) (c).



MANHOLE TOP (FLAT TOP)

(NOT TO SCALE)

USE WHERE RESTRICTED HEAD ROOM WILL NOT ALLOW FOR TAPERED WALLS



* STRUCTURE WALL THICKNESS TABLE

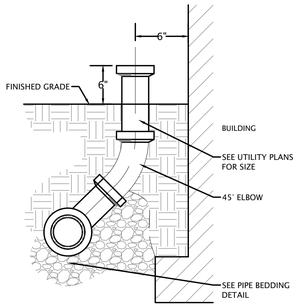
MH I.D.	WALL THICKNESS
36"	4"
48"	5"
60"	6"
72"	7"

NOTES:
1. WHERE DEPTH FROM TOP OF CASTING TO INVERT IS LESS THAN 5 FEET, USE FLAT TOP MANHOLE TYPE "C" IN LIEU OF ECCENTRIC CONE.
2. WATERTIGHT SEAL IS REQUIRED BETWEEN PRECAST RISER AND SEWER PIPE.
3. CO-POLYMER/STEEL MH STEPS AS MANUFACTURED BY M.A. INDUSTRIES OR EQUAL, AT 16 INCHES O.C. (MAX.).
4. CONTRACT UNIT PRICE FOR ALL STRUCTURES SHALL INCLUDE THE FRAME AND GRATE SPECIFIED.

INLET MANHOLE/MANHOLE

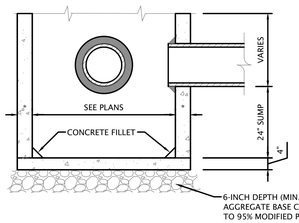
(NOT TO SCALE)

INLET MANHOLE (IMH) USES AN OPED LID - SEE STORM CALLOUT FOR FRAME & LID TYPE
MANHOLE (MH) USES A CLOSED LID - SEE STORM CALLOUT FOR FRAME & LID TYPE.



DOWNSPOUT CONNECTION

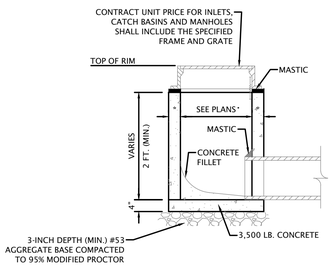
(NOT TO SCALE)



CATCH BASIN

(NOT TO SCALE)

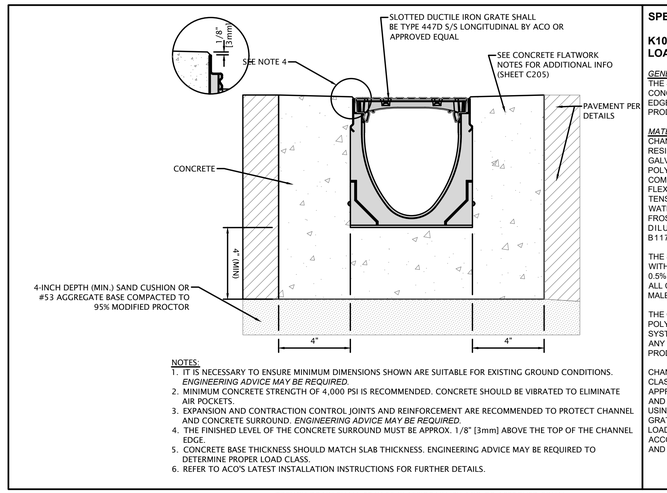
SEE INLET MANHOLE/MANHOLE DETAIL
CATCH BASIN USES EITHER CLOSED OR OPEN LIDS - SEE UTILITY PLAN FOR FRAME & LID TYPE.



INLET

(NOT TO SCALE)

INLET USES OPEN LIDS - SEE UTILITY PLAN FOR FRAME & LID TYPE.



NOTES:
1. IT IS NECESSARY TO ENSURE MINIMUM DIMENSIONS SHOWN ARE SUITABLE FOR EXISTING GROUND CONDITIONS. *ENGINEERING ADVICE MAY BE REQUIRED.*
2. MINIMUM CONCRETE STRENGTH OF 4,000 PSI IS RECOMMENDED. CONCRETE SHOULD BE VIBRATED TO ELIMINATE AIR POCKETS.
3. EXPANSION AND CONTRACTION CONTROL JOINTS AND REINFORCEMENT ARE RECOMMENDED TO PROTECT CHANNEL AND CONCRETE SURROUND. *ENGINEERING ADVICE MAY BE REQUIRED.*
4. THE FINISHED LEVEL OF THE CONCRETE SURROUND MUST BE APPROX. 1/8" [3mm] ABOVE THE TOP OF THE CHANNEL EDGE.
5. CONCRETE BASE THICKNESS SHOULD MATCH SLAB THICKNESS. ENGINEERING ADVICE MAY BE REQUIRED TO DETERMINE PROPER LOAD CLASS.
6. REFER TO ACO'S LATEST INSTALLATION INSTRUCTIONS FOR FURTHER DETAILS.

SPECIFICATION CLAUSE

K100 KLASSIKDRAIN 'DRAINLOK' LOAD CLASS B

GENERAL
THE SURFACE DRAINAGE SYSTEM SHALL BE POLYMER CONCRETE K100 CHANNEL SYSTEM WITH GALVANIZED STEEL EDGE RAILS AS MANUFACTURED BY ACO POLYMER PRODUCTS, INC.

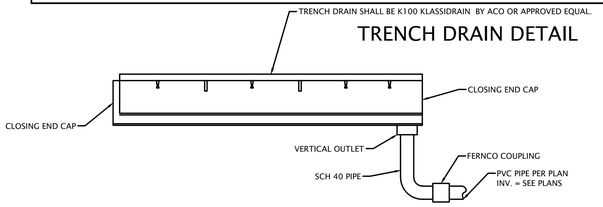
MATERIALS
CHANNELS SHALL BE MANUFACTURED FROM POLYESTER RESIN POLYMER CONCRETE WITH AN INTEGRALLY CAST-IN GALVANIZED STEEL EDGE RAIL. MINIMUM PROPERTIES OF POLYMER CONCRETE WILL BE AS FOLLOWS:

COMPRESSIVE STRENGTH:	14,000 PSI
FLEXURAL STRENGTH:	4,000 PSI
TENSILE STRENGTH:	1,500 PSI
WATER ABSORPTION:	0.07%
FROST PROOF	YES
DILUTE ACID AND ALKALI RESISTANT	YES
B117 SALT SPRAY TEST COMPLIANT	YES

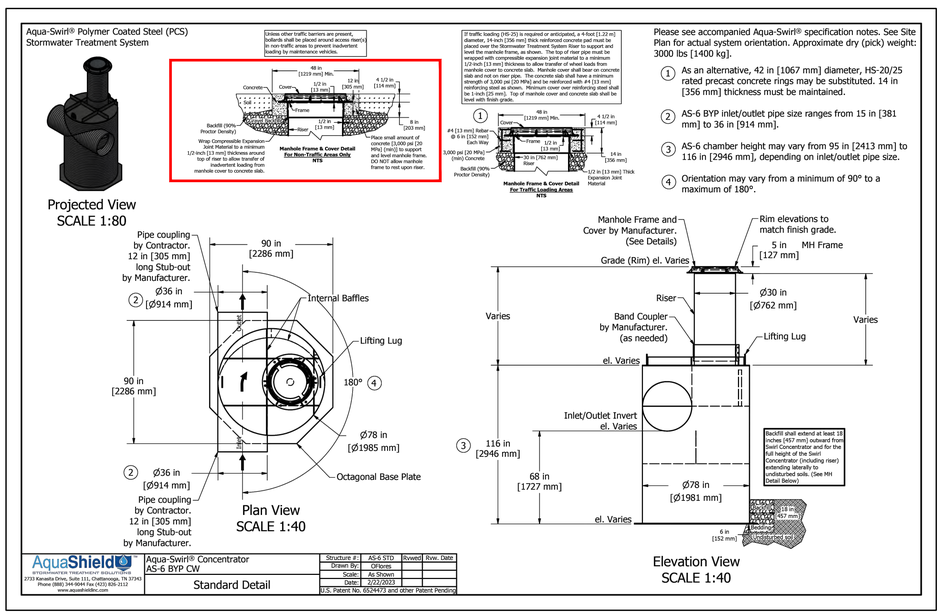
THE SYSTEM SHALL BE 4" (100mm) NOMINAL INTERNAL WIDTH WITH A 5.1" (130mm) OVERALL WIDTH AND A BUILT-IN SLOPE OF 0.5%. CHANNEL INVERT SHALL HAVE DEVELOPED "V" SHAPE. ALL CHANNELS SHALL BE INTERLOCKING WITH A MALE/FEMALE JOINT.

THE COMPLETE DRAINAGE SYSTEM SHALL BE BY ACO POLYMER PRODUCTS, INC. ANY DEVIATION OR PARTIAL SYSTEM DESIGN AND/OR IMPROPER INSTALLATION WILL VOID ANY AND ALL WARRANTIES PROVIDED BY ACO POLYMER PRODUCTS, INC.

CHANNEL SHALL WITHSTAND LOADING TO PROPER LOAD CLASS AS OUTLINED BY EN 1433. GRATE TYPE SHALL BE APPROPRIATE TO MEET THE SYSTEM LOAD CLASS SPECIFIED AND INTENDED APPLICATION. GRATES SHALL BE SECURED USING 'DRAINLOK' BOLTLESS LOCKING SYSTEM. CHANNEL AND GRATE SHALL BE CERTIFIED TO MEET THE SPECIFIED EN 1433 LOAD CLASS. THE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.



TRENCH DRAIN DETAIL



HYDRODYNAMIC SEPARATOR DETAILS

(NOT TO SCALE)

NOTES:
1. AQUA-SHIELD SPECIFICATIONS shall be considered part of this plan set.

2. Contact Sales Representative for product purchase:
Joe O'Brien
Product Consultant
Entel, Inc
734-657-3839
jobrien@entel-group.com

3. CONTRACTOR MAY USE AQUA-SHIELD, CONTECH OR OTHER EQUAL HYDRODYNAMIC SEPARATOR PRODUCT/CONFIGURATION, BUT SHALL BE APPROVED BY ENGINEER OF RECORD AND TOWN OF MUNSTER.

DESIGN NOTES:

HYDRODYNAMIC SEPARATORS	WQV FLOW	10YR FLOW	CONTECH*	AQUA-SHIELD*
HD#1	4.92 CFS	28.24 CFS	CS8	AS6 BYP

*AQUA-SHIELD HYDRODYNAMIC SEPARATOR WERE SIZED BY WQV FLOW, WQV=Q=CiA.
*CONTECH: HYDRODYNAMIC SEPARATOR WERE SIZED BY BY WQV FLOW, WQV=Q=CiA.
*ALTERNATIVE CONFIGURATION USING A BYPASS STRUCTURE MAY CHANGE THE SIZE OF THE HYDRODYNAMIC SEPARATOR.

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REGISTERED LAND SURVEYOR RUSSELL JACOB ROSEN PE-20100667 STATE OF INDIANA PROFESSIONAL ENGINEER

09/16/2025

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

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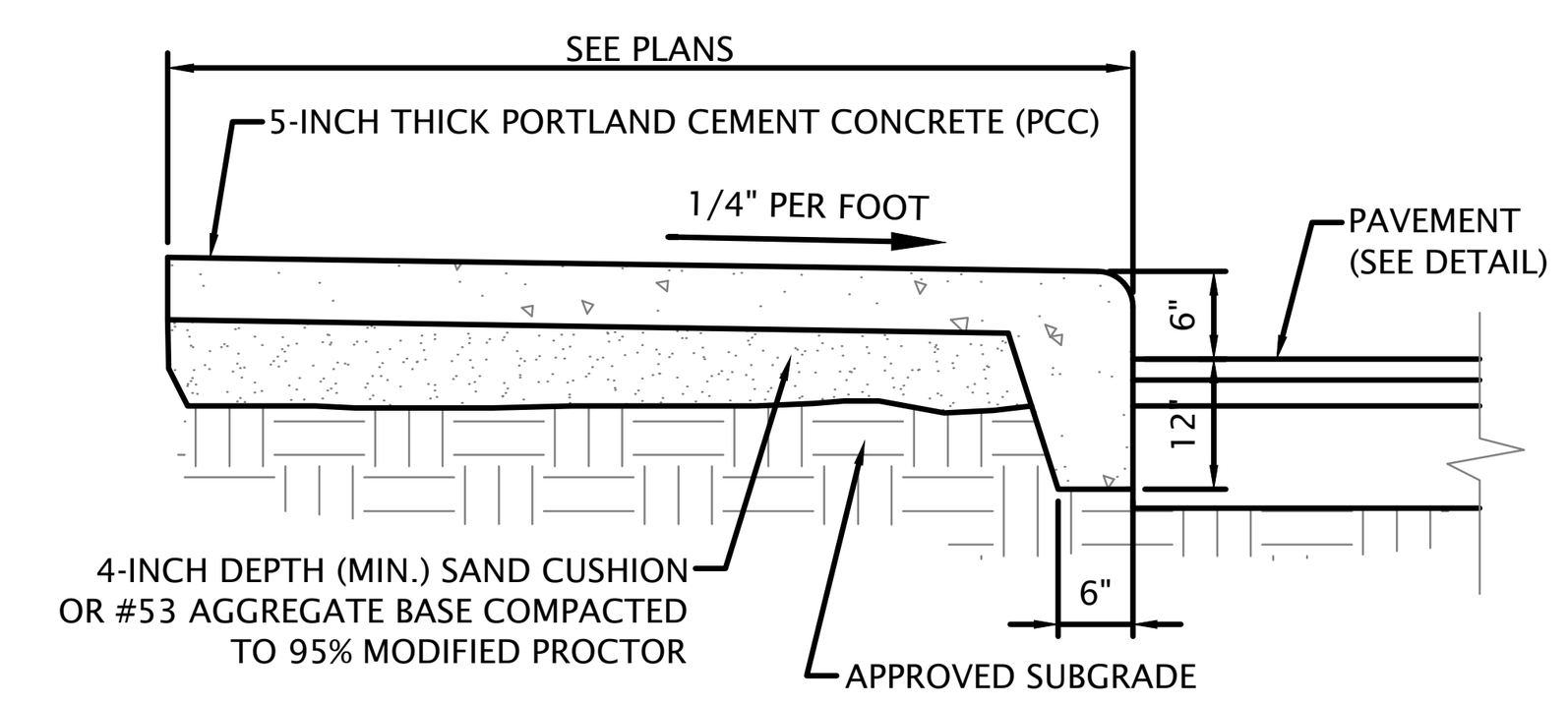
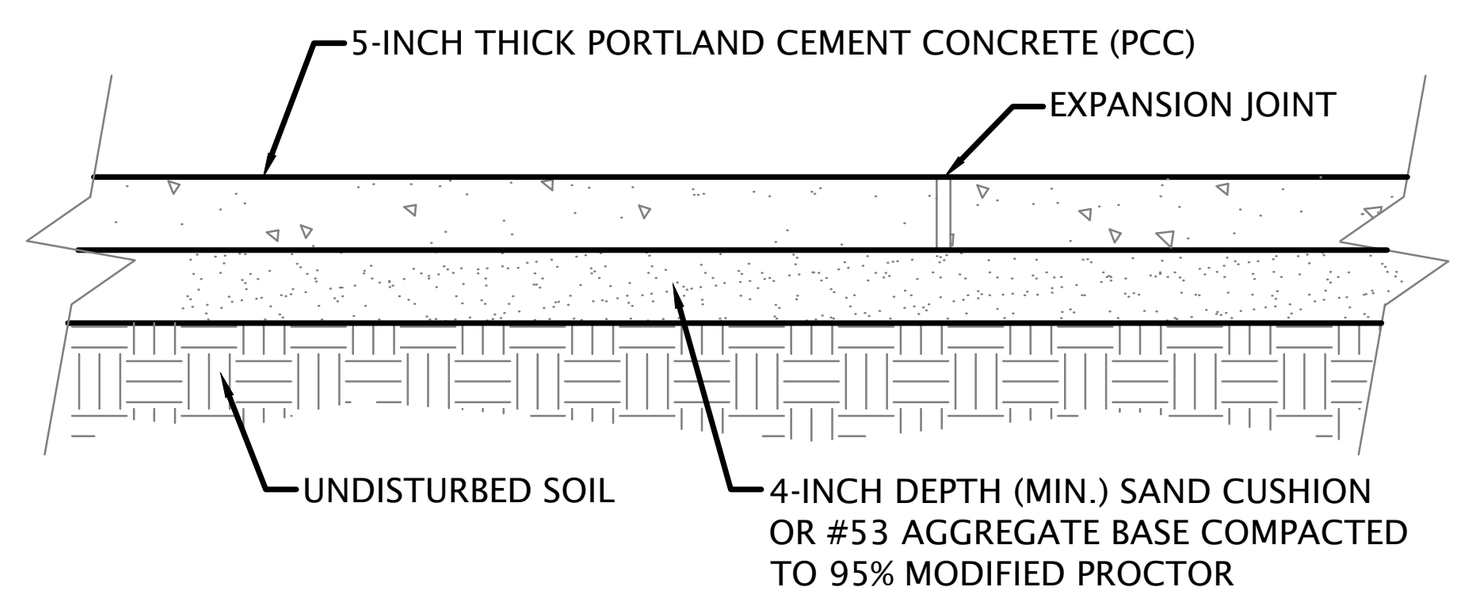


MONOLITHIC CURB & SIDEWALK
(NOT TO SCALE)

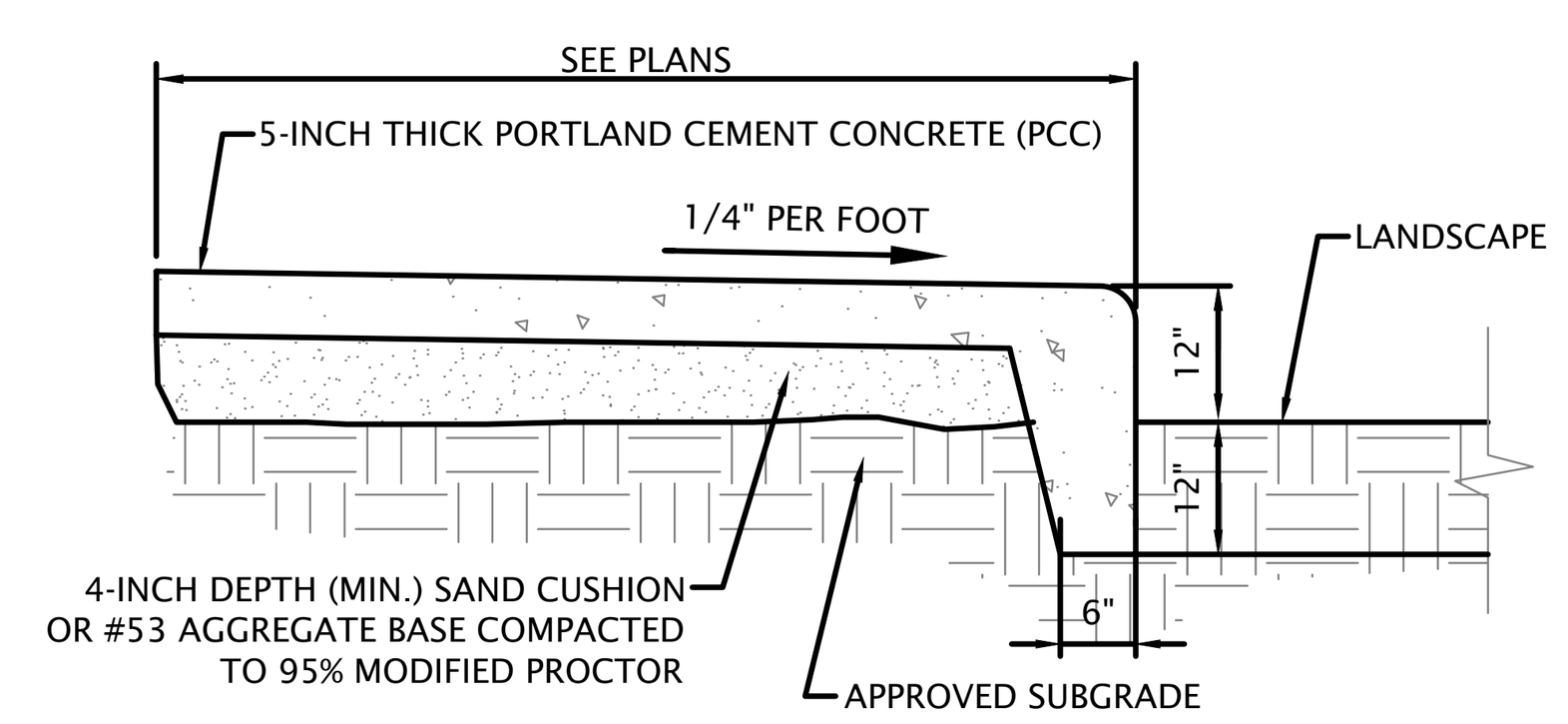


SIDEWALK
(NOT TO SCALE)

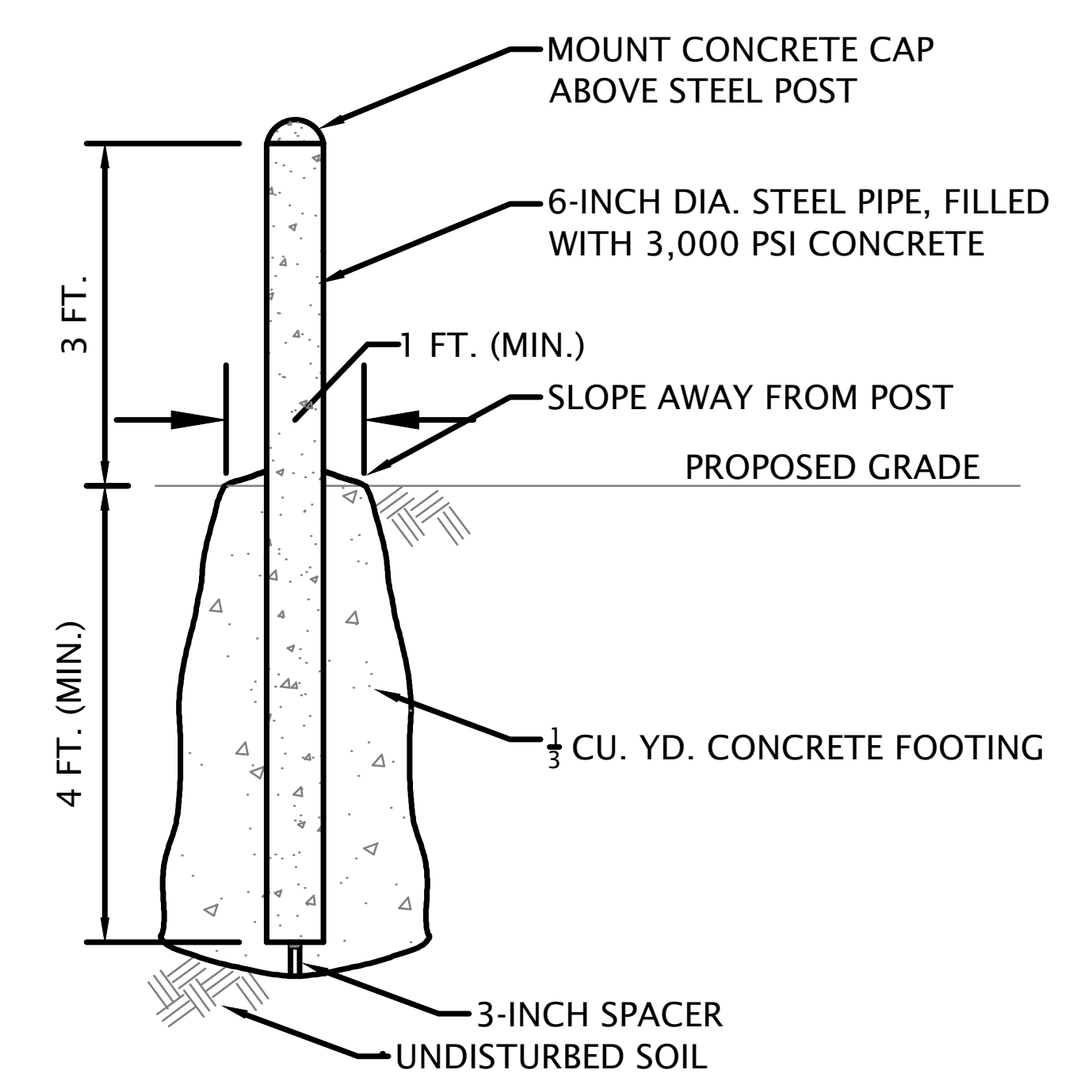
¼-INCH WIDE CONSTRUCTION TOOLED JOINT SPACED AT A DISTANCE EQUAL TO THE WIDTH

CONCRETE FLAT WORK NOTES:

1. PROVIDE ¾-INCH EXPANSION JOINT CONFORMING TO ASTM D-1751 ALONG BACK OF CURBS, DRIVEWAYS, STEPS, WALLS AND ACROSS THE SIDEWALK AT INTERVALS NOT TO EXCEED 40 FEET.
2. EXTEND EXPANSION JOINT MATERIAL FULL DEPTH OF THE SLAB.
3. PROVIDE TOOLED "V-GROOVE" CONTROL JOINT SPACED AT A DISTANCE EQUAL TO THE WIDTH OF THE WALK BUT NOT OVER 10 FEET APART, OR AS SPECIFIED ON THE SITE PLAN.
4. CONCRETE SHALL BE CLASS "A" & 4,000 PSI IN 28 DAYS; MEETING THE REQUIREMENTS OF THE MOST RECENT INDOT STANDARD SPECIFICATIONS MANUAL.
5. ALL CONCRETE FLAT WORK SHALL BE REINFORCED WIRE MESH 6"x6"x 10/10 GAUGE.

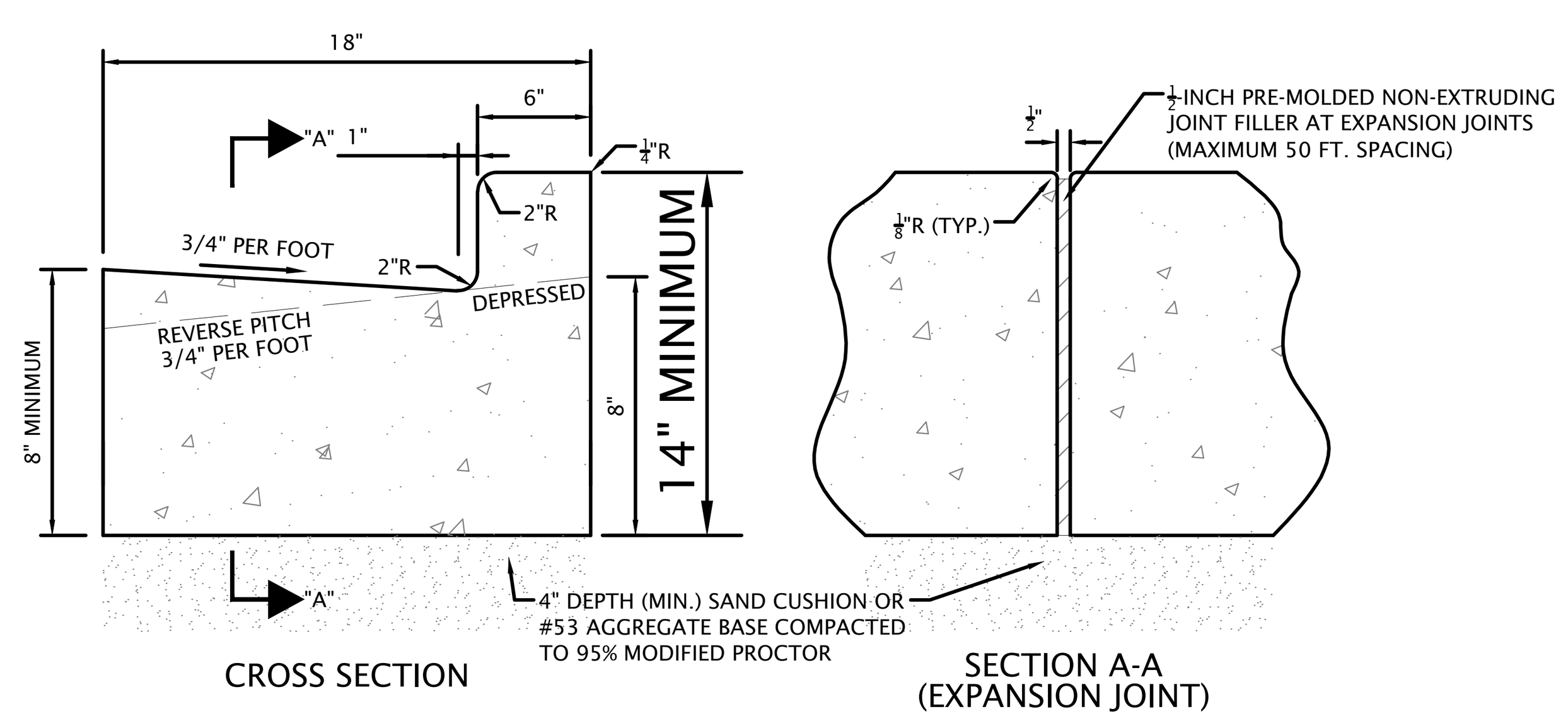


MONOLITHIC CURB & SIDEWALK (NORTH OF BUILDING)
(NOT TO SCALE)



BOLLARD
(NOT TO SCALE)

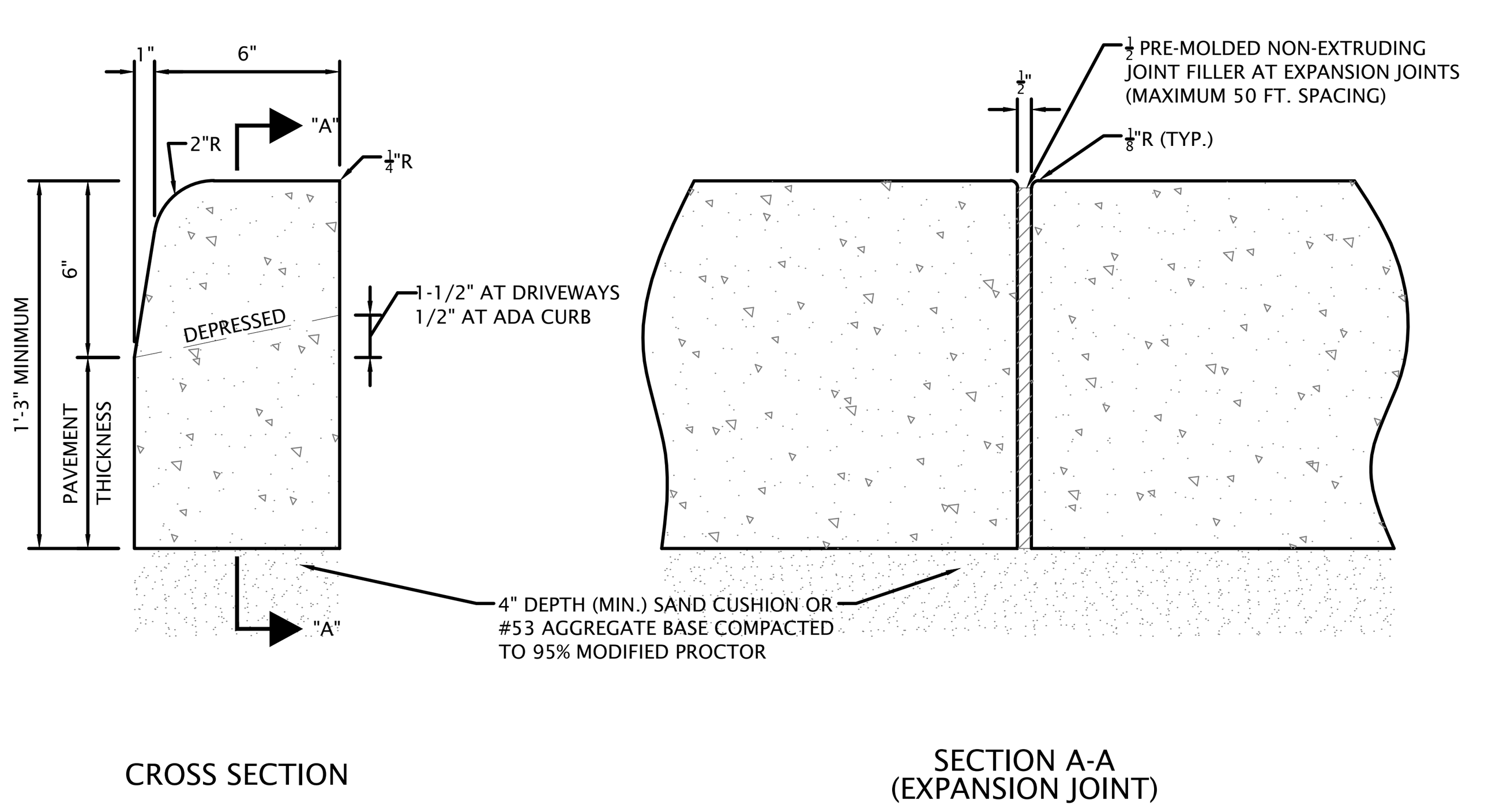
NOTES:
1. PAINT ALL BOLLARDS SAFETY YELLOW.



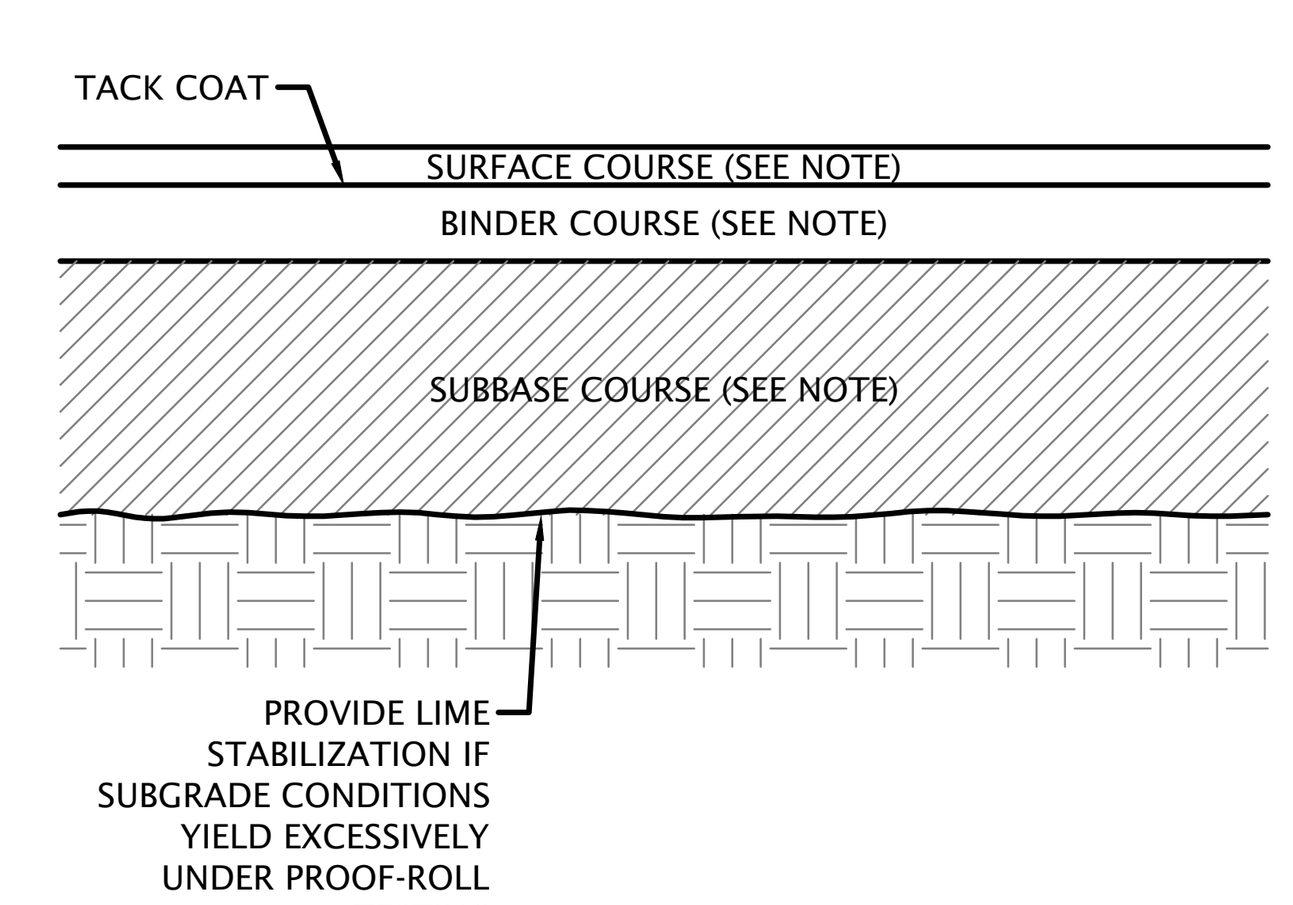
BARRIER CURB & GUTTER
(NOT TO SCALE)

CONCRETE CURB & GUTTER NOTES

1. PROVIDE TWO #4 BARS (10 FT. LONG) CENTERED IN EACH UTILITY TRENCH.
2. (NOT USED)
3. COST OF BARS SHALL BE INCLUDED IN THE UNIT PRICE (PER LINEAR FOOT) FOR CURB AND GUTTER.
4. CONTRACTION JOINTS SHALL BE PLACED AT EQUAL SPACES BETWEEN NORMAL EXPANSION JOINTS.
5. ½" EXPANSION JOINTS AT 50 FEET MAXIMUM.
6. CONTRACTION JOINTS AT 20 FEET MAXIMUM.
7. CONTRACTION JOINTS SHALL BE SAW CUT IN THE UPPER ⅓ OF CURB AND GUTTER WITHIN 7 DAYS OF PLACEMENT
8. SAW CUT EXISTING CURB PRIOR TO REMOVAL. PROVIDE NEAT AND CLEAN FACE TO ABUT NEW CURB.
9. USE 4,500 (MIN.) PSI CONCRETE.
10. DEPRESS DRIVEWAYS, AS REQUIRED.



6-INCH BARRIER CURB
(NOT TO SCALE)

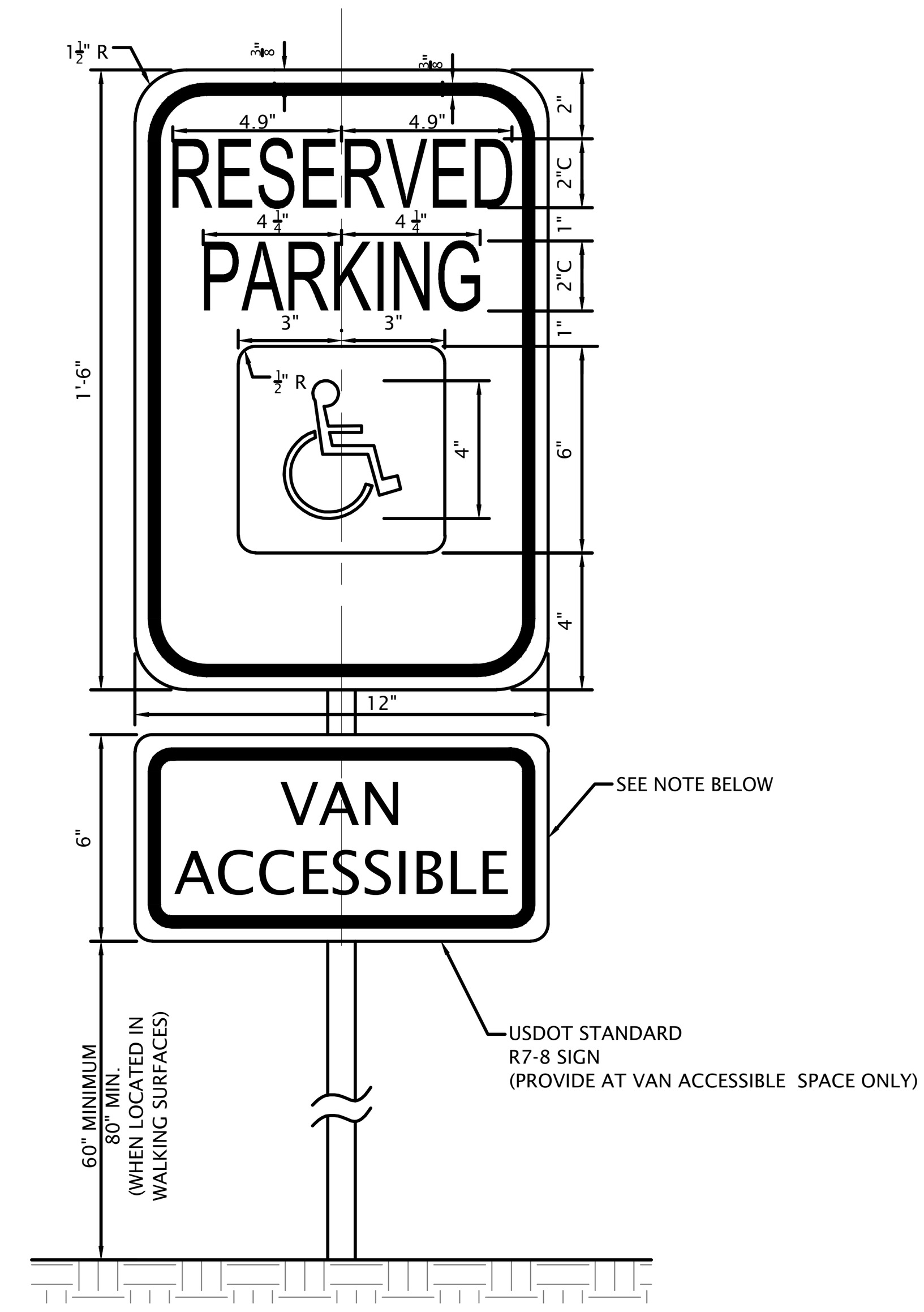


SURFACE COURSE
1.5 INCHES
INDOT HMA TYPE B SURFACE, 9.5mm

BINDER COURSE
3.0 INCHES
INDOT HMA TYPE B INTERMEDIATE, 19.0mm

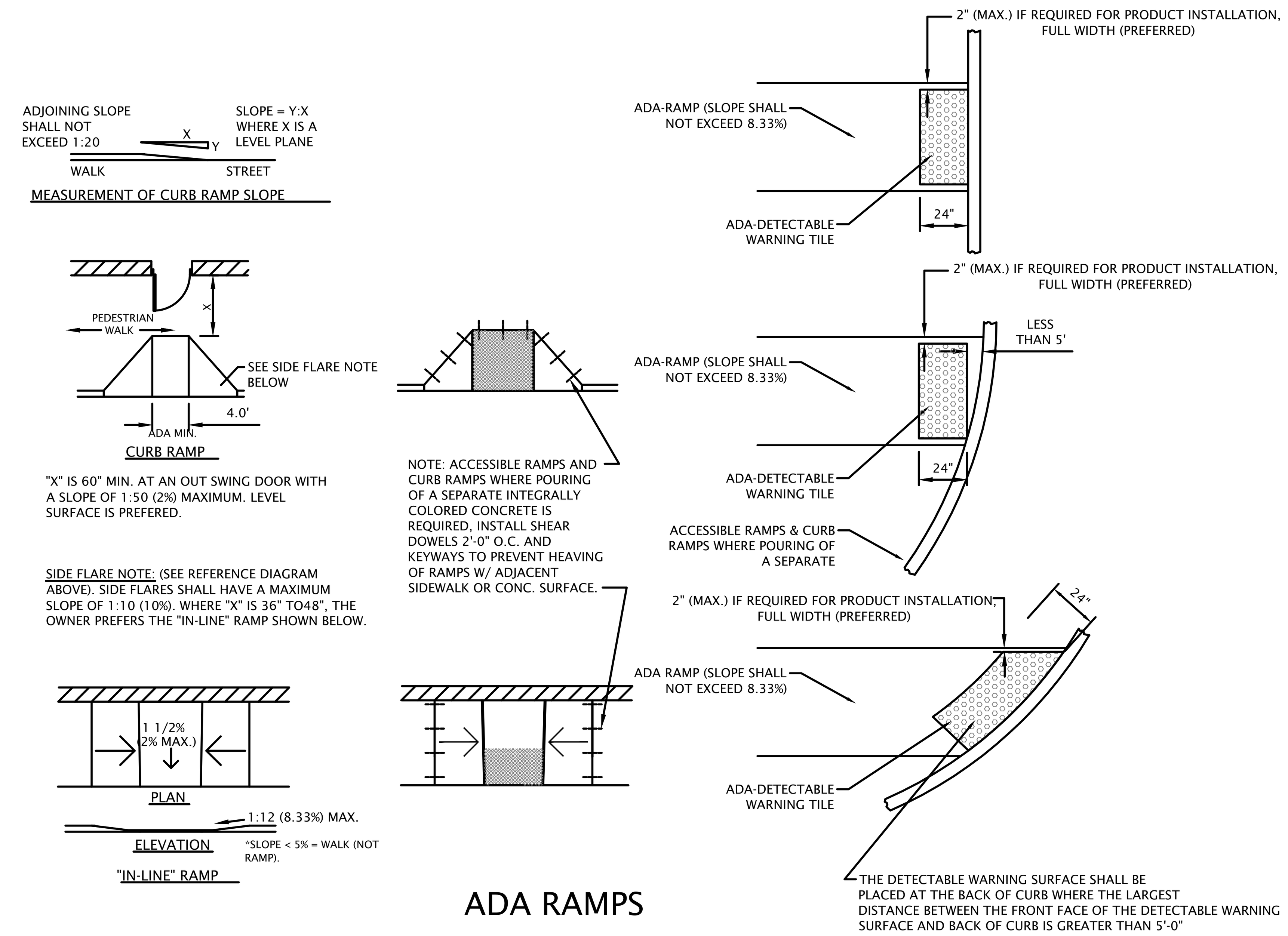
SUBBASE COURSE
9.0 INCHES OF #53 COMPACTED LIMESTONE AGGREGATE ON APPROVED PROOF-ROLLED SUBGRADE

ASPHALT PAVEMENT CROSS SECTION
(NOT TO SCALE)

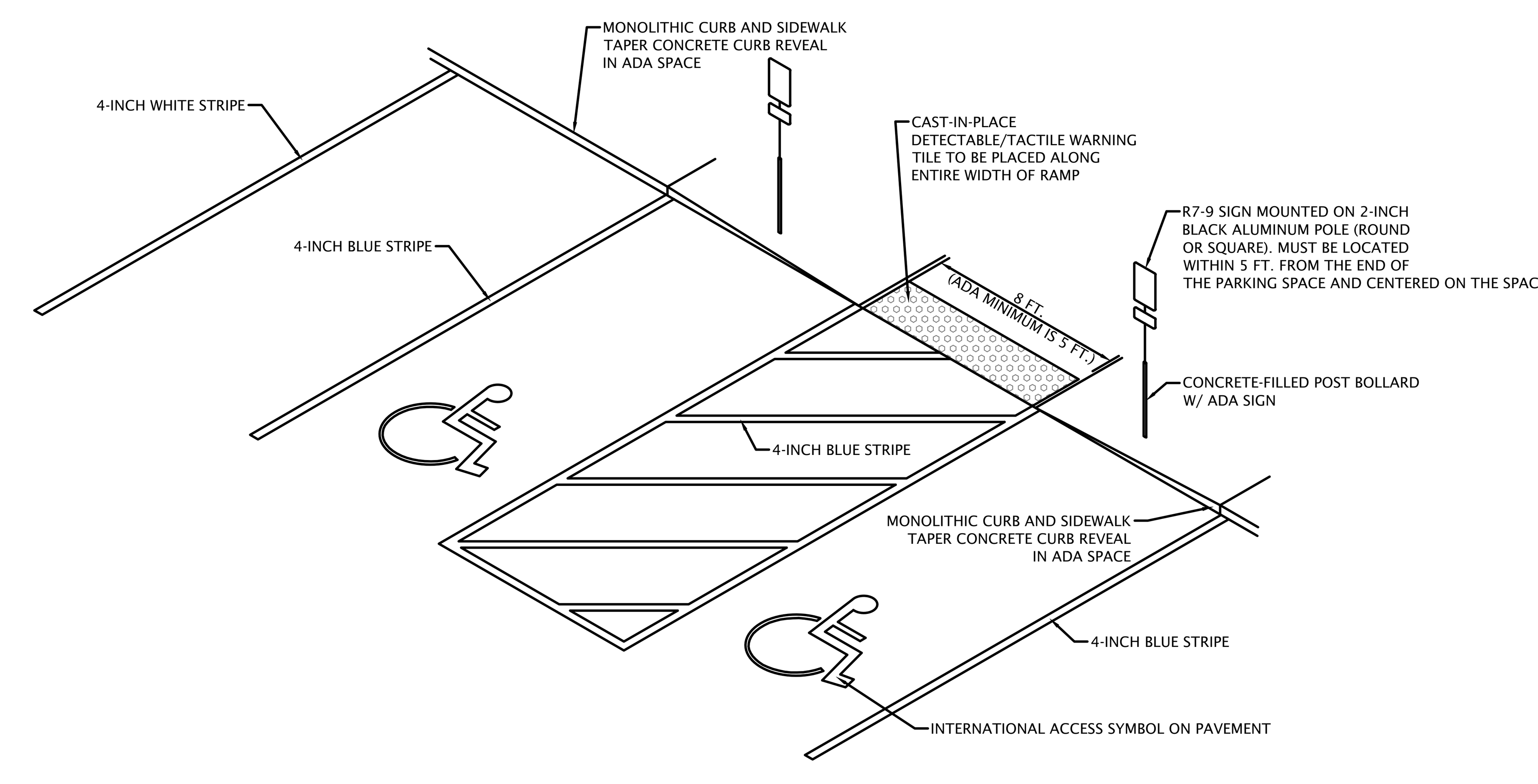


NOTE ON R7-8 SIGN:
THIS IS A STANDARD SIGN AND MAY BE ORDERED FROM ANY TRAFFIC SIGN SUPPLIER BY NUMBER. THE SIGN MUST BE SUPPLEMENTED WITH A "VAN ACCESSIBLE" SIGN AS APPLICABLE AND/OR AMOUNT OF THE FINE FOR ILLEGALLY PARKING IN THE RESERVED SPACE(S) A MUNICIPALITY MAY IMPOSE. CONFIRM WITH LOCAL REGULATIONS.

ADA SIGNAGE



ADA RAMPS



TYPICAL ADA PARKING SPACE PLAN

ADA NOTES

A CURB RAMP(S) MUST BE PROVIDED ALONG AN ACCESSILBLE PATH FROM THE PARKING LOT TO OWNERS CURBED SIDEWALK.

A CURB RAMP(S) MUST ALSO BE PROVIDED IN THE PARKING LOT AT ALL INTERMEDIATE AND PERIMETER CURBS ALONG THE ACCESSIBLE ROUTE CONNECTING TO PUBLIC SIDEWALKS.

A RAMP IS ANY SLOPE GREATER THAN 1:20 (5%) AND SHALL HAVE A MAXIMUM SLOPE OF 1:12 (8.33%). THE MAXIMUM SLOPE IS 1" OF RISE PER FOOT OF DISTANCE TRAVELED.

A RAMP SHALL HAVE A DETECTABLE SURFACE IDENTIFYING THE AREA OF THE RAMP. DETECTABLE WARNINGS SHALL CONSIST OF TRUNCATED DOMES ALIGNED IN A SQUARE OR RADIAL GRID. TRUNCATED DOMES SHALL HAVE A BASE DIAMETER OF 0.9 IN. TO 1.5 IN. MAXIMUM, A TOP DIAMETER OF 50% OF THE BASE DIAMETER MINIMUM TO 65% OF THE BASE DIAMETER MAXIMUM AND A HEIGHT OF 0.2 IN. DOMES SHALL BE SPACED CENTER-TO-CENTER OF 1.6 IN. MINIMUM TO 2.4 IN. MAXIMUM AND A BASE-TO-BASE SPACING OF 0.65 IN. MINIMUM, MEASURED BETWEEN THE MOST ADJACENT DOMES.

ADA DETECTABLE WARNING STRIPS SHALL BE A CAST IN PLACE DETECTABLE/TACTILE WARNING TILE. THE TILE MUST MEET ALL ADA REQUIREMENTS, AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANAFACTURERS INSTRUCTIONS. A 5-YEAR WARRANTEE SHALL BE PROVIDED BY THE MANUFACTURER FOR THE INSTALLED TILE FOR COLORFASTNESS AND DURABILITY. DETECTABLE/TACTILE WARNING TILE SHALL BE ARMOR-TILE, ACCESS-TILE OR AN APPROVED VENDOR.

THE LEADING EDGE OF THE DETECTABLE WARNING TILE MUST BE CLOSER THAN 5' FROM THE VEHICLE SURFACE, AND HAVE A MINIMUM OF 24" LENGTH ALONG THE PEDESTRIAN TRAVEL DIRECTION. THE TILE MAY BE CUT TO MATCH A RADIUS AT THE CURB IF ONE END OF THE RAMP EXCEEDS THE 5' MINIMUM.

THE CLEAR WIDTH OF ANY RAMP MEASURED PERPENDICULAR TO THE PEDESTRIAN TRAVEL DIRECTION IS A MINIMUM OF 36".

THERE ARE LOCAL JURISDICTIONS THAT SPECIFICALLY REQUIRE DETECTIBLE WARNINGS ON THE SIDE FLARES OR TOP OF RAMP (CA.). THERE ARE LOCAL JURISDICTIONS THAT HAVE REDEFINED DETECTIBLE WARNINGS (e.g. EXPOSED CONTRASTING COLOR AGGREGATE, GROOVES IN A PARALLEL OR DIAMOND PATTERN ETC.). ACCESSIBILITY GUIDLINES DEFINED BY LOCAL ORDINANCE SHOULD SUPERSEDE WHEN MORE STRINGENT THAN ADAAG. IN THE ABSENCE OF A DEFINITION, FOLLOW ADAAG.

A U.S. DEPARTMENT OF TRANSPORTATION R7-8 (RESERVED PARKING) AND SUPPLEMENTAL SIGNS AS NOTED ABOVE MUST BE MOUNTED ON A PERMANENT POST NO LOWER THAN 60"/80" AS STATED IN THE SIGN DETAIL ABOVE. THE POST MUST BE MOUNTED IN THE CENTER OF THE 8 FOOT WIDE ACCESSIBLE PARKING SPACE, NO MORE THAN 5 FEET FROM THE FRONT OF THE PARKING SPACE. SEE ILLUSTRATION ABOVE.

EACH ACCESSIBLE PARKING SPACE IS TO BE A MINIMUM OF 8 FEET WIDE AND HAVE A 96" MINIMUM ACCESS AISLE FOR VANS OR 60" ACCESS AISLE FOR CARS ADJACENT TO THE SPACE. THE ACCESS AISLE MAY BE ON EITHER THE DRIVER'S SIDE OR THE PASSENGER'S SIDE OF THE ACCESSIBLE SPACE. THIS APPLIES TO 90˚ PARKING. IF ANGLED PARKING (ie. 45˚,60˚), ACCESS AISLE SHALL BE ON THE PASSENGER SIDE.

ACCESSIBLE PARKING SPACES ARE TO BE LOCATED AS CLOSE TO THE BUILDING ENTRANCE AS POSSIBLE AND SHALL BE IDENTIFIED WITH A SIGN.

ACCESSIBLE PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH A SLOPE BETWEEN 1.5% AND 2% OR 1:50 IN ALL DIRECTIONS. THIS INCLUDES BOTH "RUNNING SLOPES" AND "CROSS SLOPES."

EACH PARKING SPACE ACCESS AISLE MUST CONNECT TO A COMMON LEVEL WITH AN ACCESSIBLE ROUTE...I.E., EACH ACCESS AISLE NEXT TO A PARKING SPACE MUST HAVE A CURB RAMP AT SIDEWALK OR BLEND TO A LEVEL WALKWAY LEADING TO THE ENTRANCE.

ACCESSIBLE PARKING ACCESS AISLES SHALL BE PART OF AN ACCESSIBLE ROUTE TO THE BUILDING ENTRANCE.

THE ACCESS AISLE SHALL BE DESIGNATED WITH HIGH QUALITY YELLOW DIAGONAL SURFACE PAINT STRIPING OR PER LOCAL MUNICIPALITY'S REQUIREMENTS.

RAMPS MUST NOT EXTEND OUT FROM THE CURB INTO THE ACCESS AISLE OF ANY ACCESS PARKING SPACE.

ADA ALLOWS TWO PARKING SPACES TO SHARE AN ACCESS AISLE.

ACCESSIBLE SPACE REQUIREMENTS

TOTAL OFF STREET PARKING SPACES PROVIDED	NUMBER OF ACCESSIBLE PARKING SPACES REQUIRED
1 TO 25	1
26 TO 50	2
51 TO 75	3
76 TO 100	4
101 TO 150	5
151 TO 200	6
201 TO 300	7
301 TO 400	8
401 TO 500	9
501 TO 1000	2% OF TOTAL
OVER 1000	2% PLUS 1 FOR EACH 100 OVER 1000
HOSPITAL OUTPATIENT FACILITIES	10% OF TOTAL PATIENT & VISITOR PARKING SPACES

ADA REQUIRES ONE VAN ACCESSIBLE PARKING SPACE IN EVERY SIX ACCESSIBLE SPACES, BUT NOT LESS THAN ONE.

- VAN ACCESSIBLE SPACES SHALL BE PERMITTED TO BE 8ft WIDE (MIN) WITH A 8ft WIDE (MIN) ACCESS AISLE
  OR
- VAN ACCESSIBLE SPACES SHALL BE PERMITTED TO BE 11ft WIDE WITH A 5ft WIDE (MIN) ACCESS AISLE

ACCESSIBLE PARKING-SIZE AND MARKINGS

NOTES:
1. PAINTED CROSSWALKS SHALL BE WHITE 18" WIDE STRIPES 6' LONG, SPACED 36" ON CENTER ACROSS THE ENTIRE LENGTH OF THE CROSSING.
2. PAINT 2" BLACK OUTLINE AROUND ARROWS AND LETTERS IN AREAS OF CONCRETE SURFACE.
3. PARKING SPACES ARE TO BE "WHITE" - 4" WIDE STRIPES
4. ADA SPACES, ADA MARKING, AND ADA ACCESS SPACE ARE TO BE "BLUE" - 4" WIDE STROKES.

PAVEMENT MARKINGS

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB POZEN
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/16/2025

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 11
Bldg. A-Sprouts
Construction Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25

PROJECT NO. 25-0081

C204

GENERAL STORM WATER MANAGEMENT NOTES

Soil erosion and sedimentation control shall protect against loss of soil by the action of water, ice and wind.

Erosion control shall be in accordance with the Town of Munster Storm Water Ordinance & Storm Water Technical Manual & "The Indiana Storm Water Quality Manual".

There are two main elements for Storm Water Quality: Construction Site Stormwater Runoff Control and Post-Construction Stormwater Management. The contractor shall provide Construction Site Stormwater Runoff Control as required and construct the Post-Construction Stormwater Management features as shown on these plans.

The contractor shall be responsible for maintaining site conditions such that Stormwater Runoff Control is provided throughout construction. Surface water runoff management, ie: temporary ditches, swales, bypass pumping, and erosion control measures shall be constructed and maintained as required by construction activity and these items are considered incidental to the contract. These items shall be included in the base contract.

Upon the completion of the site work the contractor shall remove the Construction Site Stormwater Runoff Control measures and install the Post-Construction Stormwater Management measures.

Those Stormwater Runoff Control measures such as detention ponds that will also serve in the Post-Construction Stormwater Management Plan shall have construction sediment removed and full functionality restored upon the completion of the Site construction.

Each Construction Site Stormwater Runoff Control measure shall be installed immediately following the construction of the structure or feature in which the measure is intended to protect.

The contractor is responsibile for any damage and/or cleaning to the structure or feature. Corrective work incurred by the contractor shall be considered incidental to the contract.

The contractor is responsibile for compliance with the S.W.P.P.P. Any fines or punative measures incurred by the project due to failure to comply with the S.W.P.P.P. are the responsibility of the contractor. These costs shall be considered incidental to the contract, and shall not be considered an extra.

During the course of construction the S.W.P.P.P. may require additional erosion control measures to be installed to address site specific items not anticipated by this plan due to construction schedule or sequencing. It is not the intent of this plan to direct the schedule or sequencing beyond the general construction sequence. Any stormwater runoff control measures required due to construction methodology, sequencing, etc. are incidental to the contract. Corrective work and maintenance shall also be considered incidental, and shall not be considered an extra.

All items shown on these detail sheets are standard details and describe standard installation practices. Not all of these Stormwater Runoff Control measures will be utilized. See the erosion control plan for location and types of erosion control measures utilized. The stormwater checklist document will serve to further outline the S.W.P.P.P. for this project and it is considered part of the plan documents. In the event that site conditions require additional or different erosion control measures, these details serve to describe some acceptable methods.

POTENTIAL CONSTRUCTION POLLUTANT SOURCES

Potential pollutants that could enter the stormwater during construction include exposed soils, fuel and oil from leaking heavy equipment and vehicles. Equipment has the potential to leak fuel throughout the disturbed areas, or wherever construction is occurring. The contractors will inspect equipment before initiating construction and routinely thereafter. If leaks are discovered, they will be repaired before the equipment is used or new equipment will be brought to the site.

Bulk Fuel storage on-site can leak and thereby be a pollutant. All Fuel storage tanks shall meet the minimum requirements of the Fuel Storage requirements.

Exposed soils also have potential for being eroded by water and wind and must be prevented from entering the stormwater system. The contractor will install silt fence, riprap, and ditch checks in areas designated on the site development plans.

MATERIAL HANDLING AND STORAGE

Concrete Washout:
- Concrete wastewater liquid shall be fully evaporated prior to the planned capacity of the washout structure capacity being exceeded. Liquid must be disposed of offsite as wastewater.
- Concrete wastewater liquid that has not solidified may be pumped out into a secondary lined container or into a tanker and taken to an approved disposal facility.
- Concrete wastewater shall not be allowed to leak onto the ground, run into storm drains, or into any body of water. Where washout wastewater leaks onto the ground, all contaminated soils shall be excavated and disposed of properly.
- Allow concrete wastes to set. Break up and properly dispose of hardened wastes. Upon removal of waste, inspect the structure.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose of in the trash.
- Do not dump excess concrete onsite, except in designated areas.
- When concrete washout areas are no longer required, close the concrete washout systems. Dispose of all hardened concrete and other materials used to construct the system. Backfill, grade, and stabilize any holes, depressions, and other land disturbances associated with the system.

SOLID WASTE MANAGEMENT
- Select designated waste collection areas onsite.
- Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project. Provide containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow. Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should
  not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater run-on should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measure to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft. from drainage facilities and watercourses and should not be located in area prone to flooding or ponding.
- Inspect construction waste area weekly.

CHEMICALS AND LIQUIDS STORAGE AND HANDLING
- Store materials in manufacturer's containers.
- Maintain Safety Data Sheets (SDS) on all products.
- Store materials in a weatherproof/vandal resistant locker or building. Keep materials away from flammable sources.
- Follow manufacturer's instructions for the proper use and storage of all materials.
- Do not perform washing of applicators or containers of solvent, paint, grout, stucco, or other materials near or into a waterway or stormwater inlet. Wash water is to be disposed offsite as wastewater.
- Tightly seal and store paint containers and curing compounds when not required for use.
- Do not discharge excess paint to a waterway or storm system. Properly dispose of excess paint according to the manufacturer's instructions and in accordance with all Federal, State, and local regulations.
- Provide secondary containment for aboveground storage tanks or storage areas containing hazardous materials that are located outside.
- Remove collected liquid in the secondary containment area within 72 hours of its discovery to maintain the capacity.

Fertilizers
- Apply fertilizers only in the minimum amounts recommended by the manufacturer, as indicated from a soil test, or per the Indiana Stormwater Quality Manual.
- Work fertilizers into the soil to limit exposure to stormwater.
- Do not apply immediately prior to precipitation events.
- Store fertilizers in a covered area and transfer partially used bags to a sealable container to avoid spills.

Equipment and Vehicle Washing
- As feasible, perform washing offsite in a covered facility with an impervious floor and drains connected to the sanitary sewer.
- Use a dedicated site for washing. Locate wash areas at least 50 feet from stormwater inlets or water bodies.
- Do not discharge wash water if using soaps, solvents, or detergents. Only non-contaminated wash water may be discharged to stormwater.
- Inspect equipment and vehicles for leaks or worn hoses prior to washing.
- Properly dispose of contaminated wash water.

CONSTRUCTION SITE STORMWATER RUNOFF CONTROL SUMMARY OF BASIC PRINCIPLES

1. Keep disturbed area as small as possible.

2. Stabilize and/or protect disturbed areas as soon as possible.

3. Keep storm water runoff velocities low.

4. Retain sediment within immediate construction area.

The purpose of this plan is to specify methods for construction site stormwater runoff control.

All soil erosion and sedimentation control devices shall be regularly maintained by the contractor through the duration of the project. Collected silt and sedimentation shall be removed as required to maintain the effectiveness of the silt traps or sedimentation control devices. The contractor shall replace filter materials which have become ineffective due to contamination or physical deterioration. The contractor shall inspect all stormwater runoff control devices weekly and after all storm events.

The contractor shall have a log of maintenance and inspections, to be available at the site upon request of Local and State Inspectors.

If possible no grubbing should take place within 30' of an active watercourse.

GENERAL CONSTRUCTION SEQUENCE

- Installation/implementation of storm water quality measures.
- Site Clearing/demolition activities.
- Topsoil removal and stockpiling.
- Mass grading.
- Installation of underground utilities.
- Installation of curb and sidewalk.
- Construction of asphalt.
- Final grading.
- Permanent seeding/sod.

STORMWATER QUALITY CONSTRUCTION SEQUENCE

The sequence of when each measure will be implemented is summarized below.

- Post signed CSGP NOI, NPDES Permit number, CSGP NOS (when available), contact information for the site, municipal stormwater permit, and location where construction plans may be obtained in a visible location at entrance to site.
- Construct gravel construction entrance from the street to the building pad prior to construction.
- Install silt fence/fiber rolls prior to construction at construction limits.
- Construct refueling area and concrete washout area prior to construction.
- Install inlet protection at all inlets on property.
- Perform topsoil removal and stockpiling. Soil stockpiles created on site to be protected from erosion with silt fence around the base.
- Perform mass grading of the site subgrade.
- Establish connection between new storm sewer and existing storm sewer.
- Install underground utilities.
- Upon completion of the rough grading, all areas affected by construction shall be temporarily seeded if they will remain dormant for greater than 7 days. These areas shall be stabilized within 7 days of remaining dormant and erosion control blankets shall be installed on slide slopes as shown on the plans.
- Re-seed any areas disturbed by construction and utilities installation with temporary seed mix within 3 days of completion of disturbance.
- Grade site to final elevations.
- Install curbs, sidewalk, pavement, and aggregate subbase.
- Install permanent seeding or sod.
- Maintain temporary erosion control features until construction is complete.
- Remove temporary erosion control measures once permanent vegetative cover has been established.
- Submit the the Notice of Termination for the Construction Stormwater General (CSGP) permit.

See attached details for acceptable erosion and sedimentation control installation methods.

TYPES OF CONTROL DEVICES

The Construction Site Stormwater Runoff Control Plan involves the use of four types of control devices to manage runoff thereby assuring that runoff meets the current requirements for stormwater quality.

1. Erosion Control
   a. Chemical Stabilization
   b. Geotextiles
   c. Scour Stop
   d. Riprap
   e. Mulching
   f. Soil Roughening
   g. Topsoil Utilization
   h. Seeding
   i. Sodding
2. Runoff Control
   a. Check Dams
   b. Temporary Diversion Dikes
   c. GeoRidge Ditch Berms
3. Sediment Control
   a. Polymer Systems (Floc Logs)
   b. Fiber Rolls
   c. Sediment Basins
   d. Dewatering Bags
   e. Silt Fence
   f. Storm Drain Inlet Protection
   g. Construction Entrances
   h. Construction Entrance Mud Mats
4. Material Management (housekeeping)
   a. Concrete Washouts
   b. Spill Prevention and Control Plan
   c. Fuel Storage
   d. Stockpiles
   e. Temporary Facilities
   f. Material Handling and Storage

SELF MONITORING PROGRAM

The contractor shall perform inspections weekly and after each storm event of 0.5" or more throughout the construction process for all Construction Site Stormwater Runoff Control measures.

See the Maintenance Section under each measure, or follow the manufacturers recommendations for routine maintenance.

The attached self monitoring form shall be used to monitor the Construction Site Stormwater Runoff Control measures. A binder of the weekly forms shall be kept and available upon request.

The contractors will inspect equipment before initiating construction and routinely thereafter to assure that mechanical equipment is not polluting the stormwater runoff.

SELF MONITORING FORM

Date: ______________________
Project: ______________________
Inspected by: ______________________
Type of Inspection: ☐ Scheduled Weekly ☐ Rain Event

CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG
(To be Completed by Property Owner or Agent)

All stormwater pollution prevention BMPs shall be inspected and maintained as needed to ensure continued performance of their intended function during construction and shall continue until the entire site has been stabilized and a Notice of Termination has been issued. An inspection of the project site must be completed by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Maintenance and repair shall be conducted in accordance with the accepted site plans. This log shall be kept as a permanent record and must be made available to the Municipal Engineer, in an organized fashion, within forty-eight (48) hours upon request.

Yes	No	N/A	
			1. Are all sediment control barriers, inlet protection and silt fences in place and functioning properly?
			2. Are all erodible slopes protected from erosion through the implementation of acceptable soil stabilization practices?
			3. Are all dewatering structures functioning properly?
			4. Are all discharge points free of any noticeable pollutant discharges?
			5. Are all discharge points free of any noticeable erosion or sediment transport?
			6. Are designated equipment washout areas properly sited, clearly marked, and being utilized?
			7. Are construction staging and parking areas restricted to areas designated as such on the plans?
			8. Are temporary soil stockpiles in approved areas and properly protected?
			9. Are construction entrances properly installed and being used and maintained?
			10. Are "Do Not Disturb" areas designated on plan sheets clearly marked on-site and avoided?
			11. Are public roads at intersections with site access roads being kept clear of sediment, debris, and mud?
			12. Is spill response equipment on-site, logically located, and easily accessed in an emergency?
			13. Are emergency response procedures and contact information clearly posted?
			14. Is solid waste properly contained?
			15. Is a stable access provided to the solid waste storage and pick-up area?
			16. Are hazardous materials, waste or otherwise, being properly handled and stored?
			17. Have previously recommended corrective actions been implemented?

If you answered "no" to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective actions are to be completed.

____
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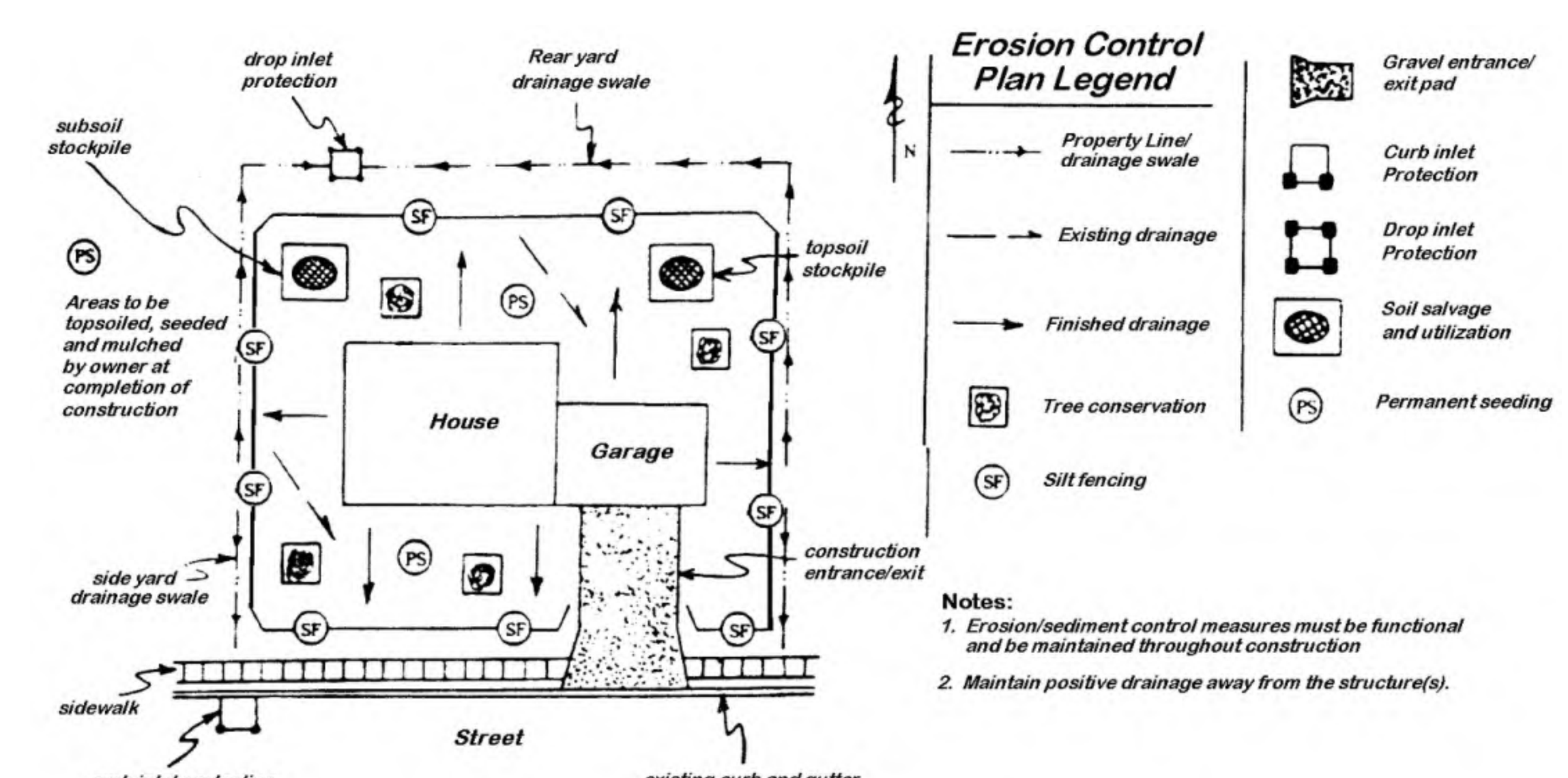
SAMPLE EROSION/SEDIMENT CONTROL PRACTICE PLAN

FOR A TYPICAL ONE OR TWO FAMILY DWELLING UNDER CONSTRUCTION



POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN

- After construction is completed, including buildings, parking lots constructed, and landscaping, the property owner will take possession of the property. When the property becomes occupied, it is no longer the responsibility of the developer to maintain the site. The responsibility for maintaining the permanent erosion and sediment control measures belongs to the current owner/s of the property. Pollutants associated with the proposed land use will most likely be very typical of commercial/retail developments. Most expected pollutants will be associated with automobiles: oil, grease, antifreeze, brake dust, rubber fragments, gasoline, diesel fuel, metals, and improper disposal of trash. It is the responsibility of the property owner/s or owners association to provide routine maintenance. Some maintenance items may include trimming vegetation, picking up litter, monitoring and cleaning catch basins, pond outlet structure and culverts. The sediment control basins protecting the stormwater quality of the site will require periodic cleaning of sediments that accumulate. After vegetation has been established, temporary erosion and sediment control measures such as silt fence and straw bales will be removed by the installing contractor.
- The plans make use of a detention pond system and green space to control the pollutants that occur after construction activities conclude.
- The post-construction stormwater quality measures will be installed as a part of the normal construction activities for the site. They shall be fully operational, and complete at the completion of construction.
- All storm water run-off shall be controlled by restrictors in the outfall pipes constructed as part of these engineering plans. The stormwater quality measures shall minimize the pollutants from stormwater run-off and therefore minimize adverse impacts to the receiving streams and riparian habitats.
- Green spaces - The green space areas of the site should receive routine fertilizing, watering, mowing and trimming to maintain a healthy landscape.
- Catch basins - Catch basins should be routinely inspected for build up of sediment. Mechanical cleaners or hand cleaning will be required to maintain the function of the catch basin.
- Storm drain flushing - In the event that the storm drains cease to function properly due to excessive sediment buildup, flushing of the storm drains may be required.
- Trees
- Native re-vegetation
- Pre-cast Storm Drain Covers
- Grass swales - Grass swales should receive routine fertilizing, watering, mowing and trimming to maintain a healthy landscape.

DVG Team Inc. has prepared this erosion and sedimentation control plan for the owner/developer in accordance with the known requirements and ordinances. It is the responsibility of the owner/developer for compliance with this erosion and sedimentation control plan and the related attachments by all subcontractors and consultants that perform work on the project site. The owner/developer is responsible for the routine inspection and maintenance of the erosion and sediment control measures. DVG Team Inc. is not responsible for the enforcement or compliance of the Erosion and Sediment Control Plan. Any additional erosion or sediment control measures beyond those specified in this plan, for unforeseen or unexpected situations, which may be required by the regulatory agencies shall be the responsibility of the owner/developer to implement.

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RUSSELL JACOB POZEN REGISTERED NO. PE10910667 STATE OF INDIANA PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/16/2025

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 11
Bldg. A-Sprouts
Stormwater Pollution Prevention Plan Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25
PROJECT NO.	
25-0081	
C301	

EROSION CONTROL MEASURES

CHEMICAL STABILIZATION

MATERIAL: SOFT PIABLE MATTING SUCH AS JUTE, COIR OR BURLAP, APPLIED POLYMER SYSTEMS, "SILT STOP" DRY POWER (OR APPROVED EQUAL).

COVERAGE: "SILT STOP" DRY POWDER IS A SOIL-SPECIFIC MATERIAL. A SOIL SAMPLE MUST BE SUBMITTED TO THE MANUFACTURER TO DETERMINE PROPER APPLICATION RATES.

INSTALLATION:
1. PREPARE THE SITE BY FILLING IN GULLIES, RILLS AND LOW SPOTS.
2. APPLY "SILT STOP" POWER (DRY) OVER DRY GROUND WITH A SEED/FERTILIZER SPREADER.
3. SELECT THE TYPE AND WEIGHT OF EROSION CONTROL BLANKET TO FIT THE SITE CONDITIONS (e.g. SLOPE, CHANNEL AND FLOW VELOCITY).

MAINTENANCE:
1. DURING VEGETATIVE ESTABLISHMENT, INSPECT AFTER STORM EVENTS FOR ANY EROSION.
2. IF ANY AREA SHOWS EROSION, REPAIR THE GRADE AND RE-APPLY "SILT STOP" POWDER AND RE-LAY AND STAPLE THE BLANKET.
3. AFTER VEGETATIVE ESTABLISHMENT, CHECK THE TREATED AREA PERIODICALLY.

GEOTEXTILES

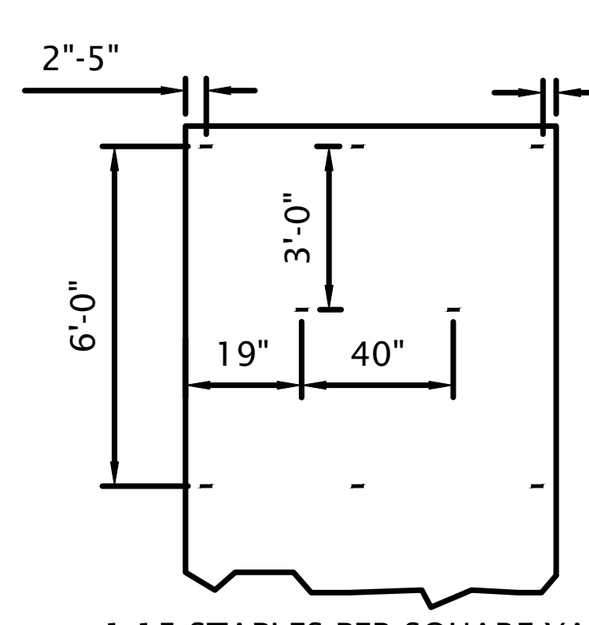
MATERIAL: NORTH AMERICAN GREEN - SC 150 or DS 150 BLANKET
SC 150 WHEN PLACEMENT OCCURS IN THE FALL/WINTER AND WHEN DURABILITY IS REQUIRED
DS 150 DEGRADES MORE RAPIDLY, ALLOWING FOR SOONER MOWING OF THE STABILIZED AREA

EROSION CONTROL BLANKET (SURFACE-APPLIED)

ANCHORING: STAPLES AS RECOMMENDED BY THE MANUFACTURER. FOR NORTH AMERICAN GREEN, USE STAPLE PATTERN "B". SEE CHART BELOW.

INSTALLATION:
1. SELECT THE TYPE AND WEIGHT OF EROSION CONTROL BLANKET TO FIT THE SITE CONDITIONS (e.g. SLOPE, CHANNEL, FLOW VELOCITY).
2. INSTALL ANY PRACTICES NEEDED TO CONTROL EROSION AND RUNOFF, SUCH AS TEMPORARY OR PERMANENT DIVERSION, SEDIMENT BASIN OR TRAP, SILT FENCE, AND/OR STRAW BALE DAM.
3. GRADE THE SITE AS SPECIFIED IN THE CONSTRUCTION PLAN.
4. ADD TOPSOIL WHERE APPROPRIATE.
5. PREPARE THE SEEDBED, FERTILIZE (AND LIME IF NEEDED) AND SEED THE AREA IMMEDIATELY AFTER GRADING.
6. FOLLOW MANUFACTURER'S DIRECTIONS AND LAY THE BLANKETS ON THE SEEDED AREA SUCH THAT THEY ARE IN CONTINUOUS CONTACT WITH THE SOIL AND THAT THE UPSLOPE OR UPSTREAM ONES OVERLAP THE LOWER ONES BY AT LEAST 8 INCHES.
7. TUCK THE UPPERMOST EDGE OF THE UPPER BLANKETS INTO A CHECK SLOT (SLIT TRENCH), BACKFILL WITH SOIL, AND TAMP DOWN.
8. ANCHOR THE BLANKETS AS SPECIFIED BY THE MANUFACTURER.

MAINTENANCE:
1. DURING VEGETATIVE ESTABLISHMENT, INSPECT AFTER STORM EVENTS FOR ANY EROSION BELOW THE BLANKET.
2. IF ANY AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE BLANKET COVERING IT, ADD SOIL, RE-SEED THE AREA, AND RE-LAY AND STAPLE THE BLANKET.
3. AFTER VEGETATIVE ESTABLISHMENT, CHECK THE TREATED AREA PERIODICALLY.

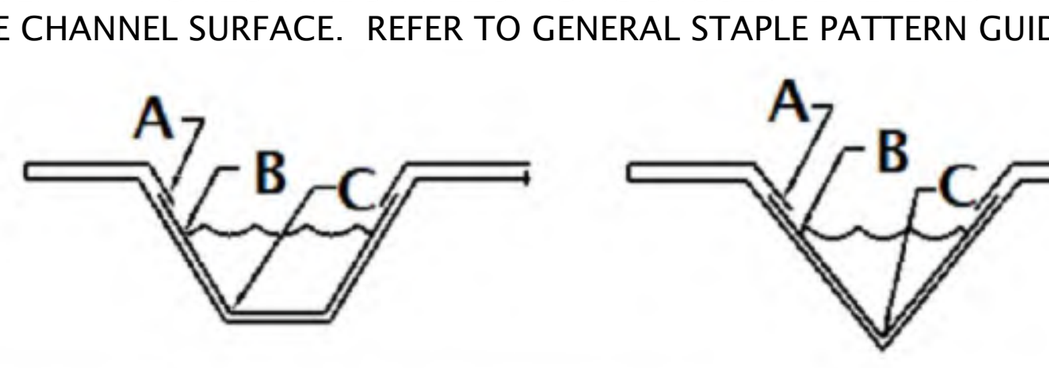


1.15 STAPLES PER SQUARE YARD
STAPLE PATTERN "B"
NORTH AMERICAN GREEN
(NOT TO SCALE)

EROSION CONTROL BLANKET (CHANNEL APPLICATION)

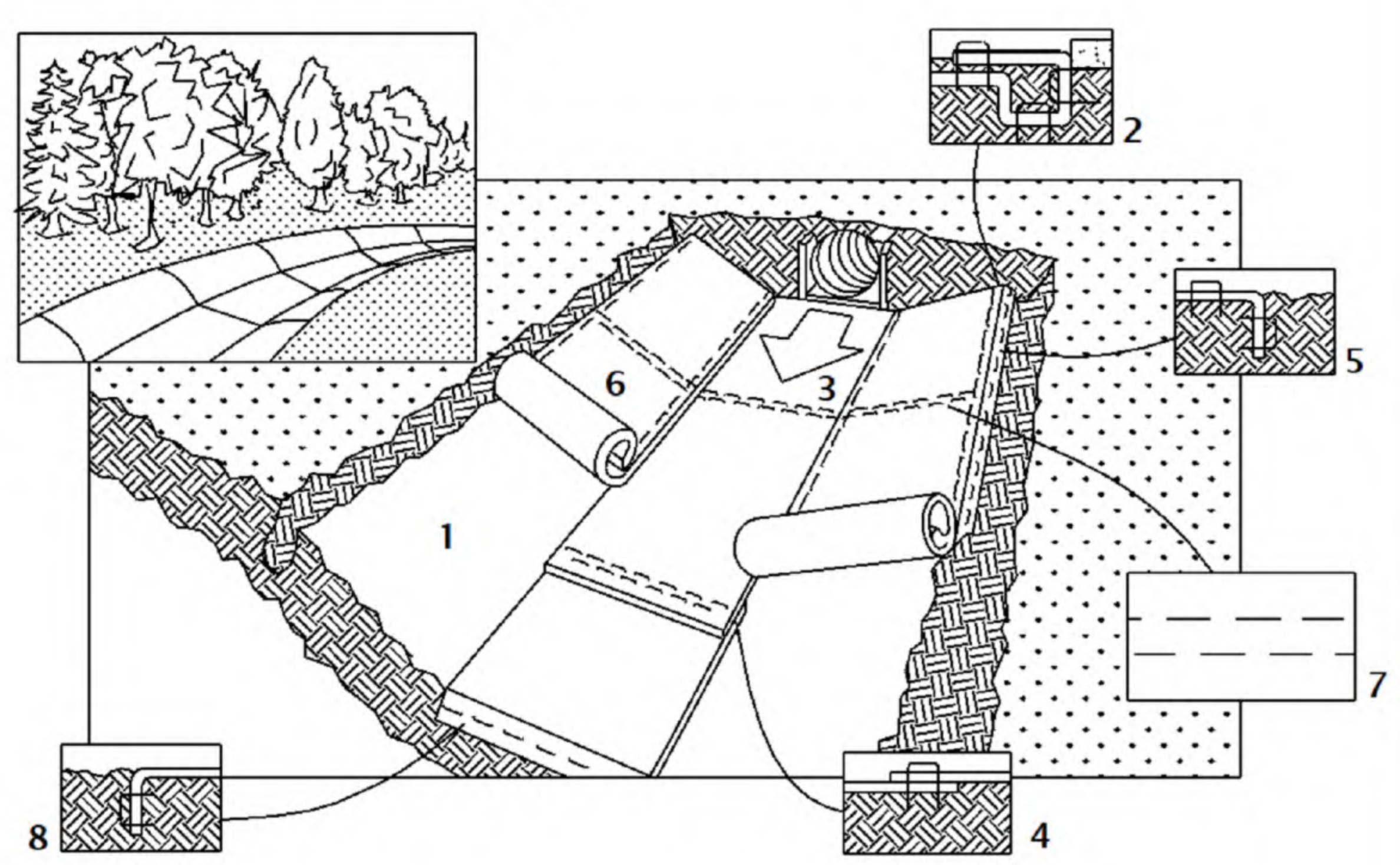
DETAIL SOURCE: NORTH AMERICAN GREEN

NOTE: HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE. REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE RECOMMENDATIONS FOR CHANNELS.



CRITICAL POINTS:

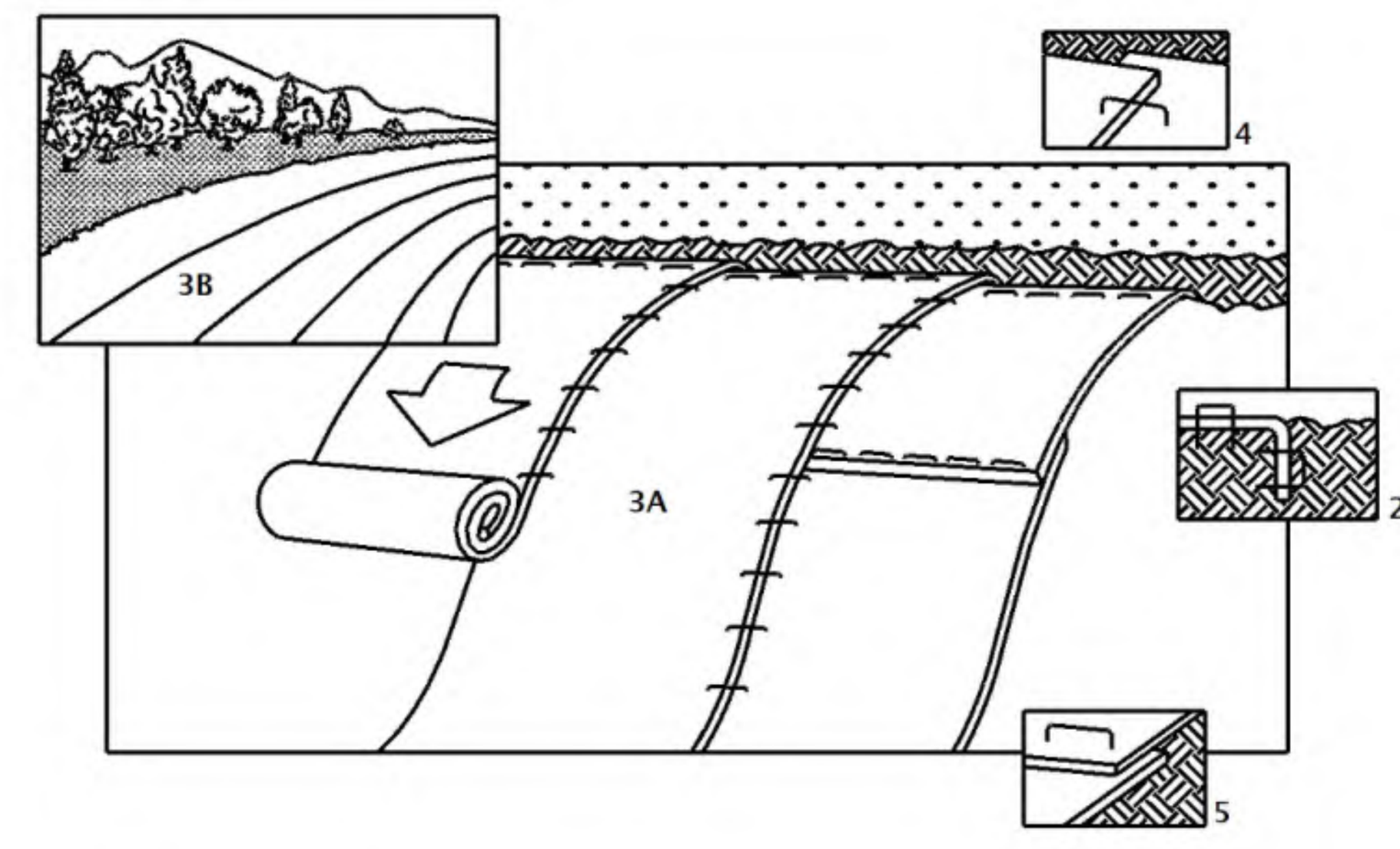
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDES, SLOPE VERTICES



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6-INCH DEEP BY 6-INCH WIDE TRENCH, BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW ON BOTTOM OF CHANNEL.
4. PLACE BLANKETS END OVER END (SHINGLE-STYLE) WITH A 6-INCH OVERLAP. USE A DOUBLE ROW OF STAGGERED STAPLES 4 INCHES APART TO SECURE BLANKETS.
5. FULL LENGTH EDGE OF BLANKETS AT THE TOP OF SIDE SLOPES MUST BE ANCHORED IN 6-INCH DEEP BY 6-INCH WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. BLANKETS ON SIDE SLOPES MUST BE OVERLAPPED 4 INCHES OVER THE CENTER OF BLANKET AND STAPLED (2 INCHES FOR C350 MATTING).
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 FT. TO 40 FT. INTERVALS. USE A ROW OF STAPLES 4 INCHES APART OVER ENTIRE WIDTH OF CHANNEL. PLACE A SECOND ROW 4 INCHES BELOW THE FIRST ROW IN A STAGGERED PATTERN.
8. THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED IN A 6-INCH DEEP BY 6-INCH WIDE TRNECH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

EROSION CONTROL BLANKET (SIDE SLOPE APPLICATION)

DETAIL SOURCE: NORTH AMERICAN GREEN



NOTE: REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE RECOMMENDATIONS FOR CHANNELS.

DIRECTIONS:
1. PREPARE SOIL BEFORE INSTALLING BLANKETS INCLUDING APPLICATION OF LIME, FERTILIZER AND SEED. WHEN USING CELL-O-SEED, DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET 6-INCHEDEEP BY 6-INCH WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL THE BLANKETS DOWN OR HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH AN APPROXIMATELY 2-INCH OVERLAP.
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE-STYLE) WITH AN APPROXIMATELY 4-INCH OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12 INCHES APART.

RIP RAP AT PIPE OUTLET

MATERIAL: HARD, ANGULAR AND WEATHER-RESISTANT, HAVING A SPECIFIC GRAVITY OF AT LEAST 2.5
GRADATION: WELL-GRADED STONE, 50% (BY WEIGHT LARGER THAN THE SPECIFIED d50; HOWEVER, THE LARGEST PIECES SHOULD NOT EXCEED TWO TIMES THE SPECIFIED d50 AND NO MORE THAN 15% OF THE PIECES (BY WEIGHT) SHOULD BE LESS THAN 3 INCHES.
FILTER: USE GEOTEXTILE FABRIC FOR STABILIZATION AND FILTRATION OR SAND/GRAVEL LAYER PLACED UNDER ALL PERMANENT RIP RAP INSTALLATIONS.
SLOPE: 2:1 OR FLATTER, UNLESS APPROVED IN THE EROSION AND SEDIMENT CONTROL PLAN.

SUBGRADE PREPARATION

1. REMOVE BRUSH, TREES, STUMPS AND OTHER DEBRIS.
2. EXCAVATE ONLY DEEP ENOUGH FOR BOTH FILTER AND RIP RAP. OVER-EXCAVATION INCREASES THE AMOUNT OF SPOIL CONSIDERABLY.
3. COMPACT ANY FILL MATERIAL TO THE DENSITY OF THE SURROUNDING UNDISTURBED SOIL.
4. SMOOTH THE GRADED FOUNDATION.

FILTER PLACEMENT

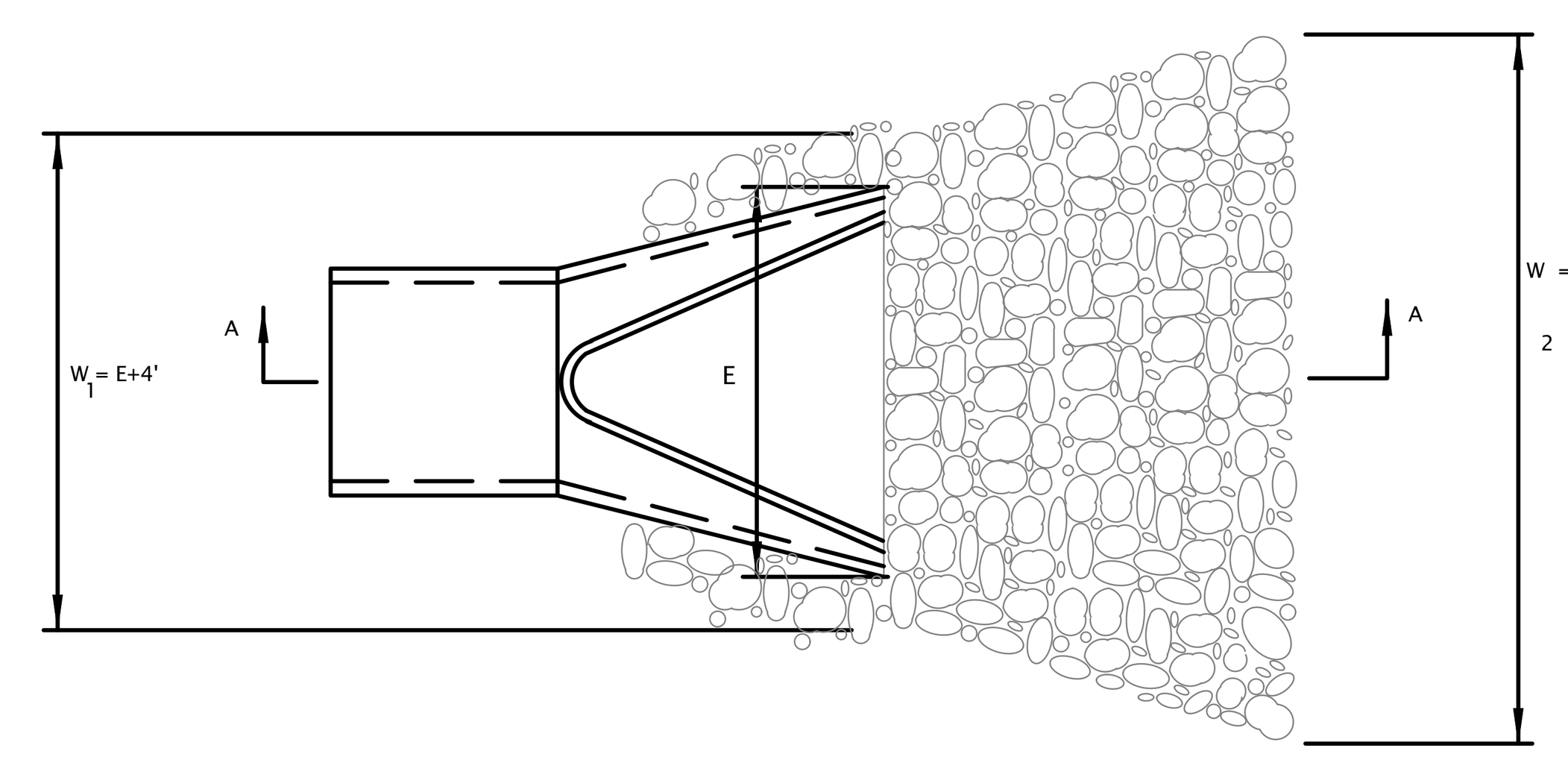
1. IF USING GEOTEXTILE FABRIC, PLACE IT ON THE SMOOTHED FOUNDATION, OVERLAP THE EDGES AT LEAST 12 INCHES AND SECURE WITH ANCHOR PINS SPACED EVERY 3 FEET ALONG THE OVERLAP.
2. IF USING A SAND/GRAVEL FILTER, SPREAD THE WELL-GRADED AGGREGATE IN A UNIFORM LAYER TO THE REQUIRED THICKNESS (6 INCHES MINIMUM); IF TWO OR MORE LAYERS ARE SPECIFIED, PLACE THE LAYER OF SMALLER GRADATION FIRST AND AVOID MIXING THE LAYERS.

RIP RAP PLACEMENT

1. IMMEDIATELY AFTER INSTALLING THE FILTER, ADD THE RIP RAP TO FULL THICKNESS IN ONE OPERATION. DO NOT DUMP THROUGH CHUTES OR USE ANY METHOD THAT CAUSES SEGREGATION OF ROCK SIZES OR THAT WILL DISLODGE OR DAMAGE THE UNDERLYING FILTER MATERIAL.
2. IF FABRIC IS DAMAGED, REMOVE THE RIP RAP AND REPAIR BY ADDING ANOTHER LAYER OF FABRIC, OVERLAPPING THE DAMAGED AREA BY 12 INCHES.
3. PLACE SMALLER ROCK IN VOIDS TO FORM A DENSE, UNIFORM AND WELL-GRADED MASS. SELECTIVE LOADING AT THE QUARRY AND SOME HAND PLACEMENT MAY BE NEEDED TO ENSURE AN EVEN DISTRIBUTION OF ROCK MATERIAL.
4. BLEND THE ROCK SURFACE SMOOTHLY WITH THE SURROUNDING AREA TO ELIMINATE PROTRUSIONS OR OVER-FALLS.

MAINTENANCE

1. INSPECT PERIODICALLY FOR DISPLACED ROCK MATERIAL, SLUMPING AND EROSION AT EDGES, ESPECIALLY DOWN-STREAM OR DOWN-SLOPE.



PLAN
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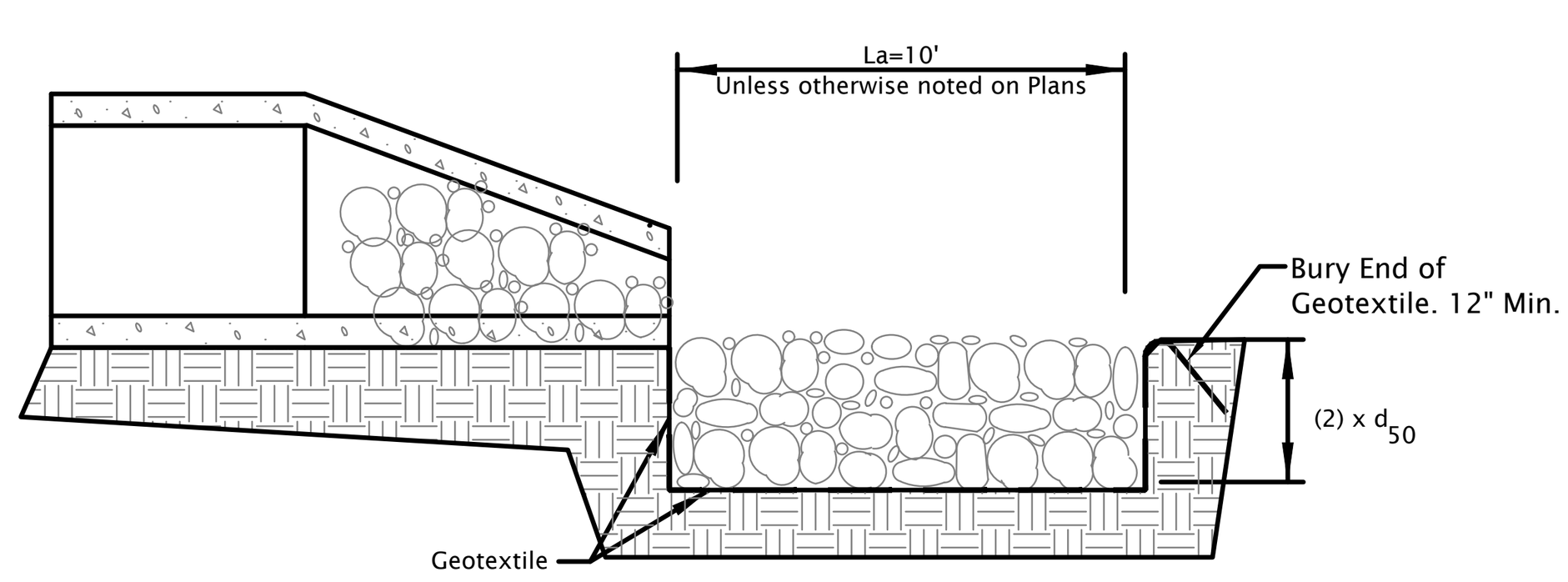
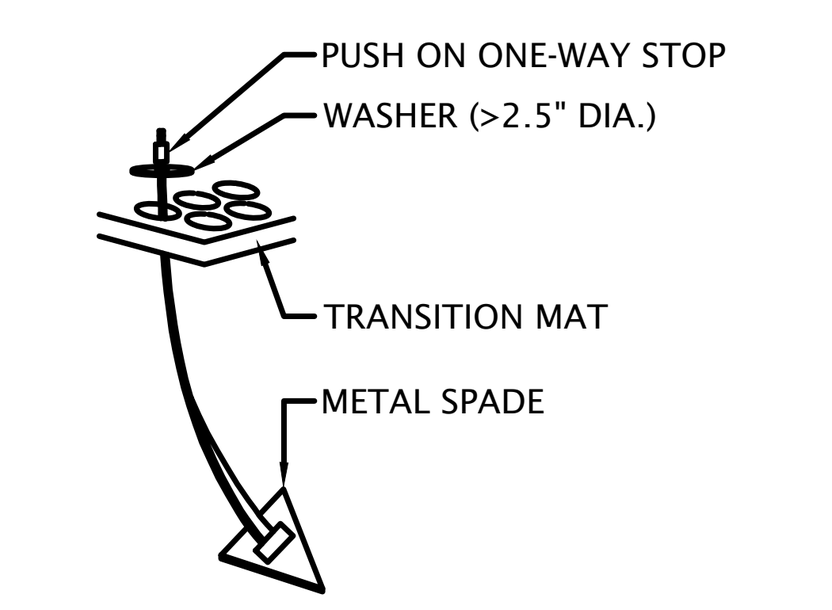


SECTION A-A
(NOT TO SCALE)

SCOURSTOP TRANSITION MAT FOR SCOUR PROTECTION

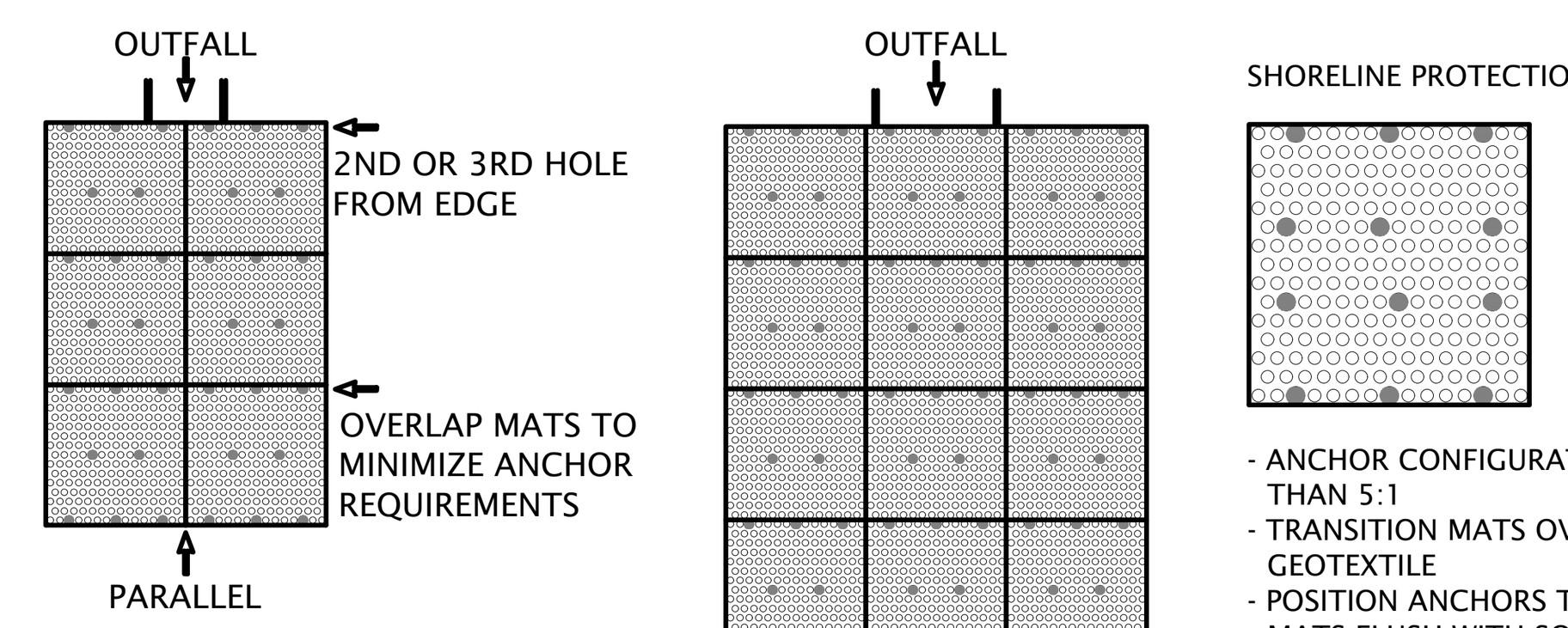
MATERIAL: SCOUR STOP TRANSITION MATS
WH SHURTLEFF COMPANY
11 WALLACE AVENUE
SOUTH PORTLAND, ME 04106
(800) 663-6149
WWW.WHSHURTLEFF.COM

PIPE DIAMETER	DISCHARGE (CFS)	SCOURSTOP WIDTHxLENGTH
12"	8	4' x 4'
24"	30	4' x 8'
36"	75	8' x 12'
48"	100	12' x 16'
60"	150	12' x 20'
72"+		SEE DETAILS

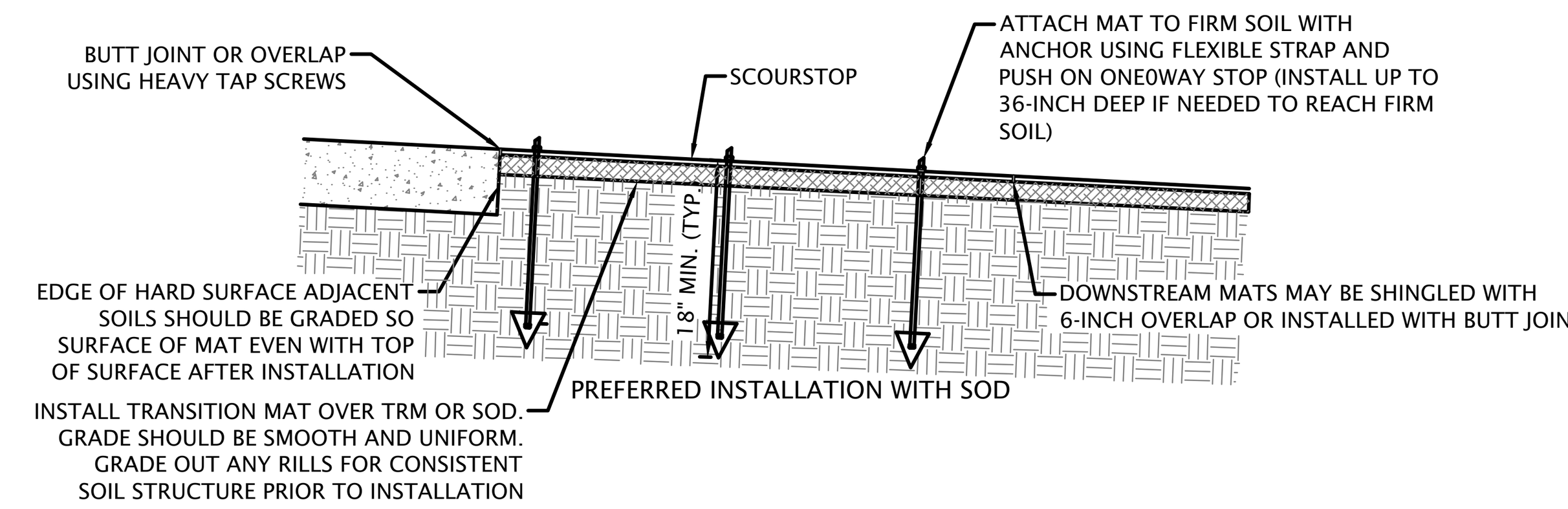


ANCHOR REQUIREMENTS*: FIRST ROW OF SCOURSTOP MATS - MINIMUM OF 8 ANCHORS
SECTION ROW OF SCOURSTOP MATS - MINIMUM OF 5 ANCHORS

* TO ENSURE CONSISTENT CONTACT WITH THE SOIL, EXCEED THE MINIMUM ANCHOR REQUIREMENT AT INSTALLATION OR IMPROVE SOIL SURFACE SMOOTHNESS



- ANCHOR CONFIGURATION FOR SLOPES STEEPER THAN 5:1
- TRANSITION MATS OVER A MINIMUM 8 OZ. GEOTEXTILE
- POSITION ANCHORS TO SECURE SCOURSTOP MATS FLUSH WITH SOIL SURFACE
- MINIMIZE GAPS OR BRIDGING



NOT TO SCALE

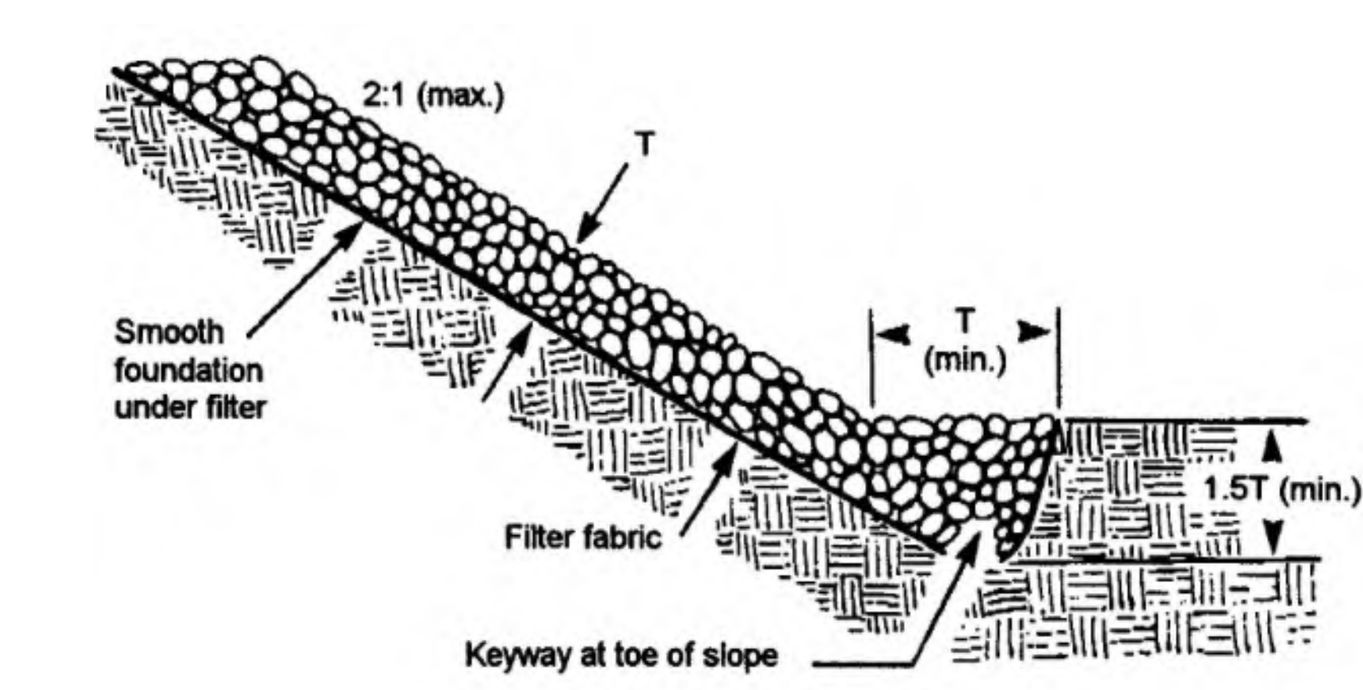
NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURERS' SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.

RIP-RAP FOR SCOUR PROTECTION

MATERIAL: HARD, ANGULAR AND WEATHER-RESISTANT, HAVING A SPECIFIC GRAVITY OF AT LEAST 2.5
GRADATION: WELL-GRADED STONE, 50% (BY WEIGHT LARGER THAN THE SPECIFIED d50; HOWEVER, THE LARGEST PIECES SHOULD NOT EXCEED TWO TIMES THE SPECIFIED d50 AND NO MORE THAN 15% OF THE PIECES (BY WEIGHT) SHOULD BE LESS THAN 3 INCHES.
FILTER: USE GEOTEXTILE FABRIC FOR STABILIZATION AND FILTRATION OR SAND/GRAVEL LAYER PLACED UNDER ALL PERMANENT RIP RAP INSTALLATIONS.
SLOPE: 2:1 OR FLATTER, UNLESS APPROVED IN THE EROSION AND SEDIMENT CONTROL PLAN.
MINIMUM THICKNESS: TWO TIMES THE SPECIFIED d50 STONE DIAMETER.

SUBGRADE PREPARATION

1. REMOVE BRUSH, TREES, STUMPS AND OTHER DEBRIS.
2. EXCAVATE ONLY DEEP ENOUGH FOR BOTH FILTER AND RIP RAP. OVER-EXCAVATION INCREASES THE AMOUNT OF SPOIL CONSIDERABLY.
3. COMPACT ANY FILL MATERIAL TO THE DENSITY OF THE SURROUNDING UNDISTURBED SOIL.
4. CUT KEYWAY IN STABLE MATERIAL AT THE BASE OF THE SLOPE TO REINFORCE TOE. KEYWAY DEPTH SHOULD BE 1.5 TIMES THE DESIGN THICKNESS OF THE RIP RAP AND SHOULD EXTEND A HORIZONTAL DISTANCE EQUAL TO THE DESIGN THICKNESS.
5. SMOOTH THE GRADED FOUNDATION



FILTER PLACEMENT

1. IF USING GEOTEXTILE FABRIC, PLACE IT ON THE SMOOTHED FOUNDATION, OVERLAP THE EDGES AT LEAST 12 INCHES AND SECURE WITH ANCHOR PINS SPACED EVERY 3 FEET ALONG THE OVERLAP.
2. IF USING A SAND/GRAVEL FILTER, SPREAD THE WELL-GRADED AGGREGATE IN A UNIFORM LAYER TO THE REQUIRED THICKNESS (6 INCHES MINIMUM); IF TWO OR MORE LAYERS ARE SPECIFIED, PLACE THE LAYER OF SMALLER GRADATION FIRST AND AVOID MIXING THE LAYERS.

RIP RAP PLACEMENT

1. IMMEDIATELY AFTER INSTALLING THE FILTER, ADD THE RIP RAP TO FULL THICKNESS IN ONE OPERATION. DO NOT DUMP THROUGH CHUTES OR USE ANY METHOD THAT CAUSES SEGREGATION OF ROCK SIZES OR THAT WILL DISLODGE OR DAMAGE THE UNDERLYING FILTER MATERIAL.
2. IF FABRIC IS DAMAGED, REMOVE THE RIP RAP AND REPAIR BY ADDING ANOTHER LAYER OF FABRIC, OVERLAPPING THE DAMAGED AREA BY 12 INCHES.
3. PLACE SMALLER ROCK IN VOIDS TO FORM A DENSE, UNIFORM AND WELL-GRADED MASS. SELECTIVE LOADING AT THE QUARRY AND SOME HAND PLACEMENT MAY BE NEEDED TO ENSURE AN EVEN DISTRIBUTION OF ROCK MATERIAL.
4. BLEND THE ROCK SURFACE SMOOTHLY WITH THE SURROUNDING AREA TO ELIMINATE PROTRUSIONS OR OVER-FALLS.

MAINTENANCE

1. INSPECT PERIODICALLY FOR DISPLACED ROCK MATERIAL, SLUMPING AND EROSION AT EDGES, ESPECIALLY DOWN-STREAM OR DOWN-SLOPE.

SILT FENCE

APPROACH: POOL AREA FLAT (LESS THAN 1% SLOPE), WITH SEDIMENT STORAGE OF 945 CU.FT./ACRE DISTURBED.

MATERIALS: ECONOMY BLUE STRIPE SILT FENCE WITH POSTS, MANUFACTURED BY MIDWEST CONSTRUCTION PRODUCTS AT (800) 532-2381 OR APPROVED EQUAL.

ANCHORING: 2 INCH BY 2 INCH HARDWOOD STAKES WITH A LENGTH EQUAL TO THE HEIGHT OF THE SILT FENCE PLUS 1 FOOT.

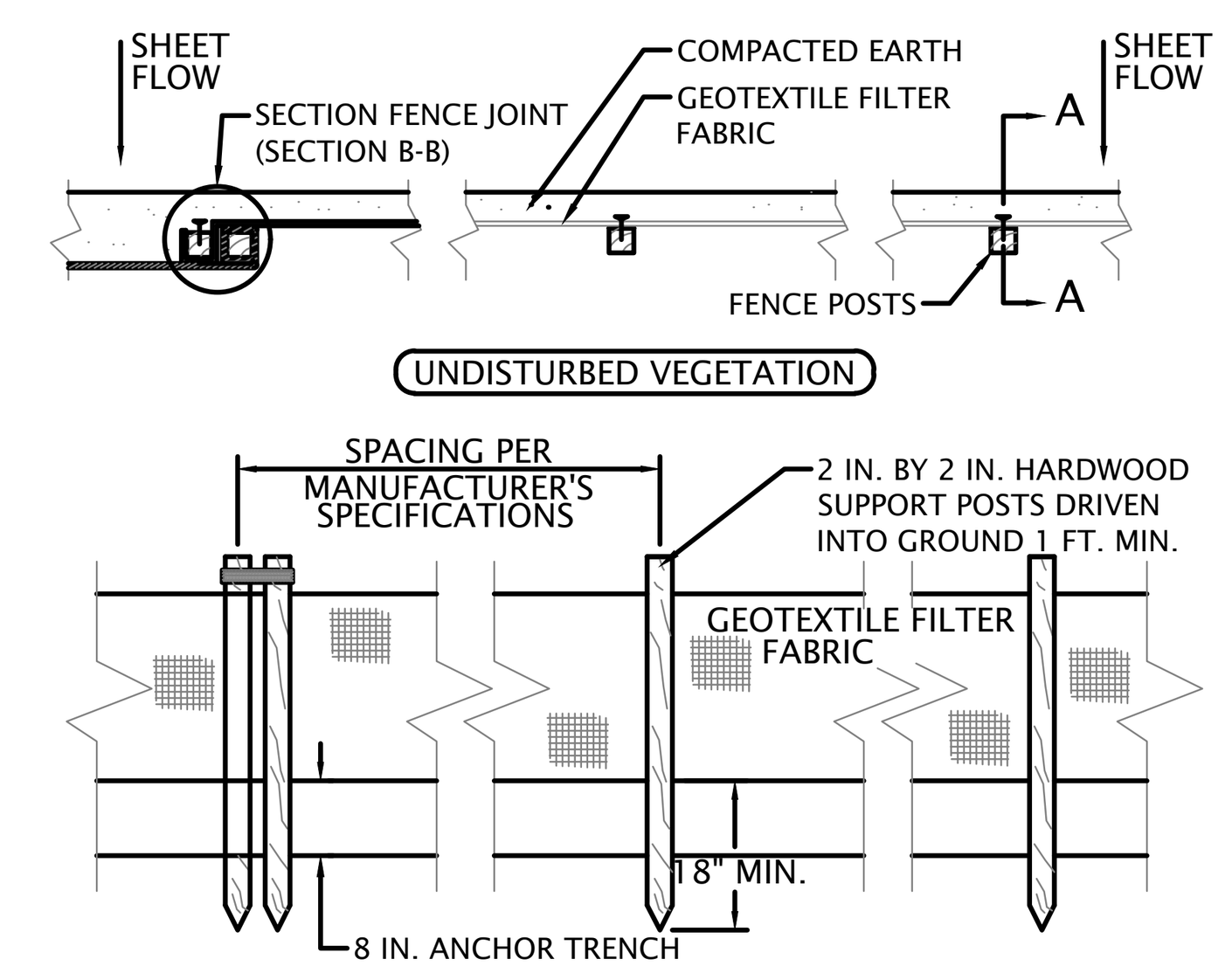
INSTALLATION:

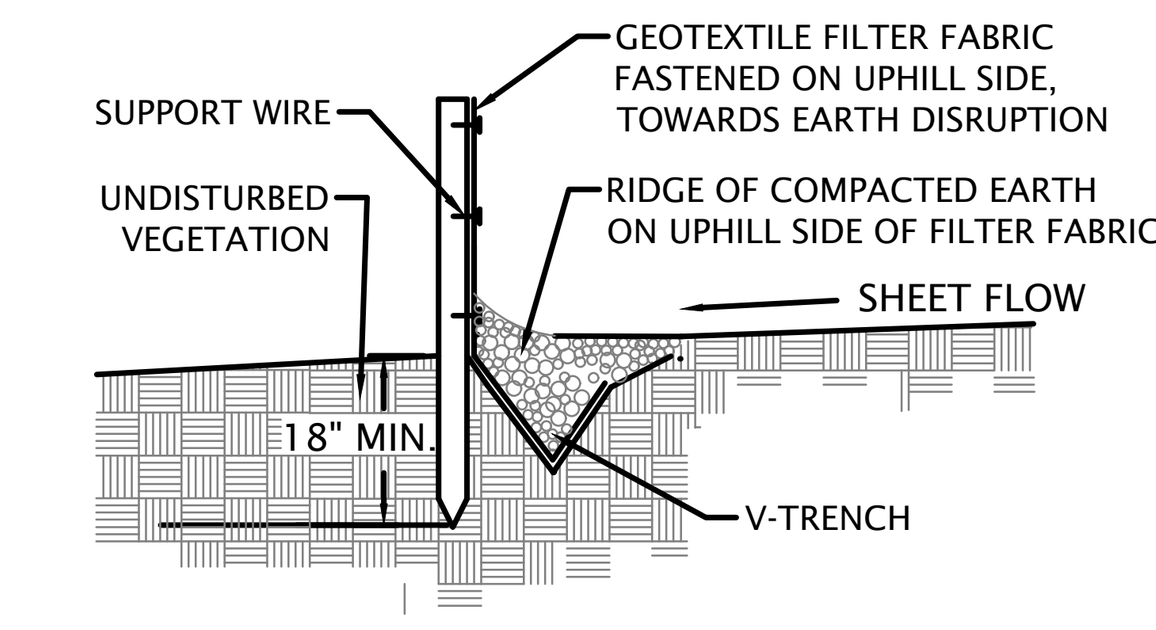
1. DRIVE STAKES 1 FT. (MINIMUM) INTO GROUND AND ATTACH FABRIC TO STAKES WITH STAPLER.
2. BOTTOM OF FABRIC SHALL BE PLACED UNDER 6 INCHES COMPACTED SOIL TO PREVENT SEDIMENT FLOW UNDERNEATH THE FENCE.
3. ENSURE THAT ALL SUPPORTING POSTS ARE ON THE DOWN SLOPE SIDE OF THE FENCING.

MAINTENANCE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR/REPLACE THE SILT FENCE AS NEEDED.

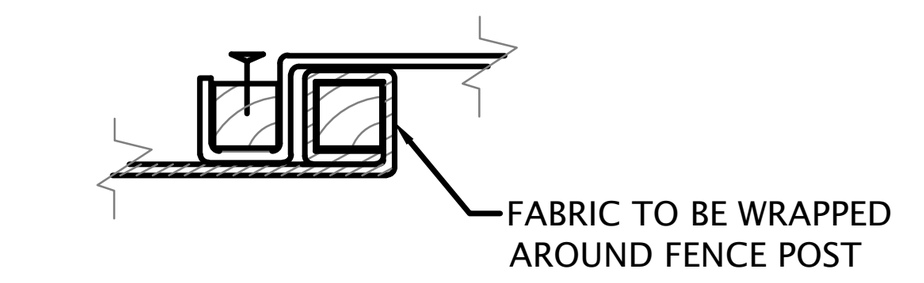
ADDITIONAL CONSIDERATIONS:
1. WHEN PROTECTING SLOPES, FENCES SHOULD BE INSTALLED PARALLEL TO THE SLOPE CONTOUR.
2. ON SLOPES, THE STEEPNESS OF GRADE WILL DETERMINE THE MAXIMUM DISTANCE BETWEEN PARALLEL FENCES.

LESS THAN 2%	100 FT. MAX.
BETWEEN 2% AND 5%	75 FT. MAX.
GREATER THAN 55	ADDITIONAL SURFACE STABILIZATION SHALL BE PROVIDED





SECTION A-A



SECTION B-B

(NOT TO SCALE)

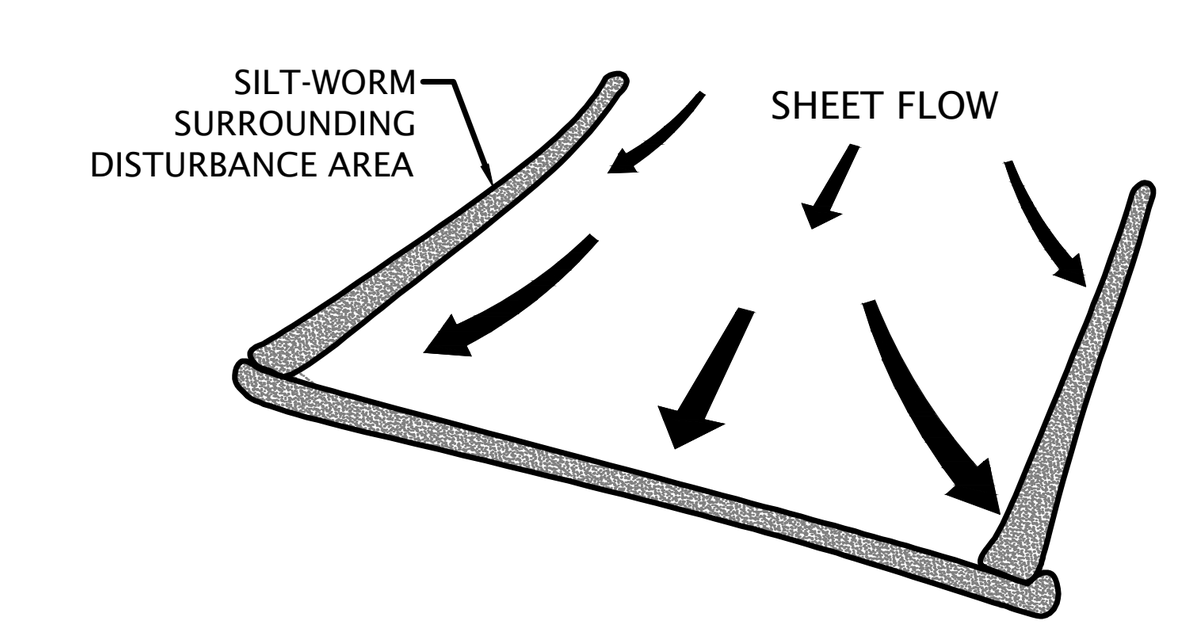
SILT-WORM

MATERIAL: SILT-WORM OR APPROVED EQUAL

DIAMETER: 9 INCHES MINIMUM

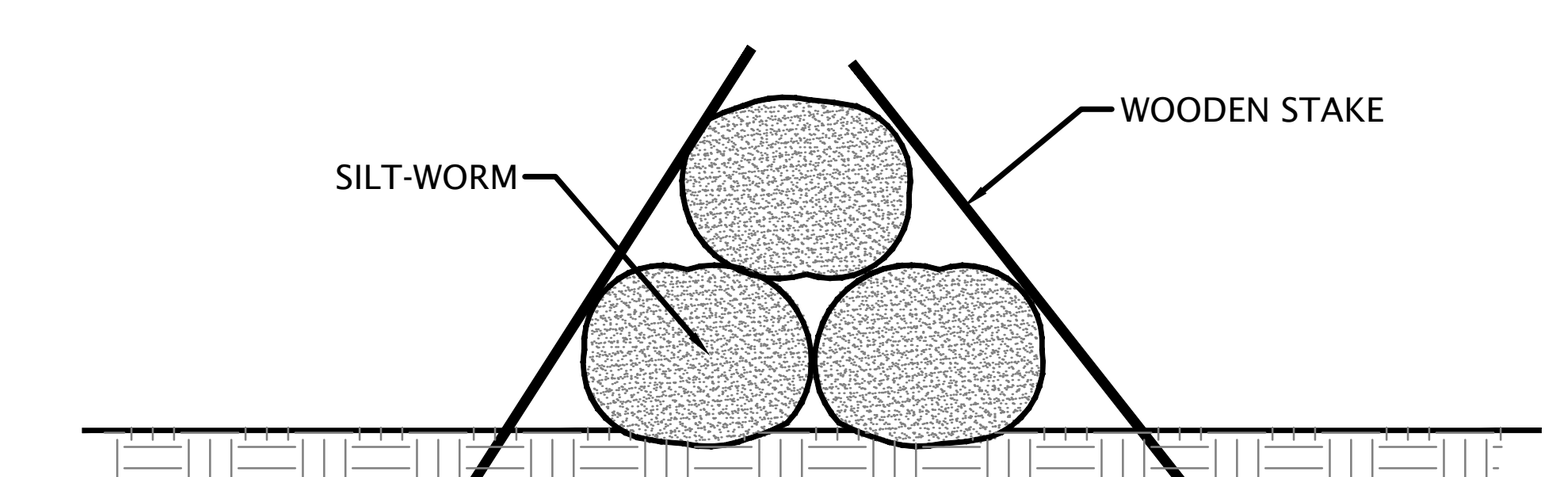
PERIMETER CONTROL

INSTALLATION:
1. PLACE SILT-WORM DIRECLY ON TOP OF GRADE FOR GRADES UNDER 12%.
2. ARRANGE PERIMETER CONTROL IN A MANNER THAT IS APPLIED PERPENDICULAR TO SHEET FLOW.
3. OVERLAP CONTIGUOUS SECTIONS OF SILT WORM AT A MINIMUM OF 6 INCHES.



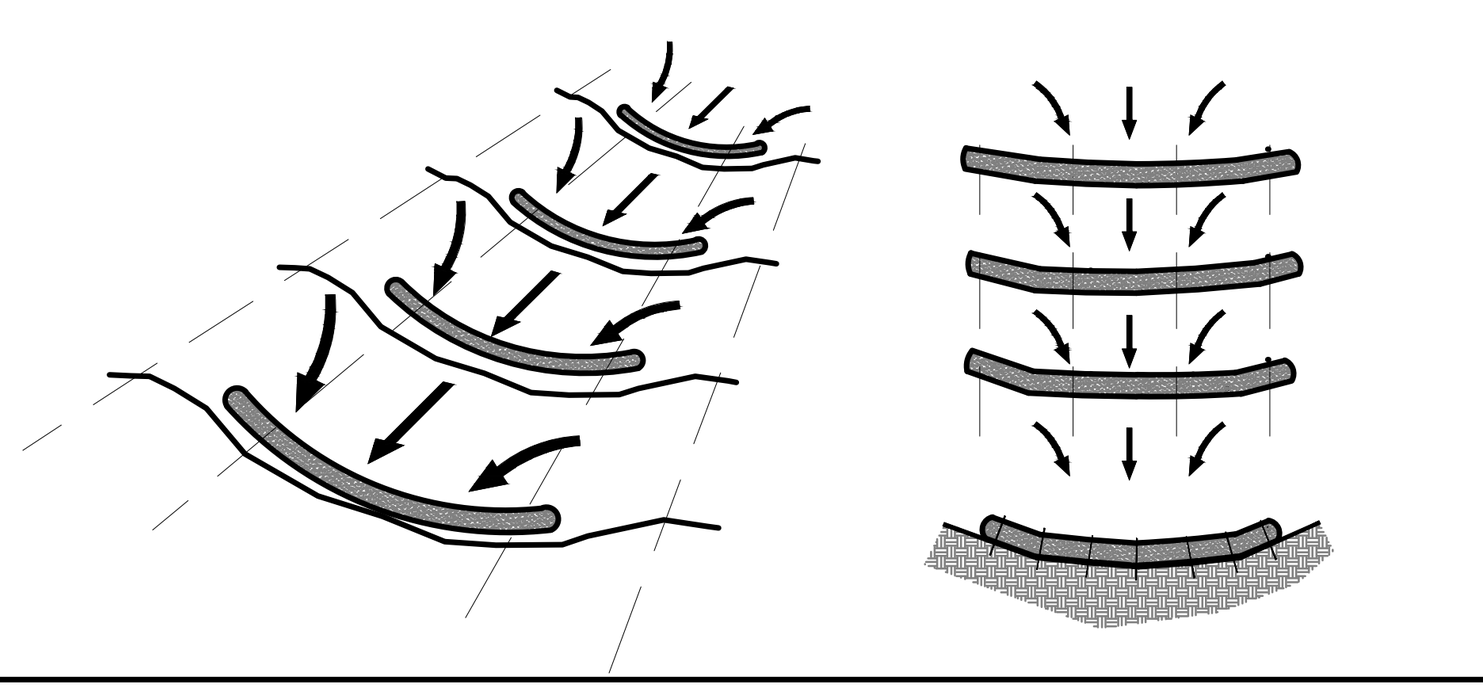
STACKING

INSTALLATION:
1. PLACE SILT-WORM DIRECTLY ON TOP OF GRADE FOR GRADES UNDER 12%.
2. STACK SILT-WORM IN A STAGGERED MANNER, AS SHOWN BELOW.
3. OVERLAP CONTIGUOUS SECTIONS OF SILT-WORM AT A MINIMUM OF 6 INCHES.



SLOPE INTERRUPTION / DITCH CHECK

INSTALLATION:
1. PLACE SILT-WORM PERPENDICULAR TO SHEET FLOW AND CURL ENDS UP TOWARD TOP OF SLOPE.
2. STAKE THE SILT-WORM EVERY 4 FEET AND OVERLAP THE ENDS BETWEEN 1 AND 2 FEET.
3. PLACE A LINE OF DEFENSE AT THE TOP OF THE SLOPE AND ANOTHER WITHIN 10 FEET FROM TOE OF SLOPE.



SPACING FOR SLOPE APPLICATION				
SLOPE	9-inch	12-inch	18-inch	24-inch
2% or less	70 ft.	80 ft.	N/A	N/A
5%	30 ft.	60 ft.	80 ft.	N/A
10%	20 ft.	30 ft.	70 ft.	80 ft.
6:1	N/A	20 ft.	40 ft.	55 ft.
4:1	N/A	20 ft.	30 ft.	30 ft.
3:1	N/A	N/A	20 ft.	25 ft.
2:1	N/A	N/A	20 ft.	20 ft.

SILT-WORM MAINTENANCE GUIDELINES

- INSPECT WITHIN 24 HOURS OF A RAIN EVENT AND AT LEAST ONCE EVERY 7 CALENDAR DAYS.
- IF SILT-WORM TEARS, STARTS TO DECOMPOSE, OR IN ANY WAY BECOMES INEFFECTIVE, REPLACE THE AFFECTED PORTION IMMEDIATELY. NOTE: ALL REPAIRS SHOULD MEET SPECIFICATIONS AS OUTLINED WITHIN THIS MEASURE.
- REMOVE DEPOSITED SEDIMENT WHEN IT IS CAUSING THE SILT-WORM TO BULGE OR WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SILT-WORM AT ITS LOWEST POINT. WHEN CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED, REMOVE THE SILT-WORM AND SEDIMENT DEPOSITS, GRADE THE SITE TO BLEND WITH THE SURROUNDING AREA, AND STABILIZE.

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB POZEN REGISTERED NO. PE10910667 STATE OF INDIANA PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/16/2025

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE: REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 11
Bldg. A-Sprouts
Stormwater Pollution
Prevention Plan Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25
PROJECT NO.	
25-0081	
C302	

EROSION CONTROL MEASURES (continued)

MULCHING

MATERIAL: STRAW, HAY, WOOD FIBER, CELLULOSE OR EXCELSIOR OR EROSION CONTROL BLANKETS OR TURF REINFORCEMENT MATS, AS SPECIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN

COVERAGE: AT LEAST 75% OF THE SOIL SURFACE

ANCHORING: REQUIRED FOR STRAW OR HAY MULCH AND SOMETIMES EXCELSIOR TO PREVENT DISPLACEMENT BY WIND AND/OR WATER

MATERIAL	RATE	COMMENTS
STRAW OR HAY	1.5 TO 2 TONS/ACRE	SHOULD BE DRY; UNCHOPPED; FREE OF UNDESIRABLE SEEDS SPREAD BY HAND OR ANCHORED MUST BE CRIMPED OR ANCHORED
WOOD FIBER OF CELLULOSE	1 TON/ACRE	APPLY WITH A HYDROMULCHER AND USE WITH TACKING AGENT
LONG FIBER WOOD (EXCELSIOR)	0.5 TO 0.75 TON/ACRE	ANCHOR IN AREAS SUBJECT TO WIND

INSTALLATION:
1. APPLY MULCH AT THE RECOMMENDED RATE.
2. SPREAD UNIFORMLY BY HAND, HAY FORK, MULCH BLOWER OR HYDROMULCHER. AFTER SPREADING, NO MORE THAN 25% OF THE GROUND SURFACE SHOULD BE VISIBLE.
3. IF STRAW OR HAY IS USED, ANCHOR IT IMMEDIATELY IN ONE OF THE FOLLOWING WAYS:

ANCHORING METHOD	HOW TO APPLY
MULCH ANCHORING TOOL OR FARM DISK (DULL, SERRATED AND SET STRAIGHT)	CRIMP OR PUNCH THE STRAW OR HAY INTO THE SOIL 2 TO 4 INCHES. OPERATE MACHINERY ON THE CONTOUR OF SLOPE.
CLEATING WITH DOZER TRACKS	OPERATE DOZER UP AND DOWN SLOPE, NOT ACROSS OR ELSE THE TRACKS WILL FORM RILLS.
WOOD HYDROMULCH FIBERS	APPLY 1 TO 2 TONS/ACRE USING A HYDROMULCHER AT A RATE OF 750 LBS./ACRE WITH A TACKING AGENT (OR ACCORDING TO CONTRACTOR SPECIFICATIONS). DO NOT USE IN AREAS OF CONCENTRATED FLOW.
ASPHALT EMULSION	EMULSIFIED ASPHALT SHOULD CONFORM TO THE REQUIREMENTS OF ASTEM SPEC. #977. APPLY WITH SUITABLE EQUIPMENT AT A RATE OF 0.05 GAL/SY. DO NOT USE IN AREAS OF CONCENTRATED FLOW.
SYNTHETIC TACKIFIER, BINDER OR SOIL STABILIZER	APPLY ACCORDING TO MANUFACTURER'S RECOMMENDATIONS
BIODEGRADABLE NETTING (POLYPROPYLENE OR SIMILAR MATERIAL)*	APPLY OVER MULCH AND STAPLE WITH 6 TO 8 INCH WIRE STAPLES. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION. BEST SUITED TO SLOPE APPLICATION.

* INSTALL THE NETTING IMMEDIATELY AFTER APPLYING THE MULCH. IN AREAS OF CONCENTRATED WATER FLOW, LAY NETTING PARALLEL TO THE DIRECTION OF FLOW. ON OTHER SLOPES, LAY NETTING EITHER PARALLEL OR PERPENDICULAR TO DIRECTION OF FLOW. EDGES OF ADJACENT NETTING STRIPS SHOULD OVERLAP 4 TO 6 INCHES WITH THE STRIP ON THE UPGRADE SIDE OF ANY LATERAL WATER FLOW ON TOP. INSTALLATION DETAILS ARE SITE SPECIFIC, SO FOLLOW THE MANUFACTURER'S DIRECTIONS.

MAINTENANCE:
1. INSPECT AFTER STORM EVENTS TO CHECK FOR MOVEMENT OF MULCH OR FOR EROSION.
2. IF WASHOUT, BREAKAGE, OR EROSION IS PRESENT, REPAIR THE SURFACE, THEN RE-SEED, RE-MULCH AND, IF APPLICABLE, INSTALL NEW NETTING.
3. CONTINUE INSPECTIONS UNTIL VEGETATION IS FIRMLY ESTABLISHED.

SOIL ROUGHENING

DESCRIPTION:
SOIL ROUGHENING IS A TEMPORARY EROSION CONTROL PRACTICE OFTEN USED IN CONJUNCTION WITH GRADING. SOIL ROUGHENING INVOLVES INCREASING THE RELIEF OF A BARE SOIL SURFACE WITH HORIZONTAL GROOVES BY EITHER STAIR-STEPPING (RUNNING PARALLEL TO THE CONTOUR OF THE LAND) OR USING CONSTRUCTION EQUIPMENT TO TRACK THE SURFACE. SLOPES THAT ARE NOT FINE GRADED AND LEFT IN A ROUGHENED CONDITION CAN ALSO REDUCE EROSION. SOIL ROUGHENING REDUCES RUNOFF VELOCITY, INCREASES INFILTRATION, REDUCES EROSION, TRAPS SEDIMENT, AND PREPARES THE SOIL FOR SEEDING AND PLANTING BY GIVING SEED AN OPPORTUNITY TO TAKE HOLD AND GROW.

APPLICABILITY:
SOIL ROUGHENING IS APPROPRIATE FOR ALL SLOPES, BUT WORKS ESPECIALLY WELL ON SLOPES GREATER THAN 3:1, ON PILES OF EXCAVATED SOIL, AND IN AREAS WITH HIGHLY ERODIBLE SOILS. THIS TECHNIQUE IS ESPECIALLY APPROPRIATE FOR SOILS THAT ARE FREQUENTLY DISTURBED, BECAUSE ROUGHENING IS RELATIVELY EASY. TO SLOW EROSION, ROUGHEN THE SOIL AS SOON AS POSSIBLE AFTER THE VEGETATION HAS BEEN REMOVED FROM THE SLOPE OR IMMEDIATELY AFTER GRADING ACTIVITIES HAVE CEASED (TEMPORARILY OR PERMANENTLY). USE THIS PRACTICE IN CONJUNCTION WITH SEEDING, PLANTING, AND TEMPORARY MULCHING TO STABILIZE AN AREA. A COMBINATION OF SURFACE ROUGHENING AND VEGETATION IS APPROPRIATE FOR STEEPER SLOPES AND SLOPES THAT WILL BE LEFT BARE FOR LONGER PERIODS OF TIME.

SITING AND DESIGN CONSIDERATIONS:
ROUGHENED SLOPE SURFACES HELP ESTABLISH VEGETATION, IMPROVE INFILTRATION, AND DECREASE RUNOFF VELOCITY. A ROUGH SOIL SURFACE ALLOWS SURFACE PONDING THAT PROTECTS LIME, FERTILIZER, AND SEED AND DECREASES EROSION POTENTIAL. GROOVES IN THE SOIL ARE COOLER AND PROVIDE MORE FAVORABLE MOISTURE CONDITIONS THAN HARD, SMOOTH SURFACES. THESE CONDITIONS PROMOTE SEED GERMINATION AND VEGETATIVE GROWTH.
AVOID EXCESSIVE SOIL COMPACTING, BECAUSE THIS INHIBITS VEGETATION GROWTH AND CAUSES HIGHER RUNOFF VELOCITY. LIMIT ROUGHENING WITH TRACKED MACHINERY TO SANDY SOILS THAT DO NOT COMPACT EASILY; ALSO, AVOID TRACKING ON HEAVY CLAY SOILS, ESPECIALLY WHEN WET. SEED ROUGHENED AREAS AS QUICKLY AS POSSIBLE, AND FOLLOW PROPER PROCEDURES.
DEPENDING ON THE TYPE OF SLOPE AND THE AVAILABLE EQUIPMENT, USE DIFFERENT METHODS FOR ROUGHENING SOIL ON A SLOPE. THESE INCLUDE STAIR-STEP GRADING, GROOVING, AND TRACKING. WHEN CHOOSING A METHOD, CONSIDER FACTORS SUCH AS SLOPE STEEPNESS, MOWING REQUIREMENTS, WHETHER THE SLOPE IS FORMED BY CUTTING OR FILLING, AND AVAILABLE EQUIPMENT. CHOOSE FROM THE FOLLOWING METHODS FOR SURFACE ROUGHENING:

- *CUT SLOPE ROUGHENING FOR AREAS THAT WILL NOT BE MOWED.* USE STAIR-STEP GRADES OR GROOVE-CUT SLOPES FOR GRADIENTS STEEPER THAN 3:1. USE STAIR-STEP GRADING ON ANY ERODIBLE MATERIAL THAT IS SOFT ENOUGH TO BE RIPPED WITH A BULLDOZER. ALSO, IT IS WELL SUITED FOR SLOPES CONSISTING OF SOFT ROCK WITH SOME SUBSOIL. MAKE THE VERTICAL CUT DISTANCE LESS THAN THE HORIZONTAL DISTANCE, AND SLOPE THE HORIZONTAL PORTION OF THE STEP SLIGHTLY TOWARD THE VERTICAL WALL. KEEP INDIVIDUAL VERTICAL CUTS LESS THAN 2 FEET DEEP IN SOFT MATERIALS AND LESS THAN 3 FEET DEEP IN ROCKY MATERIALS.
- *GROOVING.* THIS TECHNIQUE USES MACHINERY TO CREATE A SERIES OF RIDGES AND DEPRESSIONS THAT RUN ACROSS THE SLOPE ALONG THE CONTOUR. MAKE GROOVES USING ANY APPROPRIATE IMPLEMENT THAT CAN BE SAFELY OPERATED ON THE SLOPE, SUCH AS DISKS, TILLERS, SPRING HARROWS, OR THE TEETH ON A FRONT-END LOADER BUCKET. MAKE THE GROOVES LESS THAN 3 INCHES DEEP AND LESS THAN 15 INCHES APART.
- *FILL SLOPE ROUGHENING FOR AREAS THAT WILL NOT BE MOWED.* FILL SLOPES WITH A GRADIENT STEEPER THAN 3:1 SHOULD BE PLACED IN LIFTS LESS THAN 9 INCHES, AND PROPERLY COMPACT EACH LIFT. THE FACE OF THE SLOPE SHOULD CONSIST OF LOOSE, UNCOMPACTED FILL 4 TO 6 INCHES DEEP. IF NECESSARY, ROUGHEN THE FACE OF THE SLOPES BY GROOVING THE SURFACE AS DESCRIBED ABOVE. DO NOT BLADE OR SCRAPE THE FINAL SLOPE FACE.
- *CUTS, FILLS, AND GRADED AREAS THAT WILL BE MOWED.* MAKE MOWED SLOPES NO STEEPER THAN 3:1. ROUGHEN THESE AREAS WITH SHALLOW GROOVES LESS THAN 10 INCHES APART AND DEEPER THAN 1 INCH USING NORMAL TILLING, DISKING, OR HARROWING EQUIPMENT (A CULTIPACKER-SEEDER CAN ALSO BE USED). EXCESSIVE ROUGHNESS IS UNDESIRABLE WHERE MOWING IS PLANNED.
- *ROUGHENING WITH TRACKED MACHINERY.* TO AVOID UNDUE COMPACTION OF THE SOIL SURFACE, LIMIT ROUGHENING WITH TRACKED MACHINERY ONLY TO SANDY SOILS. OPERATE TRACKED MACHINERY PERPENDICULARLY TO THE SLOPE TO LEAVE HORIZONTAL DEPRESSIONS IN THE SOIL. TRACKING IS GENERALLY NOT AS EFFECTIVE AS OTHER ROUGHENING METHODS.

LIMITATIONS:
SOIL ROUGHENING IS NOT APPROPRIATE FOR ROCKY SLOPES. TRACKED MACHINERY CAN EXCESSIVELY COMPACT THE SOIL. TYPICALLY, SOIL ROUGHENING IS EFFECTIVE ONLY FOR GENTLE OR SHALLOW DEPTH RAINS. IF ROUGHENING IS WASHED AWAY IN A HEAVY STORM, RE-ROUGHEN THE SURFACE AND RESEED.

MAINTENANCE CONSIDERATIONS:
INSPECT ROUGHENED AREAS AFTER STORMS TO SEE IF RE-ROUGHENING IS NEEDED. REGULAR INSPECTION SHOULD INDICATE WHERE ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES ARE NEEDED. IF RILLS (SMALL WATERCOURSES THAT HAVE STEEP SIDES AND ARE USUALLY ONLY A FEW INCHES DEEP) APPEAR, FILL, REGRADE, AND RESEED THEM IMMEDIATELY. USE PROPER METHODS.

EFFECTIVENESS:
SOIL ROUGHENING PROVIDES MODERATE EROSION PROTECTION FOR BARE SOILS WHILE VEGETATIVE COVER IS BEING ESTABLISHED. IT IS INEXPENSIVE AND SIMPLE FOR SHORT-TERM EROSION CONTROL WHEN USED WITH OTHER EROSION AND SEDIMENT CONTROLS.

TOPSOIL (SALVAGE AND UTILIZATION)

SALVAGING AND STOCKPILING:
1. DETERMINE DEPTH AND SUITABILITY OF TOPSOIL AT THE SITE.
2. PRIOR TO STRIPPING TOPSOIL, INSTALL ANY SITE-SPECIFIC DOWNSLOPE PRACTICES NEEDED TO CONTROL RUNOFF AND SEDIMENTATION.
3. REMOVE THE SOIL MATERIAL NO DEEPER THAN WHAT THE COUNTY SOIL SURVEY DESCRIBES AS "SURFACE SOIL" (i.e., A OR AP HORIZON).
4. STOCKPILE THE MATERIAL IN ACCESSIBLE LOCATIONS THAT NEITHER INTERFERE WITH OTHER CONSTRUCTION ACTIVITIES NOR BLOCK NATURAL DRAINAGE; AND INSTALL SILT FENCES, STRAW BALES, OR OTHER BARRIERS TO TRAP SEDIMENT. (SEVERAL SMALLER PILES AROUND THE CONSTRUCTION SITE ARE USUALLY MORE EFFICIENT AND EASIER TO CONTAIN THAN ONE LARGE PILE.)
5. IF SOIL IS STOCKPILED FOR MORE THAN 6 MOS., IT SHOULD BE TEMPORARILY SEEDED OR COVERED WITH A TARP OR SURROUNDED BY A SEDIMENT BARRIER.

SPREADING TOPSOIL:
1. PRIOR TO APPLYING TOPSOIL, GRADE THE SUBSOIL AND ROUGHEN THE TOP 3-4 IN. BY DISKING. THIS HELPS THE TOPSOIL BOND WITH THE SUBSOIL.
2. DO NOT APPLY TOPSOIL WHEN THE SITE IS WET, MUDDY OR FROZEN, BECAUSE IT MAKES SPREADING DIFFICULT, INHIBITS BONDING, AND CAN CAUSE COMPACTION PROBLEMS.
3. APPLY TOPSOIL EVENLY TO A DEPTH OF AT LEAST 4 IN. (8-12 IN. IF THE UNDERLYING MATERIAL IS BEDROCK, LOOSE SAND, ROCK FRAGMENTS, GRAVEL OR OTHER UNSUITABLE SOIL MATERIAL) COMPACT SLIGHTLY TO IMPROVE CONTACT WITH THE SUBSOIL.
4. AFTER SPREADING, GRADE AND STABILIZE.

MAINTENANCE:
2. INSPECT NEWLY TOPSOILED AREAS FREQUENTLY UNTIL VEGETATION IS ESTABLISHED.
3. REPAIR ERODED OR DAMAGED AREAS AND REPLANT.

TEMPORARY SEEDING

SITE PREPARATION:
1. THESE INSTALLATION PRACTICES ARE NEEDED TO CONTROL EROSION, SEDIMENTATION, AND WATER RUNOFF, SUCH AS TEMPORARY AND PERMANENT DIVERSIONS, SEDIMENT TRAPS OR BASINS, SILT FENCES, AND TRIANGULAR SILT DIKES.
2. GRADE THE SITE AS SPECIFIED IN THE CONSTRUCTION PLAN.

SEEDBED PREPARATION:
1. FERTILIZE AS REQUIRED.
2. WORK THE FERTILIZER INTO THE SOIL 2-4 IN. DEEP WITH A DISK OR RAKE OPERATED ACROSS THE SLOPE

SEEDING:
1. SELECT A SEEDING MIXTURE AND RATE FROM THE TABLE AND PLANT AT DEPTH AND ON DATES SHOWN.
2. APPLY SEED UNIFORMLY WITH A DRILL OR CULTIPACKER-SEEDER OR BY BROADCASTING, AND COVER TO THE DEPTH SHOWN.
3. IF DRILLING OR BROADCASTING, FIRM THE SEEDBED WITH A ROLLER OR CULTIPACKER.
4. MULCH SEEDED AREAS TO INCREASE SEEDING SUCCESS.
5. UPON COMPLETION OF THE ROUGH GRADING, ALL AREAS AFFECTED BY CONSTRUCTION SHALL BE TEMPORARILY SEEDED IF THEY WILL REMAIN DORMANT FOR GREATER THAN 7 DAYS. THESE AREAS SHALL BE STABILIZED WITHIN 14 DAYS OF REMAINING DORMANT AND EROSION CONTROL BLANKETS SHALL BE INSTALLED ON SIDE SLOPES AS SHOWN ON THE PLANS.

1. MAINTENANCE
2. INSPECT PERIODICALLY AFTER PLANTING TO SEE THAT VEGETATIVE STANDS ARE ADEQUATELY ESTABLISHED, RE-SEED IF NECESSARY. CHECK FOR EROSION DAMAGE AFTER STORM EVENTS AND REPAIR, RESEED AND MULCH IF NECESSARY.
3. TOP-DRESS FALL SEEDED WHEAT OR RYE SEEDING WITH 50 LBS./ACRE OF NITROGEN IN FEBRUARY OR MARCH IF NITROGEN DEFICIENCY IS APPARENT. TEMPORARY SEEDING RECOMMENDATIONS

TEMPORARY SEEDING RECOMMENDATIONS:

SEED SPECIES	RATE/ACRE	PLANTING DEPTH	OPTIMUM DATES**
WHEAT OR RYE	150 LBS.	1 TO 1.5 INCHES	SEPTEMBER 15 TO OCTOBER 30
SPRING OATS	100 LBS.	1 INCH	MARCH 1 TO APRIL 15
ANNUAL RYEGRASS	40 LBS.	0.25 INCH	MARCH 1 TO MAY 1 AUGUST 1 TO SEPTEMBER 1
GERMAN MILLET	40 LBS.	1 TO 2 INCHES	MAY 1 TO JUNE 1
SUDANGRASS	35 LBS.	1 TO 2 INCHES	MAY 1 TO JULY 30

* PERENNIAL SPECIES MAY BE USED AS A TEMPORARY COVER, ESPECIALLY IF THE AREA TO BE SEEDED WILL REMAIN IDLE FOR MORE THAN A YEAR
** SEEDING DONE OUTSIDE THE OPTIMUM DATES INCREASES THE CHANCE OF SEEDING FAILURE

PERMANENT SEEDING

PERMANENTLY SEED ALL FINAL GRADE AREAS (E.G., LANDSCAPE BERMS, DRAINAGE SWALES, EROSION CONTROL STRUCTURES, ETC.) AS EACH IS COMPLETED AND ALL AREAS WHERE ADDITIONAL WORK IS NOT SCHEDULED FOR A PERIOD OF MORE THAN A YEAR.

SITE PREPARATION:
1. THESE INSTALLATION PRACTICES ARE NEEDED TO CONTROL EROSION, SEDIMENTATION, AND WATER RUNOFF, SUCH AS TEMPORARY AND PERMANENT DIVERSIONS, SEDIMENT TRAPS OR BASINS, SILT FENCES, AND TRIANGULAR SILT DIKES.
2. GRADE THE SITE AS SPECIFIED IN THE CONSTRUCTION PLAN AND FILL IN DEPRESSIONS THAT CAN COLLECT WATER.
3. ADD TOPSOIL TO ACHIEVE NEEDED DEPTH FOR ESTABLISHMENT OF VEGETATION.

SEEDBED PREPARATION:
1. FERTILIZE AS REQUIRED.
2. TILL THE SOIL TO OBTAIN A UNIFORM SEEDBED, WORKING THE FERTILIZER INTO THE SOIL 2-4 IN. DEEP WITH A DISK OR RAKE OPERATED ACROSS THE SLOPE.

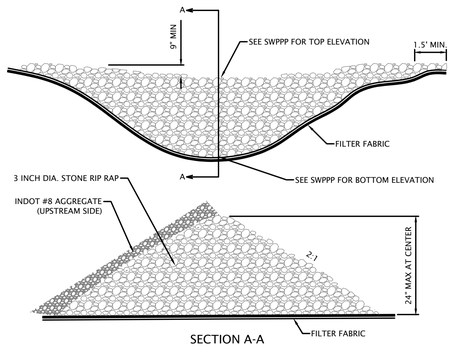
SEEDING:
OPTIMUM SEEDING DATES ARE MARCH 1-MAY 10 AND AUGUST 10-SEPTEMBER 30. PERMANENT SEEDING DONE BETWEEN MAY 10 AND AUGUST 10 MAY NEED TO BE IRRIGATED. AS AN ALTERNATIVE, USE TEMPORARY SEEDING UNTIL THE PREFERRED DATE FOR PERMANENT SEEDING.
1. SELECT A SEEDING MIXTURE AND RATE FROM THE TABLE AND PLANT AT DEPTH AND ON DATES SHOWN.
2. APPLY SEED UNIFORMLY WITH A DRILL OR CULTIPACKER-SEEDER OR BY BROADCASTING, AND COVER TO THE DEPTH SHOWN.
3. IF DRILLING OR BROADCASTING, FIRM THE SEEDBED WITH A ROLLER OR CULTIPACKER.
4. MULCH SEEDED AREAS. USE EROSION CONTROL BLANKETS ON SLOPING AREAS. IF SEEDING IS DONE WITH A HYDROSEEDER, FERTILIZER AND MULCH CAN BE APPLIED WITH THE SEED IN A SLURRY MIXTURE.

MAINTENANCE
1. INSPECT PERIODICALLY AFTER PLANTING TO SEE THAT VEGETATIVE STANDS ARE ADEQUATELY ESTABLISHED, RE-SEED IF NECESSARY.
2. CHECK FOR EROSION DAMAGE AFTER STORM EVENTS AND REPAIR, RESEED AND MULCH IF NECESSARY.

PERMANENT SEEDING RECOMMENDATIONS
THIS TABLE PROVIDES SEVERAL SEEDING OPTIONS. ADDITIONAL SEED SPECIES AND MIXTURES ARE AVAILABLE COMMERCIALLY. WHEN SELECTING A MIXTURE, CONSIDER SITE CONDITIONS, INCLUDING SOIL PROPERTIES (E.G., SOIL PH AND DRAINAGE), SLOPE ASPECT AND THE TOLERANCE OF EACH SPECIES TO SHADE AND DROUGHT.

SEED SPECIES AND MIXTURES	RATE/ACRE	OPTIMUM SOIL pH
OPEN AND DISTURBED AREAS (REMAINING IDLE FOR MORE THAN ONE YEAR)		
PERENNIAL RYEGRASS + WHITE OR LADINO DOVER	30 TO 50 LBS. 1 TO 2 LBS.	5.6 TO 7.0
KENTUCKY BLUEGRASS + SMOOTH BROMEGRASS + SWITCHGRASS + TIMOTHY + PERENNIAL RYEGRASS + WHITE OR LADINO DOVER	20 LBS. 10 LBS. 3 LBS. 4 LBS. 10 LBS. 1 TO 2 LBS.	5.5 TO 7.5

RUNOFF CONTROL MEASURES
RIP-RAP CHECK DAMS



SECTION A-A
(NOT TO SCALE)

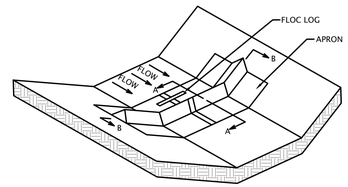
MAINTENACE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR/REPLACE THE CHECK DAMS AS NEEDED.

TRIANGULAR SILT FENCE DIKE - CHECK DAMS

MATERIAL: THE TRIANGULAR-SHAPED INNER MATERIAL SHALL BE URETHANE FORM. THE OUTER COVER SHALL BE A WOVEN GEOTEXTILE FABRIC PLACED AROUND THE INNER MATERIAL AND ALLOWED TO EXTEND BEYOND BOTH SIDES OF THE TRIANGLE 2 TO 3 FEET.

ANCHORING: THE DIKES SHALL BE ATTACHED TO THE GROUND WITH WIRE STAPLES. THE STAPLES SHALL BE #11 GAUGE WIRE AND BE AT LEAST 6 TO 8 INCHES LONG. STAPLES SHALL BE PLACED AS INDICATED ON THE INSTALLATION DETAIL.

INSTALLATION:
1. PLACE TRIANGULAR SILT FENCE DIKE AS REQUIRED.
2. ATTACHED DIKES TO THE GROUND WITH STAPLES AS INDICATED ON THE DETAIL.



SILT DIKE UNIT
CUT SECTION
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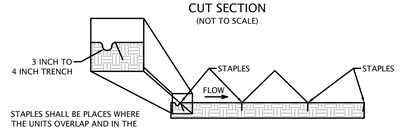
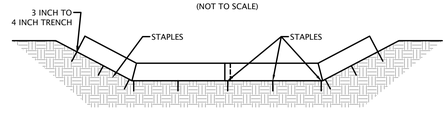


STAPLES SHALL BE PLACES WHERE THE UNITS OVERLAP AND IN THE CENTER OF THE 7 FT. UNIT AS SHOWN ON THE DIAGRAM

SECTION A-A
(NOT TO SCALE)



POINT "1" MUST BE HIGHER THAN POINT "2" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS

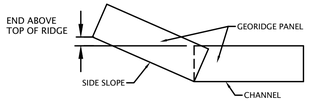
DIKE SECTION
SECTION B-B
(NOT TO SCALE)

MAINTENACE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR/REPLACE THE CHECK DAMS AS NEEDED.

GEORIDGE DITCH BERM - CHECK DAMS

MATERIAL: GEORIDGE OR GEORIDGE BIO BY NILEX PRODUCTS, AN HDPE PRODUCT THAT SERVES TO DISSIPATE WATER ENERGY WITHIN A DITCH OR CHANNEL. GEORIDGE IS TO BE USED IN APPLICATIONS WHERE THE MEASURE WILL BE REMOVED AFTER THE CHANNEL IS STABILIZED. GEORIDGE BIO CAN BE USED WHEN THE MEASURE CAN BE LEFT TO DECOMPOSE IN LIEU OF BEING REMOVED.

INSTALLATION:
1. PLACE AN EROSION CONTROL BLANKET (ECB), LAID PARALLEL WITH THE CHANNEL DIRECTION, IN THE AREA WHERE THE GEORIDGE IS TO BE PLACED. ECB SHALL BE APPROPRIATE FOR THE CHANNEL SLOPE, VOLUME AND VELOCITY.
ECB SHALL BE SECURED WITH A 4" TRENCH AT THE UPSTREAM EDGE, WITH MINIMUM 6-INCH STAPLES PLACED 21-INCH O.C. ALONG THE UPSTREAM AND DOWNSTREAM EDGES.
2. PLACE GEORIDGE BERM IN THE MIDDLE OF THE ECB, PERPENDICULAR TO THE CHANNEL FLOW DIRECTION, AND ANCHOR WITH 10-INCH SPIRAL SPIKES. A MINIMUM OF 3 ANCHORS SHALL BE USED ON THE UPSTREAM SIDE AND 2 ANCHORS ON THE DOWNSTREAM SIDE.
IF MORE THAN ONE GEORIDGE BERM PANEL IS REQUIRED TO SPAN THE CHANNEL, LINE UP THE ANCHORING HOLES FOR INSTALLATION OF THE ANCHORS.
3. WHEN PLACING THE GEORIDGE PANEL ON THE SIDE SLOPE OF THE CHANNEL, THE BOTTOM OF THE PANELS SHOULD MEET WITH THE RIDGE BEING OVERLAPPED. THIS WILL PREVENT WATER FROM PASSING THROUGH THE BERM.
ADDITIONALLY, THE OUTSIDE EDGE OF THE PANEL ON THE SIDE SLOPE SHOULD BE INSTALLED SO THAT IT IS HIGHER THAN THE TOP OF THE PANEL IN THE CHANNEL BOTTOM.



4. THE SPACING IS CALCULATED BY DIVIDING THE HEIGHT OF THE GEORIDGE BY THE GRADIENT OF THE CHANNEL SLOPE. 9-INCH / 0.0.2 GRADIENT = 450 INCHES OR 37.5 FEET

MAINTENANCE
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT WHEN IT REACHES HALF THE HEIGHT OF THE GEORIDGE.
3. REPAIR/REPLACE THE GEORIDGE AND THE EROSION CONTROL MAT AS NEEDED.

SEDIMENT CONTROL MEASURES
POLYMER SYSTEMS

MATERIAL: APS 700 SERIES FLOC LOG OR EQUAL

INSTALLATION:
1. THE FLOC LOG VENDOR SHALL SAMPLE THE WATER THAT IS TO BE TREATED WITH THE SYSTEM. THIS SAMPLE SHALL BE USED TO DETERMINE THE SITE-SPECIFIC POLYMER MIX THAT SHOULD BE USED.
2. IN APPLICATIONS WHERE THE OBJECTIVE OF THIS MEASURE IS TO MEET THE TOTAL SUSPENDED SOLIDS REQUIREMENTS PRIOR TO COMPLETION OF THE DETENTION POND; I.E. THE SIDE SLOPES ARE NOT FULLY STABILIZED, DEWATERING THE POND FOR FURTHER EXPANSION, ETC., THE FLOC LOG SHOULD BE INSTALLED AT THE END OF THE OUTFALL PIPE AND A TEMPORARY MATERIAL SUCH AS GEOJUTE SHOULD BE PLACED DOWNSTREAM OF THE FLOC LOG PROVIDING A SEDIMENT SETTLING AREA. (SEE PLANS FOR SPECIFIC INSTALLATION LOCATIONS)
3. IN APPLICATIONS WHERE THE OBJECTIVE OF THIS MEASURE IS TO MEET THE TOTAL SUSPENDED SOLIDS REQUIREMENTS AFTER THE DETENTION POND IS COMPLETED, THE FLOC LOG SHOULD BE INSTALLED AT THE END OF THE INLET PIPES INTO THE DETENTION POND. THIS WILL CAUSE THE SEDIMENT TO SETTLE MORE QUICKLY IN THE WET DETENTION POND, PROVIDING A CLEANER DISCHARGE. (SEE PLANS FOR SPECIFIC INSTALLATION LOCATIONS).
4 FOLLOWING THE USE OF THE FLOC LOG, THE SETTLED SEDIMENT WILL NEED TO BE REMOVED. THIS TEMPORARY SETTLING MEDIA REMOVED, OR THE DETENTION POND MIGHT NEED TO BE CLEANED IF SEDIMENT SETTLING HAS SIGNIFICANTLY REDUCED THE POND VOLUME.

MAINTENANCE:
1. INSPECT AFTER STORM EVENTS TO CHECK FOR MOVEMENT OF MULCH OR FOR EROSION.
2. IF WASHOUT, BREAKAGE, OR EROSION IS PRESENT IN THE SEDIMENT SETTLING MEDIA, REPAIR THE MEDIA.
3. BE SURE THE FLOC LOG IS SECURE ATTACHED AT THE INSTALLED LOCATION, VERIFY THAT STORM WATER IS HAVING CONTACT WITH THE FLOC LOG.

FIBER ROLLS

MATERIAL: TUBE SHAPED FIBER ROLLS FILLED WITH STRAW, FLAX, RICE, COCONUT FIBER MATERIAL, MULCH, OR COMPOSTED MATERIAL. EACH ROLL IS WRAPPED WITH UV-DEGRADABLE POLYPROPYLENE NETTING FOR LONGEVITY OR WITH 100 PERCENT BIODEGRADABLE MATERIALS LIKE BURLAP, JUTE, OR COIR.

INSTALLATION:
1. INSTALL ROLLS PARALLEL WITH THE SLOPE CONTOUR, WITH THE ENDS SLIGHTLY LOWER THAN THE MID-SECTION, TO PREVENT WATER PONDING AT THE MID-SECTION. TURN THE ENDS SLIGHTLY UPSLOPE TO PREVENT WATER FROM BYPASSING THE MEASURE.
2. EXCAVATE A TRENCH WITH A WIDTH AND DEPTH EQUAL TO ONE-FOURTH THE DIAMETER OF THE LOG.
3. WHERE APPLICABLE INSTALL THE MEASURE UPSLOPE OF A CURB OR SIDEWALK. PLACING THE MEASURE AGAINST THE CURB WILL PROVIDE ADDITIONAL STABILITY AND RESISTANCE TO SURFACE FLOW.
4. PLACE ROLLS END TO END TO FORM A CONTINUOUS BARRIER.
5. HARDWOOD STAKES SHALL BE DRIVEN THROUGH THE ROLLS, SPACED NO GREATER THAN 5' TO A DEPTH OF 18".
6. THE FIBER ROLLS SHOULD BE FASTENED TO THE HARDWOOD STAKES WITH ROPE.
7. BACKFILL THE TRENCH WITH EXCAVATED SOIL TO GROUND LEVEL ON THE DOWN-SLOPE SIDE AND 2" ABOVE GROUND LEVEL ON THE UP-SLOPE SIDE OF THE ROLL.

MAINTENANCE:
1. THE ROLLS SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAINFALL EVENT. INSPECTION SHOULD INCLUDE IF THE MATERIAL'S DIAMETER IS LESS THAN SPECIFICATION AND IF THE OUTER NETTING HAS BEEN DEGRADED OR BROKEN.
2. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ONE-QUARTER OF THE HEIGHT OF THE ROLL.
3. REPAIR ERODED AND DAMAGED AREAS.
4. IF PONDING BECOMES EXCESSIVE, ROLLS SHOULD BE REMOVED AND EITHER RECONSTRUCTED OR NEW PRODUCT INSTALLED.

SEDIMENT BASINS/DETENTION PONDS

MATERIAL: DEPRESSIONAL AREAS CONSTRUCTED AT THE OUTFALL OF PIPES, END OF CHANNELS, OR END OF SURFACE SHEET FLOW, WHICH SERVES TO SETTLE OUT THE SUSPENDED SOLIDS.

INSTALLATION:
1. AT LOCATIONS SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXCAVATE A SMALL BASIN. THE BASIN SIZE SHALL BE SHOWN ON THE PLANS AND IS DETERMINED BY THE VOLUME OF WATER TRIBUTARY TO THE BASIN. THE BASIN OVERFLOW ELEVATION SHALL BE LOWER THAN THE INCOMING WATER, BY A MINIMUM OF 12 INCHES.
2. THE BASIN SHALL BE LINED WITH A GEOTEXTILE FABRIC, 9" OF 4" RIPRAP SHALL BE PLACED ALL AROUND THE INSIDE OF THE BASIN.

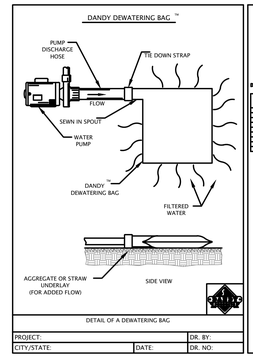
MAINTENANCE:
1. THE BASINS SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAINFALL EVENT.
2. REPLACE AND RESTORE ANY BASIN BANK EROSION.
3. REPAIR OR REPLACE ANY DISPLACED RIPRAP.
4. RE-EXCAVATE AND REPLACE THE BASIN WHEN IT BECOMES MORE THAN 50% FULL OF SEDIMENT.

DEWATERING BAGS

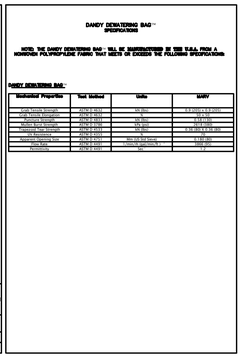
MATERIAL: "DANDY" DE-WATERING BAG OR "PUMP-IT" DE-WATERING BAG

INSTALLATION:
1. INSTALL AT LOCATION OF THE DEWATERING PUMP OUTFALL.
2. SIZE THE BAG T THE DISCHARGE RATE. THE MAXIMUM BAG SIZE MAY LIMIT THE DISCHARGE RATE OF THE PUMP.
3. CONNECT BAG TO PUMP OUTFALL PER MANUFACTURER'S INSTRUCTIONS.
4. INSTALL BAG UPSTREAM OF THE RECEIVING STRUCTURE LOCATION.
5. OUTLET TO GRASS AREA IF POSSIBLE

MAINTENANCE:
1. THE BASINS SHOULD BE INSPECTED PRIOR TO EACH USE.
2. REPLACE BAG WHEN IT IS HALF FULL.



DETAIL OF A DEWATERING BAG


DANDY DEWATERING BAG ™ SPECIFICATIONS
NOTE: THE DANDY DEWATERING BAG ™ WILL BE MANUFACTURED TO THE 'F.O.B. FROM A N

SEDIMENT CONTROL MEASURES (continued)

INLET PROTECTION

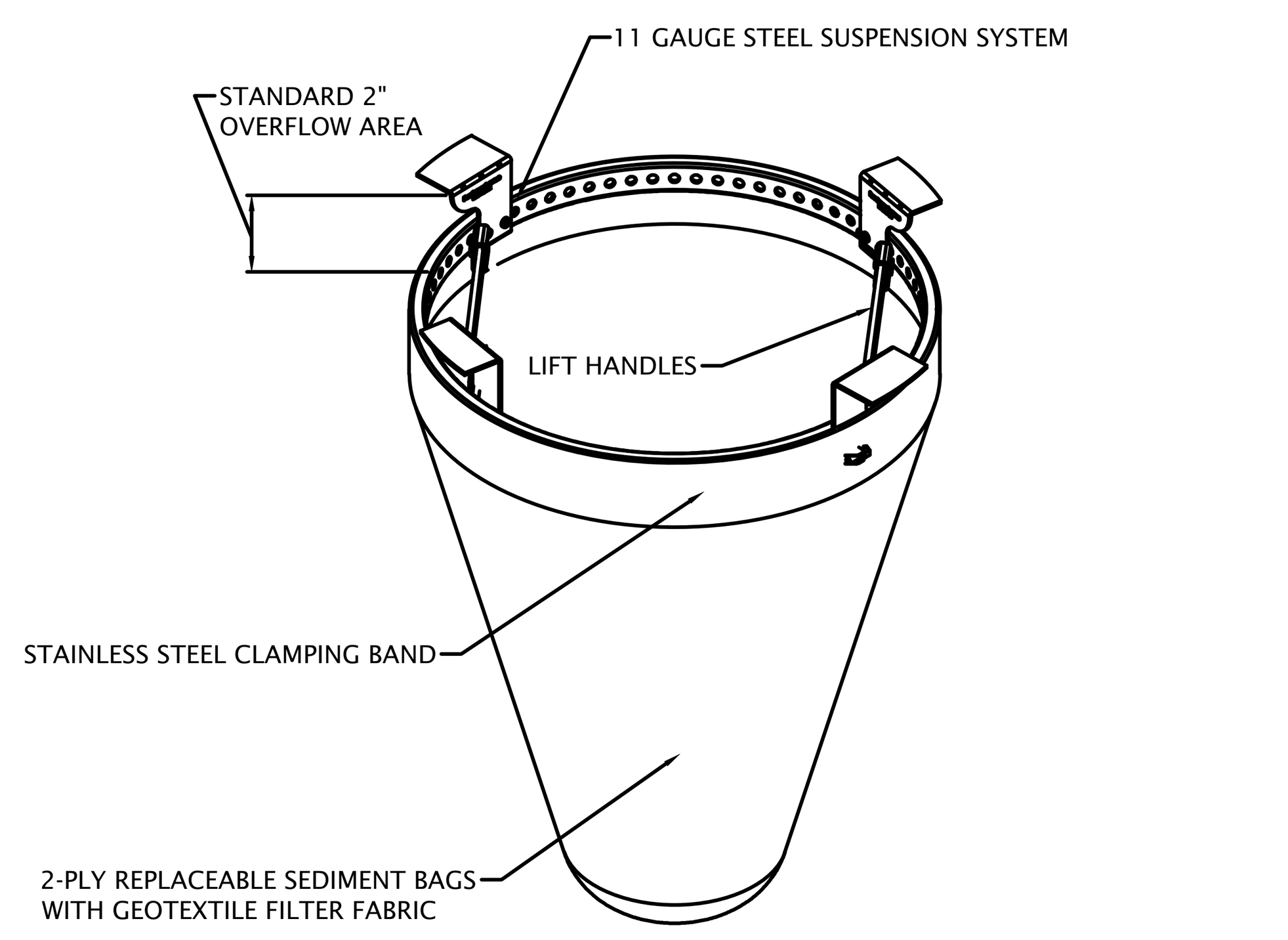
MATERIAL: FLEXSTORM CATCH-IT BY ADS, INC. OR APPROVED EQUAL.
ADS CAN BE CONTACTED AT (866) 287-8655

CAPACITY:

SPECIFICATIONS FOR STANDARD BAGS BY NOMINAL SIZE

Nominal Bag Size	Solids Storage (CuFt)	Filtered Flow Rate at 50% Max (CFS) FX (Woven)	IL (NonWoven)
Small	1.6	1.2	0.9
Medium	2.1	1.7	1.3
Large	3.8	2.7	1.9
XL	4.2	3.6	2.6

INSTALLATION:
1. REMOVE GRATE; INSTALL PRIOR TO LAND DISTURBING ACTIVITIES AND/OR IMMEDIATELY AFTER DRAINAGE STRUCTURES HAVE BEEN INSTALLED
2. DROP INLET PROTECTION ONTO LOAD BEARING LIP OF CASTING OR CONCRETE STRUCTURE.
3. REPLACE GRATE.



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INLET PROTECTION - CURB BASKET

CONTRIBUTING DRAINAGE AREA: 0.25 ACRE MAXIMUM

LOCATION: AT CURB INLETS WHERE BARRIERS SURROUNDING THEM WOULD BE IMPRACTICAL OR UNSAFE

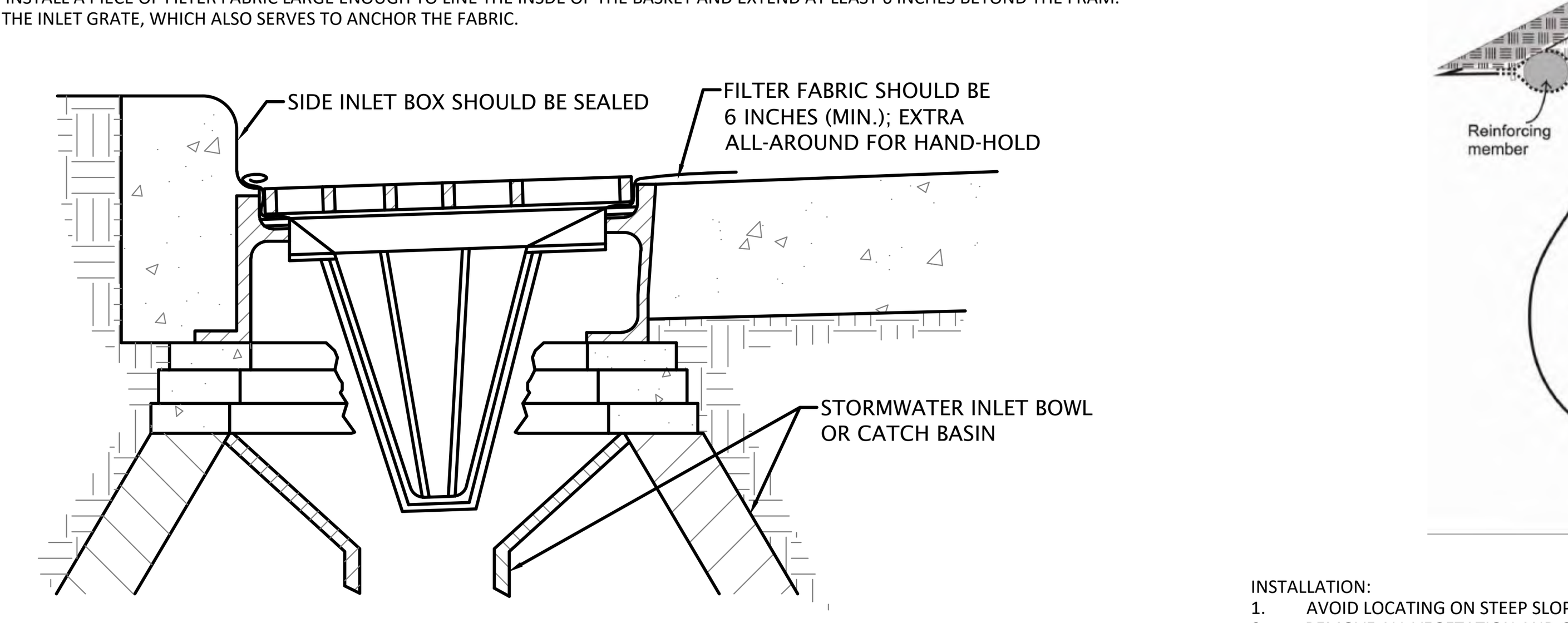
MATERIAL: D2 CATCH-ALL INLET PROTECTOR OR APPROVED EQUAL
D2 LAND & WATER RESOURCE (WWW.D2LWR.COM OR 800-597-2180)

CAPACITY: RUNOFF FROM A 2-YEAR FREQUENCY, 24-HOUR DURATION STORM EVENT ENTERING A STORM DRAIN WITHOUT BYPASS FLOW

BASKET: FABRICATED METAL WITH TOP WDITH/LENGTH DIMENSIONS SUCH THAT THE BASKET FITS INTO THE INLET WITHOUT GAPS

GEOTEXTILE FABRIC: FOR FILTRATION

INSTALLATION:
1. INSTALL BASKET CURB INLET PROTECTIONS AS SOON AS INLET BOXES ARE INSTALLED IN THE NEW DEVELOPMENT OR BEFORE LAND-DISTURBING ACTIVITIES BEGIN IN A STABILIZED AREA.
2. IF NECESSARY, ADAPT BASKET DIMENSIONS TO FIT INLET BOX DIMENSIONS, WHICH VARY ACCORDING TO THE MANUFACTURER AND/OR MODEL.
3. SEAL THE SIDE INLETS ON THOSE TYPES OF INLET BOXES THAT HAVE THEM.
4. REMOVE THE GRATE AND PLACE THE BASKET IN THE INLET.
5. CUT AND INSTALL A PIECE OF FILTER FABRIC LARGE ENOUGH TO LINE THE INSDE OF THE BASKET AND EXTEND AT LEAST 6 INCHES BEYOND THE FRAM.
6. REPLACE THE INLET GRATE, WHICH ALSO SERVES TO ANCHOR THE FABRIC.



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MAINTENANCE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR (OR REPLACE IF NECESSARY) THE GEOTEXTILE FABRIC AFTER EACH STORM EVENT.
3. PERIODICALLY REMOVE SEDIMENT AND TRACKED-ON SOIL FROM THE STREET (BUT NOT BY FLUSHING WITH WATER) TO REDUCE THE SEDIMENT LOAD ON THIS CURB INLET PRACTICE.

COMMON CONCERNS:
1. SEDIMENT NOT REMOVED AND GEOTEXTILE FABRIC NOT REPLACED FOLLWING A STORM EVENT RESULTS IN INCREASED SEDIMENT, TRACKING, TRAFFIC HAZARD, AND EXCESSIVE PONDING.
2. GEOTEXTILE FABRICE PERMITTIVITY THAT IS TOO LOW RESULTS IN RAPID CLOGGING AND CAUSES SEVERE PONDING WITH SEDIMENT ENTERING THE DRAIN IF THE FABRIC BREAKS.
3. DRAINAGE AREA TOO LARGE RESULTS IN SEDIMENT OVERLAOD AND SEVERE PONDING; SEDIMENT ENTERS THE DRAIN IF FABRIC BREAKS.

TEMPORARY CONSTRUCTION ENTRANCE/EXIT PAD

MATERIAL: 2 TO 3 INCHES OF WASHED STONE (INDOT #2 AGGREGATE) OVER A STABLE FOUNDATION

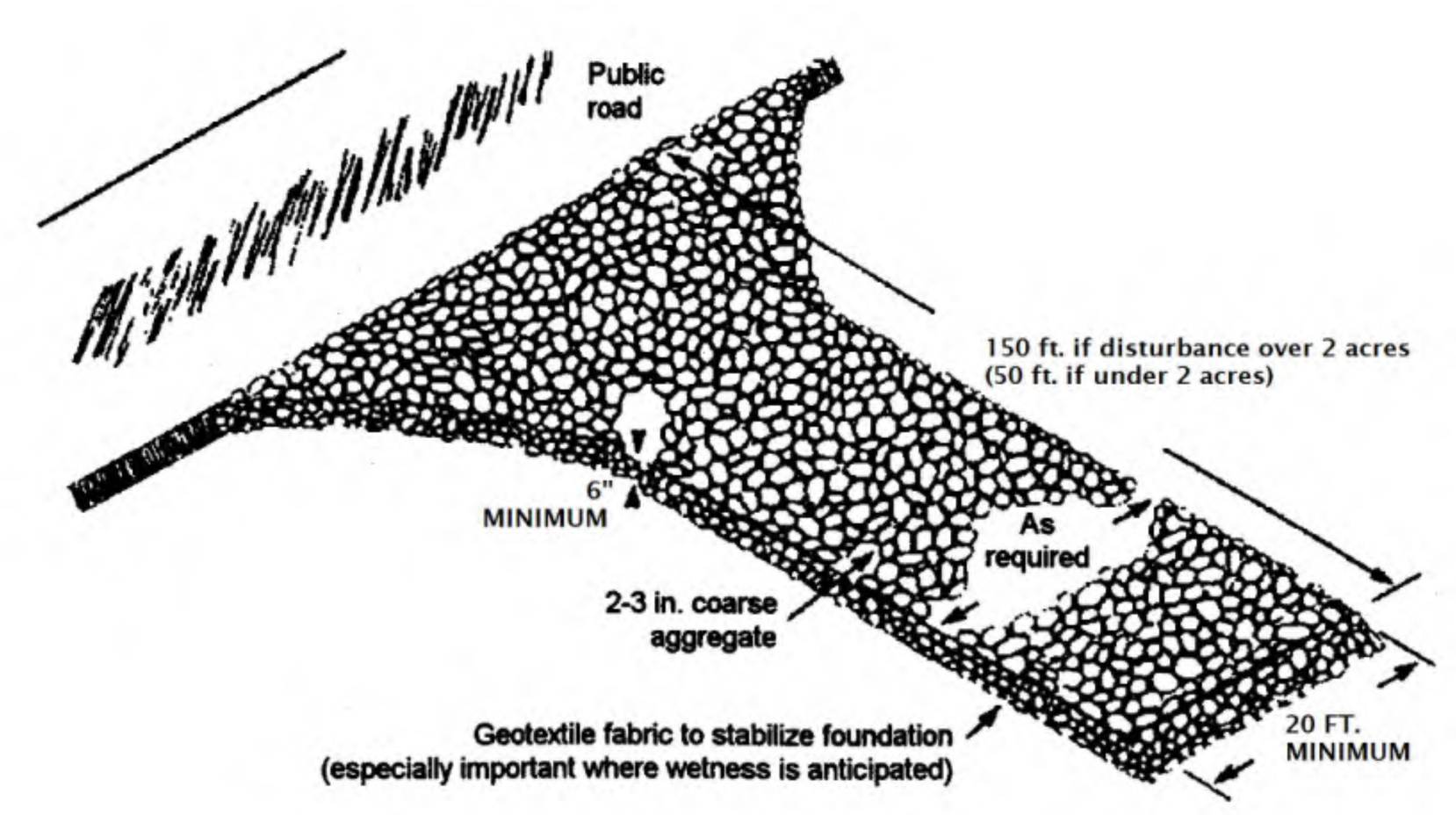
THICKNESS: 6 INCHES MINIMUM

WIDTH: 20 FEET MINIMUM OR FULL WIDTH OF ENTRANCE/EXIT ROADWAY, WHICHEVER IS GREATER

LENGTH: 150 FEET MINIMUM (50 FEET MINIMUM IF SITE DISTURBANCE IS UNDER 2.0 ACRES)

WASHING FACILITY: LEVEL AREA WITH 3 INCHES OF WASHED STONE (MINIMUM) OR A COMMERCIAL RACK AND WASTE WATER DIVERTED TO A SEDIMENT TRAP OR BASIN (PRACTICE 3.72)

GEOTEXTILE FABRIC UNDERLINER: MAY BE USED UNDER WET CONDITIONS OR FOR SOILS WITHIN A HIGH SEASONAL WATER TABLE TO PROVIDE GREATER BEARING STRENGTH



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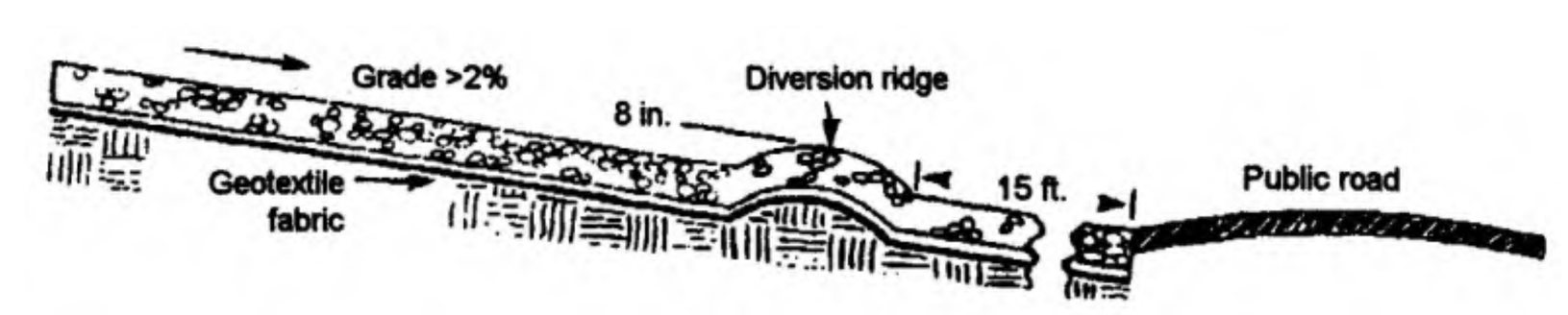
INSTALLATION:
1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES IN PUBLIC ROADS.
2. REMOVE ALL VEGETATION AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA, AND GRADE AND CROWN FOR POSITIVE DRAINAGE.
3. IF SLOPE TOWARDS THE ROAD EXCEEDS 2%, CONSTRUCT A 6-8 IN. HIGH WATER BAR (RIDGE) WITH 3:1 SIDE SLOPES ACROSS THE FOUNDATION AREA ABOUT 15 FT. FROM THE ENTRANCE TO DIVERT RUNOFF AWAY FROM THE ROAD (PRACTICE 3.24) SEE EXHIBIT.
4. INSTALL PIPE UNDER THE PAD IF NEEDED TO MAINTAIN PROPER PUBLIC ROAD DRAINAGE.
5. IF WET CONDITIONS ARE ANTICIPATED, PLACE GEOTEXTILE FABRIC ON THE GRADED FOUNDATION TO IMPROVE STABILITY.
6. PLACE STONE TO DIMENSIONS AND GRADE SHOWN IN THE EROSION/SEDIMENT CONTROL PLAN, LEAVING THE SURFACE SMOOTH AND SLOPED FOR DRAINAGE.
7. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE STONE PAD TO A SEDIMENT TRAP OR BASIN.

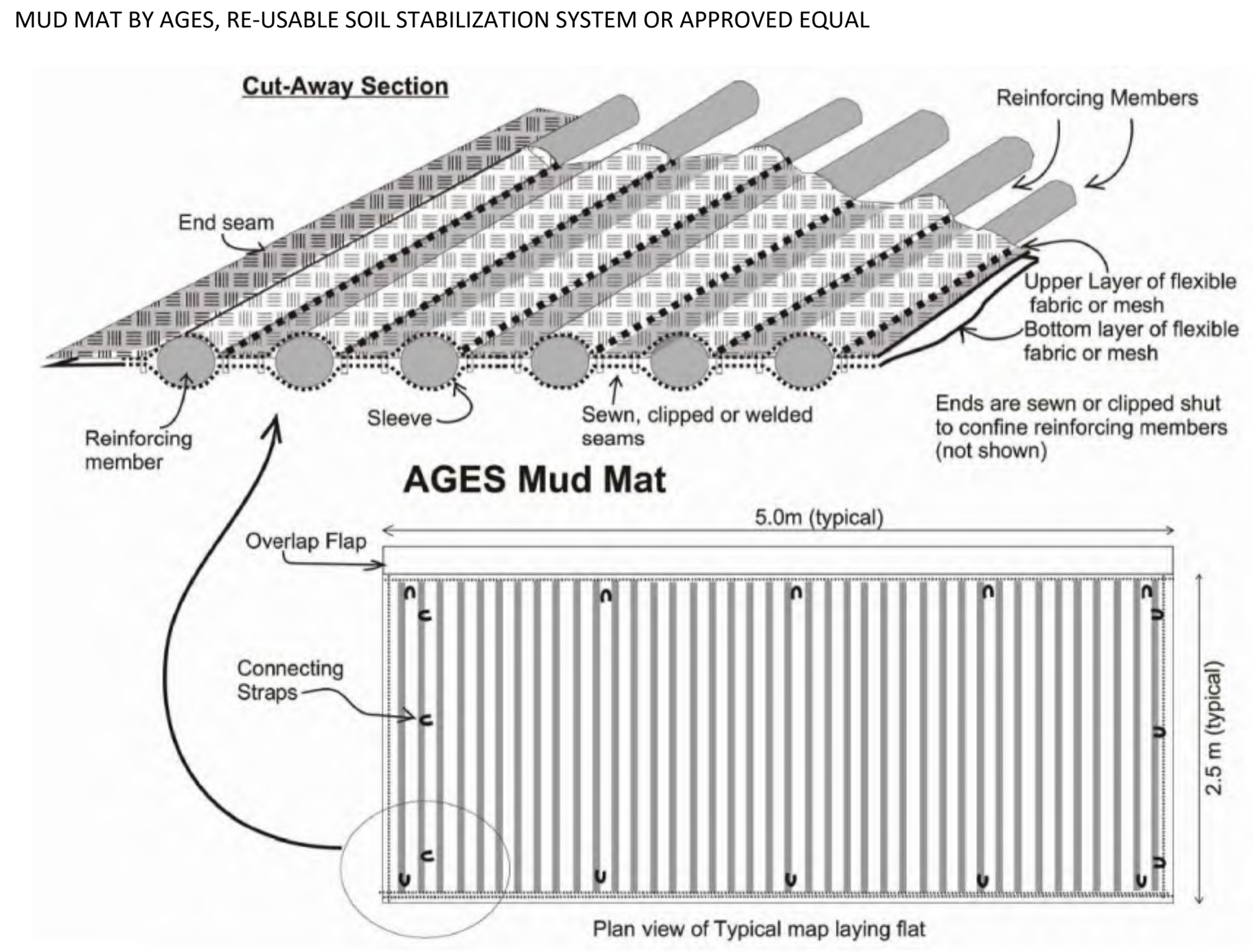


(NOT TO SCALE)

MAINTENANCE:
1. INSPECT ENTRANCE PAD AND SEDIMENT DISPOSAL AREA WEEKLY AND AFTER STORM EVENTS OR HEAVY USE.
2. RESHAPE PAD AS NEEDED FOR DRAINAGE AND RUNOFF CONTROL.
3. TOP-DRESS WITH CLEAN STONE AS NEEDED.
4. IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROADS BY BRUSHING OR SWEEPING. FLUSHING SHOULD ONLY BE USED IF THE WATER IS CONVEYED INTO A SEDIMENT TRAP OR BASIN.
5. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.

MUD MATS - ENTRANCE STABILIZATION

MATERIAL: MUD MAT BY AGES, RE-USABLE SOIL STABILIZATION SYSTEM OR APPROVED EQUAL



(NOT TO SCALE)

INSTALLATION:
1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES IN PUBLIC ROADS.
2. REMOVE ALL VEGETATION AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA, AND GRADE AND CROWN FOR POSITIVE DRAINAGE.
3. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. UNROLL, CONNECT MATS TOGETHER TO FORM AREA OF PROTECTION AND PROPERLY ANCHOR TO GROUND.
4. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE MUD MAT TO A SEDIMENT TRAP OR BASIN.
5. MINIMUM SIZE OF THE MAT IS 12 FEET WIDE AND 50 FEET LONG.

MAINTENANCE:
1. INSPECT ENTRANCE PAD DAILY AND REMOVE BUILT-UP DEBRIS AS NECESSARY.
2. INSPECT ENTRANCE PAD FOR BREAKS AND TEARS IN THE MATERIAL. REPAIR OR REPLACE AS NECESSARY.
3. IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROADS BY BRUSHING OR SWEEPING. FLUSHING SHOULD ONLY BE USED IF THE WATER IS CONVEYED INTO A SEDIMENT TRAP OR BASIN.
4. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.

MATERIAL MANAGEMENT MEASURES (HOUSEKEEPING)

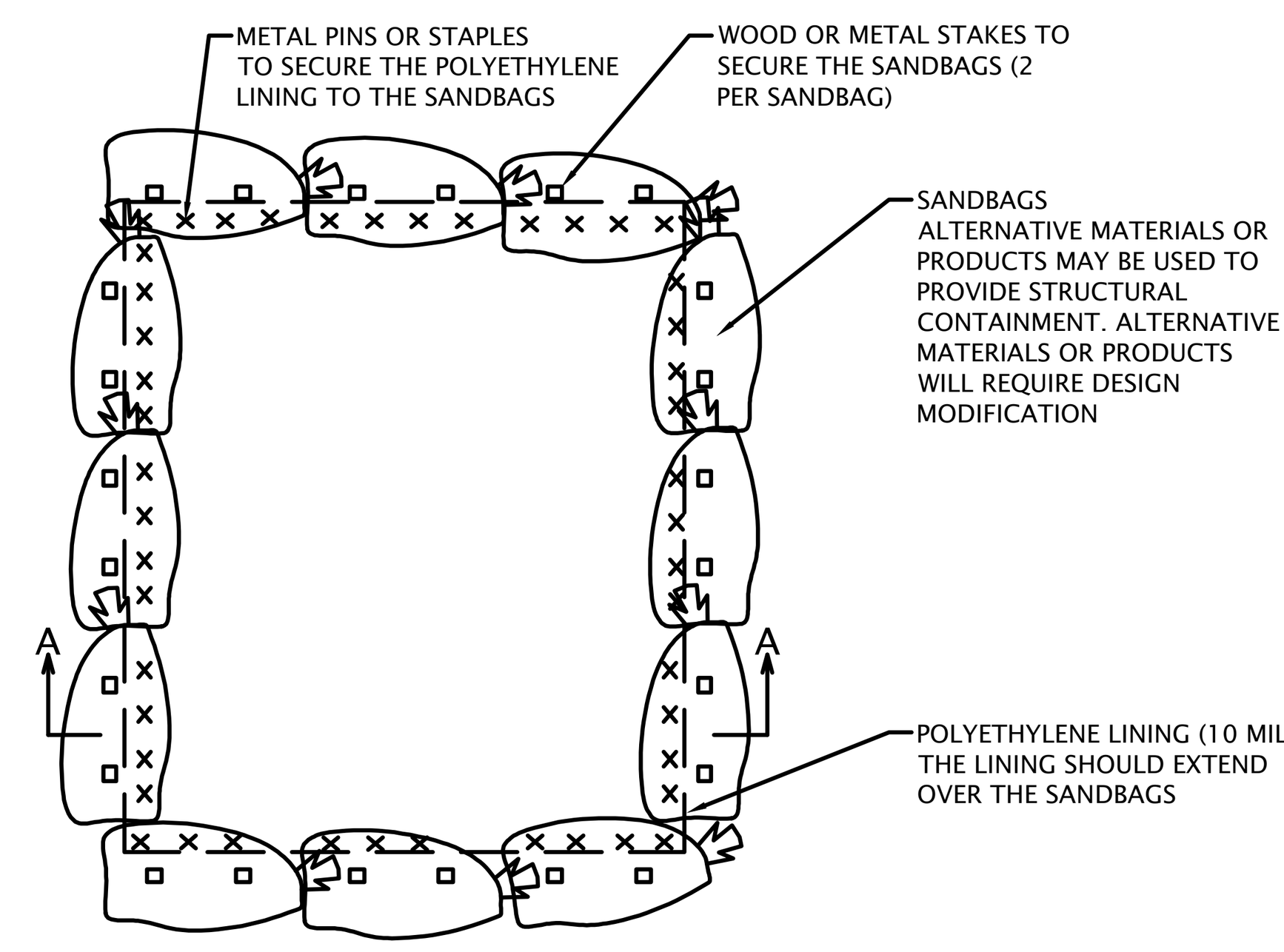
CONCRETE WASHOUT

MATERIALS: MINIMUM OF TEN MIL POLYETHYLENE SHEETING, FREE OF HOLES, TEARS, AND OTHER DEFECTS
ORANGE SAFETY FENCING OR EQUIVALENT
SANDBAGS
METAL PINS OR STAPLES SIX INCHES IN LENGTH MINIMUM.

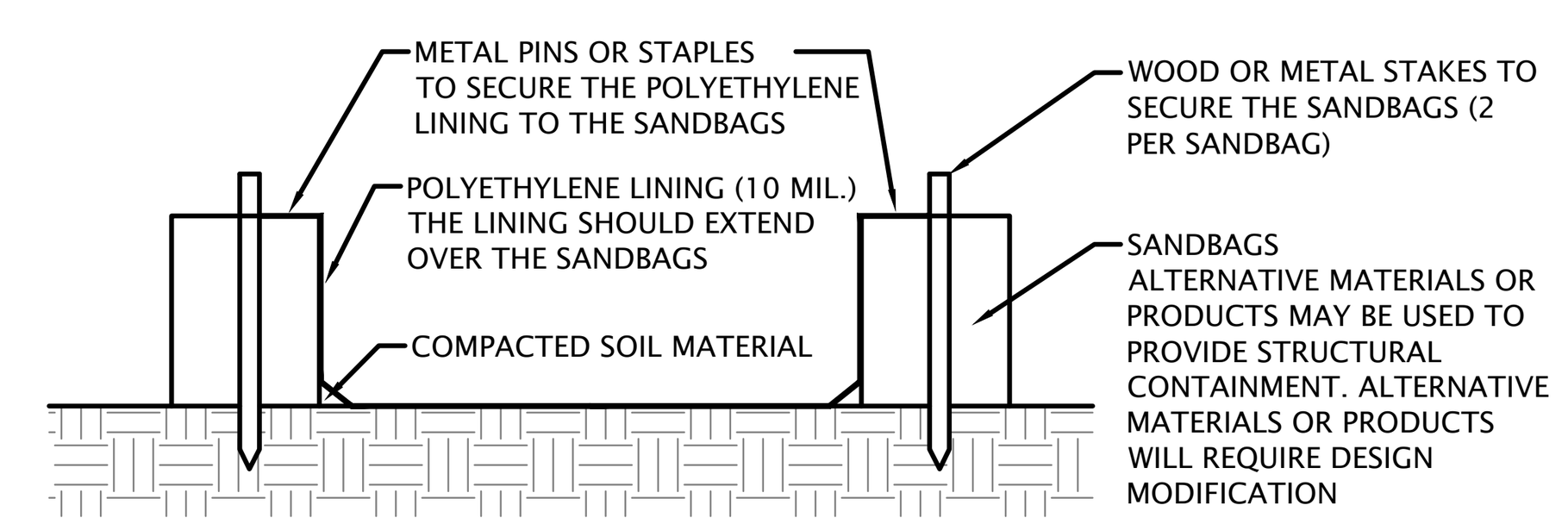
LOCATION:
1. LOCATE CONCRETE WASHOUT SYSTEMS AT LEAST 50 FEET FROM ANY CREEKS, WETLANDS, DITCHES, KARST FEATURES, OR STORM DRAINS/MANMADE CONVEYANCE SYSTEMS.
2. LOCATE CONCRETE WASHOUT SYSTEMS IN RELATIVELY FLAT AREAS THAT HAVE ESTABLISHED VEGETATIVE COVER AND DO NOT RECEIVE RUNOFF FROM ADJACENT LAND AREAS.
3. LOCATE AWAY FROM OTHER CONSTRUCTION TRAFFIC IN AREAS THAT PROVIDE EASY ACCESS FOR CONCRETE TRUCKS.

INSTALLATION:
1. A BASE SHALL BE CONSTRUCTED AND PREPARED THAT IS FREE OF ROCKS AND OTHER DEBRIS THAT MAY CAUSE TEARS OR PUNCTURES IN THE POLYETHYLENE LINING.
2. INSTALL THE POLYETHYLENE LINING. FOR EXCAVATED SYSTEMS, THE LINING SHOULD EXTEND OVER THE ENTIRE EXCAVATION. THE LINING FOR BERMED SYSTEMS SHOULD BE INSTALLED OVER THE POOLING AREA WITH ENOUGH MATERIAL TO EXTEND THE LINING OVER THE BERM OR CONTAINMENT SYSTEM. THE LINING SHOULD BE SECURED WITH PINS, STAPLES, OR OTHER FASTENERS.
3. PLACE FLAGS, SAFETY FENCING, OR EQUIVALENT TO PROVIDE A BARRIER TO CONSTRUCTION EQUIPMENT AND OTHER TRAFFIC. INSTALL SIGNAGE THAT IDENTIFIES CONCRETE WASHOUT AREAS.
4. WHERE NECESSARY, PROVIDE STABLE INGRESS AND EGRESS OR ALTERNATIVE APPROACH PAD.

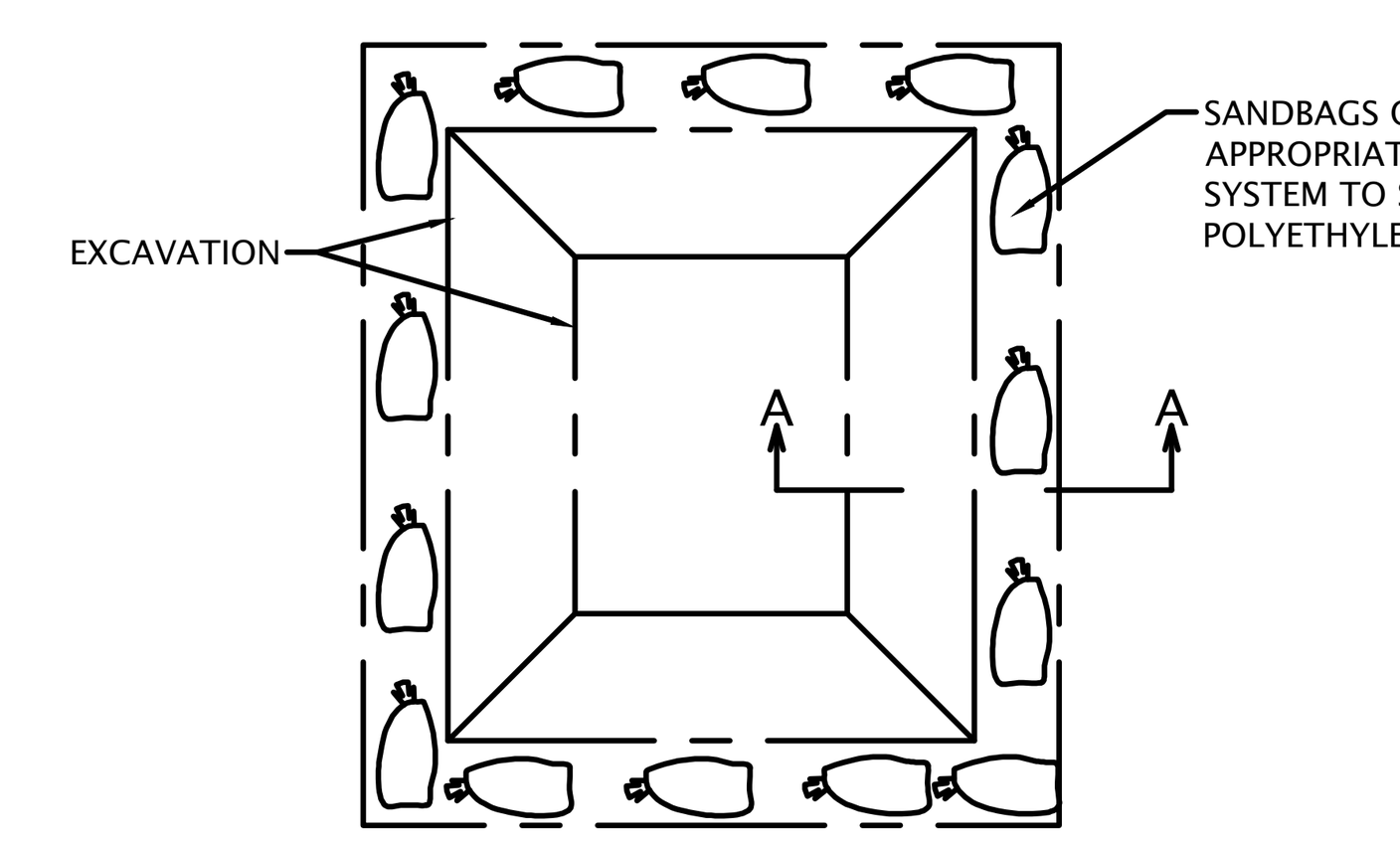
MAINTENANCE:
1. INSPECT DAILY AND AFTER EACH STORM EVENT.
2. INSPECT THE SYSTEM FOR LEAKS, SPILLS, AND TRACKING OF SOIL BY EQUIPMENT.
3. INSPECT THE POLYETHYLENE LINING FOR FAILURE, INCLUDING TEARS AND PUNCTURES.
4. ONCE CONCRETE WASTES HARDEN, REMOVE AND DISPOSE OF THE MATERIAL.
5. EXCESS CONCRETE SHOULD BE REMOVED WHEN THE WASHOUT SYSTEM REACHES 50 PERCENT OF THE DESIGN CAPACITY. USE OF THE SYSTEM SHOULD BE DISCONTINUED UNTIL APPROPRIATE MEASURES CAN BE INITIATED TO CLEAN THE STRUCTURE.
6. UPON REMOVAL OF THE SOLIDS, INSPECT THE STRUCTURE. REPAIR THE STRUCTURE AS NEEDED OR CONSTRUCT A NEW SYSTEM. DISPOSE OF ALL CONCRETE IN A LEGAL MANNER. REUSE THE MATERIAL ON SITE, RECYCLE, OR HAUL THE MATERIAL TO AN APPROVED CONSTRUCTION/DEMOLITION LANDFILL SITE. RECYCLING OF MATERIAL IS ENCOURAGED. THE WASTE MATERIAL CAN BE USED FOR MULTIPLE APPLICATIONS INCLUDING BUT NOT LIMITED TO ROADBEDS AND BUILDING. THE AVAILABILITY FOR RECYCLING SHOULD BE CHECKED LOCALLY.
7. THE PLASTIC LINER SHOULD BE REPLACED AFTER EVERY CLEANING; THE REMOVAL OF MATERIAL WILL USUALLY DAMAGE THE LINING. THE CONCRETE WASHOUT SYSTEM SHOULD BE REPAIRED OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE.
8. CONCRETE WASHOUT SYSTEMS ARE DESIGNED TO PROMOTE EVAPORATION. HOWEVER, IF THE LIQUIDS DO NOT EVAPORATE AND THE SYSTEM IS NEAR CAPACITY IT MAY BE NECESSARY TO VACUUM OR REMOVE THE LIQUIDS AND DISPOSE OF THEM IN AN ACCEPTABLE METHOD. DISPOSAL MAY BE ALLOWED AT THE LOCAL SANITARY SEWER AUTHORITY PROVIDED THEIR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS ALLOW FOR ACCEPTANCE OF THIS MATERIAL. ANOTHER OPTION WOULD BE TO UTILIZE A SECONDARY CONTAINMENT SYSTEM OR BASIN FOR FURTHER DEWATERING.
9. INSPECT CONSTRUCTION ACTIVITIES ON A REGULAR BASIS TO ENSURE SUPPLIERS, CONTRACTORS, AND OTHERS ARE UTILIZING DESIGNATED WASHOUT AREAS. IF CONCRETE WASTE IS BEING DISPOSED OF IMPROPERLY, IDENTIFY THE VIOLATORS AND TAKE APPROPRIATE ACTION.
10. WHEN CONCRETE WASHOUT SYSTEMS ARE NO LONGER REQUIRED, THE CONCRETE WASHOUT SYSTEMS SHALL BE CLOSED. DISPOSE OF ALL HARDENED CONCRETE AND OTHER MATERIALS USED TO CONSTRUCT THE SYSTEM.
11. HOLES, DEPRESSIONS, AND OTHER LAND DISTURBANCES ASSOCIATED WITH THE SYSTEM SHOULD BE BACKFILLED, GRADED, AND STABILIZED.



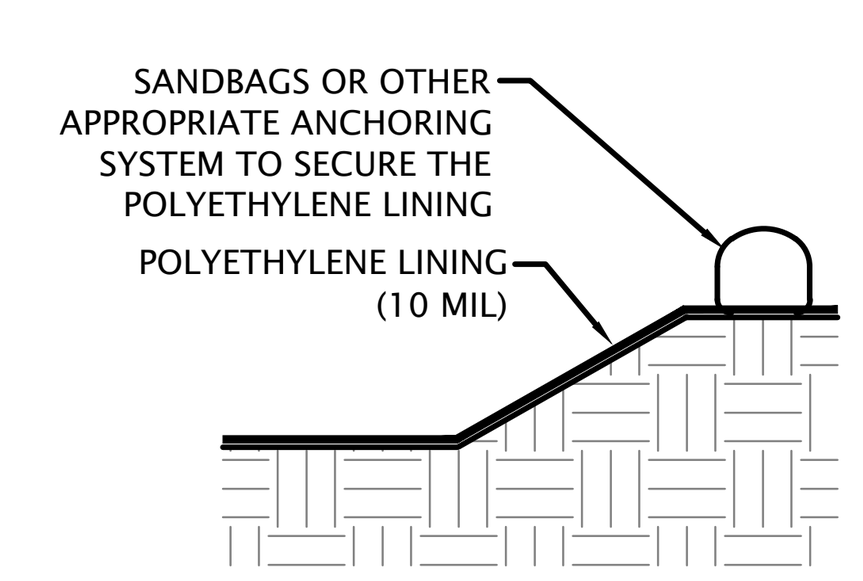
ABOVE GRADE CONCRETE WASHOUT
(NOT TO SCALE)



SECTION A-A
(NOT TO SCALE)



BELOW GRADE CONCRETE WASHOUT
(NOT TO SCALE)



SECTION A-A
(NOT TO SCALE)

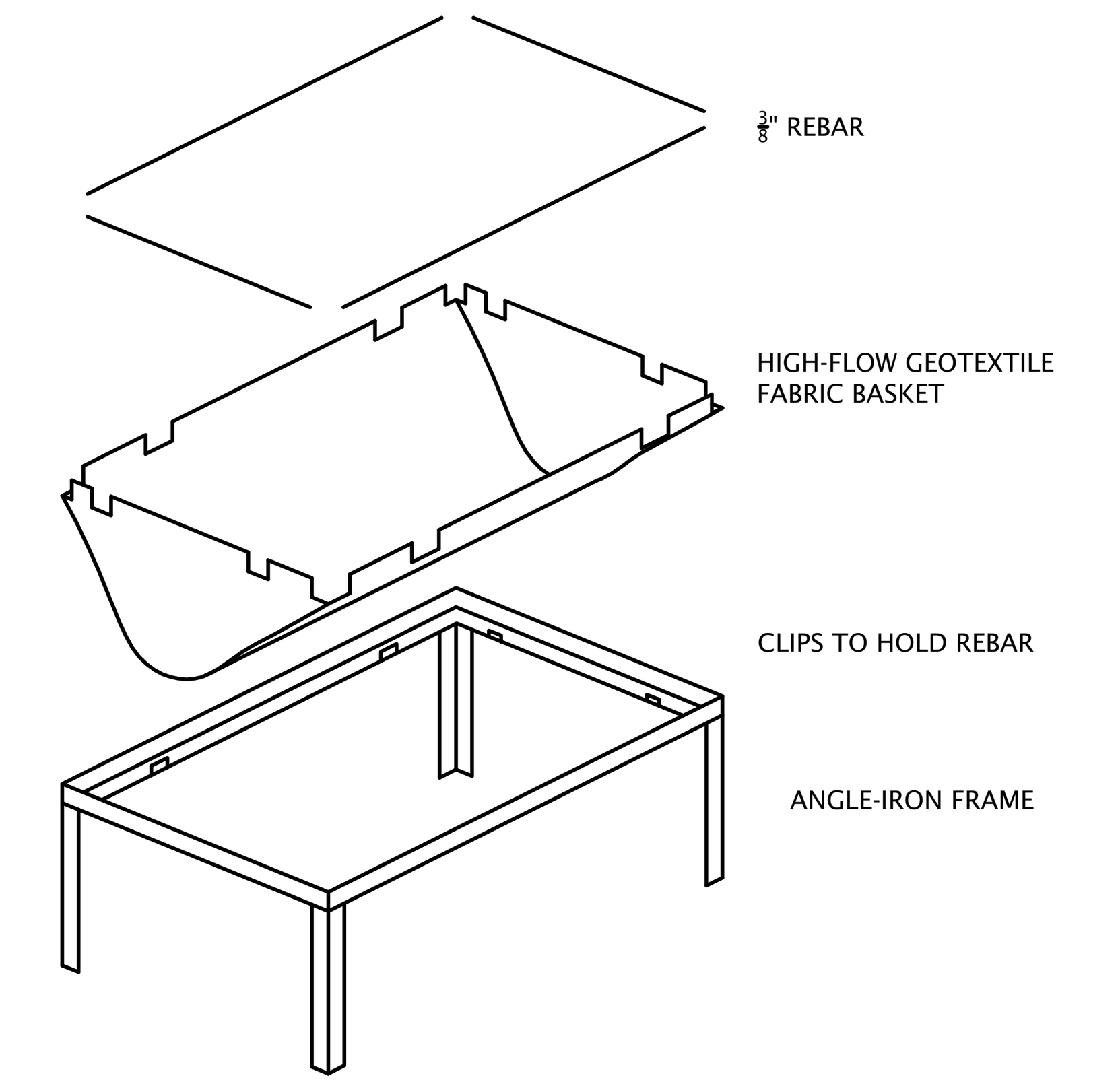
COMMON CONCERNS:
1. COMPLETE CONSTRUCTION/INSTALLATION OF THE SYSTEM AND HAVE WASHOUT LOCATIONS OPERATIONAL PRIOR TO CONCRETE DELIVERY.
2. IT IS RECOMMENDED THAT WASHOUT SYSTEMS BE RESTRICTED TO WASHING CONCRETE FROM MIXER AND PUMP TRUCKS AND NOT USED TO DISPOSE OF EXCESS CONCRETE OR RESIDUAL LOADS DUE TO POTENTIAL TO EXCEED THE DESIGN CAPACITY OF THE WASHOUT SYSTEM.
3. INSTALL SYSTEMS AT STRATEGIC LOCATIONS THAT ARE CONVENIENT AND IN CLOSE PROXIMITY TO WORK AREAS AND IN SUFFICIENT NUMBER TO ACCOMMODATE THE DEMAND FOR DISPOSAL.
4. INSTALL SIGNAGE IDENTIFYING THE LOCATION OF CONCRETE WASHOUT SYSTEMS.

FRYEFLOW FILTRATION SYSTEMS WASHOUT

MATERIALS: FRYE-FLOW FILTRATION SYSTEMS CONCRETE WASHOUT DEVICE OR APPROVED EQUAL

INSTALLATION:
1. INSERT REBAR INTO POCKETS OF DEBRIS BAG.
2. INSTALL FRYEFLOW SYSTEMS DEBRIS BAG INTO ANGLE IRON FRAME.
3. MAKE SURE REBAR SETS BEHIND REBAR BRACKETS.
4. MAKE SURE FRAME AND BAG IS SET ON FLAT SURFACE
5. INSTALL SIGNAGE THAT IDENTIFIES CONCRETE WASHOUT AREAS.
6. WHERE NECESSARY, PROVIDE STABLE INGRESS AND EGRESS OR ALTERNATIVE APPROACH PAD.

MAINTENANCE:
1. ONCE DEBRIS BAG IS FULL, USE HANDLES PROVIDED TO LIFT OUT OF FRAME.
2. REMOVE REBAR FROM SIDE POCKETS.
3. INSERT NEW DEBRIS BAG.



SPILL PREVENTION AND CONTROL PLAN

1. ONLY APPROVED FUEL STORAGE TANK SHALL BE ALLOWED ON SITE.
2. SPILL KITS MUST BE LOCATED ON-SITE IN THE VICINITY OF THE FUEL STORAGE SINK.
3. MOBILE FUELING SHALL BE USED WHENEVER POSSIBLE.
4. FUELING SHOULD TAKE PLACE IN A CENTRAL LOCATION.
5. EQUIPMENT SHOULD BE KEPT IN GOOD WORKING ORDER, WELL MAINTAINED SO THAT BREAKDOWNS, AND EQUIPMENT FAILURES ARE REDUCED.

FUEL STORAGE

1. ALL FUEL TANKS ON SITE SHALL HAVE SECONDARY CONTAINMENT APPROVED BY IDEM.
2. NO FUEL TANKS ARE TO BE LOCATED WITHIN 100 FEET OF A STORM SEWER INLET.
3. FUEL STORAGE SYSTEM SHALL BE KEPT IN GOOD WORKING ORDER AND SHALL BE SUBJECT TO PERIODIC IDEM INSPECTIONS.
4. SPILL KITS MUST BE LOCATED ON-SITE IN THE VICINITY OF THE FUEL STORAGE SINK.
5. FUEL TANKS SHALL HAVE A SAFETY GAUGE.

STOCKPILES

1. THE CONTRACTOR SHALL LOCATE TOPSOIL STOCKPILES ON-SITE AS NOTED ON THE S.W.P.P.P. AND SHALL ENCOMPASS EACH WITH SEDIMENT DITCH AND SILT FENCE.
2. IN CASES WHERE THE STOCKPILE IS SMALL AND WILL BE REMOVED FROM THE SITE WITHIN 15 DAYS, THE CONTRACTOR CAN COVER THE STOCKPILE WITH A WATERPROOF TARPAULINE TYPE COVER.
3. NO OFF-SITE STOCKPILES ARE BEING PROPOSED. ANY OFF-SITE STOCKPILES THAT THE CONTRACTOR UTILIZES SHALL FOLLOW THE SAME REQUIREMENTS AS ON-SITE STOCKPILES. THE CONTRACTOR SHALL IDENTIFY TO THE LOCAL S.W.P.P.P. ENFORCEMENT AGENCY THE LOCATIONS OF ANY OFF-SITE STOCKPILES.

TEMPORARY FACILITIES

1. THE CONTRACTOR SHALL FOLLOW THE PROCEDURES DELINEATED ON THE PLAN IN ORDER TO CONSTRUCT AND MAINTAIN THE FACILITIES SHOWN ON THE DRAWINGS TO CONTROL WATER AND WIND EROSION DURING CONSTRUCTION OF THE PROJECT.
2. ALL DISTURBED SURFACE AREAS (INCLUDING UTILITY TRENCHES) SHALL BE TEMPORARILY GRADED AND/OR DITCHED TO DIRECT WATER RUNOFF FROM SUCH AREAS TO SEDIMENTATION CONTROL DEVICES WHICH WILL PREVENT DISTURBING ERODED WATER CARRYING SOIL FROM ENTERING A WATERCOURSE, SEWER, OR ADJACENT LANDS. SUCH SEDIMENTATION CONTROL DEVICES SHALL INCLUDE BUT NOT BE LIMITED TO PROTECTIVE DITCHES, SEDIMENT TRAPS, SEDIMENT FILTERS, DITCH TRAPS, PIPE BARRIERS, SIKE DIKES, CHECK DAMS, CHEMICAL SETTLING FILTERS.
3. UPON COMPLETION OF THE ROUGH GRADING ALL AREAS NOT EFFECTED BY CONSTRUCTION TRAFFIC SHALL BE PERMANENTLY SEEDED, AND EROSION CONTROL BLANKETS INSTALLED ON SIDE SLOPES THAT EXCEED 5:1.
4. UPON COMPLETION OF THE STORM SEWER SYSTEM, INLET PROTECTION SHALL BE INSTALLED, CHECK DAMS INSTALLED IN THE SWALES, AND TEMPORARY RIPRAP WITH SETTLING BASINS PLACED AT THE OUTFALLS OF ALL PIPE.
5. IN ROADWAY AREAS TEMPORARY AGGREGATE SURFACING SHALL BE PLACED IMMEDIATELY AFTER THE BACKFILLING HAS BEEN COMPLETED. POSITIVE DUST CONTROL MEASURES SHALL BE TAKEN AT ALL TIMES.
6. WITHIN 14 DAYS FROM THE DATE A PROJECT IMPROVEMENT IS INSTALLED THE CONTRACTOR SHALL PROCEED WITH FINAL CLEANUP AND RESTORATION OF THE PROJECT AREA DISTURBED INCLUDING SPOIL AREAS,AND COMPLETE SUCH OPERATIONS WITHIN THE NEXT 15 DAYS. IF SEASONAL CONDITIONS PREVENT FINAL CLEANING AND RESTORATION, THE CONTRACTOR SHALL PROCEED WITH TEMPORARY STABILIZATION OF THE DISTURBED AREAS. FINAL CLEANUP AND RESTORATION WILL CONSIST OF FINAL GRADING, APPLYING TOPSOIL, SEEDING AND MULCHING AND/OR SODDING OF ALL DISTURBED AREAS OF THE PROJECT. TEMPORARY STABILIZATION SHALL CONSIST OF ROUGH GRADING THE DISTURBED AREAS TO A CONDITION READY TO RECEIVE TOPSOIL, SEEDING, AND MULCHING IN ACCORDANCE WITH THE TEMPORARY SEEDING SCHEDULE. TEMPORARY STABILIZATION MATERIALS SHALL BE REMOVED, DISPOSED OF, AND FINAL CLEANUP AND RESTORATION SHALL BE COMPLETED NOT LATER THAN 60 DAYS AFTER SEASONAL CONDITIONS ALLOW PERFORMANCE OF THE REQUIRED WORK. THE CONTRACTOR SHALL LOCATE TOPSOIL STOCKPILES ON-SITE AS NOTED ON THE S.W.P.P.P. AND SHALL ENCOMPASS EACH WITH SEDIMENT DITCH AND SILT FENCE. IN CASES WHERE THE STOCKPILE IS SMALL AND WILL BE REMOVED FROM THE SITE WITHIN 15 DAYS, THE CONTRACTOR CAN COVER THE STOCKPILE WITH A WATERPROOF TARPAULINE TYPE COVER. NO OFF-SITE STOCKPILES ARE BEING PROPOSED. ANY OFF-SITE STOCKPILES THAT THE CONTRACTOR UTILIZES SHALL FOLLOW THE SAME REQUIREMENTS AS ON-SITE STOCKPILES. THE CONTRACTOR SHALL IDENTIFY TO THE LOCAL S.W.P.P.P. ENFORCEMENT AGENCY THE LOCATIONS OF ANY OFF-SITE STOCKPILES.

MATERIAL HANDLING AND STORAGE

THE CONTRACTOR SHALL MINIMIZE THE DISTURBANCE OF EXCAVATED SOILS BY MINIMIZING THE NUMBER OF TIMES THE SOIL IS HANDLED. ON-SITE HANDLING OF SOILS WILL OCCUR DURING EXCAVATION, LOADING, AND SPREADING ACTIVITIES. FUEL FOR HEAVY EQUIPMENT AND VEHICLES WILL NOT BE STORED ON THE SITE DURING CONSTRUCTION OPERATIONS. MOBILE FUEL TANKS WILL FUEL HEAVY EQUIPMENT. IN THE EVENT OF A SPILL OR LEAK THE CONTRACTOR SHALL FOLLOW PROPER PROCEDURES TO MINIMIZE CONCERN. THE CONTRACTOR SHALL:

1. TAKE IMMEDIATE MEASURES TO CONTROL AND CONTAIN THE SPILL TO PREVENT RELEASE INTO SEWERS OR SURFACE WATERS.
2. NOTIFY THE LOCAL FIRE DEPARTMENT IMMEDIATELY AT 9-1-1.
3. NOTIFY THE FEDERAL EMERGENCY SPILL HOTLINE AT 1-800-424-8802 WITHIN 2 HOURS IF THE AMOUNT IS ABOVE A REPORTABLE
4. QUANTITY OR ANY AMOUNT ENTERS A WATERWAY OR STORM SEWER.
5. NOTIFY THE INDIANA EMERGENCY RESPONSE HOTLINE AT 1-888-233-7745.
6. FOLLOW THE GUIDELINES FOR HANDLING THE SPILL AS OUTLINED IN THE INCLUDED MATERIAL SAFETY DATA SHEETS.

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB POZEN
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/16/2025

CV BDG A LLC
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 11
Bldg. A-Sprouts
Stormwater Pollution Prevention Plan Details

NO SCALE

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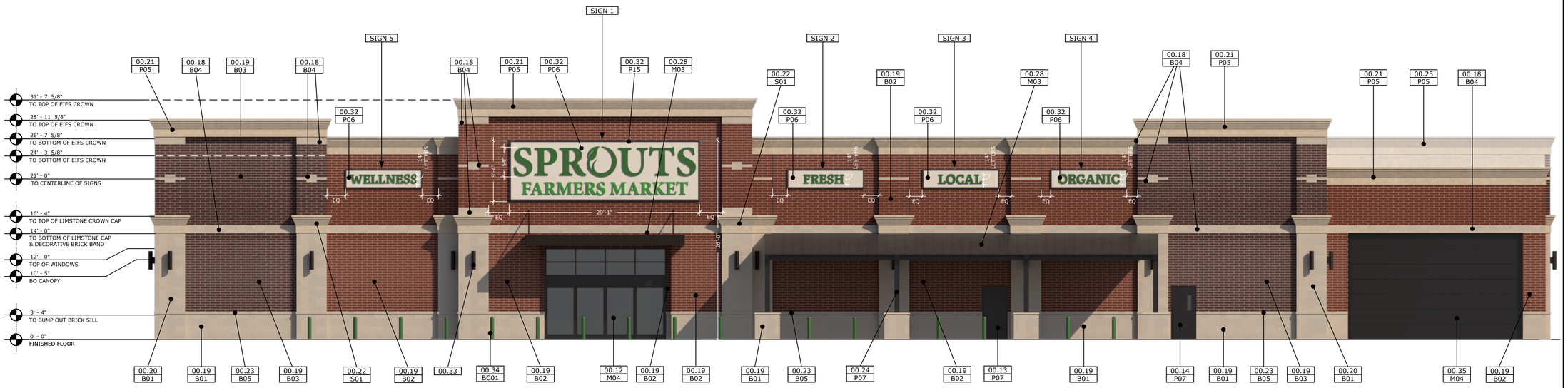
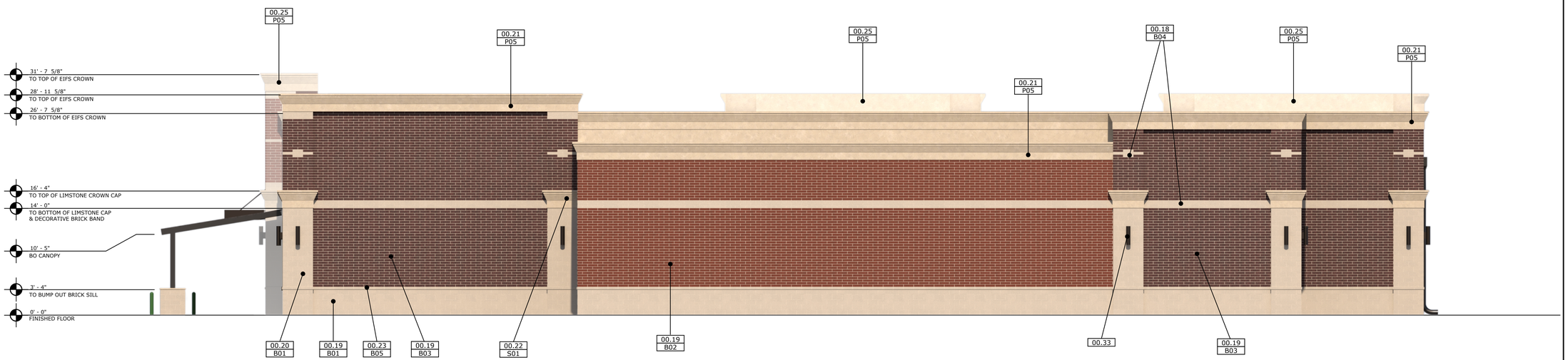
DESIGN BY	DATE
DVG	08/21/25

PROJECT NO. 25-0081

C304



SOUTH ELEVATION | ELV 01.00



EAST ELEVATION | ELV 02.00

FOR MATERIAL DETAILS SEE PAGE 03

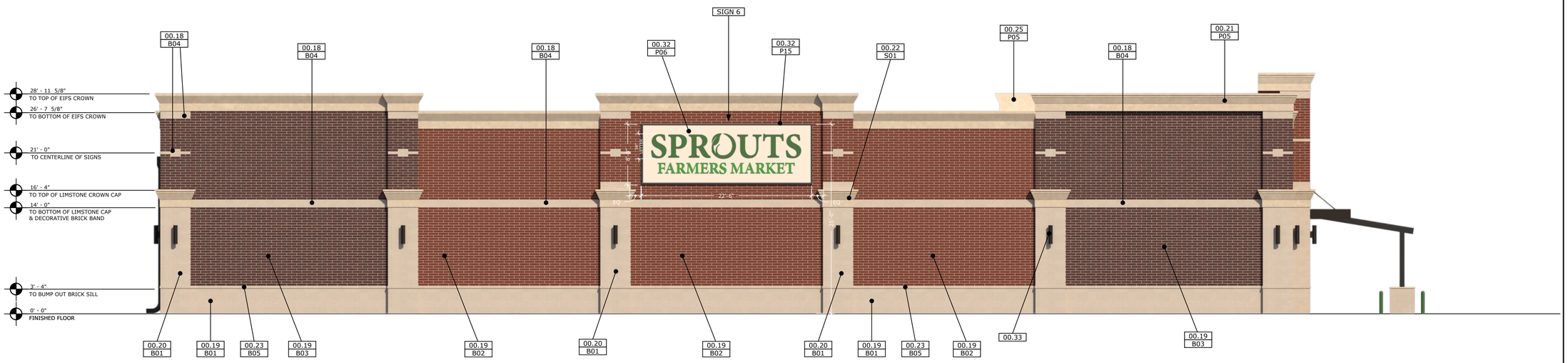
KEYNOTES	
00.09	SUSTAINABILITY AREA WITH PRIVACY FENCE AND GATE
00.12	AUTOMATIC SLIDING ENTRY DOOR
00.13	HOLLOW METAL EGRESS DOOR
00.14	CLICK & COLLECT DOOR
~~00.15~~	~~DAILY STORE DELIVERY (DSD) OVERHEAD DOOR~~
00.18	STRUCTURAL BRICK ACCENT BAND
00.19	STRUCTURAL BRICK
00.20	BUMPED OUT STRUCTURAL BRICK "COLUMNS"
00.21	EIFS CROWN SYSTEM
00.22	MANUFACTURED CAST LIMESTONE CROWN
00.23	BUMPED OUT 10x4x16 STRUCTURAL BRICK SILL
00.24	STEEL POST
00.25	LINE OF ROOF BEYOND
00.28	STANDING SEAM METAL ROOF
00.29	METAL PARAPET CAP
00.30	METAL DOWNSPOUT
~~00.31~~	~~ALUMINUM "PASTURE GATE" FRAMEWORK FOR SECONDARY SIGN BY SIGNAGE VENDOR~~
00.32	BACKGROUND PANEL FOR SECONDARY SIGN BY SIGNAGE VENDOR
00.33	SPECTRUM LIGHTING SPC0618UDINC 5325 BRONZE COLOR
00.34	BOLLARD CAP
00.35	OVERHEAD DOOR

KEYNOTES - SIGNAGE	
SIGN 1	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 2	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 3	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 4	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 5	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 6	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED

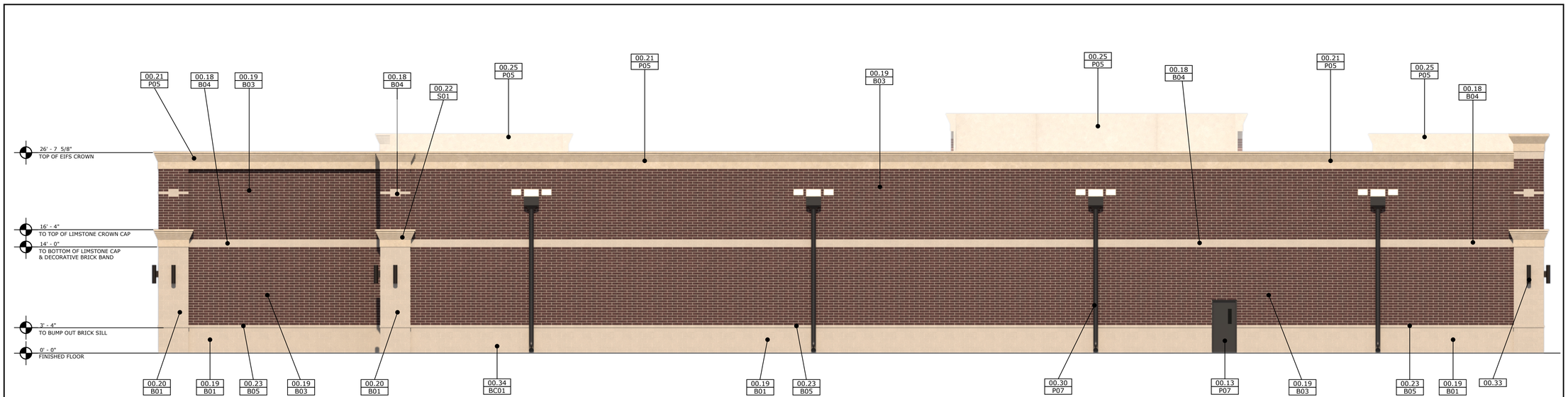
SPROUTS FARMERS MARKET
800 45TH STREET
MUNTER, IN 46321

ELEVATIONS

PAGE 01



WEST ELEVATION | ELV 03.00



NORTH ELEVATION | ELV 04.00

FOR MATERIAL DETAILS SEE PAGE 03

KEYNOTES	
00.09	SUSTAINABILITY AREA WITH PRIVACY FENCE AND GATE
00.12	AUTOMATIC SLIDING ENTRY DOOR
00.13	HOLLOW METAL EGRESS DOOR
00.14	CLICK & COLLECT DOOR
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SIGN 3	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 4	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 5	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED
SIGN 6	ILLUMINATED CHANNEL LETTERS, FLUSH MOUNTED

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ELEVATIONS

PAGE 02



STANDING SEAM METAL ROOFING

BERRIDGE
"AGED BRONZE"
(M03)



PAINT

SHERWIN WILLIAMS
"ACCESSIBLE BEIGE"
(SW7036)
(P05)

PAINT

PPG 1009-1
"TUNDRA FROST"
(P06)



PAINT

PPG 1006-7
"METROPOLIS"
(P15)



PAINT

SHERWIN WILLIAMS
"URBANE BRONZE"
(SW7048)
(P07)



BOLLARD COVER

CUSTOM
PMS - 2465
(BC01)



ANODIZED ALUMINUM

ANODIZED ALUMINUM
"DARK BRONZE"
(M04)



SUPER ATLAS 8x8x16

SAWGRASS 8x8x16
(B01)



ATLAS 8x4x16

MOUTAIN RED 8x4x16
(B02)



ATLAS 8x4x16

IRONSTONE 8x4x16
(B03)



ATLAS 8x4x16

SAWGRASS 8x4x16
(B04)



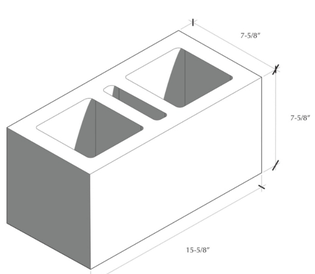
ATLAS 10x4x16

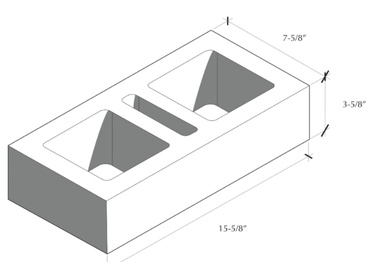
SAWGRASS 10x4x16
(B05)

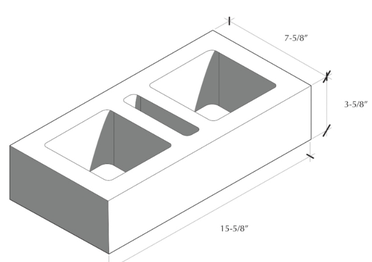


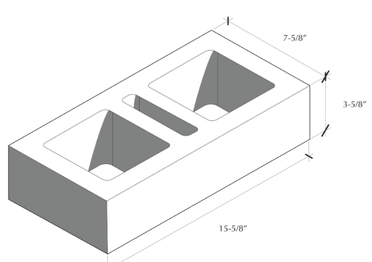
HARVEY CEMENT

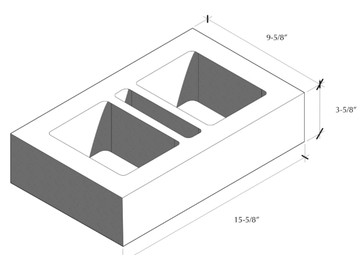
CAST LIMESTONE
(SO1)











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800 45TH STREET
MUNTER, IN 46321

MATERIAL DETAILS

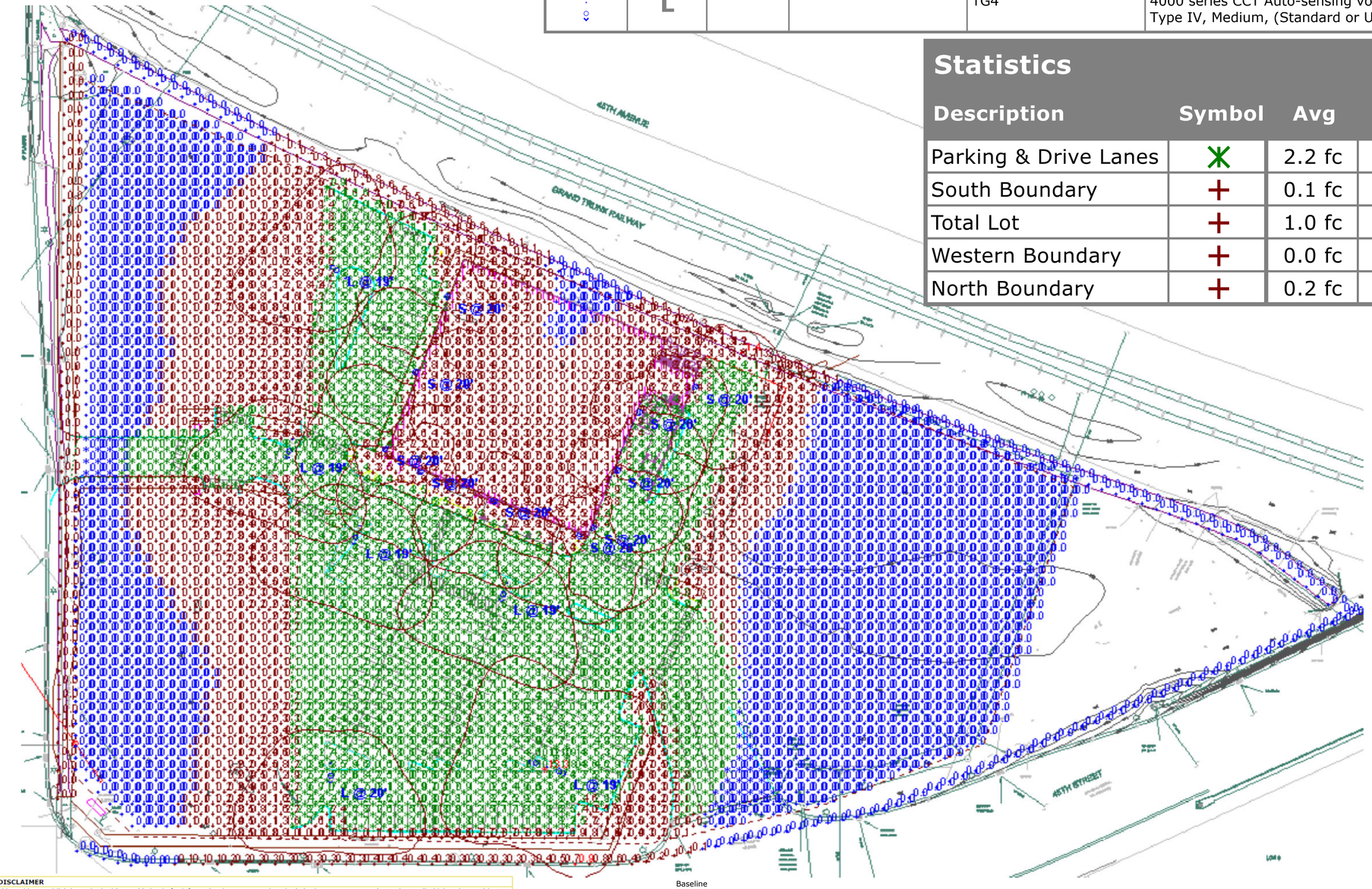
PAGE 03

Note

1. Luminaires depreciated to 0.9 LLF
2. See Location Schedule for aiming and orientation.
3. Vist acuitybrands.com for full spec information.

Schedule

Symbol	Label	QTY	Manufacturer	Catalog	Description	Number Lamps	Lamp Output	LLF	Input Power
	L	5	Holophane	MPL3 P60S 40K XXXXX TG4	Memphis style housings Standard housing, 4000 series CCT Auto-sensing voltage, Type IV, Medium, (Standard or Uplight)	1	28204	0.9	214.54
	S	10	Holophane	HLWPC2 P50 40K XX TFTM	Wallpack Full Cutoff LED, LED Performance Package P20, 4000 series CCT, Voltage, Forward Throw Medium	1	12125	0.9	115
	L	1	Holophane	MPL3 P60S 40K XXXXX TG4	Memphis style housings Standard housing, 4000 series CCT Auto-sensing voltage, Type IV, Medium, (Standard or Uplight)	1	28204	0.9	429.08



Baseline

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Parking & Drive Lanes	✳	2.2 fc	13.3 fc	0.0 fc	N/A	N/A
South Boundary	+	0.1 fc	0.9 fc	0.0 fc	N/A	N/A
Total Lot	+	1.0 fc	13.3 fc	0.0 fc	N/A	N/A
Western Boundary	+	0.0 fc	0.0 fc	0.0 fc	N/A	N/A
North Boundary	+	0.2 fc	1.4 fc	0.0 fc	N/A	N/A

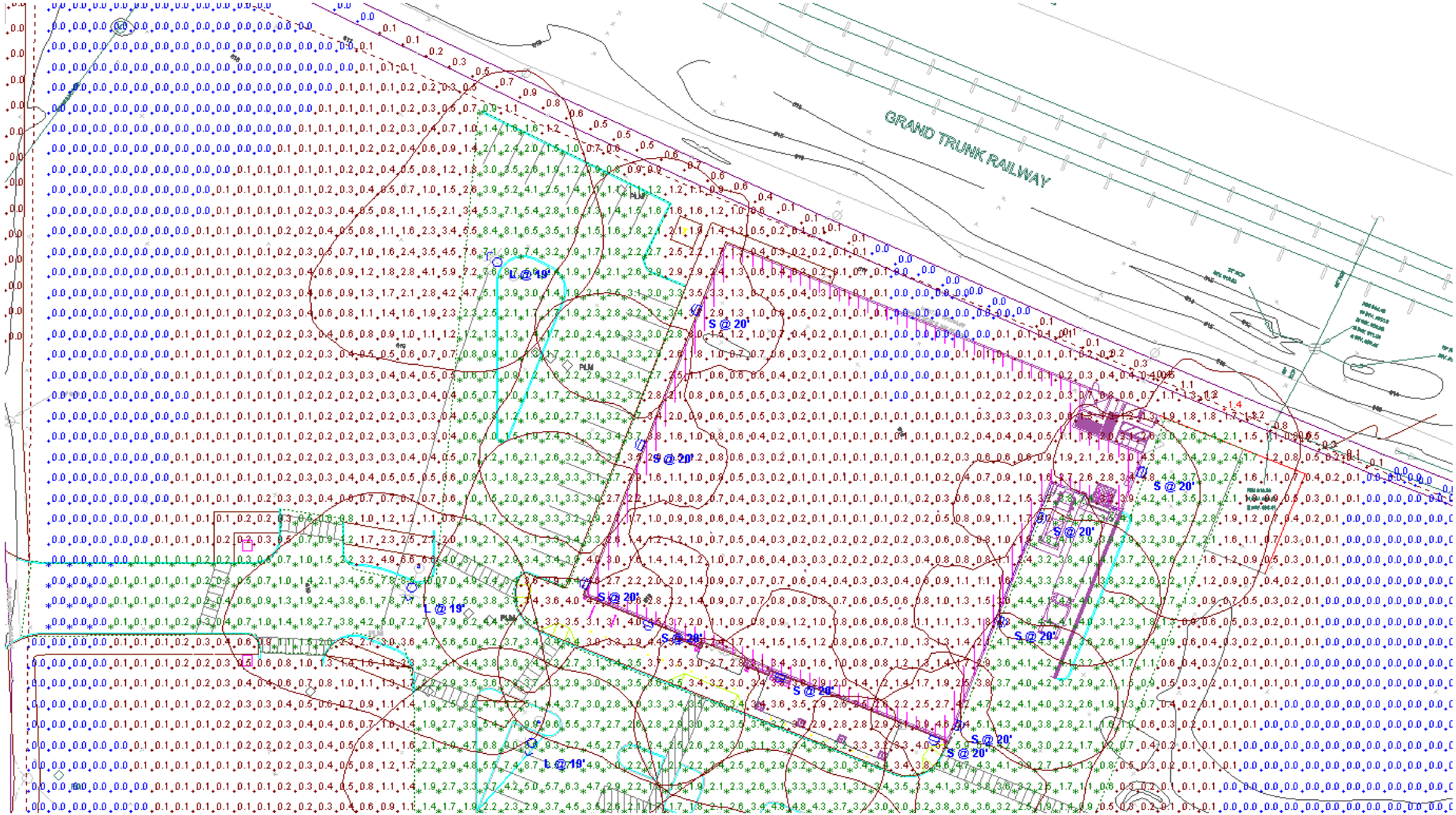
DISCLAIMER

This architectural lighting submittal is provided only for informational purposes and to the help the customer or end-user (as applicable) understand how various sections of linear fixtures connect to each other and how they mount to the ceiling. This lighting submittal is strictly based on the information provided to Acuity Brands, and is provided without warranty as to accuracy, completeness, reliability or otherwise. If the information (including but not limited to floor-plans, reflected ceiling plans, electrical plans and specifications) provided to Acuity Brands is incomplete or not current (i.e., newer versions exist), the accuracy of proposed design may be adversely affected. Once this lighting submittal is received by the customer or end-user (as applicable), it is the obligation of the customer or end-user (as applicable) to consult with a professional engineering advisor to determine whether the proposed design meets the applicable project requirements for lighting system performance, code compliance, safety, suitability and effectiveness for use in a particular application. In no event will Acuity Brands be responsible for any loss resulting from any use of any information contained in this lighting submittal.

VISUAL

Centennial, Munster, Sprout Grocery, 2392-A0

Designer RMorgan
Date 08/20/2025
Scale Not to Scale
Drawing No. A0
Summary



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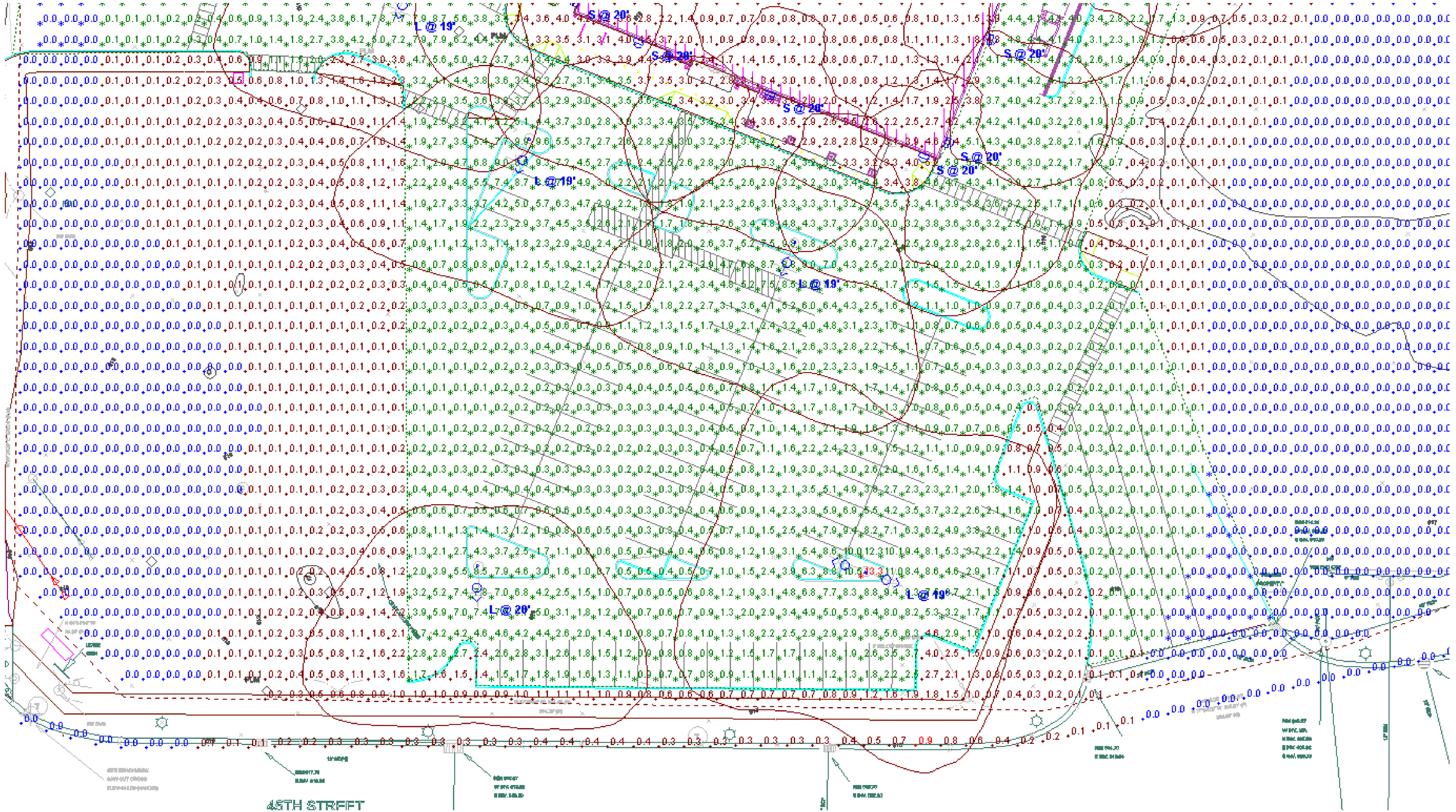
VISUAL

Centennial, Munster, Sprout Grocery, 2392-A0

Designer
RMorgan
Date
08/20/2025
Scale
Not to Scale
Drawing No.
A0
Summary



Southern Lot

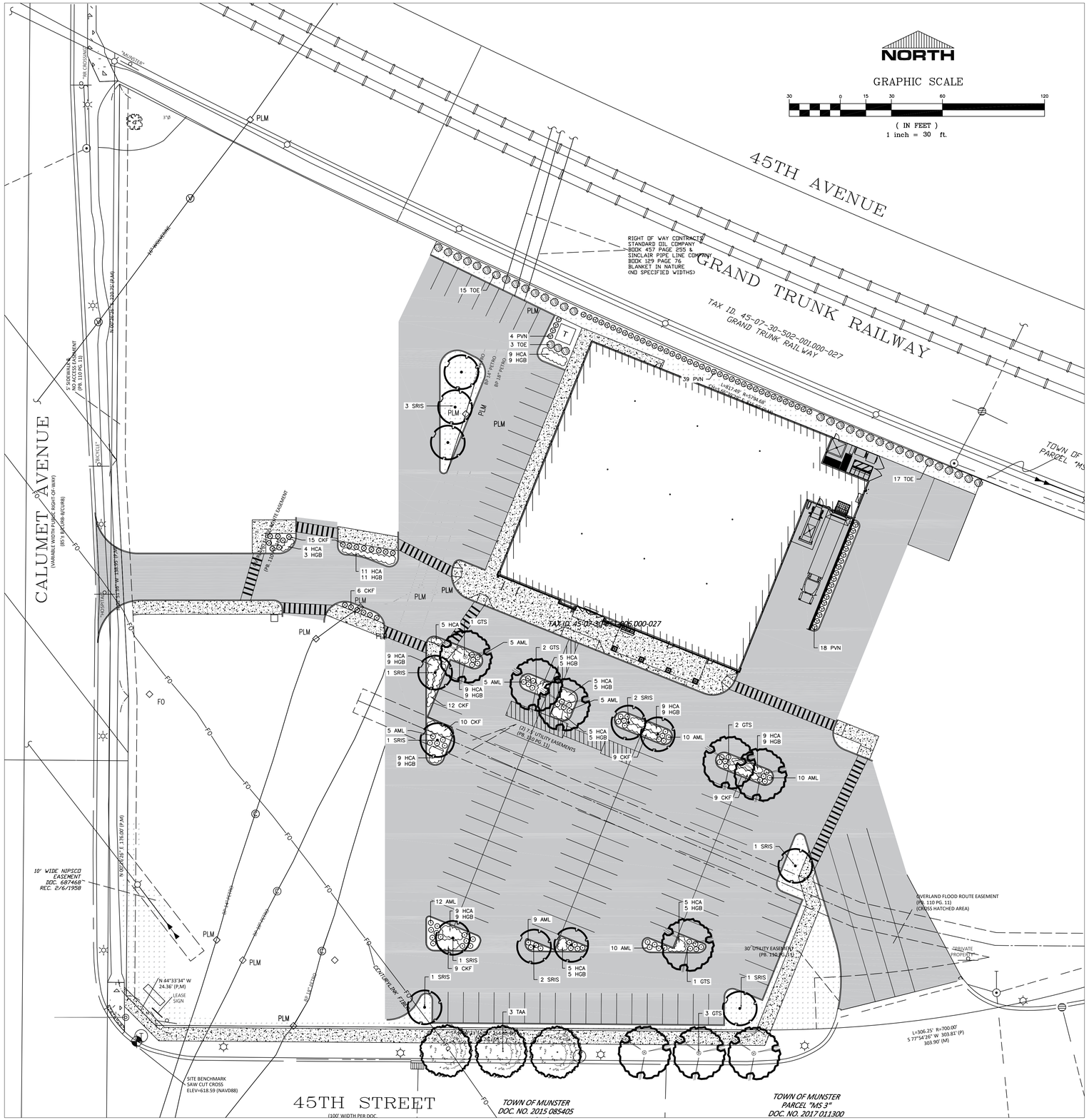
DISCLAIMER

This architectural lighting submittal is provided only for informational purposes and to the help the customer or end-user (as applicable) understand how various sections of linear fixtures connect to each other and how they mount to the ceiling. This lighting submittal is strictly based on the information provided to Acuity Brands, and is provided without warranty as to accuracy, completeness, reliability or otherwise. If the information (including but not limited to floor-plans, reflected ceiling plans, electrical plans and specifications) provided to Acuity Brands is incomplete or not current (i.e., newer versions exist), the accuracy of proposed design may be adversely affected. Once this lighting submittal is received by the customer or end-user (as applicable), it is the obligation of the customer or end-user (as applicable) to consult with a professional engineering advisor to determine whether the proposed design meets the applicable project requirements for lighting system performance, code compliance, safety, suitability and effectiveness for use in a particular application. In no event will Acuity Brands be responsible for any loss resulting from any use of any information contained in this lighting submittal.

VISUAL

Centennial, Munster, Sprout Grocery, 2392-A0

Designer
RMorgan
Date
08/20/2025
Scale
Not to Scale
Drawing No.
A0
Summary

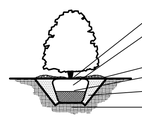


Note: An Irrigation System Shall Be Provided by Landscape Contractor
- Only Turf Areas Require Irrigation

PLANT LIST

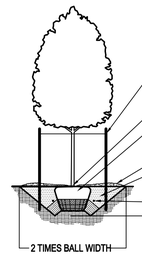
Symbol	Botanical Name	Common Name	Size
Trees			
GTS	Gleditsia triacanthos var. inermis 'Skycole'	Skyline Honeylocust	2.5"
SRIS	Syringa reticulata 'Ivory Silk'	Ivory Silk Lilac Tree	2.5"
TAA	Tilia americana 'McKSentry'	American Sentry Linden	2.5"
TOE	Thuja occidentalis 'Smaragd'	Emerald Green Arborvitae	5'
Shrubs			
AML	Aronia melanocarpa 'UCONNAM165'	Lowscape Mound Chokeberry	#3
Perennial			
CKF	Calamagrostis × acutiflora 'Karl Foerster'	Karl Foerster Feather Reed Grass	#1
HCA	Hemerocallis 'Chicago Apache'	Chicago Apache Daylily	#1
HGB	Hemerocallis 'Going Bananas'	Going Bananas Daylily	#1
PVN	Panicum virgatum 'Northwind'	Northwind Switchgrass	#1

LOCATE ALL UNDERGROUND UTILITIES PRIOR TO DIGGING. SHRUB PIT WIDTH TO BE TWO TIMES THE WIDTH OF THE ROOT BALL. PRUNE OFF ALL DEAD, BROKEN OR SCARRED BRANCHES, AND SHAPE PRUNE AS DIRECTED BY THE LANDSCAPE ARCHITECT. LOCATE ROOT FLARE IN ROOT BALL AND SET SHRUB HEIGHT SO THAT ROOT FLARE IS FLUSH OR SLIGHTLY HIGHER THAN FINISH GRADE DEPENDING ON EXISTING SOIL CONDITIONS. WATER IN THE PLANTING MIX THOROUGHLY, WHILE KEEPING THE SHRUB PLUMB. STRAIGHTEN SHRUB IF SETTLING OCCURS. MULCH LIMITS FOR SHRUBS TO EXTEND TO ALL EDGES OF PLANTING BEDS, SEE PLANS FOR BED LAYOUTS.



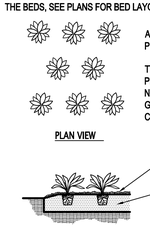
1 SHRUB PLANTING DETAIL
NOT TO SCALE

LOCATE ALL UNDERGROUND UTILITIES PRIOR TO DIGGING. TREE PIT WIDTH TO BE Two TIMES THE WIDTH OF THE ROOT BALL. PRUNE OFF ALL DEAD, BROKEN OR SCARRED BRANCHES, AND SHAPE PRUNE AS DIRECTED BY THE LANDSCAPE ARCHITECT. LOCATE ROOT FLARE IN ROOT BALL AND SET TREE HEIGHT SO THAT ROOT FLARE IS FLUSH OR SLIGHTLYI HIGHER THAN FINISH GRADE DEPENDING ON EXISTING SOIL CONDITIONS. WATER IN THE PLANTING MIX THOROUGHLY, WHILE KEEPING THE TREE PLUMB. STRAIGHTEN TREE IF SETTLING OCCURS.



2 DECIDUOUS & EVERGREEN TREE PLANTING DETAIL
NOT TO SCALE

LOCATE ALL UNDERGROUND UTILITIES PRIOR TO DIGGING. AMEND PLANTING BED SOIL WITH COMPOST PRIOR TO PLANT INSTALLATION. BED HEIGHT IS TO BE 2" ABOVE FINISH GRADE AND WELL DRAINED. MULCH LIMITS FOR PERENNIAL AND GROUNDCOVER BEDS TO EXTEND TO ALL EDGES OF THE BEDS, SEE PLANS FOR BED LAYOUTS.



3 PERENNIAL, GROUNDCOVER, AND ANNUAL PLANTING DETAIL
NOT TO SCALE

This Drawing and Design is the Property of Hubinger Landscaping Corp. and is not to be reproduced or used without the permission of Hubinger Landscaping Corp.

Notes:

Stand alone trees and Landscape Areas to have Shredded Hardwood Bark Mulch 3" Deep w/ Pre-emergent herbicide and have spade dug edge.

All disturbed lawn areas to be restored w/ 4" of topsoil, Seed w/ HLC Sunny Mix or approved equal w/ DS-75 Erosion Control Blanket.

Starter fertilizer to be applied at installation and post fertilizer application applied 30-45 days later with a minimum of 1# of Nitrogen per 1000 SF and 50% being slow release.

HOLEY MOLEY SAYS
"DIG SAFELY"



"IT'S THE LAW"
CALL 2 WORKING DAYS BEFORE YOU DIG
1-800-382-5544
CALL TOLL FREE
PER INDIANA STATE LAW IC8-1-26. IT IS AGAINST THE LAW TO EXCAVATE WITHOUT NOTIFYING THE UNDERGROUND LOCATION SERVICE TWO (2) WORKING DAYS BEFORE COMMENCING WORK.



Revisions:	Date

HUBINGER
Landscaping Corp.
210 East 113th Avenue
Crown Point, Indiana
Phone: 219-662-9911
www.hubingers.com

SPROUTS GROCERY STORE
MUNSTER, IN

Drawn By: LBK/SAS	L1.0
Date: 8/21/25	
Scale: 1:30	

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lots 10, 11, 12 & 13

Storm Water Technical Report
August 2025

Prepared for:

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

Table of Contents

1.0 Project Description

2.0 Storm Sewer Design

3.0 Overland Flood Route

Exhibits

1. ALTA Survey
2. Storm Sewer Calculations
3. Overland Flood Route Calculations
4. Centennial Village – Lot 9 – Building “M” Stormwater Report, dated June 2023

1.0 Project Description

Centennial Village is proposing to develop a grocery store, as the next phase of the ongoing Centennial Village Subdivision PUD project. The site is located northeast of the intersection Calumet Avenue and 45th Avenue in Munster, Indiana. Lot 11 contains approximately 2.36 acres and the proposed building is approximately 23,299 sf. Lots 10, 12 and 13 are 2.02 ac, 1.17ac and 0.93 ac respectively.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards. When Lots 10, 12 & 13 are developed, it shall provide an updated stormwater report including their proposed drainage and storm sewer design for each site.

See **Exhibit 1 ALTA Survey** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 10, 11 (future Sprouts), 12 & 13 (future Chase Bank). The proposed storm sewer system connects to the existing 36" RCP stub located at the southeast corner of the 45th Avenue entrance. The connection will convey flows into the major storm sewer system south of 45th Avenue, which ultimately discharges to the Centennial Village regional detention facility, Clayhole Lake. The pipe capacity and the major existing storm sewer system being connected to were previously studied by Robinson Engineering in their stormwater report dated October 2, 2017. As shown in **Exhibit 4,** *Centennial Village – Lot 9 – Building M Stormwater Report* (June 2023), the storm sewer system was designed to accommodate Lot C, which is now being subdivided into Lots 10, 11, 12, and 13.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow.
See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of Lot 11. When Lot 10 is developed, it shall provide an overland flood route for the site. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 3 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

Exhibit 1

ALTA Survey

ALTA/NSPS
LAND TITLE SURVEY

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P - DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG" - 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG" - 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF - REBAR FOUND
PB. - PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO - NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A. - LANDSCAPE AREA
PG. - PAGE
REC. - RECORDED

- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CURB INLET
- CATCH BASIN
- TRAFFIC MANHOLE
- GUY/ANCHOR
- ROAD SIGN
- PLM PIPELINE MARKER
- GAS TEST STATION
- GAS LINE VENT
- GAS VALVE
- ICV IRRIGATION CONTROL VALVE
- bov BLOW OFF VALVE
- SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON
- W BURIED WATER LINE
- G BURIED GAS LINE
- E BURIED ELECTRIC LINE
- T BURIED COMMUNICATION LINE
- OHU OVERHEAD UTILITY WIRES
- BP BURIED BRITISH PETROLEUM PIPE LINE
- WOLVERINE BURIED WOLVERINE PIPE LINE
- SUBJECT PARCEL LINE
- ADJOINING PARCEL LINE
- SECTION/QUARTER LINE
- EASEMENT LINE
- STORM SEWER WITH FLOW DIRECTION
- SANITARY SEWER WITH FLOW DIRECTION
- WATER VALVE
- FIRE HYDRANT ASSEMBLY
- FIBER OPTIC MARKER POST
- TREE WITH SIZE
- xxx EXISTING 1-FOOT CONTOUR
- xxx.x EXISTING SPOT ELEVATION
- ADA PAD
- CONCRETE
- ASPHALT
- STONE

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF- ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY, ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL-
RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT.

ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.

ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.

ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.

ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.

ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

SCALE: 1" = 50'

THE ARCHITECTS PARTNERSHIP

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\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

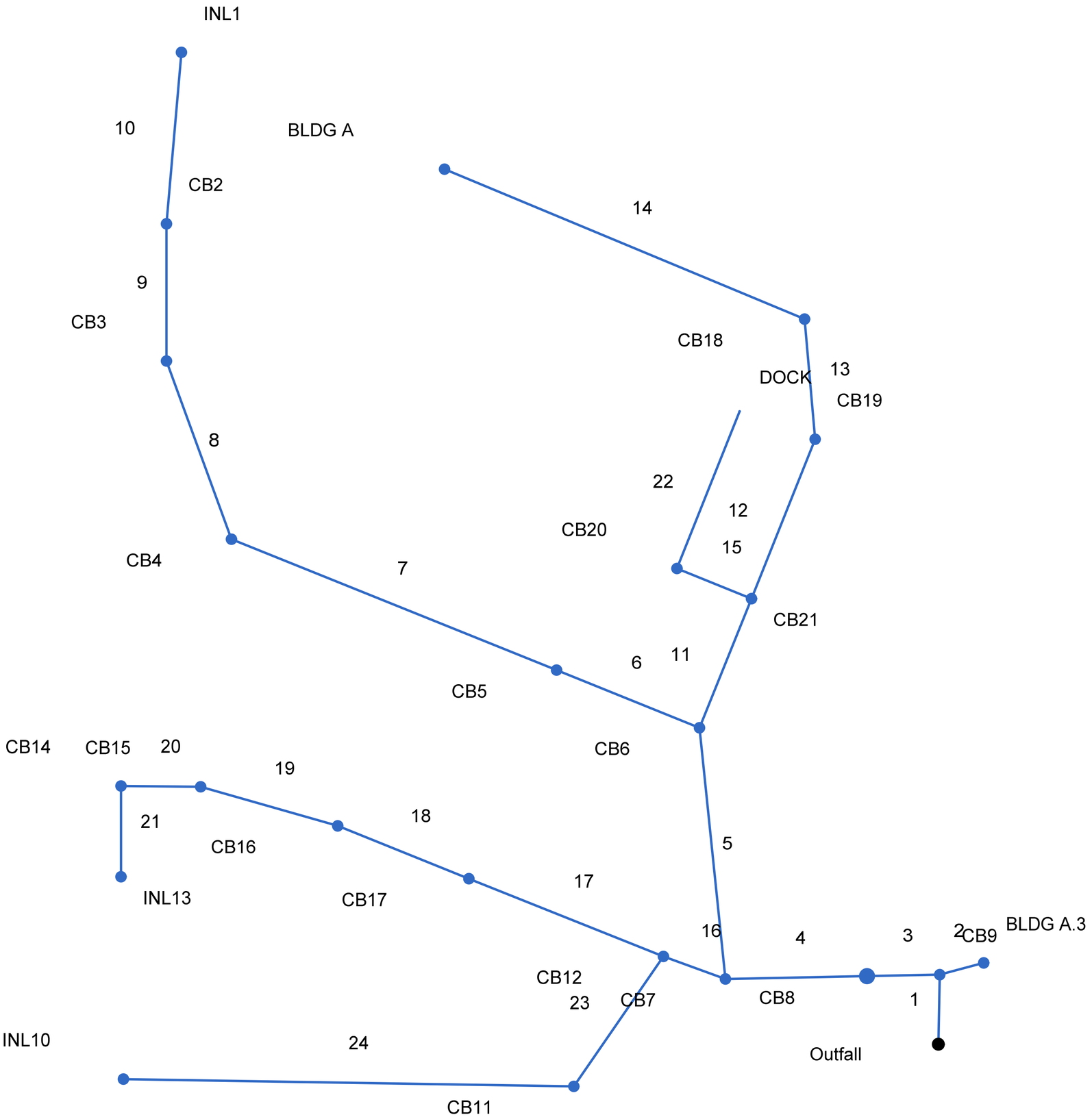
DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

Exhibit 2

Storm Sewer Calculations

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



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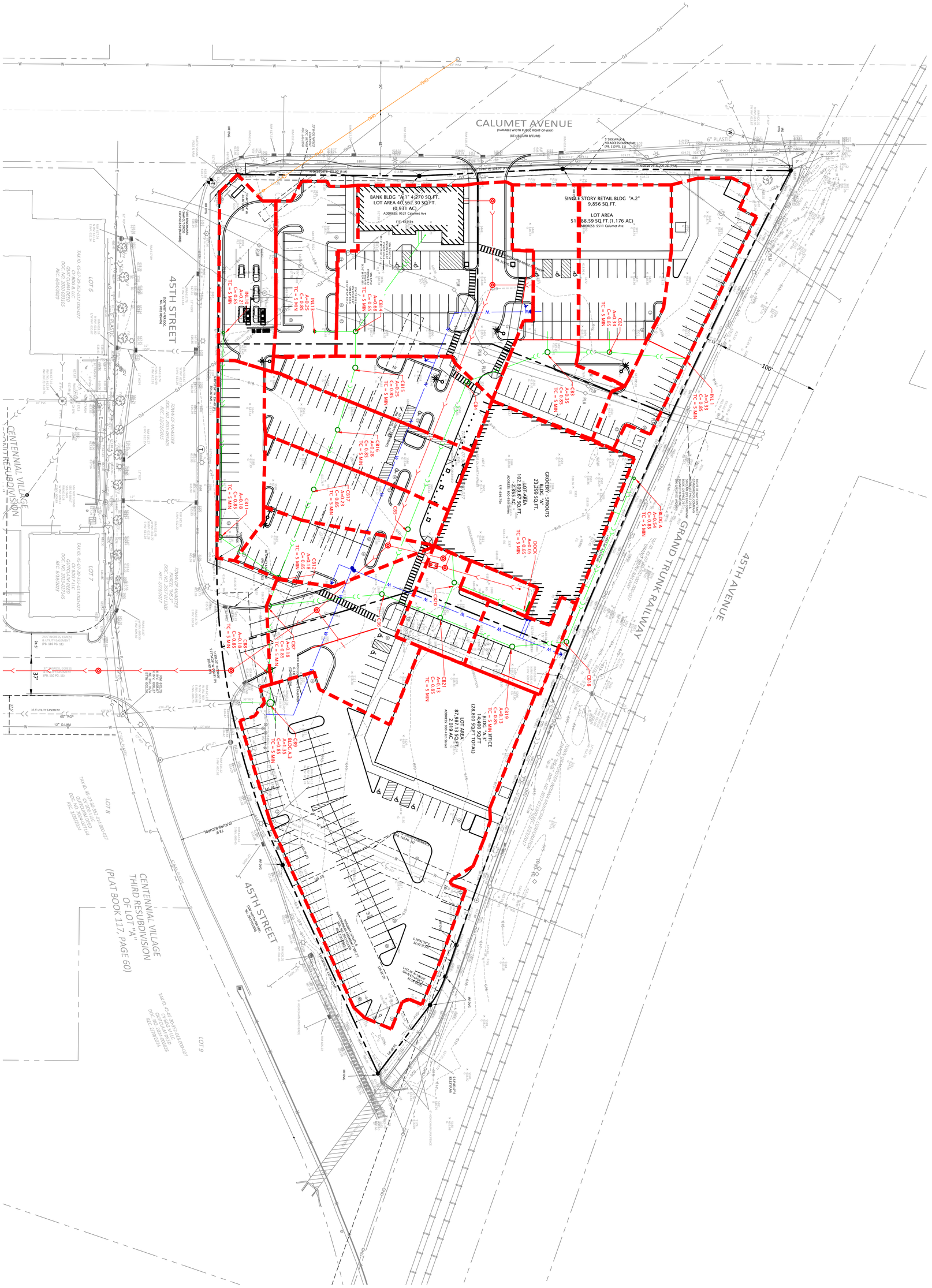

NOT FOR CONSTRUCTION

TRIB EX

PROJECT NO: 25-0081

DESIGNED BY: GMPF

DATE: 08/20/25

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SCALE: 1" = 40'

Centennial Village-Lot 11
Bldg. A Sprouts

Tributary Area Exhibit

DATE:	REVISIONS AND NOTES:

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

08/20/25

NOT FOR CONSTRUCTION

1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

BY: ___DPW___
DATE: _08/20/2025__
CHECKED BY: ____
DATE: __

PROJECT: 25-0081 CVP Sprouts
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
1	CB9	CB9-EXMH	0.00	5.79	0.85	5.00	9.20	5.74	0.00	28.24	29.62	4.77	0.013	30.00	36.00	0.20	615.90	607.15	607.09	609.49	609.43
2	BLDG A.3	BLDGA3-CB9	1.35	1.35	0.85	5.00	5.00	7.07	0.00	8.11	12.25	2.69	0.012	20.00	24.00	0.25	615.90	608.05	608.00	609.86	609.85
3	CB8	CB8-CB9	0.18	4.44	0.85	5.00	9.10	5.77	0.00	21.77	24.85	4.52	0.012	32.00	30.00	0.31	615.05	607.55	607.45	609.91	609.85
4	CB7	CB7-CB8	0.18	4.26	0.85	5.00	8.90	5.83	0.00	21.10	25.18	4.40	0.012	62.00	30.00	0.32	615.55	607.75	607.55	610.06	609.95
5	CB6	CB6-CB7	0.00	1.87	0.85	5.00	8.30	5.98	0.00	9.51	12.77	3.03	0.012	110.00	24.00	0.27	617.93	608.20	607.90	610.54	610.37
6	CB5	CB5-CB6	0.00	1.02	0.85	5.00	7.00	6.35	0.00	5.51	6.91	3.12	0.012	68.00	18.00	0.37	618.74	609.25	609.00	610.82	610.66
7	CB4	CB4-CB5	0.00	1.02	0.85	5.00	6.20	6.61	0.00	5.73	6.48	4.15	0.012	154.00	18.00	0.32	618.68	613.50	613.00	614.60	614.10
8	CB3	CB3-CB4	0.35	1.02	0.85	5.00	5.80	6.76	0.00	5.86	7.90	4.00	0.012	83.00	18.00	0.48	617.80	613.90	613.50	614.96	614.80
9	CB2	CB2-CB3	0.34	0.67	0.85	5.00	5.50	6.87	0.00	3.91	4.95	3.48	0.012	60.00	15.00	0.50	617.90	614.20	613.90	615.21	615.08
10	INL1	INL1-CB2	0.33	0.33	0.85	5.00	5.00	7.07	0.00	1.98	2.81	2.72	0.012	75.00	12.00	0.53	617.40	614.60	614.20	615.41	615.24
11	CB21	CB21-CB6	0.13	0.85	0.85	5.00	8.00	6.06	0.00	4.38	4.91	3.61	0.012	61.00	15.00	0.49	618.60	609.70	609.40	610.88	610.66
12	CB19	CB19-CB21	0.13	0.67	0.85	5.00	5.90	6.72	0.00	3.83	5.11	3.15	0.012	75.00	15.00	0.53	618.60	610.10	609.70	611.29	611.08
13	CB18	CB18-CB19	0.00	0.54	0.85	5.00	5.70	6.80	0.00	3.12	3.36	3.98	0.012	53.00	12.00	0.76	618.00	610.50	610.10	611.71	611.37
14	BLDG A	BLDGA-CB18	0.54	0.54	0.85	5.00	5.00	7.07	0.00	3.24	3.49	5.02	0.012	171.00	12.00	0.82	617.00	613.50	612.10	614.27	612.86
15	CB20	CB20-CB21	0.00	0.05	0.85	5.00	6.40	6.54	0.00	0.28	3.25	1.33	0.012	35.00	12.00	0.71	619.70	610.60	610.35	610.82	611.08
16	CB12	CB12-CB7	0.18	2.21	0.85	5.00	7.50	6.22	0.00	11.68	14.40	5.10	0.012	29.00	24.00	0.35	615.75	611.15	611.05	612.52	612.42
17	CB17	CB17-CB12	0.23	1.64	0.85	5.00	6.00	6.70	0.00	9.34	9.56	5.29	0.012	92.00	18.00	0.71	616.20	611.80	611.15	613.53	612.91
18	CB16	CB16-CB17	0.23	1.41	0.85	5.00	5.70	6.78	0.00	8.13	8.54	4.60	0.012	62.00	18.00	0.56	616.25	612.15	611.80	613.91	613.60
19	CB15	CB15-CB16	0.25	1.18	0.85	5.00	5.50	6.88	0.00	6.90	7.19	3.91	0.012	63.00	18.00	0.40	616.35	612.40	612.15	614.19	613.96
20	CB14	CB14-CB15	0.68	0.93	0.85	5.00	5.30	6.93	0.00	5.48	6.47	4.47	0.012	35.00	15.00	0.86	616.35	612.70	612.40	614.48	614.27
21	INL13	INL13-CB14	0.25	0.25	0.85	5.00	5.00	7.07	0.00	1.50	2.74	1.91	0.012	40.00	12.00	0.50	616.40	612.90	612.70	614.85	614.79
22	DOCK	DOCK-CB21	0.05	0.05	0.85	5.00	5.00	7.07	0.00	0.30	0.96	2.44	0.012	74.00	8.00	0.54	615.75	613.00	612.60	613.26 j	612.86
23	CB11	CB11-CB12	0.18	0.39	0.85	5.00	7.10	6.34	0.00	2.10	2.75	2.68	0.012	69.00	12.00	0.51	616.30	612.10	611.75	613.10	612.91
24	INL10	INL10-CB11	0.21	0.21	0.85	5.00	5.00	7.07	0.00	1.26	2.60	2.26	0.012	198.00	12.00	0.45	617.00	613.00	612.10	613.54	613.19

INLET CAPACITY ANALYSIS

BY: DPW
DATE: 8/20/2025
CHECKED: GMPF
DATE: 8/20/2025

Project: 25-0081 CVP-Sprouts
Location: 45th & Calumet Munster, IN

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

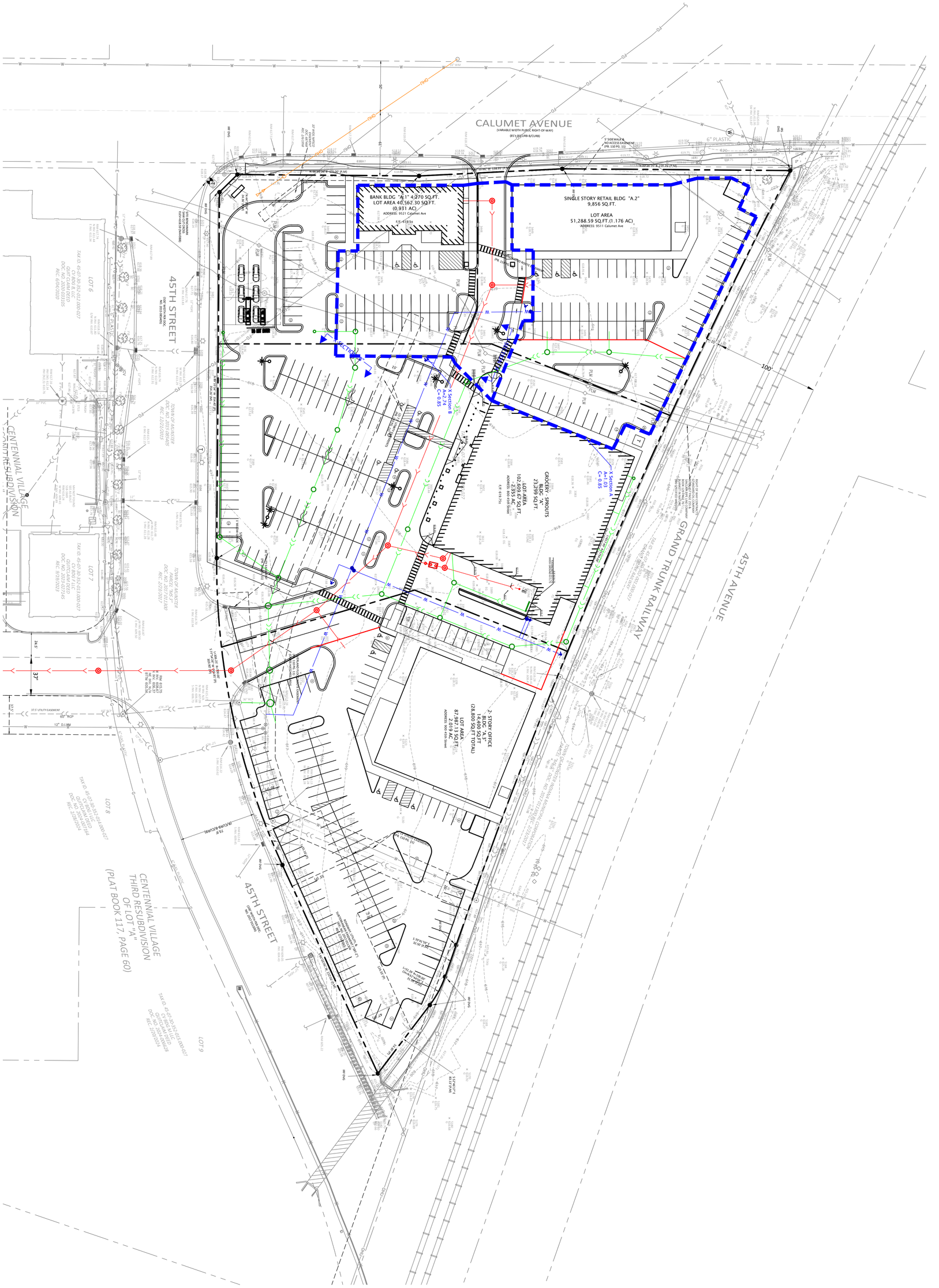
$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
INL1	EJ 1020 M1	0.97	5.92	0.67	0.33	0.85	7.08	1.99	0.58	0.35	6.9
CB2	EJ 1040 M1	1.32	6.83	0.67	0.34	0.85	7.08	2.05	0.33	0.32	4.0
CB3	EJ 1040 M1	1.32	6.83	0.67	0.35	0.85	7.08	2.11	0.35	0.33	4.2
CB7	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB8	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL10	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB11	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB12	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL13	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB14	V5630	3.29	10.00	0.67	0.58	0.85	7.08	3.50	0.16	0.36	4.3
CB15	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB16	EJ 1020 M1	0.97	5.92	0.67	0.28	0.85	7.08	1.69	0.42	0.31	5.0
CB17	EJ 1020 M1	0.97	5.92	0.67	0.23	0.85	7.08	1.38	0.28	0.27	3.4
CB19	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
CB21	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
DOCK	EJ 1020 M1	0.97	5.92	0.67	0.05	0.85	7.08	0.30	0.01	0.10	1.2

Exhibit 3

Overland Flood Route Calculations



NOT FOR CONSTRUCTION

EX

PROJECT NO: 25-0081

DESIGNED BY: GMPF

DATE: 08/20/25

© COPYRIGHT 2017 DVG TEAM, INC

SCALE: 1" = 40'

Centennial Village-Lot 11
Bldg. A Sprouts

Overland Flood Route Exhibit

DATE:	REVISIONS AND NOTES:

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

08/20/25

NOT FOR CONSTRUCTION

1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DVG TEAM INC

Overland Flood Route Computation Calculation

Project: 25-0081 CVP-Sprouts
Date: 8/20/2025

Storm Event: 100yr
*** Areas Calculated from Exhibit 3, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: G A					
Tc=	10	min			
Area=	1.03	acres			
C=	0.85				
i=	5.46	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**4.77**	**cfs**
100YR Overflow Water Elevation=				**618.55**	**Elev**
Freeboard to Nearest Bldg=				**1.20**	**ft**

Cross Section: B					
Tc=	15	min			
Area=	2.74	acres			
C=	0.85				
i=	4.52	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**10.53**	**cfs**
100YR Overflow Water Elevation=				**616.85**	**Elev**
Freeboard to Nearest Bldg=				**2.90**	**ft**

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Aug 20 2025

XSectionA

User-defined

Invert Elev (ft)	= 618.35
Slope (%)	= 1.20
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.77

Highlighted

Depth (ft)	= 0.20
Q (cfs)	= 4.770
Area (sqft)	= 1.52
Velocity (ft/s)	= 3.14
Wetted Perim (ft)	= 15.21
Crit Depth, Yc (ft)	= 0.26
Top Width (ft)	= 15.20
EGL (ft)	= 0.35

(Sta, El, n)-(Sta, El, n)...

(0.00, 619.15)-(19.71, 618.73, 0.011)-(33.23, 618.35, 0.011)-(53.45, 618.85, 0.011)-(59.57, 619.35, 0.011)-(80.15, 619.75, 0.011)

Channel Report

XSectionB

User-defined

Invert Elev (ft)	= 616.70
Slope (%)	= 3.20
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.53

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 10.53
Area (sqft)	= 2.71
Velocity (ft/s)	= 3.89
Wetted Perim (ft)	= 36.13
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 36.13
EGL (ft)	= 0.38

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.00)-(31.66, 616.70, 0.011)-(58.72, 616.90, 0.011)-(73.28, 617.05, 0.011)-(170.78, 619.75, 0.011)

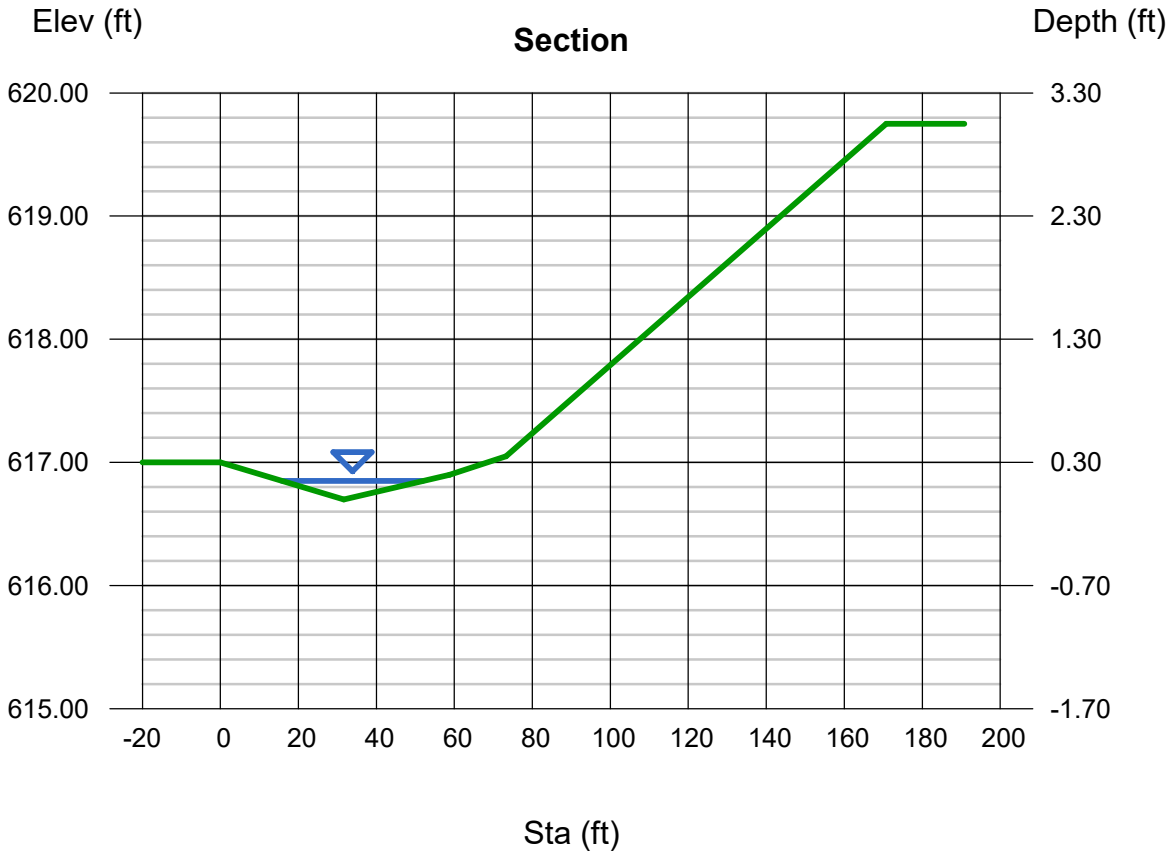


Exhibit 4

Centennial Village – Lot 9 – Building M, dated June 2023

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lot 9 – Building "M"
9603 N. Centennial Drive Munster, IN

Storm Water Technical Report
June 2023

Prepared for:

Centennial Village
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

Table of Contents

1.0 Project Description

2.0 Storm Sewer Design

3.0 Overland Flood Route

Exhibits

1. USGS Location Map
2. Storm Sewer Calculations
3. Overland Flood Route Calculations

1.0 Project Description

Centennial Village is proposing to develop two retail buildings, M and I, as the next phase of the ongoing Centennial Village Subdivision PUD project. Building M will be permitted and built at this time, while building I will be developed in a near future phase. The northwestern portion of Lot A is to be further subdivided into Lots 8 and 9, with Lot 8 serving building I and Lot 9 serving building M. Lot 8 contains approximately 0.84 acres and Lot 9 contains 2.14 acres. The project will also include construction of a new paved parking area, concrete sidewalks, a retaining wall adjacent to 45th Street, and installation of new water, sanitary, and storm services.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards.

See **Exhibit 1 USGS Location Map** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 8 and 9, as well as the future development of Building A directly north of 45th Street. Depicted outfall data from Building A is provided in a stormwater report by Robinson Engineering dated 10/02/17. This data was incorporated into our storm sewer calculations to accurately model pipe capacity.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow. This proposed storm sewer system then ties into an existing 60" HDPE before discharging to Clayhole Lake.

See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Robinson Engineering Stormwater Report Excerpts**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of North Centennial Drive, directly south of Lots 8 and 9. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 6 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

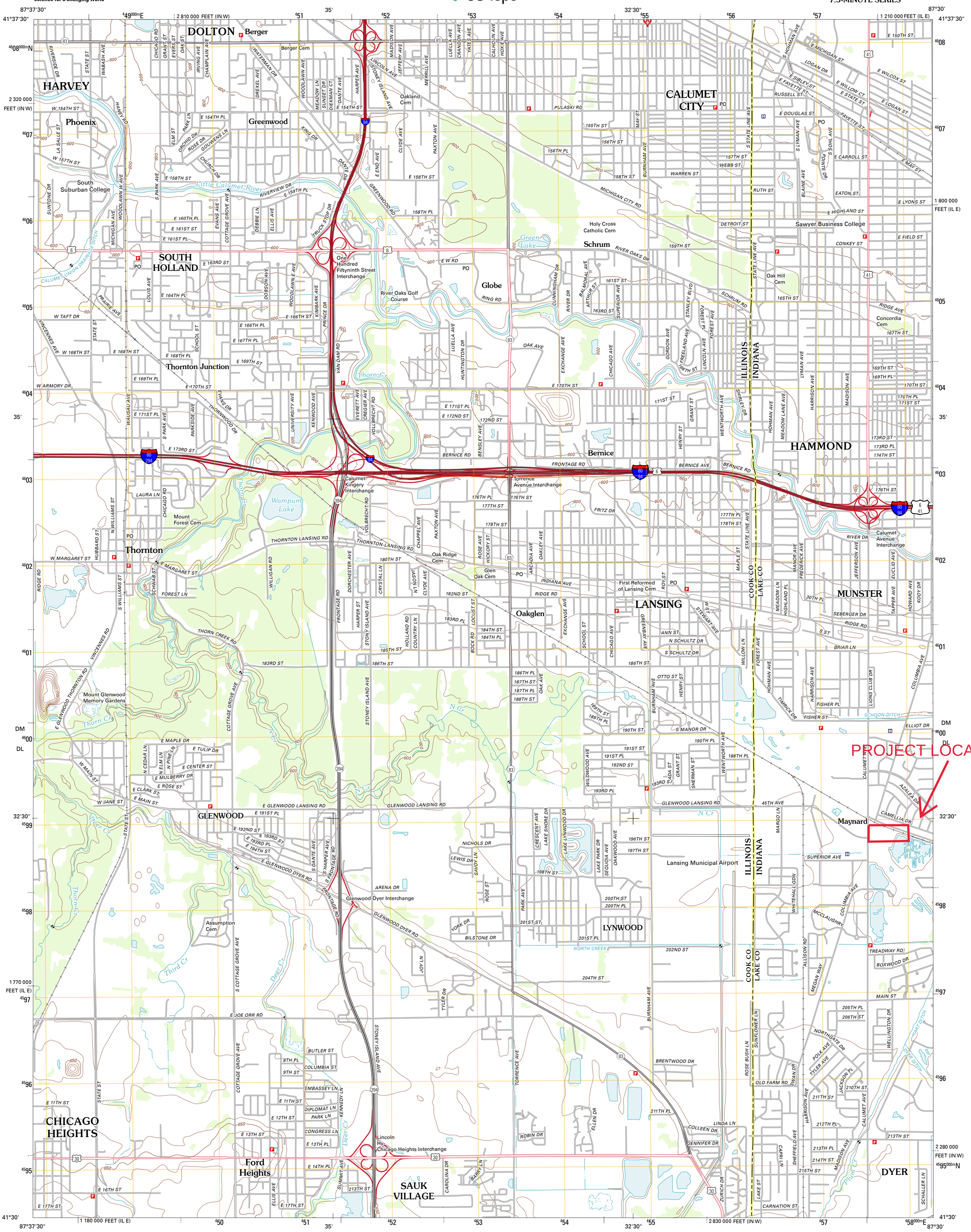
Exhibit 1

USGS Location Map

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map US Topo

CALUMET CITY QUADRANGLE
ILLINOIS-INDIANA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 16T
10 000-foot ticks: Illinois Coordinate System of 1983 (east zone), Indiana Coordinate System of 1983 (west zone)

Imagery.....NAIP, August 2011
Roads.....©2006-2011 TomTom
Names.....GNIS, 2011
Hydrography.....National Hydrography Dataset, 2011
Contours.....National Elevation Dataset, 2012
Boundaries.....Census, IBWC, IBC, USGS, 1972 - 2010

UTM GRID AND 2012 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
DM DL
Grid Zone Designation
16T

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.3

QUADRANGLE LOCATION

Blue Island	Lake Calumet	Whiting
Harvey	Calumet City	Highland
Steger	Dyer	Saint John

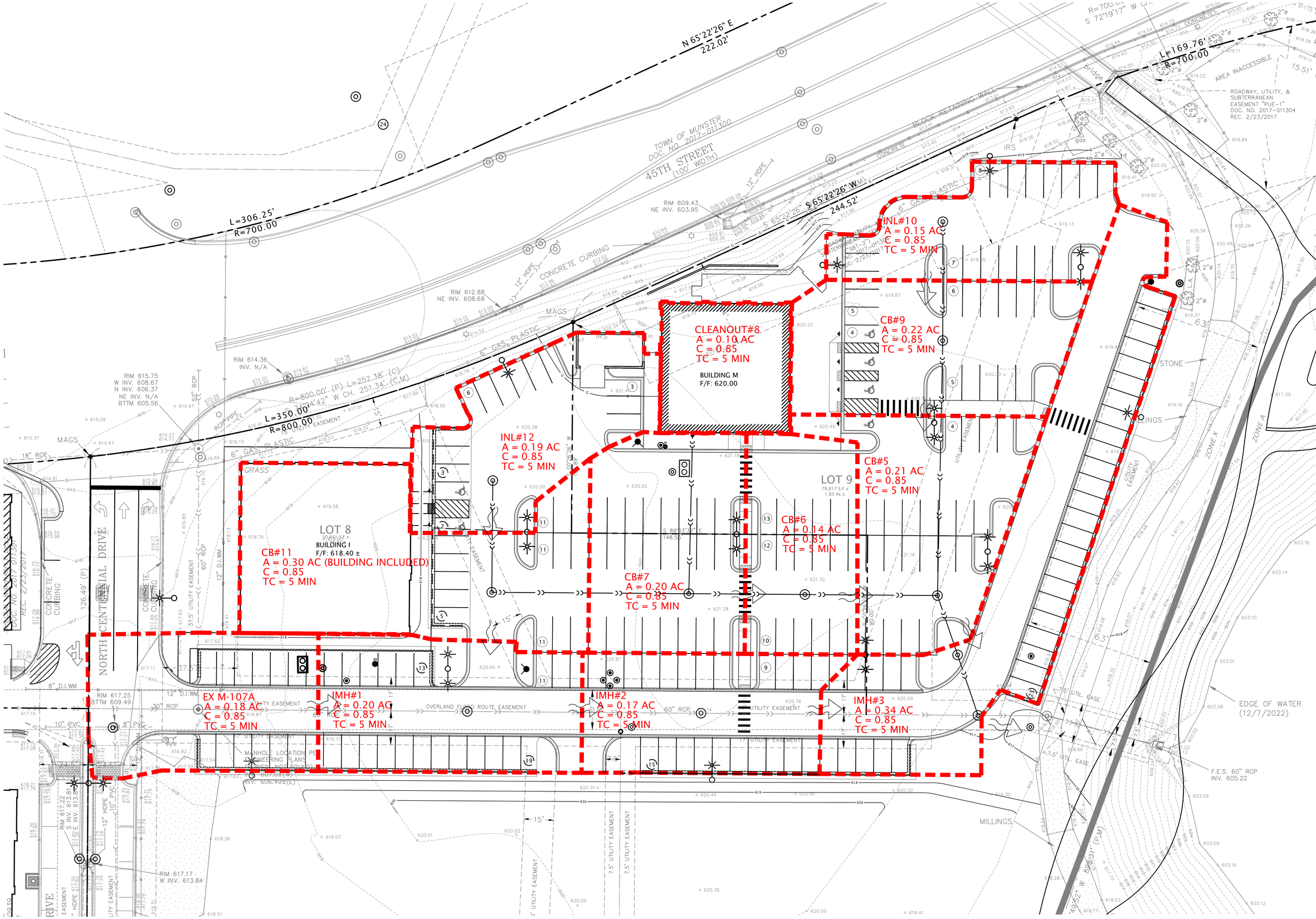
ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION
Interstate Route
US Route
Ramp
State Route
Local Road
4WD
Interstate Route US Route State Route

CALUMET CITY, IL-IN
2012

Exhibit 2

Storm Sewer Calculations



DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
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www.dvgteam.com

NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE

631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Stormwater Tributary Area Exhibit

N

0' 10' 20'

SCALE: 1" = 20'

© COPYRIGHT 2017 DVG TEAM, INC

DESIGN BY	DATE
MPO	06/20/23
PROJECT NO.	
23-0026	

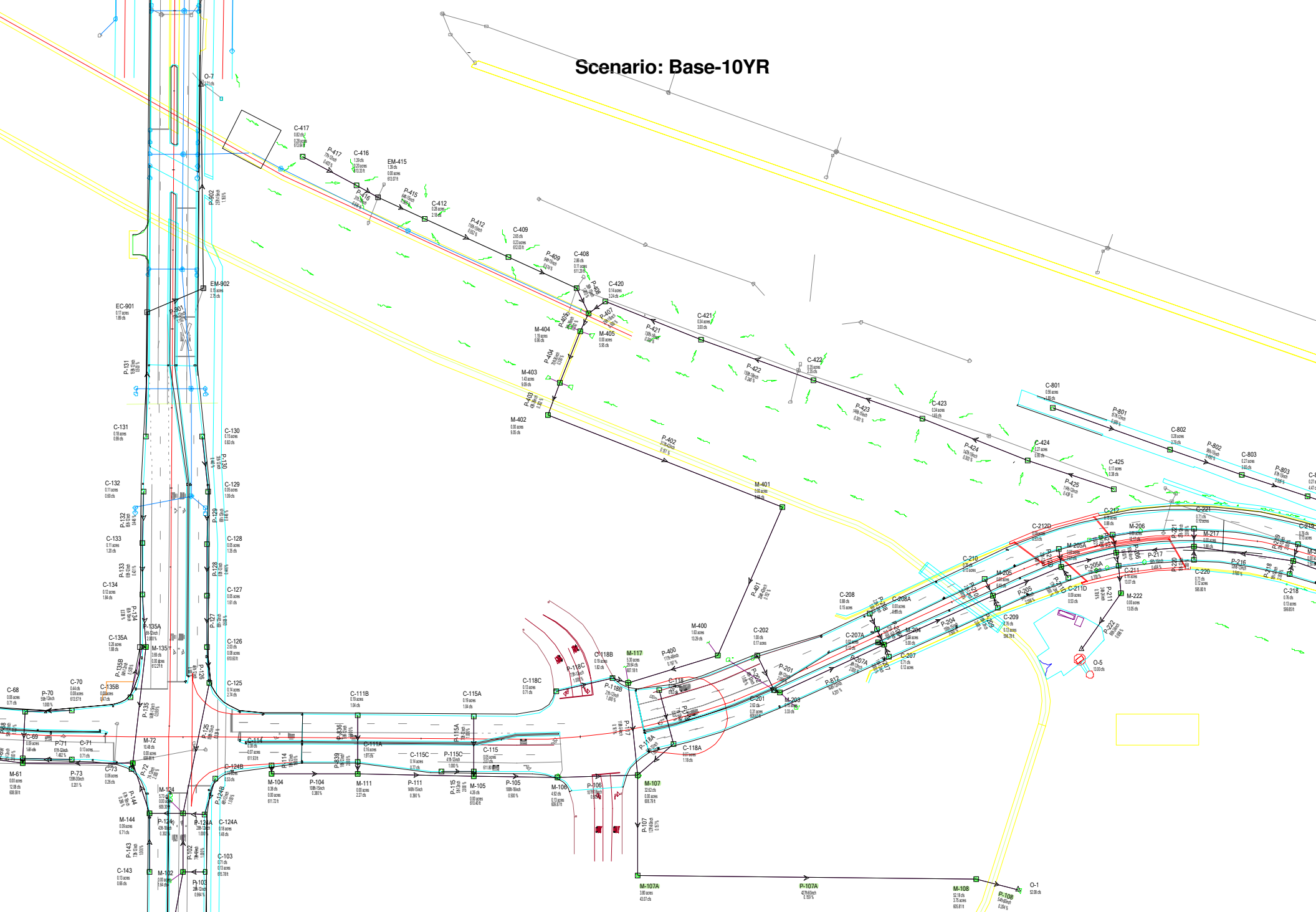
EX 2

BY: MPO
DATE: 06/20/23
CHECKED BY: RJP
DATE: 6/20/23

PROJECT: 23-0026 Centennial Village Buildings M & I
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
32	CLEANOUT#8	CB#7	0.10	0.10	0.85	5.00	5.00	7.07	0.00	0.60	2.00	2.40	0.012	81	8	2.35	620.00	615.00	613.10	615.36 j	614.90
31	INL#12	CB#11	0.19	0.19	0.85	5.00	5.00	7.07	0.00	1.14	2.82	1.45	0.012	56	12	0.54	617.00	614.00	613.70	615.69	615.64
30	EX M-117	EX M-107	8.48	8.48	0.84	3.50	3.50	7.07	0.00	50.33	85.49	4.02	0.012	118	54	0.16	614.68	607.18	606.99	610.42	610.35
29	INL#10	CB#9	0.15	0.15	0.85	5.00	5.00	7.07	0.00	0.90	2.73	2.43	0.012	60	12	0.50	617.90	614.90	614.60	615.30	615.22
28	CB#9	CB#5	0.22	0.37	0.85	5.00	5.90	6.74	0.00	2.12	3.59	4.44	0.012	127	12	0.87	617.90	614.60	613.50	615.22	614.05
27	CB#11	CB#7	0.30	0.49	0.85	5.00	5.60	6.82	0.00	2.84	3.00	3.62	0.012	99	12	0.61	616.70	613.70	613.10	615.44	614.90
26	CB#7	CB#6	0.20	0.79	0.85	5.00	6.10	6.66	0.00	4.47	4.95	3.64	0.012	60	15	0.50	616.60	613.10	612.80	614.69	614.45
25	CB#6	CB#5	0.14	0.93	0.85	5.00	6.40	6.57	0.00	5.19	5.41	4.23	0.012	67	15	0.60	616.55	612.80	612.40	614.41	614.04
24	CB#5	HYDRODYNAMIC SEP#4	0.21	1.51	0.85	5.00	6.60	6.47	0.00	8.31	8.99	5.60	0.012	32	18	0.63	616.50	612.40	612.20	613.54	613.41
23	HYDRODYNAMIC SEP#4	IMH#3	0.00	1.51	0.85	5.00	6.80	6.44	0.00	8.26	8.99	5.77	0.012	32	18	0.63	617.20	612.2	612	613.33	613.13
22	EX M-107	EX M-107A	0	8.48	0	3.40	4.10	7.07	0.00	50.33	111.96	3.31	0.012	127	60	0.16	615.75	606.79	606.59	610.33	610.29
21	EX BLDG G	EX CB#13	0.52	0.52	0.9	10.00	10.00	5.55	0.00	2.60	6.8	6.28	0.012	45	12	3.11	618.40	613.5	612.1	614.19	612.53
20	EX INL#16	EX IMH#14	0.21	0.21	0.81	5.00	5.00	7.07	0.00	1.2	7.84	2.46	0.012	45	12	4.13	616.50	613.5	611.64	613.96 j	613.16
19	EX INL#15	EX IMH#14	0.12	0.12	0.81	5.00	5.00	7.07	0.00	0.69	6.15	1.87	0.012	85	12	2.54	616.80	613.8	611.64	614.15 j	613.16
18	EX YD#12	EX YD#11	0.03	0.03	0.81	5.00	5.00	7.07	0.00	0.17	1.02	1.82	0.012	46	8	0.61	618.30	615.00	614.72	615.19	614.96
17	EX YD#11	EX YD#10	0.02	0.05	0.81	5.00	6.60	6.50	0.00	0.26	1.02	1.87	0.012	53	8	0.60	618.30	614.72	614.40	614.96	614.76
16	EX YD#10	EX IMH#6	0.10	0.15	0.81	5.00	7.70	6.16	0.00	0.75	5.57	1.94	0.012	111	12	2.09	618.30	614.40	612.09	614.76 j	613.80
15	EX IMH#14	EX IMH#5	0.14	0.47	0.81	5.00	6.60	6.48	0.00	2.47	4.72	2.01	0.012	44	15	0.45	616.40	611.64	611.44	613.07	613.01
14	EX INL#9	EX IMH#8	0.10	0.10	0.81	5.00	5.00	7.07	0.00	0.57	5.74	1.72	0.012	45	12	2.21	617.00	614.00	613.00	614.31 j	614.24
13	EX IMH#8	EX IMH#7	0.10	0.20	0.81	5.00	6.00	6.68	0.00	1.08	3.36	1.38	0.012	66	12	0.76	616.90	613.00	612.50	614.20	614.15
12	EX IMH#7	EX IMH#6	0.31	0.51	0.81	5.00	6.80	6.42	0.00	2.65	3.33	3.38	0.012	55	12	0.75	616.80	612.50	612.09	614.06	613.80
11	EX IMH#6	EX IMH#5	0.29	0.95	0.81	5.00	9.40	5.69	0.00	4.38	5.42	3.57	0.012	108	15	0.60	616.60	612.09	611.44	613.43	613.01
10	EX IMH#5	EX CB#4	0.10	1.52	0.81	5.00	9.80	5.58	0.00	6.87	7.67	5.60	0.012	76	15	1.20	616.60	609.06	608.15	612.15	611.42
9	EX CB#4	EX CB#3	0.97	2.49	0.81	8.00	10.00	5.54	0.00	11.17	16.29	3.56	0.012	86	24	0.44	616.70	608.15	607.77	611.15	610.97
8	EX CB#3	EX CB#13	0.39	2.88	0.81	5.00	10.40	5.45	0.00	12.72	16.53	4.05	0.012	68	24	0.46	616.60	607.77	607.46	610.84	610.66
7	EX CB#13	EX HYDRODYNAMIC SEP#2	0.13	3.01	0.81	5.00	10.70	5.40	0.00	13.16	27.86	2.68	0.013	13	30	0.46	616.60	607.46	607.40	610.61	610.59
6	EX HYDRODYNAMIC SEP#2	EX M-107A	0	3.53	0.81	5.00	10.70	5.38	0.00	15.63	18.16	3.19	0.013	102	30	0.2	616.77	607.4	607.2	610.43	610.29
5	EX M-107A	IMH#1	0.18	12.19	0.85	5.00	11.30	5.27	0.00	53.65	113.9	3.46	0.012	135	60	0.16	617.00	606.49	606.27	610.09	610.05
4	IMH#1	IMH#2	0.2	12.39	0.85	5.00	12.10	5.11	0.00	52.86	110.56	3.28	0.012	117	60	0.15	616.45	606.27	606.09	610.02	609.99
3	IMH#2	IMH#3	0.17	12.56	0.85	5.00	12.80	4.97	0.00	52.18	114.18	3.12	0.012	140	60	0.16	616.50	606.09	605.86	609.97	609.93
2	IMH#3	EX MH107B	0.34	14.41	0.85	5.00	13.70	4.82	0.00	58.14	109.82	3.54	0.012	33	60	0.15	616.20	605.86	605.81	609.74	609.73

Scenario: Base-10YR



Title: REL #08-315 45TH ST UNDERPASS - MUNSTER, IN
c:\...\stormcad-no-cal_10-17\munster-ph1.stm
10/02/17 05:46:02 PM

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Robinson Engineering Ltd
Haestad Methods Solution Center Watertown, CT 06795 USA +1-203-755-1666

Project Engineer: JJD
StormCAD v5.6 [05.06.014.00]

Scenario: Base-10YR

DOT Pipe Report 2

Label	Up. Node	Dn. Node	Up. Inlet Rat. Coef.	Up. Inlet Area (acres)	Up. Calc. Sys. CA (acres)	System Tc (min)	I (in/hr)	System Q (cfs)	L (ft)	S (%)	Size	Mannings n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)
P-417	C-417	C-416	0.60	0.17	0.17	15.00	4.84	0.82	77	0.403	12 inch	0.012	2.45	613.64	613.33	616.30	616.00	1.66	1.67	614.04	613.83
P-425	C-425	C-424	0.45	0.08	0.08	15.00	4.84	0.38	114	0.439	12 inch	0.012	2.56	612.28	611.78	614.90	615.00	1.62	2.22	612.54	612.20
P-416	C-416	EM-41	0.60	0.12	0.29	15.46	4.79	1.39	31	0.516	12 inch	0.012	2.77	613.33	613.17	616.00	616.50	1.67	2.33	613.83	613.67
P-424	C-424	C-423	0.45	0.12	0.20	15.82	4.76	0.95	142	0.303	15 inch	0.012	3.85	611.78	611.35	615.00	615.20	1.97	2.60	612.20	611.92
P-415	EM-41	C-412	0.00	0.00	0.29	15.60	4.78	1.39	64	0.563	15 inch	0.012	5.25	613.07	612.71	616.50	616.00	2.18	2.04	613.54	613.28
P-423	C-423	C-422	0.45	0.15	0.35	16.73	4.66	1.65	146	0.301	15 inch	0.012	3.84	611.35	610.91	615.20	615.00	2.60	2.84	611.92	611.59
P-412	C-412	C-409	0.60	0.17	0.46	15.90	4.75	2.18	116	0.552	15 inch	0.012	5.20	612.69	612.05	616.00	615.60	2.06	2.30	613.28	612.68
P-422	C-422	C-421	0.45	0.16	0.51	17.53	4.58	2.35	150	0.240	18 inch	0.012	5.57	610.91	610.55	615.00	615.30	2.59	3.25	611.59	611.28
P-409	C-409	C-408	0.45	0.10	0.56	16.38	4.70	2.65	94	0.574	15 inch	0.012	5.30	612.03	611.49	615.60	615.70	2.32	2.96	612.68	612.11
P-421	C-421	C-420	0.45	0.15	0.66	18.36	4.49	3.00	130	0.300	18 inch	0.012	6.23	610.55	610.16	615.30	615.30	3.25	3.64	611.28	610.85
P-408	C-408	M-405	0.45	0.05	0.61	16.74	4.66	2.86	36	1.000	15 inch	0.012	7.00	611.29	610.93	615.70	615.70	3.16	3.52	611.97	611.49
P-407	C-420	M-405	0.45	0.06	0.73	18.98	4.43	3.24	26	0.500	18 inch	0.012	8.05	610.16	610.03	615.30	615.70	3.64	4.17	610.85	610.69
P-405	M-405	M-404	0.00	0.00	1.33	19.08	4.42	5.95	24	0.292	36 inch	0.012	39.02	609.83	609.76	615.70	615.60	2.87	2.84	610.64	610.61
P-404	M-404	M-403	0.40	0.48	1.81	25.00	3.81	6.96	70	0.300	36 inch	0.012	39.57	609.76	609.55	615.60	615.80	2.84	3.25	610.61	610.53
P-403	M-403	M-402	0.40	0.57	2.38	25.28	3.78	9.09	43	0.302	36 inch	0.012	39.73	609.55	609.42	615.80	616.00	3.25	3.58	610.53	610.37
P-836	C-111E	C-111A	0.84	0.16	0.16	5.00	6.48	1.04	59	2.000	12 inch	0.012	5.46	613.71	612.53	617.64	617.09	2.93	3.56	614.14	613.02
P-114	C-114	M-104	0.84	0.06	0.06	5.00	6.48	0.38	10	1.600	12 inch	0.012	4.88	611.93	611.77	618.60	618.12	5.67	5.35	612.19	611.96
P-402	M-402	M-401	0.00	0.00	2.38	25.43	3.77	9.05	317	0.151	42 inch	0.012	42.41	608.92	608.44	616.00	616.90	3.58	4.96	610.02	609.52
P-115A	C-115A	C-115	0.84	0.16	0.16	5.00	6.48	1.04	70	1.000	12 inch	0.012	3.86	612.50	611.80	616.66	616.66	3.16	3.86	612.93	612.41
P-115C	C-115C	C-115	0.84	0.12	0.12	5.00	6.48	0.77	41	1.000	12 inch	0.012	3.86	612.50	612.09	616.88	616.66	3.38	3.57	612.87	612.39
P-839	C-111A	M-111	0.84	0.13	0.29	5.18	6.46	1.91	16	2.000	12 inch	0.012	5.46	612.43	612.11	617.09	617.14	3.66	4.03	613.02	612.55
P-104	M-104	M-111	0.00	0.00	0.06	5.04	6.47	0.38	108	0.380	15 inch	0.012	4.31	611.72	611.31	618.12	617.14	5.15	4.58	611.98	611.95
P-401	M-401	M-400	0.00	0.00	2.38	26.94	3.61	8.68	204	0.152	42 inch	0.012	42.49	608.34	608.03	616.90	616.00	5.06	4.47	609.46	609.29
P-118C	C-118C	C-118B	0.84	0.11	0.11	5.00	6.48	0.71	73	1.000	12 inch	0.012	3.86	611.34	610.61	615.18	614.63	2.84	3.02	611.69	611.18
P-115	C-115	M-105	0.84	0.04	0.32	5.28	6.45	2.07	5	2.000	12 inch	0.012	5.46	611.80	611.70	616.66	616.60	3.86	3.90	612.41	612.20
P-111	M-111	M-105	0.00	0.00	0.35	5.87	6.38	2.27	146	0.390	15 inch	0.012	4.37	611.31	610.74	617.14	616.60	4.58	4.61	611.95	611.34
P-400	M-400	M-117	0.84	1.37	3.75	27.92	3.51	13.29	117	0.197	48 inch	0.012	68.99	607.83	607.60	616.00	614.68	4.17	3.08	609.24	609.19
P-118B	C-118B	M-117	0.90	0.17	0.28	5.32	6.44	1.82	21	1.000	12 inch	0.012	3.86	610.61	610.40	614.63	614.68	3.02	3.28	611.18	610.89
P-118	C-118	C-118A	0.90	0.13	0.13	5.00	6.48	0.82	71	0.507	12 inch	0.012	2.75	611.00	610.64	614.60	614.89	2.60	3.25	611.38	611.10
P-105	M-105	M-106	0.00	0.00	0.67	6.55	6.29	4.26	106	0.500	18 inch	0.012	8.05	610.40	609.87	616.60	616.80	4.70	5.43	611.19	610.72
P-117	M-117	M-107	0.84	4.45	8.48	28.38	3.47	29.64	118	0.161	54 inch	0.012	85.48	607.18	606.99	614.68	615.70	3.00	4.21	609.05	608.91
P-118A	C-118A	M-107	0.81	0.06	0.18	5.39	6.43	1.18	59	1.000	12 inch	0.012	3.86	610.64	610.05	614.89	615.70	3.25	4.65	611.10	610.43
P-106	M-106	M-107	0.84	0.11	0.78	6.93	6.25	4.92	101	0.505	18 inch	0.012	8.09	609.87	609.36	616.80	615.70	5.43	4.84	610.72	610.20
P-107	M-107	M-107A	0.00	0.00	9.45	28.78	3.42	32.62	127	0.157	60 inch	0.012	111.96	606.79	606.59	615.70	616.20	3.91	4.61	608.89	608.82
P-107A	M-107A	M-108	0.84	3.19	12.64	29.21	3.38	43.07	427	0.159	60 inch	0.012	112.59	606.49	605.81	616.20	615.70	4.71	4.89	608.64	607.98
P-108	M-108	O-1	0.84	3.15	15.79	30.54	3.28	52.18	54	0.204	60 inch	0.012	127.34	605.81	605.70	615.70	614.50	4.89	3.80	607.98	607.73

BY: MPO
DATE: 5/31/2023
CHECKED: RJP
DATE: 6/20/2023

INLET CAPACITY ANALYSIS

Project: 23-0026 Centennial Village Buildings M & I
Location: North Centennial Drive & 45th Street Munster, IN

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
IMH#1	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
IMH#2	EJ 1020 M1	0.97	5.92	0.67	0.17	0.85	7.08	1.02	0.15	0.22	2.7
IMH#3	EJ 7020, TYPE T2, M1	1.81	5.92	0.67	0.34	0.85	7.08	2.05	0.18	0.35	4.2
CB#5	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB#6	EJ 1020 M1	0.97	5.92	0.67	0.14	0.85	7.08	0.84	0.10	0.20	2.3
CB#7	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
CB#9	EJ 1020 M1	0.97	5.92	0.67	0.22	0.85	7.08	1.32	0.26	0.26	3.2
INL#10	EJ 1020 M1	0.97	5.92	0.67	0.15	0.85	7.08	0.90	0.12	0.20	2.5
CB#11	EJ 1020 M1	0.97	5.92	1.67	0.30	0.85	7.08	1.81	0.08	0.32	3.9
INL#12	EJ 1020 M1	0.97	5.92	2.67	0.19	0.85	7.08	1.14	0.01	0.24	2.9

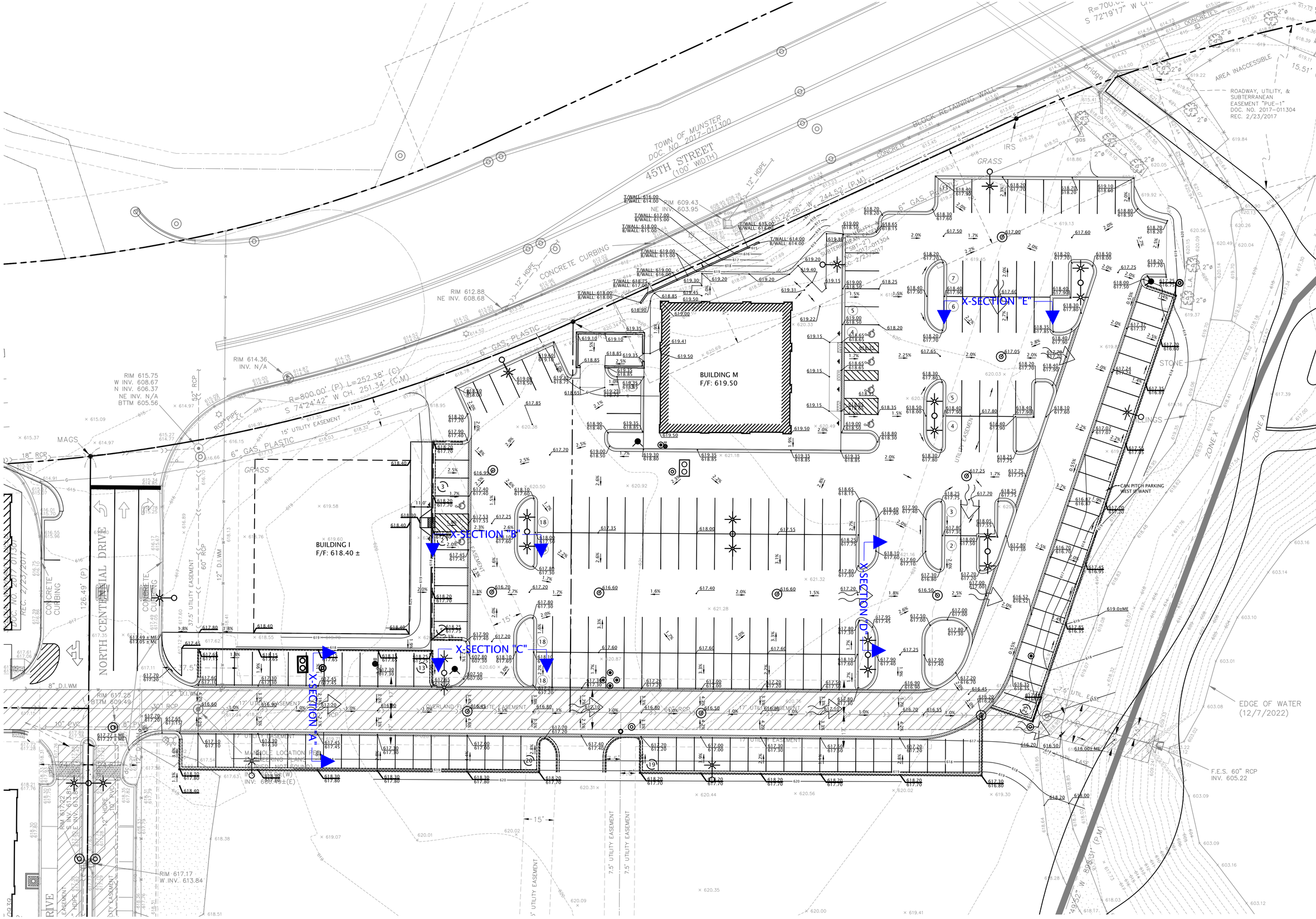
**** 10-YR Flow values are calculated using the Rational Method. Q=CIA***

Grate Properties

Type	Open Area (sq.in.)	A (sq.ft.)	P (ft)
EJ 1020 M1	140.00	0.97	5.92
EJ 1040 M1	190.00	1.32	6.83
EJ 7020, TYPE T2, M1	260.00	1.81	5.92

Exhibit 3

Overland Flood Route Calculations



DVG TEAM INC
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Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Overall Overland Flood Route Exhibit

N

0' 10' 20'
SCALE: 1" = 20'

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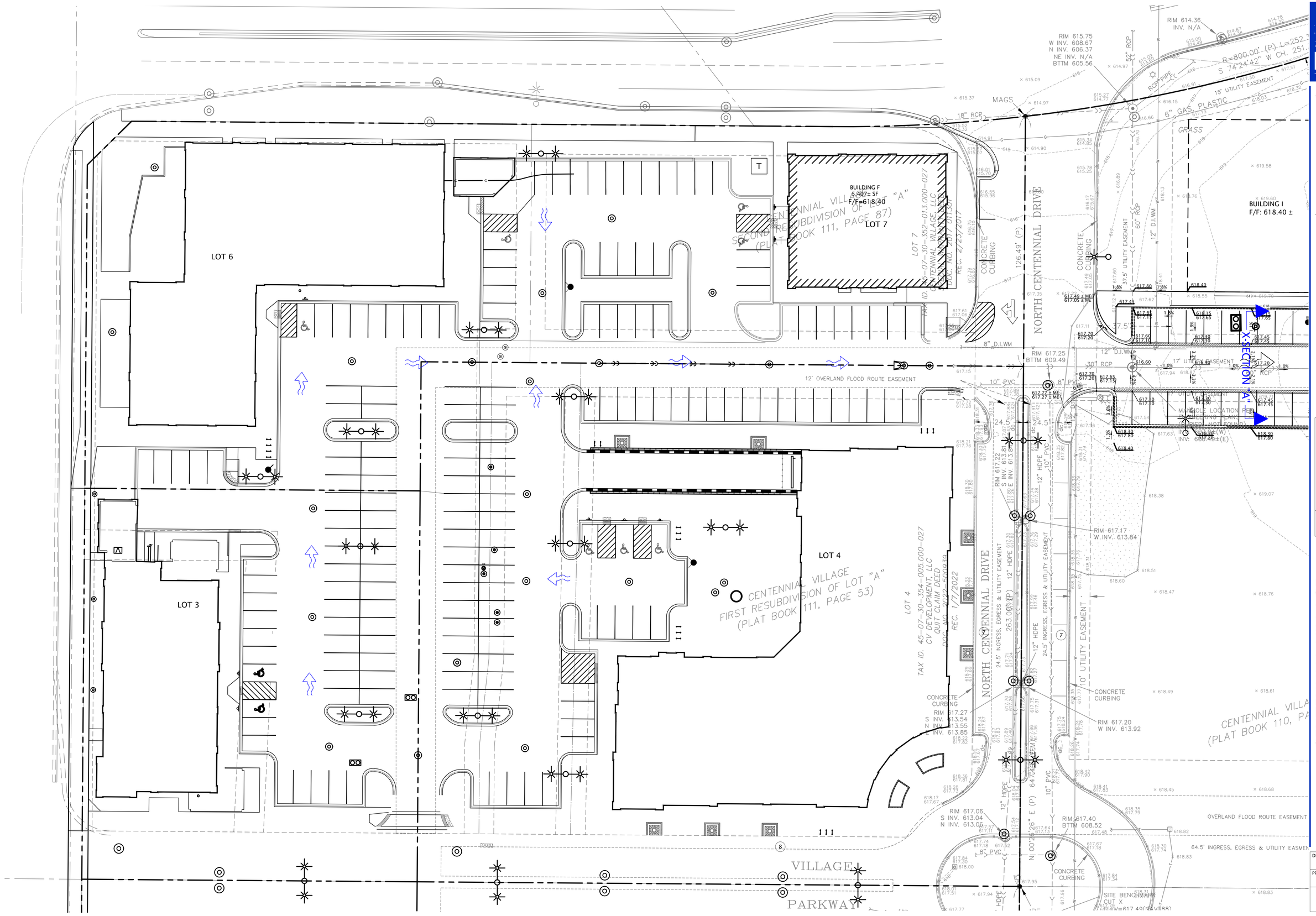
DESIGN BY	DATE
MPO	05/31/23

PROJECT NO.
23-0026

EX 3



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Overall Overland Flood Route Exhibit

N

0' 10' 20'

SCALE: 1" = 20'

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DESIGN BY	DATE
MPO	05/31/23
PROJECT NO.	
23-0026	

EX 3

Overland Flood Route Computation Calculation

Project: 23-0026 Centennial Village Buildings M & I
Date: 5/31/2023

Storm Event: 100yr
*** Areas Calculated from Exhibit 5, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: A					
Tc=	5	min			
Area=	0.12	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.00**	**cfs**
100YR Overflow Water Elevation=				**617.30**	**Elev**
Freeboard to Nearest Bldg=				**2.20**	**ft**

Cross Secti D					
Tc=	5	min			
Area=	0.20	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.67**	**cfs**
100YR Overflow Water Elevation=				**617.28**	**Elev**
Freeboard to Nearest Bldg=				**2.22**	**ft**

Cross Section: B					
Tc=	5	min			
Area=	0.18	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.51**	**cfs**
100YR Overflow Water Elevation=				**617.36**	**Elev**
Freeboard to Nearest Bldg=				**2.14**	**ft**

Cross Secti E					
Tc=	5	min			
Area=	0.15	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.25**	**cfs**
100YR Overflow Water Elevation=				**617.68**	**Elev**
Freeboard to Nearest Bldg=				**1.82**	**ft**

Cross Section: C					
Tc=	5	min			
Area=	0.24	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**2.01**	**cfs**
100YR Overflow Water Elevation=				**617.29**	**Elev**
Freeboard to Nearest Bldg=				**2.21**	**ft**

Channel Report

X-Section A

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.00
N-Value	= 0.011

Calculations

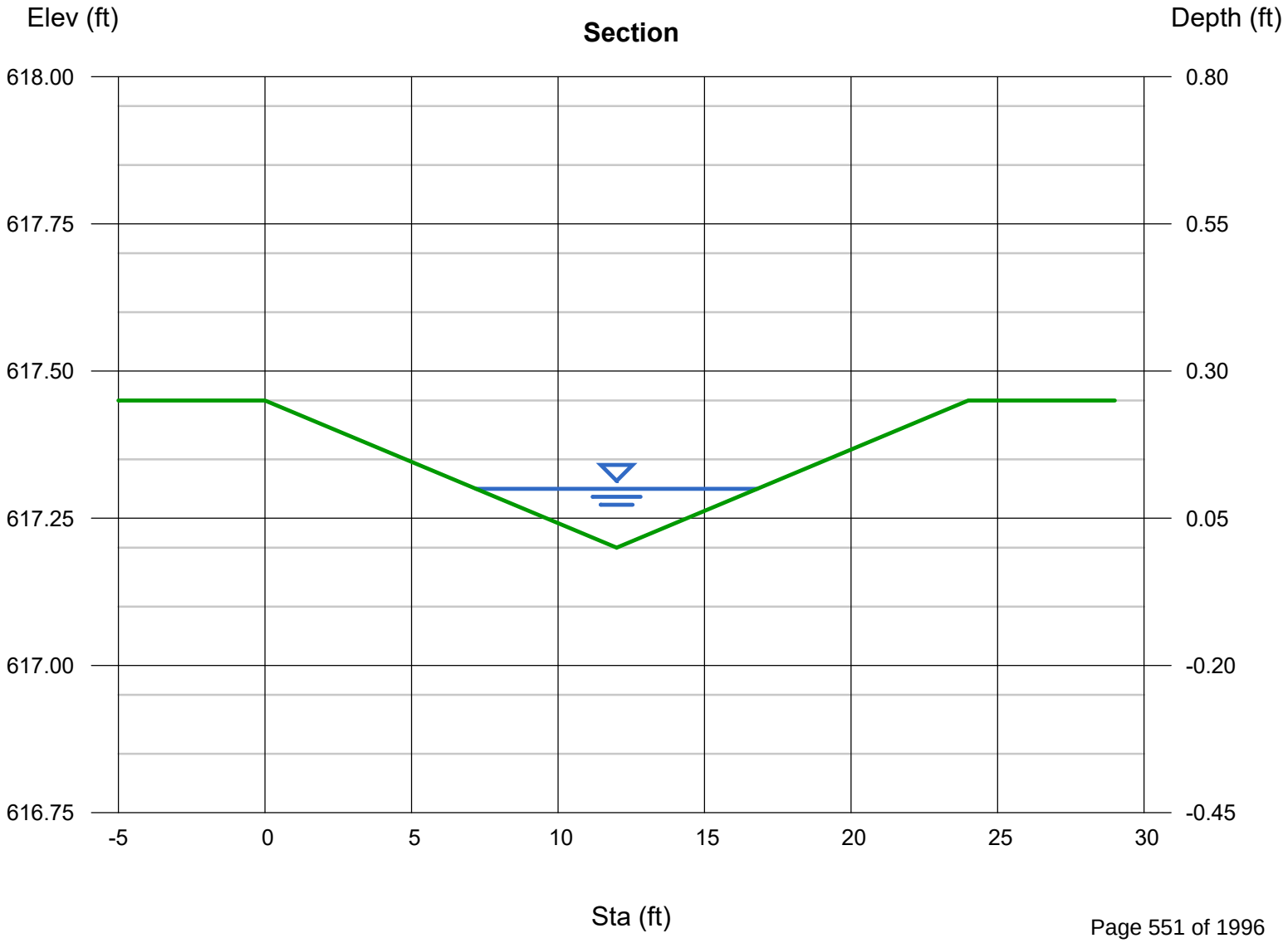
Compute by:	Known Q
Known Q (cfs)	= 1.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.45)-(12.00, 617.20, 0.011)-(24.00, 617.45, 0.011)

Highlighted

Depth (ft)	= 0.10
Q (cfs)	= 1.000
Area (sqft)	= 0.48
Velocity (ft/s)	= 2.08
Wetted Perim (ft)	= 9.60
Crit Depth, Yc (ft)	= 0.13
Top Width (ft)	= 9.60
EGL (ft)	= 0.17



Channel Report

X-Section B

User-defined

Invert Elev (ft)	= 617.25
Slope (%)	= 1.60
N-Value	= 0.011

Calculations

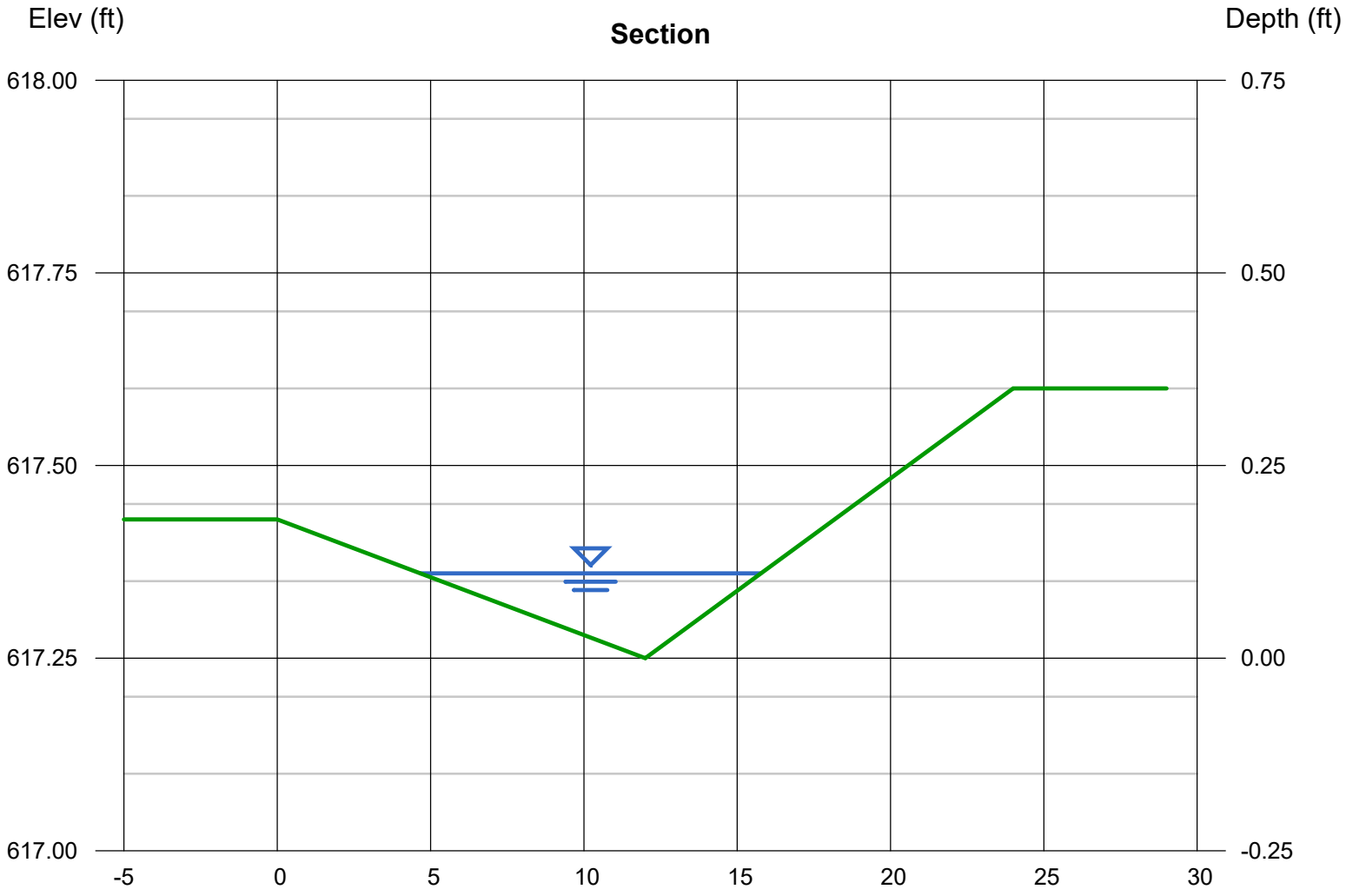
Compute by:	Known Q
Known Q (cfs)	= 1.51

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.43)-(12.00, 617.25, 0.011)-(24.00, 617.60, 0.011)

Highlighted

Depth (ft)	= 0.11
Q (cfs)	= 1.510
Area (sqft)	= 0.61
Velocity (ft/s)	= 2.47
Wetted Perim (ft)	= 11.11
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 11.10
EGL (ft)	= 0.21



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jun 1 2023

X-Section C

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.50
N-Value	= 0.011

Calculations

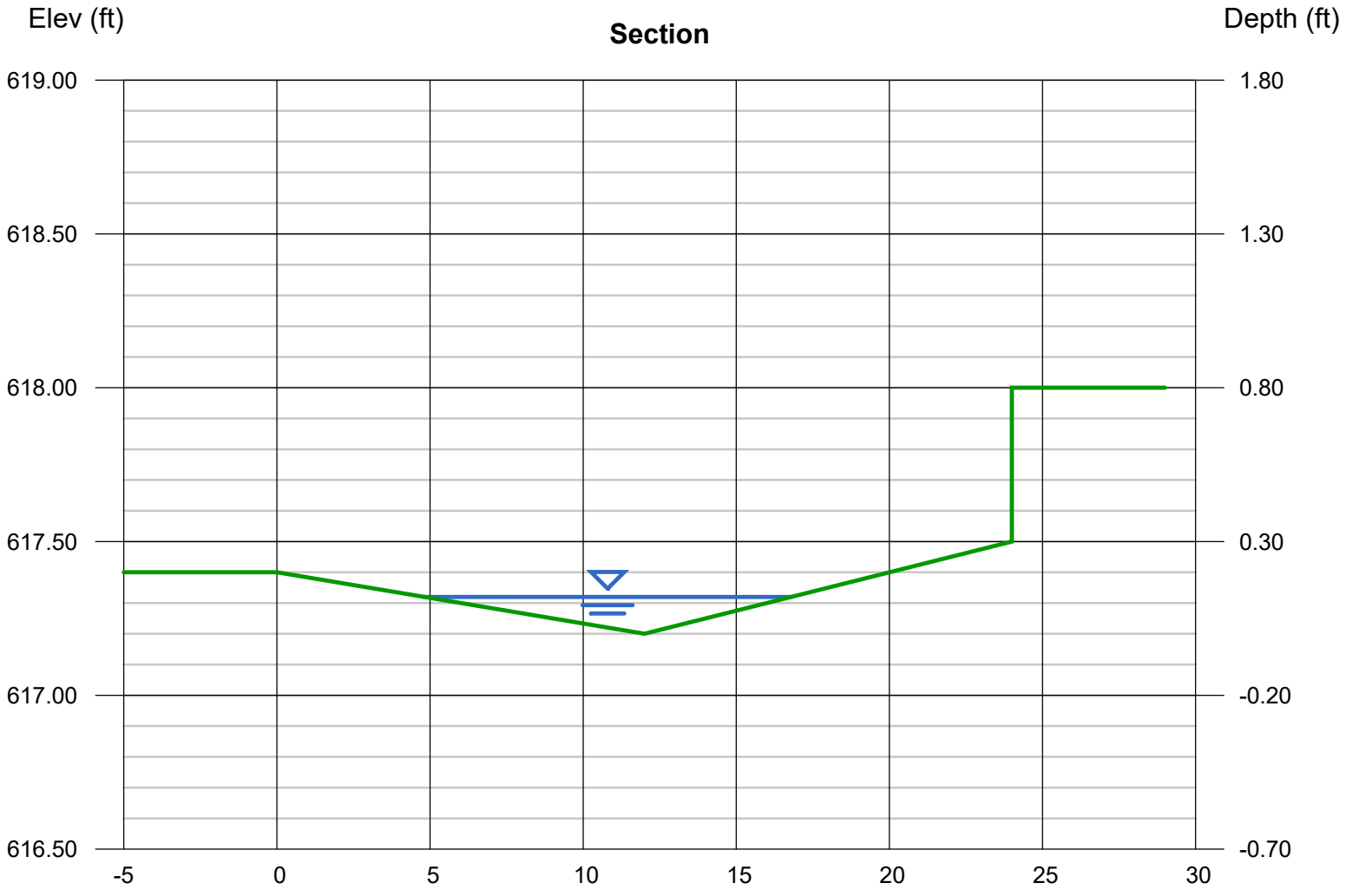
Compute by:	Known Q
Known Q (cfs)	= 2.01

Highlighted

Depth (ft)	= 0.12
Q (cfs)	= 2.010
Area (sqft)	= 0.72
Velocity (ft/s)	= 2.79
Wetted Perim (ft)	= 12.00
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 12.00
EGL (ft)	= 0.24

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.40)-(12.00, 617.20, 0.011)-(24.00, 617.50, 0.011)-(24.00, 618.00, 0.011)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section D

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 1.80
N-Value	= 0.011

Calculations

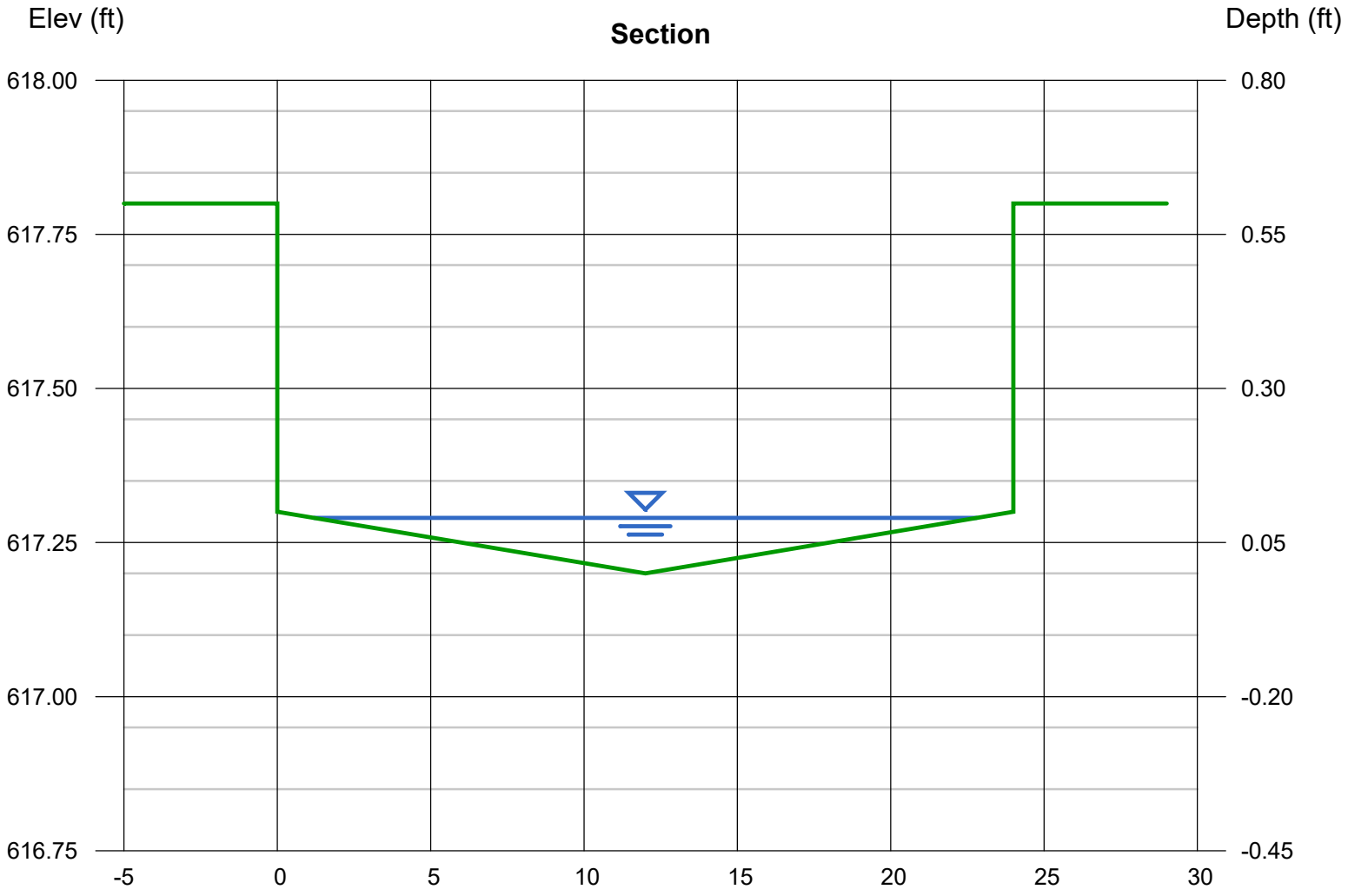
Compute by:	Known Q
Known Q (cfs)	= 1.67

Highlighted

Depth (ft)	= 0.09
Q (cfs)	= 1.670
Area (sqft)	= 0.97
Velocity (ft/s)	= 1.72
Wetted Perim (ft)	= 21.61
Crit Depth, Yc (ft)	= 0.11
Top Width (ft)	= 21.61
EGL (ft)	= 0.14

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.80)-(12.00, 617.20, 0.011)-(24.00, 617.30, 0.011)-(24.00, 617.80, 0.011)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section E

User-defined

Invert Elev (ft)	= 617.60
Slope (%)	= 2.70
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.25

Highlighted

Depth (ft)	= 0.08
Q (cfs)	= 1.250
Area (sqft)	= 0.67
Velocity (ft/s)	= 1.86
Wetted Perim (ft)	= 16.80
Crit Depth, Yc (ft)	= 0.10
Top Width (ft)	= 16.80
EGL (ft)	= 0.13

(Sta, El, n)-(Sta, El, n)...

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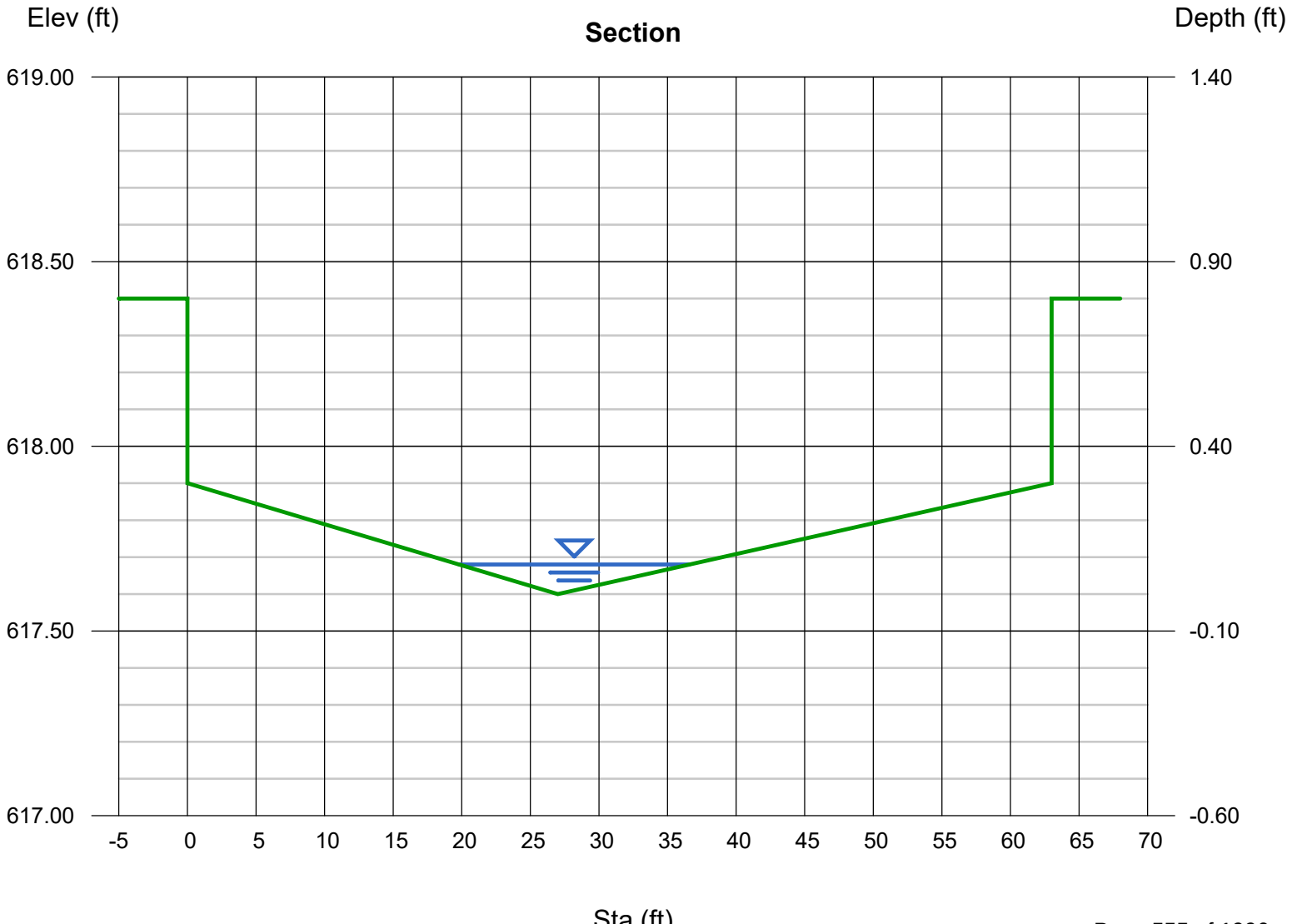

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219.662.7710
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Sprouts Farmers Market Grocer – Lot 11 – Building "A"
800 45TH Street, Munster, IN 46321

Stormwater SWPPP Checklist
August 2025

Prepared for:

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team, Inc.
1155 Troutwine Road
Crown Point, IN 46307

Construction Plans

A1 An index showing locations of required Plan Elements:

The Stormwater Permit Checklist serves as the index.

A2 11 x 17 inch plat showing a building lot numbers/boundaries and road layout/names:

See **Exhibit 1** for the Recorded Plat and Site Plan sheet C103 of the engineering plans.

A3 Description of the nature and purpose of the project:

Centennial Village is proposing to develop a grocery store, as the next phase of the ongoing Centennial Village Subdivision PUD project. The site is located northeast of the intersection Calumet Avenue and 45th Avenue in Munster, Indiana. Lot 11 contains approximately 2.36 acres. The project will consist of a 23,299 sf building.

A4 Vicinity map showing project location:

See **Exhibit 1** for the Vicinity Map or the location map on the cover sheet of the engineering plans.

A5 Legal description of the project site:

See **Exhibit 2** for the Preliminary Plat.

A6 Location of all lots and proposed site improvements:

See Site Plan sheet C103 of the engineering plans.

A7 Hydrologic Unit Code HUC (14-digit):

The 14-digit HUC is 07120003030030.

A8 Notation of any state or federal water quality permits.

State or federal water quality permits that are required are as follows:

- Indiana Construction Stormwater General Permit (CSGP)

A9 Specific points where stormwater discharge will leave the site:

All discharge from this site will be directed into the Centennial Village subdivision storm sewers which will be eventually directed southeast into the Hart Ditch (Plum Creek)- Dyer Ditch.

A10 Location and name of all wetlands, lakes and water courses on and adjacent to the site:

See Existing Conditions sheet C101 in the engineering plan set.

A11 Identification of all receiving waters:

All discharge from this site will be directed into the Centennial Village subdivision storm sewers with eventual outfall to Hart Ditch (Plum-Creek)- Dyer Ditch.

A12 Identification of potential discharges to groundwater:

Not applicable.

A13 One hundred (100) year floodplains, floodway fringes, and floodways. Please note if none exists:

There is no floodplain/floodway associated with the area. Hart Ditch is located on the further southeast of the site. No disturbance will occur in this area. See **Exhibit 4** for the FEMA Firm Map.

A14 Pre-construction and post-construction estimate of Peak Discharge:

See the Stormwater Technical Report for peak discharges.

A15 Land use of all adjacent properties:

North – CD- 4.A: General Urban A Character District
South – SD-PUD: Planned Unit Development Special District
East – SD- PUD: Planned Unit Development Special District
West – SD- PUD: Planned Unit Development Special District
Northeast- CD-3.R3: Neighborhood- 60' Lot One Family and Two Family Residence Character District &
CD- 3.R2: Neighborhood- 60' Lot One Family Residence Character District

A16 Locations and approximate boundaries of all disturbed areas:

See Site Plan sheet C103 of the engineering plan set.

A17 Identification of existing vegetative cover:

See Existing Conditions sheet C101 in the engineering plan set.

A18 Soils map including soil descriptions:

See **Exhibit 3** for the NRCS Soils Survey.

A19 Locations, size and dimensions of proposed stormwater systems:

See Grading Plan sheet C104 and Utility Plan C105 of the engineering plan set.

A20 Plans for any off-site construction activities associated with this project (sewer/water tie-ins):

The sanitary sewer extension is from Centennial Drive, south of 45th Ave and the property.

A21 Location of all soil stockpiles and borrow areas:

See SWPPP sheet C106 of the engineering plan set.

A22 Existing topography at a contour interval appropriate to indicate drainage patterns:

See Existing Conditions sheet C101 of the engineering plan set

A23 Proposed final topographic information to indicate drainage patterns:

See Grading Plan sheet C104 of the engineering plan set.

Storm Water Pollution Prevention Plan for Construction Sites

B1 Description of potential pollutant sources associated with the construction activities:

Potential pollutants that could enter the storm water during construction include exposed soils, fuel and oil from leaking heavy equipment and vehicles. Equipment has the potential to leak fuel throughout the disturbed areas, or wherever construction is occurring. The contractors will inspect equipment before initiating construction and routinely thereafter. If leaks are discovered, they will be repaired before the equipment is used or new equipment will be brought to the site. Exposed soils also have potential for being eroded by water and wind and entering the storm water system. The contractor will install silt fence, construction entrance mats, and seeding in areas designated on the site development plans. In addition, street sweeping will be done at the construction entrance as needed.

B2 Sequence describing stormwater quality measure implementation:

The sequence of implementation summarized below:

- Post signed NOI, NPDES Permit number, NOS (when available), contact information for the site, municipal stormwater permit, and location where construction plans may be obtained in a visible location at entrance to site.
- Construct gravel construction entrance from the street to the building pad prior to construction.
- Install silt fence/fiber rolls prior to construction at construction limits.
- Construct refueling area and concrete washout area prior to construction.
- Install inlet protection at all inlets on property.

- Perform topsoil removal and stockpiling. Soil stockpiles created on site to be protected from erosion with silt fence around the base.
- Perform mass grading of the site subgrade.
- Install underground utilities.
- Upon completion of the rough grading, all areas affected by construction shall be temporarily seeded if they will remain dormant for greater than 7 days. These areas shall be stabilized within 7 days of remaining dormant and erosion control blankets shall be installed on slide slopes as shown on the plans.
- Re-seed any areas disturbed by construction and utilities installation with temporary seed mix within 3 days of completion of disturbance.
- Grade site to final elevations.
- Install curbs, sidewalk, pavement, and aggregate subbase.
- Install permanent seeding or sod.
- Maintain temporary erosion control features until construction is complete.
- Remove temporary erosion control measures once permanent vegetative cover has been established.
- Submit the Notice of Termination for the Construction Stormwater General (CSGP) permit.

B3 Stable construction entrance locations and specifications:

See SWPPP and detail sheets C106 and C301-C304.

B4 Sediment control measures for sheet flow areas:

See SWPPP and detail sheets C106 and C301-C304.

B5 Sediment control measures for concentrated flow areas:

See SWPPP and detail sheets C106 and C301-C304.

B6 Storm sewer inlet protection measure locations and specifications:

See SWPPP and detail sheets C106 and C301-C304.

B7 Runoff control measures:

See SWPPP and detail sheets C106 and C301-C304.

B8 Storm water outlet protection specifications:

See SWPPP and detail sheets C106 and C301-C304.

B9 Grade stabilization structure locations and specifications:

See SWPPP and detail sheets C106 and C301-C304.

B10 Locations, dimensions, specifications, and construction details of each stormwater quality measure:

See SWPPP and detail sheets C106 and C301-C304.

B11 Temporary surface stabilization methods appropriate for each season:

See SWPPP and detail sheets C106 and C301-C304.

B12 Permanent surface stabilization methods appropriate for each season:

See SWPPP and detail sheets C106 and C301-C304.

B13 Material handling and spill prevention plan:

The contractor shall minimize the disturbance of excavated soils by minimizing the number of times the soil is handled. On-site handling of soils will occur during excavation, loading, and spreading activities. Fuel for heavy equipment and vehicles will not be stored on the site during construction operations. Mobile fuel tanks will fuel heavy equipment. In the event of a spill or leak the contractor shall follow proper procedures to minimize concern.

- Take immediate measures to control and contain the spill to prevent release into sewers or surface waters.
- Notify the Local Fire Department immediately at 9-1-1.
- Notify the Federal Emergency Spill Hotline at 1-800-424-8802 within 2 hours if the amount is above a reportable quantity or any amount enters a waterway or storm sewer.
- Notify the Indiana Emergency Response Hotline at 1-888-233-7745.
- Follow the guidelines for handling the spill as outlined in the included Material Safety Data Sheets (**Exhibit 7**).

B14 Self-monitoring program including plan and procedures:

See the attached Self-Monitoring Form (**Exhibit 5**). Below are the monitoring and maintenance requirements for the erosion and sediment control measures. The contractor shall perform inspections throughout the construction process.

- Silt fence will be inspected weekly and after each storm event to ensure it is functioning properly and to make any necessary repairs. Deposited sediments will be removed when it reaches half the height of the fence or is causing the fence to bulge.
- Inlet Barrier Protection will be inspected after each storm event of 0.5-inch of rainfall in a 24-hour period, and any sediment deposits will be removed. The erosion control measure will also be inspected weekly for deterioration or damage and will be repaired or replaced if necessary.
- In the event that the storm drains cease to function properly due to excessive sediment buildup, flushing of the storm drains may be required.
- Catch basins should be routinely inspected for buildup of sediment. Mechanical cleaners or hand cleaning will be required to maintain the function of the catch basin.

B15 Erosion & sediment control specifications for individual building lots:

See SWPPP and detail sheets C106 and C301-C304.

Post-Construction Storm Water Pollution Prevention Plan

C1 A description of potential pollutant sources from the proposed land use, which may reasonably be expected to add a significant amount of pollutants to storm water discharges:

Pollutants associated with the proposed land use will most likely be very typical of parking lots. Most expected pollutants will be associated with automobiles: oil, grease, antifreeze, brake dust, rubber fragments, gasoline, diesel fuel, metals, and improper disposal of trash. The contractors will inspect equipment before initiating construction and routinely thereafter. If leaks are discovered, they will be repaired before the equipment is used or new equipment will be brought to the site. It is the responsibility of the property owner to provide routine maintenance. Some maintenance items may include trimming vegetation and picking up litter. After vegetation has been established, temporary erosion and sediment control measures such as silt fence and inlet protection will be removed.

C2 Sequence describing stormwater quality measure implementation:

See SWPPP Plan Sheet C301 section “Stormwater Quality Construction Sequence”.

C3 Description of proposed post-construction stormwater quality measures:

See SWPPP Plan Sheet C301 section “Post-Construction Stormwater Management Plan”.

C4 Locations, dimensions, specifications, and construction details of each stormwater quality measure:

See SWPPP and detail sheets C106 and C301-C304.

C5 A narrative description of the maintenance guidelines for all post-construction storm water quality measures to facilitate their proper long term function. This narrative description shall be made available to future parties who will assume responsibility for the operation and maintenance of the post-construction storm water quality measures.

See SWPPP Plan Sheet C301 section “Post-Construction Stormwater Management Plan”. This maintenance plan will remain a part of the plan set and as-built plan set so it is available to future parties who may assume the responsibility for the operation and maintenance of the post-construction stormwater quality measures.

Exhibit 1

Vicinity Map


Site Location
Braden Way
Columbia Ave
Tulip Ln
Bluebird Ln
MAYNARD
Fran-lin Pkwy
Azalea Dr
Oriole Dr
Red Lobster
Frank H. Hammond Park
Hyatt Place Munster
Magnolia Ln
45th Ave
Larch Dr
Camellia Dr
Rosebud Steakhouse
Centennial Village
SpringHill Suites Chicago
Southeast/Munster, IN
Clayhole Lake
Superior Ave
Indiana Pkwy
Valparaiso Dr
Brewing
Progress Ave
Centennial Park,
Munster, IN
Centennial Park Dog Park
Brielle Pausma
Photography
Brooks de Dr
Cedarcrest Dr
Tamarack Dr
Ivy Ln
Holly Ln
Beech Ave
Birch Ave
Marigold Ln
Southwood Dr
Elmwood Dr
Dogwood Dr
Walnut Dr
Google

Exhibit 2

Preliminary Plat

PRELIMINARY PLAT
CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"
PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN LOTS AND LOT AS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE]
STATE OF INDIANA] SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF _____, 2025.

CENTENNIAL VILLAGE, LLC

BY:_____

TITLE: _____

(PRINTED NAME):_____

ACKNOWLEDGMENT

COUNTY OF _____]
STATE OF _____] SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED _____ AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 2025.

_____
(SIGNATURE)

PRINTED NAME:_____
NOTARY PUBLIC
RESIDENT OF _____COUNTY

COMMISSION EXPIRES: _____

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE]
STATE OF INDIANA] SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF _____, 2025.

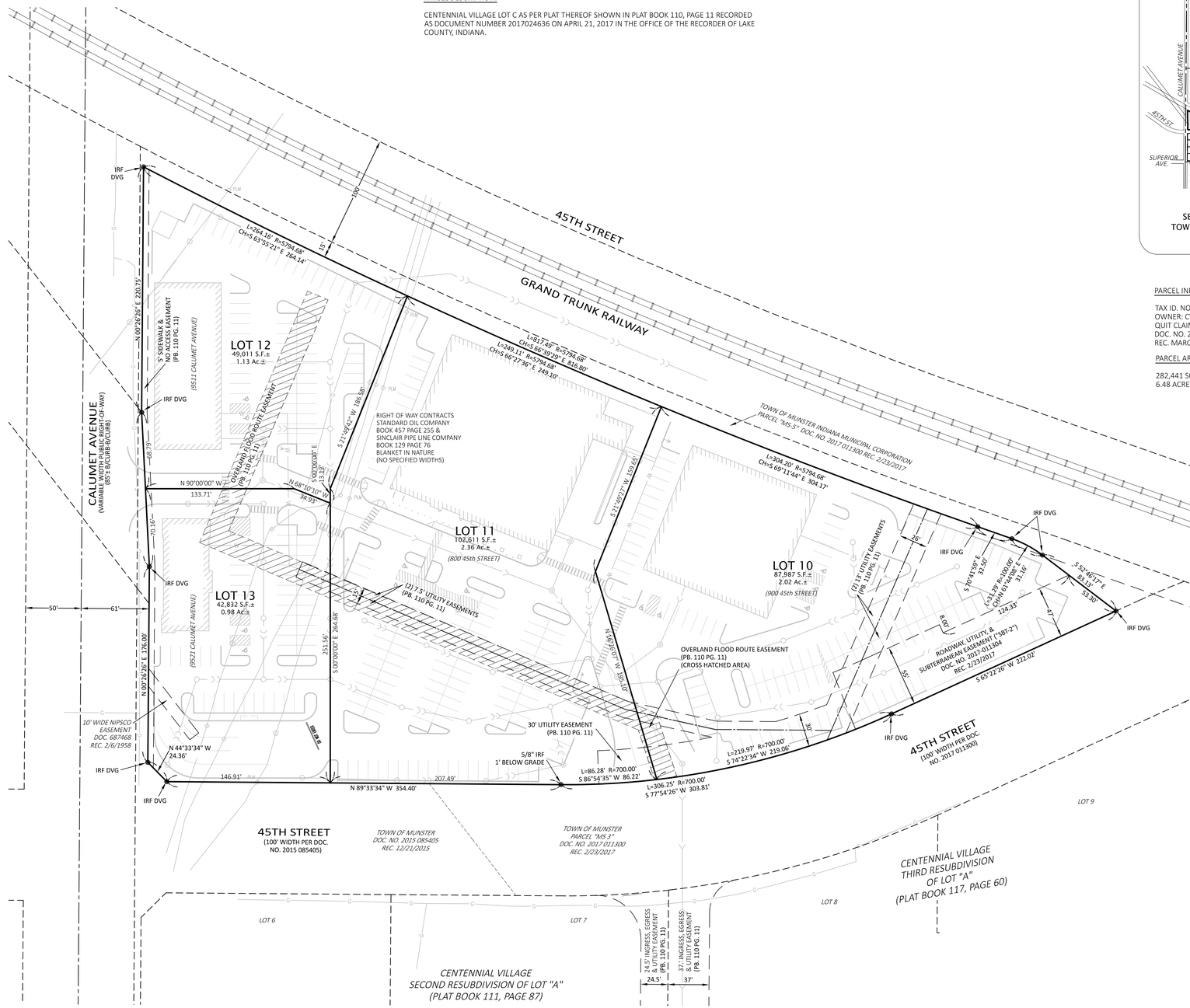
_____ _____
PRINTED NAME SIGNATURE

TITLE:

ATTEST:

_____ _____
PRINTED NAME SIGNATURE

TITLE:





VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SUBDIVIDER AND OWNER:

CENTENNIAL VILLAGE, LLC
631 KILLARNEY DRIVE
DYER, IN 46311

ENGINEER AND SURVEYOR:

DVG TEAM INC.
1155 TROUTWINE ROAD
CROWN POINT, IN 46307

LEGEND

APPURTENANT INGRESS/EGRESS EASEMENT
INGRESS/EGRESS AND PARKING EASEMENT
IRS DVG 5/8" REBAR SET WITH BLUE PLASTIC CAP STAMPED "DVG TEAM INC FIRM NO. 0120"
MAGF "MAG" NAIL FOUND WITH METAL WASHER STAMPED "DVG TEAM INC FIRM NO. 0120"
P.B. - PLAT BOOK

DEVELOPMENTAL STANDARDS:
THERE ARE DEVELOPMENTAL STANDARDS ASSOCIATED WITH DEVELOPMENT THAT ARE RECORDED AS DOCUMENT NUMBER 2017-024635 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

REFERENCE SURVEYS:
1. PLAT OF CENTENNIAL VILLAGE P.U.D. RECORDED IN PLAT BOOK 110, PAGE 11.
2. ALTA/ACSM LAND TITLE SURVEY OF PARCELS TW-1, 2, 4 AND PK-1, 3 BY PLUMB TUCKETT AND ASSOCIATES, INC. (NOW DVG TEAM, INC.), JOB NO. S15644, LAST REVISED 3/25/16, RECORDED AS DOCUMENT NUMBER 2017-015652, ON 3/9/2017.
3. CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 53.
4. CENTENNIAL VILLAGE 2ND RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 87.
5. CENTENNIAL VILLAGE 3RD RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 117, PAGE 60.

IT IS THE OPINION OF THE SURVEYOR THAT THERE ARE NO SUBSTANTIAL DIFFERENCES BETWEEN SAID SURVEYS AND THIS PLAT.

FLOOD ZONE INFORMATION:
FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCELS DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEAR TO LIE WITHIN ZONE "X": AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCELS PLOT BY SCALE ON FLOOD INSURANCE RATE MAP NO. 180139 0117 E FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, MAP EFFECTIVE DATE BEING JANUARY 18, 2012 AND REVISED TO REFLECT LOMR EFFECTIVE MARCH 18, 2016.

SURVEY NOTE:
THE EXTERIOR OF THE OVERALL SUBDIVISION BOUNDARY WAS STAKED AND THE MONUMENTS SET AND FOUND ARE SHOWN ON THE RECORDED PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT (PLAT BOOK 110, PAGE 11). IT IS THE OPINION OF THE SURVEYOR THAT IT IS PROBABLE THAT THE INDIVIDUAL LOT MONUMENTS FOR THIS RESUBDIVISION WILL BE DISTURBED BY CONSTRUCTION AND MASS GRADING. THE SETTING OF THE INDIVIDUAL LOT MONUMENTS ARE HEREBY DELAYED UNTIL AFTER CONSTRUCTION IS COMPLETE OR UP TO TWO YEARS AFTER RECORDATION OF THIS PLAT, WHICHEVER OCCURS FIRST AS PRESCRIBED BY TITLE 865 IAC 1-12-18(l).

SURVEYOR'S CERTIFICATION:

I, GLEN E. BOREN, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEYOR LICENSED IN COMPLIANCE WITH THE LAWS OF THE STATE OF INDIANA; THAT THIS PLAT CORRECTLY REPRESENTS A SURVEY COMPLETED BY ME ON MONTH XX, 2025 AND THAT ALL DIMENSIONS, LINEAR AND ANGULAR ARE CORRECTLY SHOWN, AND THAT ALL MONUMENTS OR MARKERS SHOWN THEREON ACTUALLY EXIST, AND THAT THEIR LOCATIONS, SIZE, TYPE AND DESCRIPTION ARE ACCURATELY SHOWN.

WITNESS MY HAND AND SEAL THIS _____ DAY OF _____, 2025.

_____
GLEN E. BOREN, P.S. NO. LS20000006

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "C"
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
PRELIMINARY PLAT

N
0' 25' 50'
SCALE: 1" = 50'

SPROUTS

© COPYRIGHT DVG TEAM, INC

\25-0081 Preliminary Plat.dwg	
FB/PG	FILE NO.
DRAWN BY G.B.	DATE 7/30/25
SECTION 30-36-9	COUNTY, STATE LAKE, IN
JOB NO. 25-0081	

Exhibit 3

NRCS Soils Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lake County, Indiana



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


87° 30' 33" W
87° 30' 17" W
41° 32' 30" N
41° 32' 22" N
457520
457560
457600
457640
457680
457720
457760
457800
457840
457880
4599020
4598980
4598940
4598900
4598860
4598820
4598780
Rs
Calumet Ave
45th
45th St
Bn
Cp
Calumet
Soil Map may not be valid at this scale.
Map Scale: 1:1,740 if printed on A landscape (11" x 8.5") sheet.
N
0 25 50 100 150 Meters
0 50 100 200 300 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, Indiana
Survey Area Data: Version 27, Aug 26, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 16, 2022—Jun 27, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Bn	Bono silty clay	8.9	99.2%
Cp	Clay pits	0.1	0.6%
Rs	Rensselaer loam, calcareous subsoil variant	0.0	0.1%
Totals for Area of Interest		**8.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County, Indiana

Bn—Bono silty clay

Map Unit Setting

National map unit symbol: 94hk
Elevation: 570 to 790 feet
Mean annual precipitation: 36 to 40 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 170 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bono and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bono

Setting

Landform: Depressions on lake plains
Landform position (two-dimensional): Toeslope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey lacustrine deposits

Typical profile

H1 - 0 to 21 inches: silty clay
H2 - 21 to 39 inches: silty clay
H3 - 39 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R097XB047IL - Chicago Wet Clayey Flats
Hydric soil rating: Yes

Cp—Clay pits

Map Unit Setting

National map unit symbol: 94hq
Elevation: 640 to 940 feet
Mean annual precipitation: 34 to 40 inches
Mean annual air temperature: 47 to 51 degrees F
Frost-free period: 170 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, clayey: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Clayey

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Clayey lacustrine deposits

Rs—Rensselaer loam, calcareous subsoil variant

Map Unit Setting

National map unit symbol: 94k5
Elevation: 570 to 790 feet
Mean annual precipitation: 36 to 40 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 170 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Rensselaer and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rensselaer

Setting

Landform: Depressions on lake plains
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy outwash over clayey lacustrine deposits

Typical profile

H1 - 0 to 16 inches: loam
H2 - 16 to 27 inches: loam
H3 - 27 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 40 percent
Available water supply, 0 to 60 inches: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R097XB047IL - Chicago Wet Clayey Flats
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

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Exhibit 4

FEMA Firm Map

National Flood Hazard Layer FIRMette

FEMA

87°30'44"W 41°32'34"N



87°30'6"W 41°32'8"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/31/2025 at 9:29 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Exhibit 5

Self-Monitoring Form

Date: _____
Project: _____
Inspected by: _____

Type of Inspection: ☐ Scheduled Weekly ☐ Rain Event

CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG
(To be Completed by Property Owner or Agent)

All stormwater pollution prevention BMPs shall be inspected and maintained as needed to ensure continued performance of their intended function during construction and shall continue until the entire site has been stabilized and a Notice of Termination has been issued. An inspection of the project site must be completed by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Maintenance and repair shall be conducted in accordance with the accepted site plans. This log shall be kept as a permanent record and must be made available to the Municipal Engineer, in an organized fashion, within forty-eight (48) hours upon request.

Yes	No	N/A	
			1. Are all sediment control barriers, inlet protection and silt fences in place and functioning properly?
			2. Are all erodible slopes protected from erosion through the implementation of acceptable soil stabilization practices?
			3. Are all dewatering structures functioning properly?
			4. Are all discharge points free of any noticeable pollutant discharges?
			5. Are all discharge points free of any noticeable erosion or sediment transport?
			6. Are designated equipment washout areas properly sited, clearly marked, and being utilized?
			7. Are construction staging and parking areas restricted to areas designated as such on the plans?
			8. Are temporary soil stockpiles in approved areas and properly protected?
			9. Are construction entrances properly installed and being used and maintained?
			10. Are “Do Not Disturb” areas designated on plan sheets clearly marked on-site and avoided?
			11. Are public roads at intersections with site access roads being kept clear of sediment, debris, and mud?
			12. Is spill response equipment on-site, logically located, and easily accessed in an emergency?
			13. Are emergency response procedures and contact information clearly posted?
			14. Is solid waste properly contained?
			15. Is a stable access provided to the solid waste storage and pick-up area?
			16. Are hazardous materials, waste or otherwise, being properly handled and stored?
			17. Have previously recommended corrective actions been implemented?

If you answered “no” to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective actions are to be completed.

Exhibit 6

Errors & Omissions Insurance

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 7/1/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Meyers Glaros, LLC 8605 Broadway Merrillville IN 46410	PHONE (A/C, No, Ext): 219-865-6447	FAX (A/C, No): 219-865-6443
	E-MAIL ADDRESS:	

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Sentinel Insurance Co. Ltd.	11000
INSURER B : Hartford Accident and Indemnit	
INSURER C : Twin City Fire Insurance Co.	
INSURER D : Beazley America ins, Co, Inc	16510
INSURER E :	
INSURER F :	

INSURED: DVGTEAM-01
DVG Team, Inc
1155 Troutwine Road
Crown Point IN 46307

COVERAGES **CERTIFICATE NUMBER:** 1991973700 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:			36 SBA AQ8351 SA	4/15/2025	4/15/2026	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG $	$ 1,000,000 $ 10,000 $ 1,000,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $
B	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY [ ] SCHEDULED AUTOS X HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY			36 UEC ZV0608	4/15/2025	4/15/2026	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) $	$ 1,000,000 $ $ $ $
A	X UMBRELLA LIAB [X] OCCUR EXCESS LIAB [ ] CLAIMS-MADE DED [X] RETENTION $ 10,000			36 SBA AQ8351 SA	4/15/2025	4/15/2026	EACH OCCURRENCE AGGREGATE $	$ 10,000,000 $ 10,000,000 $
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N [N] ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		36 WEC BY2928	4/15/2025	4/15/2026	X PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000
D	Professional Liability E&O			C18A80251101	6/2/2025	6/2/2026	Each Claim Aggregate	5,000,000 5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

For Information Purposes Only
****
****

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

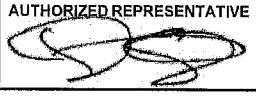

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Exhibit 7

Material Safety Data Sheet

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

DIESEL FUEL No. 2

Product Use: Fuel
Product Number(s): CPS203410 [See Section 16 for Additional Product Numbers]
Synonyms: 15 S Diesel Fuel 2, Alternative Low Aromatic Diesel (ALAD), Calco LS Diesel 2, Calco ULS DF2, Calco ULS Diesel 2, Chevron LS Diesel 2, Chevron ULS Diesel 2, Diesel Fuel Oil, Diesel Grade No. 2, Diesel No. 2-D S15, Diesel No. 2-D S500, Diesel No. 2-D S5000, Distillates, straight run, Gas Oil, HS Diesel 2, HS Heating Fuel 2, Light Diesel Oil Grade No. 2-D, LS Diesel 2, LS Heating Fuel 2, Marine Diesel, RR Diesel Fuel, Texaco Diesel, Texaco Diesel No. 2, Ultra Low Sulfur Diesel 2
Company Identification
Chevron Products Company
Marketing, MSDS Coordinator
6001 Bollinger Canyon Road
San Ramon, CA 94583
United States of America

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
MSDS Requests: (800) 689-3998
Technical Information: (510) 242-5357

SPECIAL NOTES: This MSDS covers all Chevron and Calco non-CARB Diesel No. 2 Fuels. The sulfur content is less than 0.5% (mass). Red dye is added to non-taxable fuel. (MSDS 6894)

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Diesel Fuel No. 2	68476-34-6	100 %wt/wt
Distillates, hydrodesulfurized, middle	64742-80-9	0 - 100 %wt/wt
Distillates, straight run middle (gas oil, light)	64741-44-2	0 - 100 %wt/wt
Kerosine	8008-20-6	0 - 25 %wt/wt
Kerosine, hydrodesulfurized	64742-81-0	0 - 25 %wt/wt
Distillates (petroleum), light catalytic cracked	64741-59-9	0 - 50 %wt/wt
Naphthalene	91-20-3	0.02 - 0.2 %wt/wt
Total sulfur	None	0 - 0.5 %wt/wt

SECTION 3 HAZARDS IDENTIFICATION

****

EMERGENCY OVERVIEW

- COMBUSTIBLE LIQUID AND VAPOR
- HARMFUL OR FATAL IF SWALLOWED - MAY CAUSE LUNG DAMAGE IF SWALLOWED
- CAUSES SKIN IRRITATION
- MAY CAUSE CANCER BASED ON ANIMAL DATA
- TOXIC TO AQUATIC ORGANISMS

****

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin causes irritation. Skin contact may cause drying or defatting of the skin. Symptoms may include pain, itching, discoloration, swelling, and blistering. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death. May be irritating to mouth, throat, and stomach. Symptoms may include pain, nausea, vomiting, and diarrhea.
Inhalation: Mists of this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing. Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death.

DELAYED OR OTHER HEALTH EFFECTS:

Cancer: Prolonged or repeated exposure to this material may cause cancer. Whole diesel engine exhaust has been classified as a Group 2A carcinogen (probably carcinogenic to humans) by the International Agency for Research on Cancer (IARC). Diesel exhaust particulate has been classified as reasonably anticipated to be a human carcinogen in the National Toxicology Program's Ninth Report on Carcinogens. The National Institute of Occupational Safety and Health (NIOSH) has recommended that whole diesel exhaust be regarded as potentially causing cancer. Diesel engine exhaust is known to the State of California to cause cancer. Contains naphthalene, which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC). See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.
Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.
Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Combustible liquid.

NFPA RATINGS: Health: 0 Flammability: 2 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Pensky-Martens Closed Cup) 52 °C (125 °F) (Min)
Autoignition: 257 °C (494 °F)
Flammability (Explosive) Limits (% by volume in air): Lower: 0.6 Upper: 4.7

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive force. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 29C (85F).
Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Do not breathe mist. Wash thoroughly after handling. Keep out of the reach of children.
Unusual Handling Hazards: WARNING! Do not use as portable heater or appliance fuel. Toxic fumes may accumulate and cause death.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA

77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces . USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: Wear protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted. Suggested materials for protective gloves include: Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Nitrile Rubber, Polyurethane, Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors.
When used as a fuel, this material can produce carbon monoxide in the exhaust. Determine if airborne concentrations are below the occupational exposure limit for carbon monoxide. If not, wear an approved positive-pressure air-supplying respirator.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Diesel Fuel No. 2	ACGIH	100 mg/m3	--	--	Skin A3 total hydrocarbon
Diesel Fuel No. 2	CVX	--	1000 mg/m3	--	--
Kerosine	ACGIH	200 mg/m3	--	--	Skin A3 Total hydrocabon vapor
Kerosine	CVX	--	1000 mg/m3	--	--
Kerosine, hydrodesulfurized	ACGIH	200 mg/m3	--	--	Skin A3 Total hydrocabon vapor
Kerosine, hydrodesulfurized	CVX	--	1000 mg/m3	--	--
Naphthalene	ACGIH	10 ppm (weight)	15 ppm (weight)	--	Skin
Naphthalene	OSHA Z-1	50 mg/m3	--	--	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Varies depending on specification
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: 0.04 kPa (Approximate) @ 40 °C (104 °F)
Vapor Density (Air = 1): >1
Boiling Point: 175.6°C (348°F) - 370°C (698°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Melting Point: Not Applicable
Specific Gravity: 0.8 - 0.88 @ 15.6°C (60.1°F) (Typical)
Viscosity: 1.9 cSt - 4.1 cSt @ 40°C (104°F)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: This material did not cause skin sensitization reactions in a Buehler guinea pig test.
Acute Dermal Toxicity: LD50: >5ml/kg (rabbit).
Acute Oral Toxicity: LD50: > 5 ml/kg (rat)
Acute Inhalation Toxicity: 4 hour(s) LC50: > 5mg/l (rat).

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains gas oils.
CONCAWE (product dossier 95/107) has summarized current health, safety and environmental data available for a number of gas oils, typically hydrodesulfurized middle distillates, CAS 64742-80-9, straight-run middle distillates, CAS 64741-44-2, and/or light cat-cracked distillate CAS 64741-59-9. CARCINOGENICITY: All materials tested have caused the development of skin tumors in mice, but all featured severe skin irritation and sometimes a long latency period before tumors developed. Straight-run and cracked gas oil samples were studied to determine the influence of dermal irritation on the carcinogenic activity of middle distillates. At non-irritant doses the straight-run gas oil was not carcinogenic, but at irritant doses, weak activity was demonstrated. Cracked gas oils, when diluted with mineral oil, demonstrated carcinogenic activity irrespective of the occurrence of skin irritation. Gas oils were tested on male mice to study tumor initiating/promoting activity. The results demonstrated that while a straight-run gas oil sample was neither an initiator or promotor, a blend of straight-run and FCC stock was both a tumor initiator and a promoter.
GENOTOXICITY: Hydrotreated & hydrodesulfurized gas oils range in activity from inactive to weakly positive in in-vitro bacterial mutagenicity assays. Mouse lymphoma assays on straight-run gas oils without subsequent hydrodesulphurization gave positive results in the presence of S9 metabolic activation. In-vivo bone marrow cytogenetics and sister chromatic exchange assay exhibited no activity for straight-run components with or without hydrodesulphurization. Thermally or catalytically cracked gas oils tested with in-vitro bacterial mutagenicity assays in the

presence of S9 metabolic activation were shown to be mutagenic. In-vitro sister chromatic exchange assays on cracked gas oil gave equivocal results both with and without S9 metabolic activation. In-vivo bone marrow cytogenetics assay was inactive for two cracked gas oil samples. Three hydrocracked gas oils were tested with in-vitro bacterial mutagenicity assays with S9, and one of the three gave positive results. Twelve distillate fuel samples were tested with in-vitro bacterial mutagenicity assays & with S9 metabolic activation and showed negative to weakly positive results. In one series, activity was shown to be related to the PCA content of samples tested. Two in-vivo studies were also conducted. A mouse dominant lethal assay was negative for a sample of diesel fuel. In the other study, 9 samples of No 2 heating oil containing 50% cracked stocks caused a slight increase in the number of chromosomal aberrations in bone marrow cytogenetics assays. DEVELOPMENTAL TOXICITY: Diesel fuel vapor did not cause fetotoxic or teratogenic effects when pregnant rats were exposed on days 6-15 of pregnancy. Gas oils were applied to the skin of pregnant rats daily on days 0-19 of gestation. All but one (coker light gas oil) caused fetotoxicity (increased resorptions, reduced litter weight, reduced litter size) at dose levels that were also maternally toxic.

This product contains naphthalene. GENERAL TOXICITY: Exposure to naphthalene has been reported to cause methemoglobinemia and/or hemolytic anemia, especially in humans deficient in the enzyme glucose-6-phosphate dehydrogenase. Laboratory animals given repeated oral doses of naphthalene have developed cataracts. REPRODUCTIVE TOXICITY AND BIRTH DEFECTS: Naphthalene did not cause birth defects when administered orally to rabbits, rats, and mice during pregnancy, but slightly reduced litter size in mice at dose levels that were lethal to the pregnant females. Naphthalene has been reported to cross the human placenta. GENETIC TOXICITY: Naphthalene caused chromosome aberrations and sister chromatid exchanges in Chinese hamster ovary cells, but was not a mutagen in several other in-vitro tests.CARCINOGENICITY: In a study conducted by the National Toxicology Program (NTP), mice exposed to 10 or 30 ppm of naphthalene by inhalation daily for two years had chronic inflammation of the nose and lungs and increased incidences of metaplasia in those tissues. The incidence of benign lung tumors (alveolar/ bronchiolar adenomas) was significantly increased in the high-dose female group but not in the male groups. In another two-year inhalation study conducted by NTP, exposure of rats to 10, 30, and 60 ppm naphthalene caused increases in the incidences of a variety of nonneoplastic lesions in the nose. Increases in nasal tumors were seen in both sexes, including olfactory neuroblastomas in females at 60 ppm and adenomas of the respiratory epithelium in males at all exposure levels. The relevance of these effects to humans has not been established. No carcinogenic effect was reported in a 2-year feeding study in rats receiving naphthalene at 41 mg/kg/day.

This product may contain significant amounts of Polynuclear Aromatic Hydrocarbons (PAH's) which have been shown to cause skin cancer after prolonged and frequent contact with the skin of test animals. Brief or intermittent skin contact with this product is not expected to have serious effects if it is washed from the skin. While skin cancer is unlikely to occur in human beings following use of this product, skin contact and breathing, of mists, vapors or dusts should be reduced to a minimum.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
96 hour(s) LC50: 21-210 mg/l (Salmo gairdneri)
48 hour(s) EC50: 20-210 mg/l (Daphnia magna)
72 hour(s) EC50: 2.6-25 mg/l (Raphidocellus subcapitata)
This material is expected to be toxic to aquatic organisms.

ENVIRONMENTAL FATE
On release to the environment the lighter components of diesel fuel will generally evaporate but depending on local environmental conditions (temperature, wind, mixing or wave action, soil type, etc.) the remainder may become dispersed in the water column or absorbed to soil or sediment. Diesel fuel would not be expected to be readily biodegradable. In a modified Strum test (OECD method 301B) approximately 40% biodegradation was recorded over 28 days. However, it has been shown that most hydrocarbon components of diesel fuel are degraded in soil in the presence of oxygen. Under anaerobic conditions, such as in anoxic sediments, rates of biodegradation are negligible.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: GAS OIL, COMBUSTIBLE LIQUID, UN1202,III

IMO/IMDG Shipping Description: UN1202, GAS OIL, 3, III, FLASH POINT SEE SECTION 5

ICAO/IATA Shipping Description: UN1202, GAS OIL, 3, III

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: YES
3. Fire Hazard: YES
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated.

Diesel Fuel No. 2	07
Distillates, straight run middle (gas oil, light)	06
Kerosine	05, 06, 07
Naphthalene	01-2B, 02, 03, 04, 05, 06, 07

CERCLA REPORTABLE QUANTITIES(RQ)/EPCRA 302 THRESHOLD PLANNING QUANTITIES(TPQ):

Component	Component RQ	Component TPQ	Product RQ
Naphthalene	100 lbs	None	55556 lbs

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

NEW JERSEY RTK CLASSIFICATION:
Refer to components listed in Section 2. Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: DIESEL FUEL

WHMIS CLASSIFICATION:
Class B, Division 3: Combustible Liquids
Class D, Division 2, Subdivision A: Very Toxic Material - Carcinogenicity
Class D, Division 2, Subdivision B: Toxic Material - Skin or Eye Irritation

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 2 Reactivity: 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

Additional Product Number(s): CPS203413, CPS203417, CPS220122, CPS225114, CPS225115, CPS225150, CPS266176, CPS270000, CPS270005, CPS270094, CPS270095, CPS270096, CPS271006, CPS272006, CPS272007, CPS272008, CPS272009, CPS272010, CPS272011, CPS272012, CPS272013, CPS272093, CPS272102, CPS272126, CPS272152, CPS272185, CPS272190, CPS272195, CPS272593, CPS272601, CPS272693, CPS272793, CPS273003, CPS273030, CPS273053, CPS275000
REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 16.
Revision Date: July 31, 2006

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

CHEVRON Diesel Engine Oil Delo® 6130 CFO SAE 20W-40

Product Use: Diesel Engine Oil
Product Number(s): CPS235067
Company Identification
ChevronTexaco Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
ChevronTexaco Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
email : lubemsds@Chevron.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Highly refined mineral oil (C15 - C50)	Mixture	80 - 100 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To

remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Cleveland Open Cup) 210 °C (410 °F) (Min)
Autoignition: No Data Available
Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely

drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.
Respiratory Protection: No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	--	--
Highly refined mineral oil (C15 - C50)	OSHA Z-1	5 mg/m3	--	--	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Brown
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)
Vapor Density (Air = 1): >1
Boiling Point: >315.6°C (600°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Melting Point: Not Applicable
Specific Gravity: 0.88 @ 15.6°C (60.1°F) / 15.6°C (60.1°F) (Typical)
Density: 0.88 kg/l @ 15°C (59°F)
Viscosity: 14.3 cSt @ 100°C (212°F) (Min)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: No product toxicology data available.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3). During use in engines, contamination of oil with low levels of cancer-causing combustion products occurs. Used motor oils have been shown to cause skin cancer in mice following repeated application and continuous exposure. Brief or intermittent skin contact with used motor oil is not expected to have serious effects in humans if the oil is thoroughly removed by washing with soap and water.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

ENVIRONMENTAL FATE
This material is not expected to be readily biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods

Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
Additional Information: NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE.

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

No components of this material were found on the regulatory lists above.

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

One or more components does not comply with the following chemical inventory requirements: AICS (Australia).

NEW JERSEY RTK CLASSIFICATION:
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Motor oil)

WHMIS CLASSIFICATION:
This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 1 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *-

Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Label Category : ENGINE OIL 1

REVISION STATEMENT: This Material Safety Data Sheet has been discontinued.
Revision Date: 08/03/2006

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

CHEVRON and TEXACO REGULAR UNLEADED GASOLINES

Product Use: Fuel
Product Number(s): CPS201000 [See Section 16 for Additional Product Numbers]
Synonyms: Calco Regular Unleaded Gasoline, Chevron Regular Unleaded Gasoline, Chevron UL/CQ Gasoline, Gasolines, Automotive, Texaco Unleaded Gasoline
Company Identification
Chevron Products Company
Marketing, MSDS Coordinator
6001 Bollinger Canyon Road
San Ramon, CA 94583
United States of America

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
Technical Information: (510) 242-5357

SPECIAL NOTES: This MSDS applies to: all motor gasoline.

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Gasoline	86290-81-5	100 %vol/vol
Benzene	71-43-2	0.1 - 4.9 %vol/vol
Toluene (methylbenzene)	108-88-3	1 - 17 %vol/vol
Ethyl benzene	100-41-4	0.1 - 3 %vol/vol
Xylene (contains o-, m-, & p- xylene isomers in varying amounts)	1330-20-7	1 - 15 %vol/vol
Butane	106-97-8	1 - 12 %vol/vol
Heptane	142-82-5	1 - 4 %vol/vol
Hexane	110-54-3	1 - 5 %vol/vol
Cyclohexane	110-82-7	1 - 3 %vol/vol
Methylcyclohexane	108-87-2	1 - 2 %vol/vol

Pentane, 2,2,4-trimethyl- (Isooctane)	540-84-1	1 - 13 %vol/vol
Naphthalene	91-20-3	0.1 - 2 %vol/vol
Ethanol	64-17-5	0 - 10 %vol/vol
Methyl tert-butyl ether (MTBE)	1634-04-4	0 - 15 %vol/vol
Tertiary amyl methyl ether (TAME)	994-05-8	0 - 17 %vol/vol
Ethyl tert-butyl ether (ETBE)	637-92-3	0 - 18 %vol/vol

Information on ingredients that are considered Controlled Products and/or that appear on the WHMIS Ingredient Disclosure List (IDL) is provided as required by the Canadian Hazardous Products Act (HPA, Sections 13 and 14). Ingredients considered hazardous under the OSHA Hazard Communication Standard, 29 CFR 1910.1200, are also listed. See Section 15 for additional regulatory information.

SECTION 3 HAZARDS IDENTIFICATION

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EMERGENCY OVERVIEW

- EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE
- HARMFUL OR FATAL IF SWALLOWED - MAY CAUSE LUNG DAMAGE IF SWALLOWED
- VAPOR HARMFUL
- CAUSES EYE AND SKIN IRRITATION
- LONG-TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN LABORATORY ANIMALS
- KEEP OUT OF REACH OF CHILDREN

****

IMMEDIATE HEALTH EFFECTS
Eye: Contact with the eyes causes irritation. Symptoms may include pain, tearing, reddening, swelling and impaired vision.
Skin: Contact with the skin causes irritation. Skin contact may cause drying or defatting of the skin. Symptoms may include pain, itching, discoloration, swelling, and blistering. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death.
Inhalation: The vapor or fumes from this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing.

DELAYED OR OTHER HEALTH EFFECTS:
Reproduction and Birth Defects: This material is not expected to cause birth defects or other harm to the developing fetus based on animal data.
Cancer: Prolonged or repeated exposure to this material may cause cancer. Gasoline has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Whole gasoline exhaust has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Contains benzene, which has been classified as a carcinogen by the National Toxicology Program (NTP) and a Group 1 carcinogen (carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
Contains ethylbenzene which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
Contains naphthalene, which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC). Contains benzene, which has been classified as an A1 Group Confirmed Human Carcinogen by the American Conference of Governmental Industrial Hygienists (ACGIH).
See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: Flush eyes with water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get medical attention if irritation persists.
Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.
Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.
Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FLAMMABLE PROPERTIES:
Flashpoint: (Tagliabue Closed Cup ASTM D56) < -45 °C (< -49 °F)
Autoignition: > 280 °C (> 536 °F)
Flammability (Explosive) Limits (% by volume in air): Lower: 1.4 Upper: 7.6 (Typical)

EXTINGUISHING MEDIA: Dry Chemical, CO2, AFFF Foam or alcohol resistant foam if >15% volume polar solvents (oxygenates).
PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: Use water spray to cool fire-exposed containers and to protect personnel. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL. This product presents an extreme fire hazard. Liquid very quickly evaporates, even at low temperatures, and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Do not store in open or unlabeled containers. Use only as a motor fuel. Do not use for cleaning, pressure appliance fuel, or any other such use. Never siphon gasoline by mouth.
Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Wash thoroughly after handling. Keep out of the reach of children.
Unusual Handling Hazards: WARNING! Do not use as portable heater or appliance fuel. Toxic fumes may accumulate and cause death.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'. Improper filling of portable gasoline containers creates danger of fire. Only dispense gasoline into approved and properly labeled gasoline containers. Always place portable containers on the ground. Be sure pump nozzle is in contact with the container while filling. Do not use a nozzle's lock-open device. Do not fill portable containers that are inside a vehicle or truck/trailer bed.

General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces . USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Nitrile Rubber,

Polyurethane, Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors.
When used as a fuel, this material can produce carbon monoxide in the exhaust. Determine if airborne concentrations are below the occupational exposure limit for carbon monoxide. If not, wear an approved positive-pressure air-supplying respirator.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Country/ Agency	TWA	STEL	Ceiling	Notation
Benzene	ACGIH	.5 ppm (weight)	2.5 ppm (weight)	--	Skin A1
Butane	ACGIH	1000 ppm (weight)	--	--	--
Cyclohexane	ACGIH	100 ppm (weight)	--	--	--
Ethanol	ACGIH	1000 ppm (weight)	--	--	A4
Ethyl benzene	ACGIH	100 ppm (weight)	125 ppm (weight)	--	A3
Ethyl tert-butyl ether (ETBE)	ACGIH	5 ppm (weight)	--	--	--
Gasoline	ACGIH	300 ppm (weight)	500 ppm (weight)	--	A3
Heptane	ACGIH	400 ppm (weight)	500 ppm (weight)	--	--
Hexane	ACGIH	50 ppm (weight)	--	--	Skin
Methyl tert-butyl ether (MTBE)	ACGIH	50 ppm (weight)	--	--	A3
Methyl tert-butyl ether (MTBE)	CVX	--	50 ppm	--	--
Methylcyclohexane	ACGIH	400 ppm (weight)	--	--	--
Naphthalene	ACGIH	10 ppm (weight)	15 ppm (weight)	--	Skin
Pentane, 2,2,4-trimethyl- (Isooctane)	ACGIH	300 ppm (weight)	--	--	--
Tertiary amyl methyl ether (TAME)	ACGIH	20 ppm (weight)	--	--	--
Tertiary amyl methyl ether (TAME)	CVX	--	50 ppm	--	--
Toluene (methylbenzene)	ACGIH	50 ppm (weight)	--	--	Skin A4
Xylene (contains o-, m-, & p- xylene isomers in varying amounts)	ACGIH	100 ppm (weight)	150 ppm (weight)	--	A4

NOTE ON OCCUPATIONAL EXPOSURE LIMITS: Consult local authorities for acceptable provincial values in Canada. Consult the Canadian Standards Association Standard 94.4-2002 Selection, Use and Care of Respirators.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Colorless to yellow
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: 5 psi - 15 psi (Typical) @ 37.8 °C (100 °F)
Vapor Density (Air = 1): 3 - 4 (Typical)
Boiling Point: 37.8°C (100°F) - 204.4°C (400°F) (Typical)
Solubility: Insoluble in water; miscible with most organic solvents.
Freezing Point: Not Applicable
Melting Point: Not Applicable
Specific Gravity: 0.7 g/ml - 0.8 g/ml @ 15.6°C (60.1°F) (Typical)
Viscosity: <1 SUS @ 37.8°C (100°F)
Evaporation Rate: No Data Available
Odor Threshold: No Data Available
Coefficient of Water/Oil Distribution: No Data Available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.
Sensitivity to Mechanical Impact: No.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The Draize eye irritation mean score in rabbits for a 24-hour exposure was: 0/110.
Skin Irritation: For a 4-hour exposure, the Primary Irritation Index (PII) in rabbits is: 4.8/8.0.
Skin Sensitization: This material did not cause skin sensitization reactions in a Buehler guinea pig test.
Acute Dermal Toxicity: LD50: >3.75g/kg (rabbit).
Acute Oral Toxicity: LD50: >5 ml/kg (rat)
Acute Inhalation Toxicity: 4 hour(s) LD50: >20000mg/m3 (rat). For additional information on the acute toxicity of the components, call the technical information center.**Subchronic Effects:** Exposure of rats for 13 weeks (6 hr/day for 5 days/week) to the light ends of gasoline (up to 20,000 mg/m3) resulted in minimal responses of toxicity. There were no indications of neurotoxicity based morphological, functional and biochemical indices. There was also no evidence of immunotoxicity in the rats. However, when rats were exposed to gasoline vapor containing ethanol up to 20,000 mg/m3 there was evidence of both humoral immune suppression and mild astrogliosis. **Reproduction and Birth Defects:** Exposure of rats to the light ends of gasoline at up to 20,000 mg/m3 had generally no impact upon reproductive abilities and did not cause birth defects.
Genetic Toxicity: Gasoline was not mutagenic, with or without activation, in the Ames assay (Salmonella typhimurium), Saccharamyces cerevisesae, or mouse lymphoma assays. In addition, point mutations were not induced in human lymphocytes. Gasoline was not mutagenic when tested in the mouse dominant lethal assay. Administration of gasoline to rats did not cause chromosomal aberrations in their bone marrow cells. Inhalation exposure of rats to the light ends of gasoline caused increased sister chromatid exchange in their peripheral white blood cells but did not cause an increase in micronucleated red blood cells in their bone marrow.
ADDITIONAL TOXICOLOGY INFORMATION:
Gasolines are highly volatile and can produce significant concentrations of vapor at ambient temperatures. Gasoline vapor is heavier than air and at high concentrations may accumulate in confined spaces to present both safety and

heath hazards. When vapor exposures are low, or short duration and infrequent, such as during refueling and tanker loading/unloading, neither total hydrocarbon nor components such as benzene are likely to result in any adverse health effects. In situations such as accidents or spills where exposure to gasoline vapor is potentially high, attention should be paid to potential toxic effects of specific components. Information about specific components in gasoline can be found in Sections 2, 8 and 15 of this MSDS. More detailed information on the health hazard of specific gasoline components can be obtained calling the Chevron Emergency Information Center (see Section 1 for phone numbers).
Pathological misuse of solvents and gasoline, involving repeated and prolonged exposure to high concentrations of vapor is a significant exposure on which there are many reports in the medical literature. As with other solvents, persistent abuse involving repeated and prolonged exposures to high concentrations of vapor has been reported to result in central nervous system damage and eventually, death. In a study in which ten human volunteers were exposed for 30 minutes to approximately 200, 500 or 1000 ppm concentrations of gasoline vapor, irritation of the eyes was the only significant effect observed, based on both subjective and objective assessments.
Lifetime inhalation of wholly vaporized unleaded gasoline at 2056 ppm has caused increased liver tumors in female mice and kidney cancer in male rats. In their 1988 review of carcinogenic risk from gasoline, The International Agency for Research on Cancer (IARC) noted that, because published epidemiology studies did not include any exposure data, only occupations where gasoline exposure may have occurred were reviewed. These included gasoline service station attendants and automobile mechanics. IARC also noted that there was no opportunity to separate effects of combustion products from those of gasoline itself. Although IARC allocated gasoline a final overall classification of Group 2B, i.e. possibly carcinogenic to humans, this was based on limited evidence in experimental animals plus supporting evidence including the presence in gasoline of benzene. The actual evidence for carcinogenicity in humans was considered inadequate.
To explore the health effects of workers potentially exposed to gasoline vapors in the marketing and distribution sectors of the petroleum industry, the American Petroleum Institute sponsored a cohort mortality study (Publication 4555), a nested case-control study (Publication 4551), and an exposure assessment study (Publication 4552). Histories of exposure to gasoline were reconstructed for cohort of more than 18,000 employees from four companies for the time period between 1946 and 1985. The results of the cohort mortality study indicated that there was no increased mortality from either kidney cancer or leukemia among marketing and marine distribution employees who were exposed to gasoline in the petroleum industry, when compared to the general population. More importantly, based on internal comparisons, there was no association between mortality from kidney cancer or leukemia and various indices of gasoline exposure. In particular, neither duration of employment, duration of exposure, age at first exposure, year of first exposure, job category, cumulative exposure, frequency of peak exposure, nor average intensity of exposure had any effect on kidney cancer or leukemia mortality. The results of the nested case-control study confirmed the findings of the original cohort study. That is, exposure to gasoline at the levels experienced by this cohort of distribution workers is not a significant risk factor for leukemia (all cell types), acute myeloid leukemia, kidney cancer or multiple myeloma.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
96 hour(s) LC50: 8.3 mg/l (Cyprinodon variegatus)
96 hour(s) LC50: 1.8 mg/l (Mysidopsis bahia)
48 hour(s) LC50: 3.0 mg/l (Daphnia magna)
96 hour(s) LC50: 2.7 mg/l (Oncorhynchus mykiss)
Gasoline studies have been conducted in the laboratory under a variety of test conditions with a range of fish and invertebrate species. An even more extensive database is available on the aquatic toxicity of individual aromatic constituents. The majority of published studies do not identify the type of gasoline evaluated, or even provide distinguishing characteristics such as aromatic content or presence of lead alkyls. As a result, comparison of results among studies using open and closed vessels, different ages and species of test animals and different gasoline types, is difficult.

The bulk of the available literature on gasoline relates to the environmental impact of monoaromatic (BTEX) and diaromatic (naphthalene, methylnaphthalenes) constituents. In general, non-oxygenated gasoline exhibits some short-term toxicity to freshwater and marine organisms, especially under closed vessel or flow-through exposure conditions in the laboratory. The components which are the most prominent in the water soluble fraction and cause aquatic toxicity,

are also highly volatile and can be readily biodegraded by microorganisms.

ENVIRONMENTAL FATE
This material is expected to be readily biodegradable. Following spillage, the more volatile components of gasoline will be rapidly lost, with concurrent dissolution of these and other constituents into the water. Factors such as local environmental conditions (temperature, wind, mixing or wave action, soil type, etc), photo-oxidation, biodegradation and adsorption onto suspended sediments, can contribute to the weathering of spilled gasoline.

The aqueous solubility of non-oxygenated unleaded gasoline, based on analysis of benzene, toluene, ethylbenzene +xylenes and naphthalene, is reported to be 112 mg/l. Solubility data on individual gasoline constituents also available.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by USEPA under RCRA (40CFR261), Environment Canada, or other State, Provincial, and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

TC Shipping Description: UN1203, GASOLINE, 3, II

IMO/IMDG Shipping Description: UN1203,GASOLINE,3,II,FLASH POINT SEE SECTION 5

ICAO/IATA Shipping Description: UN1203, GASOLINE, 3, II

DOT Shipping Description: GASOLINE,3,UN1203,II

SECTION 15 REGULATORY INFORMATION

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1
01-2A=IARC Group 2A
01-2B=IARC Group 2B
35=WHMIS IDL

The following components of this material are found on the regulatory lists indicated.

Benzene	01-1, 35
Butane	35
Cyclohexane	35
Ethanol	01-1, 35
Ethyl benzene	01-2B, 35
Gasoline	01-2B
Heptane	35
Hexane	35

Methylcyclohexane	35
Naphthalene	01-2B, 35
Pentane, 2,2,4-trimethyl- (Isooctane)	35
Toluene (methylbenzene)	35
Xylene (contains o-, m-, & p- xylene isomers in varying amounts)	35

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: DSL (Canada), EINECS (European Union), KECI (Korea), TSCA (United States).

One or more components does not comply with the following chemical inventory requirements: AICS (Australia), ENCS (Japan), IECSC (China), PICCS (Philippines).

WHMIS CLASSIFICATION:
Class B, Division 2: Flammable Liquids
Class D, Division 2, Subdivision A: Very Toxic Material - Carcinogenicity
Class D, Division 2, Subdivision B: Toxic Material - Skin or Eye Irritation

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations. (See Hazardous Products Act (HPA), R.S.C. 1985, c. H-3,s.2).

MSDS PREPARATION:

This Material Safety Data Sheet has been prepared by the Toxicology and Health Risk Assessment Unit, ERTC, P.O. Box 1627, Richmond, CA 94804, (888)676-6183.

Revision Date: January 08, 2007

SECTION 16 OTHER INFORMATION

Additional Product Number(s): CPS201023, CPS201054, CPS201055, CPS201075, CPS201090, CPS201105, CPS201106, CPS201120, CPS201121, CPS201122, CPS201126, CPS201128, CPS201131, CPS201136, CPS201141, CPS201142, CPS201148, CPS201153, CPS201158, CPS201161, CPS201162, CPS201168, CPS201175, CPS201181, CPS201185, CPS201186, CPS201188, CPS201216, CPS201217, CPS201218, CPS201236, CPS201237, CPS201238, CPS201266, CPS201267, CPS201268, CPS201277, CPS201278, CPS201279, CPS201286, CPS201287, CPS201289, CPS201296, CPS201297, CPS201298, CPS201849, CPS201850, CPS201855, CPS201856, CPS201857, CPS204000, CPS204001, CPS204002, CPS204003, CPS204010, CPS204011, CPS204022, CPS204023, CPS204046, CPS204047, CPS204070, CPS204071, CPS204088, CPS204089, CPS204104, CPS204105, CPS204116, CPS204117, CPS204140, CPS204141, CPS204164, CPS204165, CPS204188, CPS204189, CPS204200, CPS204201, CPS204207, CPS204212, CPS204213, CPS204224, CPS204225, CPS204248, CPS204249, CPS204272, CPS204273, CPS204290, CPS204291, CPS204322, CPS204323, CPS204324, CPS204350, CPS204352, CPS204354, CPS204356, CPS204358, CPS204359, CPS204364, CPS204365, CPS204370, CPS204371, CPS204376, CPS204377, CPS204382, CPS204383, CPS204388, CPS204389, CPS204394, CPS204395, CPS204400, CPS204401, CPS204406, CPS204407, CPS204412, CPS204413, CPS204418, CPS204419, CPS204424, CPS204425, CPS204430, CPS204431, CPS204436, CPS204437, CPS204442, CPS204446, CPS204450, CPS204454, CPS204458, CPS204462, CPS204466, CPS204467, CPS204484, CPS204485, CPS204502, CPS204503, CPS204520, CPS204521, CPS204538, CPS204539, CPS204556, CPS204557, CPS204574, CPS204575, CPS204592, CPS204593, CPS204610, CPS204611, CPS204628, CPS204629, CPS204646, CPS204647,

CPS204664, CPS204665, CPS204682, CPS204690, CPS204691, CPS204696, CPS204697, CPS204702, CPS204703, CPS204708, CPS204709, CPS204721, CPS204722, CPS204727, CPS204728, CPS204739, CPS241765
REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 1

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Black Pearl® Grease EP

Product Use: Grease
Product Number(s): CPS254590, CPS254591, CPS254592
Synonyms: Chevron Black Pearl® Grease EP NLGI 0, Chevron Black Pearl® Grease EP NLGI 1, Chevron Black Pearl® Grease EP NLGI 2
Company Identification
ChevronTexaco Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
email : lubemsds@Chevron.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Highly refined mineral oil (C15 - C50)	Mixture	70 - 80 %weight
Polyurea thickener		10 - 20 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory

irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, apply a waterless hand cleaner, mineral oil, or petroleum jelly. Then wash with soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
Note to Physicians: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Cleveland Open Cup) 246 °C (475 °F) (Min)
Autoignition: No Data Available
Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion. Combustion may form oxides of: Nitrogen .

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Clean up spills immediately, observing precautions in Exposure Controls/Personal Protection section.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Neoprene, Nitrile Rubber, Silver Shield, Viton.
Respiratory Protection: No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	--	--
Highly refined mineral oil (C15 - C50)	OSHA Z-1	5 mg/m3	--	--	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Black

Physical State: Semi-solid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: <1 mmHg @ 40 °C (104 °F)
Vapor Density (Air = 1): >1
Boiling Point: >315°C (599°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Melting Point: 205°C (401°F) (Min)
Viscosity: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

ENVIRONMENTAL FATE
This material is not expected to be readily biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A HAZARDOUS MATERIAL

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A DANGEROUS GOOD

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING GREASE, NOT REGULATED AS A DANGEROUS GOOD

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

No components of this material were found on the regulatory lists above.

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: DSL (Canada), EINECS (European Union), TSCA (United States).

One or more components does not comply with the following chemical inventory requirements: AICS (Australia), IECSC (China), KECI (Korea), PICCS (Philippines).

NEW JERSEY RTK CLASSIFICATION:
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Grease)

WHMIS CLASSIFICATION:
This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 1 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *-Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Label Category : GREASE 1

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 2,8,9,16
Revision Date: 07/09/2004

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Clarity ® Hydraulic Oil AW

Product Use: Hydraulic Oil
Product Number(s): CPS230340, CPS230341, CPS230342
Synonyms: Chevron Clarity ® Hydraulic Oil AW ISO 32, Chevron Clarity® Hydraulic Oil AW ISO 46, Chevron Clarity® Hydraulic Oil AW ISO 68
Company Identification
Chevron Products Company
Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
email : lubemsds@Chevron.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Highly refined mineral oil (C15 - C50)	Mixture	90 - 100 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.
Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
Note to Physicians: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

Leaks/ruptures in high pressure system using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs).

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Cleveland Open Cup) 190 °C (374 °F) (Min)
Autoignition: No Data Available
Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.
Respiratory Protection: No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	--	--
Highly refined mineral oil (C15 - C50)	OSHA Z-1	5 mg/m3	--	--	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Colorless

Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)
Vapor Density (Air = 1): >1
Boiling Point: >315 °C (599°F)
Solubility: Soluble in hydrocarbon solvents; insoluble in water.
Freezing Point: Not Applicable
Density: 0.86 - 0.87 kg/l @ 15.6 °C (60.1°F)
Viscosity: 32 cSt @ 40 °C (104°F) (Min)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The Draize eye irritation mean score in rabbits for a 24-hour exposure was: 2/110.
Skin Irritation: For a 24-hour exposure, the Primary Irritation Score (PIS) in rabbits is: 0.7/8.
Skin Sensitization: No product toxicology data available.
Acute Dermal Toxicity: LD50: >2.0g/kg (rabbit).
Acute Oral Toxicity: LD50: >5 g/kg (rat)
Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
96 hour(s) LC50: >5000 mg/l (WAF) (Oncorhynchus mykiss)
96 hour(s) LC50: >5000 mg/l (WAF) (Mysidopsis bahia)
This material is not expected to be harmful to aquatic organisms.

ENVIRONMENTAL FATE
This material is considered inherently biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
Additional Information: NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE.

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

No components of this material were found on the regulatory lists above.

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

NEW JERSEY RTK CLASSIFICATION:
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Hydraulic oil)

WHMIS CLASSIFICATION:

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 1 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *-Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Label Category : INDUSTRIAL OIL 1 - IND1

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 12.
Revision Date: August 29, 2006

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Delo® 100 Motor Oil

Product Use: Engine Oil
Product Number(s): CPS222403, CPS222404, CPS222405
Synonyms: Chevron Delo® 100 Motor Oil SAE 30, Chevron Delo® 100 Motor Oil SAE 40, Chevron Delo® 100 Motor Oil SAE 50
Company Identification
Chevron Products Company
a division of Chevron U.S.A. Inc.
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
email : lubemsds@chevrontexaco.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Highly refined mineral oil (C15 - C50)	Mixture	90 - 100 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
Note to Physicians: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

Leaks/ruptures in high pressure system using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs).

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Cleveland Open Cup) 210 °C (410 °F) (Min)
Autoignition: No Data Available
Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.
Keep out of the reach of children.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.
Respiratory Protection: No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	--	--
Highly refined mineral oil (C15 - C50)	OSHA Z-1	5 mg/m3	--	--	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Amber
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)
Vapor Density (Air = 1): >1
Boiling Point: >315°C (599°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Specific Gravity: 0.88 - 0.9 @ 15.6°C (60.1°F) / 15.6°C (60.1°F)
Viscosity: 8.5 cSt @ 100°C (212°F) (Min)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: No product toxicology data available.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3). During use in engines, contamination of oil with low levels of cancer-causing combustion products occurs. Used motor oils have been shown to cause skin cancer in mice following repeated application and continuous exposure. Brief or intermittent skin contact with used motor oil is not expected to have serious effects in humans if the oil is thoroughly removed by washing with soap and water.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

ENVIRONMENTAL FATE
This material is not expected to be readily biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
Additional Information:NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE.

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

No components of this material were found on the regulatory lists above.

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: EINECS (European Union), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

DSL (Canada).

AICS (Australia), ENCS (Japan).

NEW JERSEY RTK CLASSIFICATION:
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Motor oil)

WHMIS CLASSIFICATION:
This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 1 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *-Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Label Category : ENGINE OIL 1 - ENG1

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 1
Revision Date: November 17, 2005

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Synthetic Automatic Transmission Fluid Heavy Duty

Product Use: Transmission Fluid
Product Number(s): CPS226718
Company Identification
ChevronTexaco Global Lubricants
6001 Bollinger Canyon Rd.
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
email : lubemsds@Chevron.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Distillates, hydrotreated heavy paraffinic	64742-54-7	70 - 90 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.
Note to Physicians: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

Leaks/ruptures in high pressure system using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs).

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Cleveland Open Cup) 180 °C (356 °F) (Min)
Autoignition: No Data Available
Flammability (Explosive) Limits (% by volume in air): Lower: No data available Upper: No data available

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Keep out of the reach of children.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.
Respiratory Protection: No respiratory protection is normally required.
If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Distillates, hydrotreated heavy paraffinic	ACGIH	5 mg/m3	10 mg/m3	--	--
Distillates, hydrotreated heavy paraffinic	OSHA Z-1	5 mg/m3	--	--	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Red
Physical State: Liquid
Odor: Petroleum odor

pH: Not Applicable
Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)
Vapor Density (Air = 1): >1
Boiling Point: >315°C (599°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Specific Gravity: 0.85 @ 15.6°C (60.1°F) / 15.6°C (60.1°F)
Viscosity: 7 cSt @ 100°C (212°F) (Min)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: No product toxicology data available.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.
Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

ENVIRONMENTAL FATE
This material is not expected to be readily biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
Additional Information: NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE.

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

No components of this material were found on the regulatory lists above.

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

One or more components is listed on ELINCS (European Union). Secondary notification by the importer may be required.

NEW JERSEY RTK CLASSIFICATION:
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows: PETROLEUM OIL (Automatic transmission fluid)

WHMIS CLASSIFICATION:
This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 1 Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *-Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Label Category : INDUSTRIAL OIL 1

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 2,5,8,9,15
Revision Date: 08/26/2005

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

CENTENNIAL VILLAGE-LOT 13-BUILDING "A.1"
CHASE BANK

9521 CALUMET AVE, MUNSTER, INDIANA

ISSUED FOR PERMIT - 09/04/2025



Location Map
(No Scale)

BENCHMARK

SAW CUT CROSS AT THE NORTHEAST CORNER OF CALUMET AVE & 45TH AVE INTERSECTION
ELEVATION = 618.59 (NAVD88)

Indiana811 Know what's **below.Call** before you dig.

To Submit a Locate Request
24 Hours a Day, Seven Days a Week:
Call 811 or 800-382-5544
www.Indiana811.org

INDEX OF SHEETS

C001	Cover Sheet
C101	Existing Conditions Before Sprouts Dev
C102	Demolition Plan Before Sprouts Dev
C103	PUD Overall Site Plan
C103A	Site Plan
C104	Grading Plan
C105	PUD Overall Utility Plan
C105A	Utility Plan
C106	Stormwater Pollution Prevention Plan (SWPPP)
C201-C204	Construction Details
C301-C304	SWPPP Details

LEGEND

EXISTING DRAINAGE STRUCTURE
EXISTING END SECTION
EXISTING SANITARY STRUCTURE
EXISTING FIRE HYDRANT
EXISTING VALVE & BOX
EXISTING B-BOX
EXISTING STREET LIGHT
POWER POLE
SBC PEDESTAL
MAIL BOX
PROPOSED DRAINAGE STRUCTURE
PROPOSED END SECTION
PROPOSED SANITARY STRUCTURE
PROPOSED FIRE HYDRANT
PROPOSED VALVE & VAULT
PROPOSED VALVE & BOX
PROPOSED B-BOX
PROPOSED STREET LIGHT
DIRECTION OF FLOW
OVERLAND FLOOD ROUTE
000.00 T/W / 000.00 B/W — PROPOSED TOP RETAINING WALL ELEVATION / PROPOSED BOTTOM OF RETAINING ELEVATION
000.00 / 000.00 — PROPOSED TOP OF CURB ELEVATION / PROPOSED GUTTER FLOWLINE ELEVATION
000.00 — PROPOSED SURFACE ELEVATION

710 — EXISTING CONTOURS
710 — PROPOSED CONTOURS
BOUNDARY LINES
RIGHT-OF-WAY LINES
PROPOSED LOT LINES
UNDERLYING LOT LINE
EASEMENT LINES
BUILDING LINES
CHAINLINK FENCE
ORNAMENTAL FENCE
OHW — OVERHEAD POWER LINES
T — TELEPHONE ROUTE
E — ELECTRIC ROUTE
G — GAS ROUTE
EXISTING WATER
EXISTING STORM
EXISTING SANITARY
PROPOSED WATER
PROPOSED STORM
PROPOSED SANITARY

PROPOSED

STORM SEWER
CB #1 /48"Ø
102221, 1020M1
R: 100.00
I: 95.00 (W)
I: 94.00 (E)
TYPE & LABEL/DIAMETER
TYPE OF FRAME & COVER
RIM ELEVATION
PIPE INVERT AND DIRECTION
PIPE INVERT AND DIRECTION

SANITARY SEWER
SAN MH A /48"Ø
102221, 1020AGS
R: 100.00
I: 94.00 (W)
I: 93.90 (E)
TYPE & LABEL/DIAMETER
TYPE OF FRAME & COVER
RIM ELEVATION
PIPE INVERT AND DIRECTION
PIPE INVERT AND DIRECTION

WATER
FH #1
G: 100.0
FIRE HYDRANT & NUMBER LABEL
GROUND ELEVATION

V.B #1
W/ 6" GATE VALVE
G: 100.0
T/P: 95.0
V.B FOR VALVE BOX AND V.V FOR VALVE IN VAULT
SIZE OF GATE VALVE OR TAPPING SLEEVE
GROUND ELEVATION
TOP OF PIPE ELEVATION

PROJECT CONTACTS

SCHOOL DISTRICT
SCHOOL TOWN OF MUNSTER
8616 COLUMBIA AVENUE
MUNSTER, IN 46321
(219) 836-9111

WATER UTILITY
TOWN OF MUNSTER
WATER DEPARTMENT
1005 RIDGE ROAD
MUNSTER, IN 46321
(219) 836-6970

ELECTRIC & GAS UTILITY
NIPSCO
801 E. 86th AVENUE
MERRILLVILLE, IN 46410
(800) 464-7726

DEVELOPER/OWNER
MATT KIMMEL
631 KILLARNEY DRIVE
DYER, INDIANA 46311
MATT@MKIMMEL.COM

MUNICIPAL
TOWN OF MUNSTER
COMMUNITY DEVELOPMENT
1005 RIDGE ROAD
MUNSTER, IN 46321
(219) 836-6995

SANITARY SEWER UTILITY
TOWN OF MUNSTER
SEWER DEPARTMENT
1005 RIDGE ROAD
MUNSTER, IN 46321
(219) 836-6970

CABLE UTILITY
COMCAST
16 W. 84th DRIVE
MERRILLVILLE, IN 46410
(219) 738-2780

TELECOM UTILITY
AT&T
5858 N. COLLEGE AVENUE
INDIANAPOLIS, IN 46220
(317) 252-4007

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB ANDERSON — REGISTERED — 29300007 — STATE OF INDIANA — PROFESSIONAL ENGINEER
09/04/2025

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE: | REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Cover Sheet

NO SCALE

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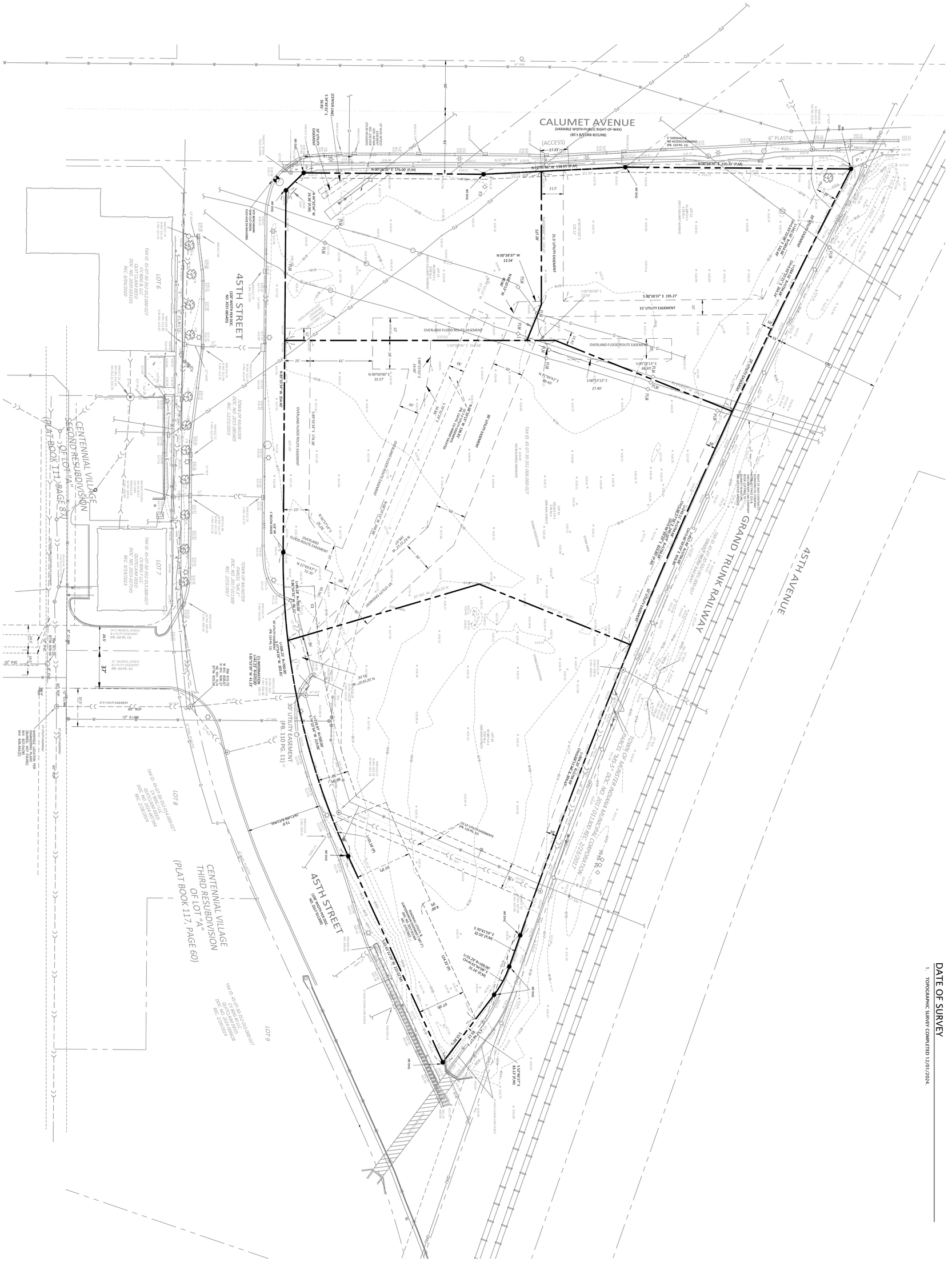
DESIGN BY	DATE
DVG	09/04/25
PROJECT NO.	
25-0081	

C001


CALUMET AVENUE
(VARIABLE WIDTH PUBLIC RIGHT-OF-WAY)
(85'± B/CURB-B/CURB)
45TH STREET
45TH AVENUE
GRAND TRUNK RAILWAY
CENTENNIAL VILLAGE
SECOND RESUBDIVISION
OF LOT "A"
(PLAT BOOK 113, PAGE 87)
CENTENNIAL VILLAGE
THIRD RESUBDIVISION
OF LOT "A"
(PLAT BOOK 117, PAGE 60)
LOT 6
LOT 7
LOT 8
LOT 9
30' UTILITY EASEMENT
(PB. 110 PG. 11)
OVERLAND FLOOD ROUTE EASEMENT
15' UTILITY EASEMENT
5' SIDEWALK & NO ACCESS EASEMENT
(PB. 110 PG. 11)
37' INGRESS, EGRESS & UTILITY EASEMENT
(PB. 110 PG. 11)
24.5' INGRESS, EGRESS & UTILITY EASEMENT
(PB. 110 PG. 11)
[ACCESS]
N 00°38'37" W 176.00' (P,M)
N 00°38'37" W 22.54'
S 00°38'37" E 195.27'
N 00°00'00" E 35.57'
S 00°00'00" E 264.68'
S 00°13'13" E 68.00'
S 00°13'13" E 27.40'
N 00°28'20" E 220.35' (P,M)
N 00°38'37" W 138.95' (P,M)
N 71°59'47" E 49.40'
S 71°59'47" E 32.50' (M,R)
N 21°45'47" E 52.35'
N 21°45'47" E 52.35'
S 21°45'47" W 52.35'
S 21°45'47" W 52.35'
N 68°14'13" W 30.00'
S 68°14'13" E 30.00'
N 21°45'47" E 30.00'
S 21°45'47" W 30.00

LEGEND

- REMOVE BITUMINOUS PAVEMENT AND SUB-BASE MATERIAL
- CONTRACTOR TO STRIP AND REMOVE SOD FROM ALL AREAS TO BE REGRADED AND PROPERLY DISPOSE. REMOVE SUBGRADE MATERIAL OR TOPSOIL AS NEEDED
- ITEM TO BE REMOVED
- NIPSCO ELEC POLE & GUYWIRE RELOCATION
- CENTURYLINK FIBER RELOCATION

NOTES

1. NO DEMOLITION SHALL TAKE PLACE UNTIL ALL PERMITS HAVE BEEN ACQUIRED.
2. THE CONTRACTOR SHALL FIELD-VERIFY SITE CONDITIONS AND INFORMATION ON DRAWINGS. PROMPTLY REPORT ANY CONCEALED CONDITIONS, MISTAKES, DISCREPANCIES, OR DEVIATIONS FROM THE INFORMATION SHOWN IN THE CONTRACT DOCUMENTS. THE OWNER IS NOT RESPONSIBLE FOR UNAUTHORIZED CHANGES OR EXTRA WORK REQUIRED TO CORRECT UNREPORTED DISCREPANCIES.
3. "REMOVAL" MEANS REMOVAL OF AN ITEM ABOVE GRADE AND REMOVAL OF ALL ELEMENTS BELOW GRADE INCLUDING, BUT NOT LIMITED TO, FOOTINGS, WIRINGS, AND PIPING THAT ARE IMMEDIATELY ADJACENT TO ITEM BEING REMOVED.
4. THE CONTRACTOR SHALL SAW CUT PAVEMENT FULL DEPTH AT LIMITS OF ASPHALT REMOVAL.
5. FOR ALL CONCRETE REMOVAL, THE CONTRACTOR SHALL REMOVE CONCRETE TO NEAREST JOINT, UNLESS NOTED OTHERWISE.
6. EXISTING MATERIALS TO REMAIN AROUND THE CONSTRUCTION AREA SHALL NOT BE DAMAGED DURING CONSTRUCTION. IF ANY DAMAGE IS MADE, THE CONTRACTOR IS RESPONSIBLE TO REPAIR OR RESTORE TO THE ORIGINAL CONDITION AT CONTRACTOR'S OWN EXPENSE.

CALUMET AV
(VARIABLE WIDTH PUBLIC RIGHT (85'± B/CURB-B/CURB)
(ACCESS)
27.23'
21.5'
RELOCATE FIBER OPTIC (BY OTHERS) (TO BE COORDINATED)
21.5' UTILITY EASEMENT
N 90°00'00" E 128.12'
N 90°00'00" W 130.43'
127.28'
N 02°51'36" W 138.95' (P,M)
82.30'
S 00°00'00" E 27.66'
OVERLAND
S 00°13'13" 27.40'
13.41'
N 21°49'42" E 49.40'
RIM 618.35
"HOSPITALITY"
N 02°51'36" W 138.95'
N 00°38'37" W 22.54'
N 68°10'13" W 40.86'
N 68°10'13" W 97.74'
IRF DVG
RIM 618.04
DO NOT DISTURB LIGHT POLE
50'
61'
DEMO PAVED BIKE PATH
RIM 617.75
RELOCATE POLE 20FT SOUTH & 5 FT WEST & RELOCATE GUYWIRE AS NEEDED (BY OTHERS) (TO BE COORDINATED WITH NIPSCO)
10' WIDE NIPSCO EASEMENT DOC. 687468 REC. 2/6/1958 (TO BE RELEASED)
N 00°26'26" E 176.00' (P,M)
RIM 617.49
RIM 617.51
(CENTER LINE) DO NOT DISTURB LIGHT POLE
S 34°49'31" E 36.85'
10' UTILITY EASEMENT
N 44°33'34" W 24.36' (P,M)
LEASE SIGN
RIM 617.52
IRF DVG
TRAFFIC SIGNAL POLE & ARM
REMOVE LEASE SIGN
SITE BENCHMARK SAW CUT CROSS ELEV=618.59 (NAVD88)
DO NOT DISTURB LIGHT POLE
RIM 617.76 E INV. 613.83
12" HDPE
RIM 616.67 W INV. 613.29 S INV. 613.29
RIM 616.74 N INV. 612.99 S INV. 612.91
RIM 617.89
45TH STREET
(100' WIDTH PER DOC. NO. 2015 085405)
OVERLAND FLOOD ROUTE EASEMENT
237.02'
LOT 13
40,558 S.F.±
0.93 Ac.±
(9521 CALUMET AVENUE)
DO NOT DISTURB BP LINES (ANY CONSTRUCTION ACTIVITY SHALL BE COORDINATED WITH BP PRIOR CONSTRUCTION)
22'
28'
N 00°00'00" E 35.57'
61'
25'
12'
146.91'
S 89°25'55" E 24.00'
20'
S 79°32'29" E 34.86'
15'
30' UTILITY EASEMENT
N 68°10'13" W 196.81'
(2) 7.5' UTILITY EASEMENTS (PB. 110 PG. 11) HEREBY VACATED
OVERLAND FLOOD ROUTE EASEMENT
N 68°10'13" W 264.98'
S 89°33'34" E 174.38'
OVERLAND FLOOD ROUTE EASEMENT
207.49'
N 89°33'34" W 354.40'
TAX ID. 45-07-30-351-006.000-027
NO BUILDINGS OBSERVED
LOT 11
102,611 S.F.±
2.36 Ac.±
(800 45th STREET)
STONE AREA
STONE/VEGETATION
TOWN OF MUNSTER DOC. NO. 2015 085405 REC. 12/21/2015
TOWN OF MUNSTER PARCEL "MS 3" DOC. NO. 2017 011300 REC. 2/23/2017
RIM 615.76 S INV. 612.20
RIM 615.48 W INV. 611.77 N INV. 611.28 S INV. 611.28
RIM 615.77 E INV. 612.15
12" RCP
54" RCP
RIM 614.87 W INV. 609.50
RIM 615.75 W INV. 608.67 N INV. 606.37 NE INV. N/A BTTM 605.56
RIM 616.28 N INV. 608.41 E INV. 608.41
N 21°49'27" W 159.65'
N 16°26'07" W 195.10'
N 16°26'07" W 33.26'
STORM AREA
30' UTILITY EASEMENT
RIM 614.34 W INV. 610.40 E INV. 610.50
bov WM END CAP 8" WM
"PRIVATE PROPERTY"
N 56°57'14" E 26.29'
OVERLAND FLOOD ROUTE EASEMENT
N 21°49'47" E 52.35'
65.56'
C1
L=86.28' R=700.00' S 86°54'35" W 86.22'
12" RCP
L=306.25' R=700.00' S 77°54'26" W 303.81'
30' UTILITY EASEMENT (PB. 110 PG. 11)
5/8" IRF 1' BELOW GRADE
RIM 614.70 E INV. 610.94
C1 INFORMATION
L=41.23' R=670.00'
S 85°53'39" W 41.23'
RIM 615.27 W INV. N/A N INV. 607.09 E INV. 606.98
36" RCP
30' UTI
12" W/M
SCALE: 1" = 20'

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
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F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB PFEIFER — REGISTERED — No. PE10910667 — STATE OF INDIANA — PROFESSIONAL ENGINEER
FOR CONSTRUCTION
09/04/25

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Demolition Plan Before Sprouts Dev

NOT FOR CONSTRUCTION

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DESIGN BY	DATE
GMPF	09/04/25
PROJECT NO.	
24-0091	

C102

SITE DATA (BUILDING A-SPROUTS)

- USE: GROCERY
- LOT AREA: 2.355 AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 125 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2)

- USE: RETAIL
- LOT AREA: 1.176 AC
- BUILDING AREA: 9,856 SQ. FT.
- PARKING REQUIRED: 32 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 63 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3)

- USE: 2 OR 3 STORY OFFICE
- LOT AREA: 2.019 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 130 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (TOTAL-ALL FOUR BUILDINGS)

- LOT AREA (TOTAL): 6.482 AC
- PARKING REQUIRED: 234 SPACES
- PARKING PROVIDED: 360 SPACES (DURING BANK HOURS) 369 SPACES (DURING NON-BANK HOURS)

LEGEND

- CONCRETE SIDEWALK
- CONCRETE PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- ASPHALT PAVEMENT
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.

45TH AVENUE

GRAND TRUNK RAILWAY

TAX ID: 45-07-30-502-001.000-027
GRAND TRUNK RAILWAY

RIGHT OF WAY CONTRACT STANDARD OIL CO. BOOK 417 PAGE 255 & SINCLAIR PIPE LINE COMPANY BOOK 129 PAGE 76 BLANKET IN NATURE (NO SPECIFIED WIDTHS)

TOWN OF MUNSTER INDIANA MUNICIPAL CORPORATION PARCEL "MS-5" DOC. NO. 2017 011300 REC. 2/23/2017

CALUMET AVENUE
(VARIABLE WIDTH PUBLIC RIGHT-OF-WAY)
(85' R/W PER CMB-B/CURB)

SINGLE STORY RETAIL BLDG "A.2"
9,856 SQ.FT.
LOT AREA
51,288.59 SQ.FT (1.176 AC)
ADDRESS: 9511 Calumet Ave

BANK BLDG. "A.1" 4,270 SQ.FT.
LOT AREA 40,514 SQ.FT.
0.931 AC
ADDRESS: 9501 Calumet Ave

GROCERY - SPROUTS
BLDG "A"
23,299 SQ.FT.

LOT AREA
102,609.67 SQ.FT.
2.355 AC
ADDRESS: 800 45th Street

F/F: 619.85

2- STORY OFFICE
BLDG "A.3"
14,400 SQ.FT
(28,800 SQ.FT TOTAL)

LOT AREA
87,987.13 SQ.FT.
2.019 AC
ADDRESS: 900 45th Street

45TH STREET
(100' WIDTH PER DOC. NO. 2017 013300)

45TH STREET
(100' WIDTH PER DOC. NO. 2015 085405)

TOWN OF MUNSTER
DOC. NO. 2015 085405
REC. 12/21/2015

TOWN OF MUNSTER
PARCEL "MS 2"
DOC. NO. 2017 011300
REC. 2/23/2017

CENTENNIAL VILLAGE
THIRD RESUBDIVISION
OF LOT "A"
(PLAT BOOK 117, PAGE 60)

CENTENNIAL VILLAGE
SECOND RESUBDIVISION
OF LOT "A"
(PLAT BOOK 111, PAGE 87)

LOT 6
TAX ID. 45-07-30-352-012.000-027
CV BDG B, LLC
QUIT CLAIM DEED
DOC. NO. 2020 033105
REC. 6/04/2020

LOT 7
TAX ID. 45-07-30-352-013.000-027
CV BDG F LLC
QUITCLAIM DEED
DOC. NO. 2023-027145
REC. 9/19/2023

LOT 8
TAX ID. 45-07-30-352-014.000-027
CV BDG L LLC
QUITCLAIM DEED
DOC. NO. 2024-007164
REC. 2/28/2024

LOT 9
TAX ID. 45-07-30-352-015.000-027
CV BDG M LLC
QUITCLAIM DEED
DOC. NO. 2024-006628
REC. 2/20/2024

C1 INFORMATION
L=41.23' R=670.00'
S 85°53'39" W 41.23'

L=306.25' R=700.00'
S 77°54'26" W 303.83'

L=812.46' R=3794.65'
CH=S 86°59'29" E 810.80'

L=304.20' R=3794.65'
CH=S 80°14'44" E 303.72'

L=35.78' (P)

S 52°46'17" E
83.13' (P,M)

S 63°07'20" W 222.02' (M)

S 89°25'55" E
24.00'

S 89°33'34" E 174.38'

N 89°33'34" W 354.82'

N 68°10'13" W
40.86'

N 68°10'13" W
97.94'

N 68°10'13" W 364.58'

N 90°00'00" E
228.12'

S 00°18'37" E 195.27'

S 00°18'37" E
23.00'

N 00°00'00" E
228.12'

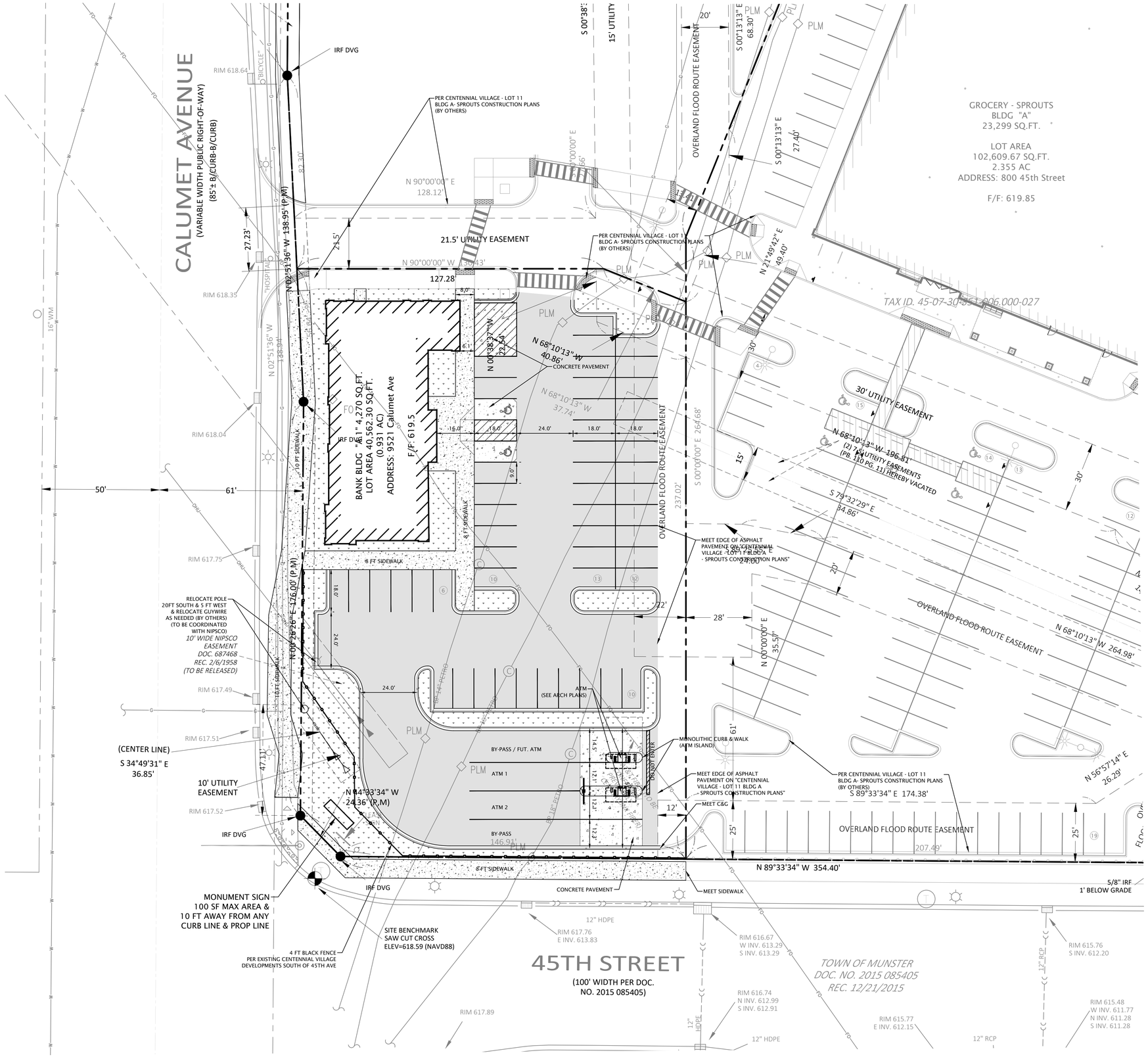
N 00°00'34" E
35.29'

S 89°59'26" E
24.00'

S 89°33'34" E
24.00'

S 89°33'34" E
24.00'

S 89°33'34



SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 24,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

LEGEND

- CONCRETE SIDEWALK
- CONCRETE PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- ASPHALT PAVEMENT
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.

DVG TEAM INC
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RUSSELL JACOB POZEN
REGISTERED NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/04/25

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Site Plan

NOT FOR CONSTRUCTION

N
0' 10' 20'
SCALE: 1" = 20'

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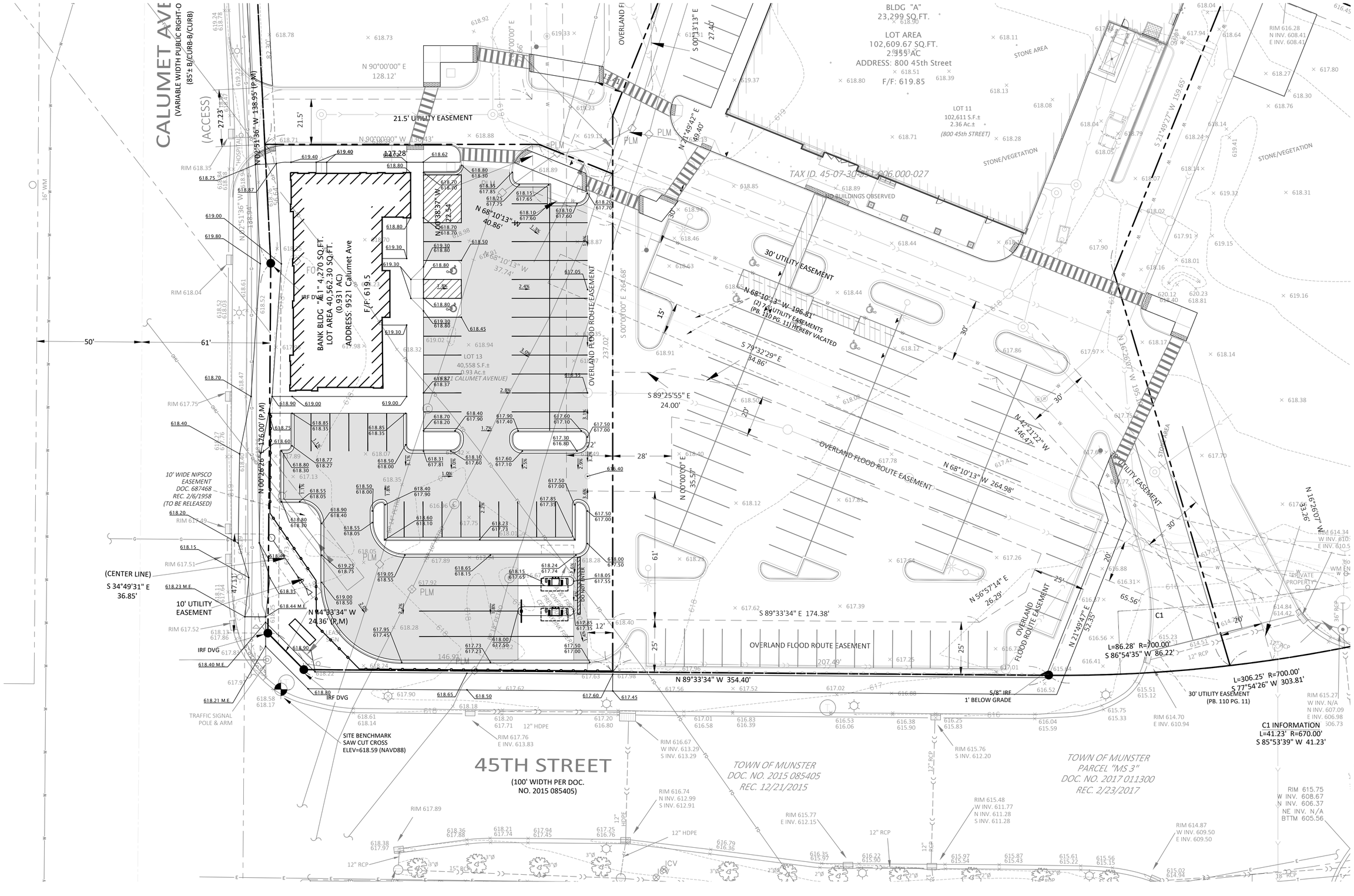
DESIGN BY	DATE
GMPF	09/04/25
PROJECT NO.	
24-0091	

C103.A



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RUSSELL JAMES FOREMAN
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NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER

09/04/25

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

NOT FOR CONSTRUCTION

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Grading Plan

N

0' 10' 20'
SCALE: 1" = 20'

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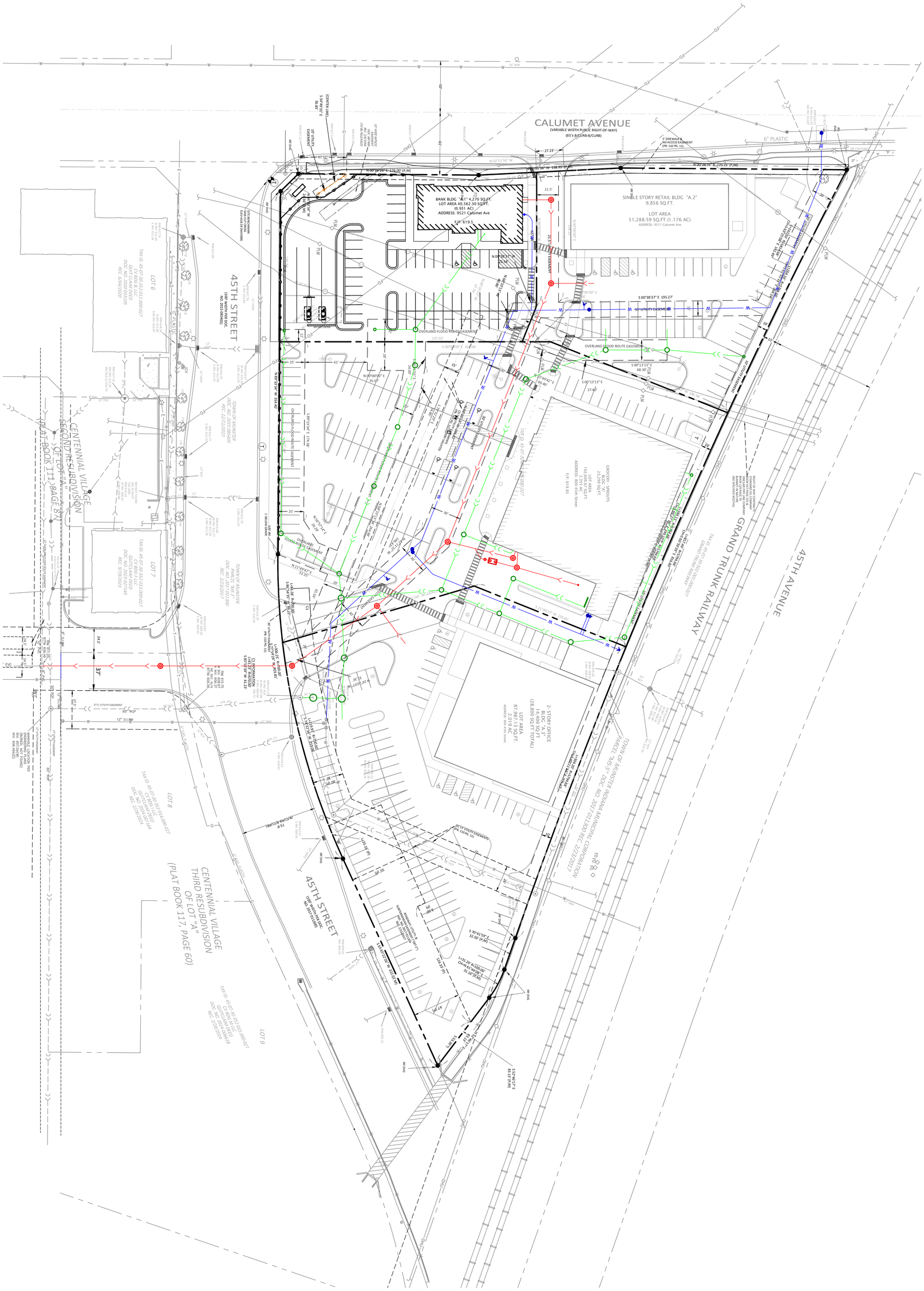
DESIGN BY	DATE
GMPF	09/04/25
PROJECT NO.	
24-0091	

C104


CALUMET AVENUE
(VARIABLE WIDTH PUBLIC RIGHT-OF-WAY)
(85'± R.O.O.W.& C/LINE)
45TH STREET
45TH AVENUE
GRAND TRUNK RAILWAY
CENTENNIAL VILLAGE
SECOND RESUBDIVISION
OF LOT "A"
(PLAT BOOK 114, PAGE 87)
CENTENNIAL VILLAGE
THIRD RESUBDIVISION
OF LOT "A"
(PLAT BOOK 117, PAGE 60)
BANK BLDG. "A.1" 4,270 SQ.FT.
LOT AREA 40,162.30 SQ.FT.
(0.931 AC)
ADDRESS: 9521 Calumet Ave
F.F. 619.5
SINGLE STORY RETAIL BLDG "A.2"
9,856 SQ.FT.
LOT AREA
51,288.59 SQ.FT.(1.176 AC)
ADDRESS: 9511 Calumet Ave
GROCERY GROCERS
BLDG "B"
21,379 SQ.FT.
LOT AREA
103,237.26 SQ.FT.
2.355 AC
ADDRESS: 900 45th Street
2- STORY OFFICE
BLDG "C"
14,400 SQ.FT.
(28,800 SQ.FT TOTAL)
LOT AREA
87,555 SQ.FT.
2.013 AC
ADDRESS: 900 45th Street
OVERLAND FLOOD ROUTE EASEMENT
UTILITY EASEMENT
LOT 6
LOT 7
LOT 8
LOT 9
TOWN OF MUNSTER
PARCEL "NO-5" DOC. NO. 2017012300 REC. 2/23/2017
TOWN OF MUNSTER
DOC. NO. 2021052480
REC. 2/25/2021
TOWN OF MUNSTER
DOC. NO. 2021052481
REC. 2/25/2021
TOWN OF MUNSTER
DOC. NO. 2021052482
REC. 2/25/2021
TOWN OF MUNSTER
DOC. NO. 2021052483
REC. 2/25/2021
TOWN OF MUNSTER
DOC. NO. 2021052484
REC. 2/25/2021
TOWN OF MUNSTER
DOC. NO.

CALUMET AVENUE
("VARIABLE WIDTH PUBLIC RIGHT-OF-WAY)
(85± B/CURB-B/CURB)

N 90°00'00" E
128.12'

N 00°00'00" E
264.66'

OVERLAND FLOOD ROUTE EASEMENT

S 00°13'13" E
27.40'

GROCERY - SPROUTS
BLDG "A"
23,299 SQ.FT.

LOT AREA
102,609.67 SQ.FT.
2.355 AC
ADDRESS: 800 45th Street

F/F: 619.85

LOT 11
102,611 S.F.±
2.36 Ac.±
(800 45th STREET)

STONE AREA

RIM 616.28
N INV. 608.41
E INV. 608.41

N 21°49'42" E
49.40'

S 21°49'27" W 159.65'

STONE/VEGETATION

TAX ID. 45-07-30-302-006.000-027
NO BUILDINGS OBSERVED

B-BOX#1
W/ 2" CURB STOP
G: 619.4
T/P: 614.4

CONNECT TO
DOMESTIC WATER
SERVICE
T/P: 614.4

N 02°51'36" W 184.95' (P,M)

21.5' UTILITY EASEMENT

100 LF -2"Ø TYPE K
WATER SERVICE
(DOMESTIC)

WATER SERVICE TAP

N 90°00'00" W 127.43'

127.28

RIM 618.35

SANI INV: 615.3

N 02°51'36" W
184.84'

DS INV: 616.5

BANK BLDG "A" 1 4,270 SQ.FT.
LOT AREA 40,562.30 SQ.FT.
(0.931 AC)
ADDRESS: 9521 Calumet Ave

F/F: 619.5

IRF DVG

RIM 618.04

50'

61'

N 68°38'37" W
22.54'

CLEANOUT#1 (8"Ø
INV: 619
T: 616

N 68°10'13" W
40.86'

WYE CONNECTION

N 68°10'13" W
37.74'

115LF -
8" SDR26
@ 2.30%

STM T/P:615.77
STM INV:615.02
STM B/P: 614.94
EX 14" BP T/P: 611.2

LOT 13

STM T/P:614.82
STM INV:614.08
STM B/P: 614
(95) EX 10" BP T/P: 611.2 (UE)

STM T/P:614.32
STM INV:613.58
STM B/P: 613.5
EX 18" BP T/P: 611.2

CB14, 48"DIA
EJ 1020, M1
RIM: 616.35
INV: 613.35(NW)
INV: 612.70(S)
INV: 612.70(E)
(BY OTHERS)

OVERLAND FLOOD ROUTE EASEMENT

237.02'

S 00°00'00" E 264.68'

15'

30' UTILITY EASEMENT

N 68°10'13" W 196.81'
(2) 7.5' UTILITY EASEMENTS
(PB. 110 PG. 11) HEREBY VACATED

30'

S 79°32'29" E
84.86'

S 89°25'55" E
24.00'

20'

N 42°21'02" W
146.47'

30' UTILITY EASEMENT

N 16°26'07" W 195.65'

N 16°26'07" W
33.26'

RIM 614.3
W INV. 61
E INV. 610

PRIVATE PROPERTY

36" RCP

12" RCP

L=86.28' R=700.00'
S 86°54'35" W 86.22'

C1

L=306.25' R=700.00'
S 77°54'26" W 303.81'

30' UTILITY EASEMENT
(PB. 110 PG. 11)

C1 INFORMATION
L=41.23' R=670.00'
S 85°53'39" W 41.23'

RIM 615.27
W INV. N/A
N INV. 607.09
E INV. 606.98
506.73

RIM 614.70
E INV. 610.94

N 00°00'00" E
35.57'

61'

N 68°10'13" W 264.98'

N 56°57'14" E
26.29'

25'

OVERLAND FLOOD ROUTE EASEMENT

N 21°49'47" E
52.35'

65.56'

20'

S 89°33'34" E 174.38'

OVERLAND FLOOD ROUTE EASEMENT
207.49'

N 89°33'34" W 354.40'

12'

25'

146.91'

10' WIDE NIPSCO
EASEMENT
DOC. 687468
REC. 2/6/1958
(TO BE RELEASED)

N 00°26'26" E 176.00' (P,M)

RIM 617.49

RIM 617.51

(CENTER LINE)
S 34°49'31" E
36.85'

10' UTILITY
EASEMENT

47.11'

N 14°33'34" W
24.36' (P,M)

RIM 617.52

IRF DVG

TRAFFIC SIGNAL
POLE & ARM

IRF DVG

SITE BENCHMARK
SAW CUT CROSS
ELEV=618.59 (NAVD88)

5/8" IRF
1' BELOW GRADE

DO NOT ENTER

12" HDPE

RIM 617.76
E INV. 613.83

RIM 616.67
W INV. 613.29
S INV. 613.29

RIM 615.76
S INV. 612.20

12" RCP

45TH STREET
(100' WIDTH PER DOC.
NO. 2015 085405)

TOWN OF MUNSTER
DOC. NO. 2015 085405
REC. 12/21/2015

TOWN OF MUNSTER
PARCEL "MS 3"
DOC. NO. 2017 011300
REC. 2/23/2017

RIM 616.74
N INV. 612.99
S INV. 612.91

RIM 615.77
E INV. 612.15

12" RCP

RIM 615.48
W INV. 611.77
N INV. 611.28
S INV. 611.28

RIM 614.87
W INV. 609.50
E INV. 609.50

RIM 615.75
W INV. 608.67
N INV. 606.37
NE INV. N/A
BTTM 605.56

RIM 617.89

12" RCP

ICV

NOT FOR CONSTRUCTION

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

FOR CONSTRUCTION
RUSSELL JACOB REED
NO. PE10910967
STATE OF INDIANA
PROFESSIONAL ENGINEER

09/04/25

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Utility Plan

N

0' 10' 20'
SCALE: 1" = 20'

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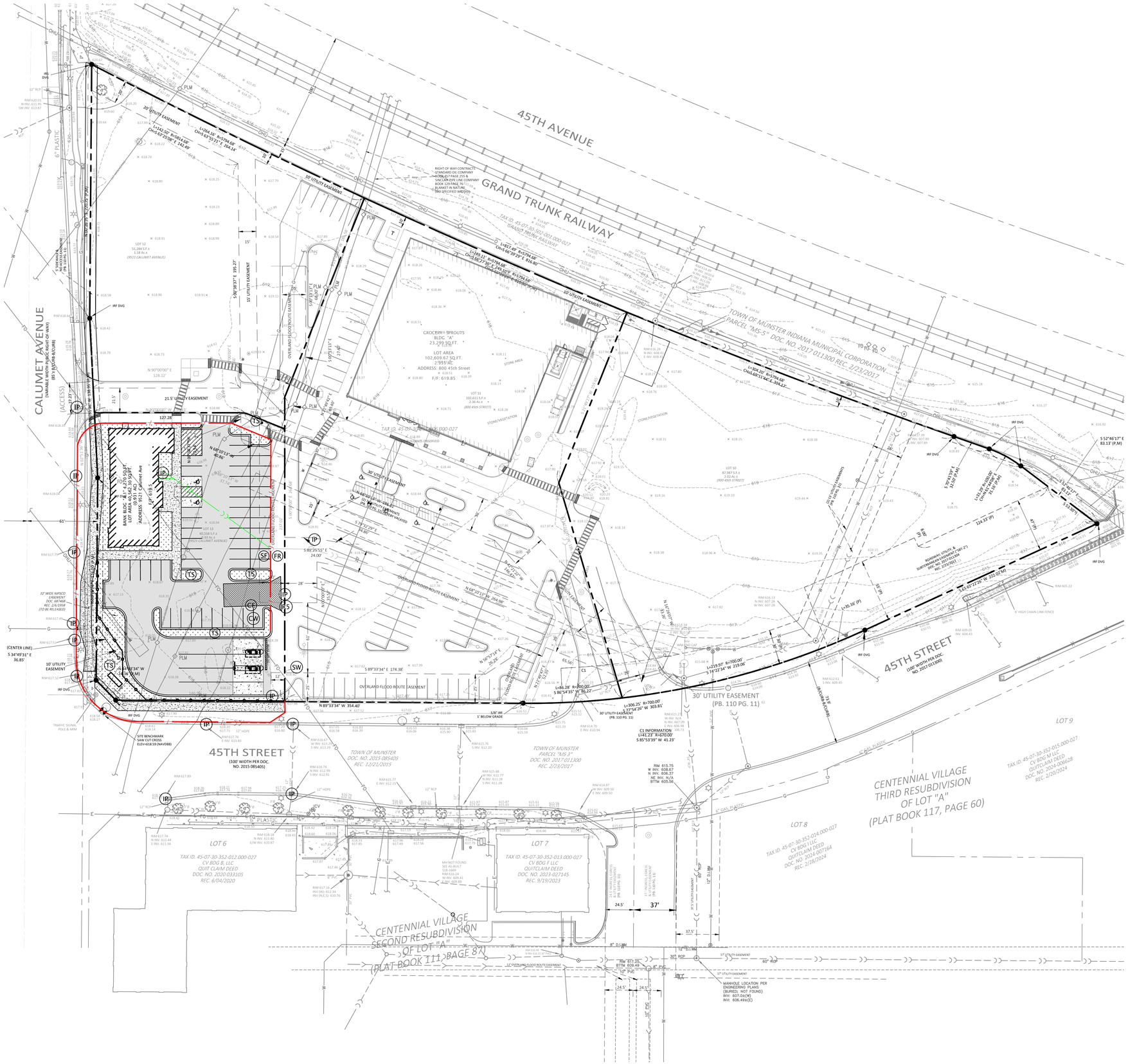
DESIGN BY	DATE
GMPF	09/04/25
PROJECT NO.	
24-0091	

C105.A



NOTES

1. THE SITE CONTRACTOR SHALL PROVIDE EROSION CONTROL MEASURES IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN DURING DEMOLITION AND CONSTRUCTION ACTIVITIES. MEASURES MUST BE IMPLEMENTED PRIOR TO BEGINNING CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE AND/OR CLEANING TO THE STRUCTURE OR FEATURE. CORRECTIVE WORK INCURRED BY THE CONTRACTOR SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
3. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH THE S.W.P.P.P. ANY FINES OR PUNITIVE MEASURES INCURRED BY THE PROJECT DUE TO FAILURE TO COMPLY WITH THE S.W.P.P.P. ARE THE RESPONSIBILITY OF THE CONTRACTOR. THESE COSTS SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT AND SHALL NOT BE CONSIDERED AN EXTRA.
4. DURING THE COURSE OF CONSTRUCTION, THE LOCAL ENFORCEMENT OF THE S.W.P.P.P. MAY REQUIRE ADDITIONAL EROSION CONTROL MEASURES TO BE INSTALLED TO ADDRESS SITE-SPECIFIC ITEMS NOT ANTICIPATED BY THIS PLAN. THESE ITEMS ARE CONSIDERED AN EXTRA TO THE CONTRACT, BUT ONLY TO THE EXTENT OF INITIAL INSTALLATION. CORRECTIVE WORK AND MAINTENANCE SHALL BE CONSIDERED INCIDENTAL AND SHALL NOT BE CONSIDERED AN EXTRA.
5. THE SITE CONTRACTOR SHALL INSTALL THE CONSTRUCTION ENTRANCE AND PLACE PERIMETER SILT FENCING/FIBER ROLLS AND INLET PROTECTION ON EXISTING STRUCTURES PRIOR TO COMMENCING ANY SOIL DISTURBANCE. SEE SITE PLAN FOR LOCATIONS. THE CONSTRUCTION ENTRANCE SHALL SERVE AS SITE ACCESS FOR ALL CONSTRUCTION TRAFFIC INGRESS AND EGRESS TO THE PROJECT SITE.
6. THE SOIL STOCKPILE SHALL BE PROTECTED BY SILT FENCE/FIBER ROLLS SURROUNDING THE PILE AND THE PILE SHALL BE TEMPORARILY SEEDED IF THE STOCKPILE REMAINS DORMANT FOR GREATER THAN 7 DAYS. THE PILE SHALL BE STABILIZED WITHIN 14 DAYS.
7. DURING SOIL-DISTURBING ACTIVITIES, THE CONTRACTOR SHALL CREATE DIVERSION SWALES AND INSTALL DITCH CHECKS SO THAT ALL SITE RUNOFF PASSES THROUGH AN EROSION CONTROL MEASURE PRIOR TO BEING DISCHARGED OFF-SITE.
8. UPON COMPLETION OF THE ROUGH GRADING, ALL AREAS AFFECTED BY CONSTRUCTION SHALL BE TEMPORARILY SEEDED IF THEY WILL REMAIN DORMANT FOR GREATER THAN 7 DAYS. THESE AREAS SHALL BE STABILIZED WITHIN 14 DAYS OF REMAINING DORMANT AND EROSION CONTROL BLANKETS SHALL BE INSTALLED ON SIDE SLOPES AS SHOWN ON THE PLANS.
9. CONTRACTOR SHALL PERFORM STREET SWEEPING WHENEVER TRACKING OF MUD, DIRT, AND CONSTRUCTION DEBRIS OCCURS ON THE PUBLIC ROAD.

LEGEND

CE	TEMPORARY CONSTRUCTION ENTRANCE	SW	STREET SWEEPING
IP	INLET BARRIER PROTECTION	CW	CONCRETE WASHOUT
TS	TEMPORARY/PERMANENT SEEDING	RS	BUILDING & STORMWATER PERMITS
SF FR	SILT FENCE/FIBER ROLLS (MAY BE USED INTERCHANGABLY WHERE REQUIRED)	SP	STOCKPILE

CONCRETE WASHOUT ONLY

CONCRETE WASHOUT SIGNAGE

TOTAL DISTURBANCE AREA = 0.98 ac

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RUSSELL JACOB POTZEN REGISTERED PROFESSIONAL ENGINEER NO. PE10910667 STATE OF INDIANA
NOT FOR CONSTRUCTION
09/04/25

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE: REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Storm Water Pollution Prevention Plan

N
0' 20' 40'
SCALE: 1" = 40'

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DESIGN BY	DATE
GMPF	09/04/25
PROJECT NO.	
24-0091	

C106

SITE DEVELOPMENT
COMMON EXCAVATION AND EARTHWORK
GENERAL SPECIFICATIONS

A Geological Investigation report by the ESC Midwest, LLC shall be considered a part of this plan set.

1.0 Quality Assurance:
1. Contractor shall notify the Construction Manager, Architect, Engineer and testing laboratory inspector when common excavation and earthwork is scheduled. Earthwork operations which require inspecting and testing by testing laboratory inspector shall not be performed unless testing laboratory inspector is present.
2. Contractor shall provide a 1-year warranty against settlement and damage caused by settlement for common excavation and earthwork.
3. If settlement occurs within 1 year after the date of Substantial Completion, the Contractor shall remove the affected surface feature, provide additional suitable fill, thoroughly compact and restore the surface feature to its original undisturbed condition.

2.0 Testing:
1. An inspector from the Owner's soils testing laboratory shall, during the common excavation work operations, provide the following services:
   a. Test & Classify on-site excavated soils for reuse as topsoil, common site fill, embankment fill and structural fill.
   b. Test materials furnished from any off-site sources to verify compliance with specified requirements.
   c. Observe proofing rolling of exposed subsoil in areas where grades will be raised and provide recommendations for soil correction to ensure that unstable materials have been removed.
   d. Inspect placement and compaction of common site fill, embankment fill and structural fill to ensure the material being compacted is in accordance with specified requirements. For each lift, a minimum of 1 density test for every 10,000 square feet of lawn surface area, and 5,000 square feet of paved surface area, and 500 square feet of proposed building area is required.
   e. Density tests are required for all subgrade/subsoil in areas that have been cut to rough grade elevations, after soils have been compacted to ensure soil compaction density is in accordance with the specified requirements. Test frequency shall be as described above in sub-paragraph 1.d..
2. Tests and analysis of fill materials shall be performed in the laboratory in accordance with ASTM D1557.
3. Testing shall be performed as directed by the Soils Report Engineer. Compaction Testing shall be performed in accordance with ASTM D2922 and D3017.

3.0 Special Weather Protection:
1. Construction shall be limited during cold weather to prevent the formation of frost and snow accumulation to occur in materials used for site fill or in soils where site excavation is taking place. All areas that are scheduled for excavation activity shall be protected from freezing and snow accumulation. Any frozen material shall be removed and disposed of off site.

4.0 Clearing & Grubbing:
1. Contractor shall provide all clearing, grubbing, removal and disposal of all vegetation and debris related to the existing site conditions.
2. Vegetation debris shall be removed from site and transported to a local and state authorized disposal sites.

5.0 Top Soil Stripping:
1. The project has a depth of topsoil variation throughout the site. The geotechnical report shows the topsoil depths at several locations throughout the project site. The Contractor shall strip and stockpile all topsoil at the location designated in the Site Development Drawings or as directed by the owner.
2. Topsoil removal material shall consist of fertile, friable, organic surface soil stripped from the site and shall be free of subsoil, brush, turf grasses, weeds, roots, stumps, stones larger than 1-inch in diameter and other contaminated matter."
3. Topsoil shall be stockpiled so that it may be reused and re-spread on site over Lawn and Landscaped areas.
4. The topsoil stockpile area shall be properly protected against soil erosion into the adjacent drainage system.

6.0 Borrow Material/Embankment & Structural Fill Material:
1. Borrow material for structural fill shall be first excavated from on site source locations as defined by the Soils Report Engineer.
2. Structural fill material shall be placed under all utility trench corridors, building pad locations, paved parking, driveway, sidewalk and roadway areas.
3. Common site and embankment fill shall be placed under lawn, landscape and detention pond areas.
4. Maintain moisture content of structural fill within plus or minus 3 percent of the optimum moisture content as determined by the Modified Proctor Test.
5. Contractor shall provide subgrade conditions meeting the design grades for pavements, exterior walks, curbs and building pads.
6. Contractor shall only place approved fill material under proposed building pads and parking areas
7. Contractor shall undercut any areas that do not meet the requirements for structural fill and shall replace with structural fill.

7.0 Excavation:
1. Protect all existing natural features on site.
2. Install soil erosion prevention measures in accordance with local and state ordinances and in accordance with the soil erosion control project drawings.
3. All proposed contours shown on this set of plans are proposed surface elevation. All fill shall be placed as structural fill for buildings and parking lots.
4. Prior to excavation an on-site Pre-construction Meeting shall be held between the Engineer, Owner/Owner's Representative and General Contractor to discuss earthwork protocol.
5. During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if ordinarily encountered at the site, the party discovering such conditions shall promptly notify the Owner/Owner's Representative/General Contractor and the Engineer in writing of the specific differing conditions. Upon written notification, the Engineer and Owner/Owner's Representative/General Contractor will investigate the conditions, and determine if adjustments to the Construction Documents and/or to the Contract are warranted. No contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice of a changed condition.

8.0 Compaction:
1. Exercise care when compacting exposed soils relative to water table, rain or other moisture conditions.
2. Maintain moisture content of embankment material and structural fill material near optimum as recommended by the soils testing laboratory and Soil Boring Engineer. Maintain optimum moisture content of backfill and fill material to attain the required compaction density.
3. Backfill common site fill, embankment fill, structural fill and utility trenches to contours and elevations defined on the project site development plans.
4. Systematically backfill to allow maximum time for optimum compaction and do not backfill over porous, wet or spongy subgrade surfaces.
5. Employ a soils placement and compaction method that does not disturb or damage work performed and that maximizes soil compaction.
6. All common site, embankment and structural fill shall be place and compacted in continuous layers/lifts not exceeding 8-inches loose depth.
7. Compact subsoil for structural fill to 95% of the Modified Proctor Maximum Dry Density (ASTM D1557) beneath all building pad locations.
8. Compact subsoil for structural fill to 95% of Modified Proctor Maximum Dry Density (ASTM D1557) beneath all pavement areas and utility corridor trenches.
9. Compact subsoil for common site fill and embankment fill to 90% of the Modified Proctor Maximum Dry Density (ASTM D1557) beneath all lawn, landscape and detention pond areas.
10. Compact subsoil under building pad area to achieve soil-bearing capacities of 3,000 psf at a distance of 4-feet below the proposed finish floor elevations of all building ads.
11. If tests indicated work does not meet specified requirements, all sub-standard work shall be immediately removed, replaced and retested at no expense to the Owner.

GENERAL NOTES

1. Town of Munster, DVG Team, Inc. (Engineer) and any Utility Company affected must be notified at least two working days prior to commencement of work. Prior to construction the contractor is to call INDIANA 811.

2. Elevation Datum is U.S.G.S.

4. The locations of existing underground utilities, such as water mains, sewer, gas lines, etc., as shown on the plans have been determined from the best available information and is given for the convenience of the contractor. However, the engineer and the owner do not assume responsibility for the accuracy of the locations shown. It shall be the responsibility of the contractor to contact all utility companies and their facilities shall be located prior to commencement of any work.

5. Wherever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that alteration in the plans is required, the engineer shall be notified prior to any changes and any changes shall only be as approved via written instruction by the Engineer and the local Municipal Engineer.

6. As-built drawings shall be prepared by the contractor and submitted to the engineer as soon as the project is completed. Any change in the length, location or alignment shall be shown in red. "AS BUILT" drawings shall be forwarded to the appropriate utility organizations. Four (4) copies shall be submitted to the Municipal Engineer.

7. All proposed sanitary sewer, storm sewer, water main and service lines under and within 2' of pavement, curbs, and sidewalk shall be backfilled with crushed limestone (INDOT #53) or material consistent with Class I or II material as described in ASTM D2321 placed in 8" maximum layers and mechanically compacted to 95% modified proctor density. Slag is not permitted.

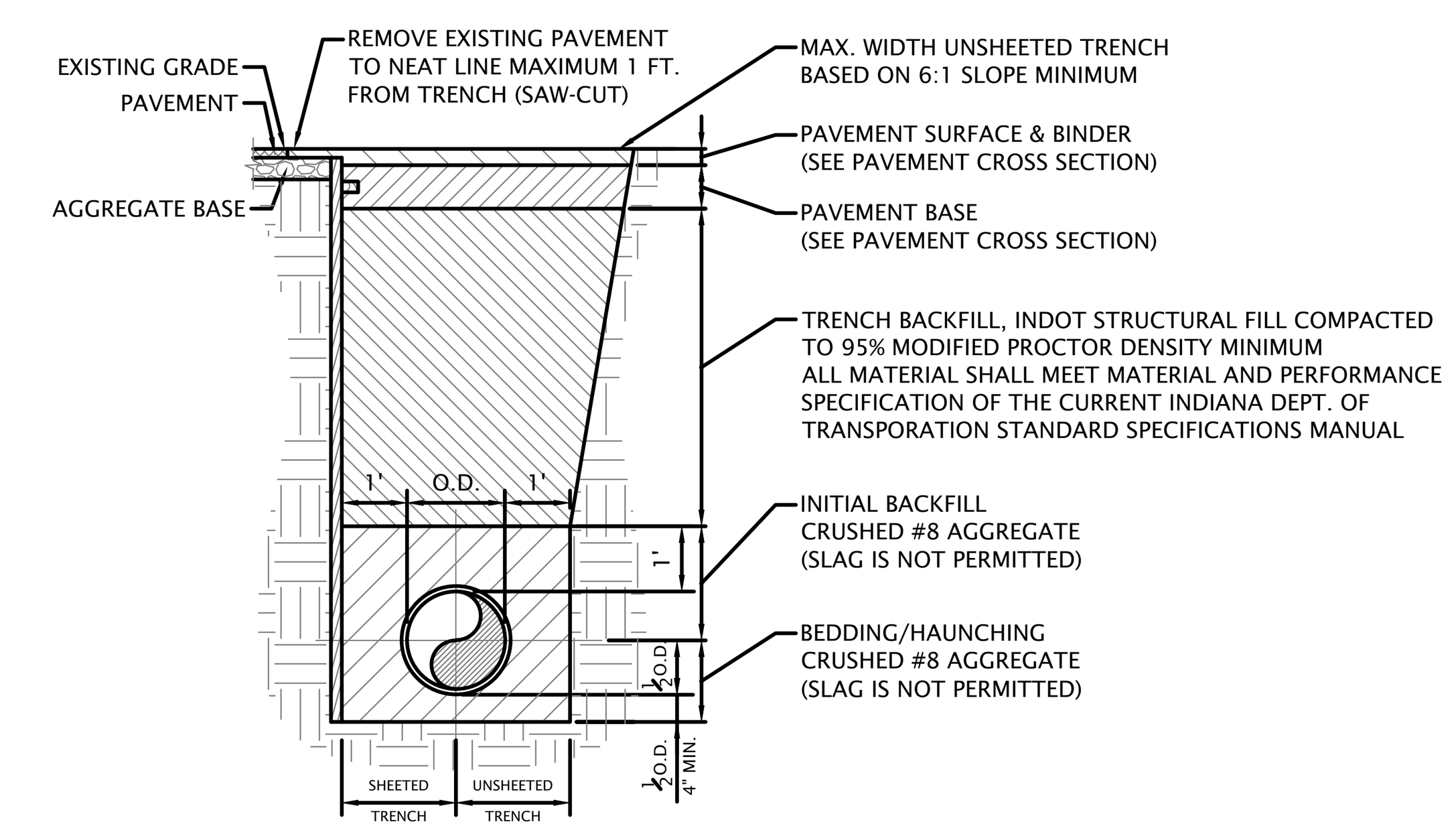
8. Materials used for water, sanitary sewer, storm sewer and streets shall conform to the Town of Munster standards and specifications.

9. Any existing public improvements (sidewalks, curb and gutter, etc.), disturbed during construction shall be replaced in kind, or per current of Town of Munster specifications as directed by the Municipal Engineer.

10. All public street construction shall meet performance standards of the current edition of the Indiana Department of Transportation Standard Specifications.

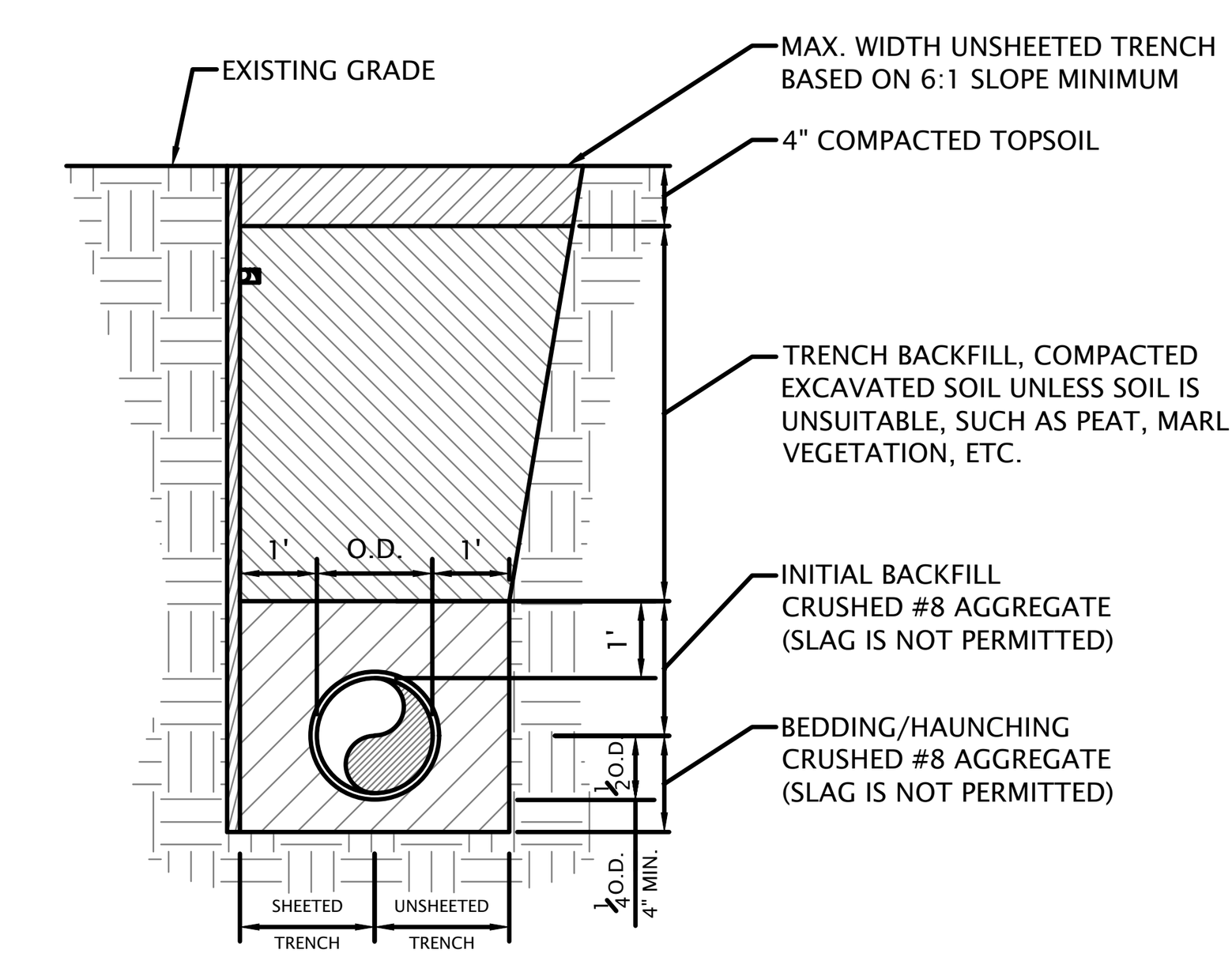
11. Street signage shall be included in accordance with the MUTCD requirements applicable at the time of construction.

12. The Owner/General Contractor shall be responsible for any and all utility new customer form submissions. Utility company review typically cannot begin until all new customer forms have been submitted.



PIPE BEDDING/TRENCH BACKFILL
(NOT TO SCALE)

FOR TRENCH IN PAVEMENT AREAS



PIPE BEDDING/TRENCH BACKFILL
(NOT TO SCALE)

FOR TRENCH IN GRASS/LANDSCAPED AREAS

DVG TEAM INC
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RUSSELL JACOB POZEN REGISTERED NO. PE10910667 STATE OF INDIANA PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/04/2025

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Construction Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25
PROJECT NO.	
25-0081	
C201	

SANITARY SEWER GENERAL NOTES

1. All Floor Drains shall discharge to the sanitary sewer.

2. Sanitary sewer pipe shall be PVC (SDR 26) ASTM D-3034 with push-on rubber gasket joints and shall be in accordance with ASTM C-3212, unless otherwise noted on the plans.

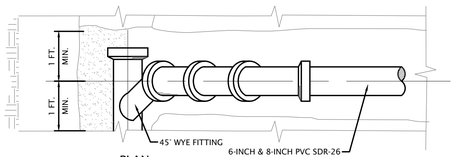
3. All sanitary sewer manholes shall be air tested for leaks in accordance with ASTM C1244-93 and Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test.

4. Where ductile iron pipe is used for sanitary sewer, the pipe shall be in accordance with ANSI A-21.51 and the joints in accordance with ANSI A-21.11.

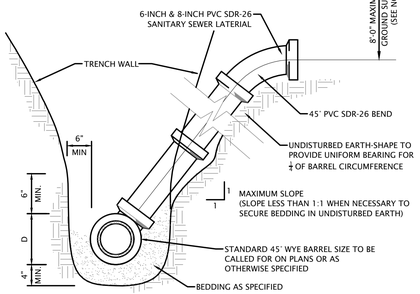
5. A deflection test shall be performed on each flexible pipe following the elapse of thirty (30) days after the placement of the final backfill. No pipe shall exceed a deflection of five percent (5%) or greater. The diameter of the rigid ball or mandrel used for a deflection test shall be no less than ninety-five percent (95%) of the base inside diameter of the pipe to be tested dependent on what is specified in the corresponding ASTM standard. The test shall not be performed with the aid of a mechanical pulling device.

6. A leakage test shall be performed using one of the following leakage test types.
   a.) A hydrostatic test shall be performed with a minimum of two (2) feet of positive head. The rate of exfiltration or infiltration shall not exceed two hundred (200) gallons per inch of pipe diameter per linear mile per day.
   b.) An air test shall conform to ASTM F1417-92, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air, for plastic pipe.

7. All sanitary sewer shall be inspected by Town of Munster.



PLAN



CROSS SECTION

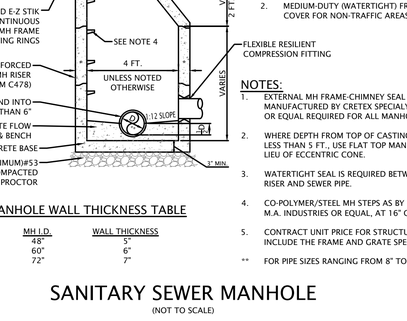
NOTES:

1. RISERS TO BE CONSTRUCTED IN LIEU OF WYES WHERE SEWER DEPTH EXCEEDS 10 FEET. FOR PIPE MATERIAL AND CONCRETE, SEE SPECIFICATIONS.

2. ALL SANITARY SEWER SERVICE LATERALS SHALL BE PLUGGED WITH A WATERTIGHT CAP AND SHALL BE LOCATED WITH 4-INCH x 4-INCH WOOD MARKERS TO IDENTIFY LATERAL END.

SANITARY SEWER SERVICE

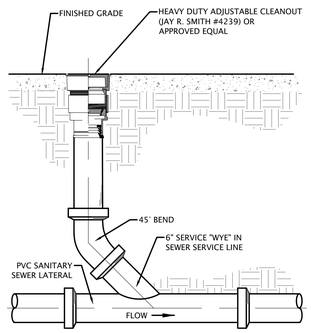
(NOT TO SCALE)



MANHOLE TOP (FLAT TOP)

(NOT TO SCALE)

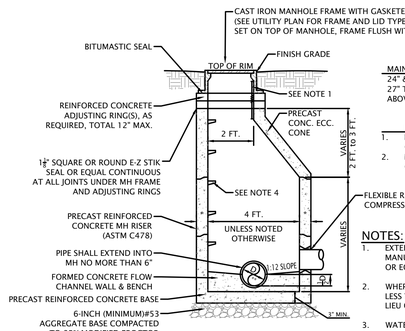
USED WHERE RESTRICTED HEAD ROOM WILL NOT ALLOW FOR TAPERED WALLS
SEE SANITARY MANHOLE NOTES



SANITARY CLEANOUT

(NOT TO SCALE)

CLEANOUT REQUIRED 2' TO 5' FROM BUILDING AND AT 100' INTERVALS ALONG SEWER SERVICE, AS MEASURED FROM SEWER MAIN



MAIN SEWER		MANHOLE
24" & UNDER (DIA.)	=	48" (DIA.)
27" TO 42" (DIA.)	=	60" (DIA.)
ABOVE 42" (DIA.)	=	AS SPEC.

FOR ALL SANITARY SEWER STRUCTURES
1. HEAVY-DUTY (WATERTIGHT) FRAME & COVER FOR TRAFFIC AREAS.
2. MEDIUM-DUTY (WATERTIGHT) FRAME & COVER FOR NON-TRAFFIC AREAS.

NOTES:
1. EXTERNAL MH FRAME-CHIMNEY SEAL AS MANUFACTURED BY CRETEX SPECIALY PRODUCTS OR EQUAL REQUIRED FOR ALL MANHOLES.
2. WHERE DEPTH FROM TOP OF CASTING TO INVERT IS LESS THAN 5 FT., USE FLAT TOP MANHOLE TYPE IN LIEU OF ECCENTRIC CONE.
3. WATERTIGHT SEAL IS REQUIRED BETWEEN PRECAST RISER AND SEWER PIPE.
4. CO-POLYMER/STEEL MH STEPS AS BY M.A. INDUSTRIES OR EQUAL, AT 16" O.C. (MAX.)
5. CONTRACT UNIT PRICE FOR STRUCTURES SHALL INCLUDE THE FRAME AND GRATE SPECIFED.

** FOR PIPE SIZES RANGING FROM 8" TO 30" IN DIAMETER

* MANHOLE WALL THICKNESS TABLE

MH I.D.	WALL THICKNESS
48"	5"
60"	6"
72"	7"

SANITARY SEWER MANHOLE

(NOT TO SCALE)

WATERMAIN GENERAL NOTES

1. All water mains, fittings, and valves shall be ductile iron cement lined pressure class 350 with rubber gasket push-on joints in accordance with ANSI A-21.51 & AWWA C 151 and be Polyethylene Encased per IAC 8-3.2-8. Water main joints shall conform to the requirements of AWWA C 111. Mechanical joints shall be restrained and shall use Meg-A-Lug as manufactured by EBAA Iron Sales (or equal). Watermain may be PVC C900, DR 18 only if noted on the plans.

2. Water mains shall be laid at least 10' horizontally from any existing or proposed sanitary sewer, storm sewer, sewer manhole, drain or service connection as measured from outside edge of the water main to outside edge of the sewers or manhole. If local conditions prevent horizontal separation of 10 feet, then the SEWER SHALL BE CONSTRUCTED OF WATER MAIN QUALITY REQUIREMENTS as specified in the IAC 8-3.2 Sections 8, 9 and 17(a).

3. When water mains cross any existing or proposed sanitary or storm sewers (sewers), there shall be at least 18 inches vertical separation between the outside edge of the water main and the outside edge of the sewer. This shall be the case where water mains cross above or below sewers. This crossing must be at a minimum angle of forty-five (45) degrees measured from the centerline of each. All these conditions specified shall be maintained for a minimum distance of ten (10) feet from either side of the water main. If vertical separation specified herein cannot be met, then the SEWER SHALL BE CONSTRUCTED OF WATER MAIN QUALITY REQUIREMENTS as specified in the IAC 8-3.2 Sections 8, 9 and 17(a).

4. For additional separation requirements between water mains and sewers, the Contractor shall refer to the Indiana Administrative Code 327 IAC 8 and IAC 3.

5. All water main shall be installed in accordance with IAC 8-3.2-17. The contractor shall provide pressure and leak testing results conforming to IAC 8-3.2-17(a).

6. All water main shall be disinfected in accordance with IAC 8-3.2-18.

7. Water services shall be installed as required at the time of individual lot development. Service sizes to be determined by building requirements.

8. Water services shall have an outside shut-off valve located per the direction of the Municipal Utility Director. Separate services and shut-offs are required for domestic service and fire protection.

RESTRAINED PIPE LENGTH
(FEET)

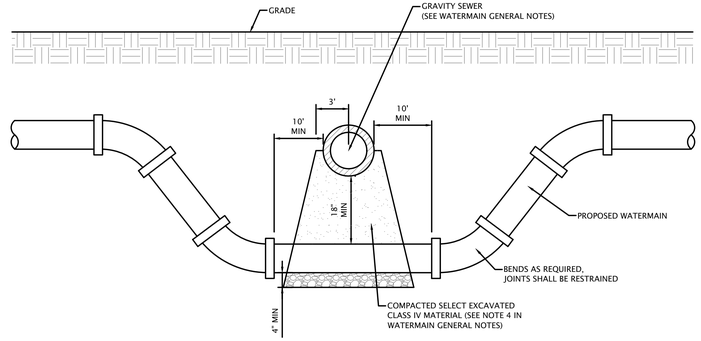
PIPE SIZE (INCHES)	TEE* BRANCH	90° ELBOW	45° ELBOW	22 1/2° ELBOW	11 1/4° ELBOW	DEAD ENDS
4	0	15	6	3	2	20
6	9	22	9	4	2	28
8	18	27	11	5	3	37
10	25	33	14	7	3	44
12	33	39	16	8	4	52
14	41	44	18	9	4	60
16	48	50	21	10	5	68
18	56	55	23	11	5	75
20	63	61	25	12	6	82
24	77	71	29	14	7	96
30	97	86	36	17	8	116
36	116	100	41	20	10	135

* ONE FULL LENGTH (18') OF PIPE ON BOTH SIDES OF BRANCH TO BE RESTRAINED.

INCREASE ALL LENGTHS IN TABLE BY 75% FOR USE ON POLYETHYLENE WRAPPED DUCTILE IRON PIPE OR PVC PIPE.

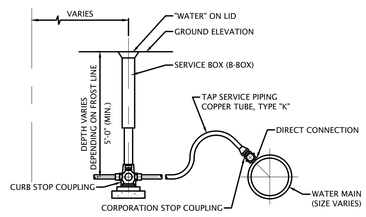
TEST PRESSURE BASED ON 150 PSI.

RESTRAINED PIPE LENGTH TABLE



SANITARY/STORM SEWER & WATERMAIN CROSSING

(NOT TO SCALE)



TYPICAL B-BOX & TAP SERVICE PIPING

(NOT TO SCALE)

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RUSSELL JACOB ROSEN — REGISTERED — PE10700667 — STATE OF INDIANA — PROFESSIONAL ENGINEER

09/04/2025

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE: | REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Construction Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25

PROJECT NO. 25-0081

C202

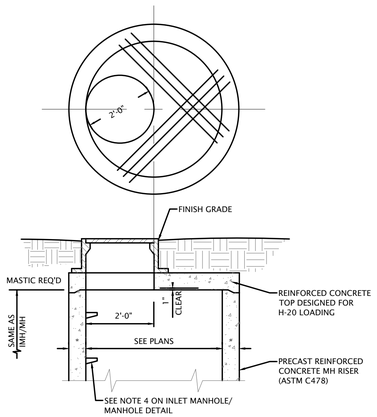
STORM SEWER GENERAL NOTES

1. Footing drains, sump pump drains and outside drains shall discharge to the storm sewer where storm sewer is provided.

2. The maximum allowable rate of infiltration or exfiltration shall not exceed 100 gallons, per 24 hours per inch-diameter per mile of sewer pipe.

3. Storm sewers shall be as noted on the plans. If approved by the Engineer, an alternative storm sewer pipe 12 inches and larger can be reinforced concrete minimum Class III, wall B conforming to ASTM C-76; Corrugated High-Density Polyethylene Pipe with smooth interior (ADS N-12) conforming to AASHTO M-294; Corrugated Polypropylene Pipe with smooth interior conforming to AASHTO M-330 (ADS HP STORM); Corrugated High-Density Polyethylene Pipe with smooth interior (PRINSCO, GOLDFLO) conforming to AASHTO M-294 or other INDOT, Type 2 storm sewers as approved by the Engineer.

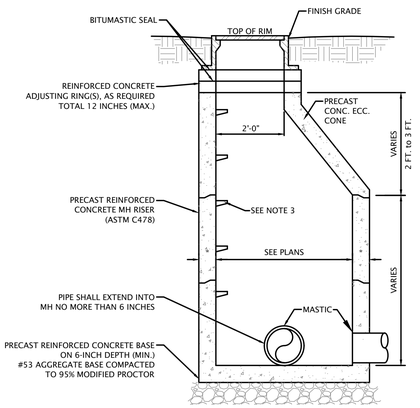
4. All HDPE storm sewer pipe shall be tested with a mandrel. Maximum deflection shall meet ASTM C1244-93 and Standard Test Method for Concrete Sewer Manholes 30 days after backfill, and should be performed without the aid of a mechanical pulling device. The deflection testing shall meet all requirements of IDEM section 327 IAC 3-6-19(a) (b) (c).



MANHOLE TOP (FLAT TOP)

(NOT TO SCALE)

USE WHERE RESTRICTED HEAD ROOM WILL NOT ALLOW FOR TAPERED WALLS



* STRUCTURE WALL THICKNESS TABLE

MH I.D.	WALL THICKNESS
36"	4"
48"	5"
60"	6"
72"	7"

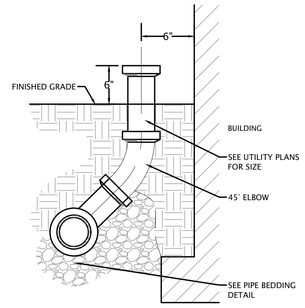
NOTES:

1. WHERE DEPTH FROM TOP OF CASTING TO INVERT IS LESS THAN 5 FEET, USE FLAT TOP MANHOLE TYPE "C" IN LIEU OF ECCENTRIC CONE.
2. WATERTIGHT SEAL IS REQUIRED BETWEEN PRECAST RISER AND SEWER PIPE.
3. CO-POLYMER/STEEL MH STEPS AS MANUFACTURED BY M.A. INDUSTRIES OR EQUAL, AT 16 INCHES O.C. (MAX.).
4. CONTRACT UNIT PRICE FOR ALL STRUCTURES SHALL INCLUDE THE FRAME AND GRATE SPECIFIED.

INLET MANHOLE/MANHOLE

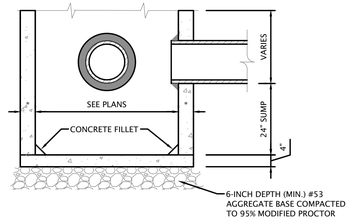
(NOT TO SCALE)

INLET MANHOLE (IMH) USES AN OPED LID - SEE STORM CALLOUT FOR FRAME & LID TYPE
MANHOLE (MH) USES A CLOSED LID - SEE STORM CALLOUT FOR FRAME & LID TYPE.



DOWNSPOUT CONNECTION

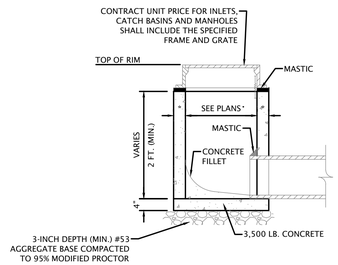
(NOT TO SCALE)



CATCH BASIN

(NOT TO SCALE)

SEE INLET MANHOLE/MANHOLE DETAIL
CATCH BASIN USES EITHER CLOSED OR OPEN LIDS - SEE UTILITY PLAN FOR FRAME & LID TYPE.



INLET

(NOT TO SCALE)

INLET USES OPEN LIDS - SEE UTILITY PLAN FOR FRAME & LID TYPE.

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RUSSELL JACOB ASHER — REGISTERED — PE10039867 — STATE OF INDIANA — PROFESSIONAL ENGINEER

09/04/2025

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Construction Details

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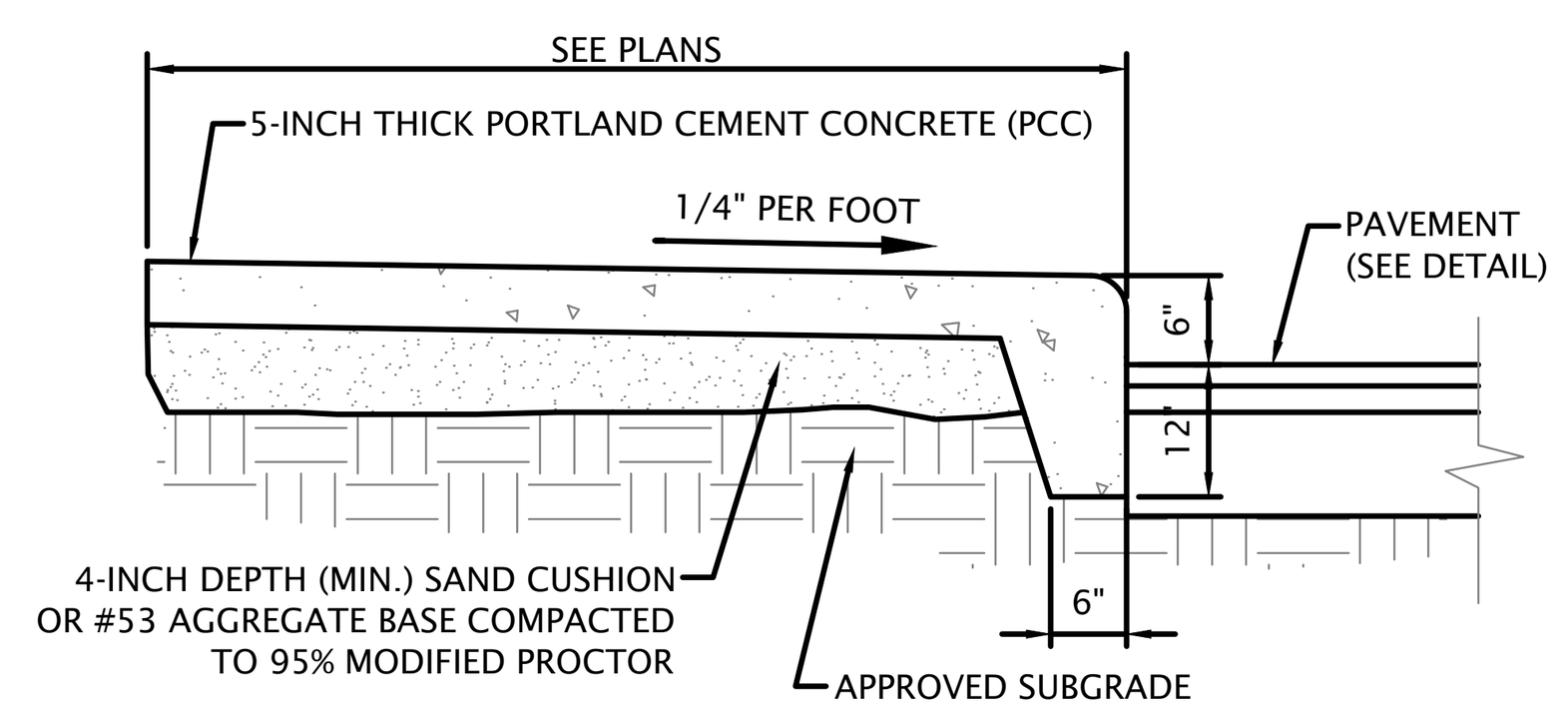
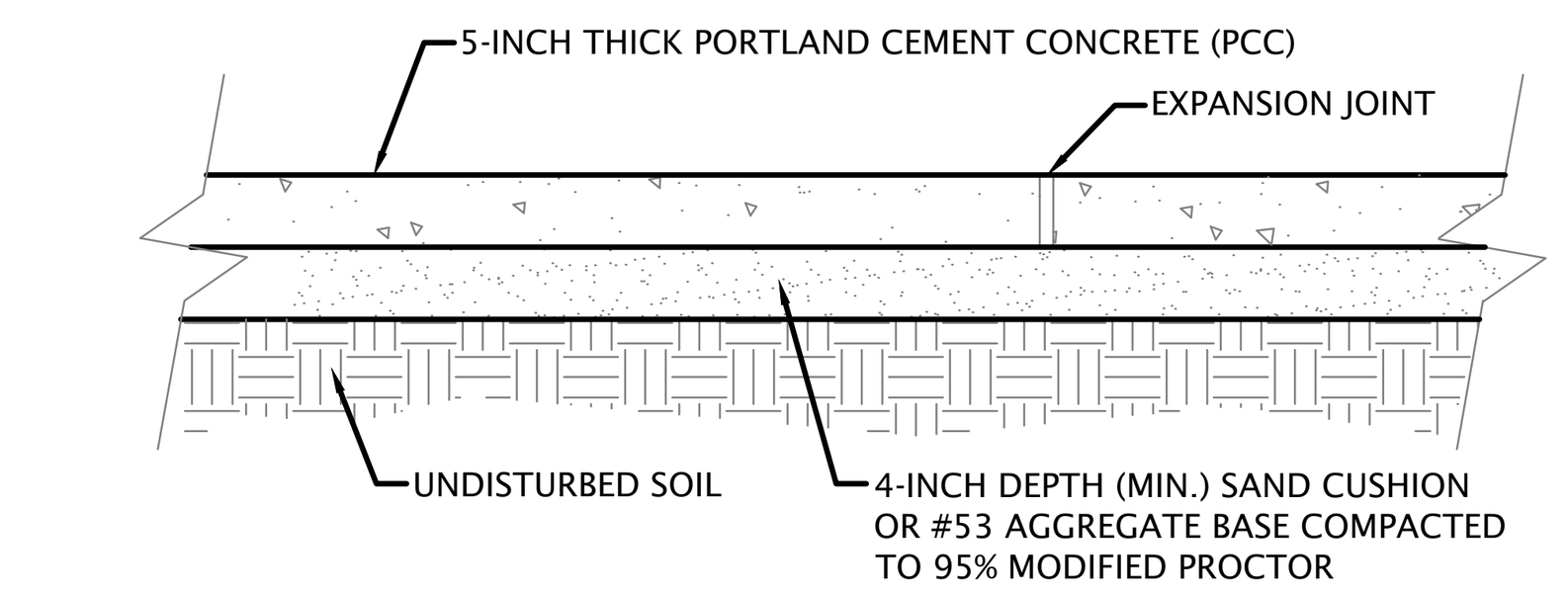
25-0081	

C203



MONOLITHIC CURB & SIDEWALK
(NOT TO SCALE)

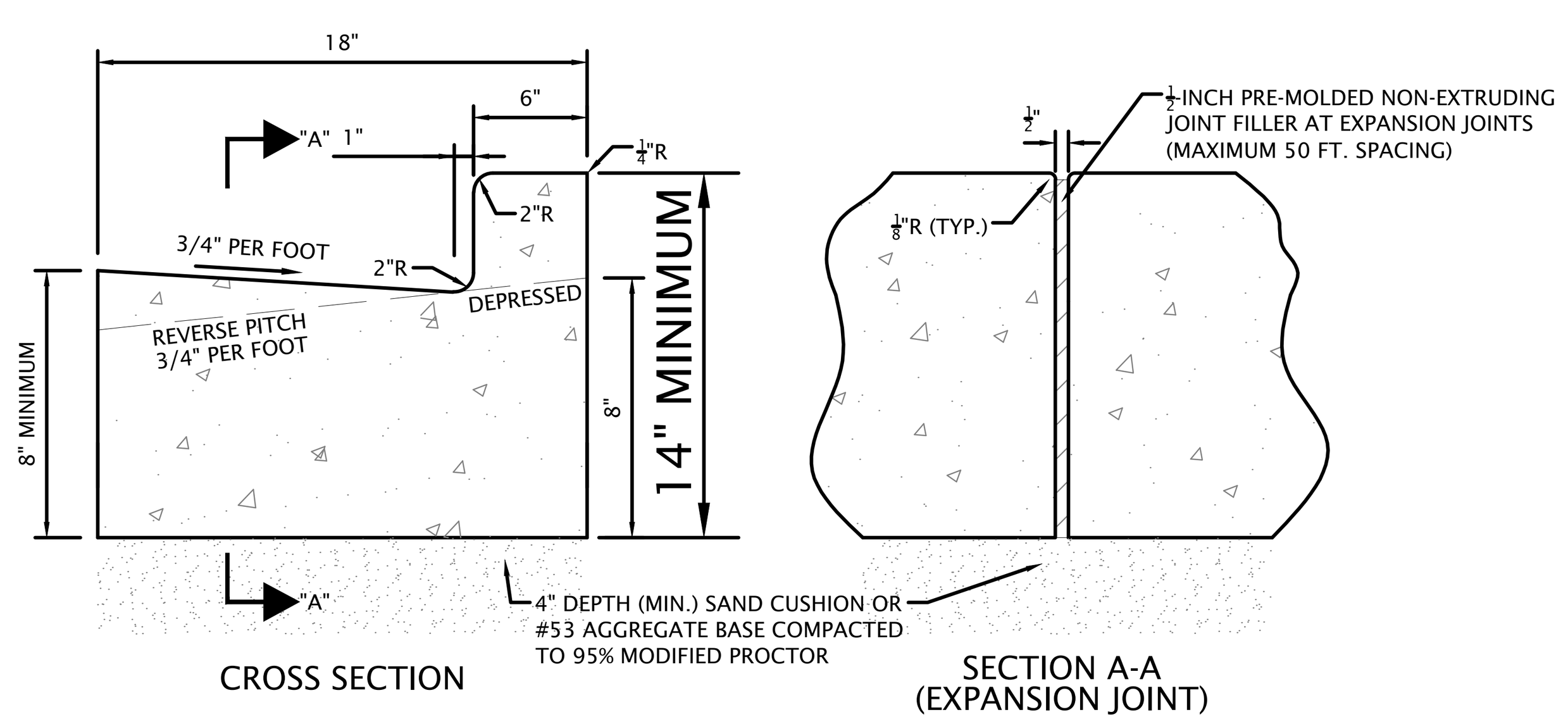


SIDEWALK
(NOT TO SCALE)

1/4-INCH WIDE CONSTRUCTION TOOLED JOINT SPACED AT A DISTANCE EQUAL TO THE WIDTH

CONCRETE FLAT WORK NOTES:

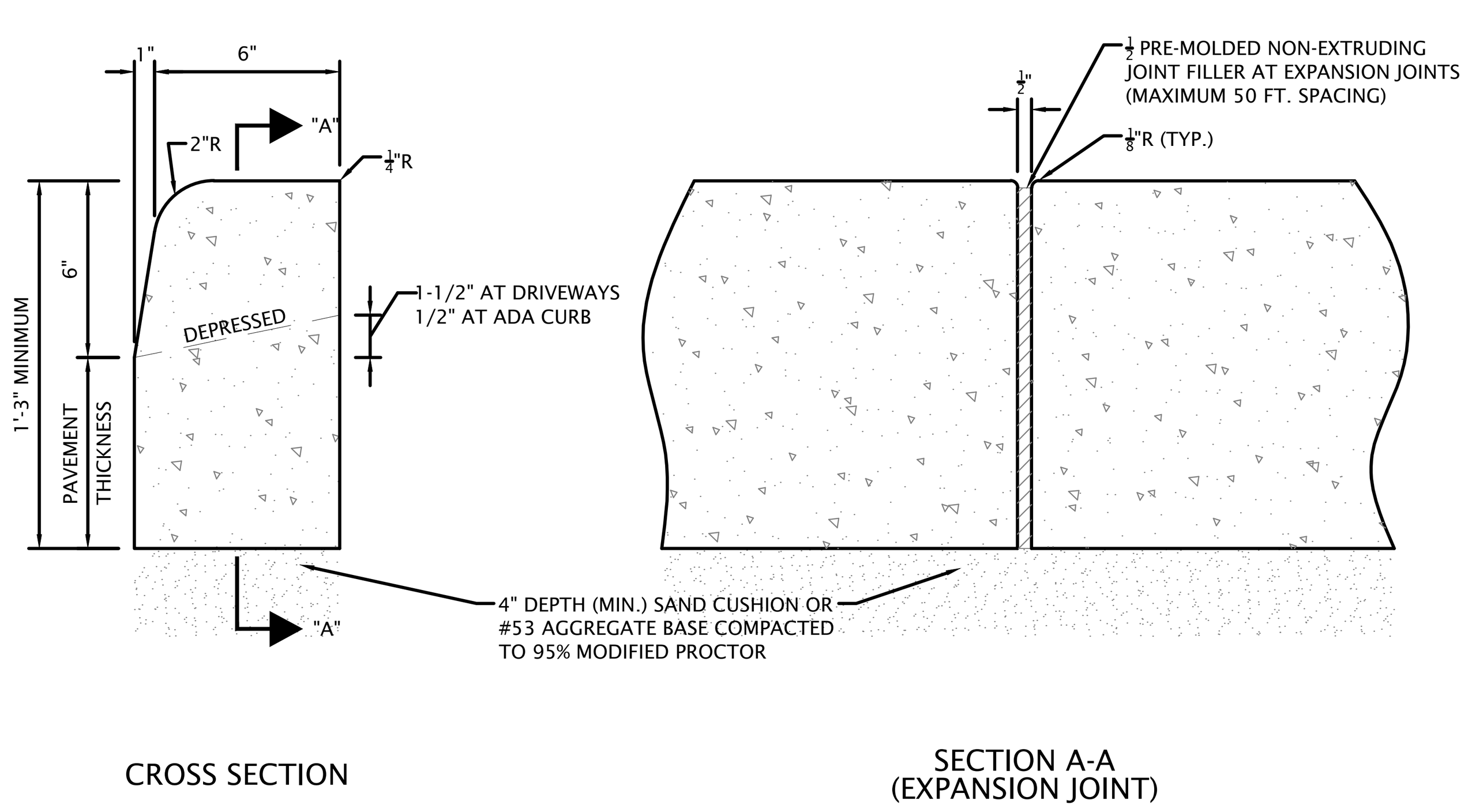
1. PROVIDE 3/4-INCH EXPANSION JOINT CONFORMING TO ASTM D-1751 ALONG BACK OF CURBS, DRIVEWAYS, STEPS, WALLS AND ACROSS THE SIDEWALK AT INTERVALS NOT TO EXCEED 40 FEET.
2. EXTEND EXPANSION JOINT MATERIAL FULL DEPTH OF THE SLAB.
3. PROVIDE TOOLED "V-GROOVE" CONTROL JOINT SPACED AT A DISTANCE EQUAL TO THE WIDTH OF THE WALK BUT NOT OVER 10 FEET APART, OR AS SPECIFIED ON THE SITE PLAN.
4. CONCRETE SHALL BE CLASS "A" & 4,000 PSI IN 28 DAYS; MEETING THE REQUIREMENTS OF THE MOST RECENT INDOT STANDARD SPECIFICATIONS MANUAL.
5. ALL CONCRETE FLAT WORK SHALL BE REINFORCED WIRE MESH 6"x6"x 10/10 GAUGE.



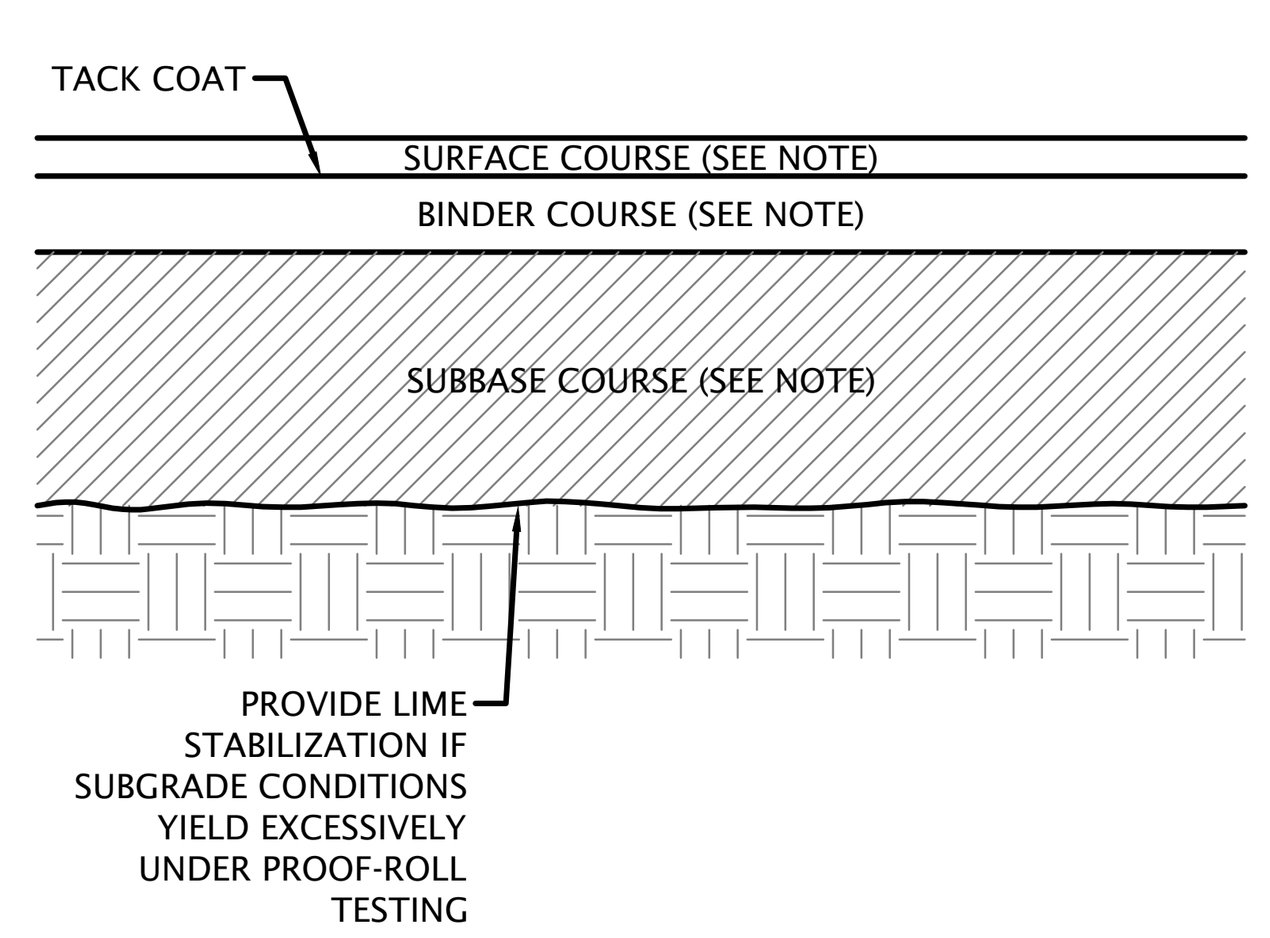
BARRIER CURB & GUTTER
(NOT TO SCALE)

CONCRETE CURB & GUTTER NOTES

1. PROVIDE TWO #4 BARS (10 FT. LONG) CENTERED IN EACH UTILITY TRENCH.
2. (NOT USED)
3. COST OF BARS SHALL BE INCLUDED IN THE UNIT PRICE (PER LINEAR FOOT) FOR CURB AND GUTTER.
4. CONTRACTION JOINTS SHALL BE PLACED AT EQUAL SPACES BETWEEN NORMAL EXPANSION JOINTS.
5. 1/2" EXPANSION JOINTS AT 50 FEET MAXIMUM.
6. CONTRACTION JOINTS AT 20 FEET MAXIMUM.
7. CONTRACTION JOINTS SHALL BE SAW CUT IN THE UPPER 1/3 OF CURB AND GUTTER WITHIN 7 DAYS OF PLACEMENT
8. SAW CUT EXISTING CURB PRIOR TO REMOVAL. PROVIDE NEAT AND CLEAN FACE TO ABUT NEW CURB.
9. USE 4,500 (MIN.) PSI CONCRETE.
10. DEPRESS DRIVEWAYS, AS REQUIRED.



6-INCH BARRIER CURB
(NOT TO SCALE)

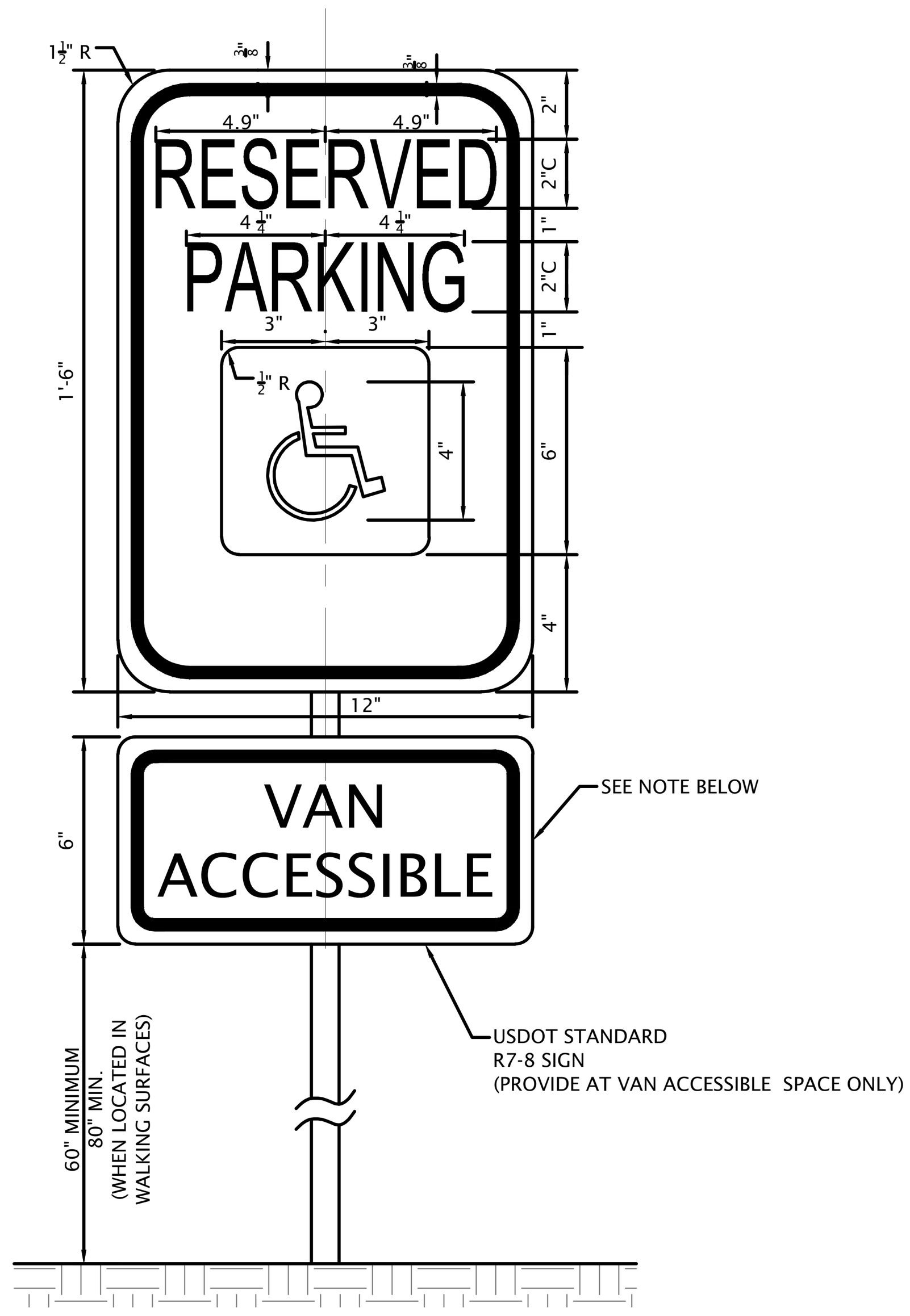


SURFACE COURSE
1.5 INCHES
INDOT HMA TYPE B SURFACE, 9.5mm

BINDER COURSE
3.0 INCHES
INDOT HMA TYPE B INTERMEDIATE, 19.0mm

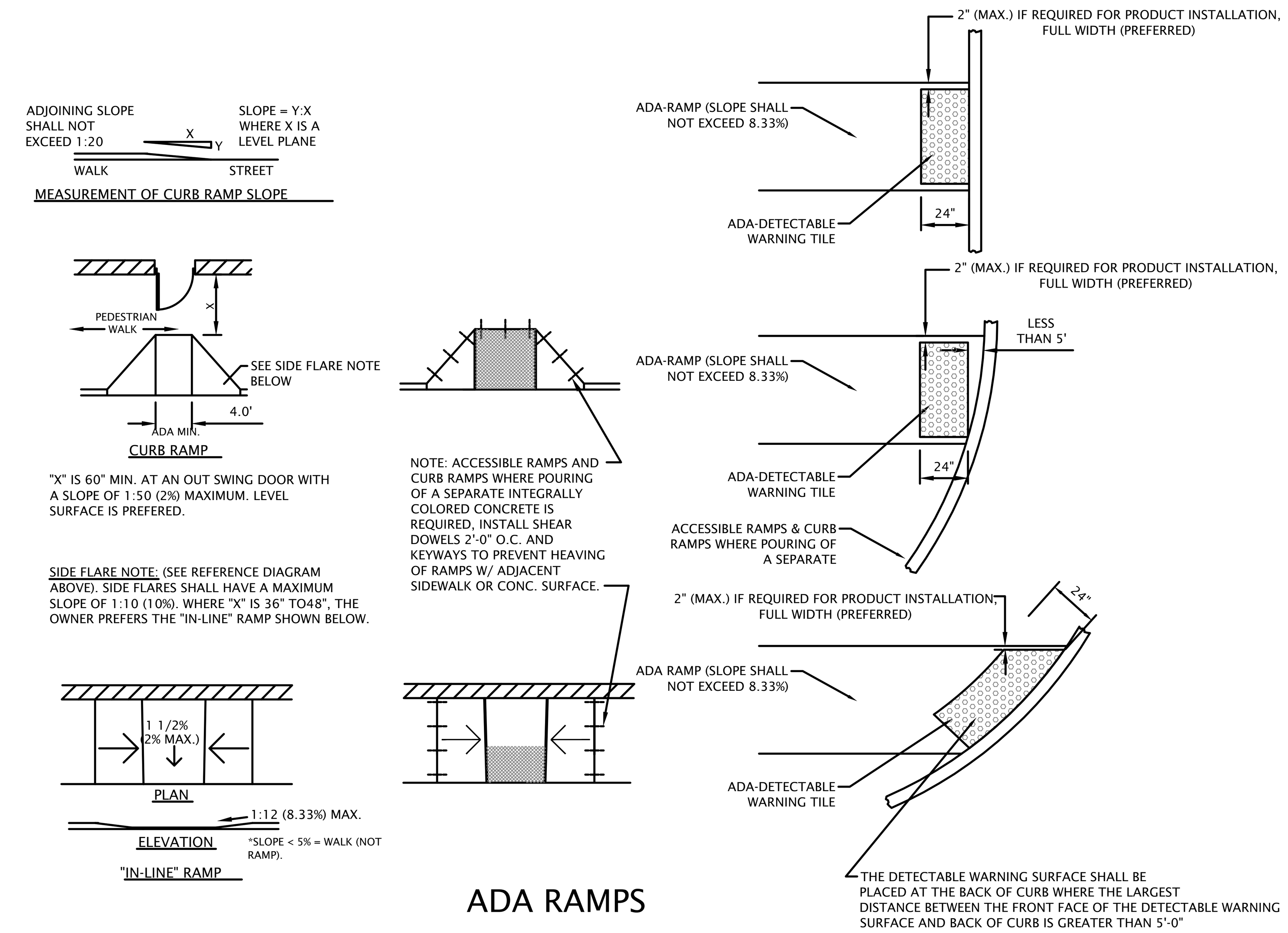
SUBBASE COURSE
9.0 INCHES OF #53 COMPACTED LIMESTONE AGGREGATE ON APPROVED PROOF-ROLLED SUBGRADE

ASPHALT PAVEMENT CROSS SECTION
(NOT TO SCALE)

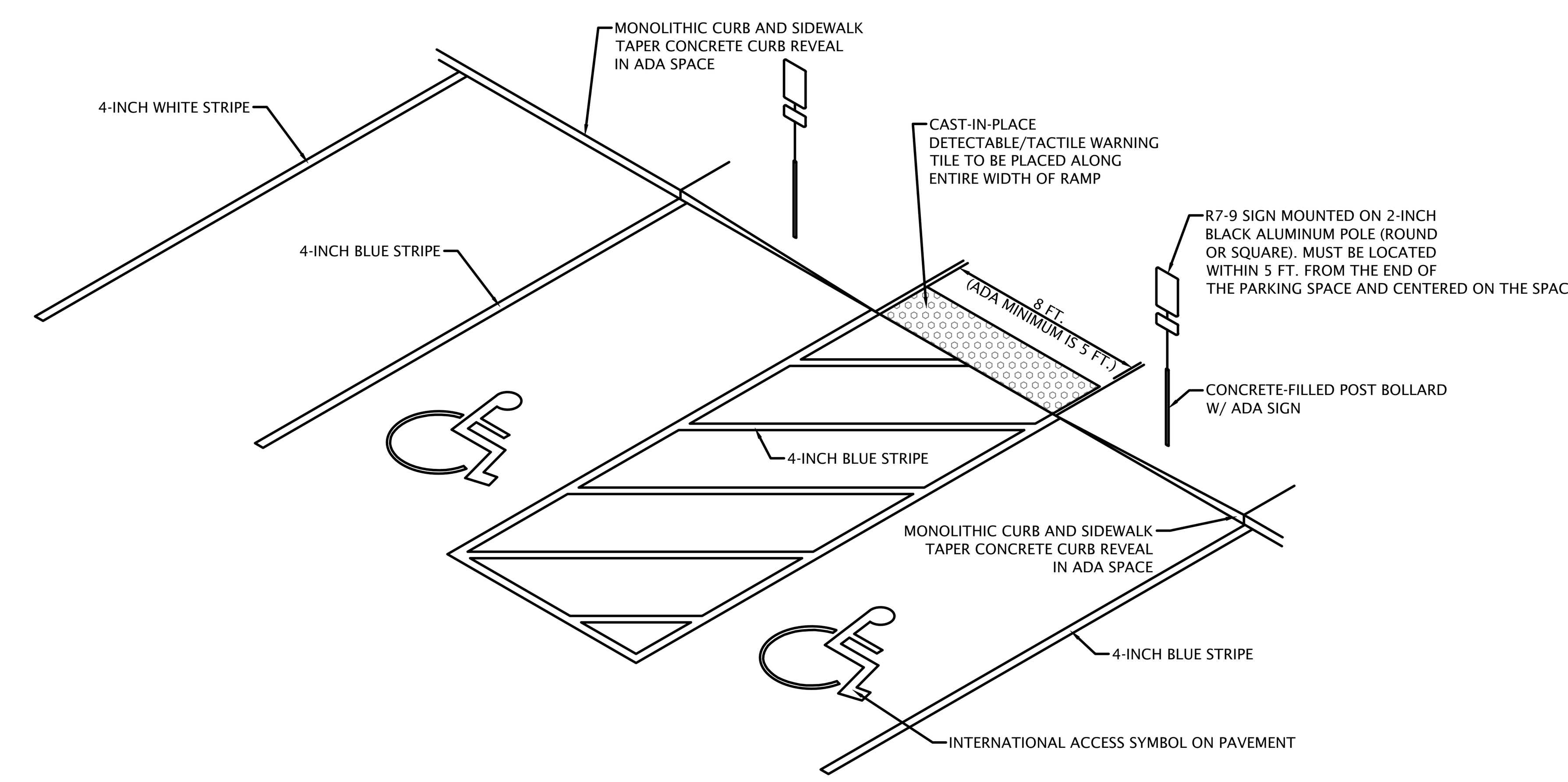


NOTE ON R7-8 SIGN:
THIS IS A STANDARD SIGN AND MAY BE ORDERED FROM ANY TRAFFIC SIGN SUPPLIER BY NUMBER. THE SIGN MUST BE SUPPLEMENTED WITH A "VAN ACCESSIBLE" SIGN AS APPLICABLE AND/OR AMOUNT OF THE FINE FOR ILLEGALLY PARKING IN THE RESERVED SPACE(S) A MUNICIPALITY MAY IMPOSE. CONFIRM WITH LOCAL REGULATIONS.

ADA SIGNAGE



ADA RAMPS



ADA NOTES

A CURB RAMP(S) MUST BE PROVIDED ALONG AN ACCESSILBLE PATH FROM THE PARKING LOT TO OWNERS CURBED SIDEWALK.

A CURB RAMP(S) MUST ALSO BE PROVIDED IN THE PARKING LOT AT ALL INTERMEDIATE AND PERIMETER CURBS ALONG THE ACCESSIBLE ROUTE CONNECTING TO PUBLIC SIDEWALKS.

A RAMP IS ANY SLOPE GREATER THAN 1:20 (5%) AND SHALL HAVE A MAXIMUM SLOPE OF 1:12 (8.33%). THE MAXIMUM SLOPE IS 1" OF RISE PER FOOT OF DISTANCE TRAVELED.

A RAMP SHALL HAVE A DETECTABLE SURFACE IDENTIFYING THE AREA OF THE RAMP. DETECTABLE WARNINGS SHALL CONSIST OF TRUNCATED DOMES ALIGNED IN A SQUARE OR RADIAL GRID. TRUNCATED DOMES SHALL HAVE A BASE DIAMETER OF 0.9 IN. TO 1.5 IN. MAXIMUM, A TOP DIAMETER OF 50% OF THE BASE DIAMETER MINIMUM TO 65% OF THE BASE DIAMETER MAXIMUM AND A HEIGHT OF 0.2 IN. DOMES SHALL BE SPACED CENTER-TO-CENTER OF 1.6 IN. MINIMUM TO 2.4 IN. MAXIMUM AND A BASE-TO-BASE SPACING OF 0.65 IN. MINIMUM, MEASURED BETWEEN THE MOST ADJACENT DOMES.

ADA DETECTABLE WARNING STRIPS SHALL BE A CAST IN PLACE DETECTABLE/TACTILE WARNING TILE. THE TILE MUST MEET ALL ADA REQUIREMENTS, AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANAFACTURERS INSTRUCTIONS. A 5-YEAR WARRANTEE SHALL BE PROVIDED BY THE MANUFACTURER FOR THE INSTALLED TILE FOR COLORFASTNESS AND DURABILITY. DETECTABLE/TACTILE WARNING TILE SHALL BE ARMOR-TILE, ACCESS-TILE OR AN APPROVED VENDOR.

THE LEADING EDGE OF THE DETECTABLE WARNING TILE MUST BE CLOSER THAN 5' FROM THE VEHICLE SURFACE, AND HAVE A MINIMUM OF 24" LENGTH ALONG THE PEDESTRIAN TRAVEL DIRECTION. THE TILE MAY BE CUT TO MATCH A RADIUS AT THE CURB IF ONE END OF THE RAMP EXCEEDS THE 5' MINIMUM.

THE CLEAR WIDTH OF ANY RAMP MEASURED PERPENDICULAR TO THE PEDESTRIAN TRAVEL DIRECTION IS A MINIMUM OF 36".

THERE ARE LOCAL JURISDICTIONS THAT SPECIFICALLY REQUIRE DETECTIBLE WARNINGS ON THE SIDE FLARES OR TOP OF RAMP (CA.). THERE ARE LOCAL JURISDICTIONS THAT HAVE REDEFINED DETECTIBLE WARNINGS (e.g. EXPOSED CONTRASTING COLOR AGGREGATE, GROOVES IN A PARALLEL OR DIAMOND PATTERN ETC.). ACCESSIBILITY GUIDLINES DEFINED BY LOCAL ORDINANCE SHOULD SUPERSEDE WHEN MORE STRINGENT THAN ADAAG. IN THE ABSENCE OF A DEFINITION, FOLLOW ADAAG.

TYPICAL ADA PARKING SPACE PLAN

A U.S. DEPARTMENT OF TRANSPORTATION R7-8 (RESERVED PARKING) AND SUPPLEMENTAL SIGNS AS NOTED ABOVE MUST BE MOUNTED ON A PERMANENT POST NO LOWER THAN 60"/80" AS STATED IN THE SIGN DETAIL ABOVE. THE POST MUST BE MOUNTED IN THE CENTER OF THE 8 FOOT WIDE ACCESSIBLE PARKING SPACE, NO MORE THAN 5 FEET FROM THE FRONT OF THE PARKING SPACE. SEE ILLUSTRATION ABOVE.

EACH ACCESSIBLE PARKING SPACE IS TO BE A MINIMUM OF 8 FEET WIDE AND HAVE A 96" MINIMUM ACCESS AISLE FOR VANS OR 60" ACCESS AISLE FOR CARS ADJACENT TO THE SPACE. THE ACCESS AISLE MAY BE ON EITHER THE DRIVER'S SIDE OR THE PASSENGER'S SIDE OF THE ACCESSIBLE SPACE. THIS APPLIES TO 90° PARKING. IF ANGLED PARKING (ie. 45°,60°), ACCESS AISLE SHALL BE ON THE PASSENGER SIDE.

ACCESSIBLE PARKING SPACES ARE TO BE LOCATED AS CLOSE TO THE BUILDING ENTRANCE AS POSSIBLE AND SHALL BE IDENTIFIED WITH A SIGN.

ACCESSIBLE PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH A SLOPE BETWEEN 1.5% AND 2% OR 1:50 IN ALL DIRECTIONS. THIS INCLUDES BOTH "RUNNING SLOPES" AND "CROSS SLOPES."

EACH PARKING SPACE ACCESS AISLE MUST CONNECT TO A COMMON LEVEL WITH AN ACCESSIBLE ROUTE...I.E., EACH ACCESS AISLE NEXT TO A PARKING SPACE MUST HAVE A CURB RAMP AT SIDEWALK OR BLEND TO A LEVEL WALKWAY LEADING TO THE ENTRANCE.

ACCESSIBLE PARKING ACCESS AISLES SHALL BE PART OF AN ACCESSIBLE ROUTE TO THE BUILDING ENTRANCE.

THE ACCESS AISLE SHALL BE DESIGNATED WITH HIGH QUALITY YELLOW DIAGONAL SURFACE PAINT STRIPING OR PER LOCAL MUNICIPALITY'S REQUIREMENTS.

RAMPS MUST NOT EXTEND OUT FROM THE CURB INTO THE ACCESS AISLE OF ANY ACCESS PARKING SPACE.

ADA ALLOWS TWO PARKING SPACES TO SHARE AN ACCESS AISLE.

ACCESSIBLE SPACE REQUIREMENTS

TOTAL OFF STREET PARKING SPACES PROVIDED	NUMBER OF ACCESSIBLE PARKING SPACES REQUIRED
1 TO 25	1
26 TO 50	2
51 TO 75	3
76 TO 100	4
101 TO 150	5
151 TO 200	6
201 TO 300	7
301 TO 400	8
401 TO 500	9
501 TO 1000	2% OF TOTAL
OVER 1000	2% PLUS 1 FOR EACH 100 OVER 1000
HOSPITAL OUTPATIENT FACILITIES	10% OF TOTAL PATIENT & VISITOR PARKING SPACES

ADA REQUIRES ONE VAN ACCESSIBLE PARKING SPACE IN EVERY SIX ACCESSIBLE SPACES, BUT NOT LESS THAN ONE.

- VAN ACCESSIBLE SPACES SHALL BE PERMITTED TO BE 8ft WIDE (MIN) WITH A 8ft WIDE (MIN) ACCESS AISLE
  OR
- VAN ACCESSIBLE SPACES SHALL BE PERMITTED TO BE 11ft WIDE WITH A 5ft WIDE (MIN) ACCESS AISLE

ACCESSIBLE PARKING-SIZE AND MARKINGS

NOTES:
1. PAINTED CROSSWALKS SHALL BE WHITE 18" WIDE STRIPES 6' LONG, SPACED 36" ON CENTER ACROSS THE ENTIRE LENGTH OF THE CROSSING.
2. PAINT 2" BLACK OUTLINE AROUND ARROWS AND LETTERS IN AREAS OF CONCRETE SURFACE.
3. PARKING SPACES ARE TO BE "WHITE" - 4" WIDE STRIPES
4. ADA SPACES, ADA MARKING, AND ADA ACCESS SPACE ARE TO BE "BLUE" - 4" WIDE STROKES.

PAVEMENT MARKINGS

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NOT FOR CONSTRUCTION
09/04/2025

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200 S Michigan Ave, Suite 1020
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DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A.1-Chase Bank
Construction Details

NO SCALE

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PROJECT NO.	
25-0081	

C204

GENERAL STORM WATER MANAGEMENT NOTES

Soil erosion and sedimentation control shall protect against loss of soil by the action of water, ice and wind.

Erosion control shall be in accordance with the Town of Munster Storm Water Ordinance & Storm Water Technical Manual & "The Indiana Storm Water Quality Manual".

There are two main elements for Storm Water Quality: Construction Site Stormwater Runoff Control and Post-Construction Stormwater Management. The contractor shall provide Construction Site Stormwater Runoff Control as required and construct the Post-Construction Stormwater Management features as shown on these plans.

The contractor shall be responsible for maintaining site conditions such that Stormwater Runoff Control is provided throughout construction. Surface water runoff management, ie: temporary ditches, swales, bypass pumping, and erosion control measures shall be constructed and maintained as required by construction activity and these items are considered incidental to the contract. These items shall be included in the base contract.

Upon the completion of the site work the contractor shall remove the Construction Site Stormwater Runoff Control measures and install the Post-Construction Stormwater Management measures.

Those Stormwater Runoff Control measures such as detention ponds that will also serve in the Post-Construction Stormwater Management Plan shall have construction sediment removed and full functionality restored upon the completion of the Site construction.

Each Construction Site Stormwater Runoff Control measure shall be installed immediately following the construction of the structure or feature in which the measure is intended to protect.

The contractor is responsibile for any damage and/or cleaning to the structure or feature. Corrective work incurred by the contractor shall be considered incidental to the contract.

The contractor is responsibile for compliance with the S.W.P.P.P. Any fines or punative measures incurred by the project due to failure to comply with the S.W.P.P.P. are the responsibility of the contractor. These costs shall be considered incidental to the contract, and shall not be considered an extra.

During the course of construction the S.W.P.P.P. may require additional erosion control measures to be installed to address site specific items not anticipated by this plan due to construction schedule or sequencing. It is not the intent of this plan to direct the schedule or sequencing beyond the general construction sequence. Any stormwater runoff control measures required due to construction methodology, sequencing, etc. are incidental to the contract. Corrective work and maintenance shall also be considered incidental, and shall not be considered an extra.

All items shown on these detail sheets are standard details and describe standard installation practices. Not all of these Stormwater Runoff Control measures will be utilized. See the erosion control plan for location and types of erosion control measures utilized. The stormwater checklist document will serve to further outline the S.W.P.P.P. for this project and it is considered part of the plan documents. In the event that site conditions require additional or different erosion control measures, these details serve to describe some acceptable methods.

POTENTIAL CONSTRUCTION POLLUTANT SOURCES

Potential pollutants that could enter the stormwater during construction include exposed soils, fuel and oil from leaking heavy equipment and vehicles. Equipment has the potential to leak fuel throughout the disturbed areas, or wherever construction is occurring. The contractors will inspect equipment before initiating construction and routinely thereafter. If leaks are discovered, they will be repaired before the equipment is used or new equipment will be brought to the site.

Bulk Fuel storage on-site can leak and thereby be a pollutant. All Fuel storage tanks shall meet the minimum requirements of the Fuel Storage requirements.

Exposed soils also have potential for being eroded by water and wind and must be prevented from entering the stormwater system. The contractor will install silt fence, riprap, and ditch checks in areas designated on the site development plans.

MATERIAL HANDLING AND STORAGE

Concrete Washout:

- Concrete wastewater liquid shall be fully evaporated prior to the planned capacity of the washout structure capacity being exceeded. Liquid must be disposed of offsite as wastewater.
- Concrete wastewater liquid that has not solidified may be pumped out into a secondary lined container or into a tanker and taken to an approved disposal facility.
- Concrete wastewater shall not be allowed to leak onto the ground, run into storm drains, or into any body of water. Where washout wastewater leaks onto the ground, all contaminated soils shall be excavated and disposed of properly.
- Allow concrete wastes to set. Break up and properly dispose of hardened wastes. Upon removal of waste, inspect the structure.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose of in the trash.
- Do not dump excess concrete onsite, except in designated areas.
- When concrete washout areas are no longer required, close the concrete washout systems. Dispose of all hardened concrete and other materials used to construct the system. Backfill, grade, and stabilize any holes, depressions, and other land disturbances associated with the system.

SOLID WASTE MANAGEMENT

- Select designated waste collection areas onsite.
- Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project. Provide containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow. Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should
  not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater run-on should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measure to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft. from drainage facilities and watercourses and should not be located in area prone to flooding or ponding.
- Inspect construction waste area weekly.

CHEMICALS AND LIQUIDS STORAGE AND HANDLING

- Store materials in manufacturer's containers.
- Maintain Safety Data Sheets (SDS) on all products.
- Store materials in a weatherproof/vandal resistant locker or building. Keep materials away from flammable sources.
- Follow manufacturer's instructions for the proper use and storage of all materials.
- Do not perform washing of applicators or containers of solvent, paint, grout, stucco, or other materials near or into a waterway or stormwater inlet. Wash water is to be disposed offsite as wastewater.
- Tightly seal and store paint containers and curing compounds when not required for use.
- Do not discharge excess paint to a waterway or storm system. Properly dispose of excess paint according to the manufacturer's instructions and in accordance with all Federal, State, and local regulations.
- Provide secondary containment for aboveground storage tanks or storage areas containing hazardous materials that are located outside.
- Remove collected liquid in the secondary containment area within 72 hours of its discovery to maintain the capacity.

Fertilizers

- Apply fertilizers only in the minimum amounts recommended by the manufacturer, as indicated from a soil test, or per the Indiana Stormwater Quality Manual.
- Work fertilizers into the soil to limit exposure to stormwater.
- Do not apply immediately prior to precipitation events.
- Store fertilizers in a covered area and transfer partially used bags to a sealable container to avoid spills.

Equipment and Vehicle Washing

- As feasible, perform washing offsite in a covered facility with an impervious floor and drains connected to the sanitary sewer.
- Use a dedicated site for washing. Locate wash areas at least 50 feet from stormwater inlets or water bodies.
- Do not discharge wash water if using soaps, solvents, or detergents. Only non-contaminated wash water may be discharged to stormwater.
- Inspect equipment and vehicles for leaks or worn hoses prior to washing.
- Properly dispose of contaminated wash water.

CONSTRUCTION SITE STORMWATER RUNOFF CONTROL SUMMARY OF BASIC PRINCIPLES

1. Keep disturbed area as small as possible.

2. Stabilize and/or protect disturbed areas as soon as possible.

3. Keep storm water runoff velocities low.

4. Retain sediment within immediate construction area.

The purpose of this plan is to specify methods for construction site stormwater runoff control.

All soil erosion and sedimentation control devices shall be regularly maintained by the contractor through the duration of the project. Collected silt and sedimentation shall be removed as required to maintain the effectiveness of the silt traps or sedimentation control devices. The contractor shall replace filter materials which have become ineffective due to contamination or physical deterioration. The contractor shall inspect all stormwater runoff control devices weekly and after all storm events.

The contractor shall have a log of maintenance and inspections, to be available at the site upon request of Local and State Inspectors.

If possible no grubbing should take place within 30' of an active watercourse.

GENERAL CONSTRUCTION SEQUENCE

- Installation/implementation of storm water quality measures.
- Site Clearing/demolition activities.
- Topsoil removal and stockpiling.
- Mass grading.
- Installation of underground utilities.
- Installation of curb and sidewalk.
- Construction of asphalt.
- Final grading.
- Permanent seeding/sod.

STORMWATER QUALITY CONSTRUCTION SEQUENCE

The sequence of when each measure will be implemented is summarized below.

- Post signed CSGP NOI, NPDES Permit number, CSGP NOS (when available), contact information for the site, municipal stormwater permit, and location where construction plans may be obtained in a visible location at entrance to site.
- Construct gravel construction entrance from the street to the building pad prior to construction.
- Install silt fence/fiber rolls prior to construction at construction limits.
- Construct refueling area and concrete washout area prior to construction.
- Install inlet protection at all inlets on property.
- Perform topsoil removal and stockpiling. Soil stockpiles created on site to be protected from erosion with silt fence around the base.
- Perform mass grading of the site subgrade.
- Establish connection between new storm sewer and existing storm sewer.
- Install underground utilities.
- Upon completion of the rough grading, all areas affected by construction shall be temporarily seeded if they will remain dormant for greater than 7 days. These areas shall be stabilized within 7 days of remaining dormant and erosion control blankets shall be installed on slide slopes as shown on the plans.
- Re-seed any areas disturbed by construction and utilities installation with temporary seed mix within 3 days of completion of disturbance.
- Grade site to final elevations.
- Install curbs, sidewalk, pavement, and aggregate subbase.
- Install permanent seeding or sod.
- Maintain temporary erosion control features until construction is complete.
- Remove temporary erosion control measures once permanent vegetative cover has been established.
- Submit the the Notice of Termination for the Construction Stormwater General (CSGP) permit.

See attached details for acceptable erosion and sedimentation control installation methods.

TYPES OF CONTROL DEVICES

The Construction Site Stormwater Runoff Control Plan involves the use of four types of control devices to manage runoff thereby assuring that runoff meets the current requirements for stormwater quality.

1. Erosion Control
   a. Chemical Stabilization
   b. Geotextiles
   c. Scour Stop
   d. Riprap
   e. Mulching
   f. Soil Roughening
   g. Topsoil Utilization
   h. Seeding
   i. Sodding
2. Runoff Control
   a. Check Dams
   b. Temporary Diversion Dikes
   c. GeoRidge Ditch Berms
3. Sediment Control
   a. Polymer Systems (Floc Logs)
   b. Fiber Rolls
   c. Sediment Basins
   d. Dewatering Bags
   e. Silt Fence
   f. Storm Drain Inlet Protection
   g. Construction Entrances
   h. Construction Entrance Mud Mats
4. Material Management (housekeeping)
   a. Concrete Washouts
   b. Spill Prevention and Control Plan
   c. Fuel Storage
   d. Stockpiles
   e. Temporary Facilities
   f. Material Handling and Storage

SELF MONITORING PROGRAM

The contractor shall perform inspections weekly and after each storm event of 0.5" or more throughout the construction process for all Construction Site Stormwater Runoff Control measures.

See the Maintenance Section under each measure, or follow the manufacturers recommendations for routine maintenance.

The attached self monitoring form shall be used to monitor the Construction Site Stormwater Runoff Control measures. A binder of the weekly forms shall be kept and available upon request.

The contractors will inspect equipment before initiating construction and routinely thereafter to assure that mechanical equipment is not polluting the stormwater runoff.

SELF MONITORING FORM

Date: ______________________________
Project: ______________________________
Inspected by: ______________________________
Type of Inspection: ☐ Scheduled Weekly ☐ Rain Event

CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG
(To be Completed by Property Owner or Agent)

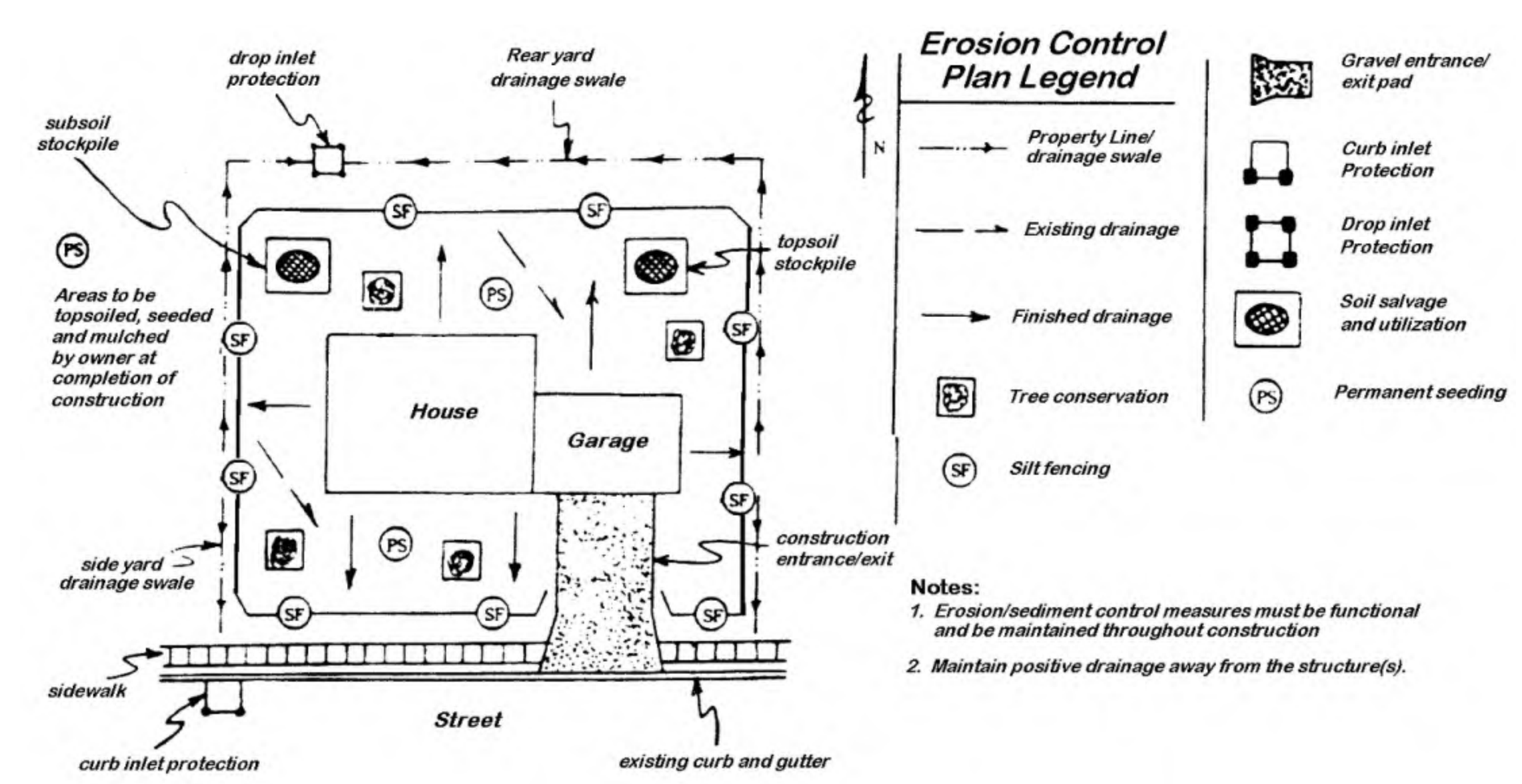
All stormwater pollution prevention BMPs shall be inspected and maintained as needed to ensure continued performance of their intended function during construction and shall continue until the entire site has been stabilized and a Notice of Termination has been issued. An inspection of the project site must be completed by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Maintenance and repair shall be conducted in accordance with the accepted site plans. This log shall be kept as a permanent record and must be made available to the Municipal Engineer, in an organized fashion, within forty-eight (48) hours upon request.

Yes	No	N/A	
			1. Are all sediment control barriers, inlet protection and silt fences in place and functioning properly?
			2. Are all erodible slopes protected from erosion through the implementation of acceptable soil stabilization practices?
			3. Are all dewatering structures functioning properly?
			4. Are all discharge points free of any noticeable pollutant discharges?
			5. Are all discharge points free of any noticeable erosion or sediment transport?
			6. Are designated equipment washout areas properly sited, clearly marked, and being utilized?
			7. Are construction staging and parking areas restricted to areas designated as such on the plans?
			8. Are temporary soil stockpiles in approved areas and properly protected?
			9. Are construction entrances properly installed and being used and maintained?
			10. Are "Do Not Disturb" areas designated on plan sheets clearly marked on-site and avoided?
			11. Are public roads at intersections with site access roads being kept clear of sediment, debris, and mud?
			12. Is spill response equipment on-site, logically located, and easily accessed in an emergency?
			13. Are emergency response procedures and contact information clearly posted?
			14. Is solid waste properly contained?
			15. Is a stable access provided to the solid waste storage and pick-up area?
			16. Are hazardous materials, waste or otherwise, being properly handled and stored?
			17. Have previously recommended corrective actions been implemented?

If you answered "no" to any of the above questions, describe any corrective action which must be taken to remedy the problem and when the corrective actions are to be completed.

SAMPLE EROSION/SEDIMENT CONTROL PRACTICE PLAN

FOR A TYPICAL ONE OR TWO FAMILY DWELLING UNDER CONSTRUCTION



POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN

- After construction is completed, including buildings, parking lots constructed, and landscaping, the property owner will take possession of the property. When the property becomes occupied, it is no longer the responsibility of the developer to maintain the site. The responsibility for maintaining the permanent erosion and sediment control measures belongs to the current owner/s of the property. Pollutants associated with the proposed land use will most likely be very typical of commercial/retail developments. Most expected pollutants will be associated with automobiles: oil, grease, antifreeze, brake dust, rubber fragments, gasoline, diesel fuel, metals, and improper disposal of trash. It is the responsibility of the property owner/s or owners association to provide routine maintenance. Some maintenance items may include trimming vegetation, picking up litter, monitoring and cleaning catch basins, pond outlet structure and culverts. The sediment control basins protecting the stormwater quality of the site will require periodic cleaning of sediments that accumulate. After vegetation has been established, temporary erosion and sediment control measures such as silt fence and straw bales will be removed by the installing contractor.
- The plans make use of a detention pond system and green space to control the pollutants that occur after construction activities conclude.
- The post-construction stormwater quality measures will be installed as a part of the normal construction activities for the site. They shall be fully operational, and complete at the completion of construction.
- All storm water run-off shall be controlled by restrictors in the outfall pipes constructed as part of these engineering plans. The stormwater quality measures shall minimize the pollutants from stormwater run-off and therefore minimize adverse impacts to the receiving streams and riparian habitats.
- Green spaces - The green space areas of the site should receive routine fertilizing, watering, mowing and trimming to maintain a healthy landscape.
- Catch basins - Catch basins should be routinely inspected for build up of sediment. Mechanical cleaners or hand cleaning will be required to maintain the function of the catch basin.
- Storm drain flushing - In the event that the storm drains cease to function properly due to excessive sediment buildup, flushing of the storm drains may be required.
- Trees
- Native re-vegetation
- Pre-cast Storm Drain Covers
- Grass swales - Grass swales should receive routine fertilizing, watering, mowing and trimming to maintain a healthy landscape.

DVG Team Inc. has prepared this erosion and sedimentation control plan for the owner/developer in accordance with the known requirements and ordinances. It is the responsibility of the owner/developer for compliance with this erosion and sedimentation control plan and the related attachments by all subcontractors and consultants that perform work on the project site. The owner/developer is responsible for the routine inspection and maintenance of the erosion and sediment control measures. DVG Team Inc. is not responsible for the enforcement or compliance of the Erosion and Sediment Control Plan. Any additional erosion or sediment control measures beyond those specified in this plan, for unforeseen or unexpected situations, which may be required by the regulatory agencies shall be the responsibility of the owner/developer to implement.

DVG
TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB POZEN
REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/04/2025

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. 1 - Chase Bank
Stormwater Pollution Prevention Plan Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25
PROJECT NO.	
25-0081	
C301	

EROSION CONTROL MEASURES

CHEMICAL STABILIZATION

MATERIAL: SOFT PIABLE MATTING SUCH AS JUTE, COIR OR BURLAP, APPLIED POLYMER SYSTEMS, "SILT STOP" DRY POWER (OR APPROVED EQUAL).

COVERAGE: "SILT STOP" DRY POWDER IS A SOIL-SPECIFIC MATERIAL. A SOIL SAMPLE MUST BE SUBMITTED TO THE MANUFACTURER TO DETERMINE PROPER APPLICATION RATES.

INSTALLATION:
1. PREPARE THE SITE BY FILLING IN GULLIES, RILLS AND LOW SPOTS.
2. APPLY "SILT STOP" POWER (DRY) OVER DRY GROUND WITH A SEED/FERTILIZER SPREADER.
3. SELECT THE TYPE AND WEIGHT OF EROSION CONTROL BLANKET TO FIT THE SITE CONDITIONS (e.g. SLOPE, CHANNEL AND FLOW VELOCITY).

MAINTENANCE:
1. DURING VEGETATIVE ESTABLISHMENT, INSPECT AFTER STORM EVENTS FOR ANY EROSION.
2. IF ANY AREA SHOWS EROSION, REPAIR THE GRADE AND RE-APPLY "SILT STOP" POWDER AND RE-LAY AND STAPLE THE BLANKET.
3. AFTER VEGETATIVE ESTABLISHMENT, CHECK THE TREATED AREA PERIODICALLY.

GEOTEXTILES

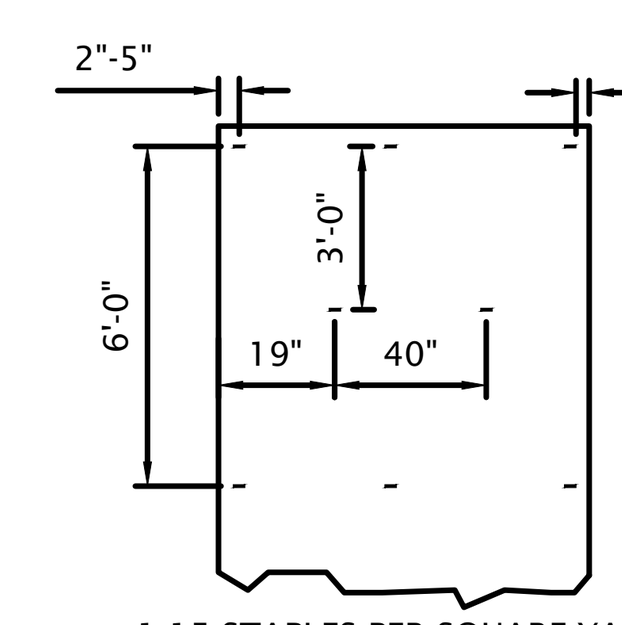
MATERIAL: NORTH AMERICAN GREEN - SC 150 or DS 150 BLANKET
SC 150 WHEN PLACEMENT OCCURS IN THE FALL/WINTER AND WHEN DURABILITY IS REQUIRED
DS 150 DEGRADES MORE RAPIDLY, ALLOWING FOR SOONER MOWING OF THE STABILIZED AREA

EROSION CONTROL BLANKET (SURFACE-APPLIED)

ANCHORING: STAPLES AS RECOMMENDED BY THE MANUFACTURER. FOR NORTH AMERICAN GREEN, USE STAPLE PATTERN "B". SEE CHART BELOW.

INSTALLATION:
1. SELECT THE TYPE AND WEIGHT OF EROSION CONTROL BLANKET TO FIT THE SITE CONDITIONS (e.g. SLOPE, CHANNEL, FLOW VELOCITY).
2. INSTALL ANY PRACTICES NEEDED TO CONTROL EROSION AND RUNOFF, SUCH AS TEMPORARY OR PERMANENT DIVERSION, SEDIMENT BASIN OR TRAP, SILT FENCE, AND/OR STRAW BALE DAM.
3. GRADE THE SITE AS SPECIFIED IN THE CONSTRUCTION PLAN.
4. ADD TOPSOIL WHERE APPROPRIATE.
5. PREPARE THE SEEDBED, FERTILIZE (AND LIME IF NEEDED) AND SEED THE AREA IMMEDIATELY AFTER GRADING.
6. FOLLOW MANUFACTURER'S DIRECTIONS AND LAY THE BLANKETS ON THE SEEDED AREA SUCH THAT THEY ARE IN CONTINUOUS CONTACT WITH THE SOIL AND THAT THE UPSLOPE OR UPSTREAM ONES OVERLAP THE LOWER ONES BY AT LEAST 8 INCHES.
7. TUCK THE UPPERMOST EDGE OF THE UPPER BLANKETS INTO A CHECK SLOT (SLIT TRENCH), BACKFILL WITH SOIL, AND TAMP DOWN.
8. ANCHOR THE BLANKETS AS SPECIFIED BY THE MANUFACTURER.

MAINTENANCE:
1. DURING VEGETATIVE ESTABLISHMENT, INSPECT AFTER STORM EVENTS FOR ANY EROSION BELOW THE BLANKET.
2. IF ANY AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE BLANKET COVERING IT, ADD SOIL, RE-SEED THE AREA, AND RE-LAY AND STAPLE THE BLANKET.
3. AFTER VEGETATIVE ESTABLISHMENT, CHECK THE TREATED AREA PERIODICALLY.

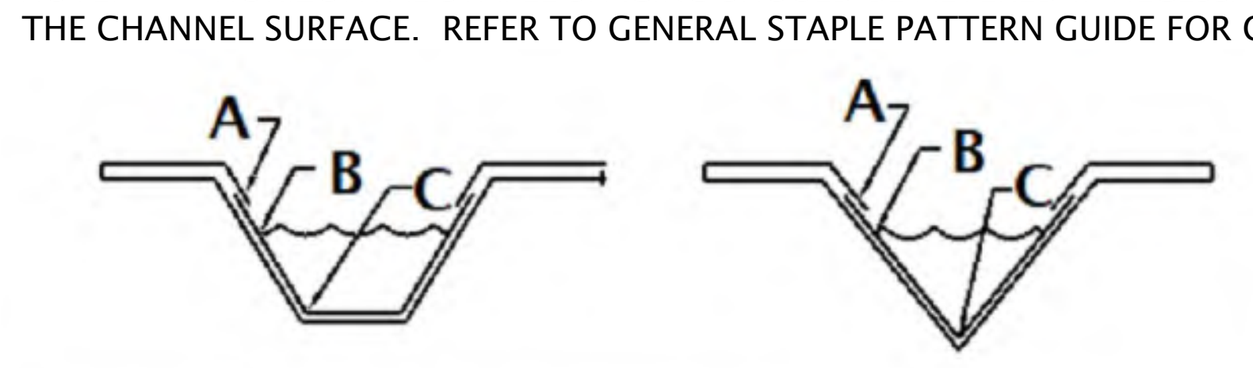


1.15 STAPLES PER SQUARE YARD
STAPLE PATTERN "B"
NORTH AMERICAN GREEN
(NOT TO SCALE)

EROSION CONTROL BLANKET (CHANNEL APPLICATION)

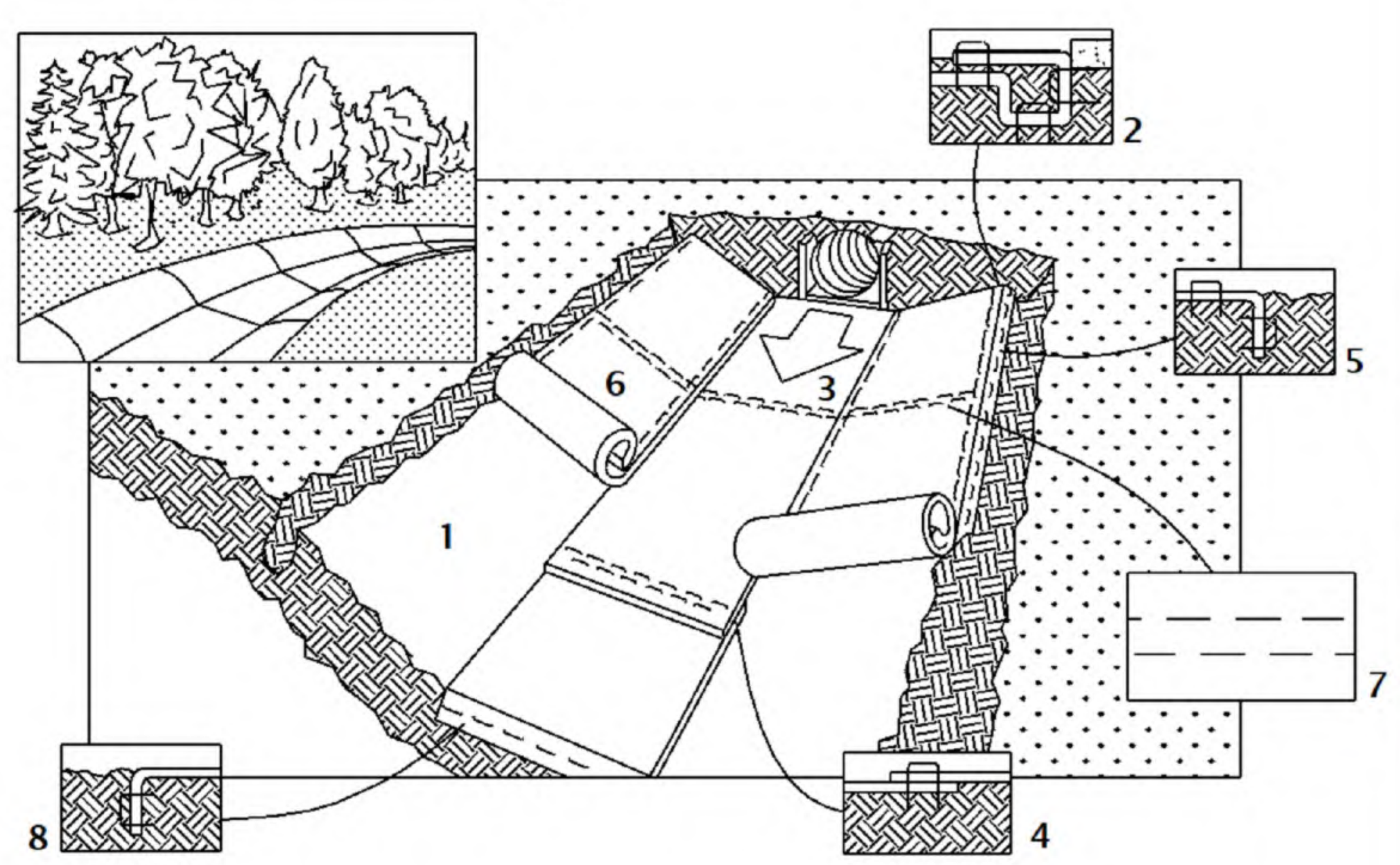
DETAIL SOURCE: NORTH AMERICAN GREEN

NOTE: HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE. REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE RECOMMENDATIONS FOR CHANNELS.



CRITICAL POINTS:

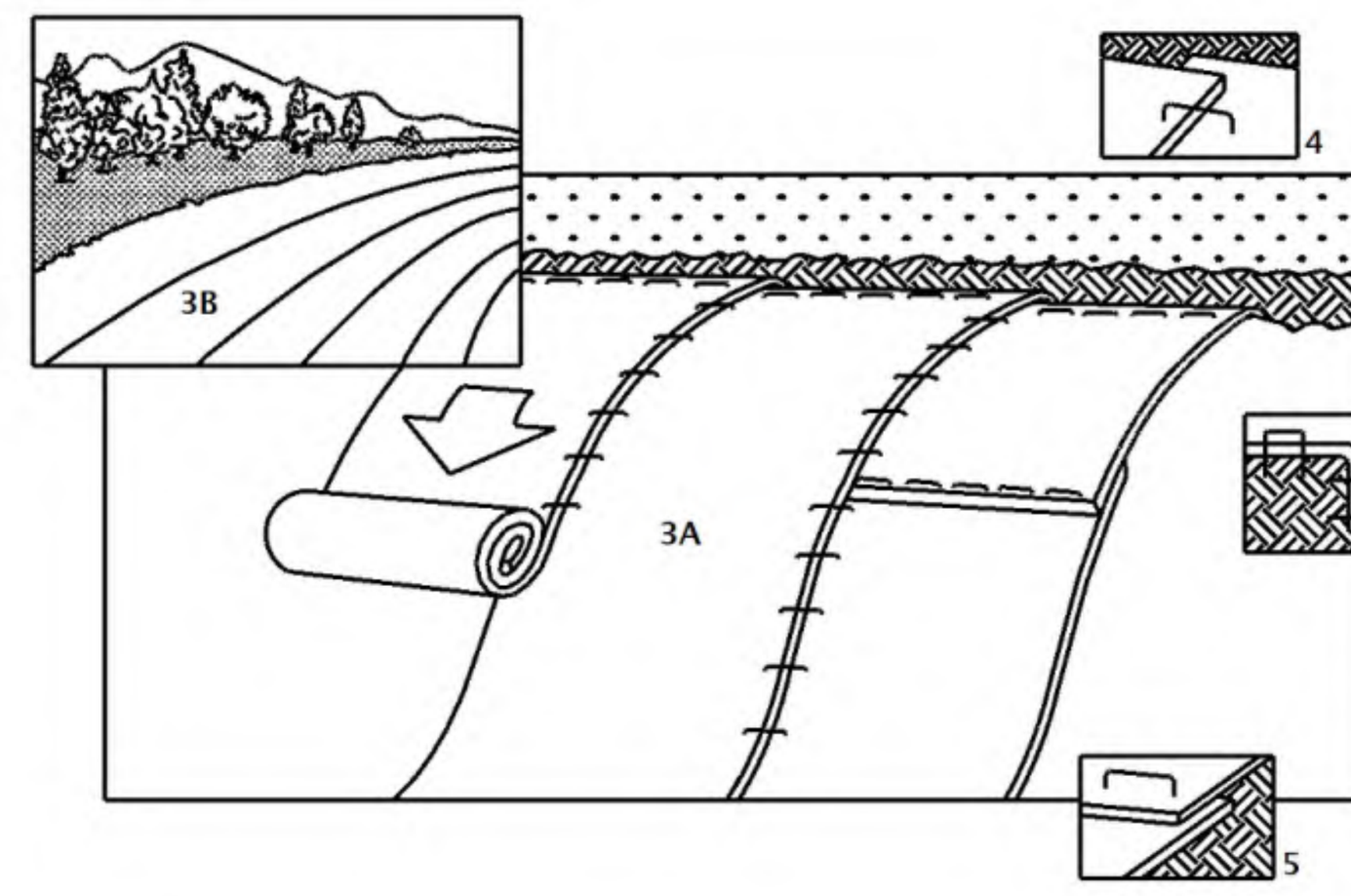
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDES, SLOPE VERTICES



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6-INCH DEEP BY 6-INCH WIDE TRENCH, BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW ON BOTTOM OF CHANNEL.
4. PLACE BLANKETS END OVER END (SHINGLE-STYLE) WITH A 6-INCH OVERLAP. USE A DOUBLE ROW OF STAGGERED STAPLES 4 INCHES APART TO SECURE BLANKETS.
5. FULL LENGTH EDGE OF BLANKETS AT THE TOP OF SIDE SLOPES MUST BE ANCHORED IN 6-INCH DEEP BY 6-INCH WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. BLANKETS ON SIDE SLOPES MUST BE OVERLAPPED 4 INCHES OVER THE CENTER OF BLANKET AND STAPLED (2 INCHES FOR C350 MATTING).
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 FT. TO 40 FT. INTERVALS. USE A ROW OF STAPLES 4 INCHES APART OVER ENTIRE WIDTH OF CHANNEL. PLACE A SECOND ROW 4 INCHES BELOW THE FIRST ROW IN A STAGGERED PATTERN.
8. THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED IN A 6-INCH DEEP BY 6-INCH WIDE TRNECH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

EROSION CONTROL BLANKET (SIDE SLOPE APPLICATION)

DETAIL SOURCE: NORTH AMERICAN GREEN



NOTE: REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE RECOMMENDATIONS FOR CHANNELS.

DIRECTIONS:
1. PREPARE SOIL BEFORE INSTALLING BLANKETS INCLUDING APPLICATION OF LIME, FERTILIZER AND SEED. WHEN USING CELL-O-SEED, DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET 6-INCHEDEEP BY 6-INCH WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL THE BLANKETS DOWN OR HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH AN APPROXIMATELY 2-INCH OVERLAP.
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE-STYLE) WITH AN APPROXIMATELY 4-INCH OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12 INCHES APART.

RIP RAP AT PIPE OUTLET

MATERIAL: HARD, ANGULAR AND WEATHER-RESISTANT, HAVING A SPECIFIC GRAVITY OF AT LEAST 2.5
GRADATION: WELL-GRADED STONE, 50% (BY WEIGHT LARGER THAN THE SPECIFIED d50; HOWEVER, THE LARGEST PIECES SHOULD NOT EXCEED TWO TIMES THE SPECIFIED d50 AND NO MORE THAN 15% OF THE PIECES (BY WEIGHT) SHOULD BE LESS THAN 3 INCHES.
FILTER: USE GEOTEXTILE FABRIC FOR STABILIZATION AND FILTRATION OR SAND/GRAVEL LAYER PLACED UNDER ALL PERMANENT RIP RAP INSTALLATIONS.
SLOPE: 2:1 OR FLATTER, UNLESS APPROVED IN THE EROSION AND SEDIMENT CONTROL PLAN.

SUBGRADE PREPARATION

1. REMOVE BRUSH, TREES, STUMPS AND OTHER DEBRIS.
2. EXCAVATE ONLY DEEP ENOUGH FOR BOTH FILTER AND RIP RAP. OVER-EXCAVATION INCREASES THE AMOUNT OF SPOIL CONSIDERABLY.
3. COMPACT ANY FILL MATERIAL TO THE DENSITY OF THE SURROUNDING UNDISTURBED SOIL.
4. SMOOTH THE GRADED FOUNDATION.

FILTER PLACEMENT

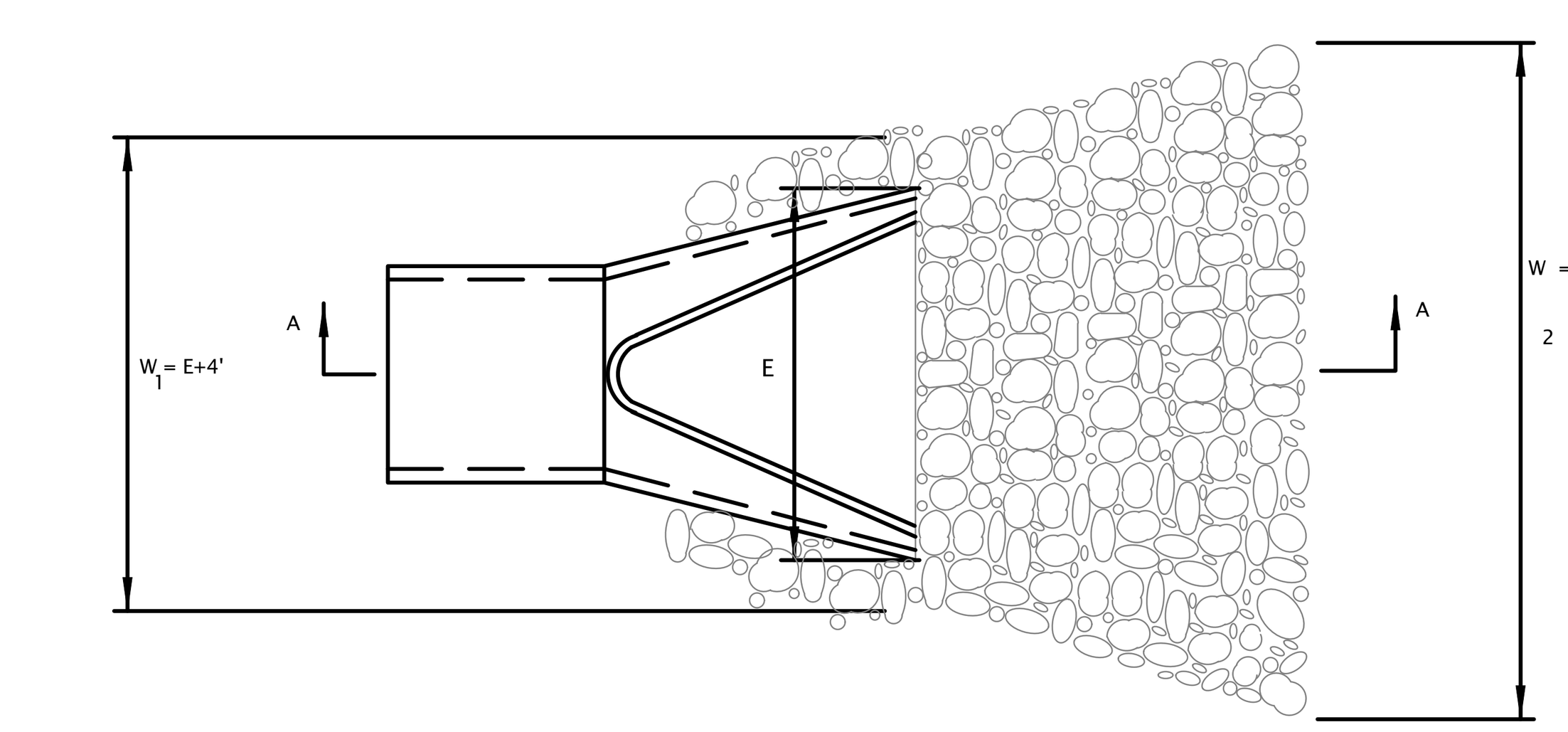
1. IF USING GEOTEXTILE FABRIC, PLACE IT ON THE SMOOTHED FOUNDATION, OVERLAP THE EDGES AT LEAST 12 INCHES AND SECURE WITH ANCHOR PINS SPACED EVERY 3 FEET ALONG THE OVERLAP.
2. IF USING A SAND/GRAVEL FILTER, SPREAD THE WELL-GRADED AGGREGATE IN A UNIFORM LAYER TO THE REQUIRED THICKNESS (6 INCHES MINIMUM); IF TWO OR MORE LAYERS ARE SPECIFIED, PLACE THE LAYER OF SMALLER GRADATION FIRST AND AVOID MIXING THE LAYERS.

RIP RAP PLACEMENT

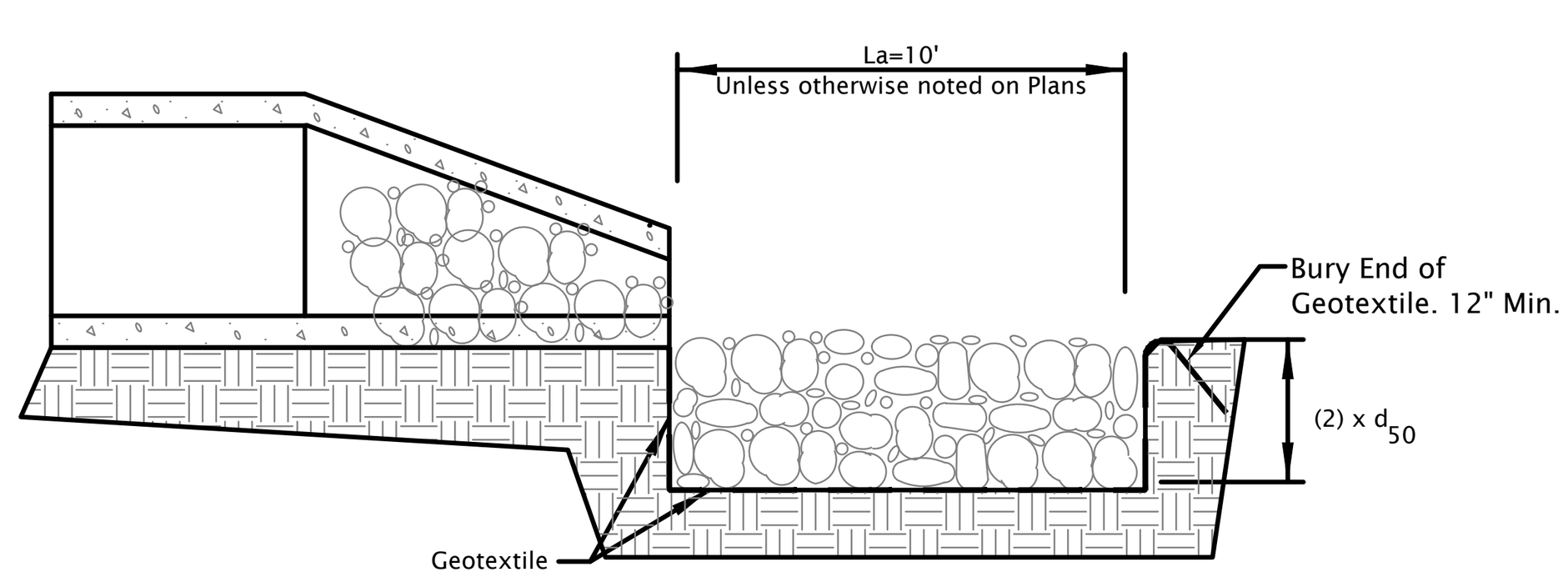
1. IMMEDIATELY AFTER INSTALLING THE FILTER, ADD THE RIP RAP TO FULL THICKNESS IN ONE OPERATION. DO NOT DUMP THROUGH CHUTES OR USE ANY METHOD THAT CAUSES SEGREGATION OF ROCK SIZES OR THAT WILL DISLODGE OR DAMAGE THE UNDERLYING FILTER MATERIAL.
2. IF FABRIC IS DAMAGED, REMOVE THE RIP RAP AND REPAIR BY ADDING ANOTHER LAYER OF FABRIC, OVERLAPPING THE DAMAGED AREA BY 12 INCHES.
3. PLACE SMALLER ROCK IN VOIDS TO FORM A DENSE, UNIFORM AND WELL-GRADED MASS. SELECTIVE LOADING AT THE QUARRY AND SOME HAND PLACEMENT MAY BE NEEDED TO ENSURE AN EVEN DISTRIBUTION OF ROCK MATERIAL.
4. BLEND THE ROCK SURFACE SMOOTHLY WITH THE SURROUNDING AREA TO ELIMINATE PROTRUSIONS OR OVER-FALLS.

MAINTENANCE

1. INSPECT PERIODICALLY FOR DISPLACED ROCK MATERIAL, SLUMPING AND EROSION AT EDGES, ESPECIALLY DOWN-STREAM OR DOWN-SLOPE.



PLAN
(NOT TO SCALE)

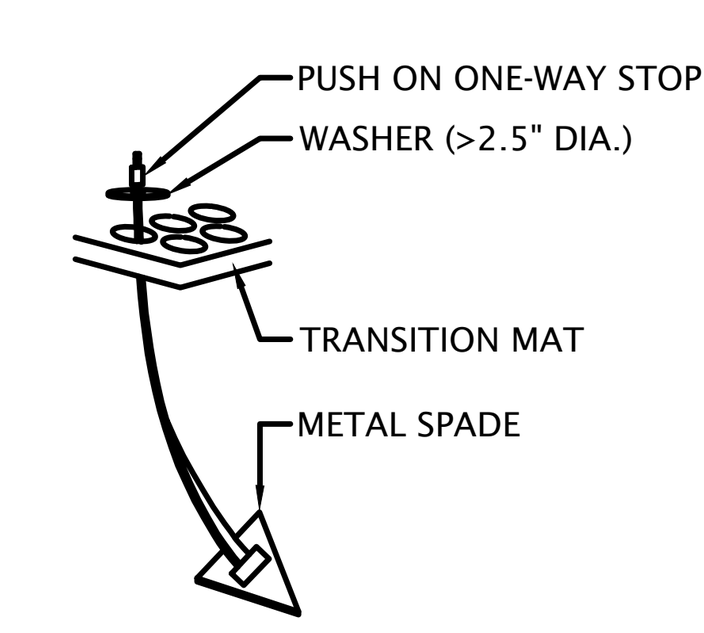


SECTION A-A
(NOT TO SCALE)

SCOURSTOP TRANSITION MAT FOR SCOUR PROTECTION

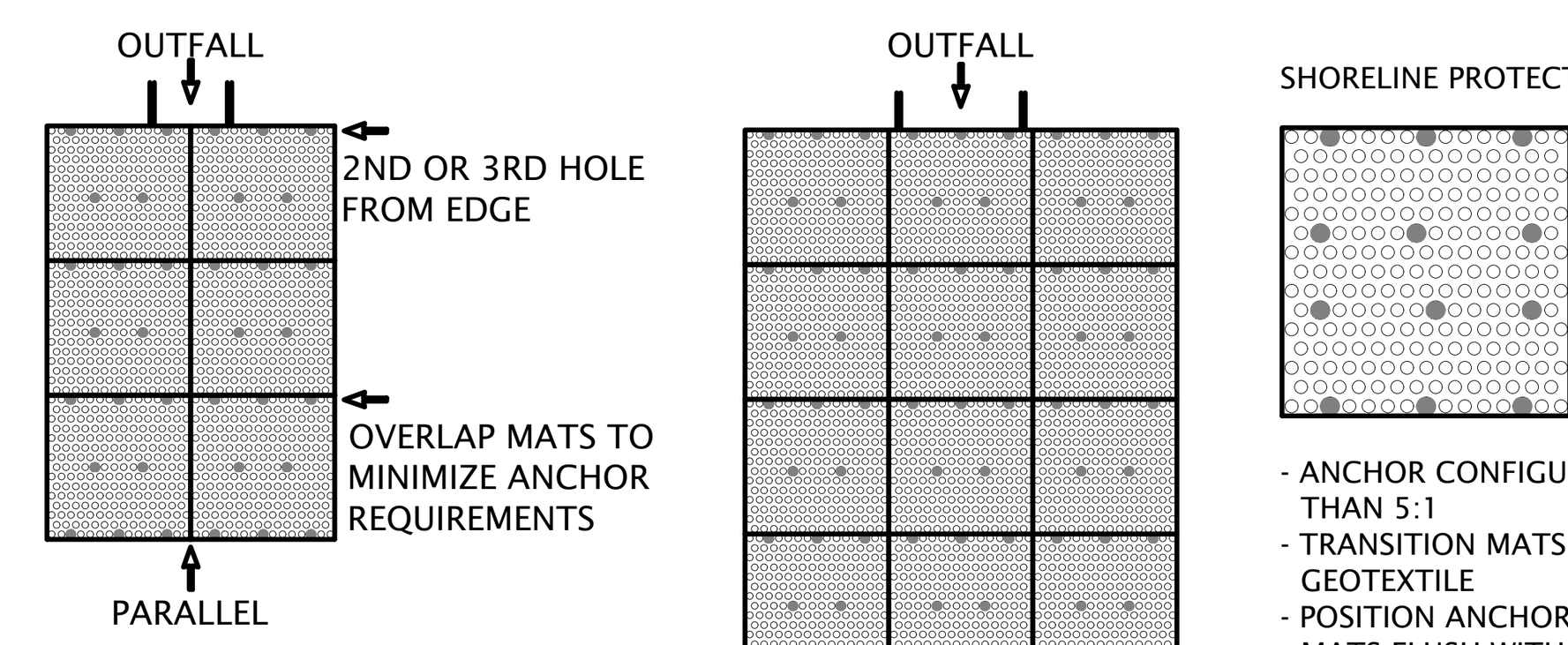
MATERIAL: SCOUR STOP TRANSITION MATS
WH SHURTLEFF COMPANY
11 WALLACE AVENUE
SOUTH PORTLAND, ME 04106
(800) 663-6149
WWW.WHSHURTLEFF.COM

PIPE DIAMETER	DISCHARGE (CFS)	SCOURSTOP WIDTHxLENGTH
12"	8	4' x 4'
24"	30	4' x 8'
36"	75	8' x 12'
48"	100	12' x 16'
60"	150	12' x 20'
72"+		SEE DETAILS

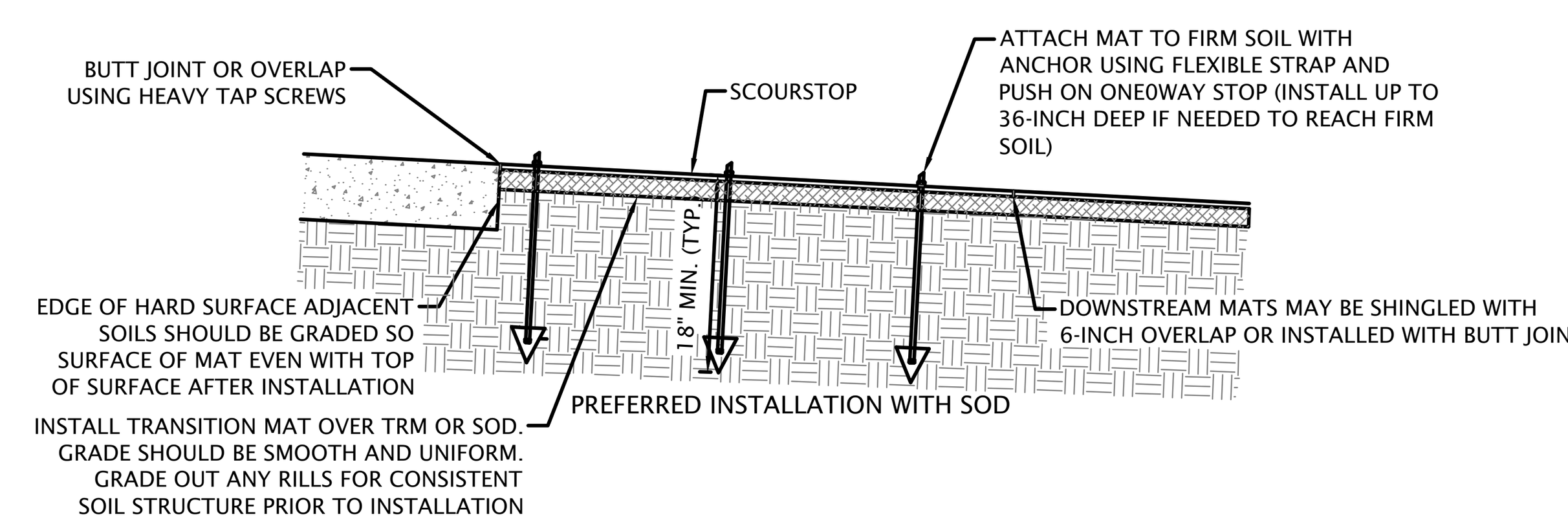


ANCHOR REQUIREMENTS*: FIRST ROW OF SCOURSTOP MATS - MINIMUM OF 8 ANCHORS
SECTION ROW OF SCOURSTOP MATS - MINIMUM OF 5 ANCHORS

* TO ENSURE CONSISTENT CONTACT WITH THE SOIL, EXCEED THE MINIMUM ANCHOR REQUIREMENT AT INSTALLATION OR IMPROVE SOIL SURFACE SMOOTHNESS



- ANCHOR CONFIGURATION FOR SLOPES STEEPER THAN 5:1
- TRANSITION MATS OVER A MINIMUM 8 OZ. GEOTEXTILE
- POSITION ANCHORS TO SECURE SCOURSTOP MATS FLUSH WITH SOIL SURFACE
- MINIMIZE GAPS OR BRIDGING



NOT TO SCALE

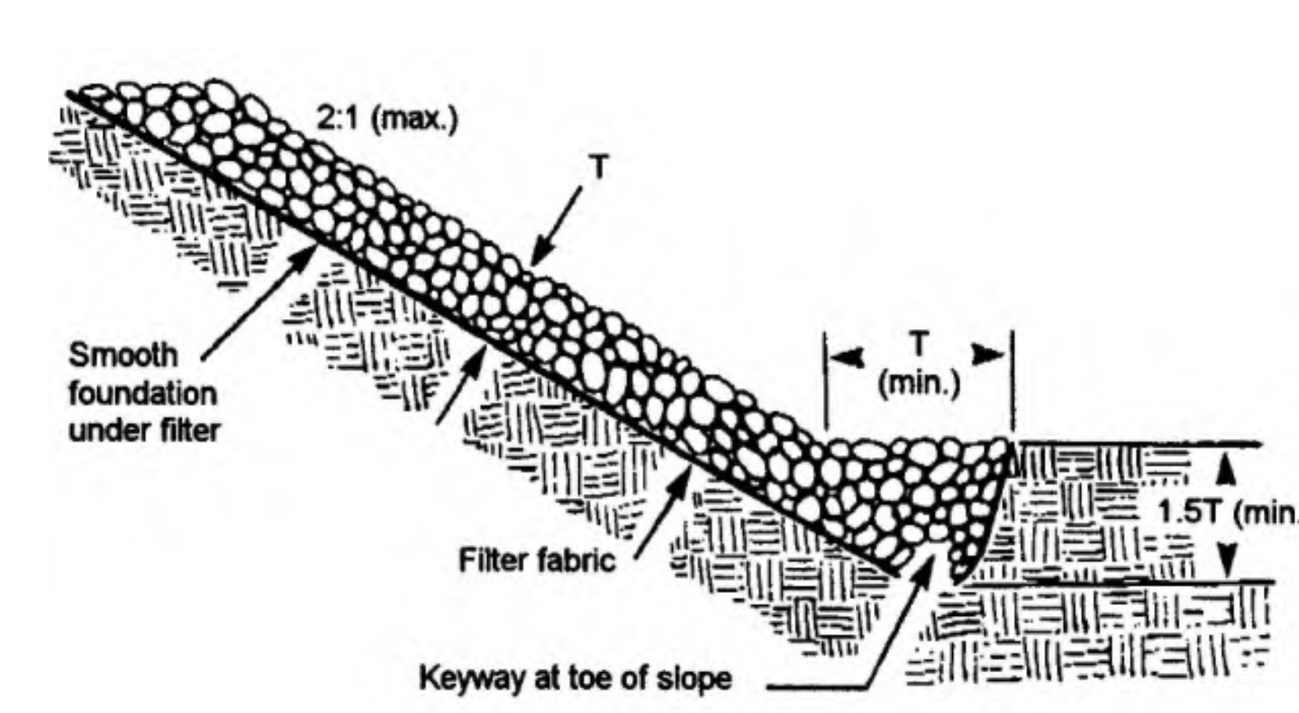
NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURERS' SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.

RIP-RAP FOR SCOUR PROTECTION

MATERIAL: HARD, ANGULAR AND WEATHER-RESISTANT, HAVING A SPECIFIC GRAVITY OF AT LEAST 2.5
GRADATION: WELL-GRADED STONE, 50% (BY WEIGHT LARGER THAN THE SPECIFIED d50; HOWEVER, THE LARGEST PIECES SHOULD NOT EXCEED TWO TIMES THE SPECIFIED d50 AND NO MORE THAN 15% OF THE PIECES (BY WEIGHT) SHOULD BE LESS THAN 3 INCHES.
FILTER: USE GEOTEXTILE FABRIC FOR STABILIZATION AND FILTRATION OR SAND/GRAVEL LAYER PLACED UNDER ALL PERMANENT RIP RAP INSTALLATIONS.
SLOPE: 2:1 OR FLATTER, UNLESS APPROVED IN THE EROSION AND SEDIMENT CONTROL PLAN.
MINIMUM THICKNESS: TWO TIMES THE SPECIFIED d50 STONE DIAMETER.

SUBGRADE PREPARATION

1. REMOVE BRUSH, TREES, STUMPS AND OTHER DEBRIS.
2. EXCAVATE ONLY DEEP ENOUGH FOR BOTH FILTER AND RIP RAP. OVER-EXCAVATION INCREASES THE AMOUNT OF SPOIL CONSIDERABLY.
3. COMPACT ANY FILL MATERIAL TO THE DENSITY OF THE SURROUNDING UNDISTURBED SOIL.
4. CUT KEYWAY IN STABLE MATERIAL AT THE BASE OF THE SLOPE TO REINFORCE TOE. KEYWAY DEPTH SHOULD BE 1.5 TIMES THE DESIGN THICKNESS OF THE RIP RAP AND SHOULD EXTEND A HORIZONTAL DISTANCE EQUAL TO THE DESIGN THICKNESS.
5. SMOOTH THE GRADED FOUNDATION



FILTER PLACEMENT

1. IF USING GEOTEXTILE FABRIC, PLACE IT ON THE SMOOTHED FOUNDATION, OVERLAP THE EDGES AT LEAST 12 INCHES AND SECURE WITH ANCHOR PINS SPACED EVERY 3 FEET ALONG THE OVERLAP.
2. IF USING A SAND/GRAVEL FILTER, SPREAD THE WELL-GRADED AGGREGATE IN A UNIFORM LAYER TO THE REQUIRED THICKNESS (6 INCHES MINIMUM); IF TWO OR MORE LAYERS ARE SPECIFIED, PLACE THE LAYER OF SMALLER GRADATION FIRST AND AVOID MIXING THE LAYERS.

RIP RAP PLACEMENT

1. IMMEDIATELY AFTER INSTALLING THE FILTER, ADD THE RIP RAP TO FULL THICKNESS IN ONE OPERATION. DO NOT DUMP THROUGH CHUTES OR USE ANY METHOD THAT CAUSES SEGREGATION OF ROCK SIZES OR THAT WILL DISLODGE OR DAMAGE THE UNDERLYING FILTER MATERIAL.
2. IF FABRIC IS DAMAGED, REMOVE THE RIP RAP AND REPAIR BY ADDING ANOTHER LAYER OF FABRIC, OVERLAPPING THE DAMAGED AREA BY 12 INCHES.
3. PLACE SMALLER ROCK IN VOIDS TO FORM A DENSE, UNIFORM AND WELL-GRADED MASS. SELECTIVE LOADING AT THE QUARRY AND SOME HAND PLACEMENT MAY BE NEEDED TO ENSURE AN EVEN DISTRIBUTION OF ROCK MATERIAL.
4. BLEND THE ROCK SURFACE SMOOTHLY WITH THE SURROUNDING AREA TO ELIMINATE PROTRUSIONS OR OVER-FALLS.

MAINTENANCE

1. INSPECT PERIODICALLY FOR DISPLACED ROCK MATERIAL, SLUMPING AND EROSION AT EDGES, ESPECIALLY DOWN-STREAM OR DOWN-SLOPE.

SILT FENCE

APPROACH: POOL AREA FLAT (LESS THAN 1% SLOPE), WITH SEDIMENT STORAGE OF 945 CU.FT./ACRE DISTURBED.

MATERIALS: ECONOMY BLUE STRIPE SILT FENCE WITH POSTS, MANUFACTURED BY MIDWEST CONSTRUCTION PRODUCTS AT (800) 532-2381 OR APPROVED EQUAL.

ANCHORING: 2 INCH BY 2 INCH HARDWOOD STAKES WITH A LENGTH EQUAL TO THE HEIGHT OF THE SILT FENCE PLUS 1 FOOT.

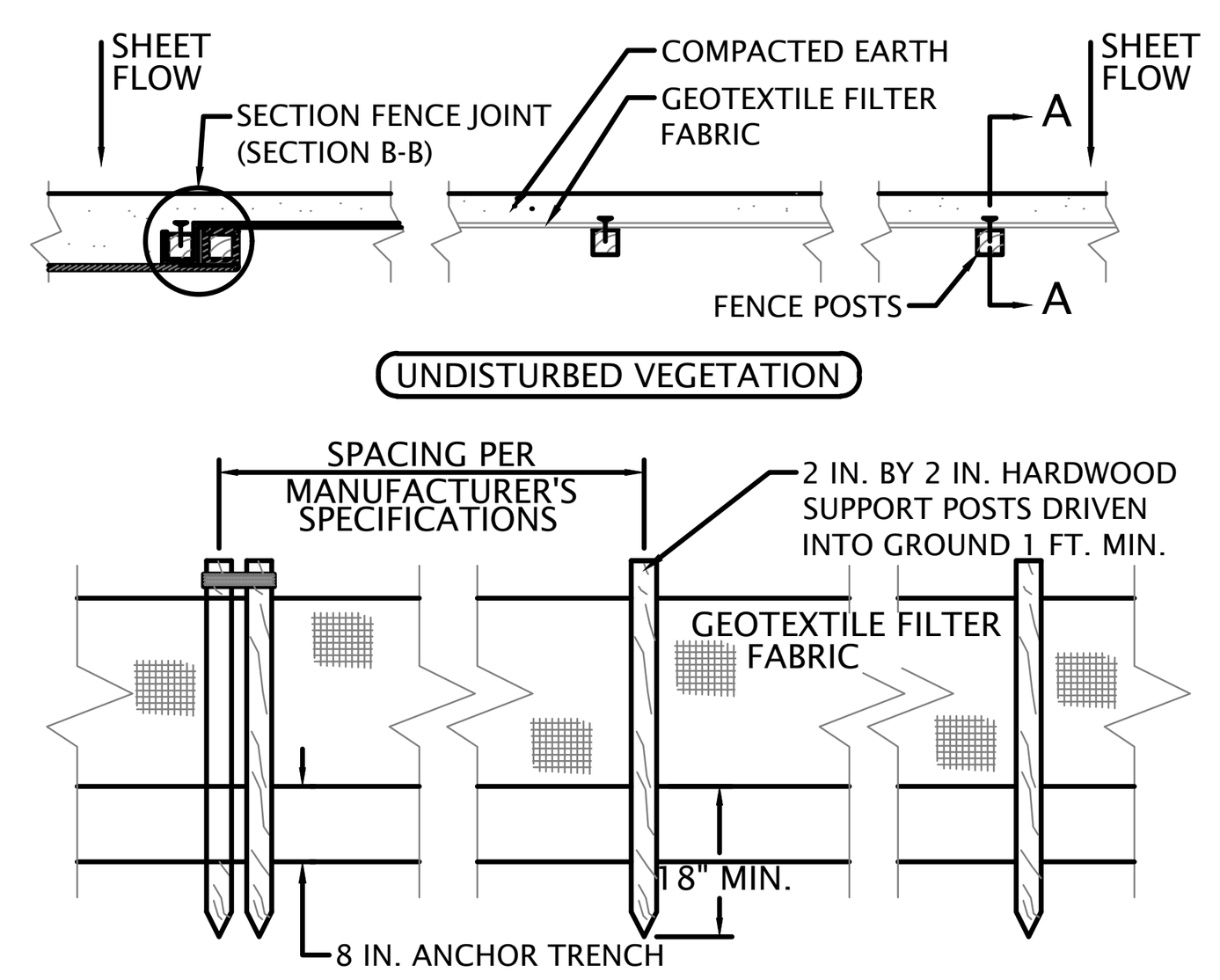
INSTALLATION:

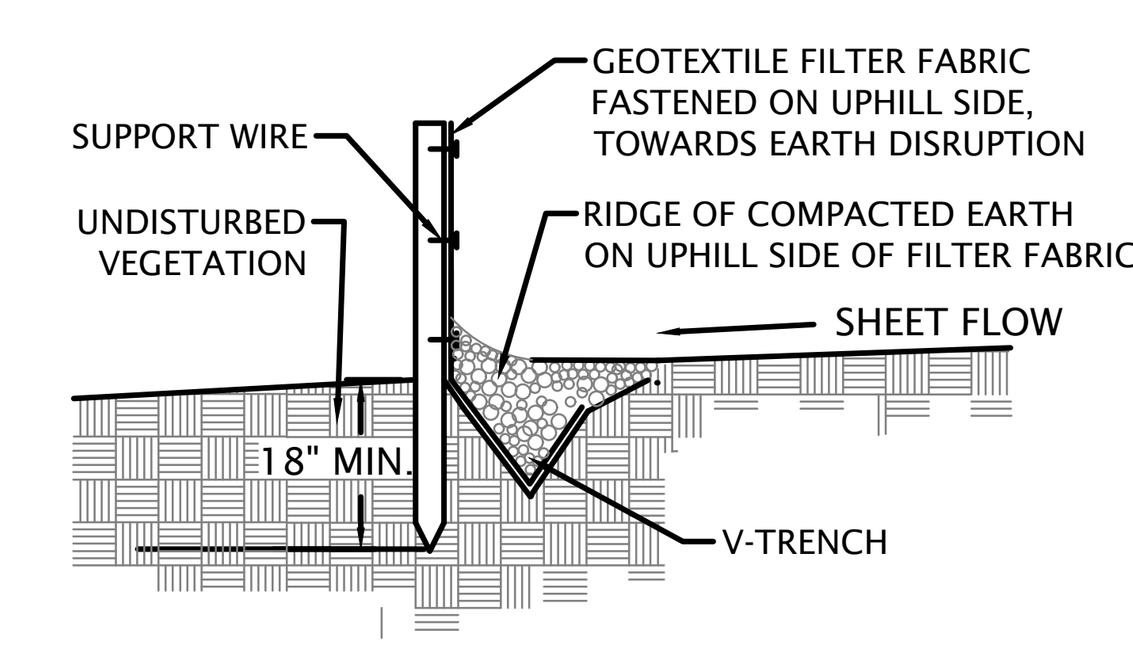
1. DRIVE STAKES 1 FT. (MINIMUM) INTO GROUND AND ATTACH FABRIC TO STAKES WITH STAPLER.
2. BOTTOM OF FABRIC SHALL BE PLACED UNDER 6 INCHES COMPACTED SOIL TO PREVENT SEDIMENT FLOW UNDERNEATH THE FENCE.
3. ENSURE THAT ALL SUPPORTING POSTS ARE ON THE DOWN SLOPE SIDE OF THE FENCING.

MAINTENANCE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR/REPLACE THE SILT FENCE AS NEEDED.

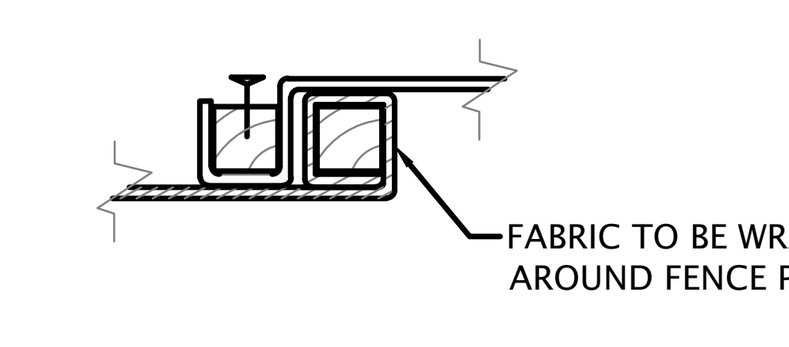
ADDITIONAL CONSIDERATIONS:
1. WHEN PROTECTING SLOPES, FENCES SHOULD BE INSTALLED PARALLEL TO THE SLOPE CONTOUR.
2. ON SLOPES, THE STEEPNESS OF GRADE WILL DETERMINE THE MAXIMUM DISTANCE BETWEEN PARALLEL FENCES.

LESS THAN 2%	100 FT. MAX.
BETWEEN 2% AND 5%	75 FT. MAX.
GREATER THAN 55	ADDITIONAL SURFACE STABILIZATION SHALL BE PROVIDED





SECTION A-A



SECTION B-B

(NOT TO SCALE)

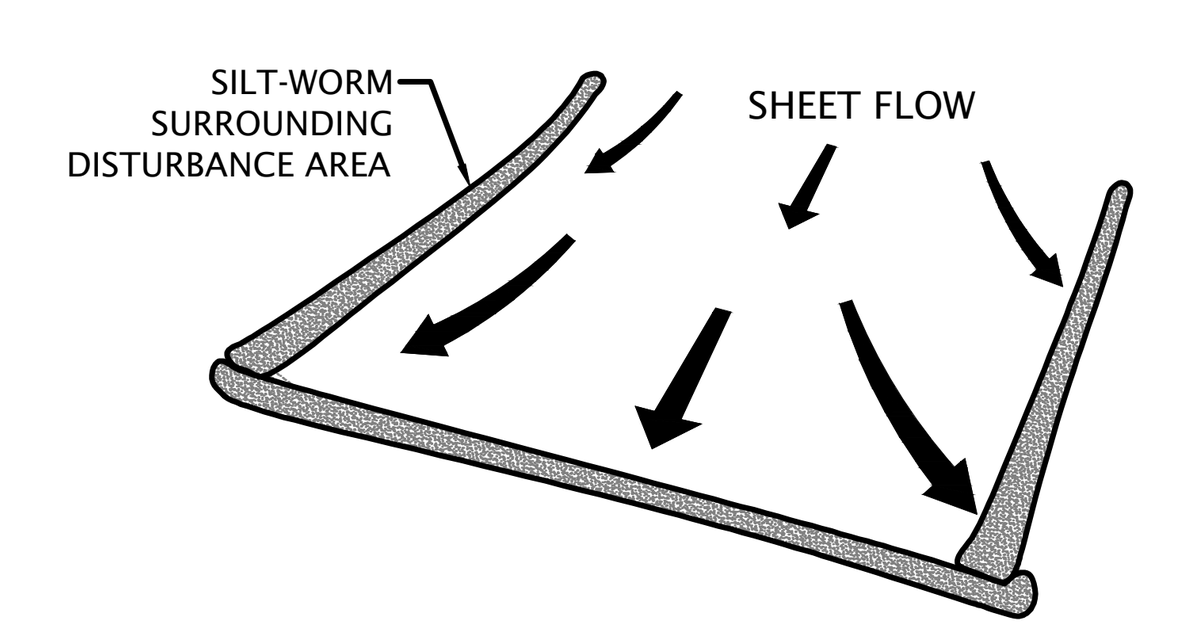
SILT-WORM

MATERIAL: SILT-WORM OR APPROVED EQUAL

DIAMETER: 9 INCHES MINIMUM

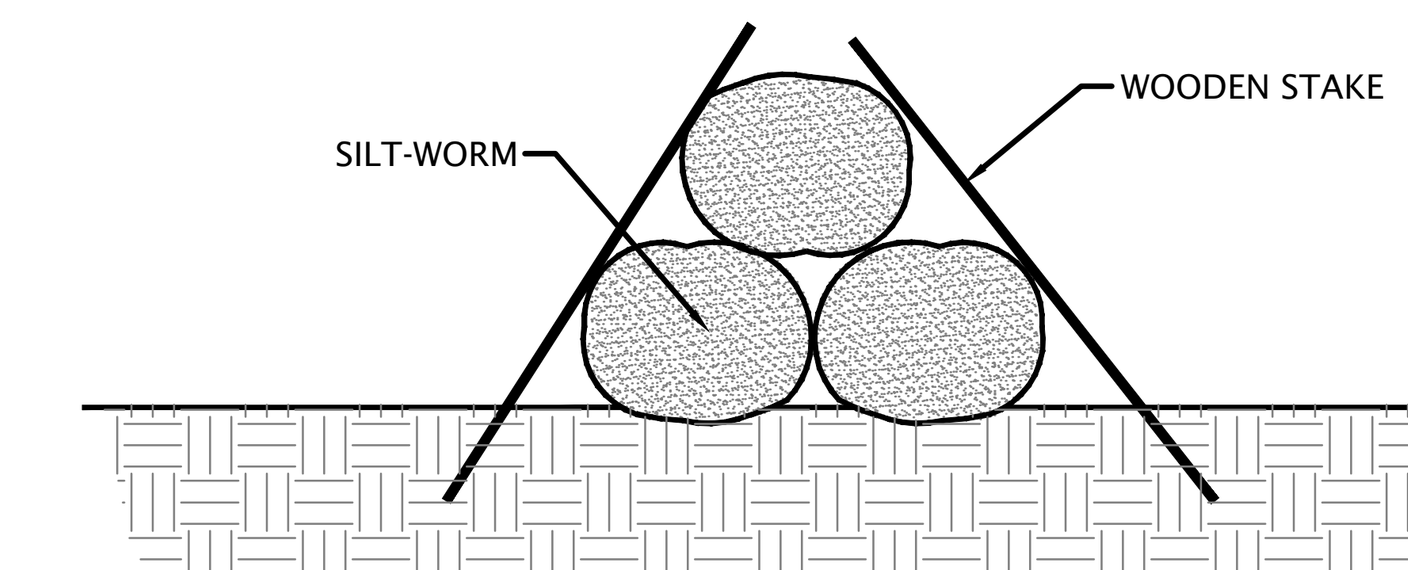
PERIMETER CONTROL

INSTALLATION:
1. PLACE SILT-WORM DIRECLY ON TOP OF GRADE FOR GRADES UNDER 12%.
2. ARRANGE PERIMETER CONTROL IN A MANNER THAT IS APPLIED PERPENDICULAR TO SHEET FLOW.
3. OVERLAP CONTIGUOUS SECTIONS OF SILT WORM AT A MINIMUM OF 6 INCHES.



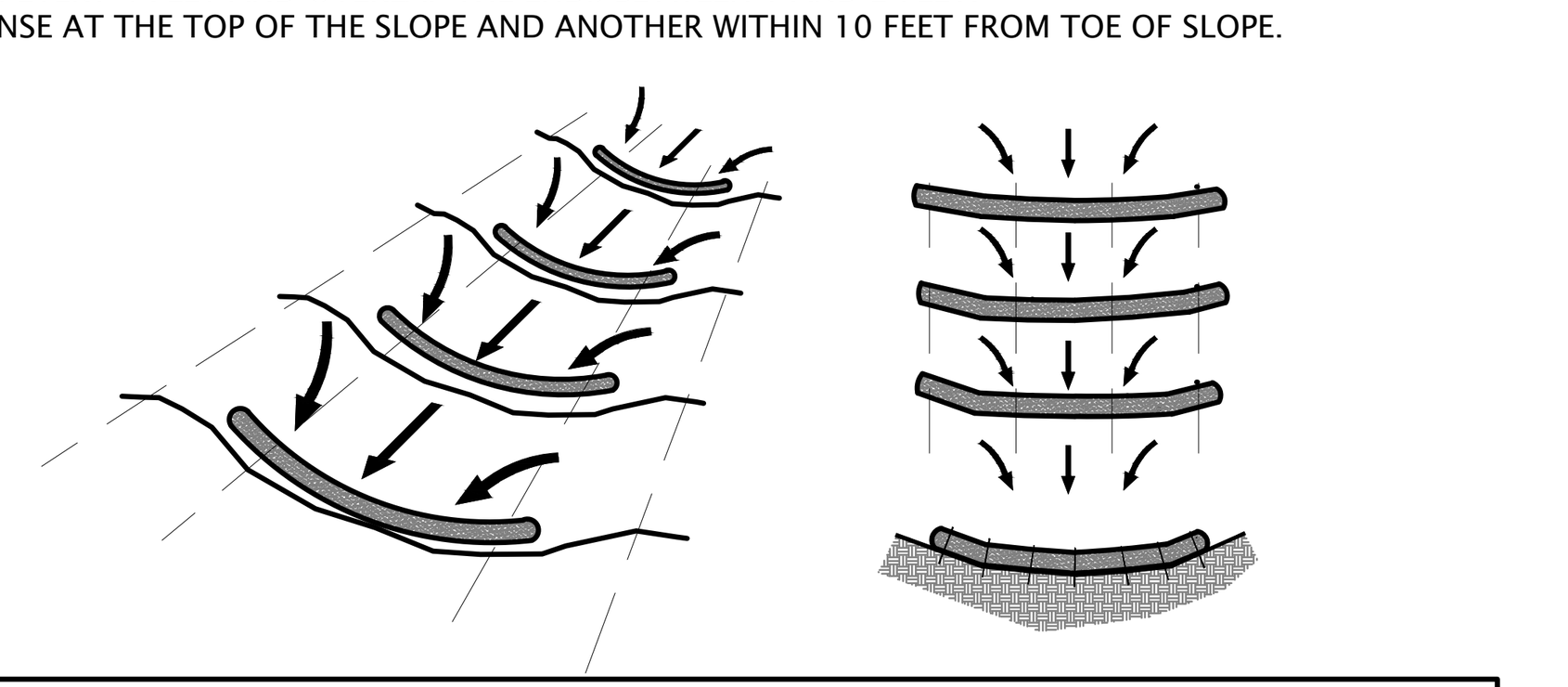
STACKING

INSTALLATION:
1. PLACE SILT-WORM DIRECTLY ON TOP OF GRADE FOR GRADES UNDER 12%.
2. STACK SILT-WORM IN A STAGGERED MANNER, AS SHOWN BELOW.
3. OVERLAP CONTIGUOUS SECTIONS OF SILT-WORM AT A MINIMUM OF 6 INCHES.



SLOPE INTERRUPTION / DITCH CHECK

INSTALLATION:
1. PLACE SILT-WORM PERPENDICULAR TO SHEET FLOW AND CURL ENDS UP TOWARD TOP OF SLOPE.
2. STAKE THE SILT-WORM EVERY 4 FEET AND OVERLAP THE ENDS BETWEEN 1 AND 2 FEET.
3. PLACE A LINE OF DEFENSE AT THE TOP OF THE SLOPE AND ANOTHER WITHIN 10 FEET FROM TOE OF SLOPE.



SPACING FOR SLOPE APPLICATION				
SLOPE	9-inch	12-inch	18-inch	24-inch
2% or less	70 ft.	80 ft.	N/A	N/A
5%	30 ft.	60 ft.	80 ft.	N/A
10%	20 ft.	30 ft.	70 ft.	80 ft.
6:1	N/A	20 ft.	40 ft.	55 ft.
4:1	N/A	20 ft.	30 ft.	30 ft.
3:1	N/A	N/A	20 ft.	25 ft.
2:1	N/A	N/A	20 ft.	20 ft.

SILT-WORM MAINTENANCE GUIDELINES

- INSPECT WITHIN 24 HOURS OF A RAIN EVENT AND AT LEAST ONCE EVERY 7 CALENDAR DAYS.
- IF SILT-WORM TEARS, STARTS TO DECOMPOSE, OR IN ANY WAY BECOMES INEFFECTIVE, REPLACE THE AFFECTED PORTION IMMEDIATELY. NOTE: ALL REPAIRS SHOULD MEET SPECIFICATIONS AS OUTLINED WITHIN THIS MEASURE.
- REMOVE DEPOSITED SEDIMENT WHEN IT IS CAUSING THE SILT-WORM TO BULGE OR WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SILT-WORM AT ITS LOWEST POINT. WHEN CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED, REMOVE THE SILT-WORM AND SEDIMENT DEPOSITS, GRADE THE SITE TO BLEND WITH THE SURROUNDING AREA, AND STABILIZE.

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REGISTERED
NO. PE10910667
STATE OF INDIANA
PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/04/2025

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE:	REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A - Chase Bank
Storm Water Pollution
Prevention Plan Details

NO SCALE

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25-0081	
C302	

EROSION CONTROL MEASURES (continued)

MULCHING

MATERIAL: STRAW, HAY, WOOD FIBER, CELLULOSE OR EXCELSIOR OR EROSION CONTROL BLANKETS OR TURF REINFORCEMENT MATS, AS SPECIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN

COVERAGE: AT LEAST 75% OF THE SOIL SURFACE

ANCHORING: REQUIRED FOR STRAW OR HAY MULCH AND SOMETIMES EXCELSIOR TO PREVENT DISPLACEMENT BY WIND AND/OR WATER

MATERIAL	RATE	COMMENTS
STRAW OR HAY	1.5 TO 2 TONS/ACRE	SHOULD BE DRY, UNCHOPPED, FREE OF UNDESIRABLE SEEDS SPREAD BY HAND OR ANCHORED MUST BE CRIMPED OR ANCHORED
WOOD FIBER OF CELLULOSE	1 TON/ACRE	APPLY WITH A HYDROMULCHER AND USE WITH TACKING AGENT
LONG FIBER WOOD (EXCELSIOR)	0.5 TO 0.75 TON/ACRE	ANCHOR IN AREAS SUBJECT TO WIND

INSTALLATION:
1. APPLY MULCH AT THE RECOMMENDED RATE.
2. SPREAD UNIFORMLY BY HAND, HAY FORK, MULCH BLOWER OR HYDROMULCHER. AFTER SPREADING, NO MORE THAN 25% OF THE GROUND SURFACE SHOULD BE VISIBLE.
3. IF STRAW OR HAY IS USED, ANCHOR IT IMMEDIATELY IN ONE OF THE FOLLOWING WAYS:

MAINTENANCE:
1. DURING VEGETATIVE ESTABLISHMENT, INSPECT AFTER STORM EVENTS FOR ANY EROSION.
2. IF ANY AREA SHOWS EROSION, REPAIR THE GRADE AND RE-APPLY "SILT STOP" POWDER AND RE-LAY AND STAPLE THE BLANKET.
3. AFTER VEGETATIVE ESTABLISHMENT, CHECK THE TREATED AREA PERIODICALLY.

ANCHORING METHOD	HOW TO APPLY
MULCH ANCHORING TOOL OR FARM DISK (DULL, SERRATED AND SET STRAIGHT)	CRIMP OR PUNCH THE STRAW OR HAY INTO THE SOIL 2 TO 4 INCHES. OPERATE MACHINERY ON THE CONTOUR OF SLOPE.
CLEATING WITH DOZER TRACKS	OPERATE DOZER UP AND DOWN SLOPE, NOT ACROSS OR ELSE THE TRACKS WILL FORM RILLS.
WOOD HYDROMULCH FIBERS	APPLY 1 TO 2 TONS/ACRE USING A HYDROMULCHER AT A RATE OF 750 LBS./ACRE WITH A TACKING AGENT (OR ACCORDING TO CONTRACTOR SPECIFICATIONS). DO NOT USE IN AREAS OF CONCENTRATED FLOW.
ASPHALT EMULSION	EMULSIFIED ASPHALT SHOULD CONFORM TO THE REQUIREMENTS OF ASTEM SPEC. #977. APPLY WITH SUITABLE EQUIPMENT AT A RATE OF 0.05 GAL./SY. DO NOT USE IN AREAS OF CONCENTRATED FLOW.
SYNTHETIC TACKIFIER, BINDER OR SOIL STABILIZER	APPLY ACCORDING TO MANUFACTURER'S RECOMMENDATIONS
BIODEGRADABLE NETTING (POLYPROPYLENE OR SIMILAR MATERIAL)*	APPLY OVER MULCH AND STAPLE WITH 6 TO 8 INCH WIRE STAPLES. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION. BEST SUITED TO SLOPE APPLICATION.

* INSTALL THE NETTING IMMEDIATELY AFTER APPLYING THE MULCH. IN AREAS OF CONCENTRATED WATER FLOW, LAY NETTING PARALLEL TO THE DIRECTION OF FLOW. ON OTHER SLOPES, LAY NETTING EITHER PARALLEL OR PERPENDICULAR TO DIRECTION OF FLOW. EDGES OF ADJACENT NETTING STRIPS SHOULD OVERLAP 4 TO 6 INCHES WITH THE STRIP ON THE UPGRADE SIDE OF ANY LATERAL WATER FLOW ON TOP. INSTALLATION DETAILS ARE SITE SPECIFIC, SO FOLLOW THE MANUFACTURER'S DIRECTIONS.

MAINTENANCE:
1. INSPECT AFTER STORM EVENTS TO CHECK FOR MOVEMENT OF MULCH OR FOR EROSION.
2. IF WASHOUT, BREAKAGE, OR EROSION IS PRESENT, REPAIR THE SURFACE, THEN RE-SEED, RE-MULCH AND, IF APPLICABLE, INSTALL NEW NETTING.
3. CONTINUE INSPECTIONS UNTIL VEGETATION IS FIRMLY ESTABLISHED.

SOIL ROUGHENING

DESCRIPTION:
SOIL ROUGHENING IS A TEMPORARY EROSION CONTROL PRACTICE OFTEN USED IN CONJUNCTION WITH GRADING. SOIL ROUGHENING INVOLVES INCREASING THE RELIEF OF A BARE SOIL SURFACE WITH HORIZONTAL GROOVES BY EITHER STAIR-STEPPING (RUNNING PARALLEL TO THE CONTOUR OF THE LAND) OR USING CONSTRUCTION EQUIPMENT TO TRACK THE SURFACE. SLOPES THAT ARE NOT FINE GRADED AND LEFT IN A ROUGHENED CONDITION CAN ALSO REDUCE EROSION. SOIL ROUGHENING REDUCES RUNOFF VELOCITY, INCREASES INFILTRATION, REDUCES EROSION, TRAPS SEDIMENT, AND PREPARES THE SOIL FOR SEEDING AND PLANTING BY GIVING SEED AN OPPORTUNITY TO TAKE HOLD AND GROW.

APPLICABILITY:
SOIL ROUGHENING IS APPROPRIATE FOR ALL SLOPES, BUT WORKS ESPECIALLY WELL ON SLOPES GREATER THAN 3:1, ON PILES OF EXCAVATED SOIL, AND IN AREAS WITH HIGHLY ERODIBLE SOILS. THIS TECHNIQUE IS ESPECIALLY APPROPRIATE FOR SOILS THAT ARE FREQUENTLY DISTURBED, BECAUSE ROUGHENING IS RELATIVELY EASY. TO SLOW EROSION, ROUGHEN THE SOIL AS SOON AS POSSIBLE AFTER THE VEGETATION HAS BEEN REMOVED FROM THE SLOPE OR IMMEDIATELY AFTER GRADING ACTIVITIES HAVE CEASED (TEMPORARILY OR PERMANENTLY). USE THIS PRACTICE IN CONJUNCTION WITH SEEDING, PLANTING, AND TEMPORARY MULCHING TO STABILIZE AN AREA. A COMBINATION OF SURFACE ROUGHENING AND VEGETATION IS APPROPRIATE FOR STEEPER SLOPES AND SLOPES THAT WILL BE LEFT BARE FOR LONGER PERIODS OF TIME.

SITING AND DESIGN CONSIDERATIONS:
ROUGHENED SLOPE SURFACES HELP ESTABLISH VEGETATION, IMPROVE INFILTRATION, AND DECREASE RUNOFF VELOCITY. A ROUGH SOIL SURFACE ALLOWS SURFACE PONDING THAT PROTECTS LIME, FERTILIZER, AND SEED AND DECREASES EROSION POTENTIAL. GROOVES IN THE SOIL ARE COOLER AND PROVIDE MORE FAVORABLE MOISTURE CONDITIONS THAN HARD, SMOOTH SURFACES. THESE CONDITIONS PROMOTE SEED GERMINATION AND VEGETATIVE GROWTH.
AVOID EXCESSIVE SOIL COMPACTING, BECAUSE THIS INHIBITS VEGETATION GROWTH AND CAUSES HIGHER RUNOFF VELOCITY. LIMIT ROUGHENING WITH TRACKED MACHINERY TO SANDY SOILS THAT DO NOT COMPACT EASILY; ALSO, AVOID TRACKING ON HEAVY CLAY SOILS, ESPECIALLY WHEN WET. SEED ROUGHENED AREAS AS QUICKLY AS POSSIBLE, AND FOLLOW PROPER PROCEDURES.
DEPENDING ON THE TYPE OF SLOPE AND THE AVAILABLE EQUIPMENT, USE DIFFERENT METHODS FOR ROUGHENING SOIL ON A SLOPE. THESE INCLUDE STAIR-STEP GRADING, GROOVING, AND TRACKING. WHEN CHOOSING A METHOD, CONSIDER FACTORS SUCH AS SLOPE STEEPNESS, MOWING REQUIREMENTS, WHETHER THE SLOPE IS FORMED BY CUTTING OR FILLING, AND AVAILABLE EQUIPMENT. CHOOSE FROM THE FOLLOWING METHODS FOR SURFACE ROUGHENING:

- *CUT SLOPE ROUGHENING FOR AREAS THAT WILL NOT BE MOWED.* USE STAIR-STEP GRADES OR GROOVE-CUT SLOPES FOR GRADIENTS STEEPER THAN 3:1. USE STAIR-STEP GRADING ON ANY ERODIBLE MATERIAL THAT IS SOFT ENOUGH TO BE RIPPED WITH A BULLDOZER. ALSO, IT IS WELL SUITED FOR SLOPES CONSISTING OF SOFT ROCK WITH SOME SUBSOIL. MAKE THE VERTICAL CUT DISTANCE LESS THAN THE HORIZONTAL DISTANCE, AND SLOPE THE HORIZONTAL PORTION OF THE STEP SLIGHTLY TOWARD THE VERTICAL WALL. KEEP INDIVIDUAL VERTICAL CUTS LESS THAN 2 FEET DEEP IN SOFT MATERIALS AND LESS THAN 3 FEET DEEP IN ROCKY MATERIALS.
- *GROOVING.* THIS TECHNIQUE USES MACHINERY TO CREATE A SERIES OF RIDGES AND DEPRESSIONS THAT RUN ACROSS THE SLOPE ALONG THE CONTOUR. MAKE GROOVES USING ANY APPROPRIATE IMPLEMENT THAT CAN BE SAFELY OPERATED ON THE SLOPE, SUCH AS DISKS, TILLERS, SPRING HARROWS, OR THE TEETH ON A FRONT-END LOADER BUCKET. MAKE THE GROOVES LESS THAN 3 INCHES DEEP AND LESS THAN 15 INCHES APART.
- *FILL SLOPE ROUGHENING FOR AREAS THAT WILL NOT BE MOWED.* FILL SLOPES WITH A GRADIENT STEEPER THAN 3:1 SHOULD BE PLACED IN LIFTS LESS THAN 9 INCHES, AND PROPERLY COMPACT EACH LIFT. THE FACE OF THE SLOPE SHOULD CONSIST OF LOOSE, UNCOMPACTED FILL 4 TO 6 INCHES DEEP. IF NECESSARY, ROUGHEN THE FACE OF THE SLOPES BY GROOVING THE SURFACE AS DESCRIBED ABOVE. DO NOT BLADE OR SCRAPE THE FINAL SLOPE FACE.
- *CUTS, FILLS, AND GRADED AREAS THAT WILL BE MOWED.* MAKE MOWED SLOPES NO STEEPER THAN 3:1. ROUGHEN THESE AREAS WITH SHALLOW GROOVES LESS THAN 10 INCHES APART AND DEEPER THAN 1 INCH USING NORMAL TILLING, DISKING, OR HARROWING EQUIPMENT (A CULTIPACKER-SEEDER CAN ALSO BE USED). EXCESSIVE ROUGHNESS IS UNDESIRABLE WHERE MOWING IS PLANNED.
- *ROUGHENING WITH TRACKED MACHINERY.* TO AVOID UNDUE COMPACTION OF THE SOIL SURFACE, LIMIT ROUGHENING WITH TRACKED MACHINERY ONLY TO SANDY SOILS. OPERATE TRACKED MACHINERY PERPENDICULARLY TO THE SLOPE TO LEAVE HORIZONTAL DEPRESSIONS IN THE SOIL. TRACKING IS GENERALLY NOT AS EFFECTIVE AS OTHER ROUGHENING METHODS.

LIMITATIONS:
SOIL ROUGHENING IS NOT APPROPRIATE FOR ROCKY SLOPES. TRACKED MACHINERY CAN EXCESSIVELY COMPACT THE SOIL. TYPICALLY, SOIL ROUGHENING IS EFFECTIVE ONLY FOR GENTLE OR SHALLOW DEPTH RAINS. IF ROUGHENING IS WASHED AWAY IN A HEAVY STORM, RE-ROUGHEN THE SURFACE AND RESEED.

MAINTENANCE CONSIDERATIONS:
INSPECT ROUGHENED AREAS AFTER STORMS TO SEE IF RE-ROUGHENING IS NEEDED. REGULAR INSPECTION SHOULD INDICATE WHERE ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES ARE NEEDED. IF RILLS (SMALL WATERCOURSES THAT HAVE STEEP SIDES AND ARE USUALLY ONLY A FEW INCHES DEEP) APPEAR, FILL, REGRADE, AND RESEED THEM IMMEDIATELY. USE PROPER METHODS.

EFFECTIVENESS:
SOIL ROUGHENING PROVIDES MODERATE EROSION PROTECTION FOR BARE SOILS WHILE VEGETATIVE COVER IS BEING ESTABLISHED. IT IS INEXPENSIVE AND SIMPLE FOR SHORT-TERM EROSION CONTROL WHEN USED WITH OTHER EROSION AND SEDIMENT CONTROLS.

TOPSOIL (SALVAGE AND UTILIZATION)

SALVAGING AND STOCKPILING:
1. DETERMINE DEPTH AND SUITABILITY OF TOPSOIL AT THE SITE.
2. PRIOR TO STRIPPING TOPSOIL, INSTALL ANY SITE-SPECIFIC DOWNSLOPE PRACTICES NEEDED TO CONTROL RUNOFF AND SEDIMENTATION.
3. REMOVE THE SOIL MATERIAL NO DEEPER THAN WHAT THE COUNTY SOIL SURVEY DESCRIBES AS "SURFACE SOIL" (i.e., A OR AP HORIZON).
4. STOCKPILE THE MATERIAL IN ACCESSIBLE LOCATIONS THAT NEITHER INTERFERE WITH OTHER CONSTRUCTION ACTIVITIES NOR BLOCK NATURAL DRAINAGE; AND INSTALL SILT FENCES, STRAW BALES, OR OTHER BARRIERS TO TRAP SEDIMENT. (SEVERAL SMALLER PILES AROUND THE CONSTRUCTION SITE ARE USUALLY MORE EFFICIENT AND EASIER TO CONTAIN THAN ONE LARGE PILE.)
5. IF SOIL IS STOCKPILED FOR MORE THAN 6 MOS., IT SHOULD BE TEMPORARILY SEEDED OR COVERED WITH A TARP OR SURROUNDED BY A SEDIMENT BARRIER.

SPREADING TOPSOIL:
1. PRIOR TO APPLYING TOPSOIL, GRADE THE SUBSOIL AND ROUGHEN THE TOP 3-4 IN. BY DISKING. THIS HELPS THE TOPSOIL BOND WITH THE SUBSOIL.
2. DO NOT APPLY TOPSOIL WHEN THE SITE IS WET, MUDDY OR FROZEN, BECAUSE IT MAKES SPREADING DIFFICULT, INHIBITS BONDING, AND CAN CAUSE COMPACTION PROBLEMS.
3. APPLY TOPSOIL EVENLY TO A DEPTH OF AT LEAST 4 IN. (8-12 IN. IF THE UNDERLYING MATERIAL IS BEDROCK, LOOSE SAND, ROCK FRAGMENTS, GRAVEL OR OTHER UNSUITABLE SOIL MATERIAL) COMPACT SLIGHTLY TO IMPROVE CONTACT WITH THE SUBSOIL.
4. AFTER SPREADING, GRADE AND STABILIZE.

MAINTENANCE:
2. INSPECT NEWLY TOPSOILED AREAS FREQUENTLY UNTIL VEGETATION IS ESTABLISHED.
3. REPAIR ERODED OR DAMAGED AREAS AND REPLANT.

TEMPORARY SEEDING

SITE PREPARATION:
1. THESE INSTALLATION PRACTICES ARE NEEDED TO CONTROL EROSION, SEDIMENTATION, AND WATER RUNOFF, SUCH AS TEMPORARY AND PERMANENT DIVERSIONS, SEDIMENT TRAPS OR BASINS, SILT FENCES, AND TRIANGULAR SILT DIKES.
2. GRADE THE SITE AS SPECIFIED IN THE CONSTRUCTION PLAN.

SEEDBED PREPARATION:
1. FERTILIZE AS REQUIRED.
2. WORK THE FERTILIZER INTO THE SOIL 2-4 IN. DEEP WITH A DISK OR RAKE OPERATED ACROSS THE SLOPE

SEEDING:
1. SELECT A SEEDING MIXTURE AND RATE FROM THE TABLE AND PLANT AT DEPTH AND ON DATES SHOWN.
2. APPLY SEED UNIFORMLY WITH A DRILL OR CULTIPACKER-SEEDER OR BY BROADCASTING, AND COVER TO THE DEPTH SHOWN.
3. IF DRILLING OR BROADCASTING, FIRM THE SEEDBED WITH A ROLLER OR CULTIPACKER.
4. MULCH SEEDED AREAS TO INCREASE SEEDING SUCCESS.
5. UPON COMPLETION OF THE ROUGH GRADING, ALL AREAS AFFECTED BY CONSTRUCTION SHALL BE TEMPORARILY SEEDED IF THEY WILL REMAIN DORMANT FOR GREATER THAN 7 DAYS. THESE AREAS SHALL BE STABILIZED WITHIN 14 DAYS OF REMAINING DORMANT AND EROSION CONTROL BLANKETS SHALL BE INSTALLED ON SIDE SLOPES AS SHOWN ON THE PLANS.

1. MAINTENANCE
2. INSPECT PERIODICALLY AFTER PLANTING TO SEE THAT VEGETATIVE STANDS ARE ADEQUATELY ESTABLISHED, RE-SEED IF NECESSARY. CHECK FOR EROSION DAMAGE AFTER STORM EVENTS AND REPAIR, RESEED AND MULCH IF NECESSARY.
3. TOP-DRESS FALL SEEDED WHEAT OR RYE SEEDING WITH 50 LBS./ACRE OF NITROGEN IN FEBRUARY OR MARCH IF NITROGEN DEFICIENCY IS APPARENT. TEMPORARY SEEDING RECOMMENDATIONS

TEMPORARY SEEDING RECOMMENDATIONS:

SEED SPECIES	RATE/ACRE	PLANTING DEPTH	OPTIMUM DATES**
WHEAT OR RYE	150 LBS.	1 TO 1.5 INCHES	SEPTEMBER 15 TO OCTOBER 30
SPRING OATS	100 LBS.	1 INCH	MARCH 1 TO APRIL 15
ANNUAL RYEGRASS	40 LBS.	0.25 INCH	MARCH 1 TO MAY 1 AUGUST 1 TO SEPTEMBER 1
GERMAN MILLET	40 LBS.	1 TO 2 INCHES	MAY 1 TO JUNE 1
SUDANGRASS	35 LBS.	1 TO 2 INCHES	MAY 1 TO JULY 30

* PERENNIAL SPECIES MAY BE USED AS A TEMPORARY COVER, ESPECIALLY IF THE AREA TO BE SEEDED WILL REMAIN IDLE FOR MORE THAN A YEAR
** SEEDING DONE OUTSIDE THE OPTIMUM DATES INCREASES THE CHANCE OF SEEDING FAILURE

PERMANENT SEEDING

PERMANENTLY SEED ALL FINAL GRADE AREAS (E.G., LANDSCAPE BERMS, DRAINAGE SWALES, EROSION CONTROL STRUCTURES, ETC.) AS EACH IS COMPLETED AND ALL AREAS WHERE ADDITIONAL WORK IS NOT SCHEDULED FOR A PERIOD OF MORE THAN A YEAR.

SITE PREPARATION:
1. THESE INSTALLATION PRACTICES ARE NEEDED TO CONTROL EROSION, SEDIMENTATION, AND WATER RUNOFF, SUCH AS TEMPORARY AND PERMANENT DIVERSIONS, SEDIMENT TRAPS OR BASINS, SILT FENCES, AND TRIANGULAR SILT DIKES.
2. GRADE THE SITE AS SPECIFIED IN THE CONSTRUCTION PLAN AND FILL IN DEPRESSIONS THAT CAN COLLECT WATER.
3. ADD TOPSOIL TO ACHIEVE NEEDED DEPTH FOR ESTABLISHMENT OF VEGETATION.

SEEDBED PREPARATION:
1. FERTILIZE AS REQUIRED.
2. TILL THE SOIL TO OBTAIN A UNIFORM SEEDBED, WORKING THE FERTILIZER INTO THE SOIL 2-4 IN. DEEP WITH A DISK OR RAKE OPERATED ACROSS THE SLOPE.

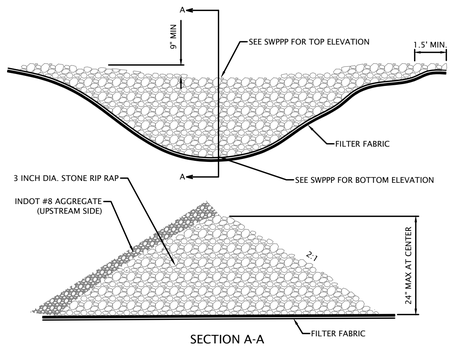
SEEDING:
OPTIMUM SEEDING DATES ARE MARCH 1-MAY 10 AND AUGUST 10-SEPTEMBER 30. PERMANENT SEEDING DONE BETWEEN MAY 10 AND AUGUST 10 MAY NEED TO BE IRRIGATED. AS AN ALTERNATIVE, USE TEMPORARY SEEDING UNTIL THE PREFERRED DATE FOR PERMANENT SEEDING.
1. SELECT A SEEDING MIXTURE AND RATE FROM THE TABLE AND PLANT AT DEPTH AND ON DATES SHOWN.
2. APPLY SEED UNIFORMLY WITH A DRILL OR CULTIPACKER-SEEDER OR BY BROADCASTING, AND COVER TO THE DEPTH SHOWN.
3. IF DRILLING OR BROADCASTING, FIRM THE SEEDBED WITH A ROLLER OR CULTIPACKER.
4. MULCH SEEDED AREAS. USE EROSION CONTROL BLANKETS ON SLOPING AREAS. IF SEEDING IS DONE WITH A HYDROSEEDER, FERTILIZER AND MULCH CAN BE APPLIED WITH THE SEED IN A SLURRY MIXTURE.

MAINTENANCE
1. INSPECT PERIODICALLY AFTER PLANTING TO SEE THAT VEGETATIVE STANDS ARE ADEQUATELY ESTABLISHED, RE-SEED IF NECESSARY.
2. CHECK FOR EROSION DAMAGE AFTER STORM EVENTS AND REPAIR, RESEED AND MULCH IF NECESSARY.

PERMANENT SEEDING RECOMMENDATIONS
THIS TABLE PROVIDES SEVERAL SEEDING OPTIONS. ADDITIONAL SEED SPECIES AND MIXTURES ARE AVAILABLE COMMERCIALLY. WHEN SELECTING A MIXTURE, CONSIDER SITE CONDITIONS, INCLUDING SOIL PROPERTIES (E.G., SOIL PH AND DRAINAGE), SLOPE ASPECT AND THE TOLERANCE OF EACH SPECIES TO SHADE AND DROUGHT.

SEED SPECIES AND MIXTURES	RATE/ACRE	OPTIMUM SOIL pH
OPEN AND DISTURBED AREAS (REMAINING IDLE FOR MORE THAN ONE YEAR)		
PERENNIAL RYEGRASS + WHITE OR LADINO DOVER	30 TO 50 LBS. 1 TO 2 LBS.	5.6 TO 7.0
KENTUCKY BLUEGRASS + SMOOTH BROMEGRASS + SWITCHGRASS + TIMOTHY + PERENNIAL RYEGRASS + WHITE OR LADINO DOVER	20 LBS. 10 LBS. 3 LBS. 4 LBS. 10 LBS. 1 TO 2 LBS.	5.5 TO 7.5

RUNOFF CONTROL MEASURES
RIP-RAP CHECK DAMS



SECTION A-A
(NOT TO SCALE)

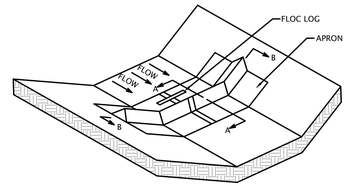
MAINTENACE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR/REPLACE THE CHECK DAMS AS NEEDED.

TRIANGULAR SILT FENCE DIKE - CHECK DAMS

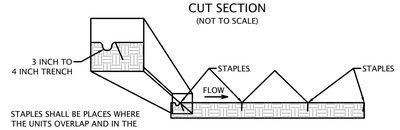
MATERIAL: THE TRIANGULAR-SHAPED INNER MATERIAL SHALL BE URETHANE FORM. THE OUTER COVER SHALL BE A WOVEN GEOTEXTILE FABRIC PLACED AROUND THE INNER MATERIAL AND ALLOWED TO EXTEND BEYOND BOTH SIDES OF THE TRIANGLE 2 TO 3 FEET.

ANCHORING: THE DIKES SHALL BE ATTACHED TO THE GROUND WITH WIRE STAPLES. THE STAPLES SHALL BE #11 GAUGE WIRE AND BE AT LEAST 6 TO 8 INCHES LONG. STAPLES SHALL BE PLACED AS INDICATED ON THE INSTALLATION DETAIL.

INSTALLATION:
1. PLACE TRIANGULAR SILT FENCE DIKE AS REQUIRED.
2. ATTACHED DIKES TO THE GROUND WITH STAPLES AS INDICATED ON THE DETAIL.

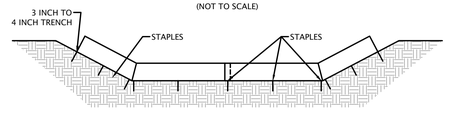


SILT DIKE UNIT
CUT SECTION
(NOT TO SCALE)



STAPLES SHALL BE PLACES WHERE THE UNITS OVERLAP AND IN THE CENTER OF THE 7 FT. UNIT AS SHOWN ON THE DIAGRAM

SECTION A-A
(NOT TO SCALE)



POINT "1" MUST BE HIGHER THAN POINT "2" TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS

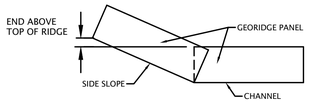
DIKE SECTION
SECTION B-B
(NOT TO SCALE)

MAINTENACE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR/REPLACE THE CHECK DAMS AS NEEDED.

GEORIDGE DITCH BERM - CHECK DAMS

MATERIAL: GEORIDGE OR GEORIDGE BIO BY NILEX PRODUCTS, AN HDPE PRODUCT THAT SERVES TO DISSIPATE WATER ENERGY WITHIN A DITCH OR CHANNEL. GEORIDGE IS TO BE USED IN APPLICATIONS WHERE THE MEASURE WILL BE REMOVED AFTER THE CHANNEL IS STABILIZED. GEORIDGE BIO CAN BE USED WHEN THE MEASURE CAN BE LEFT TO DECOMPOSE IN LIEU OF BEING REMOVED.

INSTALLATION:
1. PLACE AN EROSION CONTROL BLANKET (ECB), LAID PARALLEL WITH THE CHANNEL DIRECTION, IN THE AREA WHERE THE GEORIDGE IS TO BE PLACED. ECB SHALL BE APPROPRIATE FOR THE CHANNEL SLOPE, VOLUME AND VELOCITY.
ECB SHALL BE SECURED WITH A 4" TRENCH AT THE UPSTREAM EDGE, WITH MINIMUM 6-INCH STAPLES PLACED 21-INCH O.C. ALONG THE UPSTREAM AND DOWNSTREAM EDGES.
2. PLACE GEORIDGE BERM IN THE MIDDLE OF THE ECB, PERPENDICULAR TO THE CHANNEL FLOW DIRECTION, AND ANCHOR WITH 10-INCH SPIRAL SPIKES. A MINIMUM OF 3 ANCHORS SHALL BE USED ON THE UPSTREAM SIDE AND 2 ANCHORS ON THE DOWNSTREAM SIDE.
IF MORE THAN ONE GEORIDGE BERM PANEL IS REQUIRED TO SPAN THE CHANNEL, LINE UP THE ANCHORING HOLES FOR INSTALLATION OF THE ANCHORS.
3. WHEN PLACING THE GEORIDGE PANEL ON THE SIDE SLOPE OF THE CHANNEL, THE BOTTOM OF THE PANELS SHOULD MEET WITH THE RIDGE BEING OVERLAPPED. THIS WILL PREVENT WATER FROM PASSING THROUGH THE BERM.
ADDITIONALLY, THE OUTSIDE EDGE OF THE PANEL ON THE SIDE SLOPE SHOULD BE INSTALLED SO THAT IT IS HIGHER THAN THE TOP OF THE PANEL IN THE CHANNEL BOTTOM.



4. THE SPACING IS CALCULATED BY DIVIDING THE HEIGHT OF THE GEORIDGE BY THE GRADIENT OF THE CHANNEL SLOPE. 9-INCH / 0.0.2 GRADIENT = 450 INCHES OR 37.5 FEET

MAINTENANCE
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT WHEN IT REACHES HALF THE HEIGHT OF THE GEORIDGE.
3. REPAIR/REPLACE THE GEORIDGE AND THE EROSION CONTROL MAT AS NEEDED.

SEDIMENT CONTROL MEASURES
POLYMER SYSTEMS

MATERIAL: APS 700 SERIES FLOC LOG OR EQUAL

INSTALLATION:
1. THE FLOC LOG VENDOR SHALL SAMPLE THE WATER THAT IS TO BE TREATED WITH THE SYSTEM. THIS SAMPLE SHALL BE USED TO DETERMINE THE SITE-SPECIFIC POLYMER MIX THAT SHOULD BE USED.
2. IN APPLICATIONS WHERE THE OBJECTIVE OF THIS MEASURE IS TO MEET THE TOTAL SUSPENDED SOLIDS REQUIREMENTS PRIOR TO COMPLETION OF THE DETENTION POND; I.E. THE SIDE SLOPES ARE NOT FULLY STABILIZED, DEWATERING THE POND FOR FURTHER EXPANSION, ETC., THE FLOC LOG SHOULD BE INSTALLED AT THE END OF THE OUTFALL PIPE AND A TEMPORARY MATERIAL SUCH AS GEOJUTE SHOULD BE PLACED DOWNSTREAM OF THE FLOC LOG PROVIDING A SEDIMENT SETTLING AREA. (SEE PLANS FOR SPECIFIC INSTALLATION LOCATIONS)
3. IN APPLICATIONS WHERE THE OBJECTIVE OF THIS MEASURE IS TO MEET THE TOTAL SUSPENDED SOLIDS REQUIREMENTS AFTER THE DETENTION POND IS COMPLETED, THE FLOC LOG SHOULD BE INSTALLED AT THE END OF THE INLET PIPES INTO THE DETENTION POND. THIS WILL CAUSE THE SEDIMENT TO SETTLE MORE QUICKLY IN THE WET DETENTION POND, PROVIDING A CLEANER DISCHARGE. (SEE PLANS FOR SPECIFIC INSTALLATION LOCATIONS).
4 FOLLOWING THE USE OF THE FLOC LOG, THE SETTLED SEDIMENT WILL NEED TO BE REMOVED. THIS TEMPORARY SETTLING MEDIA REMOVED, OR THE DETENTION POND MIGHT NEED TO BE CLEANED IF SEDIMENT SETTLING HAS SIGNIFICANTLY REDUCED THE POND VOLUME.

MAINTENANCE:
1. INSPECT AFTER STORM EVENTS TO CHECK FOR MOVEMENT OF MULCH OR FOR EROSION.
2. IF WASHOUT, BREAKAGE, OR EROSION IS PRESENT IN THE SEDIMENT SETTLING MEDIA, REPAIR THE MEDIA.
3. BE SURE THE FLOC LOG IS SECURE ATTACHED AT THE INSTALLED LOCATION, VERIFY THAT STORM WATER IS HAVING CONTACT WITH THE FLOC LOG.

FIBER ROLLS

MATERIAL: TUBE SHAPED FIBER ROLLS FILLED WITH STRAW, FLAX, RICE, COCONUT FIBER MATERIAL, MULCH, OR COMPOSTED MATERIAL. EACH ROLL IS WRAPPED WITH UV-DEGRADABLE POLYPROPYLENE NETTING FOR LONGEVITY OR WITH 100 PERCENT BIODEGRADABLE MATERIALS LIKE BURLAP, JUTE, OR COIR.

INSTALLATION:
1. INSTALL ROLLS PARALLEL WITH THE SLOPE CONTOUR, WITH THE ENDS SLIGHTLY LOWER THAN THE MID-SECTION, TO PREVENT WATER PONDING AT THE MID-SECTION. TURN THE ENDS SLIGHTLY UPSLOPE TO PREVENT WATER FROM BYPASSING THE MEASURE.
2. EXCAVATE A TRENCH WITH A WIDTH AND DEPTH EQUAL TO ONE-FOURTH THE DIAMETER OF THE LOG.
3. WHERE APPLICABLE INSTALL THE MEASURE UPSLOPE OF A CURB OR SIDEWALK. PLACING THE MEASURE AGAINST THE CURB WILL PROVIDE ADDITIONAL STABILITY AND RESISTANCE TO SURFACE FLOW.
4. PLACE ROLLS END TO END TO FORM A CONTINUOUS BARRIER.
5. HARDWOOD STAKES SHALL BE DRIVEN THROUGH THE ROLLS, SPACED NO GREATER THAN 5' TO A DEPTH OF 18".
6. THE FIBER ROLLS SHOULD BE FASTENED TO THE HARDWOOD STAKES WITH ROPE.
7. BACKFILL THE TRENCH WITH EXCAVATED SOIL TO GROUND LEVEL ON THE DOWN-SLOPE SIDE AND 2" ABOVE GROUND LEVEL ON THE UP-SLOPE SIDE OF THE ROLL.

MAINTENANCE:
1. THE ROLLS SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAINFALL EVENT. INSPECTION SHOULD INCLUDE IF THE MATERIAL'S DIAMETER IS LESS THAN SPECIFICATION AND IF THE OUTER NETTING HAS BEEN DEGRADED OR BROKEN.
2. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ONE-QUARTER OF THE HEIGHT OF THE ROLL.
3. REPAIR ERODED AND DAMAGED AREAS.
4. IF PONDING BECOMES EXCESSIVE, ROLLS SHOULD BE REMOVED AND EITHER RECONSTRUCTED OR NEW PRODUCT INSTALLED.

SEDIMENT BASINS/DETENTION PONDS

MATERIAL: DEPRESSIONAL AREAS CONSTRUCTED AT THE OUTFALL OF PIPES, END OF CHANNELS, OR END OF SURFACE SHEET FLOW, WHICH SERVES TO SETTLE OUT THE SUSPENDED SOLIDS.

INSTALLATION:
1. AT LOCATIONS SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXCAVATE A SMALL BASIN. THE BASIN SIZE SHALL BE SHOWN ON THE PLANS AND IS DETERMINED BY THE VOLUME OF WATER TRIBUTARY TO THE BASIN. THE BASIN OVERFLOW ELEVATION SHALL BE LOWER THAN THE INCOMING WATER, BY A MINIMUM OF 12 INCHES.
2. THE BASIN SHALL BE LINED WITH A GEOTEXTILE FABRIC, 9" OF 4" RIPRAP SHALL BE PLACED ALL AROUND THE INSIDE OF THE BASIN.

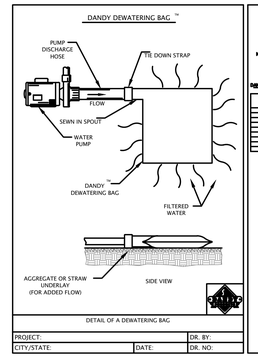
MAINTENANCE:
1. THE BASINS SHOULD BE INSPECTED WEEKLY AND AFTER EACH RAINFALL EVENT.
2. REPLACE AND RESTORE ANY BASIN BANK EROSION.
3. REPAIR OR REPLACE ANY DISPLACED RIPRAP.
4. RE-EXCAVATE AND REPLACE THE BASIN WHEN IT BECOMES MORE THAN 50% FULL OF SEDIMENT.

DEWATERING BAGS

MATERIAL: "DANDY" DE-WATERING BAG OR "PUMP-IT" DE-WATERING BAG

INSTALLATION:
1. INSTALL AT LOCATION OF THE DEWATERING PUMP OUTFALL.
2. SIZE THE BAG T THE DISCHARGE RATE. THE MAXIMUM BAG SIZE MAY LIMIT THE DISCHARGE RATE OF THE PUMP.
3. CONNECT BAG TO PUMP OUTFALL PER MANUFACTURER'S INSTRUCTIONS.
4. INSTALL BAG UPSTREAM OF THE RECEIVING STRUCTURE LOCATION.
5. OUTLET TO GRASS AREA IF POSSIBLE

MAINTENANCE:
1. THE BASINS SHOULD BE INSPECTED PRIOR TO EACH USE.
2. REPLACE BAG WHEN IT IS HALF FULL.


DANDY DEWATERING BAG ™
PUMP DISCHARGE HOSE
TIE DOWN STRAP
FLOW
SEWN IN SPOUT
WATER PUMP
DANDY DEWATERING BAG ™
FILTERED WATER
AGGREGATE

SEDIMENT CONTROL MEASURES (continued)

INLET PROTECTION

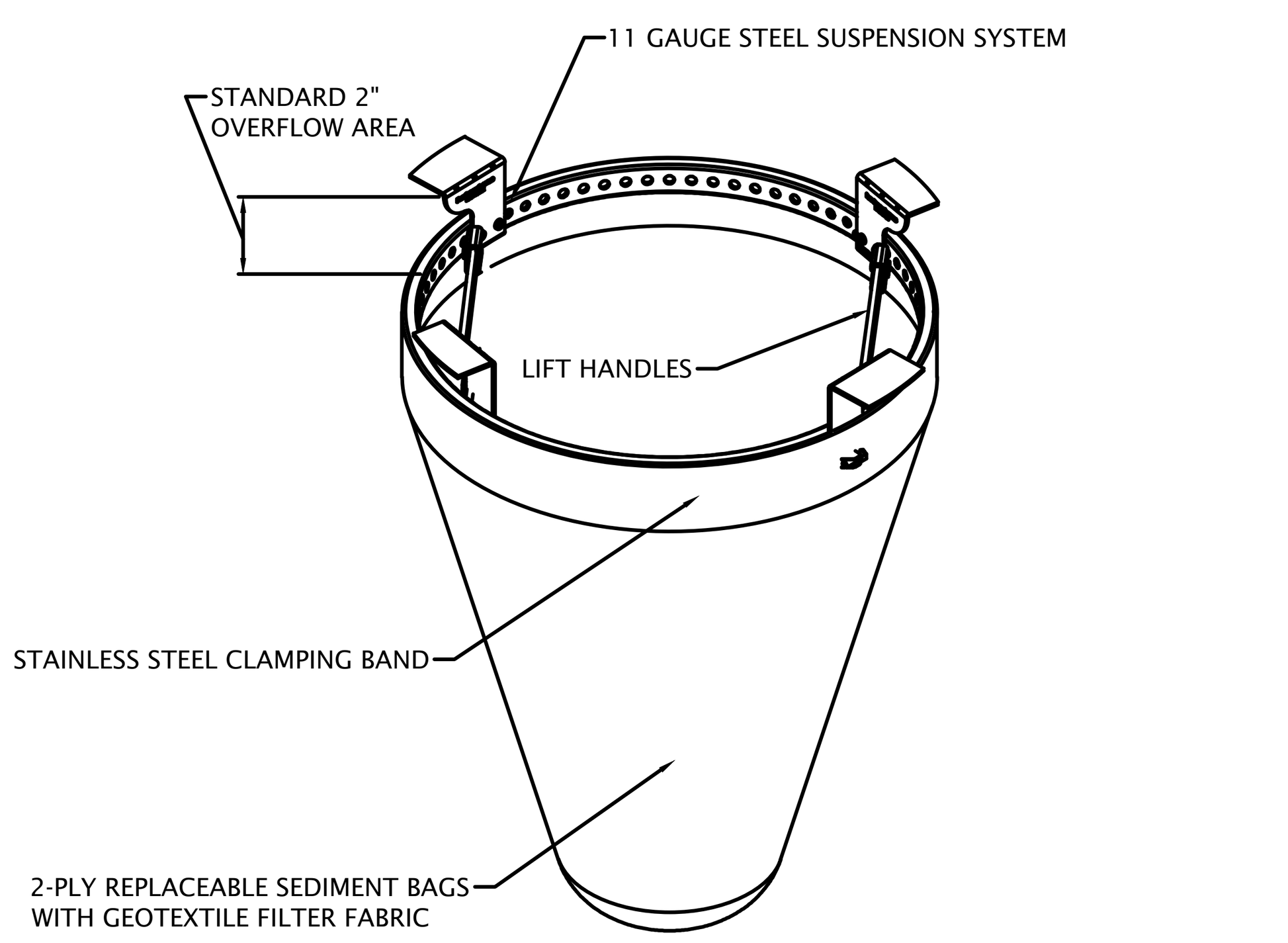
MATERIAL: FLEXSTORM CATCH-IT BY ADS, INC. OR APPROVED EQUAL.
ADS CAN BE CONTACTED AT (866) 287-8655

CAPACITY:

SPECIFICATIONS FOR STANDARD BAGS BY NOMINAL SIZE

Nominal Bag Size	Solids Storage (CuFt)	Filtered Flow Rate at 50% Max (CFS) FX (Woven)	IL (NonWoven)
Small	1.6	1.2	0.9
Medium	2.1	1.7	1.3
Large	3.8	2.7	1.9
XL	4.2	3.6	2.6

INSTALLATION:
1. REMOVE GRATE; INSTALL PRIOR TO LAND DISTURBING ACTIVITIES AND/OR IMMEDIATELY AFTER DRAINAGE STRUCTURES HAVE BEEN INSTALLED
2. DROP INLET PROTECTION ONTO LOAD BEARING LIP OF CASTING OR CONCRETE STRUCTURE.
3. REPLACE GRATE.



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INLET PROTECTION - CURB BASKET

CONTRIBUTING DRAINAGE AREA: 0.25 ACRE MAXIMUM

LOCATION: AT CURB INLETS WHERE BARRIERS SURROUNDING THEM WOULD BE IMPRACTICAL OR UNSAFE

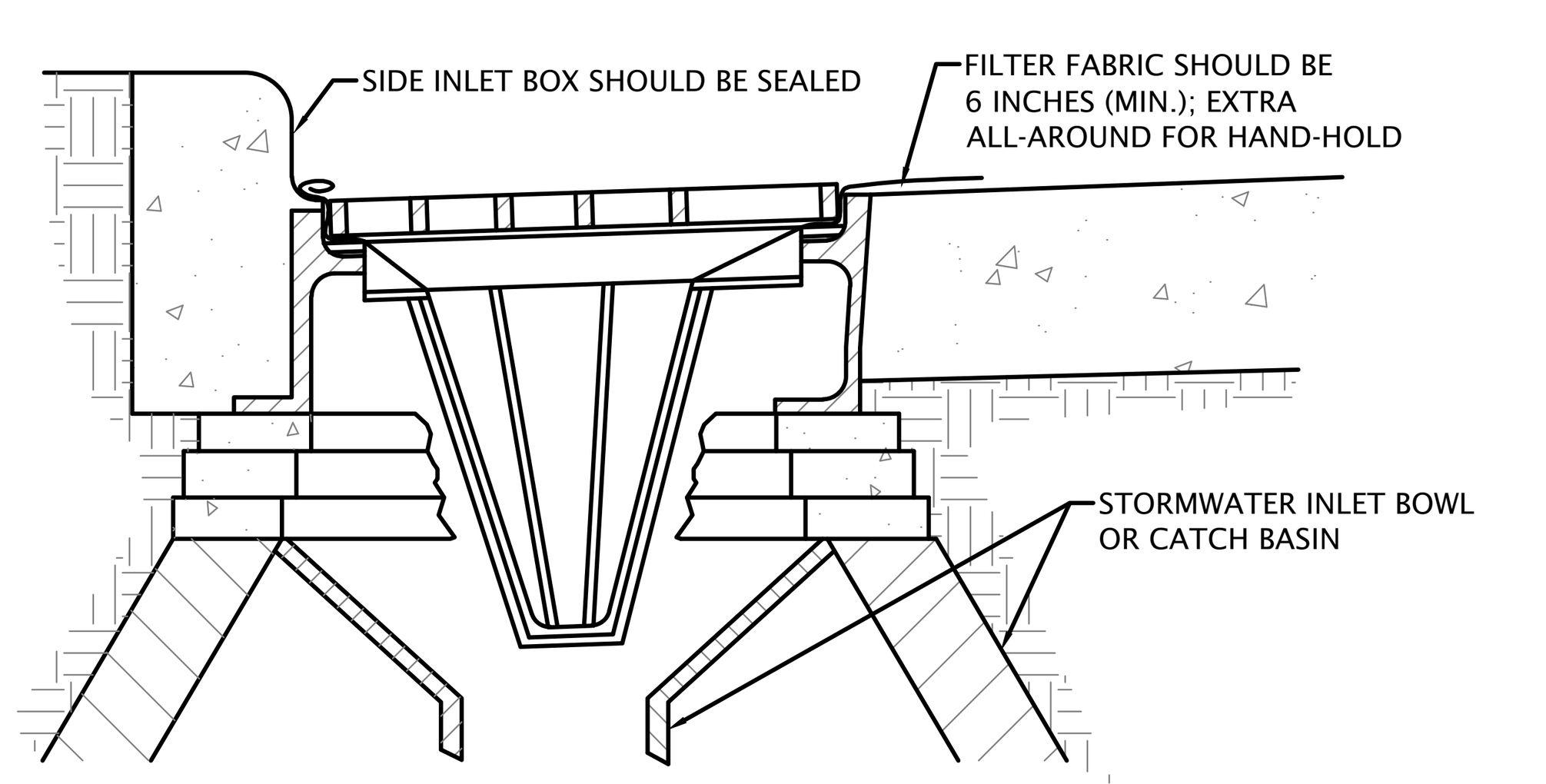
MATERIAL: D2 CATCH-ALL INLET PROTECTOR OR APPROVED EQUAL
D2 LAND & WATER RESOURCE (WWW.D2LWR.COM OR 800-597-2180)

CAPACITY: RUNOFF FROM A 2-YEAR FREQUENCY, 24-HOUR DURATION STORM EVENT ENTERING A STORM DRAIN WITHOUT BYPASS FLOW

BASKET: FABRICATED METAL WITH TOP WDITH/LENGTH DIMENSIONS SUCH THAT THE BASKET FITS INTO THE INLET WITHOUT GAPS

GEOTEXTILE FABRIC: FOR FILTRATION

INSTALLATION:
1. INSTALL BASKET CURB INLET PROTECTIONS AS SOON AS INLET BOXES ARE INSTALLED IN THE NEW DEVELOPMENT OR BEFORE LAND-DISTURBING ACTIVITIES BEGIN IN A STABILIZED AREA.
2. IF NECESSARY, ADAPT BASKET DIMENSIONS TO FIT INLET BOX DIMENSIONS, WHICH VARY ACCORDING TO THE MANUFACTURER AND/OR MODEL.
3. SEAL THE SIDE INLETS ON THOSE TYPES OF INLET BOXES THAT HAVE THEM.
4. REMOVE THE GRATE AND PLACE THE BASKET IN THE INLET.
5. CUT AND INSTALL A PIECE OF FILTER FABRIC LARGE ENOUGH TO LINE THE INSDE OF THE BASKET AND EXTEND AT LEAST 6 INCHES BEYOND THE FRAM.
6. REPLACE THE INLET GRATE, WHICH ALSO SERVES TO ANCHOR THE FABRIC.



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MAINTENANCE:
1. INSPECT AFTER EACH STORM EVENT.
2. REMOVE BUILT-UP SEDIMENT AND REPAIR (OR REPLACE IF NECESSARY) THE GEOTEXTILE FABRIC AFTER EACH STORM EVENT.
3. PERIODICALLY REMOVE SEDIMENT AND TRACKED-ON SOIL FROM THE STREET (BUT NOT BY FLUSHING WITH WATER) TO REDUCE THE SEDIMENT LOAD ON THIS CURB INLET PRACTICE.

COMMON CONCERNS:
1. SEDIMENT NOT REMOVED AND GEOTEXTILE FABRIC NOT REPLACED FOLLWING A STORM EVENT RESULTS IN INCREASED SEDIMENT, TRACKING, TRAFFIC HAZARD, AND EXCESSIVE PONDING.
2. GEOTEXTILE FABRICE PERMITTIVITY THAT IS TOO LOW RESULTS IN RAPID CLOGGING AND CAUSES SEVERE PONDING WITH SEDIMENT ENTERING THE DRAIN IF THE FABRIC BREAKS.
3. DRAINAGE AREA TOO LARGE RESULTS IN SEDIMENT OVERLAOD AND SEVERE PONDING; SEDIMENT ENTERS THE DRAIN IF FABRIC BREAKS.

TEMPORARY CONSTRUCTION ENTRANCE/EXIT PAD

MATERIAL: 2 TO 3 INCHES OF WASHED STONE (INDOT #2 AGGREGATE) OVER A STABLE FOUNDATION

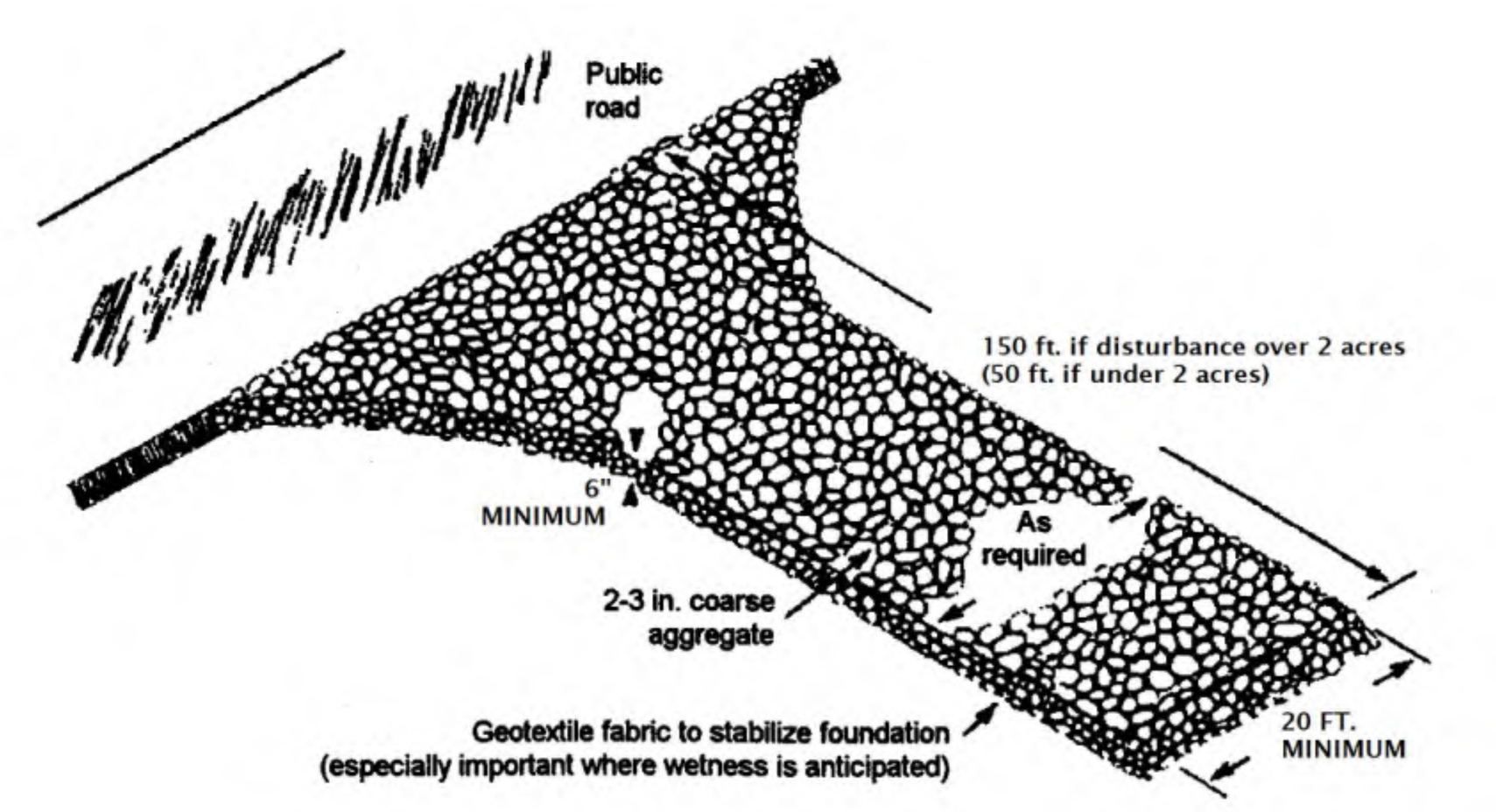
THICKNESS: 6 INCHES MINIMUM

WIDTH: 20 FEET MINIMUM OR FULL WIDTH OF ENTRANCE/EXIT ROADWAY, WHICHEVER IS GREATER

LENGTH: 150 FEET MINIMUM (50 FEET MINIMUM IF SITE DISTURBANCE IS UNDER 2.0 ACRES)

WASHING FACILITY: LEVEL AREA WITH 3 INCHES OF WASHED STONE (MINIMUM) OR A COMMERCIAL RACK AND WASTE WATER DIVERTED TO A SEDIMENT TRAP OR BASIN (PRACTICE 3.72)

GEOTEXTILE FABRIC UNDERLINER: MAY BE USED UNDER WET CONDITIONS OR FOR SOILS WITHIN A HIGH SEASONAL WATER TABLE TO PROVIDE GREATER BEARING STRENGTH



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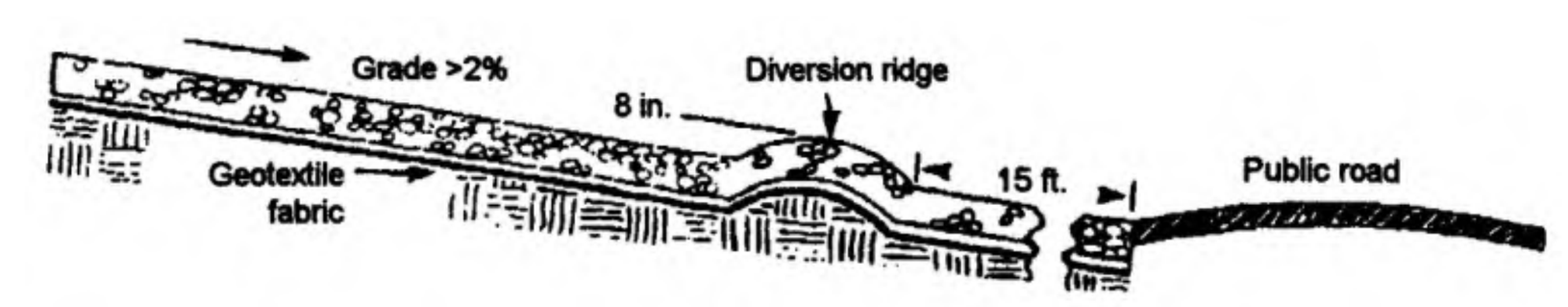
INSTALLATION:
1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES IN PUBLIC ROADS.
2. REMOVE ALL VEGETATION AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA, AND GRADE AND CROWN FOR POSITIVE DRAINAGE.
3. IF SLOPE TOWARDS THE ROAD EXCEEDS 2%, CONSTRUCT A 6-8 IN. HIGH WATER BAR (RIDGE) WITH 3:1 SIDE SLOPES ACROSS THE FOUNDATION AREA ABOUT 15 FT. FROM THE ENTRANCE TO DIVERT RUNOFF AWAY FROM THE ROAD (PRACTICE 3.24) SEE EXHIBIT.
4. INSTALL PIPE UNDER THE PAD IF NEEDED TO MAINTAIN PROPER PUBLIC ROAD DRAINAGE.
5. IF WET CONDITIONS ARE ANTICIPATED, PLACE GEOTEXTILE FABRIC ON THE GRADED FOUNDATION TO IMPROVE STABILITY.
6. PLACE STONE TO DIMENSIONS AND GRADE SHOWN IN THE EROSION/SEDIMENT CONTROL PLAN, LEAVING THE SURFACE SMOOTH AND SLOPED FOR DRAINAGE.
7. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE STONE PAD TO A SEDIMENT TRAP OR BASIN.



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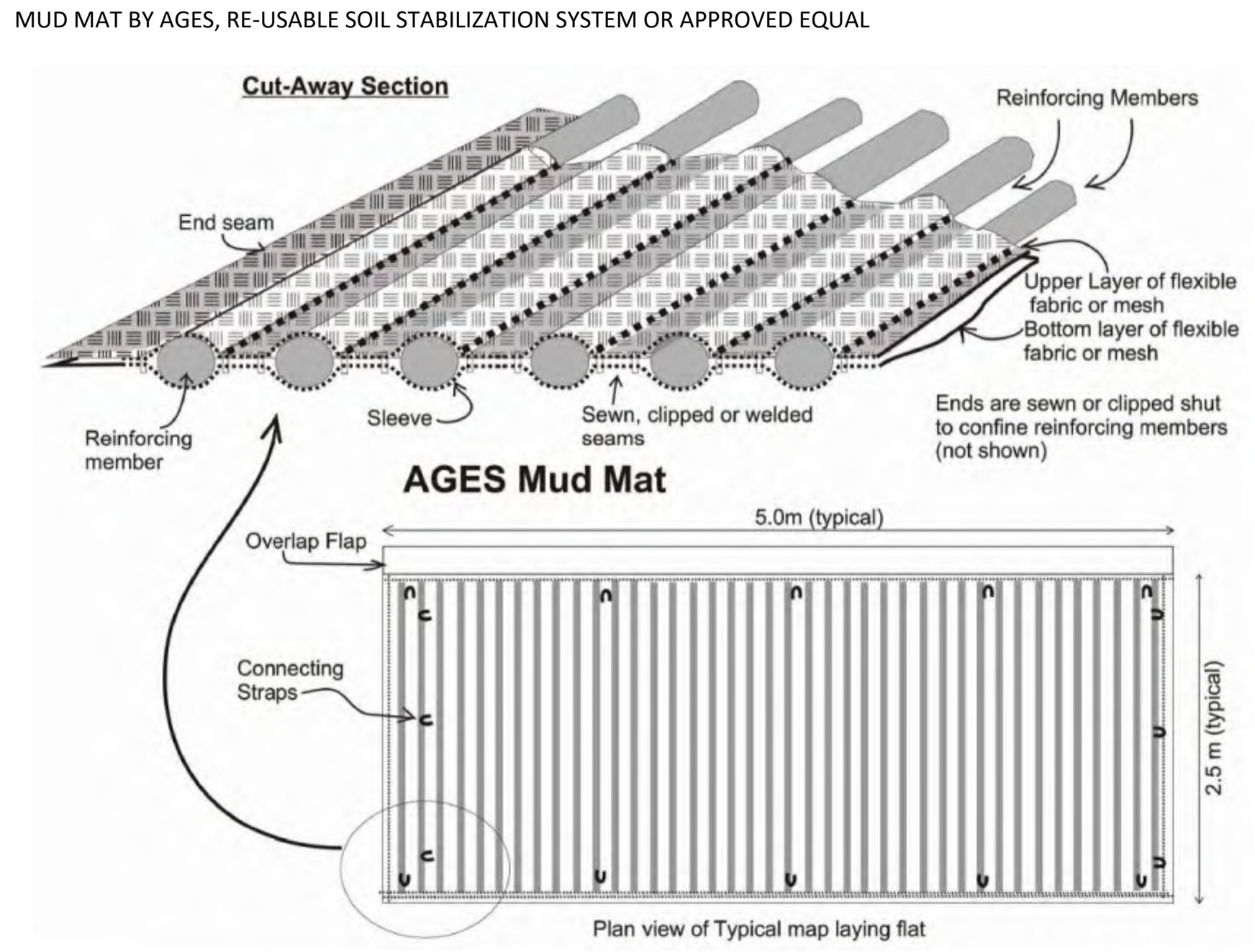
MAINTENANCE:
1. INSPECT ENTRANCE PAD AND SEDIMENT DISPOSAL AREA WEEKLY AND AFTER STORM EVENTS OR HEAVY USE.
2. RESHAPE PAD AS NEEDED FOR DRAINAGE AND RUNOFF CONTROL.
3. TOP-DRESS WITH CLEAN STONE AS NEEDED.
4. IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROADS BY BRUSHING OR SWEEPING. FLUSHING SHOULD ONLY BE USED IF THE WATER IS CONVEYED INTO A SEDIMENT TRAP OR BASIN.
5. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.

MUD MATS - ENTRANCE STABILIZATION

MATERIAL: MUD MAT BY AGES, RE-USABLE SOIL STABILIZATION SYSTEM OR APPROVED EQUAL



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INSTALLATION:
1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES IN PUBLIC ROADS.
2. REMOVE ALL VEGETATION AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA, AND GRADE AND CROWN FOR POSITIVE DRAINAGE.
3. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. UNROLL, CONNECT MATS TOGETHER TO FORM AREA OF PROTECTION AND PROPERLY ANCHOR TO GROUND.
4. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE MUD MAT TO A SEDIMENT TRAP OR BASIN.
5. MINIMUM SIZE OF THE MAT IS 12 FEET WIDE AND 50 FEET LONG.

MAINTENANCE:
1. INSPECT ENTRANCE PAD DAILY AND REMOVE BUILT-UP DEBRIS AS NECESSARY.
2. INSPECT ENTRANCE PAD FOR BREAKS AND TEARS IN THE MATERIAL. REPAIR OR REPLACE AS NECESSARY.
3. IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROADS BY BRUSHING OR SWEEPING. FLUSHING SHOULD ONLY BE USED IF THE WATER IS CONVEYED INTO A SEDIMENT TRAP OR BASIN.
4. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.

MATERIAL MANAGEMENT MEASURES (HOUSEKEEPING)

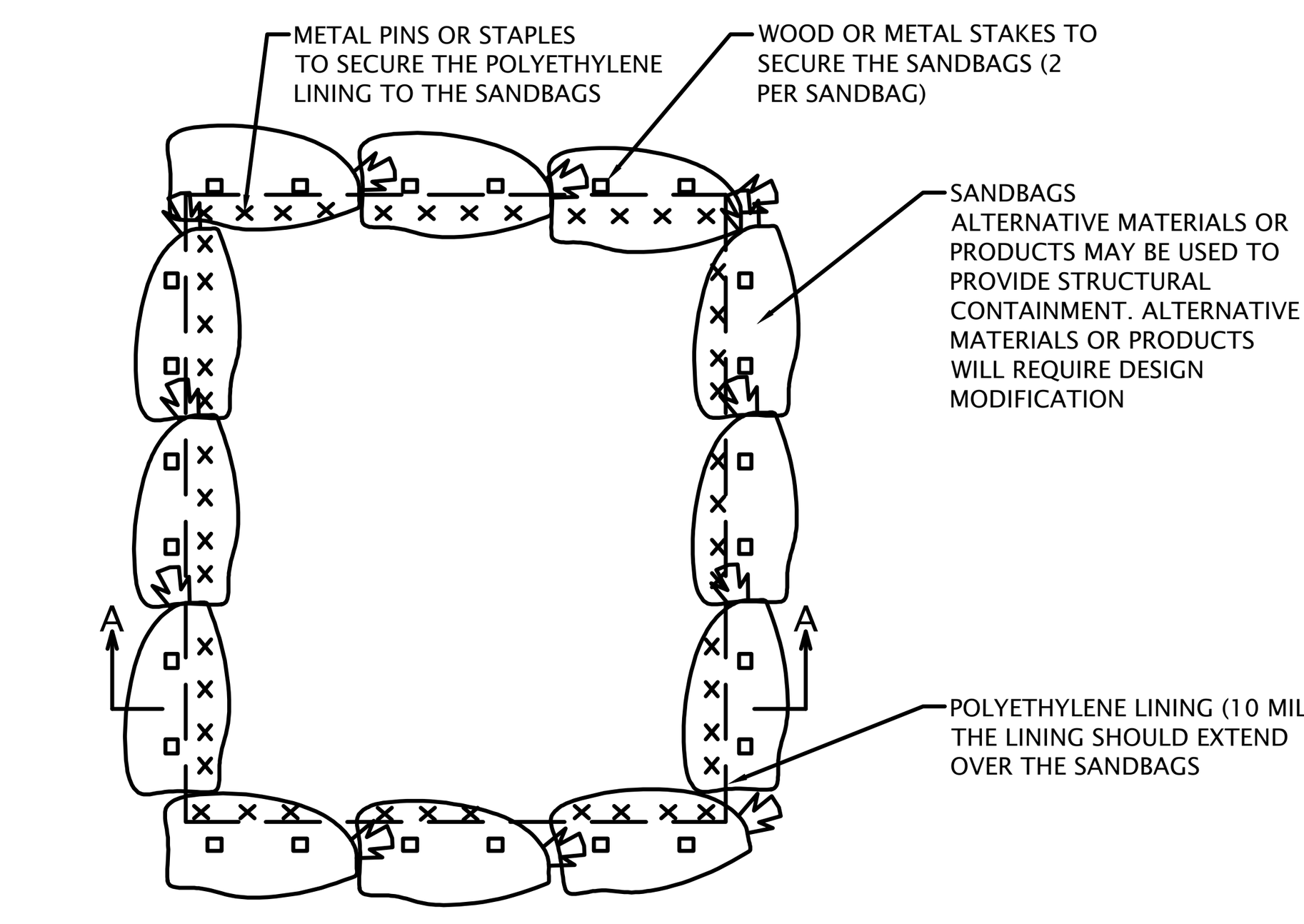
CONCRETE WASHOUT

MATERIALS: MINIMUM OF TEN MIL POLYETHYLENE SHEETING, FREE OF HOLES, TEARS, AND OTHER DEFECTS
ORANGE SAFETY FENCING OR EQUIVALENT
SANDBAGS
METAL PINS OR STAPLES SIX INCHES IN LENGTH MINIMUM.

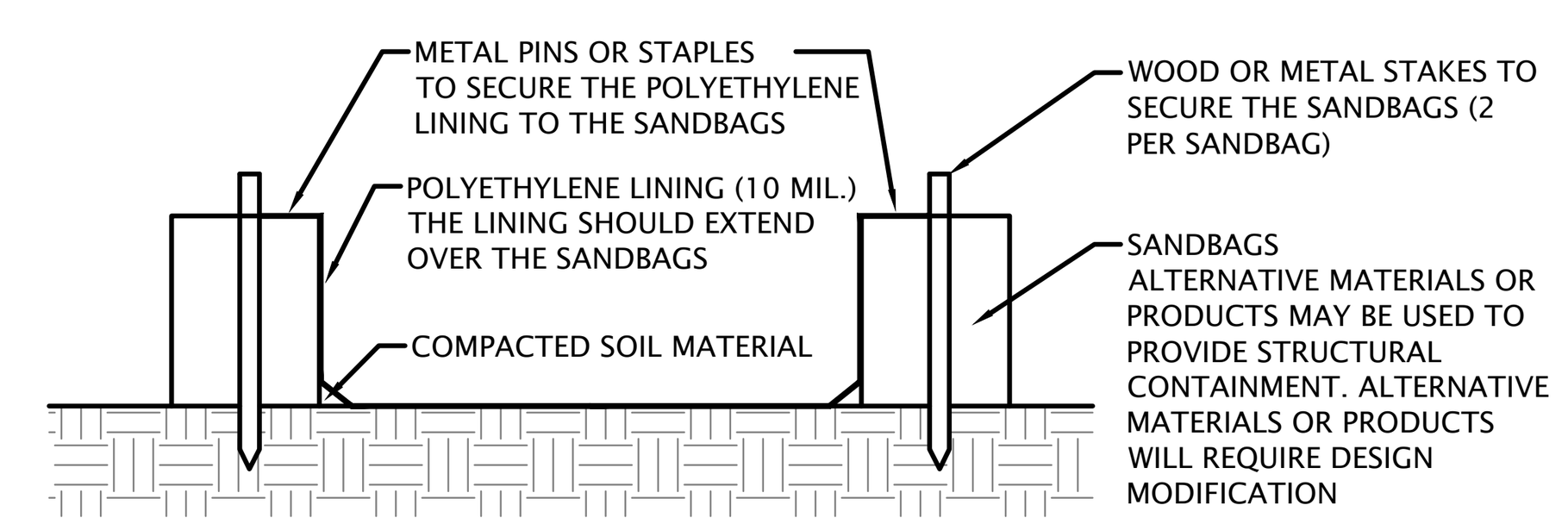
LOCATION:
1. LOCATE CONCRETE WASHOUT SYSTEMS AT LEAST 50 FEET FROM ANY CREEKS, WETLANDS, DITCHES, KARST FEATURES, OR STORM DRAINS/MANMADE CONVEYANCE SYSTEMS.
2. LOCATE CONCRETE WASHOUT SYSTEMS IN RELATIVELY FLAT AREAS THAT HAVE ESTABLISHED VEGETATIVE COVER AND DO NOT RECEIVE RUNOFF FROM ADJACENT LAND AREAS.
3. LOCATE AWAY FROM OTHER CONSTRUCTION TRAFFIC IN AREAS THAT PROVIDE EASY ACCESS FOR CONCRETE TRUCKS.

INSTALLATION:
1. A BASE SHALL BE CONSTRUCTED AND PREPARED THAT IS FREE OF ROCKS AND OTHER DEBRIS THAT MAY CAUSE TEARS OR PUNCTURES IN THE POLYETHYLENE LINING.
2. INSTALL THE POLYETHYLENE LINING. FOR EXCAVATED SYSTEMS, THE LINING SHOULD EXTEND OVER THE ENTIRE EXCAVATION. THE LINING FOR BERMED SYSTEMS SHOULD BE INSTALLED OVER THE POOLING AREA WITH ENOUGH MATERIAL TO EXTEND THE LINING OVER THE BERM OR CONTAINMENT SYSTEM. THE LINING SHOULD BE SECURED WITH PINS, STAPLES, OR OTHER FASTENERS.
3. PLACE FLAGS, SAFETY FENCING, OR EQUIVALENT TO PROVIDE A BARRIER TO CONSTRUCTION EQUIPMENT AND OTHER TRAFFIC. INSTALL SIGNAGE THAT IDENTIFIES CONCRETE WASHOUT AREAS.
4. WHERE NECESSARY, PROVIDE STABLE INGRESS AND EGRESS OR ALTERNATIVE APPROACH PAD.

MAINTENANCE:
1. INSPECT DAILY AND AFTER EACH STORM EVENT.
2. INSPECT THE SYSTEM FOR LEAKS, SPILLS, AND TRACKING OF SOIL BY EQUIPMENT.
3. INSPECT THE POLYETHYLENE LINING FOR FAILURE, INCLUDING TEARS AND PUNCTURES.
4. ONCE CONCRETE WASTES HARDEN, REMOVE AND DISPOSE OF THE MATERIAL.
5. EXCESS CONCRETE SHOULD BE REMOVED WHEN THE WASHOUT SYSTEM REACHES 50 PERCENT OF THE DESIGN CAPACITY. USE OF THE SYSTEM SHOULD BE DISCONTINUED UNTIL APPROPRIATE MEASURES CAN BE INITIATED TO CLEAN THE STRUCTURE.
6. UPON REMOVAL OF THE SOLIDS, INSPECT THE STRUCTURE. REPAIR THE STRUCTURE AS NEEDED OR CONSTRUCT A NEW SYSTEM. DISPOSE OF ALL CONCRETE IN A LEGAL MANNER. REUSE THE MATERIAL ON SITE, RECYCLE, OR HAUL THE MATERIAL TO AN APPROVED CONSTRUCTION/DEMOLITION LANDFILL SITE. RECYCLING OF MATERIAL IS ENCOURAGED. THE WASTE MATERIAL CAN BE USED FOR MULTIPLE APPLICATIONS INCLUDING BUT NOT LIMITED TO ROADBEDS AND BUILDING. THE AVAILABILITY FOR RECYCLING SHOULD BE CHECKED LOCALLY.
7. THE PLASTIC LINER SHOULD BE REPLACED AFTER EVERY CLEANING; THE REMOVAL OF MATERIAL WILL USUALLY DAMAGE THE LINING. THE CONCRETE WASHOUT SYSTEM SHOULD BE REPAIRED OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE.
8. CONCRETE WASHOUT SYSTEMS ARE DESIGNED TO PROMOTE EVAPORATION. HOWEVER, IF THE LIQUIDS DO NOT EVAPORATE AND THE SYSTEM IS NEAR CAPACITY IT MAY BE NECESSARY TO VACUUM OR REMOVE THE LIQUIDS AND DISPOSE OF THEM IN AN ACCEPTABLE METHOD. DISPOSAL MAY BE ALLOWED AT THE LOCAL SANITARY SEWER AUTHORITY PROVIDED THEIR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS ALLOW FOR ACCEPTANCE OF THIS MATERIAL. ANOTHER OPTION WOULD BE TO UTILIZE A SECONDARY CONTAINMENT SYSTEM OR BASIN FOR FURTHER DEWATERING.
9. INSPECT CONSTRUCTION ACTIVITIES ON A REGULAR BASIS TO ENSURE SUPPLIERS, CONTRACTORS, AND OTHERS ARE UTILIZING DESIGNATED WASHOUT AREAS. IF CONCRETE WASTE IS BEING DISPOSED OF IMPROPERLY, IDENTIFY THE VIOLATORS AND TAKE APPROPRIATE ACTION.
10. WHEN CONCRETE WASHOUT SYSTEMS ARE NO LONGER REQUIRED, THE CONCRETE WASHOUT SYSTEMS SHALL BE CLOSED. DISPOSE OF ALL HARDENED CONCRETE AND OTHER MATERIALS USED TO CONSTRUCT THE SYSTEM.
11. HOLES, DEPRESSIONS, AND OTHER LAND DISTURBANCES ASSOCIATED WITH THE SYSTEM SHOULD BE BACKFILLED, GRADED, AND STABILIZED.



ABOVE GRADE CONCRETE WASHOUT
(NOT TO SCALE)



SECTION A-A
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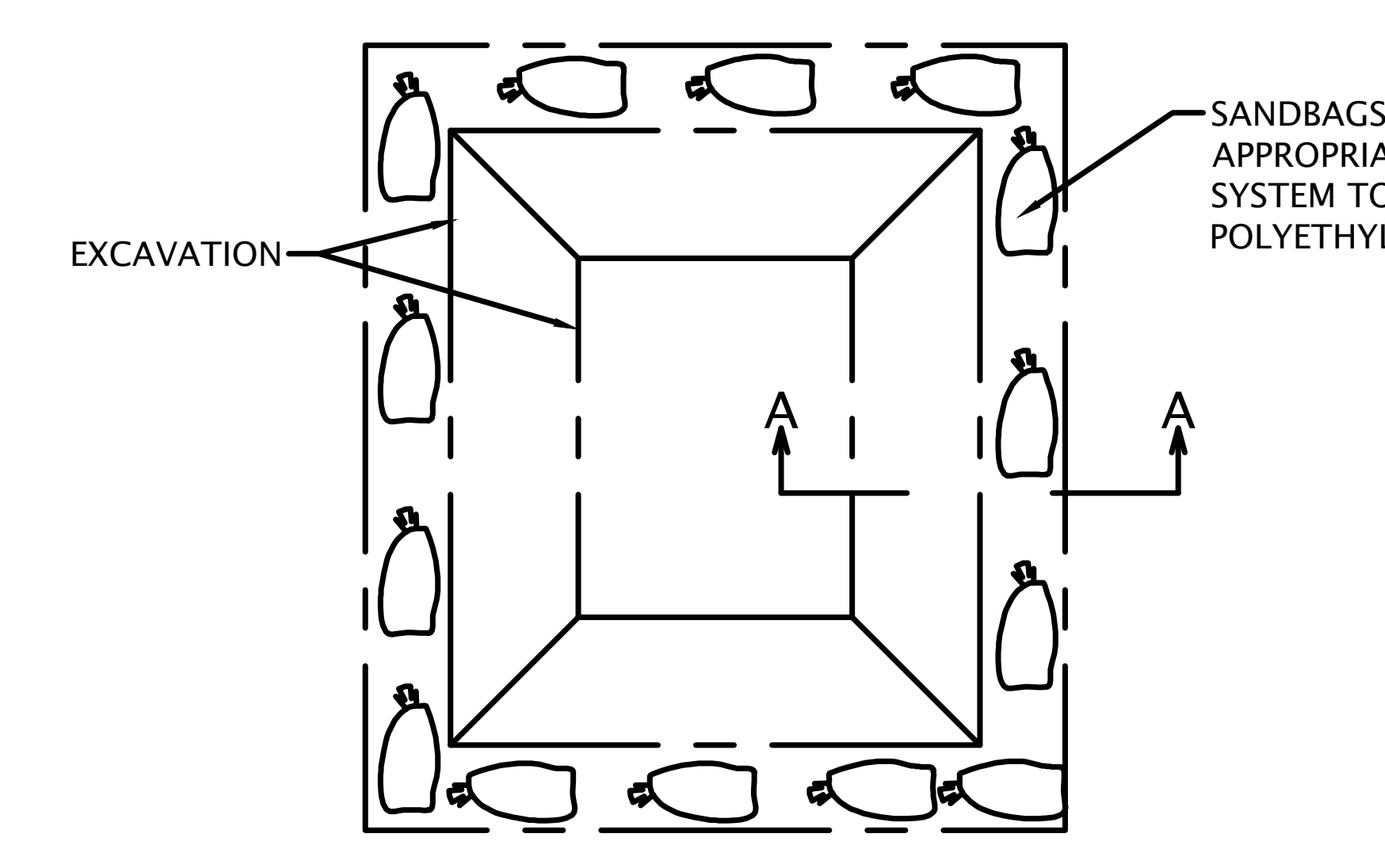

BELOW GRADE CONCRETE WASHOUT
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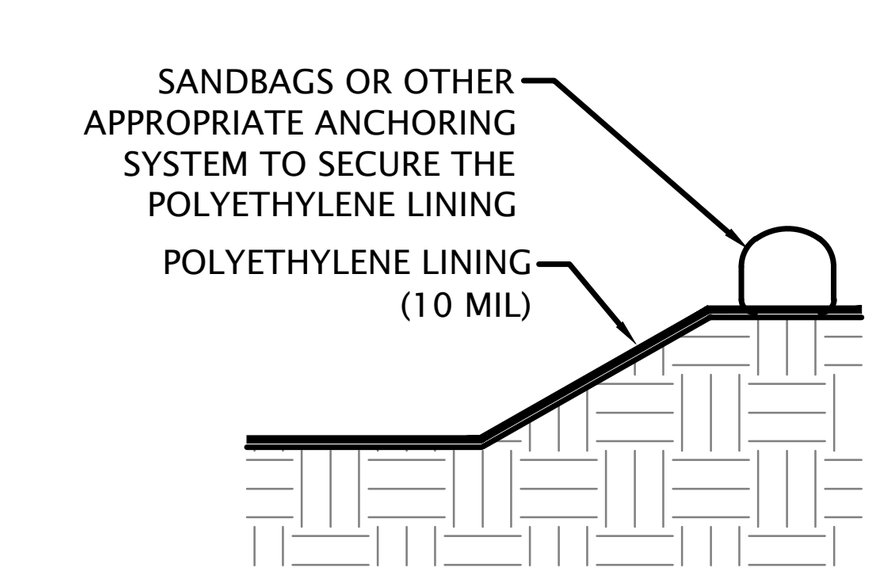


SECTION A-A
(NOT TO SCALE)

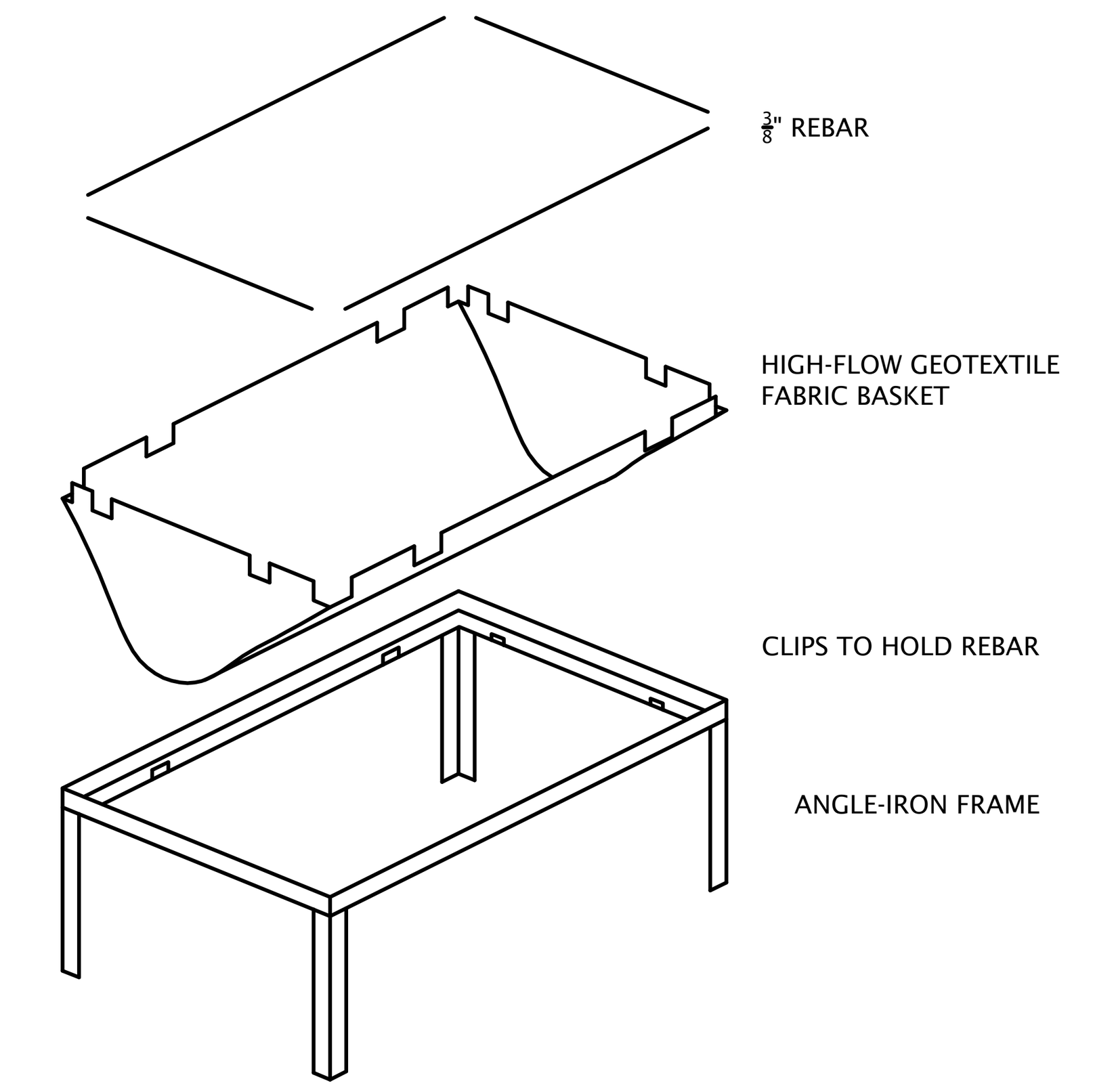
COMMON CONCERNS:
1. COMPLETE CONSTRUCTION/INSTALLATION OF THE SYSTEM AND HAVE WASHOUT LOCATIONS OPERATIONAL PRIOR TO CONCRETE DELIVERY.
2. IT IS RECOMMENDED THAT WASHOUT SYSTEMS BE RESTRICTED TO WASHING CONCRETE FROM MIXER AND PUMP TRUCKS AND NOT USED TO DISPOSE OF EXCESS CONCRETE OR RESIDUAL LOADS DUE TO POTENTIAL TO EXCEED THE DESIGN CAPACITY OF THE WASHOUT SYSTEM.
3. INSTALL SYSTEMS AT STRATEGIC LOCATIONS THAT ARE CONVENIENT AND IN CLOSE PROXIMITY TO WORK AREAS AND IN SUFFICIENT NUMBER TO ACCOMMODATE THE DEMAND FOR DISPOSAL.
4. INSTALL SIGNAGE IDENTIFYING THE LOCATION OF CONCRETE WASHOUT SYSTEMS.

FRYEFLOW FILTRATION SYSTEMS WASHOUT

MATERIALS: FRYE-FLOW FILTRATION SYSTEMS CONCRETE WASHOUT DEVICE OR APPROVED EQUAL

INSTALLATION:
1. INSERT REBAR INTO POCKETS OF DEBRIS BAG.
2. INSTALL FRYEFLOW SYSTEMS DEBRIS BAG INTO ANGLE IRON FRAME.
3. MAKE SURE REBAR SETS BEHIND REBAR BRACKETS.
4. MAKE SURE FRAME AND BAG IS SET ON FLAT SURFACE
5. INSTALL SIGNAGE THAT IDENTIFIES CONCRETE WASHOUT AREAS.
6. WHERE NECESSARY, PROVIDE STABLE INGRESS AND EGRESS OR ALTERNATIVE APPROACH PAD.

MAINTENANCE:
1. ONCE DEBRIS BAG IS FULL, USE HANDLES PROVIDED TO LIFT OUT OF FRAME.
2. REMOVE REBAR FROM SIDE POCKETS.
3. INSERT NEW DEBRIS BAG.



SPILL PREVENTION AND CONTROL PLAN

1. ONLY APPROVED FUEL STORAGE TANK SHALL BE ALLOWED ON SITE.
2. SPILL KITS MUST BE LOCATED ON-SITE IN THE VICINITY OF THE FUEL STORAGE SINK.
3. MOBILE FUELING SHALL BE USED WHENEVER POSSIBLE.
4. FUELING SHOULD TAKE PLACE IN A CENTRAL LOCATION.
5. EQUIPMENT SHOULD BE KEPT IN GOOD WORKING ORDER, WELL MAINTAINED SO THAT BREAKDOWNS, AND EQUIPMENT FAILURES ARE REDUCED.

FUEL STORAGE

1. ALL FUEL TANKS ON SITE SHALL HAVE SECONDARY CONTAINMENT APPROVED BY IDEM.
2. NO FUEL TANKS ARE TO BE LOCATED WITHIN 100 FEET OF A STORM SEWER INLET.
3. FUEL STORAGE SYSTEM SHALL BE KEPT IN GOOD WORKING ORDER AND SHALL BE SUBJECT TO PERIODIC IDEM INSPECTIONS.
4. SPILL KITS MUST BE LOCATED ON-SITE IN THE VICINITY OF THE FUEL STORAGE SINK.
5. FUEL TANKS SHALL HAVE A SAFETY GAUGE.

STOCKPILES

1. THE CONTRACTOR SHALL LOCATE TOPSOIL STOCKPILES ON-SITE AS NOTED ON THE S.W.P.P.P. AND SHALL ENCOMPASS EACH WITH SEDIMENT DITCH AND SILT FENCE.
2. IN CASES WHERE THE STOCKPILE IS SMALL AND WILL BE REMOVED FROM THE SITE WITHIN 15 DAYS, THE CONTRACTOR CAN COVER THE STOCKPILE WITH A WATERPROOF TARPAULINE TYPE COVER.
3. NO OFF-SITE STOCKPILES ARE BEING PROPOSED. ANY OFF-SITE STOCKPILES THAT THE CONTRACTOR UTILIZES SHALL FOLLOW THE SAME REQUIREMENTS AS ON-SITE STOCKPILES. THE CONTRACTOR SHALL IDENTIFY TO THE LOCAL S.W.P.P.P. ENFORCEMENT AGENCY THE LOCATIONS OF ANY OFF-SITE STOCKPILES.

TEMPORARY FACILITIES

1. THE CONTRACTOR SHALL FOLLOW THE PROCEDURES DELINEATED ON THE PLAN IN ORDER TO CONSTRUCT AND MAINTAIN THE FACILITIES SHOWN ON THE DRAWINGS TO CONTROL WATER AND WIND EROSION DURING CONSTRUCTION OF THE PROJECT.
2. ALL DISTURBED SURFACE AREAS (INCLUDING UTILITY TRENCHES) SHALL BE TEMPORARILY GRADED AND/OR DITCHED TO DIRECT WATER RUNOFF FROM SUCH AREAS TO SEDIMENTATION CONTROL DEVICES WHICH WILL PREVENT DISTURBING ERODED WATER CARRYING SOIL FROM ENTERING A WATERCOURSE, SEWER, OR ADJACENT LANDS. SUCH SEDIMENTATION CONTROL DEVICES SHALL INCLUDE BUT NOT BE LIMITED TO PROTECTIVE DITCHES, SEDIMENT TRAPS, SEDIMENT FILTERS, DITCH TRAPS, PIPE BARRIERS, SIKE DIKES, CHECK DAMS, CHEMICAL SETTLING FILTERS.
3. UPON COMPLETION OF THE ROUGH GRADING ALL AREAS NOT EFFECTED BY CONSTRUCTION TRAFFIC SHALL BE PERMANENTLY SEEDED, AND EROSION CONTROL BLANKETS INSTALLED ON SIDE SLOPES THAT EXCEED 5:1.
4. UPON COMPLETION OF THE STORM SEWER SYSTEM, INLET PROTECTION SHALL BE INSTALLED, CHECK DAMS INSTALLED IN THE SWALES, AND TEMPORARY RIPRAP WITH SETTLING BASINS PLACED AT THE OUTFALLS OF ALL PIPE.
5. IN ROADWAY AREAS TEMPORARY AGGREGATE SURFACING SHALL BE PLACED IMMEDIATELY AFTER THE BACKFILLING HAS BEEN COMPLETED. POSITIVE DUST CONTROL MEASURES SHALL BE TAKEN AT ALL TIMES.
6. WITHIN 14 DAYS FROM THE DATE A PROJECT IMPROVEMENT IS INSTALLED THE CONTRACTOR SHALL PROCEED WITH FINAL CLEANUP AND RESTORATION OF THE PROJECT AREA DISTURBED INCLUDING SPOIL AREAS,AND COMPLETE SUCH OPERATIONS WITHIN THE NEXT 15 DAYS. IF SEASONAL CONDITIONS PREVENT FINAL CLEANING AND RESTORATION, THE CONTRACTOR SHALL PROCEED WITH TEMPORARY STABILIZATION OF THE DISTURBED AREAS. FINAL CLEANUP AND RESTORATION WILL CONSIST OF FINAL GRADING, APPLYING TOPSOIL, SEEDING AND MULCHING AND/OR SODDING OF ALL DISTURBED AREAS OF THE PROJECT. TEMPORARY STABILIZATION SHALL CONSIST OF ROUGH GRADING THE DISTURBED AREAS TO A CONDITION READY TO RECEIVE TOPSOIL, SEEDING, AND MULCHING IN ACCORDANCE WITH THE TEMPORARY SEEDING SCHEDULE. TEMPORARY STABILIZATION MATERIALS SHALL BE REMOVED, DISPOSED OF, AND FINAL CLEANUP AND RESTORATION SHALL BE COMPLETED NOT LATER THAN 60 DAYS AFTER SEASONAL CONDITIONS ALLOW PERFORMANCE OF THE REQUIRED WORK. THE CONTRACTOR SHALL LOCATE TOPSOIL STOCKPILES ON-SITE AS NOTED ON THE S.W.P.P.P. AND SHALL ENCOMPASS EACH WITH SEDIMENT DITCH AND SILT FENCE. IN CASES WHERE THE STOCKPILE IS SMALL AND WILL BE REMOVED FROM THE SITE WITHIN 15 DAYS, THE CONTRACTOR CAN COVER THE STOCKPILE WITH A WATERPROOF TARPAULINE TYPE COVER. NO OFF-SITE STOCKPILES ARE BEING PROPOSED. ANY OFF-SITE STOCKPILES THAT THE CONTRACTOR UTILIZES SHALL FOLLOW THE SAME REQUIREMENTS AS ON-SITE STOCKPILES. THE CONTRACTOR SHALL IDENTIFY TO THE LOCAL S.W.P.P.P. ENFORCEMENT AGENCY THE LOCATIONS OF ANY OFF-SITE STOCKPILES.

MATERIAL HANDLING AND STORAGE

THE CONTRACTOR SHALL MINIMIZE THE DISTURBANCE OF EXCAVATED SOILS BY MINIMIZING THE NUMBER OF TIMES THE SOIL IS HANDLED. ON-SITE HANDLING OF SOILS WILL OCCUR DURING EXCAVATION, LOADING, AND SPREADING ACTIVITIES. FUEL FOR HEAVY EQUIPMENT AND VEHICLES WILL NOT BE STORED ON THE SITE DURING CONSTRUCTION OPERATIONS. MOBILE FUEL TANKS WILL FUEL HEAVY EQUIPMENT. IN THE EVENT OF A SPILL OR LEAK THE CONTRACTOR SHALL FOLLOW PROPER PROCEDURES TO MINIMIZE CONCERN. THE CONTRACTOR SHALL:

1. TAKE IMMEDIATE MEASURES TO CONTROL AND CONTAIN THE SPILL TO PREVENT RELEASE INTO SEWERS OR SURFACE WATERS.
2. NOTIFY THE LOCAL FIRE DEPARTMENT IMMEDIATELY AT 9-1-1.
3. NOTIFY THE FEDERAL EMERGENCY SPILL HOTLINE AT 1-800-424-8802 WITHIN 2 HOURS IF THE AMOUNT IS ABOVE A REPORTABLE
4. QUANTITY OR ANY AMOUNT ENTERS A WATERWAY OR STORM SEWER.
5. NOTIFY THE INDIANA EMERGENCY RESPONSE HOTLINE AT 1-888-233-7745.
6. FOLLOW THE GUIDELINES FOR HANDLING THE SPILL AS OUTLINED IN THE INCLUDED MATERIAL SAFETY DATA SHEETS.

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

RUSSELL JACOB POZEN REGISTERED NO. PE10910667 STATE OF INDIANA PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION
09/04/2025

The Architects Partnership, Ltd.
200 S Michigan Ave, Suite 1020
Chicago, Illinois 60604

DATE: REVISIONS AND NOTES:

Centennial Village - Lot 13
Bldg. A - Chase Bank
Stormwater Pollution
Prevention Plan Details

NO SCALE

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DESIGN BY	DATE
DVG	08/21/25
PROJECT NO.	
25-0081	
C304	



SOUTH ELEVATION



EAST ELEVATION



METAL CANOPY
COLOR: BLACK ANODIZED ALUM.



STORE FRONT
COLOR: BLACK ANODIZED ALUM.



CLEAR GLASS



PANELS
COLOR: DARK BRONZE



CAST STONE
COLOR: TO MATCH EXISTING WITHIN PUD



BRICK
COLOR: WELSFORD IRONSPOT GLEN-GERY



SPANDREL GLASS

NOTE: PER THE EXISTING PUD, THE PROPOSED ARCHITECTURE SHOULD MATCH THE EXISTING SURROUNDING BUILDINGS. MASONRY AND BRICK ARE OBSERVED IN THE SURROUNDING AREA.

SCALE: $\frac{1}{4}$" = 1'

0 5' 10' 15'

CHASE

WHITE OAK
NEC Calumet and 45th
Munster, IN 46321

ARCHITECTURAL ELEVATIONS

04.25.2025

Architect/Designer
The Architects Partnership, Ltd.
200 South Michigan Avenue
Chicago, IL 60604
t: 312.583.9800
f: 312.583.9890
TAP Project Number: 25001

tap



SOUTH ELEVATION



WEST ELEVATION



METAL CANOPY
COLOR: BLACK ANODIZED ALUM.



STORE FRONT
COLOR: BLACK ANODIZED ALUM.



CLEAR GLASS



PANELS
COLOR: DARK BRONZE



CAST STONE
COLOR: TO MATCH EXISTING WITHIN PUD



BRICK
COLOR: WELSFORD IRONSPOT GLEN-GERY



SPANDREL GLASS

NOTE: PER THE EXISTING PUD, THE PROPOSED ARCHITECTURE SHOULD MATCH THE EXISTING SURROUNDING BUILDINGS. MASONRY AND BRICK ARE OBSERVED IN THE SURROUNDING AREA.

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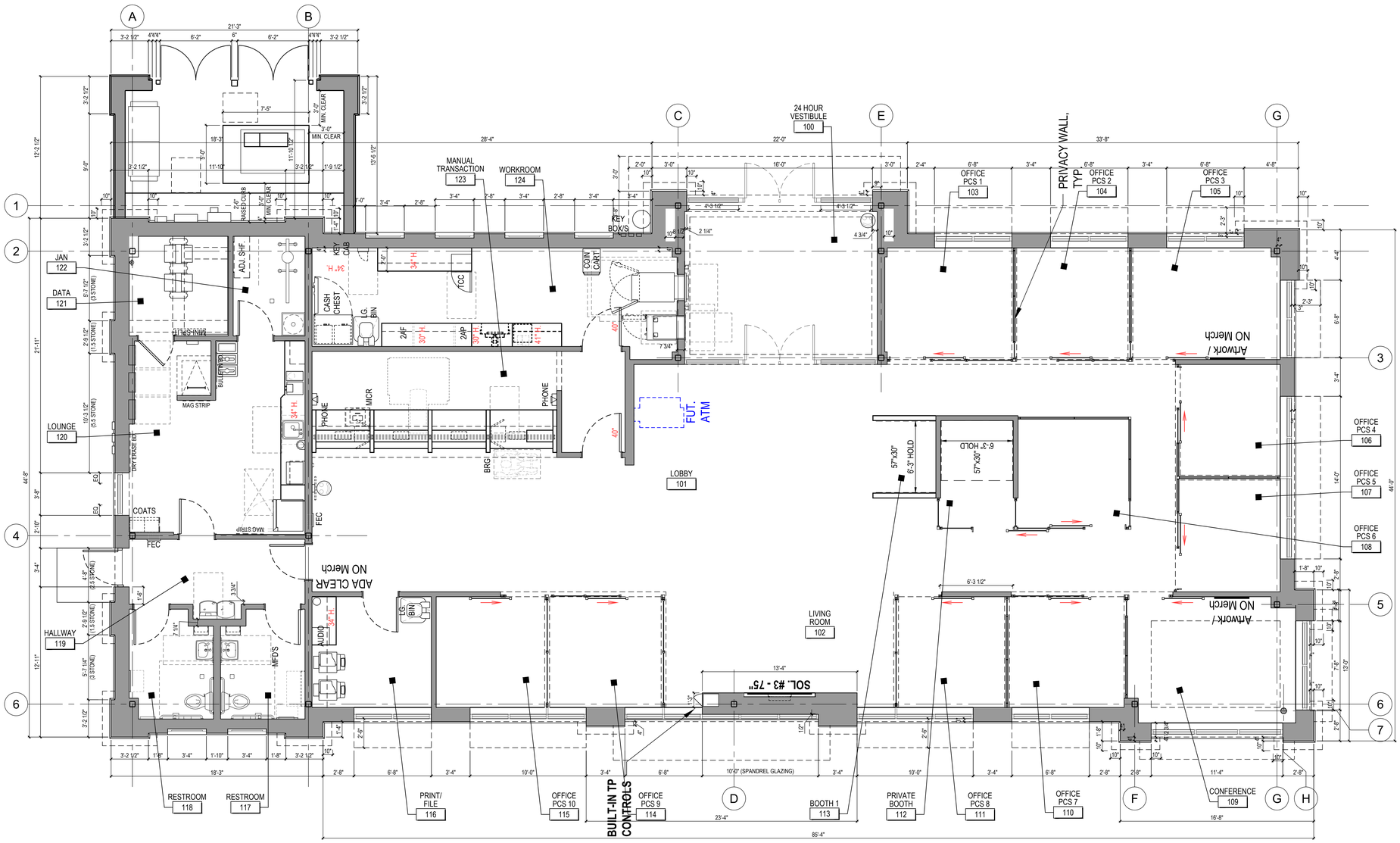
tap



1 A1.1.1 FLOOR PLAN
1/4" = 1'-0"

0 2' 4' 8'
1/4" = 1'-0"

N

FLOOR PLAN GENERAL NOTES:

- WALLS PERPENDICULAR TO EXTERIOR WINDOW SYSTEMS SHALL TYPICALLY ALIGN WITH OR BE CENTERED ON MULLIONS PER PLAN. VERIFY EXACT ROOM DIMENSIONS IN THE FIELD.
- SEE ELEVATIONS & DETAILS FOR CUSTOM SHOP FABRICATED BUILT-IN MILLWORK.
- EXTERIOR WINDOW FRAMES ARE 2" UNO.
- INTERIOR WALLS ARE TYPE W.I UNO.
- G.C. TO PROVIDE 5/8" TYPE 'X' GYP. BOARD ON INSIDE OF ALL EXTERIOR WALL FRAMING UP TO UNDERSIDE OF DECK. FINISHING OF GYP. BOARD JOINTS CAN BE LEVEL 2 OR 3 ABOVE FINISH CEILING. ADDITIONALLY, PROVIDE CLASS III VAPOR RETARDER ON INSIDE FACE OF GYP. BOARD VIA PRIMER AND/OR LATEX PAINT ENTIRE HEIGHT OF WALL. PROVIDE SEALANT AT INTERSECTION OF DRYWALL AND STRUCTURAL DECK,SLAB, OR SHEATHING AT TOP & BOTTOM.
- G.C. TO PROVIDE CONTINUOUS WEATHER RESISTIVE BARRIER AROUND PERIMETER OF BUILDING. COORDINATE WITH WALL SECTIONS AND DETAILS.
- UNLESS DESIGNATED WITH AN ANGLE, ALL NEW WALLS TO BE PARALLEL/PERPENDICULAR WITH PERIMETER WALLS.
- ALL GYP. BOARD TRIM AND FINISH ACCESSORIES, INCLUDING BEADS, REVEALS, CAPS, ETC. SHALL BE MFG STEEL, GALV. STEEL, OR ALUM. NO PLASTIC COMPONENTS.
- SOFFITS OVER FURNITURE PARTITIONS TO HAVE ACOUSTICAL INSULATION TO 6 INCHES BELOW DECK. REFER TO SHEET A5.2.3.

FLOOR PLAN NOTES:

A-01	LINE OF SOFFIT/COVE/HEADER ABOVE - SEE RCP.
A-02	RECESSED FIRE EXTINGUISHER CABINET. MOUNT AT MAX. 48" AFF TO TOP OF CABINET.
A-03	WALL-MOUNT FIRE EXTINGUISHER: CARBON DIOXIDE ONLY / WATER OR DRY CHEMICAL TYPES NOT PERMITTED, CLASS C OR B-C, 5 LB. OR SMALLER, SET WALL BRACKET TO KEEP HANDLE < 48" AFF
A-04	ADJUSTABLE WIRE OR PLASTIC LAMINATE SHELVING. REFER TO INTERIOR ELEVATIONS.
A-05	AUTOMATIC DOOR BUTTON AND KEY SWITCH RECESSED IN STOREFRONT MULLION OR WALL. SEE ELEVATIONS FOR LOCATIONS. COORDINATE WITH ELEC.
A-06	AUTOMATIC DOOR BUTTON FOR INTERIOR DOOR - RECESSED IN MULLION OR WALL. SEE ELEVATIONS FOR LOCATIONS. COORDINATE WITH ELEC.
A-07	~~AUTOMATIC DOOR BUTTON FOR EXTERIOR DOOR AND CARD READER~~ - RECESSED IN ~~BOLLARD. SEE ELEVATIONS~~ FOR LOCATIONS. ~~COORDINATE WITH ELEC.~~
A-08	AUTOMATIC DOOR OPERATOR BUTTON AND KEYCARD READER RECESSED FLUSH WITH WALL SURFACE- DO NOT SURFACE-MOUNT. REFER TO ELEVATION 1/A2.1 AND DETAIL 2/A3.2.
A-09	RECESS MOUNTED KEYBOX BY OWNER'S VENDOR, TO BE MOUNTED CENTERLINE AT 44" AFF. REFER TO ELEVATIONS AND DETAILS.
A-10	NOT USED
A-11	DEMOUNTABLE FURNITURE PARTITION ASSEMBLY BY VENDOR. G.C. TO COORDINATE DIMENSIONS AND INSTALLATION.
A-12	CUSTOM CABINETRY / MILLWORK BY MILLWORKER. REFER TO ELEVATIONS AND DETAILS FOR ADDITIONAL INFORMATION.
A-13	MEDIA WALL - G.C. TO PROVIDE ALL REQUIRED CONDUIT AND CABLING AS REQUIRED BY THE AV VENDOR. SEE ELECTRICAL AND TC DRAWINGS FOR ADDITIONAL INFORMATION. COORDINATE AND REFERENCE A/V DRAWINGS BY OTHERS.
A-14	CONSTRUCT WALL POCKET FOR RECESSED VIDEO MONITOR. SEE ELEVATIONS AND DETAILS FOR ADDITIONAL INFORMATION. G.C. TO COORDINATE OPENING SIZE WITH MONITOR SIZE. REFER TO TC DRAWINGS.
A-15	PROVIDE F.T. BLOCKING IN WALL FOR DEMOUNTABLE DOOR TRACK. SEE DETAIL 5/A5.2.3 AND ELEVATIONS.
A-16	STAGGER STUDS TO ACHIEVE DESIRED WALL THICKNESS.
A-17	PROVIDE POWER FOR MERCHANDISING SIGNAGE. SEE INTERIOR ELEVATIONS AND ELECTRICAL.
A-18	G.C. TO INCLUDE PRICING TO PROVIDE ALL NECESSARY CONDUIT PENETRATIONS FOR ILLUMINATED CHASE SIGNAGE ABOVE ENTRY DOOR AND STOREFRONT. SEE ELEVATIONS FOR LOCATIONS. PATCH BACK PENETRATION(S) TO BE WATER TIGHT AND MATCH ADJACENT FINISH. PROVIDE ACCESS PANEL ON INSIDE ABOVE CEILING TO ACCESS J-BOX. SEE CHASE SIGNAGE BRAND BOOK FOR ADDITIONAL INFORMATION. COORDINATE EXACT LOCATION WITH SIGN VENDOR.
A-19	ELECTRIC BASEBOARD HEATER. SEE MECHANICAL.
A-20	ELECTRIC WALL HEATER. SEE ELEVATIONS AND MECHANICAL.
A-21	EXTERIOR KNOX BOX FOR EMERGENCY SERVICES USE. VERIFY MODEL AND MOUNTING LOCATION WITH FIRE DEPARTMENT. REFER TO DETAIL 15A/A5.2.2.
A-22	FIRE ALARM ANNUNCIATOR PANEL IN VESTIBULE AND FIRE ALARM CONTROL PANEL IN BACK-OF-HOUSE. SEE ELEVATIONS AND ELECTRICAL FOR ADDITIONAL INFORMATION. COORDINATE EXACT LOCATION WITH LOCAL FIRE DEPARTMENT.
A-23	NOT USED
A-24	RETURN AIR GRILL AT LOWER PART OF WALL.
A-25	RECESSED ATM KEYBOX BY OWNER'S VENDOR. REFER TO DETAIL 19/A5.2.2.
A-26	NOT USED
A-27	~~FLOOR DRAIN LOCATION - SEE PLUMBING DWG & CURB PLAN FOR FLOOR CORE LOCATIONS~~
A-28	EXTEND GYP. BD UP TO DECK AT WALLS OF DATA ROOM.
A-29	THICKEN STUD WALL FOR RECESSED ELECTRICAL PANELS.
A-30	ROOF ACCESS LADDER & SCUTTLE. REFER TO ROOF PLAN & SEE DETAILS 3/A4.1 AND 1/A5.1.3.

CHASE

WHITE OAK RELO
RETAIL BANKING CENTER
1600 W 45TH AVENUE
MUNSTER, IN, 46321

48100R019318

ARCHITECT/ ENGINEER OF RECORD

tap The Architects Partnership

SEAL

EXPIRES 06/30/2022

ISSUE	DATE	DESCRIPTION
	##-###-20##	ISS. FOR [REASON]

PROJECT INFORMATION BLOCK

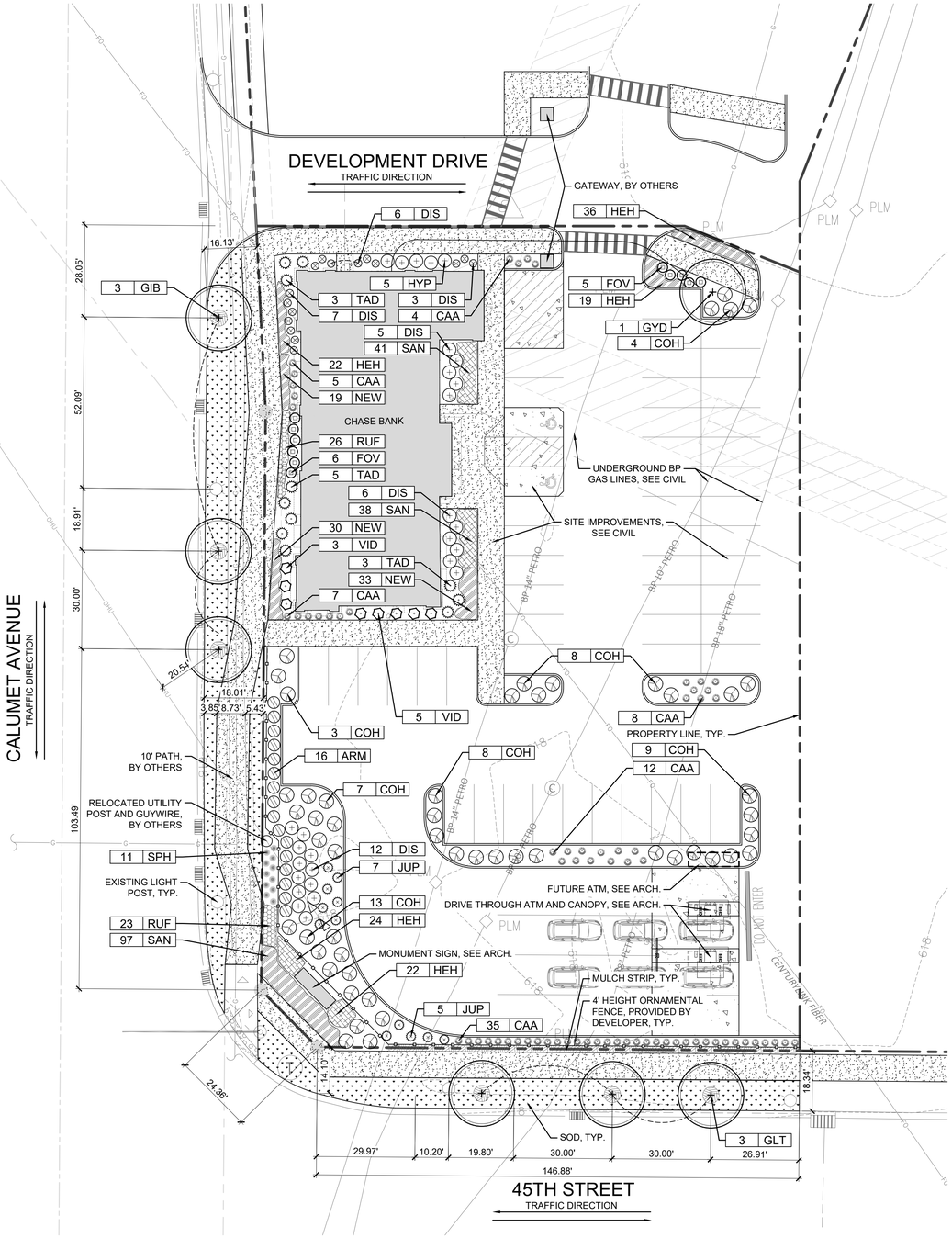
JOB #	25001
DRAWN BY:	GP / ED
CHECKED BY:	TM

SHEET TITLE

FLOOR PLAN

SHEET NUMBER

A1.1.1



N

20' 0 10' 20' 40'

Scale: 1 inch = 20 feet

LEGEND:

- PROPERTY LINE
- BUILDING
- CONCRETE PAVEMENT AND BASE
- CONCRETE WALK AND BASE
- ORNAMENTAL FENCE
- SHADE TREE
- DECIDUOUS SHRUBS
- EVERGREEN SHRUBS
- ORNAMENTAL GRASSES
- SOD
- PERENNIAL / GROUNDCOVER AREAS
- MULCH, 3" DEPTH

Plant Schedule

Chase Bank - Munster, IN

Qty.	Key	Botanical name	Common name	Size	Notes
		SHADE TREES			
3	GIB	Ginkgo biloba	Ginkgo	2.5" B&B	Central leader
3	GLT	Gleditsia triacanthos 'Skyline'	Skyline Honeylocust	2.5" B&B	Central leader
1	GYD	Gymnocladus dioicus 'Espresso'	Espresso Kentucky Coffeetree	2.5" B&B	Central leader
		DECIDUOUS SHRUBS			
16	ARM	Aronia melanocarpa 'Morton'	Iroquois Beauty Chokeberry	24" B&B	5' o.c.
52	COH	Cotoneaster 'Hessei'	Hesse Cotoneaster	#5 Cont.	5' o.c.
39	DIS	Diervilla x splendens 'SMNDSS'	Kodiak Fresh Bush Honeysuckle	#5 Cont.	3' o.c.
11	FOV	Forsythia viridissima 'Bronxensis'	Bronx Dwarf Forsythia	#3 Cont.	3' o.c.
5	HYP	Hydrangea paniculata 'Jane'	Little Lime Hydrangea	24" B&B	4' o.c.
8	VID	Viburnum dentatum 'Christom'	Blue Muffin Viburnum	24" B&B	5' o.c.
		EVERGREEN SHRUBS			
12	JUP	Juniperus x pfitzeriana 'Sea Green'	Sea Green Juniper	24" B&B	5' o.c.
11	TAD	Taxus x media 'Densiformis'	Dense Spreading Yew	24" B&B	5' o.c.
		PERENNIALS			
123	HEH	Hemerocallis 'Happy Returns'	Happy Returns Daylily	#1 Cont.	18" o.c.
82	NEW	Nepeta racemosa 'Walker's Low'	Walker's Low Catmint	#1 Cont.	18" o.c.
176	SAN	Salvia nemorosa 'Caradonna'	Caradonna Sage	#1 Cont.	18" o.c.
49	RUF	Rudbeckia fulgida 'Viette's Little Suzy'	Little Suzy Black-Eyed Susan	#1 Cont.	18" o.c.
		ORNAMENTAL GRASSES			
71	CAA	Calamagrostis acutiflora 'Karl Foerster'	Karl Foerster Feather Reed Grass	#1 Cont.	36" o.c.
11	SPH	Sporobolus heterolepis	Prairie Dropseed	#1 Cont.	24" o.c.

SWORN STATEMENTS:

The undersigned acknowledges that the landscape planting plan shown on the attached landscape plan(s) for the property at:

9521 Calumet Ave, Town of Munster, Indiana

has to the best of the undersigned applicant's knowledge, been designed and will be installed, maintained, and replaced, as required, by current and subsequent owners in accordance with the requirements of the Town of Munster Municipal Code, the landscaping standards of the Town of Munster Zoning Ordinance, and the Guide to the Town of Munster Landscape Ordinance.

Existing parkway and on-site interior trees are to be protected while project is under construction and will be replaced by current and subsequent owner if damaged.

Owner's Name and Signature

The undersigned LANDSCAPE ARCHITECT, registered in the State of indiana, acknowledges that the landscape planting plan and construction details shown on the attached landscape plan(s) for the property at:

9521 Calumet Ave, Town of Munster, Indiana

has been designed in accordance with the requirements of the Town of Munster Municipal Code, the landscaping standards of the Town of Munster Zoning Ordinance, and the Guide to the Town of Munster Landscape Ordinances.

#LA21900010
exp. 12/31/25

Keven Graham FASLA, PLA
TERRA Engineering Ltd.
225 W. Ohio Street, Fourth Floor
Chicago, Illinois 60610
ph: 312.467.0123

CHASE BANK

9521 Calumet Ave,
Munster, IN 46321

Client

CHASE

Project Team

LANDSCAPE ARCHITECT

TERRA landscapearchitecture
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(T) 312-467-0123 | (F) 312-467-0220

ARCHITECT

THE ARCHITECTS PARTNERSHIP, LTD.
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Chicago, IL. 60604
312-583-9800

CIVIL ENGINEER

KIMLEY HORN
4201 Winfield Road
Suite 600
Warrenville, IL. 60555
630-487-5550

Revisions

Date	Issue
09/04/2025	Submittal
09/19/2025	Submittal

Stamp

KEVEN GRAHAM REGISTERED NO. LA21900010 STATE OF INDIANA LANDSCAPE ARCHITECT

Title

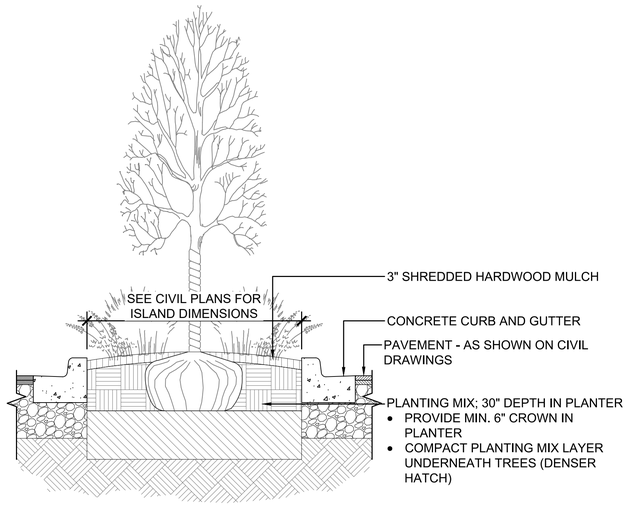
LANDSCAPE PLAN

Sheet No.

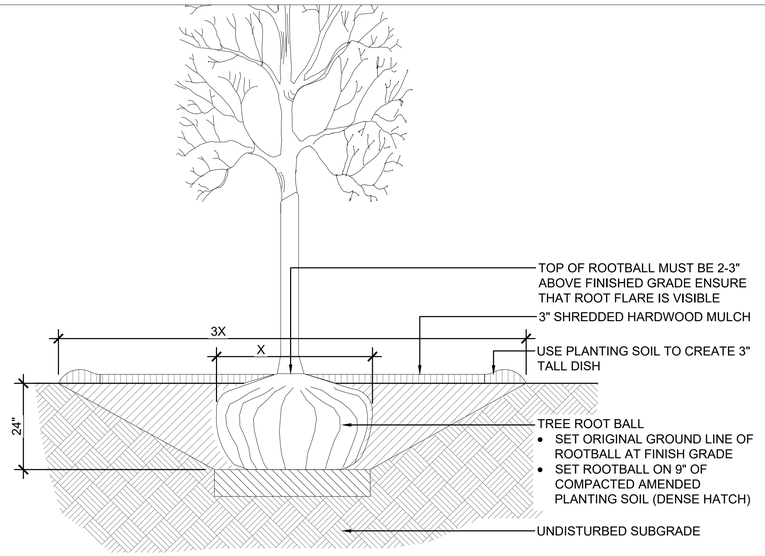
L1.0

TERRA Project No. 18-162-058

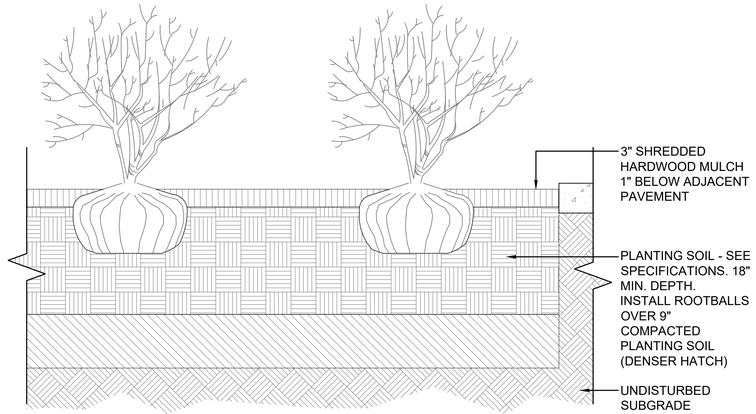
Sep 19, 2025 - 9:14am
M:_2018\18-162 The Architects Partnership\18-162-058 - Munster IN\Design\Site\Drawings\L1.0 Landscape Plan.dwg
Conejal



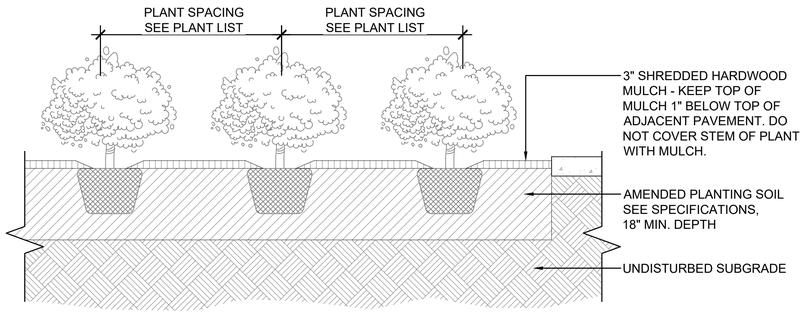
1 SHADE TREE PLANTING - PARKING LOT ISLAND
SCALE: NTS



2 SHADE/ORNAMENTAL TREE PLANTING DETAIL
SCALE: NTS



3 SHRUB PLANTING DETAIL
SCALE: NTS



4 GROUNDCOVER / PERENNIAL PLANTING DETAIL
SCALE: NTS

CHASE BANK
9521 Calumet Ave,
Munster, IN 46321

Client

CHASE

Project Team

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Revisions

Date	Issue
09/04/2025	Submittal
09/19/2025	Submittal

Stamp

KEVEN GRAVAN REGISTERED NO: LA21900010 STATE OF INDIANA LANDSCAPE ARCHITECT

Title

LANDSCAPE DETAILS

Sheet No.

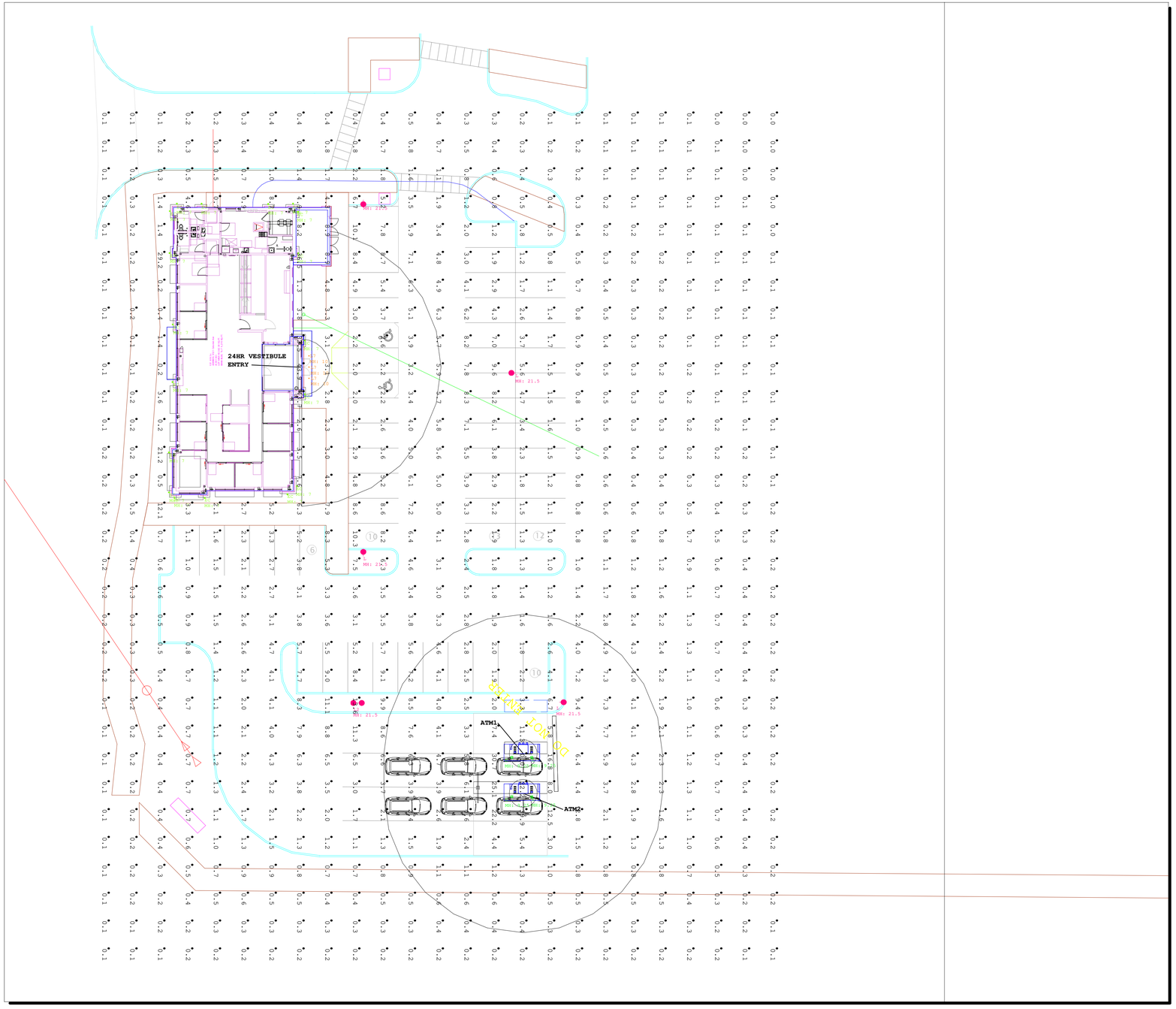
L2.0

TERRA Project No. 18-162-058

Sep 19, 2025 - 9:14am
M:_2018\18-162 The Architects Partnership\18-162-058 - Munster IN\Design\Site\Drawings\L2.0 Landscape Details.dwg
Original

Calculation Summary							
Label	**Units**	**Avg**	**Max**	**Min**	**Avg/Min**	**Max/Min**	**Description**
24HR VESTIBULE-ENTRY 10'	Fc	34.77	139.3	2.4	14.49	58.04	FC TAKEN 10' FROM ENTRY @ 3'-0" AFG
ATM'S 50'	Fc	6.07	99.7	0.2	30.35	498.50	FC TAKEN 50' FROM ATMS @ 3'-0" AFG
ATM1 5'	Fc	48.32	66.3	3.0	16.11	22.10	FC TAKEN 5' FROM ATM1 @ 3'-0" AFG
ATM2 5'	Fc	78.83	105.3	14.2	5.55	7.42	FC TAKEN 5' FROM ATM2 @ 3'-0" AFG
ENTRY 50'	Fc	4.79	85.4	1.0	4.79	85.40	FC TAKEN 50' FROM ENTRY @ 3'-0" AFG
STE	Fc	2.45	43.9	0.0	N.A.	N.A.	FC TAKEN @ GRADE

Luminaire Schedule				
Symbol	**Label**	**Qty**	**Part Number**	**Description**
	EC	18	CW04XXUDPC 20LWDCL 20LWDCL 35KXX XXMW	EXISTING CYCLINDER
	L7	3	5811SAT20L	RECESSED DOWNLIGHT
	C	4	CSE08A-W40W	SURFACE MOUNT CANOPY BY OTHERS
	L	4	MPL3 P60S 40K MVOLT TG4	PENDANT TEARDROP FIXTURE
	L2	1	MPL3 P60S 40K MVOLT TG4	PENDANT TEARDROP FIXTURE



- DUE TO CHANGING LIGHTING ORDINANCES IT IS THE CONTRACTORS RESPONSIBILITY TO SUBMIT THE SITE PHOTOMETRICS AND LUMINAIRE SPECS TO THE LOCAL INSPECTOR BEFORE ORDERING TO ENSURE THIS PLAN COMPLIES WITH LOCAL LIGHTING ORDINANCES
- THIS LIGHTING DESIGN IS BASED ON INFORMATION SUPPLIED BY OTHERS. CHANGES IN ELECTRICAL SUPPLY, AREA GEOMETRY AND OBJECTS WITHIN THE LIGHTED AREA MAY PRODUCE ILLUMINATION VALUES DIFFERENT FROM THE PREDICTED RESULTS SHOWN ON THIS LAYOUT.
- THIS LAYOUT IS BASED ON IES FILES THAT WERE LAB TESTED OR COMPUTER GENERAGED. ACTUAL RESULTS MAY VARY
- MH IS OVERALL MOUNTING HEIGHT

lighting > electrical > energy
technology > signs
FACILITY SOLUTIONS GROUP

#	Date	Comments

Revisions

Drawn By: JJM
Checked By:
Date:9/4/2025

JPMC WHITE OAK, IN
LIGHTING LAYOUT

PHOTOMETRIC CALCULATIONS

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lots 10, 11, 12 & 13

Storm Water Technical Report
August 2025

Prepared for:

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

Table of Contents

1.0 Project Description

2.0 Storm Sewer Design

3.0 Overland Flood Route

Exhibits

1. ALTA Survey
2. Storm Sewer Calculations
3. Overland Flood Route Calculations
4. Centennial Village – Lot 9 – Building “M” Stormwater Report, dated June 2023

1.0 Project Description

Centennial Village is proposing to develop a grocery store, as the next phase of the ongoing Centennial Village Subdivision PUD project. The site is located northeast of the intersection Calumet Avenue and 45th Avenue in Munster, Indiana. Lot 11 contains approximately 2.36 acres and the proposed building is approximately 23,299 sf. Lots 10, 12 and 13 are 2.02 ac, 1.17ac and 0.93 ac respectively.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards. When Lots 10, 12 & 13 are developed, it shall provide an updated stormwater report including their proposed drainage and storm sewer design for each site.

See **Exhibit 1 ALTA Survey** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 10, 11 (future Sprouts), 12 & 13 (future Chase Bank). The proposed storm sewer system connects to the existing 36" RCP stub located at the southeast corner of the 45th Avenue entrance. The connection will convey flows into the major storm sewer system south of 45th Avenue, which ultimately discharges to the Centennial Village regional detention facility, Clayhole Lake. The pipe capacity and the major existing storm sewer system being connected to were previously studied by Robinson Engineering in their stormwater report dated October 2, 2017. As shown in **Exhibit 4,** *Centennial Village – Lot 9 – Building M Stormwater Report* (June 2023), the storm sewer system was designed to accommodate Lot C, which is now being subdivided into Lots 10, 11, 12, and 13.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow.
See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of Lot 11. When Lot 10 is developed, it shall provide an overland flood route for the site. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 3 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

Exhibit 1

ALTA Survey

ALTA/NSPS
LAND TITLE SURVEY

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P - DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG" - 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG" - 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"

IRF - REBAR FOUND
PB. - PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO - NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A. - LANDSCAPE AREA
PG. - PAGE
REC. - RECORDED

- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CURB INLET
- CATCH BASIN
- TRAFFIC MANHOLE
- GUY/ANCHOR
- ROAD SIGN
- PLM PIPELINE MARKER
- GAS TEST STATION
- GAS LINE VENT
- GAS VALVE
- ICV IRRIGATION CONTROL VALVE
- bov BLOW OFF VALVE
- SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON

- W BURIED WATER LINE
- G BURIED GAS LINE
- E BURIED ELECTRIC LINE
- T BURIED COMMUNICATION LINE
- OHU OVERHEAD UTILITY WIRES
- BP BURIED BRITISH PETROLEUM PIPE LINE
- WOLVERINE BURIED WOLVERINE PIPE LINE
- SUBJECT PARCEL LINE
- ADJOINING PARCEL LINE
- SECTION/QUARTER LINE
- EASEMENT LINE
- STORM SEWER WITH FLOW DIRECTION
- SANITARY SEWER WITH FLOW DIRECTION
- WATER VALVE
- FIRE HYDRANT ASSEMBLY
- FIBER OPTIC MARKER POST
- TREE WITH SIZE
- xxx EXISTING 1-FOOT CONTOUR
- xxx.x EXISTING SPOT ELEVATION

- ADA PAD
- CONCRETE
- ASPHALT
- STONE

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

GLEN E. BOREN
PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF- ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY, ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL- RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT.

ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.

ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.

ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.

ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.

ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

N
0' 25' 50'
SCALE: 1" = 50'

THE ARCHITECTS PARTNERSHIP

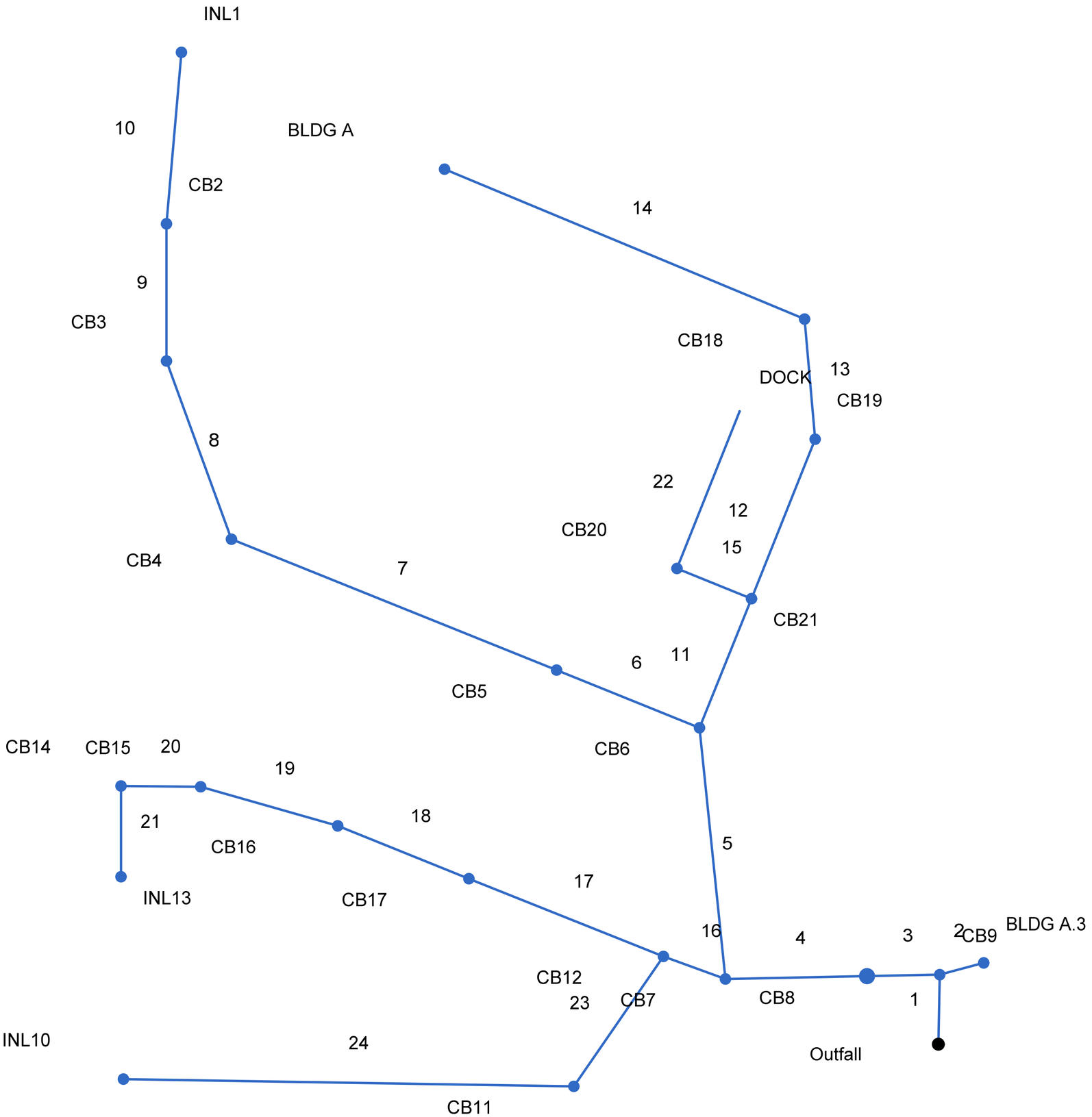
© COPYRIGHT DVG TEAM, INC

\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

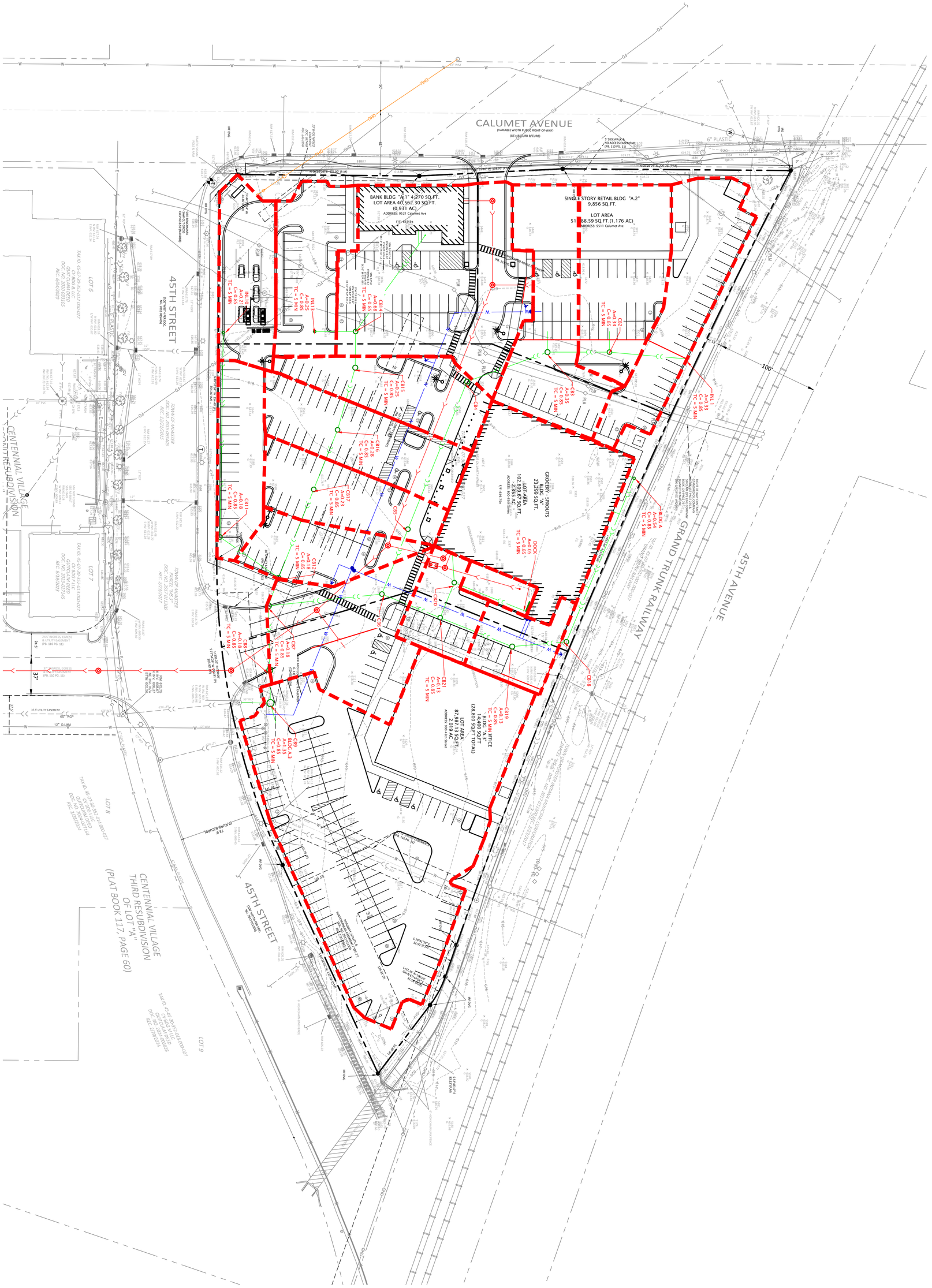
Exhibit 2

Storm Sewer Calculations

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: SS.stm	Number of lines: 24	Date: 8/20/2025



NOT FOR CONSTRUCTION

TRIB EX

PROJECT NO: 25-0081

DESIGNED BY: GMPF

DATE: 08/20/25

© COPYRIGHT 2017 DVG TEAM, INC

SCALE: 1" = 40'

Centennial Village-Lot 11
Bldg. A Sprouts

Tributary Area Exhibit

DATE:	REVISIONS AND NOTES:

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

08/20/25

NOT FOR CONSTRUCTION

1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DVG TEAM INC

BY: ___DPW___
DATE: _08/20/2025__
CHECKED BY: ____
DATE: __

PROJECT: 25-0081 CVP Sprouts
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
1	CB9	CB9-EXMH	0.00	5.79	0.85	5.00	9.20	5.74	0.00	28.24	29.62	4.77	0.013	30.00	36.00	0.20	615.90	607.15	607.09	609.49	609.43
2	BLDG A.3	BLDGA3-CB9	1.35	1.35	0.85	5.00	5.00	7.07	0.00	8.11	12.25	2.69	0.012	20.00	24.00	0.25	615.90	608.05	608.00	609.86	609.85
3	CB8	CB8-CB9	0.18	4.44	0.85	5.00	9.10	5.77	0.00	21.77	24.85	4.52	0.012	32.00	30.00	0.31	615.05	607.55	607.45	609.91	609.85
4	CB7	CB7-CB8	0.18	4.26	0.85	5.00	8.90	5.83	0.00	21.10	25.18	4.40	0.012	62.00	30.00	0.32	615.55	607.75	607.55	610.06	609.95
5	CB6	CB6-CB7	0.00	1.87	0.85	5.00	8.30	5.98	0.00	9.51	12.77	3.03	0.012	110.00	24.00	0.27	617.93	608.20	607.90	610.54	610.37
6	CB5	CB5-CB6	0.00	1.02	0.85	5.00	7.00	6.35	0.00	5.51	6.91	3.12	0.012	68.00	18.00	0.37	618.74	609.25	609.00	610.82	610.66
7	CB4	CB4-CB5	0.00	1.02	0.85	5.00	6.20	6.61	0.00	5.73	6.48	4.15	0.012	154.00	18.00	0.32	618.68	613.50	613.00	614.60	614.10
8	CB3	CB3-CB4	0.35	1.02	0.85	5.00	5.80	6.76	0.00	5.86	7.90	4.00	0.012	83.00	18.00	0.48	617.80	613.90	613.50	614.96	614.80
9	CB2	CB2-CB3	0.34	0.67	0.85	5.00	5.50	6.87	0.00	3.91	4.95	3.48	0.012	60.00	15.00	0.50	617.90	614.20	613.90	615.21	615.08
10	INL1	INL1-CB2	0.33	0.33	0.85	5.00	5.00	7.07	0.00	1.98	2.81	2.72	0.012	75.00	12.00	0.53	617.40	614.60	614.20	615.41	615.24
11	CB21	CB21-CB6	0.13	0.85	0.85	5.00	8.00	6.06	0.00	4.38	4.91	3.61	0.012	61.00	15.00	0.49	618.60	609.70	609.40	610.88	610.66
12	CB19	CB19-CB21	0.13	0.67	0.85	5.00	5.90	6.72	0.00	3.83	5.11	3.15	0.012	75.00	15.00	0.53	618.60	610.10	609.70	611.29	611.08
13	CB18	CB18-CB19	0.00	0.54	0.85	5.00	5.70	6.80	0.00	3.12	3.36	3.98	0.012	53.00	12.00	0.76	618.00	610.50	610.10	611.71	611.37
14	BLDG A	BLDGA-CB18	0.54	0.54	0.85	5.00	5.00	7.07	0.00	3.24	3.49	5.02	0.012	171.00	12.00	0.82	617.00	613.50	612.10	614.27	612.86
15	CB20	CB20-CB21	0.00	0.05	0.85	5.00	6.40	6.54	0.00	0.28	3.25	1.33	0.012	35.00	12.00	0.71	619.70	610.60	610.35	610.82	611.08
16	CB12	CB12-CB7	0.18	2.21	0.85	5.00	7.50	6.22	0.00	11.68	14.40	5.10	0.012	29.00	24.00	0.35	615.75	611.15	611.05	612.52	612.42
17	CB17	CB17-CB12	0.23	1.64	0.85	5.00	6.00	6.70	0.00	9.34	9.56	5.29	0.012	92.00	18.00	0.71	616.20	611.80	611.15	613.53	612.91
18	CB16	CB16-CB17	0.23	1.41	0.85	5.00	5.70	6.78	0.00	8.13	8.54	4.60	0.012	62.00	18.00	0.56	616.25	612.15	611.80	613.91	613.60
19	CB15	CB15-CB16	0.25	1.18	0.85	5.00	5.50	6.88	0.00	6.90	7.19	3.91	0.012	63.00	18.00	0.40	616.35	612.40	612.15	614.19	613.96
20	CB14	CB14-CB15	0.68	0.93	0.85	5.00	5.30	6.93	0.00	5.48	6.47	4.47	0.012	35.00	15.00	0.86	616.35	612.70	612.40	614.48	614.27
21	INL13	INL13-CB14	0.25	0.25	0.85	5.00	5.00	7.07	0.00	1.50	2.74	1.91	0.012	40.00	12.00	0.50	616.40	612.90	612.70	614.85	614.79
22	DOCK	DOCK-CB21	0.05	0.05	0.85	5.00	5.00	7.07	0.00	0.30	0.96	2.44	0.012	74.00	8.00	0.54	615.75	613.00	612.60	613.26 j	612.86
23	CB11	CB11-CB12	0.18	0.39	0.85	5.00	7.10	6.34	0.00	2.10	2.75	2.68	0.012	69.00	12.00	0.51	616.30	612.10	611.75	613.10	612.91
24	INL10	INL10-CB11	0.21	0.21	0.85	5.00	5.00	7.07	0.00	1.26	2.60	2.26	0.012	198.00	12.00	0.45	617.00	613.00	612.10	613.54	613.19

INLET CAPACITY ANALYSIS

BY: DPW
DATE: 8/20/2025
CHECKED: GMPF
DATE: 8/20/2025

Project: 25-0081 CVP-Sprouts
Location: 45th & Calumet Munster, IN

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

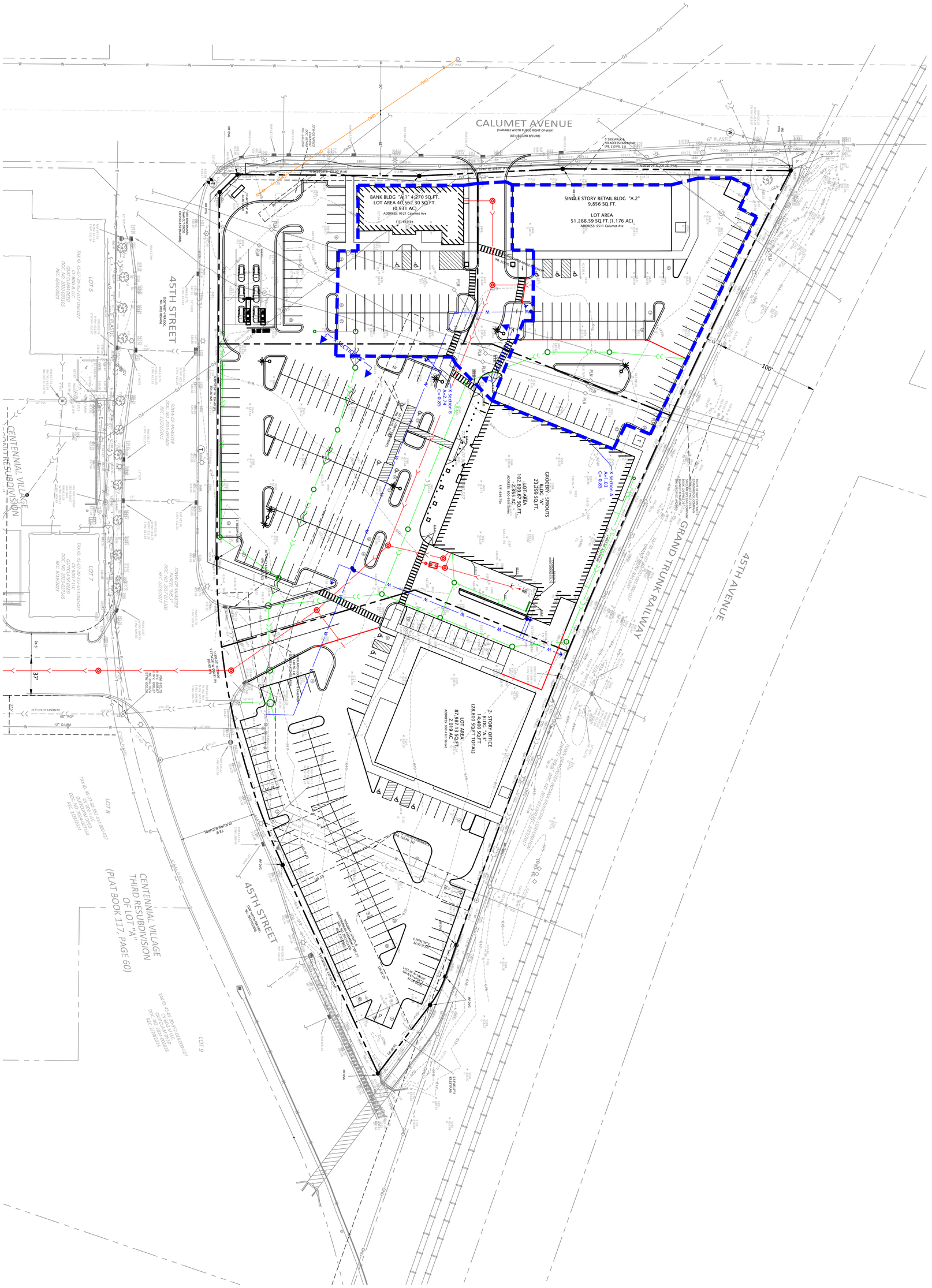
$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
INL1	EJ 1020 M1	0.97	5.92	0.67	0.33	0.85	7.08	1.99	0.58	0.35	6.9
CB2	EJ 1040 M1	1.32	6.83	0.67	0.34	0.85	7.08	2.05	0.33	0.32	4.0
CB3	EJ 1040 M1	1.32	6.83	0.67	0.35	0.85	7.08	2.11	0.35	0.33	4.2
CB7	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB8	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL10	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB11	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB12	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL13	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB14	V5630	3.29	10.00	0.67	0.58	0.85	7.08	3.50	0.16	0.36	4.3
CB15	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB16	EJ 1020 M1	0.97	5.92	0.67	0.28	0.85	7.08	1.69	0.42	0.31	5.0
CB17	EJ 1020 M1	0.97	5.92	0.67	0.23	0.85	7.08	1.38	0.28	0.27	3.4
CB19	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
CB21	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
DOCK	EJ 1020 M1	0.97	5.92	0.67	0.05	0.85	7.08	0.30	0.01	0.10	1.2

Exhibit 3

Overland Flood Route Calculations



NOT FOR CONSTRUCTION

Centennial Village-Lot 11
Bldg. A Sprouts

Overland Flood Route Exhibit

DATE:	REVISIONS AND NOTES:

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

08/20/25

NOT FOR CONSTRUCTION

DVG TEAMING INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

EX

PROJECT NO: 25-0081

DESIGNED BY: GMPF

DATE: 08/20/25

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SCALE: 1" = 40'

Overland Flood Route Computation Calculation

Project: 25-0081 CVP-Sprouts
Date: 8/20/2025

Storm Event: 100yr
*** Areas Calculated from Exhibit 3, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: G A					
Tc=	10	min			
Area=	1.03	acres			
C=	0.85				
i=	5.46	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**4.77**	**cfs**
100YR Overflow Water Elevation=				**618.55**	**Elev**
Freeboard to Nearest Bldg=				**1.20**	**ft**

Cross Section: B					
Tc=	15	min			
Area=	2.74	acres			
C=	0.85				
i=	4.52	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**10.53**	**cfs**
100YR Overflow Water Elevation=				**616.85**	**Elev**
Freeboard to Nearest Bldg=				**2.90**	**ft**

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Aug 20 2025

XSectionA

User-defined

Invert Elev (ft)	= 618.35
Slope (%)	= 1.20
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.77

Highlighted

Depth (ft)	= 0.20
Q (cfs)	= 4.770
Area (sqft)	= 1.52
Velocity (ft/s)	= 3.14
Wetted Perim (ft)	= 15.21
Crit Depth, Yc (ft)	= 0.26
Top Width (ft)	= 15.20
EGL (ft)	= 0.35

(Sta, El, n)-(Sta, El, n)...

(0.00, 619.15)-(19.71, 618.73, 0.011)-(33.23, 618.35, 0.011)-(53.45, 618.85, 0.011)-(59.57, 619.35, 0.011)-(80.15, 619.75, 0.011)

Channel Report

XSectionB

User-defined

Invert Elev (ft)	= 616.70
Slope (%)	= 3.20
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.53

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 10.53
Area (sqft)	= 2.71
Velocity (ft/s)	= 3.89
Wetted Perim (ft)	= 36.13
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 36.13
EGL (ft)	= 0.38

(Sta, El, n)-(Sta, El, n)...

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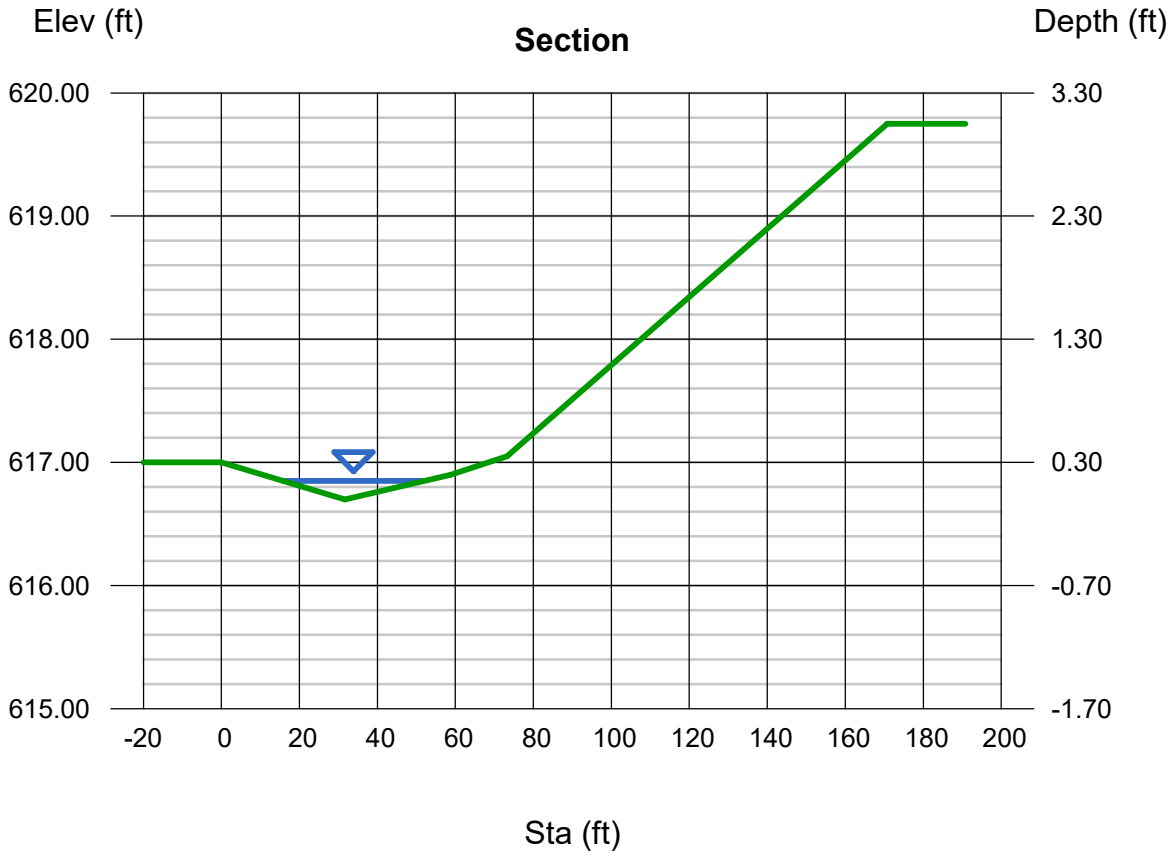


Exhibit 4

Centennial Village – Lot 9 – Building M, dated June 2023

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lot 9 – Building "M"
9603 N. Centennial Drive Munster, IN

Storm Water Technical Report
June 2023

Prepared for:

Centennial Village
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

Table of Contents

1.0 Project Description

2.0 Storm Sewer Design

3.0 Overland Flood Route

Exhibits

1. USGS Location Map
2. Storm Sewer Calculations
3. Overland Flood Route Calculations

1.0 Project Description

Centennial Village is proposing to develop two retail buildings, M and I, as the next phase of the ongoing Centennial Village Subdivision PUD project. Building M will be permitted and built at this time, while building I will be developed in a near future phase. The northwestern portion of Lot A is to be further subdivided into Lots 8 and 9, with Lot 8 serving building I and Lot 9 serving building M. Lot 8 contains approximately 0.84 acres and Lot 9 contains 2.14 acres. The project will also include construction of a new paved parking area, concrete sidewalks, a retaining wall adjacent to 45th Street, and installation of new water, sanitary, and storm services.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards.

See **Exhibit 1 USGS Location Map** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 8 and 9, as well as the future development of Building A directly north of 45th Street. Depicted outfall data from Building A is provided in a stormwater report by Robinson Engineering dated 10/02/17. This data was incorporated into our storm sewer calculations to accurately model pipe capacity.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow. This proposed storm sewer system then ties into an existing 60" HDPE before discharging to Clayhole Lake.

See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Robinson Engineering Stormwater Report Excerpts**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of North Centennial Drive, directly south of Lots 8 and 9. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 6 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

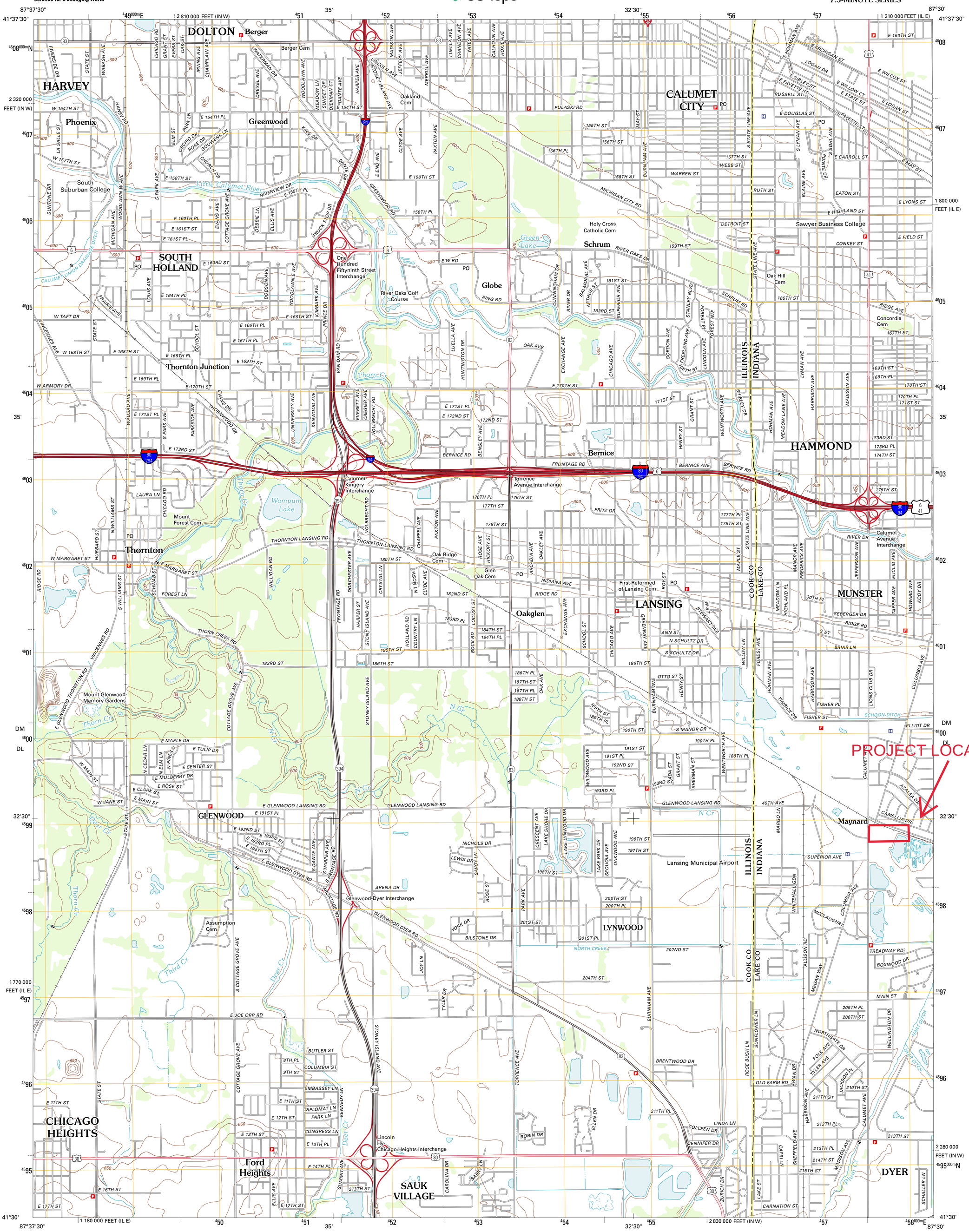
Exhibit 1

USGS Location Map

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map US Topo

CALUMET CITY QUADRANGLE
ILLINOIS-INDIANA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 16T
10 000-foot ticks: Illinois Coordinate System of 1983 (east zone), Indiana Coordinate System of 1983 (west zone)

Imagery.....NAIP, August 2011
Roads.....©2006-2011 TomTom
Names.....GNIS, 2011
Hydrography.....National Hydrography Dataset, 2011
Contours.....National Elevation Dataset, 2012
Boundaries.....Census, IBWC, IBC, USGS, 1972 - 2010

UTM GRID AND 2012 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
DM DL
Grid Zone Designation
16T

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.3

QUADRANGLE LOCATION

Blue Island	Lake Calumet	Whiting
Harvey	Calumet City	Highland
Steger	Dyer	Saint John

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

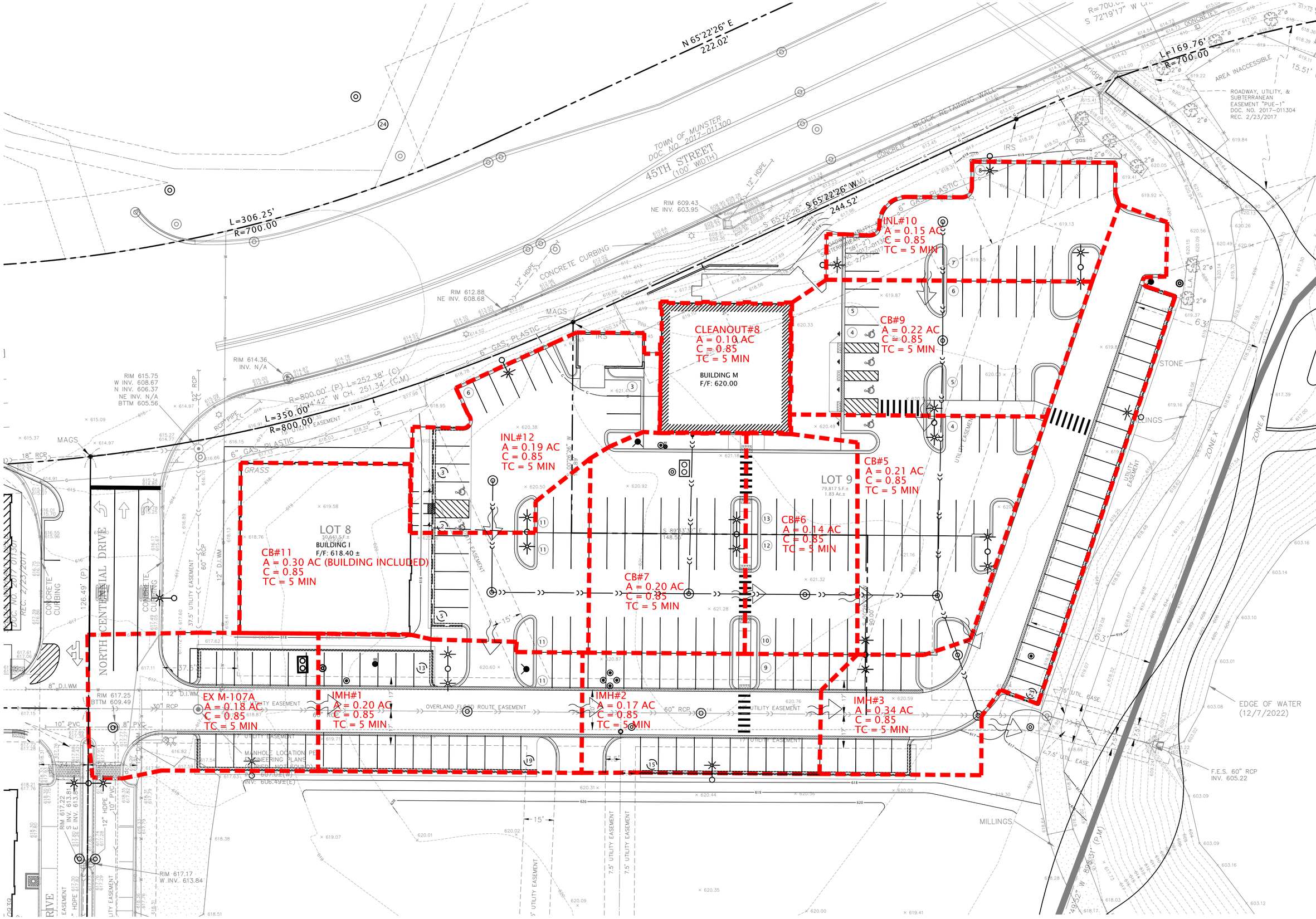
Interstate Route	State Route
US Route	Local Route
Ramp	4WD

Interstate Route · US Route · State Route

CALUMET CITY, IL-IN
2012

Exhibit 2

Storm Sewer Calculations



DVG TEAM INC
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www.dvgteam.com

NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE

631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Stormwater Tributary Area Exhibit

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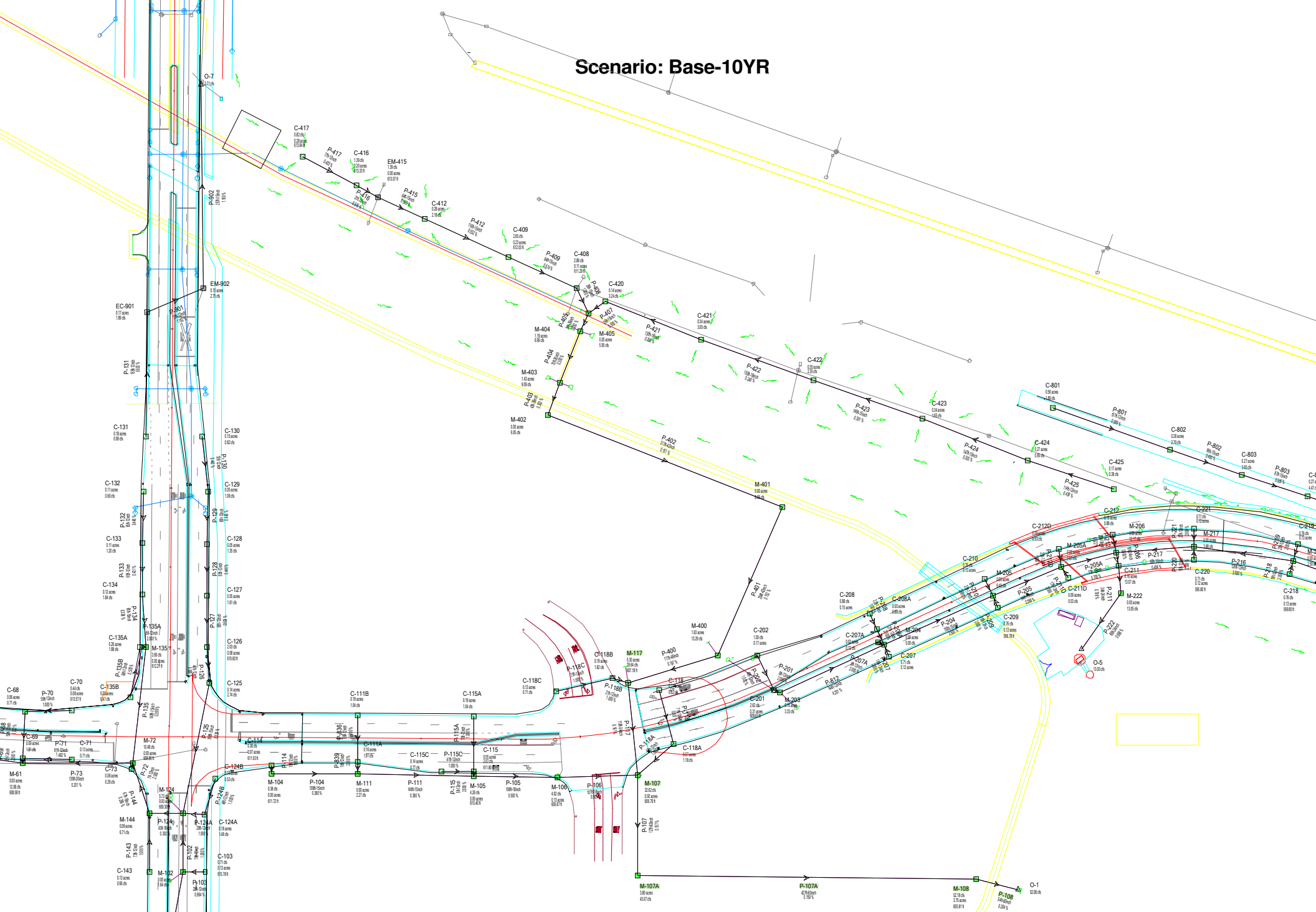
DESIGN BY	DATE
MPO	06/20/23
PROJECT NO.	
23-0026	
EX 2	

BY: MPO
DATE: 06/20/23
CHECKED BY: RJP
DATE: 6/20/23

PROJECT: 23-0026 Centennial Village Buildings M & I
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
32	CLEANOUT#8	CB#7	0.10	0.10	0.85	5.00	5.00	7.07	0.00	0.60	2.00	2.40	0.012	81	8	2.35	620.00	615.00	613.10	615.36 j	614.90
31	INL#12	CB#11	0.19	0.19	0.85	5.00	5.00	7.07	0.00	1.14	2.82	1.45	0.012	56	12	0.54	617.00	614.00	613.70	615.69	615.64
30	EX M-117	EX M-107	8.48	8.48	0.84	3.50	3.50	7.07	0.00	50.33	85.49	4.02	0.012	118	54	0.16	614.68	607.18	606.99	610.42	610.35
29	INL#10	CB#9	0.15	0.15	0.85	5.00	5.00	7.07	0.00	0.90	2.73	2.43	0.012	60	12	0.50	617.90	614.90	614.60	615.30	615.22
28	CB#9	CB#5	0.22	0.37	0.85	5.00	5.90	6.74	0.00	2.12	3.59	4.44	0.012	127	12	0.87	617.90	614.60	613.50	615.22	614.05
27	CB#11	CB#7	0.30	0.49	0.85	5.00	5.60	6.82	0.00	2.84	3.00	3.62	0.012	99	12	0.61	616.70	613.70	613.10	615.44	614.90
26	CB#7	CB#6	0.20	0.79	0.85	5.00	6.10	6.66	0.00	4.47	4.95	3.64	0.012	60	15	0.50	616.60	613.10	612.80	614.69	614.45
25	CB#6	CB#5	0.14	0.93	0.85	5.00	6.40	6.57	0.00	5.19	5.41	4.23	0.012	67	15	0.60	616.55	612.80	612.40	614.41	614.04
24	CB#5	HYDRODYNAMIC SEP#4	0.21	1.51	0.85	5.00	6.60	6.47	0.00	8.31	8.99	5.60	0.012	32	18	0.63	616.50	612.40	612.20	613.54	613.41
23	HYDRODYNAMIC SEP#4	IMH#3	0.00	1.51	0.85	5.00	6.80	6.44	0.00	8.26	8.99	5.77	0.012	32	18	0.63	617.20	612.2	612	613.33	613.13
22	EX M-107	EX M-107A	0	8.48	0	3.40	4.10	7.07	0.00	50.33	111.96	3.31	0.012	127	60	0.16	615.75	606.79	606.59	610.33	610.29
21	EX BLDG G	EX CB#13	0.52	0.52	0.9	10.00	10.00	5.55	0.00	2.60	6.8	6.28	0.012	45	12	3.11	618.40	613.5	612.1	614.19	612.53
20	EX INL#16	EX IMH#14	0.21	0.21	0.81	5.00	5.00	7.07	0.00	1.2	7.84	2.46	0.012	45	12	4.13	616.50	613.5	611.64	613.96 j	613.16
19	EX INL#15	EX IMH#14	0.12	0.12	0.81	5.00	5.00	7.07	0.00	0.69	6.15	1.87	0.012	85	12	2.54	616.80	613.8	611.64	614.15 j	613.16
18	EX YD#12	EX YD#11	0.03	0.03	0.81	5.00	5.00	7.07	0.00	0.17	1.02	1.82	0.012	46	8	0.61	618.30	615.00	614.72	615.19	614.96
17	EX YD#11	EX YD#10	0.02	0.05	0.81	5.00	6.60	6.50	0.00	0.26	1.02	1.87	0.012	53	8	0.60	618.30	614.72	614.40	614.96	614.76
16	EX YD#10	EX IMH#6	0.10	0.15	0.81	5.00	7.70	6.16	0.00	0.75	5.57	1.94	0.012	111	12	2.09	618.30	614.40	612.09	614.76 j	613.80
15	EX IMH#14	EX IMH#5	0.14	0.47	0.81	5.00	6.60	6.48	0.00	2.47	4.72	2.01	0.012	44	15	0.45	616.40	611.64	611.44	613.07	613.01
14	EX INL#9	EX IMH#8	0.10	0.10	0.81	5.00	5.00	7.07	0.00	0.57	5.74	1.72	0.012	45	12	2.21	617.00	614.00	613.00	614.31 j	614.24
13	EX IMH#8	EX IMH#7	0.10	0.20	0.81	5.00	6.00	6.68	0.00	1.08	3.36	1.38	0.012	66	12	0.76	616.90	613.00	612.50	614.20	614.15
12	EX IMH#7	EX IMH#6	0.31	0.51	0.81	5.00	6.80	6.42	0.00	2.65	3.33	3.38	0.012	55	12	0.75	616.80	612.50	612.09	614.06	613.80
11	EX IMH#6	EX IMH#5	0.29	0.95	0.81	5.00	9.40	5.69	0.00	4.38	5.42	3.57	0.012	108	15	0.60	616.60	612.09	611.44	613.43	613.01
10	EX IMH#5	EX CB#4	0.10	1.52	0.81	5.00	9.80	5.58	0.00	6.87	7.67	5.60	0.012	76	15	1.20	616.60	609.06	608.15	612.15	611.42
9	EX CB#4	EX CB#3	0.97	2.49	0.81	8.00	10.00	5.54	0.00	11.17	16.29	3.56	0.012	86	24	0.44	616.70	608.15	607.77	611.15	610.97
8	EX CB#3	EX CB#13	0.39	2.88	0.81	5.00	10.40	5.45	0.00	12.72	16.53	4.05	0.012	68	24	0.46	616.60	607.77	607.46	610.84	610.66
7	EX CB#13	EX HYDRODYNAMIC SEP#2	0.13	3.01	0.81	5.00	10.70	5.40	0.00	13.16	27.86	2.68	0.013	13	30	0.46	616.60	607.46	607.40	610.61	610.59
6	EX HYDRODYNAMIC SEP#2	EX M-107A	0	3.53	0.81	5.00	10.70	5.38	0.00	15.63	18.16	3.19	0.013	102	30	0.2	616.77	607.4	607.2	610.43	610.29
5	EX M-107A	IMH#1	0.18	12.19	0.85	5.00	11.30	5.27	0.00	53.65	113.9	3.46	0.012	135	60	0.16	617.00	606.49	606.27	610.09	610.05
4	IMH#1	IMH#2	0.2	12.39	0.85	5.00	12.10	5.11	0.00	52.86	110.56	3.28	0.012	117	60	0.15	616.45	606.27	606.09	610.02	609.99
3	IMH#2	IMH#3	0.17	12.56	0.85	5.00	12.80	4.97	0.00	52.18	114.18	3.12	0.012	140	60	0.16	616.50	606.09	605.86	609.97	609.93
2	IMH#3	EX MH107B	0.34	14.41	0.85	5.00	13.70	4.82	0.00	58.14	109.82	3.54	0.012	33	60	0.15	616.20	605.86	605.81	609.74	609.73

Scenario: Base-10YR



Scenario: Base-10YR

DOT Pipe Report 2

Label	Up. Node	Dn. Node	Up. Inlet Rat. Coef.	Up. Inlet Area (acres)	Up. Calc. Sys. CA (acres)	System Tc (min)	I (in/hr)	System Q (cfs)	L (ft)	S (%)	Size	Mannings n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)
P-417	C-417	C-416	0.60	0.17	0.17	15.00	4.84	0.82	77	0.403	12 inch	0.012	2.45	613.64	613.33	616.30	616.00	1.66	1.67	614.04	613.83
P-425	C-425	C-424	0.45	0.08	0.08	15.00	4.84	0.38	114	0.439	12 inch	0.012	2.56	612.28	611.78	614.90	615.00	1.62	2.22	612.54	612.20
P-416	C-416	EM-41	0.60	0.12	0.29	15.46	4.79	1.39	31	0.516	12 inch	0.012	2.77	613.33	613.17	616.00	616.50	1.67	2.33	613.83	613.67
P-424	C-424	C-423	0.45	0.12	0.20	15.82	4.76	0.95	142	0.303	15 inch	0.012	3.85	611.78	611.35	615.00	615.20	1.97	2.60	612.20	611.92
P-415	EM-41	C-412	0.00	0.00	0.29	15.60	4.78	1.39	64	0.563	15 inch	0.012	5.25	613.07	612.71	616.50	616.00	2.18	2.04	613.54	613.28
P-423	C-423	C-422	0.45	0.15	0.35	16.73	4.66	1.65	146	0.301	15 inch	0.012	3.84	611.35	610.91	615.20	615.00	2.60	2.84	611.92	611.59
P-412	C-412	C-409	0.60	0.17	0.46	15.90	4.75	2.18	116	0.552	15 inch	0.012	5.20	612.69	612.05	616.00	615.60	2.06	2.30	613.28	612.68
P-422	C-422	C-421	0.45	0.16	0.51	17.53	4.58	2.35	150	0.240	18 inch	0.012	5.57	610.91	610.55	615.00	615.30	2.59	3.25	611.59	611.28
P-409	C-409	C-408	0.45	0.10	0.56	16.38	4.70	2.65	94	0.574	15 inch	0.012	5.30	612.03	611.49	615.60	615.70	2.32	2.96	612.68	612.11
P-421	C-421	C-420	0.45	0.15	0.66	18.36	4.49	3.00	130	0.300	18 inch	0.012	6.23	610.55	610.16	615.30	615.30	3.25	3.64	611.28	610.85
P-408	C-408	M-405	0.45	0.05	0.61	16.74	4.66	2.86	36	1.000	15 inch	0.012	7.00	611.29	610.93	615.70	615.70	3.16	3.52	611.97	611.49
P-407	C-420	M-405	0.45	0.06	0.73	18.98	4.43	3.24	26	0.500	18 inch	0.012	8.05	610.16	610.03	615.30	615.70	3.64	4.17	610.85	610.69
P-405	M-405	M-404	0.00	0.00	1.33	19.08	4.42	5.95	24	0.292	36 inch	0.012	39.02	609.83	609.76	615.70	615.60	2.87	2.84	610.64	610.61
P-404	M-404	M-403	0.40	0.48	1.81	25.00	3.81	6.96	70	0.300	36 inch	0.012	39.57	609.76	609.55	615.60	615.80	2.84	3.25	610.61	610.53
P-403	M-403	M-402	0.40	0.57	2.38	25.28	3.78	9.09	43	0.302	36 inch	0.012	39.73	609.55	609.42	615.80	616.00	3.25	3.58	610.53	610.37
P-836	C-111E	C-111A	0.84	0.16	0.16	5.00	6.48	1.04	59	2.000	12 inch	0.012	5.46	613.71	612.53	617.64	617.09	2.93	3.56	614.14	613.02
P-114	C-114	M-104	0.84	0.06	0.06	5.00	6.48	0.38	10	1.600	12 inch	0.012	4.88	611.93	611.77	618.60	618.12	5.67	5.35	612.19	611.96
P-402	M-402	M-401	0.00	0.00	2.38	25.43	3.77	9.05	317	0.151	42 inch	0.012	42.41	608.92	608.44	616.00	616.90	3.58	4.96	610.02	609.52
P-115A	C-115A	C-115	0.84	0.16	0.16	5.00	6.48	1.04	70	1.000	12 inch	0.012	3.86	612.50	611.80	616.66	616.66	3.16	3.86	612.93	612.41
P-115C	C-115C	C-115	0.84	0.12	0.12	5.00	6.48	0.77	41	1.000	12 inch	0.012	3.86	612.50	612.09	616.88	616.66	3.38	3.57	612.87	612.39
P-839	C-111A	M-111	0.84	0.13	0.29	5.18	6.46	1.91	16	2.000	12 inch	0.012	5.46	612.43	612.11	617.09	617.14	3.66	4.03	613.02	612.55
P-104	M-104	M-111	0.00	0.00	0.06	5.04	6.47	0.38	108	0.380	15 inch	0.012	4.31	611.72	611.31	618.12	617.14	5.15	4.58	611.98	611.95
P-401	M-401	M-400	0.00	0.00	2.38	26.94	3.61	8.68	204	0.152	42 inch	0.012	42.49	608.34	608.03	616.90	616.00	5.06	4.47	609.46	609.29
P-118C	C-118C	C-118B	0.84	0.11	0.11	5.00	6.48	0.71	73	1.000	12 inch	0.012	3.86	611.34	610.61	615.18	614.63	2.84	3.02	611.69	611.18
P-115	C-115	M-105	0.84	0.04	0.32	5.28	6.45	2.07	5	2.000	12 inch	0.012	5.46	611.80	611.70	616.66	616.60	3.86	3.90	612.41	612.20
P-111	M-111	M-105	0.00	0.00	0.35	5.87	6.38	2.27	146	0.390	15 inch	0.012	4.37	611.31	610.74	617.14	616.60	4.58	4.61	611.95	611.34
P-400	M-400	M-117	0.84	1.37	3.75	27.92	3.51	13.29	117	0.197	48 inch	0.012	68.99	607.83	607.60	616.00	614.68	4.17	3.08	609.24	609.19
P-118B	C-118B	M-117	0.90	0.17	0.28	5.32	6.44	1.82	21	1.000	12 inch	0.012	3.86	610.61	610.40	614.63	614.68	3.02	3.28	611.18	610.89
P-118	C-118	C-118A	0.90	0.13	0.13	5.00	6.48	0.82	71	0.507	12 inch	0.012	2.75	611.00	610.64	614.60	614.89	2.60	3.25	611.38	611.10
P-105	M-105	M-106	0.00	0.00	0.67	6.55	6.29	4.26	106	0.500	18 inch	0.012	8.05	610.40	609.87	616.60	616.80	4.70	5.43	611.19	610.72
P-117	M-117	M-107	0.84	4.45	8.48	28.38	3.47	29.64	118	0.161	54 inch	0.012	85.48	607.18	606.99	614.68	615.70	3.00	4.21	609.05	608.91
P-118A	C-118A	M-107	0.81	0.06	0.18	5.39	6.43	1.18	59	1.000	12 inch	0.012	3.86	610.64	610.05	614.89	615.70	3.25	4.65	611.10	610.43
P-106	M-106	M-107	0.84	0.11	0.78	6.93	6.25	4.92	101	0.505	18 inch	0.012	8.09	609.87	609.36	616.80	615.70	5.43	4.84	610.72	610.20
P-107	M-107	M-107A	0.00	0.00	9.45	28.78	3.42	32.62	127	0.157	60 inch	0.012	111.96	606.79	606.59	615.70	616.20	3.91	4.61	608.89	608.82
P-107A	M-107A	M-108	0.84	3.19	12.64	29.21	3.38	43.07	427	0.159	60 inch	0.012	112.59	606.49	605.81	616.20	615.70	4.71	4.89	608.64	607.98
P-108	M-108	O-1	0.84	3.15	15.79	30.54	3.28	52.18	54	0.204	60 inch	0.012	127.34	605.81	605.70	615.70	614.50	4.89	3.80	607.98	607.73

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BY: MPO
DATE: 5/31/2023
CHECKED: RJP
DATE: 6/20/2023

INLET CAPACITY ANALYSIS

Project: 23-0026 Centennial Village Buildings M & I
Location: North Centennial Drive & 45th Street Munster, IN

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
IMH#1	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
IMH#2	EJ 1020 M1	0.97	5.92	0.67	0.17	0.85	7.08	1.02	0.15	0.22	2.7
IMH#3	EJ 7020, TYPE T2, M1	1.81	5.92	0.67	0.34	0.85	7.08	2.05	0.18	0.35	4.2
CB#5	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB#6	EJ 1020 M1	0.97	5.92	0.67	0.14	0.85	7.08	0.84	0.10	0.20	2.3
CB#7	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
CB#9	EJ 1020 M1	0.97	5.92	0.67	0.22	0.85	7.08	1.32	0.26	0.26	3.2
INL#10	EJ 1020 M1	0.97	5.92	0.67	0.15	0.85	7.08	0.90	0.12	0.20	2.5
CB#11	EJ 1020 M1	0.97	5.92	1.67	0.30	0.85	7.08	1.81	0.08	0.32	3.9
INL#12	EJ 1020 M1	0.97	5.92	2.67	0.19	0.85	7.08	1.14	0.01	0.24	2.9

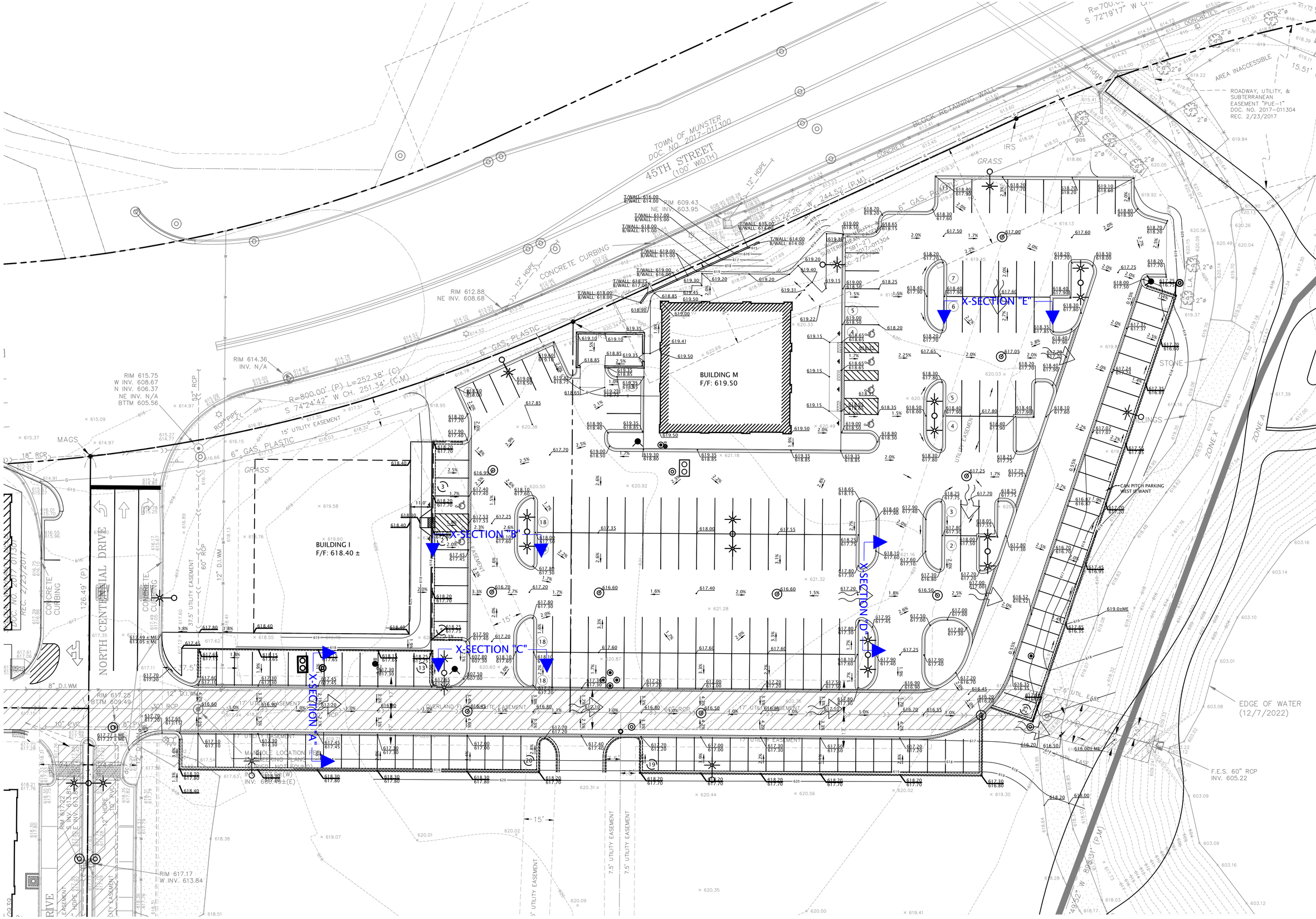
**** 10-YR Flow values are calculated using the Rational Method. Q=CIA***

Grate Properties

Type	Open Area (sq.in.)	A (sq.ft.)	P (ft)
EJ 1020 M1	140.00	0.97	5.92
EJ 1040 M1	190.00	1.32	6.83
EJ 7020, TYPE T2, M1	260.00	1.81	5.92

Exhibit 3

Overland Flood Route Calculations



DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
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NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE
631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Overall Overland Flood Route Exhibit

N

0' 10' 20'
SCALE: 1" = 20'

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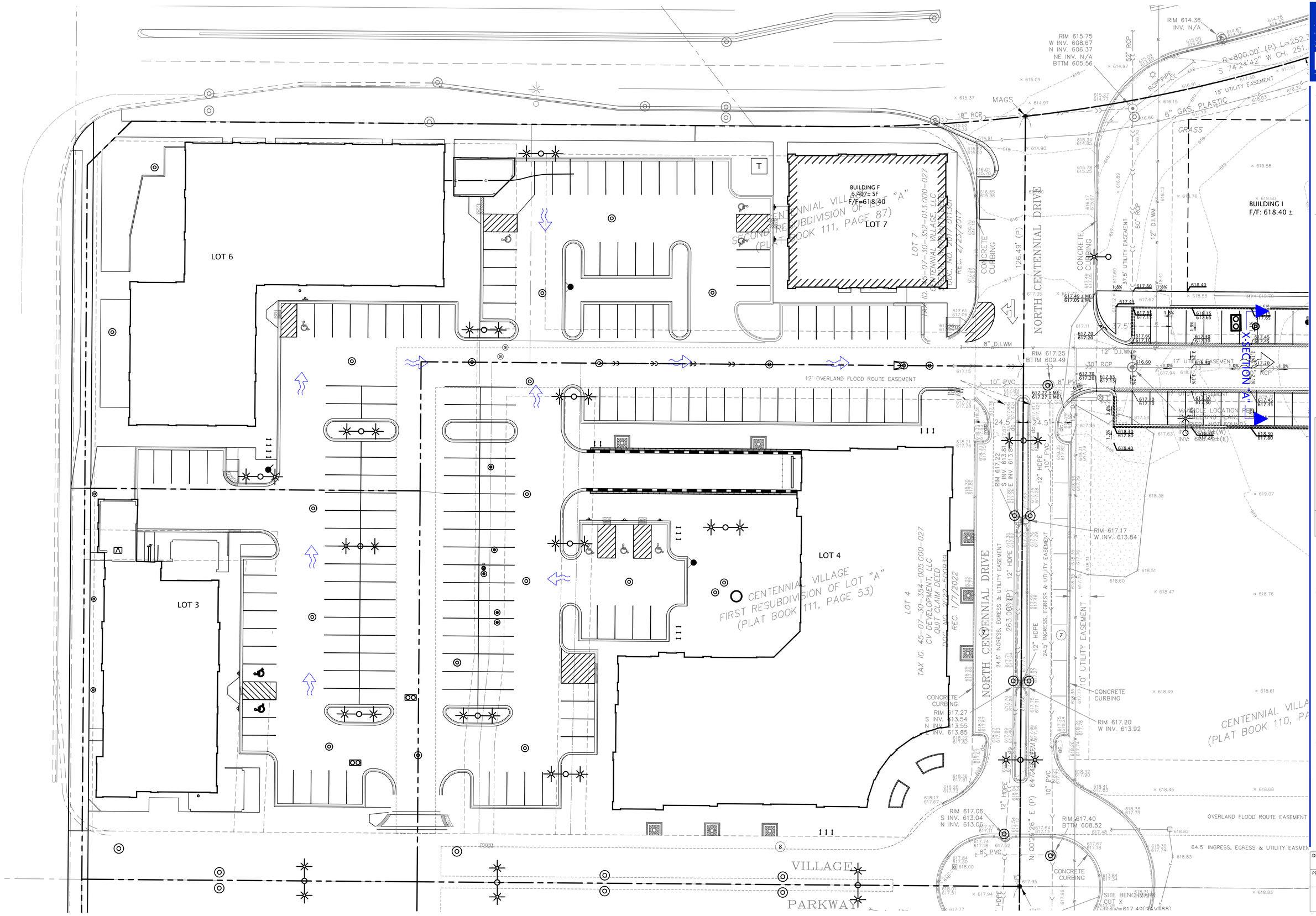
DESIGN BY	DATE
MPO	05/31/23

PROJECT NO.
23-0026

EX 3



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Overall Overland Flood Route Exhibit

N

0' 10' 20'
SCALE: 1" = 20'

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DESIGN BY	DATE
MPO	05/31/23
PROJECT NO.	
23-0026	

EX 3

Overland Flood Route Computation Calculation

Project: 23-0026 Centennial Village Buildings M & I
Date: 5/31/2023

Storm Event: 100yr
*** Areas Calculated from Exhibit 5, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: A					
Tc=	5	min			
Area=	0.12	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.00**	**cfs**
100YR Overflow Water Elevation=				**617.30**	**Elev**
Freeboard to Nearest Bldg=				**2.20**	**ft**

Cross Secti D					
Tc=	5	min			
Area=	0.20	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.67**	**cfs**
100YR Overflow Water Elevation=				**617.28**	**Elev**
Freeboard to Nearest Bldg=				**2.22**	**ft**

Cross Section: B					
Tc=	5	min			
Area=	0.18	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.51**	**cfs**
100YR Overflow Water Elevation=				**617.36**	**Elev**
Freeboard to Nearest Bldg=				**2.14**	**ft**

Cross Secti E					
Tc=	5	min			
Area=	0.15	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.25**	**cfs**
100YR Overflow Water Elevation=				**617.68**	**Elev**
Freeboard to Nearest Bldg=				**1.82**	**ft**

Cross Section: C					
Tc=	5	min			
Area=	0.24	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**2.01**	**cfs**
100YR Overflow Water Elevation=				**617.29**	**Elev**
Freeboard to Nearest Bldg=				**2.21**	**ft**

Channel Report

X-Section A

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.00
N-Value	= 0.011

Calculations

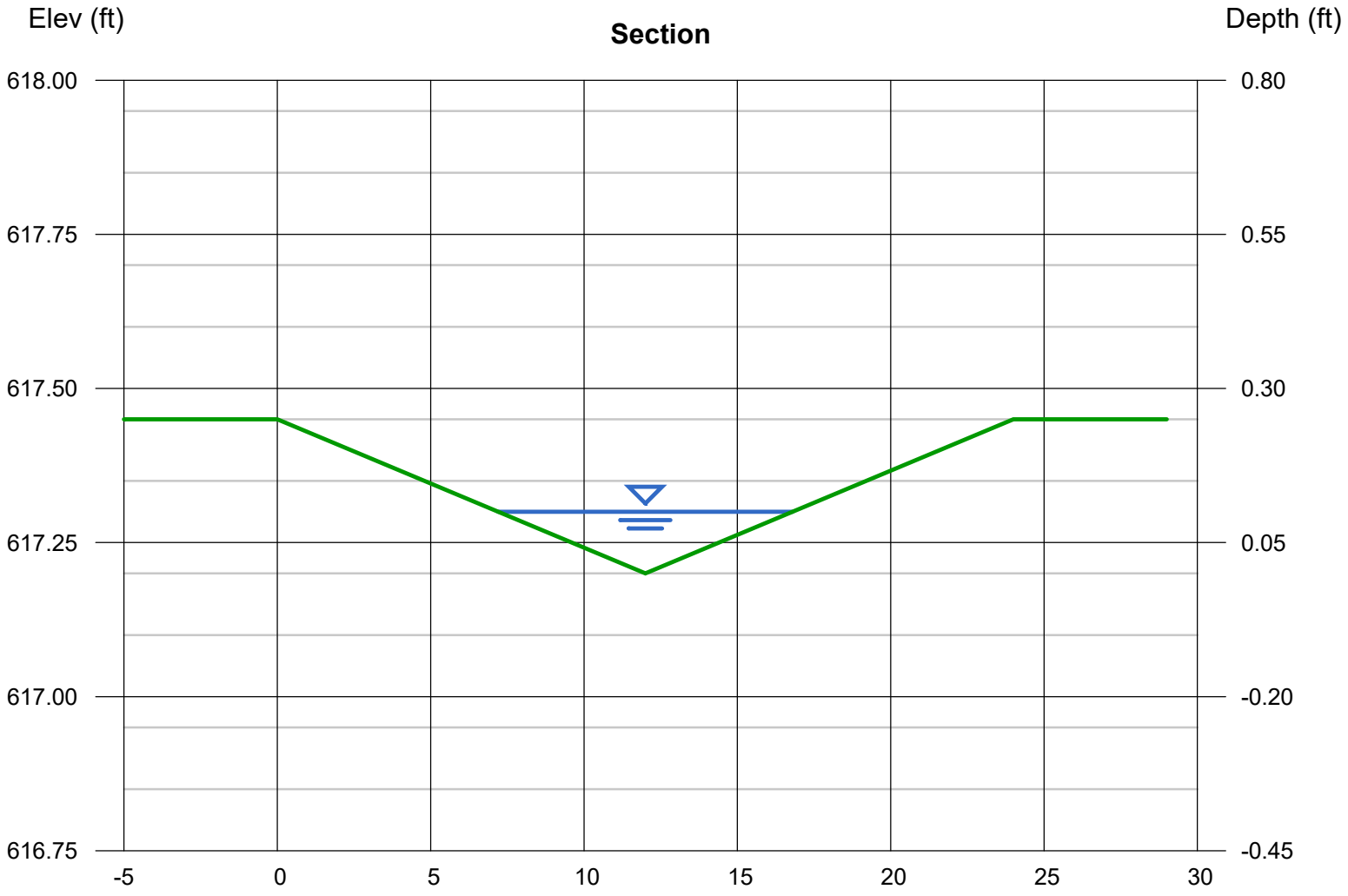
Compute by:	Known Q
Known Q (cfs)	= 1.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.45)-(12.00, 617.20, 0.011)-(24.00, 617.45, 0.011)

Highlighted

Depth (ft)	= 0.10
Q (cfs)	= 1.000
Area (sqft)	= 0.48
Velocity (ft/s)	= 2.08
Wetted Perim (ft)	= 9.60
Crit Depth, Yc (ft)	= 0.13
Top Width (ft)	= 9.60
EGL (ft)	= 0.17



Channel Report

X-Section B

User-defined

Invert Elev (ft)	= 617.25
Slope (%)	= 1.60
N-Value	= 0.011

Calculations

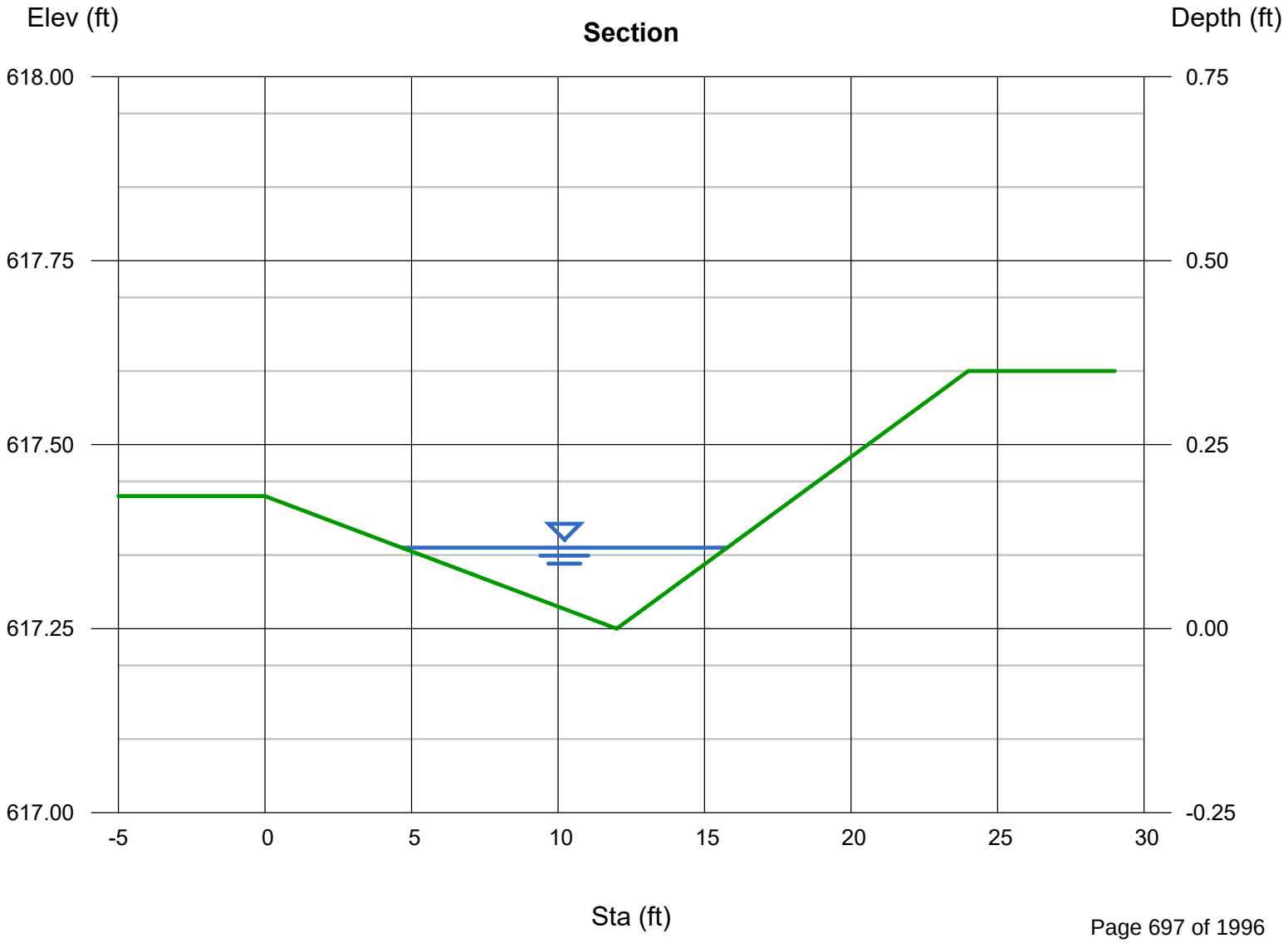
Compute by:	Known Q
Known Q (cfs)	= 1.51

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.43)-(12.00, 617.25, 0.011)-(24.00, 617.60, 0.011)

Highlighted

Depth (ft)	= 0.11
Q (cfs)	= 1.510
Area (sqft)	= 0.61
Velocity (ft/s)	= 2.47
Wetted Perim (ft)	= 11.11
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 11.10
EGL (ft)	= 0.21



Channel Report

X-Section C

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.50
N-Value	= 0.011

Calculations

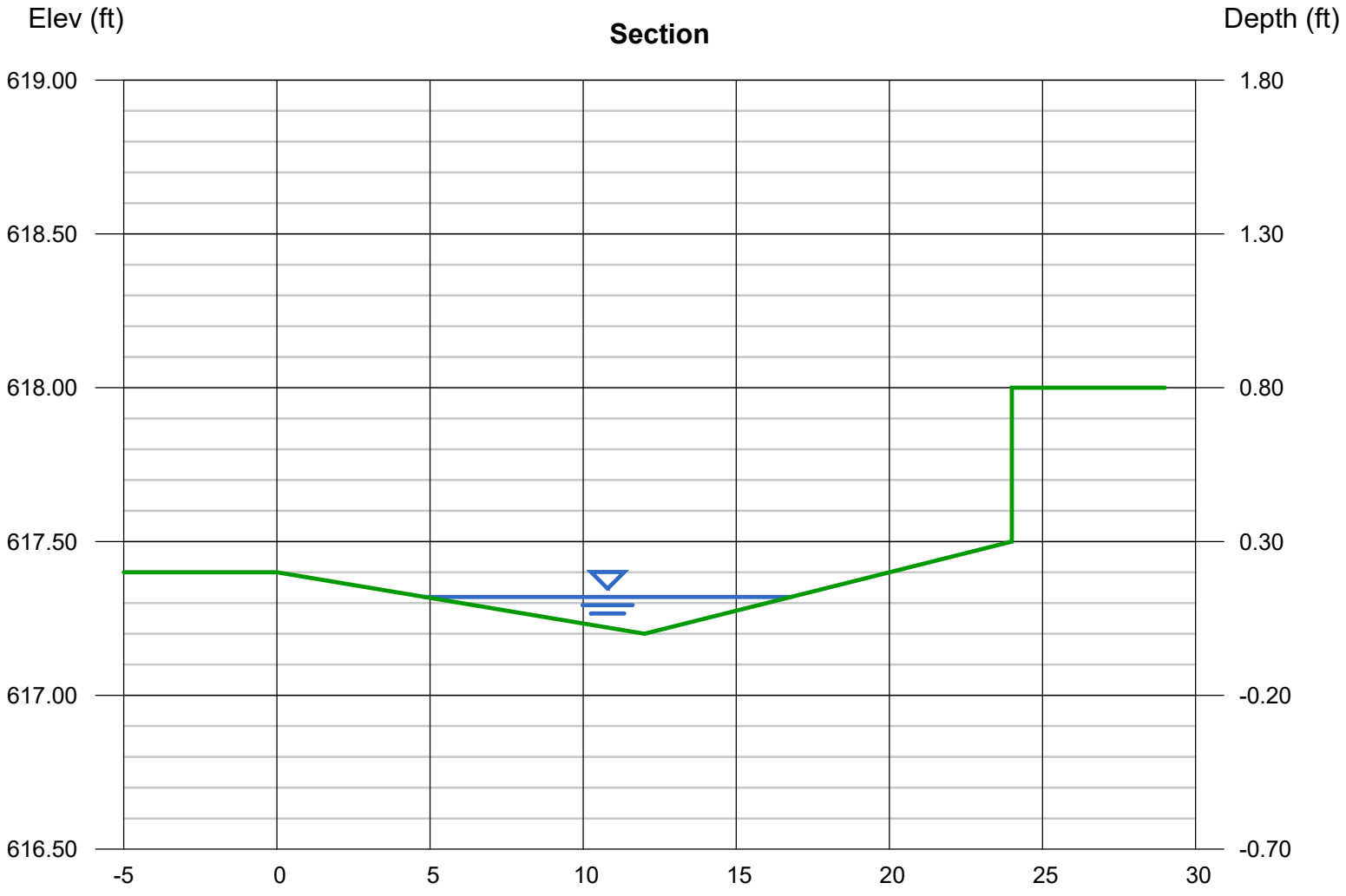
Compute by:	Known Q
Known Q (cfs)	= 2.01

Highlighted

Depth (ft)	= 0.12
Q (cfs)	= 2.010
Area (sqft)	= 0.72
Velocity (ft/s)	= 2.79
Wetted Perim (ft)	= 12.00
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 12.00
EGL (ft)	= 0.24

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.40)-(12.00, 617.20, 0.011)-(24.00, 617.50, 0.011)-(24.00, 618.00, 0.011)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section D

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 1.80
N-Value	= 0.011

Calculations

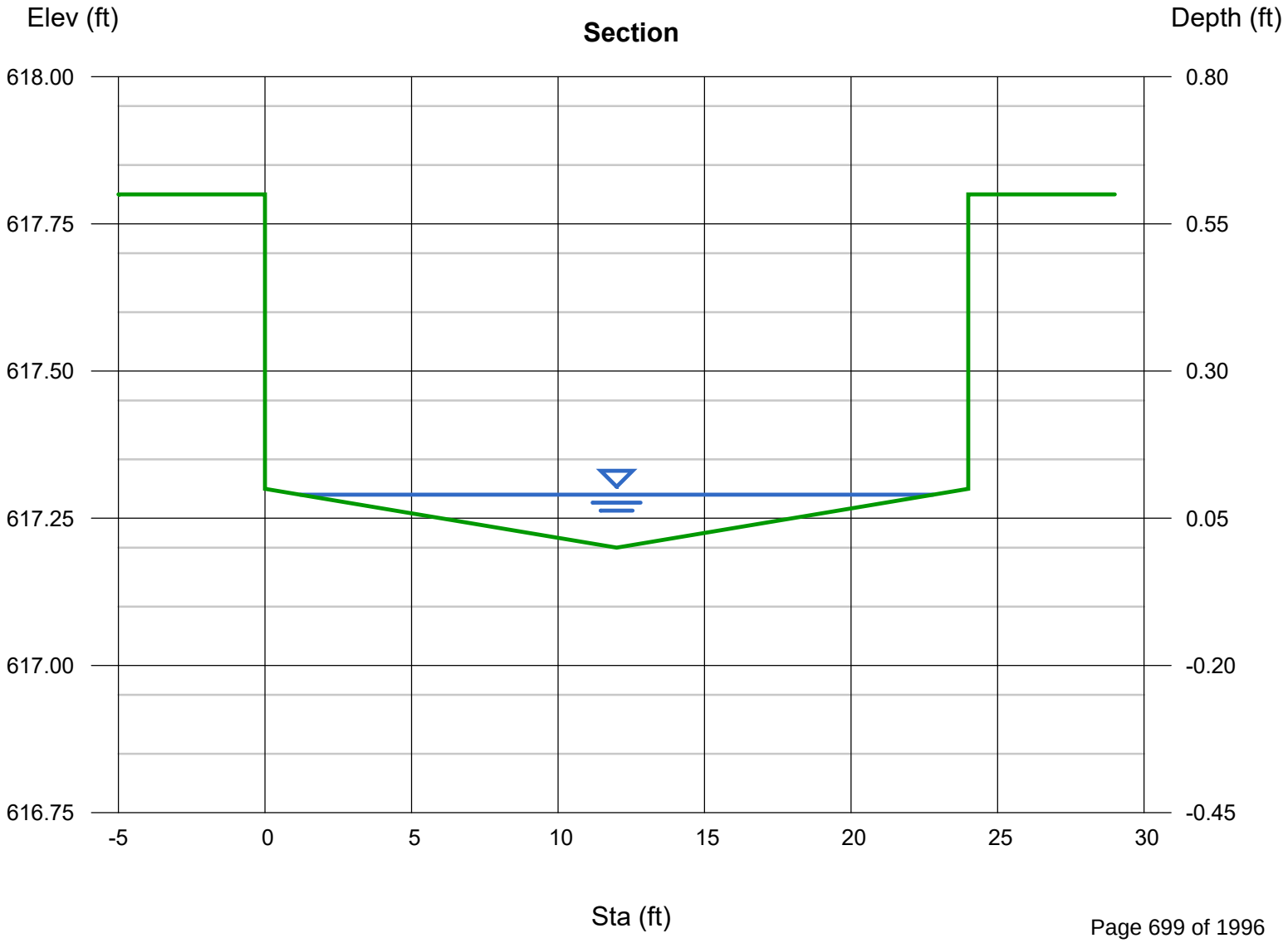
Compute by:	Known Q
Known Q (cfs)	= 1.67

Highlighted

Depth (ft)	= 0.09
Q (cfs)	= 1.670
Area (sqft)	= 0.97
Velocity (ft/s)	= 1.72
Wetted Perim (ft)	= 21.61
Crit Depth, Yc (ft)	= 0.11
Top Width (ft)	= 21.61
EGL (ft)	= 0.14

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.80)-(12.00, 617.20, 0.011)-(24.00, 617.30, 0.011)-(24.00, 617.80, 0.011)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section E

User-defined

Invert Elev (ft)	= 617.60
Slope (%)	= 2.70
N-Value	= 0.011

Calculations

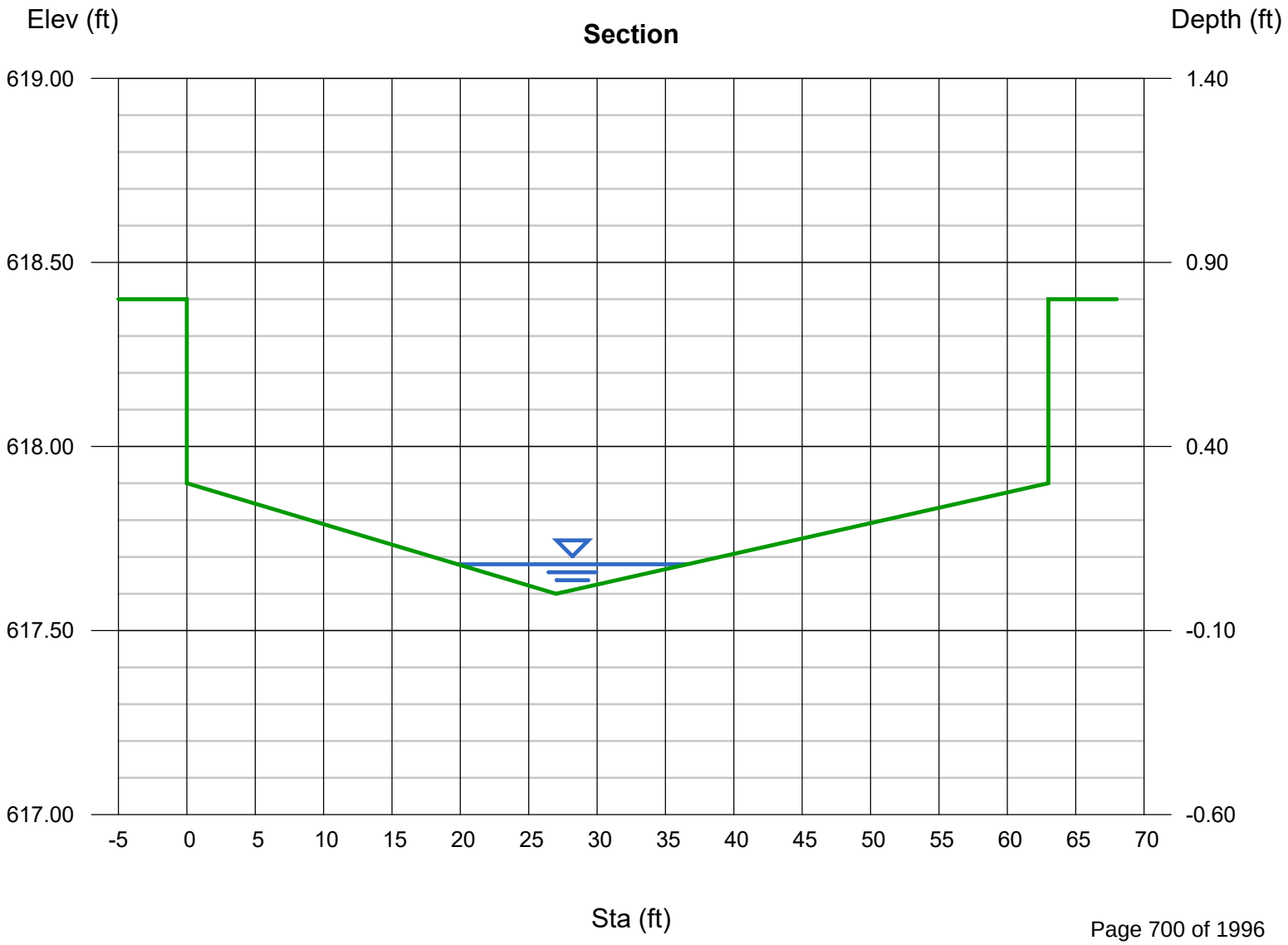
Compute by:	Known Q
Known Q (cfs)	= 1.25

Highlighted

Depth (ft)	= 0.08
Q (cfs)	= 1.250
Area (sqft)	= 0.67
Velocity (ft/s)	= 1.86
Wetted Perim (ft)	= 16.80
Crit Depth, Yc (ft)	= 0.10
Top Width (ft)	= 16.80
EGL (ft)	= 0.13

(Sta, El, n)-(Sta, El, n)...

(0.00, 618.40)-(27.00, 617.60, 0.011)-(63.00, 617.90, 0.011)-(63.00, 618.40, 0.011)



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NELSON TESTING LABORATORIES®

EXPERIENCED | INNOVATIVE | AUTHENTIC

Physical Analysis of Concrete Masonry Units

for

Northfield Block

8-in Regular

Northfield Block Company
One Hunt Court
Mundelein, IL 60060

March 7, 2022

NELSON TESTING LABORATORIES®

EXPERIENCED | INNOVATIVE | AUTHENTIC

March 7, 2022

Northfield Block Company
One Hunt Court
Mundelein, IL 60060

REPORT OF TESTS

SUBJECT:	**Physical Analysis of Concrete Masonry Units**
PROJECT:	**Northfield Block – 8 x 8 x 16-in Regular Concrete Masonry Units**
SPECIFICATION:	ASTM C90-21, "Specification for Loadbearing Concrete Masonry Units"
TEST METHODS:	ASTM C140-21, "Test Methods for Sampling and Testing Concrete Masonry Units and Related Units." ASTM C426-16, "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units" ACI 216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies."
MATERIALS:	Delivered to NTL on February 21, 2022
NTL PROJECT #:	22-1046
PAGE:	1 of 3

TEST DATA

Dates of Testing: February and March 2022

Specimen ID	1	2	3	Average
Dimensions (in)				
Height	7.7	7.6	7.7	7.7
Width	7.6	7.6	7.6	7.6
Length	15.6	15.6	15.6	15.6
Min. Face Shell Thickness (in)	1.3	1.3	1.3	1.3
Min. Web Thickness (in)	1.1	1.1	1.1	1.1
Normalized Web Area (in²/ft²)	29.2	29.3	29.2	29.2
Gross Area (in²)	118.6	118.6	118.6	118.6
Net Area (in²)	60.8	60.1	60.4	60.4

March 7, 2022
Northfield Block – 8-in Regular Concrete Masonry Units
NTL Project #22-1046

TEST RESULTS

Specimen ID	1	2	3	Average
Density (lbs/ft³)	134.0	135.0	133.7	**134.3**
*Absorption (%)	6.3	7.0	7.2	**6.9**
*Absorption (lbs/ft³)	8.5	9.5	9.7	**9.2**
Solids (%)	51.3	50.7	51.0	**51.0**
Equivalent Thickness (in)	3.9	3.9	3.9	**3.9**
**Fire Rating (hours)	2.0	2.0	2.0	**2.0**

Specimen ID	4	5	6	Average
*Compressive Load (lbs)	249,900	238,700	243,380	**243,990**
Net Compressive Strength (psi)	4,140	3,950	4,030	**4,040**

Specimen ID	7	8	9	Average
Shrinkage (%)	0.038	0.042	0.042	**0.041**

**Absorption and compressive strength testing on full units.*
***Calculations based on aggregate types.*

SUMMARY

The test results listed above complied with their corresponding requirements as set forth in ASTM C90-21, "Specification for Loadbearing Concrete Masonry Units".

March 7, 2022
Northfield Block – 8-in Regular Concrete Masonry Units
NTL Project #22-1046

Respectfully submitted,

NELSON TESTING LABORATORIES

Mark R. Nelson
President

Notes: The results listed within this report relate only to the materials submitted for testing. This report shall not be reproduced, except in full, without written approval of this laboratory. The test materials not consumed in this testing will be discarded 14 days from the date of this report unless we receive written notification requesting otherwise.

Nelson Testing Laboratories is accredited/inspected by AASHTO and CCRL under ASTM C1093.

TECHNICAL BULLETIN 3

Specification for Atlas® Hollow Brick

Part 1 Quality Assurance

Brick Tests

1. All tests shall be performed by an independent certified testing laboratory.
2. All tests shall be in accordance with ASTM C-67.

Submittals

1. Submit test report and certificate of conformance document for each type and color of brick specified on contract documents for architect's approval.
2. Test reports shall include:
   a. Compressive strength
   b. 24 hour cold water absorption
   c. 5 hour boil absorption (if required)
   d. Saturation Coefficient (if required)
   e. Initial Rate of Absorption (I.R.A.)
   f. Efflorescence
   g. Weather classification
3. Certificate of conformance shall state that brick meets or exceeds applicable ASTM specifications.

Sample Panels

1. Sample panel size shall be 4'x4' showing the proposed color range, texture, bond, mortar, workmanship, cleaning, and water repellents where applicable.
2. Final brick selection shall be made only following architect's review of sample panel.
3. Brick from manufactured material for project shall be shipped to site and sample panel erected.
4. No brick shall be shipped from manufacturer to site until architect's acceptance of job panel constructed from actual material for project. This panel shall replace all other sample panels and shall remain on site throughout construction, and become the project standard for bond, mortar, workmanship, and appearance.

Part II Products

Hollow Brick

1. Manufacturer: **Interstate Brick Company** or **H.C. Muddox**
2. ASTM C-652, Grade SW, Type HBX or better.
3. Color and texture
4. Dimensions *(width)* x *(height)* x *(length)*.
5. Minimum compressive strength 9,000 psi.
6. Maximum Saturation Coefficient 0.78 (if required).
7. Minimum IRA 6 g/ min/30 in^2.
8. Maximum IRA 30 g/min/30 in^2. Where IRA exceeds 30 g/ min/30 in^2, pre-wetting brick is recommended.
9. Shapes; where special shapes are shown on architectural drawings, manufacturer shall provide shop drawings for architect's approval prior to manufacturing shapes.

Mortar

Mortar shall conform to ASTM C 270 Type S
Proportion Specification:
1 part Portland cement (ASTM C 150 Types I, IA, II, IIA, III, IIIA or V) less than 6 months old
½ part hydrated lime (ASTM C-207)
3-½ to 4-½ parts sand (ASTM C-144)
OR
Property Specification:
Portland cement - lime mortar
Compressive strength 1800 psi
Water retention 75% minimum
Air content 12% maximum
Sand: 2 ¼ -3 ½ the sum of the separate volumes of cementitious materials sand (ASTM C-144)

Grout

Grout shall conform to ASTM C 476
Grout strength shall be greater than or equal to f'_m

Part III Execution

Bond

Bond shall be running bond unless otherwise shown on contract documents.

Jointing

Mortar joints shall be concave unless otherwise shown on contract documents.

Construction

All construction strictly adheres to International Building Code (IBC) or TMS 402/ACI530/ASCE5.

Cleaning

Cleaning shall conform to Interstate Brick Technical Bulletin 4 Brick Cleaning Recommendations, Section 040120 and BIA Technical Note #20 Cleaning Brickwork
Do not use muriatic acid or san blasting.
Contact manufacturer for recommendations.

Water Repellent & Coatings

Where water repellents are required, consult Interstate Brick Technical Bulletin 1 Water Repellent Coatings and Section 071900.

INTERSTATE® BRICK
INTERSTATE BRICK 9780 South 5200 West, West Jordan, UT 84081-5625
Phone: 801 280 5200 Toll Free (800) 233-8654 www.interstatebrick.com

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H.C. MUDDOX 4875 Bradshaw Road Sacramento, CA 95827-9727
Phone: (916) 859-6320 Toll Free (800) 776-1244 www.hcmuddox.com

Revision-0323

TECHNICAL BULLETIN 7

Structural Brick Compressive Strength Data Table

Selected Brick Colors	Average Net Area Unit Compressive Strength psi	(MPa)	Assumed Wall Assembly Design Strength (f'_m) psi	(MPa)
Arctic White	11,000	(75.84)	3,844	(26.50)
Autumn Red	12,000	(82.74)	4,000	(27.58)
Bronzestone	11,900	(82.05)	4,000	(27.58)
Canyon Rose	13,600	(93.77)	4,000	(27.58)
Cedar	13,200	(91.01)	4,000	(27.58)
Copperstone	14,000	(96.53)	4,000	(27.58)
Desert Sand	14,000	(96.53)	4,000	(27.58)
Golden Buff	15,400	(106.18)	4,000	(27.58)
Ironstone	14,600	(100.66)	4,000	(27.58)
Midnight Black	15,000	(103.42)	4,000	(27.58)
Monterey	14,400	(99.28)	4,000	(27.58)
Mountain Red	15,600	(107.56)	4,000	(27.58)
Ochre Buff	14,700	(101.35)	4,000	(27.58)
Park Rose	13,600	(93.77)	4,000	(27.58)
Platinum	11,000	(75.84)	3,844	(26.50)
Smokey Mountain	15,500	(106.87)	4,000	(27.58)
Tumbleweed	15,400	(106.18)	4,000	(27.58)
Walnut	12,800	(88.25)	4,000	(27.58)

1. Clay and shales are naturally occuring materials that vary, to some degree, throughout the deposits and strata layers. Consequently, various physical properties of the brick units, including the unit compressive strength values noted above are variable. The data above is based on historic data, not future projections. The data for the noted colors, and other colors, is kept on file, available upon request.

2. Assumed Wall Assembly Design Strengths f'_m, are based on TMS 602-22, Section 1.4-B-2(a), Table 1, and represent the design strength of wall assemblies comprised of masonry units, mortar, and grout. Mortar is assumed to be ASTM C270 compliant Type M, or Type S mortar. Grout is assumed to be ASTM C476 compliant grout with 28-day minimum compressive strength (f'_c) equal to or greater than f'_m.

3. Wall Assembly Design Strengths (f'_m) in excess of 4,000 psi can be acheived based on job specific prism testing.

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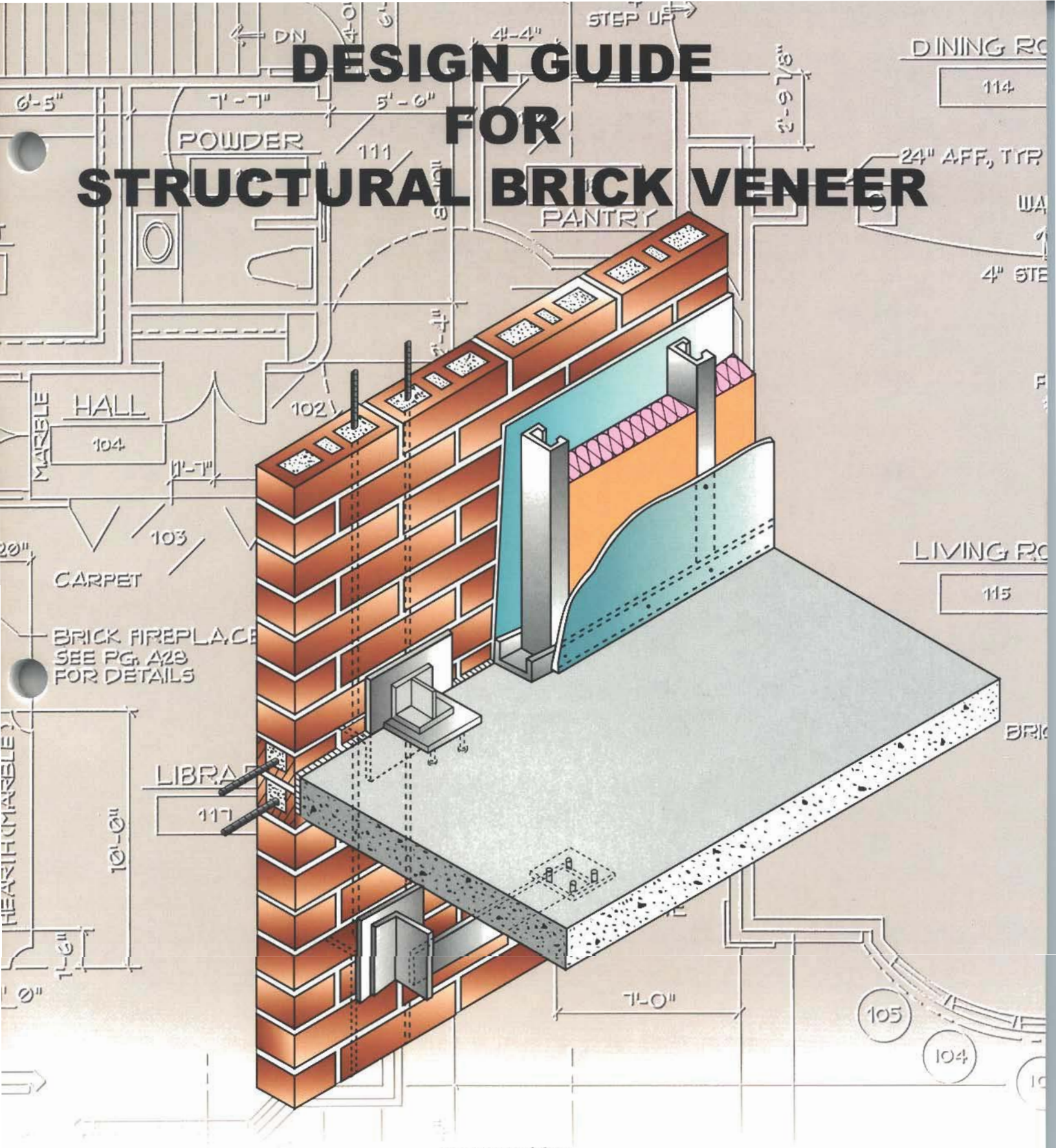
DESIGN GUIDE FOR STRUCTURAL BRICK VENEER



prepared for

Western States Clay Products Association

by

KPFF Consulting Engineers

DESIGN GUIDE

FOR

STRUCTURAL BRICK VENEER

Prepared for:

Western States Clay Products Association
www.wscpa.us

Submitted by:

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1601 5th Ave. Suite 1600
Seattle, WA 98101

Second Edition, July 2004

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John G. Tawresey, KPFF Consulting Engineers prepared the 2004 Second Edition.

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Summary

Structural Brick Veneer is a unique approach to the design and construction of brick exterior walls. Strengthening the brick with steel reinforcement provides new opportunities for reducing the cost of the wall, increasing design flexibility and improving wall performance. In use for more than thirty years, the approach has been used extensively in the Pacific Northwest.

The Structural Brick Veneer system is similar to conventional brick veneer except that the brick is reinforced to allow it to span further between ties and supports. The system allows the architect a variety of opportunities to create traditional walls or dramatic brick forms. Sloping windowsills, brick soffits, lintels without exposed ledger angles and precast concrete bands and inserts are only a few examples of the design opportunities available.

In areas of high seismic exposure, the Structural Brick Veneer system can be easily isolated from the primary structure making “immediate occupancy” performance more cost effective.

The following document will provide the structural engineer and the architect with an introduction to the design and specification of the Structural Brick Veneer system. It includes some design examples and dialogue on our experiences with the system over the past 20 years.



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1.0 Introduction

Structural Brick Veneer is the name that we have chosen to describe hollow reinforced clay brick curtainwall systems. These systems commonly replace brick veneer walls.

The Structural Brick Veneer system is similar to conventional brick veneer because it supports no gravity loads other than its own weight, the weight of windows, and possibly other miscellaneous loads. The difference is that in the Structural Brick Veneer system the masonry is reinforced to allow the brick to span further between ties and provide structural capacity to create more intricately shaped walls.

Structural Brick Veneer can be laid in place similar to conventional brick veneer, or they can be prefabricated at another location and lifted and installed to their final position.

The system has many advantages over conventional brick veneer. Some of these advantages are:

1. Greater design flexibility.
2. Reduced backup requirements.
3. Enhanced design life through heavier connections.
4. Reduced tie connections, which provides more continuous moisture barrier.
5. Greater seismic resistance and more ductility.
6. Less restrictive deflection requirements of the backup structure.
7. Reduced cost of the backup system.
8. Often lower construction cost.
9. Greater resistance to cracking.
10. Greater water resistance.

The system has been used on more than 100 projects over the last 20 years.

1.1 Purpose & Scope

The purpose of this guide is to provide the architect, structural engineer and owner with information about the design and construction of Structural Brick Veneers. It is intended to be easily understood by someone experienced with reinforced brick masonry design and construction. For those not familiar with the design of reinforced brick masonry, the Western States Clay Products Publication, "*Notes on the Selection, Design and Construction of Reinforced Hollow Clay Masonry*" is recommended.

As the design and construction of reinforced brick masonry varies from location to location, so does the design and construction of Structural Brick Veneer vary from location to location. The information and recommendations in this guide are based on the design and construction of projects in the Pacific Northwest and are not intended to replace local experience and engineering judgment.

1.2 History of the System

The origin of Structural Brick Veneer dates back to the early sixties. In 1962, a mechanical equipment penthouse was built on top of the nine-story United Fund office building in Denver, Colorado. The 15-foot high, load

bearing, 4-inch thick clay brick prefabricated panels supported long span, prestressed, twin-tee concrete slabs that were the roof structure of the penthouse. This construction was made possible by the use of a new "tensile strength intensive" exotic mortar and some backup steel reinforcing.

This 4-inch brick and exotic mortar system was used for several years thereafter in the Colorado area in prefabricated and in situ, hand-laid brick panel and curtainwall applications on many commercial buildings designed by George Hanson, P.E. of the firm of Sallada & Hanson, Engineers. This strong thin-wall system intrigued the designers who used this system on horizontal soffits, cantilevered balcony railings, post-tensioned panels, load-bearing and non-load-bearing walls on schools, office buildings, hospitals, the walls in vehicular tunnels, highway rest area toilet modules and picnic shelters. Even though this brick curtainwall system was very successful, it was relatively expensive due to the use of the high tensile strength mortar.

In the middle 1960's, Donald A. Wakefield, P.E. of the Structural Clay Products Institute developed, in Colorado, a new clay unit and method of construction that reduced the cost and allowed for the use of regular reinforcing and standard mortar and grout. This unit was a 3-1/2" x 3-1/2" x 11-l/2" hollow clay brick using ASTM C-212 recommendations. This system accommodated both horizontal and vertical reinforcing and permitted high-lift grouting.

This thinner reinforceable, hollow clay unit was more economical, ductile, flexible and more predictable; thus expanding its use in commercial curtainwall systems as well as load-bearing residences, four-story load-bearing apartment buildings, and prefabricated panels.

During the 1970's, a similar system was developed and perfected by Barkshire Panel Systems, Seattle, WA. Barkshire’s system used a 3 1/2-inch thick hollow clay brick similar to the one mentioned earlier and verified by testing conducted by Western States Clay Products Association under the direction of John G. Tawresey.

The secret to Barkshire’s system was advancements in the connections to the frame, and the technical knowledge of the overall building's physical needs.

As a consequence, the system is found on multi-story high-rise office buildings, schools, apartment buildings, residences and many other applications throughout the Northwest.

2.0 System Description

The system relies on a simple structural concept that will be described, followed by the presentation of some typical configurations and a brief discussion of weather protection.

2.1 Structural Concept

Structural Brick Veneer is essentially the same as conventional brick veneers except that the brick is reinforced. Hollow bricks that can be reinforced are a necessary part of the system.

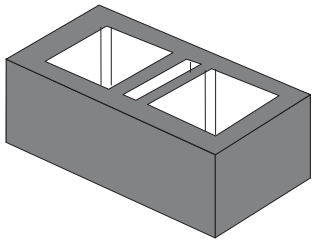


Figure 1 Typical Hollow Brick

The reinforcement increases the structural capacity of the brick wall. The spacing of the ties, typical in conventional veneers, can be increased and in most cases, the spacing can be increased to the distance between building floors or columns. The conventional veneer ties are eliminated and are replaced by more substantial connectors. The connectors are usually attached to the primary structural system of the building instead of a separate backup wall.

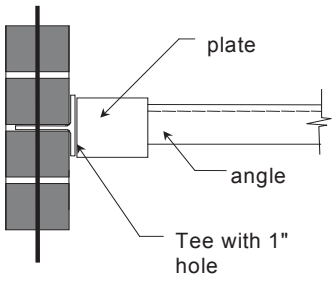


Figure 2 Typical Structural Brick Veneer Connector

Ledgers very similar to the ledgers of more conventional veneers can support the dead load of the Structural Brick Veneer.



Figure 3 Brick Supported on a Ledger

Or, separate discontinuous connectors can be used to support the dead load. These connectors are similar in design to those used to support precast concrete panels.

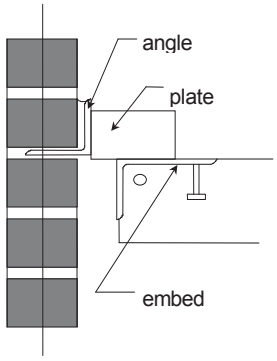


Figure 4 Typical Structural Brick Veneer Deadload Connector

Another available option is to support the dead load of the Structural Brick Veneer on the building foundation. Because the Structural Brick Veneer is designed in accordance with the

structural chapters of the code, height limitations are generally more liberal.

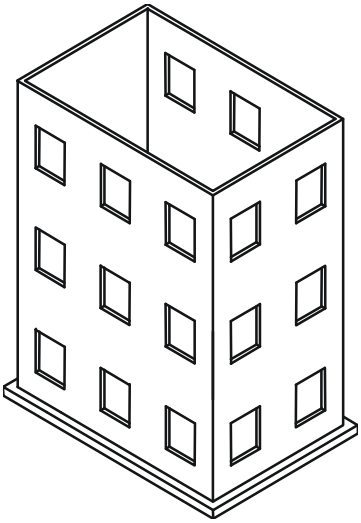


Figure 5 Dead Load on the Foundation

The connectors of the Structural Brick Veneer are designed and constructed to be flexible in one or more directions and rigid in other directions. Thus, the Structural Brick Veneer can be isolated from the movements of the building.

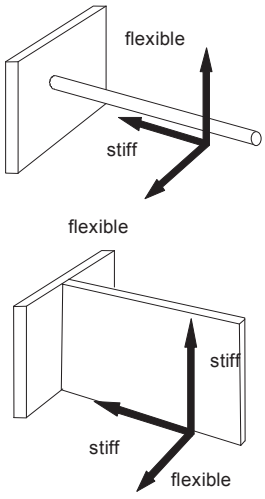


Figure 6 Flexible Connectors

The design of the Structural Brick Veneer is based on the following principles:

1. The Structural Brick Veneer is designed to be isolated from the primary building structure. For non-essential facilities, the isolation should be adequate to insure that the brick will not be damaged by a moderate earthquake. For essential facilities, the isolation should be adequate to insure that the brick will not be damaged by a maximum considered earthquake. The Structural Brick Veneer must not support the building or provide any assistance to the stability of the building as a whole.

2. Structural Brick Veneer is commonly designed to have **mortar joint** cracks at service wind and seismic loading. However, **brick cracking** should not occur. Cracking should be limited to the cracking of the horizontal bed joints at the brick to mortar interface. This is an aesthetic design criteria rather than a structural performance criteria. Experience has shown that cracking of the brick unit is considered by most owners to be a failure of the system.

3. The Structural Brick Veneer is designed to transfer the loading to the connectors and the connectors are designed to transfer the loading to the primary structure.

2.2 Concept Configurations

Structural Brick Veneer buildings can be configured in limitless ways. Because the brick wall has more capacity to resist

loading, the designer has more choices to configure and attach the wall. The number of different forms is controlled only by the designer's imagination.

The Structural Brick Veneer system offers the architect a variety of opportunities to create dramatic brick forms. Sloping windowsills, brick soffits, lintels without exposed ledger angles and precast concrete bands are only a few examples.

Sloping Sills

Sloped sills are a common accent in brick construction. Small slopes created from special brick shapes can be readily incorporated into the Structural Brick Veneer wall. Larger, more dramatically sloped sills may require shoring to construct.

Where the depth of the slope does not allow the weight of the brick veneer to cantilever from the vertical wall, then adding connections or spanning horizontally to column supports can provide alternative support.

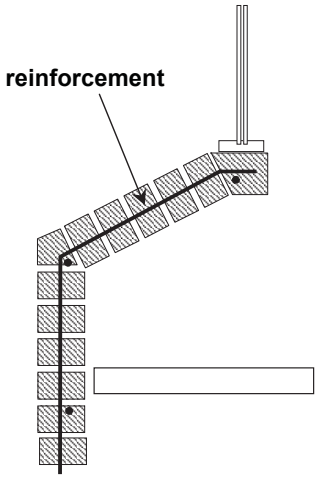


Figure 7 Sloping Sill Brick Soffits

Brick soffits can be designed and constructed similar to the conditions at a sloping sill.

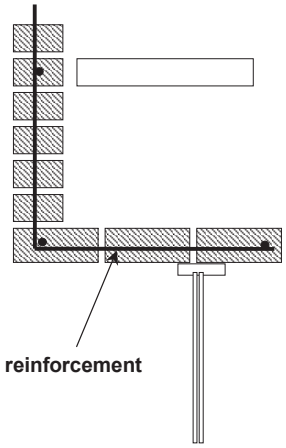


Figure 8 Brick Soffit

Brick with Concrete Masonry

Another architectural variation is to combine concrete masonry with Structural Brick Veneer. This commonly takes the form of banding, either horizontal or vertical, or as an accent pattern. In some circumstances, concrete masonry may be used instead of brick where it doesn't show. In either arrangement, concrete masonry can be incorporated into the Structural Brick Veneer with ease. The designer should recognize however that the spacing of reinforcement in brick might not match the cells in the concrete masonry. Some effort should be made to space the reinforcement to match both modules. Also, when using horizontal brick and concrete masonry bands, the designers must recognize the opposing behavior and strengths of the two materials and detail accordingly with movement joints and reinforcement. Brick will expand with exposure to moisture while concrete masonry is more dynamic and

will shrink with drying and expand with moisture. Extra reinforcement may be added to reduce the impact of this effect.

Brick with Precast Concrete

Precast concrete window sills and heads as well as accents can be successfully included in a Structural Brick Veneer System. Where the precast elements are small, they can be added by providing holes through the precast for the reinforcement. Large precast components may require separate connectors to the building frame or to the Structural Brick Veneer.

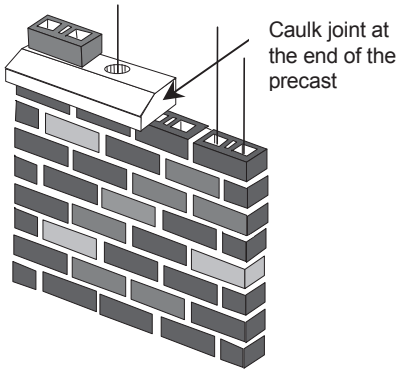


Figure 9 Precast in Structural Brick Veneer

Also, precast concrete elements shrink with time and drying, and expand with moisture. Again, the designer should consider the compatibility of the expanding brick and shrinking concrete.

2.3 Weather Protection

The primary function of the exterior wall is to protect the interior of the building from the weather.

The Structural Brick Veneer System provides two methods of weather protection. The exterior brick veneer, caulking, and windows act as the primary barrier. The interior cavity, flashing, weeps, window channels and other elements act as the secondary barrier.

The system performance depends to a large extent on the prevention of water leakage through the reinforced brick. Reinforced brick is more water-resistant than unreinforced brick. The most obvious reason is that the cracks are smaller and more evenly distributed due to the resistance provided by the reinforcement.

Another reason is that brick expands with age. When the brick is made, it contains no water. With time, the brick absorbs water and reaches equilibrium with its moist environment. The clay expands (just like unfired clay). The moisture can come from the humidity in the air. This expansion can take years.

ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures* recommends a value of .0003 inch/inch for moisture expansion of clay masonry.

When the brick expands, the reinforcement tends to resist the expansion. The reinforcement is stretched in tension and the brick masonry compressed. The consequence is smaller and sometimes there are fewer cracks.

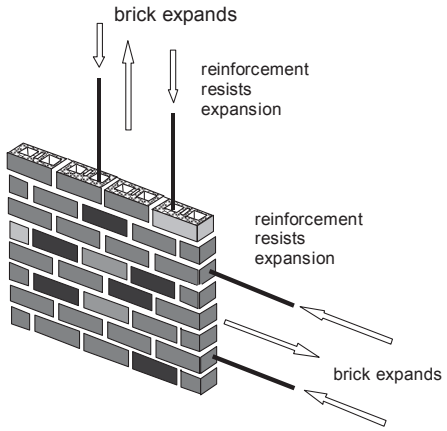


Figure 10 Brick Expanding Resisted by the Reinforcement

Even with smaller cracks, leakage can still occur. Wind-driven water flows in sheets in all directions over the wall and concentrates at discontinuities such as joints. Lateral movement of water is greatest near the windward corners. Movement upward is greatest near the top of the building. Tall buildings have greater accumulation of water flow. Greater distances between irregularities will result in larger flows.

It should be assumed that all masonry might leak and allow water to penetrate. Masonry leaks more through the mortar and brick interface than through the masonry unit itself. If the mortar and brick interface is cracked, leakage may increase.

There are two concepts used to control the water. The first is the drainage wall, and the second is the “rainscreen” principle.

A drainage wall consists of a secondary method of removing the moisture once it has penetrated the outside wall. Flashing is an example.

The principle of the rainscreen consists of providing a cavity behind the wall that equalizes the outside pressure thus preventing the water from penetrating the outside surface. A properly proportioned rainscreen wall needs no caulk on the outside barrier. Unfortunately, the available technology for designing rainscreen walls is limited and while many walls use some of the principles, most installations rely on a drainage wall system. For more information on the rainscreen walls, see Western States Clay Products publication “*Design Guide for Anchored Brick Veneer Over Steel Studs”*.

3.0 Design

Once the decision to use Structural Brick Veneer is made, the next step is to provide for a design. The Structural Brick Veneer is not part of the primary structural system and, consequently, may, or may not be designed by the building design team. It may not be in their scope of services. Thus the first issue to address is who designs the wall? Whether designed by the building design team or by a designer working for the contractor or sub-contractor, the design criteria and methods of analysis are the same. In the next paragraphs, these methods are described followed by three design examples.

3.1 Who Designs the Wall?

Structural Brick Veneer, like other wall systems, can be designed by either the design team and bid, or it can be specified as a bidder-designed item. It is done both ways.

Some owners complain to their architect that the design is incomplete without drawings and specifications to bid the exterior wall. It is like “buying a car without the wheels.” Yet, contractors design most exterior walls because they have special knowledge necessary to complete the task.

Questions that should be addressed early in the design of any wall system include the following. How much of the design of the wall should be shown on the design drawings? Where does the designer of record’s responsibilities end and the contractor’s responsibilities begin?

Often, the structural engineer of record does not show bracing because he is unaware of the wall system to be used and the method of attachment is left to the contractor. The designer should clearly identify on the drawings the responsibility for the design and construction of each component of the wall system, including bracing.

In some locations, it is common for brick veneer supports to be shown on the design drawings. In Seattle, it is common for the structural engineer of record to design precast concrete panels as part of the “standard services”. In most locations, including Seattle, the contractor prepares the design of Structural Brick Veneer.

These examples are presented to illustrate that there is no consensus about who should design an exterior wall. The “*National Practice Guidelines for the Structural Engineer of Record* ” published by the Council of American Structural Engineers clearly states that the design of curtainwall systems is not considered part of Basic Services. It is considered Additional Services under Special Services. Unfortunately, the document does not provide us with help for the bracing and stiffening problem. Nor does it show where to draw the line of responsibility between the contractor and the structural engineer of record.

No matter who designs the wall, the contractor or the engineer of record, the following information about the design criteria and methods applies.

3.2 Design Criteria

The design criteria for Structural Brick Veneer includes the applicable code sections, the appropriate design life, seismic performance, loads, allowable stresses, code prescriptive requirements and special connection requirements.

3.2.1 The Applicable Code Sections

The term “Structural Brick Veneer” may cause some confusion when applying the building code. The use of the term “Veneer” implies “non-structural”. However, the structural analysis of the Structural Brick Veneer uses the structural portions of the masonry design codes. But, they are used in combination with the performance criteria of the masonry veneer sections of the code.

3.2.2 Design Life

Design life is an important quantitative measure that defines the quality of the project. Buildings will not last forever. The owner and designer should establish a reasonable design life for each project. This requires consideration of

the economic factors such as initial cost and maintenance costs. The design life will have an impact on the selection of materials, maintenance procedures, and the selected factors of safety.

The expected performance is also an important qualitative measure for the design of the project. The minimum performance level is set by the building code, however, there are aspects of a Structural Brick Veneer System performance that are not explicitly covered by the code and require judgment.

It has been useful to define two distinct levels of expected life and performance:

Level 1 (institutional) is intended to signify a high level of quality and long life. Buildings of this type might include public or institutional buildings. Specifically, these are buildings where the additional costs associated with higher quality are judged to be necessary in meeting the overall project requirements.

Level 2 (commercial) is intended to signify a good level of quality and an average design life. Buildings of this type might include general office, industrial, and residential buildings. These are buildings where the additional cost of Level 1 (institutional) quality is not economically justified or necessary.

Increasing the quality of the connectors, improving the weather resistance of the materials and expanding on the amount of inspection and testing are the normal means to increase the design life.

3.2.3 Seismic Performance

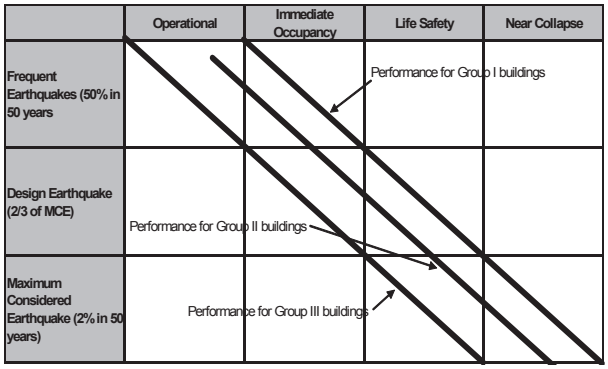
Seismic performance of Structural Brick Veneer is a complex subject since under certain levels of seismic shaking, damage can occur to the veneer. There are currently several organizations preparing standards for seismic design. The National Earthquake Hazards Reduction Program (NEHRP-2000) divides the performance of structures into four levels:

1. Operational: “Structures meeting this level when responding to an earthquake are expected to experience only negligible damage to their structural systems and minor damage to nonstructural systems” (the structural brick veneer). “Repairs if necessary can be conducted at the convenience of the owner.” “The risk to life is negligible.”
2. Immediate occupancy: “Structures meeting this level are expected to sustain more damage to nonstructural systems” (the structural brick veneer). “Exterior nonstructural wall elements and roof elements continue to provide a weather barrier, and are otherwise serviceable” (although they may be damaged).
3. Life safety: “Significant structural and nonstructural damage has occurred.” “Nonstructural elements of the structure, while secured and not presenting falling hazards, are severely damaged and can not function” (the structural brick veneer).
4. Collapse prevention: “The structure has sustained nearly complete damage. Nonstructural elements of the structure have experienced substantial damage and may have become dislodged creating falling hazards” (the structural brick veneer).

The NEHRP provisions also distinguish between building uses by assigning each structure a Seismic Use Group.

1. Group III are essential facilities requiring post-earthquake use.
2. Group II are facilities with a large number of occupants.
3. Group I are all other facilities.

Combining the performance classification with the occupancy distinction results in the following chart describing expected seismic performance.



The building code is not specific about the seismic performance of curtainwall and Structural Brick Veneer. Judgment is required on the part of the engineer to develop appropriate seismic criteria based on the project performance objective. For example, failure of a Structural Brick Veneer over the firehouse door during a major earthquake is not acceptable. Whereas, complete separation of a Structural Brick Veneer from the frame on a suburban office building with surrounding planters may be acceptable.

Because of the nature of the connections, Structural Brick Veneer can be designed to perform to a higher seismic performance level than conventional veneer. For buildings with operational performance or immediate occupancy criteria, Structural Brick Veneer offers significant advantages. If high seismic performance criteria are combined with a complex geometry, sills, soffits and articulated surfaces, it is likely that Structural Brick Veneer will be the least costly system.

3.2.4 Design Loads

Loads applied to a Structural Brick Veneer include dead load, wind load, and seismic load. The Structural Brick Veneer should support no vertical load other than its own weight. In normal practice, it may also support the weight of window systems, small air handling units and possibly some ornamentation.

Most modern building codes contain two levels of loading, service loads (allowable stress design) and ultimate loads (strength design). Both levels of loading are used in the design of Structural Brick Veneer. Local jurisdictions must be consulted for the correct design load criteria.

3.2.5 Design Assumptions and Allowable Stresses

Working Stress Design

Working stress design methods are recommended. Strength or limit states design methods are still in the development stage and have not been extensively used for the design of structural brick or Structural Brick Veneer. The ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures* contains a new strength design section, Chapter 3. It may offer less conservative designs for Structural Brick Veneers resisting out-of-plane

wind and seismic loading particularly when compared to allowable stress design that does not allow a one-third increase in allowable stress for load combinations, including wind or seismic loading.

Allowable Stresses

The allowable stresses permitted in the Structural Brick Veneer are the same as those allowed for structural reinforced masonry. The one-third increase in allowable stress is typically used for load combinations, including wind and seismic loads.

The design of connectors requires additional allowable stresses not typically included in the building codes. These additional required allowables are as follows:

1. The shear cone capacity of masonry for pull-out is typically taken as the beam allowable shear stress (1.0 x $(f'_m)^{1/2} \leq 50$ psi).

2. The shear cone angle is conservatively assumed to be 20 degrees instead of the more commonly used 45 degrees.

3. The torsion allowable stresses are assumed equal to the beam shear allowable stress (1.0 x $(f'_m)^{1/2} \leq 50$ psi). Unpublished testing on several projects has confirmed the validity of this assumption for several projects. The tests consisted of square panels fixed on three corners and lifted on the fourth corner. Failure stresses were typically 2.5 times the allowable values.

4. The concrete shear friction equation is assumed to apply with a friction factor of 0.4, ($A_v = V_u / \phi F_y$). The ultimate shear is taken as 2.0 times the design shear.

5. The tension allowable stress of the brick mortar interface is typically neglected.

6. The tensile capacity of the brick is assumed to be 10% of the compression capacity. The allowable stress is determined by applying an appropriate factor of safety for the load condition being considered. This allowable is for the brick, not the masonry. The code provides allowable tension values for the masonry in tension parallel and perpendicular to the bed joints and for different bonding patterns and mortars.

7. The allowable bond stress to plane steel is assumed to be 60 psi. or the same value as the allowable bond stress to plane bars.

Cracking of Brick

At service loads, the brick units should not crack. Cracking of the interface between the brick and mortar is acceptable. However, a cracked brick could be an aesthetic problem even though the structural capacity may be adequate. The engineer should decide the appropriate service design loading and the factor of safety to be applied.

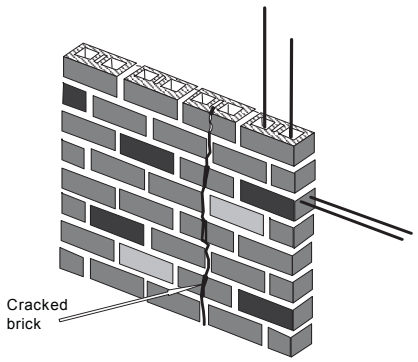


Figure 11 Cracked Brick

Code Minimum Requirements

It could be interpreted that because the Structural Brick Veneer is not classified as structural in the code, the prescriptive minimums of most structural codes do not apply. An example is that the usual minimum reinforcement spacing does not apply. However, the practice is to conform to these minimum requirements as though the Structural Brick Veneer is structural reinforced masonry.

Connector Requirements

Most seismic codes have special minimum criteria for the design of curtainwall connections. These provisions are principally directed towards precast concrete panels used as curtain wall and it is reasonable to assume they apply to Structural Brick Veneer.

One example is IBC 2003 Chapter 16, Section 1621 which references ASCE 7 (2002) Section 9.6.2.4:

> 1. Connection and panel joints shall allow for the story drift caused by relative seismic displacements (D_p) determined in Section 9.6.1.4, or ½ in. whichever is greatest.
>
> 2. Connections to permit movement in the plane of the panel for story drift shall be sliding connections using slotted or oversize holes, connections that permit movement by bending of steel, and other connections providing equivalent sliding and ductility capacity.
>
> 3. The connecting member itself shall have sufficient ductility and rotation capacity so as to preclude fracture of the concrete (masonry) or brittle failures at or near welds.
>
> 4. All fasteners in the connecting system such as bolts, inserts, welds and dowels and the body of the connectors shall be designed for the force (F_p) determined by Eq. 9.6.1.3-2 with values of R_p and a_p taken from Table 9.6.2.2 applied at the center of mass of the panel.
>
> 5. Anchorage using flat straps embedded in concrete or masonry shall be attached to or hooked around reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel or to assure that pullout of anchorage is not the initial failure mechanism.

3.2.5 Isolation from the Building

The most challenging part of the design is to isolate the Structural Brick Veneer from the building frame. There are many ways that this can be accomplished and a few will be discussed.

The amount of isolation is an important factor and the code does not provide precise criteria. There are three directions in space: vertical, horizontal in the plane of the wall, and horizontal perpendicular to the plane of the wall. The building behind

the wall, while seemingly static, is in fact subject to a variety of different movements in all three directions.

Vertical Isolation

The vertical movement can result from several different sources. The following figure shows one source.

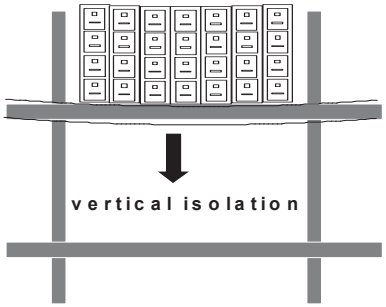


Figure 12 Differential Vertical Deflection

The different amount of vertical loading on the floors will result in a shortening of the distance between the floors. In many buildings, this can be an important factor and can result in differential deflections of greater than three-quarters of an inch. If the system does not provide compliance for this movement, the file cabinet load will be reacted by the Structural Brick Veneer instead of the floor beams and could cause failure.

If the building is constructed of concrete, the concrete shrinkage and creep will contribute to the shortening between floors. In high-rise construction, the elastic and differential elastic shortening may become important and may affect the construction schedule and sequencing.

Horizontal Isolation in the Plane of the Wall

Lateral forces from wind and seismic loading cause horizontal movement of the building frame. When one floor moves horizontally relative to the adjacent (higher or lower) floor, the wall system must accommodate the movement. If the Structural Brick Veneer is attached to both floors, then the veneer would resist the lateral forces and possibly fail. The amount of differential horizontal movement can be large; up to four inches is common in areas of high seismic activity.

A movement joint at the window head is commonly used to accommodate the horizontal movement.

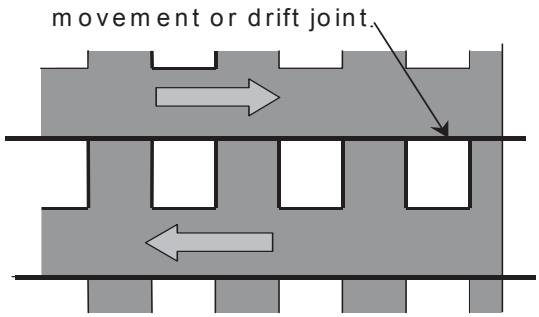


Figure 13 Horizontal Drift Joint

These joints are usually called drift joints and can be located at any horizontal plane of the building. When horizontal joints change elevation at different surfaces of the wall, it is difficult to accommodate horizontal displacement.

This concept is simple until the joint reaches the corner. Corners provide additional natural restraint, and can result in an unwanted attachment to the frame.

The following figure shows an example of a Structural Brick Veneer where the connection to the structure near the corner was designed to be rigid for forces perpendicular to the wall.

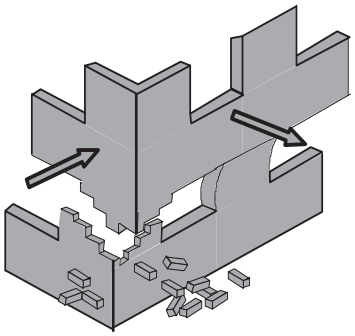


Figure 14 Corner Connected to the Structure

There are several methods available to provide isolation at a corner. One is to eliminate the corner connections and have the Structural Brick Veneer resist the loading.

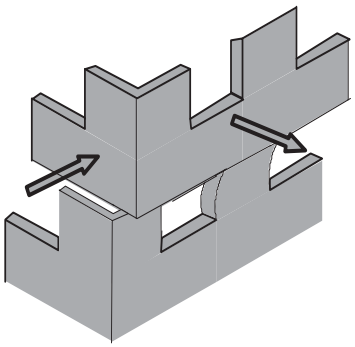


Figure 15 Corner Not Connected to the Structure

Horizontal Isolation Perpendicular to the Plane of the Wall

Another is to accommodate the movement with warping of the corner panel. This will be shown in one of the examples to follow.

For walls away from corners, horizontal movements perpendicular to the plane of the wall are accommodated by out-of - plane bending of the masonry. Typically, reinforced masonry has the capacity to accommodate large deflections in this direction and the isolation in this direction is seldom a design consideration.

Typical Deflection Magnitudes

The amount of isolation required depends on loading and expected performance. There are no known accepted national standards, but as a guide, Table 1 presents typical values and code requirements for isolation.

TYPICAL MOVEMENT DESIGN CRITERIA (1)

Movement Type	Structural System	Source of Movement	Limitations	Recommended Values	Typical Values	Isolation Method
Vertical Floors	Steel or concrete	Differential application of live load	L/600	<0.60 inch	1/4″	Compensation channel at the window head
						Soft joint under the ledger angle
	Concrete	Shrinkage with drying	(2)	(3)	1/16″	Allow the concrete to dry and cure before installing the veneer
		Creep	(2)	(3)	(3)	Provide vertical control joints every 20 to 30 feet
Vertical Columns	Steel	Differential elastic shortening	(2)	(3)	(3)	Only applies to high-rise buildings where the veneer is installed prior to finishing the building frame
	Concrete	Shrinkage	(2)	(3)	1/16″	Allow the concrete to dry and cure before installing the veneer
		Creep	(2)	(3)	1/16″	Compensation channel at the window head
						Soft joint under the ledger angle
Lateral	Frame of steel or concrete	Wind	(2)	.0025H	3/8″	Usually absorbed elastically in the system
		Seismic	Per analysis Minimum ½″	Depends on occupancy	21/2 TO 3″	Compensation channel at the window head
						Soft joint under the ledger angle
	Shear Wall	Wind	(2)	.0025H	1/8″	Usually absorbed elastically in the system
		Seismic	Per analysis Minimum ½”	Depends on occupancy	1/4 TO 1/2 ″	Compensation channel at the window head
						Soft joint under the ledger angle

1. This table should not be used for design. Each project has unique requirements.
2. No known values.
3. Depends on the structure.

3.3 Designing the Wall

The discussion describing the design of a Structural Brick Veneer wall will be divided into four parts:

1. The layout or configuration.
2. The design of the wall for code prescribed loading.
3. The design of the wall to prevent cracking of the brick.
4. The design of the connections.

In the normal process of design, all four parts are accomplished at the same time. Following the four parts, several design examples demonstrating the methods will be presented.

3.3.1 Layout or Configuration

Usually the designer begins with an architectural rendering of the wall elevations. The designer must decide on the method of isolation and the locations to react the dead load, wind and seismic loads applied to the wall.

It is difficult to describe the process for deciding the configuration of the veneer. It is part of the art of structural engineering and experience will help. Three example projects are presented to provide some insight into the issues. These represent complex applications of the Structural Brick Veneer configurations and were chosen to demonstrate the flexibility of the system. Simpler applications are more common.

Project 1

A hospital project was in the contract document phase of design. The architect's concept for the wall was brick veneer over metal studs. Unfortunately, the design had assumed only a 9-inch thickness for the wall: Three and one half inches of brick, a 1-1/2 inch cavity and 4″ deep steel studs. The floor height was 14′-8″



Figure 16 Hospital - Project 1

When the project structural engineer was asked to size the steel studs, it became apparent that the 4" depth was insufficient to support the conventional veneer. Adding thickness to the exterior wall reduced building space and had a major impact on the already designed interiors and room layout. The design of the project stopped because of the problem.

Structural Brick Veneer provided a solution. However, a 4" reinforced brick wall could not span the 14'-8" as a simple span between floors. One option was to use a 5" or 6" brick to make a simple span between floors, but this did not leave enough depth for the interior studs

to support the wallboard without thickening the wall. The solution was to provide a 4" thick (specified thickness is 3.5") Structural Brick Veneer wall system supported as shown in the following Figure.

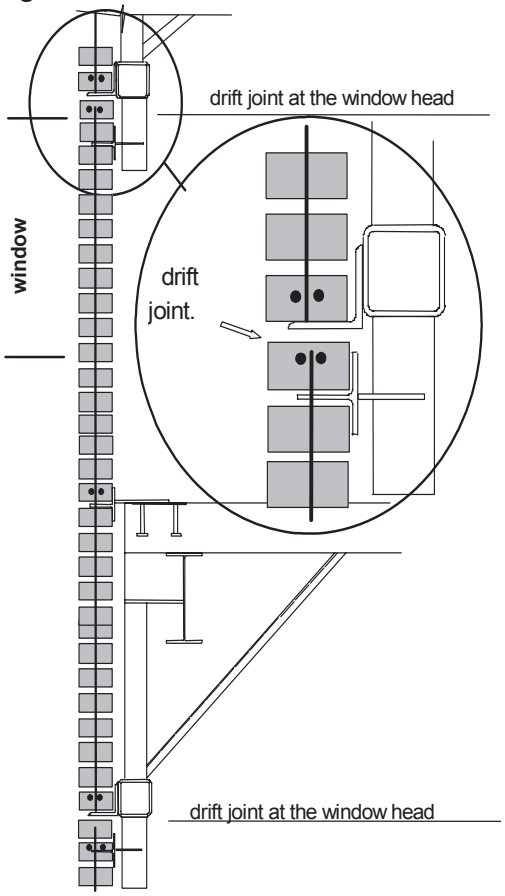


Figure 17 Project 1 – Pier Concept Between Windows

The brick masonry is supported on continuous angles located at the window head. These angles, or ledgers, are supported on a girt system suspended from hangers with kickers framing back to the underside of the slab.

Lateral bracing at the floor consists of galvanized 1/8-inch thick plate with holes for vertical reinforcement. This brace is flexible in the vertical direction and stiff in both horizontal directions.

The seismic or drift joint is located at the window head, below the ledger. The joint directly below the ledger is a caulk joint. Another lateral brace is located below the ledger. This brace is stiff perpendicular to the plane of the wall and flexible in both the horizontal in the plane of the wall and the vertical directions. This is accomplished by using a 1/8-inch thick galvanized plate with holes for the vertical reinforcement supported by two 1/8-inch thick galvanized plates welded to the bottom of the girt and welded to the plate into the brick.

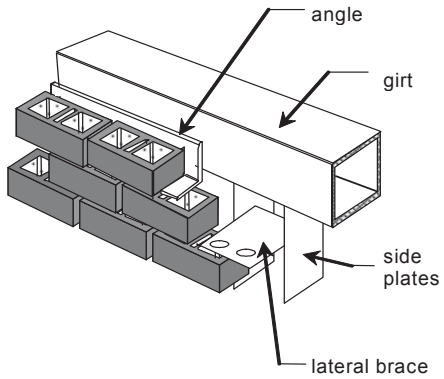


Figure 18 Lateral Connection

This configuration reduced the spans sufficiently to allow the 4" brick to resist the applied loading.

The stud wall was 26-gauge steel studs and was used only for the support of the water barrier and air barrier, and interior wallboard.



Figure 19 Drift Joint Before Ledger Installation

Dowels were welded to the ledgers, and the brick was laid by threading over the dowels. When the construction of masonry reached the head location, bars were dropped into the vertical cells and the wall solidly grouted.



Figure 20 Ledger Installation

The masonry units are nominal 4x4x12 inch with two 1-3/4 x 3-1/2 inch cells. The design f'_m was 4,000 psi .

Project 2

The second project is also a hospital addition located in an area of high seismic risk. The hospital program and site generated a geometric shape consisting of several boxy wings. A brick wall was chosen to match the old building.

The boxy nature of the floor plan made isolation for seismic lateral displacements nearly impossible with conventional veneer construction. Structural Brick Veneer was chosen because of its ability to isolate the brick veneer from the building.



Figure 21 Project 2

This Structural Brick Veneer was designed to accommodate a large lateral

seismic displacement. The building structure was a steel moment frame in one direction and a steel braced frame in the other. Because of the many corners, an unconventional approach to the isolation was used. The concept was to build a Structural Brick Veneer box in the shape of the outside wall. The box was one floor tall extending several courses above the window at the next floor. The box was then attached to the building so that it moved with each floor. The dead load support was at the floor.

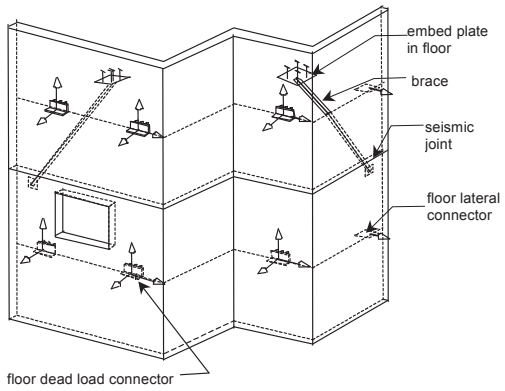


Figure 22 Hospital with Many Corners

The corners of the box resisted the wind and seismic loading perpendicular to the surfaces of the wall. The reaction of the wind and seismic load occurs in the dead load anchors as shear and over-turning. Where corners were spaced too far apart to span between them, braces were added to the underside of the slab for the floor above at a sufficient distance from the corners to accommodate the differential horizontal movement of the floor by warping of the masonry.

When the building moves laterally, the rigid corners are unaffected and the under-floor braces cause warping of the wall. The displacement perpendicular to the wall caused by the brace is at a sufficient distance from the corner to warp the wall without failure.

Continuous ledgers were not used in this situation because they would not provide adequate strength to resist the overturning forces. Consequently, the normal construction sequence needed to be modified.

The construction proceeded as follows: Beginning from the masonry below, rigid foam board was placed on the brick. Brick was then laid on top of the foam board for a height of two feet above the floor. This masonry engaged the dead load connector. At this time, the wall was grouted and allowed to cure for three days. Masonry was then laid to several courses above the window head and the process repeated for each floor. Caulk was placed over the face of the foam board that was left in the wall.

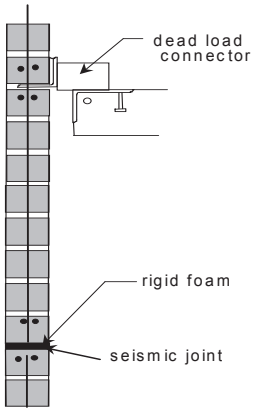


Figure 23 Temporary Rigid Foam Board Support

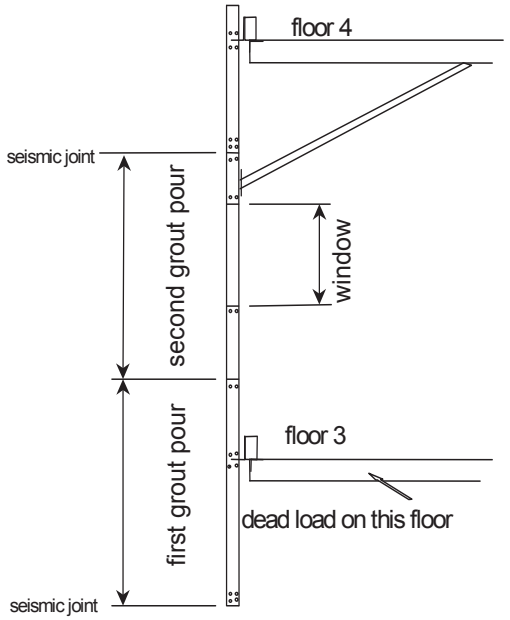


Figure 24 Construction Sequence

The design used isolated connectors instead of a ledger because, under lateral load conditions, the wall produced uplift on the floor and it was felt that the best design was to provide specific points for these forces to be reacted. The corners provide much of the needed lateral bracing, thus the number of connectors to the structure is relatively few.

The brick was a 5-inch unit. Custom shapes were provided. Additionally, the project used prefabricated Structural Brick Veneer (brick panels) where scaffolding was difficult to install or where the support of the brick was not available.

Project 3

A final example is a combination of laid-in-place Structural Brick Veneer and prefabricated Structural Brick Veneer or brick panels. Brick panels are similar to precast concrete panels except they are constructed of reinforced brick instead of reinforced concrete. The project was built on fill with friction piling used to support the load. The foundation design was such that ½ inch of differential settlement was expected in 50 feet. The building frame was a combination of steel and wood. The corners could be damaged in a moderate earthquake. The typical wall elevation is shown in the following Figure 25.

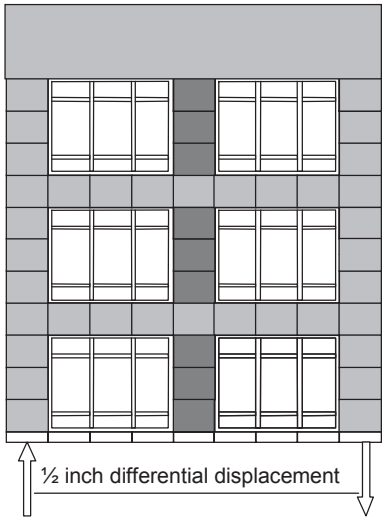


Figure 25 Building with Anticipated Differential Settlement

The solution was to use Structural Brick Veneer column elements with the dead load supported at the foundation. Lateral bracing was provided at each floor. Brick

panels were hung off the Structural Brick Veneer columns with connectors that allowed them to pivot while being stiff for loads perpendicular to the surface.

The columns were constructed of 8" brick and reinforced. They supported the entire dead load of the wall, but the lateral connectors to the building were flexible in the vertical directions so that none of the building dead load was supported on the brick. The panels were constructed of 4" brick. They were shipped 600 miles from the fabrication yard to the building location.

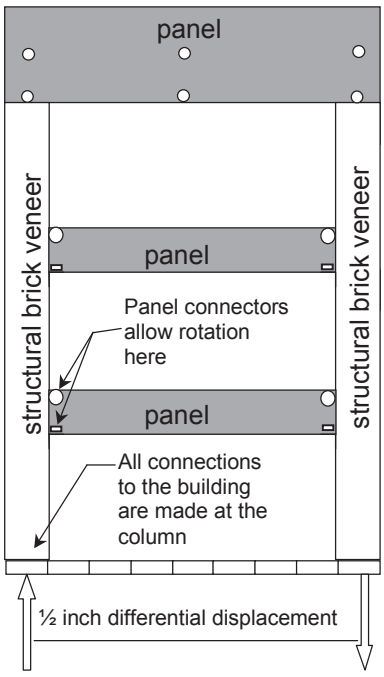


Figure 26 Concept for Settlement

3.3.2 Design for Code Loading

The reinforcement size and spacing are typically determined by conventional allowable stress design. Maximum moments usually occur at mid-span for simple configurations or at connectors for cantilevered configurations. Both horizontal and vertical reinforcement should be provided because most walls behave as plates with moments in both directions. The design often proceeds, however, by assuming simple spans with full loading in each direction.

Maximum spacing of reinforcement should be less than 4 feet with 3 feet a common value. Typically, bar sizes are No. 3 and 4 bars in 4 inch walls and No. 3, 4 and 5 bars in 5 inch and 6 inch walls.

In areas of high shear, additional reinforcement may be required. Reinforcement should also surround connectors and openings.

3.3.3 Design for Wall Cracking

An important performance criterion is to prevent the cracking of brick. This condition usually is not a structural problem for reinforced brick masonry. But, it is an aesthetic problem. The design for this performance criterion is typically done as follows:

To prevent cracking of the brick, the moments in the horizontal direction (stiff direction) are compared to the resistance of the wall in that direction, see the following figure. Failure would involve cracking of the brick unit and the head joint. Cracking due to vertical moments would result in cracking of the horizontal bed joint which is not an aesthetic problem.

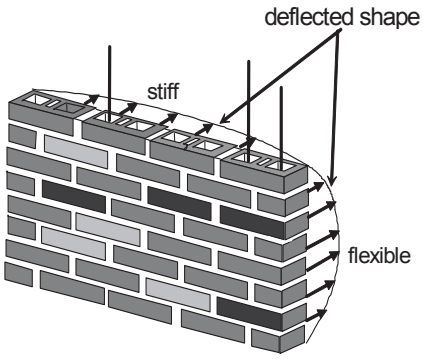


Figure 27 Stiffness of Brick Masonry

Unpublished tests and tests performed by Western States Clay Products in the early 1970's have shown that brick masonry in running bond direction is nearly 10 times as stiff as brick masonry in the vertical direction. For normal brick orientations, loads tend to run horizontally to the supports.

Most code wind loading is based on a mean return period of 50 years and this often represents a reasonable level of wind loading expected once in the life of the average building. However, in some cases, it may be appropriate to increase or decrease these levels to better match the criteria for the project.

Seismic loading would usually correspond to the moderate level earthquake. It is probably unreasonable to design to the major level earthquake to prevent an aesthetic problem.

The resistance of the wall is provided by the masonry without consideration of the reinforcement. The masonry is assumed not cracked. Without the reinforcement, the resistance is provided by the bricks and mortar joints. It is conservative to assume that there is no capacity for the head joint to resist tension stresses, consequently all of the resistance is provided by the tensile capacity of the brick. Thus, the appropriate structural section available to resist the loading is only the brick which is normally one half the gross cross-section.

There are no national standards available to provide allowable stresses for brick in tension. The brick material supplier may have information or it may be necessary to do testing. In the absence of both, using 10% of the brick's compressive strength has generally proven conservative. Because the minimal consequences of the failure and the loading are expected to occur only once in the building life, it is recommended to use a small factor of safety on the tension capacity of the brick. A value of 1.25 has been successfully applied.

3.3.4 Design of Connections

Each configuration has a unique set of reactions for each code-required load combination. The reactions must be supported by the connectors and the structure. The connectors must be of sufficient strength and ductility to meet the capacity and ductility requirements.

Materials for Connectors

Most connectors are constructed of miscellaneous steel angles, tees and plates. For Level 1 (institutional) performance they are typically galvanized. For Level 2 (commercial) performance

they are shop painted. Stainless steel connectors are probably not warranted and there are only a few known installations.

Design Methods and Assumptions

Conventional design methods apply to the design of the connectors, except for the design of the capacity of the connector to the Structural Brick Veneer. There are several additional design considerations.

First, the connector should engage more than one brick cell. Sometimes bricks have cracks as a result of manufacturing. Concentrating loads at a single cell of the brick could, if cracked, significantly reduce the capacity. Consequently, for the design of connectors in Structural Brick Veneer, the scale of the engagement into the brick should be at least two times that usually associated with connectors engaging reinforced concrete.

Next, because of the seismic requirement for connectors, “Anchorage using flat straps embedded in concrete or masonry shall be attached to or hooked around reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel or to assure that pullout of anchorage is not the initial failure mechanism”, it is often necessary to thread reinforcement through holes placed in the steel. This may restrict the flow of grout at the connection and a recommended mitigation is to use bond beams above and/or below the connector.

Construction Tolerances

An important factor in the design of a connector is construction tolerance. Structural Brick Veneer walls are located in plane and elevation with tolerances more restrictive than the supporting structure. For example, the deviation from plumb (down the height of the building) often is limited to 1/2 inch for Structural Brick Veneer. In a steel frame at the upper floors, the tolerance on the frame is 1-1/4 inches inward and 2-1/4 inches outward. The location of the slab edge is often plus or minus 1 inch.

The elevation of the floor also varies from the planned location. There are several reasons for this. First, there is construction tolerance. Second, the floor is supported on beams that deflect due to loading. Third, there is elastic shortening of the building and for concrete buildings, there is creep and shrinkage. Again, this uncertainty of floor elevation is important to the design of the connector. These tolerances have an important design and construction impact.

The connector must be designed to accommodate these deviations in dimension. The edge of floor connector should be configured to be installable with the slab edge at either extreme of the allowed tolerance. Additionally, the strength of the connector should be adequate to support the loads with the most unfavorable combination of element locations.

The configuration of the connector is often dictated by the tolerance requirements, and the resulting load eccentrici-

ties often (to the untrained eye) appear to oversize the connections.

3.4 Design Examples

Three design examples are presented. The first is a strip spandrel configuration supported on a continuous ledger. The second is the same except the veneer is supported on separate floor dead load connectors. The third example addresses seismic displacement design at a Structural Brick Veneer corner.

3.4.1 Example 1

This example is very simple and unlikely to occur in actual practice. The designer is cautioned not to apply the methods and equations contained in this example to other applications. The purpose of the example is to demonstrate a sequence of assumptions and analysis appropriate for this simple design. Different assumptions and analysis methods should be used when the design changes.

A four-story office building with a “strip window” system serves as a common application. The story height is 12'-6", the window height is 6'-0" and the sill height is 2'-6". The wind load is 30 psf and the building is classified as seismic design category D. The wind load of 30 psf (according to most codes) is typically larger than the seismic inertia load perpendicular to the surface of the veneer and this is assumed for this example. Floor to floor drift isolation is provided by a slip joint in the window head. Warping of the glass accommodates drift at the building corners. In other words, the brick corner remains rigid and moves with the floor to which it is attached.

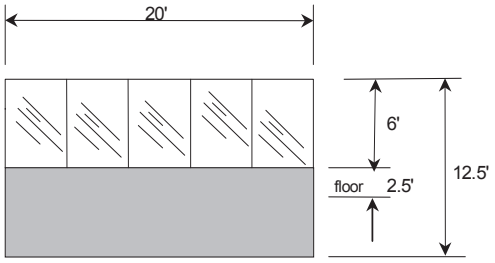


Figure 28 Strip System Example

A continuous ledger system is hung from the bottom of the spandrel beam and braced to the underside of the floor.

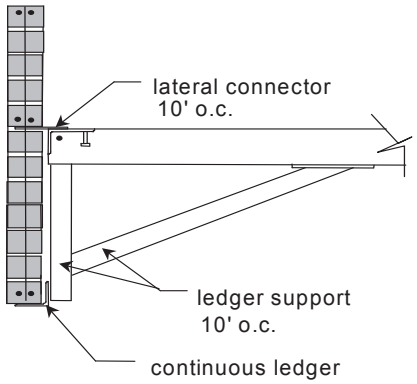


Figure 29 Support for the Wall

The hanger and brace are located at 10 feet on center. This matches the purlin spacing when the floor spans in the direction parallel to the edge of the slab. Assume 4-inch hollow brick is used. The actual thickness is 3.5 inches and the depth of the reinforcement from the surface is 1.75 inches.

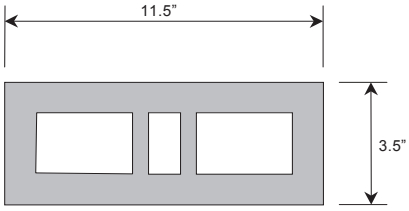


Figure 30 Brick Used in the Example

The design might proceed as follows:

The dead load on the ledger includes the weight of the brick veneer and the windows.

Wall = 40 psf x 6.5 ft = 260plf
Window = 6 psf x 6 ft = 36 plf

Total = 296 plf

Since the hangers are spaced at 10 feet, the hanger vertical load is:

296 plf x 10 ft = 2960 lbs

The ledger is designed to span between supports. In Structural Brick Veneer, the brick can also be used to span if shoring is used during construction. Assume the brick is used to span between supports, then try (2) #3 in a bond beam at the first course above the ledger.

The bending due to dead load is:

$M_A = W L^2 / 8$
$M_A = 296plf \times 10^2 ft /8 = 3700 lb\text{-}ft$

The steel ratio “ρ“ is used to calculate the capacity to resist the loading.

$$\rho = A_s / bd$$

Where A_s is the area of flexural reinforcement, b is the width or thickness of the masonry and d is the depth of the flexural element from the extreme compression fiber to the centroid of the reinforcement.

$$\rho = .22\ in^2 /(3.5 \times (78 - 4))$$

$$\rho = .00085$$

Assume the masonry modulus of elasticity is 3,000,000 psi, and the steel modulus of elasticity is 29,000,000 psi then the modular ratio between the reinforcement and the masonry is:

$$n = Es/ E_m = 9.67$$

and then

$$n\rho = .00085 \times 9.67 = .0082$$

Most codes allow a design flexural stress for grade 60 reinforcement as:

$$F_s = 24{,}000 \text{ psi}$$

Similarly, the allowable masonry stress is 1/3 the specified strength. If 4000 psi is specified, then the allowable flexural masonry compression stress is:

$$F_b = 4000/3 = 1333 \text{ psi}$$

By summing forces in the direction along the flexural element, the following

expression for the location of the neutral axis can be obtained:

$$k = [(n\rho)^2+2n\rho]^{1/2} - n\rho$$

$$k = .12$$

A convenient term "j" is defined as:

$$j = (1 - k / 3) = .96$$

The moment capacity limited by the allowable reinforcement stress is defined as:

$$M_t = A_s\ j\ d\ F_s$$

Thus:

$$M_t = .22 \times .96 \times 74 \times 24000/12$$

$$M_t = 31{,}200 \text{ lb-ft}$$

The moment capacity limited by the allowable compression stress in the masonry is defined as:

$$M_c = bd^2kj\ F_b / 2$$

$$M_c = 3.5 \times 74^2 \times .12 \times .96 \times 1333/(2 \times 12)$$

$$M_c = 122{,}600 \text{ lb-ft}$$

Since both M_t and M_c are greater than the applied moment, M_a, the two #3 bars provide more than adequate vertical support between ledger hangers.

If shoring is provided, a similar calculation would show that the vertical support could be extended to 20 feet or more and the weight of the wall reacted at the building columns.

However, as will be seen later, the lateral support (for wind and seismic loading) will need to be 10 foot. Thus, the hanger could be spaced at 20′, but the braces back to the underside of the slab will need to be at 10′.

The wind load on the wall is 30 psf. This load acts perpendicular to the surface of the brick and the window.

Assume floor connections are spaced at 10 foot at the same location as the lateral support of the ledger.

The floor reaction is found by summing moments about the ledger:

The reaction of the window at the sill (top of the brick) is:

$$R_w = 3 \text{ ft} \times 30 \text{ psf} = 90 \text{ lb/ft}$$

The resulting moment about the ledger is:

$$M_w = 90 \text{ lb/ft} \times 6.5 \text{ ft} = 585 \text{ lb-ft/ft}$$

The moment about the ledger due to the wind loading on the brick is:

$$M_b = 30 \text{ psf} \times 6.5 \text{ ft} \times 6.5 \text{ ft} / 2$$

$$M_b = 634 \text{ lb-ft/ft}$$

The reaction resists the moments and is calculated as:

$$R_F = [\ M_b + M_w\ ] / 4$$

$$R_F = [\ 634 + 585\ ] / 4$$

$$R_F = 304.7 \text{ lb-ft/ft}$$

Since the spacing of the connectors is at 10 feet on center, the connector reaction is:

R_F = 3047 lbs

By summing forces perpendicular to the surface of the brick, the ledger lateral reaction is:

R_L = 12.5 ft x 30 psf x 10 ft - R_F

R_L = 703 lbs

Drawing the shear and moment diagrams reveals that the maximum moment occurs at the floor and is equal to the moment on the brick due to the window sill load plus the moment on the brick due to the wind on the brick:

M_w = 30 psf x 3 ft x2.5 ft

M_w = 225 lb-ft/ft

M_b = 30 psf x 2.5 ft x 2.5 ft / 2

M_b = 93.75 lb-ft/ft

$M_a = M_w + M_b$

Thus:

M_a = 318.75 lb-ft/ft

and over the 10 foot spacing becomes:

M_a = 3187.5 lb-ft

An estimate of the required reinforcement can be obtained as follows:

$A_S \cong M_a / [.9 F_s d]$

$A_S \cong$ (3187.5 x 12)/[.9 x 24,000 x 1.33 x 1.75]

$A_S \cong .75$ in^2

Where the design depth is one-half the wall thickness (1.75 inches), and the stress has been increased by 1/3 for wind short duration loading.

Try (4) #4 bars. The brick module is 6 inches. The code allows an effective width for bending of six times the thickness of the wall. The width for design can be obtained by laying out the bars in the brick cells:

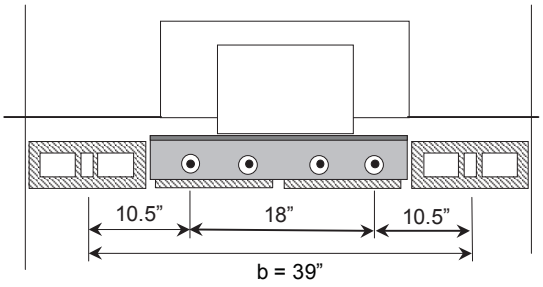


Figure 31 Plan View of Connector

And:

$\rho = A_s / bd$

$\rho = 4$ x.2 in^2 /(1.75 in x 39 in)

$\rho = .0117$

$n\rho = .113$, $k = .37$ $j = .87$

The moment limited by the allowable stress in the reinforcement is:

$M_t = A_s\ j\ d\ F_s$

$M_t = .8 \times .87 \times 1.75 \times 24{,}000 \times 1.33 / 12$

$M_t = 3250$ lb-ft

The moment limited by the allowable stress in the masonry is:

$M_c = bd^2kj\ F_b / 2$

$M_c = 39 \times 1.75^2 \times .37 \times .87 \times 4000 \times 1.33/(3 \times 2 \times 12)$

$M_c = 2840$ lb-ft n.g.

Compression at the floor in the brick is often the limiting factor.

Add (2) #4 bars for a total of 6 bars. Then

$b = 6 \times 3.5 + 5 \times 6 = 51$ in.

$n\rho = (9.67 \times 6 \times .2)/(1.75 \times 51)$

$n\rho = .13$

$k = .40 \quad j = .87$

$M_t = 4870$ lb-ft ok

$M_c = 4025$ lb-ft ok

The wind loading must span horizontally 10 feet to the vertical connector strips. Assume the window head reaction is reacted by the lateral bracing and the ledger, and the window sill reaction is reacted by the brick, then the moment in the brick is the moment caused by the window and the moment caused by the wind load on the brick.

$M_w = 30$ psf $\times$ 3 ft $\times\ 10^2 / 8$

$M_b = 30$ psf $\times$ 6.5 ft $\times\ 10^2 / 8$

$M_a = M_w + M_b$

$M_a = 3562$ lb-ft

Assume (5) bond beams with (2) #3 in each, then:

$A_s = 1.10$ in^2

$\rho = 1.10/(78 \times 1.75)$

$\rho = .00805$

$n\rho = .078, \quad k = .32 \quad j = .89$

$M_t = 1.10 \times .89 \times 1.75 \times 24000 \times 1.33 / 12$

$M_t = 4567$ lb-ft ok

$M_c = 78 \times 1.75^2 \times .32 \times .89 \times 1333 \times 1.33/(2 \times 12)$

$M_c = 5038$ lb-ft ok

The condition of dead load plus wind is satisfied by inspection, but can be checked as follows:

$[M_a/(M_t \text{ or } M_c)]_{\text{dead}} + [M_a/(M_t \text{ or } M_c)]_{\text{wind}} < 1.0$

$3700/3120 + 3562/4567 = .89 < 1.0$

The condition of inertia seismic and dead load is also satisfied by inspection since the inertia seismic load was assumed less than the 30 psf wind load. This conclusion by inspection can easily be made when designing the veneer, but should not be so easily made when designing connectors. This is because most seismic codes have special load factors and additional criteria for seismic connector design that are not typical for the wind design of a connector.

The final check is for cracking of the brick.

Assume a service load of 15 psf. The value selected should relate to the design life and the performance criteria selected for the project.

The uniform horizontal loading of the strip between the connectors is a result of the wind load acting on the windows and brick. The moment is estimated as:

$$M_w = 15 \text{ psf} \times 3 \text{ ft} \times 10^2 / 8$$

$$M_w = 562.5 \text{ lb-ft}$$

$$M_b = 15 \text{ psf} \times 6.5 \text{ ft} \times 10^2 / 8$$

$$M_b = 1218.7 \text{ lb-ft}$$

$$M_a = M_w + M_b$$

$$M_a = 1782 \text{ lb-ft}$$

The section available to resist the moment is estimated as half the wall height since half of that height is head joints.

$$I = b\, t^3 / 12$$

$$I = (78/2) \times 3.5^3 / 12 = 139.3 \text{ in}^4$$

The stress is:

$$\sigma = Mc/I$$

$$\sigma = 1782 \times 12 \times 1.75 / 139.3$$

$$\sigma = 269 \text{ psi}$$

The brick unit should have a tensile strength in excess of 269 psi times the factor of safety. If 1.25 is used, then the tensile strength needs to exceed 335 psi.

According to an unpublished test and experience, to achieve an f'_m of 4000 psi the brick strength probably exceeds 10,000 psi. Using the 10% rule of thumb, the expected tensile strength of the brick is 1000 psi.

A simple lateral connector at the floor is shown in the following figure. It consists of an embedded WT 4 x 5 with a coupler welded to the flange for the attachment of a rod.

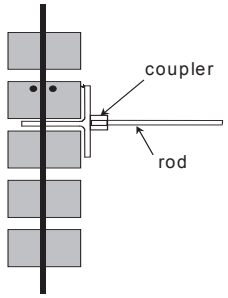


Figure 32 Simple Lateral Connector

The length of the tee will need to be determined based on the loads applied. To start, assume the tee is 22 inches long. The tee contains four 1-inch diameter holes for reinforcement placement. The capacity of the connector can be estimated by using a shear cone.

Assuming the shear cone originates at the bar then the height of the cone is:

$$h = 1.75 + .25 = 2.0 \text{ inches}$$

Assuming a 20 degree slope at the edge of the cone, the approximate surface area of the cone is:

$$A = \text{Length} \times \text{width} \times 2$$

$$A = \{2.0 / \cos 20^{\circ}\} \times 22 \times 2$$

The ends of the cone are neglected, but can be added if the capacity is insufficient.

$$A = 94 \text{ square inches}$$

Assuming the shear allowable is the same as the maximum shear allowable for beams of 50 psi (the masonry design strength exceeds 2500 psi and the 1/3 stress increase is used) then the allowable for the connector for pull-out is:

$$P = A \times 50 \text{ psi} \times 1.33$$

$$P = 94 \times 50 \times 1.33 = 6250 \text{ Lbs}$$

Another failure mode is the connector breaking the bond between the steel and masonry. The area of contact is:

$$A = \text{Length} \times \text{width} \times 2$$

$$A = 2.75 \times 22 \times 2 = 121 \text{ in}^2$$

The bond strength is assumed to be 60 psi plus the 1/3 stress increase. Thus, the capacity of the connector is estimated as:

$$P = A \times 60 \times 1.33$$

$$P = 121 \times 60 \times 1.33 = 9656 \text{ lbs}$$

The shear friction check results in:

$$A_v = V_u / \phi F_y$$

or

$$V_u = \phi A_v F_y$$

$$V_u = .4 \times 4x.2 \times 60{,}000$$

$$V_u = 19{,}200 \text{ lbs}$$

$$V = V_u / 2 = 9600 \text{ lbs}$$

The lowest allowable load is 6250 lbs compared to the applied wind load of 3047 lbs. A 10-inch long anchor would likely supply sufficient capacity, but only two of the six bars would be engaged making the design for ductility questionable.

It is assumed that the code level seismic inertial force is .315 times the force of gravity. The working stress design inertia loading is .315/1.4 or .225 times gravity. The brick weight is approximately 40 psf resulting in a surface inertial load of 9 psf and a reaction of 3047 x 9 / 30 or 914 lbs. The connector factor of safety exceeds 7 for code level seismic loads. This satisfies the additional seismic criteria for connectors by inspection.

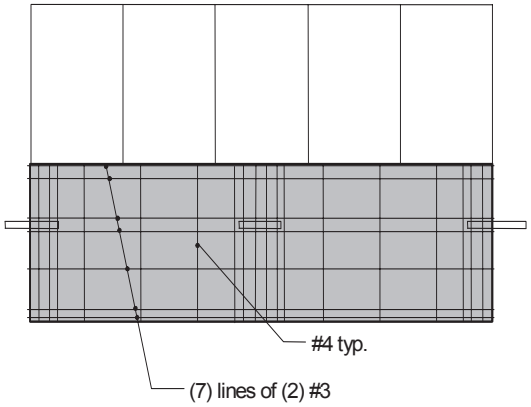


Figure 33 Final Design

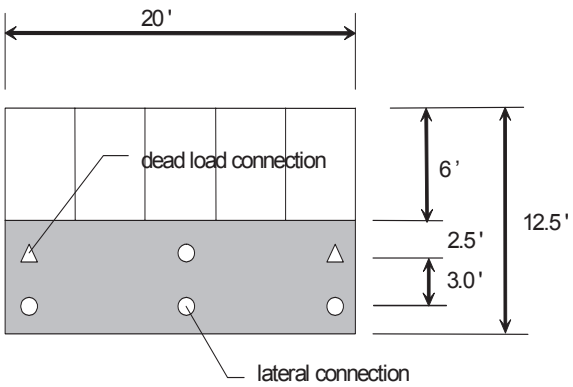


Figure 34 Location of Connectors

Limited testing of connectors has been conducted. One recent test conducted by Western States Clay Products Association validated the design methods for the connection shown above. Other tests specific to special connections on projects have been conducted. They are unpublished, but also verify the above methods.

3.4.2 Example 2

The same strip window system is used for Example 2 except that the dead load support is now on separated connectors located at the floor. Shoring will be used to construct the wall. The design example is for the in-place condition only. In actual practice, the designer of the Structural Brick Veneer would design the system for the shoring conditions as well as the in-place condition.

The following figure presents the new layout of the connections.

The veneer is assumed to have a vertical expansion joint at 20 feet on center. From the previous example, the horizontal span of the brick is limited to less than 10 feet. Thus, a lateral anchor at the floor and a brace will be required at the mid point of the panel.

The design dead load, after the wall is constructed, is the same as the previous example.

Placing the dead load anchors away from the columns will avoid interference with the building structure and make the installation easier. Assume the dead load anchors are placed at 2 feet from the column line. A vertical expansion joint is assumed at the column. The 2 feet dimension was chosen as the center of the head joint so that the connector is centered on the head joint and an even number of bars will pass through the connector. If an odd number of bars passes through the connector, then the anchor would be located at the center of a cell. Two feet three inches or

two feet nine inches from the expansion joint would be examples.
`

The reaction load on the dead load connector is:

$$R = w \times L / 2$$

$$R = 296 \times 20 \text{ ft} / 2 = 2960 \text{ lbs}$$

The maximum moment occurs at the mid span and is:

$$M_a = R \times \{L/2-s\} - W \times \{L/2\}^2 / 2$$

$$M_a = 2960 \times (10 - 2) - 296 \times 10^2 / 2$$

$$M_a = 8880 \text{ lb-ft}$$

From the previous example, the wall can support this load.

The bending out of plane on the wall due to wind is assumed reacted by braces one foot above the bottom of the brick and at the floor. The reaction at the floor can be found by summing moments about the location of the brace as follows:

$M_w = 30 \text{ psf} \times 3 \times [5.5 - 1] \text{ft}$

$$M_w = 405 \text{ lb-ft/ft}$$

$$M_b = 30 \text{ psf} \times [5.5^2 / 2 - 1^2 / 2] \text{ ft}^2$$

$$M_b = 438.75 \text{ lb-ft/ft}$$

$$R_{Floor} = [M_w + M_b] / 3$$

$$R_{Floor} = 281 \text{ lbs/ft}$$

Summing forces perpendicular to the veneer results in the horizontal brace force:

$$R_{brace} = 30 \times 12.5 - 281 = 94 \text{ lb/ft}$$

The maximum moment again occurs at the floor line and is:

$$M_a = 30 \times 3 \times 2.5 + [30 \times 2.5^2] / 2$$

$$M_a = 318.8 \text{ ft-lb/ft}$$

The contributing length of veneer for the dead load connector is about 6 feet consisting of the 2 feet of cantilever and half the distance to the center connector. The design moment is:

$$M_a = 318 \times 6 = 1908 \text{ lf-ft}$$

The layout of the connector at the column is shown in the following figure and results in 5 contributing #4 bars.

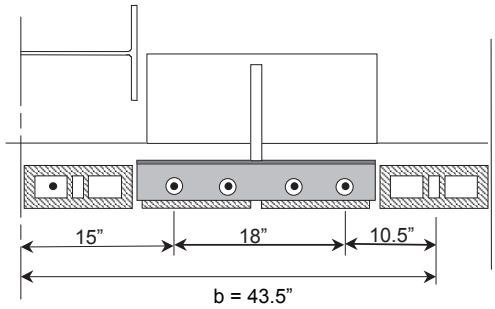


Figure 35 Plan View of Connector

Thus:

$$b = 43.5 \text{ in.}$$

$$A_s = 1.0 \text{ in}^2$$

$\rho = 1.0/(43.5 \times 1.75)$

$\rho = .013$

$n\rho = .127, \quad k = .39 \quad j = .87$

$M_t = 1.0 \times .87 \times 1.75 \times 24000 \times 1.33 / 12$

$M_t = 4060$ lb-ft ok

$M_c = 43.5 \times 1.75^2 \times .39 \times .87 \times 1333 \times 1.33/(2 \times 12)$

$M_c = 3347$ lb-ft ok

But, this may not be the only out-of plane moment in the masonry. Depending on the connector design, there could also be a significant moment added into the masonry as a result of dead load eccentricity

The connector will be designed next. Assume a configuration as shown in the following figure:

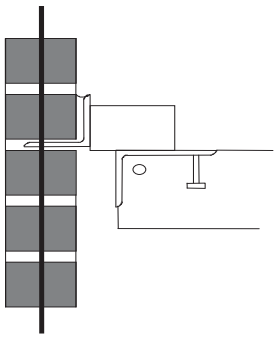


Figure 36 Dead Load Connector

The vertical reaction is 2960 lbs and the wind reaction is 6 feet x 281 lb/ft = 1686 lbs.

The eccentricity of the dead load is important to the design. It is calculated assuming an edge of slab tolerance of 1 inch as shown in the following figure.

$e = 3.5/2 + 1\ 1/2 + 1$ (tol.) $+ 3.0/2$

$e = 5.75$ in.

The resulting eccentric moment can be reacted either in the brick veneer or in the floor slab or by both. When the wall is shored, the connector installed and the shoring removed, the eccentric moment is reacted by both the wall and the floor slab. The amount of moment in each is very difficult to determine and will depend on the stiffness of the shoring as well as the manner in which the wall is built.

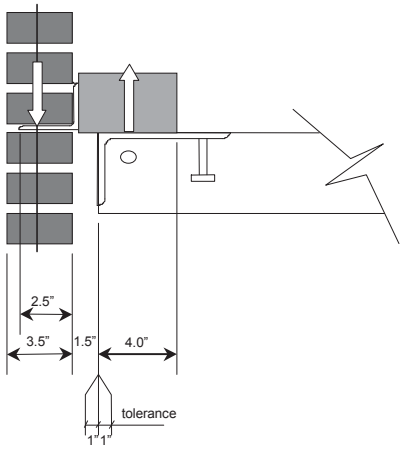


Figure 37 Dead Load Moment

A conservative approach to the design is to design assuming all of the moment is in the brick veneer and then assume all of the moment is in the floor. We will first assume the moment is in the brick veneer.

Assume the connector design is controlled by the combined dead load and wind condition. From the previous example, the dead load on the anchor is 2960 lbs.

The moment is in the brick wall, thus:

M_a = 2960 x 5.75 in

M_a = 17,202 lb-in

This moment should be combined with the wind moment resulting in:

M_a = 17,202 + 1908 x 12

M_a = 40,100 lb-in or 3340 lb-ft

The previous design using (5) #4 bars provides adequate resistance.

Now, check the local capacity of the connector to transfer the load into the veneer. Assume the moment is inserted into the veneer wall by forces consisting of shear on the horizontal leg of the angle and bearing on the vertical leg of the angle. If a triangular distribution of bearing on the vertical leg is assumed, the force is:

P = 17,202 / (6 x 2/3)

P = 4,255 lbs

Note that the moment due to wind is not included. The wind load moment is already in the veneer. The reaction of the wind at the floor must, however, be added to the horizontal leg of the angle.

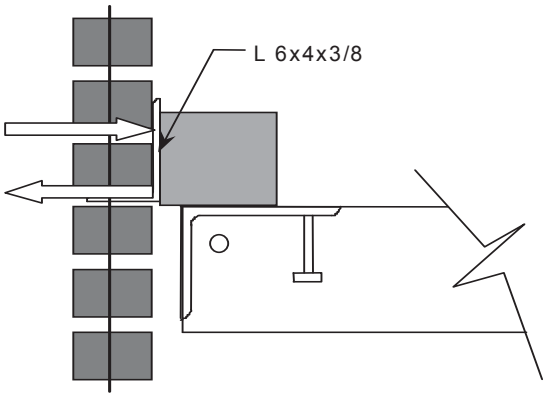


Figure 38 Resisting Moment

P = 4255 lb + 281 lb/ft x 6 ft

P = 5942 lbs

Assume the failure is in the bond between the horizontal leg of the angle and the masonry. Using 60 psi shear allowable and 2.5 inch contact length, both top and bottom, the required length of contact is:

L = 5942 / (2.5 x 2x 60 x 1.33)

L = 14.8 in

Or, using the cone pull-out check the length becomes:

P =2 x (d/cos 20^0) x L x 50 x 1.33

L = P / (141.5 x d)

L = 5942 / (141.5 x 2.0)

L = 21 in.

Therefore use a 24 inch long angle.

The shear friction method can also be used:

$A_v = V_u / \phi F_y$

or

$V_u = \phi A_v F_y$

$V_u = .4 \times 6x.2 \times 60{,}000$

$V_u = 28{,}800$ lbs

$P = 28{,}800 / 2 = 14{,}400$ lbs ok

The 2003 International Building Code requires the fasteners and body of the connector to be designed to equation 9.6.1.3-2 which is a maximum value. Lower values are likely for many structures using equation 9.6.1.3-1.

$F_p = 1.6 S_{DS} I_p W_p$

Using $S_{DS} = .75$ (a high value)

$F_p = 1.65 \times .75 \times 1.0 \times W_p$

$F_p = 1.24 \times 40$ psf $= 49.6$ psf

the design level is:

$F = 49.6$ psf $/ 1.4 = 36$ psf.

This is higher than the design wind load of 30 psf and controls.

$P = 4255$ lb $+ 281 \times \{36/30\} \times 6$

$P = 6278$ lbs

$L = 6278 / (141.5 \times 2.0)$

$L = 22$ in.

Use a 24 inch angle.

The bearing of the brick wall on the horizontal leg of the angle is seldom limiting in design and is satisfied here by inspection.

Now check assuming the moment is in the floor. By inspection, the brick veneer is adequate. The design of the plate, welds and embedded plate is all that is required. Assume the worst situation of the tolerance for the edge of slab results is 3 inches of connection between the slab embed and the plate.

The analysis is the same as would be performed for a precast concrete panel or other wall system. Examples can be found in many references.

The design results in a ½ inch thick vertical plate. The weld on the vertical leg of the angle should also be a 3/8 inch fillet 4 inches long on both sides. And the weld on the plate to the embed should be a 3/8 inch fillet 3 inches long on both sides.

Notice that the size of the weld exceeds the thickness of the plate. This is because the design factors of safety for the weld loaded by seismic forces was assumed larger than that required for the body of the connection.

The 24 inch angle is a conservative size since both the brick and slab connection are designed for the moment. If a more detailed analysis were made, the length of the angle could probably be reduced. The cost savings, however, would likely not justify the reduction in capacity.

3.4.3 Example 3

The final example will demonstrate the design of a corner for seismic isolation. Assume a 12'-6" story height. The corner is constructed of Structural Brick Veneer with a width of 10 feet from the corner. Given that the elastic seismic drift is .31 inch, the building is a specially reinforced concrete moment frame with a C_d of 5.5, and assuming the building is a hospital with the corner above the emergency entrance, the maximum expected floor drift is:

Δ = 5.5 x .31 = 1.7 inches

The corner can support part of the wind loading, but a lateral connector will be needed 10 feet away from the corner.

Since the brick is 10 times stiffer in the running bond direction, most of the resistance to the movement is reacted at the corner.

The analysis of this corner displacement is complex. It can be visualized by considering a flat rectangular panel of veneer 12'-6" by 10 feet laid flat horizontally on the floor with anchors at the corners. The analogous displacement is to lifting up one of the four corners of the flat panel while the other three are held to the floor.

The load deflection calculation for this condition is complex and includes bending in two axis and torsion. And, again the veneer is not isotropic.

Making a simplifying assumption that half the height participates with bending about the stiff direction only, then the load required to deflect the wall 1.7 inches is calculated as follows:

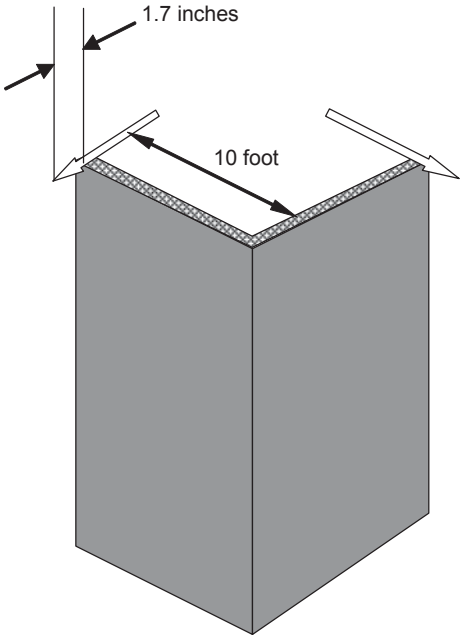


Figure 39 Warping Corner

$\Delta = PL^3/(3 \times E_m \times I)$

The head joints are assumed cracked so the contribution of the wall is half.

$I = 1/12 \times \{(6' - 3'') / 2\} \times 3.5^3$

$I = 134 \text{ in}^4$

Δ = 1.7 inches

$P = 1.7 \times 3 \times 3{,}000{,}000 \times 134 / (120^3)$

P = 1186 lbs

The resulting stress in the brick is:

$$\sigma = M\ c / I$$
$$\sigma = 1186 \times 120 \times 1.75 / 134$$

$$\sigma = 1860 \text{ psi}$$

If the entire wall height were assumed to resist the displacement, the stress would not change because the stiffness increases in proportion. Because the stress exceeds the likely tensile capacity of the brick, the wall will crack.

This is acceptable according to our criteria provided the panel remains intact. Notice that the wall will likely remain uncracked for half the ultimate displacement resulting in no damage.

Reinforcement will be required to hold the panel together.

Sufficient reinforcement must be provided to assure ductile behavior. The cracking moment is:

$$M = (1186 \times 1000 \text{ psi}) / 1860) \times 10 \times 12$$

$$M = 76{,}500 \text{ lb-in}$$

Where the tensile capacity of the brick is assumed to be 1000 psi.

The estimate of the reinforcement is:

$$A_s = 76{,}500 / (60{,}000 \times 1.75)$$

$$A_s = .72 \text{ in}^2$$

Four bond beams with two #3 bars will be sufficient. Notice that 60,000 psi was used for the steel stress. The assumed yield strength should be compared to the ultimate cracking strength since this part of the design is for ultimate seismic.

4.0 Specification

The Structural Brick Veneer System consists of several components that must be specified and detailed. The following discussion should help in this process.

4.1 Quality Control and Assurance

According to the International Building Code and ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structure,* the designer needs to specify the required inspections and quality control tests. Structural Brick Veneer projects are designed either in accordance with Chapter 2 or Chapter 3 of ACI 530-02/ASCE 5-02/TMS 402-02 or Sections 2106, 2107 or 2108 of the International Code.

The International Code requires inspections at Level 1 (Table 1704.5.1) for non-essential facilities and Level 2 (Table 1704.5.3) for essential facilities. These tables identify activities requiring full time and periodic inspection during construction.

It is recommended that prism tests for each 5000 square foot of wall be performed in accordance with Level 3 quality assurance (Table 1.15.3) in ACI 530-02/ASCE 5-02/TMS 402-02. The verification of f'_m can be either by prism test or the unit strength method.

4.2 Masonry

Generally, brick is selected for its color, texture, and size. The most common brick specified is ASTM C 652 Hollow Brick. More detailed information about the hollow brick can be found at:

http://www.bia.org/html/frmset_thnt.htm, Technical Note 41 Hollow Brick Masonry.

Most Structural Brick Veneers are constructed of bricks with nominal thickness of 4, 5 or 6 inch.

Mortar should be Type S, Portland cement, hydrated lime, and sand. Type S mortar exhibits higher flexural bond strength while providing sufficient compressive strength. Type M mortar is generally too stiff at the time of laying to result in good bond, and thus may leak more and is harder to clean.

The durability of the wall is highly influenced by the quality of the mortar joints. Care should be taken to ensure that dense joints are achieved. Joints should be tooled to a concave or “V” finish to densify the mortar surface and improve bond between the mortar and the brick. If raked joints are desired, a “deep V” may achieve the effect. Simple raked joints must be tooled after raking.

Grout is the material placed in the cells of the brick. The proportions are similar to mortar, except that sufficient water has been added to provide a fluid consistency. Grout should be poured in brick masonry with a slump exceeding 10 inches.



Figure 40 Fluid Grout

The excess water in the grout is absorbed into the brick before hydration. Reconsolidation of the grout is required to remove the voids left by the water absorbed into the brick. The specification should require reconsolidation or the additive Grout Aid.

It is recommended to add Sika Grout Aid to all installations. This is a proprietary product, but the only one known to be specifically designed for addition to grout. More information can be obtained at:

http://www.sikaconstruction.com/con/con-admixture_in_con-prod-category-ga.htm

Sika Grout Aid is a balanced blend of expanding, retarding and water-reducing agents for Portland cement grouts. It provides a slow, controlled expansion prior to the grout hardening.

Other manufacturers claim equivalence, but often lack test data to support product performance. In structural brick

masonry, the important property of the grout is to fill all of the space and voids, and to make the connection between the reinforcement and the brick unit. The strength is of secondary importance, since the brick unit compression strengths typically exceed 8000 psi.

If an additive other than the Sika Grout Aid is used, a test should be performed to assure filling of the space and bonding to the units and reinforcement. This likely means the preparing of a grout sample panel and cutting it after curing to visually confirm the performance.

The reinforcement is usually specified as ASTM A 615 Grade 60. Deformed bars are required and sizes are limited by the thickness of the wall. Generally, bars larger than No. 5 are not used. When reinforcement is to be welded, ASTM A706 bars should be specified. It is slightly more expensive but it can be welded without becoming brittle. ASTM A706 bars can be identified by a “W” mark on the bar.

Joint Reinforcement is not recommended for Level 1 projects. Experience with galvanized metal in masonry on the exterior walls indicates a life of 30 years or less.

Reinforcement bars grouted into bond beams will have an expected life greater than 30 years.

4.3 Steel for Connectors

Connectors can be designed and constructed in many forms. Most are made from ASTM A 36 structural steel angles, plate, rods, channels, tees and other available shapes. Connectors may be shop-painted for Level 2 (commercial) installations. Connectors for Level 1 (institutional) installations should be hot-dip galvanized to meet ASTM A 123 Grade 65 requirements. Connectors that are not protected can possibly corrode, stain the brick, and ultimately fail to resist the loading. Damage to galvanized coatings by welding or other field installation practices should be repaired using cold galvanizing compounds.

The use of 300 series stainless steel is generally not necessary and may be subject to galvanic corrosion if placed in contact with galvanized steel.

4.4 Flashing/Weeps

Continuous flashing is necessary for the removal of water that enters the cavity space. In masonry, water enters the surface of the wall and then gravity pulls it downward. When the masonry is interrupted by openings that provide a horizontal discontinuity, flashing is required to intercept the water and direct it out of the building.

Flashing material for the Structural Brick Veneer System is the same as the materials used in other types of brick wall construction.

Pea gravel, proprietary meshes or screens above the flashing will help to prevent mortar droppings from clogging weep holes. Weep holes should be spaced no more than 32 inches apart. Open head joint weep holes are recommended. Weep tubes and cotton wicks often fail to function when they become clogged or damaged. Screens

in open head joint weeps can be used to deter insect infestations.

It is important that the flashing extend through the thickness of the wall in order to intercept the flow. Whether or not flashing should protrude from the wall is controversial. Since the flow of water on the surface of the wall is in all directions, a flashing that protrudes from the surface intercepts the flow at caulk joint. This is the weakest point for water to penetrate the wall.

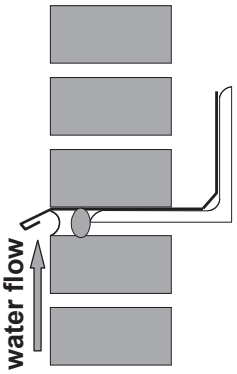


Figure 41 Protruding Flashing Detail

Flashing not protruding will allow the water to pass over the weak point. However, water intercepted by the flashing from the interior and exiting at the weep holes above the flashing may have a better chance of re-entering the building.

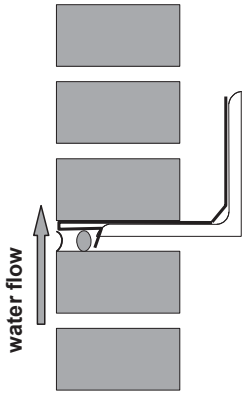


Figure 42 Flush Flashing Detail

4.5 Sealants

Sealants provide the first line of protection against rain intrusion into the system. Placement of sealants should be accomplished in conformance with the manufacturer's recommendations. Joints should be properly prepared, cleaned with solvent, primed for adhesion and backed with a backer rod.

Sealant compatibility tests (peel test) conforming to ASTM C 794 should be conducted for each type of brick unit used and all other materials in direct contact with the sealant, including flashing. The compatibility tests should also be conducted on treated (sealed) brick, unless the treatment is to be done after sealing. The compatibility tests are important to assure bond between the sealant and the brick.

4.6 Water Repellents

Water repellents are desirable for a variety of reasons. The principal reason is to limit water ingress due to wind-driven

rain. By reducing the water that enters the wall, the repellent provides several benefits, both aesthetic and related to engineering performance that would justify their use. Some of these attributes are:

1. Efflorescence control.

2. Reduction of algae growth as a result of the absence of moisture in the pores and capillaries of the masonry.

3. Atmospheric pollutants that are dissolved in precipitation are not absorbed into the masonry.

4. Freeze-thaw damage is reduced when there is no water in the substrate to freeze.

5. Thermal efficiencies of the masonry wall are maintained since water is a good thermal conductor.

Although a number of technologies have been utilized in the formation of masonry water repellents, silane/siloxane monomer and polymer blends have a proven track record. In the Pacific Northwest where there are heavy wind-driven rains, Fabrishield 761 silane/siloxane water repellent has been proven over time to be an excellent clear water repellent. These types of water repellents are formulated to penetrate into the pores and capillaries of the masonry assembly where they react with the moisture and alkalinity and actually chemically fuse onto the mineral material in the linings of the pores and capillaries. During this chemical bonding process, a conversion occurs in the repellent material that fully develops the hydro phobic (water repellent) properties.

An additional benefit to the manner in which these repellents function is that they tend to bond along the pore linings rather than build films across the pore openings. This ensures that sufficient vapor transmission can occur to maintain “breathability” in the assembly. Repellent manufacturers state a repellent life of up to 10 years, but there are numerous projects in the Pacific Northwest that have never had to have a second application.

One of the most controversial topics nationally is when and if water repellent should be used for brick construction. As outlined above, there are many positive job results obtained by properly applied clear water repellent. While most experts acknowledge the positive attributes, the primary concern is the severe problems that can occur if an improper repellent is applied. Most western states brick manufacturers are knowledgeable about the issues and can recommend which repellents will work with their products. However, the repellent manufacturer must warrantee the performance of the repellent in service. The performance problems arise when other repellent salesmen (and there are many) convince the specifier that their product is equal to the specified repellent and will save money and the “equal” product is then used. Our advice is this: DO NOT SUBSTITUTE! Demand past successful performance of the proposed coating on the specific manufacturer’s brick, for a

number of years, under the same type of exposure. Demand that the repellent manufacturer's application instructions be followed.

4.7 Backup Wall

Structural Brick Veneer installations do not require a separate backup wall. A backup wall is sometimes constructed as a second air and water vapor barrier. Many Level 2 (commercial) buildings do not require the extra water and air protection since a well-designed drainage wall is often sufficient.

If a back-up wall is used, many options are available including metal studs with sheathing. The studs are typically not designed for the wind loading since the brick wythe is structurally designed to resist the wind.

4.8 Cavity

When a backup wall is provided, the cavity or air space behind the brick can be any width. The cavity acts to provide a buffer for wind-driven rain and allows water that penetrates the Structural Brick Veneer to migrate down the back-side of the brick without migrating across the cavity space. Connectors should be designed and constructed to direct any of this water toward the back-side of the brick instead of into the building.

The cavity should be kept clear of any obstructions that might allow water to bridge across. Mortar droppings should be prevented from falling into the cavity. Construction tolerance on the cavity width should be limited to ± 1/2 inch. At each floor, fire safing is required to stop smoke and heat from moving between floors. The safing can act as a bridge for water to enter the building. Flashing over the safing should be provided.

4.9 Expansion Joints

Expansion joints need to be provided at various strategic locations in the Structural Brick Veneer wall system. Expansion joint placement is dictated by two considerations. First, expansion joints may be provided in locations where the brick wythe is likely to crack and second, to provide isolation from building movement. In Structural Brick Veneer systems, the spacing of vertical joints can be increased over that of conventional veneers because the reinforcement provides additional resis-tance to cracking.

The Brick Institute of America Technical Note 18A, Differential Movement - Ex-pansion Joints, contains a valuable discussion on the many considerations involved in expansion joints.

http://www.bia.org/html/frmset_thnt.htm

As a general rule, vertical expansion (movement) joints should be provided at the following locations:

1. At or near wall corners
2. At wall discontinuities
3. At changes in height
4. At changes in thickness
5. At changes in stiffness
6. Adjacent to dissimilar materials
7. At abutments to other building ele-ments

The joint size should be a minimum of twice the calculated amount to meet the limitations of the compressibility of the sealant. As a minimum, it is recommended that the joint not be less than 3/8 inch.

4.10 Window Anchorage

Windows are usually anchored to the Structural Brick Veneer and not to the backup wall. In some installations, connectors are included in the design to make the attachment. In other installations, powder-actuated fasteners shot into the masonry have been used to make the connection. The choice depends on the loading and local practice.

5.0 Construction

5.1 General

The construction phase of the project begins with the award of the Contract for Construction. If the Structural Brick Veneer was specified as bidder designed, then the design of the Structural Brick Veneer may begin with the beginning of the construction. In this event, there is usually limited time for the design and it should begin without delay.

Once designed, a Structural Brick Veneer project construction is similar to any other structural brick project.

The mason contractor is normally a subcontractor to the general contractor. If the Structural Brick Veneer is bidder designed, the mason contractor usually becomes responsible for the design. If the design is part of the contract documents, the mason contractor will still need to prepare shop drawings detailing the installation.

Most mason contractors do not normally prepare shop drawings for reinforcement. Thus, the responsibility for providing an adequate set of shop drawings can become lost in the process of bidding. The general contractor thinks the mason will prepare the shop drawings and the mason thinks the general contractor will prepare the shop drawings.

Often, the mason contractor does not supply the reinforcement for the wall. The general contractor supplies it. The design team should become aware of who will supply the reinforcement. It will have some influence on how the project proceeds.

Experience has shown that the preferred choice is for the mason contractor to purchase the reinforcement and supply the shop drawings. However, some mason contractors may bid high or even not bid at all as a result of this requirement. The resulting cost pressure may require the design team to be flexible about the requirement for shop drawings and their preparation.

Sometimes the general contractor will supply the shop drawings using his normal reinforcement detailer. Unfortunately, the detailer may have limited experience with masonry (the expertise is concrete) and the drawings submitted are often full of errors or items that cannot be constructed.

5.2 Construction Sequence

Several construction trades construct structural Brick Veneer. The dead load support angle (or connectors) and lateral braces are usually installed by the steel erector or the general contractor. These trades prefer to complete their work with the completion of the building structural frame. But if this is done, the mason is constrained by constructing the brick to match the installed connectors.

For example, for a Structural Brick Veneer supported on a continuous ledger, if the ledgers are all installed prior to the laying of the brick, it is nearly impossible to place the vertical reinforcement and grout the wall. It is usually necessary to delay installation of the ledgers until after the brick below is completed.

If a backup wall is constructed, it is usually installed by a different contractor and at a different time than the Structural Brick Veneer. Normal choices for the inside wall include masonry, concrete or steel studs. For a Structural Brick Veneer System, however, the masonry and concrete choices are unlikely because the stiffness and strength of the backup wall are no longer required.

When metal studs are used, it is common to sheath the outside face of the stud to provide additional water and air infiltration protection. The sheathing must be installed before the Structural Brick Veneer. Thus, the connectors typically penetrate the sheathing. This requires additional coordination between the trades.

5.3 Pre-Construction

Once the general contractor and the mason subcontractor have been selected, the engineer should verify the mason's qualifications with the local masonry institute and the local material suppliers. This information will be helpful for determining the amount of time and effort that will be needed during construction.

At an appropriate time, usually at least two months before the start of masonry construction, arrange for a preconstruction conference to discuss the masonry construction. Attendees should include:

1. The mason contractor and foreman.
2. The general contractor and superintendent.
3. The building official.
4. The architect.
5. The special inspector, when required.
6. The engineer.
7. The owner's representative.
8. The brick supplier.
9. The window supplier.
10. The dry-wall installer.

Subjects for discussion include:

1. Brick:

Determine the availability and delivery schedule of the selected brick. If the unit strength method is used to verify required masonry strength, verify that the brick will meet the required strength.

2. Initial testing:

If the unit strength method was used to establish the design strength f'_m, then mortar, grout and prism testing prior to construction are not required. However, it is recommended that when full allowable stresses were used in the design, prism testing should be conducted prior to construction. As a minimum, unit testing or manufacturer's certification is required.

For Structural Brick Veneer installations, a grouting test panel is often necessary to demonstrate the grouting procedures. The schedule should be defined. The design team, building official and special inspector should be present for the grouting demonstration.

Often the grouting demonstration panel can also be used as a color and quality control panel for the architect.

3. Testing During Construction:

Prism testing is recommended for each 5,000 square feet of wall. During construction, three prisms constitute a test, however, five are recommended. Test the first one at seven days, the next three at 28 days and hold the final sample for testing in case of a problem.

If prism tests are conducted, grout and mortar tests are usually not required.

4. Inspection:

ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures.*

The inspector should regularly check the preparation of mortar and grout to ensure proper proportions and the laying of units to ensure proper workmanship. The inspector should verify and ensure full compliance with the contract documents for the placement of reinforcement, grouting and the protection of the masonry from rain, dirt, cold and/or hot weather.

5. Observation:

Inform all participants that from time to time representatives of the design team will visit the site to ensure general compliance with the contract documents.

6. Inspection Reports:

Normally, test reports and inspection reports go to the general contractor; then to the architect; and then to the engineer. Deviations from this normal procedure should be discussed, defined and documented.

7. Submittals:

Verify that the required project submittals have been approved or are in the process of being approved.

8. Cleaning and Water Repellents:

The procedures to be used to clean and apply water repellents should be discussed. It is important that the mason contractor verify the cleaning method with the unit manufacturer. If water repellent is to be applied, the method and materials to be used should also be verified with the brick manufacturer.

Proper water repellents do not seal the wall. Masonry must breathe. Painting contractors often are not experienced with applying water repellents to masonry, and assuring understanding of proper methods is important.

9. Construction Sequence and Schedule:

The successful installation of a Structural Brick Veneer project requires co-ordination of many trades (see previous discussion). Ask the general contractor questions to ensure that the construction sequence and responsibilities have been defined. Discuss the schedule for inspection and testing. Discuss co-ordination issues. One usually missed item is the coordination with the window and door supplier. The design of the connections should be discussed.

10. Window Attachment:

As previously discussed, the attachment of the window and coordination of the flashing system will be important to the successful performance of the wall. Too often this important coordination is left to the last minute or not done at all. The pre-construction conference is a good opportunity to discuss the issue and assign responsibility.

11. Sealant Installation:

Often the sealant installer is a separate subcontractor from the Structural Brick Veneer and window contractors. The specified sealant may or may not be compatible with the brick, mortar, water repellent and window-supporting member finish. These building elements, and often others, all come together at the sealant joints. The selected sealant and installation procedures should be checked for compatibility with adjacent materials.

12. Compliance Testing

Most Structural Brick Veneer projects require compliance testing. When the brick supplier is not experienced with the system, testing of prisms in accordance with national standards should be completed before construction begins. Testing during construction is also generally required. During the pre-construction conference, the compliance testing required should be communicated to all involved.

5.4 Submittal Review

Items submitted for review include the following:

1. Mortar proportions and laboratory test:

The mortar submittal is usually only submitted by type. This is satisfactory provided the mortar is specified by proportions, not strength, and provided there is a method to control the proportions of the mortar.

The contractor may submit proportions other than by type. In this case, laboratory tests should be performed to verify the compressive strength of the mortar (ASTM C 270).

2. Grout proportions:

Specify grout in accordance with proportion requirements of ASTM C 476.

Do not specify grout by the minimum strength of 2,000 psi. The proportions will result in strengths well in excess of 2,000 psi.

Lime may be added to grout. This usually improves the grout properties by increasing flow and retention of water, resulting in improved placement and bonding to the unit.

The additive Grout Aid should be added to the grout as recommended by the manufacturer.

For batch-provided grout, the proportions are normally described by weight. The weight proportions should be converted to volume proportions for comparison with ASTM C 476.

3. Unit certifications:

The unit manufacture should provide certificates that the masonry units comply with the requirements specified.

4. Reinforcement shop drawings:

These should be scheduled to provide sufficient time for review and resubmittal prior to construction. Experience has shown that rejection of the first set of drawings is likely.

5. Connector shop drawings:

Shop drawings showing the detailing of reinforcement, connectors and embedded items need to be submitted with sufficient time for review.

6. Quality control program:

When required by the specification, the quality control program should be written by the mason contractor and submitted in time for review and discussion with all involved, including the inspector and general contractor.

5.5 Site Visits

The structural engineer should make site visits to check on the progress and quality of the work. This part of the engineer's scope of services is called construction observation. It is defined in AIA C141 Section 2.6.3 as:

"The consultant shall visit the site at intervals appropriate to the stage of construction for This Part of the Project, or as otherwise agreed with the Architect in writing, to become generally familiar with the progress and quality of the Work completed for This Part of the Project and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the consultant shall not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work for This Part of the Project. On the basis of such on-site observations as a consultant, the consultant shall keep the Architect informed of the progress of the Work for This Part of the Project and shall endeavor to guard the Owner against defects and deficiencies in such work. (More extensive site representation may be agreed to as an Additional Service, as described in Paragraph 3.2)."

5.6 Non-Conforming Quality Control Tests

Experience has shown that the field-testing of masonry is highly variable. The source of the variability can be the materials, the methods used to prepare the samples, the testing of the samples and the interpretation of the results. Before rejecting a wall because of non-conforming field-testing, the engineer should carefully assess the possible causes of the field test non-conformance and possibly remove and test samples from the actual wall.

5.6.1 Unit Compression Strength

If the Unit Strength Method for establishing and verifying the specified compression strength, f'_m, then prism tests (or unit compression tests) are required prior to and during construction. The tests prior to construction should provide assurance that the units and masonry will be satisfactory. If the test prior to construction does not comply with the required strength, then another brick may be required, or the project may have to be redesigned for a lower strength.

Sometimes the brick tests prior to construction are not performed and the units are tested during construction and do not conform. In this case, a new analysis may be required to verify strength. One option is to use Strength Design provisions based on UBC Section 2108. These methods are less sensitive to low compression strength. But, the engineer should be careful about excess deflections and other serviceability issues when designing with Strength Design.

When prism (units) are tested prior to construction and conform to the requirements, but do not conform to the requirements when tested during construction, the problem is probably in the manufacturing of the prisms or there was a change in the testing procedures or materials. The units should be tested (or re-tested). If the units still do not comply, the code allows prism testing to verify strength. Construct prism tests to verify the strength.

If the prism strengths do not comply, a redesign or change in the brick unit may be required. Non-conforming walls will likely require removal.

5.6.2 Mortar Compression

It is recommended that field-testing of mortar not be required. Prism testing every 5000 square feet of wall should be specified. However, the requirement for mortar testing often is not within the control of the structural engineer, and on many projects mortar testing becomes a requirement.

The field sampling and testing for mortar compression strength is highly variable. The following figure is a frequency distribution of field mortar compression tests taken from actual projects in California, Oregon and Washington. There are a total of 205 mortar tests. The coefficient of variation is 36%.

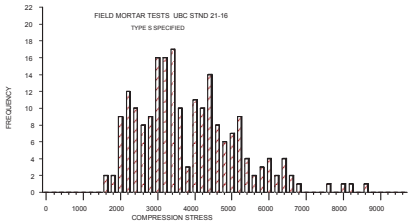


Figure 43 Variation of Field Mortar Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression mortar tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request from the mason the proportions being used.

2. Assess the method being used to control proportions.

3. Verify that the testing lab is using the procedures of ASTM C 780.

4. Visit the site and observe the mortar in the joint. Scratch the mortar with a key. If a white scratch results and the sand does not separate from the mortar, the strength of the mortar is probably acceptable. However, if the masonry is highly stressed (above 1200 psi) it may be necessary to remove a prism from the wall for testing.

The relationship between 7-day mortar strength and 28-day mortar strength is fairly consistent from sample to sample. It is useful to know the 7-day test results since they provide the engineer with an early indication of the 28 day results. The following figure presents the relationship.

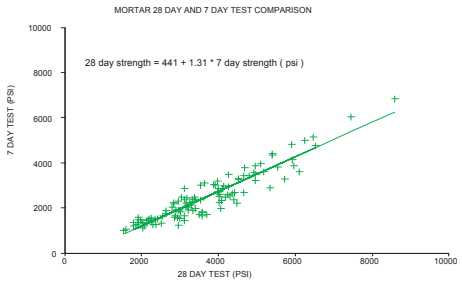


Figure 44 Mortar 7 day and 28 Day Tests

5.6.3 Grout Compression

It is recommended that field-testing of grout not be required. Prism testing every 5000 square feet of wall should be adequate quality control. However, the requirement for grout testing often is not within the control of the structural engineer, and on some projects grout testing becomes a requirement.

The field sampling and testing for grout compression strength is highly variable. The following figure is a frequency distribution of field grout compression tests taken from actual projects in California, Oregon and Washington. There are a total of 323 grout tests. The coefficient of variation is 32%.

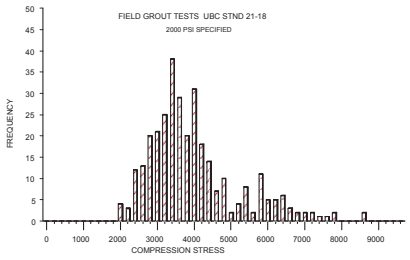


Figure 45 Variation of Field Grout Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression grout tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request from the mason the proportions being used.

2. Assess the method being used to control the proportions.

3. Verify that the testing lab is using the procedures of ASTM C1019.

4. If the cause of the low break is not identified, then taking core samples and testing them may be required.

5. The structural engineer should also consider the reason for requiring the specific grout strength. Often, the purpose of the grout is only to connect the reinforcement to the units. Even low strength grouts (1500 psi) are probably capable of making the connection. Because of the high strength of the brick, the compression contribution of the grout can often be ignored in the analysis.

The relationship between 7-day grout strength and 28-day grout strength is also consistent from sample to sample. It is useful to know the 7-day test results since they provide the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.

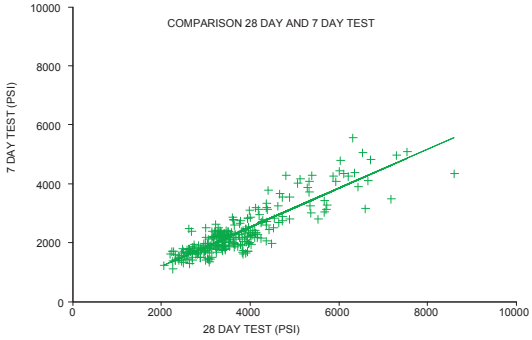


Figure 46 Seven Day and 28 Day Grout Strength

5.6.4 Prism Tests

Prism tests are less variable than either mortar or grout testing and provide the engineer with a higher level of confidence that the masonry system has the desired strength.

When prism tests do not conform, verify that the materials used (units, mortar and grout) conform to the specifications. If they do conform, then either the prism was improperly constructed or the testing procedures were not in compliance with ASTM 1314.

Improper construction of prisms includes not constructing the prism true and plumb. It is very important that the top and bottom planes of the prism are parallel. Another common problem for large cell units (8″ units and larger) is that the grout is not properly re-consolidated. Without proper re-consolidation, a dome-shaped void will often form at the mortar joint part way up the height of the prism and render the area of grout ineffective for resisting compression.

Common testing errors include not properly capping the prism so that the top and bottom planes are level and parallel, not using a testing machine with a spherical head, and not providing a thick enough loading platen to distribute the test machine load evenly to the prism. It has also been reported that some testing labs stop loading at the first sound emitted. The first sound may correlate to the failure of a concrete cylinder, but does not typically correlate to the failure of a masonry prism.

5.7 Troubleshooting During Construction

The following table is presented to assist the engineer with problems often occurring during construction. This table was developed over the years based on the experience of the authors. It has been evolving and it often seems that contractors have a special ability to create new situations not previously considered or addressed. Proceed with caution.

Troubleshooting Table for The Design and Construction of Structural Brick Veneer

PROBLEM	CAUSE	SOLUTION
Prisms fail to reach the design strength.	1. The testing lab has incorrectly tested the prism, usually by not placing the prism correctly in the machine or using a loading platen that is too thin. Or the specimens may have been damaged during transportation. 2. The bricks are below the specified strength. 3. The mortar is under specified strength. 4. Lab reported gross area stress instead of net area stress. 5. Lab stopped testing with first noise.	1. Instruct the lab to retest being careful to follow the ASTM C 1314. 2. Request that the contractor have a lab retest the brick. If still too low, change the brick or redesign. 3. Check mortar proportions. Retest the prisms. 4. Have the lab correct the report. 5. Re-test.
Mortar doesn't reach strength.	1. Incorrect proportions. 2. Incorrect testing.	1. Check mortar quality control procedures. 2. Mortar tests are unreliable. Forget about testing mortar. The code doesn't require it, if prisms are tested.
Colors do not meet expectations.	1. Bricks were not blended. 2. Sample panel has different sealer. 3. The brick production run is different from the sample run.	1. This is a problem for the architect and brick supplier. There are paints available, but results are questionable. 2. Use the sample panel sealer. 3. Approve the production run before beginning construction.
Someone calls and says more expansion joints are required.	Someone was checking on your advice. They should do this, so don't get mad.	Explain how the reinforcement reduces the need for most of the expansion joints.
The mason tells the general who tells everyone that the cells are too small to be grouted with all the congested steel.	1. The mason contractor does not have experience with grouting of reinforced hollow brick. He doesn't understand that he can make the grout with an 8 to 11 inch slump. 2. The cell is too small.	1. Prepare and grout a test panel. Be sure to invite everyone concerned. 2. Use a different cell size.

PROBLEM	CAUSE	SOLUTION
Welded bars are breaking off.	ASTM A 706 bars were not used.	Inspect bars. A "W" symbol indicates type A 706. Use the correct bars.
Contractor is not protecting his materials or work.	Sometimes the responsibility for protecting the work is left with the general contractor. He is saving money. Sometimes the responsibility is not well defined.	Write a letter to your client. Explain the consequences. Send a copy to the brick manufacturer.
Cracks in the mortar joints.	1. Shrinkage of the mortar joint. 2. Movement of the supporting structure. 3. Overloading. 4. Too rapid drying.	1. Suggest the contractor decrease the cement content of the mortar and increase the lime. 2. Check supports. 3. Check the loading, the timing of the loading and shoring removal. 4. Pre-wet the units. Wet the wall during curing. Add lime to the mortar.
Shop drawings are not prepared.	The requirement was missed or "value engineered away".	Write a letter to your client explaining the requirement. If the project is underway, require an engineer familiar with the design be on site full time.
The grout strength is specified at a minimum of 2000 psi, how can I get a prism of 4000 psi.	This is normal.	Explain that the prism does not fail in accordance with the weak link theory.
The contractor wants to high-lift grout with lifts larger than 6'	The code restricts the grout lift to 6' even though the grout pour might be higher.	The problem is blow-outs of mortar joints and the ability to reconsolidate. In hollow clay, these problems are unlikely. Have the contractor demonstrate the procedure to you and the inspector.
The contractor doesn't want clean-outs. You want high-lift grouting.	Code requires clean-outs for high-lift, in order to remove the mortar droppings.	In most Structural Brick Veneers the shear stresses are low. It is usually possible to waive the clean-out requirement.

PROBLEM	CAUSE	SOLUTION
The dowels out of the concrete foundation or ledger interfere with the unit cross webs. They miss the cells.	Improper placement of the dowels. However, it is often very difficult to get them in the right place. This situation should not occur in a Structural Brick Veneer.	Cut the unit cross webs to allow the dowel to pass or drill in new dowels. Verify that all the dowels are required to meet strength requirements. Do not, allow the dowels to be bent.
The brick masonry is cracked, with cracks extending through the units.	1. A great deal of force is required for this condition to exist. The cause is likely a problem. 2. The bricks may have been manufactured with the cracks. 3. Foundation cracks extend into brick wall.	1. Find the reason for the cracking. It is likely that something needs to be corrected. Likely candidates include frozen grout, foundation movement, or thermal movement from adjacent structure. 2. Verify the integrity of the units before use. A quick check is to bang the bricks together, If a ringing sound results instead of a thud, then the bricks are sound. 3. Foundation control joints need to be coordinated with the masonry expansion joints.
Contractor doesn't cover the walls at the end of the day.	1. The contractor is attempting to save money. 2. The responsibility for the masonry protection may have been left with the general contractor or worse, left out of all the contracts.	1. Insist on covering the walls. 2. Write a letter stating that the contractor is not in conformance with the likely result being efflorescence and other wall damage.
Corrosion of the joint reinforcement.	1. Too strong an acid cleaning without pre-wetting the wall. 2. Ungalvanized joint reinforcement.	1. Pre-wet the wall and use industry cleaners as recommended by the manufacturer of the units. 2. Use galvanized joint reinforcement.

6.0 Testing

Many different pre-construction mockup tests are available for evaluating the performance of the Structural Brick Veneer System design and construction. Pre-construction mockup testing is not necessary for all projects, and because of the costs involved, is likely feasible only for large projects. Tests are generally conducted to evaluate air, water and structural performance.

6.1 Air

When air infiltration tests are conducted on the building mockup, they should be performed in accordance with ASTM E 783, while those conducted in the laboratory should be performed in accordance with ASTM E 283. Air infiltration tests should normally be done before water penetration tests because water trapped in the brick veneer tends to reduce air leakage.

6.2 Water

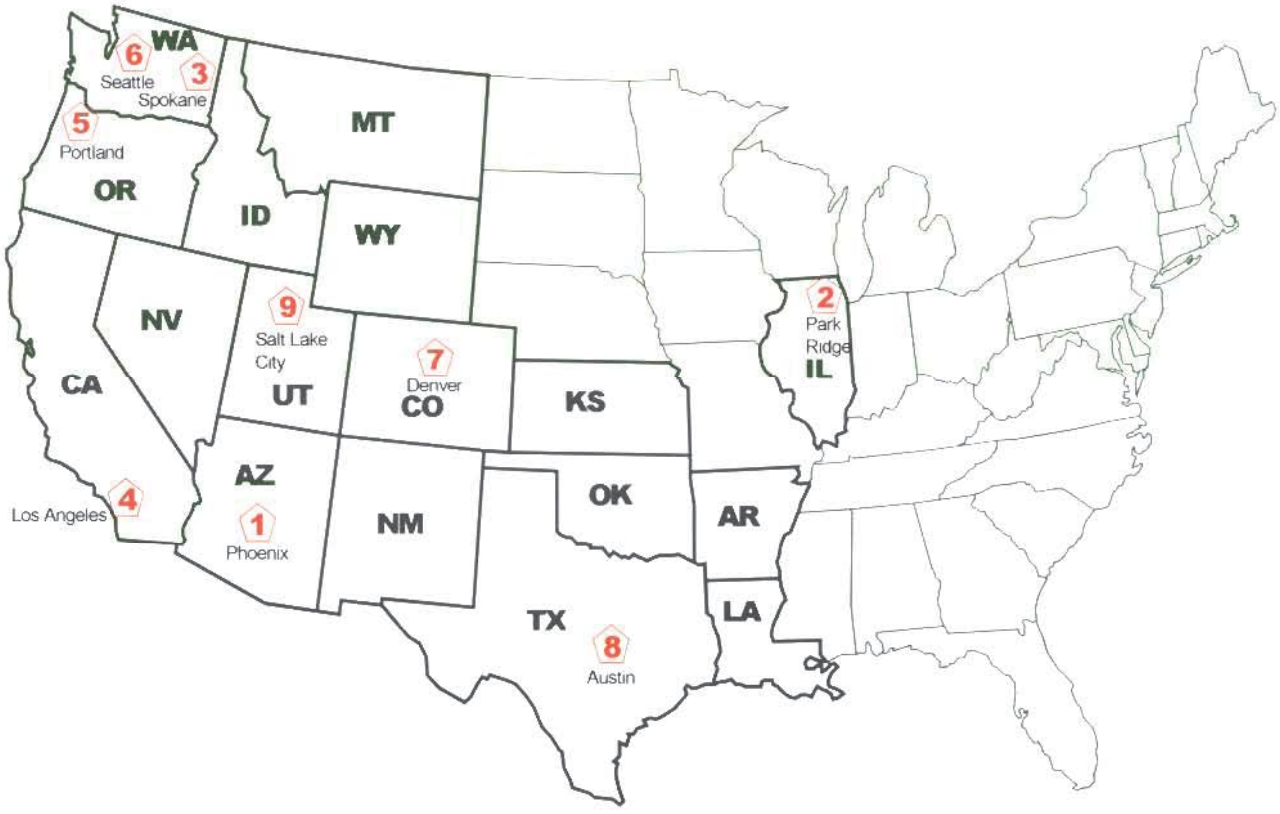
Water penetration tests for the brickwork should be performed in accordance with ASTM E 514, to measure the permeability of the constructed wall. Additional large-scale mockup tests are available using the procedures contained in AAMA 501.3, developed for testing aluminum curtain wall systems.

6.3 Structural

Structural tests measure a system's performance under lateral loading or deflection. This type of testing provides a means for accurately assessing the complex behavior of the Structural Brick Veneer System. A standard test procedure, ASTM E 330, is available for testing exterior windows and curtain walls. Brick panel strength tests can be conducted in accordance with ASTM E 72. There are no standard tests for specifically measuring seismic performance.

ALLIED ASSOCIATES AND WEB ADDRESSES

1	**Arizona Masonry Guild**	(www.masonryforlife.com)
2	**Masonry Advisory Council**	(www.maconline.org)
3	**Masonry Industry Promotion Group**	(www.masonrypromotion.com)
4	**Masonry Institute of America**	(www.masonryinstitute.org)
5	**Masonry Institute of Oregon**	(www.mioctio.org)
6	**Masonry Institute of Washington**	(www.masonryinstitute.com)
7	**Rocky Mountain Masonry Institute**	(www.rmmi.org)
8	**Southwestern Brick Institute**	(www.swbrick.com)
9	**Utah Masonry Council**	(www.utahmasonrycouncil.org)



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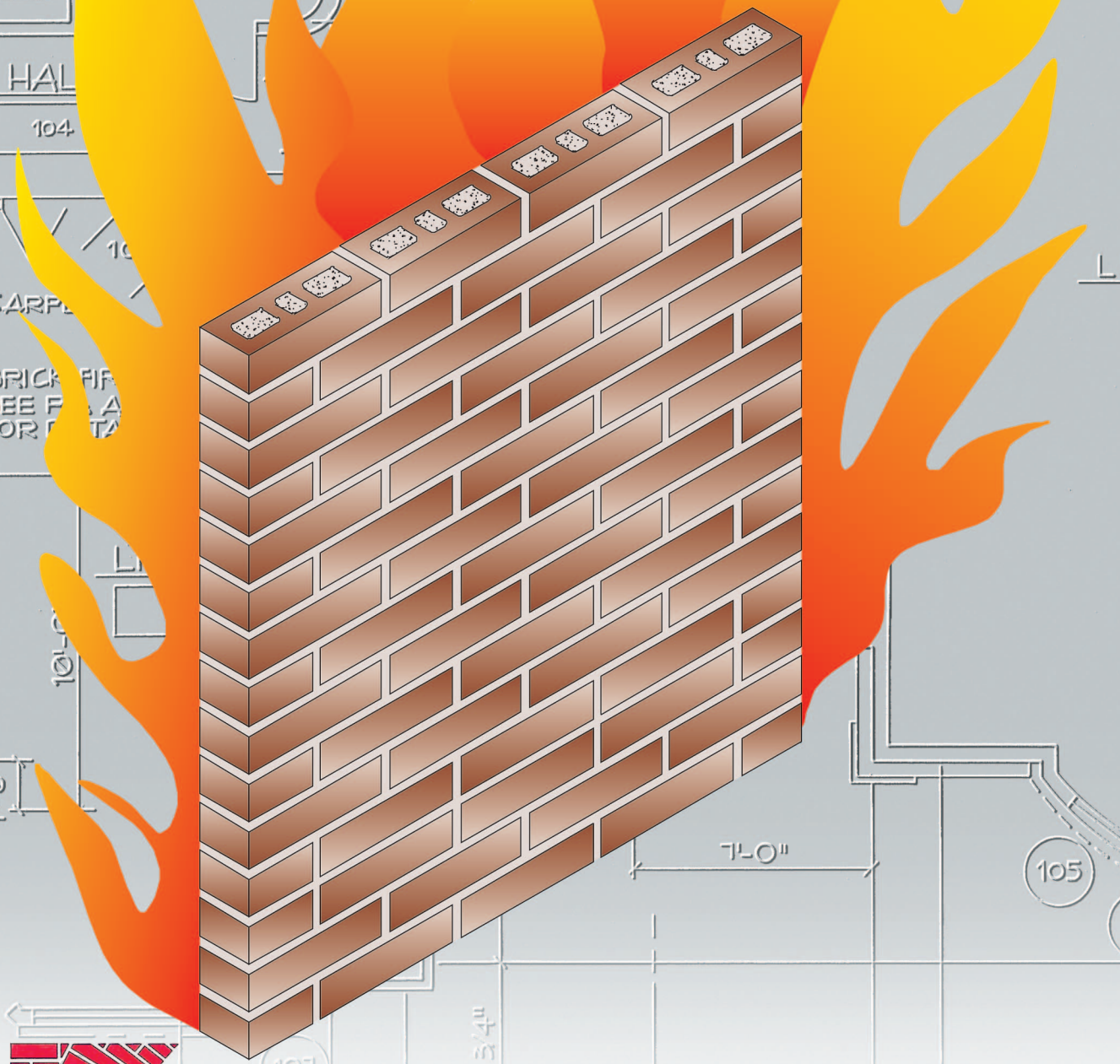
FIRE ENDURANCE RATINGS OF CLAY BRICK MASONRY



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FIRE ENDURANCE RATINGS

OF

CLAY BRICK MASONRY

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The members of Western States Clay Products Association express appreciation to Walter Dickey (1908-2002) for his tireless efforts in promoting the clay brick industry. Mr. Dickey spearheaded the initial production of this publication providing technical and editorial input that continues in this printing.

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1.0 INTRODUCTION

One of the most frequently asked questions of the designer is "How do I achieve a 1, 2, 3, or 4-hour fire rating using various clay brick masonry assemblies?"

Intuitively, we are comfortable with clay bricks as a fire resistant material because of their use as a liner in fireplaces and kilns where temperatures exceed those expected in most construction fires. In addition, we have observed the effect of fires on buildings where the only thing to remain standing is the brick. Most designers do not question that brick is non-combustible, or resistant to fire, what they question is the fire resistance of each of the brick wall configurations in hours as it relates to building code requirements.

For many wall assemblies, the information is available from BIA technical Notes 16, and the International Building Code Table 720.1. For some assemblies, the designer is allowed to use methods of calculating fire resistance. Until recently, designers had to rely on ICBO Evaluation Report #5058 to obtain 1 and 2-hour fire ratings for Adhered and Anchored Veneers. Today this information is found in Chapter 7 of the International Building Code, Table 720.1.

2.0 FIRE RESISTANCE BASICS

Fire resistance refers to the ability of a structure to act as a barrier to the spread of fire and to confine it to the area of origin. Therefore, in addition to withstanding the fire, the intent of the code is to prevent other materials adjacent to the brick from combusting after prolonged increased temperatures from fire, flame, or hot gases. Consequently, the assemblies are given a fire rating which is the time it takes for a prescribed fire on one side of an assembly to reach an average temperature on its other side that would ignite cotton waste (250°F). Refer to ASTM E119.

Fire ratings are required for load bearing and non-load bearing wall assemblies. Load bearing assemblies must be capable of withstanding the same conditions as the non-load bearing assemblies. In addition, they must be capable of supporting their prescribed design load for the duration of the fire.

Fire endurance tests alone cannot supply all of the data needed for intelligent appraisal of fire ratings of building elements. There are simply too many different types of assemblies and combinations of materials to classify them all through actual tests. Fortunately, the theory of fire endurance ratings is sufficiently advanced to offer guidance in estimating fire endurance ratings.

The ultimate goal of this guide is to bring together in one location all of the approved fire ratings for adhered veneer, anchored veneer, structural brick veneer and load bearing brick. See Table 1.

3.0 MASONRY ASSEMBLIES

Masonry fire resistant assemblies are broken down into adhered brick veneer, anchored brick veneer, structural brick veneer, and load bearing brick.

Fire rated assemblies are often required in two directions. If the fire is on the brick side, the brick assembly must resist flames, heat, and smoke from entering to the other side of the assembly prior to the rated time. If the fire is on the other side, the fire rating may be needed to protect occupants in another room or building from the same effects. In most cases, there is a structure supporting the fire resistant materials and the fire rated assembly is required on both sides to protect the structure. If the material is the structure as is the case in load bearing and structural brick veneer, the material can adequately provide fire resistance in both directions.

In a veneer system, the stud backing is the structure and must be protected in both directions. Therefore, brick most commonly provides fire resistance on the exterior side of the stud, and gypsum or some other material provides the fire resistance on the interior face of the stud.

3.1 ADHERED BRICK VENEER

Adhered brick veneer is defined as brick veneer secured and supported through adhesion to an approved bonding material applied over an approved backing. The most common wall assembly is defined by a facing of thin brick between 1/2" to 1 1/2" in thickness applied over a plaster backing. If this combined masonry layer is 1 3/4", the masonry side of the assembly qualifies for a 1-hr fire rating. If the masonry layer is 2" or more, the masonry side of the assembly qualifies for a 2-hr fire rating. In this assembly, the plaster is applied to metal lath, which in turn is applied to wood or steel framing.

The wood or steel framing members must be sized for all design loads. Steel studs are to be a minimum of 2 1/2". Wood framing is to be 2 x 4 minimum. Wider framing members can be used without degrading the fire resistance rating.

3.1.1 TEST PANEL CONSTRUCTION

The test panels were constructed similar to those for the earlier large program of gypsum board fire evaluation tests. Type X gypsum board was applied to one face of standard steel stud construction. Typical backing and adhered brick veneer was installed on the opposite face by masons experienced in such work.

The panel was designed for symmetrical resistance as required by the International Building Codes; however, if one designs for a situation in which fire exposure is limited to 1-face only, the resisting thickness can all be on one side.

3.1.2 FIRE TESTING

The veneered panels were exposed according to the procedures of ASTM E119 – standard furnace temperature rise; thermocouples on the unexposed face to show temperature rise; verification that there were no cracks that would allow passage of flame or hot spots; and resistance to hose stream exposure without penetration. Additional thermocouples were installed during construction to provide information on the thermal gradient through the section during the fire test. This information helped revise design alternates with greater accuracy.

3.1.3 RESULTS

All panels passed the three basic ASTM requirements with considerable margin. Although the results were somewhat conservative, indicating that thinner veneer might be used, no further refinements or reduction in design thickness was attempted. Precise refinements are not justified in variable hand placed materials, especially if no great cost benefits would result.

The maximum temperature rise on the unexposed face is permitted to be a maximum of 325°F for a single thermocouple and 250°F for the average of all thermocouples, at the specified time period. The test panels showed the following maximum and average rise of temperature. All withstood more hose stream exposure than required by code.

	Maximum	Average
Panel 1A:	162°F pt.	158°F
Panel 1B:	145°F pt.	135°F
Panel 2A:	129°F pt.	110°F
Panel 2B:	107°F pt.	104°F

3.1.4 CONCLUSION

Adhered brick veneer of 1 3/4" combined masonry thickness provides 1-hour of fire resistance. Adhered brick veneer of 2" combined masonry thickness provides 2-hours of fire resistance. These fire rated assemblies are found in Table 720.1(2) Items 15-2.1, and 15-2.2.

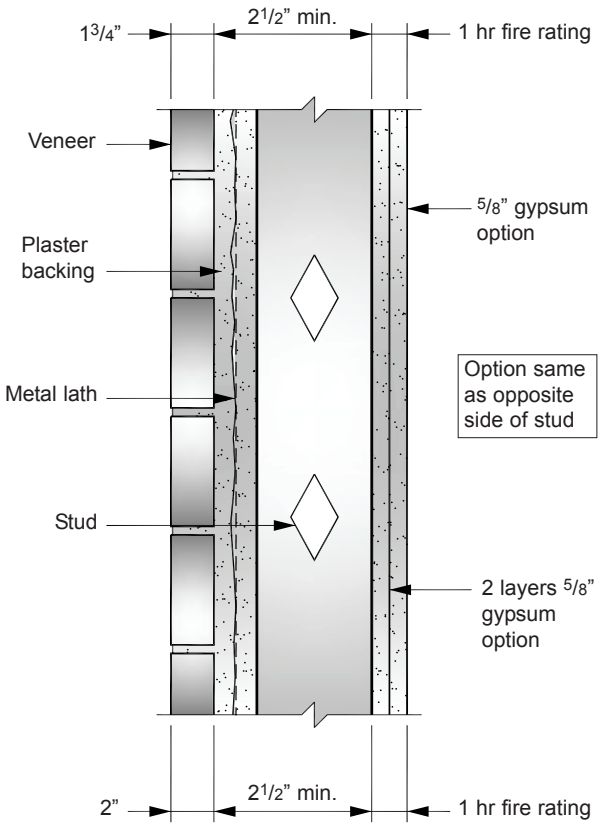


Figure 1 Adhered brick veneer.

3.2 ANCHORED BRICK VENEER

Anchored brick veneer is defined as brick veneer secured to an approved backing by mechanical fasteners. The most common wall assembly is defined by a facing of brick between 2" and 5" in width anchored through mechanical connectors to wood or steel framing.

Excerpts from Table 720.1(2)

TABLE 720.1(2) [Excerpt] RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS						
MATERIAL	ITEM NO.	CONSTRUCTION	4 hour	3 hour	2 hour	1 hour
1. Brick of clay or shale	1-1.1	Solid brick of clay or shale.	6	4.9	3.8	2.7
	1-1.2	Hollow brick, not filled.	5.0	4.3	3.4	2.3
	1-1.3	Hollow brick unit wall, grout or filled with perlite vermiculite or expanded shale aggregate.	6.6	5.5	4.4	3.0
	1-2.1	4” nominal thick units at least 75 percent solid backed with hat-shaped metal furring channel 3/4” thick formed from 0.021” sheet metal attached to the brick wall on 24” centers with approved fasteners, and 1/2” Type X gypsum wall board attached to the metal furring strips with 1” long Type S screws spaced 8” on center.	–	–	5	–

3.2.1 FIRE RESISTANCE

From the fire endurance test, additional information was provided which reduced the thickness of the veneer to 2" with a 1/2" air space for a 1-hour fire rating and a 2" veneer with a 1" air space for a 2-hour fire rating.

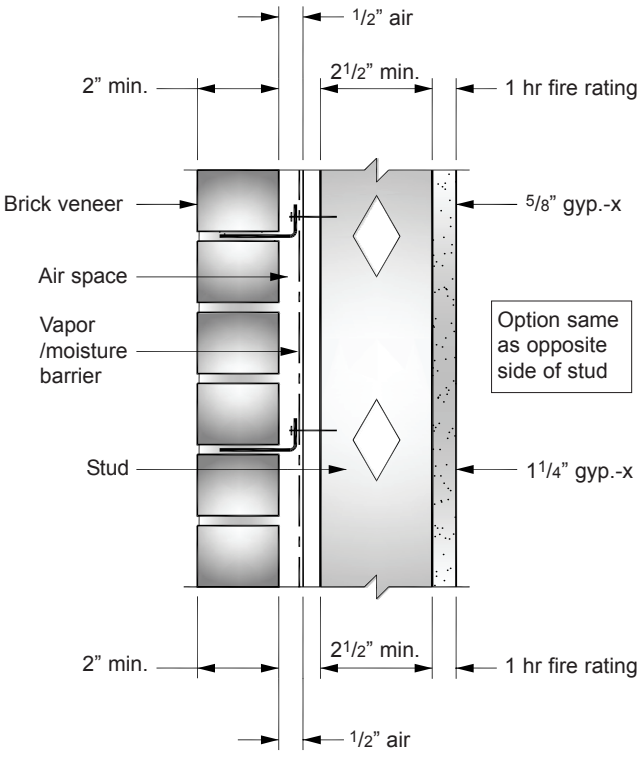


Figure 2 Anchored brick veneer.

Table 720.1(2) of the International Building Code item numbers 1-1.1 through 1-2.1 can also be used to determine the minimum equivalent thickness for brick to achieve a fire rating from 1 to 4 hours. This section of the table is used for veneer brick and structural brick in load bearing and non-load bearing construction.

3.3 STRUCTURAL BRICK VENEER

Structural Brick Veneer is defined as a masonry assembly of brick, mortar, grout, and reinforcing that is designed similar to anchored brick veneer. It carries no gravity loads other than its own weight, the weight of windows, and possibly other miscellaneous loads. In addition, it is not part of the lateral load resisting system. The difference is that the structural brick veneer is reinforced and grouted to allow the brick to span much further between wall ties. Structural brick veneer does not generally require a backup system to carry lateral loads within the panel. In the Structural brick veneer, the lateral loads are transferred through tension and compression stresses in the masonry.

3.3.1 FIRE RESISTANCE

Table 720.1(2) of the International Building Code item numbers 1-1.1 and 1-1.3 can also be used to determine the minimum brick thickness to achieve a fire rating from 1 to 4 hours. This section of the table is used for structural brick veneer. Since the structural brick veneer assembly was tested with vertical loads, the brick is capable of giving the same fire rating in both directions. No additional framing or fire resistant material is required.

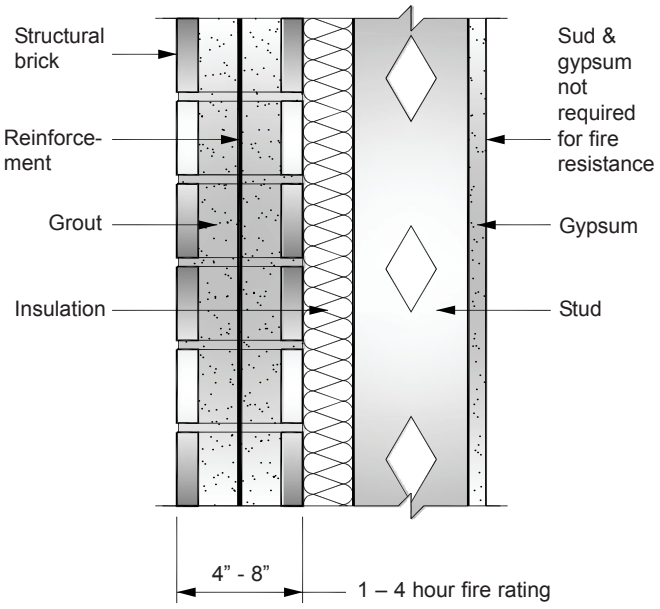


Figure 3 Structural brick veneer.

3.4 STRUCTURAL LOAD BEARING BRICK

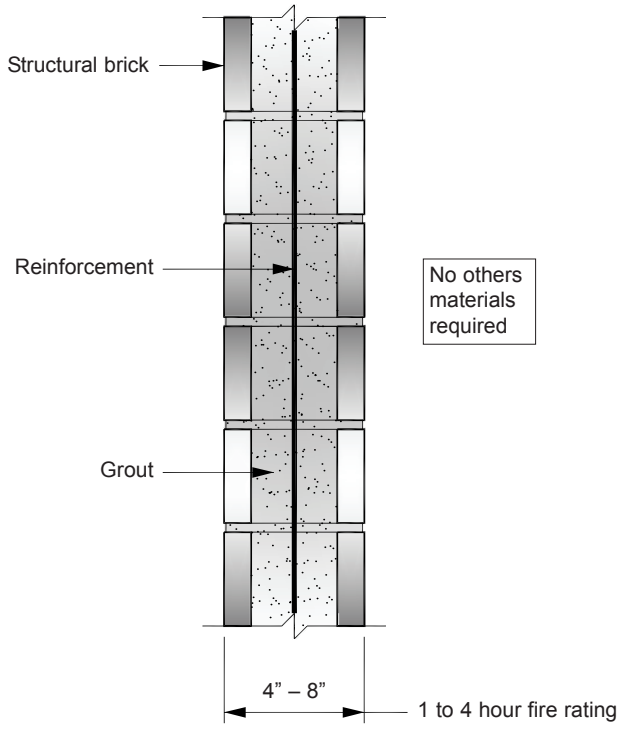


Figure 4 Structural load bearing brick.

Structural load bearing brick is defined as a masonry assembly of brick, mortar, grout and reinforcing that is designed to support all gravity and lateral loads. These masonry elements are generally part of the lateral load resisting system. Greater fire endurance performance and economics can be achieved through the use of reinforced masonry. Fire ratings of 3 and 4 hours can be achieved through the use of up to 8" of hollow clay brick as shown on Figure 4.

3.4.1 FIRE RESISTANCE

Table 720.1(2) of the International Building Code item numbers 1-1.1 through 1-2.1 can also be used to determine the minimum brick thickness to achieve a fire rating from 1 to 4 hours. This section of the table is used for structural brick in load bearing and non-load bearing construction.

4.0 CALCULATED FIRE ENDURANCE RATINGS

As it is impossible to define all of the possible configurations that might be conceived in a wall design, Section 721.4 of the IBC along with IBC Standard 7-7 provides greater assistance in designing with Clay Brick. This section and the standard list more precise rating values for thicknesses of brick, mortar, air space, cement, gypsum plaster, wall board, insulation, studs, siding, etc. They also include more precise calculations for calculating Equivalent Thickness = $T_e = V_n/LH$; R-ratings when adding plaster is defined as $R = (R_n^{0.59} + pl)1.7$ and combinations of clay brick, insulation, air and plaster can be defined using the exponential equation $R = (R_1^{0.59} + R_2^{0.59} + Rn^{0.59} + A_1 + A_2 + \ldots Pl)^{1.7}$ where R is the fire resistance of each material layer, A is the resistance of each air layer and Pl is the resistance of gypsum plaster.

Table 1 identifies a list of R, A, and Pl values for use in determining the Fire endurance of miscellaneous clay masonry assemblies.

IBC Standard 7-7 lists 8 rules that are helpful in making a quick assessment of the fire endurance of building elements when fire test data on the elements are not available.

Table 1 Fire Resistance (R) in Hours			
Masonry Assembly		**Actual Wall Thickness (inches)**	**Fire Resistance (hours)**
Adhered Veneer	**ASTM C1088**	1.75" *	1
		2" *	2
Anchored Veneer	**ASTM C216**	2" to 5"	3
Structural Veneer and Load Bearing Brick			
Solid 75%	**ASTM C216**	3.5"	1
		5.5"	2
		7.5"	3
8" Cavity wall with 2" air space		8"	3
10" Cavity wall with 2" air space		10"	4
Hollow – cells not filled	**ASTM C652**	3.5"	1
		5.5"	1
		7.5"	2
Hollow – all cells filled[1]	**ASTM C652**	3.5"	1
		5.5"	3
		7.5"	4
Air (A)		1/2" to 3 1/2"	0.30
Plaster (Pl)		1/2"	0.30
		5/8"	0.37
		3/4"	0.45

Notes:

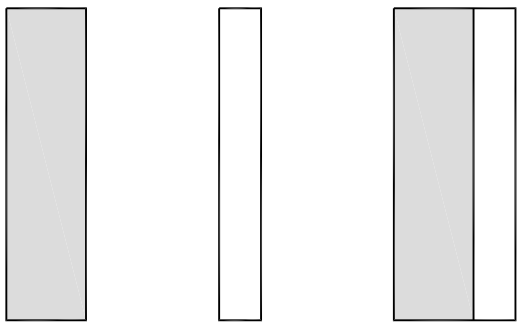
* Thickness includes plaster bedding.

1 Cells may be filled with perlite, vermiculite, expanded shale aggregate or grout.

4.1 RULE 1

The "thermal" fire endurance of a construction assembly consisting of a number of parallel layers is greater than the sum of the "thermal" fire endurance characteristic of the individual layers when exposed separately to fire.

Rule 1

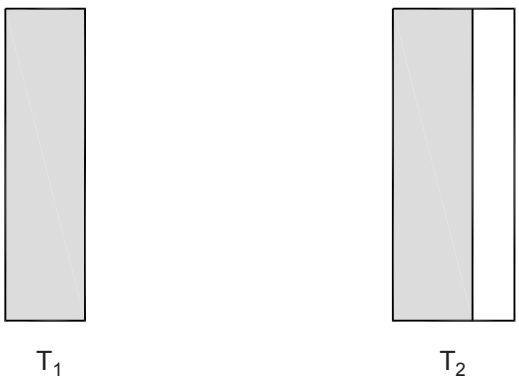


$T_1 + T_2 < T_{12}$

4.2 RULE 2

The fire endurance of a construction assembly does not decrease with the addition of further layers.

Rule 2



$T_1 < T_2$

4.3 RULE 3

The fire endurance of a construction assembly containing continuous air gaps or cavities is greater than the fire endurance of similar constructions of the same weight, but containing no air gaps or cavities.

Rule 3

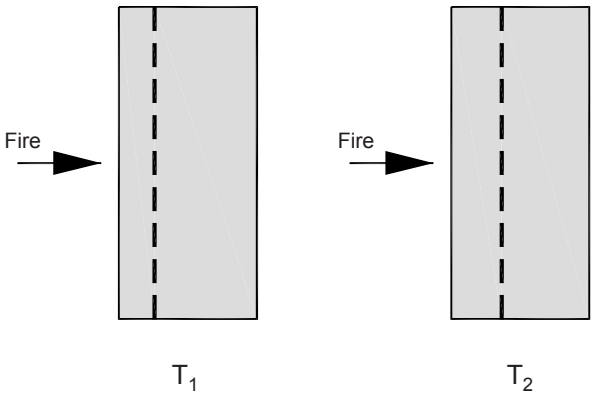


$T_1 < T_2$

4.4 RULE 4

The farther and air gap or cavity is located from the exposed surface, the more beneficial is its effect on the fire endurance.

Rule 4

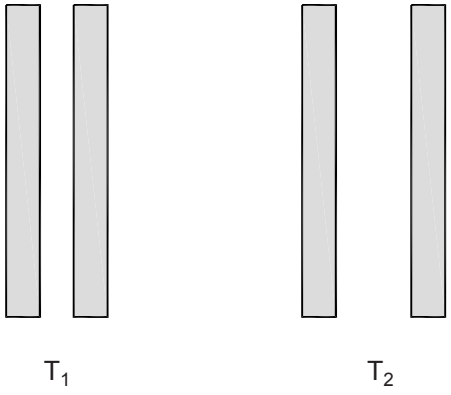


$T_1 < T_2$

4.5 RULE 5

The fire endurance of a construction assembly can not be increased by increasing the thickness of a completely enclosed air layer.

Rule 5

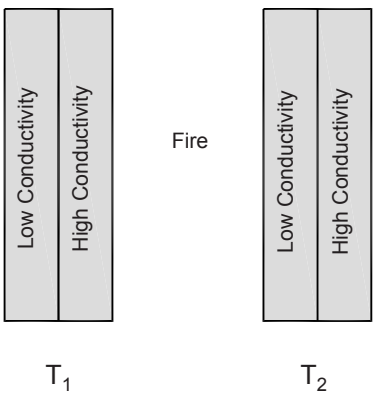


$T_1 \approx T_2$

4.6 RULE 6

Layers of materials of low thermal conductivity are better utilized on that side of the construction on which fire is more likely to happen.

Rule 6

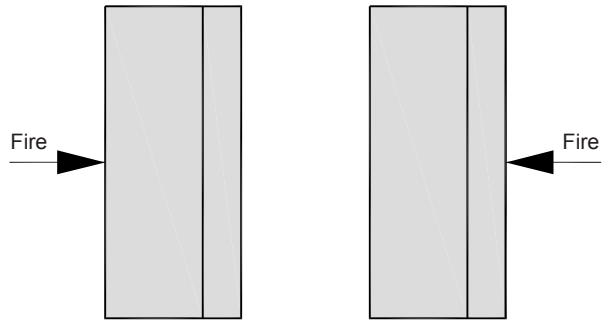


$T_1 < T_2$

4.7 RULE 7

The fire endurance of asymmetrical construction assemblies depends on the direction of heat flow.

Rule 7

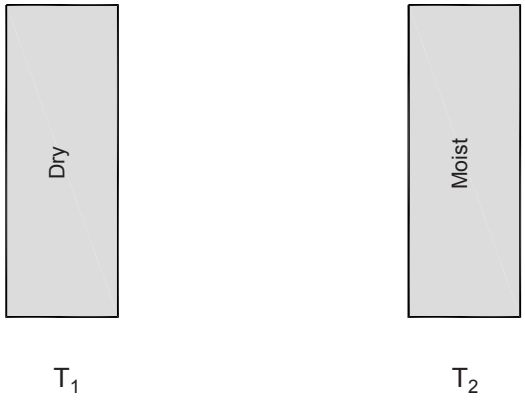


$T_1 \neq T_2$

4.8 RULE 8

The presence of moisture, if it does not result in explosive spalling, increases the fire endurance.

Rule 8



$T_1 < T_2$

5.0 CONSIDERATIONS

When backing materials are used to provide support for the fire resistive materials, the backing material shall be protected with the same fire resistance rating on both sides.

Although life safety is the primary reason for incorporating fire resistance in construction, when considering tradeoffs such as gypsum, or sprinklers, other issues should also be considered such as, fire separation, property protection, water damage, replacement costs and reuse of structure.

APPENDIX – WALL DETAILS

A.1 MATERIALS:

A.1.1 Thin Veneer Brick Units: Units are produced from clay or shale in thicknesses from 1/2 to 1 1/2 inches (12.7 to 38 mm) and comply with ASTM C1088, Grade TBS or better.

A.1.2 Face Brick Units: Units are made from clay or shale in thicknesses exceeding 1 1/2 inches (38 mm) and comply with ASTM C216 for veneer facing units; Type FBS or better and Grade SW in Severe Weather regions.

A.1.3 Hollow Brick Units: Units are made from clay or shale in thicknesses exceeding 4 inches (38 mm) and comply with ASTM C652 for hollow clay brick; Grade HBS or better and Grade SW in Severe Weather regions; Unit strength as specified for the job.

A.1.4 Mortar: Type S as set forth in Table 2103.8(1) or Table 2103.8(2) of the IBC.

A.1.5 Plaster Backing: Portland cement plaster complying with Section 718 and Section 2507 of the IBC.

A.1.6 Lath: Minimum 3.4 pounds per square yard (1.8 kg/m^3) metal lath complying with Section 2507 of the IBC.

A.1.7 Steel Framing: Framing with either gypsum plaster of gypsum wallboard must comply with Table 720.1(2) of the IBC.

A.1.8 Wood Framing: Framing with either gypsum wallboard or gypsum plaster must comply with Table 720.1(2) of the IBC.

A.2 WALL CONFIGURATION:

A.2.1 Adhered Veneer: Metal lath is installed in compliance with Section 2506.1 of the UBC. Where lath is attached to steel framing, minimum 1-inch-long (25.4 mm), No. 6 drywall screws are used. For exterior walls, a weather-resistive barrier described in Section 2510.6 of the IBC is required. The Portland cement plaster is applied in compliance with Sections 2510, 2511, and 2512 of the IBC to a minimum 3/4-inch (19.1 mm) thickness. The thin veneer units are applied in compliance with Section 1405.9 of the IBC in running bond. For one-hour fire resistance, the total thickness of plaster, mortar and brick veneer shall be at least 1 3/4 inches (45 mm). For two-hour fire resistance, the total thickness of plaster, mortar and thin brick shall be at least 2 inches (51 mm).

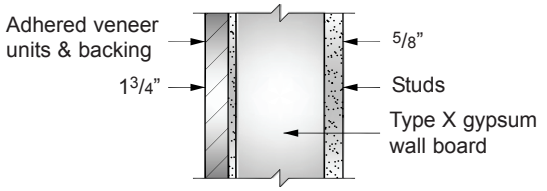
A.2.2 Anchored Veneer: Anchored veneer is installed in compliance with Section 1405.5 of the IBC for 2-to-5-inch-thick (51 to 127 mm) units and Section 1405.6 of the IBC for units up to 10 inches (254 mm) thick. Stud spacing is limited to 16 inches (406 mm) on center, and a weather-resistive barrier complying with Section 1403.2 of the IBC is required on the exterior side of exterior walls. Anchored units may be used for one-hour or two-hour fire-resistive assemblies.

A.3 INSTALLATION:

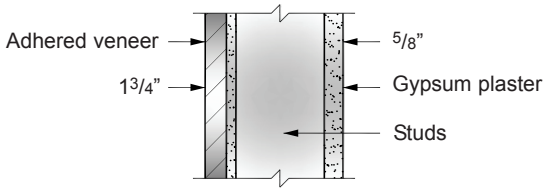
Details of one-hour and two-hour nonbearing walls are noted in Figures 5 and 6. For symmetrical one-hour fire resistance, each face shall have not less than one layer of 5/8-inch-thick (15.9 mm) Type X gypsum wallboard, or equivalent gypsum plaster, or 1 3/4 inch (45 mm) thickness of masonry veneer. For two-hour fire resistance, each face shall have not less than two layers of 5/8 inch-thick (15.9 mm) Type X gypsum wallboard, or equivalent gypsum plaster, or 2 inch (51 mm) thickness of masonry veneer.

A.3.1 Structural Brick Veneer and Structural Load Bearing Brick: Both structural brick systems are installed by combining brick, mortar, reinforcing and grout to provide a structure that combines load resistance to fire resistance. Structural brick fire ratings are generally defined by their equivalent thickness - the more solid the wall, the higher the fire rating. The International Building Code defines the minimum equivalent thickness required to achieve various fire ratings from 1 to 4 hours. Structural brick are defined as hollow without insulation and hollow with insulation. Hollow units with insulation are to be filled solid with insulation materials and the equivalent thickness is the actual thickness of the wall.

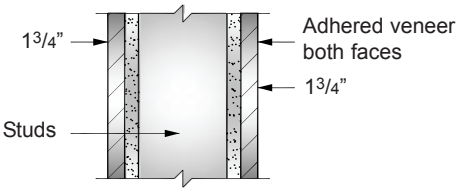
A.4 FIRE RATED WALL SECTIONS



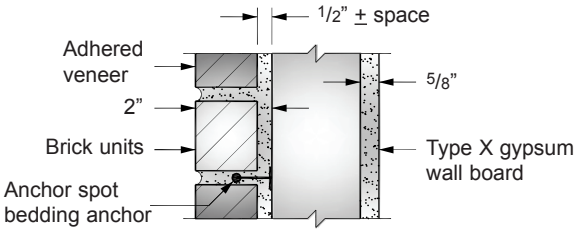
1 3/4" Adhered Brick with 5/8" Gypsum X Board



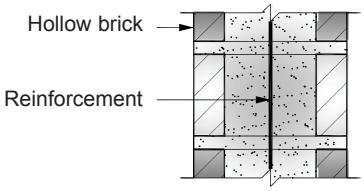
1 3/4" Adhered Brick with 5/8" Gypsum Plaster



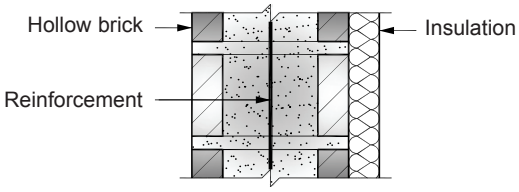
1 3/4" Adhered Brick with 1 3/4" Adhered Brick



2" Anchored Brick and 1/2" with 5/8" Gypsum X or Plaster

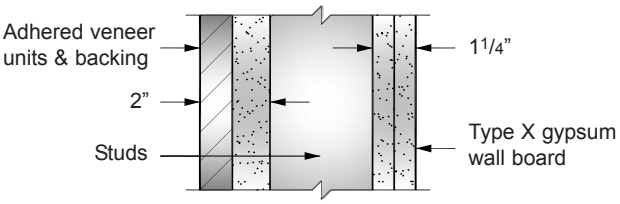


2.3" Equivalent Thickness Hollow Brick

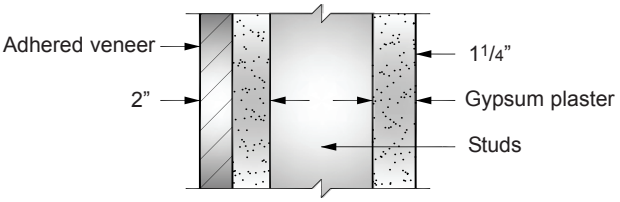


3" Equivalent Thickness Hollow Brick with Insulation

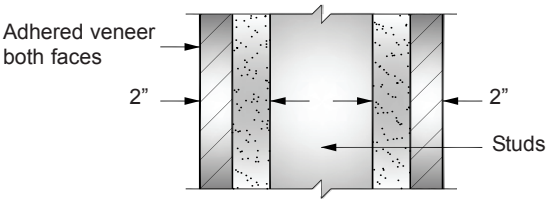
Figure 5 1–hour wall sections.



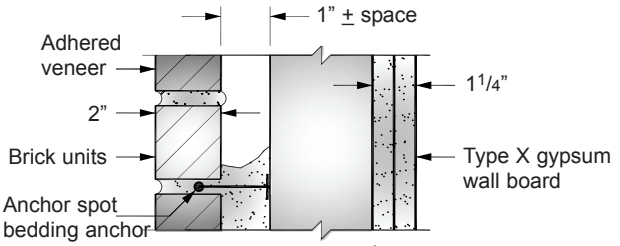
2” Adhered Brick with 1 1/4” Gypsum X Board



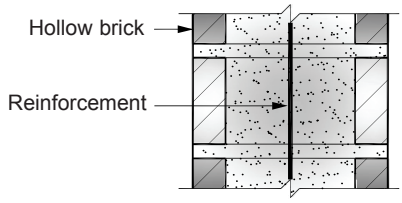
2” Adhered Brick with 1 1/4” Gypsum Plaster



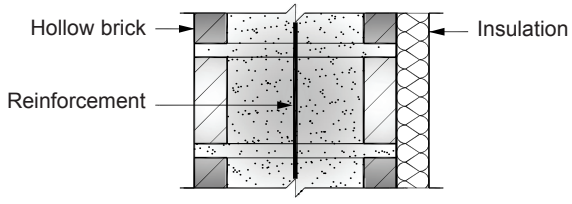
2” Adhered Brick with 2” Adhered Brick



2” Anchored Brick and 1” air with 1 1/4” Gypsum X or Plaster

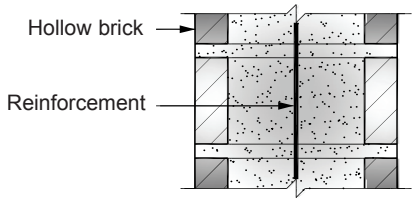


3.4” Equivalent Thickness Hollow Brick

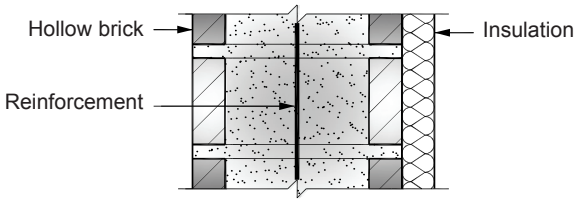


4.4” Equivalent Thickness Hollow Brick with Insulation

Figure 6 2–hour wall sections.

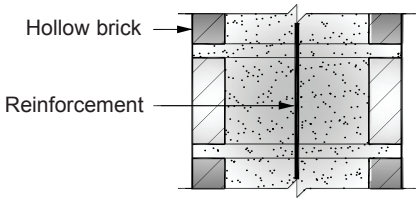


4.3” Equivalent Thickness Hollow Brick

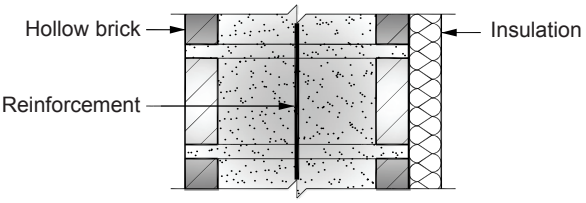


5.5” Equivalent Thickness Hollow Brick with Insulation

Figure 7 3–hour wall sections.



5.0” Equivalent Thickness Hollow Brick

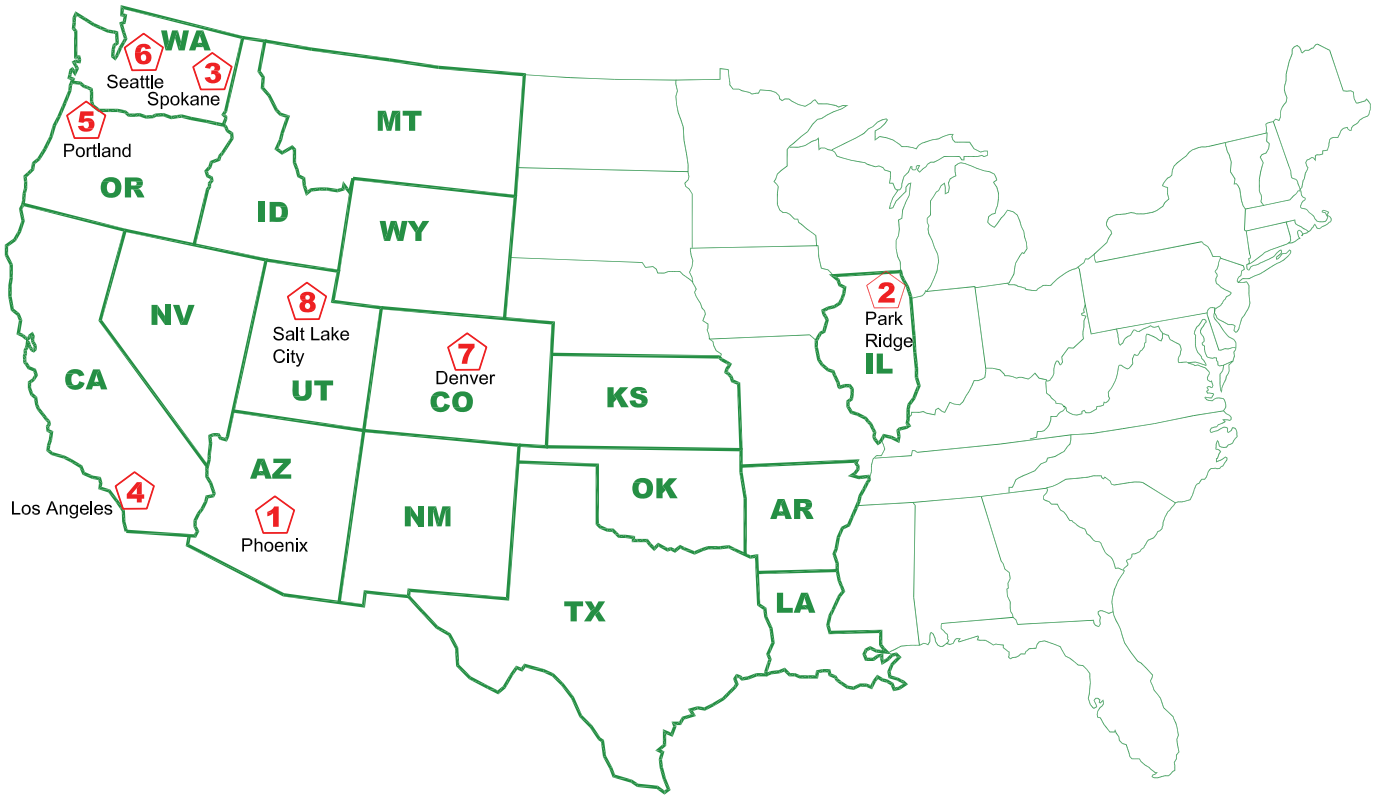


6.6” Equivalent Thickness Hollow Brick with Insulation

Figure 8 4–hour wall sections.

ALLIED ASSOCIATES AND WEB ADDRESSES

1	**Arizona Masonry Guild**	(www.masonryforlife.com)
2	**Masonry Advisory Council**	(www.maconline.org)
3	**Masonry Industry Promotion Group**	(www.masonrypromotion.com)
4	**Masonry Institute of America**	(www.masonryinstitute.org)
5	**Masonry Institute of Oregon**	(www.mioctio.org)
6	**Masonry Institute of Washington**	(www.masonryinstitute.com)
7	**Rocky Mountain Masonry Institute**	(www.rmmi.org)
8	**Utah Masonry Council**	(www.utahmasonrycouncil.org)



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Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088-5625

Report #: 2022-3
Date: March 25, 2022
Work Order #: 3596

Dimensions: 8x4x16 - 0440
Sample Color: Sawgrass
Lab Mix #: 1288

Test Date: March 21, 2022
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C216 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
3.6250	7.6250	7.6875	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3653.5	3521.5	3389.6	3664.3	3845.5	
Immersed Weight	2071.3	1944	2035.5	2067.6	2166.5	
Cold Water (SSD)	3913	3768	3848.5	3909.1	4095.6	
5 hour Boil (SSD)	4025	3879.5	3960	4020.6	4217.8	*AVERAGE*
24 hr. Cold Water (%)	7.1	7.0	13.5	6.7	6.5	8.2
5 hr. Boiling Water (%)	10.17	10.17	16.83	9.72	9.68	11.31
Saturation Coefficient	0.70	0.69	0.80	0.69	0.67	0.71

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	30.80	30.80	30.80	30.80	30.80	
Oven Dry Weight (grams)	3568.9	3587.4	3670	3594.4	3719.1	
1 Minute Gain in Weight	3581.1	3600.2	3681.8	3606.9	3733.5	*AVERAGE*
I.R.A (grams/min/30in.^{2})	11.9	12.5	11.5	12.2	14.0	12.4

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:29198)

Sample Number	1	2	3	4	5	
Brick Gross Area (in²)	58.60	58.60	58.60	58.60	58.60	
Brick Net Area (in²)	30.80	30.80	30.80	30.80	30.80	
Maximum Load (lbf)	387,900	472,010	417,600	436,970	409,740	*AVERAGE*
Net Compressive Strength (psi)	12,594	15,325	13,558	14,187	13,303	13,790
Gross Compressive Strength (psi)	6,619	8,055	7,126	7,457	6,992	7,250

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C216 Designation: Grade SW

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

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Interstate Brick
9780 South 5200 West
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Report #: 2024-10
Date: July 1, 2024
Work Order #: 4543
PO# 45-03690257

Dimensions: 8x4x16
Sample Color: Mountain Red Atlas
Lab Mix #: 1343

Test Date: July 1, 2024
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C216 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
3.6875	7.6250	7.1250	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3590.6	3602.3	3594	3584.5	3526.2	
Immersed Weight	2065.3	2068.8	2066	2060.4	2028.2	
Cold Water (SSD)	3804.5	3804.6	3799	3794.5	3724.6	
5 hour Boil (SSD)	3907	3906.6	3899.8	3896.8	3825.4	*AVERAGE*
24 hr. Cold Water (%)	5.95	5.62	5.70	5.86	5.63	5.8
5 hr. Boiling Water (%)	8.81	8.45	8.51	8.71	8.49	8.6
Saturation Coefficient	0.68	0.66	0.67	0.67	0.66	0.67

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	28.79	28.74	28.69	28.71	28.08	
Oven Dry Weight (grams)	3590.6	3602.3	3594	3584.5	3526.2	
1 Minute Gain in Weight	3599.9	3610.5	3601.9	3593.1	3534.8	*AVERAGE*
I.R.A (grams/min/30in.^{2})	9.80	8.56	8.26	8.98	9.18	9.0

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:31637)

Sample Number	6	7	8	9	10	
Brick Gross Area (in²)	54.32	54.32	54.32	54.32	54.32	
Brick Net Area (in²)	28.60	28.60	28.60	28.60	28.60	
Maximum Load (lbf)	409,150	403,510	398,190	391,640	388,240	*AVERAGE*
Net Compressive Strength (psi)	14,316	14,108	13,922	13,693	13,574	13,920
Gross Compressive Strength (psi)	7,532	7,428	7,330	7,209	7,147	7,330

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C216 Designation: Grade SW

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

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Report #: 2025-18
Drop Off Date: May 28, 2025
Test Date: July 2, 2025
Ticket #: 7325
Po#: 4503868009

Dimensions: 8x4x16
Sample Color: Terra Cotta
Lab Mix #: 1427

Test Date: July 2, 2025
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C902 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

	Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
	3.6875	7.625	7.250	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3515.7	3481.3	3479.5	3492.8	3531.7	
Immersed Weight	2049.3	2028.8	2041.2	2041.2	2064.5	
Cold Water (SSD)	3775.9	3748.3	3764.2	3767.8	3808.9	
5 hour Boil (SSD)	3861.3	3835.3	3848.2	3850.1	3896.6	*AVERAGE*
24 hr. Cold Water (%)	7.4	7.6	8.2	7.9	7.8	7.8
5 hr. Boiling Water (%)	9.8	10.2	10.6	10.2	10.3	10.2
Saturation Coefficient	0.75	0.75	0.77	0.77	0.76	0.76

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	28.58	28.47	28.52	28.58	28.88	
Oven Dry Weight (grams)	3515.7	3481.3	3479.5	3492.8	3531.7	
1 Minute Gain in Weight	35260.0	3491.4	3490.3	3502.6	3543.1	*AVERAGE*
I.R.A (grams/min/30in.^{2})	10.8	10.6	11.4	10.3	11.8	11.0

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:31296)

Sample Number	6	7	8	9	10	
Brick Gross Area (in²)	55.28	55.28	55.28	55.28	55.28	
Brick Net Area (in²)	28.61	28.61	28.61	28.61	28.61	
Maximum Load (lb.)	355,640	359,900	332,300	322,410	317,400	*AVERAGE*
Net Compressive Strength (psi)	12,430	12,579	11,614	11,269	11,094	11,800
Gross Compressive Strength (psi)	6,433	6,510	6,011	5,832	5,741	6,110

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C902 Designation: Class SX Type II

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

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NOTES ON THE SELECTION, DESIGN AND CONSTRUCTION OF REINFORCED HOLLOW CLAY MASONRY









WESTERN STATES CLAY PRODUCTS ASSOCIATION

Acknowledgements

This document was sponsored by the Western States Clay Products Association and written by John G. Tawresey, formerly of KPFF Consulting Engineers, with review and comments by John Hochwalt, KPFF Consulting Engineers, and the Technical Publication and Promotion Committee of the Western States Clay Products Association. The committee members are Steve Judd, Jim Buckley, John Chrysler, Brian Healow, Jeff McNear, Don Sackett, Jim Welte, Joe Welte, and Ann Wolter. Their contribution was very valuable and greatly appreciated.

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Introduction

Reinforced Hollow Clay Masonry (RHCM), also known as "Structural Clay Brick" and "Reinforced Structural Clay Units," offers the building owner many advantages. Unfortunately, the structural engineer often overlooks these advantages. When the structural engineer offers the client alternative structural systems, steel, concrete, concrete masonry, brick veneer, concrete masonry, and wood are usually considered, but reinforced hollow brick masonry is often not.

Most structural engineers are familiar with steel, concrete, wood, and concrete masonry design. RHCM design is similar to concrete masonry design, but there are important differences.

Knowledge of RHCM structural design provides the structural engineer with a meaningful design niche.

Recognizing this lack of knowledge, the Western States Clay Products Association (WSCPA) agreed to produce this RHCM publication specifically for the structural engineer. The first edition was published in 1995, followed by a revision in 1997. This is the third edition.

The document emphasizes the information required to successfully complete a RHCM project, the first being to convince the owner, architect, and sometimes the contractor to consider the RHCM option.

The document begins with example projects followed by helpful information during the traditional project phases: Schematic Design, Design Development, Construction Documents, and Construction.

Cost is always a factor. Suggesting RHCM will usually result in the client saying: "How much does it cost?" Costs are difficult to predict. Here is one example. For the brick wall below* costs was developed by a general contractor and a mason contractor in the Pacific Northwest in August 2022.

Two options were considered; a brick veneer on steel studs and RHCM. The brick veneer required an 8-inch structural stud backing, while the RHCM required only interior partition (furring) studs. The brick veneer option costs $59.10 per square foot, and the RHCM option costs $57.33 per square foot.

This cost study only included the wall. Additional savings exist if the RHCM wall supports the roof and provides lateral resistance.

Analogous to unreinforced concrete, unreinforced brick masonry is not cost-effective. Adding reinforcement reduces cost. The purpose of this document is to provide the structural engineer with the knowledge to utilize the RHCM design niche.

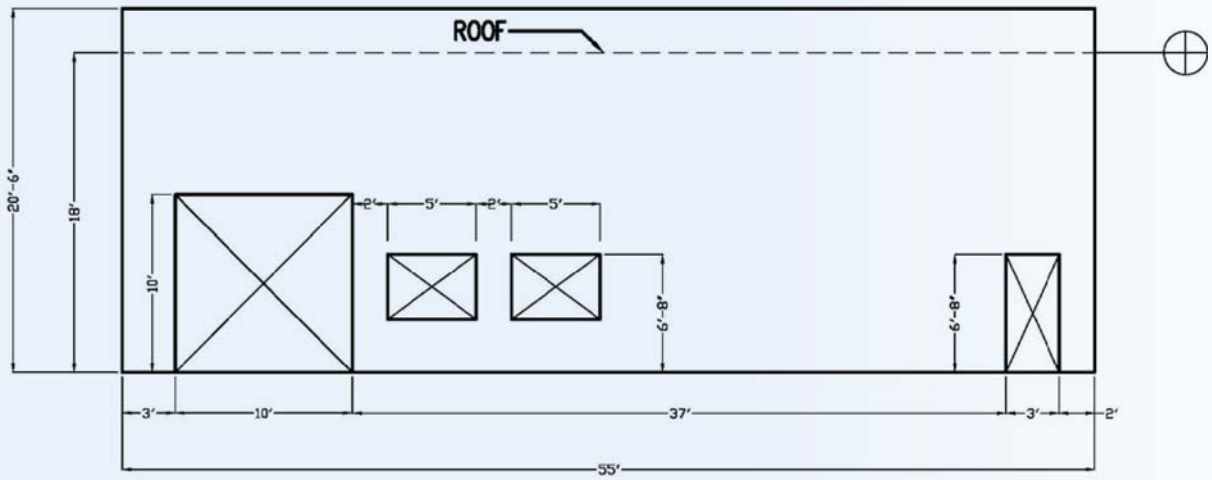


Figure 1 Cost Comparison - Brick Veneer on Metal Studs versus Reinforced Hollow Clay Masonry

What is RHCM?

The most common shapes of hollow clay units (sometimes referred to as structural clay units) are shown below. There are many shapes and sizes available. Custom shapes may be designed, fabricated, and installed on larger, more geometrically complex projects.

Hollow clay units are produced by extruding a mixture of various clays that determine color, strength, water absorption, and saturation coefficient. Different clays are combined to a fine powder, water is added, and the mixture is extruded through a steel die. The extruded column of clay is then sliced perpendicular to the extruded column at the desired unit height. The units are then placed on carts and generally fired to temperatures above 2000 F degrees in a kiln.

Following firing in the kiln, units are placed on pallets for shipping. Units are transported from the manufacturing plant to the project by truck or rail.

Masons place the units in mortar, and reinforcement is placed in the cells and bond beams. The resulting wall is grouted to bind the units, grout, and reinforcement to form the structural wall. In some situations, insulation can be placed in the ungrouted cells to enhance the thermal properties of the wall.

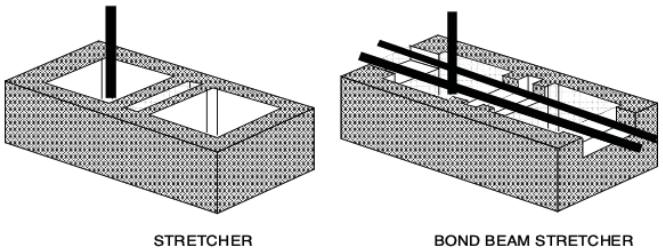


Figure 2 Typical Reinforced Hollow Clay Unit

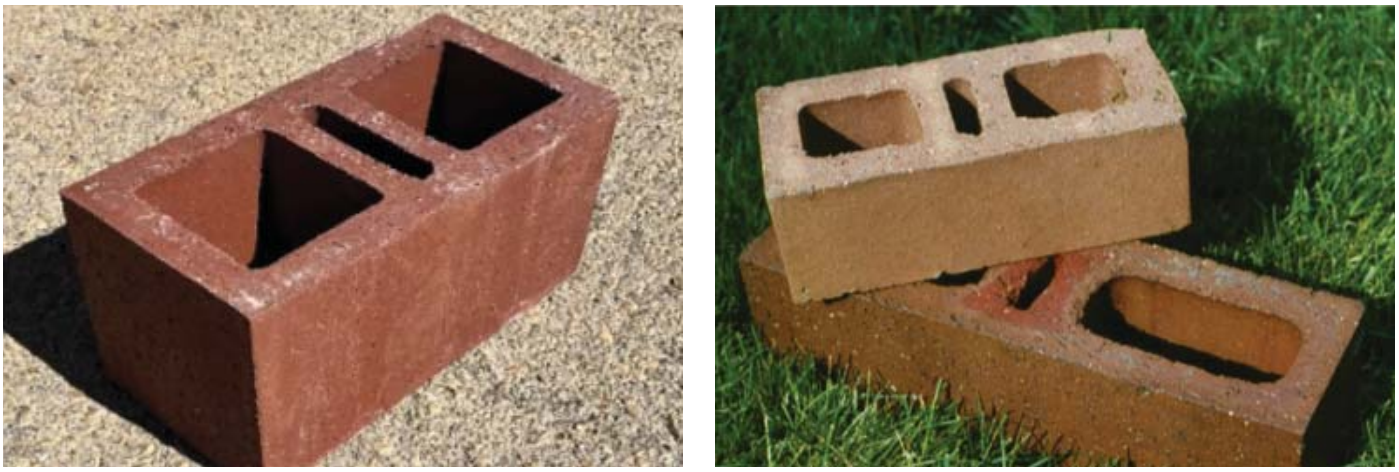


Figure 3 Hollow Clay Units (*Left:* 7 3/8" x 7 3/8" x 15 3/8", *Right:* 3 1/2" x 2 1/2" x 7 1/2", and 3 1/2" x 3 1/2" x 11 1/2")

Document Scope

Detailed information about structural design methods is not included in this document. Instead, this document contains "rules of thumb" to assist in creating the design. More detailed information on structural design methods can be found in numerous textbooks and other references. Two resources available are the Reinforced Masonry Engineering Handbook and the Masonry Designers Guide. These resources contain example designs with example structural analysis. They can be found at The Masonry Society Library.

Design software is also available from many sources.

Mostly, the information is based on Building Code Requirements and Specifications for Masonry Structures, The Masonry Society 402/602. TMS 402/602 is adopted by reference in ASCE 7 and the IBC with minor overriding provisions.

It is intended that most of the information presented is independent of the code edition selected. Specific code references are not included as code provisions change with time and may be revised by the local jurisdiction. In this document, there are statements that a provision is required by code. This statement means that the provision has existed in the code for many years or may be new and is likely to continue being a code provision. But, the provision may or may not apply to your project and may not be current. The structural engineer must check current code provisions applicable to the project based on the jurisdiction having authority.

The traditional design and construction project delivery system (design-bid-build) are assumed. In the traditional project delivery system, the structural engineer contracts with and reports to the project architect as a specialty consultant. The architect typically contracts with and reports to the owner. The contractor is selected after the design is completed, and the selection is often based on price. The contractor enters into an agreement with the owner and reports to the architect serving as the owner's representative.

Other project delivery methods exist, such as the Construction Manager/General Contractor (CM/GC) and Design-Build. Because there is usually more interaction with contractors in these alternative methods, converting a project to RHCM may be easier. However, for this publication, the traditional approach is assumed.



Figure 4 Reinforced Hollow Clay Masonry Wall with Shear Keys for the Slab Connection

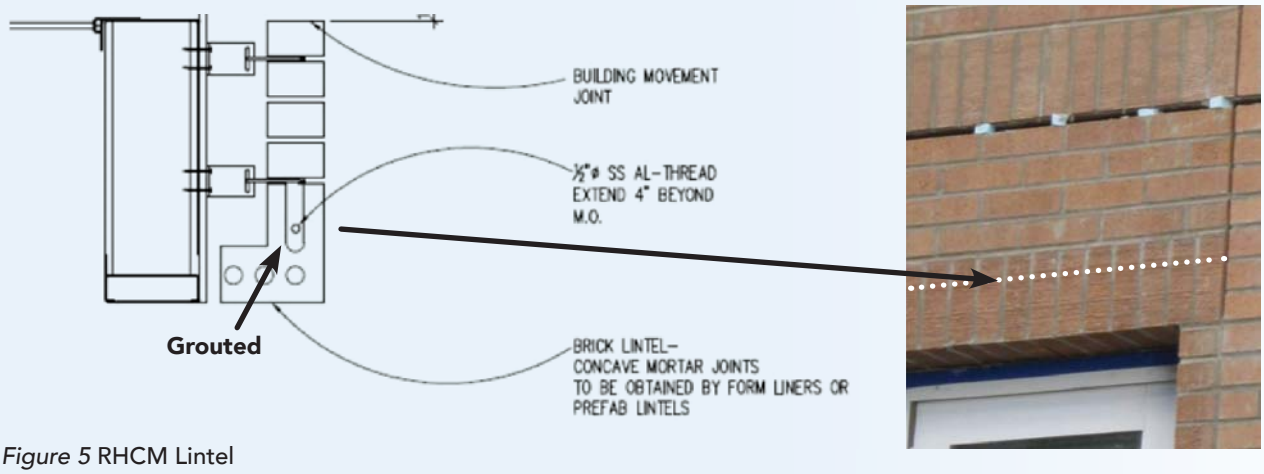


Figure 5 RHCM Lintel

Example Projects

Basic Applications

Reinforced Hollow Clay Masonry Header for Veneer

Brick veneer over various veneer backings is often used for a building's exterior wall. Above openings, the brick veneer is usually supported by steel angles called loose lintels prone to rusting. Observing the rusted angle above an opening makes it easy to determine that a wall is brick veneer. There is a better design.



Figure 6 Custom Lintel Unit for an Inset Window

Replace the steel loose lintel angle with a Reinforce Hollow Clay Masonry lintel. The simplest design is a half-hollow clay soldier. A horizontal reinforcing bar is placed in the cell, and the cell is grouted.

Because the reinforced lintel is typically exposed to water on both sides, it is recommended to use a stainless steel all-thread for the reinforcement. Stainless steel all-thread is much less expensive than stainless steel reinforcement and is readily available. For most applications, a 3/8-inch or ½-inch diameter all-thread is sufficient.

Construction is accomplished by shoring the opening, usually with wood framing. Some masons elect to prefabricate the lintel as a RHCM panel, either on-site or off-site, in a controlled environment.

Reinforced Hollow Clay Masonry Retaining Walls

Many retaining walls are constructed using concrete. Concrete forms often use brick pattern forms for the exposed surface. Why not use brick instead?

Typical hollow clay masonry design strengths (ranging between 2600 and 4000 psi) match that of concrete (higher strength than concrete masonry). Reinforcement requirements are comparable to concrete.

A significant cost advantage is the geometric flexibility of RHCM. Hollow clay masonry units are laid one unit at a time. There is flexibility to have articulated shapes for a small increase in cost.



Figure 7 Articulated Retaining Wall

The serpentine retaining wall is a classic example of the relationship between form and structure. The geometry of a RHCM retaining wall can significantly increase the structural capacity and is more economical. Varying the geometry of a concrete retaining wall is expensive. RHCM can be considered similar to reinforced concrete with the forming left in place.

Additionally, RHCM expands, and concrete and concrete masonry shrinks. In RHCM, the expansion puts the reinforcement in tension, reducing cracking and water penetration. Also, a brick retaining wall can be built from one side, often minimizing the expense of the back-side excavation.



Figure 8 RHCM Retaining Wall

RHCM Soffits, Sills, and Cantilevers

Brick veneer walls may include brick soffits, sills, and cantilevers. Instead of complicated veneer backing, RHCM can be used.

Spanning between connectors to the structure, the hollow clay masonry transforms the veneer into a structural element, eliminating the structural veneer backing. Some local building codes restrict the use of veneers on overhead horizontal surfaces. RHCM would be code compliant and solve the problem.

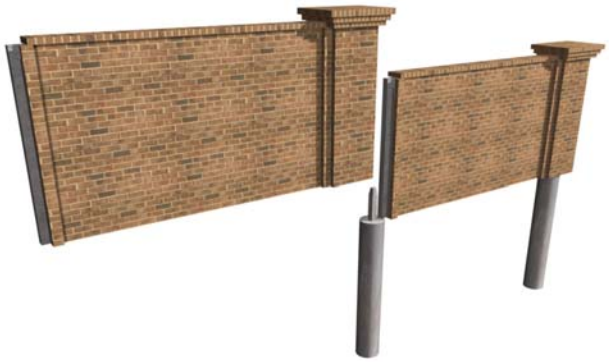


Figure 9 RHCM Cantilevered Exterior Wall

Reinforced Hollow Clay Masonry Sound Walls

RHCM sound barrier walls are cost-effective. In addition, the flexibility of color and form offers cost and aesthetic advantages.

Two schemes of sound walls are recognized, the cantilever wall and the pier and panel wall. The cantilever has a continuous footing, and the wall is designed to cantilever from the footing. The pier and panel wall has a foundation below the pier but does not require a continuous footing under the wall panels, a significant saving. The piers are designed to support the loading from the wall panel between the piers.



The Sound Transmission Class of a reinforced hollow clay wall is comparable to a concrete wall. The sound transmission class rating can be found in TMS Standard 0302-12 and Brick Industry Association Technical Note 45.



Figure 10 Pier and Panel Sound Wall

Advanced Applications

Schools

For aesthetic reasons, brick is often preferred for the exterior of a school. Often architects will opt for a brick veneer which they believe costs less. However, brick veneer has a limited life unless properly designed with items like stainless steel ties.

Additionally, school story heights add significant costs to the veneer backup system. When the veneer is converted to an RHCM structural system, the backup wall can remain inexpensive, and the brick wall can be part of the building's primary structure. There are many examples of the RHCM wall costing less than brick veneer walls.

Interior RHCM hall and classroom walls provide fire resistance and a long-lasting, durable surface that resists abuse and requires little maintenance.



Figure 11 RHCM School

Commercial/Retail

One- and two-story commercial buildings, retail malls, or other commercial developments can frequently benefit from RHCM construction. As an alternative to concrete masonry, there is an increase in initial cost for a significant improvement in aesthetics, strength, and durability.

As an alternative to a steel frame with metal stud infill walls, RHCM masonry can be used as both a bearing wall, shear wall, and enclosure wall providing structure and exterior finish simultaneously.

Long lead times for structural steel detailing and fabrication can increase the construction schedule. The construction of RHCM can usually begin shortly after the design is complete.



Figure 12 RHCM Retail Center

Small Office Buildings

The typical office building requires column-free spaces to provide flexibility for interior design. These buildings often employ moment frames or braced frames to resist lateral loads. Load-bearing walls are typically not used because they limit the flexibility of the interior space. However, RHCM shear walls can be substituted for steel braced frames or moment frames to resist lateral force. Fire-rated stairs and fire-rated elevator shafts can utilize RHCM, providing up to four-hour fire resistance with an interior brick finish. This is especially desirable when shear walls become part of the exterior aesthetics of the building or permanent partitions.

Single-Family Residential



Figure 13 Brick House

RHCM can be substituted for wood frame construction in single-family residential projects. It offers better acoustical properties, less seismic or wind drift (deflection), better fire resistance, less maintenance, insect resistance, and hail resistance. Also, stiff masonry walls may provide better performance in expansive soil locations than flexible walls.

Multi-Story Residential/Hotels

RHCM is used in medium-rise residential projects, including hotels. RHCM exhibits high compressive strength. For buildings in the four-story to the 20-story range, the full strength can be used with little or no increase in cost.



Figure 13 RHCM Residential

The high strength can mean savings and offer an advantage over other forms of construction. The RHCM system is compatible with wood, precast, cast-in-place, or prestressed floor systems. Besides aesthetics, a primary benefit of RHCM bearing wall construction is the sound separation provided by the wall mass. RHCM dwelling unit dividing walls also provide reliable fire separation and thermal mass.



Figure 15 RHCM Hotel

Institutional Facilities

Brick is often the material of choice for libraries, hospitals, fire stations, city halls, and university buildings. In these situations, using RHCM offers an alternative to brick veneer. It can perform double duty when designed to be load-bearing and may provide savings.

Even if not designed to be load-bearing, RHCM offers better seismic isolation and longer life than traditional veneers. RHCM can be designed to isolate the wall from building movements in areas of high seismic exposure. This is difficult to accomplish with conventional brick veneer, particularly at the building corners.



Figure 16 RHCM University Building

Other Applications

Small Bridges



Figure 17 Small Bridge

Building a bridge can be limited by local conditions. A RHCM brick bridge can be built almost anywhere. The materials can be transported one brick at a time. Additionally, the flexible geometry allows for more efficient structural systems.

Blast Walls

Technical information about RHCM and brick blast walls is limited. At this time, it is not a typical application. ASCE/SEI Standard 59-11 Blast Protection of Buildings addresses material and design issues. Masonry is included and, except for minor differences, is equivalent to reinforced concrete. The referenced document addresses concrete masonry. Experience indicates that because of the significant increase in strength of hollow clay masonry units over concrete masonry units, brick blast-resistant walls will perform equal to or better than concrete masonry blast-resistant walls.

The Department of Defense and the ASCE/SEI 59-11 prohibit using unreinforced or partially grouted masonry for blast resistance. This is because fragmentation of the units causes airborne debris.

Storm Shelters

Test panels made of fully grouted RHCM, produced by Interstate Brick Company, have been tested for debris impact. The test objective was to ensure compliance with a high-performance standard to protect shelter occupants from wind-borne debris. Performance criteria include preventing the perforation of the shelter by the test missile and preventing damage that could cause injuries to the occupants.

The panels tested met the debris impact guidelines of FEMA 320/361 and ICC – 500 for a tornado shelter. Again, remember that the flexibility of wall geometry gives RHCM a significant cost advantage over reinforced concrete.

Curtainwall or Reinforced Veneer, or Structural Brick Veneer

Brick veneer on metal studs is a popular curtainwall system. An alternative system is an RHCM curtainwall or reinforced veneer. A reinforced veneer is similar to a conventional veneer, except the wall is constructed with RHCM. Typical closely spaced veneer ties are replaced with intermittent connectors spaced farther apart. A typical brick veneer has ties every two square feet. Reinforced veneers have connectors every 100 square feet. The connectors carry more load, are constructed of galvanized thicker materials, offer simpler methods for isolating the veneer from the primary structure, provide less thermal bridging, and are more corrosion-resistant.

A design guide for reinforced veneer or structural brick veneer is available at the Western States Clay Products website (www.brick-wscpa.org/technical-publications.php, Design Guide for Structural Brick Veneer, Third Addition).

A reinforced veneer is sometimes called "laid-in-place panels."



Figure 18 RHCM Reinforced Veneer Hospital Exterior Wall in a High Seismic Zone

Brick Panels

Brick panels are an application for RHCM. Brick panels are constructed of hollow clay units, reinforced, fully grouted, and attached to the building in a manner comparable to a precast concrete panel. The system can speed construction, eliminate the requirement for scaffolding, and provide the designer with new opportunities not available with conventional masonry. The system has been used on many buildings ranging from single-story branch banks to 50-story office buildings.

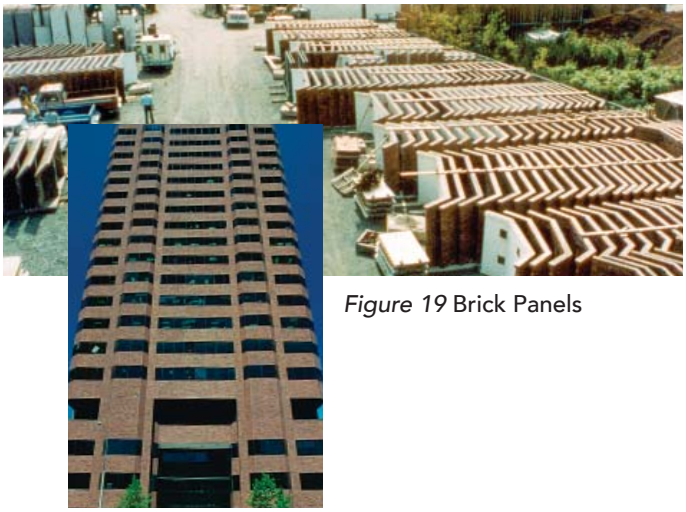
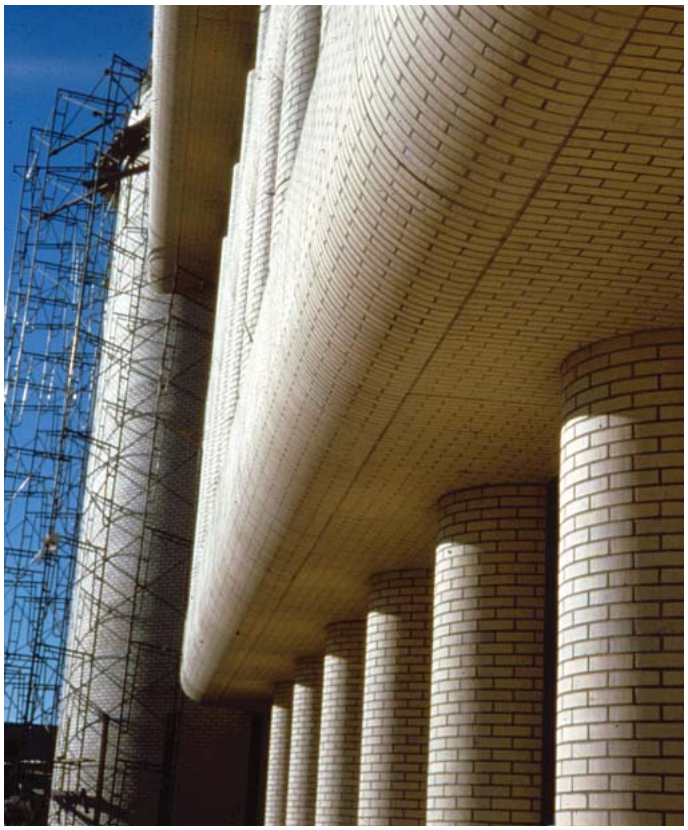


Figure 19 Brick Panels



Concrete Form

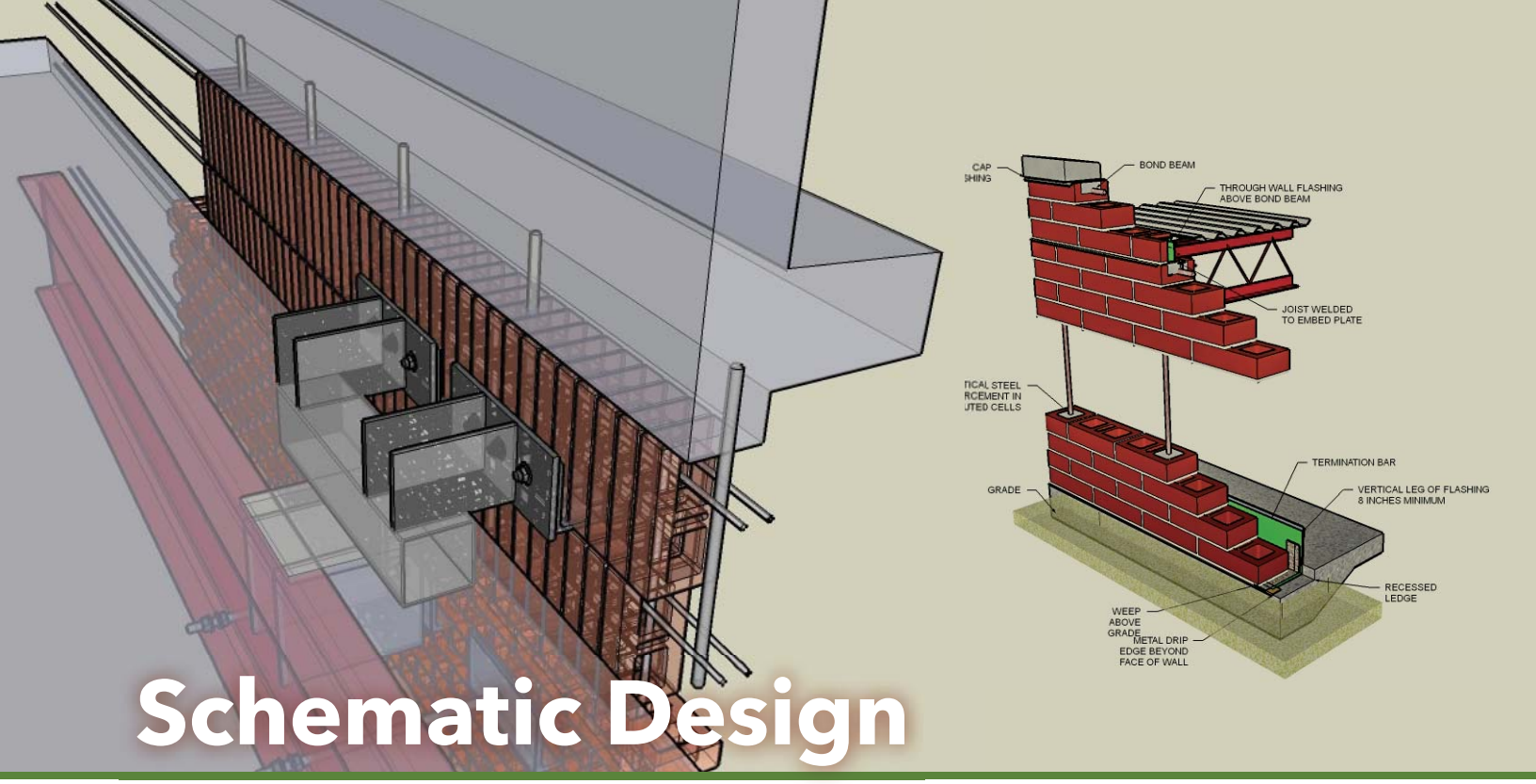
RHCM or, in some cases, unreinforced solid brick can be used as a form for concrete. When a brick exterior is desired, the brick can become the form for concrete structural columns and spandrels. In addition to increasing the element's capacity (the brick concrete form is structural and is not removed), the geometry flexibility offers interesting opportunities for unique designs.



Figure 20 RHCM Columns and Spandrels Used Both as a Form and for Structure



Figure 21 RHCM Used as the Finish Wall and Backing for Concrete Shotcrete (Gunite)



Schematic Design

Selection of the Structural System

During the schematic design phase, the architect evaluates the owner's needs and develops the project concept. Multiple design concepts are explored and developed during this phase. The structural engineer is expected to influence the selection of a structural system with choices that are cost effective for the owner.

The architect and owner will likely have defined a preliminary site plan and layout before the structural engineer's involvement. For example, if the site plan includes retaining walls, the structural engineer should include the retaining walls in the design scope, increasing the fee if possible, and suggest RHCM as a cost-saving option.

Suppose the exterior skin (curtainwall) has not been defined, and the building is of institutional quality or in a high seismic or hurricane zone. In that case, RHCM curtainwall (reinforced veneer) may be an option for significant cost reduction and enhanced performance. Reinforced veneer usually costs less than conventional brick veneer on steel studs if the story height is over 12 feet.

During the selection dialogue, the following advantages and objections could arise.

Advantages

Sustainability and Resilience

Unlike many modern construction materials, fired clay (bricks) lasts thousands of years in the environment. They are sustainable. Additionally, bricks can be recycled either by reuse or by adding ground-up bricks to clays for making new bricks.

Resilience can be developed through the geometric flexibility of RHCM. Adding intersecting walls and flanges to shear walls will increase resilience at a minimum cost.

Expansion Property

Brick masonry expands with time. This can take as long as five years. It is not reversible. In RHCM, this property places the brick in compression and the steel in tension. The result is reduced cracking and improved water penetration resistance. Expansion joints can be placed further apart or, in some cases, eliminated.

High Strength

It is relatively easy to obtain high-strength hollow clay masonry. Design strengths (f'_m) of 4,000 psi are recognized in TMS 602 Specification based on an 11,500 psi clay unit net area compressive strength. Typical unit strengths are between 10,000 and 15,000 psi. Higher unit strengths are common.

Darker colored bricks generally have higher strengths and lower absorption than lighter colored bricks. There is typically no cost premium for these higher strengths, although there may be local limitations on available colors. In load-bearing applications, the higher strengths offer an advantage over concrete masonry units.

The tensile strength of the brick masonry unit range between 700 and 1500 psi. Brick cracking in structural walls is less common than in concrete masonry (CMU).

Form and Structure

Structural capacity can be significantly increased by modifying geometry. For example, adding a pilaster to the wall. The cost to modify geometry is minimal when bricks are laid one at a time.

Speed of Construction

Most masonry materials, including hollow brick, are readily available on short notice. Therefore, it is not necessary to wait for steel fabrication.

Low Maintenance Cost

RHCM is relatively maintenance-free. Expected life far exceeds the life of metal and other light exterior wall systems. RHCM does not rot. Insects do not eat RHCM.

Aesthetic Flexibility

There are thousands of colors and textures from which to choose. The many brick placement orientations can create unique patterns that challenge the architect's creativity. Fewer expansion (or control) joints (if any) are required. Special shapes can be produced to further broaden the aesthetic possibilities.

Building a bridge can be limited by local conditions. A RHCM brick bridge can be built almost anywhere. The materials can be transported one brick at a time. Additionally, the flexible geometry allows for more efficient structural systems.

Objections

RHCM is viewed as masonry in general and carries many of the perceived negatives often associated with masonry.

Below are a few of the common objections. However, despite these objections, RHCM has been successfully used on many projects for the past 80 years and should continue to receive consideration in many projects.

Unfamiliarity with RHCM

Many designers, both architects, and engineers, are not familiar with RHCM. A simple solution is to consider RHCM as concrete masonry with the CMU units replaced with brick units.

Higher Cost

RHCM costs more than concrete masonry. But it may cost less than brick veneer on metal studs. When floor heights exceed 12 feet, many examples exist where an RHCM with only an interior partition costs less than a brick veneer with a structural steel stud backup system. This is because the backup structural steel stud wall cost exceeds the increased brick structural cost.

Water Penetration

Masonry is often perceived to leak more than other wall systems. This has proven to be inaccurate for RHCM, particularly when grouted solid. The expansion of the brick masonry against the reinforcement tends to reduce cracking and, thus, reduce leakage significantly.

Another Subcontractor

Adding the mason adds another subcontractor to the job. General contractors often resist adding a masonry subcontractor to the job. One reason is the cost of administering the masonry work. Another reason exists if the general contractor performs their own concrete work. In this situation, they will prefer concrete walls instead of masonry walls to keep a larger percentage of the project.

Unreliable Color

Colors are variable and sometimes not what was expected. Many architects have experienced difficulty in obtaining the colors desired. To a large degree, many of these problems don't exist today. More sophisticated manufacturing processes and adequate color mock-ups have nearly eliminated issues in this area.

Inexperienced with Design Methods

Many structural engineers are not familiar with masonry design methods. There are many new resources (literature and software) available. This document is one example.

Inconsistent Information

Sometimes technical answers obtained from suppliers appear inconsistent. There are many different types of masonry. There are many different uses. Communication between the masonry industry and the designer often needs clarification because of misunderstandings of intended use and terminology. Veneer brick masonry is not designed and constructed like load-bearing brick masonry. CMU masonry behaves very differently from fired clay masonry. One typical example: wetting clay units before laying is often recommended, while it is not recommended to wet CMU units before laying.

Inconsistent Standard Details

Many standard details are available, but the problem is similar to the apparent inconsistency of technical answers. Since there are so many different types of masonry, methods, and systems, a single set of standard details is not possible. Further, details vary by region. Most local masonry institutes have recommended details available.

Prices are not predictable.

Price varies from job to job. Unfortunately, it is difficult to predict the price of a masonry job. Since masonry work is labor intensive, the mason's production is a key factor. Many variables come into play. The cost of the bricks remains relatively predictable and can be obtained from the supplier.

Complicated Building Code

There are many different types of masonry and many different applications. Persistence in understanding the applicable provisions of the code is required. This document is intended to help.

Selection of Materials

When RHCM is selected for the structural system, the next step is to choose the specific type of units to be used. The choices of shape, color, texture, and pattern are almost unlimited.

Thousands of colors exist. Almost any shape can be produced. Units can be shipped thousands of miles.

Local suppliers can provide information on the available strengths, shapes, and colors. The manufacturers who are members of the Western States Clay Products Association are listed in Appendix A.

Initial Design Criteria

The likely applicable code is The Masonry Society (TMS) 402/602 *Building Code Requirements and Specification for Masonry Structures*. It is adopted by reference in the International Building Code. Associated design loads are found in the *International Building Code* and the *American Society of Civil Engineers (ASCE 7) Minimum Design Loads for Buildings and Other Structures*.

TMS 402/602 includes two design methods: Allowable Stress Design and Strength Design. The Allowable Stress Design and Strength Design methods are divided into Reinforced Masonry Design and Unreinforced Masonry Design. Hollow clay masonry can be designed as reinforced masonry or unreinforced masonry using either Allowable Stress Design or Strength Design.

The code provisions for Unreinforced Design, Reinforced Design, Strength Design, and Allowable Stress Design may be used in combination. For many years ASCE 7 has restricted combining Allowable Stress Design and Strength Design. But the IBC has typically not adopted the ASCE 7 restriction. Before combining methods, the structural engineer must verify if the mixing of design methods is allowed within the project jurisdiction.

Dimensions

It is traditional to describe the masonry unit dimensions in the order of thickness, height, and length. For example, a 6 x 4 x 12 unit is a nominal 6-inch-thick, 4-inch high, and 12-inch long unit. Nominal dimensions are one mortar joint thickness larger than the specified brick dimensions. The typical mortar joint thickness for RHCM is either 3/8 inch or 1/2 inch, depending on the manufacturer (the typical mortar joint thickness for concrete masonry units is 3/8 inch). Thus, a nominal 4-inch height unit laid with a ½-inch mortar joint has a specified height dimension of 3 ½ inches

Standard nominal thicknesses are 4, 5, 6, and 8 inches. The availability of 10 and 12-inch thick units may be limited. The typical nominal height is 4 inches (other heights are available), and the nominal length is 12 inches or 16 inches. Smaller standard-size brick units (for example, 3 ½ x 2 ½ x 7 ½) can be manufactured with cells large enough to be reinforced.

Hollow clay units are produced in accordance with ASTM C 652 H60V, where the sum of the void area is greater than 40 percent but less than 60 percent of the gross cross-sectional area.

Hollow clay masonry units have cells and cores. A cell is different from a core. A cell's cross-section exceeds 1 ½ square inches. A core's cross-section is less than 1 ½ square inches. Cores do not need to be grouted for a wall to be classified as fully grouted, but all cells need to be grouted. Reinforcement is not generally placed in cores.

Hollow clay masonry units are easily reinforced, both vertically and horizontally. Vertical reinforcement is placed in the cells that align vertically. Horizontal reinforcement is placed in bond beams that align horizontally. Smaller standard-size units manufactured with cells can also be easily reinforced. Diagonal reinforcement is very difficult to construct and is almost never designed.

Special units can be manufactured for custom patterns. The additional cost for custom units, shapes, and colors on large projects is generally small. A project that offers the opportunity for custom units provides the architect and structural engineer with an opportunity for creative, sustainable, and resilient design. One example is the custom units used in a large hospital for a six-inch thick wall that visually projected a standard four-inch corner.

For analysis, the specified dimensions of the masonry are used, except the nominal dimensions are used for the following:

1. Effective flange width.
2. Reinforcement spacing.
3. Maximum size of reinforcement based on the thickness of the unit.
4. Height-to-thickness ratios for determining design compression strength.
5. Minimum dimensions (Example: Minimum side dimension of a column is eight nominal inches).

It is desirable, but not necessary, that the plan dimensions match the unit module. Cutting units is common but can significantly add to the wall's cost. Moreover, a wall or pier of limited length (say, 14 inches long) could pose a problem with aligning cells for reinforcement.

Generally, the masonry contractor can adjust dimensions by plus or minus 1/8 inch per stretcher. This can be accomplished by unit selection or by adjusting mortar joint widths. It should be recognized that units typically are not exactly the same thickness, height, or length. Variations in specified dimensions are addressed in ASTM C 652. The dimension of a darker unit will generally be smaller than the dimension of a lighter unit. Because the thickness varies, hollow clay walls are typically laid to line on one exposed face. When both sides of the wall are exposed and considered finished, additional costs may result, either because of the increased cost for more uniform units or the potential increased cost to lay the units.

A floor height that does not divide evenly by the brick height is not a big problem. Usually, the bed joints can be adjusted. Sometimes the brick is cut. Gabled walls are typically constructed by cutting the units at an angle.

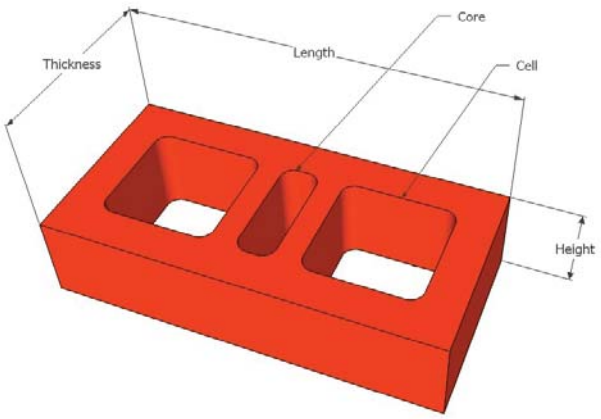


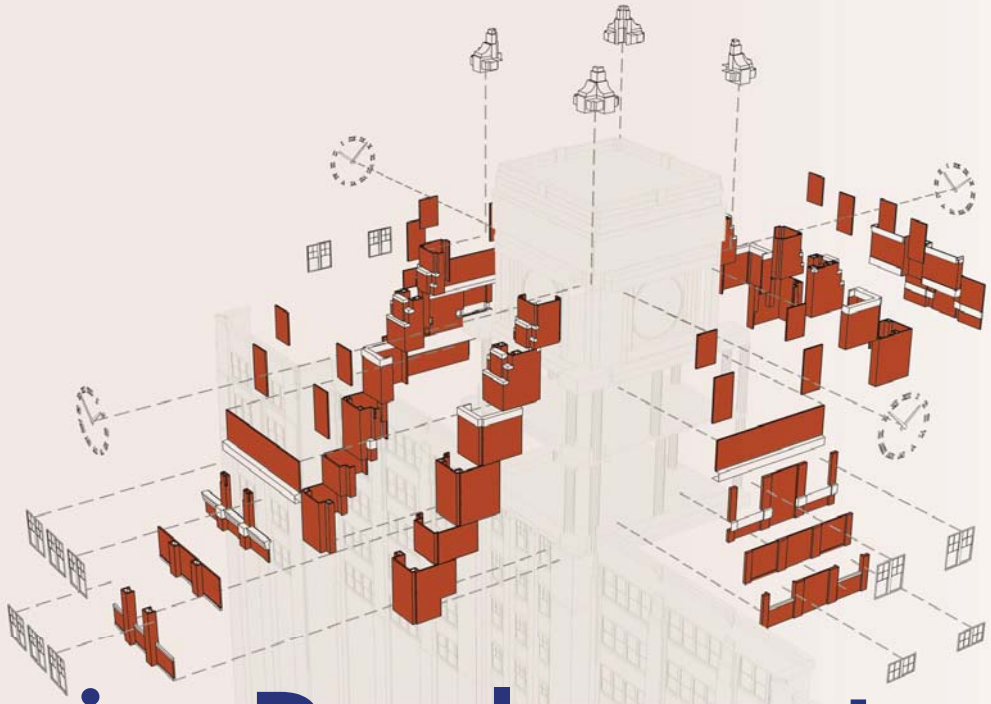
Figure 22 Dimension Order: Thickness, Height and Length



Figure 23 Custom Unit for a Four Inch Corner in a Six Inch Wall

Wall Thicknesses

It is common to use different thicknesses of walls on the same floor or to change the wall thickness from floor to floor.



Design Development

During the design development phase, the design team prepares documents consisting of drawings and specifications to fix and describe the size and character of the entire project.

During this phase, the structural engineer identifies the space required for the structural portions of the project and the elements of the structure that will control the required strength of the materials, in addition to a beginning draft of the specifications.

Bond Pattern

The building code recognizes only two bonding patterns, running bond and other than running bond (formerly defined as stack bond and that term to be used herein). For running bond, the units must overlap by more than one-quarter of the unit length. If the overlap is less than one-quarter, the pattern is classified as other than running bond for design purposes, or stack bond. The code has lower capacities for stack bond and includes prescriptive requirements for its use.

For RHCM and CMU masonry, the head joint is normally face shell bedded instead of full bedding. The structural engineer should assume that the face shell bedded head joint has no shear or tension capacity. In running bond, the head joints stair step in the wall. The code design capacities take this into account. In stack bond, the head joints line up in the wall, causing a structural discontinuity. The code provision limit capacity accordingly.

There are many bonding patterns other than stack and running bond. The orientation of the units provides the architect with many creative designs.

There are names for the orientation of units in a wall. The un-hatched face is the face exposed to view.

For unreinforced masonry, bed joint code capacities are higher than head joint code capacities. The code defines the bed joint as the horizontal layer of mortar on which the masonry is laid. The capacity is higher because of the compression on the joint during curing supplied by gravity. For example, for a soldier orientation of a unit, the head joint is the end web.

Typically, the architect will select the bonding pattern. Many designs have multiple bond patterns. Some patterns can have a significant impact on the structural design.

When the head joint limits the capacity required, using open-end units (units with the end webs removed) and fully grouting will solve the problem.

The bonding pattern may appear to create a wall that cannot be reinforced and grouted. However, there are usually methods available. Typical methods are:

- Use a single bond beam or back-to-back bond beams for vertical reinforcing in soldier courses.
- Use precast concrete or cast stone with holes (like brick cells) to pass vertical reinforcement. When using precast concrete, it is important to consider that concrete shrinks with age and that brick masonry expands. The precast should not be set until it is at least 28 days old, and the length of the precast should be limited to 10 feet with a soft caulk joint at the end. Placing sand on the surface of the caulk will make the caulk joint appear like the adjacent mortar joints.
- Use various brick thicknesses and special shapes to produce elegant walls. Flexibility is one of the most important advantages of RHCM. Rustication, quoins, and cornices are examples of a few designs that can be easily produced using different thicknesses of hollow clay.
- Work with the brick manufacturer to design custom extruded shapes.
- Use cut lintel blocks from the end of units for exposed sills and lintels.

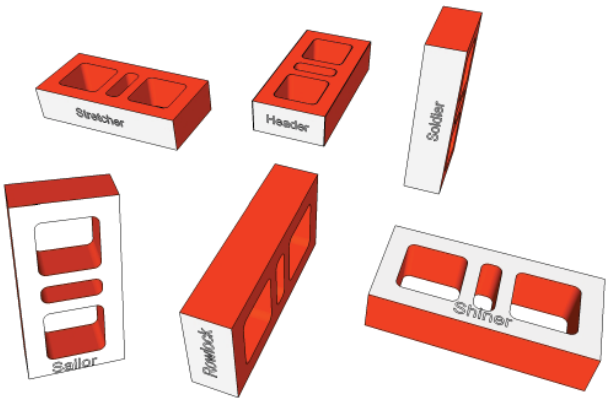


Figure 24 Unit Orientation Definitions

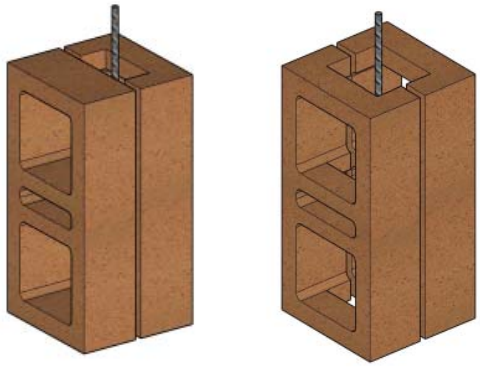


Figure 25 Soldier Reinforcement

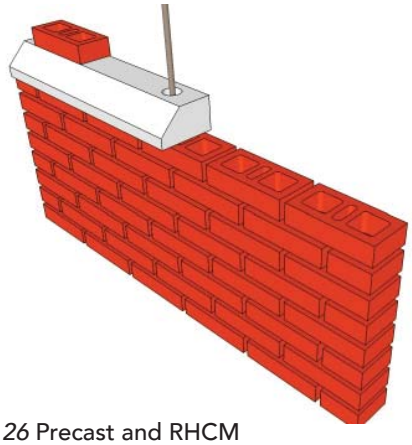


Figure 26 Precast and RHCM

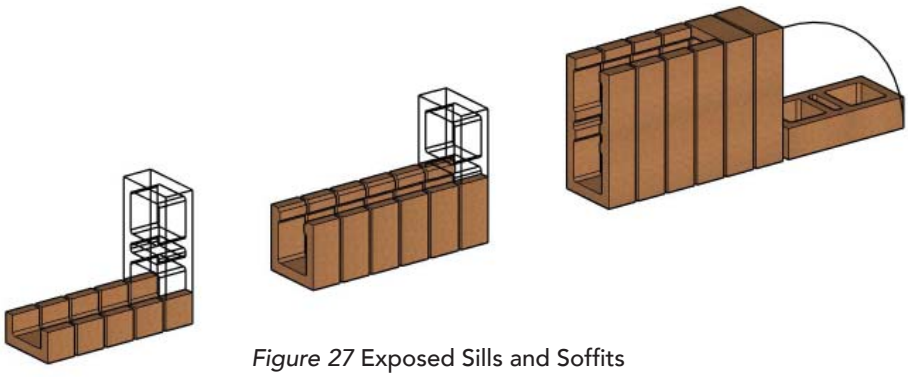


Figure 27 Exposed Sills and Soffits

Initial Sizing of Members

During meetings with the client, questions about member sizes will occur. Structural engineers tend to rely on their computer models, requiring additional time, instead of "back of the envelope" analysis on the spot. The following information will assist the engineer in quickly providing the client with the needed information.

Making money on the structural design directly correlates to the quality of the first guesses.

Designing a structure is an iterative process. It consists of guessing, checking, and resizing to meet code and performance expectations. Fortunately, whole numbers are used to select masonry member sizes, so the engineer doesn't need to run extensive analysis to get started.

Selection of the Design Strength

Masonry is composed of units, mortar, and grout. The f'_m specified is the required strength of the combination of these materials. A common incorrect assumption is that the weakest of the units, mortar or grout, determines the system's strength. This is not the case. It is common to have a combination of materials with a strength of 4000 psi, a grout strength of 2000 psi, and a mortar strength of 1800 psi. This is because laboratory or field tests, not in-the-wall tests, define the grout and mortar strengths. Laboratory and field-prepared grout and mortar test samples are cured in conditions quite different from those in the wall. The strengths in the wall are typically much higher.

Mortar and grout compression tests measure the water-to-cement ratio of the mix. In the wall, the units absorb much of the water from the grout and mortar, resulting in increased strength. Think of the unit as a sponge absorbing water. Accepted standards for the field tests of mortar and grout attempt to mimic this effect. The methods used are unreliable. Moreover, field tests of mortar and grout are sensitive to weather, temperature, sampling method, curing, handling, transportation, and testing method (Appendix D).

For this reason, the structural engineer should rely on the prism test as a measure of strength.

Unfortunately, it is rare to obtain prism test data during the design development phase. The masonry code unit strength method provides an alternative to prism testing and is recommended for the initial design.

In accordance with TMS 602, the specified strength of RHCM can be determined from the unit strength by the following equations.

$f'_m = 0.3057 * (the\ net\ area\ strength\ of\ the\ unit) + 480.39$
(Type M or S mortar)

$f'_m = 0.2439 * (the\ net\ area\ strength\ of\ the\ unit) + 487.80$
(Type N mortar)

For RHCM, the structural engineer can assume a design strength of 2,600 psi in most situations. Lower values for the hollow clay masonry are unlikely. Higher values can be obtained if required.

The modulus of elasticity for hollow clay masonry is 700 f'_m psi (for concrete masonry, it is 900 f'_m psi).

Commonly, one building element controls the required masonry strength. Reducing the strength of other elements not requiring the higher strength may or may not result in cost savings.

It is not unusual to change the wall strength or the unit thickness from floor to floor.

Changing the unit color may mean a change in the masonry strength. Consequently, the architect's choice of color may control the strength of the masonry.

Selection of Wall Thickness

Out-of-plane loads will likely control the exterior wall thickness, except for buildings over six stories, where the compression demand may control wall thickness, or in a high seismic zone, where the shear demand may control the wall thickness.



Out-of-Plane

Whether or not the architect has initially selected the wall thickness, the structural engineer will need to estimate the thickness required to resist the loads. A good initial guess can save a lot of design effort. The following table presents typical wall thicknesses for walls controlled by out-of-plane loading. Wind load is usually the controlling load (For 10-inch and thicker walls, seismic may control in high seismic areas).

Typical Height Limits for Out-of-Plane Loading

Nominal Wall Thickness (in.)[3]	Height of Wall (ft.)1.2		
	Normal Application h/t = 24	Common Application h/t = 30	Extended Application h/t = 36
4"	8	10	12
5"	10	12	15
6"	12	15	18
8"	16	20	24
10"	20	25	30
12"	24	30	36

1. h = effective height, t = nominal thickness
2. Wind loading 45 psf with .0025 net area vertical reinforcement. (f'_m = 2600 psi)
3. 10 and12-inch thick units may not be available – check with the manufacturer.

For walls with h/t ratios less than 24, there is significant capacity for compression (load bearing). Moment magnification resulting from out-of-plane deflection (small deflections) will have little or no effect on the design.

For walls with h/t ratios between 24 and 30, the compression capacity is reduced but still significant in most applications. Generally, the moment magnification factor will need to be considered in the design but will have a small effect.

For walls with h/t ratios between 30 and 36, the compression capacity is reduced, and it is necessary to consider moment magnification in the design. Walls in this category often have roof loads accumulating to a point along the wall (roof trusses). In these circumstances, the structural engineer should consider using pilasters (protruding inside, outside, or both) and span the masonry horizontally between pilasters.

Compression

Compression in the wall results from the dead load, live load, snow load, and overturning due to lateral wind or seismic forces.

The compression from dead, live, and snow loads can be easily determined by the tributary area method. The tributary area method requires engineering judgment. The dead and live load from each floor and the dead load, live load, and snow load on the roof are distributed by dividing the floor and roof into the areas between the walls (except in high snow load locations). Live load reduction should be used, and partition loads should be added if required by the code. Don't forget to include the weight of the wall.

Lateral Forces

Initial sizing for in-plane lateral loading is more complicated. Usually, the in-plane loads are due to wind or lateral seismic forces applied to the entire structure (main lateral force resisting system). For a regular geometry (the center of rigidity approximates the center of mass or the center of pressure), the first step is calculating the base shear. For irregular geometry, the first step is to educate the architect about the performance advantages of regular geometry, then determine the base shear.

Wind Base Shear

The base shear due to wind may be estimated as:

$$V_{base} = WA$$

Where W is the estimated average wind pressure on the building (generally, direct pressure on the windward elevation and plus suction on the leeward elevation) and A is the building area exposed to the wind pressure.

Seismic Base Shear

The layout of shear walls for resistance to seismic loads is important. Maintain the symmetry of shear walls. Getting the architect to add a shear wall to provide symmetry can significantly reduce the required design time. It will also improve the resilience of the building. Methods for seismic design of asymmetric geometry are available but require additional effort. Perhaps you should request an additional design fee if symmetry is not approximated.

For Seismic Design Category C and above, TMS 402 requires that along any line of lateral resistance, not more than 20 percent of the lateral resistance can be provided by columns unless the base shear is determined using a response modification factor (R) of 1.5 (not recognized by ASCE 7 or the IBC but the exception is likely within the normal standard of structural engineering care).

The base shear due to seismic can be estimated. Since Reinforced Hollow Clay Masonry buildings normally have a box system that resists seismic forces with shear walls, the estimating procedure is not very complicated. It can be estimated with hand calculations.

The base shear is:

$$V_{base} = C_s W$$

Where W is the seismic weight of the building (including partitions and sometimes snow. See ASCE 7 for the definition of seismic weight).

The value of Cs is determined by:

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}$$

Where S_{DS} is the short period design spectral response acceleration parameter, I_e is the Importance Factor, and R is the Response Modification Coefficient.

R = 5.0 for specially reinforced masonry shear walls (Seismic Design Category A, B, C, D, E, F)

R = 3.5 for intermediate reinforced masonry shear walls (Seismic Design Category A, B, C)

R = 2.0 for ordinary reinforced masonry shear walls (Seismic Design Category A, B, C)

C_s need not exceed:

$$C_s < \frac{S_{D1}}{T\left(\frac{R}{I_e}\right)}$$

Where S_{D1} is the design spectral response acceleration parameter at a period of 1 second.

The building period can be estimated as follows:

$$T_a = .02 h_n^{.75}$$

Where h_n is the height of the building, in feet.

And C_s must be greater than:

$$C_s = 0.044 S_{DS} I_e \geq 0.01$$

And, if S_1 is equal to or greater than 0.6, then C_s shall be greater than:

$$C_s = \frac{0.5 S_1}{\left(\frac{R}{I_e}\right)}$$

Where S_1 is the 5% damped mapped maximum considered earthquake spectral response acceleration parameter at a period of 1 second.

Distribution of Base Shear

The base shear, either wind or seismic, is resisted by the in-plane forces in the building walls. The amount of load in each wall can be estimated as follows.

For flexible diaphragm buildings, the base shear is distributed by the tributary area method. Flexible diaphragm buildings are constructed with wood or metal deck without concrete topping floors and roof. The tributary area method requires engineering judgment. The force in each floor diaphragm is distributed by dividing the floor into areas that split the distance between the walls. The stiffness (rigidity) of the wall is not used.

For rigid diaphragm buildings, the load is distributed to the walls in relation to the relative rigidity of the wall. Rigid diaphragm buildings are constructed with concrete, concrete plank, or concrete over metal deck floors and roof. For these buildings with wall height to length greater than 3, distribute the base shears in proportion to $(H/L)^3$. The stiffness of these walls is dominated by flexure. For walls with (H/L) less than 3, distribute the base shears to the walls in proportion to (H/L). The stiffness of these walls is dominated by shear. The value of H in the equations is the height from the base to the floor being considered.

Shear walls connected by beam elements at each floor or walls with punched window openings are sometimes designed as "coupled" shear walls. If coupled, for rigid diaphragm buildings, the length of the wall can be approximated as the sum of the walls adjacent to the coupling beam element.

Where the coupling beam stiffness is comparable to or greater than the wall stiffness, assume the wall is coupled; otherwise, assume individual walls. If coupled, the coupling beam elements have a small influence on the base shear distribution to the wall elements. The coupling beams, however, significantly affect the overturning moment. More coupling results in a lower moment because the piers and coupling beams act as a frame. This effect can be important for sizing the amount of vertical reinforcement in the wall and selecting the masonry strength.

In high seismic areas, coupling beams over interior and exterior doorways can be a problem. Distortion of the coupling beams prevents the doors from opening and traps the resident in their unit and the building.

Once the axial and shear loads are estimated, the building overturning moment can be estimated by assuming for wind that the lateral load is applied at the mid-height of the wall and for seismic that the lateral load is applied at two-thirds of the height of the wall.

Once the shear and moment are estimated, the following provides a guide for wall thickness when shear governs. This is usually the case when the H/L is less than 3. The values are conservative.

Wall Thickness for Shear

Nominal Wall Thickness (in.)[4]	Approximate Shear Capacity (lb/ft)[3]	
	Wind[1]	Seismic[2]
4"	4,000	2,500
5"	5,000	3,300
6"	6,000	4,000
8"	8,000	5,300
10"	10,000	6,600
12"	12,000	8,000

1. Approximately 2√2600
2. Approximately 2√2600/1.5
   (Factor to increase flexural dominance of a wall)
3. Strength level and fully grouted construction
4. 10 and 12-inch thick units may not be available – check with the manufacturer.

When H/L is high, the overturning moment will often dominate the initial design of the wall. Before developing the finite element model to distribute loads to the wall, an estimate of the wall thickness is needed. One method is to assume the wall consists of two piers, each with 20 percent of the wall length.

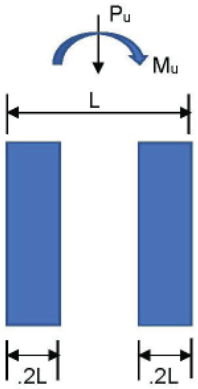


Figure 28 Model for Estimating the Design of a Wall

The axial load is divided between the two piers, and the moment is modeled as a coupled axial load on each pier. Assuming 60,000 psi reinforcement, the tension load is calculated as follows:

$$P_t = \frac{M_u}{.8L} - \frac{P_u}{2}$$

The required reinforcement is estimated as follows:

$$A_s = \frac{P_t}{60{,}000}$$

High strength reinforcement exceeding 60,000 psi yield is currently not allowed for masonry design. The area of reinforcement should appear reasonable for the wall. If not, the wall may need to be longer or more walls are needed.

The thickness of the wall will depend on the compression zone. An estimate of the compression stress can be obtained using the same model.

$$P_c = \frac{M_u}{.8L} + \frac{P_u}{2}$$

$$f_c = \frac{P_c}{.2t_{sp}L}$$

Where t_{sp} is the specified thickness of the wall, and L is the length of the wall. If the compression stress exceeds .64 f'_m , the wall needs to be increased in thickness and/or length.

One wall (or a small percentage of walls) will often not comply using the above initial method. Judgment must be employed to determine if the selected wall thickness is adequate. The above method is usually conservative, and with experience, the degree of conservatism can be readily estimated.

A more refined analysis is required during the construction document phase.

Selection of Beam or Lintel Size

An estimate of a beam or lintel size can also easily be obtained. These elements usually occur over wall openings. To estimate the beam or lintel requirements, first, calculate the applied moment. Normally the maximum moment results from full dead and live to load. If the beam is a shear wall coupling beam, then combined dead load plus seismic load normally controls.

The area of steel can be estimated as follows:

$$A_s = \frac{M_u}{.9F_y d}$$

It is best to use the same size bars in the beam or lintel as those bars used in the wall. Contractors sometimes take bars from the wrong pile. It is good practice to minimize the number of different bar sizes to simplify procurement, job site storage, and reinforcement handling.

Specifications

Specification of Materials

Units

Specify units to conform to ASTM C 652 with the minimum unit net area compression strength determined by the design requirements. ASTM C 652 requires a gross area compressive strength, not a net area compressive strength.

Mortar

Specify mortar as Type S, Portland cement-lime by proportions per ASTM C 270. Do not specify a mortar strength. Do not specify Type M mortar because Type M mortar is too hard and usually causes a crack between the unit and the mortar. For most jobs, masonry cement or mortar cement mortars are allowed by code, but local masonry preferences need to be investigated.

Preblended mortars (proportions of the ingredients are blended by the supplier with water added at the site) are specified per ASTM C 1714/C 1714M. They meet the requirements of ASTM C 270.

Do not use additives in mortar, except colors in accordance with manufacturers' recommendations.

Color additives to mortar generally do not reduce mortar bond strength or compression strength. Most color additives consist of mineral oxides except carbon black, which consists of finely ground carbon. Carbon black (for grey mortars) should be limited to 2% of the weight of the cement. When using colored mortar, follow the recommendations of the color additive manufacturer.

Grout

Specify grout per ASTM C 476 for regular or self-consolidating grout. Specify grout strength (f'g) equal to f'_m but not less than 2,000 psi (required by code). The ASTM C 476 proportions will result in strengths well in excess of 2,000 psi. Lime may be added to the grout. This usually improves the grout properties by increasing the flow and retention of water, resulting in improved placement and bonding to the unit.

Grout is normally placed at a slump of 8 to 11 inches. The high-water content is permitted because the masonry units absorb the water like a sponge before the grout sets.



Figure 29 Fluid Grout

Consolidation and Re-Consolidation

TMS 402/602 requires mechanical vibration of the grout during placement (consolidation) and, at a later time, mechanical vibration to reconsolidate.

Like concrete, mechanical vibration is used during the grout placement to increase the flow and decrease the chance of grout voids. For fluid fine grout, mechanical vibration during placement (consolidation) is likely unnecessary, and a code modification may be requested if performance is demonstrated with a grout demonstration panel.

Reconsolidation is unique to masonry. After the grout is placed in the unit, the unit absorbs water from the grout. Since the water content of the grout is high (8 to 11-inch slump or more), the volume of water removed results in voids in the grout. These voids occur somewhere between 5 minutes and forty-five minutes after the grout is placed. The amount of time depends on many factors, including the absorption of the units, the grout mix, the weather, and the height of the pour.

Reconsolidation is accomplished by placing a vibrator one foot or less into the top of the grout column for each grouted cell. When successfully done, the top of the grout will settle below its previous position, often settling 2 to 4 inches for a single lift and 4 to 8 inches for multiple lift grouting.

In some situations, mechanical reconsolidation of fine grout in small cells may not be necessary. A code modification may be appropriate if performance is demonstrated with a grout demonstration panel.

Self-consolidating grout mixed to a slump flow of 24 to 30 inches, measured in conformance to ASTM C 1611/C 1611M, may be used. For self-consolidating grout, consolidation, and re-consolidation are not required.

Sand

Specify sand per ASTM C 144. Use mortar sand for fine grout. Mortar sand is finer and produces grout that flows better, particularly in 4-inch and 5-inch hollow units. Some sands are composed of rounded granules instead of sharp granules. The rounded sands can be used in grout with less cement and water to obtain equivalent flow compared to grouts with sharper sands. Use only clean, washed sand.

Coarse aggregate for grout

Specify coarse aggregate per ASTM C404. Use only clean, washed aggregate. Coarse aggregate is not allowed in fine grout; either fine regular grout or fine self-consolidating grout.

Cement

Specify cement to conform to ASTM C 150, Types I, II, or III. Do not use air-entrained cement types IA, IIA or IIIA, etc. Low alkali cement reduces the tendency for the masonry to effloresce. If available, they are recommended.

Lime

Specify lime to conform to ASTM C 207. Do not use air entrained lime, as it will reduce the bond strength between the unit and mortar.

Reinforcement

ASTM A 615 Grade 60 reinforcement is normally used. When welding reinforcement, use ASTM A 706 bars. High strength reinforcing with specified yield strengths in excess of 60,000 psi is not currently allowed for reinforced masonry design.

Quality Assurance

IBC and TMS 402 require a minimum level of quality assurance to be included in the contract documents. It is recommended that the minimum quality assurance requirements be included in both the structural notes and the project specifications. The quality assurance program itemizes the requirements for verifying conformance with the specified materials, material storage and handling, and construction execution. It shall also set forth the procedures for reporting and review and include procedures for the resolution of non-compliance.

TMS 402/602 presents three levels of quality assurance. Level 1 is for prescriptive design methods such as veneers, glass block, and partition walls. Level 2 and Level 3 are for engineered masonry design methods that include RHCM. Level 2 is for Risk Categories I, II, or III. Level 3 is for Risk Category IV. Risk categories are defined by ASCE/SEI 7.

The primary difference between Level 2 and Level 3 quality control is that Level 2 allows more periodic inspections or less continuous inspections. The following table summarizes the quality assurance program code requirements with additional recommendations for RHCM. R means required by code. NR means not required by code but may be required for the project. P means periodic inspection. C means continuous inspection.

Quality Assurance Program

		Level 2	Level 3
Before construction			
	Verify masonry strength by prism test or the unit strength method.	R	R
	Verify compliance with mortar and grout specifications.	R	R
	Verify compliance with submittal requirements.	R	R
	Verify the grade and size of reinforcement, connectors, and anchor bolts.	R	R
	Verify and observe the construction of the sample panel, if required.	R	R
	Require a sample grout panel.	Recommended	Recommended
	Require a pre-construction meeting with the mason contractor and others.	Recommended	Recommended
During construction			
	Require verification of masonry strength every 5000 square feet of the wall.	NR	R
	Require verification that preblended mortar and grout meet specifications and submittals.	NR	R
	Require inspection of site-prepared mortar and grout.	P	P
	If self-consolidating grout, verification of conformance to the required slump flow and visual stability index is required.	R	R
	Require inspection of the grade and size of reinforcement, connectors, and anchor bolts to verify conformance to the design.	P	P
	Require inspection to verify the proper placement of masonry units and mortar joint construction.	P	P
	Require inspection to verify the size and location of structural members.	P	P
	Require inspection of the welding of reinforcement	C	C
	Require inspection to verify the type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.	P	P
	Require inspection for protection of masonry for hot and cold weather construction.	P	P
	Require inspection of the preparation of prisms and, if required, the preparation of mortar and grout specimens.	P	C
Prior to and during grouting			
	Require inspection and verification that the size of the grout space meets the specification.	P	C
	Require inspection of the size and placement of reinforcement, connections, and anchor bolts to verify conformance to the design.	P	C
	Require inspection during the placement of grout.	C	C

In addition, the quality assurance program shall also define the qualifications for testing laboratories and inspection agencies. ASTM C 1093 defines the duties and responsibilities of testing agency personnel and the technical requirements for equipment used to test masonry materials. Testing agencies qualified to test masonry are accredited or inspected for conformance to the requirements of ASTM C 1093 by a recognized evaluation authority.

It is recommended that the following be required before construction to conform to code requirements.:

1. A letter of certification provided by the unit manufacturer stating that the units meet the required strength.
2. When the mortar is not site prepared, a letter of certification provided by the mortar supplier stating that the mortar complies with the requirements.
3. When the grout is not site prepared, a letter of certification provided by the grout supplier stating that the grout complies with the requirements.
4. Prism tests per ASTM C 1314

It is recommended that prism tests be conducted during construction and for every 5000 square feet of masonry placed. Mortar and grout should be verified in the field by checking that the proper proportions are used.

Field mortar and grout tests should not be specified. They are unreliable and too variable due to the difficulty in controlling water content.

Designer Choices

Allowable Stress Design versus Strength Design

Allowable stress or working stress design was the traditional design method for hollow clay masonry. Standards and codes are now available for strength design. For some projects, the use of allowable stress design provides some advantages, or the use of strength design provides other advantages. For example, in the current codes, the maximum shear wall flexural reinforcement in ASD is less restrictive than in SD, while ASD does not have the slender wall provisions contained in SD. Care must be exercised when combining the two design methods on the same project.

Fully Grouted Versus Partial Grouted

A fully grouted wall means that all the cells are filled with grout.

Fully grouted walls perform better than partially grouted walls. Fully grouted walls resist water penetration and cracking. Sound transmission is less in fully grouted walls, a property of the wall's mass. The wall is more able to resist freeze damage because there are fewer voids in the wall.

Partial grouting requires blocking the flow of grout into the areas not intended for grout. This adds cost to the wall. However, there is an offsetting decrease in the cost of the grout material. Most contractors agree that it is less expensive to fully grout when vertical bars are spaced closer than 24 to 30 inches on center.

It is easier, and therefore takes less time, to analyze a fully grouted wall than a partially grouted wall.

Multiple Lift Versus Single Lift Grouting

Grout pours equal to or less than 5 feet 4 inches are called Low-Lift grouting. Grout pours that exceed 5 feet 4 inches are called High-Lift grouting. A grout pour is defined as the total height of masonry to be grouted before the installation of additional masonry. A grout pour consists of one or more grout lifts.

Grouting methods may be considered the contractor's means and methods and not part of the design. However, grouting methods may impact the cost and performance of a masonry wall and may be part of the designer's choice.

In hollow clay masonry, it is advantageous to use High-Lift grouting. When demonstrated with a grout demonstration panel, grout pours with heights exceeding 30 feet have been successfully accomplished. High-Lift grouting will typically have fewer voids. The reinforcement requires fewer or no splices and therefore costs less. Generally, the grout quality improves with the increased placement volume. For these reasons, it may be appropriate for the engineer to specify High-Lift grouting methods. Otherwise, the decision can be left to the contractor.

For highly stressed walls where reinforcement and grout placement are important, it is recommended that the structural engineer specify the grout pour heights and the lap locations in the wall. Where congestion of reinforcing is a concern, staggered laps and/or mechanical splices may be specified by the designer.

To verify the materials and procedures before construction, the structural engineer can recommend to the client that they specify a grouting demonstration panel. This demonstration panel is a sample of the wall built before construction and is often used as the visual mock-up. The architect, engineer, inspector, building official, owner's representative, and the general contractor should witness the grouting demonstration. Several days after the grouting, the panel can be cut open to expose the grouted cells and assess the quality of the materials and the process.

Clean-outs

Clean-outs are access ports at the bottom cell of the grout pour for access to removing mortar droppings. Mortar droppings can prevent the grout from bonding to the surface at the bottom of the grout pour. The mortar droppings cause a weak plane to resist shear forces. For partially grouted walls, clean-outs are installed at each reinforced cell. For fully grouted walls, clean-outs are spaced not less than 32" on center.

The Code requires clean-outs if the grout pour exceeds 5 feet 4 inches.

Where the in-plane or out-of-plane shear stress is less than 15 psi when using only the face shell area, clean-outs may not be necessary. The grouted cell area is not required to transfer the load. This is often the case for long walls.

To eliminate the clean-out requirement, it will be required to ask for a building code variance from the building department.

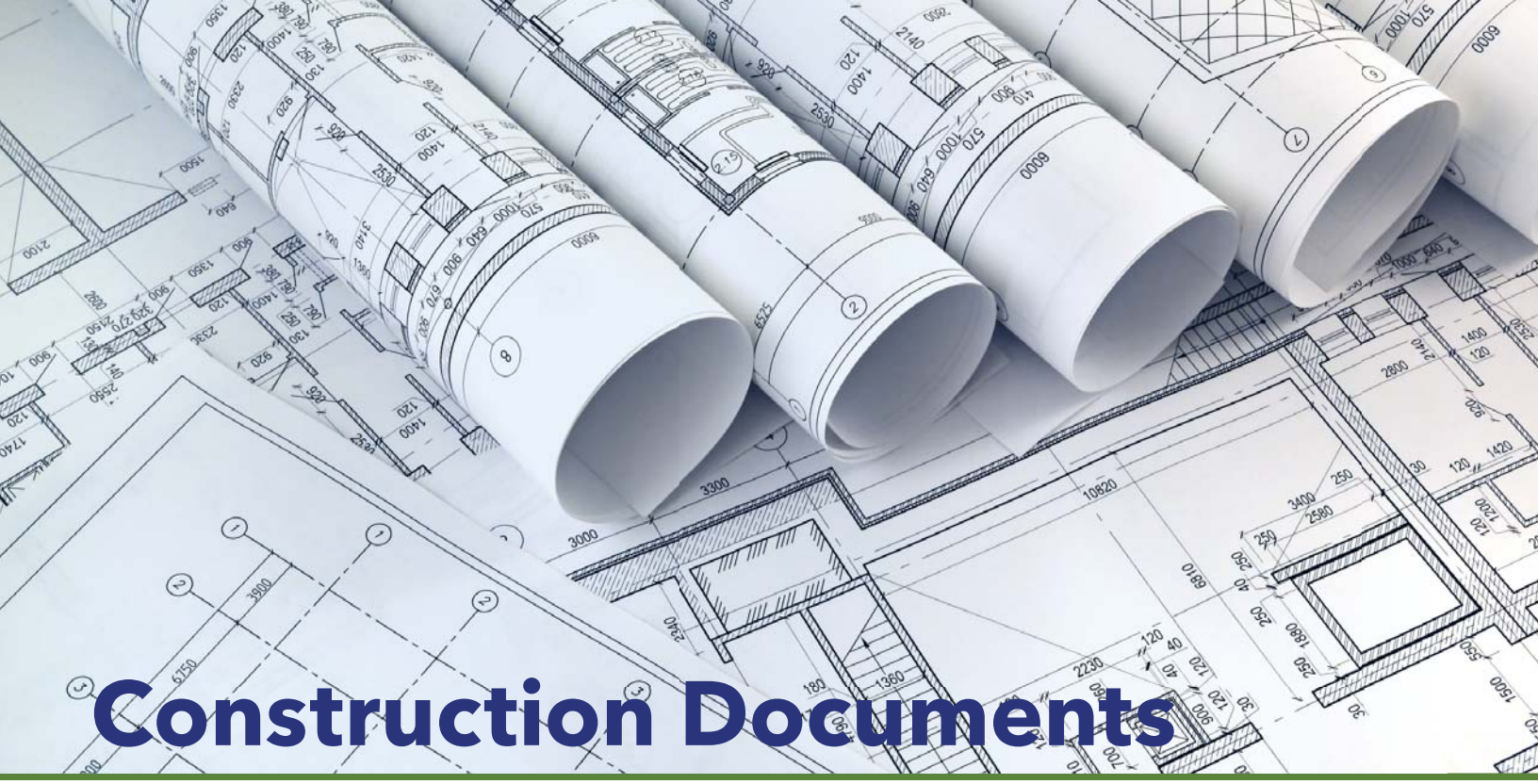
With or without clean-outs, mortar droppings should be minimized through good construction practices. Contractors can reduce droppings at the bottom of the wall by placing sponges in the cells and pulling them up as the wall is constructed. The sponges collect the mortar droppings that would otherwise need to be cleaned out at the bottom of the wall.

Horizontal Joint Reinforcement Versus Bond Beams

When horizontal reinforcement is required to resist shear forces, use bond beams. There is more confidence in the placement of bars in a bond beam than with the placement of horizontal joint reinforcement in the bed joint. This is because it is common for the joint reinforcement to be laid on the unit before the bed joint mortar is placed. The result is a void underneath the wire. It is also not unusual for the wires to be placed without lapping (butted ends). The result is incomplete embedment and development of the steel. The "butting" of horizontal joint reinforcement is a common practice in non-structural masonry and veneer. The mason may not understand the difference or importance. If joint reinforcement is used, it is recommended to require full-time inspection for its placement.

When horizontal reinforcement is not required to resist shear forces, horizontal joint reinforcement may be satisfactory and could save cost. If used, joint reinforcement must be galvanized. It is placed in the mortar joint with limited cover and must be protected from chemical attack and carbonation. Flattened or oval wire used in horizontal joint reinforcement is available in some markets. It is used to help satisfy the code wire size limitations (the wire diameter, height, cannot exceed half the bed joint height).

It is recommended that horizontal reinforcement be placed in bond beams continuously at the window sill, window and door head, and at each floor. Additionally, at least one No. 4 bar should be placed at each window and door jamb. This recommendation is for the generally good performance of the wall even when not required by code.



Construction Documents

During the construction document phase, the architect prepares the contract documents consisting of drawings and specifications set forth the detailed requirements for the construction of the project.

During the construction document phase, the structural engineer prepares the contract documents for the primary structural system consisting of drawings, including structural notes and sometimes the structural portion of the specifications.

Preparing construction documents includes structural design, analysis, drawing preparation, and writing or reviewing specifications. Each part of this process proceeds simultaneously, and they are interrelated.

Structural Analysis

Following the preliminary sizing of the primary structural elements, the global loads applied to the building are distributed to the primary structural elements. The loads are distributed to each element by methods that have become customary in structural engineering. There are several commonly used software programs available for this purpose. Stairs and ramps that are not isolated, while seldom constructed of masonry, resist wind and lateral seismic loads and must be included in the model accordingly.

For RHCM shear wall buildings, if the finite element model is used, wall expansion joints, if any, need to be modeled. If there are intersecting walls, the structural engineer needs to recognize that due to warping effects, the structural elements will have axial loads and moments resulting from torsion on the system. The design may be simplified by not connecting intersecting walls in the model. Reinforcing details can be simplified, but the overall resilience of the building is reduced. For seismic design, if the mass of the walls is included with the floors or roof, then diaphragm loads will be overestimated.

Once the loads on the walls, columns, and elements are known, the elements can be checked to ensure conformance with acceptable standards. The building code is a minimum acceptable standard. The design may or may not require a higher standard than the building code. The structural engineer should communicate options for increasing the resilience above the code minimum to the architect and owner.

A detailed discussion of the structural analysis procedures is contained in many excellent references. The following paragraphs present information commonly encountered during the structural analysis and design of RHCM structures. Appendix B provides a checklist for the design of RHCM.

Design Assumptions

The analysis for determining the strength of RHCM elements is very similar to that used to check the strength of reinforced concrete elements. Standard assumptions for strength design are:

1. Plane sections before bending remain plane after bending.
2. Masonry components (units, mortar, and grout) combine to form a homogeneous member.
3. Masonry carries no tensile stresses.
4. Reinforcement is completely surrounded by grout and bonded to the masonry materials, so they work compositely as a homogeneous material in the range of working stresses.
5. The building code limits the yield strength of reinforcement to 60,000 psi.
6. The maximum usable strain in clay masonry is 0.0035 (It is 0.0025 for concrete masonry).
7. The compression stress block height is 0.80 f'_m for a distance of 0.80 times the distance from the extreme compression fiber to the neutral axis.

Additionally, for ease of design, the following recommendations are made for the area of masonry to be used in resisting the loads.

1. For partially grouted RHCM walls, it is recommended and conservative to use the face shell area of the unit as the shear design area. For partially grouted RHCM, the code allows shear areas to be increased by counting the grouted cells, but the advantage is usually small. Also, for partially grouted walls, the nominal shear capacity is reduced by a factor of 0.70.
2. For fully grouted (sometimes referred to as solidly grouted) RHCM walls in running bond, the design area is the gross cross-sectional area of the masonry. The area of cores (most hollow clay masonry units have cores) or the void at the head joint when the masonry is laid with only face shell bedding is not subtracted from the gross area.
3. For beams with compression on the head joint and the requirement of full bedding of the head joint is not made, the design area is the face shell area for shear and flexure. This is because the head joint is filled to the face shell's depth, not the unit's full thickness. If bond beams or open-end units are used, then the design area would be the full thickness of the unit.

General

There are provisions of the code limiting the design:

1. Vertical conduits, pipes, or sleeves shall not exceed 2 percent of the net design area.
2. Pipes or conduits containing liquids, gas, or vapors at temperatures above 150 degrees Fahrenheit, pressure greater than 55 psi, or water or other liquids subject to freezing shall not be placed in the masonry.

Walls

For out-of-plane bending, the effective width "b" of the compression block is the lesser of:

1. The distance between bars.
2. In running bond, six times the nominal thickness.
3. In stack bond, the unit width.

If partially grouted, the compression area of the wall (distance to the neutral axis) needs to exclude cells not grouted. This can lead to a more complicated analysis to determine capacity.

For in-plane bending, "b" is the thickness of the wall if fully grouted. If partially grouted, the face shell area is recommended to be used. Using b as the two-face shell thicknesses is conservative.

For in-plane bending, the effective width of intersecting walls differs for compression and tension. For compression, the code allows the flange width to be 6 times the nominal thickness on each side of the intersecting wall; for tension, the maximum is 0.75 times the floor-to-floor height.

Walls Flexure Plus Compression

Flexure plus compression occurs for walls resisting lateral forces from wind or seismic loads. Software is available for checking a wall loaded with combined flexure and compression. Or, create your own. Dead load reduces the required reinforcement area when the tensile moment capacity limits an element. When intersecting walls occur, analysis can be complicated. Don't forget to include the dead load of the wall in your analysis.

For walls with a height to a nominal thickness greater than 24, second order or moment magnification effects should be considered.

Shear Walls

For shear walls resisting seismic forces, there are code-specified reinforcement requirements. For RHCM, the choices of shear wall types are Detailed Plain, Ordinary Reinforced, Intermediate Reinforced, and Special Reinforced.

The minimum reinforcement required for a Detailed Plain shear wall is shown below. Detailed Plain shear walls are only allowed in Seismic Design Categories A and B and are designed as unreinforced masonry.

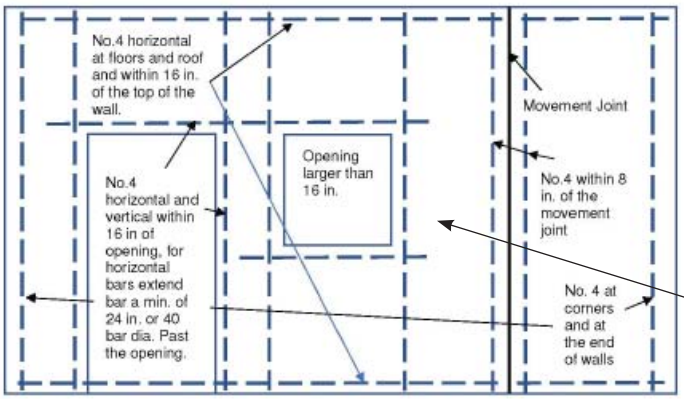


Figure 30 Minimum Reinforcement for RHCM

If your project is a Seismic Design Category C project, then Ordinary Reinforced shear walls, Reinforced Intermediate shear walls, or Special Reinforced shear walls are required. Ordinary Reinforced shear walls have the following additional requirements.

Ordinary Reinforced Shear Wall:

1. Reinforced masonry design is required.
2. Maximum spacing of vertical reinforcement is 120 inches.
3. Maximum spacing of horizontal reinforcement is 120 inches.

Intermediate Reinforced Shear Walls has the following additional requirement:

1. Maximum spacing of vertical reinforcement is 48 inches.

If your project is a Seismic Design Category D, E, or F, then Special Reinforced shear walls are required. Special Reinforced Shear Walls have the following additional requirements:

1. The maximum spacing of vertical reinforcement is smaller than 1/3 the height of the wall or 1/3 the length of the wall or 48 inches. For stacked bond masonry (less than ¼ the length of the unit overlapping), the maximum spacing is 24 inches.
2. The maximum spacing of horizontal shear reinforcement must not exceed 1/3 the height or length of the wall. For walls of short length, this can present a problem. For example, a wall consisting of a single stretcher (12-inch length) between windows will require horizontal reinforcement at 4 inches on center, or for 4-inch height units, every unit is a bond beam. In this situation, it may be best to isolate the element from the seismic resisting system. Another possible solution is a displacement compatibility analysis to demonstrate that the element can withstand the required displacements.
3. Maximum spacing of horizontal reinforcement for running bond is 48 inches and 24 inches for stack bond.

4. The sum of vertical and horizontal reinforcement must exceed .002 times the gross cross-section using specified wall dimensions, with a minimum vertical or horizontal reinforcement equal to .0007 times the gross cross-section using specified dimensions. The minimum horizontal reinforcement required for stack bond masonry is .0015 times the gross cross-section using specified dimensions.
5. Stack bond masonry must be fully grouted and use open-end units. Open-end units only need to be open on one head joint for the grout to bond to the next unit.
6. If the shear demand to only the masonry shear capacity ratio (not including the reinforcement capacity) is more than 0.40, 180-degree hooks around the vertical reinforcement at the end of the wall are required. Engineering judgment is required, and a rule of thumb is that if the shear walls' height-to-length ratio is less than 1, hooks will likely not be required.
7. The design shear capacity shall exceed a shear corresponding to 1.25 times the nominal flexural capacity but not exceed 2.0 times the factored shear demand. This provision is intended to enhance flexural ductility by increasing the wall's shear capacity.

Also, in E and F, there is an additional reinforcement requirement for walls that are not shear walls or non-participating walls.

For more detailed information on the design of Special Reinforced Masonry Shear Walls, see *Seismic design of specially reinforced masonry shear walls: A guide for practicing engineers*, NIST GCR 14-917-31, prepared by the Applied Technology Council for the National Institute of Standards and Technology, Gaithersburg, MD.

Columns

There are special code provisions for columns:

1. The distance between lateral supports of a column cannot exceed 99 times the radius of gyration of the column in the direction of support.
2. The minimum side dimension cannot be less than a nominal 8 inches.
3. The minimum number of longitudinal reinforcement bars is 4.
4. Columns must be fully grouted.
5. The area of vertical reinforcement must be greater than 0.0025 times the net area of the column and not more than 0.04 times the net area of the column.
6. The effective height of a column can be taken as the distance between inflection points. But it is recommended to use the unsupported height. For cantilevered columns, use twice the unsupported height.
7. Lateral ties of at least ¼ inch diameter shall enclose the vertical reinforcement. Spacing shall not exceed 16 longitudinal bar diameters, 48 tie diameters, or the least cross-sectional dimension of the column.
8. If allowable stress design is used, the code requires a 10% eccentricity axial load in the column. For strength design, the eccentricity is accounted for in the code equations.
9. In seismic design category C and above, when anchor bolts are used at the top of a column to connect to horizontal elements, adding two No. 4 ties within 5 inches of the top of the column is required.
10. In seismic design category D and above, lateral ties must be spaced at less than 8 inches on center and be 3/8 inch in diameter or greater.
11. In seismic design category C and above, along a line of lateral force resistance, not more than 20 percent of the resistance may be provided by masonry columns. This requirement is overly restrictive and without justification for buildings such as a single-story firehouse where one of four walls has garage door openings separated by columns. There is no reason that the columns property detailed cannot exhibit adequate ductility to accommodate seismic displacements.

    The masonry code offers an exception, but only if designed for an R of 1.5. ASCE/SEI 7 does not recognize this exception. It is not addressed in the IBC. If it is not clear which code applies, check with the authority having jurisdiction.

Placing a bearing pad, allowing lateral displacement while supporting the axial load, could be an option. Another option is to use a concrete or steel column and a brick veneer or a reinforced veneer surround.

Another possible solution is a displacement compatibility analysis demonstrating that the element can withstand the required displacements.

Fortunately, in seismic design categories A, B, and C, the code provides an exception to these restrictive column requirements for lightly loaded columns. Lightly loaded columns are defined as columns with an axial load not exceeding 2000 lbs. The requirements are only an 8-inch minimum dimension, fully grouted, more than 0.2 square inches of reinforcement, and not to exceed a height of 12 feet.

Pilasters

The code definition of a pilaster is a vertical member built integrally with a wall, with a portion of its cross-section typically projecting from one or both faces of the wall. The word typically is inserted in the definition because, in some applications, a pilaster is contained within the wall, not projecting from either side.

For the intersecting wall to be considered part of the pilaster, it needs to be connected to the pilaster element by one of the following.

1. At least 50 percent of the masonry units interlock.
2. Walls need to be anchored by steel connectors.
3. Intersecting reinforced bond beams spaced less than 48 inches on center.

The effective width for compression will depend on the pilaster's geometry and the moment's direction. The effective width is generally the same as that for intersecting walls. For compression, the code allows 6 times the nominal thickness of the intersecting wall; for tension, the maximum is 0.75 times the floor-to-floor height. When the pilaster projects from one side of the wall or unevenly on both sides of the wall, the effective width, if any, will be different depending on the direction of the moment.

When the height divided by the radius of gyration (generally equal to .288 times the thickness) exceeds 99, second-order or moment magnification effects need to be considered. This will need to be considered for both moment directions.

Bar laps and Embedment

The Code provides methods for the design of bar laps.

Alternatively, use 48 bar diameters for grade 60 reinforcement. This is conservative for RHCM units of nominal 8 inches or less for number 6 bars or less and placed at the center of the wall. For number 7 bars in 8-inch units, it is unconservative by about 10 percent.

Whenever possible, it is recommended that laps do not occur where the stress in the bar approaches the yield stress. If the stress in the bar exceeds 80% of the yield stress (48,000 psi for grade 60 bars), it is recommended to increase the lap length to 72 diameters, although not required by code.

Deflection

Deflection calculations are approximate. This results from the uncertainty about the value of the elastic modulus and the distribution and depth of cracking throughout the section. Fortunately, it is uncommon for a masonry element to be limited or sized based on the expected deflection. When deflection calculations are required, such as when height-to-thickness ratios are high, the methods presented in the building code give some indication of the deflection magnitude. The IBC provides deflection limits for exterior and interior walls with various surface finishes.

Maximum Bar Size

There are building code limitations on the sizes of reinforcement. No. 11 bar was recently allowed, but some previous codes limited the size to a No. 9. The nominal bar diameter cannot exceed one-eighth the nominal unit thickness. The maximum reinforcement in a cell is limited to 4 percent of the cell area or 8 percent with splices. The maximum diameter of the reinforcement shall not exceed one-third of the minimum dimension of the gross grout space. Additionally, there are minimum grout cover requirements for the space between the edge of rebar to the edge of the grout cell of ½" and ¼", for coarse grout and fine grout, respectively. The following table presents the typical maximum bar size for the hollow clay units. However, the cell areas vary somewhat from manufacturer to manufacturer, and dimensions should be verified on each job.

Maximum Bar Size by Cell Size

Unit Thickness (Nominal)[2]	12" Long Units		16" Long Units	
	Cell Size (Width x Length)	Max. Bar Size #	Cell Size (Width x Length)	Max. Bar Size #
4"	1 3/4 X 3 1/2	4[1]	1 3/4 x 3	4[1]
5"	2 1/2 X 3 1/2	5[1]	2 x 5	5[1]
6"	3 1/2 X 3 1/2	6[1]	3 x 5	6[1]
8"	5 X 3 1/2	8[1]	5 x 5	8[1]
10"	6 3/4 X 3 1/2	10[1]	6.5 x 5	10[1]
12"	8 1/2 X 3 1/2	11	8 x 5	11

1. Controlled by one eight of the nominal unit thickness.
2. 10 and 12-inch thick units may not be available – check with the manufacturer.

Retaining Walls

Failure of retaining walls constructed of concrete, masonry, and other materials occurs frequently. Carefully analyze the soil information (have a soil report, if not, then require one), and use proper analysis methods (it can get complicated). It is recommended to place the reinforcement in the center of the cell, not offset. Many failures are traceable to the contractor placing the bars on the wrong face of the wall. The added reinforcement costs are usually small.

Bearing, Bolts, and Shear Friction

The Code provides a design method.

Drawing Preparation

Layout

The following figure presents a typical layout of the structural drawings for a building project.

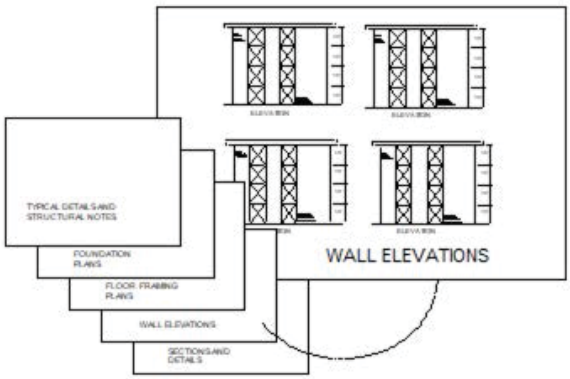


Figure 31 Recommended Drawing Layout

When RHCM is used, it is normal to prepare elevations of each wall. This may appear to be an unnecessary level of drawing detail, but experience indicates that it saves time and effort in the long run. Wall openings, expansion or movement joint locations, and reinforcing should be shown or called out on these elevation drawings. Tabulating reinforcement requirements has not proven to be a very successful method of communicating the design to the mason.

Provide a detail that shows the hollow clay unit dimensions so that the reinforcement detailers have the information to lay out the reinforcement. Additionally, expansion joints should be shown and coordinated with the architect's drawings.

Structural Notes

The structural notes are placed on the drawings to define applicable codes, loads, design assumptions, materials, and inspection requirements. Often this information is redundant to the project specifications. However, the project specifications often become lost with time. The structural notes will stay with the drawings and become useful information for some future users.

In some states, the structural notes take precedence over the specifications. In other states, the reverse is true. The architect's specification and the structural notes should state which takes precedence over the other.

The structural engineer should check the architectural specification to eliminate conflicts with the structural notes.

Details

RHCM can generally be treated like reinforced concrete, except the bond strength between the mortar and a unit is a plane of weak tension capacity. The head joints are particularly susceptible to low tension and shear capacity, and it is appropriate for the designer to assume zero tension and shear capacity for the head joint. This is important for the design of masonry connections. It is recommended that larger scale or more frequent connections be made than are typically used in reinforced concrete.

Unit dimensions restrict reinforcement spacing. Vertical bars need to be spaced to match the cell spacing, and horizontal bars need to be spaced at dimensions matching the unit height. Diagonal bars should not be used. Placing vertical bars that are 16 inches on center for a 12-inch hollow clay brick, with cells at 6 inches on center, will be generally viewed as a design error.

RHCM is normally supported on concrete or steel. The detail of the connection between the concrete or steel and the masonry is affected by the control of water and the transfer of forces. Where the exterior masonry is supported on a concrete floor or slab, it is often desirable to recess the concrete.

Water and Flashing

Water seldom completely penetrates a reinforced hollow clay wall. Instead, it enters the face of the wall and travels downward through open cells or small voids in the grout and mortar. Fully grouted walls are less susceptible to water penetration. The inside face of the wall may become damp; however, it is unusual for water to disengage from the brick or flow on the inside surface.

For this reason, the base or bottom of a wall requires flashing or another method to direct water to the exterior. The water traveling downward through the brick should be intercepted and directed outside the building. A lintel over the top of a window or door is considered a bottom of the masonry and therefore requires flashing or appropriate window head design.

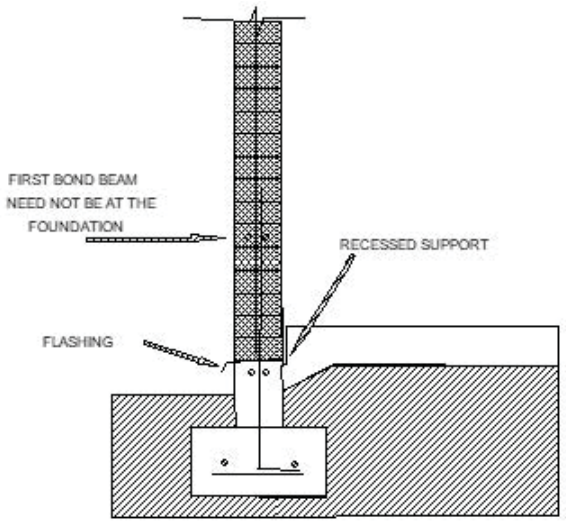


Figure 32 Wall to Foundation Detail

There are many acceptable flashing materials available. The architect should select the flashing. For the structural design, all commonly used flashing materials provide sufficient friction capacity to transfer shear loading. However, dowels will need to penetrate the flashing to transfer the shear load. Shear transfer tests indicate that the organic flashing materials transfer load better than the metal materials. This is probably because the organic materials mold to the roughness of the concrete and mortar more than the rigid material.

The code provides a method to analyze the capacity using shear friction.

Connections

Floor and roof connections to walls can take many forms. They are similar to connections to concrete walls, except the designer has more flexibility because the units are laid one at a time. Consider using embeds to connect ledgers.

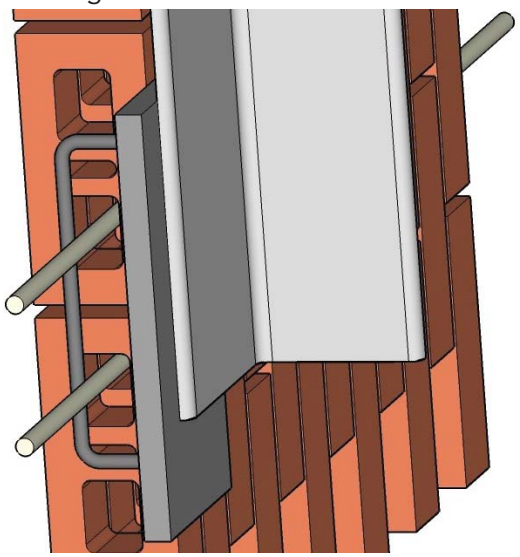


Figure 33 Embed Plate for a Ledger Connection

Movement Joints

Movement joints are challenging design item. In addition to normal thermal expansion and contraction, brick expands permanently with moisture. This permanent volumetric change is called irreversible moisture expansion and differs from concrete or CMU irreversible shrinkage and cyclic moisture expansion and contraction. Irreversible moisture expansion of brick occurs only once over an extended period of time. It does not reverse.

After the brick is fired, there is no moisture in the brick. When placed in the environment, the brick absorbs moisture through exposure to the atmosphere containing humidity or by direct contact with water. As the brick absorbs moisture, the brick irreversibly expands. The amount of permanent, irreversible expansion depends on the type of clay. The length of time required depends on the clay and exposure. The vast majority of the permanent expansion occurs between one and five years after production. TMS 402 provides a value of 0.0003 inches per inch or 3/8 inches per 100 feet for irreversible moisture expansion. This value is typically used for design. Movement joints

related to the inherent expansion of the clay brick are called expansion joints. Expansion joints are important to the performance of unreinforced clay masonry. For reinforced hollow clay masonry with horizontal reinforcement, expansion joints are less important and often are not required. As the brick expands, the reinforcement resists the expansion. The result is that the reinforcement is placed in tension, and the brick is placed in compression. The consequence is less cracking. Nevertheless, placing expansion joints at 100 feet or less is common practice.

If the wall length exceeds 20 feet, expansion joints should also be placed on one side of a corner, near the corner. Without a corner expansion joint, the expansion of the brick in the wall results in flexural stresses in the brick on the other side of the corner and may cause a crack.

Movement joints other than expansion joints may be needed to accommodate differential movement at interfaces between dissimilar materials or systems, or changes in supports or steps in foundations, or at wall intersections, depending on the design assumptions related to load transfer between walls.

Another requirement for expansion joints occurs when a brick becomes confined by another material. The following figure shows an example of hollow clay confined in a concrete frame.

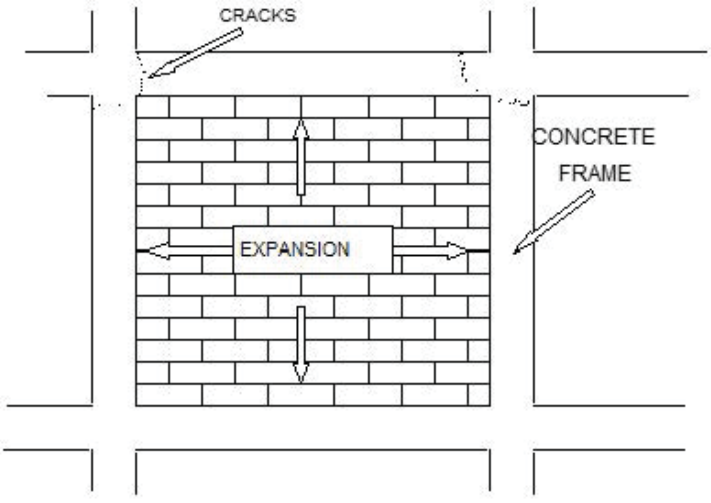


Figure 34 Brick Masonry in a Concrete Frame

Specifications

Specifications are normally prepared by the architect and reviewed by the structural engineer.

Consider including:

1. Require the mason subcontractor to prepare or oversee the preparation of reinforcing shop drawings. The shop drawing preparer should be familiar with reinforced hollow clay masonry design and construction. Concrete reinforcement detailers generally do not have an appreciation for the construction sequencing and dimensional constraints for masonry.
2. Require the water repellent to be the responsibility of the mason subcontractor. This provides a single source of responsibility in the event of problems.
3. On a large project, require a grout placement demonstration test on a sample panel prior to construction. With adequate planning, the visual mock-up panel can be used for this purpose.
4. Limit the choice of mason contractors to those experienced with the construction of RHCM. Reserve the ability to disqualify the contractor based on past performance.

The designer can influence the selection of the mason contractor through the specifications. It is recommended that the following criteria be considered in the section:

(a) Require the contractor to employ experienced masons.

(b) If available, require the mason contractor to be a member of a local masonry institute. Call the institute or the material supplier to check the contractor's qualifications or provide a list of qualified bidders.

(c) If possible and where available, require the mason to have appropriate training and be certified by the local masonry institute or council or association.

(d) Require masons who have been trained by the International Masonry Training and Education Program, of the International Masonry Institute.

5. Require a preconstruction conference.
6. Require methods other than shovel count to control proportions for mortar and grout.

7. If site mixed mortar is used, require the sand pile to be protected from rain, snow, and dust. Require the walls to be protected from rain, snow, and freezing for a minimum of 7 days after construction.

   The best practice may be to require preblended, pre-bagged mortar to maintain uniformity of material properties and color.

   Require the mason contractor to cover the wall at the end of the day. The purpose is to prevent rainwater from entering the masonry and developing water paths through the fresh mortar and grout. If not covered, the likely result is a wall that leaks and effloresces.

8. Require hot and cold weather protection. Code provisions may not be adequate. For example, in the Pacific Northwest, winter rain followed by a sudden freeze may damage the masonry.
9. Require inspection prior to grouting and during grouting.
10. Consider requiring self-consolidating grout.
11. Place a table of tolerances on the plans or include one in the structural notes. The code defines placement tolerances for reinforcement in terms of the design parameter “d”. Unfortunately, the mason contractor has no idea what “d” is.
12. Require the mason contractor to submit a written quality control program for the masonry construction.
13. For the installation of foundation dowels, provide an option to use post-installed anchors.



Construction

The project's construction phase begins with the publication of the construction contract for bidding. During the construction phase, the architect is the owner's representative and advises and consults with the owner. Instructions to the contractor are forwarded through the architect.

During the construction phase, the structural engineer advises and consults with the architect as necessary and when requested. The structural engineer responds to bidders' questions about the design. Once the contract is awarded, the structural engineer reviews submittals by the contractor of items designed by the engineer or other items affecting the engineer's design. The engineer makes periodic site observations to ensure that the contractor is in general conformance with the intent of the structural design.

A reinforced hollow clay masonry project requires about the same effort during the construction phase as other structural systems. However, there are a few unique situations. This section describes some of these situations.

Bidding and Award

The mason contractor is normally a subcontractor to the general contractor. During bidding, the general contractor will typically take bids or cost estimates from more than one mason subcontractor. During this period, the engineer will likely receive requests to clarify the contract documents.

The structural drawings show the design concept for the project. They are not detailed construction drawings. It is likely that during the bidding process, the contractor will find some missing information or contradictory information on the drawings. This is normal, and it is normal to receive questions about the design during the bidding period.

Often the mason contractor does not supply the reinforcement for the project. Instead, the general contractor supplies it. The engineer should become aware of who will supply the reinforcement. It will have some influence on how the project proceeds.

Moreover, most mason contractors do not prepare shop drawings for reinforcement. Thus, the responsibility

for providing an adequate set of shop drawings can become lost in the bidding process. The general contractor thinks the mason will prepare the shop drawings and the mason thinks the general contractor will prepare the shop drawings.

Experience has shown that the best performance occurs if the mason contractor purchases the reinforcement and supplies the shop drawings. However, some mason contractors may bid high or even not bid at all due to this requirement. The resulting cost pressure may require the engineer to be flexible about the requirement for shop drawings and their preparation.

Sometimes the general contractor will supply the shop drawings using his concrete reinforcing detailer. Unfortunately, the detailer may have limited experience with masonry (their expertise is concrete), and the drawings are often full of errors or items that cannot be constructed. An example is when the shop drawing shows bars spaced at 8 inches on center for a RHCM unit with a 6-inch module.

Submittal Review

Items submitted for review include the following:

1. Mortar proportions and laboratory test:

   The mortar submittal is usually submitted by Type (Type M, S, or N). This is satisfactory, provided the proportions are used to define the type, not strength.

   The contractor may submit by strength. In this case, laboratory tests should be performed to verify the strength of the mortar.

   Preblended dry mix mortars require submittal to verify conformance with ASTM C1714.

2. Grout proportions:

   The grout submittal is usually submitted by Type (fine or course). This is satisfactory, provided the proportions are used to define the type, not strength.

   If the design f'_m exceeds 2,000 psi, laboratory testing is required by the most recent TMS 602 to verify that the grout strength equals or exceeds f'_m. Testing is in accordance with ASTM C 1019.

   For batch-provided grout, the proportions are normally described by weight. The weight proportions should be converted to volume proportions for comparison with ASTM C 476. An example calculation of an actual grout submittal on a project follows:

Example Calculation of Volume Proportions from Weights

Item	Batch Weight (Lbs)	Conversion to Volume (Lbs/cu. ft)	Volume (cu. ft)	Proportions (by volume)
Cement	658 or 7 sacks	94[1]	7.0	1
Lime	50	40[2]	1.25	.18
Sand	2143	80[3]	26.8	3.8
Aggregate	1009	105[4]	9.6	1.37
Water	260	62.4	4.17	.6

1. 94 lbs per bag
2. One 50 lbs bag is 1 1/4 cu. ft
3. ASTM C-476 specifies 80 lbs per cu. ft for loose, damp sand (5% moisture). Dry sand weighs approximately 100 lbs per cu. ft.
4. Dry-rodded unit weight obtained from the supplier

A comparison ASTM C 476 is given in the following table.

Comparison to ASTM C 476

Item	ASTM 476	Mix
Cement	1	1
Lime	.1	.18
Sand	2.5-3.3	3.22[1]
Aggregate	1.1-2.2	1.16[1]
1. Proportions of cementitious material include both cement and lime		

The sample mix design does not comply. However, the mix design was accepted on this project because of past experience with the proportions where the additional lime in the mix improved flow while maintaining strength. ASTM C 476 allows proportions of the grout ingredients to be determined by laboratory testing or field experience if a satisfactory history of the grout mix performance is available.

3. Unit certifications:

   If the Unit Strength Method was used to establish f'_m, the structural engineer should specify that the brick supplier submits a letter stating that the bricks meet the required compressive strength.

4. Reinforcement shop drawings:

   These should be scheduled to provide sufficient time for review and resubmittal prior to construction. However, reviewing the submittal is necessary to verify that the contractor understands the design correctly. If enough time is available, re-submittal is possible without costly delays.

5. Miscellaneous metal shop drawings:

   Where miscellaneous steel connections and embedded items are included in the design, shop drawings need to be submitted with sufficient time for review.

6. Quality control program:

   TMS 402-22 requires the construction documents to include a written quality control program. A conforming quality control program should be written by the mason contractor and submitted in time for review and discussion with all involved including the inspector and general contractor.

Pre-Construction

Once the general contractor and the mason subcontractor have been selected, the engineer may verify their qualifications with the local masonry institute and material suppliers. This information will help determine the time and effort needed during construction.

At an appropriate time, usually, at least two weeks before the start of masonry construction, arrange for a preconstruction conference to discuss the masonry construction. Attendees should include:

1. The mason contractor and foreman.
2. The general contractor and superintendent.
3. The building official.
4. The architect.
5. The special inspector, when required.
6. The structural engineer.
7. The owner's representative.
8. The brick supplier or designated representative.

Subjects for discussion include:

1. Brick:

   Determine the availability and delivery schedule of the selected brick. If the unit strength method is used, verify that the brick will meet the required strength.

2. Initial testing:

   If the unit strength method was used to establish the design strength f'_m, mortar, grout, and prism testing prior to construction are not required. However, prism tests prior to construction are recommended.

   As a minimum, unit testing or manufacturer's certification is required. If a grouting test panel is to be used, define the schedule. The engineer, building official, and the special inspector should be present for the grouting demonstration. Often the grouting demonstration panel can also be used by the architect as a color and quality control panel.

3. Testing during construction:

   For risk category I, II, and III buildings, prism testing is recommended, but not required by code, for every 5,000 square feet of wall. For risk category IV buildings, prism testing is required for every 5,000 square feet of wall. Prior to construction, five prisms constitute a test. During construction, three prisms constitute a test. However, five are recommended during construction. Test the first one at seven days, the next three at 28 days, and hold the final sample for testing in case of a problem.

4. Inspection:

   The inspector should regularly check the batching of mortar and grout to ensure proper proportions or that the supplied preblended dry mortar mix meets the specifications and that the proper amount of water is added. The inspector should regularly check the laying of units to ensure proper workmanship. Continuous inspection during the placement of grout is required. The inspector should verify and ensure full compliance with the contract documents for the placement of reinforcement, grouting, consolidation, reconsolidation, top of the wall shear key, and the protection of the masonry from rain, dirt, and cold and hot weather.

5. Observation:

   Inform all participants that, from time to time, the engineer will visit the site to ensure general compliance with the contract documents.

6. Inspection Reports:

   Normally, special inspection and test reports and inspection reports go to the general contractor and the architect and then to the engineer. Deviations from this normal procedure should be discussed, defined, and documented.

7. Submittals:

   Verify that the contractor is using the approved project submittals.

8. Cleaning and Sealing:

   The procedures to clean and seal the masonry with water repellant should be discussed. It is important that the mason contractor verify the cleaning method with the unit manufacturer. If the wall is to be sealed with a water repellant, the method and materials to be used should also be verified with the brick manufacturer.

   Proper sealers do not seal the wall. The masonry must breathe. The sealers are actually only water repellents.

9. Construction Sequence and Schedule:

   Discuss the schedule for inspection and testing. Discuss coordination issues. One usually missed item is the coordination with the window and door supplier. The design of the connections should be discussed.

Site Visits

The structural engineer should make site visits to check on the progress and quality of the work. This part of the engineer's scope of services is called structural observation. Structural observation is required for most projects by the IBC and is defined as follows:

"The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents."

Structural observation does not include or waive the responsibility for the inspection required by other code sections.

Masonry walls failing during construction, particularly those employing high lift grouting, happen more frequently than they should. While it is not the structural engineer's responsibility to evaluate the contractor's means and methods, if the shoring of the wall does not look adequate, the structural engineer should inform the contractor and document that the information was given.

An example site observation form and checklist are provided in Appendix C.

Non-Conforming Quality Control Tests

Prism Compression Strength – Prior to Construction

If the prism test prior to construction does not comply with the required strength, there are many possible reasons. Often, and particularly for larger units (8 inches and above) with a specified compression strength exceeding 2,600 psi, the problem is often the testing method. It is not uncommon for the platen used to be too thin or the prism surface to be not flat. The brick may not be strong enough, or the mortar and grout may not be the appropriate mix.

Prism Compression Strength – During Construction

When prism tests do not conform, verify that the materials used (units, mortar, and grout) conform to the specifications. If they do conform, either the prism was improperly constructed, or the testing procedures did not comply with ASTM C 1314.

Prism construction errors include not constructing the prism true and plumb. It is very important that the top and bottom planes of the prism are parallel. Another common problem for large cell units (8" units and larger) is that the grout is not properly reconsolidated. Without proper reconsolidation, a dome-shaped void will often form at the mortar joint and render the area of grout ineffective for resisting compression.

Common testing errors include not properly capping the prism so that the top and bottom planes are level and parallel, not providing a thick enough loading platen to distribute the test machine load evenly to the prism, and the prism is not centered in the testing machine when loaded.

When confronted with a non-conforming wall (a low prism test for the wall), the first step is to recalculate the structural design to verify that the strength specified is required. If this does not work, the next step is to cut a prism from the wall and test it. Usually, prisms taken from the wall will test with higher compression than the sample prism. If this fails, the wall will likely need to be removed, materials changed to meet the required strength, and the wall reconstructed.

Mortar Compression

It is recommended that field testing of mortar not be required. However, the requirement for mortar testing often is outside the structural engineer's control, and on some projects, mortar testing becomes a requirement (See Appendix D for more information).

Grout Compression

It is recommended that field testing of grout not be required. However, when f'_m exceeds 2,000 psi, TMS 602-22 Section 2.2 B (Specifications for Masonry Structures) requires verification of grout strength by testing in accordance with ASTM 1019 (See Appendix D for more information). This requirement is interpreted as prior to construction rather than verification during construction.

APPENDIX A: WSCPA Members

Western States Clay Products Association
website: www.wscpa.us

Manufacturing Members

Interstate Brick Company
9780 South 5200 West
West Jordan, UT 84081-5625
Phone: (801) 280-5200
https://interstatebrick.com

McNear Brick & Block
1 McNear Brickyard Rd.
San Rafael, CA 94901-8310
Phone: (415) 453-7702
https://www.mcnear.com

H. C. Muddox/Gladding McBean
4875 Bradshaw Road
Sacramento, CA 95827
Phone: (801) 280-5200
https://www.gladdingmcbean.com

Mutual Materials Company
605 - 119th NE
Bellevue, WA 98005
Phone: (425) 452-2300
https://www.mutualmaterials.com

Summit Brick Company
601 E. 13th Street
Pueblo, CO 81001-2942
Phone: (719) 542-8278
https://www.summitbrick.com

Allied Associates Contacts

Arizona Masonry Council
3133 West Frye Road Suite 101
Chandler, AZ 85226
Phone: (602) 265-5999
https://www.azmasonry.org

Masonry Institute of America
1315 Storm Parkway
Torrance, CA 90501-5041
Phone: (310) 257-9000
https://www.masonryinstitute.org

Masonry Institute of Washington
11900 NE 1st Street, Ste 300
Bellevue, WA 98005-3049
Phone: (425) 214-7476
www.masonryinstitute.com

Rocky Mountain Masonry Institute
6145 Broadway Suite 44
Denver, CO 80216
Phone: (303) 893-3838
https://rmmi.org

Utah Masonry Council
4001 South 700 East #500
Salt Lake City, UT 84107-2177
Phone: (801) 264-6651
https://utahmasonrycouncil.org

APPENDIX B: Drawing Checklist

No.	Item	Checked
1.0	STRUCTURAL NOTES	
	Is the applicable code specified (city and date)?	
	Are the applied loads shown, including wind, seismic, and live loads?	
	Is the masonry strength f'_m specified?	
	Is the method to verify the f'_m specified? (Unit strength method.)	
	Are the units specified in accordance with ASTM C 652 with sufficient compressive strength to meet the f'_m specified?	
	Is cement specified in accordance with ASTM C 150 types I, II, or III? Is low alkaline cement available?	
	Is lime specified in accordance with ASTM C 207?	
	Is sand specified in accordance with ASTM C 144?	
	Is the mortar specified by proportions in accordance with ASTM C 270?	
	Is the grout specified in accordance with ASTM C 476?	
	Is self-consolidating grout specified in accordance with ASTM C 1611/C1611M?	
	Is high or low lift grouting specified?	
	For high lift grouting, are clean-outs to be eliminated with a code variation?	
	Is reinforcement specified in accordance with ASTM C 615 grade 60?	
	Is ASTM A 706 reinforcement specified when welded?	
	Is the quality assurance program included? (Required by code)	
	Is a grouting demonstration panel required?	
	Is there a requirement for a preconstruction meeting?	
	Are reinforcement shop drawings required?	
2.0	DESIGN	
	Is h/t less than 30? If not, verify the design includes analysis for moment magnification.	
	Are the walls at floors and roof laterally supported with straps or other methods capable of resisting at least 400 lb/ft?	
	Do the bars fit in the cells?	
	Are locations and length of laps shown? Are there locations where stresses are more than 80% of the allowable?	
	Are dowel laps sufficient?	
	Is there continuous horizontal reinforcement at the window and door head and jambs?	
	Is there continuous horizontal reinforcement at the floor?	
	Are window and door connections designed and shown on the drawings?	
	Are there expansion joints at the corners, and are they at or near the corners?	
	Are provisions made in connections to accommodate thermal and moisture expansion movement?	
	Is the brick masonry confined between other materials without expansion joints?	

No.	Item	Checked
3.0	SPECIFICATIONS (Additional items not typically in the structural notes)	
	Are the structural notes and specifications consistent?	
	Are control joint size, size, and materials specified?	
	Are control joint sealant compatibility tests required?	
	Are the cleaning methods included?	
	Does the specification allow wetting of the brick?	
	Are the joint finishes specified? If raked joints are used, is this in the analysis?	
	Are weep holes and fill materials specified?	
	Are the sealing, water repellant, procedures, and materials specified?	
	Are cold weather and hot weather construction provisions included?	
	Are requirements for protecting the work included?	
	Is it required to verify dimensions prior to laying the masonry?	
	Is a written quality control procedure required?	
	Is a color, pattern, and workmanship panel required?	

APPENDIX C: Construction Observation Checklist

No.	Item	Checked
1.0	MATERIALS	
	Are the bricks stored above ground and covered?	
	Are the bricks sound? Bang them together to see if they ring. If a thud, the bricks may need to be rejected or prism tests conducted to prove that f'_m is met.	
	Is the cement properly stored?	
	Is the lime properly stored?	
	Is the sand pile covered?	
	Does the sand appear well graded and sound?	
	Is the sand dirty?	
	Is there a method for controlling the sand proportions? Shovel count methods are not sufficiently accurate.	
	Does the person mixing the mortar know the proportions?	
	Are there any additives being added to the mortar?	
	Does the person mixing the mortar know the time limits for mixing? (10 minutes maximum.)	
	Are the grout proportions being controlled?	

No.	Item	Checked
2.0	CONSTRUCTION	
	Is the mortar dropping into the cells?	
	Are mortar fins being controlled? Are the cells clean?	
	Is the mortar being strung out too far on the bed joints?	
	Does the contractor understand cold (hot) weather construction requirements?	
	Are the walls being covered at the end of the day?	
	Is inspection being properly done?	
	Does the shoring of the masonry walls look about right?	
	Are the joints uniform in thickness and full?	
	Is the reinforcement being placed within tolerance? Is reinforcement secured against displacement? Are lap lengths correct?	
	Is the grout of sufficient slump to be placed?	
	Is the grout being vibrated during placement?	
	Is the grout being reconsolidated?	
3.0	DESIGN	
	Is the proper issue of design drawings on site?	
	Are the proper shop drawings on site?	
	Does the contractor understand the structural intent?	
	Is the inspector performing his duties properly?	
4.0	TESTING AND INSPECTION	
	Are prisms being constructed plumb and on a flat surface?	
	Are the materials being used for the prism the same as those used in the wall?	
	Are prisms being properly cured, handled, stored, and transported?	
	Is the prism grout being reconsolidated?	
	Is the frequency and quantity of testing in accordance with the contract documents?	

APPENDIX D: Field Test Data for Mortar and Grout

Field Mortar and Grout Test Data

The field sampling and testing for mortar compression strength are highly variable. Figure 1 is a frequency distribution of Type S mortar compression tests taken in the field during actual projects in California, Oregon, and Washington. There are a total of 205 mortar tests. The coefficient of variation is 36%.

With this amount of variability, it should not be surprising to get periodic non-conforming compression mortar tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request that the mason identify the proportions being used. Go to the site and observe the mixing of the mortar.
2. Assess the method being used to control proportions. Check that the correct materials are being used.
3. Verify that the testing lab is using the procedures of ASTM C 270.
4. Visit the site and observe the mortar in the joint. Scratch the mortar with a key. If a white scratch results and the sand does not separate from the mortar, the strength of the mortar is probably acceptable. However, if the masonry is highly stressed (above 1200 psi), it may be necessary to remove a prism from the wall for testing.

The relationship between 7-day mortar strength and 28-day mortar strength is not as variable as the compression strength. It is useful to know the 7-day test results since it provides the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.

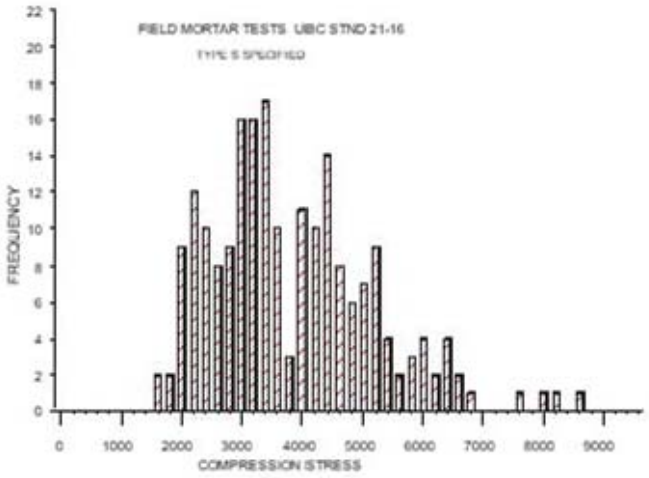


Figure 1 Field Mortar Tests

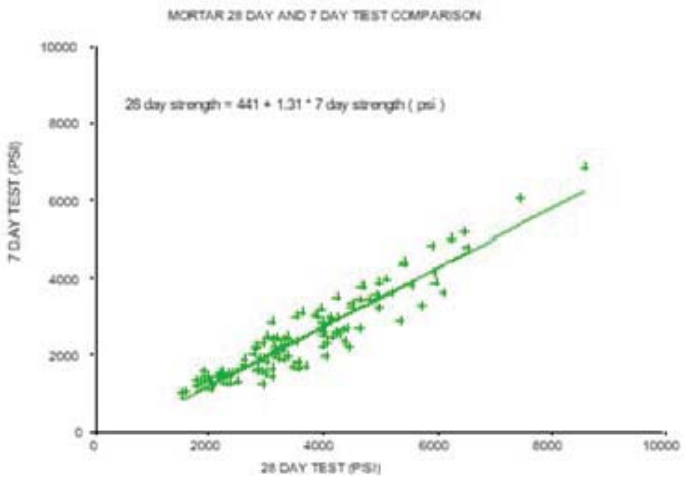


Figure 2 Comparison of 7 and 28 Day Mortar Tests

Grout Compression

It is recommended that field testing of grout not be required. However, when f'_m exceeds 2,000 psi, TMS 602-22 Section 2.2 B (Specifications for Masonry Structures) requires verification of grout strength by testing in accordance with ASTM 1019. This requirement is interpreted as prior to construction and not verification during construction.

The field sampling and testing for grout compression strength are highly variable. The following figure is a frequency distribution of field grout compression tests taken from actual projects in California, Oregon, and Washington. There are a total of 323 grout tests. The coefficient of variation is 32%.

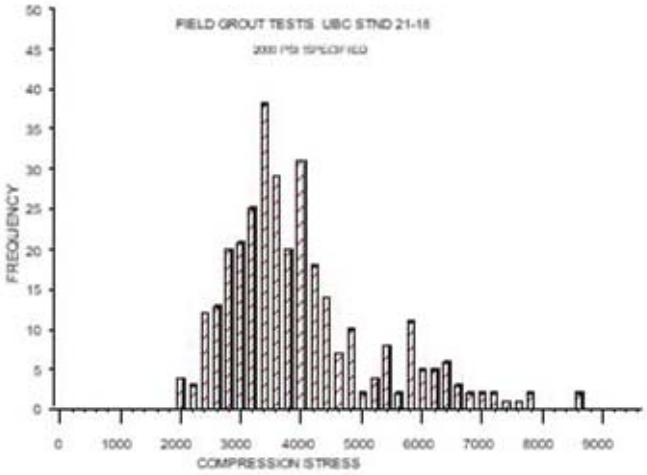


Figure 3 Field Grout Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression grout tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request that the mason identify the proportions being used.
2. Assess the method being used to control proportions.
3. Verify that the testing lab is using the procedures of ASTM 1019.
4. If the cause of the low break is not identified, then taking core samples and testing them may be required.
5. The structural engineer should also consider the reason for requiring a specific grout strength. Often, the purpose of the grout is only to connect the reinforcement to the units. Even low-strength grouts (1500 psi) are probably capable of making the connection. Because of the high strength of the brick, the compression contribution of the grout can often be ignored in the analysis. If grout strength is less than f'_m, then lap lengths should be based on the grout strength and not f'_m.

The relationship between 7-day grout strength and 28-day grout strength is not as variable as the compressive strength. It is useful to know the 7-day test results since it provides the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.



Figure 4 Comparison of 7 and 28 Day Grout Tests

APPENDIX E: Troubleshooting Table

Troubleshooting Table for the Design Structural Engineer

Problem	Cause	Solution
Prisms fail to reach the design strength.	1. The testing lab has incorrectly tested the prism, usually by not placing the prism correctly in the machine or using a loading platen that is too thin. Or the specimens may have been damaged during transportation. 2. The bricks are below the specified strength. 3. The mortar is under specified strength. 4. Lab reported gross area stress instead of net area stress.	1. Instruct the lab to retest, being careful to follow the ASTM C 1314. 2. Request that the contractor have a lab test the brick. 3. Check mortar proportions. Retest the prisms. 4. Have the lab correct the report.
Mortar doesn't reach strength.	1. Incorrect proportions. 2. Incorrect testing.	1. Check mortar quality control procedures. 2. Mortar tests are unreliable. Forget about testing mortar. The code doesn't require it.
The grout mix does not meet ASTM C 476	Wrong mix	Change the mix to conform to ASTM C 476
For f'_m exceeding 2,000 psi, the tested grout strength is less than f'_m.	1. Tested during construction 2. Incorrect testing. 3. Wrong design mix	1. Grout tests are unreliable. Forget about testing grout during construction. The code doesn't require it. 2. ASTM C 1019 is not reliable. Repeat the test using different liners. 3. Change the design mix.
The colors do not meet expectations.	1. Bricks were not blended. 2. Sample panel has a different water repellant. 3. The brick production run is different from the sample run.	1. This is a problem for the architect and brick supplier. 2. Use the sample panel sealer. 3. Approve the production run before beginning construction.
The architect calls and says more expansion joints are required.	The architect was checking on your advice. Architects should do this, so don't get mad. The architect's experience may be with concrete masonry units that require closer spaced control joints for shrinkage and is not experienced with structural reinforced hollow clay masonry.	Explain to the architect how the reinforcement reduces the need for most of the expansion joints.
The mason tells the general contractor, who tells everyone that the cells are too small to be grouted with all the congested steel.	1. The mason contractor does not have experience with the grouting of reinforced hollow brick. He doesn't understand that he can make the grout with an 8 to 11-inch slump. 2. The cell is too small.	1. Prepare and grout a test panel. Be sure to invite everyone concerned. 2. Verify that the units conform to ASTM C 652 or re-design the wall with smaller diameter reinforcement, or use mechanical connectors
Welded bars are breaking off.	ASTM A 706 bars were not used. Inspect the bars. A "W" symbol indicates type A 706. Verify that bars were properly cooled and not quenched with water after welding.	Use the correct bars.
The contractor is not protecting his materials or work.	Sometimes the responsibility for protecting the work is left to the general contractor. He is saving money. Sometimes the responsibility is not well defined.	Request your client to set up a meeting with the general contractor and the masonry contractor to address the issue.

Problem	Cause	Solution
Cracks in the mortar joints.	1. Shrinkage of the mortar joint. 2. Movement of the supporting structure. 3. Overloading. 4. Too rapid drying.	1. Suggest the contractor decrease the cement content of the mortar and increase the lime, provided it still is in conformance with ASTM C 270. 2. Check supports. 3. Check loading the timing of the loading and shoring removal. 4. Pre-wet the units. Wet the wall during curing. Add lime to the mortar. Tooling of joints may not be done at the proper time, or joints are not properly tooled.
Shop drawings are not prepared.	The requirement was missed or "value engineered away."	Write a letter to your client explaining the requirement. If the project is underway, require an engineer familiar with the design to be on site full time.
The grout strength is specified at a minimum of 2000 psi; how can I get a prism of 4000 psi?	This is normal.	Explain that the prism does not fail in accordance with the weak link theory. See the Design Development section "Selection of Masonry Strength, f'_m."
The contractor wants to grout pours to exceed the 5 feet 4-inch lift height and not provide clean-outs.	The code restricts the grout lift to 5 feet 4 inches even though the grout pour might be higher. If the lift is over the 5 feet 4-inch then it is high lift grouting.	The problem is blow-outs of mortar joints and the ability to reconsolidate. In hollow clay, these problems are unlikely. Have the contractor demonstrate the procedure to you and the inspector using a grouting demonstration panel.
The contractor doesn't want clean-outs. You want high-lift grouting.	Code requires clean-outs for high-lift in order to remove the mortar droppings.	If the shear stresses are low, it may be possible to waive the clean-out requirement. The purpose of the clean-out is for shear transfer at the bottom of the cell. If shear stresses are low, this may not be necessary, and a code exception will be necessary.
The dowels out of the concrete foundation interfere with the unit cross webs. They miss the cells.	Improper placement of the dowels. However, it is often very difficult to get them in the right place. This situation is more common than not.	Cut the unit cross webs to allow the dowel to pass or drill in new dowels. Verify that all the dowels are required to meet strength requirements. If not, allow a certain % of them to be removed. It is common to allow the dowels to be bent slightly. A 1:6 slope ratio is a commonly used maximum.
The brick masonry is cracked, with cracks extending through the units.	1. A great deal of force is required for this condition to exist. Frozen grout, foundation movement, or thermal movement from an adjacent structure are a few examples. 2. The bricks may have been manufactured with cracks. 3. Foundation cracks extend into the brick wall.	1. Find the reason for the cracking. It is likely something needs to be corrected. Likely candidates include freezing, foundation settlement, overloading and thermal movement. 2. Verify the integrity of the units before use. A quick check is to bang the bricks together; if a ringing sound results instead of a thud, then the bricks are sound. 3. Foundation control joints are not coordinated with the masonry expansion joints. It may require rework or adding a control joint.

Problem	Cause	Solution
The contractor doesn't cover the walls at the end of the day.	1. The contractor is attempting to save money. 2. The responsibility for the masonry protection may have been left with the general contractor or, worse, left out of all the contracts. 3. The contractor may not be aware of the requirements of TMS 602 to cover walls at the end of the shift.	1. Insist on covering the walls. 2. Write a letter stating that the contractor is not in conformance with the likely result being efflorescence and other wall damage.
Corrosion of the joint reinforcement.	1. Too strong of an acid cleaning without pre-wetting the wall. 2. Ungalvanized joint reinforcement.	1. Pre-wet the wall and use industry cleaners as recommended by the manufacturer of the units. 2. Use galvanized joint reinforcement.
Leaking Walls	1. Improper flashing installation. 2. Improper flashing design. 3. Poor workmanship. 4. Improper grouting. 5. Raked joints or other unprotected horizontal surfaces. 6. Water repellant not applied.	1. Correct flashing. 2. Correct flashing. 3. Repair mortar joints. 4. Pressure epoxy grout. 5. Fill joints. Cover horizontal surfaces. 6. Apply water repellant wall.
Dome shaped voids in the grout.	1. Loss of water to the unit. 2. Improper or no vibration of the grout 3. No reconsolidation	1. Use proper reconsolidation techniques. 2. Use Grout-Aid or equal. 3. Add lime to the maximum allowed. Use self-consolidating grout.
River voids in fine grout.	Loss of water to the unit.	1. This is normal, provided they are less than approximately 1/4 inch in width. 2. Use Grout-Aid or equal. 3. Add lime to the maximum allowed. 4. Reduce water in the mix.
Efflorescence on the wall.	1. Precipitation of salts at the wall surface. 2. Wall was uncovered during construction, and excessive water entered. 3. Flashing not properly detailed, not installed, or not properly installed	1. Clean the wall and then keep water from entering the wall by fixing leaks and sealing it with a water repellant. 2. Cover the wall during construction. 3. Rework the flashing

Notes on the Selection, Design and Construction of

Reinforced Hollow Clay Masonry

Is also available from Western States Clay Products Association at
http://www.brick-wscpa.org

Other technical documents are also available
Design Guide for Anchored Brick Veneer Over Steel Studs
and
Design Guide for Structural Brick Veneer

Strengths of RHCM are usually greater than the 2600 psi used in the document

- Increasing the f'm increases the capacity of the masonry. RHCM design strengths far exceed those available for concrete masonry. The assumed starting value of 2,600 psi is conservative. Some engineers start with a value of 3,500 psi. However, it is recommended to specify the lowest value necessary to meet the project demand strength requirements especially for schematic design.
- Using the higher design strength can reduce or eliminate horizontal shear reinforcing in shear walls, and shear reinforcing (stirrups) in beams, in some cases.
- For specially designed shear walls, the structural engineer may be able to eliminate the transverse reinforcement hooks at the end of the wall if the following condition is satisfied.

$$V_u / (\theta V_{nm}) \leq 0.4$$

- For intermediate and special shear walls, the ductility requirements can be mitigated by increasing f'_m to allow additional tension reinforcement. This will only occur in multi-story load-bearing applications.
- For beams with high moment demand, the limits on tension reinforcement can be increased by increasing f'_m.
- In some situations, increasing f'_m can eliminate the requirement to do a moment magnification analysis.



REINFORCED STRUCTURAL CLAY BRICK

strong, versatile solution

BY JEFF ELDER, PE

Those inexperienced in the use of reinforced structural clay brick might think that a brick is a brick and limit its application to conventional methods associated with veneer. Brick veneers are defined by their ability to support their own weight while limited by mortar to resist tension. When the mortars' resistance to tension is exceeded, brick must be joined or supported by other materials such as brick ties, shelf and ledger angles, wood, steel, concrete and other backup systems.

Researchers have spent years investigating ways to provide tensile resistance to brick. Patterned after reinforced concrete, reinforceable structural clay brick create the form and become the aggregate to support compression forces. Reinforcing steel resists the tension. Oversized holes are placed in the brick and align vertically to create a place for reinforcing steel. Grout is placed in brick cells to bond reinforcing steel to the brick.

Structural clay brick are specified under ASTM C652 as hollow, fired clay brick with a percentage void volume greater than 25%, generally ranging between 35% and 60%.

Learning Objectives

1. Reinforced Structural Clay Brick (RSCB) are designed using most of the same equations and details as Concrete Masonry Units (CMU).
2. RSCB are two to three times stronger than CMU.
3. RSCB have fire ratings of one to four hours.
4. RSCB use expansion joints whereas CMU use control joints
5. Any design detail created using brick veneer can be created using structural brick. Not every structural brick detail can be created using veneer brick.
6. RSCB can act as beams, columns, loadbearing walls, structural panels and curtain walls.
7. RSCB are available in a wide variety of colors, sizes, shapes and textures.

See page 47 for test.

net area compressive strength of clay masonry units (psi)		net area compressive strength of masonry (psi)
TYPE M OR S MORTAR	TYPE N MORTAR	
1700	2100	1000
3350	4150	1500
4950	6200	2000
6600	8250	2500
8250	10,300	3000
9900		3500
13,200		4000

Table 1. Compressive Strength of Clay Masonry. For SI: 1 lb per square inch = 0.00689 Mpa. (IBC 2105.2.2.1.1)

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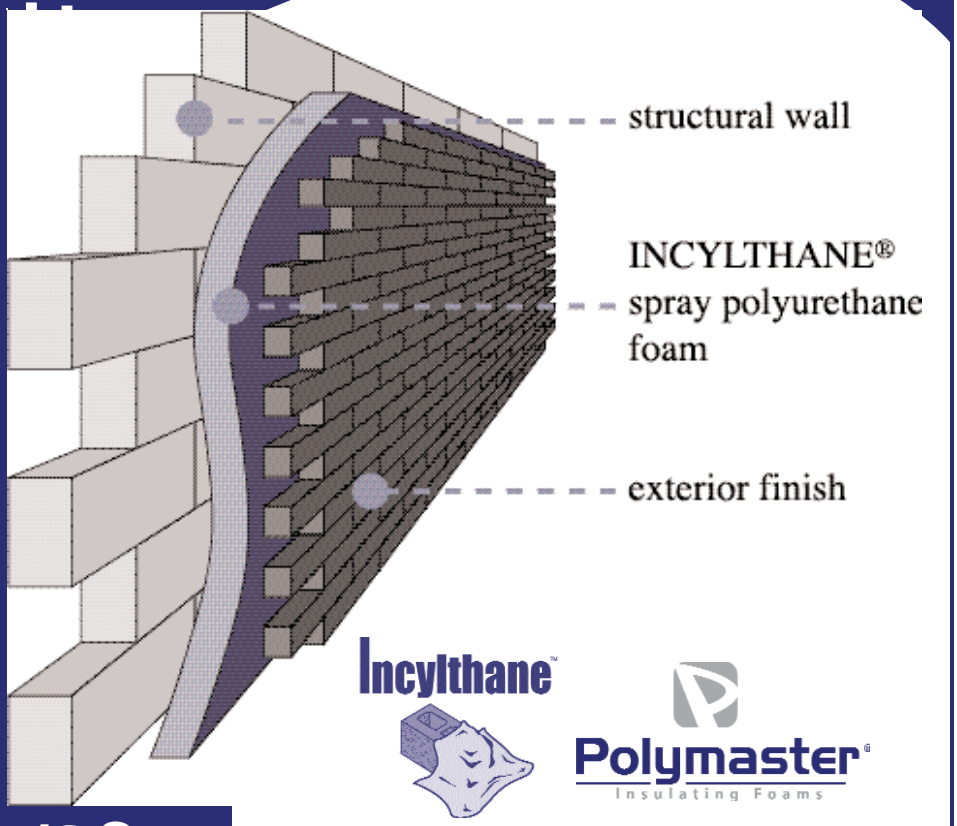
mortar	type	proportions by volume (cementitious materials) PORTLAND CEMENT[a] OR BLENDED CEMENT[b]	MASONRY CEMENT[c] M	MASONRY CEMENT[c] S	MASONRY CEMENT[c] N	MORTAR CEMENT[d] M	MORTAR CEMENT[d] S	MORTAR CEMENT[d] N	hydrated lime[e] or lime putty	aggregate measured in a damp, loose condition
CEMENT-LIME	M	1	–	–	–	–	–	–	¼	
	S	1	–	–	–	–	–	–	over ¼ to ½	
	N	1	–	–	–	–	–	–	over ½ to 1¼	
	O	1	–	–	–	–	–	–	over 1¼ to 2½	
MORTAR CEMENT	M	1	–	–	–	–	–	1	–	Not less than 2¼ and not more than 3 times the sum of the separate volumes of cementitious materials
	M	–	–	–	–	1	–	–	–	
	S	½	–	–	–	–	–	1	–	
	S	–	–	–	–	–	1	–	–	
	N	–	–	–	–	–	–	1	–	
	O	–	–	–	–	–	–	1	–	
MASONRY CEMENT	M	1	–	–	1	–	–	–	–	
	M	–	1	–	–	–	–	–	–	
	S	½	–	–	1	–	–	1	–	
	S	–	–	1	–	–	1	–	–	
	N	–	–	–	1	–	–	1	–	
	O	–	–	–	1	–	–	1	–	

Table 2. Mortar Proportions [IBC 2103.7(1)]. a. Portland cement conforming to the requirements of ASTM C150, b. Blended cement conforming to the requirements of ASTM C595, c. Masonry cement conforming to the requirements of ASTM C91, d. Mortar cement conforming to the requirements of ASTM C1329, e. Hydrated lime conforming to the requirements of ASTM C207. *2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.*



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Photos courtesy of Colonial Brick

Fox Studio, Livonia, designed by Giffels, Hoyem, Basso, now IDS, Troy, used both 4 x 8 x 16 custom color Brownstone flashed (with center score) as a veneer and 8 x 8 x 16 (with center score) as a structural unit.

The designer must specify the type of brick. Hollow brick are designated as either HBS (hollow brick standard) or tighter spec HBX (hollow brick extra). Use HBX when a higher standard for dimensional and aesthetic tolerances are required and a higher cost can be justified.

When brick are subject to frequent conditions of freezing when saturated, the designer is directed to specify Grade SW (severe weathering) brick.

Structural clay brick are commonly available in nominal widths of 4˝, 5˝, 6˝ and 8˝. They come in nominal lengths of 8˝, 12˝ and 16˝ with heights that range from 2¼˝ to 8˝.

Compressive Strength

As strength of brick is often related to color, it is important that an architect specify the color of brick early in the design process. This allows the structural engineer to maximize the strength performance of design elements. For most manufacturers, the lighter the brick color, the lower the compressive strength of the system; conversely, the darker the color, the higher the compressive strength of the system.

The designer is referred to the specified manufacturer to obtain the *compressive strength of unit* for all colors specified. The designer is then directed to the appropriate building code to cross reference *compressive strength of unit* with design value *compressive strength of masonry.*

When using the International Building Code (IBC 2003), refer to Table 2105.2.2.1.1. (See Table 1.) Similar tables are found in the masonry section of other codes. The specified *compressive strength of masonry* is referenced by designers as the f'_m value. Values of historical test data have been adjusted statistically in the table to insure a conservative design value.

Typical allowable design values for hollow clay masonry range between 2600 psi and 5300 psi. At two to three times the standard value for concrete masonry, the use of these higher values can help to reduce deflections, wall thickness, beam depth, bar diameter and bar lap requirements.

To select an f'_m value higher than those listed in the table is acceptable; however, the value must be verified by building prisms of the brick, mortar and grout specified prior to and during construction.

type	parts by volume of portland cement or blended cement	parts by volume of hydrated lime or lime putty	aggregate, measured in a damp, loose condition	
			FINE	COARSE
FINE GROUT	1	0–1/10	2 1/4 – 3 times the sum of the volumes of the cementitious materials	-----
COARSE GROUT	1	0–1/10	2 1/4 – 3 times the sum of the volumes of the cementitious materials	1–2 times the sum of the volumes of the cementitious materials

Table 3. Grout Proportions by Volume for Masonry Construction. (IBC 2103.10) ***2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.***

material	item number	construction	minimum required equivalent thickness for fire resistance [a, b, c] (inches)			
			4 hour	3 hour	2 hour	1 hour
BRICK OF CLAY OR SHALE	1-1.1	solid brick of clay or shale[d]	6	4.9	3.8	2.7
	1-1.2	hollow brick or tile of clay or shale, unfilled	5.0	4.3	3.4	2.3
	1-1.3	hollow brick or tile of clay or shale, grouted or filled with materials specified in Section 721.4.1.1.3	6.6	5.5	4.4	3.0

Table 4. Rated Fire-Resistance Periods of Clay Masonry Walls [IBC 721.4.1(1)]. For SI: 1˝ = 25.4 mm
a. Equivalent thickness as determinded from Section 721.4.1.1, b. Calculated fire resistance between the hourly increments listed shall be determined by linear interpolation, c. Where combustible members are framed in the wall, the thickness of solid material between the end of each member and the opposite face of the wall, or between members set in from opposite sides, shall not be less than 93% of the thickness shown, d. For units in which the net cross-sectional area of cored brick in any plane parallel to the surface containing the cores is at least 75% of the gross cross-sectional area measured in the same plane. ***2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.***

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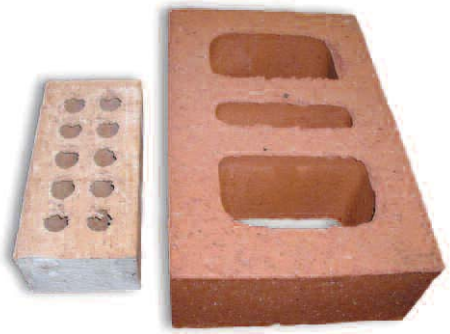
Metro Loft, Royal Oak, designed by Neumann/Smith & Associates. Re-rod and concrete pre-fab flooring attached to 8 x 4 x 12 brick single wythe walls.



Solid face brick and hollow structural unit.



Metro Loft, Royal Oak, constructed of Mission (yellowish, buffish) and Sunset, flashed to bring out color variation. Larger core holes for re-rod and grouting.

Mortar

Mortar used in reinforceable structural clay masonry assemblies is commonly specified by proportions. (See Table 2.) There are three types of mortars: Portland cement-lime, mortar cement and masonry cement. In addition, Type S mortars are prescribed for structural masonry as a minimum.

A common mistake is to over specify the mortar type. Since Type M mortars are the strongest mortars, they are often specified to insure strength of the assembly. Type M mortars have a high cement content which increases shrinkage of mortar and reduces the bond strength. In addition, the extra cement makes cleaning more difficult. Type M mortars are generally limited to below grade applications. When specifying mortars, do not call out for a mortar compressive strength testing.

Grout

Grouts for reinforceable structural clay masonry are prescribed according to Table 3 by proportion. Use coarse aggregate grout (1 part cement, 2 parts pea gravel and 3 parts sand) for applications where there is sufficient room for all of the reinforcing. Fine grouts are commonly used in smaller cells — typically 4˝ and 5˝ wide brick.

Fluidity is essential for proper placement of grout around reinforcing. A grout slump of 8˝ to 11˝ is recommended. Due to the high moisture content of grout, a volume expander, fluidifying and water reducing agent are added.

Fire Resistance

Reinforceable structural clay brick also provide fire resistance. Structural clay brick are fired in kilns at maximum temperatures around 2000°F. This allows brick to retain strength during a fire and when subjected to fire hose streams, thus enhancing public safety. Structural brick are non-combustible and do not give off toxic emissions. Prescribed code values are located in Table 4. Fire ratings from 1 to 4 hours can be achieved from this table. To select a fire rating, solid percentages of structural brick are converted to an equivalent brick thickness and compared with minimum required thicknesses for various fire ratings. Structural brick may be made solid for the intent of this table by filling all cells with grout, expanded shale, sand, pea gravel, crushed stone, slag, pumice, scoria, expanded clay, slate, slag, fly ash or cinders.

Insulative R-Values

Structural clay brick can also provide insulative properties. Uninsulated brick have insulation resistance (R)-values of approximately 0.2 R/inch. By insulating the cells that are not grouted, higher insulation values can be achieved. Structural clay brick can be insulated with perlite or foamed-in-place polyurethane to achieve R-values approaching 1-R/inch.

When insulation requirements exceed those provided above, insulate the wall the same as for brick veneer. Add a layer of closed cell polystyrene insulation to the back of the brick and fur out as required.

Reinforcement

From a design standpoint, reinforceable structural clay brick are similar to concrete masonry units (CMU). An architect or engineer familiar with the design of CMU uses many of the same details. Horizontal bar reinforcing is placed in bond beams. A grout stop fabric of paper or mesh is placed directly below bond beams to prevent grout from dropping into intentionally ungrouted cells.

Horizontal joint reinforcing is typically specified at 16˝ increments and ends are lapped 6˝. Reinforcing is typically continuous around corners. Horizontal reinforcing helps to control cracking and to transfer loads to vertical reinforcing.

Movement Joints

Concrete masonry uses control joints (CJs) in walls to control shrinkage of the concrete through the dynamic cycle of wetting and drying. CJs are commonly

recommended at spacings of 20´ to 25´ centers and are created by starting and stopping the units to form a vertical joint. Reinforcing is terminated at the joint; sealants protect the joint from the elements. In some cases, a sash block and preformed gasket are used to help control alignment of the two faces. Care should be given to the aspect ratio of the wall to insure that cracking does not occur at more frequent spacings.

With structural clay brick, expansion and contraction will occur with varying temperatures; predominant direction of movement is expansion. When expansion of brick controls the design, the movement joint needs to be free of materials that will not compress. (See Figure 1.)

Expansion joints (EJs) are not required at the same locations and spacing as in brick veneer. This is because brick veneer does not have the ability to resist tension caused from expansion. Common spacing of EJs in horizontally reinforced clay brick are generally spaced at 60´ centers. If an EJ is not preferred at the corner, horizontal reinforcing in bond beams must be continuous around the corner, a minimum of 36 bar diameters. Lap continuous reinforcing with corner bars to insure that tension created in the brick at the corner can be transferred to the reinforcing.

Where clay brick and concrete block

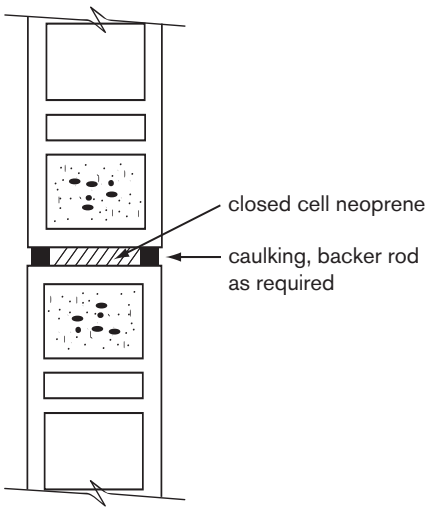


Figure 1.

Hilton Garden Inn, Detroit



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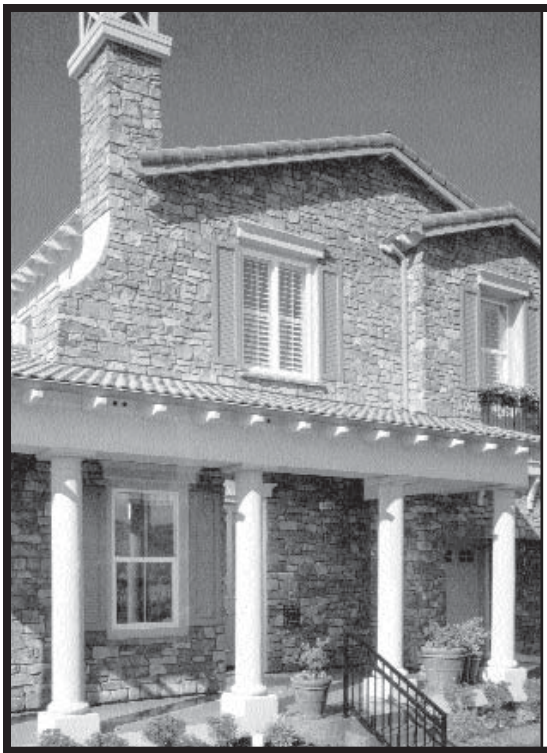

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are combined, use CJs as required for concrete block.

Moisture Control

Moisture must be controlled on a regional basis. Experience with concrete masonry unit (CMU) in an area will dictate the preferred method of treating a structure for moisture resistance. For many areas of the United States, single-wythe brick exposing both faces can be treated using a water repellent coating on the exterior face. The expansive characteristic of brick causes reinforcing to go into tension, which then places the brick into compression. This post tensioning reduces cracks and decreases moisture penetration.

When a greater resistance to moisture penetration is required, structural clay masonry must be designed similar to drainage walls with weep holes and flashing running through the wall to the back side of the insulation. Close cell extruded expanded polystyrene, other non-wicking insulations and those not affected by moisture are placed in a continuous layer on the inside face of the brick. All joints in the insulation are taped to create a moisture barrier.

Continuous insulation creates the thermal drop which forces the dew point of the wall to occur in the insulation. This reduces the chance for condensation inside the wall. Any moisture on the surface of the insulation is directed to the flashing where it is directed to the exterior of the building.

Application

Common uses of reinforceable structural clay masonry are loadbearing walls, beams, columns and piers. Other uses are structural brick veneer, curtain walls, brick panels, sound walls and retaining walls.

One and two-story buildings, even those up to 21 stories, are perfect for loadbearing masonry. For a small increase in initial cost as compared with CMU, the owner enjoys major improvements in aesthetics and strength. As an alternative for steel frame and metal stud walls, reinforced structural clay masonry can be



Embassy Suites Hotel, Livonia used both 4˝ x 8˝ x 16˝ Ironstone flashed (with center score) as a veneer and 8˝ x 8˝ x 16˝ (with center score) as a structural unit.

used as both a bearing wall and an enclosure wall providing structure and finish at the same time. Compared with wood framing, structural clay brick offer better acoustical properties, less seismic or wind drift, better fire resistance, less maintenance and no insect or mold damage.

Structural clay masonry is often installed in less time than other framing methods, reducing construction time and finance costs.

Mid-rise hotels and condominiums are a perfect choice for the structural brick curtain wall. High strength of the unit allows taller walls and fewer framing members. Perimeter beam sizes can be reduced and heavy gauge studs are replaced by light gauge ones. On some building sites with limited access, the curtain wall concept has eliminated the need for scaffolding reducing those costs.

Brick veneer on metal studs is laden with complicated construction details and extra labor. Unless properly detailed, wall ties are subject to pullout and corrosion of the stud is possible. Structural brick veneer is a popular alternative to brick veneer as wall ties, heavy structural framing and beams are replaced with reinforced hollow brick. Wall ties are replaced by less frequent structural anchors spaced every 100 sf compared with every 2 sf. Anchors are less susceptible to corrosion. Perimeter

masonry beams can be sized for L/240 deflection criteria and not the L/600 prescribed to control veneer cracking. Brick offer greater design flexibility in a wide array of colors, textures and patterns.

Sound walls and miscellaneous enclosure walls are an efficient use of structural clay masonry. Modular in size, they can accommodate large variations in land form. A wide variety of colors add structural and aesthetic advantages.

Structural clay brick are less frequently used in retaining walls. However, because of the flexibility of brick to accommodate variations in wall geometry, the structural brick retaining wall may offer more efficient design options as compared with reinforced concrete.

It is safe to say that any building designed using brick veneer can be designed using reinforced structural clay brick. The reverse is not true.

Complexity of design can be reduced, performance of materials enhanced, overall cost reduced, performance life increased by using reinforceable structural clay brick. Brick's durability is double the useful life of most building materials.

Reinforceable structural clay brick fulfills the intent of sustainable building design.

Take advantage of the structural characteristics of brick while enjoying its long list of other advantages.

For additional information on this subject, go to www.brick-wscpa.org.



Jeff Elder is sales manager for Interstate Brick Company, nationally recognized structural clay brick manufacturer in West Jordan, UT. He has served as past president and currently chairs the technical committee for Western States Clay Products Association (WSCPA), the structural research arm of the brick industry. He is a member of Masonry Standards Joint Committee, Masonry Alliance for Codes & Standards and The Masonry Society. He may be reached at jeff.elder@paccoast.com, 800-280-5290.



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INTERSTATE® BRICK

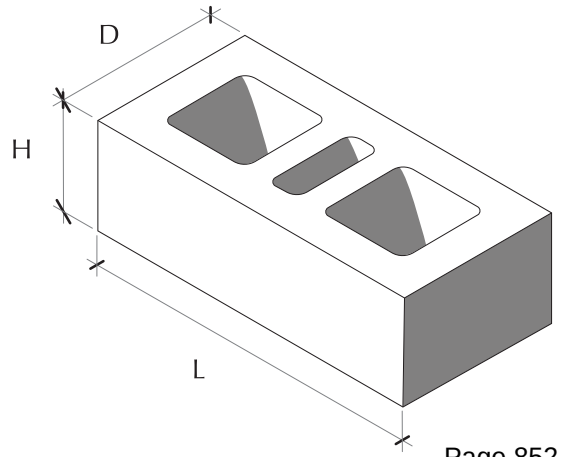
Atlas® Brick Dimensions, Weights, Coverage and Packaging

	Depth (D)		Height (H)		Length (L)		Weights		Units /Area		Packaging	
Name	in	mm	in	mm	in	mm	lbs	kg	Units /ft²	Units /m²	Type	QTY
Atlas® Utility 4 x 4 x 12	3 5/8	92	3 5/8	92	11 5/8	295	8.2	3.7	3.00	32.3	Cube	207
Atlas® Emperor® 4 x 4 x 16	3 5/8	92	3 5/8	92	15 5/8	397	11.0	5.0	2.25	24.2	Pallet	160
Atlas® Super Emperor® 4 x 8 x 16	3 5/8	92	7 5/8	194	15 5/8	397	22.5	10.2	1.13	12.1	Pallet	64
Atlas® 6 x 2 1/4 x 12	5 5/8	143	2 1/4	57	11 5/8	295	8.0	3.6	4.5	48.4	Pallet	180
Atlas® 6 x 2 1/4 x 16	5 5/8	143	2 1/4	57	15 5/8	397	10.0	4.5	3.38	36.3	Pallet	150
Atlas® 6 x 4 x 12	5 5/8	143	3 5/8	92	11 5/8	295	10.0	4.5	3	32.3	Pallet	120
Atlas® 6 x 4 x 16	5 5/8	143	3 5/8	92	15 5/8	397	14.0	6.3	2.25	24.2	Pallet	100
Atlas® 8 x 4 x 12	7 5/8	194	3 5/8	92	11 5/8	295	15.3	6.9	3.00	32.3	Pallet	100
Atlas® 8 x 2 1/4 x 16	7 5/8	194	2 1/4	57	15 5/8	397	12.7	5.7	3.38	36.3	Pallet	120
Atlas® 8 x 4 x 16	7 5/8	194	3 5/8	92	15 5/8	397	17.0	7.7	2.25	24.2	Pallet	80
Super Atlas® 8 x 8 x 16	7 5/8	194	7 5/8	194	15 5/8	397	39.0	17.6	1.13	12.1	Pallet	40
Atlas® 10 x 2 1/4 x 16	9 5/8	244	2 1/4	57	15 5/8	397	16.0	7.2	3.38	36.3	Pallet	90
Atlas® 10 x 4 x 16	9 5/8	244	3 5/8	92	15 5/8	397	20.0	9.1	2.25	24.2	Pallet	60

ONLY AVAILABLE AS SPECIAL ORDER

Weights shown are approximate dry weights. Weight will vary with moisture content and with color. Coring configuration varies depending on brick size. Please refer to individual brick sizes on the website for accurate configurations.

ONLY AVAILABLE AS SPECIAL ORDER



The Above Brick Manufactured by Interstate Brick comply with the following Specifications:

ASTM C652: Grade SW; Type HBA, HBS or HBX as specified in Purchase Order
CSA A82: Grade EG; Type HBA, HBS or HBX as specified in Purchase Order

Interstate® Brick - Standard Brick Products

Safety Data Sheet

according to the Hazard Communication Standard (CFR29 1910.1200) HazCom 2012 Date of issue: 03/26/2015 Revision date: 03/26/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name : Interstate - Standard Brick Products

Product code : Not available

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Building and construction work

1.3. Details of the supplier of the safety data sheet

Interstate Brick Company
9780 S. 5200 W.
West Jordan, UT 84088 - U.S.A.
T (801) 280-5200

1.4. Emergency telephone number

Emergency number : CHEMTREC 1 (800) 424-9300
CHEMTREC International +1 (703) 527-3887 24 hr

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Skin irritation 2
Eye irritation 2A
Skin sensitization 1B
Carcinogenicity 1A
Specific target organ toxicity - Single exposure 3
Specific target organ toxicity - Repeated exposure 1

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :



GHS07 GHS08

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : Causes skin irritation. Causes serious eye irritation. May cause an allergic skin reaction. May cause cancer. May cause respiratory irritation. Causes damage to organs through prolonged or repeated exposure.

Precautionary statements (GHS-US) : Contaminated work clothing must not be allowed out of the workplace. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Do not breathe dust. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned: Get medical advice/attention. If on skin: Wash with plenty of water. Take off contaminated clothing and wash it before reuse. If skin irritation or rash occurs: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell. Store in a well-ventilated place. Dispose of contents and container in accordance with all local, regional, national and international regulations.

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Clay/Shale Aluminum Silicates	Proprietary	90 - 95	Skin Irrit. 2 Eye Irrit. 2A Skin Sens. 1B Carc. 1A STOT SE 3 STOT RE 1
Quartz	(CAS No) 14808-60-7	40 - 75 [1]	Carc. 1A STOT RE 1
Manganese dioxide	(CAS No) 1313-13-9	< 3	Ox. Sol. 3 Acute Tox. 4 (Oral) Acute Tox. 4 (Inhalation)
Chromium oxide (Cr_2O_3)	(CAS No) 1308-38-9	< 3	Not classified
1: Quartz is present in Clay/Shale Aluminum Silicates at 40 - 75%.			

* The specific chemical identity and exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (i) of §1910.1200.

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical advice/attention if you feel unwell.

First-aid measures after skin contact : In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. If skin irritation or rash occurs: Get medical advice/attention.

First-aid measures after eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. If irritation persists, get medical attention.

First-aid measures after ingestion : If swallowed, do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical advice/attention if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : May cause respiratory irritation. May cause shortness of breath, tightness of the chest, a sore throat and cough. Repeated exposure to very high levels of repairable crystalline silica quartz can cause acute silicosis.

Symptoms/injuries after skin contact : Causes skin irritation. Symptoms may include redness, edema, drying, defatting and cracking of the skin. May cause an allergic skin reaction.

Symptoms/injuries after eye contact : Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

Symptoms/injuries after ingestion : May be harmful if swallowed. May cause stomach distress, nausea or vomiting.

4.3. Indication of any immediate medical attention and special treatment needed

Symptoms may not appear immediately. In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Treat for surrounding material.

Unsuitable extinguishing media : None known.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Products of combustion may include, and are not limited to: oxides of carbon.

5.3. Advice for firefighters

Protection during firefighting : Keep upwind of fire. Wear full fire fighting turn-out gear (full Bunker gear) and respiratory protection (SCBA).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Do not breathe dust.

6.2. Methods and material for containment and cleaning up

For containment : Contain spill, then place in a suitable container. Minimize dust generation. Do not flush to sewer or allow to enter waterways. Use appropriate Personal Protective Equipment (PPE).

Methods for cleaning up : Vacuum or sweep material and place in a disposal container. Provide ventilation.

6.3. Reference to other sections

See section 8 for further information on protective clothing and equipment and section 13 for advice on waste disposal.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Avoid contact with skin and eyes. Do not breathe dust. Avoid generating dust. Good housekeeping is important to prevent accumulation of dust. Do not swallow. Handle in accordance with good industrial hygiene and safety practice. When using do not eat, drink or smoke. Use only outdoors or in a well-ventilated area.

Hygiene measures : Launder contaminated clothing before reuse. Wash hands before eating, drinking, or smoking.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep out of the reach of children. Store in a well-ventilated place. Avoid any dust buildup by frequent cleaning and suitable construction of the storage area.

7.3. Specific end use(s)

Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Clay/Shale Aluminum Silicates (Proprietary)		
ACGIH	ACGIH TWA (mg/m³)	10 mg/m³
OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³

Quartz (14808-60-7)		
ACGIH	ACGIH TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
OSHA	OSHA PEL (TWA) (mg/m³)	((10 mg/m^3)/(%SiO_2+2) TWA (resp)) ((30 mg/m^3)/(%SiO_2+2) TWA (total)) ((250)/(%SiO_2+5) mppcf TWA (resp))

Manganese dioxide (1313-13-9)		
ACGIH	ACGIH TWA (mg/m³)	0.2 mg /m^3 (Mn)
OSHA	OSHA PEL (TWA) (mg/m³)	5 mg/m^3 (Mn)

Chromium oxide (Cr_2O_3) (1308-38-9)		
ACGIH	ACGIH TWA (mg/m³)	0.05 mg /m^3
OSHA	OSHA PEL (TWA) (mg/m³)	0.05 mg /m^3

8.2. Exposure controls

Appropriate engineering controls : Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapor, etc.) below recommended exposure limits.

Personal protective equipment : Avoid all unnecessary exposure.

Hand protection : Wear chemically resistant protective gloves.

Eye protection : Safety glasses with side shields or goggles are recommended for dust.

Skin and body protection : Wear suitable protective clothing.

Respiratory protection : A NIOSH approved dust mask or filtering facepiece is recommended in poorly ventilated areas or when permissible exposure limits may be exceeded. Respirators should be selected by and used under the direction of a trained health and safety professional following requirements found in OSHA's respirator standard (29 CFR 1910.134) and ANSI's standard for respiratory protection (Z88.2).

Environmental exposure controls : Maintain levels below Community environmental protection thresholds.

Other information : Do not eat, smoke or drink where material is handled, processed or stored. Wash hands carefully before eating or smoking. Handle according to established industrial hygiene and safety practices.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Solid

Appearance : Vitrified solid

Color : Various

Odor : Odorless

Odor threshold : No data available

pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	No data available
Relative evaporation rate (butylacetate=1)	:	No data available
Flammability (solid, gas)	:	Not flammable
Explosive limits	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Vapor pressure	:	No data available
Relative density	:	2.6
Relative vapor density at 20 °C	:	No data available
Solubility	:	Insoluble
Partition coefficient: n-octanol/water	:	No data available
Log Kow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No dangerous reaction known under conditions of normal use.

10.2. Chemical stability

Stable under normal storage conditions.

10.3. Possibility of hazardous reactions

No dangerous reaction known under conditions of normal use.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

None known.

10.6. Hazardous decomposition products

May include, and are not limited to: oxides of carbon.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified.

Interstate - Standard Brick Products	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rabbit	No data available
LC50 inhalation rat	> 5 mg/l/4h

Manganese dioxide (1313-13-9)	
LD50 oral rat	> 3478 mg/kg

Chromium oxide (Cr_2O_3) (1308-38-9)	
LD50 oral rat	>15000 mg/kg
LC50 inhalation rat	> 5.41 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.

Serious eye damage/irritation	:	Causes serious eye irritation.
Respiratory or skin sensitisation	:	May cause an allergic skin reaction.
Germ cell mutagenicity	:	Based on available data, the classification criteria are not met.
Carcinogenicity	:	May cause cancer.

Quartz (14808-60-7)	
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens

Chromium oxide (Cr_2O_3) (1308-38-9)	
IARC group	3 - Not classifiable

Reproductive toxicity	:	Based on available data, the classification criteria are not met.
Specific target organ toxicity (single exposure)	:	May cause respiratory irritation.
Specific target organ toxicity (repeated exposure)	:	Causes damage to organs through prolonged or repeated exposure. Respirable crystalline silica in the form of quartz or cristobalite from occupational sources is listed by the International Agency for Research on Cancer (IARC) and National Toxicology Program (NTP) as a lung carcinogen. Prolonged exposure to respirable crystalline silica has been known to cause silicosis, a lung disease, which may be disabling. While there may be a factor of individual susceptibility to a given exposure to respirable silica dust, the risk of contracting silicosis and the severity of the disease is clearly related to the amount of dust exposure and the length of time (usually years) of exposure.
Aspiration hazard	:	Based on available data, the classification criteria are not met.
Symptoms/injuries after inhalation	:	May cause respiratory irritation. May cause shortness of breath, tightness of the chest, a sore throat and cough. Repeated exposure to very high levels of repairable crystalline silica quartz can cause acute silicosis.
Symptoms/injuries after skin contact	:	Causes skin irritation. Symptoms may include redness, edema, drying, defatting and cracking of the skin. May cause an allergic skin reaction.
Symptoms/injuries after eye contact	:	Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.
Symptoms/injuries after ingestion	:	May be harmful if swallowed. May cause stomach distress, nausea or vomiting.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : May cause long-term adverse effects in the aquatic environment.

12.2. Persistence and degradability

Interstate - Standard Brick Products	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

Interstate - Standard Brick Products	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on the global warming : No known ecological damage caused by this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : This material must be disposed of in accordance with all local, state, provincial, and federal regulations. The generation of waste should be avoided or minimized wherever possible.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

Special transport precautions : Do not handle until all safety precautions have been read and understood.

SECTION 15: Regulatory information

15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

15.2. US State regulations

Interstate - Standard Brick Products	
State or local regulations	This product contains Crystalline Silica, Quartz and may also contain trace amounts of other chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

SECTION 16: Other information

Date of issue : 03/26/2015

Other information : None.

Disclaimer: We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind. The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for the user's own particular use.

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village PUD
Southeast & Northeast Quadrant of the Calumet Avenue & 45th Avenue Intersection
Munster, Indiana

Traffic Impact Study
September 6, 2024

Prepared for:
Centennial Village
630 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

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Preparer Qualifications

"I certify that this TRAFFIC IMPACT STUDY has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering."

James Hus Jr., P.E., PTOE
Indiana Registration 11100293
PTOE #4205
DVG Team, Inc.



September 6, 2024

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1. Introduction and Summary

The purpose of this study is to assist the developers of the Centennial Village PUD (Planned Unit Development) and Town of Munster staff to evaluate the impacts of future traffic generated by the continuing build out of the PUD. The Centennial Village PUD is generally the area bounded by Calumet Avenue to the west, the CN Railroad to the North, what this report will refer to as S Centennial Drive to the south, and Clayhole Lake to the east.

See Exhibit 1 – Vicinity Map

The PUD is split by Centennial Drive creating a looped roadway **(See Exhibit 1)**, as well as 45th Avenue which was improved in 2021 as part of a major railroad grade separation project which has significantly improved traffic flow in the area. To the knowledge of the report preparer, there have been no significant traffic analyses performed on the surrounding roadway network pertaining to the construction of the PUD.

Surrounding Roadway Network

Calumet Avenue is a north-south arterial roadway with two through lanes in each direction. Its posted speed limit is 35 MPH. At the intersection with 45th Street, there are dual-left turn lanes and a southbound right turn lane. This intersection has an existing traffic signal.

45th Street is a east-west major collector roadway with two through lanes in each direction. Its posted speed limit is 45 MPH west of Calumet Avenue and 35 MPH east of Calumet Avenue. 45th Street runs beneath the CN railroad approximately 1,300 feet east of Calumet Avenue. At the intersection with Calumet Avenue, there are exclusive left turn lanes in each direction. Right turns are shared with the outside through lanes. At the intersection with N Centennial Drive, exclusive left and right turn lanes have been constructed.

Village Drive is a local street with a boulevard appearance, one lane in each direction, a center median, and parallel parking on both sides of the roadway in some sections. It intersects Calumet Avenue 450 feet south of 45th Street. At this location Calumet Avenue is separated by a raised concrete median causing Village Drive to function as a right-in, right-out driveway. Village drive has a speed limit of 25 MPH.

Centennial Drive is a local street with a boulevard appearance, one lane in each direction, a center median, and parallel parking on both sides of the roadway in some sections. It creates a loop within the PUD. It intersects 45th Avenue 500 feet east of Calumet Avenue and intersects Calumet Avenue 850 feet south of 45th Street. Various turn lanes are in place along Centennial Drive to allow access into individual areas of the PUD. Two roundabouts/traffic circles are constructed along Centennial Drive. The southern roundabout serves to provide access to the playground and bandshell area of Centennial Park. The intersection with 45th Avenue is unsignalized and unfinished, with no defined

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turn lanes approaching 45th Avenue. The intersection with Calumet Avenue is signalized, with single exclusive left turn, thru, and right turn lanes. The intersection of S Centennial Drive is existing and not modeled as a course of this study, but traffic on S Centennial Drive was observed to inform the findings of this study. Centennial Drive has a speed limit of 25 MPH.

The vertical profiles of all roadways described here are generally flat, with the exception of 45th Avenue as it passes beneath the CN railroad.

2. Proposed Development

The Centennial Village PUD encompasses most of the old Munster Steel property. Construction began in 2016 with its first hotel development coming online in late 2017. The purpose of the PUD is to provide the Town and its residents with "a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street". The PUD design standards and development plan have changed slightly as developments have been infilled, but it generally consists of 15 structures of varying sizes and uses, with accompanying parking and pedestrian areas.

See Exhibit 2 – Vicinity Map

For the purposes of this study, Buildings B through G **(See Exhibit 2)** can be considered complete and operational, and do not need to be calculated for future traffic generation. Uses and traffic generation for the unfinished buildings will be discussed later in this report.

3. Area Conditions

The western boundary to the PUD is commercial/office. The northern boundary is residential but buffered by the CN Railroad ROW and old 45th Avenue ROW. The eastern boundary is undeveloped/lake, and the southern boundary is recreational.

24-hour Turning Movement Data was collected at the intersections of Calumet Avenue and 45th Avenue, as well as 45th Avenue and N Centennial Drive. 24-hour roadway volume counts were collected at Village Drive east of Calumet Avenue and S Centennial Drive between the southern roundabout and the entrance to Springhill Suites.

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Non-Site 24-Hour Traffic Counts (May 2024)	
Calumet Avenue	*Through*
Total Traffic	33,100
Northbound	17,000
Southbound	16,100

North of 45th Avenue

Non-Site 24-Hour Traffic Counts (May 2024)	
Calumet Avenue	*Through*
Total Traffic	37,630
Northbound	18,870
Southbound	18,760

South of 45th Avenue

Non-Site 24-Hour Traffic Counts (May 2024)	
45th Avenue	*Through*
Total Traffic	20,750
Eastbound	11,800
Westbound	8,950

East of Calumet Avenue

Non-Site 24-Hour Traffic Counts (May 2024)	
45th Avenue	*Through*
Total Traffic	25,650
Eastbound	14,650
Westbound	11,000

West of Calumet Avenue

The INDOT Traffic Count Database System (TCDS) contains state-wide traffic data collection. Its last recording of Calumet Avenue observed 31,300 vehicles in 2018. Its last recording of 45th Avenue observed 18,150 vehicles east of Southwood Drive and 17,450 vehicles west of Calumet Avenue in 2018. It is fair to assume that the improvements to the Calumet Avenue and 45th Avenue intersection have increased the amount of motorists utilizing 45th Avenue for entry into Indiana from Illinois beyond natural population growth over the past 6 years.

See Exhibit 3 – Traffic Volume Exhibit

See Exhibit 4 – Existing AM & PM Peak Hour Volumes, Calumet Avenue & 45th Avenue

See Exhibit 5 – Existing AM & PM Peak Hour Volumes, 45th Avenue & N Centennial Drive

The intersections in their existing conditions with existing traffic are first analyzed. Existing lane configurations, storage lengths, and Peak Hour Factors were utilized. The traffic signal at Calumet Avenue & 45th Avenue was found to operate under standard phasing and a cycle length of 110 seconds. Both the phasing and cycle length were kept constant for this analysis.

Existing Level of Service (LOS) Summary Table

Intersection Name	*Existing Peak Hour LOS (Exhibit #)*	
	AM	*PM*
Calumet Ave at 45th Ave	D *(6A)*	E *(6B)*
45th Ave at N Centennial Dr (unsignalized)	B *(7A)*	E *(7B)*

Given the nearly full build out of the Town of Munster and few other known major developments, no initial adjustments were made to the existing conditions. For comparison with findings further in this report, the Calumet Avenue at 45th Avenue intersection operates at an average 62.6 seconds of control delay during its existing PM Peak Hour.

4. Projected Traffic

To assess the potential traffic impact due to the proposed development on the traffic flow of the surrounding streets and intersections, the future travel demand of the site and other future possible development was simulated. In the case of this development, likely tenants/uses are known to the Developer and outlined within the PUD documents to guide traffic projections.

The Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition was utilized as the source of estimated trips for the remaining land within the PUD. As mentioned previously, certain buildings within the PUD are complete and operational and are ignored for the purpose of traffic projections.

See Exhibit 8 – ITE Land Uses

The following tables outline the traffic generation by land use by building. The building letter designators can be followed by returned to **Exhibit 2**.

Building M – Quality Restaurant (4,240 GFA)
Land Use 931 Quality Restaurant
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	2	1	1
PM Peak Hour	Adjacent Street	33	22	11
AM Peak Hour	Generator	19	15	4
PM Peak Hour	Generator	35	21	14

Building I – General Office Building (>5,000 SF) (7,250 GFA)
Land Use 710 General Office Building
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	8	7	1
PM Peak Hour	Adjacent Street	8	1	7
AM Peak Hour	Generator	11	10	1
PM Peak Hour	Generator	10	2	8

Building N – Retail / Big Box (34,000 GFA)
Land Use 820 Shopping Center
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	32	20	12
PM Peak Hour	Adjacent Street	130	62	68
AM Peak Hour	Generator	N/A	N/A	N/A
PM Peak Hour	Generator	N/A	N/A	N/A

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Building L – Small Office Building (5,000 GFA)
Land Use 712 Small Office Building
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	10	8	2
PM Peak Hour	Adjacent Street	12	4	8
AM Peak Hour	Generator	16	10	6
PM Peak Hour	Generator	19	9	10

Buildings H, J, and K Residential COMBINED
Land Use 220 Multifamily Housing
Average Vehicle Trip Ends vs. Dwelling Units

108 Dwelling Units		*Forecasted Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	60	17	43
PM Peak Hour	Adjacent Street	72	42	30
AM Peak Hour	Generator	50	12	38
PM Peak Hour	Generator	60	38	22

Buildings H, J, and K Commercial/Retail 1st Floor COMBINED
Land Use 820 Shopping Center
Average Vehicle Trip Ends vs. per 1,000 SF GFA

61,041 SF (Total of 3 Buildings)		*Forecasted Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	57	35	22
PM Peak Hour	Adjacent Street	233	112	121
AM Peak Hour	Generator	N/A	N/A	N/A
PM Peak Hour	Generator	N/A	N/A	N/A

Building D Hotel/Conference (144 Rooms)
Land Use 310 Hotel
Average Vehicle Trip Ends vs. Rooms

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	68	40	28
PM Peak Hour	Adjacent Street	86	44	42
AM Peak Hour	Generator	N/A	N/A	N/A
PM Peak Hour	Generator	N/A	N/A	N/A

Building A Grocery Store (70,000 SF GFA)
Land Use 850 Supermarket
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	267	160	107
PM Peak Hour	Adjacent Street	647	330	317
AM Peak Hour	Generator	467	243	224
PM Peak Hour	Generator	532	277	255

Building A Potential Bank Outlot w/Drive In (2,400 SF GFA)
Land Use 912 Drive-In Bank
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	24	14	10
PM Peak Hour	Adjacent Street	51	26	25
AM Peak Hour	Generator	37	20	17
PM Peak Hour	Generator	50	25	25

Traffic volumes vary considerably between Adjacent Street Peak Hour and Generator Peak Hour. The Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition displays varying rates depending on uses, as certain land uses experience their peak generation rates at different times from the adjacent roadway peak. As this traffic study is most interested in determining the impacts to the adjacent roadway and access points to it, a sound assumption is to utilize the adjacent street generation rates.

Additionally, this assumption is sound because of the multi-use nature of the development and the likelihood that individual building peaks will not coincide with other building peaks.

The highlighted volumes represent the traffic in and out of the development utilized for the study.

*Total Centennial Village**		*Forecasted Total Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	227	123	104
PM Peak Hour	Adjacent Street	562	283	279

*Excluding Building A Trips

Total Building A		*Forecasted Total Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	291	174	117
PM Peak Hour	Adjacent Street	698	355	343

Building A trips should be separated given the different access points available to Building A motorists

5. Analysis Methodology & Traffic Assignments

After trips are determined in the trip generation process described previously (Section 4), trip distribution was performed. Trip distribution is the process of determining the general direction that the site generated traffic is expected to travel to and from the development utilizing existing traffic patterns as a guide. Traffic assignment is the process of assigning traffic turning movements to the access points of the development and to the surrounding roadways/intersections.

The addition volume counts at Village Drive and "S" Centennial Drive shown in **Exhibit 3** inform the trip distribution process.

N Centennial Drive	IN	48%
N Centennial Drive	OUT	49%
Village Drive	IN	19%
Village Drive	OUT	17%
S Centennial Drive	IN	33%
S Centennial Drive	OUT	34%

As the data collected showed consistency between entrances and exits at each node, we can consolidate consistent assignments:

- N Centennial Drive – 48%
- Village Drive – 19%
- S Centennial Drive – 33%

Given the remaining buildings will span into areas both north and south of Village Drive but south of 45th Avenue, these assignment ratios are sound.

Building A motorists will utilize a newly constructed north leg at the intersection of 45th Avenue and N Centennial Drive, and a newly constructed driveway onto Calumet Avenue north of 45th Avenue. This driveway will function as a right-in, right-out driveway due to the presence of a raised concrete median on Calumet Avenue, similar to the south leg of the intersection mentioned previously in this study.

Building A area trips were distributed as follows:

- N Centennial Drive & 45th Avenue, new north leg – 70%
- New Calumet Avenue Driveway – 30%

During the traffic assignment process, trip reduced volumes are applied, if applicable. Pass-by trips, which are intermediate stops between an origin and a primary destination are also considered at this point in a study. Given this a multi-destination development, this should be considered. Given the complexity of the development, the number of access points, and the subjective nature of a multi-destination development, this study does not apply any pass-by trip reductions but omits adding the trips generated by the development to the greater roadway network. That is to say that the trips generated are only added to the turning movements into and out of the access points. To account for this omission, the baseline existing traffic shown in **Exhibit 3** was increased 5% throughout the network before adding development trips. This is a sound compromise given the Town of Munster is nearly 100% built out.

6. Level of Service Analysis

The Level of Service (LOS) is the classification of the quality of traffic flow at a given location. A breakdown of the various LOS conditions is given below:

LOS ‘A’ indicates free flow conditions

LOS ‘B’ indicates stable flow conditions

LOS ‘C’ indicates slight interruptions in flow

LOS ‘D’ indicates moderate interruptions in flow

LOS ‘E’ indicates unstable flow approaching capacity

LOS ‘F’ indicates a forced flow condition

Traffic engineering standards indicate a LOS of ‘D’ or better is acceptable. On some occasions, a LOS ‘E’ is considered acceptable. LOS ‘E’ becomes acceptable in high-volume suburban intersections where level of service improvements can only be achieved by major intersection improvements involving additional lanes and absorbing additional right of way.

The peak hours are defined as the heaviest traffic periods of the day. Traffic engineering standards dictate that the heaviest traffic periods of an average weekday shall be studied and the needs resulting from those analyses shall be considered sufficient for the rest of the time periods not analyzed.

The level of service was computed utilizing the recommended methodology of the Highway Capacity Manual (Sixth Edition, TRB 2016). Using the Synchro software, version 11, by Trafficware, the peak hour turn movement volumes for the full build condition were analyzed to determine their level of service at the following intersections:

- Calumet Avenue at 45th Avenue
  - No improvements considered. This intersection is modeled to observe changes.
- N Centennial Drive at 45th Avenue
  - Modeled as a signalized intersection utilizing already-constructed turn lanes

N Centennial Drive at 45th Avenue was modeled with the same cycle length as the Calumet intersection, which will be discussed later in this study.

The levels of service were then considered by approach and then by turn movement for each of the appropriate intersection movements to determine all traffic impacts.

7. Findings & Comments

The AM peak hour was found to be 10:30 – 11:30 AM. The PM peak hour was found to be 4:45 – 5:45 PM. This later AM peak hour is measurably greater than the normal AM commuting hours. Traffic is generally consistent from the AM peak hour as it rises slightly approaching the PM Peak hour.

See Exhibit 9 – AM Peak Hour Network Design Hourly Volumes, Full Build

See Exhibit 10 – PM Peak Hour Network Design Hourly Volumes, Full Build

Given that the AM Peak Hour is less defined than most signalized intersections and that the PM Peak Hour is demonstrably the more sever peak hour, the following results and discussion focus on the PM Peak Hour. The results of the level of service analysis and the exhibits containing the related details are tabulated below:

Proposed Level of Service (LOS) Summary Table – Full Build

Intersection Name	*Proposed PM Peak Hour (Exhibit #)*	
	LOS	*Average Control Delay*
Calumet Ave at 45th Ave (45th Avenue at N Centennial Drive Signalized)	E *(11)*	70.6 sec *(11)*
Calumet Ave at 45th Ave (45th Avenue at N Centennial Drive Roundabout – Calumet Avenue Optimized)	E *(12)*	73.7 sec *(12)*
Calumet Ave at 45th Ave (45th Avenue at N Centennial Drive Roundabout – Westbound Left Turn Optimized)	E *(13)*	79.2 sec *(13)*

Intersection Name	*Proposed PM Peak Hour (Exhibit #)*	
	LOS	*Average Control Delay*
45th Avenue at N Centennial Drive Signalized	C *(14)*	31.9 sec *(14)*
45th Avenue at N Centennial Drive Roundabout	C *(15)*	16.6 sec *(15)*

Desire for a roundabout at the intersection of N Centennial Drive and 45th Avenue has been discussed by the Town and Developer prior to the commission of this study. The information displayed is meant to inform the Town and Developer of the considerations which should be made while evaluating this option. The intersection of N Centennial Drive is located 510 feet east of Calumet Avenue. Section 46-1.06 of the Indiana Design Manual (IDM) states that "To operate efficiently, signalized intersections should be at least 1,300 feet apart". While commercial areas often have tighter signalized intersection spacing than 1,300 feet, extra care should be taken in the design of these intersections. As we know that 45th Avenue and N Centennial Drive will require additional intersection control measures than are in place today to continue operating with some efficiency, the same care should be taken in evaluating the potential for a roundabout.

Existing Conditions – PM Peak Hour

Referencing **Exhibit 6**, the 45th Avenue & Calumet Avenue intersection operates at a poor level of service presently. 50th Percentile Queues are contained within the available storage lanes. 95th Percentile Queues exceed storage distance for the westbound left turn movement. Queues frequently block entry into left turn lanes for eastbound and southbound traffic. The eastbound through movement volume exceeds the available capacity. All northbound movements and the westbound left turn movements operate at 90% or more of their capacity.

Dual Signalization

Referencing **Exhibit 11**, signalization of the N Centennial Drive intersection along with the traffic growth described earlier in this study demonstrates heightened levels of the scenario described in the existing condition. The eastbound through movement's volume is 12% greater than its available capacity. All northbound movements and the westbound left turn movement operate at 100% of their capacity. Precise calculation of expected queue lengths under this condition is not possible. Visual simulations of intersection performance confirm that queue spillover will consistently occur for the westbound left turn lane at Calumet Avenue back to the N Centennial Drive intersection, precluding some westbound traffic from proceeding through the N Centennial Drive intersection. Queue lengths for eastbound traffic will be excessive during the peak hour. Under extreme conditions, northbound Calumet Avenue traffic may back up to the intersection with Superior Avenue and prevent consistent travel through that intersection during that movement's green phase. This scenario assumes the three intersection traffic signals (N

Centennial/45th, Calumet/45th, and Calumet/Superior) are interconnected and coordinated for maximum efficiency.

N Centennial Drive Roundabout Conversion

Referencing **Exhibit 12**, consideration was given to the installation of a roundabout at the intersection of 45th Avenue and N Centennial Drive. Given that the need to coordinate with another 45th Avenue traffic signal is removed in this condition, certain movement's demand/capacity ratios are reduced, but generally all still function at or over their capacity similar to the condition described earlier. The westbound left turn movement at Calumet Avenue and 45th Avenue is of particular concern under this condition. The available storage of 285 feet is less than the 95th Percentile queue for this movement. This opens the potential for queued traffic to back up into the roundabout under extreme conditions. The overall level of service for Calumet Avenue & 45th Avenue is slightly less than a dual traffic signal, but otherwise similar. This scenario assumes that the traffic signal at Calumet Avenue & 45th Avenue is optimized to reduce overall delay.

N Centennial Drive Roundabout Conversion, Timing Adjustments

Referencing **Exhibit 13**, consideration was given to finding a scenario which could alleviate the concerns of queued traffic backing up into a roundabout at N Centennial Drive & 45th Avenue. The Calumet Avenue & 45th Avenue intersection is not maintained by INDOT, and the Town of Munster has control over the timing of this traffic signal.

By modifying the splits for the westbound left turn movement, timing can be adjusted such that the 95th Percentile queue reduces to approximately 215 feet. At this distance, the concerns raised under the first scenario would be eliminated. However, giving this deference to a minor movement will decrease the overall efficiency of the area's roadway network and cause northbound traffic to queue back through Superior Drive on a more consistent basis. Queueing for the eastbound through movement will increase substantially.

Exhibit 14 and **Exhibit 15** are included to show levels of service for N Centennial Drive & 45th Avenue under a signalized and roundabout condition. Both conditions operate adequately considering the primary focus of this study should be the affect these improvements and expansions have on the major roadway, Calumet Avenue.

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8. Conclusion

As clearly shown in this report (Exhibit 6), the intersection of Calumet Avenue and 45th Avenue operates at or over capacity at present. The additional traffic demand will further stress the network. When intersections operate beyond their capacity, modern modeling methods are unable to precisely determine the values needed to concretely evaluate the pros and cons of either intersection improvement type. It is this study's intent to inform both the Town and Developer of the different effects each intersection type will have on the roadway network in this section of the Town.

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Exhibit 1

Vicinity Map


Centennial Village
PUD Limits
Calumet
Ave
45th Ave
45th Ave
N Centennial Dr
Village Dr
"S" Centennial Dr
Hyatt Place Munster
Vision Boutique | Eye Doctor | Optometrist
Marathon Gas Station
Franciscan Physician Network Munster
Speedway
White Castle
Valvoline Instant Oil Ch
Franciscan Health Munster
Rosebud Steakhouse Centennial Village
El Salto Mexican
Springhill Suites Chicago Southeast/Munster, IN
Centennial Park Playground
Centennial Park Amphitheater
Layous Medical Group
Franciscan Physician Network Family ...

Exhibit 2

PUD Layout


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,186 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG K
71,040 SF
BLDG D
9,400 SF
BLDG E
37,540 SF
BLDG N

Exhibit 3

Traffic Volume Data

1544 45th St - TMC Calumet Avenue & 45th Avenue

Thu May 30, 2024

Full Length (12 AM-12 AM (+1))

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)

All Movements

ID: 1190987, Location: 41.539648, -87.509076

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Calumet Ave					45th St					Calumet Ave					45th St					
Direction	Southbound					Westbound					Northbound					Eastbound					
Time	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	Int
2024-05-30 12:00AM	7	22	4	0	**33**	3	5	3	0	**11**	3	19	9	0	**31**	3	12	8	0	**23**	**98**
12:15AM	4	10	0	0	**14**	5	6	1	0	**12**	1	18	2	0	**21**	2	2	7	0	**11**	**58**
12:30AM	4	11	4	0	**19**	2	1	2	0	**5**	2	8	2	0	**12**	3	3	4	0	**10**	**46**
12:45AM	0	14	0	0	**14**	0	4	2	0	**6**	1	11	4	0	**16**	1	3	5	0	**9**	**45**
Hourly Total	15	57	8	0	**80**	10	16	8	0	**34**	7	56	17	0	**80**	9	20	24	0	**53**	**247**
1:00AM	0	9	1	0	**10**	0	2	3	0	**5**	3	8	1	0	**12**	4	5	1	1	**11**	**38**
1:15AM	3	7	0	0	**10**	2	1	1	0	**4**	0	8	5	2	**15**	0	5	1	0	**6**	**35**
1:30AM	5	14	2	0	**21**	1	1	3	0	**5**	1	11	0	0	**12**	2	4	6	0	**12**	**50**
1:45AM	1	5	0	0	**6**	2	0	0	0	**2**	0	12	0	0	**12**	2	3	3	0	**8**	**28**
Hourly Total	9	35	3	0	**47**	5	4	7	0	**16**	4	39	6	2	**51**	8	17	11	1	**37**	**151**
2:00AM	1	8	3	0	**12**	0	2	1	0	**3**	0	7	1	0	**8**	1	3	5	0	**9**	**32**
2:15AM	2	9	1	0	**12**	2	0	1	0	**3**	3	6	1	0	**10**	2	2	2	0	**6**	**31**
2:30AM	2	10	1	0	**13**	4	3	0	0	**7**	2	7	0	0	**9**	0	6	6	0	**12**	**41**
2:45AM	2	8	0	0	**10**	1	0	1	0	**2**	0	10	5	1	**16**	1	2	1	0	**4**	**32**
Hourly Total	7	35	5	0	**47**	7	5	3	0	**15**	5	30	7	1	**43**	4	13	14	0	**31**	**136**
3:00AM	4	13	0	0	**17**	2	3	1	0	**6**	0	10	1	0	**11**	2	1	5	1	**9**	**43**
3:15AM	0	6	0	0	**6**	0	3	1	0	**4**	1	8	0	0	**9**	2	2	9	0	**13**	**32**
3:30AM	3	14	0	0	**17**	4	4	1	0	**9**	2	14	3	0	**19**	2	2	4	1	**9**	**54**
3:45AM	8	9	0	0	**17**	5	6	1	0	**12**	3	21	1	0	**25**	2	1	7	0	**10**	**64**
Hourly Total	15	42	0	0	**57**	11	16	4	0	**31**	6	53	5	0	**64**	8	6	25	2	**41**	**193**
4:00AM	12	4	2	0	**18**	2	8	3	0	**13**	1	31	3	0	**35**	5	4	2	0	**11**	**77**
4:15AM	21	16	0	0	**37**	7	9	7	0	**23**	3	30	8	0	**41**	2	2	7	0	**11**	**112**
4:30AM	7	30	0	0	**37**	3	8	6	0	**17**	1	34	5	1	**41**	3	1	8	0	**12**	**107**
4:45AM	8	41	2	0	**51**	13	11	13	0	**37**	2	66	9	0	**77**	11	6	11	0	**28**	**193**
Hourly Total	48	91	4	0	**143**	25	36	29	0	**90**	7	161	25	1	**194**	21	13	28	0	**62**	**489**
5:00AM	9	29	2	0	**40**	11	11	8	0	**30**	3	80	14	0	**97**	6	8	10	0	**24**	**191**
5:15AM	13	46	2	0	**61**	17	17	9	0	**43**	3	81	14	0	**98**	10	5	10	0	**25**	**227**
5:30AM	10	51	7	0	**68**	15	22	12	0	**49**	4	116	15	0	**135**	15	15	16	1	**47**	**299**
5:45AM	36	49	10	0	**95**	14	32	19	1	**66**	9	113	28	0	**150**	23	21	16	0	**60**	**371**
Hourly Total	68	175	21	0	**264**	57	82	48	1	**188**	19	390	71	0	**480**	54	49	52	1	**156**	**1088**
6:00AM	18	90	10	0	**118**	25	26	16	0	**67**	13	136	32	0	**181**	27	14	24	0	**65**	**431**
6:15AM	27	92	5	0	**124**	23	48	27	0	**98**	11	162	37	0	**210**	13	22	21	0	**56**	**488**
6:30AM	30	128	18	0	**176**	23	49	25	0	**97**	13	180	37	0	**230**	45	32	42	0	**119**	**622**
6:45AM	45	125	13	0	**183**	30	58	32	0	**120**	23	187	59	0	**269**	34	32	29	0	**95**	**667**
Hourly Total	120	435	46	0	**601**	101	181	100	0	**382**	60	665	165	0	**890**	119	100	116	0	**335**	**2208**
7:00AM	38	137	18	0	**193**	25	49	37	0	**111**	22	163	53	0	**238**	30	27	23	0	**80**	**622**
7:15AM	36	137	12	0	**185**	20	76	36	0	**132**	15	221	46	0	**282**	57	43	27	0	**127**	**726**
7:30AM	54	159	21	0	**234**	28	64	54	0	**146**	25	185	71	1	**282**	60	49	36	1	**146**	**808**
7:45AM	41	177	24	0	**242**	38	84	59	0	**181**	32	186	84	0	**302**	60	80	34	0	**174**	**899**
Hourly Total	169	610	75	0	**854**	111	273	186	0	**570**	94	755	254	1	**1104**	207	199	120	1	**527**	**3055**
8:00AM	44	152	25	0	**221**	25	57	50	0	**132**	39	180	62	0	**281**	25	24	34	0	**83**	**717**
8:15AM	38	147	39	0	**224**	36	69	53	0	**158**	43	182	43	0	**268**	66	75	49	0	**190**	**840**
8:30AM	35	166	21	0	**222**	32	52	50	0	**134**	45	164	42	0	**251**	67	52	40	0	**159**	**766**
8:45AM	30	173	38	0	**241**	25	76	52	0	**153**	38	189	50	0	**277**	62	71	41	0	**174**	**845**
Hourly Total	147	638	123	0	**908**	118	254	205	0	**577**	165	715	197	0	**1077**	220	222	164	0	**606**	**3168**
9:00AM	31	156	39	0	**226**	29	65	44	0	**138**	30	135	47	0	**212**	48	85	43	0	**176**	**752**
9:15AM	32	163	35	0	**230**	25	57	47	0	**129**	42	193	55	1	**291**	81	80	47	1	**209**	**859**
9:30AM	27	169	45	0	**241**	19	43	42	1	**105**	38	154	64	0	**256**	66	81	41	1	**189**	**791**
9:45AM	31	161	35	0	**227**	24	33	53	0	**110**	45	168	68	0	**281**	76	85	37	0	**198**	**816**
Hourly Total	121	649	154	0	**924**	97	198	186	1	**482**	155	650	234	1	**1040**	271	331	168	2	**772**	**3218**
10:00AM	27	166	39	2	**234**	25	47	40	0	**112**	25	165	43	0	**233**	88	77	55	0	**220**	**799**
10:15AM	37	184	35	0	**256**	31	47	43	0	**121**	31	166	63	0	**260**	75	92	67	0	**234**	**871**
10:30AM	20	185	37	0	**242**	33	56	43	0	**132**	57	182	63	0	**302**	87	87	51	0	**225**	**901**

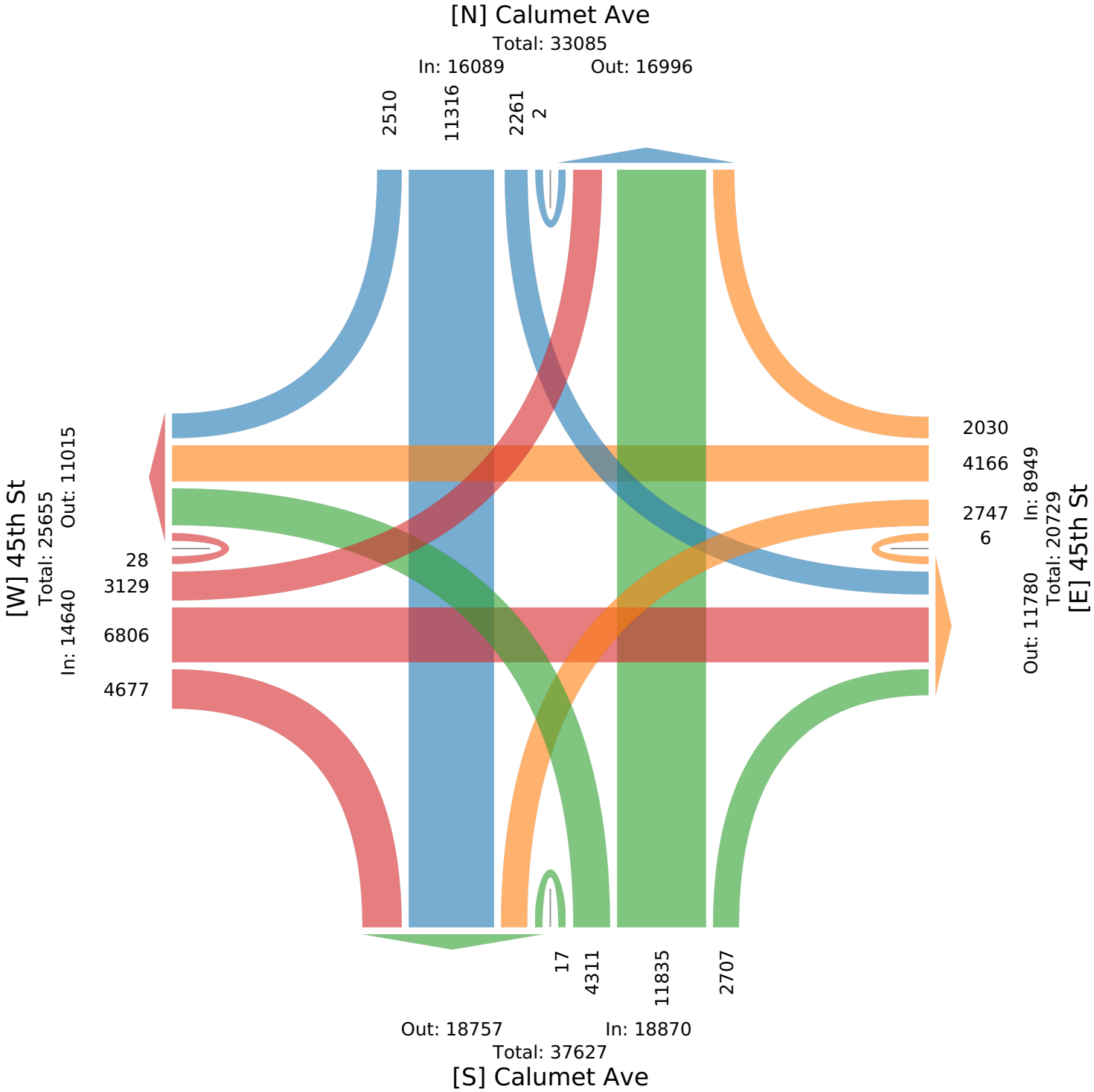
Leg	Calumet Ave					45th St					Calumet Ave					45th St					
Direction	Southbound					Westbound					Northbound					Eastbound					
Time	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	Int
10:45AM	38	143	27	0	**208**	35	49	53	0	**137**	41	213	64	0	**318**	76	92	58	1	**227**	**890**
Hourly Total	122	678	138	2	**940**	124	199	179	0	**502**	154	726	233	0	**1113**	326	348	231	1	**906**	**3461**
11:00AM	41	151	21	0	**213**	26	52	51	0	**129**	53	166	57	0	**276**	75	105	38	0	**218**	**836**
11:15AM	35	169	56	0	**260**	36	39	46	1	**122**	61	145	77	0	**283**	94	86	65	0	**245**	**910**
11:30AM	37	176	51	0	**264**	29	59	41	0	**129**	46	151	66	0	**263**	66	106	56	0	**228**	**884**
11:45AM	47	173	31	0	**251**	35	53	51	0	**139**	43	190	78	0	**311**	82	108	60	0	**250**	**951**
Hourly Total	160	669	159	0	**988**	126	203	189	1	**519**	203	652	278	0	**1133**	317	405	219	0	**941**	**3581**
12:00PM	43	164	38	0	**245**	50	65	47	0	**162**	45	184	88	0	**317**	106	127	60	0	**293**	**1017**
12:15PM	47	208	54	0	**309**	37	36	33	0	**106**	56	190	76	0	**322**	82	131	43	1	**257**	**994**
12:30PM	45	182	56	0	**283**	50	56	36	0	**142**	53	200	76	1	**330**	97	148	45	0	**290**	**1045**
12:45PM	37	185	40	0	**262**	36	52	58	0	**146**	33	187	68	0	**288**	97	119	76	0	**292**	**988**
Hourly Total	172	739	188	0	**1099**	173	209	174	0	**556**	187	761	308	1	**1257**	382	525	224	1	**1132**	**4044**
1:00PM	34	194	35	0	**263**	36	64	42	0	**142**	44	195	69	0	**308**	102	136	78	0	**316**	**1029**
1:15PM	45	172	33	0	**250**	30	70	49	0	**149**	50	183	86	3	**322**	78	160	68	0	**306**	**1027**
1:30PM	26	200	56	0	**282**	36	58	46	0	**140**	41	201	75	2	**319**	92	130	69	0	**291**	**1032**
1:45PM	38	198	49	0	**285**	28	66	53	0	**147**	42	247	68	0	**357**	50	91	53	0	**194**	**983**
Hourly Total	143	764	173	0	**1080**	130	258	190	0	**578**	177	826	298	5	**1306**	322	517	268	0	**1107**	**4071**
2:00PM	36	178	28	0	**242**	37	75	48	0	**160**	51	184	76	0	**311**	69	110	62	0	**241**	**954**
2:15PM	25	123	26	0	**174**	24	73	53	2	**152**	47	101	62	0	**210**	105	140	43	0	**288**	**824**
2:30PM	44	172	35	0	**251**	46	80	49	0	**175**	40	152	82	0	**274**	93	128	55	0	**276**	**976**
2:45PM	44	247	42	0	**333**	25	80	54	0	**159**	50	188	81	0	**319**	105	123	39	1	**268**	**1079**
Hourly Total	149	720	131	0	**1000**	132	308	204	2	**646**	188	625	301	0	**1114**	372	501	199	1	**1073**	**3833**
3:00PM	39	231	37	0	**307**	32	76	37	0	**145**	55	198	82	0	**335**	89	142	49	0	**280**	**1067**
3:15PM	37	220	41	0	**298**	23	70	45	0	**138**	63	189	58	0	**310**	109	165	50	1	**325**	**1071**
3:30PM	34	201	41	0	**276**	31	76	52	0	**159**	57	185	79	0	**321**	91	155	56	1	**303**	**1059**
3:45PM	41	237	36	0	**314**	29	83	49	0	**161**	60	202	66	1	**329**	115	179	44	0	**338**	**1142**
Hourly Total	151	889	155	0	**1195**	115	305	183	0	**603**	235	774	285	1	**1295**	404	641	199	2	**1246**	**4339**
4:00PM	45	251	52	0	**348**	28	74	50	0	**152**	75	181	82	0	**338**	103	176	62	0	**341**	**1179**
4:15PM	26	196	43	0	**265**	31	75	53	0	**159**	44	211	73	0	**328**	80	156	48	0	**284**	**1036**
4:30PM	27	183	40	0	**250**	26	78	52	0	**156**	76	207	64	0	**347**	81	177	48	0	**306**	**1059**
4:45PM	38	176	19	0	**233**	46	82	58	0	**186**	63	217	74	0	**354**	91	170	49	1	**311**	**1084**
Hourly Total	136	806	154	0	**1096**	131	309	213	0	**653**	258	816	293	0	**1367**	355	679	207	1	**1242**	**4358**
5:00PM	31	236	57	0	**324**	29	91	51	0	**171**	51	201	63	0	**315**	91	168	66	0	**325**	**1135**
5:15PM	35	259	52	0	**346**	38	87	57	0	**182**	63	248	77	0	**388**	76	134	33	0	**243**	**1159**
5:30PM	39	199	50	0	**288**	34	92	51	0	**177**	40	204	89	0	**333**	71	180	47	0	**298**	**1096**
5:45PM	44	204	43	0	**291**	33	65	44	0	**142**	49	168	64	0	**281**	113	161	67	0	**341**	**1055**
Hourly Total	149	898	202	0	**1249**	134	335	203	0	**672**	203	821	293	0	**1317**	351	643	213	0	**1207**	**4445**
6:00PM	52	175	41	0	**268**	45	65	38	0	**148**	65	187	64	0	**316**	81	138	59	0	**278**	**1010**
6:15PM	32	170	40	0	**242**	39	43	46	0	**128**	39	193	76	1	**309**	85	159	77	0	**321**	**1000**
6:30PM	38	170	31	0	**239**	24	88	32	0	**144**	31	211	63	0	**305**	73	141	51	0	**265**	**953**
6:45PM	34	149	33	0	**216**	27	39	30	0	**96**	41	122	80	0	**243**	83	131	42	1	**257**	**812**
Hourly Total	156	664	145	0	**965**	135	235	146	0	**516**	176	713	283	1	**1173**	322	569	229	1	**1121**	**3775**
7:00PM	26	163	36	0	**225**	22	55	28	0	**105**	50	153	45	0	**248**	63	112	40	0	**215**	**793**
7:15PM	29	125	27	0	**181**	19	64	23	0	**106**	35	138	53	0	**226**	62	101	36	0	**199**	**712**
7:30PM	31	132	31	0	**194**	26	44	18	1	**89**	35	149	47	0	**231**	55	86	37	0	**178**	**692**
7:45PM	36	113	26	0	**175**	23	53	23	0	**99**	40	116	71	0	**227**	60	95	31	1	**187**	**688**
Hourly Total	122	533	120	0	**775**	90	216	92	1	**399**	160	556	216	0	**932**	240	394	144	1	**779**	**2885**
8:00PM	33	98	21	0	**152**	12	44	28	0	**84**	43	120	51	0	**214**	44	100	26	2	**172**	**622**
8:15PM	30	112	26	0	**168**	22	42	22	0	**86**	25	123	52	0	**200**	49	98	38	0	**185**	**639**
8:30PM	38	136	36	0	**210**	25	42	16	0	**83**	25	103	37	0	**165**	41	88	27	1	**157**	**615**
8:45PM	45	112	26	0	**183**	26	52	14	0	**92**	11	97	56	0	**164**	42	63	30	0	**135**	**574**
Hourly Total	146	458	109	0	**713**	85	180	80	0	**345**	104	443	196	0	**743**	176	349	121	3	**649**	**2450**
9:00PM	18	102	27	0	**147**	14	59	19	0	**92**	23	70	51	0	**144**	24	45	23	1	**93**	**476**
9:15PM	28	111	28	0	**167**	13	48	15	0	**76**	22	70	34	0	**126**	37	40	20	1	**98**	**467**
9:30PM	26	92	26	0	**144**	13	25	19	0	**57**	20	62	37	0	**119**	21	32	10	0	**63**	**383**
9:45PM	17	69	11	0	**97**	10	33	7	0	**50**	8	72	45	0	**125**	17	17	6	2	**42**	**314**
Hourly Total	89	374	92	0	**555**	50	165	60	0	**275**	73	274	167	0	**514**	99	134	59	4	**296**	**1640**
10:00PM	20	54	10	0	**84**	8	27	14	0	**49**	13	80	44	0	**137**	20	25	14	0	**59**	**329**
10:15PM	8	47	10	0	**65**	8	38	11	0	**57**	14	71	36	0	**121**	23	22	16	1	**62**	**305**
10:30PM	12	48	7	0	**67**	7	33	5	0	**45**	9	64	31	1	**105**	10	11	11	3	**35**	**252**

Leg	Calumet Ave					45th St					Calumet Ave					45th St					
Direction	Southbound					Westbound					Northbound					Eastbound					
Time	R	T	L	U	**App**	R	T	L	U	**App**	R	T	L	U	**App**	R	T	L	U	**App**	**Int**
10:45PM	14	50	6	0	**70**	20	18	10	0	**48**	7	27	19	0	**53**	11	16	14	0	**41**	**212**
Hourly Total	54	199	33	0	**286**	43	116	40	0	**199**	43	242	130	1	**416**	64	74	55	4	**197**	**1098**
11:00PM	13	48	5	0	**66**	9	18	5	0	**32**	5	33	14	1	**53**	11	13	8	1	**33**	**184**
11:15PM	11	46	5	0	**62**	3	19	6	0	**28**	7	21	19	1	**48**	7	18	16	0	**41**	**179**
11:30PM	13	37	7	0	**57**	7	17	4	0	**28**	7	20	9	0	**36**	3	16	8	1	**28**	**149**
11:45PM	5	27	6	0	**38**	1	9	3	0	**13**	5	18	7	0	**30**	5	10	7	0	**22**	**103**
Hourly Total	42	158	23	0	**223**	20	63	18	0	**101**	24	92	49	2	**167**	26	57	39	2	**124**	**615**
Total	2510	11316	2261	2	**16089**	2030	4166	2747	6	**8949**	2707	11835	4311	17	**18870**	4677	6806	3129	28	**14640**	**58548**
% Approach	15.6%	70.3%	14.1%	0%	**-**	22.7%	46.6%	30.7%	0.1%	**-**	14.3%	62.7%	22.8%	0.1%	**-**	31.9%	46.5%	21.4%	0.2%	**-**	-
% Total	4.3%	19.3%	3.9%	0%	**27.5%**	3.5%	7.1%	4.7%	0%	**15.3%**	4.6%	20.2%	7.4%	0%	**32.2%**	8.0%	11.6%	5.3%	0%	**25.0%**	-
Motorcycles	4	14	2	0	**20**	5	10	4	0	**19**	3	11	7	0	**21**	5	16	6	0	**27**	87
% Motorcycles	0.2%	0.1%	0.1%	0%	**0.1%**	0.2%	0.2%	0.1%	0%	**0.2%**	0.1%	0.1%	0.2%	0%	**0.1%**	0.1%	0.2%	0.2%	0%	**0.2%**	0.1%
Lights	2363	10881	2205	2	**15451**	1989	4069	2693	6	**8757**	2629	11387	4147	17	**18180**	4487	6610	2920	28	**14045**	56433
% Lights	94.1%	96.2%	97.5%	100%	**96.0%**	98.0%	97.7%	98.0%	100%	**97.9%**	97.1%	96.2%	96.2%	100%	**96.3%**	95.9%	97.1%	93.3%	100%	**95.9%**	96.4%
Single-Unit Trucks	63	185	34	0	**282**	24	75	37	0	**136**	61	191	93	0	**345**	108	128	78	0	**314**	1077
% Single-Unit Trucks	2.5%	1.6%	1.5%	0%	**1.8%**	1.2%	1.8%	1.3%	0%	**1.5%**	2.3%	1.6%	2.2%	0%	**1.8%**	2.3%	1.9%	2.5%	0%	**2.1%**	1.8%
Articulated Trucks	79	231	17	0	**327**	10	10	11	0	**31**	11	231	64	0	**306**	77	49	123	0	**249**	913
% Articulated Trucks	3.1%	2.0%	0.8%	0%	**2.0%**	0.5%	0.2%	0.4%	0%	**0.3%**	0.4%	2.0%	1.5%	0%	**1.6%**	1.6%	0.7%	3.9%	0%	**1.7%**	1.6%
Buses	1	5	3	0	**9**	2	2	2	0	**6**	3	15	0	0	**18**	0	3	2	0	**5**	38
% Buses	0%	0%	0.1%	0%	**0.1%**	0.1%	0%	0.1%	0%	**0.1%**	0.1%	0.1%	0%	0%	**0.1%**	0%	0%	0.1%	0%	**0%**	0.1%

*L: Left, R: Right, T: Thru, U: U-Turn

1544 45th St - TMC
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)
All Movements
ID: 1190987, Location: 41.539648, -87.509076

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



9600 N Centennial Dr - TMC 45th Avenue & N Centennial Drive
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)
All Movements
ID: 1190988, Location: 41.539679, -87.50715

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	45th Ave Westbound				Centennial Dr Northbound				45th Ave Eastbound				
Time	T	L	U	**App**	R	L	U	**App**	R	T	U	**App**	**Int**
2024-05-30 12:00AM	12	0	0	**12**	1	0	0	**1**	0	17	0	**17**	**30**
12:15AM	12	1	0	**13**	0	0	0	**0**	0	4	0	**4**	**17**
12:30AM	5	0	0	**5**	0	0	0	**0**	0	9	0	**9**	**14**
12:45AM	7	0	0	**7**	0	0	0	**0**	0	3	0	**3**	**10**
Hourly Total	36	1	0	**37**	1	0	0	**1**	0	33	0	**33**	**71**
1:00AM	4	0	0	**4**	0	0	0	**0**	0	10	0	**10**	**14**
1:15AM	4	0	0	**4**	1	0	0	**1**	1	3	0	**4**	**9**
1:30AM	5	0	0	**5**	1	0	0	**1**	0	10	0	**10**	**16**
1:45AM	2	0	0	**2**	0	0	0	**0**	0	3	0	**3**	**5**
Hourly Total	15	0	0	**15**	2	0	0	**2**	1	26	0	**27**	**44**
2:00AM	3	0	0	**3**	0	0	0	**0**	0	6	0	**6**	**9**
2:15AM	3	0	0	**3**	0	0	0	**0**	0	6	0	**6**	**9**
2:30AM	7	0	0	**7**	1	0	0	**1**	0	10	0	**10**	**18**
2:45AM	2	0	0	**2**	0	0	0	**0**	0	2	0	**2**	**4**
Hourly Total	15	0	0	**15**	1	0	0	**1**	0	24	0	**24**	**40**
3:00AM	7	0	0	**7**	0	0	0	**0**	0	1	0	**1**	**8**
3:15AM	4	0	0	**4**	0	0	0	**0**	0	3	0	**3**	**7**
3:30AM	9	0	0	**9**	0	0	0	**0**	0	4	0	**4**	**13**
3:45AM	12	1	0	**13**	0	1	0	**1**	0	4	0	**4**	**18**
Hourly Total	32	1	0	**33**	0	1	0	**1**	0	12	0	**12**	**46**
4:00AM	9	0	0	**9**	0	1	0	**1**	0	6	0	**6**	**16**
4:15AM	18	0	0	**18**	0	0	0	**0**	0	6	0	**6**	**24**
4:30AM	15	0	0	**15**	0	0	0	**0**	0	2	0	**2**	**17**
4:45AM	33	0	0	**33**	0	0	0	**0**	2	8	0	**10**	**43**
Hourly Total	75	0	0	**75**	0	1	0	**1**	2	22	0	**24**	**100**
5:00AM	28	0	0	**28**	0	2	0	**2**	0	13	0	**13**	**43**
5:15AM	44	0	0	**44**	0	0	0	**0**	0	9	0	**9**	**53**
5:30AM	44	0	0	**44**	0	2	0	**2**	3	23	0	**26**	**72**
5:45AM	65	1	0	**66**	0	0	0	**0**	4	38	0	**42**	**108**
Hourly Total	181	1	0	**182**	0	4	0	**4**	7	83	0	**90**	**276**
6:00AM	64	1	0	**65**	1	3	0	**4**	0	37	0	**37**	**106**
6:15AM	98	2	0	**100**	2	2	0	**4**	0	35	0	**35**	**139**
6:30AM	103	3	0	**106**	1	2	0	**3**	0	50	0	**50**	**159**
6:45AM	119	3	0	**122**	4	4	0	**8**	1	69	0	**70**	**200**
Hourly Total	384	9	0	**393**	8	11	0	**19**	1	191	0	**192**	**604**
7:00AM	106	5	0	**111**	16	2	0	**18**	0	68	0	**68**	**197**
7:15AM	132	5	0	**137**	3	2	0	**5**	2	62	0	**64**	**206**
7:30AM	155	7	1	**163**	4	1	0	**5**	0	96	0	**96**	**264**
7:45AM	178	4	1	**183**	4	4	0	**8**	1	123	0	**124**	**315**
Hourly Total	571	21	2	**594**	27	9	0	**36**	3	349	0	**352**	**982**
8:00AM	145	9	0	**154**	5	1	0	**6**	0	102	0	**102**	**262**
8:15AM	151	9	0	**160**	2	2	0	**4**	1	155	0	**156**	**320**
8:30AM	139	5	0	**144**	3	2	0	**5**	0	127	0	**127**	**276**
8:45AM	148	12	0	**160**	7	2	0	**9**	0	166	0	**166**	**335**
Hourly Total	583	35	0	**618**	17	7	0	**24**	1	550	0	**551**	**1193**
9:00AM	132	2	0	**134**	7	3	0	**10**	4	153	0	**157**	**301**
9:15AM	127	5	0	**132**	4	4	0	**8**	4	150	0	**154**	**294**
9:30AM	100	4	0	**104**	7	2	0	**9**	4	157	0	**161**	**274**
9:45AM	110	2	0	**112**	7	1	0	**8**	3	159	0	**162**	**282**
Hourly Total	469	13	0	**482**	25	10	0	**35**	15	619	0	**634**	**1151**
10:00AM	113	10	0	**123**	7	1	0	**8**	2	131	1	**134**	**265**
10:15AM	111	9	0	**120**	8	4	0	**12**	5	163	0	**168**	**300**
10:30AM	132	4	0	**136**	10	2	0	**12**	2	176	0	**178**	**326**

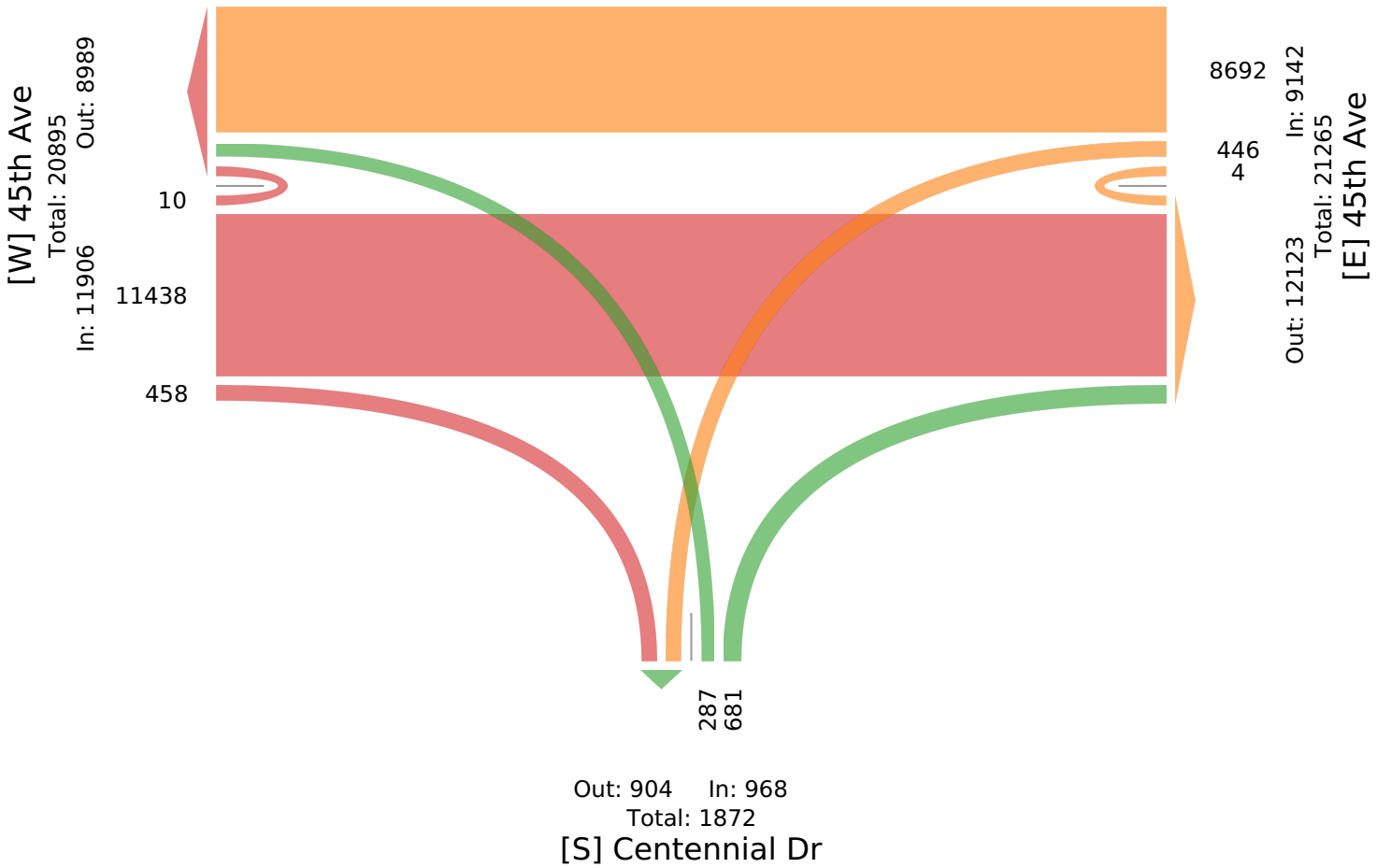
Leg	45th Ave				Centennial Dr				45th Ave				
Direction	Westbound				Northbound				Eastbound				
Time	T	L	U	**App**	R	L	U	**App**	R	T	U	**App**	**Int**
10:45AM	138	7	0	**145**	4	3	0	**7**	5	149	0	**154**	**306**
Hourly Total	494	30	0	**524**	29	10	0	**39**	14	619	1	**634**	**1197**
11:00AM	128	6	0	**134**	11	1	0	**12**	9	171	1	**181**	**327**
11:15AM	124	6	0	**130**	10	1	0	**11**	12	196	0	**208**	**349**
11:30AM	128	8	0	**136**	11	2	0	**13**	10	184	0	**194**	**343**
11:45AM	133	6	0	**139**	13	4	0	**17**	5	187	0	**192**	**348**
Hourly Total	513	26	0	**539**	45	8	0	**53**	36	738	1	**775**	**1367**
12:00PM	163	11	0	**174**	18	5	0	**23**	14	206	0	**220**	**417**
12:15PM	103	8	0	**111**	11	7	0	**18**	8	231	1	**240**	**369**
12:30PM	142	8	0	**150**	12	10	0	**22**	16	244	0	**260**	**432**
12:45PM	134	6	0	**140**	9	5	0	**14**	13	178	0	**191**	**345**
Hourly Total	542	33	0	**575**	50	27	0	**77**	51	859	1	**911**	**1563**
1:00PM	131	8	0	**139**	7	8	0	**15**	9	202	0	**211**	**365**
1:15PM	147	9	0	**156**	8	2	0	**10**	7	249	0	**256**	**422**
1:30PM	138	5	0	**143**	12	3	0	**15**	17	210	0	**227**	**385**
1:45PM	154	7	0	**161**	14	4	0	**18**	3	186	0	**189**	**368**
Hourly Total	570	29	0	**599**	41	17	0	**58**	36	847	0	**883**	**1540**
2:00PM	139	9	0	**148**	17	3	0	**20**	5	186	1	**192**	**360**
2:15PM	140	13	1	**154**	19	7	0	**26**	5	206	0	**211**	**391**
2:30PM	174	11	0	**185**	29	5	0	**34**	8	205	2	**215**	**434**
2:45PM	155	7	0	**162**	12	7	0	**19**	11	208	0	**219**	**400**
Hourly Total	608	40	1	**649**	77	22	0	**99**	29	805	3	**837**	**1585**
3:00PM	144	7	0	**151**	12	3	0	**15**	6	235	0	**241**	**407**
3:15PM	140	8	0	**148**	10	4	0	**14**	12	259	0	**271**	**433**
3:30PM	150	9	0	**159**	19	5	0	**24**	3	252	0	**255**	**438**
3:45PM	145	11	0	**156**	18	3	0	**21**	10	261	0	**271**	**448**
Hourly Total	579	35	0	**614**	59	15	0	**74**	31	1007	0	**1038**	**1726**
4:00PM	159	17	0	**176**	19	5	0	**24**	13	297	1	**311**	**511**
4:15PM	147	19	0	**166**	10	3	0	**13**	10	234	1	**245**	**424**
4:30PM	163	11	0	**174**	16	3	0	**19**	11	286	0	**297**	**490**
4:45PM	167	7	0	**174**	31	4	0	**35**	5	253	0	**258**	**467**
Hourly Total	636	54	0	**690**	76	15	0	**91**	39	1070	2	**1111**	**1892**
5:00PM	171	11	0	**182**	14	7	0	**21**	15	263	1	**279**	**482**
5:15PM	174	14	0	**188**	17	1	0	**18**	12	242	0	**254**	**460**
5:30PM	178	13	0	**191**	15	4	0	**19**	15	262	0	**277**	**487**
5:45PM	138	8	1	**147**	8	1	0	**9**	5	242	0	**247**	**403**
Hourly Total	661	46	1	**708**	54	13	0	**67**	47	1009	1	**1057**	**1832**
6:00PM	147	8	0	**155**	10	7	0	**17**	12	236	0	**248**	**420**
6:15PM	123	9	0	**132**	8	4	0	**12**	11	226	0	**237**	**381**
6:30PM	133	8	0	**141**	15	7	0	**22**	12	193	0	**205**	**368**
6:45PM	92	5	0	**97**	11	2	0	**13**	9	206	0	**215**	**325**
Hourly Total	495	30	0	**525**	44	20	0	**64**	44	861	0	**905**	**1494**
7:00PM	101	1	0	**102**	7	8	0	**15**	3	183	0	**186**	**303**
7:15PM	108	4	0	**112**	6	7	0	**13**	5	157	0	**162**	**287**
7:30PM	84	1	0	**85**	12	7	0	**19**	9	148	0	**157**	**261**
7:45PM	93	3	0	**96**	10	4	0	**14**	9	162	0	**171**	**281**
Hourly Total	386	9	0	**395**	35	26	0	**61**	26	650	0	**676**	**1132**
8:00PM	82	2	0	**84**	6	3	0	**9**	12	153	0	**165**	**258**
8:15PM	82	5	0	**87**	5	5	0	**10**	9	145	0	**154**	**251**
8:30PM	78	3	0	**81**	11	3	0	**14**	12	143	0	**155**	**250**
8:45PM	88	8	0	**96**	5	4	0	**9**	14	86	0	**100**	**205**
Hourly Total	330	18	0	**348**	27	15	0	**42**	47	527	0	**574**	**964**
9:00PM	77	1	0	**78**	9	12	0	**21**	7	89	0	**96**	**195**
9:15PM	71	5	0	**76**	5	2	0	**7**	8	84	0	**92**	**175**
9:30PM	57	2	0	**59**	4	2	0	**6**	1	78	0	**79**	**144**
9:45PM	48	2	0	**50**	9	5	0	**14**	1	41	0	**42**	**106**
Hourly Total	253	10	0	**263**	27	21	0	**48**	17	292	0	**309**	**620**
10:00PM	46	1	0	**47**	7	3	0	**10**	2	46	0	**48**	**105**
10:15PM	51	0	0	**51**	5	6	0	**11**	2	44	0	**46**	**108**
10:30PM	41	1	0	**42**	0	5	0	**5**	2	25	0	**27**	**74**

Leg	45th Ave				Centennial Dr				45th Ave				
Direction	Westbound				Northbound				Eastbound				
Time	T	L	U	**App**	R	L	U	**App**	R	T	U	**App**	**Int**
10:45PM	45	0	0	**45**	7	4	0	**11**	0	28	0	**28**	**84**
Hourly Total	183	2	0	**185**	19	18	0	**37**	6	143	0	**149**	**371**
11:00PM	22	1	0	**23**	6	8	0	**14**	1	20	1	**22**	**59**
11:15PM	22	0	0	**22**	7	6	0	**13**	2	30	0	**32**	**67**
11:30PM	24	1	0	**25**	3	3	0	**6**	2	30	0	**32**	**63**
11:45PM	13	1	0	**14**	1	0	0	**1**	0	22	0	**22**	**37**
Hourly Total	81	3	0	**84**	17	17	0	**34**	5	102	1	**108**	**226**
Total	8692	446	4	**9142**	681	287	0	**968**	458	11438	10	**11906**	**22016**
% Approach	95.1%	4.9%	0%	**-**	70.4%	29.6%	0%	**-**	3.8%	96.1%	0.1%	**-**	-
% Total	39.5%	2.0%	0%	**41.5%**	3.1%	1.3%	0%	**4.4%**	2.1%	52.0%	0%	**54.1%**	-
Motorcycles	20	3	0	**23**	1	1	0	**2**	1	31	0	**32**	57
% Motorcycles	0.2%	0.7%	0%	**0.3%**	0.1%	0.3%	0%	**0.2%**	0.2%	0.3%	0%	**0.3%**	0.3%
Lights	8503	438	4	**8945**	673	279	0	**952**	447	11123	10	**11580**	21477
% Lights	97.8%	98.2%	100%	**97.8%**	98.8%	97.2%	0%	**98.3%**	97.6%	97.2%	100%	**97.3%**	97.6%
Single-Unit Trucks	137	4	0	**141**	6	7	0	**13**	7	203	0	**210**	364
% Single-Unit Trucks	1.6%	0.9%	0%	**1.5%**	0.9%	2.4%	0%	**1.3%**	1.5%	1.8%	0%	**1.8%**	1.7%
Articulated Trucks	25	1	0	**26**	1	0	0	**1**	2	71	0	**73**	100
% Articulated Trucks	0.3%	0.2%	0%	**0.3%**	0.1%	0%	0%	**0.1%**	0.4%	0.6%	0%	**0.6%**	0.5%
Buses	7	0	0	**7**	0	0	0	**0**	1	10	0	**11**	18
% Buses	0.1%	0%	0%	**0.1%**	0%	0%	0%	**0%**	0.2%	0.1%	0%	**0.1%**	0.1%

*L: Left, R: Right, T: Thru, U: U-Turn

9600 N Centennial Dr - TMC
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)
All Movements
ID: 1190988, Location: 41.539679, -87.50715

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



3 - Village Dr btw Calumet Ave & Drwy - 2-la... - ATR

Thu May 30, 2024
Village Drive east of Calumet Avenue
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192704, Location: 41.538481, -87.508668

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	East Westbound		West Eastbound		
Time	T	**App**	T	**App**	**Int**
2024-05-30 12:00AM	2	**2**	1	**1**	**3**
12:15AM	0	**0**	0	**0**	**0**
12:30AM	0	**0**	0	**0**	**0**
12:45AM	0	**0**	0	**0**	**0**
Hourly Total	2	**2**	1	**1**	**3**
1:00AM	0	**0**	0	**0**	**0**
1:15AM	1	**1**	0	**0**	**1**
1:30AM	0	**0**	0	**0**	**0**
1:45AM	0	**0**	0	**0**	**0**
Hourly Total	1	**1**	0	**0**	**1**
2:00AM	0	**0**	0	**0**	**0**
2:15AM	0	**0**	0	**0**	**0**
2:30AM	0	**0**	0	**0**	**0**
2:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	0	**0**	**0**
3:00AM	0	**0**	0	**0**	**0**
3:15AM	0	**0**	0	**0**	**0**
3:30AM	0	**0**	0	**0**	**0**
3:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	0	**0**	**0**
4:00AM	0	**0**	1	**1**	**1**
4:15AM	1	**1**	0	**0**	**1**
4:30AM	0	**0**	0	**0**	**0**
4:45AM	1	**1**	0	**0**	**1**
Hourly Total	2	**2**	1	**1**	**3**
5:00AM	0	**0**	0	**0**	**0**
5:15AM	0	**0**	0	**0**	**0**
5:30AM	1	**1**	0	**0**	**1**
5:45AM	0	**0**	1	**1**	**1**
Hourly Total	1	**1**	1	**1**	**2**
6:00AM	2	**2**	0	**0**	**2**
6:15AM	1	**1**	1	**1**	**2**
6:30AM	0	**0**	3	**3**	**3**
6:45AM	2	**2**	2	**2**	**4**
Hourly Total	5	**5**	6	**6**	**11**
7:00AM	1	**1**	5	**5**	**6**
7:15AM	5	**5**	2	**2**	**7**
7:30AM	3	**3**	2	**2**	**5**
7:45AM	2	**2**	3	**3**	**5**
Hourly Total	11	**11**	12	**12**	**23**
8:00AM	4	**4**	4	**4**	**8**
8:15AM	6	**6**	5	**5**	**11**
8:30AM	3	**3**	2	**2**	**5**
8:45AM	4	**4**	9	**9**	**13**
Hourly Total	17	**17**	20	**20**	**37**
9:00AM	3	**3**	2	**2**	**5**
9:15AM	7	**7**	5	**5**	**12**
9:30AM	6	**6**	7	**7**	**13**
9:45AM	3	**3**	4	**4**	**7**
Hourly Total	19	**19**	18	**18**	**37**
10:00AM	6	**6**	3	**3**	**9**
10:15AM	3	**3**	1	**1**	**4**
10:30AM	11	**11**	9	**9**	**20**
10:45AM	1	**1**	3	**3**	**4**

Leg Direction	East Westbound		West Eastbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	21	**21**	16	**16**	**37**
11:00AM	9	**9**	9	**9**	**18**
11:15AM	6	**6**	5	**5**	**11**
11:30AM	11	**11**	6	**6**	**17**
11:45AM	4	**4**	6	**6**	**10**
Hourly Total	30	**30**	26	**26**	**56**
12:00PM	8	**8**	10	**10**	**18**
12:15PM	3	**3**	9	**9**	**12**
12:30PM	6	**6**	8	**8**	**14**
12:45PM	7	**7**	6	**6**	**13**
Hourly Total	24	**24**	33	**33**	**57**
1:00PM	14	**14**	10	**10**	**24**
1:15PM	10	**10**	6	**6**	**16**
1:30PM	6	**6**	2	**2**	**8**
1:45PM	10	**10**	6	**6**	**16**
Hourly Total	40	**40**	24	**24**	**64**
2:00PM	8	**8**	2	**2**	**10**
2:15PM	3	**3**	9	**9**	**12**
2:30PM	7	**7**	8	**8**	**15**
2:45PM	4	**4**	4	**4**	**8**
Hourly Total	22	**22**	23	**23**	**45**
3:00PM	6	**6**	4	**4**	**10**
3:15PM	6	**6**	4	**4**	**10**
3:30PM	2	**2**	10	**10**	**12**
3:45PM	3	**3**	11	**11**	**14**
Hourly Total	17	**17**	29	**29**	**46**
4:00PM	5	**5**	14	**14**	**19**
4:15PM	0	**0**	8	**8**	**8**
4:30PM	6	**6**	8	**8**	**14**
4:45PM	5	**5**	7	**7**	**12**
Hourly Total	16	**16**	37	**37**	**53**
5:00PM	4	**4**	9	**9**	**13**
5:15PM	4	**4**	5	**5**	**9**
5:30PM	5	**5**	8	**8**	**13**
5:45PM	5	**5**	1	**1**	**6**
Hourly Total	18	**18**	23	**23**	**41**
6:00PM	4	**4**	4	**4**	**8**
6:15PM	4	**4**	9	**9**	**13**
6:30PM	3	**3**	7	**7**	**10**
6:45PM	5	**5**	6	**6**	**11**
Hourly Total	16	**16**	26	**26**	**42**
7:00PM	6	**6**	3	**3**	**9**
7:15PM	8	**8**	1	**1**	**9**
7:30PM	7	**7**	2	**2**	**9**
7:45PM	18	**18**	8	**8**	**26**
Hourly Total	39	**39**	14	**14**	**53**
8:00PM	4	**4**	5	**5**	**9**
8:15PM	9	**9**	2	**2**	**11**
8:30PM	10	**10**	2	**2**	**12**
8:45PM	17	**17**	1	**1**	**18**
Hourly Total	40	**40**	10	**10**	**50**
9:00PM	3	**3**	3	**3**	**6**
9:15PM	13	**13**	0	**0**	**13**
9:30PM	10	**10**	2	**2**	**12**
9:45PM	10	**10**	3	**3**	**13**
Hourly Total	36	**36**	8	**8**	**44**
10:00PM	14	**14**	0	**0**	**14**
10:15PM	13	**13**	0	**0**	**13**
10:30PM	6	**6**	0	**0**	**6**
10:45PM	2	**2**	0	**0**	**2**

Leg Direction	East Westbound		West Eastbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	35	**35**	0	**0**	**35**
11:00PM	3	**3**	0	**0**	**3**
11:15PM	2	**2**	0	**0**	**2**
11:30PM	1	**1**	0	**0**	**1**
11:45PM	1	**1**	0	**0**	**1**
Hourly Total	7	**7**	0	**0**	**7**
Total	419	**419**	328	**328**	**747**
% Approach	100%	**-**	100%	**-**	-
% Total	56.1%	**56.1%**	43.9%	**43.9%**	-
Lights	407	**407**	322	**322**	729
% Lights	97.1%	**97.1%**	98.2%	**98.2%**	97.6%
Articulated Trucks	2	**2**	0	**0**	2
% Articulated Trucks	0.5%	**0.5%**	0%	**0%**	0.3%
Buses and Single-Unit Trucks	10	**10**	6	**6**	16
% Buses and Single-Unit Trucks	2.4%	**2.4%**	1.8%	**1.8%**	2.1%

*T: Thru

3 - Village Dr btw Calumet Ave & Drwy - 2-la... - ATR

Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192704, Location: 41.538481, -87.508668

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



4 - Centennial Dr btw Centennial Dr & Spring... - ATR

Thu May 30, 2024 S Centennial Drive north of Roundabout
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192705, Location: 41.537591, -87.507249

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	North Southbound		South Northbound		
Time	T	**App**	T	**App**	**Int**
2024-05-30 12:00AM	3	**3**	0	**0**	**3**
12:15AM	1	**1**	0	**0**	**1**
12:30AM	0	**0**	0	**0**	**0**
12:45AM	0	**0**	1	**1**	**1**
Hourly Total	4	**4**	1	**1**	**5**
1:00AM	0	**0**	0	**0**	**0**
1:15AM	1	**1**	1	**1**	**2**
1:30AM	0	**0**	2	**2**	**2**
1:45AM	0	**0**	0	**0**	**0**
Hourly Total	1	**1**	3	**3**	**4**
2:00AM	0	**0**	0	**0**	**0**
2:15AM	0	**0**	0	**0**	**0**
2:30AM	0	**0**	1	**1**	**1**
2:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	1	**1**	**1**
3:00AM	0	**0**	0	**0**	**0**
3:15AM	0	**0**	0	**0**	**0**
3:30AM	0	**0**	0	**0**	**0**
3:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	0	**0**	**0**
4:00AM	0	**0**	0	**0**	**0**
4:15AM	0	**0**	0	**0**	**0**
4:30AM	2	**2**	0	**0**	**2**
4:45AM	1	**1**	1	**1**	**2**
Hourly Total	3	**3**	1	**1**	**4**
5:00AM	0	**0**	0	**0**	**0**
5:15AM	0	**0**	1	**1**	**1**
5:30AM	0	**0**	1	**1**	**1**
5:45AM	2	**2**	0	**0**	**2**
Hourly Total	2	**2**	2	**2**	**4**
6:00AM	2	**2**	1	**1**	**3**
6:15AM	0	**0**	0	**0**	**0**
6:30AM	5	**5**	5	**5**	**10**
6:45AM	3	**3**	2	**2**	**5**
Hourly Total	10	**10**	8	**8**	**18**
7:00AM	6	**6**	12	**12**	**18**
7:15AM	7	**7**	8	**8**	**15**
7:30AM	6	**6**	9	**9**	**15**
7:45AM	8	**8**	6	**6**	**14**
Hourly Total	27	**27**	35	**35**	**62**
8:00AM	7	**7**	4	**4**	**11**
8:15AM	14	**14**	9	**9**	**23**
8:30AM	6	**6**	5	**5**	**11**
8:45AM	8	**8**	12	**12**	**20**
Hourly Total	35	**35**	30	**30**	**65**
9:00AM	11	**11**	3	**3**	**14**
9:15AM	9	**9**	6	**6**	**15**
9:30AM	6	**6**	5	**5**	**11**
9:45AM	4	**4**	6	**6**	**10**
Hourly Total	30	**30**	20	**20**	**50**
10:00AM	6	**6**	6	**6**	**12**
10:15AM	5	**5**	10	**10**	**15**
10:30AM	1	**1**	8	**8**	**9**
10:45AM	9	**9**	8	**8**	**17**

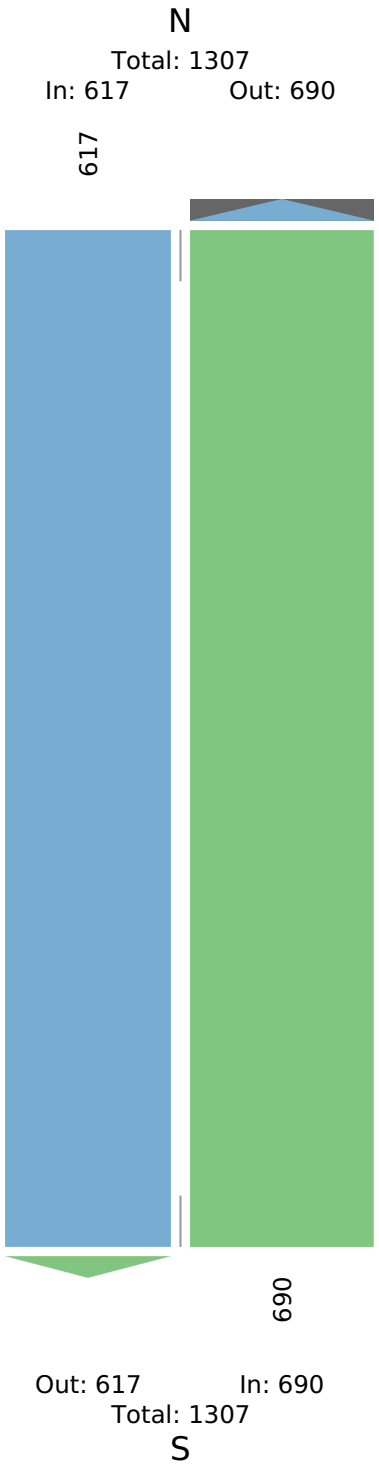
Leg Direction	North Southbound		South Northbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	21	**21**	32	**32**	**53**
11:00AM	7	**7**	11	**11**	**18**
11:15AM	12	**12**	13	**13**	**25**
11:30AM	13	**13**	11	**11**	**24**
11:45AM	11	**11**	14	**14**	**25**
Hourly Total	43	**43**	49	**49**	**92**
12:00PM	16	**16**	17	**17**	**33**
12:15PM	9	**9**	14	**14**	**23**
12:30PM	9	**9**	11	**11**	**20**
12:45PM	16	**16**	11	**11**	**27**
Hourly Total	50	**50**	53	**53**	**103**
1:00PM	17	**17**	13	**13**	**30**
1:15PM	12	**12**	11	**11**	**23**
1:30PM	7	**7**	8	**8**	**15**
1:45PM	10	**10**	9	**9**	**19**
Hourly Total	46	**46**	41	**41**	**87**
2:00PM	12	**12**	7	**7**	**19**
2:15PM	9	**9**	13	**13**	**22**
2:30PM	7	**7**	27	**27**	**34**
2:45PM	13	**13**	5	**5**	**18**
Hourly Total	41	**41**	52	**52**	**93**
3:00PM	7	**7**	15	**15**	**22**
3:15PM	17	**17**	7	**7**	**24**
3:30PM	19	**19**	15	**15**	**34**
3:45PM	13	**13**	12	**12**	**25**
Hourly Total	56	**56**	49	**49**	**105**
4:00PM	21	**21**	9	**9**	**30**
4:15PM	17	**17**	10	**10**	**27**
4:30PM	10	**10**	13	**13**	**23**
4:45PM	17	**17**	20	**20**	**37**
Hourly Total	65	**65**	52	**52**	**117**
5:00PM	13	**13**	11	**11**	**24**
5:15PM	11	**11**	16	**16**	**27**
5:30PM	12	**12**	15	**15**	**27**
5:45PM	6	**6**	10	**10**	**16**
Hourly Total	42	**42**	52	**52**	**94**
6:00PM	11	**11**	3	**3**	**14**
6:15PM	8	**8**	16	**16**	**24**
6:30PM	8	**8**	17	**17**	**25**
6:45PM	7	**7**	19	**19**	**26**
Hourly Total	34	**34**	55	**55**	**89**
7:00PM	5	**5**	18	**18**	**23**
7:15PM	6	**6**	14	**14**	**20**
7:30PM	7	**7**	20	**20**	**27**
7:45PM	5	**5**	14	**14**	**19**
Hourly Total	23	**23**	66	**66**	**89**
8:00PM	7	**7**	6	**6**	**13**
8:15PM	6	**6**	9	**9**	**15**
8:30PM	9	**9**	12	**12**	**21**
8:45PM	8	**8**	14	**14**	**22**
Hourly Total	30	**30**	41	**41**	**71**
9:00PM	9	**9**	9	**9**	**18**
9:15PM	6	**6**	8	**8**	**14**
9:30PM	4	**4**	4	**4**	**8**
9:45PM	8	**8**	10	**10**	**18**
Hourly Total	27	**27**	31	**31**	**58**
10:00PM	12	**12**	4	**4**	**16**
10:15PM	5	**5**	3	**3**	**8**
10:30PM	2	**2**	0	**0**	**2**
10:45PM	2	**2**	4	**4**	**6**

Leg Direction	North Southbound		South Northbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	21	**21**	11	**11**	**32**
11:00PM	0	**0**	1	**1**	**1**
11:15PM	4	**4**	1	**1**	**5**
11:30PM	1	**1**	2	**2**	**3**
11:45PM	1	**1**	1	**1**	**2**
Hourly Total	6	**6**	5	**5**	**11**
Total	617	**617**	690	**690**	**1307**
% Approach	100%	**-**	100%	**-**	-
% Total	47.2%	**47.2%**	52.8%	**52.8%**	-
Lights	606	**606**	677	**677**	1283
% Lights	98.2%	**98.2%**	98.1%	**98.1%**	98.2%
Articulated Trucks	2	**2**	1	**1**	3
% Articulated Trucks	0.3%	**0.3%**	0.1%	**0.1%**	0.2%
Buses and Single-Unit Trucks	9	**9**	12	**12**	21
% Buses and Single-Unit Trucks	1.5%	**1.5%**	1.7%	**1.7%**	1.6%

*T: Thru

4 - Centennial Dr btw Centennial Dr & Spring... - ATR
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192705, Location: 41.537591, -87.507249

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



INDOT TCDS Counts - Last Update 2018

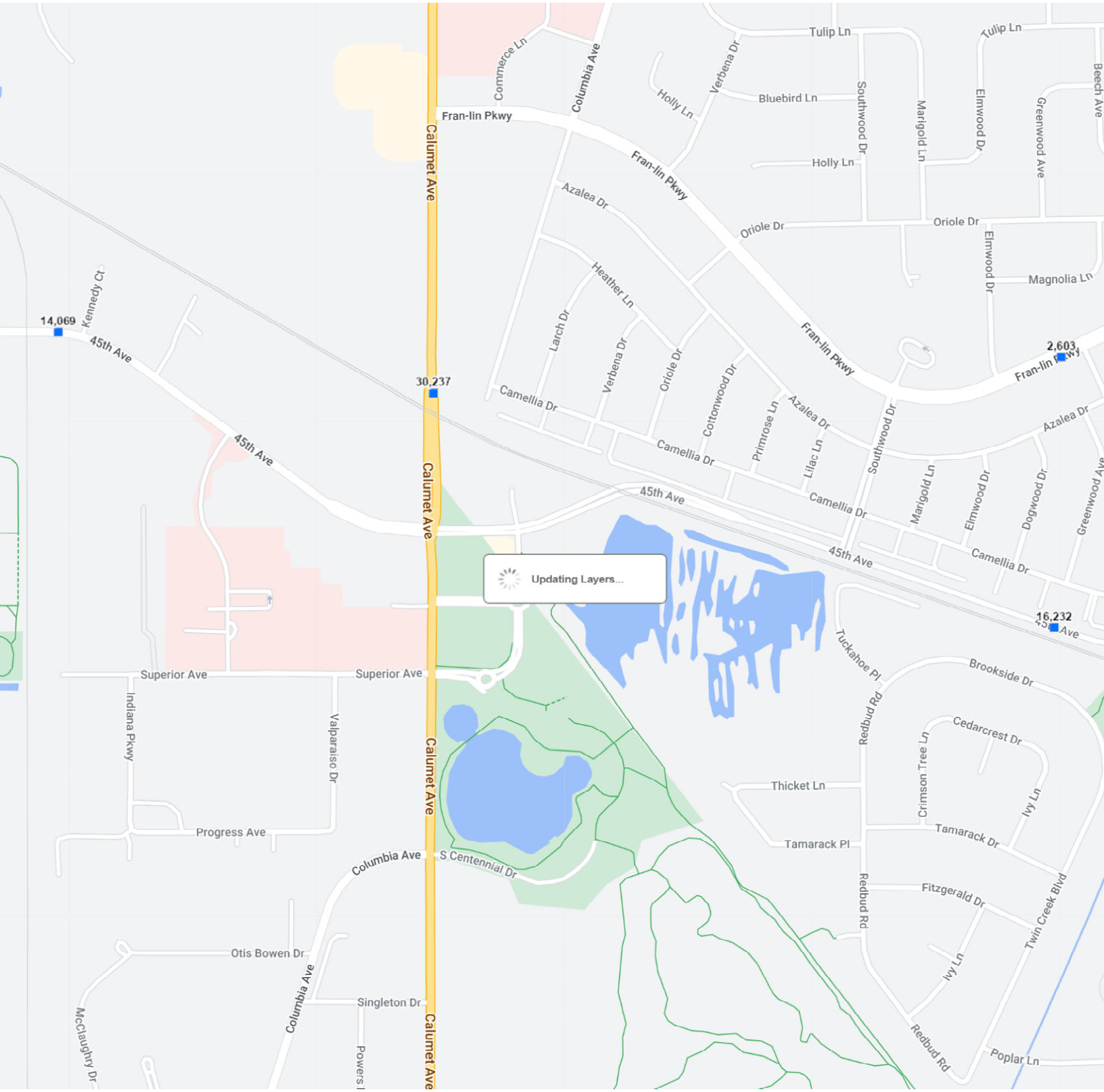
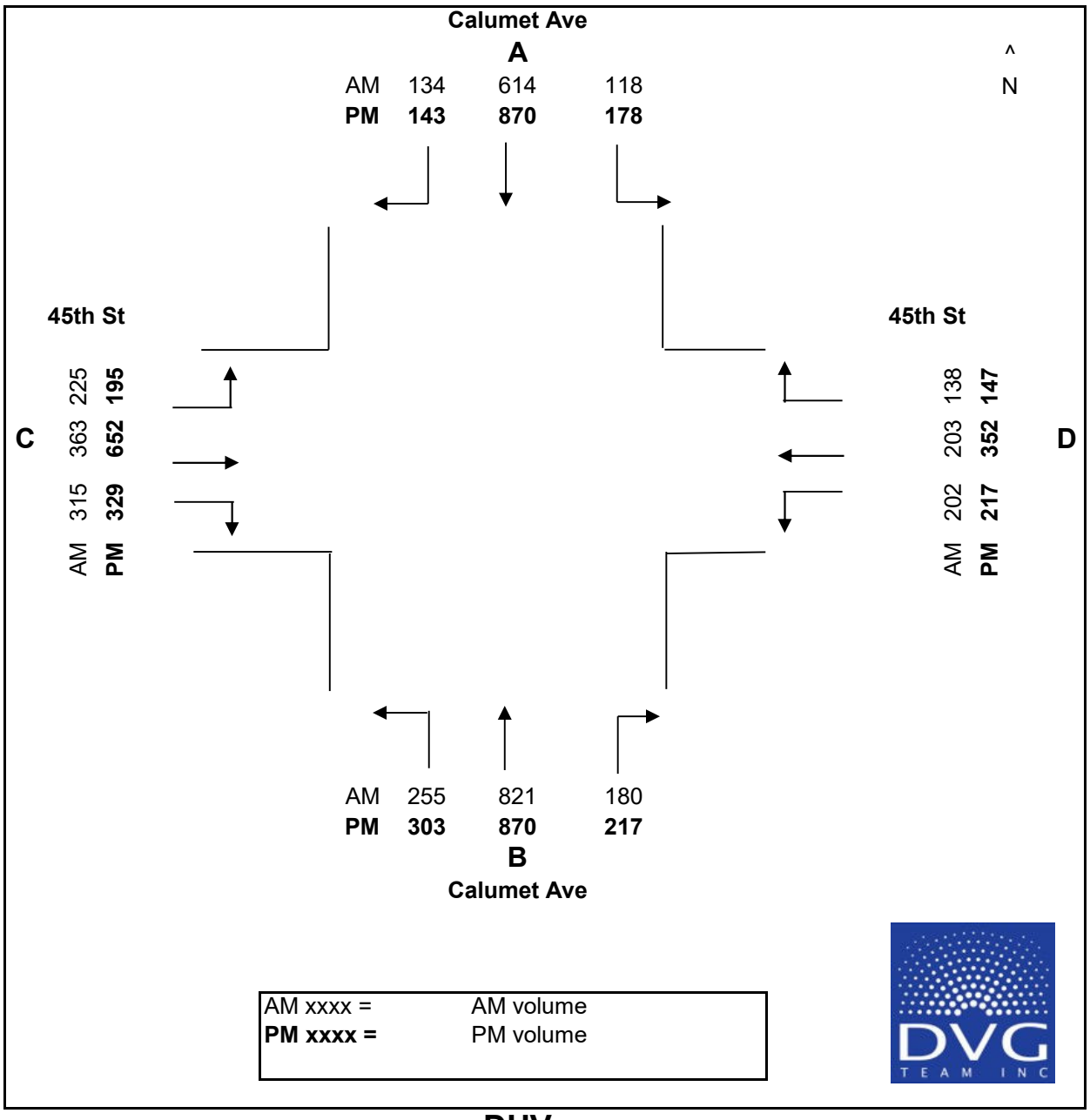


Exhibit 4

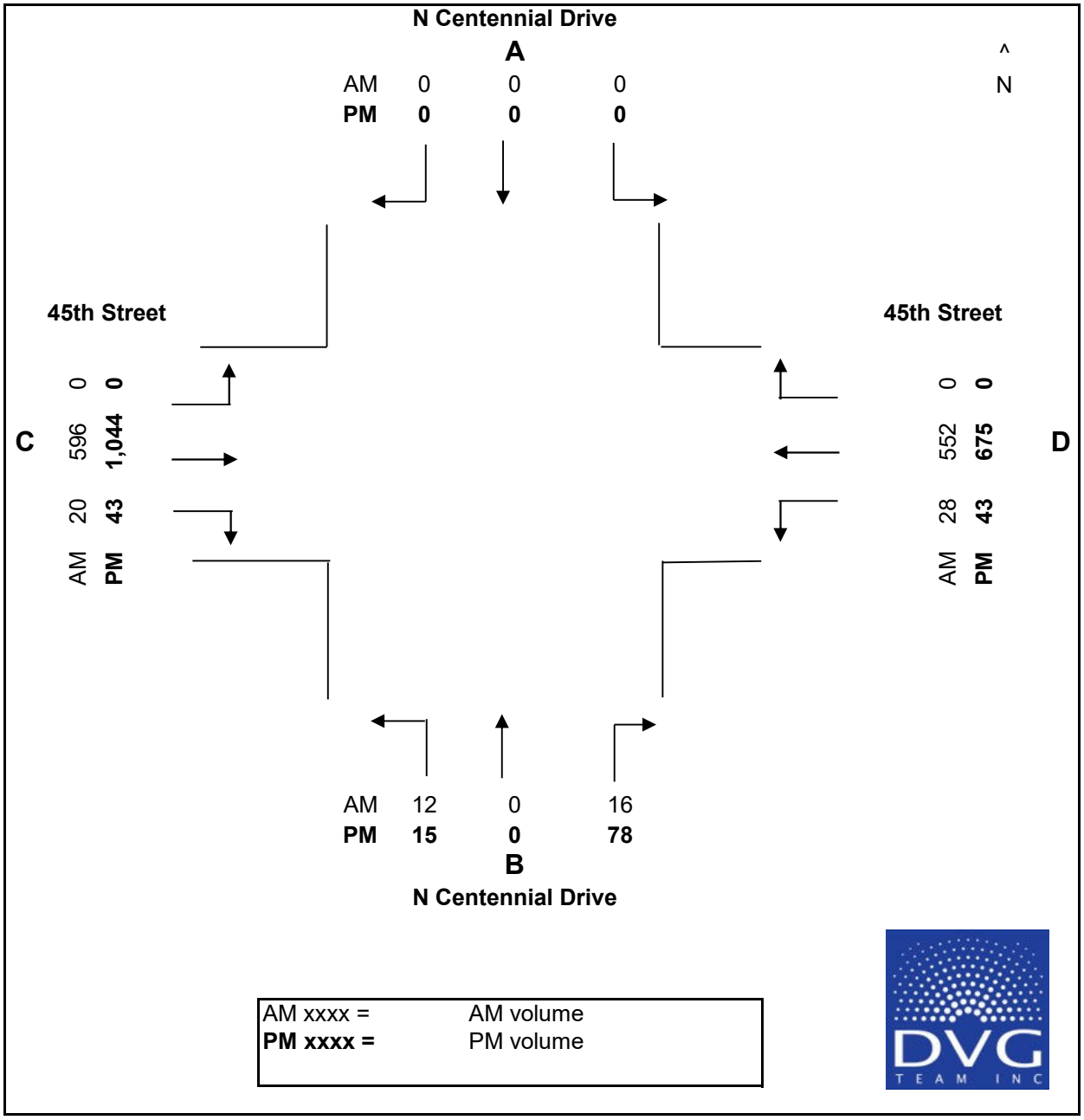
AM & PM Existing Peak Hour Volumes, Calumet Avenue & 45th Avenue



DHV
PRESENT
(2024)

Exhibit 5

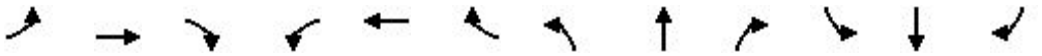
AM & PM Existing Peak Hour Volumes, 45th Avenue & N Centennial Drive



DHV
PRESENT
(2024)

Exhibit 6A

AM LOS – Existing Conditions – Calumet Avenue & 45th Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	225	363	315	202	203	138	255	821	180	118	614	134
Future Volume (veh/h)	225	363	315	202	203	138	255	821	180	118	614	134
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	232	367	346	213	223	139	255	855	228	148	740	152
Peak Hour Factor	0.97	0.99	0.91	0.95	0.91	0.99	1.00	0.96	0.79	0.80	0.83	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	400	396	353	268	457	274	323	1227	327	207	1453	648
Arrive On Green	0.12	0.22	0.22	0.11	0.21	0.21	0.09	0.44	0.44	0.06	0.41	0.41
Sat Flow, veh/h	1781	1777	1585	1781	2138	1279	3456	2775	739	3456	3554	1585
Grp Volume(v), veh/h	232	367	346	213	184	178	255	547	536	148	740	152
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1640	1728	1777	1737	1728	1777	1585
Q Serve(g_s), s	11.0	22.3	23.9	10.1	10.0	10.5	7.9	27.3	27.3	4.6	17.1	6.9
Cycle Q Clear(g_c), s	11.0	22.3	23.9	10.1	10.0	10.5	7.9	27.3	27.3	4.6	17.1	6.9
Prop In Lane	1.00		1.00	1.00		0.78	1.00		0.43	1.00		1.00
Lane Grp Cap(c), veh/h	400	396	353	268	380	351	323	786	768	207	1453	648
V/C Ratio(X)	0.58	0.93	0.98	0.79	0.48	0.51	0.79	0.70	0.70	0.71	0.51	0.23
Avail Cap(c_a), veh/h	469	396	353	321	380	351	443	786	768	236	1453	648
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	41.9	42.5	31.0	37.9	38.1	48.8	24.7	24.7	50.8	24.3	21.3
Incr Delay (d2), s/veh	1.3	27.8	42.4	11.0	1.0	1.2	6.6	5.1	5.2	8.5	1.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	12.7	13.4	5.1	4.4	4.3	3.7	12.3	12.1	2.2	7.3	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.0	69.7	84.9	41.9	38.9	39.3	55.4	29.8	29.9	59.3	25.6	22.1
LnGrp LOS	C	E	F	D	D	D	E	C	C	E	C	C
Approach Vol, veh/h		945			575			1338			1040	
Approach Delay, s/veh		65.5			40.2			34.7			29.9	
Approach LOS		E			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	53.2	16.8	29.0	14.8	49.5	17.7	28.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	7.5	44.5	15.5	24.5	14.1	37.9	17.5	22.5
Max Q Clear Time (g_c+I1), s	6.6	29.3	12.1	25.9	9.9	19.1	13.0	12.5
Green Ext Time (p_c), s	0.0	6.5	0.2	0.0	0.3	5.5	0.3	1.5

Intersection Summary	
HCM 6th Ctrl Delay	41.7
HCM 6th LOS	D

Exhibit 6B

PM LOS & Queue Report – Existing Conditions – Calumet Avenue & 45th Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	195	652	329	217	352	147	303	870	217	178	870	143
Future Volume (veh/h)	195	652	329	217	352	147	303	870	217	178	870	143
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	264	716	366	231	367	184	356	989	252	228	1036	155
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	400	672	343	245	627	309	393	1026	260	258	1160	517
Arrive On Green	0.12	0.30	0.30	0.10	0.27	0.27	0.11	0.37	0.37	0.07	0.33	0.33
Sat Flow, veh/h	1781	2276	1162	1781	2305	1137	3456	2806	713	3456	3554	1585
Grp Volume(v), veh/h	264	559	523	231	282	269	356	625	616	228	1036	155
Grp Sat Flow(s),veh/h/ln	1781	1777	1661	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	11.5	32.5	32.5	10.3	15.1	15.5	11.2	37.9	38.2	7.2	30.5	8.0
Cycle Q Clear(g_c), s	11.5	32.5	32.5	10.3	15.1	15.5	11.2	37.9	38.2	7.2	30.5	8.0
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	400	525	491	245	483	453	393	649	637	258	1160	517
V/C Ratio(X)	0.66	1.06	1.07	0.94	0.58	0.59	0.91	0.96	0.97	0.89	0.89	0.30
Avail Cap(c_a), veh/h	429	525	491	245	483	453	393	649	637	258	1160	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	38.8	38.8	28.9	34.6	34.8	48.2	34.2	34.3	50.4	35.2	27.7
Incr Delay (d2), s/veh	3.4	57.5	59.3	41.7	1.8	2.1	24.1	27.2	28.5	28.5	10.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	22.1	20.9	7.1	6.6	6.4	6.1	20.6	20.5	4.1	14.5	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.5	96.3	98.1	70.7	36.4	36.9	72.3	61.4	62.8	78.9	45.9	29.1
LnGrp LOS	C	F	F	E	D	D	E	E	E	E	D	C
Approach Vol, veh/h		1346			782			1597			1419	
Approach Delay, s/veh		83.7			46.7			64.4			49.3	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	44.7	15.6	37.0	17.0	40.4	18.2	34.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.2	11.1	32.5	12.5	35.9	15.5	28.1
Max Q Clear Time (g_c+I1), s	9.2	40.2	12.3	34.5	13.2	32.5	13.5	17.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.2	0.2	2.4

Intersection Summary	
HCM 6th Ctrl Delay	62.6
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	264	1082	231	551	356	1241	228	1036	155
v/c Ratio	0.73	1.05	0.94	0.60	0.90	0.99	0.88	0.92	0.25
Control Delay	32.2	73.4	70.4	31.1	71.3	55.5	78.4	46.7	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	73.4	70.4	31.1	71.3	55.5	78.4	46.7	5.3
Queue Length 50th (ft)	110	~373	98	139	117	400	75	332	0
Queue Length 95th (ft)	135	#505	#248	196	#181	#536	#112	#384	44
Internal Link Dist (ft)		527		437		357		570	
Turn Bay Length (ft)	255		290		435		245		250
Base Capacity (vph)	375	1035	245	916	394	1251	260	1128	610
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	1.05	0.94	0.60	0.90	0.99	0.88	0.92	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Exhibit 7A

AM LOS – Existing Conditions – 45th Avenue & N Centennial Drive

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	596	20	28	552	12	16
Future Vol, veh/h	596	20	28	552	12	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	155	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	596	20	28	552	12	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	616	0	928	298
Stage 1	-	-	-	-	596	-
Stage 2	-	-	-	-	332	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	960	-	267	698
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	960	-	259	698
Mov Cap-2 Maneuver	-	-	-	-	259	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	679	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	404	-	-	960	-
HCM Lane V/C Ratio	0.069	-	-	0.029	-
HCM Control Delay (s)	14.6	-	-	8.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Exhibit 7B

PM LOS – Existing Conditions – 45th Avenue & N Centennial Drive

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1044	43	43	675	15	78
Future Vol, veh/h	1044	43	43	675	15	78
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	155	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	72	77	97	54	63
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1147	60	56	696	28	124

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1207	0	1607	574
Stage 1	-	-	-	-	1147	-
Stage 2	-	-	-	-	460	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	574	-	96	462
Stage 1	-	-	-	-	265	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	574	-	87	462
Mov Cap-2 Maneuver	-	-	-	-	87	-
Stage 1	-	-	-	-	265	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	37.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	258	-	-	574	-
HCM Lane V/C Ratio	0.588	-	-	0.097	-
HCM Control Delay (s)	37.1	-	-	11.9	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	3.4	-	-	0.3	-

Exhibit 8

ITE Land Uses

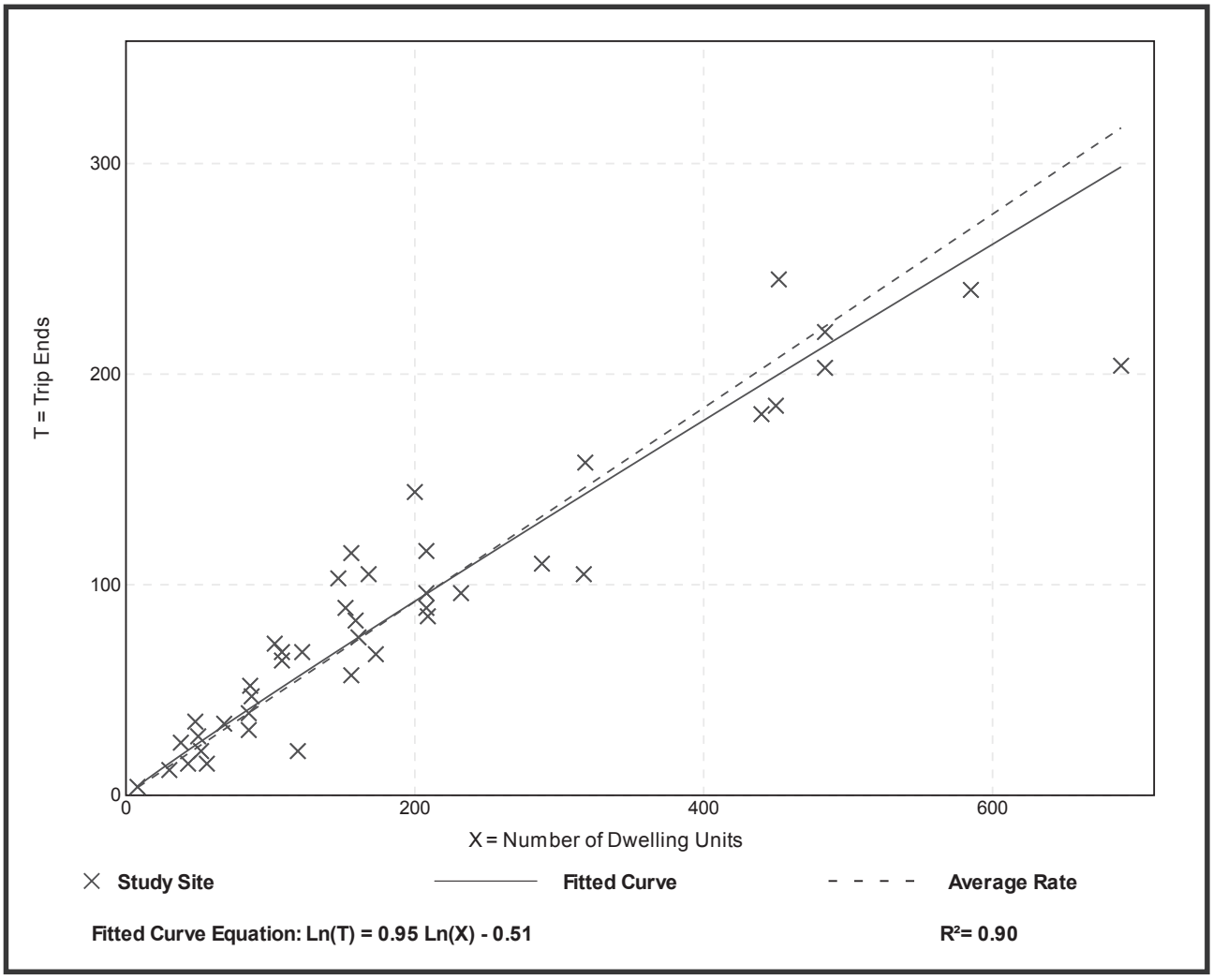
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 7 and 9 a.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	42
Avg. Num. of Dwelling Units:	199
Directional Distribution:	23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

Data Plot and Equation



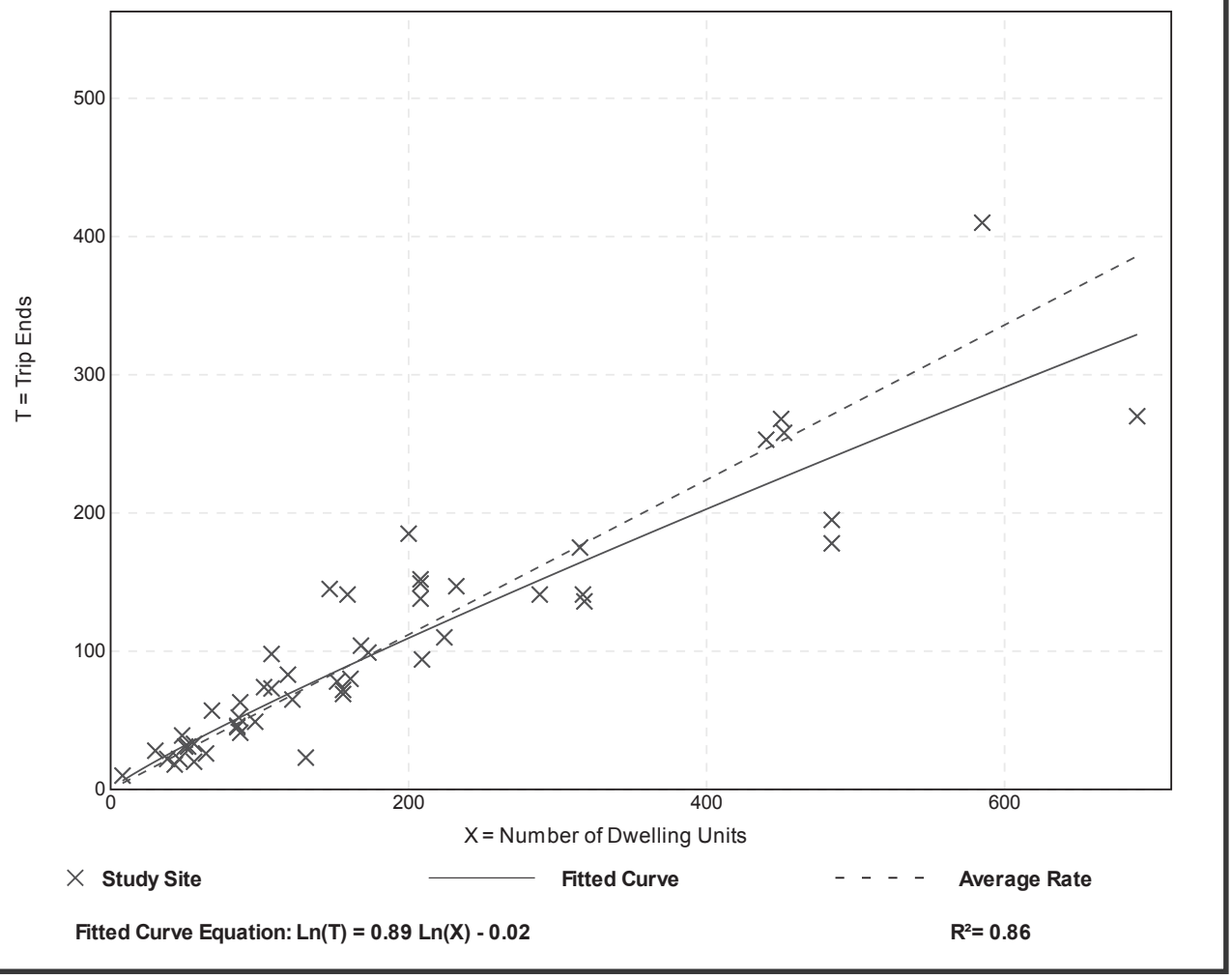
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	50
Avg. Num. of Dwelling Units:	187
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

Data Plot and Equation



Multifamily Housing (Low-Rise)
(220)

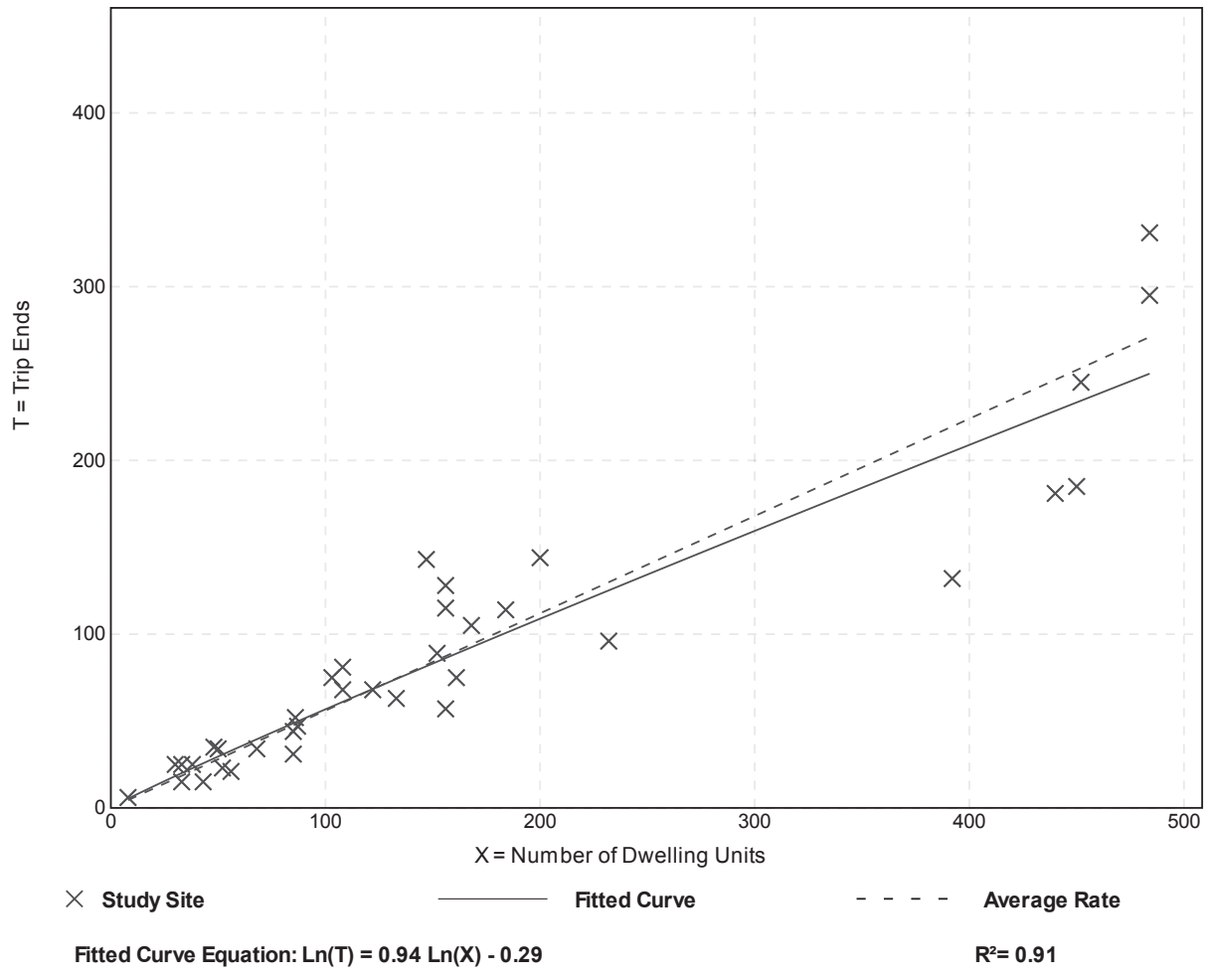
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 36
Avg. Num. of Dwelling Units: 161
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.34 - 0.97	0.15

Data Plot and Equation



Multifamily Housing (Low-Rise)
(220)

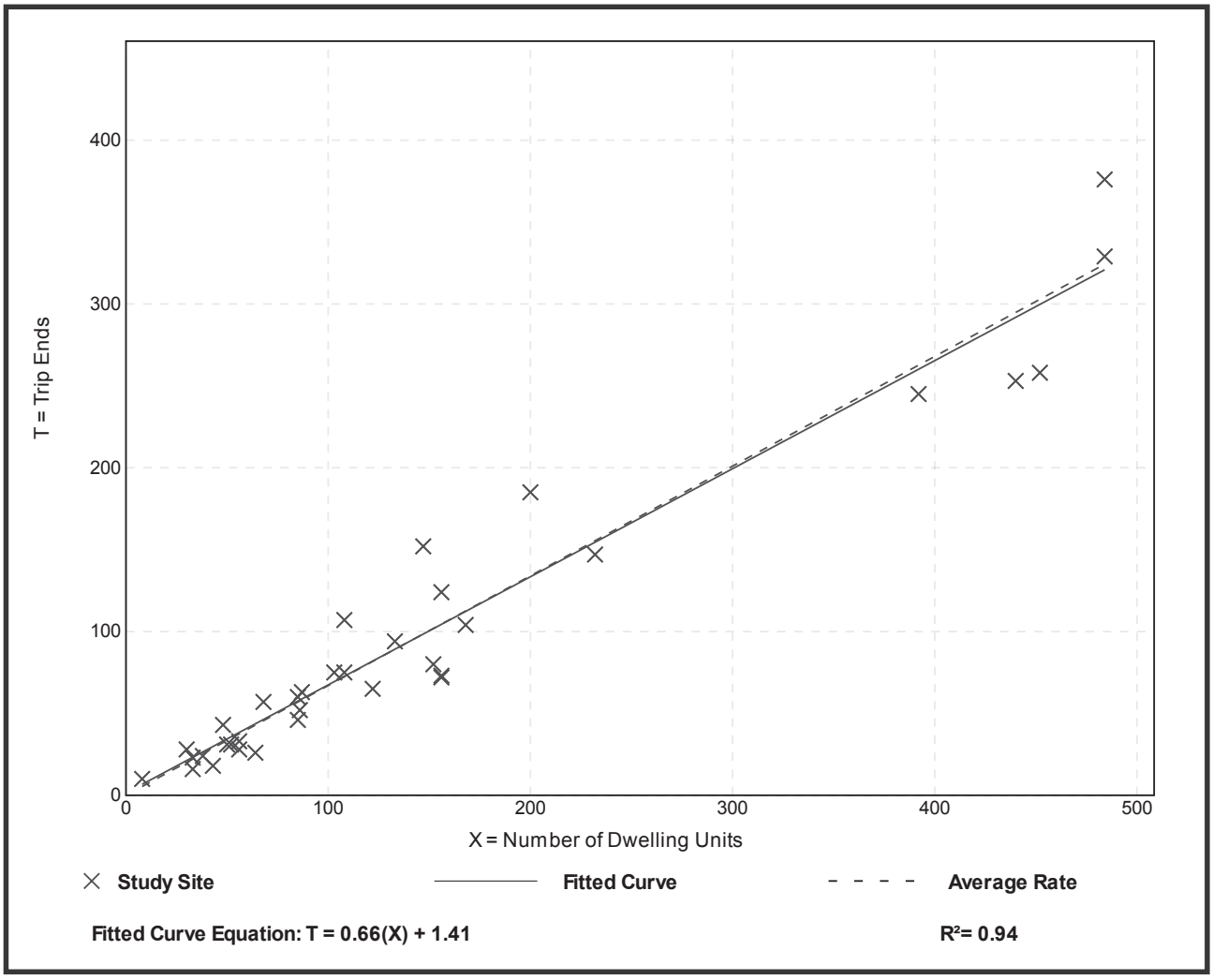
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 35
Avg. Num. of Dwelling Units: 146
Directional Distribution: 59% entering, 41% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.67	0.41 - 1.25	0.14

Data Plot and Equation



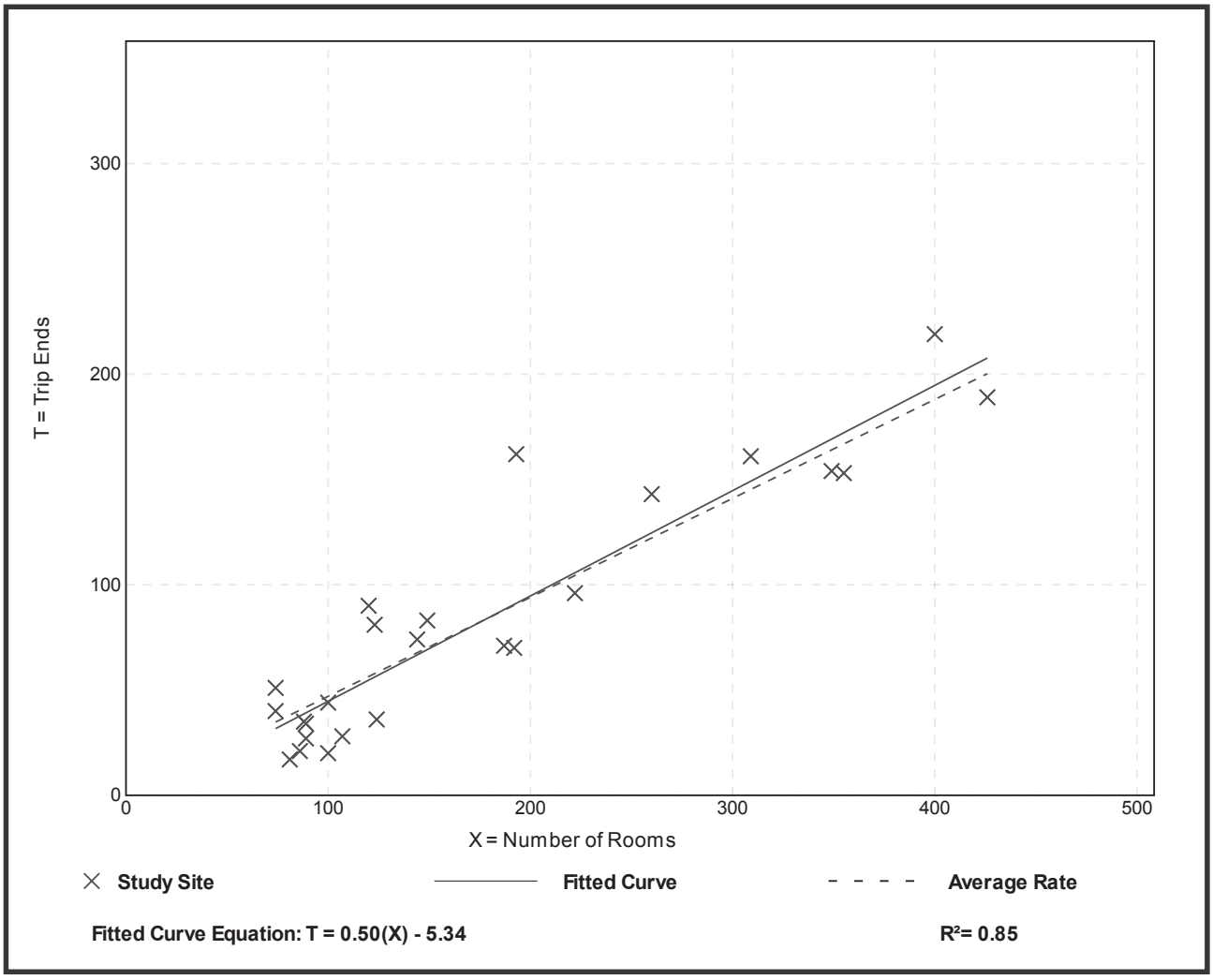
Hotel
(310)

Vehicle Trip Ends vs:	**Rooms**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	25
Avg. Num. of Rooms:	178
Directional Distribution:	59% entering, 41% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.47	0.20 - 0.84	0.14

Data Plot and Equation



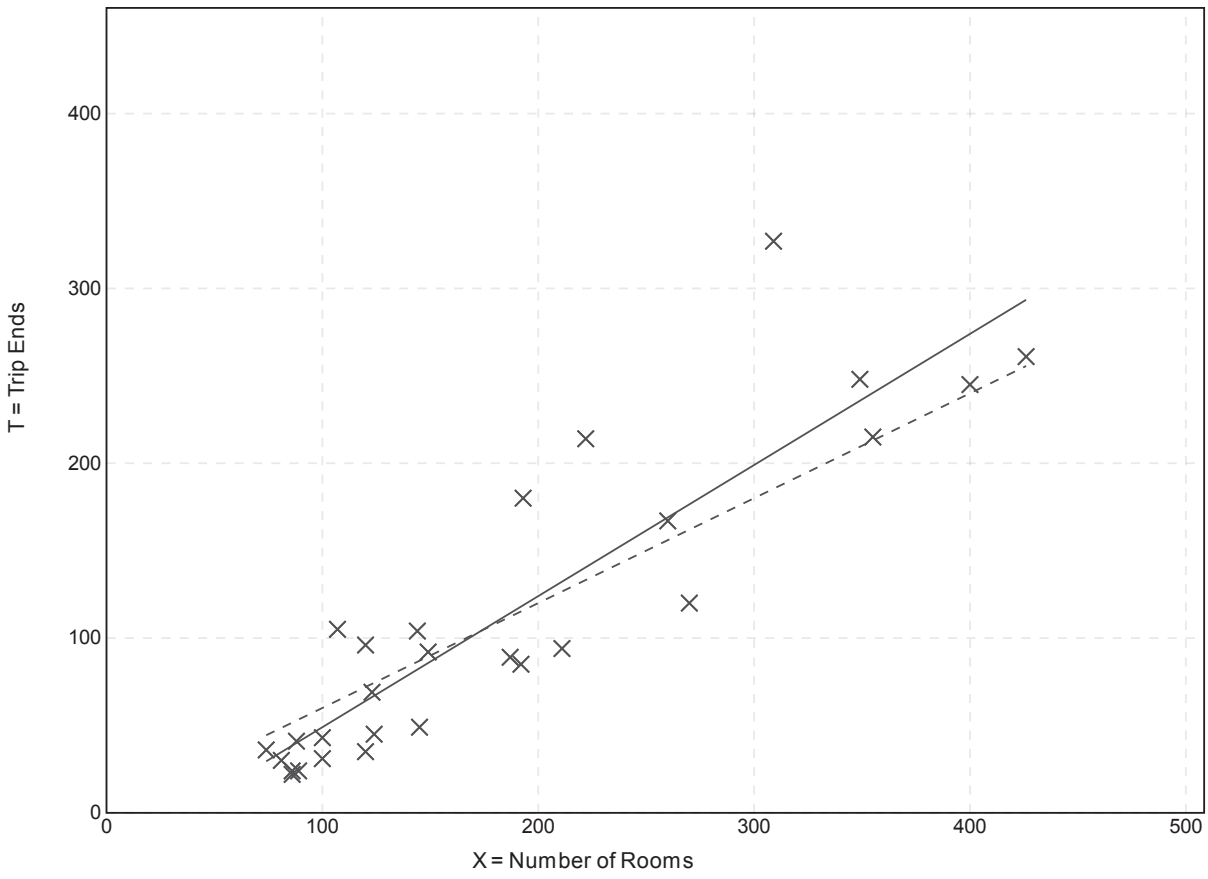
Hotel
(310)

Vehicle Trip Ends vs:	**Rooms**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	28
Avg. Num. of Rooms:	183
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.60	0.26 - 1.06	0.22

Data Plot and Equation



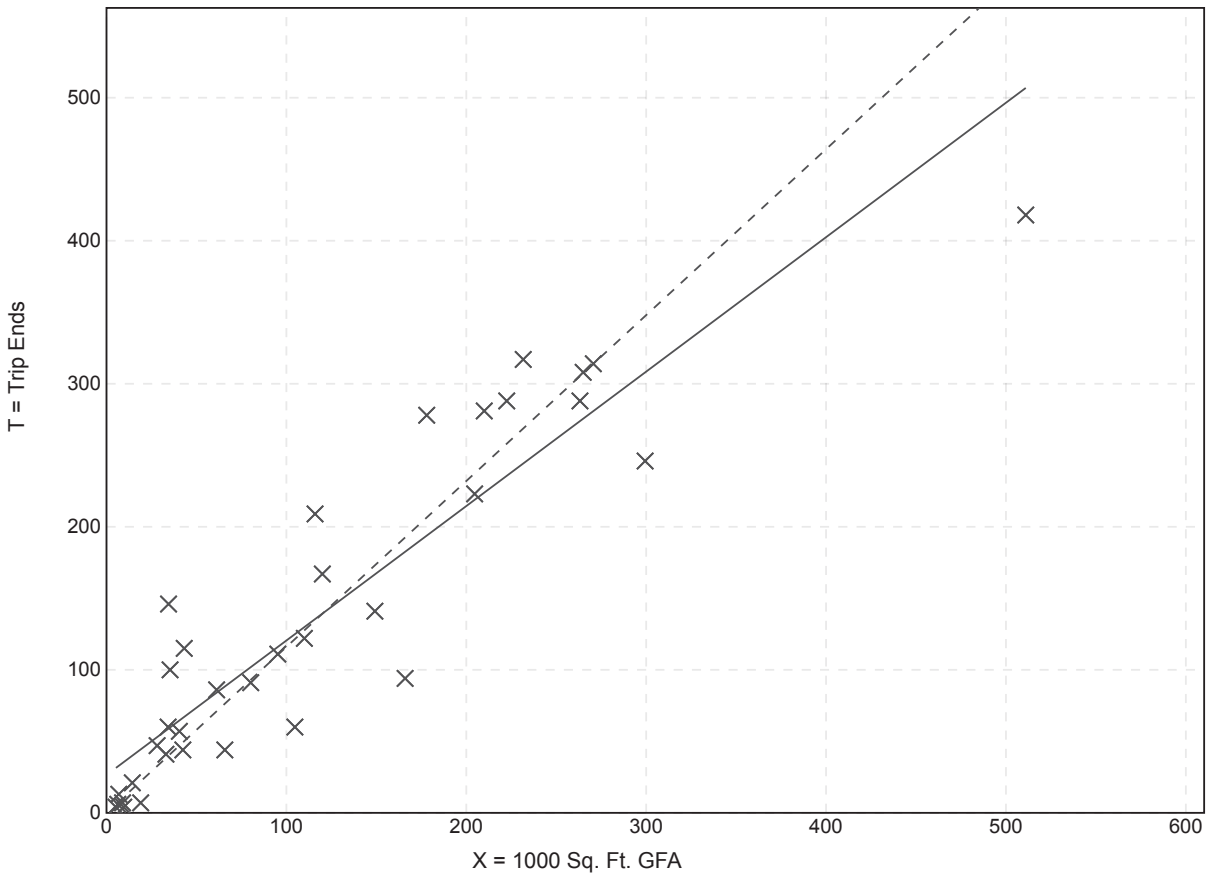
General Office Building
(710)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 35
1000 Sq. Ft. GFA: 117
Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.16	0.37 - 4.23	0.47

Data Plot and Equation



Fitted Curve Equation: T = 0.94(X) + 26.49

R^2= 0.85

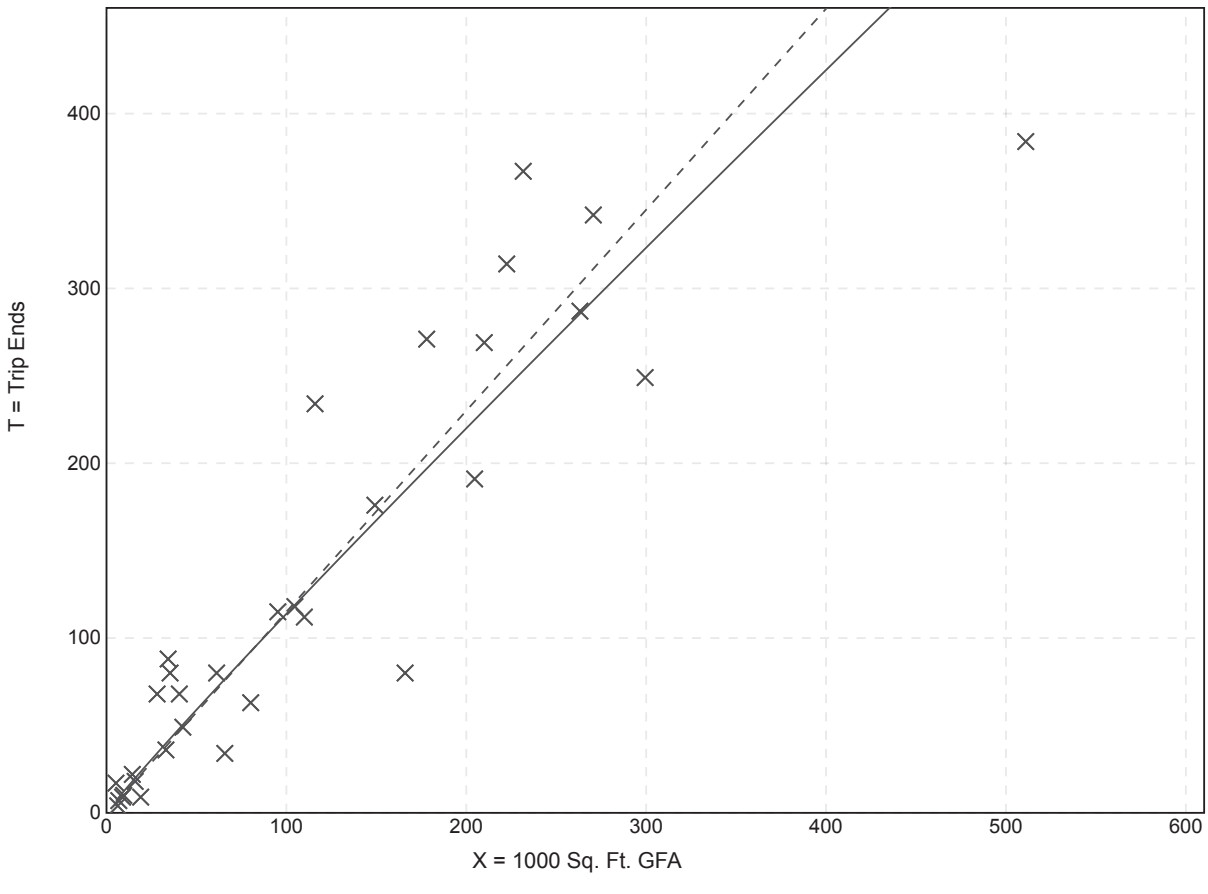
General Office Building
(710)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 32
1000 Sq. Ft. GFA: 114
Directional Distribution: 16% entering, 84% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.15	0.47 - 3.23	0.42

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.95 Ln(X) + 0.36

R^2= 0.88

General Office Building
(710)

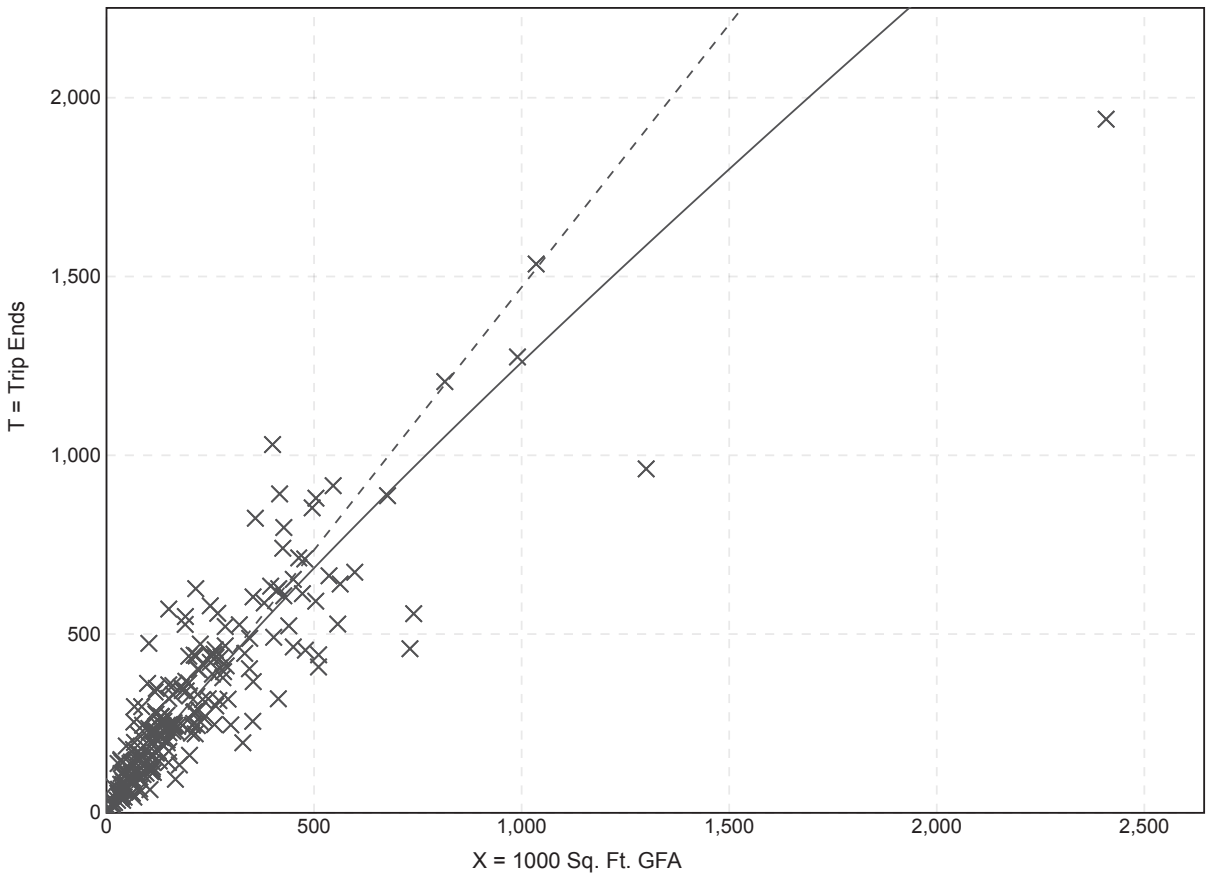
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 228
1000 Sq. Ft. GFA: 209
Directional Distribution: 88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.47	0.57 - 4.93	0.60

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.88 Ln(X) + 1.06

R^2= 0.84

General Office Building
(710)

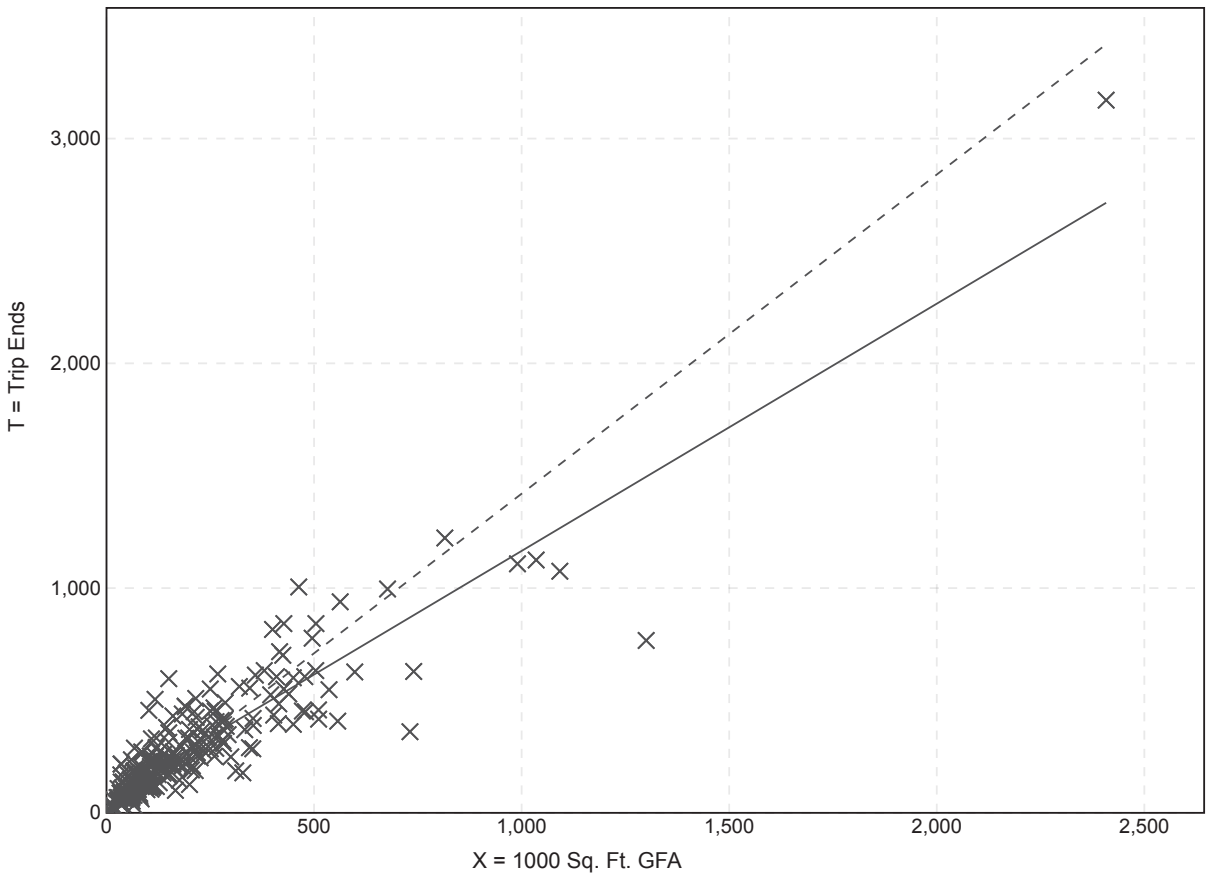
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 243
1000 Sq. Ft. GFA: 205
Directional Distribution: 18% entering, 82% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.42	0.49 - 6.20	0.61

Data Plot and Equation



Fitted Curve Equation: T = 1.10(X) + 65.39

R^2= 0.82

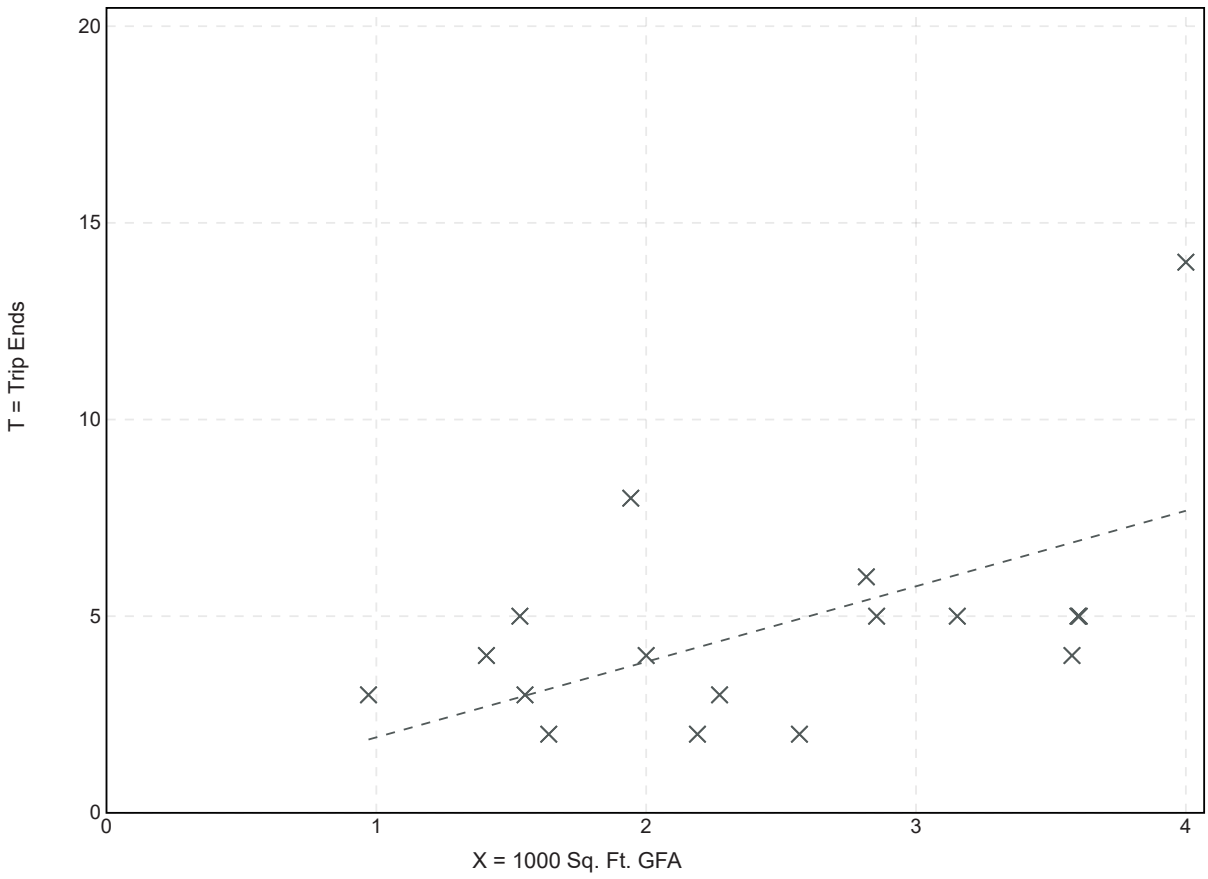
Small Office Building
(712)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 17
1000 Sq. Ft. GFA: 2
Directional Distribution: 83% entering, 18% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.92	0.78 - 4.12	0.97

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

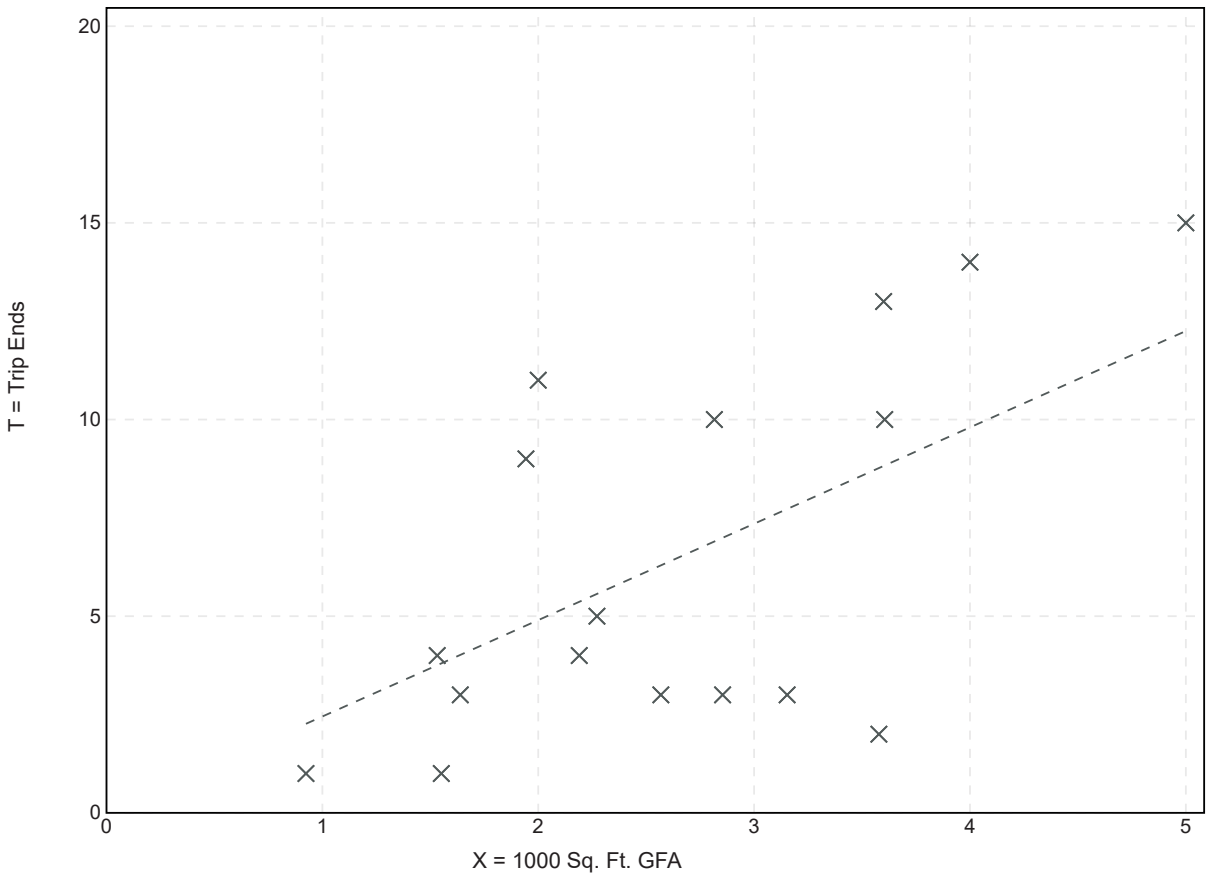
Small Office Building
(712)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 17
1000 Sq. Ft. GFA: 3
Directional Distribution: 32% entering, 68% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.45	0.56 - 5.50	1.38

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Small Office Building
(712)

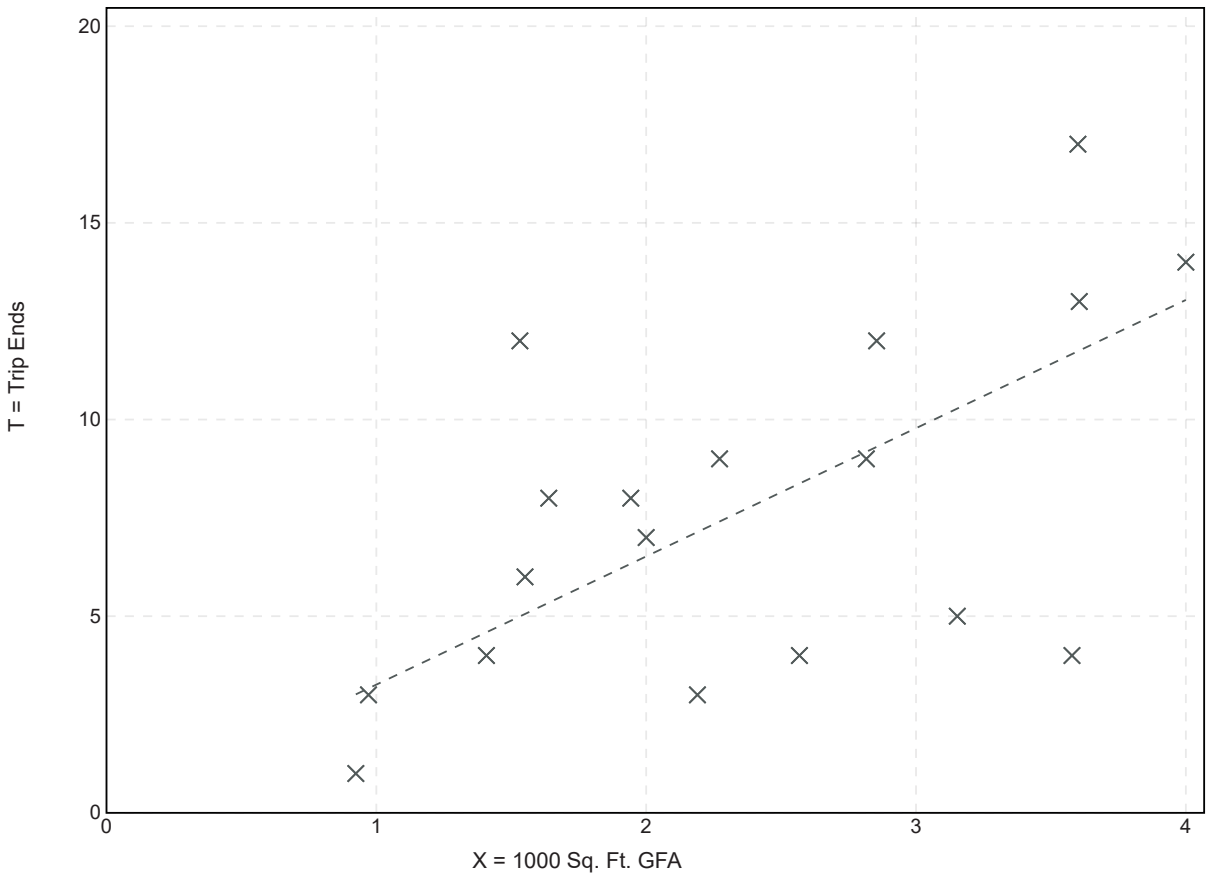
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 18
1000 Sq. Ft. GFA: 2
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.26	1.08 - 7.83	1.54

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Small Office Building
(712)

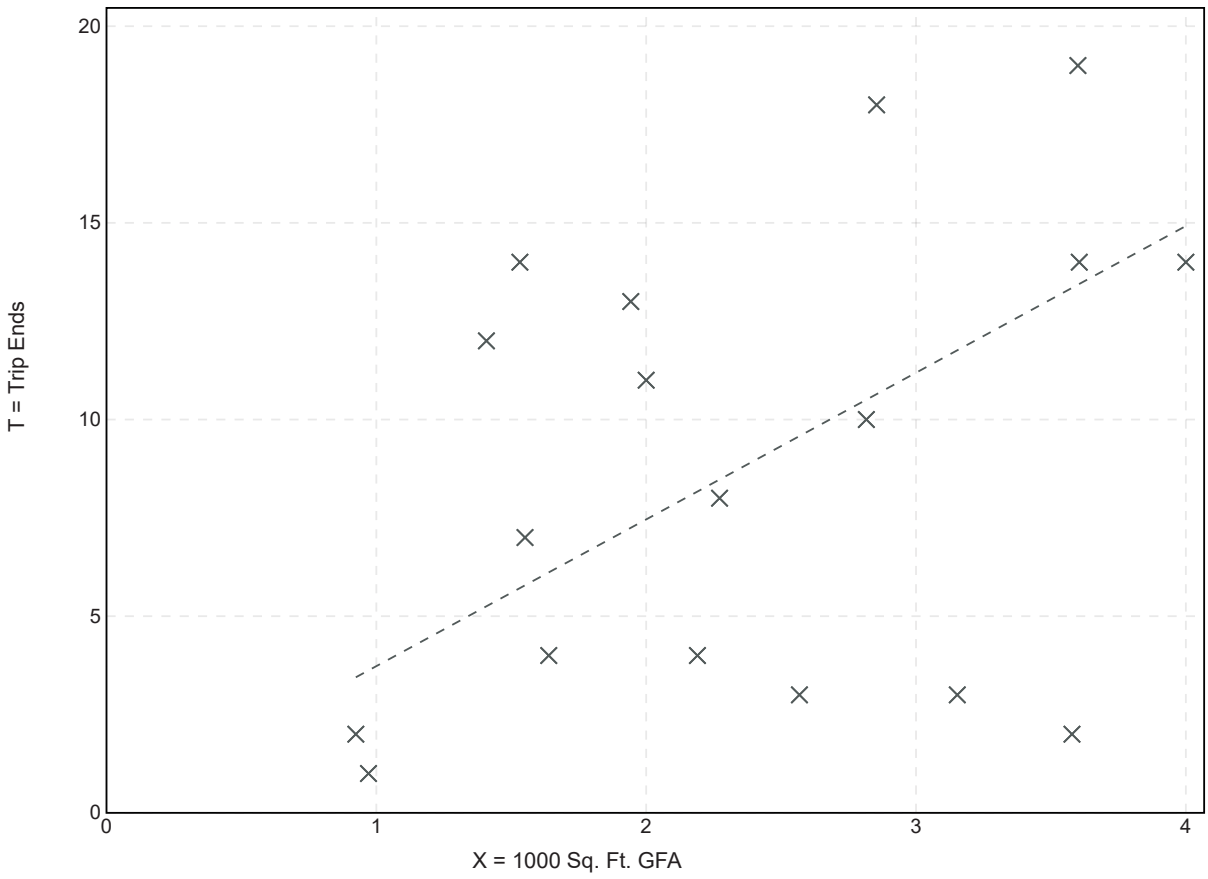
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 18
1000 Sq. Ft. GFA: 2
Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.73	0.56 - 9.14	2.37

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

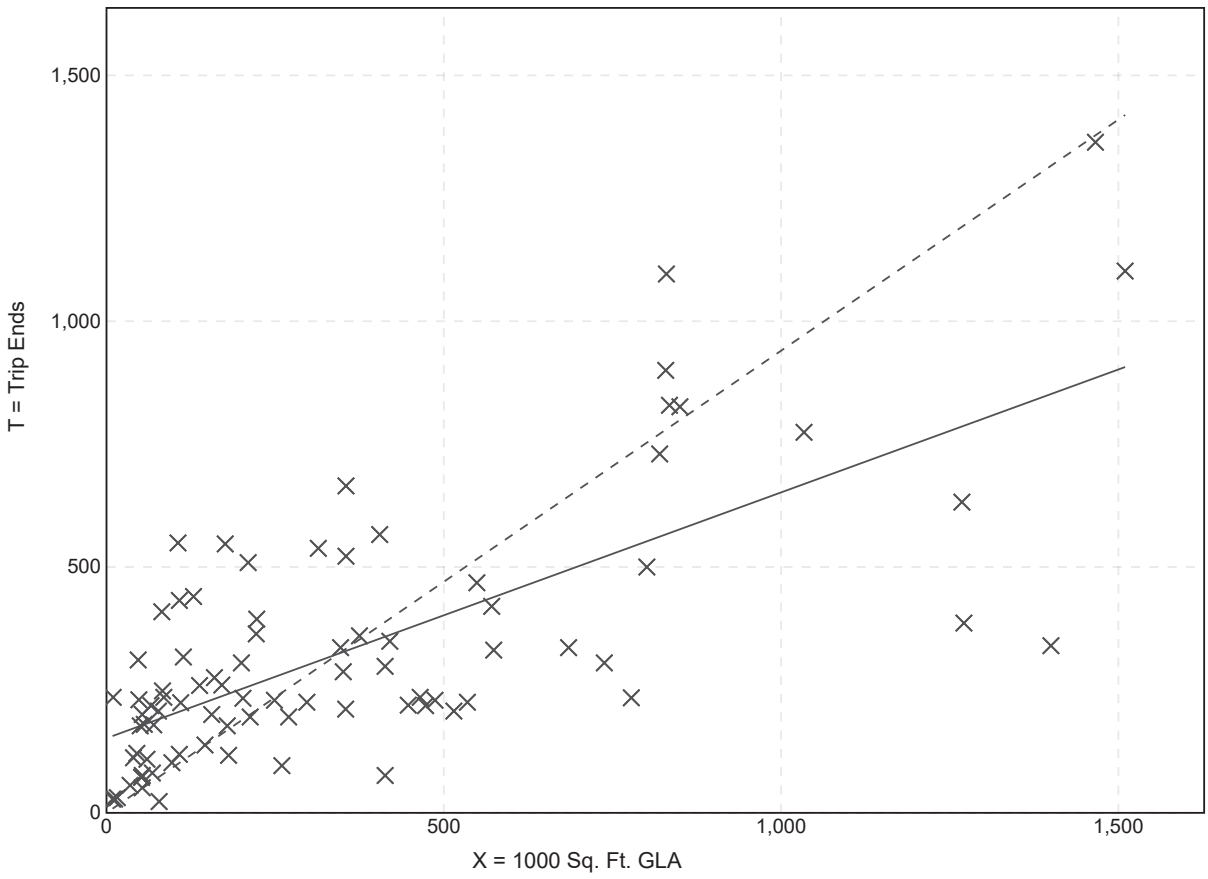
Shopping Center
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 84
1000 Sq. Ft. GLA: 351
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



Fitted Curve Equation: T = 0.50(X) + 151.78

R^2= 0.50

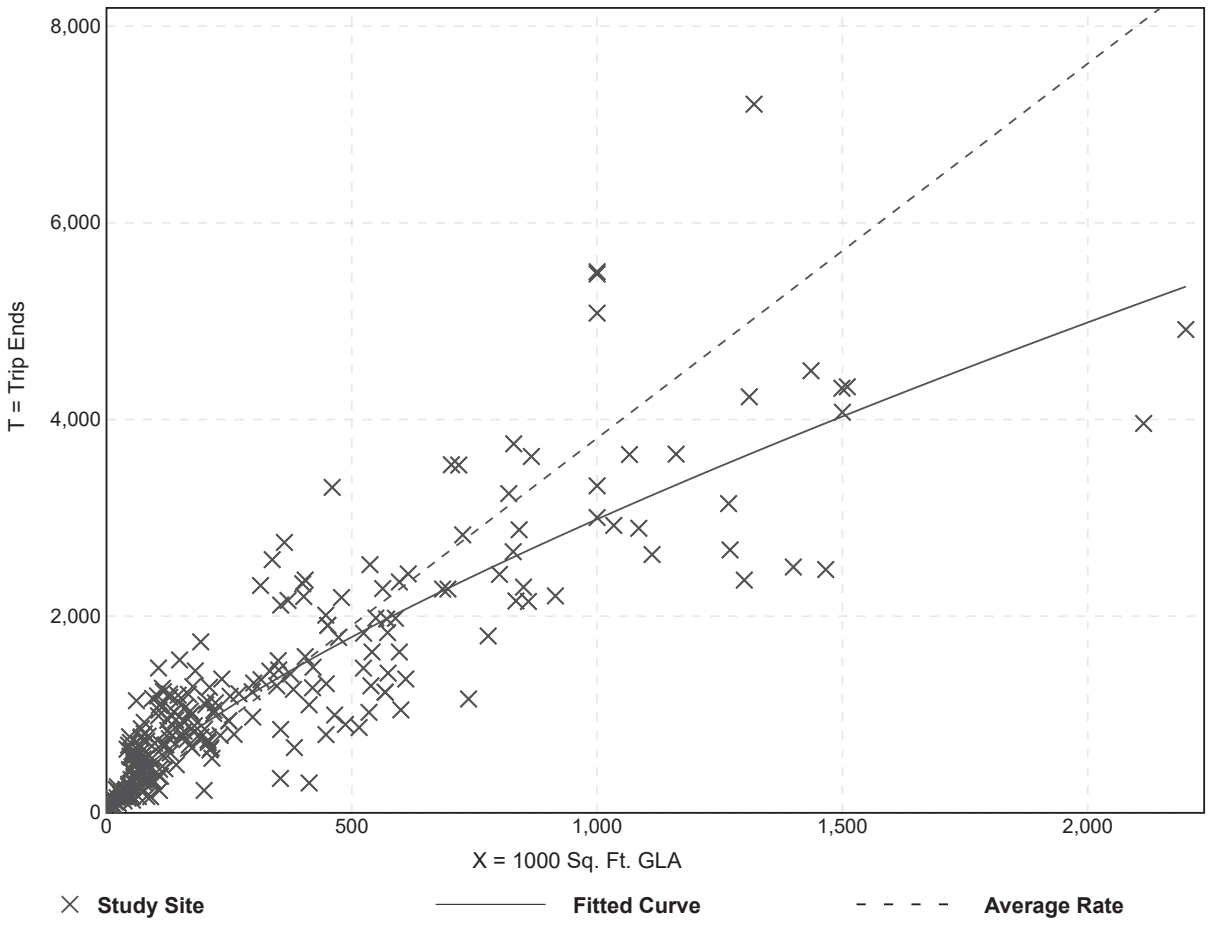
Shopping Center
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 261
1000 Sq. Ft. GLA: 327
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.74 Ln(X) + 2.89

R^2= 0.82

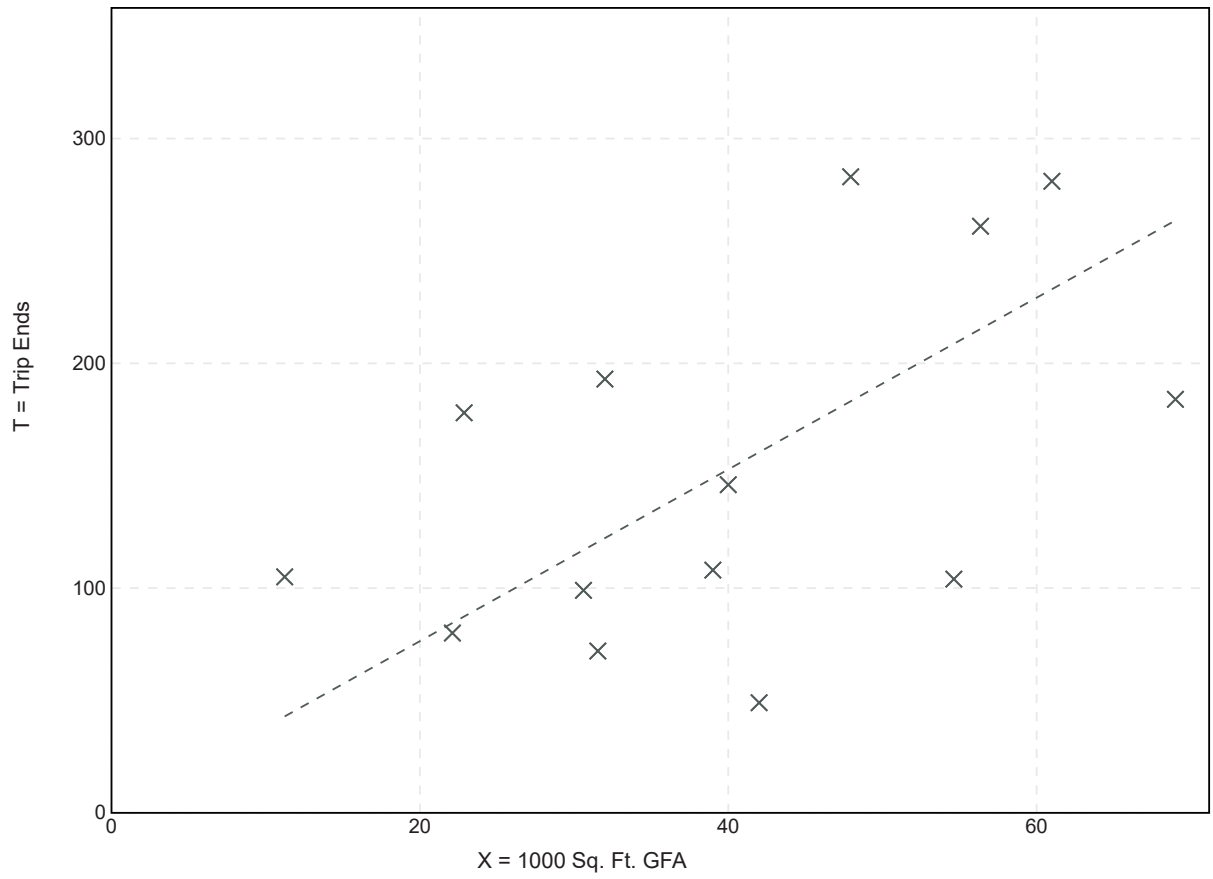
Supermarket
(850)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	14
1000 Sq. Ft. GFA:	40
Directional Distribution:	60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.82	1.17 - 9.35	1.89

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

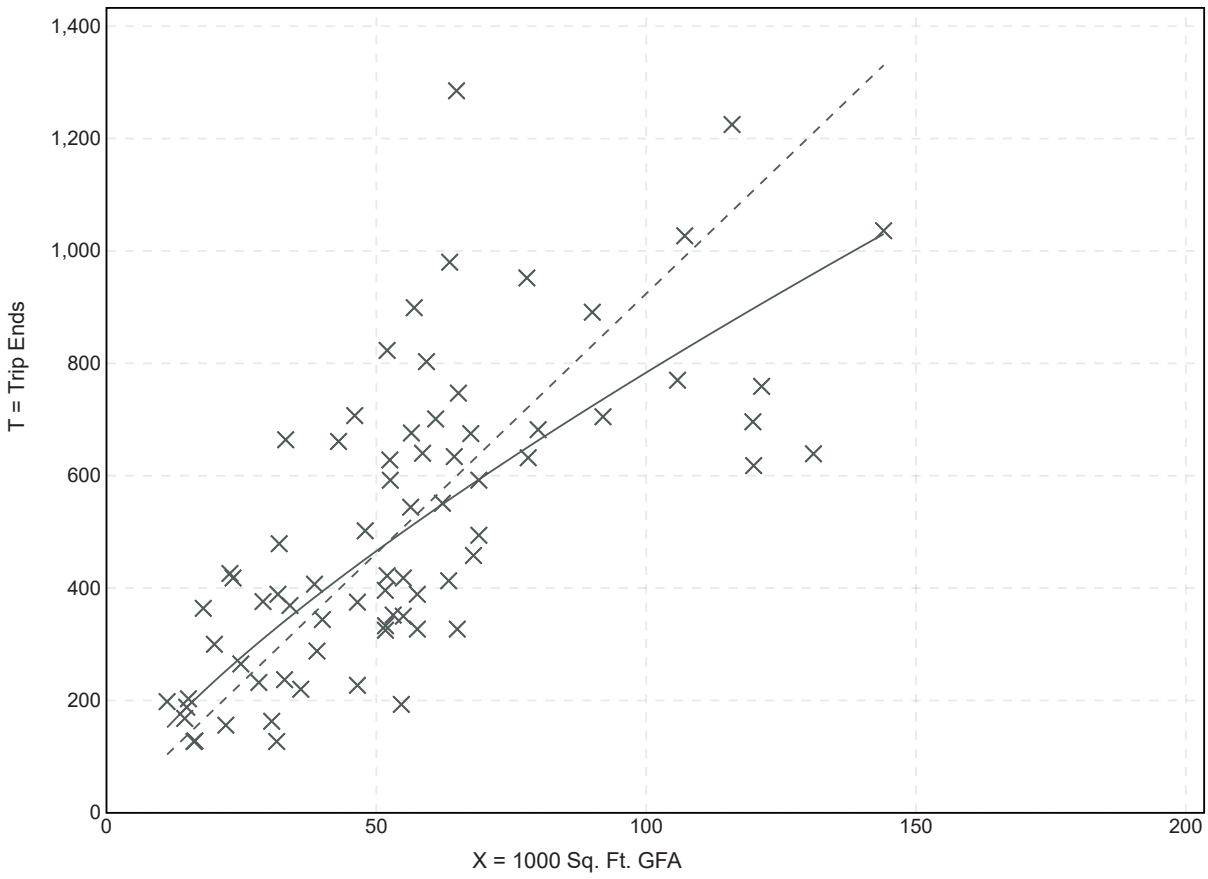
Supermarket
(850)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 73
1000 Sq. Ft. GFA: 55
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.24	3.53 - 20.30	3.69

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.75 Ln(X) + 3.21

R^2= 0.57

Supermarket
(850)

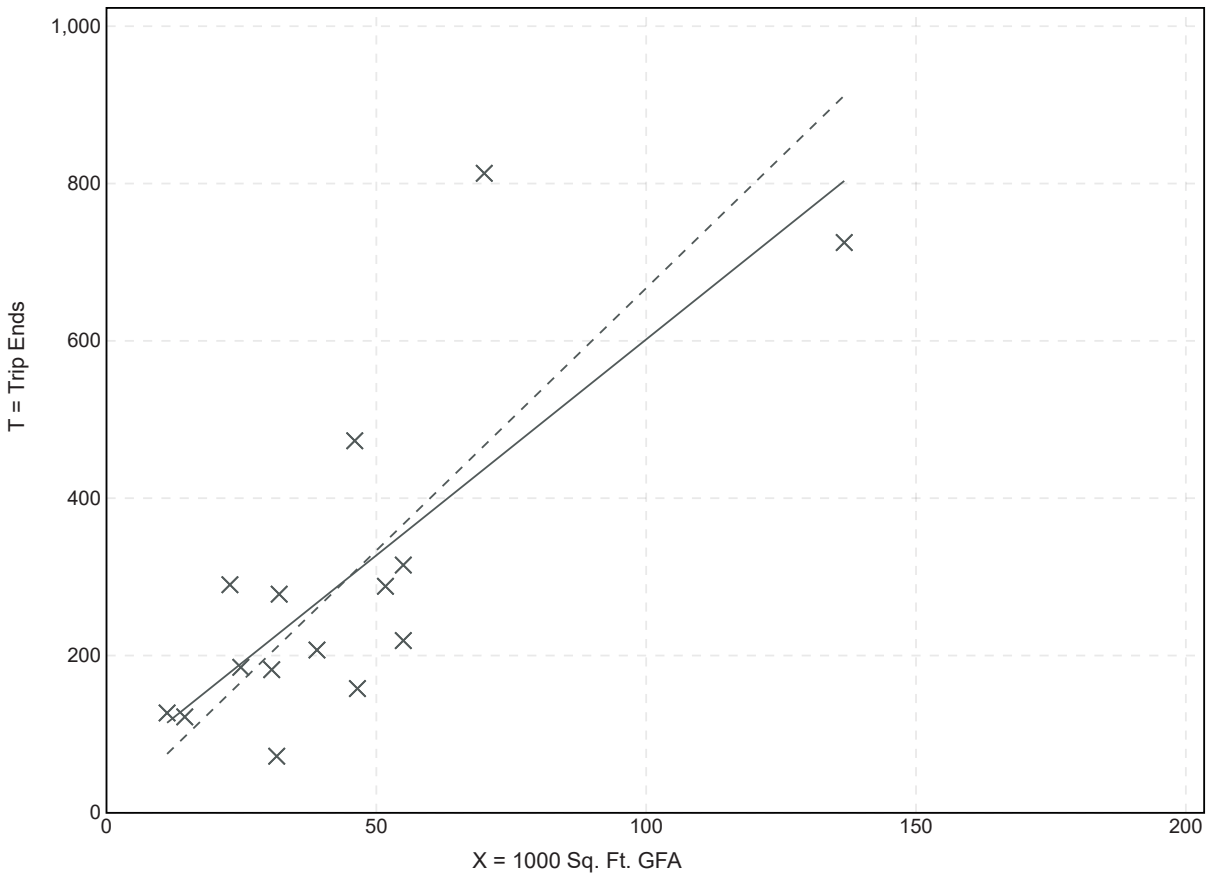
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 15
1000 Sq. Ft. GFA: 45
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
6.67	2.28 - 12.68	2.98

Data Plot and Equation



Fitted Curve Equation: T = 5.49(X) + 52.83

R^2= 0.59

Supermarket
(850)

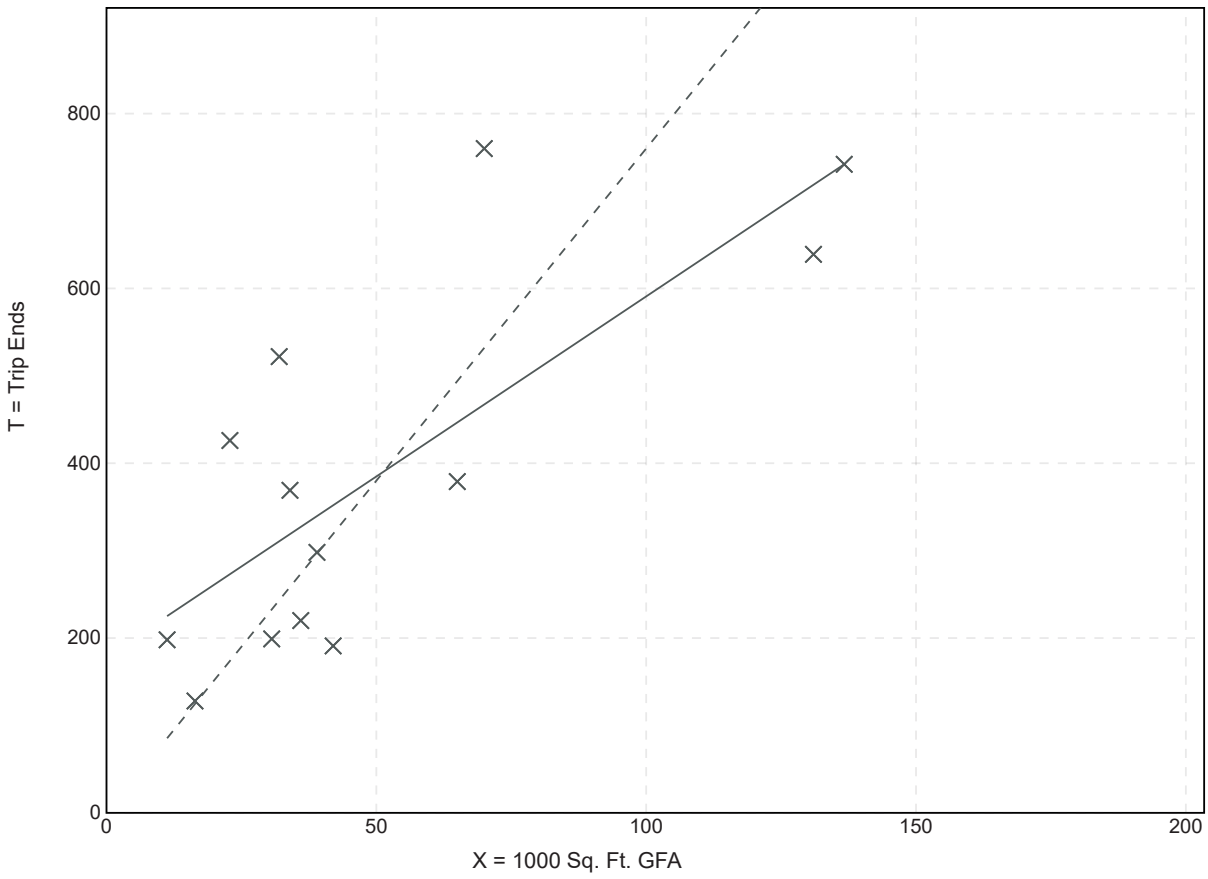
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 13
1000 Sq. Ft. GFA: 51
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
7.60	4.55 - 18.63	3.98

Data Plot and Equation



Fitted Curve Equation: T = 4.12(X) + 178.83

R^2= 0.59

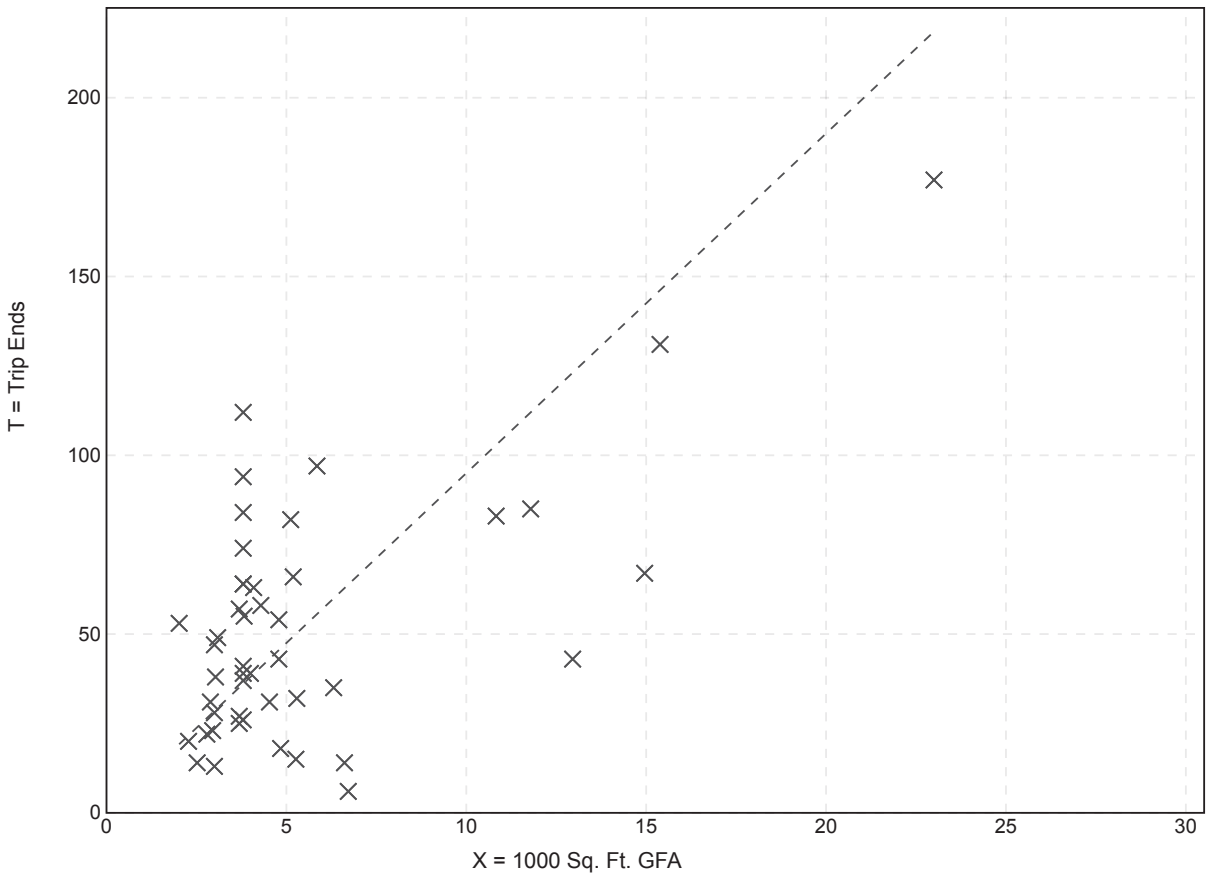
Drive-in Bank
(912)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 46
1000 Sq. Ft. GFA: 5
Directional Distribution: 58% entering, 42% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.50	0.89 - 29.47	5.85

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

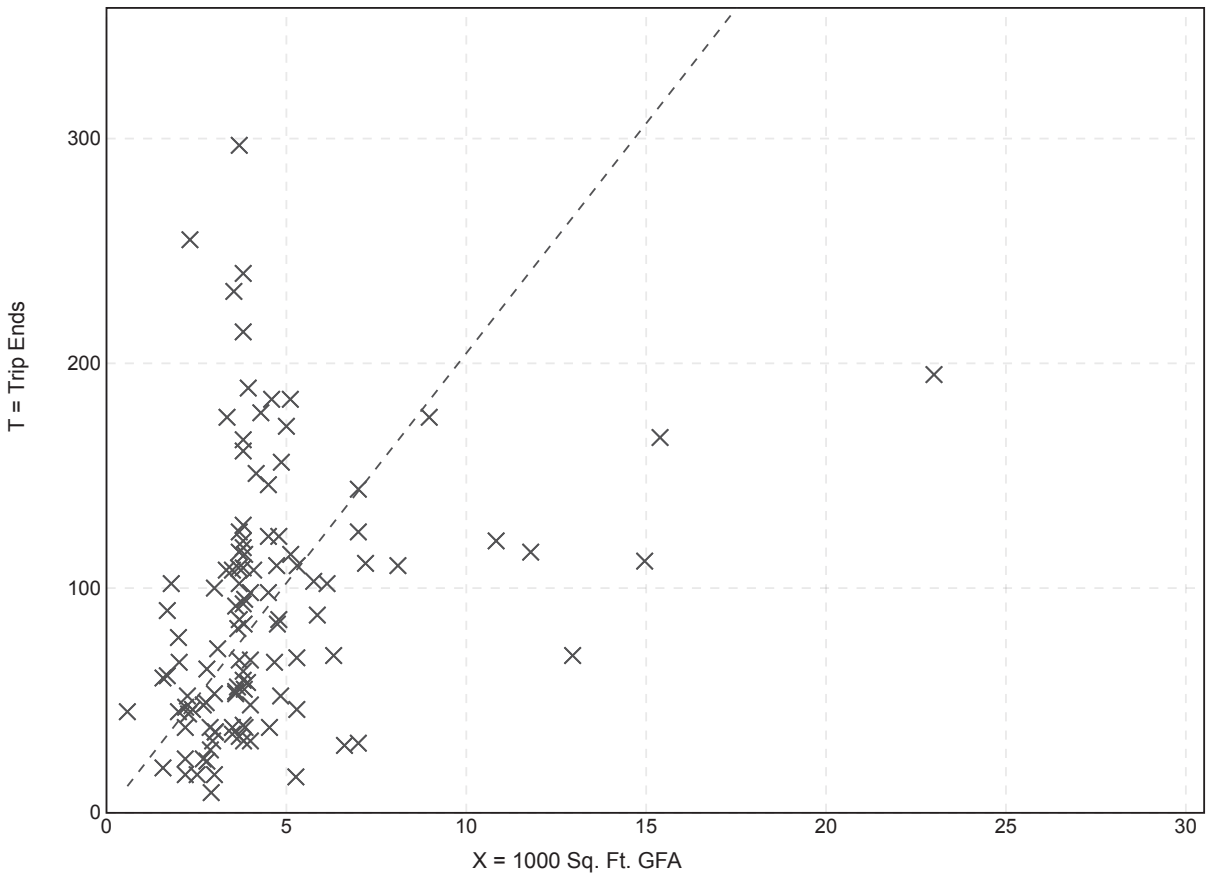
Drive-in Bank
(912)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 115
1000 Sq. Ft. GFA: 4
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
20.45	3.04 - 109.91	15.01

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Drive-in Bank
(912)

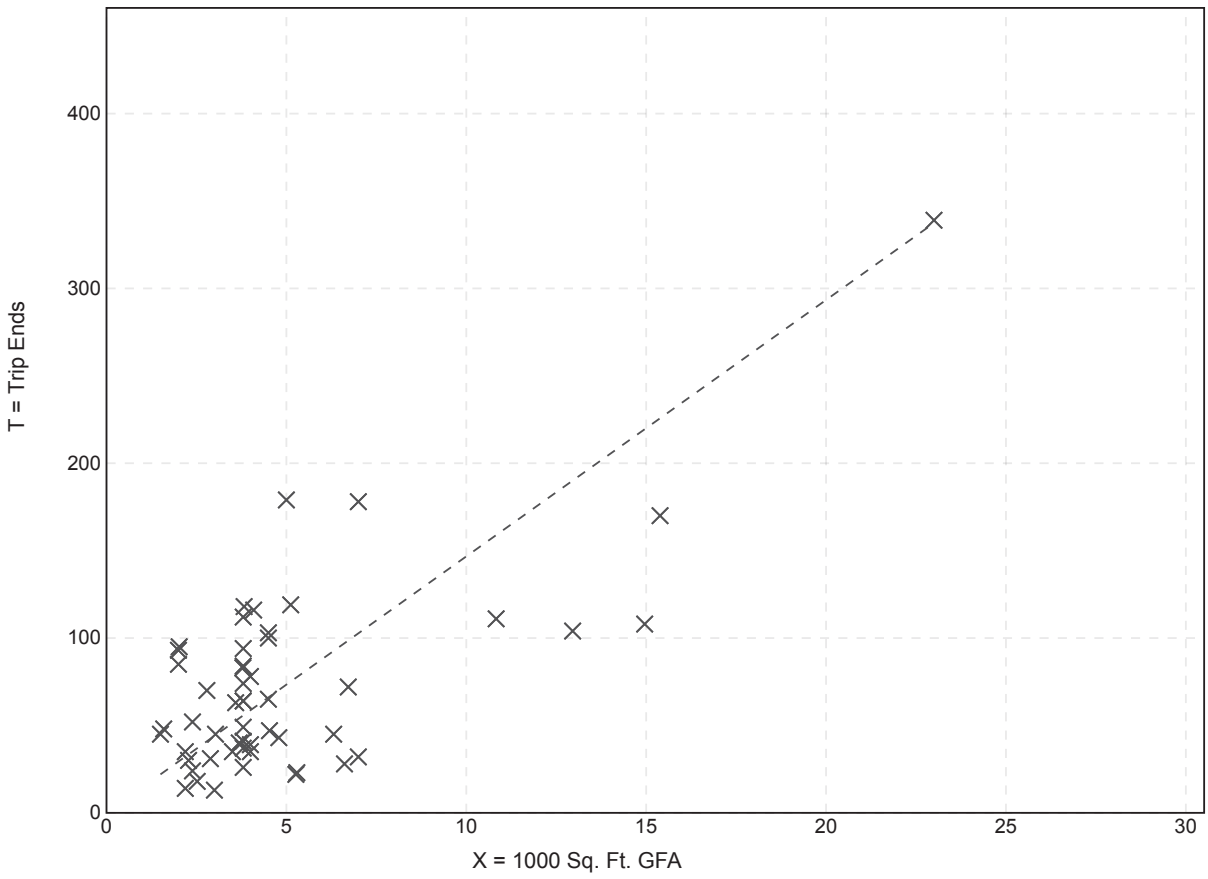
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 53
1000 Sq. Ft. GFA: 5
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
14.67	4.18 - 47.03	9.06

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Drive-in Bank
(912)

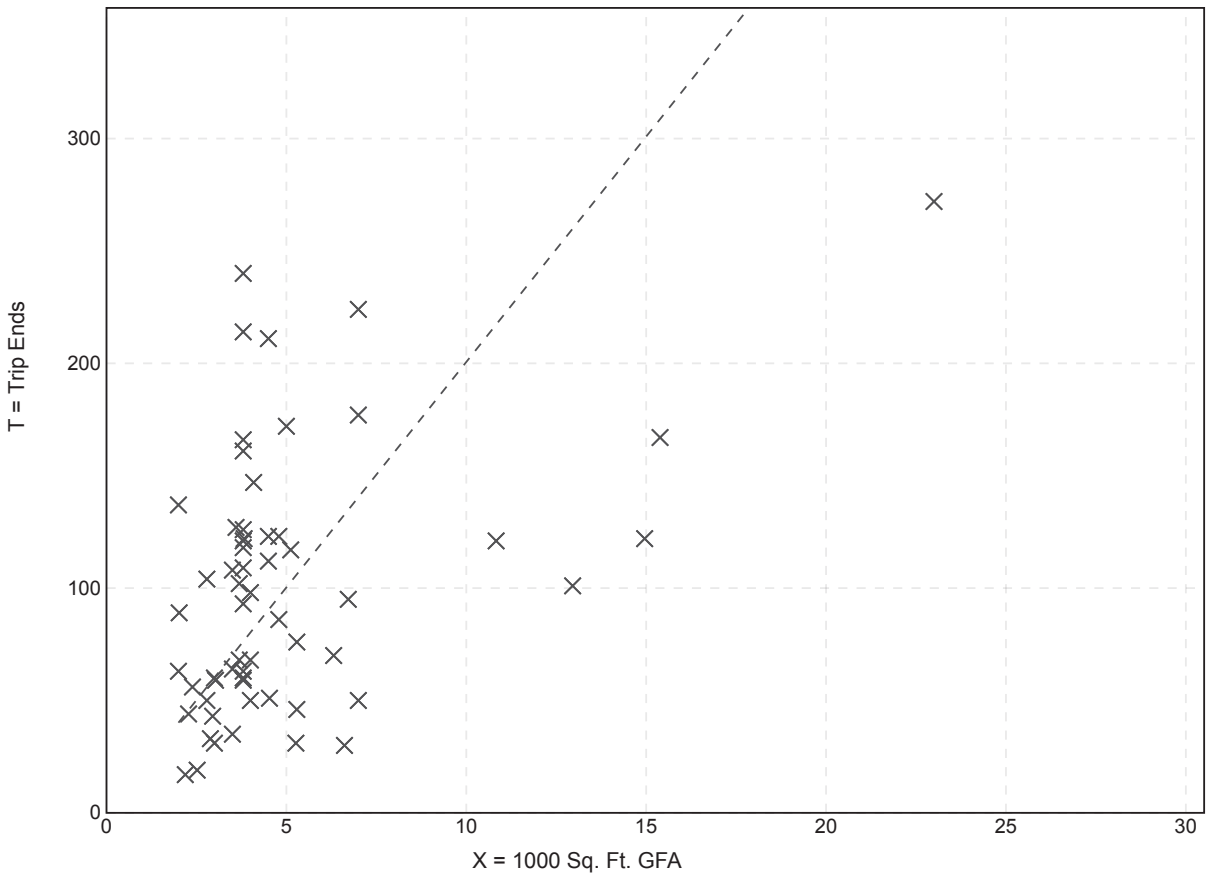
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 59
1000 Sq. Ft. GFA: 5
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
20.06	4.54 - 68.50	13.13

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

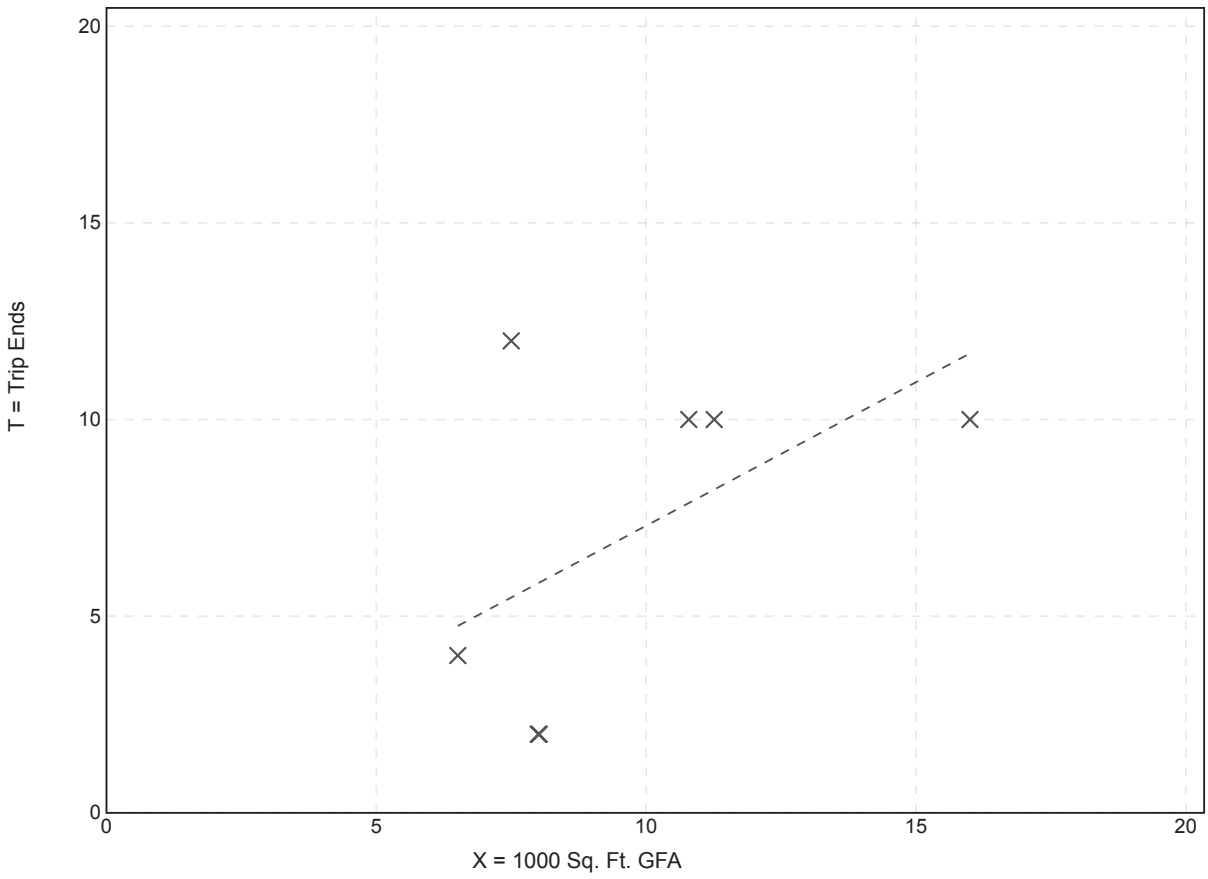
Quality Restaurant
(931)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 7
1000 Sq. Ft. GFA: 10
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.73	0.25 - 1.60	0.42

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

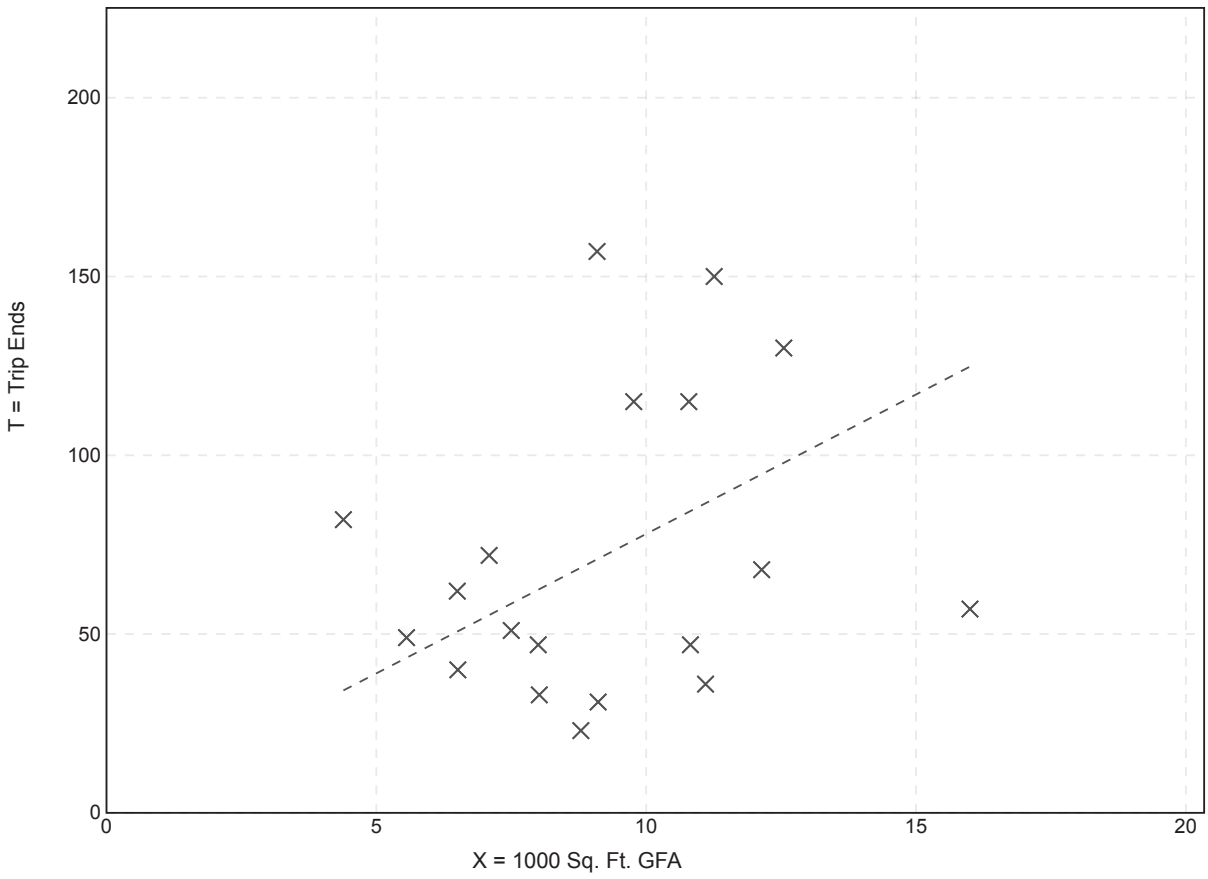
Quality Restaurant
(931)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	19
1000 Sq. Ft. GFA:	9
Directional Distribution:	67% entering, 33% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
7.80	2.62 - 18.68	4.49

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Quality Restaurant
(931)

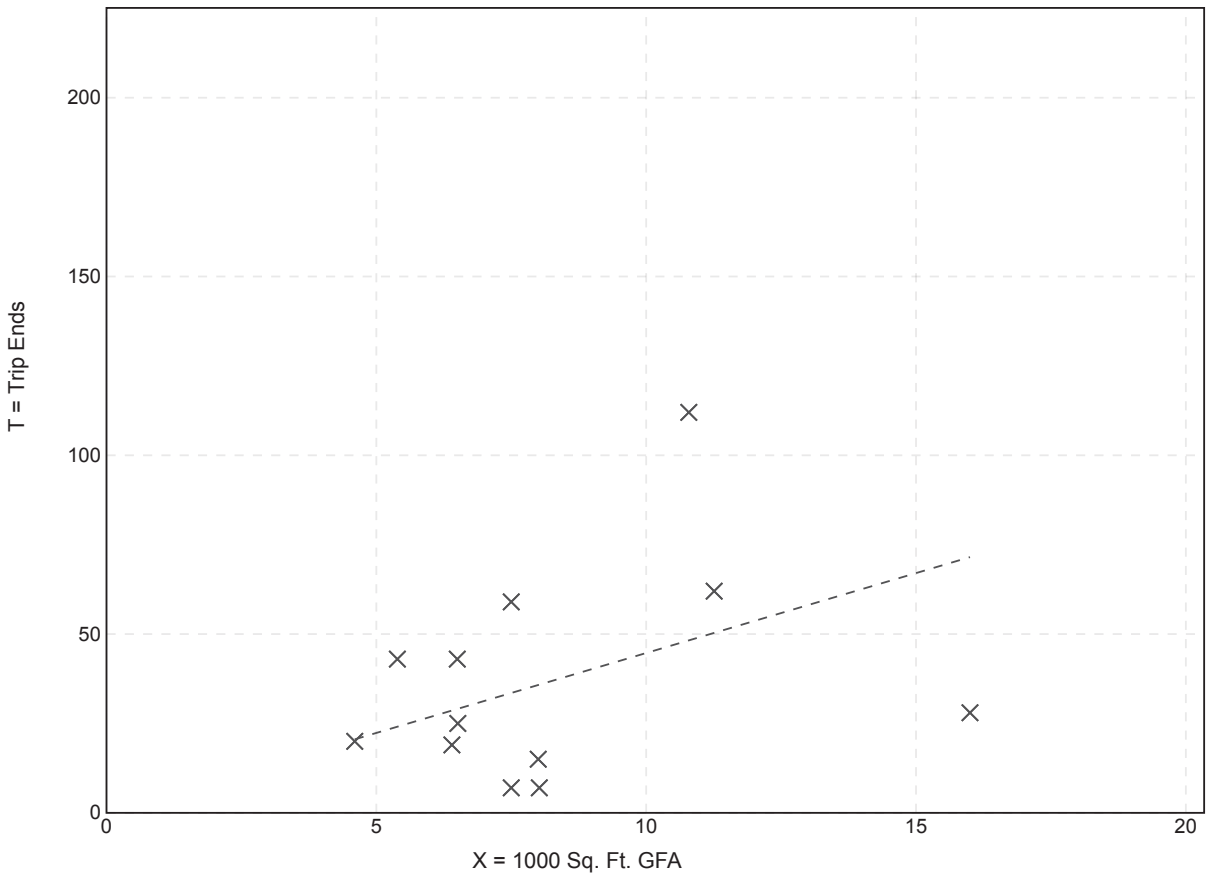
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 12
1000 Sq. Ft. GFA: 8
Directional Distribution: 80% entering, 20% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.47	0.87 - 10.38	3.26

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Quality Restaurant
(931)

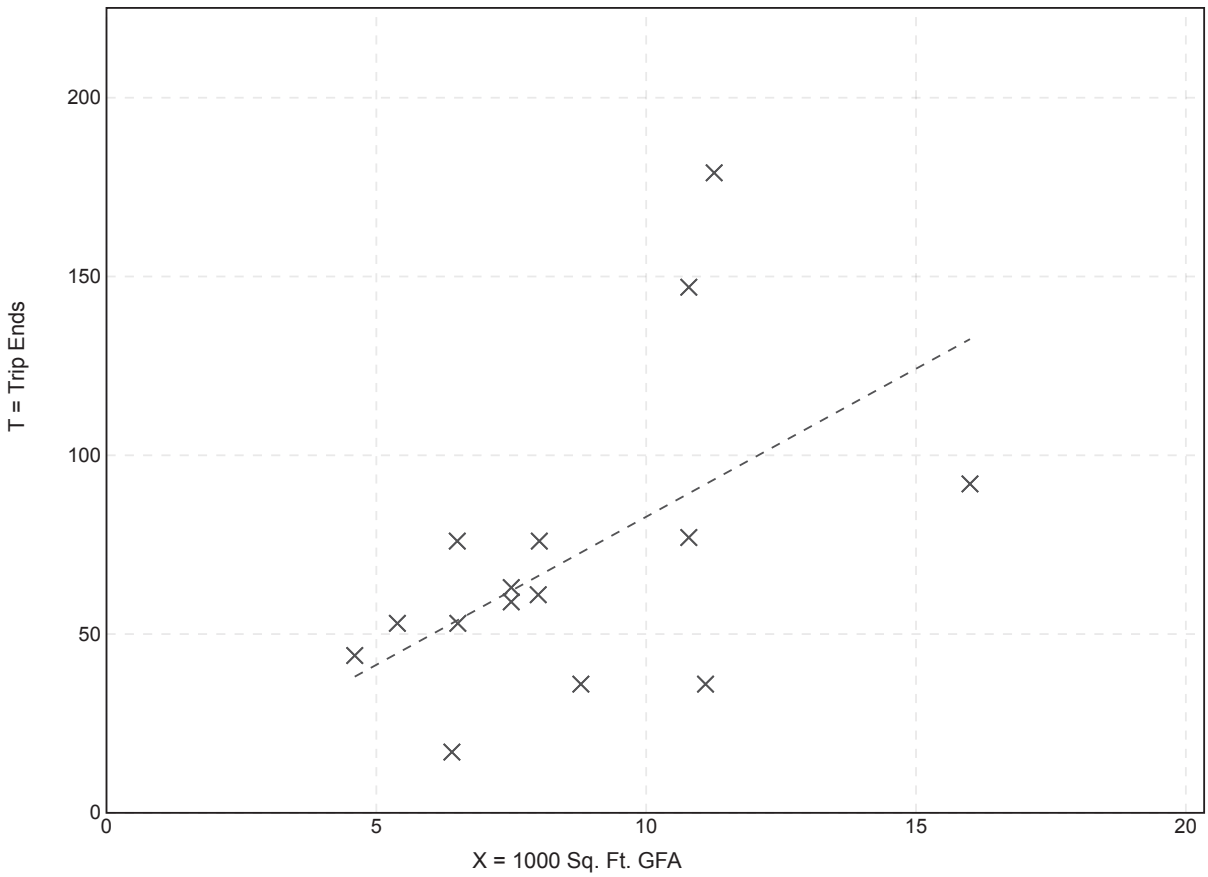
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 15
1000 Sq. Ft. GFA: 9
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
8.28	2.66 - 15.90	3.89

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Exhibit 9

AM Peak Hour – Network Design Hourly Volumes – Full Build


45th Ave
AM Peak Hour
909
35
Calumet
1191
52
140
645
124
145
213
212
41
4
37
57
580
59
45th
236
381
331
268
862
189
63
626
48
4
36
42
N Centennial
1188
34
Village
1315
41
Greenway

Exhibit 10

PM Peak Hour – Network Design Hourly Volumes – Full Build


45th Ave
PM Peak Hour
1250
103
Calumet
1166
107
150
913
187
154
370
228
140
10
90
94
709
148
45th
205
685
345
318
914
228
145
1096
129
69
10
161
1487
90
N Centennial
Greenway
1467
84
Village

Exhibit 11

PM LOS & Queue Report – Full Build Conditions – Calumet Avenue & 45th Avenue – Dual Signals

HCM 6th Signalized Intersection Summary
1: 45th & Calumet

09/05/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Future Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	753	383	243	385	192	374	1039	265	240	1087	163
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	408	674	342	242	610	300	393	1031	262	258	1166	520
Arrive On Green	0.13	0.30	0.30	0.17	0.44	0.44	0.11	0.37	0.37	0.07	0.33	0.33
Sat Flow, veh/h	1781	2281	1158	1781	2308	1135	3456	2807	712	3456	3554	1585
Grp Volume(v), veh/h	277	586	550	243	295	282	374	656	648	240	1087	163
Grp Sat Flow(s),veh/h/ln	1781	1777	1662	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	12.1	32.5	32.5	10.9	14.1	14.5	11.8	40.4	40.4	7.6	32.6	8.5
Cycle Q Clear(g_c), s	12.1	32.5	32.5	10.9	14.1	14.5	11.8	40.4	40.4	7.6	32.6	8.5
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	408	525	491	242	469	440	393	653	640	258	1166	520
V/C Ratio(X)	0.68	1.12	1.12	1.00	0.63	0.64	0.95	1.00	1.01	0.93	0.93	0.31
Avail Cap(c_a), veh/h	456	525	491	242	469	440	393	653	640	258	1166	520
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.88	0.88	0.88	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	38.8	38.8	28.3	26.6	26.7	48.5	34.8	34.8	50.6	35.8	27.7
Incr Delay (d2), s/veh	3.5	75.3	77.7	55.4	2.4	2.8	33.2	36.5	38.9	38.0	14.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	24.7	23.4	7.9	5.3	5.1	6.8	23.3	23.3	4.6	16.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.3	114.0	116.5	83.7	28.9	29.4	81.7	71.3	73.7	88.6	50.2	29.2
LnGrp LOS	C	F	F	F	C	C	F	F	F	F	D	C
Approach Vol, veh/h		1413			820			1678			1490	
Approach Delay, s/veh		98.2			45.3			74.5			54.1	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	44.9	15.4	37.0	17.0	40.6	18.8	33.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.4	10.9	32.5	12.5	36.1	17.3	26.1
Max Q Clear Time (g_c+I1), s	9.6	42.4	12.9	34.5	13.8	34.6	14.1	16.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.1	0.3	2.4

Intersection Summary	
HCM 6th Ctrl Delay	70.6
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	277	1136	243	578	374	1304	240	1087	163
v/c Ratio	0.76	1.08	1.00	0.64	0.96	1.02	0.94	0.94	0.26
Control Delay	35.5	87.6	103.3	25.0	85.5	63.9	94.5	51.4	6.3
Queue Delay	0.0	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	95.5	103.3	25.0	85.5	63.9	94.5	51.4	6.3
Queue Length 50th (ft)	128	~451	~152	71	137	~490	88	388	5
Queue Length 95th (ft)	153	#586	#304	131	#210	#618	#131	#442	51
Internal Link Dist (ft)		527		437		357		316	
Turn Bay Length (ft)	255		290		435		245		250
Base Capacity (vph)	386	1050	242	901	390	1281	255	1161	622
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	118	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	1.22	1.00	0.64	0.96	1.02	0.94	0.94	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Exhibit 12

LOS Full Build & Queue Report – Calumet Avenue & 45th Avenue – PM Peak Hour with N Centennial Drive Roundabout – Fully Optimized Signal

HCM 6th Signalized Intersection Summary
1: 45th & Calumet

09/05/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Future Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	753	383	243	385	192	374	1039	265	240	1087	163
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	393	674	342	242	610	300	393	1031	262	258	1166	520
Arrive On Green	0.13	0.30	0.30	0.10	0.26	0.26	0.08	0.25	0.25	0.07	0.33	0.33
Sat Flow, veh/h	1781	2281	1158	1781	2308	1135	3456	2807	712	3456	3554	1585
Grp Volume(v), veh/h	277	586	550	243	295	282	374	656	648	240	1087	163
Grp Sat Flow(s),veh/h/ln	1781	1777	1662	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	12.1	32.5	32.5	10.9	16.1	16.5	11.9	40.4	40.4	7.6	32.6	8.5
Cycle Q Clear(g_c), s	12.1	32.5	32.5	10.9	16.1	16.5	11.9	40.4	40.4	7.6	32.6	8.5
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	393	525	491	242	469	440	393	653	640	258	1166	520
V/C Ratio(X)	0.70	1.12	1.12	1.00	0.63	0.64	0.95	1.00	1.01	0.93	0.93	0.31
Avail Cap(c_a), veh/h	441	525	491	242	469	440	393	653	640	258	1166	520
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.3	38.8	38.8	29.8	35.7	35.8	50.5	41.5	41.5	50.6	35.8	27.7
Incr Delay (d2), s/veh	4.4	75.3	77.7	59.0	2.7	3.1	33.2	36.5	38.9	38.0	14.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	24.7	23.4	8.5	7.2	7.0	7.1	24.7	24.7	4.6	16.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.7	114.0	116.5	88.8	38.4	39.0	83.8	77.9	80.3	88.6	50.2	29.2
LnGrp LOS	C	F	F	F	D	D	F	F	F	F	D	C
Approach Vol, veh/h		1413			820			1678			1490	
Approach Delay, s/veh		98.4			53.5			80.2			54.1	
Approach LOS		F			D			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	44.9	15.4	37.0	17.0	40.6	18.8	33.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.4	10.9	32.5	12.5	36.1	17.3	26.1
Max Q Clear Time (g_c+I1), s	9.6	42.4	12.9	34.5	13.9	34.6	14.1	18.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.1	0.3	2.1

Intersection Summary	
HCM 6th Ctrl Delay	73.7
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	277	1136	243	578	374	1304	240	1087	163
v/c Ratio	0.76	1.08	1.00	0.64	0.96	1.02	0.94	0.94	0.26
Control Delay	35.5	87.6	89.3	36.0	85.2	60.5	94.5	51.4	6.3
Queue Delay	0.0	0.4	12.8	0.0	0.0	0.0	0.0	2.1	0.0
Total Delay	35.5	88.0	102.1	36.0	85.2	60.5	94.5	53.4	6.3
Queue Length 50th (ft)	128	~451	~128	171	144	~507	88	388	5
Queue Length 95th (ft)	153	#586	#296	233	m#209	m#596	#131	#442	51
Internal Link Dist (ft)		527		437		357		316	
Turn Bay Length (ft)	255		290		435		245		250
Base Capacity (vph)	386	1050	242	901	390	1281	255	1161	622
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	1	10	0	0	0	0	27	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	1.08	1.05	0.64	0.96	1.02	0.94	0.96	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Exhibit 13

LOS Full Build & Queue Report – Calumet Avenue & 45th Avenue – PM Peak Hour with N Centennial Drive Roundabout – Queue Sensitive Timing

HCM 6th Signalized Intersection Summary
1: 45th & Calumet

09/05/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Future Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	753	383	243	385	192	374	1039	265	240	1087	163
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	381	613	311	274	597	293	357	1108	281	234	1276	569
Arrive On Green	0.13	0.27	0.27	0.12	0.26	0.26	0.10	0.39	0.39	0.07	0.36	0.36
Sat Flow, veh/h	1781	2281	1158	1781	2308	1135	3456	2807	712	3456	3554	1585
Grp Volume(v), veh/h	277	586	550	243	295	282	374	656	648	240	1087	163
Grp Sat Flow(s),veh/h/ln	1781	1777	1662	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	13.6	32.5	32.5	12.1	17.9	18.3	12.5	42.8	43.4	8.2	34.2	8.9
Cycle Q Clear(g_c), s	13.6	32.5	32.5	12.1	17.9	18.3	12.5	42.8	43.4	8.2	34.2	8.9
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	381	477	446	274	459	431	357	701	688	234	1276	569
V/C Ratio(X)	0.73	1.23	1.23	0.89	0.64	0.65	1.05	0.94	0.94	1.02	0.85	0.29
Avail Cap(c_a), veh/h	404	477	446	379	459	431	357	701	688	234	1276	569
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.8	44.2	44.3	32.3	39.9	40.0	54.3	35.1	35.3	56.4	35.8	27.7
Incr Delay (d2), s/veh	6.0	120.0	122.6	17.1	3.0	3.5	56.1	18.6	19.9	65.4	7.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	29.9	28.3	6.4	8.1	7.8	8.2	21.5	21.6	5.7	15.7	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.9	164.2	166.8	49.4	42.9	43.6	110.4	53.7	55.2	121.8	43.1	29.0
LnGrp LOS	C	F	F	D	D	D	F	D	E	F	D	C
Approach Vol, veh/h		1413			820			1678			1490	
Approach Delay, s/veh		139.9			45.1			66.9			54.2	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	52.3	19.0	37.0	17.0	48.0	20.3	35.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.4	21.7	32.5	12.5	36.1	17.3	26.1
Max Q Clear Time (g_c+I1), s	10.2	45.4	14.1	34.5	14.5	36.2	15.6	20.3
Green Ext Time (p_c), s	0.0	0.0	0.4	0.0	0.0	0.0	0.1	1.7

Intersection Summary	
HCM 6th Ctrl Delay	79.2
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	277	1136	243	578	374	1304	240	1087	163
v/c Ratio	0.68	1.04	0.79	0.51	1.05	1.12	1.03	1.03	0.29
Control Delay	28.9	78.1	46.1	31.1	114.3	102.2	121.8	77.0	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	78.1	46.1	31.1	114.3	102.2	121.8	77.0	9.7
Queue Length 50th (ft)	128	~491	132	170	~164	~609	~103	~476	17
Queue Length 95th (ft)	149	#678	215	229	#241	#721	#150	#541	69
Internal Link Dist (ft)		527		437		787		521	
Turn Bay Length (ft)	255		290		435		250		250
Base Capacity (vph)	428	1088	377	1125	355	1166	233	1057	566
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.04	0.64	0.51	1.05	1.12	1.03	1.03	0.29

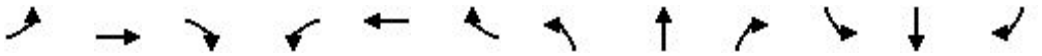
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Exhibit 14

LOS Full Build – 45th Avenue & N Centennial Drive – Signalized



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	1096	129	148	709	94	69	10	161	140	10	90
Future Volume (veh/h)	145	1096	129	148	709	94	69	10	161	140	10	90
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	158	1204	179	192	731	102	128	11	256	152	11	98
Peak Hour Factor	0.92	0.91	0.72	0.77	0.97	0.92	0.54	0.92	0.63	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	358	1324	590	236	1368	610	589	15	343	341	14	127
Arrive On Green	0.07	0.37	0.37	0.08	0.38	0.38	0.29	0.22	0.22	0.15	0.09	0.09
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	66	1529	1781	162	1447
Grp Volume(v), veh/h	158	1204	179	192	731	102	128	0	267	152	0	109
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	0	1595	1781	0	1610
Q Serve(g_s), s	5.9	35.4	3.6	7.2	17.5	2.9	1.4	0.0	17.1	4.3	0.0	7.3
Cycle Q Clear(g_c), s	5.9	35.4	3.6	7.2	17.5	2.9	1.4	0.0	17.1	4.3	0.0	7.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		0.90
Lane Grp Cap(c), veh/h	358	1324	590	236	1368	610	589	0	358	341	0	141
V/C Ratio(X)	0.44	0.91	0.30	0.81	0.53	0.17	0.22	0.00	0.75	0.45	0.00	0.77
Avail Cap(c_a), veh/h	389	1373	612	281	1444	644	589	0	358	341	0	284
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.1	32.8	4.0	25.5	26.2	8.4	27.7	0.0	39.7	40.2	0.0	49.1
Incr Delay (d2), s/veh	0.1	1.0	0.0	14.2	0.3	0.1	0.2	0.0	13.2	0.9	0.0	8.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	15.0	3.0	3.9	7.4	1.7	2.5	0.0	8.0	3.7	0.0	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.2	33.7	4.0	39.7	26.5	8.6	27.9	0.0	52.9	41.1	0.0	57.8
LnGrp LOS	C	C	A	D	C	A	C	A	D	D	A	E
Approach Vol, veh/h		1541			1025			395			261	
Approach Delay, s/veh		28.9			27.2			44.8			48.1	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.5	29.2	13.8	45.5	36.6	14.1	12.5	46.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.7	24.7	12.1	42.5	18.0	19.4	9.9	44.7
Max Q Clear Time (g_c+I1), s	6.3	19.1	9.2	37.4	3.4	9.3	7.9	19.5
Green Ext Time (p_c), s	0.2	0.8	0.1	3.6	0.3	0.3	0.1	5.8

Intersection Summary	
HCM 6th Ctrl Delay	31.9
HCM 6th LOS	C

Exhibit 14

LOS Full Build – 45th Avenue & N Centennial Drive – Signalized

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1541	1025	395	261
Demand Flow Rate, veh/h	1572	1046	403	266
Vehicles Circulating, veh/h	362	303	1544	1073
Vehicles Exiting, veh/h	977	1644	390	276
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.3	9.3	29.4	10.8
Approach LOS	C	A	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	L	TR	L	TR
Assumed Moves	LT	TR	LT	TR	L	TR	L	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.325	0.675	0.583	0.417
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	739	833	492	554	131	272	155	111
Cap Entry Lane, veh/h	968	1044	1021	1098	326	382	503	570
Entry HV Adj Factor	0.980	0.980	0.980	0.981	0.977	0.981	0.981	0.980
Flow Entry, veh/h	724	817	482	543	128	267	152	109
Cap Entry, veh/h	948	1023	1001	1077	319	375	493	559
V/C Ratio	0.764	0.798	0.482	0.505	0.402	0.712	0.308	0.195
Control Delay, s/veh	18.7	19.7	9.3	9.2	20.7	33.6	12.1	9.0
LOS	C	C	A	A	C	D	B	A
95th %tile Queue, veh	8	9	3	3	2	5	1	1

MUNSTER PLAN COMMISSION
MINUTES OF REGULAR MEETING
November 18, 2025

The Munster Plan Commission held a meeting on November 18, 2025, at Munster Town Hall, 1005 Ridge Road, in the Main meeting room and could be accessed remotely via Zoom webinar, a videoconference application.

Call to Order: President Baker called the meeting to order at 7:00 pm.

Moment of Silence and Pledge of Allegiance

Roll Call:
William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025

Members in Attendance	**Members Absent:**	**Staff Present**
Jennifer Johns		Sergio Mendoza, Planning Director
Rachel Branagan		Nicole Bennett, Town Attorney
Joseph Hofferth		Denise Core, Administrative Assistant
David Nellans		
Roland Raffin		
George Shinkan		
William Baker		

President Baker said we have a quorum.

Approval of Minutes: October 14, 2025, Plan Commission Minutes

Motion: Commissioner Branagan moved to approve October 14, 2025, Plan Commission minutes.
Second: Councilor Nellans
Vote: Yes –7; No – 0; Abstain – 0. Motion carried.

Preliminary Hearings:

PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue.

Director Mendoza gave an overview of the project saying that this is for entire PUD, and part of it is just for Lot C. He described that the entire PUD impact would be the guidelines for sign standards identified in the first bullet point of the staff report. The request is to modify the sign standards that are in the existing design standards and add these standards as part of an exhibit to the existing sign standard of this PUD. The changes impacting Lot C include changes to the proposed Lot 11 for the use of structural brick as well as the impact to two additional lots, lots 10 and 11 for the proposed roundabout. At the last meeting, the Plan Commission asked that a determination be made with regards to a four-way intersection or a roundabout. The petitioners have submitted drawings for a roundabout, and a conceptual drawing without a roundabout, which will be discussed here or with any of the other applications. They are essentially trying to take lot C as part of this PUD and divide it into four lots as they have identified for four structures.

President Baker addressed the attendees and explained that there are 3 processes for Centennial Village up for preliminary hearings. He said there would be no (public) discussion on those, there would be a discussion on what's going on, get some feedback from the board, hear from the petitioner, and then we'll set that for public hearing. There will be opportunities for comments at that time.

President Baker asked if the PUD amendment and a recommendation to the Council would be for the entire development. Attorney Bennett said it's on whatever is being amended. They are not amending the entire PUD, but we want to consolidate all the exiting sections and divisions into one document, so the staff does not need to look at 10 or 12 different documents to understand the PUD moving forward, kind of like it's a single zone classification. The intention is to move it together at one time, so it would be taking all of the existing PUD bulk standards and specific development standards like the design standards and putting them into one document at the same time they are closing out those amendments that are specific to what is being currently requested. She said their vote in that respect would be for the entire document, but the amendment itself is only going to be the items that they're requesting. It's not putting everything into play, but the entire document will be adopted as part of the PUD. Director Mendoza added that those changes can be found highlighted within the staff report with page numbers referring to the existing document; the commissioners also have a copy of the red line version to see those changes as part of the final document that will be submitted to Town Council for recommendation. President Baker clarified that this is for changes the petitioner is requesting, nothing from the town as it relates to changes to that PUD. Attorney Bennett said not as to changes, it just would be consolidating it into a single document. President Baker asked if there were any other questions for staff. There were none. He asked if somebody wanted to speak about this.

Mr. Matt Kimball, 631 Killarney Drive, Dyer, Indiana said the amendment to this PUD is consistent with the way they've changed it two times previously, so they're just going through the process and updating some things, including the signage package and other factors. He said the primary driver of the change of Lot C in this amendment is that their first design standards had a big box up on the north part of the

renditions. It was a 70,000 square foot grocery store. They've found that that doesn't work anymore on this site for various reasons, so they've decided to partition it into four separate parcels with a smaller grocery store and other professional offices. He turned the presentation over to Mr. Pozen and Mr. Rohn to explain the changes and answer questions.

Mr. Russ Posen of 1155 Troutline Road, Crown Point, Indiana said he is a civil engineer. He said, at the last meeting, they had brought the roads, the drives, and the roundabout. He said, specifically, this PUD has always had right in, right out coming onto Calumet Avenue and that is staying consistent with this PUD, that hasn't changed. There has always been a 45th entrance; in the past, it has been shown as a traffic signal, and that still is a part of this PUD as an option but in the update to the PUD, they added language to include a roundabout. He said they have documentation, whether it's the plat which shows a roundabout option, or just a site development plan, which is a part of the PUD showing the roundabout. He said that's to allow for a potential roundabout which could be better for the community, better for the traffic flow. He said they've done a traffic study and have submitted it to the town engineers, and it's being reviewed. He said the final approval of that can come later on in the process as things develop; the engineer reviews, the town reviews, the town can have a comment and obviously seek to figure out what's best for the community. He said the good thing is they have it in the PUD so it can be reviewed and approved by the town engineers and by the developers when they are ready to fully discuss the roundabout option. He said they wanted to make sure the documentation was included so their ordinance is clean from a legal standpoint. He turned to Mr. Rohn to discuss architecture.

Mr. Ted Rohn, Rohn Associates Architects, asked Director Mendoza to pull up the rendering of the Sprouts prototype. President Baker asked if he was the architect just for the Sprouts or for the buildings that we're looking at. Mr. Rohn said not all the buildings, because some of them have not been developed. He said he is not doing the bank, the architect for the bank is here. He said he had done several of the architectural designs at Centennial Village, including a lot of the build-outs. Director Mendoza said if he was looking for the documents that were sent this morning (11/18/25), those are not included in the staff report. Mr. Rohn said he had one copy to pass around to the Plan Commission members. He said it is not a new plan; it is the prototype that Sprouts Farmers Market uses nationwide. It's what they have been building, it's his understanding that they're building about 9 Chicagoland locations. He said he wanted the Plan Commission to see what they are building elsewhere, it's what they would prefer to do. He said it's extremely difficult to get retailers away from their standards. He said he has worked with many nationwide companies like that, and getting to this point has been a big accomplishment. Their design is like a farm stand with their branding. Three sides of the building are concrete block, and it's painted. The front side is a combination of concrete block, smooth and rough stone, and structural brick that's also painted. He said they use fiber cement siding, which can be seen at the front entry, some vertical siding, and manufactured stone along the base. At the front and along the main entry, they have an open truck dock. He said he wanted the commissioners to see where their starting point was with them, and where they've ended up now. Councilor Shinkan said he prefers the prototype design because it is Sprouts. He said everything's uniform over there; they should break it up. Mr. Rohn said it is the developer's wish, and the design standards that have been set for Centennial Village, that they would blend in well with the existing design. He said there a lot of aspects in that prototype design that they just couldn't do so the new design is a combination. He said it does meet development standards, and it's got 4 sides of brick; they call it structural brick, it's a clay brick product. He said it's got structural brick base band and pilasters as well. He said since they've submitted this, they've decided as a team that they will go with cast stone for the pilasters like they have on all the other buildings across the street so that will help this

building tie in better to the existing. He said the storefronts will be similar to what they've done on the other buildings. He said another important aspect is they are enclosing the truck dock, which was discussed in the last meeting so instead of having an open dock, they have a screen wall on the side and an actual door on the front. President Baker asked how that would operate since it is still facing the same way and there's a trash compactor inside of that enclosure. Mr. Rohn said it's all contained within that enclosure. Director Mendoza showed the front elevation from the truck dock. Mr. Rohn said they have been complimented by the Sprouts corporate team; they like this building and they're excited about coming here to Munster. He said another thing he had added this morning was that the typical wall sections of the Sprouts prototype are concrete block and some structural brick, so they'll be developing their wall sections here along with their structural engineer as we get approvals and move forward to the construction drawings. He said there were a lot of questions and some discussion last time about the structural brick itself, so he's sent Director Mendoza a lot of information, including test data and product information, and there are links to photos where structural brick has been used on a lot of different buildings. He said he has used it personally on several different types of buildings and it has performed well, it looks great, and their structural engineer likes working with it. He said it's a clay unit and has net compressive strength as high as 20,000 psi which is 4 to 5 times more than a concrete block when you compare net compressive strengths. He said it's a quality product, you can use rebar, and it can span high and support great loads like we'd have in a grocery store with large span steel beams and bar joists. He said they come in typical sizes; they are proposing to 8x8x16, and then 4x8x16, which gives you that brick height look. He said the colors that Mr. Kimmel and his team have picked out are very, very close to the buildings across the street. He said he understands that the some of the bricks they've used on the other buildings are discontinued, so the brick supplier was great at finding a good match. He concluded by saying that this is not a new product; it's used nationwide and is already used by Sprouts. He said it provides a brick veneer and structural wall all in one unit and will last a long time. He said it's a great product for larger buildings when you don't have expansive openings, like grocery stores where you have very little window openings. He said they're confident that It's a great product, it's a great design, and it beats trying to use tilt-up concrete panels like he's done on some retail buildings. They are hoping to move forward quickly with this; Sprouts wants to get this thing started in the spring.

Ms. Amy Ferguson with the Architects Partnership, 680 North Lakeshore Drive, Chicago, Illinois, said she's here for the Chase Bank, which is a lot 13. She said the proposal was worked through with Mr. Kimmell and it's very much in keeping with the rest of the development. The clerestory windows on the south elevation and the west elevation is where Chase's conference room would be, so they did a little fun clerestory expanse of glass there to bring a little difference to it. She said that is also something that's done in the new C & D restaurant building. She said they are using all the same brick and all the same cast stone. They have an enclosure at the north end on the east elevation that is where their transformer will be, their electrical gear will be hidden behind, and that's also where their trash is going to be. She said she misspoke at the last meeting when she said they were going to be using Sprouts' trash. They have designed this enclosure to be large enough to hold a dumpster in it, so Chase will have their own trash. President Baker asked for clarification of the orientation of the transformer and the trash enclosure and the views from the north and the south. Ms. Ferguson said the building, when going south on Calumet Avenue and coming over the railroad tracks, doesn't have many windows because that's the Chase back of house space with the janitor's closet, the data room, and the lounge; the one window there is in the break room for Chase Bank. She said that is all back house space, adding that it's not reasonable to put a window in a bathroom.

Commissioner Branagan asked Mr. Rohn what material is proposed for the Sprouts signage, the main and smaller signs. Mr. Kimmell answered that he doesn't know specifically but it is not stone. He said it would comply with the new sign standards being adopted as part of this PUD amendment. President Baker asked about the signage for the Sprouts street signage and for the PUD. Mr. Kimmell said there is a PUD amendment which includes the entire signage package; the site plan shows a monument sign at the corner of 45th and Calumet and that is consistent with the sign standards that are being adopted now, that will have both the label of the Centennial Village and then the major tenants in place. President Baker said Mr. Kimmell had had discussed placing that signage in front of Rosebuds in Phase 1 but there's nothing there now identifying the Centennial Village. Mr. Kimmell said that was correct; they have rights to put monument signage at each of the entrances to a public right-of-way; that would be on 45th and North Centennial, and on Village Parkway and Calumet Avenue. He said they have the rights to do it, but they haven't done it yet; it is included in the sign standards. President Baker suggested that they bypass it in Phase 1 and have a dedicated right turn lane from Calumet Avenue to 45th Street. He asked Mr. Kimmell to submit a full signage plan including the sign dimensions with the tenant names for the entire PUD. Mr. Kimmell said the square footage for the monument sign at the corner of 45th and Calumet is going to be about 100 square feet, with a maximum height 10 feet. President Baker said he'd like to see a rendering for the next public meeting showing where that signage is going to go, its location, how it'll be landscaped, the whole nine yards, since that is a high-profile area and we're looking at the back end of an ATM under this proposal. Mr. Kimmell said they do have a landscaping plan. He said Director Mendoza has been involved with the staff meetings and the site review meetings which included images of the of the signage and the regulations on the signage and the landscaping. President Baker asked if the landscaping plan will be for the entire development including the last 2 vacant lots or if it is just for the two sites that they're proposing now. Mr. Pozen said there are landscaping standards currently in the design standards, they will be essentially the same with a few modifications. He said the actual landscape plans have been submitted for the Sprouts and the Chase but not the two other sites. The other 2 remaining 2 lots will adhere to the PUD standards amendment that would be, hopefully, approved in this process. President Baker said his point is the lot north of that, not one of the two they are talking about today, is going to look like an empty field until something happens there. They are not going to extend the parking lot, or any of the sidewalk, or anything like that towards the north. Mr. Kimmell said they intend to maintain that site, if required, according to the maintenance standards of the undeveloped lots in Centennial. He said they have intentions to come forth with another user and a building for that north parcel that would also start in the spring and have the same architectural features, the same landscaping layouts and species; they will make it seamless for that particular parcel to the north of Chase.

Attorney Bennett said the PUD amendment is what's proposed in PC25-016. She asked the Plan Commission members to review each petition separately and entirely, especially if the plan at this time is to proceed to public hearing. They should review the PUD amendment before they ever look at the development plans. She further proposed that they be done separately because what is drafted in text in the PUD amendment is very similar to the zoning ordinances that they are reviewing. It is a zoning classification that's going to determine what the rules are for this subdivision. She said, as had been indicated in prior discussions, the plan moving forward is to have one PUD ordinance for this development instead of having all these different documents all over. She clarified that when she says this development, she means the entire Centennial Village. The sign regulations, the landscaping requirements, the screening requirements, the fencing requirements, the uses, and all of those things are written in text in the PUD amendment. She explained that like a separate zoning code, moving forward, anyone can go to that PUD amendment and look for what type of uses they can bring to this

subdivision, they can find the landscaping requirements, signage, etc. She said after the Plan Commission members are content with the way that PUD standards document is laid out, they can then proceed forward on reviewing the development plans. She said the theory is that the Sprouts development plan, for instance, does not have something on it that is not in that zoning amendment.

President Baker said that is what they did that as part of the original PUD, they put it all that together and the petitioner is coming back with these amendments, because everybody wants a different view. Attorney Bennett said that is the point, that the PUD amendment document has everything identified in it and it's all in one consolidated document, so they don't have confusion all over the place. Compliance or non-compliance is dependent upon what that document reads, just like the zoning code. She said if there's an issue, then a variance is applied for and it's not being done by amendments that are taking place with development plans; development plans are not ordinances, they should not be. She said an overall amendment would require a full amendment of the law, much like an amendment to the zoning code for this community, but right now, the commissioners are just approving this to be on one document. They have the preliminary plat and the PUD amendment that's proposed which would incorporate what they are talking about, including all of the new sign changes. She said she knows they want to see pictures, layouts, development plans, and her point here is she is asking them to separate them entirely. The easiest way she knows to put it is, the law has to be written first with the rules that have to be followed. They are then applied to the development plan. To avoid confusion, that PUD amendment needs to go first so we have a clear rule in moving forward.

Attorney Bennett addressed questions from several Commissioners by saying this is what they are proposing in this preliminary hearing; the commissioners can go to what has been posted in Exhibit B Design Standards; that is their proposed PUD modification. They can see that it's redlined, or green line, or whatever it may be, but that it's crossed out, and it's referenced to appendixes, or sections at the end. As an example, she referred to page 50 of 59 of the PUD document, where the sign regulations can be found. That is going to be the sign rules that apply in this case. She said there is some overlap in the documents included in each of the 4 petitions. The petitioner attached their supporting documents to their request, and the town doesn't have the ability to strike their petition.

President Baker said he'd like to jump over to Phase 1 and talk about the completion of the residential and the parking lot and those types of things as well; he'd like to talk about a lot of other issues. Attorney Bennett said those are not before them unless the amendment addresses those items. It was confirmed that they are changing the PUD ordinance where all the design standards for Centennial Village are included in this particular PUD design standards, any modifications that they're making here would apply to the second residential building, the hotel, and all the things that are in Phase 1 that are not under discussion here. Mr. Kimmell said the design standards don't really influence any of the architectural style, it just relates to the materials to be used, so there's some flexibility of design standards and architectural look but it's all about materials used. He said their intention to make the building look very similar across the whole development. He said the key points the commissioners will be deciding at some point, is the change in design standards; the parcelization of the north parcel going from one parcel to four parcels is part of the design standards; it is the addition of not only just brick, but brick and structural brick, and then it's also the sign package that was bifurcated partially in the old design standards at Centennial and the town design standards for signs; that has all been wrapped in together. He said those are the principal approvals they're looking for as part of the changes. Director Mendoza said that's the start of the conversation.

Motion: Councilor Shinkan moved to schedule PC Docket No. 25-016, a proposed amendment to the Centennial Village Planned Unit Development, for a December 9, 2025, public hearing including all discussions and findings.
Second: Commissioner Branagan
Vote: Yes – 7; No – 0; Abstain – 0. Motion carries.

PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street.

Director Mendoza gave an overview of this project, PC25-017, which is a development plan for the proposed Lot 11, a 23,299 square-foot Sprouts market. President Baker said what we see in staff report package is not what it's going to look like, it's going to look like the handout. Councilor Shinkan clarified that it is not going to look like the handout, the handout is the original Sprouts. What we have in our package is the deviation from how Sprouts National is changing their look for Munster only. Director Mendoza said the handout was to show the structural wall. He said there were some questions last month regarding the use of structural brick and how that would be impacted. In the prototype, they're showing what that structural wall would look like, nothing's changed on the design elements of what's being initially proposed in compliance with the design guidelines. President Baker asked Mr. Kimmel is he had anything additional to add; he did not.

Motion: Commissioner Raffin moved to set PC Docket No. 25-017, a development plan review, to a public hearing.
Second: Councilor Shinkan
Vote: Yes – 7 No – 0 Abstain – 0. Motion carries.

PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.

Motion: Commissioner Raffin moved to set PC Docket No. 25-018, a development plan review for Chase Bank, to a public hearing.
Second: Councilor Shinkan
Vote: Yes – 7; No – 0; Abstain – 0. Motion carries.

PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.

Director Mendoza said the location is identified as west of Wildwood, along 45th and Fran Lin. They are currently proposing to divide one lot into four separate lots. The request is to identify the two existing separate structures on their own lots of record; Lot 4 is Danny Z's, Lot 1 is the Ace, they are proposing an outlot on Lot 3 for future development at some point in time, and Lot 2 is proposed as a development plan for a two-story self-storage facilities building there. He showed the rendering of what the current site would look like once the lots have been established. He said this is the preliminary subdivision hearing. He said they have included the preliminary plat, the easements for the existing signage, the

cross-axis easements, and the parking easements agreed upon as part of the recording of the subdivision. President Baker asked what happened in site plan review, he recalled a conversation some time ago with regard to this particular property and its adjacent property to the east. There is an alleyway between the two and there were some concerns with who was maintaining them; there were also some entrance concerns. He hoped that would be reintroduced as part of this discussion because it still is challenging. Director Mendoza said maintenance would be on the property owner; we can follow up with the property owner and we can address that. President Baker said he didn't know if there is cross-access in there, because you drive passed Danny's, and pass Hallmark to get out that way. He said he didn't know how those would be handled or what's going to happen with the ingress and egress. He said there was something that was passed about 10 years ago on the continuity between those two developments because there's no real fencing or that type of thing. Director Mendoza said the fencing can be identified in the PUD process to see what is identified in the language within there for separation. He said it is always great to have institutional knowledge, so he appreciated President Baker for bringing up that information so we can research the PUD or the previous description from 10 years or so ago. He said we'll see what we can find and then share it with the applicant.

President Baker asked if there were any more questions for staff before we let the petitioner speak. Attorney Bennett said the intention is to do the same thing with this PUD, this is an is an amendment to the PUD. President Baker asked the petitioner to state his name and address for the record.

Mr. Scott Yahne, 3 Lincoln Way, Suite 201, Valparaiso, Indiana, introduced himself and thanked the Commission for the opportunity to speak. He complimented Director Mendoza on his staff reports. He said he works with many municipalities and this report, with the integrated photos and maps is pretty impressive and it has helped him. He said he represents GHK Development, also in attendance are Gordo Kolb, the developer, Tom Connolly, with the development team, Jared Ducote, the architect, Jason Henderson, the civil engineer is online and Stuart Allen from Torrenga Engineering. He said they have 3 petitions tonight; the first two are the preliminary plat and the PUD amendment. He said this is a one-lot subdivision and an old, messy type of PUD which goes back to when we just had some words in an ordinance and not much else. He said a big part of what they'll be doing is developing design standards for this PUD that are written in comprehensive form. He said his task last week was to update the PUD development standards that were submitted in the original packet so there will be an update for the next meeting. He said they will be able to look at everything in one place, including where they make references to the existing zoning ordinance. They will have the actual text sections incorporated in that PUD document.

President Baker said the first petition is the replat. Mr. Yahne said they have one-lot subdivision that they seek to make a four-lot subdivision. President Baker asked if they were steadfast in these lines, and with how they're subdividing this particular parcel. Attorney Yahne said they were careful in selecting the lines but are open to feedback. President Baker said he was talking about the parking component of it. He said there is going to be a cross-access parking agreement, so if they sell lot 1, they'll be able to park in Lot 3; Lot 2 is a very busy restaurant and there are not that many parking spaces. Attorney Yahne said they made some attempts to adjust to building footprints and extra parking spaces around the buildings. He said they do have cross easements in place. He said his client is a purchaser of this property, so this is a transition phase. This is all being put in place, contingent on this being approved, so when he says they're in place, they will be put in place, and that will be a condition. There will be cross-parking easements so they will have sufficient parking. He said in selecting this line, they were mindful of the existing building

footprints. President Baker said this is going all retail, it's not going to be storage, there's going to be more cars, theoretically. Attorney Yahne said President Baker was right because one of their proposals is they we have the existing storage that eventually will relocate out of the retail strip. He said some of the legacy leases are coming up to maturity state and, as part of that process, the developer intends to update the entire plaza as those opportunity arises. President Baker asked if there were questions for the petitioner. He added that this is a preliminary for doing a resubdivision that's going to eventually potentially look like the rendering. There were no further questions from the commissioners.

Motion: Councilor Shinkan made a motion to schedule PC Docket No. 25-021 to a public hearing on December 9, 2025, including all discussions and findings.
Second: Commissioner Branagan
Vote: Yes – 7 No – 0 Abstain – 0. Motion carries.

PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.

Director Mendoza said this site had previously operated under a PUD. They are proposing to update the PUD, as Attorney Yahne had indicated, since there was not much language or guidance to this development. They have agreed to provide standards, which are in the staff report, that will guide the development moving forward, particularly what's being proposed on Lot 4 and Lot 2. The standards show what they are proposing for future development on those lots and solidifying the existing structures. He said the commissioners need to read the document if they have not yet and he will get Attorney Yahne's updates out to the commissioners.

Commissioner Raffin asked Director Mendoza how the building materials line up with our current ordinance, there is lot of stucco. Director Mendoza said the proposed building materials in the PUD reflect and support the existing use on that site for that development. The materials identified reflect that and they support the existing structures. Commissioner Raffin asked if they are locked in with those materials. Attorney Bennett said it can be limited, they're legal non-conforming anyway. That's the existing design standards that are pulled into this single draft; it obviously was how it's constructed at the time, as well as approved at the time. It's just getting it codified into one document so that that clearly is moving forward. But that can be limited only to where those structures are and that exist right now with that type of scheme. She clarified for Commissioner Branagan that even if they decided to do a total renovation of all of their property, they still would just adhere to that old standard because that's not being amended. It is all being put into one document and cleaning it up, the properties are not being affected. Commissioner Raffin asked for clarification of the lots that will be new development, Councilor Shinkan said they were on the plat colored in yellow and red.

Motion: Councilor Shinkan moved to set PC Docket No. 25-022 to a public hearing on December 9, 2025, including all discussions and findings.
Second: Commissioner Johns
Vote: Yes – 7; No – 0; Abstain – 0. Motion carries.

PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.

Director Mendoza said this is for the proposed Lot 2. This is a two-story building that would emulate the existing architecture of the strip mall and the other sites. He said their site development plan, they're proposing on-site retention, lighting standards, circulation around or near the rear of the building, as well as the building footprint, lighting specs, building materials, and their landscape plan. He described where the landscaping is planned for this new development. President Baker asked is the commissioners had any questions. When there were none, he invited Attorney Yahne to speak.

Attorney Scott Yahne, 3 Lincoln Way, Suite 201, Valparaiso, IN, attorney for the developer, GHK Development, said this is concerning the lot depicted in red in the rear. They are proposing a 117,000 square foot gross area building, to be a modern two-story, climate-controlled facility. Ther building is entirely self-contained with loading and unloading from an interior drive-through tunnel. There is an existing climate-controlled storage facility in the retail center that will eventually move to this location so that is an approved use for this lot. He said the intent is to complete the new storage building in 2027, the acquisition to take place in early 2026 and that's when that relocation would take place. He said they submitted a parking study together with this development plan to show that they more than adequately accommodate parking on-site for this facility itself. He said the petitioners have decided that they want to have an integrated shopping center and came up with the design that was submitted. He said they are here to listen to the commissioners; the architect and engineer were attending to answer questions and take down commentary.

Commissioner Branagan asked if the drive-through is just for cars that are trying to access their storage units or do they anticipate truck traffic back there. She said there are homes on the other side of the train tracks, so she wanted to understand the traffic back there.

Mr. Gordo Kolb, Jr. of 3920 Magazine Street, New Orleans, Louisiana, 70115, introduced himself. He said he's the developer of this project. He explained that the basic footprint is a two-story building; the first floor will be a drive-through. There will be a gate with a roll-up door, somebody will type in their code, the roll-up door will go up, the gate will go up, and then they'll drive into the tunnel, the gate will go back down, and they'll park along the side. He said there are probably 8 to 10 parking spots inside that they didn't count as parking places. He said that's how generally it works; they'll get out and either load or unload through the west or the east building and exit through another roll-up door that will get them back out into the parking lot. He said it is self-contained, so the noise is very minimal. He said they do this to help people get out of the elements and to minimize the noise around the neighborhoods. President Baker asked if the tunnel was open to the roof. Mr. Kolb said it's basically a two-story building; it's just a drive-through on the first floor; the second-floor storage units, not the roof, will be above the drive through.

Commissioner Branagan said she doesn't love the architecture, the buildings that are already there are in that whole complex, are somewhat dated. She encouraged Mr. Kolb to make it the best building out there, adding that it is a storage facility, but the buildings are there forever. Mr. Kolb said they can take that into consideration. He said there is only a very small portion of this building that's seen, but they'd love any feedback they can get on that.
President Baker asked if the access to this new facility is on the current curb cutoff of Fran Lin, and if that the only point of ingress and egress. The petitioner said there is the current access off of Fran Lin is one portion, the second access into the site will basically be the drive aisle along the railroad tracks which is

parallel the railroad tracks into the tunnel. That would be their second ingress to egress point. President Baker said the loop is going to be go in through the building, do your business, come back out, and then go back to Fran Lin. He asked if they would be able to turn right if he goes through there and out the other way if he wants to go east. The answer was you will be able to do that; they just didn't include that in this drawing, because it's just showing their development plan, but you can currently go around that building as is right now. President Baker said theoretically, a box truck can go through all of this and make all of those routes; the petitioners said that is correct.

Commissioner Raffin asked Director Mendoza if, for the next meeting, he'd like to see how the materials on this building and design differentiate from our current code, because he doesn't think we allow synthetic stucco or a lot of EFIS, except for design materials or CMU units. Director Mendoza encouraged them to make that as part of your recommendation to the applicant, to have their architect create a comparative spreadsheet for your review. Commissioner Raffin said okay, because there are residents that butt up to this two-story warehouse in their backyard. There was a discussion on the old and new architecture. Attorney Bennett suggested that since they are incorporating it from the old PUD, they can add language for a structure on a lot that is demolished or more than 50% remodeled. This could be for a building that is pre-existent, not the entire development. She said the standards would be for those empty lots, but it's also a about identifying from the prior records, minutes, reactions, and approvals of what who was actually allowed as part of the community for those two lots that do have construction, so that then we can actually codify them into a document moving forward that addresses all the lots. They can be identified by structure, by lot, or by construction dates, that is, constructed before this date or constructed after that date. She said it's going to be the work in progress.

Commissioner Johns asked to what extent the developer would be making improvements as leases come due. The answer was it would be more cosmetic, and specific on whatever that use is. If they could incorporate some more storefront or glass for a specific tenant, they'd like to do that. They will be painting, cleaning up and doing general maintenance to bring it up to standards.

Commissioner Branagan asked if there is a real demand for storage in Munster. The petitioner answered that they had done several feasibility studies, and it shows that there's a big demand. He said they're not too far down the road in Dyer, Indiana, and that store filled up very, very quickly for them. Director Mendoza said one demand is really coming from the medical field to store their documents.

Motion: Commissioner Raffin moved to set PC Docket No. 25-023 to a public hearing with the caveat that the architectural and design team for the self-storage unit present the Plan Commission with a drawing with the architectural materials and a comparison with our current code.
Second: Commissioner Branagan
Vote: Yes – 7; No – 0; Abstain – 0. Motion carries.

Public Hearings:

PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue.

Director Mendoza said last month, this was set for public hearing, so this is still a public hearing. We had discussed subdividing one lot into four lots. Their proposal has the separate lots outlined in different colors. what they're proposing. He said, last month, there was a request that the roundabout be identified and that has been submitted.

Commissioner Raffin asked if the commissioners are just looking at the parcels and dividing the lots. Director Mendoza said the request was what these lots will look like with the roundabout, if that's the direction that the developers want to move forward with because last month there was supposed to be a 4-way intersection or a roundabout, and the commissioners said they need to make a definitive decision, so that the Plan Commission can make a decision. He said they came back with this roundabout the impact of the roundabout on both lots; that is what is before them. He said if this advances, after a public hearing with an approval, the next step would be the findings of fact, then final plat review and approval; typically, the final plat reflects what was approved in the preliminary and there should be no changes; then the development plan moves forward. If the roundabout does not move forward, if there's a change, they have to come back and provide a new subdivision for consideration. Commissioner Raffin asked if the town has reviewed this enough and are comfortable with roundabouts or whatever. Director Mendoza said they have not received the report from our town engineer on the traffic study and the draft layout documents of the proposed roundabout so there has been no determination on how those fit into the town's perspective. Director Mendoza said what typically happens is when an applicant submits a subdivision, and it's not a maybe, could be, or maybe we'll change it later; it is what they're moving forward with. The Commission expressed last month that they need to know what they are moving forward with. He said they submitted the roundabout, so he's under the impression that is what's moving forward, because that's what was submitted, that's what was requested. If they are thinking of changing it back, then this project is probably not ready to move forward. President Baker asked if the roundabout is included this PC-25-015 subdivision petition. Director Mendoza said yes. Attorney Bennett added if it's identified as a lot, as well as any of the rights-of-way on a preliminary plat, and proposed in that respect, then that is absolutely what should be considered by the Plan Commission. President baker called on the petitioner to state their name and address for the public record.

Mr. Russ Pozen, civil engineer from DVG Team located at 1155 Troutwine, Crown Point, Indiana, said they actually do have a different interpretation of what we have submitted and how they intended this to go. They have submitted two primary plats, one is with a traffic signal, and the other is an option with a roundabout. The request of those two is so that , as the engineering from the town's engineer is reviewed and approved, and a final decision plays itself out in the in this whole entire PUD process with the Plan Commission, they legally can use either plat. He said they have submitted both plans and the town is saying they can't have 2 plats. Attorney Bennett said they can't have two approved plats; it's one or the other. Mr. Kimmell said the plat they are going through will house either a four-way intersection or a roundabout; they've designed it that way. He said the plat is capable of going either way, depending upon the results of the review of the draft. Mr. Pozen said if it is the traffic signal, they will fit it in the same space. There was a discussion relating to subdividing the parcels into four lots is impacted by what happens at the intersection, it does impact the size of the lots, and it impacts to the shape of the lots, it impacts the ingress/egress and drive access the 45th street right-of-way dedication and the parking counts.

Attorney Bennett asked Mr. Pozen if all the improvements have been provided, particularly the odd shaped portion at the north end of the plat that is currently private property that is dedicated as right-of-

way by the plat. Mr. Pozen said technically it has not since the infrastructure, the relocation of curbs, for instance, will change. Attorney Bennett said if a roundabout is not in the final plans, it will affect the plat so they will need an amendment to the preliminary or a resubmittal preliminary plat for that be reflected in the final plat.

President Baker opened the public hearing and asked if anyone wanted to speak on this the petition to come to the microphone and state your name and address for the record. When there were no public comments, President Baker left the public hearing open and brought the meeting back to the commissioners.

Commissioner Raffin read from the traffic study and noted there is already a stacking issue on Calumet Avenue, he asked what pros and cons had been identified for both options. President Baker said if there is a train and you are going north at Calumet Avenue with no dedicated right lane, all the lanes going forward stop. You can't turn right, so anybody that wants to go on 45th or bypass and utilize the underpass is not able to do that if somebody's sitting in lane ready to go straight. He said that happens already and there are only so many chances to fix some of these things because this is all expensive stuff. Councilor Nellans asked if the criteria had been met for the town engineer to complete the report, specifically if the developer has paid for the SEH study. Director Mendoza confirmed they had.

Motion: Commissioner Johns moved to defer PC Docket No. 25-015, subdivision preliminary plat, to the December 9, 2025, meeting.
Second: Councilor Nellans
Vote: Yes – 6 No – 1 Abstain – 0. Motion carries.
President Baker voted No.

PC25-020 DEVELOPMENT PLAN REVIEW: Jim Glascott of WT Group representing the School Town of Munster requests review of a Development Plan for the construction of ten (10) tennis courts at 8839 Calumet Avenue.

Director Mendoza said there had been no changes. The deferral was for a response regarding drainage from our engineers and we have not received that yet. He said they did add some additional landscaping to the entrance and showed where new landscaping is planned. Commissioner Raffin asked if we are waiting for an engineering staff report from SEH. Director Mendoza said there was a request from last month to defer. Commissioner Raffin asked if we could make a contingency based on the engineering approval so this will not be held up for another month. Attorney Bennett said not a contingency, per se, but rather based upon Director Mendoza's recommendation that an engineering review be part of any approval and since it is in the development plan, it's going to be the Commissioner's interpretation and application of the engineering review on what is potentially modified or needs to be modified there. President Baker asked is someone wanted to speak on this petition.

Mr. Jim Glascott, principal in charge of civil engineering with the WT Group, said he is representing the School Town of Munster on this project. He said the only real revision here is that they've added landscaping at the northern main entrance to the area as requested at the previous meeting. He said there was some questioning about signage and potential graphics on the windscreens as well; they are not proposing any signage or graphics on the windscreens at this point. He said they are available for any questions.

President Baker said he has talked about the storm drainage and we're waiting for the engineer. He said they still have to put in another pond for this modification to the park. Mr. Glascott said they are proposing a storm trap system under the north five banks of courts, and they have two at-grade ponds in this area that's all tied into a single system that then drains down to the south. President Baker said Schoon Ditch isn't very far away then asked if anybody looked at the possibility of doing something where there's a drainage system for this new development, as well as the pond. He said he is still struggling with why we have one (pond) between a park and a school, and it's not draining into the ditch. He asked if that was reviewed at all. Mr. Glascott said they tried to analyze what was going into that pond by trying to find records of what goes in there and it was very difficult; the town did not have a lot of good records on how that was designed and everything that went into it. He said their survey does show that this pond goes through a restrictor and down a storm sewer down to the south, so their intention was to leave that in place because they just don't know enough about that to be able to modify it and then provide a separate system to meet the town's requirements under the tennis court and in the aggregate basin. He said they are meeting the requirements and not creating any detrimental impacts. President Baker said under the premise that you only have so many opportunities, and this is a great opportunity to take away a safety hazard between a park and a school, and he thinks it's worthwhile to take a serious review instead of putting another pond in, putting significant cost into the storage underneath the tennis courts. He said you could eliminate all that and that would be a good thing. Mr. Glascott said potentially yes, but that pond doesn't appear to be very large as far as the amount of volume that's provided in it. They could look at doing a large-scale study to try and figure out everything that goes in there and then find out there's no available storage. President Baker said he is not saying put more storage into that pond, he's saying take the pond away, and put everything you create into the Schoon Ditch, which is about a 9-iron away. Councilor Shinkan said the park owns the pond. Councilor Nellans said Schoon Ditch is regulated as far as how much water it can take, and they have seen Schoon Ditch all the way up to the road. President Baker said it is being modified by the county, he is bringing this up because they are working on it.

Commissioner Raffin referenced the staff report findings and recommendations, specifically the sidewalk-trail connection, planting schedules, and a connection link between the northern entrance and a proposed southern sidewalk as a way to have a buffer at the frontage. He asked if that had all been incorporated in the drawings.

Mr. Glascott said it has not, they don't feel that a walkway on the east side of the tennis courts provides any real value. He said they do have the walkway coming through the tennis court facility and the other issue is that there are fuel pipelines running up the east side, so anything they build over those is going to cause some potential issues. He said they're not going to be allowed to put any sort of real landscaping or trees in that area because of those pipes. Commissioner Johns asked if they were at all concerned that people would just start parking in that big green surfboard area if they don't put in some kind of a barrier. She had concerns that area would become very messy and undefined. Mr. Glascott said they'd have to do some extensive study and see how deep those pipelines are; he has run into some very shallow pipelines recently that have been in the millions of dollars to try and work around. Commissioner Johns suggested it could be something functional like a sidewalk or a path to other access points.

Mr. Sean Begley, Director of Operations at the School Town of Munster, said they had considered that, but they wanted to stay off that easement. He said they had the tennis courts at an angle at one point

over the pipeline. He said we have a very tennis-savvy community, and you're supposed to have a 15-degree angle with the direction of the sun. He said they wanted to incorporate into the plans, but it was taken out because of the pipeline that's running up north and south and that is something they do not want to risk. He said they have plenty of parking throughout the site. Councilor Shinkan noted that money is going to be an issue with everybody. Mr. Begley said they are right at budget, at $4 million. Attorney Bennett asked where the easement is. Mr. Begley said the easement runs right along the grassy area; it's a 30-foot easement that they want to stay away from. Attorney Bennett asked if cars are butting up to that easement. Mr. Begley said they are. Attorney Bennett said then her concern is from a liability standpoint for the town, since this is town-owned property. She said that easement runs south so what is preventing people from parking on that grass when it's busy around the tennis courts. She said some type of blocking should be done. She said If it's such a concern to construct on, then she has a legal concern for liability detriment to the town if it's left open and people are parking cars on that grass area, which we all know people do once parking is tight. She respected that fact that money is a factor but asked what can be placed there so that it avoids parking in that area. Mr. Begley said they certainly could look at doing some sort of barrier material down the road if it was an issue. Commissioner Johns suggested a multi-path, just a simple nature trail path. Commissioner Raffin said European cities have stone paths all the time. Commissioner Johns said people would still park on that so they might want to do some balusters at the end. Attorney Bennett said it could be signage or balusters. Mr. Glascott said they could provide parking blocks as a potential option to keep drivers out. Commissioner Raffin said they couldn't do balusters because you can't put them in the ground. Mr. Glascott said they are very hesitant to do much of anything in that easement area because of the risk. He said the loading from cars isn't really that great of a concern but when you're building a road, there are bulldozers, compactors, and heavy equipment going over them. Attorney Bennett asked if the School Town would sign an indemnity as an amendment to the lease to indemnify the town. She reiterated her concerns with liability with that pipeline danger and all those other things. She said if there's such a concern that if a simple road stop block can't be put on and sit on it, that says to her that a car can't sit there for a long period of time. Mr. Glascott said he believes there are multiple lines coming through here, the surveyor has located the existing gas line and it's actually already under the parking lot in this area. He said it really difficult to locate some of these utilities at times in the easement but one of the lines is currently in the parking area.

Councilor Nellans asked, with respect to constructing these tennis courts, how they are going to move their dozers and excavators and other heavy equipment if they don't want a car on it. Mr. Begley said he knows they put large mats on the bike trail when they're doing utility work, it dissipates the load. Mr. Glascott added that they are proposing a construction entrance, which would have a stone layer built up for them to drive over; that helps dissipate that loading when heavy traffic is going over the top of it.

Commissioner Raffin said he thought is was tough that they're forcing people to walk down the roadway to get to the tennis courts, behind cars and not down some kind of a walking path. Mr. Begley pointed out where there is going to be a walking path, aerial bleachers, and a raised platform.

President Baker opened the public hearing. When there were no public comments, President Baker closed the public hearing, bringing it back to the Commission. Attorney Bennett asked that the public hearing remain open; President Baker reopened the public hearing.

Motion: Councilor Shinkan moved to approve PC Docket No. 25-020, a Development Plan for the School Town of Munster Tennis Courts Facility, with the conditions that the stormwater plan

complies with engineering recommendations, an east frontage be spatially defined with a path/trail and landscape/plant schedule, and barriers be installed, including all discussions and findings.
Second: Councilor Nellans
Vote: Yes – 4; No –1; Abstain – 2. Motion carries.
President Baker voted no, Commissioners Branagan and Johns abstained.

President Baker closed the public hearing.

PC25-025 DEVELOPMENT PLAN REVIEW: Erin Gogolin of Bohler Engineering on behalf of Dutch Brothers Coffee requests review of a Development Plan for the redesign of an existing building and parking lot located at 8032 Calumet Avenue.

Director Mendoza said this is the former site of the Boston Market; Dutch Brothers is interested in the site SM Yes, so this is the former site of the Boston Market. Currently, the, Dutch Brothers Coffee is interested in this, site. He said he overlaid their site plan on the existing area. They are proposing to increase some of the green space to the south and then restructure the access points on the south to allow for right in, right out, as well as to the left, including on the south side. They submitted a proposed landscaping plan. The materials have been identified and they're not seeking any variances, and they comply with the current standards. They're proposing to meet our lighting standards. He said everything is in the staff reports, including the exhibits. President Baker asked if there were any questions. There were none. He asked if anyone wished to speak on behalf of the petitioner, please state your name and address for the record.

Mr. Ben Siembida said he is with Boehler Engineering, address is 4100 Regent Street, Suite M, Columbus, Ohio, 43219. He said he is the civil engineer for the site. He said they have the architect and a member of Dutch Brothers here to discuss operations. He said, as Mr. Mendoza pointed out, they believe they have addressed all of the staff's comments. He offered to answer questions.

Councilor Shinkan asked if this was strictly a drive-through or would they be repurposing the inside for seating.

Elizabeth from Chipman Designs, 1350 East Touhy Avenue, Des Plaines, IL, said there is a small interior area that will be publicly accessible just to pick up drinks, but no seating is intended. Councilor Shinkan said he had never a Dutch Brothers with and interior space. Elizabeth said they sometimes have an outside pickup area but that was not feasible at this location.

Commissioner Raffin asked Director Mendoza if all the building materials meet code, if the signage and everything else meets our code. Director Mendoza said yes, they went the extra mile and identified a chart with our codes in their proposal. He said it was a very thorough submission package.

Commissioner Johns asked if they might consolidate some of the 3 curb cuts on this property or perhaps partner with the other lot so there is one curb cut to come in. Director Mendoza said typically those types of opportunities occur with the Redevelopment Commission with incentives for funding. Councilor Shinkan said the south end is exit only, like it was with Boston Market. President Baker asked what site review had to say about ingress and egress. Director Mendoza said there was discussion on the impact. He thought the discussion was that the traffic that would be generated would, ideally, be coming from

the north to the south to the medical office buildings, so off the highway, from the north, primarily doing right-in, right-out, through the drive-through as they head back south to the medical facility during the business hours for doctors, nurses and staff. He said he thought that was the discussion that occurred with the traffic, and that the stacking aisles would help accommodate that. President Baker said we ran into some challenges with this at Dunkin' Donuts by the Mr. Munster Gyros and it backs up onto Calumet Avenue. He said most people are going towards the Borman. He said this is a challenge because of the safety component of it, because you have a turn lane there to get to the out to Broadmoor. Mr. Siembida said one other thing they're proposing to improve is a right out, left out to delineate northbound and southbound traffic . He thought that came from a discussion with the police chief. He said right now, it is one-way only so that provides an opportunity. The commissioners and petitioners discussed the challenge of moving cars to prevent stacking. Mr. Siembida said they have runners to bring drinks to customers, but the commissioners explained that the problem is more that the customers will not be able to get back into traffic. It's a busy street and very tough left turn.

President Baker opened the public hearing and asked if anyone wanted to comment on this petition.

Mr. Scott Milne said he is an owner of the Clock Tower, the strip mall to the north. He said his main concern is with the north. He said they have an entrance going into our property and right next to it, they have a grassland that has always just been a grassland that they've taken care of, and there is a left and a right turn. He said all the tenants he's had for at least 15 years dislike the fact of going north, all their customers are complaining. He said if they are willing to help them, because they have issues with parking right now. He said they using the north side of their neighbor's parking as the egress, and they've always shared it. He said they have historically used the spaces on the left side for their tenant parking. He said they, in turn, would snowplow their lots for them at every snowfall like they did a couple weeks ago, and they pay for that. He said the landscaper who cleans up their property, also cleans up those two grassy areas on their property. He said he was bringing this up because there may be some room for negotiation or discussion with traffic concerns. He concluded by saying that he's glad somebody purchased that and made look nicer. He said they try to keep the up as well.

President Baker asked if the Dutch Brothers are renting or own.

Mr. Bill Crawford, 5596 Crescent Drive, Holland, MI said he was the construction manager for the Dutch Brothers project said he believes they lease didn't know off, so he could get back to them on that.

President Baker said they've issues with cross-access over the years, he asked who is responsible for the review of documentation for things like that?. He asked if this is the time for this type of issue to be brought up; when there's a drive-through between two separate parcels, who would manage that, the two private property owners or would the town get involved. Director Mendoza said, in the past, he has seen the town take the initiative to reduce the number of curb cuts for redevelopment complexes. . They would typically use funds and partner with the private property owners as part of the redevelopment efforts, particularly to help control traffic. He said he didn't know if there is an interest or an appetite from those decision makers to evaluate that.

President Baker asked if there was anyone else who wished to speak. There were no further comments, he closed the public hearing.

Mr. Bill Crawford gave this clarification. They own the building, and they lease land. President Baker said then they are supposed to take care of the structure and the site, but they're not the legal entity that owns the property.

Commissioner Branagan said she was looking at the floorplan and asked the architect if the might think all of the unoccupied storage on the southeast corner and use that for an opportunity for seating.

Director Mendoza advised the commissioners that if the two parcel owners want to discuss the curb cuts, they could contact the Town Manager's office and work with the Redevelopment Commission to see if there's any interest and opportunity for a partnership.

Motion: Councilor Shinkan moved to approve PC Docket No. 25-025, a development plan for Dutch Brothers Coffee with a condition that all building and site remodeling comply with the town's zoning codes or they seek a variance from the BZA, including all discussions and findings.
Second: Commissioner Johns
Vote: Yes – 6; No – 0; Abstain – 0; Absent – 1. Motion carries.
Councilor Nellans had stepped out of the meeting for a few minutes.

PC25-026 DEVELOPMENT PLAN REVIEW: Marc Smith of E. Anthony, Inc. on behalf of Orthopedic Specialists of Northwest Indiana (OSNI) requests review of a Development Plan for expansion of a 30,000 square foot parking lot located at 9900 Columbia Avenue.

Director Mendoza said the petitioner was here several months ago, they have complied with all the requests that were identified previously for the approval. They do have several variances, one is for light standards, one is for a parking modification. This is the proposal for the expansion of parking. They're looking to relocate the existing access points to the west, which is further from the intersection. That is a good thing. He said they have complied with the landscape requirements and the screening. They did get a waiver from the Commission regarding a fence. Aside from the things we see here, they have complied with everything. President Baker said his first question was that this was in Phase 2 and they were going to add another building as a part of additional parking spaces, Director Mendoza said they plan to add a Phase 2 for the additional space, but they're not moving forward with that at this time, but they need the parking spaces. President Baker asked if there were any questions for staff. There were none. He asked if anyone wanted to speak for the petitioners.

Mr. Marc Smith of E. Anthony introduced himself.

Mr. Antonio Belmonte of 9987 Marble Lane excused himself and addressed the commission. He said the want to use the other area if and when they're ready to do the expansion. They will use that for staging. They figured they'd just put it in and then they can stage there so they won't interrupt everything else going on there with patients and staff. He said they don't want to don't want to build a building and have all this construction going on in this area. He said they'll be able to use the east side of the parking division without interrupting patient operations during construction. President Baker asked what the total number of parking spaces they have currently for the total amount of square footage at this location. Director Mendoza said they exceed the minimum standard number of parking spaces for the use. President Baker asked about the Impervious surface. Director Mendoza said they had planned a detention pond to accommodate that; they initially built the detention to accommodate that expansion. President

Baker asked where the detention pond is. Mr. Smith said it is on the west side. Director Mendoza said it was sized and approved in the first round when anticipating Phase 1 and Phase 2 for the expansion. He said they might do a Phase three for the building at some point. This is for the additional parking only. President Baker said parking is an issue at this location. He wanted to understand why they need more parking at their old location. Mr. Belmonte said they are building an MRI facility , St. John is getting remodeled and they are doing another x-ray, so they are shifting doctors and services around to this location to accommodate those projects.

Ms. Lisa Werth, the office manager, 225 Knightbridge Place, said as Tony said, they have several projects going on concurrently. They have their MRI suite that's going in in Munster, they're remodeling their St. John office, which is going to happen after this. She said, in order to continue to do business operations that impact their patient care, they have to provide more services at this location right now and until those projects are fully fleshed out and ready to go. She said she understand the new building Is not part of this request, but it makes the most sense for like you said for staging to get the parking lot in place, make sure all of that is squared away, so that when they go to move on that second building as the next project, it will not impact our patients' business operations.

President Baker asked Ms. Werth what percentage of people would be reduced from the amount of folks coming into this facility that would be moved off when those other projects are completed. Ms. Werth said this will still be their main office, so she thought maybe a 20% reduction. The need for this lot will still be there regardless of when those projects are completed; it will not be as intense all at the same times a day like it is right now.

Commissioner Raffin said the staff had several recommendations in the staff report regarding waivers, lighting, screening, construction sidewalks, drive aprons, and proposed irrigation methods. He asked for confirmation that this meets everything under the Munster zoning code. Director Mendoza said their site plan shows the relocation and the restoration of the sidewalks, and the relocation of the access points. They would have to comply with all that's shown in the document.

President Baker opened the public hearing. There were no public comments; he closed the public hearing.

Motion: Councilor Shinkan moved to approve PC Docket No. 25-026, a development plan for the expansion of an existing parking lot, including all discussions and findings.
Second: Commissioner Johns
Vote: Yes – 7; No – 0; Abstain – 0. Motion carries.

Findings of Fact:

PC25-011 SUBDIVISION PRELIMINARY PLAT: Bruce Boyer on behalf of Crew Car Wash received approval of a Primary Plat for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION located at 111 Ridge Road.

Motion: Commissioner Raffin moved to approve the Findings of Fact for PC Docket No. 25-011.
Second: Councilor Nellans
Vote: Yes – 7; No – 0; Abstain – 0. Motion carries.

PC25-012 DEVELOPMENT PLAN REVIEW: Bruce Boyer representing Crew Car Wash received conditional approval of a Development Plan to allow onsite parking, lighting, dumpster enclosure, and emergency exit from the car wash lane located at 111 Ridge Road.

Motion: Commissioner Raffin moved to approve the Findings of Fact for PC Docket No. 25-012.
Second: Councilor Nellans
Vote: Yes – 7; No – 0; Abstain – 0. Motion carries.

Continued Discussion Items: None

Other Business: None

Next Meeting: President Baker Raffin announced the next regular business meeting will be held on December 9, 2025.

Adjournment:

Motion: Councilor Shinkan moved to adjourn.
Second: Councilor Nellans
Vote: Yes – 7 No – 0 Abstain – 0. Motion carries.

Meeting adjourned at 9:34pm

President Baker
Plan Commission

1.14.26
Date of Approval

Executive Secretary Sergio Mendoza
Plan Commission

1.14.26
Date of Approval

TOWN OF MUNSTER

PLAN COMMISSION REGULAR MEETING 12/9/25

Munster Town Hall: Main Meeting Room

Tuesday, December 09, 2025 at 07:00 PM

AGENDA

Join Zoom Webinar as a Viewer:
https://us02web.zoom.us/j/83006860776
Meeting ID: 830 0686 0776
Passcode: 138335

1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**

William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025

5. **APPROVAL OF MINUTES**
    a. November 18, 2025 PC Minutes
6. **PRELIMINARY HEARINGS**
7. **PUBLIC HEARINGS**
    a. PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue. CONTINUED PUBLIC HEARING
    Documents: PC 25-015 Staff Report 12.09.25 CV Prelim Sub Lot C | EX A Application CV Preliminary Plat | EX B ALTA Survey Lot C | EX C Preliminary Plat_Centennial Village 1st Resub Lot C_rcvd 11-25-25 email | EX D Roundabout_Site Eng Plan | EX E Centennial Village PUD Amend.CV Design Standards Revised 10.20.25 | EX F Stormwater Report Lots 10 - 13 STMW Report | EX G Traffic Study | EX H Traffic Study SEH Review
    b. PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue.
    Documents: PC 25-016 Staff Report 12.09.25 CV PUD Amendment | EX A Application PUD Amendment with Alta Survey | EX B Centennial Village PUD Amend.CV Design Standards Revised 10.20.25 | EX C Preliminary Plat_Centennial Village 1st Resub Lot C_9-4-25 | EX D CVP Preliminary Plat- Roundabout Option-DRAFT | EX E Stormwater Report Lots 10 - 13 STMW Report | EX F Structural Brick docs | EX G Traffic Study | EX H Traffic Study SEH Review
    c. PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street.
    Documents: PC25-017 Staff Report 12.09.25 CV Sprouts Development | EX A Application Sprouts | EX B Centennial Village PUD Amend.CV Design Standards Revised 10.20.25 | EX C Plat with

Roundabout | EX D Roundabout_Site Eng Plan | EX E 5. Site Civil Plan Sprouts | EX F Sprouts Rendering | EX G Photometric SPROUTS | EX H Landscape Plan SPROUTS | EX I Stormwater Report SPROUT | EX J SWPPP SPROUTS | EX K Structural Brick docs | EX L Traffic Study | EX M Traffic Study SEH Review

d. PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.
Documents: PC25-018 Staff Report 12.09.25 development plan CV Chase Bank | Ex A Application Chase Bank | Ex B ALTA Survey Parcel C | EX C Site Plan with Roundabout | EX D Renderings Chase Bank | EX F Landscape Plan Chase | EX G Photometrics Chase | EX H STMW lots 10-13 | EX I Traffic Study | EX J Traffic Study SEH Review

e. PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.
Documents: PC 25-021 Staff Report 12.09.25 Pavilion Prelim Sub | Ex A Application Preliminary Plat | Ex B Alta Surveys PC25-021 | Ex C Concept Lots PC25-021 | Ex D Lots overlay aerial | Ex E Prelim Plat

f. PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.
Documents: PC 25-022 Staff Report 12.09.25 Pavilion PUD | EX A Application | EX B PUD Standards v2 redline | Ex C Alta Surveys PC25-022 | Ex D Concept Lots PC25-022 | Ex E Lots overlay aerial | Ex F Prelim Plat | Ex G Site Plan | Ex H Rendering Architecture Plan

g. PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.
Documents: PC 25-023 Staff Report 12.09.25 Pavilion Self Storage | EX A Application | Ex B Alta Surveys | Ex C Site Plan | Ex D Landscape Plan | Ex E Photometric | Ex F Rendering Architecture Plan | Ex G Site Eng Plans | Ex H Stormwater Report | Ex I PUD Standards | EX J Concept Lots | Ex K Lots overlay aerial | Ex L Prelim Plat

8. **FINDINGS OF FACT**
   a. PC25-020 DEVELOPMENT PLAN REVIEW: Jim Glascott of WT Group representing the School Town of Munster received approval with conditions for a Development Plan for the construction of ten (10) tennis courts at 8839 Calumet Avenue.
   FINDINGS OF FACT
   b. PC25-025 DEVELOPMENT PLAN REVIEW: Erin Gogolin of Bohler Engineering on behalf of Dutch Brothers Coffee received approval with conditions for a Development Plan for the redesign of an existing building and parking lot located at 8032 Calumet Avenue.
   FINDINGS OF FACT
   c. PC25-026 DEVELOPMENT PLAN REVIEW: Marc Smith of E. Anthony, Inc. on behalf of Orthopedic Specialists of Northwest Indiana (OSNI) received approval (check conditions) for a Development Plan for expansion of a 30,000 square foot parking lot located at 9900 Columbia Avenue.
   FINDINGS OF FACT
9. **OTHER BUSINESS**
10. **CONTINUED DISCUSSION ITEMS**
11. **NEXT REGULAR BUSINESS MEETING** January 13, 2025
12. **ADJOURNMENT**

Recorded meetings are archived at: https://www.youtube.com/channel/UCjZG8vgYLDwUr-sEWvNOSFQ

PLAN COMMISSION STAFF REPORT

To:	Members of the Plan Commission
From:	Sergio Mendoza, Planning Director
Meeting Date:	December 9, 2025
Agenda Item:	PC 25-016
Application Type:	PUD Amendment
Hearing:	Public
Summary:	Matt Kimmel is requesting to requesting an amendment to the CENTENNIAL VILLAGE DESIGN STANDARDS to modify the size, location, and shape of lots and building on recorded lot C, as well as update sign standards and materials for all of Centennial Village PUD.

Applicant:	Matt Kimmel , Centennial Village Development.
Property Address:	9505 Calumet Avenue
Current Zoning:	PUD – CENTENNIAL VILLAGE
Adjacent Zoning:	North: CD 4 A – General Commercial and CD 4 R4 – Multifamily South: PUD – CENTENNIAL VILLAGE East: CD 4 R4 – Multifamily West: SD M Manufacturing
Applicant Requesting:	Approve PUD Amendment
Action Required:	Review of CENTENNIAL VILLAGE PUD DESIGN STANDARDS Review of Section 26-6.804. L. 9. k. xiii.

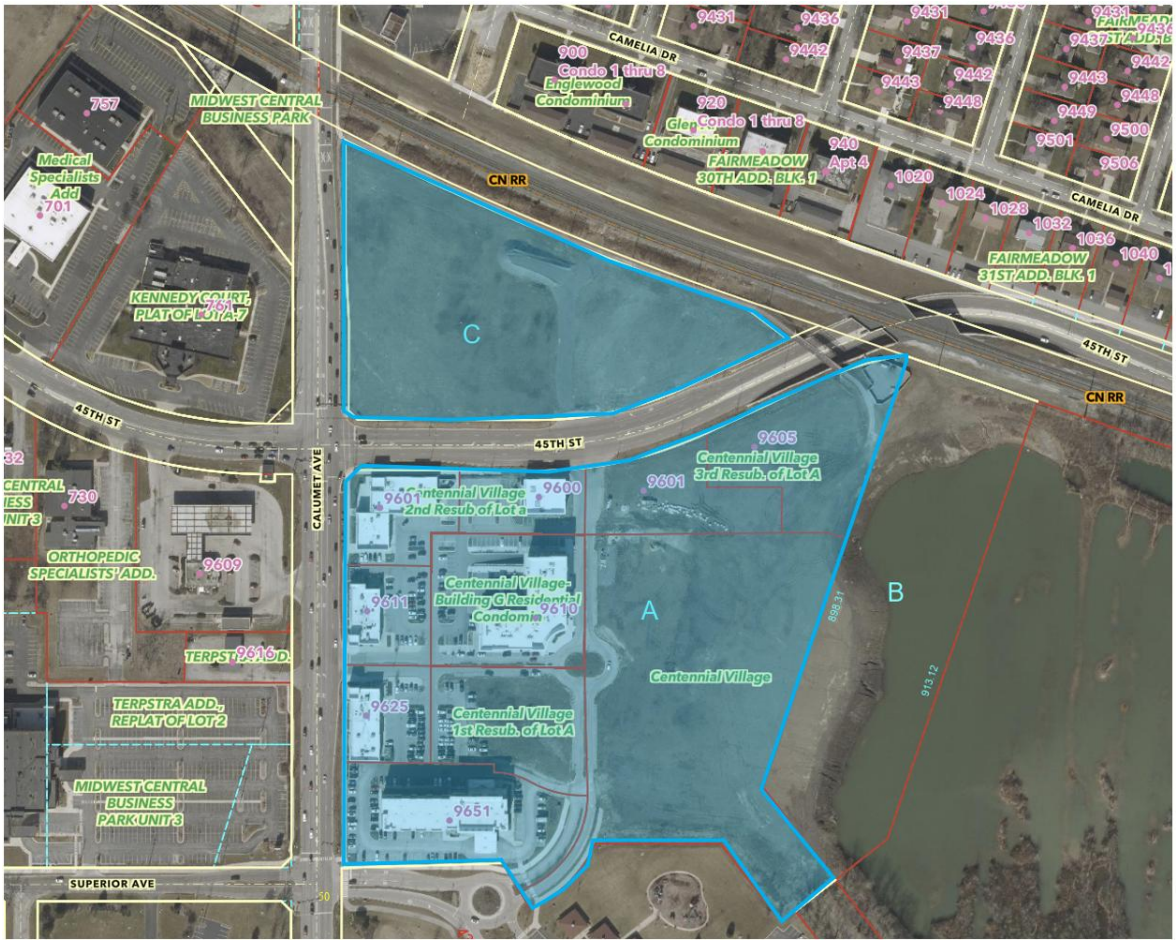
Staff Recommendation: Table Amendment to CENTENNIAL VILLAGE PUD DESIGN STANDARDS
Review PUD Amendment Standards
Review Engineer's Traffic Study Review
Review Engineer's Structural Brick Document
Schedule a December 9, 2025 Public Hearing

Attachments:

1. PUD Amendment Application, Exhibit A
2. PUD Design Standards (10/20/25), Exhibit B
3. Site without Roundabout, Exhibit C
4. Site with roundabout, Exhibit D
5. STMW Report Lots 10-13, Exhibit E
6. Structural Brick Documents, Exhibit F
7. Traffic Study Report , Exhibit G
8. Traffic Study Review, Exhibit H

SITE LOCATION

The proposed Subdivision/Replat is located east of Calumet Avenue, north of 45th Street, south of the Canadian National Railroad, and west of the 45th Street underpass and Canadian National Railroad bridge intersection.

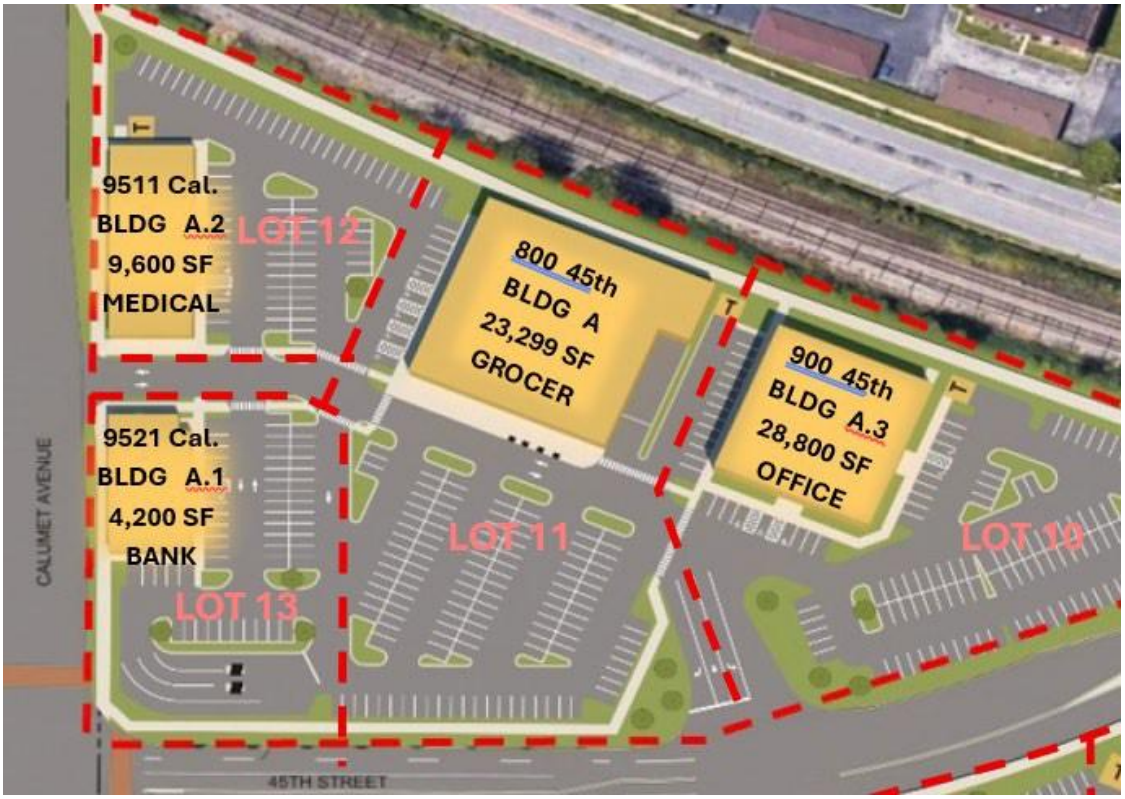


PROJECT BRIEFING

The Centennial Village PUD was approved as a development that will provide Town of Munster with a sustainable, mixed-use, walkable lifestyle community. Centennial Village was established through a Rezone action on July 22, 2013, ORDINANCE 1598. The development is currently governed by the Centennial Village PUD Design Standards and Conceptual Plan that has been amended multiple times through the following ordinances:

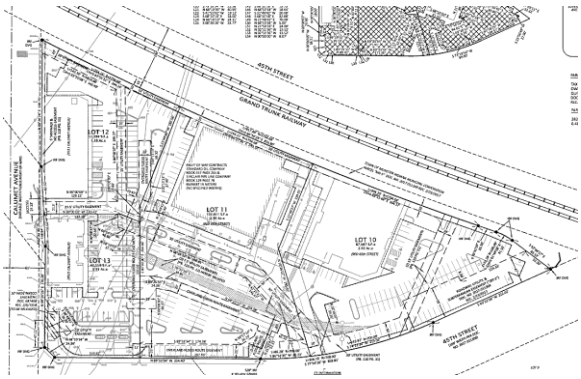
- ORDINANCE 1659, adopted June 8, 2015;
- ORDINANCE 1709, adopted March 6, 2017;
- ORDINANCE 1911, adopted August 21, 2023; and
- ORDINANCE 1930, adopted December 3, 2023.

The focus area proposed for amendment is commonly known as 9505 Calumet Avenue, Lot C in Centennial Village. The current site is approximately 6.5 acres of vacant undeveloped land zoned for mixed use development in a TIF district. Lot C was approved by the Plan Commission in March 2017 and recorded in April 2017 as CENTENNIAL VILLAGE, PB 110, PG 11, Document Number: 2017-024636. Mr. Matt Kimmel requests that the subject lot (LOT C) be reorganized as LOTS 10, 11, 12, 13 OF CENTENNIAL VILLAGE RESUBDIVISION OF LOT C. Below is modified conceptual image from the proposed PUD. However, the concept does not include a roundabout at the proposed intersection.

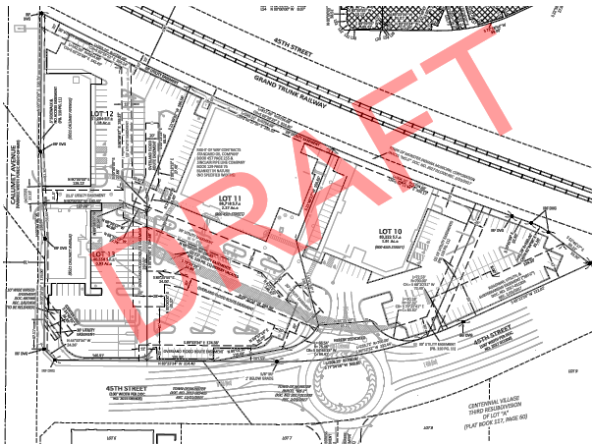


At the October 14, 2025 Preliminary Hearing, the Commissioners discussed whether the PUD Amendment accurately reflects the proposed subdivision of four (4) lots from Lot C and evaluated the potential impacts to the intersection at 45th Avenue and N. Centennial Drive. It was noted that two different intersection configurations were presented—one depicting a four-way intersection and the other a roundabout. Commissioners also discussed the implications of introducing structural brick as an approved construction material within the PUD. Following discussion, the Commissioners voted to defer the matter to allow the applicant to revise the PUD in accordance with the comments provided and to submit an updated intersection plan with a roundabout intersection.

4-way intersection with traffic signal



Roundabout



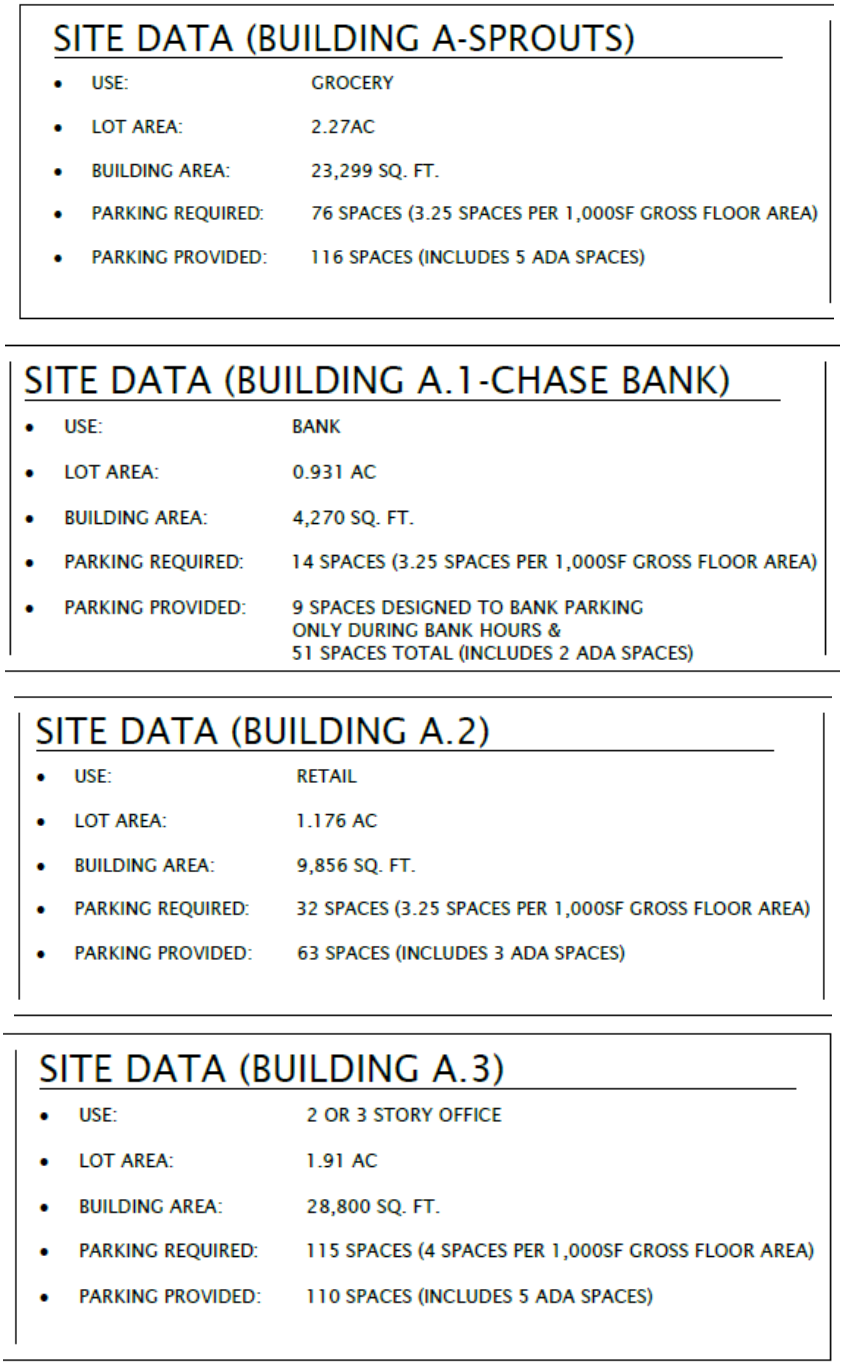
The Plan Commission directed the applicant to proceed with one preferred option, and the roundabout concept was selected for advancement.

At the November 18, 2025 Plan Commission Public Hearing, the applicant presented the roundabout preliminary plat. During discussion, commissioners raised questions regarding potential impacts to other development components and whether these issues would be addressed following approval of the roundabout plat. The applicant then requested approval of both the roundabout and four-way intersection options; however, the Commission advised that such a dual-approval approach is not common and not supported by local or state procedural requirements. The item was tabled, and the applicant was instructed to return with one submittal for determination by the Commission.

On November 25, 2025, staff received notice that the applicant intends to proceed with the plat showing only the signalized 4-way intersection option. Mr. Kimmel now submits this request pursuant to Section 26-233 of the Munster Subdivision Code, which states: *"No plat or replat of a subdivision of land located within the territorial jurisdiction of the town plan commission shall be recorded until it shall have been approved by the plan commission and such approval shall have been entered in writing on the plat by the president and secretary of the commission."* In addition, staff received a Professional Services Review Letter from the Town Engineers regarding the Traffic Study. The Traffic Study Review Letter was submitted to the Commissioner's ShareFile on December 1, 2025 and shared with the applicant on December 2, 2025.

There have been no updates to the PUD Design Guidelines have been presented since it last update on October 20, 2025. Proposed amendments to the Centennial Village PUD Design Standards and Conceptual Plan include:

- Modification to lot lines and proposed buildings
  10.20.25 Design Standards, pages, 4, 9, 10, 15.



SITE DATA (BUILDING A-SPROUTS)

- USE: GROCERY
- LOT AREA: 2.27AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 116 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1-CHASE BANK)

- USE: BANK
- LOT AREA: 0.931 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 9 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 51 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2)

- USE: RETAIL
- LOT AREA: 1.176 AC
- BUILDING AREA: 9,856 SQ. FT.
- PARKING REQUIRED: 32 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 63 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3)

- USE: 2 OR 3 STORY OFFICE
- LOT AREA: 1.91 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 110 SPACES (INCLUDES 5 ADA SPACES)

- Sign standards - change in size size, type, material, location, and quantity

10.20.25 Design Standards, page 49.

Sign Regulations for Centennial Village

Town of Munster

Purpose
The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All permanent signs located within the development shall conform to the following standards:

- Building materials – included the use of structural brick on lot 11 only

10.20.25 Design standards, page 11

Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
~~a.~~b. ~~or~~ Structural Brick: permitted only on Lot 11
~~b.~~c. Natural Masonry and Architectural Cast Stone
~~c.~~d. Architectural Metal Panels
~~d.~~e. Glass & Store Front Aluminum Window & Door Frames
~~e.~~f. Conventional Windows and Frames

- Intersection development reference four way or roundabout, no roundabout concept included.

10.20.25 Design standards, pages 19, 45

1. Development Area North of 45th Street:
    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

2. Development Area South of 45th Street:
    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet ~~west~~ east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

CODE REVIEW

TOWN OF MUNSTER CHARACTER BASED ZONING CODE

Section 26-6.804. L. 9. Specifics Supplemental Provisions Related to Planned Unit Developments.
(pg 402)

k. The procedure for…amending an existing SD-PUD…shall be as follows:

xiii. The Plan Commission may recommend … amendment to the SD-PUD…provided that it finds that:

I. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will not detrimentally affect present or potential property values or Uses of Adjacent property or elsewhere in Town.

II. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District adequately takes into account existing and proposed conditions and character of the land, Uses, Buildings, and Development proposed to be subject to the SD- PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and within all Adjacent Districts.

III. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will have a beneficial effect on the Town, which could not be achieved if the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District were not approved and the such Development was developed under the standards of any other District.

IV. Any deviation from the standards or requirements that otherwise would be applicable with another District is warranted by the design and amenities incorporated in the Development Plan.

V. The SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is necessary to address unique site conditions that are not characteristics of other sites in the Town and the application and Development Plan adequately address the same.

VI. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District and the Development proposed therein are:

1) either compatible with the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District or the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District can be planned in coordination with the proposed Development within such SD-PUD Planned Unit Development Special District;

2) the most desirable Development and Use(s) for which the property subject to the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is adapted; and

3) constitute responsible growth and Development.

VII. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District is in conformance with the general intent of this Article and the Comprehensive Plan.

VIII. Existing and proposed Thoroughfares are suitable and adequate to carry anticipated traffic within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and its vicinity.

IX. Existing and proposed utility services are adequate for the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District.

X. Each phase of the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District, contains the required parking spaces, and landscape and utility areas necessary for creating and sustaining a desirable and stable environment.

XI. The proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and all proposed Buildings, parking accommodations, and landscape and utility areas therein can be completely Developed within five (5) years of the initial establishment of the District.

XII. All conditions and requirements of Sections 26-6.804. L. 9. a. - .k have been satisfied.

STAFF FINDINGS AND RECOMMENDATIONS

Staff has determined that the applicant has submitted the required supporting documentation for an amendment to the CENTENNIAL VILLAGE PUD, and that the submission complies with the Public Notice requirements outlined in Section 26-6.804.L.9.k.xii for conducting a Public Hearing on this matter.

Staff notes that the applicant has not updated the proposed PUD Design Standards to include a conceptual roundabout drawing, but that is no longer applicable, as the applicant has indicated that the project will proceed with a signalized four-way intersection. Staff further finds that both the Commission and the applicant expressed interest in reviewing and understanding the use of structural brick for the proposed Lot 11 Sprouts Market development. While the applicant has provided documents referencing the proposed structural brick material, engineering review and confirmation of its permissibility within the PUD have not yet been completed.

Staff has also reviewed both the DVG Traffic Study and the SEH Traffic Study Review and finds they're in agreement that Calumet Avenue and 45th Avenue are already operating under significant strain, with substantial delays and queueing during peak hours. Both firms also identify a roundabout at 45th Avenue and North Centennial Drive as a preferred long-term improvement, though only as part of a phased approach to addressing overall LOS and congestion for Calumet Avenue and 45th Avenue.

The DVG Traffic Study indicates that full build-out of the proposed subdivision would double traffic volumes during peak times and DVG concludes that a roundabout at 45th Street and North Centennial Drive, would improve LOS and reduce delays; again, only as part of a phased approach to an overall Calumet Avenue and 45th Avenue roadway enhancements. SEH concurs that a roundabout would provide better operations and reduce queueing but acknowledges that it would require a larger footprint and carry higher construction cost.

Additional findings between a roundabout and 4-way intersection would occur to propsoed parking counts on Lots 10 and 11. Lot 11 (Sprouts Market) parking spaces would be reduced from 127 to 116. However, the required parking spaces are 76. Lot 10 (building A3) parking spaces would be reduced from 130 to 110, the required parking spaces are 115.

Staff recommends that this matter be tabled and that the applicant return to the Plan Commission with updated Centennial Village Design Guidelines reflecting the proposed structural brick material, the final intersection design determination at North Centennial Drive and 45th Avenue, and the proposed screening for the ATM use on Lot 13.

MOTION

Plan Commission may consider the following motion:

Motion to Table PC 25-016, a proposed Amendment to the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT so the applicant may resubmit updated Design Guidelines in support of final building material, roadway infrastructure, and screening, including all discussion and findings

Petition PC 25 - 016
Date: _____
Application Fee: $_____
Sign Fee: $_____

Town of Munster *Plan Commission Petition Application*

OWNER INFORMATION:

Matt Kimmel
Name of Owner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

APPLICANT OR PETITIONER INFORMATION (if different than above):

Matt Kimmel
Name of Applicant/Petitioner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

PROPERTY INFORMATION: Centennial Village

Business or Development Name (if applicable)

9601 & 9605 N. Centennial Drive Munster, IN 46321
Address of Property or Legal Description

PUD
Current Zoning

APPLICATION INFORMATION:

Please select what this Application is for:

☐ **Subdivision** If yes, select one of the following: ☐ **Preliminary Plat** ☐ **Final Plat**

☐ **Development Plan Review**

☑ **Rezoning (including Planned Unit Development) – Proposed Zoning District**

PUD Amendment of Centennial Village

Brief Description of Project:

Revisions to the size, location, and shape of Buildings "A", "A.1", "A.2" and "A.3"
Revisions to sign regulations and the use of structural brick in the material sections

Russ Pozen, PE
Name of Registered Engineer, Architect or Land Surveyor

(219) 281-4068
Phone Number

1155 Troutwine Road Crown Point, IN 46307
Street address, City, ST, ZIP Code

rpozen@dvgteam.com
Email address

REQUIRED ATTACHMENTS

Required Attachments for Plan Commission Applications

To ensure that adequate information is provided to the Plan Commission, please check off each of these items and provide documentation to the Community Development Department at the time of submittal of the application.

ALL APPLICATIONS	Included	N/A
Narrative statement describing project		
Property owner consent (Signature page)		
Proof of Ownership (e.g. copy of tax bill)		
Current ALTA Survey		
Vicinity Plan (A dimensioned drawing to scale of the planned building(s)/improvements in the context of the surrounding properties, including existing buildings and driveways at least one block in every direction)		

The following pages list the additional attachments required for specific applications. Please refer to your type of petition request and provide the additional required attachments.

SUBDIVISION - PRELIMINARY PLAT	Included	N/A
Single-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Report		

Commercial or Multi-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Reports		
Preliminary Development Plan containing:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		

SUBDIVISION - FINAL PLAT	Included	N/A
Final Plat		
Engineering Plans		
Stormwater report		
Special Studies as required – see Site Plan Review Committee minutes		

REZONING (including PLANNED UNIT DEVELOPMENT amendments)	Included	N/A
Preliminary Development Plan containing at a minimum:		
Boundary Identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Proposed Use table		
Stormwater report		
Special Studies as Required– see Site Plan Review Committee minutes		

DEVELOPMENT PLAN	Included	N/A
Detailed Site plan including:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		
Square footage of:		
Lot or parcel		
Existing impervious surface		
Proposed total impervious (existing plus current proposal)		
Existing building		
Proposed total building (existing plus current proposal)		

Existing parking and pavement		
Proposed total parking and pavement (existing plus current proposal)		
Relevant dimensions including:		
Buildings		
Parking stalls		
Driveway widths		
Setbacks to buildings and other improvements		
Parking lot aisles, turnarounds, turning radii, etc.		
Distance from driveway to street corner if less than 200'		
Sidewalk, walkway and handicap ramp widths and locations		
Widths of abutting R.O.W.'s, roadways, and terraces.		
Full color architectural renderings of all building elevations with materials identified		
Proposed lighting for site, including:		
Photometric Plan		
Location of all light fixtures		
Pole height		
Luminaire type and manufacturer's specifications for all exterior light fixtures		
Landscaping plan drawn to scale including:		
Common and Latin plant names		
Planting specifications		
Total number of trees provided		
Total square footage of landscaped area on site and internal to the parking lot		
Identification of area used to calculate internal parking lot landscaping		
Fence detail drawing		
Dumpster enclosure detail drawing		
Sign detail drawing		
Special studies as required– see Site Plan Review Committee minutes		

NOTE: If you checked any exhibits "N/A", please explain:

ALTA/NSPS LAND TITLE SURVEY

PC25-016

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

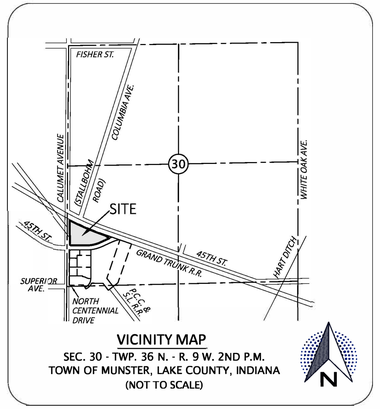
GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P- DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG"- 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG"- 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF- REBAR FOUND
PB.- PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO- NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A.- LANDSCAPE AREA
PG.- PAGE
REC.- RECORDED

- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CURB INLET
- CATCH BASIN
- TRAFFIC MANHOLE
- GUY/ANCHOR
- ROAD SIGN
- PLM PIPELINE MARKER
- GAS TEST STATION
- GAS LINE VENT
- GAS VALVE
- ICV IRRIGATION CONTROL VALVE
- BOV BLOW OFF VALVE
- SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON
- ADA PAD
- ASPHALT
- BURIED WATER LINE
- BURIED GAS LINE
- BURIED ELECTRIC LINE
- BURIED COMMUNICATION LINE
- OHU OVERHEAD UTILITY WIRES
- BP BURIED BRITISH PETROLEUM PIPE LINE
- WOLVERINE BURIED WOLVERINE PIPE LINE
- SUBJECT PARCEL LINE
- ADJOINING PARCEL LINE
- SECTION/QUARTER LINE
- EASEMENT LINE
- STORM SEWER WITH FLOW DIRECTION
- SANITARY SEWER WITH FLOW DIRECTION
- WATER VALVE
- FIRE HYDRANT ASSEMBLY
- FO FIBER OPTIC MARKER POST
- TREE WITH SIZE
- EXISTING 1-FOOT CONTOUR
- xxx.x EXISTING SPOT ELEVATION
- CONCRETE
- STONE

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

GLEN E. BOREN

PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF - ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL-RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT
ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.
ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.
ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.
ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.
ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

SCALE: 1" = 50'

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
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DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY

APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

THE ARCHITECTS PARTNERSHIP

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FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

~~Revised~~ August 21, 2023

Revised August 07,2025

Presented October 14, 2025

Revised October 20, 2025


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
BLDG M
6,950 SF
BLDG B
11,613 SF
BLDG F
1,400 SF
BLDG I
22,188 SF
BLDG C
4,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG K
71,040 SF
BLDG D
8,400 SF
BLDG E
57,500 SF
BLDG N
24,000 SF


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,813 SF
BLDG F
5,400 SF
BLDG C
6,400 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG K
71,040 SF
BLDG D
6,400 SF
BLDG O
7,000 SF
BLDG E
57,560 SF


BLDG A2
BLDG A
BLDG A3
BLDG A1
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
BLDG M
BLDG B
BLDG F
BLDG I
BLDG C
BLDG G
BLDG J
BLDG O
BLDG H
BLDG K
BLDG D
BLDG E
BLDG N

Design Standards
Centennial Village Planned Unit Development

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2: Plan of Development
3: Infrastructure Development Plan Set
4: Sign Regulations for Centennial Village

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	~~Retail – Anchor~~Grocery - Anchor	1	35	~~30~~5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	~~23~~1	50~~35~~	5	5	5
O	Hotel~~Retail – Single Tenant~~	5~~1~~	80~~25~~	5	5	5

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Building Lot A, A.1, A.2 and A.3 are~~is~~ located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

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Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
~~a.~~b. ~~or~~ Structural Brick: permitted only on Lot 11
~~b.~~c. Natural Masonry and Architectural Cast Stone
~~c.~~d. Architectural Metal Panels
~~d.~~e. Glass & Store Front Aluminum Window & Door Frames
~~e.~~f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 54th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 2530% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 2530% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 54th Floor Level Exterior Walls. The 2nd to 54th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, ~~wall~~ for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 54th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 750% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5-4th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

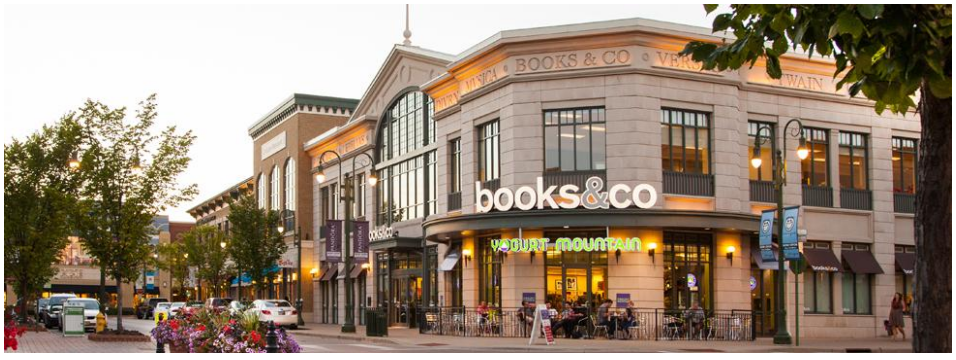
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	~~Retail – Anchor~~Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	~~2~~31	Class 1 & 2	Class 3 & 4~~N/A~~
O	Hotel~~Retail – Single Tenant~~	51	Class 1 & 2	Class 3 & 4~~N/A~~

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet ~~west~~ east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the

existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

   a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
   b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
   c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
   d. Where feasible, tandem parking spaces may be provided in under building parking garages.
   e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
   f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
   g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

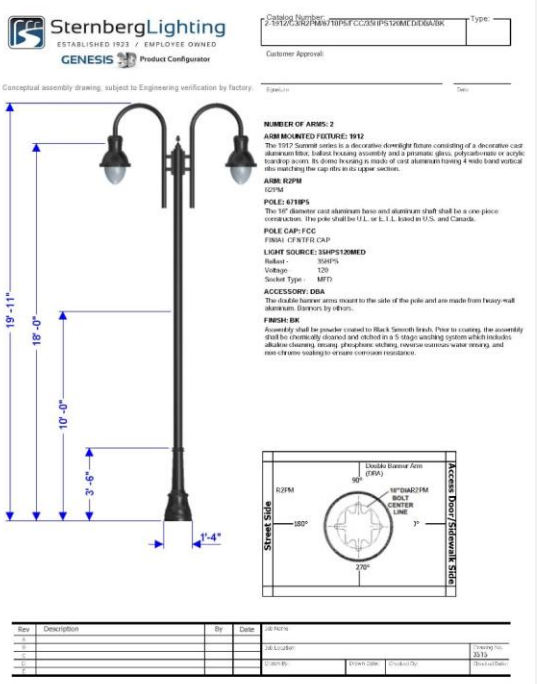
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No "shoe box" wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet

Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2
Trees for Parkway Planting

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1
Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering

Common Name	Scientific Name
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as "Invasive Species" as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3') (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
~~15.~~23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

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Section 11 – Signage

All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.~~edition of the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs. Additionally, the Centennial Village Planned Unit Development building and site sign design shall comply with the following standards:~~

~~1. Prohibited signs:~~

~~a. Signs that extend above the highest point of a roof line~~

~~b. Billboards~~

~~c. Signs painted or mounted upon the exterior side or rear wall of any principal or accessory structure except as otherwise identified in the Design Standards.~~

~~d. Signs which contain blinking, pulsating, flashing, or moving lighting.~~

~~e. Neon Lighting Signs~~

~~2. Traffic Control Signs including street name, stop signs, parking signs, directional signs and other traffic control signs that are used to implement public safety and wayfinding within the development shall be of an ornamental design similar to the site lighting posts and fixtures, following the decorative style of the Genesis Series by Sternburg Lighting.~~

~~3. No sign shall be located to block or obscure the vision of motor vehicle drivers for safe travel through streets and parking areas.~~

~~4. No sign shall be erected, located or maintained to prevent access to any door, window, public walkway or fire escape.~~

~~5. Materials and color palettes for signs shall follow the approved materials and colors defined in the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs.~~

~~6. A sign located on the main entry door or adjacent to the main entry door identifying the business name, hours of operation, address shall not exceed 6 square feet in total area.~~

~~7. Each business within multi-tenant buildings will be permitted one principal sign. Such signs may be wall mounted and with a total sign area as calculated below:~~

~~a. The total area of all signs for each business shall not exceed 1 square foot of sign area for each 30 feet of interior retail or business space, excluding storage area. Each business shall be allowed a minimum of 12 square feet of sign area. The maximum total square footage of sign area for a business shall not exceed:~~

~~i. 75 square feet for businesses having a total gross floor area of 0 square feet to 5,000 square feet.~~

~~ii. 125 square feet for businesses having a total gross floor area of 5,001 square feet to 20,000 square feet.~~

~~iii. 200 square feet for businesses having a total gross floor area of 20,001 square feet and larger~~

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8. Signs affixed to the exterior of a building shall be architecturally compatible with the style, composition, materials, colors and details of the building. Box Panel signs shall not be permitted on any building within the development.

9. The location of tenant signs shall be integrated with the building façade design and not obstruct architectural details and wall signs shall not extend more than 12 inches out from the exterior face of the building for "non-projection or non-blade" signs.

10. Projecting and Blade Signs extending perpendicular from the wall of a principal structure may be permitted so long as they do not interfere with clear vision to other adjacent business signs and do not interfere with the safe movement of vehicles and pedestrians. The Centennial Village PUD shall evaluate all requests for Projecting and Blade signs on a case by case basis and determine its approval based on the sign's design, materials and number of adjacent projecting banner signs. Projecting and Blade Signs may not extend a distance greater than 4 feet from a principal structure wall, be a minimum of 8 feet from the bottom of the sign to the top of the sidewalk below, may not exceed a total of 15 square feet and shall be counted against the total maximum business signage area.



11. Awning signs are permitted within the Centennial Village PUD following the approved sign design criteria, standards, materials and colors for awning signs defined in the Town of Munster Ordinance 1679.

12. In cases where businesses have rear or side parking lots or adjoins a public street, an additional sign developed to the same restrictions identified in Section 11 – Signage, shall be permitted only on one side or rear of the building.

13. Business signs shall be permitted to be back lighted or front lighted provided the sign illumination does not cause a nuisance to adjoining businesses and properties.

14. A sign bearing the name of a business of the principal tenant occupying space in the rear or upper floors of a building shall be allowed at the principal structure entrance to the business and the area of such sign identifying such business shall not exceed 4 square feet.

15. Free Standing Monument Signs shall be located and permitted to identify the Centennial Village PUD development areas at the locations as defined below:

a. Lot A – Identifying the development parcel north of 45th Street
b. Lot B – Identifying the development parcel south of 45th Street
c. Lot E – Identifying the development parcel south of 45th Street and the Lot E use

16. Free Standing Monument Signs shall have a maximum total surface area for any display surface of 100 square feet and a maximum height of 6 feet. The calculation of display surface does not include the surface area of the sign structure that the display surface is mounted.

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~~17. All signs and sign structures shall be maintained in good repair and safe condition. The owner of each sign shall be responsible for the proper maintenance of their respective sign. A sign shall be at all times legible, working and safe for the public.~~

~~18. No sign shall be constructed within the development unless the sign information has been reviewed and approved by the Centennial Village PUD developer and the proper permits and approvals have been granted by the Town of Munster.~~

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Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side

of Calumet Avenue. The development's water distribution system design will provide a water supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the

45th Street Town of Munster public improvement project. It is anticipated that storm water from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of ~~15~~ 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
45TH STREET
CALUMET AVENUE
CENTENNIAL PARK
BLDG PAD A
70,000sf
BLDG PAD L
BLDG PAD M
BLDG PAD F
5,200sf
BLDG PAD
5,200sf
BLDG PAD B
12,930sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD O
7,000sf
BLDG PAD I
17,360sf



Modified and approved within the red hashed line –

August 07, 2025 Conceptual Plan



Modified and approved within the red hashed line ~~-~~

August 21, 2023~~Conceptual Plan~~



Modified and approved within the red line – November 20, 2023

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Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

Appendix 4 – Signage

by reference:

Sign Regulations for Centennial Village

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.

4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.
5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised

letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.

24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.
25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display,

illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.

39. **Storefront:** The façade of a business space that contains a public entrance.
40. **Streamer**: A long, narrow flag, banner or pennant.
41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any artificial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.

2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.
3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or

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2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.

b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.

d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **Projecting Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projecting sign per business and must be spaced at a minimum of 15 feet from other projecting or blade signs. Projecting signs are only permitted where the business does not have a blade sign.

   a. **Small Projecting Sign(s)**: May only be installed on the first story of a building. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10 sf with a maximum height of 3 ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.

   b. **Large Projecting Sign(s)**: May only be installed on buildings with multiple stories and may not be installed on the first story. Sign shall be vertically oriented with the height greater than the projection of the sign. Must be 12 ft above the sidewalk elevation. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 ft from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.

9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.

10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.

11. **"Open" Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.

12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.

13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The

material must be the general material sign standard compatible and consistent with the materials used to construct the building.

14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.
15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl

or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.

20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.

19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required
It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit
Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits
It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code
All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code
All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance
The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs
Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend

beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.

4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.
7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.

PRELIMINARY PLAT
CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"
PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN ALL THE LOTS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF _____, 2025.

CENTENNIAL VILLAGE, LLC

BY:_____

TITLE: _____

(PRINTED NAME):_____

ACKNOWLEDGMENT

COUNTY OF _____
STATE OF _____] SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED _____ AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 2025.

_____
(SIGNATURE)

PRINTED NAME:_____
NOTARY PUBLIC
RESIDENT OF _____COUNTY

COMMISSION EXPIRES: _____

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA] SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF _____, 2025.

THE PREVIOUSLY GRANTED AND SHOWN OVERLAND FLOOD ROUTE EASEMENT BY PLAT BOOK 110, PAGE 11 IN DOCUMENT NUMBER 2017-024636 IS HEREBY VACATED AND SUPERCEDED WITH THE OVERLAND FLOOD ROUTE EASEMENT SHOWN HEREON.

_____ _____
PRINTED NAME SIGNATURE

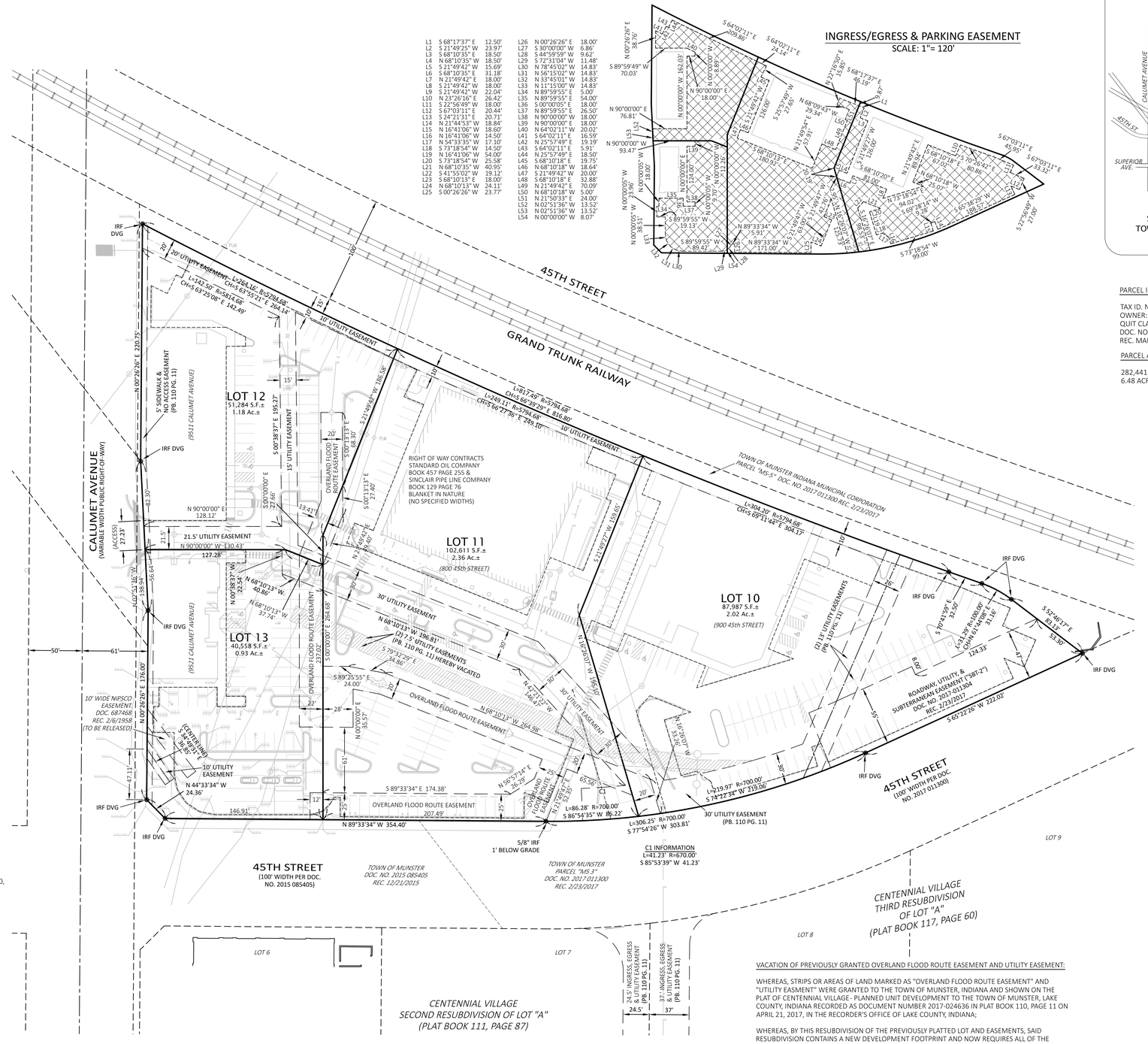
TITLE:

ATTEST:

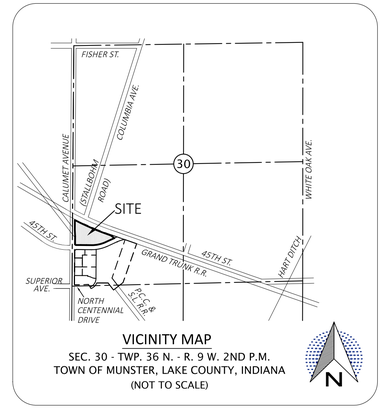
_____ _____
PRINTED NAME SIGNATURE

TITLE:

L1	S 68°17'37" E	12.50'	L26	N 00°26'26" E	18.00'
L2	S 21°49'25" W	23.97'	L27	S 30°00'00" W	6.86'
L3	S 68°10'35" E	18.50'	L28	S 44°59'59" W	9.62'
L4	N 68°10'35" W	18.50'	L29	S 72°31'04" W	11.48'
L5	S 21°49'42" W	15.69'	L30	N 78°45'02" W	14.83'
L6	S 68°10'35" E	31.18'	L31	N 56°15'02" W	14.83'
L7	N 21°49'42" E	18.00'	L32	N 33°45'01" W	14.83'
L8	S 21°49'42" W	18.00'	L33	N 11°15'00" W	14.83'
L9	S 21°49'42" W	22.04'	L34	N 89°59'55" E	5.00'
L10	N 23°26'16" E	26.42'	L35	N 89°59'55" E	54.00'
L11	S 22°56'49" W	18.00'	L36	S 00°00'05" E	18.00'
L12	S 67°03'11" E	20.44'	L37	N 89°59'55" E	26.50'
L13	S 24°21'13" E	20.71'	L38	N 90°00'00" W	18.00'
L14	N 21°44'53" W	18.84'	L39	N 90°00'00" E	18.00'
L15	N 16°41'06" W	18.60'	L40	N 64°02'11" W	20.02'
L16	N 16°43'06" W	14.50'	L41	S 64°02'11" E	16.59'
L17	N 54°33'35" W	17.10'	L42	N 25°57'49" E	19.19'
L18	S 73°18'54" W	14.50'	L43	S 64°02'11" E	5.91'
L19	N 16°41'06" W	54.00'	L44	N 25°57'49" E	18.50'
L20	S 73°18'54" W	25.58'	L45	S 68°10'18" E	19.75'
L21	N 68°10'35" W	40.95'	L46	N 68°10'18" W	18.64'
L22	S 41°55'02" W	19.12'	L47	S 21°49'42" W	20.00'
L23	S 68°10'13" E	20.00'	L48	S 68°10'18" E	32.88'
L24	N 68°10'13" W	24.11'	L49	N 21°49'42" E	70.09'
L25	S 00°26'26" W	23.77'	L50	N 68°10'18" W	5.00'
			L51	N 21°50'33" E	24.00'
			L52	N 02°51'36" W	13.52'
			L53	N 02°51'36" W	13.52'
			L54	N 00°00'00" W	8.07'



INGRESS/EGRESS & PARKING EASEMENT
SCALE: 1"= 120'



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SUBDIVIDER AND OWNER:

CENTENNIAL VILLAGE, LLC
631 KILLARNEY DRIVE
DYER, IN 46311

ENGINEER AND SURVEYOR:

DVG TEAM INC.
1155 TROUTWINE ROAD
CROWN POINT, IN 46307

LEGEND

- INGRESS/EGRESS AND PARKING EASEMENT
- PREVIOUSLY PLATTED UTILITY EASEMENT HEREBY VACATED
- IRS DVG 5/8" REBAR SET WITH BLUE PLASTIC CAP STAMPED "DVG TEAM INC FIRM NO. 0120"
- MAGF "MAG" NAIL FOUND WITH METAL WASHER STAMPED "DVG TEAM INC FIRM NO. 0120"

P.B. - PLAT BOOK

DEVELOPMENTAL STANDARDS:
THERE ARE DEVELOPMENTAL STANDARDS ASSOCIATED WITH DEVELOPMENT THAT ARE RECORDED AS DOCUMENT NUMBER 2017-024635 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

REFERENCE SURVEYS:
1. PLAT OF CENTENNIAL VILLAGE P.U.D. RECORDED IN PLAT BOOK 110, PAGE 11.
2. ALTA/ACSM LAND TITLE SURVEY OF PARCELS TW-1, 2, 4 AND PK-1, 3 BY PLUMB TUCKETT AND ASSOCIATES, INC. (NOW DVG TEAM, INC.), JOB NO. S15644, LAST REVISED 3/25/16, RECORDED AS DOCUMENT NUMBER 2017-015652, ON 3/9/2017.
3. CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 53.
4. CENTENNIAL VILLAGE 2ND RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 111, PAGE 87.
5. CENTENNIAL VILLAGE 3RD RESUBDIVISION OF LOT "A" RECORDED IN PLAT BOOK 117, PAGE 60.

IT IS THE OPINION OF THE SURVEYOR THAT THERE ARE NO SUBSTANTIAL DIFFERENCES BETWEEN SAID SURVEYS AND THIS PLAT.

FLOOD ZONE INFORMATION:
FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCELS DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEAR TO LIE WITHIN ZONE "X": AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCELS PLOT BY SCALE ON FLOOD INSURANCE RATE MAP NO. 180139 0117 E FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, MAP EFFECTIVE DATE BEING JANUARY 18, 2012 AND REVISED TO REFLECT LOMR EFFECTIVE MARCH 18, 2016.

SURVEY NOTE:
THE EXTERIOR OF THE OVERALL SUBDIVISION BOUNDARY WAS STAKED AND THE MONUMENTS SET AND FOUND ARE SHOWN ON THE RECORDED PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT (PLAT BOOK 110, PAGE 11). IT IS THE OPINION OF THE SURVEYOR THAT IT IS PROBABLE THAT THE INDIVIDUAL LOT MONUMENTS FOR THIS RESUBDIVISION WILL BE DISTURBED BY CONSTRUCTION AND MASS GRADING. THE SETTING OF THE INDIVIDUAL LOT MONUMENTS ARE HEREBY DELAYED UNTIL AFTER CONSTRUCTION IS COMPLETE OR UP TO TWO YEARS AFTER RECORDATION OF THIS PLAT, WHICHEVER OCCURS FIRST AS PRESCRIBED BY TITLE 865 IAC 1-12-18(l).

VACATION OF PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND UTILITY EASEMENT:

WHEREAS, STRIPS OR AREAS OF LAND MARKED AS "OVERLAND FLOOD ROUTE EASEMENT" AND "UTILITY EASMENT" WERE GRANTED TO THE TOWN OF MUNSTER, INDIANA AND SHOWN ON THE PLAT OF CENTENNIAL VILLAGE- PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA RECORDED AS DOCUMENT NUMBER 2017-024636 IN PLAT BOOK 110, PAGE 11 ON APRIL 21, 2017, IN THE RECORDER'S OFFICE OF LAKE COUNTY, INDIANA;

WHEREAS, BY THIS RESUBDIVISION OF THE PREVIOUSLY PLATTED LOT AND EASEMENTS, SAID RESUBDIVISION CONTAINS A NEW DEVELOPMENT FOOTPRINT AND NOW REQUIRES ALL OF THE PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND A PORTION OF THE SAID PREVIOUSLY GRANTED UTILITY EASEMENT AS INDICATED HEREON FOR THE DEVELOPMENT OF THIS RESUBDIVISION TO BE RELEASED AND VACATED BY THE TOWN OF MUNSTER, INDIANA;

WHEREAS, BOTH SAID EASEMENTS ARE BEING RECONFIGURED TO ACCOMMODATE THE NEW DEVELOPMENT FOOTPRINT AND GRANTED ACCORDINGLY ON THIS PLAT;

NOW THEREFORE, ALL OF SAID PREVIOUSLY GRANTED OVERLAND FLOOD ROUTE EASEMENT AND PORTIONS OF SAID PREVIOUSLY GRANTED UTILITY EASEMENT (AS INDICATED HEREON) ARE HEREBY RELEASED AND VACATED BY THE EXECUTION AND ACCEPTANCE OF THIS PLAT BY THE TOWN OF MUNSTER, INDIANA BECOMING EFFECTIVE ON THE DATE OF RECORDATION OF THIS PLAT.

SURVEYOR'S CERTIFICATION:

I, GLEN E. BOREN, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEYOR LICENSED IN COMPLIANCE WITH THE LAWS OF THE STATE OF INDIANA; THAT THIS PLAT CORRECTLY REPRESENTS A SURVEY COMPLETED BY ME ON MONTH XX, 2025 AND THAT ALL DIMENSIONS, LINEAR AND ANGULAR ARE CORRECTLY SHOWN, AND THAT ALL MONUMENTS OR MARKERS SHOWN THEREON ACTUALLY EXIST, AND THAT THEIR LOCATIONS, SIZE, TYPE AND DESCRIPTION ARE ACCURATELY SHOWN.

WITNESS MY HAND AND SEAL THIS _____ DAY OF _____, 2025.

_____
GLEN E. BOREN, P.S. NO. LS20000006

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE 1ST RESUBDIVISION OF LOT "C"
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
PRELIMINARY PLAT

0' 25' 50'
SCALE: 1" = 50'

SPROUTS

© COPYRIGHT DVG TEAM, INC

\25-0081 Preliminary Plat.dwg	
FB/PG	FILE NO.
DRAWN BY: G.B.	DATE: 9/4/25
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 25-0081	

PLAT EXHIBIT
CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "C"
PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA

PARCEL DESCRIPTION:

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

UTILITY AND DRAINAGE EASEMENTS:
AN EASEMENT IS HEREBY GRANTED TO THE TOWN OF MUNSTER, INDIANA, SBC, AT&T, NORTHERN INDIANA PUBLIC SERVICE COMPANY AND OTHER COMPANIES IDENTIFIED BY THE MUNSTER TOWN BOARD AS SUPPLYING PUBLIC SERVICE NEEDS SEVERALLY AND THEIR RESPECTIVE SUCCESSORS AND ASSIGNS TO INSTALL, LAY, ERECT, CONSTRUCT, RENEW, OPERATE, REPAIR, REPLACE, AND MAINTAIN SEWERS, WATER MAINS, GAS MAINS, CONDUITS, CABLES, POLES, WIRES, UNDERGROUND WITH ALL NECESSARY BRACES, GUYS, ANCHORS AND OTHER APPLIANCES, IN, UPON, ALONG AND OVER THE STRIP OR STRIPS OF LAND DESIGNATED BY DOTTED LINES ON THE PLAT AND MARKED "UTILITY EASEMENT" FOR THE PURPOSE OF SERVING THE PUBLIC IN GENERAL WITH AERIAL SERVICE WIRES TO ADJACENT LOTS, TOGETHER WITH THE RIGHT TO ENTER UPON THE SAID EASEMENTS FOR PUBLIC UTILITIES AT ALL TIMES FOR ANY AND ALL OF THE PURPOSES AFORESAID AND TO TRIM AND KEEP TRIMMED ANY TREES, SHRUBS, OR SAPLINGS THAT INTERFERE WITH ANY SUCH UTILITY EQUIPMENT. ANY FENCES, TREES, BLACK TOPPINGS, VEGETATION IMPROVEMENTS OR OTHER POTENTIAL OBSTACLES TO THE USE OF EASEMENTS SHOWN UPON THE SUBDIVISION PLAT SHALL BE PLACED AT THE RISK OF THE PROPERTY OWNER AND MAY BE SUBJECT TO REMOVAL IN THE EVENT OF ANY INTERFERENCE WITH THE USE OF SAID EASEMENTS OR DRAINAGE OF OTHER LOTS. CHANGES OF YARD ELEVATIONS IN EASEMENTS FROM THOSE ESTABLISHED UPON THE SUBDIVISION PLAT OR NOTED ON PLATS SUBMITTED AND APPROVED WHEN BUILDING PERMITS ARE ISSUED THAT ADVERSELY IMPACT DRAINAGE OF ADJOINING LOTS SHALL BE SUBJECT TO REGRADING AT THE OWNER'S EXPENSE. ALL DESIGNATED UTILITY EASEMENTS ARE ALSO HEREBY DEDICATED AS DRAINAGE EASEMENTS.

INGRESS-EGRESS EASEMENT:
AN INGRESS-EGRESS EASEMENT IS HEREBY GRANTED TO THE PUBLIC FOR ACCESS TO EACH LOT IN THE SUBDIVISION OVER AND ACROSS THE AREAS ON THIS PLAT DESIGNATED AS "INGRESS, EGRESS EASEMENT".

CROSS PARKING EASEMENT:
THERE ARE AREAS DESIGNATED ON THIS PLAT AS "PARKING EASEMENT" THAT ARE HEREBY RESERVED FOR MUTUAL CROSS PARKING BETWEEN ALL THE LOTS SHOWN HEREON. SAID MUTUAL CROSS PARKING IS ALLOWED ONLY ON CONSTRUCTED AND STRIPED PARKING SPACES LOCATED WITHIN SAID DESIGNATED AREAS.

OVERLAND FLOOD ROUTE EASEMENT:
THERE ARE STRIPS OF GROUND DESIGNATED ON THIS PLAT AS "OVERLAND FLOOD ROUTE" WHICH ARE AREAS DESIGNED TO DIRECT THE SURFACE FLOW OF STORM WATER TO PASS THROUGH THE DEVELOPMENT WITHOUT DAMAGE TO PROPERTY. NO BUILDINGS OR STRUCTURES MAY BE PLACED WITHIN SAID STRIPS THAT WOULD ADVERSELY AFFECT THE FREE FLOW OF STORM WATER. EACH OWNER OR SUBSEQUENT PURCHASER SHALL BE EQUALLY RESPONSIBLE FOR MAINTAINING THE OVERLAND FLOOD ROUTE EASEMENT AREAS AND SHALL NOT DESTROY OR MODIFY GRADES OR SLOPES IN ACCORDANCE WITH THE TOWN APPROVED INFRASTRUCTURE ENGINEERING PLANS WITHOUT FIRST HAVING RECEIVED PRIOR WRITTEN APPROVAL OF THE TOWN OF MUNSTER.

OWNER'S CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA } SS:

WE, THE UNDERSIGNED, CENTENNIAL VILLAGE, LLC, OWNER OF THE REAL ESTATE SHOWN AND DESCRIBED HEREON, DO HEREBY CERTIFY THAT IT HAS LAID OFF, PLATTED AND SUBDIVIDED, AND DO HEREBY LAY OFF, PLAT AND SUBDIVIDE SAID REAL ESTATE IN ACCORDANCE WITH THE PLAT HEREON. THIS SUBDIVISION SHALL BE KNOWN AND DESIGNATED AS CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA.

DATED THIS ___ DAY OF _____, 2025.

CENTENNIAL VILLAGE, LLC

BY:_____

TITLE: _____

(PRINTED NAME):_____

ACKNOWLEDGMENT

COUNTY OF _____
STATE OF _____ } SS:

BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY AND STATE, PERSONALLY APPEARED _____ AND DOES ACKNOWLEDGE THE EXECUTION OF THE FOREGOING INSTRUMENT AS HIS VOLUNTARY ACT AND DEED, FOR THE PURPOSES HEREIN EXPRESSED. WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 2025.

_____
(SIGNATURE)

PRINTED NAME:_____
NOTARY PUBLIC
RESIDENT OF _____COUNTY

COMMISSION EXPIRES: _____

PLAN COMMISSION CERTIFICATE:

COUNTY OF LAKE
STATE OF INDIANA } SS:

SUBMITTED TO, APPROVED AND ACCEPTED BY THE PLAN COMMISSION OF THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, THIS _____ DAY OF _____, 2025.

THE PREVIOUSLY GRANTED AND SHOWN OVERLAND FLOOD ROUTE EASEMENT BY PLAT BOOK 110, PAGE 11 IN DOCUMENT NUMBER 2017-024636 IS HEREBY VACATED AND SUPERCEDED WITH THE OVERLAND FLOOD ROUTE EASEMENT SHOWN HEREON.

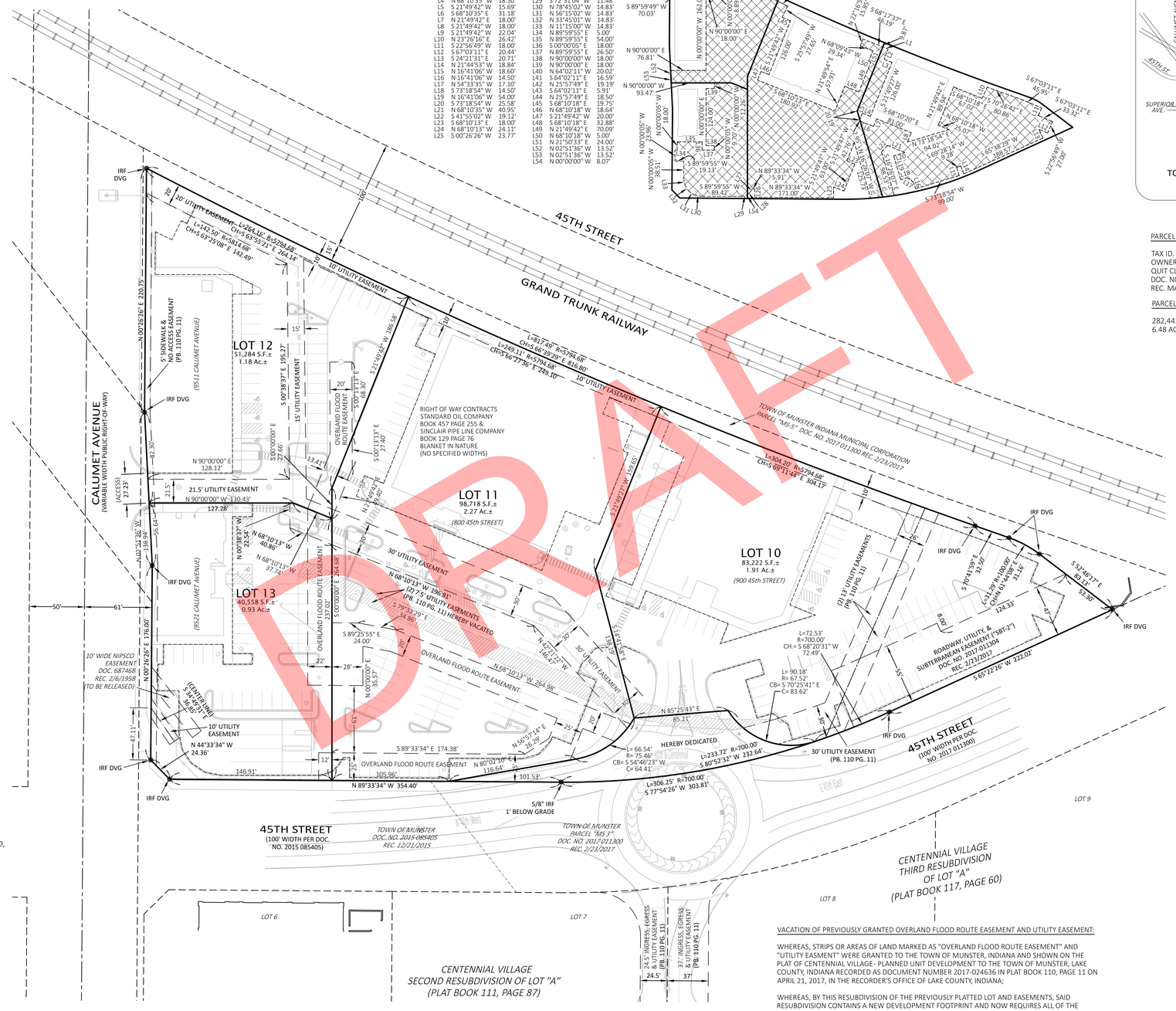
_____ _____
PRINTED NAME SIGNATURE

TITLE:

ATTEST:

_____ _____
PRINTED NAME SIGNATURE

TITLE:


45TH STREET
GRAND TRUNK RAILWAY
CALUMET AVENUE
(VARIABLE WIDTH PUBLIC RIGHT-OF-WAY)
(ACCESS) 27.23'
(9511 CALUMET AVENUE)
(9521 CALUMET AVENUE)
LOT 12
51,284 S.F.±
1.18 Ac.±
LOT 13
40,558 S.F.±
0.93 Ac.±
LOT 11
98,718 S.F.±
2.27 Ac.±
(800 45th STREET)
LOT 10
83,222 S.F.±
1.91 Ac.±
(900 45th STREET)
45TH STREET
(100' WIDTH PER DOC. NO. 2015 085405)
45TH STREET
(100' WIDTH PER DOC. NO. 2017 011300)
HEREBY DEDICATED
30' UTILITY EASEMENT (PB. 110 PG. 11)
20' UTILITY EASEMENT
10' UTILITY EASEMENT
15' UTILITY EASEMENT
21.5' UTILITY EASEMENT
30' UTILITY EASEMENT
OVERLAND FLOOD ROUTE EASEMENT
5' SIDEWALK & NO ACCESS EASEMENT (PB. 110 PG. 11)
10' WIDE NIPSCO EASEMENT DOC. 687468 REC. 2/6/1958 (TO BE RELEASED)
(CENTER LINE) S 89°33'34" E 354.40'
N 89°33'34" W 354.40'
IRF DVG
5/8" IRF 1' BELOW GRADE
RIGHT OF WAY CONTRACTS STANDARD OIL COMPANY BOOK 457 PAGE 255 & SINCLAIR PIPE LINE COMPANY BOOK 129 PAGE 76 BLANKET IN NATURE (NO SPECIFIED WIDTHS)
TOWN OF MUNSTER INDIANA MUNICIPAL CORPORATION PARCEL "MS-5" DOC. NO. 2017 011300 REC. 2/23/2017
TOWN OF MUNSTER PARCEL "MS-3" DOC. NO. 2015 085405 REC. 12/21/2015
TOWN OF MUNSTER PARCEL "MS-3" DOC. NO. 2017 011300 REC. 2/23/2017
CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A" (PLAT BOOK 111, PAGE 87)
CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A" (PLAT BOOK 117, PAGE 60)
LOT 6
LOT 7
LOT 8
LOT 9
24.5' INGRESS, EGRESS & UTILITY EASEMENT (PB. 110 PG. 11)
37' INGRESS, EGRESS & UTILITY EASEMENT (PB. 110 PG. 11)
ROADWAY UTILITY & SUBTERRANEAN EASEMENT ("SBT-2") DOC. NO. 2017 011304 REC. 2/23/2017
(2) 13' UTILITY EASEMENTS (PB. 110 PG. 11)
N 00°26'26" E 220.75'
N 00°26'26" E 176.00'
N 00°26'26" E 26.40'
N 00°26'26" E 27.66'
N 00°26'26" E 264.88'
N 00°26'26" E 237.02'
N 00°26'26" E 35.57'
N 00°26'26" E 27.43'
N 00°26'26" E 159.60'
N 00°26'26" E 130.43'
N 00°26'26" E 38.76'
N 00°26'26" E 38.34'
N 00°26'26" E 56.64'
N 00°26'26" E 23.96'
N 00°26'26" E 38.51'
N 00°26'26" E 27.23'
N 00°26'26" E 27.66'
N 00°26'26" E 27.43'
N 00°26'26" E 27.43'
N 00°26'26" E 27.43

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lots 10, 11, 12 & 13

Storm Water Technical Report
August 2025

Prepared for:

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

Table of Contents

1.0 Project Description

2.0 Storm Sewer Design

3.0 Overland Flood Route

Exhibits

1. ALTA Survey
2. Storm Sewer Calculations
3. Overland Flood Route Calculations
4. Centennial Village – Lot 9 – Building “M” Stormwater Report, dated June 2023

1.0 Project Description

Centennial Village is proposing to develop a grocery store, as the next phase of the ongoing Centennial Village Subdivision PUD project. The site is located northeast of the intersection Calumet Avenue and 45th Avenue in Munster, Indiana. Lot 11 contains approximately 2.36 acres and the proposed building is approximately 23,299 sf. Lots 10, 12 and 13 are 2.02 ac, 1.17ac and 0.93 ac respectively.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards. When Lots 10, 12 & 13 are developed, it shall provide an updated stormwater report including their proposed drainage and storm sewer design for each site.

See **Exhibit 1 ALTA Survey** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 10, 11 (future Sprouts), 12 & 13 (future Chase Bank). The proposed storm sewer system connects to the existing 36" RCP stub located at the southeast corner of the 45th Avenue entrance. The connection will convey flows into the major storm sewer system south of 45th Avenue, which ultimately discharges to the Centennial Village regional detention facility, Clayhole Lake. The pipe capacity and the major existing storm sewer system being connected to were previously studied by Robinson Engineering in their stormwater report dated October 2, 2017. As shown in **Exhibit 4,** *Centennial Village – Lot 9 – Building M Stormwater Report* (June 2023), the storm sewer system was designed to accommodate Lot C, which is now being subdivided into Lots 10, 11, 12, and 13.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow.
See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of Lot 11. When Lot 10 is developed, it shall provide an overland flood route for the site. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 3 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

Exhibit 1

ALTA Survey

ALTA/NSPS
LAND TITLE SURVEY

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P - DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG" - 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG" - 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF - REBAR FOUND
PB. - PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO - NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A. - LANDSCAPE AREA
PG. - PAGE
REC. - RECORDED

UTILITY POLE
LIGHT POLE
MANHOLE
CURB INLET
CATCH BASIN
TRAFFIC MANHOLE
GUY/ANCHOR
ROAD SIGN
PLM PIPELINE MARKER
GAS TEST STATION
GAS LINE VENT
GAS VALVE
ICV IRRIGATION CONTROL VALVE
BOV BLOW OFF VALVE
SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON

W BURIED WATER LINE
G BURIED GAS LINE
E BURIED ELECTRIC LINE
T BURIED COMMUNICATION LINE
OHU OVERHEAD UTILITY WIRES
BP BURIED BRITISH PETROLEUM PIPE LINE
WOLVERINE BURIED WOLVERINE PIPE LINE
SUBJECT PARCEL LINE
ADJOINING PARCEL LINE
SECTION/QUARTER LINE
EASEMENT LINE
STORM SEWER WITH FLOW DIRECTION
SANITARY SEWER WITH FLOW DIRECTION
WATER VALVE
FIRE HYDRANT ASSEMBLY
FIBER OPTIC MARKER POST
TREE WITH SIZE
EXISTING 1-FOOT CONTOUR
xxx.x EXISTING SPOT ELEVATION

ADA PAD
CONCRETE
ASPHALT
STONE

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF- ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY, ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL- RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT.

ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.

ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.

ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.

ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.

ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.

ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

GLEN E. BOREN
PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

N
0' 25' 50'
SCALE: 1" = 50'

THE ARCHITECTS PARTNERSHIP

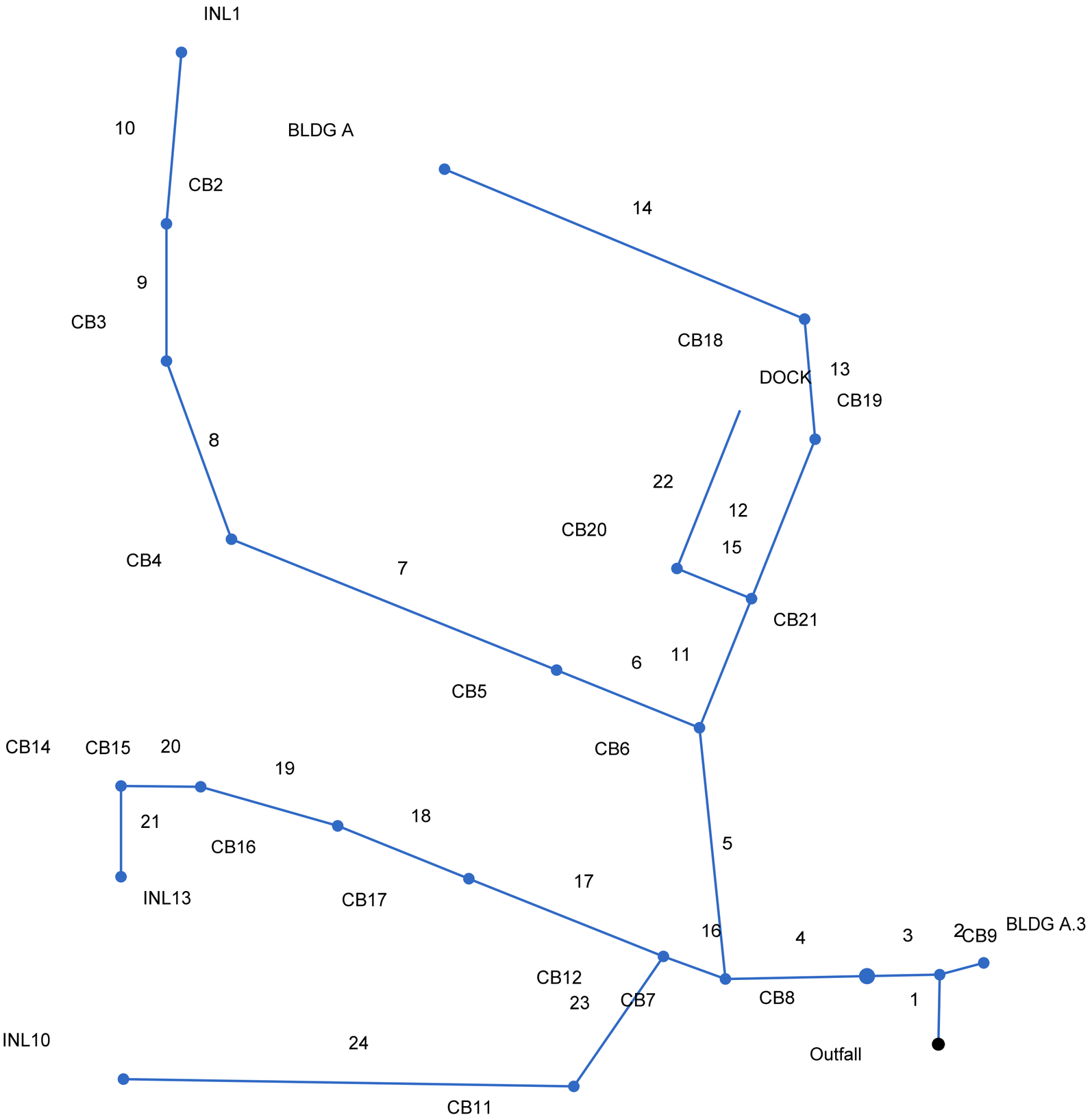
© COPYRIGHT DVG TEAM, INC

\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

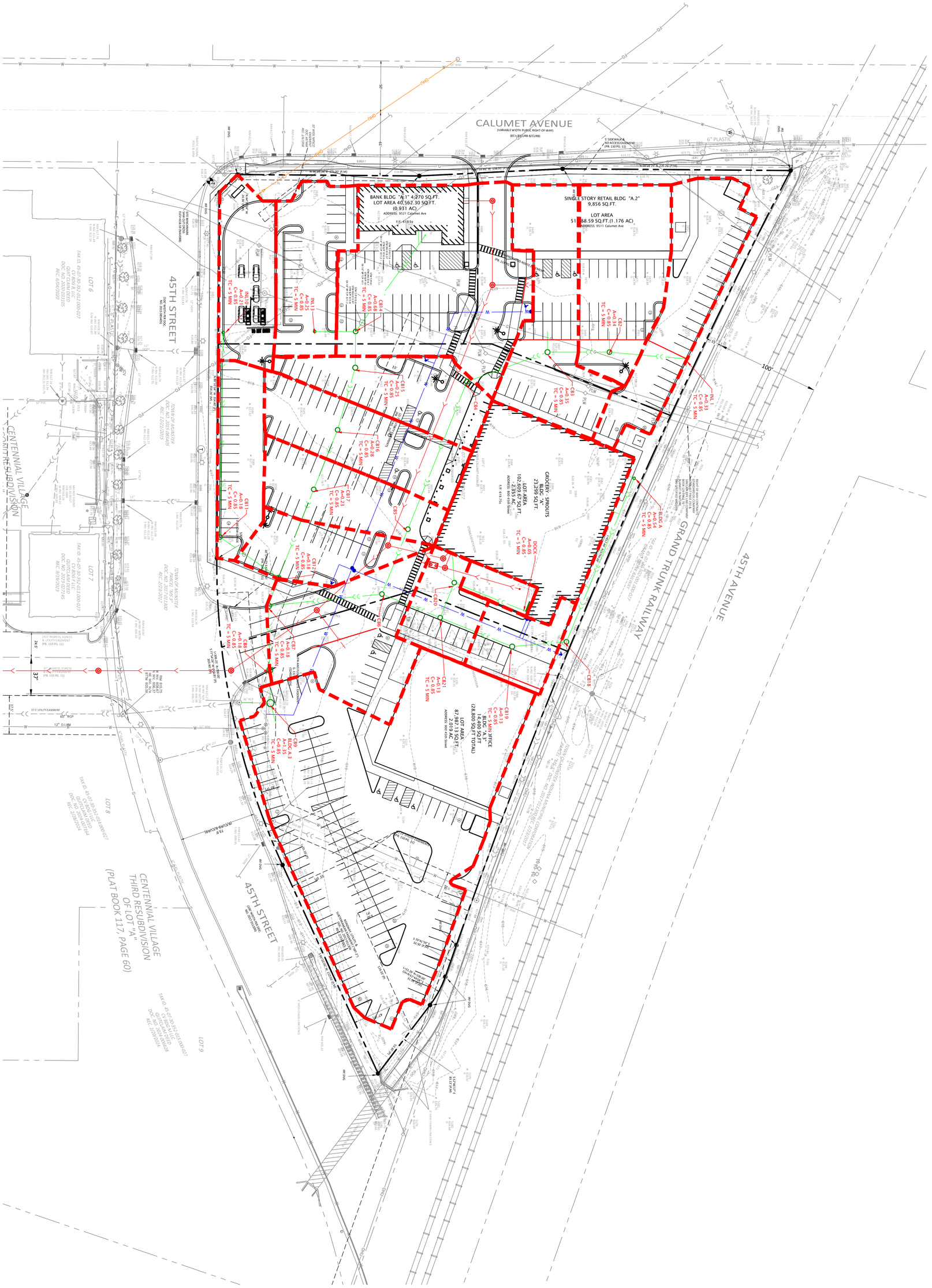
Exhibit 2

Storm Sewer Calculations

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: SS.stm	Number of lines: 24	Date: 8/20/2025



NOT FOR CONSTRUCTION

Centennial Village-Lot 11
Bldg. A Sprouts

Tributary Area Exhibit

DATE:	REVISIONS AND NOTES:

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

08/20/25

NOT FOR CONSTRUCTION

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

TRIB EX

PROJECT NO: 25-0081

DESIGNED BY: GMPF

DATE: 08/20/25

SCALE: 1" = 40'

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BY: ___DPW___
DATE: _08/20/2025__
CHECKED BY: ____
DATE: __

PROJECT: 25-0081 CVP Sprouts
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
1	CB9	CB9-EXMH	0.00	5.79	0.85	5.00	9.20	5.74	0.00	28.24	29.62	4.77	0.013	30.00	36.00	0.20	615.90	607.15	607.09	609.49	609.43
2	BLDG A.3	BLDGA3-CB9	1.35	1.35	0.85	5.00	5.00	7.07	0.00	8.11	12.25	2.69	0.012	20.00	24.00	0.25	615.90	608.05	608.00	609.86	609.85
3	CB8	CB8-CB9	0.18	4.44	0.85	5.00	9.10	5.77	0.00	21.77	24.85	4.52	0.012	32.00	30.00	0.31	615.05	607.55	607.45	609.91	609.85
4	CB7	CB7-CB8	0.18	4.26	0.85	5.00	8.90	5.83	0.00	21.10	25.18	4.40	0.012	62.00	30.00	0.32	615.55	607.75	607.55	610.06	609.95
5	CB6	CB6-CB7	0.00	1.87	0.85	5.00	8.30	5.98	0.00	9.51	12.77	3.03	0.012	110.00	24.00	0.27	617.93	608.20	607.90	610.54	610.37
6	CB5	CB5-CB6	0.00	1.02	0.85	5.00	7.00	6.35	0.00	5.51	6.91	3.12	0.012	68.00	18.00	0.37	618.74	609.25	609.00	610.82	610.66
7	CB4	CB4-CB5	0.00	1.02	0.85	5.00	6.20	6.61	0.00	5.73	6.48	4.15	0.012	154.00	18.00	0.32	618.68	613.50	613.00	614.60	614.10
8	CB3	CB3-CB4	0.35	1.02	0.85	5.00	5.80	6.76	0.00	5.86	7.90	4.00	0.012	83.00	18.00	0.48	617.80	613.90	613.50	614.96	614.80
9	CB2	CB2-CB3	0.34	0.67	0.85	5.00	5.50	6.87	0.00	3.91	4.95	3.48	0.012	60.00	15.00	0.50	617.90	614.20	613.90	615.21	615.08
10	INL1	INL1-CB2	0.33	0.33	0.85	5.00	5.00	7.07	0.00	1.98	2.81	2.72	0.012	75.00	12.00	0.53	617.40	614.60	614.20	615.41	615.24
11	CB21	CB21-CB6	0.13	0.85	0.85	5.00	8.00	6.06	0.00	4.38	4.91	3.61	0.012	61.00	15.00	0.49	618.60	609.70	609.40	610.88	610.66
12	CB19	CB19-CB21	0.13	0.67	0.85	5.00	5.90	6.72	0.00	3.83	5.11	3.15	0.012	75.00	15.00	0.53	618.60	610.10	609.70	611.29	611.08
13	CB18	CB18-CB19	0.00	0.54	0.85	5.00	5.70	6.80	0.00	3.12	3.36	3.98	0.012	53.00	12.00	0.76	618.00	610.50	610.10	611.71	611.37
14	BLDG A	BLDGA-CB18	0.54	0.54	0.85	5.00	5.00	7.07	0.00	3.24	3.49	5.02	0.012	171.00	12.00	0.82	617.00	613.50	612.10	614.27	612.86
15	CB20	CB20-CB21	0.00	0.05	0.85	5.00	6.40	6.54	0.00	0.28	3.25	1.33	0.012	35.00	12.00	0.71	619.70	610.60	610.35	610.82	611.08
16	CB12	CB12-CB7	0.18	2.21	0.85	5.00	7.50	6.22	0.00	11.68	14.40	5.10	0.012	29.00	24.00	0.35	615.75	611.15	611.05	612.52	612.42
17	CB17	CB17-CB12	0.23	1.64	0.85	5.00	6.00	6.70	0.00	9.34	9.56	5.29	0.012	92.00	18.00	0.71	616.20	611.80	611.15	613.53	612.91
18	CB16	CB16-CB17	0.23	1.41	0.85	5.00	5.70	6.78	0.00	8.13	8.54	4.60	0.012	62.00	18.00	0.56	616.25	612.15	611.80	613.91	613.60
19	CB15	CB15-CB16	0.25	1.18	0.85	5.00	5.50	6.88	0.00	6.90	7.19	3.91	0.012	63.00	18.00	0.40	616.35	612.40	612.15	614.19	613.96
20	CB14	CB14-CB15	0.68	0.93	0.85	5.00	5.30	6.93	0.00	5.48	6.47	4.47	0.012	35.00	15.00	0.86	616.35	612.70	612.40	614.48	614.27
21	INL13	INL13-CB14	0.25	0.25	0.85	5.00	5.00	7.07	0.00	1.50	2.74	1.91	0.012	40.00	12.00	0.50	616.40	612.90	612.70	614.85	614.79
22	DOCK	DOCK-CB21	0.05	0.05	0.85	5.00	5.00	7.07	0.00	0.30	0.96	2.44	0.012	74.00	8.00	0.54	615.75	613.00	612.60	613.26 j	612.86
23	CB11	CB11-CB12	0.18	0.39	0.85	5.00	7.10	6.34	0.00	2.10	2.75	2.68	0.012	69.00	12.00	0.51	616.30	612.10	611.75	613.10	612.91
24	INL10	INL10-CB11	0.21	0.21	0.85	5.00	5.00	7.07	0.00	1.26	2.60	2.26	0.012	198.00	12.00	0.45	617.00	613.00	612.10	613.54	613.19

INLET CAPACITY ANALYSIS

BY: DPW
DATE: 8/20/2025
CHECKED: GMPF
DATE: 8/20/2025

Project: 25-0081 CVP-Sprouts
Location: 45th & Calumet Munster, IN

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

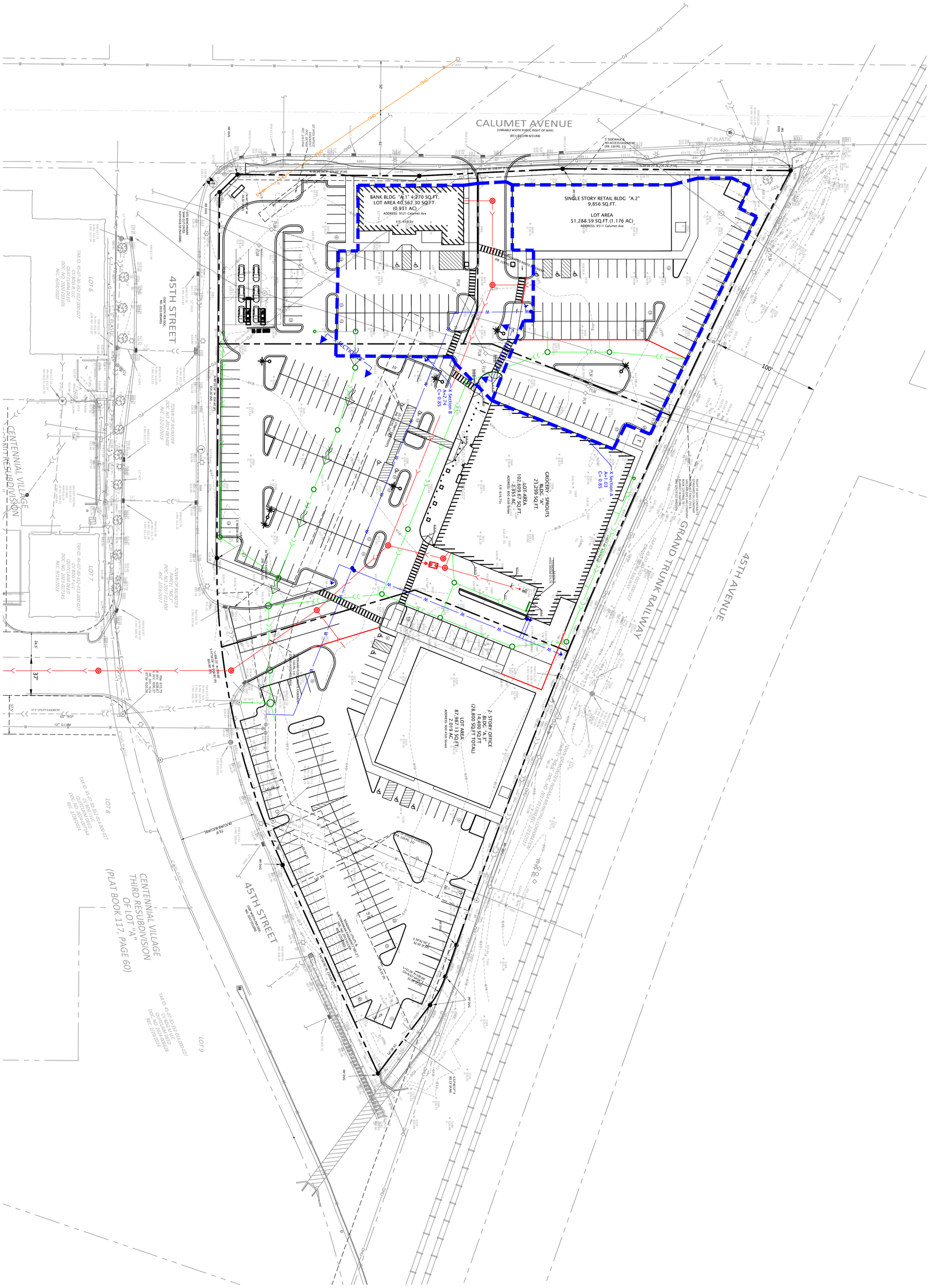
$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
INL1	EJ 1020 M1	0.97	5.92	0.67	0.33	0.85	7.08	1.99	0.58	0.35	6.9
CB2	EJ 1040 M1	1.32	6.83	0.67	0.34	0.85	7.08	2.05	0.33	0.32	4.0
CB3	EJ 1040 M1	1.32	6.83	0.67	0.35	0.85	7.08	2.11	0.35	0.33	4.2
CB7	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB8	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL10	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB11	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB12	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL13	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB14	V5630	3.29	10.00	0.67	0.58	0.85	7.08	3.50	0.16	0.36	4.3
CB15	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB16	EJ 1020 M1	0.97	5.92	0.67	0.28	0.85	7.08	1.69	0.42	0.31	5.0
CB17	EJ 1020 M1	0.97	5.92	0.67	0.23	0.85	7.08	1.38	0.28	0.27	3.4
CB19	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
CB21	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
DOCK	EJ 1020 M1	0.97	5.92	0.67	0.05	0.85	7.08	0.30	0.01	0.10	1.2

Exhibit 3

Overland Flood Route Calculations



NOT FOR CONSTRUCTION

Centennial Village-Lot 11
Bldg. A Sprouts

Overland Flood Route Exhibit

DATE:	REVISIONS AND NOTES:

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

NOT FOR CONSTRUCTION

08/20/25

DVG TEAMING INC
1155 Troutwine Road
Crown Point, IN 46307
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F: (219) 662-2740
www.dvgteam.com

EX

PROJECT NO: 25-0081
DESIGNED BY: GMPF
DATE: 08/20/25

SCALE: 1" = 40'

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Overland Flood Route Computation Calculation

Project: 25-0081 CVP-Sprouts
Date: 8/20/2025

Storm Event: 100yr
*** Areas Calculated from Exhibit 3, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: G A					
Tc=	10	min			
Area=	1.03	acres			
C=	0.85				
i=	5.46	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**4.77**	**cfs**
100YR Overflow Water Elevation=				**618.55**	**Elev**
Freeboard to Nearest Bldg=				**1.20**	**ft**

Cross Section: B					
Tc=	15	min			
Area=	2.74	acres			
C=	0.85				
i=	4.52	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**10.53**	**cfs**
100YR Overflow Water Elevation=				**616.85**	**Elev**
Freeboard to Nearest Bldg=				**2.90**	**ft**

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Aug 20 2025

XSectionA

User-defined

Invert Elev (ft)	= 618.35
Slope (%)	= 1.20
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.77

Highlighted

Depth (ft)	= 0.20
Q (cfs)	= 4.770
Area (sqft)	= 1.52
Velocity (ft/s)	= 3.14
Wetted Perim (ft)	= 15.21
Crit Depth, Yc (ft)	= 0.26
Top Width (ft)	= 15.20
EGL (ft)	= 0.35

(Sta, El, n)-(Sta, El, n)...

(0.00, 619.15)-(19.71, 618.73, 0.011)-(33.23, 618.35, 0.011)-(53.45, 618.85, 0.011)-(59.57, 619.35, 0.011)-(80.15, 619.75, 0.011)

Channel Report

XSectionB

User-defined

Invert Elev (ft)	= 616.70
Slope (%)	= 3.20
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.53

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 10.53
Area (sqft)	= 2.71
Velocity (ft/s)	= 3.89
Wetted Perim (ft)	= 36.13
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 36.13
EGL (ft)	= 0.38

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.00)-(31.66, 616.70, 0.011)-(58.72, 616.90, 0.011)-(73.28, 617.05, 0.011)-(170.78, 619.75, 0.011)

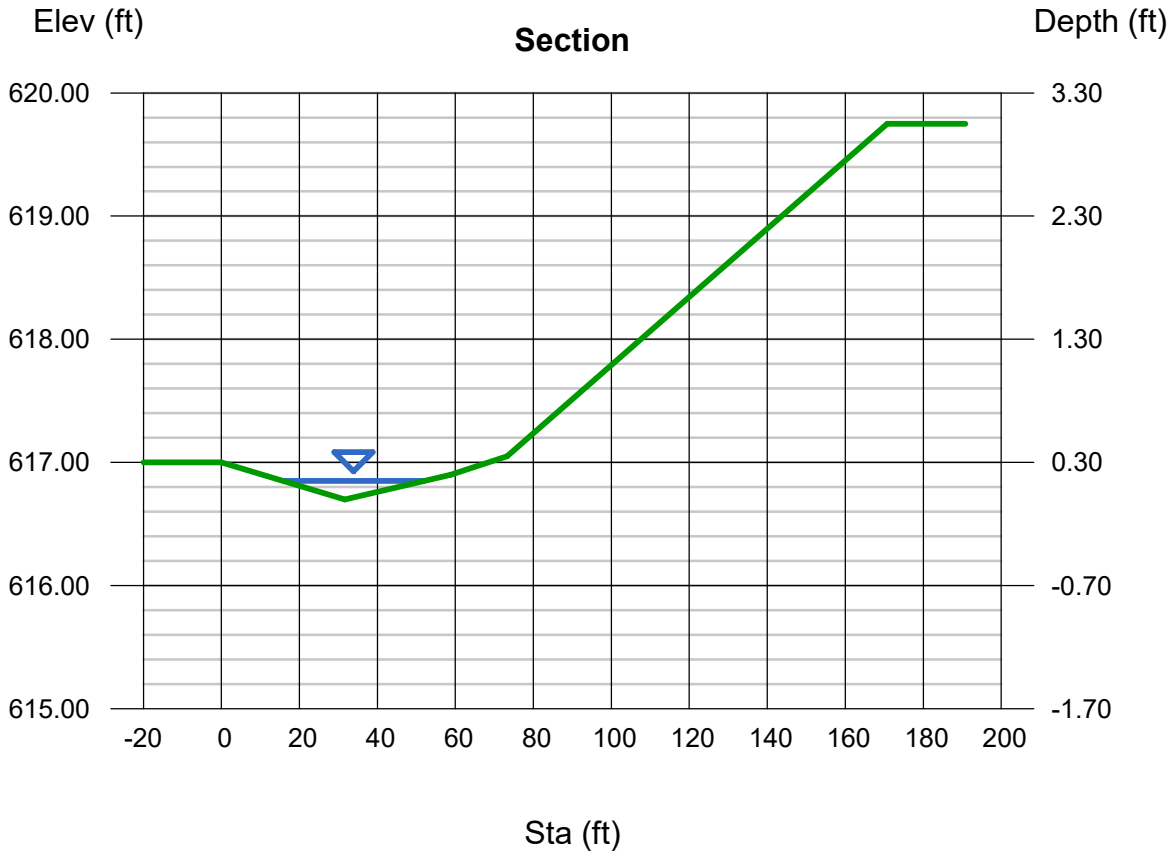


Exhibit 4

Centennial Village – Lot 9 – Building M, dated June 2023

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lot 9 – Building "M"
9603 N. Centennial Drive Munster, IN

Storm Water Technical Report
June 2023

Prepared for:

Centennial Village
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

Table of Contents

1.0 Project Description

2.0 Storm Sewer Design

3.0 Overland Flood Route

Exhibits

1. USGS Location Map
2. Storm Sewer Calculations
3. Overland Flood Route Calculations

1.0 Project Description

Centennial Village is proposing to develop two retail buildings, M and I, as the next phase of the ongoing Centennial Village Subdivision PUD project. Building M will be permitted and built at this time, while building I will be developed in a near future phase. The northwestern portion of Lot A is to be further subdivided into Lots 8 and 9, with Lot 8 serving building I and Lot 9 serving building M. Lot 8 contains approximately 0.84 acres and Lot 9 contains 2.14 acres. The project will also include construction of a new paved parking area, concrete sidewalks, a retaining wall adjacent to 45th Street, and installation of new water, sanitary, and storm services.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards.

See **Exhibit 1 USGS Location Map** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 8 and 9, as well as the future development of Building A directly north of 45th Street. Depicted outfall data from Building A is provided in a stormwater report by Robinson Engineering dated 10/02/17. This data was incorporated into our storm sewer calculations to accurately model pipe capacity.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow. This proposed storm sewer system then ties into an existing 60" HDPE before discharging to Clayhole Lake.

See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Robinson Engineering Stormwater Report Excerpts**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of North Centennial Drive, directly south of Lots 8 and 9. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 6 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

Exhibit 1

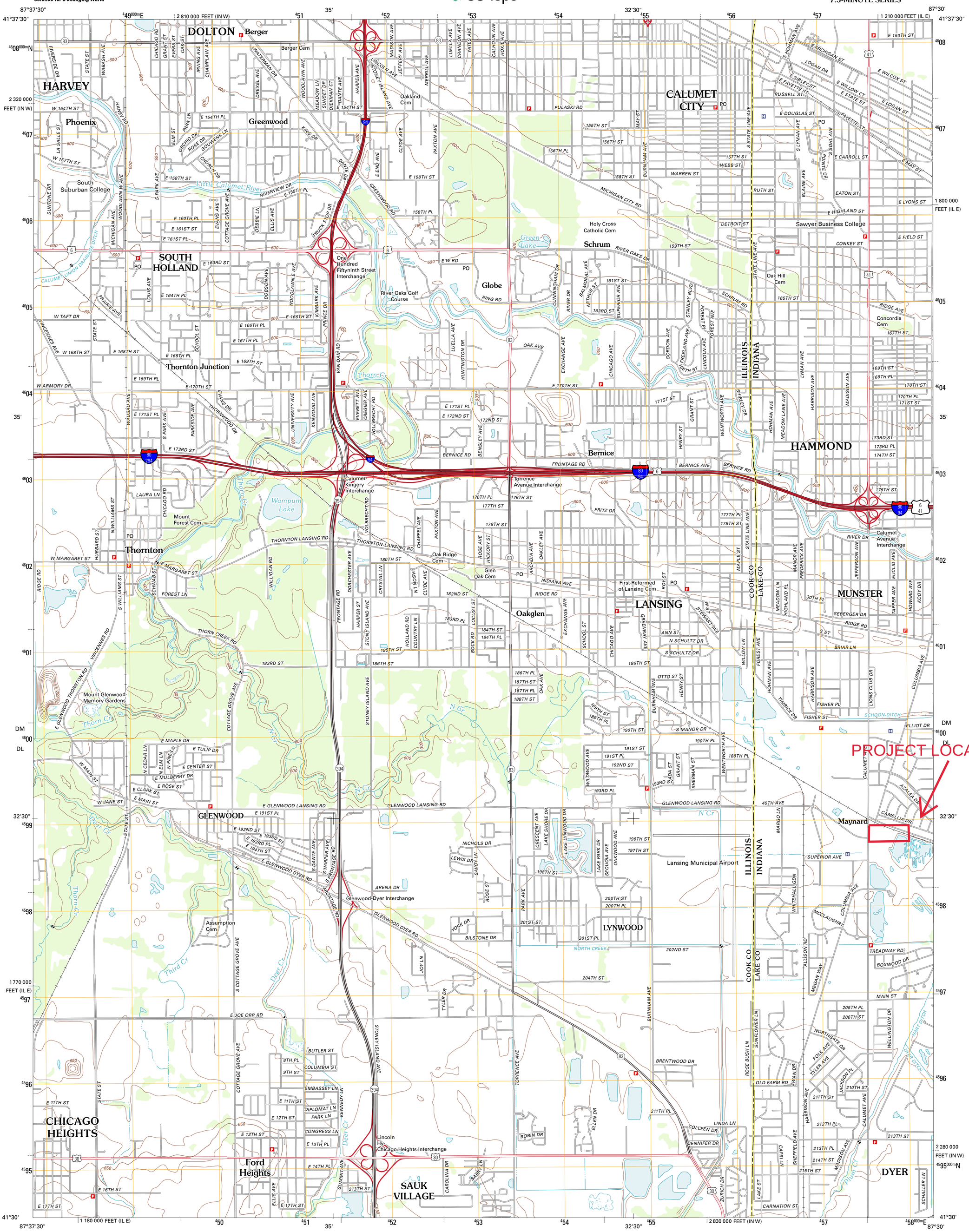
USGS Location Map

USGS science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

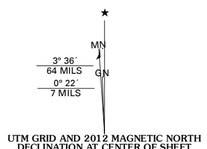
The National Map US Topo

CALUMET CITY QUADRANGLE
ILLINOIS-INDIANA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 16T
10 000-foot ticks: Illinois Coordinate System of 1983 (east zone), Indiana Coordinate System of 1983 (west zone)

Imagery.....NAIP, August 2011
Roads.....©2006-2011 TomTom
Names.....GNIS, 2011
Hydrography.....National Hydrography Dataset, 2011
Contours.....National Elevation Dataset, 2012
Boundaries.....Census, IBWC, IBC, USGS, 1972 - 2010



UTM GRID AND 2012 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
DM DL
Grid Zone Designation
16T

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.3



QUADRANGLE LOCATION

Blue Island	Lake Calumet	Whiting
Harvey	Calumet City	Highland
Steger	Dyer	Saint John

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

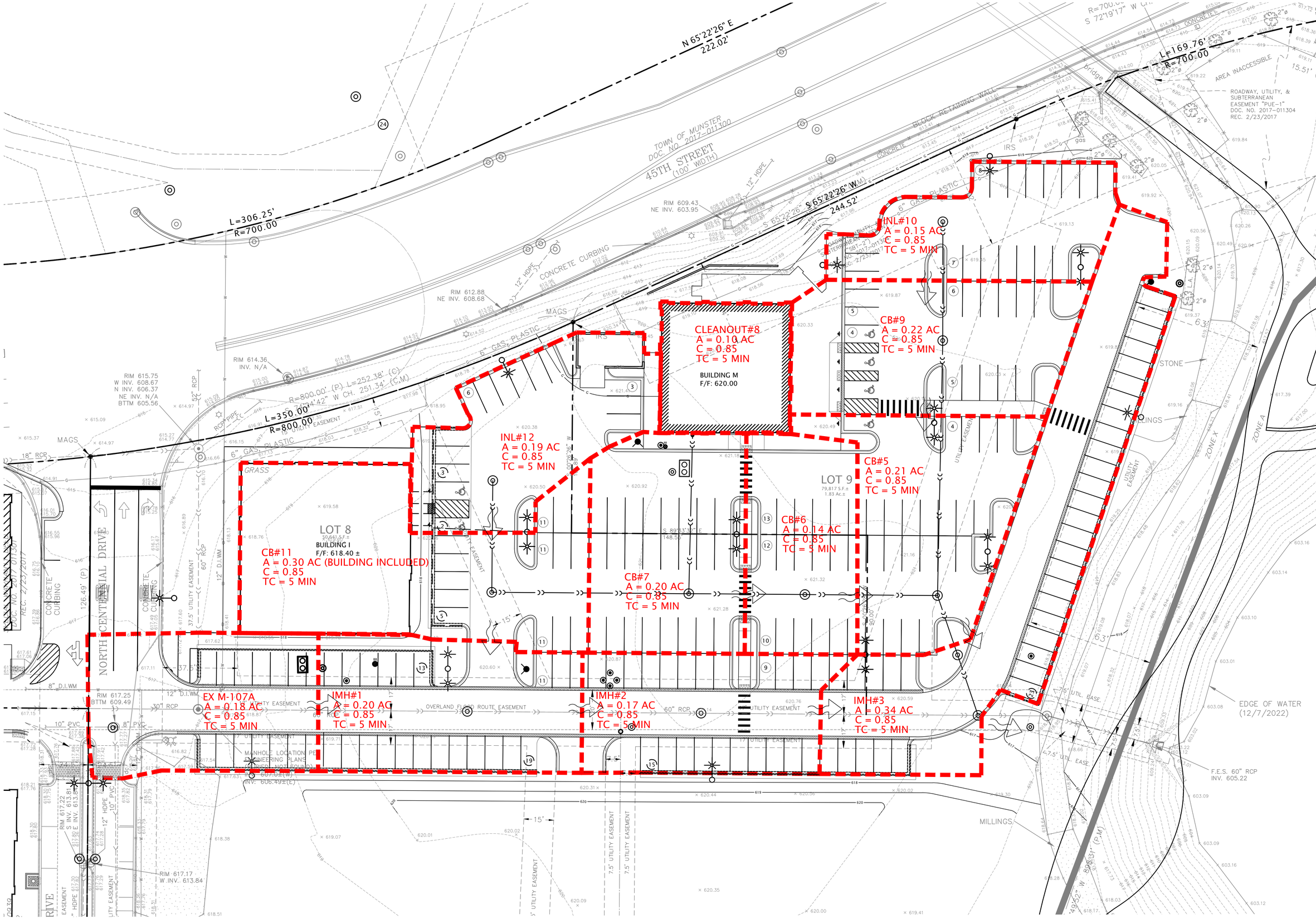
Interstate Route
US Route
Ramp
State Route
Local Road
4WD

Interstate Route US Route State Route

CALUMET CITY, IL-IN
2012

Exhibit 2

Storm Sewer Calculations



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NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE

631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Stormwater Tributary Area Exhibit

N

0' 10' 20'

SCALE: 1" = 20'

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DESIGN BY	DATE
MPO	06/20/23

PROJECT NO.
23-0026

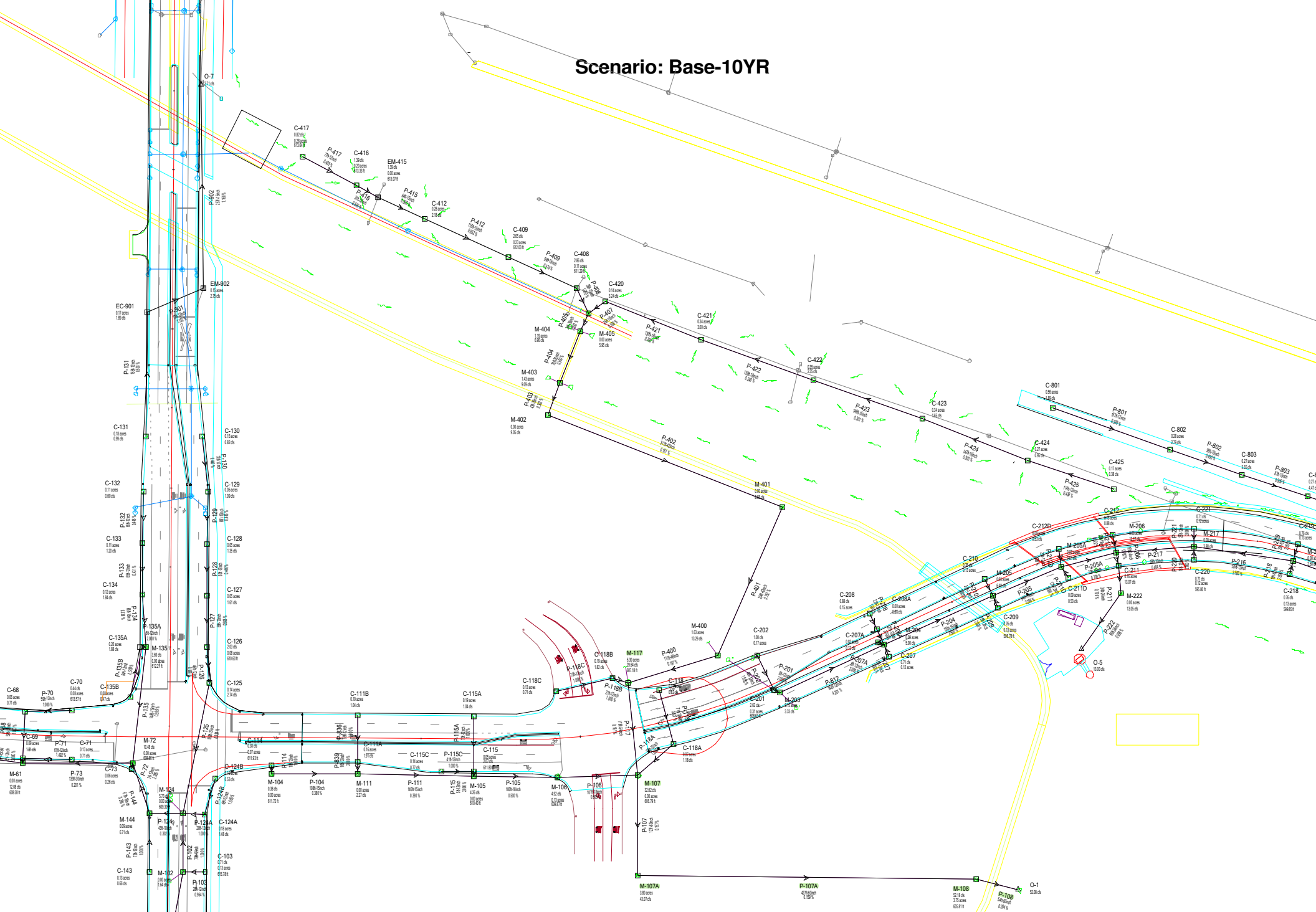
EX 2

BY: MPO
DATE: 06/20/23
CHECKED BY: RJP
DATE: 6/20/23

PROJECT: 23-0026 Centennial Village Buildings M & I
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
32	CLEANOUT#8	CB#7	0.10	0.10	0.85	5.00	5.00	7.07	0.00	0.60	2.00	2.40	0.012	81	8	2.35	620.00	615.00	613.10	615.36 j	614.90
31	INL#12	CB#11	0.19	0.19	0.85	5.00	5.00	7.07	0.00	1.14	2.82	1.45	0.012	56	12	0.54	617.00	614.00	613.70	615.69	615.64
30	EX M-117	EX M-107	8.48	8.48	0.84	3.50	3.50	7.07	0.00	50.33	85.49	4.02	0.012	118	54	0.16	614.68	607.18	606.99	610.42	610.35
29	INL#10	CB#9	0.15	0.15	0.85	5.00	5.00	7.07	0.00	0.90	2.73	2.43	0.012	60	12	0.50	617.90	614.90	614.60	615.30	615.22
28	CB#9	CB#5	0.22	0.37	0.85	5.00	5.90	6.74	0.00	2.12	3.59	4.44	0.012	127	12	0.87	617.90	614.60	613.50	615.22	614.05
27	CB#11	CB#7	0.30	0.49	0.85	5.00	5.60	6.82	0.00	2.84	3.00	3.62	0.012	99	12	0.61	616.70	613.70	613.10	615.44	614.90
26	CB#7	CB#6	0.20	0.79	0.85	5.00	6.10	6.66	0.00	4.47	4.95	3.64	0.012	60	15	0.50	616.60	613.10	612.80	614.69	614.45
25	CB#6	CB#5	0.14	0.93	0.85	5.00	6.40	6.57	0.00	5.19	5.41	4.23	0.012	67	15	0.60	616.55	612.80	612.40	614.41	614.04
24	CB#5	HYDRODYNAMIC SEP#4	0.21	1.51	0.85	5.00	6.60	6.47	0.00	8.31	8.99	5.60	0.012	32	18	0.63	616.50	612.40	612.20	613.54	613.41
23	HYDRODYNAMIC SEP#4	IMH#3	0.00	1.51	0.85	5.00	6.80	6.44	0.00	8.26	8.99	5.77	0.012	32	18	0.63	617.20	612.2	612	613.33	613.13
22	EX M-107	EX M-107A	0	8.48	0	3.40	4.10	7.07	0.00	50.33	111.96	3.31	0.012	127	60	0.16	615.75	606.79	606.59	610.33	610.29
21	EX BLDG G	EX CB#13	0.52	0.52	0.9	10.00	10.00	5.55	0.00	2.60	6.8	6.28	0.012	45	12	3.11	618.40	613.5	612.1	614.19	612.53
20	EX INL#16	EX IMH#14	0.21	0.21	0.81	5.00	5.00	7.07	0.00	1.2	7.84	2.46	0.012	45	12	4.13	616.50	613.5	611.64	613.96 j	613.16
19	EX INL#15	EX IMH#14	0.12	0.12	0.81	5.00	5.00	7.07	0.00	0.69	6.15	1.87	0.012	85	12	2.54	616.80	613.8	611.64	614.15 j	613.16
18	EX YD#12	EX YD#11	0.03	0.03	0.81	5.00	5.00	7.07	0.00	0.17	1.02	1.82	0.012	46	8	0.61	618.30	615.00	614.72	615.19	614.96
17	EX YD#11	EX YD#10	0.02	0.05	0.81	5.00	6.60	6.50	0.00	0.26	1.02	1.87	0.012	53	8	0.60	618.30	614.72	614.40	614.96	614.76
16	EX YD#10	EX IMH#6	0.10	0.15	0.81	5.00	7.70	6.16	0.00	0.75	5.57	1.94	0.012	111	12	2.09	618.30	614.40	612.09	614.76 j	613.80
15	EX IMH#14	EX IMH#5	0.14	0.47	0.81	5.00	6.60	6.48	0.00	2.47	4.72	2.01	0.012	44	15	0.45	616.40	611.64	611.44	613.07	613.01
14	EX INL#9	EX IMH#8	0.10	0.10	0.81	5.00	5.00	7.07	0.00	0.57	5.74	1.72	0.012	45	12	2.21	617.00	614.00	613.00	614.31 j	614.24
13	EX IMH#8	EX IMH#7	0.10	0.20	0.81	5.00	6.00	6.68	0.00	1.08	3.36	1.38	0.012	66	12	0.76	616.90	613.00	612.50	614.20	614.15
12	EX IMH#7	EX IMH#6	0.31	0.51	0.81	5.00	6.80	6.42	0.00	2.65	3.33	3.38	0.012	55	12	0.75	616.80	612.50	612.09	614.06	613.80
11	EX IMH#6	EX IMH#5	0.29	0.95	0.81	5.00	9.40	5.69	0.00	4.38	5.42	3.57	0.012	108	15	0.60	616.60	612.09	611.44	613.43	613.01
10	EX IMH#5	EX CB#4	0.10	1.52	0.81	5.00	9.80	5.58	0.00	6.87	7.67	5.60	0.012	76	15	1.20	616.60	609.06	608.15	612.15	611.42
9	EX CB#4	EX CB#3	0.97	2.49	0.81	8.00	10.00	5.54	0.00	11.17	16.29	3.56	0.012	86	24	0.44	616.70	608.15	607.77	611.15	610.97
8	EX CB#3	EX CB#13	0.39	2.88	0.81	5.00	10.40	5.45	0.00	12.72	16.53	4.05	0.012	68	24	0.46	616.60	607.77	607.46	610.84	610.66
7	EX CB#13	EX HYDRODYNAMIC SEP#2	0.13	3.01	0.81	5.00	10.70	5.40	0.00	13.16	27.86	2.68	0.013	13	30	0.46	616.60	607.46	607.40	610.61	610.59
6	EX HYDRODYNAMIC SEP#2	EX M-107A	0	3.53	0.81	5.00	10.70	5.38	0.00	15.63	18.16	3.19	0.013	102	30	0.2	616.77	607.4	607.2	610.43	610.29
5	EX M-107A	IMH#1	0.18	12.19	0.85	5.00	11.30	5.27	0.00	53.65	113.9	3.46	0.012	135	60	0.16	617.00	606.49	606.27	610.09	610.05
4	IMH#1	IMH#2	0.2	12.39	0.85	5.00	12.10	5.11	0.00	52.86	110.56	3.28	0.012	117	60	0.15	616.45	606.27	606.09	610.02	609.99
3	IMH#2	IMH#3	0.17	12.56	0.85	5.00	12.80	4.97	0.00	52.18	114.18	3.12	0.012	140	60	0.16	616.50	606.09	605.86	609.97	609.93
2	IMH#3	EX MH107B	0.34	14.41	0.85	5.00	13.70	4.82	0.00	58.14	109.82	3.54	0.012	33	60	0.15	616.20	605.86	605.81	609.74	609.73

Scenario: Base-10YR



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Scenario: Base-10YR

DOT Pipe Report 2

Label	Up. Node	Dn. Node	Up. Inlet Rat. Coef.	Up. Inlet Area (acres)	Up. Calc. Sys. CA (acres)	System Tc (min)	I (in/hr)	System Q (cfs)	L (ft)	S (%)	Size	Mannings n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)
P-417	C-417	C-416	0.60	0.17	0.17	15.00	4.84	0.82	77	0.403	12 inch	0.012	2.45	613.64	613.33	616.30	616.00	1.66	1.67	614.04	613.83
P-425	C-425	C-424	0.45	0.08	0.08	15.00	4.84	0.38	114	0.439	12 inch	0.012	2.56	612.28	611.78	614.90	615.00	1.62	2.22	612.54	612.20
P-416	C-416	EM-41	0.60	0.12	0.29	15.46	4.79	1.39	31	0.516	12 inch	0.012	2.77	613.33	613.17	616.00	616.50	1.67	2.33	613.83	613.67
P-424	C-424	C-423	0.45	0.12	0.20	15.82	4.76	0.95	142	0.303	15 inch	0.012	3.85	611.78	611.35	615.00	615.20	1.97	2.60	612.20	611.92
P-415	EM-41	C-412	0.00	0.00	0.29	15.60	4.78	1.39	64	0.563	15 inch	0.012	5.25	613.07	612.71	616.50	616.00	2.18	2.04	613.54	613.28
P-423	C-423	C-422	0.45	0.15	0.35	16.73	4.66	1.65	146	0.301	15 inch	0.012	3.84	611.35	610.91	615.20	615.00	2.60	2.84	611.92	611.59
P-412	C-412	C-409	0.60	0.17	0.46	15.90	4.75	2.18	116	0.552	15 inch	0.012	5.20	612.69	612.05	616.00	615.60	2.06	2.30	613.28	612.68
P-422	C-422	C-421	0.45	0.16	0.51	17.53	4.58	2.35	150	0.240	18 inch	0.012	5.57	610.91	610.55	615.00	615.30	2.59	3.25	611.59	611.28
P-409	C-409	C-408	0.45	0.10	0.56	16.38	4.70	2.65	94	0.574	15 inch	0.012	5.30	612.03	611.49	615.60	615.70	2.32	2.96	612.68	612.11
P-421	C-421	C-420	0.45	0.15	0.66	18.36	4.49	3.00	130	0.300	18 inch	0.012	6.23	610.55	610.16	615.30	615.30	3.25	3.64	611.28	610.85
P-408	C-408	M-405	0.45	0.05	0.61	16.74	4.66	2.86	36	1.000	15 inch	0.012	7.00	611.29	610.93	615.70	615.70	3.16	3.52	611.97	611.49
P-407	C-420	M-405	0.45	0.06	0.73	18.98	4.43	3.24	26	0.500	18 inch	0.012	8.05	610.16	610.03	615.30	615.70	3.64	4.17	610.85	610.69
P-405	M-405	M-404	0.00	0.00	1.33	19.08	4.42	5.95	24	0.292	36 inch	0.012	39.02	609.83	609.76	615.70	615.60	2.87	2.84	610.64	610.61
P-404	M-404	M-403	0.40	0.48	1.81	25.00	3.81	6.96	70	0.300	36 inch	0.012	39.57	609.76	609.55	615.60	615.80	2.84	3.25	610.61	610.53
P-403	M-403	M-402	0.40	0.57	2.38	25.28	3.78	9.09	43	0.302	36 inch	0.012	39.73	609.55	609.42	615.80	616.00	3.25	3.58	610.53	610.37
P-836	C-111E	C-111A	0.84	0.16	0.16	5.00	6.48	1.04	59	2.000	12 inch	0.012	5.46	613.71	612.53	617.64	617.09	2.93	3.56	614.14	613.02
P-114	C-114	M-104	0.84	0.06	0.06	5.00	6.48	0.38	10	1.600	12 inch	0.012	4.88	611.93	611.77	618.60	618.12	5.67	5.35	612.19	611.96
P-402	M-402	M-401	0.00	0.00	2.38	25.43	3.77	9.05	317	0.151	42 inch	0.012	42.41	608.92	608.44	616.00	616.90	3.58	4.96	610.02	609.52
P-115A	C-115A	C-115	0.84	0.16	0.16	5.00	6.48	1.04	70	1.000	12 inch	0.012	3.86	612.50	611.80	616.66	616.66	3.16	3.86	612.93	612.41
P-115C	C-115C	C-115	0.84	0.12	0.12	5.00	6.48	0.77	41	1.000	12 inch	0.012	3.86	612.50	612.09	616.88	616.66	3.38	3.57	612.87	612.39
P-839	C-111A	M-111	0.84	0.13	0.29	5.18	6.46	1.91	16	2.000	12 inch	0.012	5.46	612.43	612.11	617.09	617.14	3.66	4.03	613.02	612.55
P-104	M-104	M-111	0.00	0.00	0.06	5.04	6.47	0.38	108	0.380	15 inch	0.012	4.31	611.72	611.31	618.12	617.14	5.15	4.58	611.98	611.95
P-401	M-401	M-400	0.00	0.00	2.38	26.94	3.61	8.68	204	0.152	42 inch	0.012	42.49	608.34	608.03	616.90	616.00	5.06	4.47	609.46	609.29
P-118C	C-118C	C-118B	0.84	0.11	0.11	5.00	6.48	0.71	73	1.000	12 inch	0.012	3.86	611.34	610.61	615.18	614.63	2.84	3.02	611.69	611.18
P-115	C-115	M-105	0.84	0.04	0.32	5.28	6.45	2.07	5	2.000	12 inch	0.012	5.46	611.80	611.70	616.66	616.60	3.86	3.90	612.41	612.20
P-111	M-111	M-105	0.00	0.00	0.35	5.87	6.38	2.27	146	0.390	15 inch	0.012	4.37	611.31	610.74	617.14	616.60	4.58	4.61	611.95	611.34
P-400	M-400	M-117	0.84	1.37	3.75	27.92	3.51	13.29	117	0.197	48 inch	0.012	68.99	607.83	607.60	616.00	614.68	4.17	3.08	609.24	609.19
P-118B	C-118B	M-117	0.90	0.17	0.28	5.32	6.44	1.82	21	1.000	12 inch	0.012	3.86	610.61	610.40	614.63	614.68	3.02	3.28	611.18	610.89
P-118	C-118	C-118A	0.90	0.13	0.13	5.00	6.48	0.82	71	0.507	12 inch	0.012	2.75	611.00	610.64	614.60	614.89	2.60	3.25	611.38	611.10
P-105	M-105	M-106	0.00	0.00	0.67	6.55	6.29	4.26	106	0.500	18 inch	0.012	8.05	610.40	609.87	616.60	616.80	4.70	5.43	611.19	610.72
P-117	M-117	M-107	0.84	4.45	8.48	28.38	3.47	29.64	118	0.161	54 inch	0.012	85.48	607.18	606.99	614.68	615.70	3.00	4.21	609.05	608.91
P-118A	C-118A	M-107	0.81	0.06	0.18	5.39	6.43	1.18	59	1.000	12 inch	0.012	3.86	610.64	610.05	614.89	615.70	3.25	4.65	611.10	610.43
P-106	M-106	M-107	0.84	0.11	0.78	6.93	6.25	4.92	101	0.505	18 inch	0.012	8.09	609.87	609.36	616.80	615.70	5.43	4.84	610.72	610.20
P-107	M-107	M-107A	0.00	0.00	9.45	28.78	3.42	32.62	127	0.157	60 inch	0.012	111.96	606.79	606.59	615.70	616.20	3.91	4.61	608.89	608.82
P-107A	M-107A	M-108	0.84	3.19	12.64	29.21	3.38	43.07	427	0.159	60 inch	0.012	112.59	606.49	605.81	616.20	615.70	4.71	4.89	608.64	607.98
P-108	M-108	O-1	0.84	3.15	15.79	30.54	3.28	52.18	54	0.204	60 inch	0.012	127.34	605.81	605.70	615.70	614.50	4.89	3.80	607.98	607.73

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BY: MPO
DATE: 5/31/2023
CHECKED: RJP
DATE: 6/20/2023

INLET CAPACITY ANALYSIS

Project: 23-0026 Centennial Village Buildings M & I
Location: North Centennial Drive & 45th Street Munster, IN

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
IMH#1	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
IMH#2	EJ 1020 M1	0.97	5.92	0.67	0.17	0.85	7.08	1.02	0.15	0.22	2.7
IMH#3	EJ 7020, TYPE T2, M1	1.81	5.92	0.67	0.34	0.85	7.08	2.05	0.18	0.35	4.2
CB#5	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB#6	EJ 1020 M1	0.97	5.92	0.67	0.14	0.85	7.08	0.84	0.10	0.20	2.3
CB#7	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
CB#9	EJ 1020 M1	0.97	5.92	0.67	0.22	0.85	7.08	1.32	0.26	0.26	3.2
INL#10	EJ 1020 M1	0.97	5.92	0.67	0.15	0.85	7.08	0.90	0.12	0.20	2.5
CB#11	EJ 1020 M1	0.97	5.92	1.67	0.30	0.85	7.08	1.81	0.08	0.32	3.9
INL#12	EJ 1020 M1	0.97	5.92	2.67	0.19	0.85	7.08	1.14	0.01	0.24	2.9

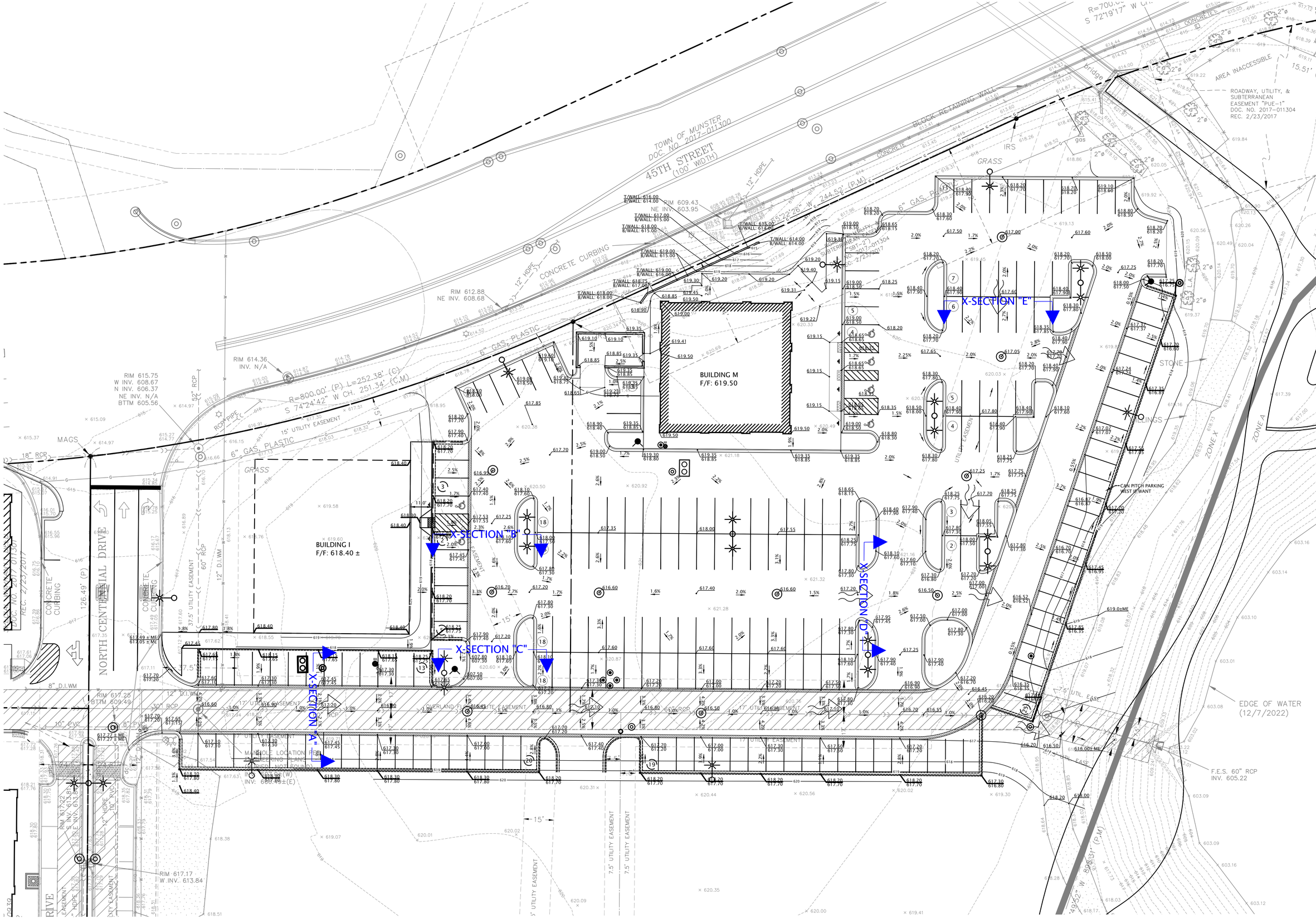
**** 10-YR Flow values are calculated using the Rational Method. Q=CIA***

Grate Properties

Type	Open Area (sq.in.)	A (sq.ft.)	P (ft)
EJ 1020 M1	140.00	0.97	5.92
EJ 1040 M1	190.00	1.32	6.83
EJ 7020, TYPE T2, M1	260.00	1.81	5.92

Exhibit 3

Overland Flood Route Calculations



DVG TEAM INC

1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE

631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Overall Overland Flood Route Exhibit

N

0' 10' 20'
SCALE: 1" = 20'

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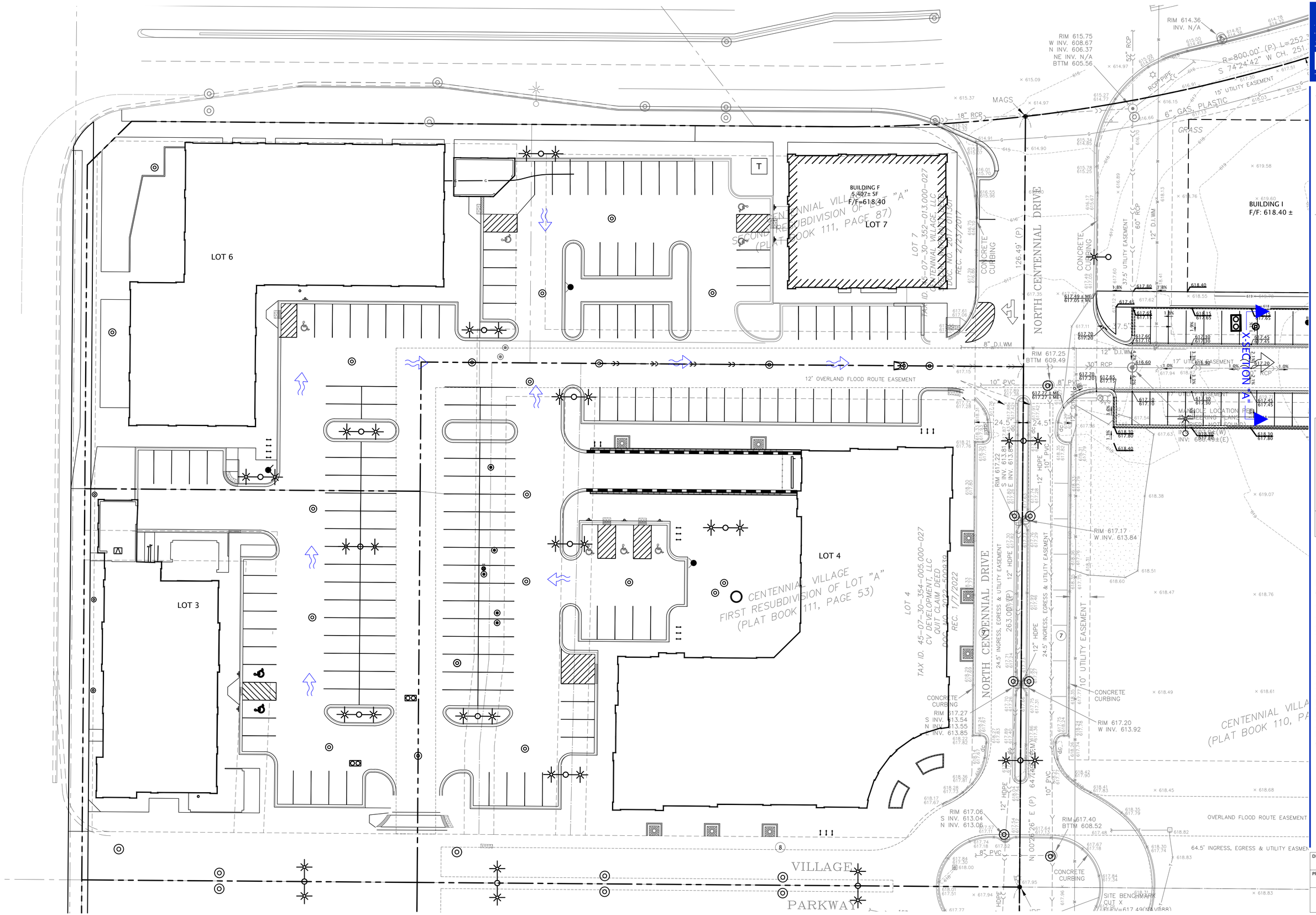
DESIGN BY	DATE
MPO	05/31/23

PROJECT NO.
23-0026

EX 3



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CENTENNIAL VILLAGE

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DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Overall Overland Flood Route Exhibit

N

0' 10' 20'
SCALE: 1" = 20'

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DESIGN BY	DATE
MPO	05/31/23
PROJECT NO.	
23-0026	

EX 3

Overland Flood Route Computation Calculation

Project: 23-0026 Centennial Village Buildings M & I
Date: 5/31/2023

Storm Event: 100yr
*** Areas Calculated from Exhibit 5, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: A					
Tc=	5	min			
Area=	0.12	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.00**	**cfs**
100YR Overflow Water Elevation=				**617.30**	**Elev**
Freeboard to Nearest Bldg=				**2.20**	**ft**

Cross Secti D					
Tc=	5	min			
Area=	0.20	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.67**	**cfs**
100YR Overflow Water Elevation=				**617.28**	**Elev**
Freeboard to Nearest Bldg=				**2.22**	**ft**

Cross Section: B					
Tc=	5	min			
Area=	0.18	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.51**	**cfs**
100YR Overflow Water Elevation=				**617.36**	**Elev**
Freeboard to Nearest Bldg=				**2.14**	**ft**

Cross Secti E					
Tc=	5	min			
Area=	0.15	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**1.25**	**cfs**
100YR Overflow Water Elevation=				**617.68**	**Elev**
Freeboard to Nearest Bldg=				**1.82**	**ft**

Cross Section: C					
Tc=	5	min			
Area=	0.24	acres			
C=	0.85				
i=	9.84	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**2.01**	**cfs**
100YR Overflow Water Elevation=				**617.29**	**Elev**
Freeboard to Nearest Bldg=				**2.21**	**ft**

Channel Report

X-Section A

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.00
N-Value	= 0.011

Calculations

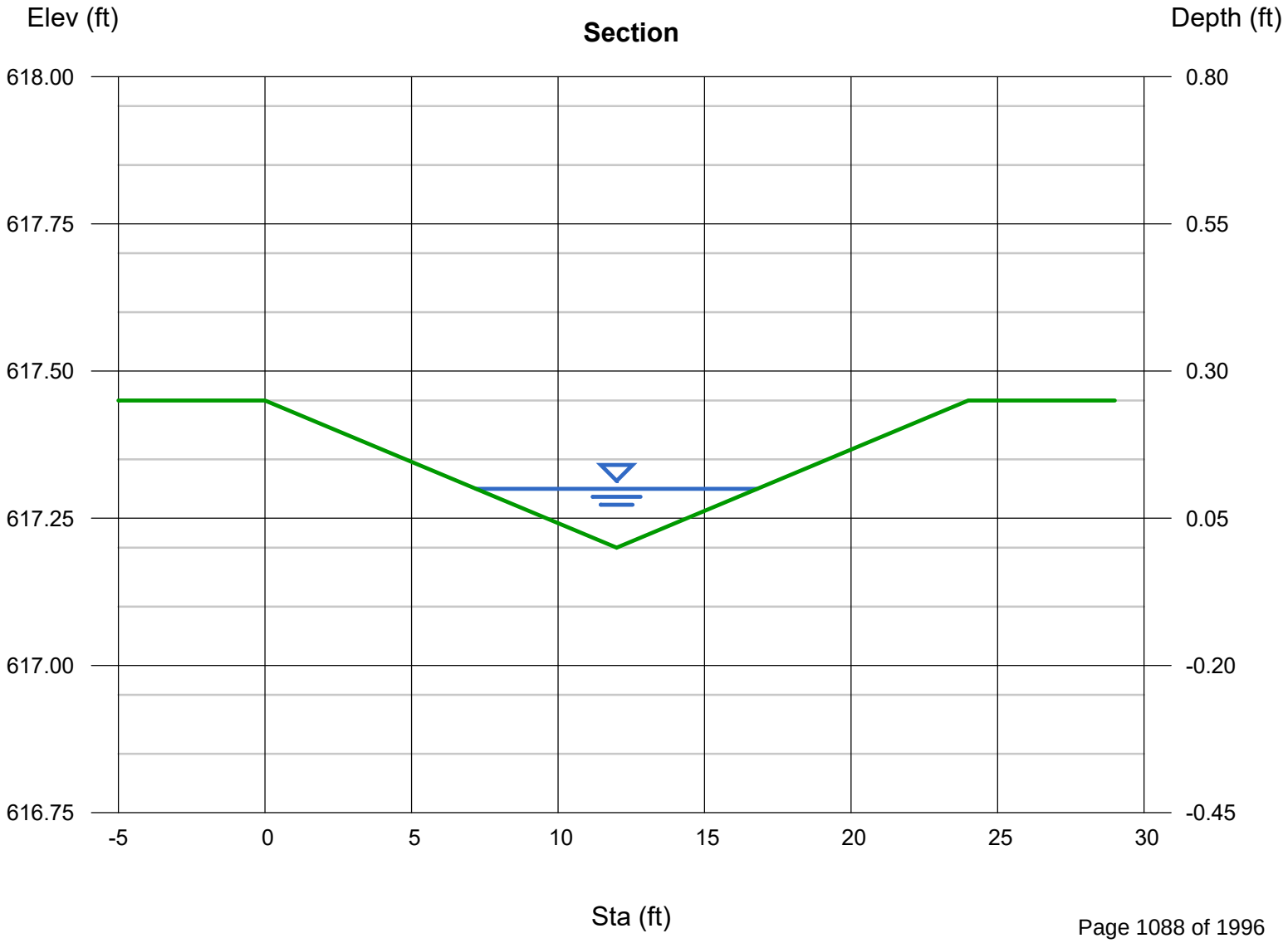
Compute by:	Known Q
Known Q (cfs)	= 1.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.45)-(12.00, 617.20, 0.011)-(24.00, 617.45, 0.011)

Highlighted

Depth (ft)	= 0.10
Q (cfs)	= 1.000
Area (sqft)	= 0.48
Velocity (ft/s)	= 2.08
Wetted Perim (ft)	= 9.60
Crit Depth, Yc (ft)	= 0.13
Top Width (ft)	= 9.60
EGL (ft)	= 0.17



Channel Report

X-Section B

User-defined

Invert Elev (ft)	= 617.25
Slope (%)	= 1.60
N-Value	= 0.011

Calculations

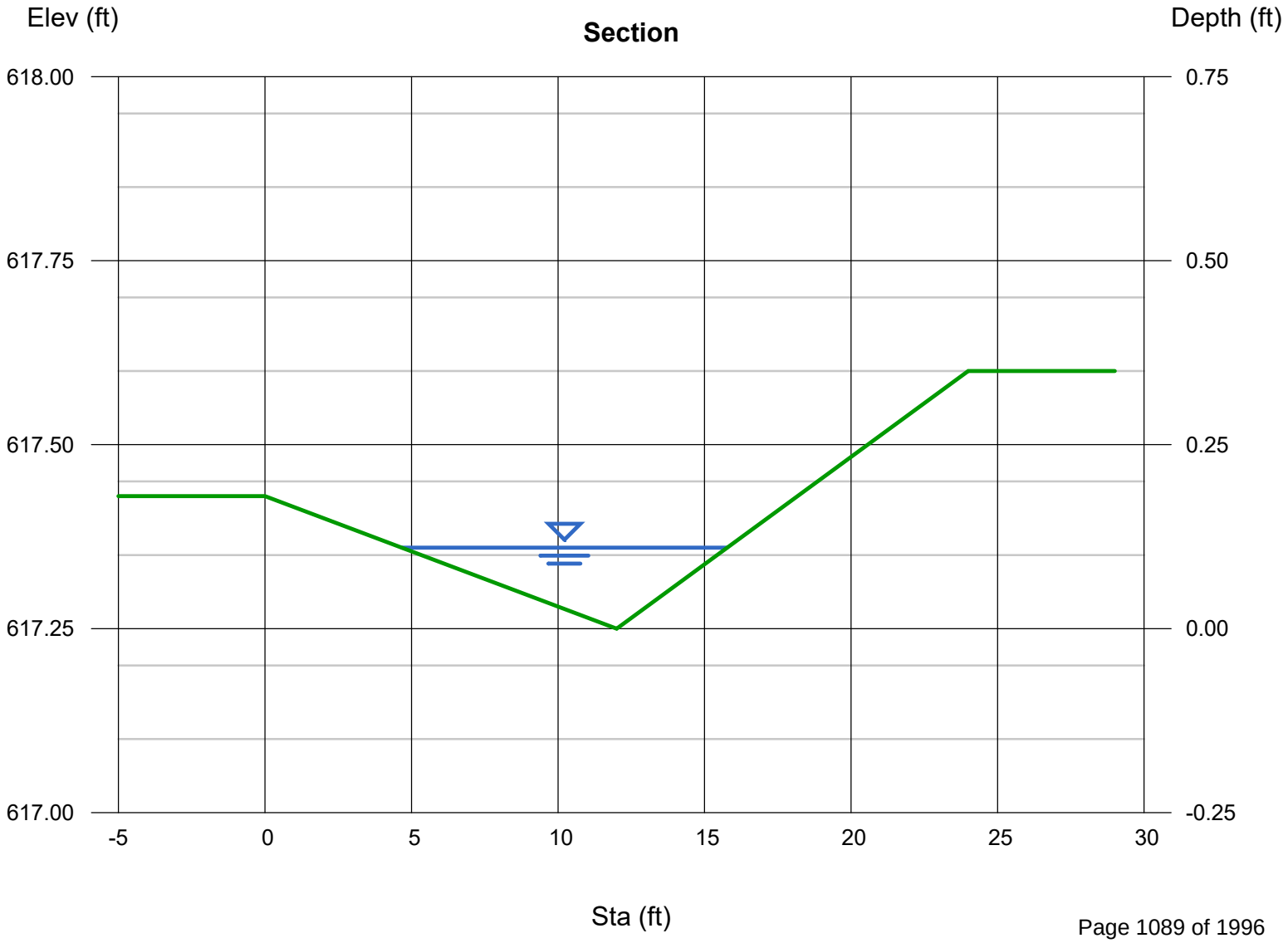
Compute by:	Known Q
Known Q (cfs)	= 1.51

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.43)-(12.00, 617.25, 0.011)-(24.00, 617.60, 0.011)

Highlighted

Depth (ft)	= 0.11
Q (cfs)	= 1.510
Area (sqft)	= 0.61
Velocity (ft/s)	= 2.47
Wetted Perim (ft)	= 11.11
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 11.10
EGL (ft)	= 0.21



Channel Report

X-Section C

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.50
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.01

Highlighted

Depth (ft)	= 0.12
Q (cfs)	= 2.010
Area (sqft)	= 0.72
Velocity (ft/s)	= 2.79
Wetted Perim (ft)	= 12.00
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 12.00
EGL (ft)	= 0.24

(Sta, El, n)-(Sta, El, n)...

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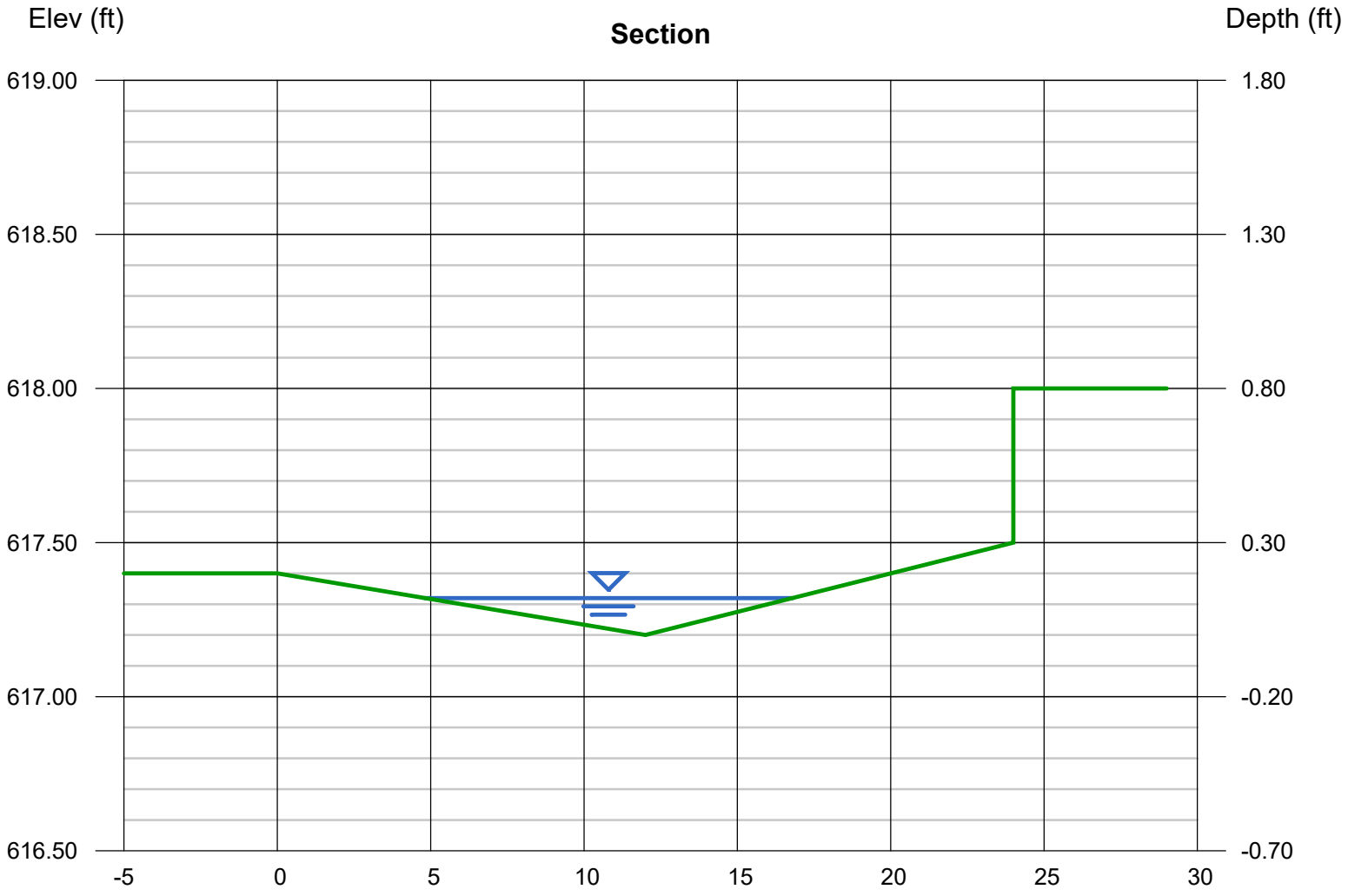

Channel Report

X-Section D

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 1.80
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.67

Highlighted

Depth (ft)	= 0.09
Q (cfs)	= 1.670
Area (sqft)	= 0.97
Velocity (ft/s)	= 1.72
Wetted Perim (ft)	= 21.61
Crit Depth, Yc (ft)	= 0.11
Top Width (ft)	= 21.61
EGL (ft)	= 0.14

(Sta, El, n)-(Sta, El, n)...

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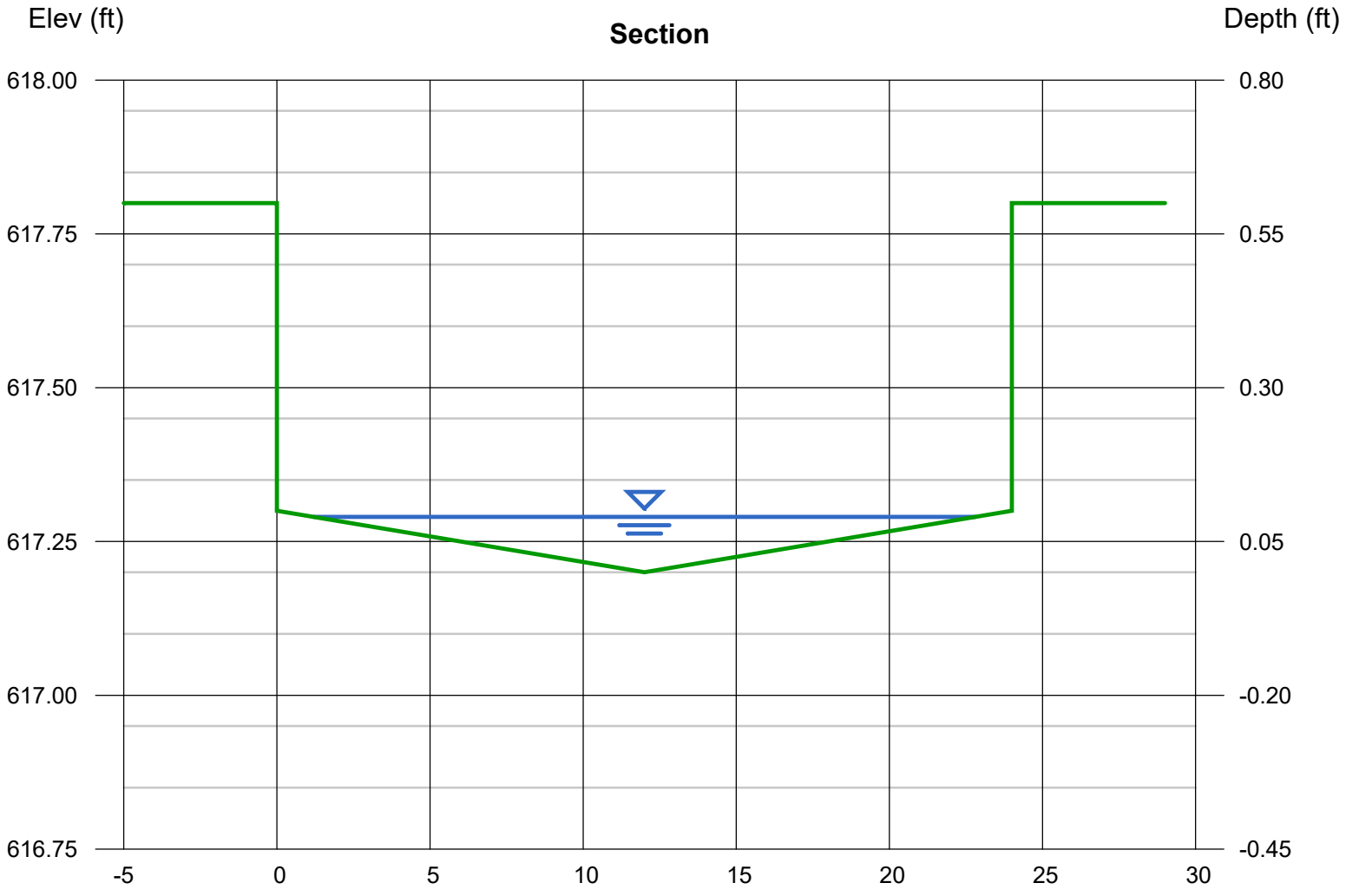

Channel Report

X-Section E

User-defined

Invert Elev (ft)	= 617.60
Slope (%)	= 2.70
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.25

Highlighted

Depth (ft)	= 0.08
Q (cfs)	= 1.250
Area (sqft)	= 0.67
Velocity (ft/s)	= 1.86
Wetted Perim (ft)	= 16.80
Crit Depth, Yc (ft)	= 0.10
Top Width (ft)	= 16.80
EGL (ft)	= 0.13

(Sta, El, n)-(Sta, El, n)...

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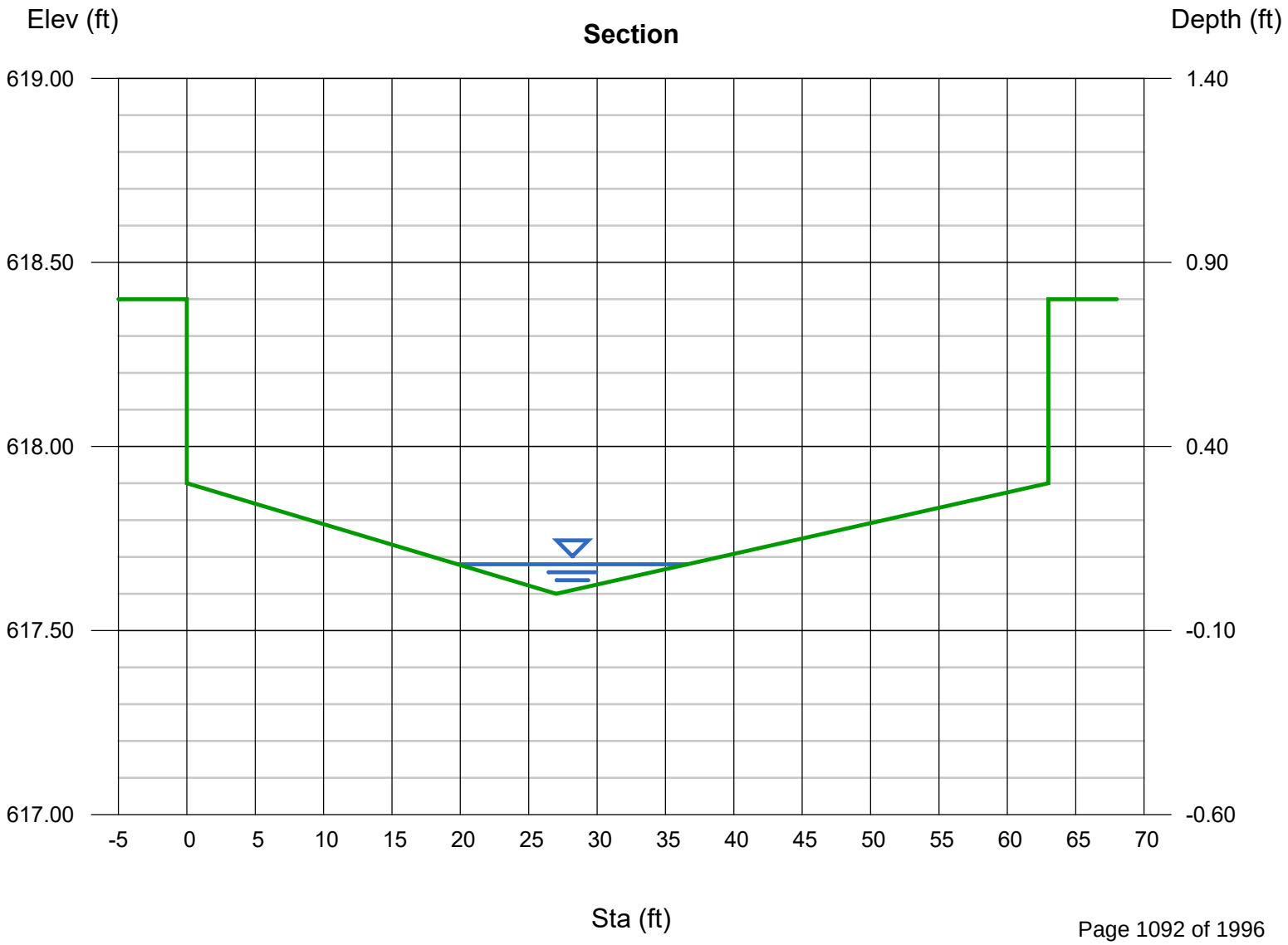

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Interstate Brick Types and Safety Data Pg 152

NELSON TESTING LABORATORIES®

EXPERIENCED | INNOVATIVE | AUTHENTIC

Physical Analysis of Concrete Masonry Units

for

Northfield Block

8-in Regular

Northfield Block Company
One Hunt Court
Mundelein, IL 60060

March 7, 2022

NELSON TESTING LABORATORIES®

EXPERIENCED | INNOVATIVE | AUTHENTIC

March 7, 2022

Northfield Block Company
One Hunt Court
Mundelein, IL 60060

REPORT OF TESTS

SUBJECT:	**Physical Analysis of Concrete Masonry Units**
PROJECT:	**Northfield Block – 8 x 8 x 16-in Regular Concrete Masonry Units**
SPECIFICATION:	ASTM C90-21, "Specification for Loadbearing Concrete Masonry Units"
TEST METHODS:	ASTM C140-21, "Test Methods for Sampling and Testing Concrete Masonry Units and Related Units." ASTM C426-16, "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units" ACI 216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies."
MATERIALS:	Delivered to NTL on February 21, 2022
NTL PROJECT #:	22-1046
PAGE:	1 of 3

TEST DATA

Dates of Testing: February and March 2022

Specimen ID	1	2	3	Average
Dimensions (in)				
Height	7.7	7.6	7.7	7.7
Width	7.6	7.6	7.6	7.6
Length	15.6	15.6	15.6	15.6
Min. Face Shell Thickness (in)	1.3	1.3	1.3	1.3
Min. Web Thickness (in)	1.1	1.1	1.1	1.1
Normalized Web Area (in²/ft²)	29.2	29.3	29.2	29.2
Gross Area (in²)	118.6	118.6	118.6	118.6
Net Area (in²)	60.8	60.1	60.4	60.4

March 7, 2022
Northfield Block – 8-in Regular Concrete Masonry Units
NTL Project #22-1046

TEST RESULTS

Specimen ID	1	2	3	Average
Density (lbs/ft³)	134.0	135.0	133.7	**134.3**
*Absorption (%)	6.3	7.0	7.2	**6.9**
*Absorption (lbs/ft³)	8.5	9.5	9.7	**9.2**
Solids (%)	51.3	50.7	51.0	**51.0**
Equivalent Thickness (in)	3.9	3.9	3.9	**3.9**
**Fire Rating (hours)	2.0	2.0	2.0	**2.0**

Specimen ID	4	5	6	Average
*Compressive Load (lbs)	249,900	238,700	243,380	**243,990**
Net Compressive Strength (psi)	4,140	3,950	4,030	**4,040**

Specimen ID	7	8	9	Average
Shrinkage (%)	0.038	0.042	0.042	**0.041**

**Absorption and compressive strength testing on full units.*
***Calculations based on aggregate types.*

SUMMARY

The test results listed above complied with their corresponding requirements as set forth in ASTM C90-21, "Specification for Loadbearing Concrete Masonry Units".

March 7, 2022
Northfield Block – 8-in Regular Concrete Masonry Units
NTL Project #22-1046

Respectfully submitted,

NELSON TESTING LABORATORIES

Mark R. Nelson
President

Notes: The results listed within this report relate only to the materials submitted for testing. This report shall not be reproduced, except in full, without written approval of this laboratory. The test materials not consumed in this testing will be discarded 14 days from the date of this report unless we receive written notification requesting otherwise.

Nelson Testing Laboratories is accredited/inspected by AASHTO and CCRL under ASTM C1093.

TECHNICAL BULLETIN 3

Specification for Atlas® Hollow Brick

Part 1 Quality Assurance

Brick Tests

1. All tests shall be performed by an independent certified testing laboratory.
2. All tests shall be in accordance with ASTM C-67.

Submittals

1. Submit test report and certificate of conformance document for each type and color of brick specified on contract documents for architect's approval.
2. Test reports shall include:
   a. Compressive strength
   b. 24 hour cold water absorption
   c. 5 hour boil absorption (if required)
   d. Saturation Coefficient (if required)
   e. Initial Rate of Absorption (I.R.A.)
   f. Efflorescence
   g. Weather classification
3. Certificate of conformance shall state that brick meets or exceeds applicable ASTM specifications.

Sample Panels

1. Sample panel size shall be 4'x4' showing the proposed color range, texture, bond, mortar, workmanship, cleaning, and water repellents where applicable.
2. Final brick selection shall be made only following architect's review of sample panel.
3. Brick from manufactured material for project shall be shipped to site and sample panel erected.
4. No brick shall be shipped from manufacturer to site until architect's acceptance of job panel constructed from actual material for project. This panel shall replace all other sample panels and shall remain on site throughout construction, and become the project standard for bond, mortar, workmanship, and appearance.

Part II Products

Hollow Brick

1. Manufacturer: **Interstate Brick Company** or **H.C. Muddox**
2. ASTM C-652, Grade SW, Type HBX or better.
3. Color and texture
4. Dimensions *(width)* x *(height)* x *(length)*.
5. Minimum compressive strength 9,000 psi.
6. Maximum Saturation Coefficient 0.78 (if required).
7. Minimum IRA 6 g/ min/30 in^2.
8. Maximum IRA 30 g/min/30 in^2. Where IRA exceeds 30 g/ min/30 in^2, pre-wetting brick is recommended.
9. Shapes; where special shapes are shown on architectural drawings, manufacturer shall provide shop drawings for architect's approval prior to manufacturing shapes.

Mortar

Mortar shall conform to ASTM C 270 Type S
Proportion Specification:
1 part Portland cement (ASTM C 150 Types I, IA, II, IIA, III, IIIA or V) less than 6 months old
½ part hydrated lime (ASTM C-207)
3-½ to 4-½ parts sand (ASTM C-144)
OR
Property Specification:
Portland cement - lime mortar
Compressive strength 1800 psi
Water retention 75% minimum
Air content 12% maximum
Sand: 2 ¼ -3 ½ the sum of the separate volumes of cementitious materials sand (ASTM C-144)

Grout

Grout shall conform to ASTM C 476
Grout strength shall be greater than or equal to f'_m

Part III Execution

Bond

Bond shall be running bond unless otherwise shown on contract documents.

Jointing

Mortar joints shall be concave unless otherwise shown on contract documents.

Construction

All construction strictly adheres to International Building Code (IBC) or TMS 402/ACI530/ASCE5.

Cleaning

Cleaning shall conform to Interstate Brick Technical Bulletin 4 Brick Cleaning Recommendations, Section 040120 and BIA Technical Note #20 Cleaning Brickwork
Do not use muriatic acid or san blasting.
Contact manufacturer for recommendations.

Water Repellent & Coatings

Where water repellents are required, consult Interstate Brick Technical Bulletin 1 Water Repellent Coatings and Section 071900.

INTERSTATE® BRICK
INTERSTATE BRICK 9780 South 5200 West, West Jordan, UT 84081-5625
Phone: 801 280 5200 Toll Free (800) 233-8654 www.interstatebrick.com

H.C. MUDDOX
H.C. MUDDOX 4875 Bradshaw Road Sacramento, CA 95827-9727
Phone: (916) 859-6320 Toll Free (800) 776-1244 www.hcmuddox.com

Revision-0323

TECHNICAL BULLETIN 7

Structural Brick Compressive Strength Data Table

Selected Brick Colors	Average Net Area Unit Compressive Strength psi	(MPa)	Assumed Wall Assembly Design Strength (f'_m) psi	(MPa)
Arctic White	11,000	(75.84)	3,844	(26.50)
Autumn Red	12,000	(82.74)	4,000	(27.58)
Bronzestone	11,900	(82.05)	4,000	(27.58)
Canyon Rose	13,600	(93.77)	4,000	(27.58)
Cedar	13,200	(91.01)	4,000	(27.58)
Copperstone	14,000	(96.53)	4,000	(27.58)
Desert Sand	14,000	(96.53)	4,000	(27.58)
Golden Buff	15,400	(106.18)	4,000	(27.58)
Ironstone	14,600	(100.66)	4,000	(27.58)
Midnight Black	15,000	(103.42)	4,000	(27.58)
Monterey	14,400	(99.28)	4,000	(27.58)
Mountain Red	15,600	(107.56)	4,000	(27.58)
Ochre Buff	14,700	(101.35)	4,000	(27.58)
Park Rose	13,600	(93.77)	4,000	(27.58)
Platinum	11,000	(75.84)	3,844	(26.50)
Smokey Mountain	15,500	(106.87)	4,000	(27.58)
Tumbleweed	15,400	(106.18)	4,000	(27.58)
Walnut	12,800	(88.25)	4,000	(27.58)

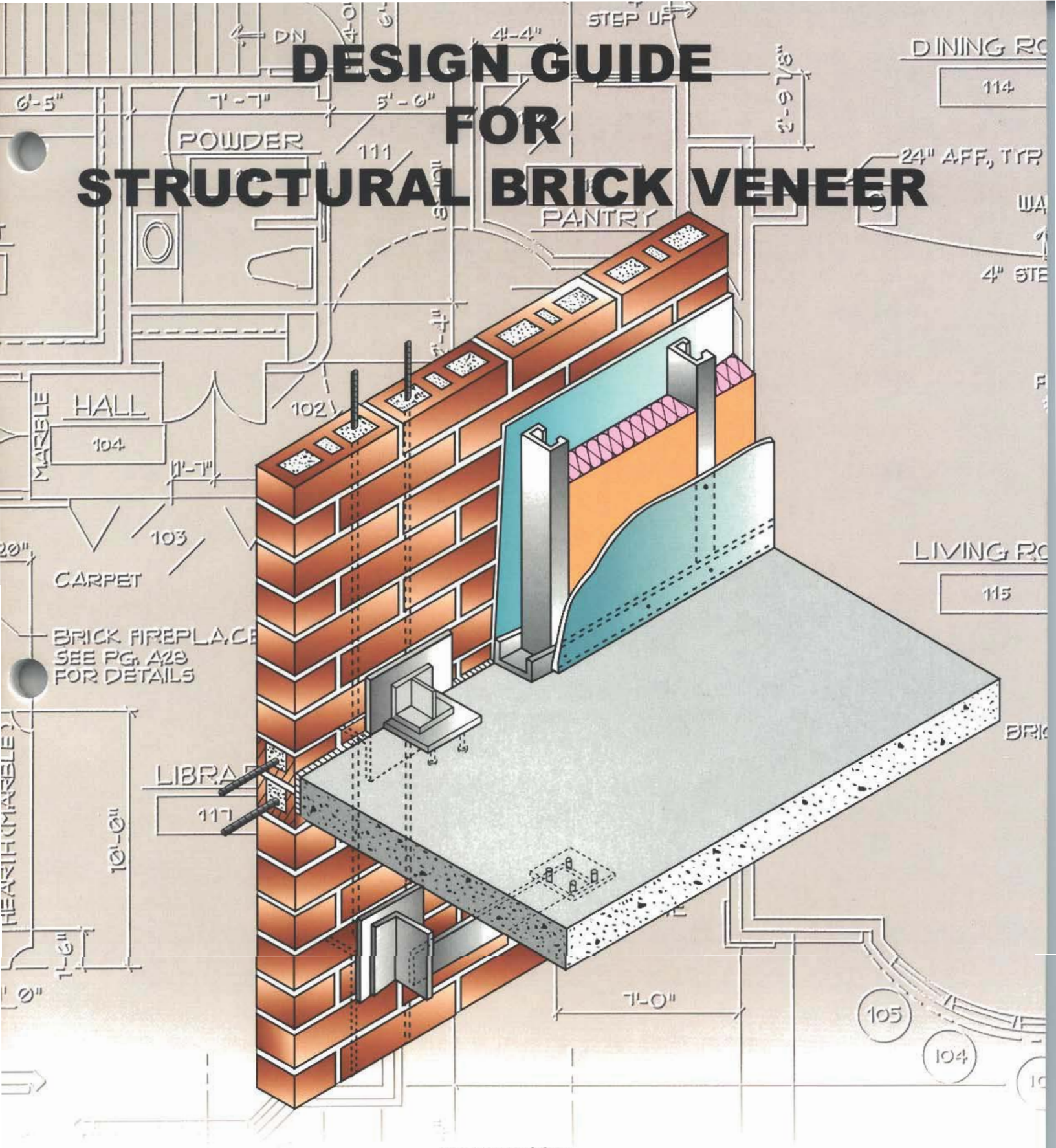
1. Clay and shales are naturally occuring materials that vary, to some degree, throughout the deposits and strata layers. Consequently, various physical properties of the brick units, including the unit compressive strength values noted above are variable. The data above is based on historic data, not future projections. The data for the noted colors, and other colors, is kept on file, available upon request.

2. Assumed Wall Assembly Design Strengths f'_m, are based on TMS 602-22, Section 1.4-B-2(a), Table 1, and represent the design strength of wall assemblies comprised of masonry units, mortar, and grout. Mortar is assumed to be ASTM C270 compliant Type M, or Type S mortar. Grout is assumed to be ASTM C476 compliant grout with 28-day minimum compressive strength (f'_c) equal to or greater than f'_m.

3. Wall Assembly Design Strengths (f'_m) in excess of 4,000 psi can be acheived based on job specific prism testing.

INTERSTATE BRICK 9780 South 5200 West, West Jordan, UT 84081-5625
Phone: (801) 280-5200 Toll Free (800) 233-8654 www.interstatebrick.com

DESIGN GUIDE FOR STRUCTURAL BRICK VENEER



prepared for

Western States Clay Products Association

by

KPFF Consulting Engineers

DESIGN GUIDE

FOR

STRUCTURAL BRICK VENEER

Prepared for:

Western States Clay Products Association
www.wscpa.us

Submitted by:

KPFF Consulting Engineers
1601 5th Ave. Suite 1600
Seattle, WA 98101

Second Edition, July 2004

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John G. Tawresey, KPFF Consulting Engineers prepared the 2004 Second Edition.

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Summary

Structural Brick Veneer is a unique approach to the design and construction of brick exterior walls. Strengthening the brick with steel reinforcement provides new opportunities for reducing the cost of the wall, increasing design flexibility and improving wall performance. In use for more than thirty years, the approach has been used extensively in the Pacific Northwest.

The Structural Brick Veneer system is similar to conventional brick veneer except that the brick is reinforced to allow it to span further between ties and supports. The system allows the architect a variety of opportunities to create traditional walls or dramatic brick forms. Sloping windowsills, brick soffits, lintels without exposed ledger angles and precast concrete bands and inserts are only a few examples of the design opportunities available.

In areas of high seismic exposure, the Structural Brick Veneer system can be easily isolated from the primary structure making “immediate occupancy” performance more cost effective.

The following document will provide the structural engineer and the architect with an introduction to the design and specification of the Structural Brick Veneer system. It includes some design examples and dialogue on our experiences with the system over the past 20 years.



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1.0 Introduction

Structural Brick Veneer is the name that we have chosen to describe hollow reinforced clay brick curtainwall systems. These systems commonly replace brick veneer walls.

The Structural Brick Veneer system is similar to conventional brick veneer because it supports no gravity loads other than its own weight, the weight of windows, and possibly other miscellaneous loads. The difference is that in the Structural Brick Veneer system the masonry is reinforced to allow the brick to span further between ties and provide structural capacity to create more intricately shaped walls.

Structural Brick Veneer can be laid in place similar to conventional brick veneer, or they can be prefabricated at another location and lifted and installed to their final position.

The system has many advantages over conventional brick veneer. Some of these advantages are:

1. Greater design flexibility.
2. Reduced backup requirements.
3. Enhanced design life through heavier connections.
4. Reduced tie connections, which provides more continuous moisture barrier.
5. Greater seismic resistance and more ductility.
6. Less restrictive deflection requirements of the backup structure.
7. Reduced cost of the backup system.
8. Often lower construction cost.
9. Greater resistance to cracking.
10. Greater water resistance.

The system has been used on more than 100 projects over the last 20 years.

1.1 Purpose & Scope

The purpose of this guide is to provide the architect, structural engineer and owner with information about the design and construction of Structural Brick Veneers. It is intended to be easily understood by someone experienced with reinforced brick masonry design and construction. For those not familiar with the design of reinforced brick masonry, the Western States Clay Products Publication, "*Notes on the Selection, Design and Construction of Reinforced Hollow Clay Masonry*" is recommended.

As the design and construction of reinforced brick masonry varies from location to location, so does the design and construction of Structural Brick Veneer vary from location to location. The information and recommendations in this guide are based on the design and construction of projects in the Pacific Northwest and are not intended to replace local experience and engineering judgment.

1.2 History of the System

The origin of Structural Brick Veneer dates back to the early sixties. In 1962, a mechanical equipment penthouse was built on top of the nine-story United Fund office building in Denver, Colorado. The 15-foot high, load

bearing, 4-inch thick clay brick prefabricated panels supported long span, prestressed, twin-tee concrete slabs that were the roof structure of the penthouse. This construction was made possible by the use of a new "tensile strength intensive" exotic mortar and some backup steel reinforcing.

This 4-inch brick and exotic mortar system was used for several years thereafter in the Colorado area in prefabricated and in situ, hand-laid brick panel and curtainwall applications on many commercial buildings designed by George Hanson, P.E. of the firm of Sallada & Hanson, Engineers. This strong thin-wall system intrigued the designers who used this system on horizontal soffits, cantilevered balcony railings, post-tensioned panels, load-bearing and non-load-bearing walls on schools, office buildings, hospitals, the walls in vehicular tunnels, highway rest area toilet modules and picnic shelters. Even though this brick curtainwall system was very successful, it was relatively expensive due to the use of the high tensile strength mortar.

In the middle 1960's, Donald A. Wakefield, P.E. of the Structural Clay Products Institute developed, in Colorado, a new clay unit and method of construction that reduced the cost and allowed for the use of regular reinforcing and standard mortar and grout. This unit was a 3-1/2" x 3-1/2" x 11-l/2" hollow clay brick using ASTM C-212 recommendations. This system accommodated both horizontal and vertical reinforcing and permitted high-lift grouting.

This thinner reinforceable, hollow clay unit was more economical, ductile, flexible and more predictable; thus expanding its use in commercial curtainwall systems as well as load-bearing residences, four-story load-bearing apartment buildings, and prefabricated panels.

During the 1970's, a similar system was developed and perfected by Barkshire Panel Systems, Seattle, WA. Barkshire’s system used a 3 1/2-inch thick hollow clay brick similar to the one mentioned earlier and verified by testing conducted by Western States Clay Products Association under the direction of John G. Tawresey.

The secret to Barkshire’s system was advancements in the connections to the frame, and the technical knowledge of the overall building's physical needs.

As a consequence, the system is found on multi-story high-rise office buildings, schools, apartment buildings, residences and many other applications throughout the Northwest.

2.0 System Description

The system relies on a simple structural concept that will be described, followed by the presentation of some typical configurations and a brief discussion of weather protection.

2.1 Structural Concept

Structural Brick Veneer is essentially the same as conventional brick veneers except that the brick is reinforced. Hollow bricks that can be reinforced are a necessary part of the system.

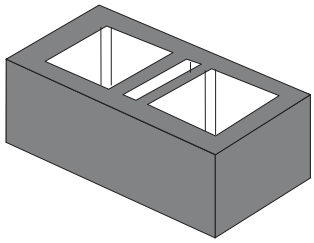


Figure 1 Typical Hollow Brick

The reinforcement increases the structural capacity of the brick wall. The spacing of the ties, typical in conventional veneers, can be increased and in most cases, the spacing can be increased to the distance between building floors or columns. The conventional veneer ties are eliminated and are replaced by more substantial connectors. The connectors are usually attached to the primary structural system of the building instead of a separate backup wall.

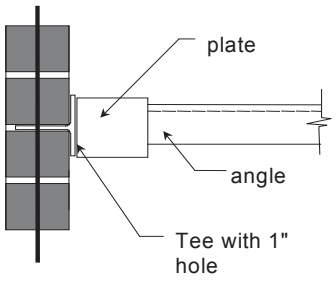


Figure 2 Typical Structural Brick Veneer Connector

Ledgers very similar to the ledgers of more conventional veneers can support the dead load of the Structural Brick Veneer.



Figure 3 Brick Supported on a Ledger

Or, separate discontinuous connectors can be used to support the dead load. These connectors are similar in design to those used to support precast concrete panels.

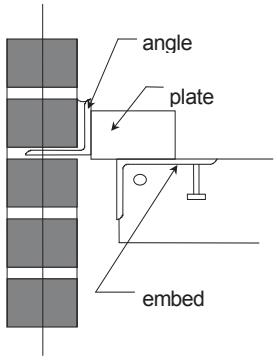


Figure 4 Typical Structural Brick Veneer Deadload Connector

Another available option is to support the dead load of the Structural Brick Veneer on the building foundation. Because the Structural Brick Veneer is designed in accordance with the

structural chapters of the code, height limitations are generally more liberal.

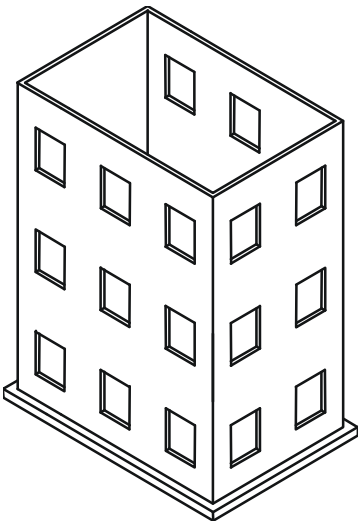


Figure 5 Dead Load on the Foundation

The connectors of the Structural Brick Veneer are designed and constructed to be flexible in one or more directions and rigid in other directions. Thus, the Structural Brick Veneer can be isolated from the movements of the building.

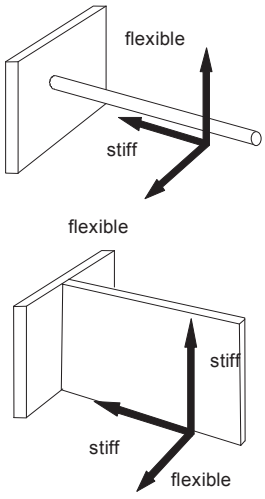


Figure 6 Flexible Connectors

The design of the Structural Brick Veneer is based on the following principles:

1. The Structural Brick Veneer is designed to be isolated from the primary building structure. For non-essential facilities, the isolation should be adequate to insure that the brick will not be damaged by a moderate earthquake. For essential facilities, the isolation should be adequate to insure that the brick will not be damaged by a maximum considered earthquake. The Structural Brick Veneer must not support the building or provide any assistance to the stability of the building as a whole.

2. Structural Brick Veneer is commonly designed to have **mortar joint** cracks at service wind and seismic loading. However, **brick cracking** should not occur. Cracking should be limited to the cracking of the horizontal bed joints at the brick to mortar interface. This is an aesthetic design criteria rather than a structural performance criteria. Experience has shown that cracking of the brick unit is considered by most owners to be a failure of the system.

3. The Structural Brick Veneer is designed to transfer the loading to the connectors and the connectors are designed to transfer the loading to the primary structure.

2.2 Concept Configurations

Structural Brick Veneer buildings can be configured in limitless ways. Because the brick wall has more capacity to resist

loading, the designer has more choices to configure and attach the wall. The number of different forms is controlled only by the designer's imagination.

The Structural Brick Veneer system offers the architect a variety of opportunities to create dramatic brick forms. Sloping windowsills, brick soffits, lintels without exposed ledger angles and precast concrete bands are only a few examples.

Sloping Sills

Sloped sills are a common accent in brick construction. Small slopes created from special brick shapes can be readily incorporated into the Structural Brick Veneer wall. Larger, more dramatically sloped sills may require shoring to construct.

Where the depth of the slope does not allow the weight of the brick veneer to cantilever from the vertical wall, then adding connections or spanning horizontally to column supports can provide alternative support.

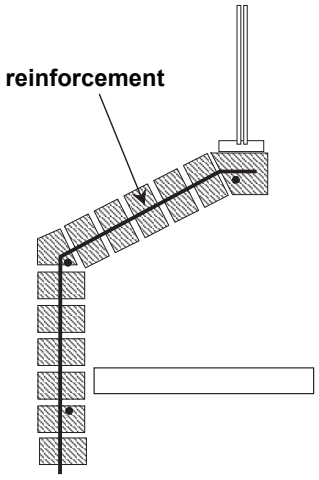


Figure 7 Sloping Sill Brick Soffits

Brick soffits can be designed and constructed similar to the conditions at a sloping sill.

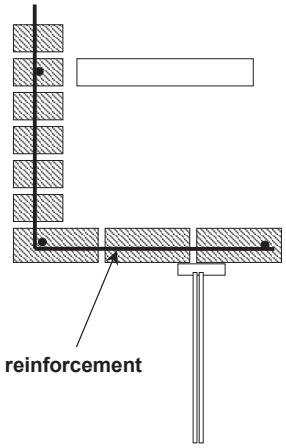


Figure 8 Brick Soffit

Brick with Concrete Masonry

Another architectural variation is to combine concrete masonry with Structural Brick Veneer. This commonly takes the form of banding, either horizontal or vertical, or as an accent pattern. In some circumstances, concrete masonry may be used instead of brick where it doesn't show. In either arrangement, concrete masonry can be incorporated into the Structural Brick Veneer with ease. The designer should recognize however that the spacing of reinforcement in brick might not match the cells in the concrete masonry. Some effort should be made to space the reinforcement to match both modules. Also, when using horizontal brick and concrete masonry bands, the designers must recognize the opposing behavior and strengths of the two materials and detail accordingly with movement joints and reinforcement. Brick will expand with exposure to moisture while concrete masonry is more dynamic and

will shrink with drying and expand with moisture. Extra reinforcement may be added to reduce the impact of this effect.

Brick with Precast Concrete

Precast concrete window sills and heads as well as accents can be successfully included in a Structural Brick Veneer System. Where the precast elements are small, they can be added by providing holes through the precast for the reinforcement. Large precast components may require separate connectors to the building frame or to the Structural Brick Veneer.

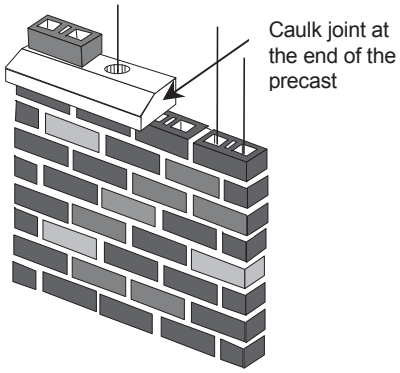


Figure 9 Precast in Structural Brick Veneer

Also, precast concrete elements shrink with time and drying, and expand with moisture. Again, the designer should consider the compatibility of the expanding brick and shrinking concrete.

2.3 Weather Protection

The primary function of the exterior wall is to protect the interior of the building from the weather.

The Structural Brick Veneer System provides two methods of weather protection. The exterior brick veneer, caulking, and windows act as the primary barrier. The interior cavity, flashing, weeps, window channels and other elements act as the secondary barrier.

The system performance depends to a large extent on the prevention of water leakage through the reinforced brick. Reinforced brick is more water-resistant than unreinforced brick. The most obvious reason is that the cracks are smaller and more evenly distributed due to the resistance provided by the reinforcement.

Another reason is that brick expands with age. When the brick is made, it contains no water. With time, the brick absorbs water and reaches equilibrium with its moist environment. The clay expands (just like unfired clay). The moisture can come from the humidity in the air. This expansion can take years.

ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures* recommends a value of .0003 inch/inch for moisture expansion of clay masonry.

When the brick expands, the reinforcement tends to resist the expansion. The reinforcement is stretched in tension and the brick masonry compressed. The consequence is smaller and sometimes there are fewer cracks.

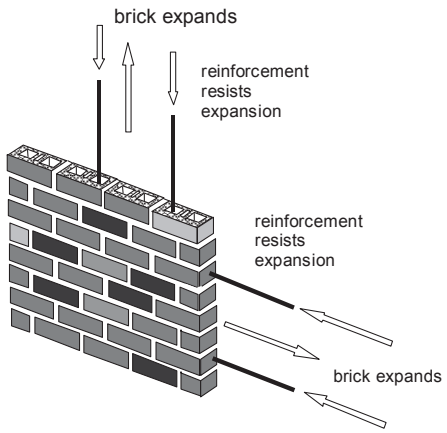


Figure 10 Brick Expanding Resisted by the Reinforcement

Even with smaller cracks, leakage can still occur. Wind-driven water flows in sheets in all directions over the wall and concentrates at discontinuities such as joints. Lateral movement of water is greatest near the windward corners. Movement upward is greatest near the top of the building. Tall buildings have greater accumulation of water flow. Greater distances between irregularities will result in larger flows.

It should be assumed that all masonry might leak and allow water to penetrate. Masonry leaks more through the mortar and brick interface than through the masonry unit itself. If the mortar and brick interface is cracked, leakage may increase.

There are two concepts used to control the water. The first is the drainage wall, and the second is the "rainscreen" principle.

A drainage wall consists of a secondary method of removing the moisture once it has penetrated the outside wall. Flashing is an example.

The principle of the rainscreen consists of providing a cavity behind the wall that equalizes the outside pressure thus preventing the water from penetrating the outside surface. A properly proportioned rainscreen wall needs no caulk on the outside barrier. Unfortunately, the available technology for designing rainscreen walls is limited and while many walls use some of the principles, most installations rely on a drainage wall system. For more information on the rainscreen walls, see Western States Clay Products publication "*Design Guide for Anchored Brick Veneer Over Steel Studs"*.

3.0 Design

Once the decision to use Structural Brick Veneer is made, the next step is to provide for a design. The Structural Brick Veneer is not part of the primary structural system and, consequently, may, or may not be designed by the building design team. It may not be in their scope of services. Thus the first issue to address is who designs the wall? Whether designed by the building design team or by a designer working for the contractor or sub-contractor, the design criteria and methods of analysis are the same. In the next paragraphs, these methods are described followed by three design examples.

3.1 Who Designs the Wall?

Structural Brick Veneer, like other wall systems, can be designed by either the design team and bid, or it can be specified as a bidder-designed item. It is done both ways.

Some owners complain to their architect that the design is incomplete without drawings and specifications to bid the exterior wall. It is like “buying a car without the wheels.” Yet, contractors design most exterior walls because they have special knowledge necessary to complete the task.

Questions that should be addressed early in the design of any wall system include the following. How much of the design of the wall should be shown on the design drawings? Where does the designer of record’s responsibilities end and the contractor’s responsibilities begin?

Often, the structural engineer of record does not show bracing because he is unaware of the wall system to be used and the method of attachment is left to the contractor. The designer should clearly identify on the drawings the responsibility for the design and construction of each component of the wall system, including bracing.

In some locations, it is common for brick veneer supports to be shown on the design drawings. In Seattle, it is common for the structural engineer of record to design precast concrete panels as part of the “standard services”. In most locations, including Seattle, the contractor prepares the design of Structural Brick Veneer.

These examples are presented to illustrate that there is no consensus about who should design an exterior wall. The “*National Practice Guidelines for the Structural Engineer of Record* ” published by the Council of American Structural Engineers clearly states that the design of curtainwall systems is not considered part of Basic Services. It is considered Additional Services under Special Services. Unfortunately, the document does not provide us with help for the bracing and stiffening problem. Nor does it show where to draw the line of responsibility between the contractor and the structural engineer of record.

No matter who designs the wall, the contractor or the engineer of record, the following information about the design criteria and methods applies.

3.2 Design Criteria

The design criteria for Structural Brick Veneer includes the applicable code sections, the appropriate design life, seismic performance, loads, allowable stresses, code prescriptive requirements and special connection requirements.

3.2.1 The Applicable Code Sections

The term “Structural Brick Veneer” may cause some confusion when applying the building code. The use of the term “Veneer” implies “non-structural”. However, the structural analysis of the Structural Brick Veneer uses the structural portions of the masonry design codes. But, they are used in combination with the performance criteria of the masonry veneer sections of the code.

3.2.2 Design Life

Design life is an important quantitative measure that defines the quality of the project. Buildings will not last forever. The owner and designer should establish a reasonable design life for each project. This requires consideration of

the economic factors such as initial cost and maintenance costs. The design life will have an impact on the selection of materials, maintenance procedures, and the selected factors of safety.

The expected performance is also an important qualitative measure for the design of the project. The minimum performance level is set by the building code, however, there are aspects of a Structural Brick Veneer System performance that are not explicitly covered by the code and require judgment.

It has been useful to define two distinct levels of expected life and performance:

Level 1 (institutional) is intended to signify a high level of quality and long life. Buildings of this type might include public or institutional buildings. Specifically, these are buildings where the additional costs associated with higher quality are judged to be necessary in meeting the overall project requirements.

Level 2 (commercial) is intended to signify a good level of quality and an average design life. Buildings of this type might include general office, industrial, and residential buildings. These are buildings where the additional cost of Level 1 (institutional) quality is not economically justified or necessary.

Increasing the quality of the connectors, improving the weather resistance of the materials and expanding on the amount of inspection and testing are the normal means to increase the design life.

3.2.3 Seismic Performance

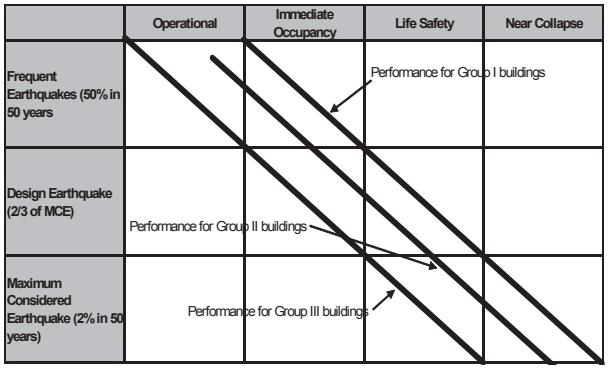
Seismic performance of Structural Brick Veneer is a complex subject since under certain levels of seismic shaking, damage can occur to the veneer. There are currently several organizations preparing standards for seismic design. The National Earthquake Hazards Reduction Program (NEHRP-2000) divides the performance of structures into four levels:

1. Operational: “Structures meeting this level when responding to an earthquake are expected to experience only negligible damage to their structural systems and minor damage to nonstructural systems” (the structural brick veneer). “Repairs if necessary can be conducted at the convenience of the owner.” “The risk to life is negligible.”
2. Immediate occupancy: “Structures meeting this level are expected to sustain more damage to nonstructural systems” (the structural brick veneer). “Exterior nonstructural wall elements and roof elements continue to provide a weather barrier, and are otherwise serviceable” (although they may be damaged).
3. Life safety: “Significant structural and nonstructural damage has occurred.” “Nonstructural elements of the structure, while secured and not presenting falling hazards, are severely damaged and can not function” (the structural brick veneer).
4. Collapse prevention: “The structure has sustained nearly complete damage. Nonstructural elements of the structure have experienced substantial damage and may have become dislodged creating falling hazards” (the structural brick veneer).

The NEHRP provisions also distinguish between building uses by assigning each structure a Seismic Use Group.

1. Group III are essential facilities requiring post-earthquake use.
2. Group II are facilities with a large number of occupants.
3. Group I are all other facilities.

Combining the performance classification with the occupancy distinction results in the following chart describing expected seismic performance.



The building code is not specific about the seismic performance of curtainwall and Structural Brick Veneer. Judgment is required on the part of the engineer to develop appropriate seismic criteria based on the project performance objective. For example, failure of a Structural Brick Veneer over the firehouse door during a major earthquake is not acceptable. Whereas, complete separation of a Structural Brick Veneer from the frame on a suburban office building with surrounding planters may be acceptable.

Because of the nature of the connections, Structural Brick Veneer can be designed to perform to a higher seismic performance level than conventional veneer. For buildings with operational performance or immediate occupancy criteria, Structural Brick Veneer offers significant advantages. If high seismic performance criteria are combined with a complex geometry, sills, soffits and articulated surfaces, it is likely that Structural Brick Veneer will be the least costly system.

3.2.4 Design Loads

Loads applied to a Structural Brick Veneer include dead load, wind load, and seismic load. The Structural Brick Veneer should support no vertical load other than its own weight. In normal practice, it may also support the weight of window systems, small air handling units and possibly some ornamentation.

Most modern building codes contain two levels of loading, service loads (allowable stress design) and ultimate loads (strength design). Both levels of loading are used in the design of Structural Brick Veneer. Local jurisdictions must be consulted for the correct design load criteria.

3.2.5 Design Assumptions and Allowable Stresses

Working Stress Design

Working stress design methods are recommended. Strength or limit states design methods are still in the development stage and have not been extensively used for the design of structural brick or Structural Brick Veneer. The ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures* contains a new strength design section, Chapter 3. It may offer less conservative designs for Structural Brick Veneers resisting out-of-plane

wind and seismic loading particularly when compared to allowable stress design that does not allow a one-third increase in allowable stress for load combinations, including wind or seismic loading.

Allowable Stresses

The allowable stresses permitted in the Structural Brick Veneer are the same as those allowed for structural reinforced masonry. The one-third increase in allowable stress is typically used for load combinations, including wind and seismic loads.

The design of connectors requires additional allowable stresses not typically included in the building codes. These additional required allowables are as follows:

1. The shear cone capacity of masonry for pull-out is typically taken as the beam allowable shear stress (1.0 x $(f'_m)^{1/2} \leq 50$ psi).

2. The shear cone angle is conservatively assumed to be 20 degrees instead of the more commonly used 45 degrees.

3. The torsion allowable stresses are assumed equal to the beam shear allowable stress (1.0 x $(f'_m)^{1/2} \leq 50$ psi). Unpublished testing on several projects has confirmed the validity of this assumption for several projects. The tests consisted of square panels fixed on three corners and lifted on the fourth corner. Failure stresses were typically 2.5 times the allowable values.

4. The concrete shear friction equation is assumed to apply with a friction factor of 0.4, ($A_v = V_u / \phi F_y$). The ultimate shear is taken as 2.0 times the design shear.

5. The tension allowable stress of the brick mortar interface is typically neglected.

6. The tensile capacity of the brick is assumed to be 10% of the compression capacity. The allowable stress is determined by applying an appropriate factor of safety for the load condition being considered. This allowable is for the brick, not the masonry. The code provides allowable tension values for the masonry in tension parallel and perpendicular to the bed joints and for different bonding patterns and mortars.

7. The allowable bond stress to plane steel is assumed to be 60 psi. or the same value as the allowable bond stress to plane bars.

Cracking of Brick

At service loads, the brick units should not crack. Cracking of the interface between the brick and mortar is acceptable. However, a cracked brick could be an aesthetic problem even though the structural capacity may be adequate. The engineer should decide the appropriate service design loading and the factor of safety to be applied.

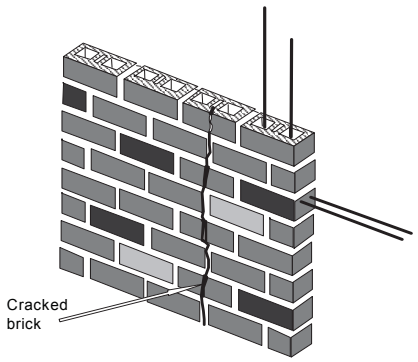


Figure 11 Cracked Brick

Code Minimum Requirements

It could be interpreted that because the Structural Brick Veneer is not classified as structural in the code, the prescriptive minimums of most structural codes do not apply. An example is that the usual minimum reinforcement spacing does not apply. However, the practice is to conform to these minimum requirements as though the Structural Brick Veneer is structural reinforced masonry.

Connector Requirements

Most seismic codes have special minimum criteria for the design of curtainwall connections. These provisions are principally directed towards precast concrete panels used as curtain wall and it is reasonable to assume they apply to Structural Brick Veneer.

One example is IBC 2003 Chapter 16, Section 1621 which references ASCE 7 (2002) Section 9.6.2.4:

> 1. Connection and panel joints shall allow for the story drift caused by relative seismic displacements (D_p) determined in Section 9.6.1.4, or ½ in. whichever is greatest.
>
> 2. Connections to permit movement in the plane of the panel for story drift shall be sliding connections using slotted or oversize holes, connections that permit movement by bending of steel, and other connections providing equivalent sliding and ductility capacity.
>
> 3. The connecting member itself shall have sufficient ductility and rotation capacity so as to preclude fracture of the concrete (masonry) or brittle failures at or near welds.
>
> 4. All fasteners in the connecting system such as bolts, inserts, welds and dowels and the body of the connectors shall be designed for the force (F_p) determined by Eq. 9.6.1.3-2 with values of R_p and a_p taken from Table 9.6.2.2 applied at the center of mass of the panel.
>
> 5. Anchorage using flat straps embedded in concrete or masonry shall be attached to or hooked around reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel or to assure that pullout of anchorage is not the initial failure mechanism.

3.2.5 Isolation from the Building

The most challenging part of the design is to isolate the Structural Brick Veneer from the building frame. There are many ways that this can be accomplished and a few will be discussed.

The amount of isolation is an important factor and the code does not provide precise criteria. There are three directions in space: vertical, horizontal in the plane of the wall, and horizontal perpendicular to the plane of the wall. The building behind

the wall, while seemingly static, is in fact subject to a variety of different movements in all three directions.

Vertical Isolation

The vertical movement can result from several different sources. The following figure shows one source.

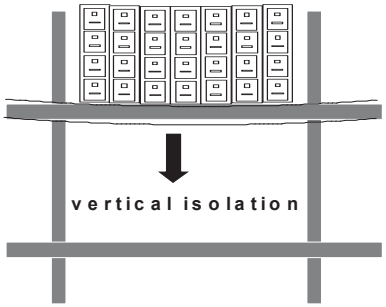


Figure 12 Differential Vertical Deflection

The different amount of vertical loading on the floors will result in a shortening of the distance between the floors. In many buildings, this can be an important factor and can result in differential deflections of greater than three-quarters of an inch. If the system does not provide compliance for this movement, the file cabinet load will be reacted by the Structural Brick Veneer instead of the floor beams and could cause failure.

If the building is constructed of concrete, the concrete shrinkage and creep will contribute to the shortening between floors. In high-rise construction, the elastic and differential elastic shortening may become important and may affect the construction schedule and sequencing.

Horizontal Isolation in the Plane of the Wall

Lateral forces from wind and seismic loading cause horizontal movement of the building frame. When one floor moves horizontally relative to the adjacent (higher or lower) floor, the wall system must accommodate the movement. If the Structural Brick Veneer is attached to both floors, then the veneer would resist the lateral forces and possibly fail. The amount of differential horizontal movement can be large; up to four inches is common in areas of high seismic activity.

A movement joint at the window head is commonly used to accommodate the horizontal movement.

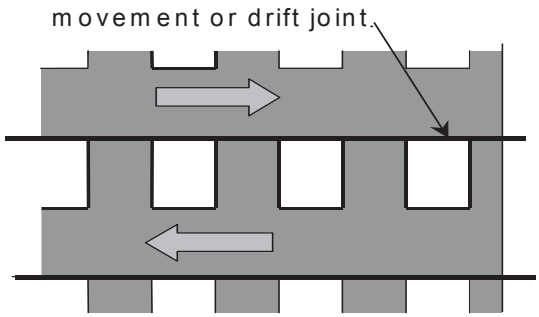


Figure 13 Horizontal Drift Joint

These joints are usually called drift joints and can be located at any horizontal plane of the building. When horizontal joints change elevation at different surfaces of the wall, it is difficult to accommodate horizontal displacement.

This concept is simple until the joint reaches the corner. Corners provide additional natural restraint, and can result in an unwanted attachment to the frame.

The following figure shows an example of a Structural Brick Veneer where the connection to the structure near the corner was designed to be rigid for forces perpendicular to the wall.

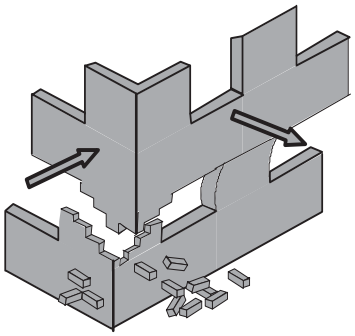


Figure 14 Corner Connected to the Structure

There are several methods available to provide isolation at a corner. One is to eliminate the corner connections and have the Structural Brick Veneer resist the loading.

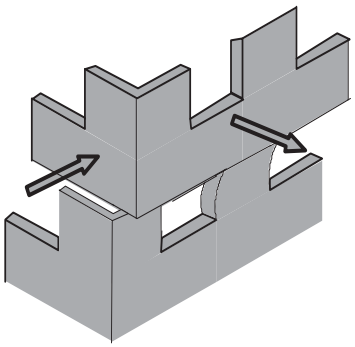


Figure 15 Corner Not Connected to the Structure

Horizontal Isolation Perpendicular to the Plane of the Wall

Another is to accommodate the movement with warping of the corner panel. This will be shown in one of the examples to follow.

For walls away from corners, horizontal movements perpendicular to the plane of the wall are accommodated by out-of - plane bending of the masonry. Typically, reinforced masonry has the capacity to accommodate large deflections in this direction and the isolation in this direction is seldom a design consideration.

Typical Deflection Magnitudes

The amount of isolation required depends on loading and expected performance. There are no known accepted national standards, but as a guide, Table 1 presents typical values and code requirements for isolation.

TYPICAL MOVEMENT DESIGN CRITERIA (1)

Movement Type	Structural System	Source of Movement	Limitations	Recommended Values	Typical Values	Isolation Method
Vertical Floors	Steel or concrete	Differential application of live load	L/600	<0.60 inch	1/4″	Compensation channel at the window head
						Soft joint under the ledger angle
	Concrete	Shrinkage with drying	(2)	(3)	1/16″	Allow the concrete to dry and cure before installing the veneer
		Creep	(2)	(3)	(3)	Provide vertical control joints every 20 to 30 feet
Vertical Columns	Steel	Differential elastic shortening	(2)	(3)	(3)	Only applies to high-rise buildings where the veneer is installed prior to finishing the building frame
	Concrete	Shrinkage	(2)	(3)	1/16″	Allow the concrete to dry and cure before installing the veneer
		Creep	(2)	(3)	1/16″	Compensation channel at the window head
						Soft joint under the ledger angle
Lateral	Frame of steel or concrete	Wind	(2)	.0025H	3/8″	Usually absorbed elastically in the system
		Seismic	Per analysis Minimum ½″	Depends on occupancy	21/2 TO 3″	Compensation channel at the window head
						Soft joint under the ledger angle
	Shear Wall	Wind	(2)	.0025H	1/8″	Usually absorbed elastically in the system
		Seismic	Per analysis Minimum ½”	Depends on occupancy	1/4 TO 1/2 ″	Compensation channel at the window head
						Soft joint under the ledger angle

1. This table should not be used for design. Each project has unique requirements.
2. No known values.
3. Depends on the structure.

3.3 Designing the Wall

The discussion describing the design of a Structural Brick Veneer wall will be divided into four parts:

1. The layout or configuration.
2. The design of the wall for code prescribed loading.
3. The design of the wall to prevent cracking of the brick.
4. The design of the connections.

In the normal process of design, all four parts are accomplished at the same time. Following the four parts, several design examples demonstrating the methods will be presented.

3.3.1 Layout or Configuration

Usually the designer begins with an architectural rendering of the wall elevations. The designer must decide on the method of isolation and the locations to react the dead load, wind and seismic loads applied to the wall.

It is difficult to describe the process for deciding the configuration of the veneer. It is part of the art of structural engineering and experience will help. Three example projects are presented to provide some insight into the issues. These represent complex applications of the Structural Brick Veneer configurations and were chosen to demonstrate the flexibility of the system. Simpler applications are more common.

Project 1

A hospital project was in the contract document phase of design. The architect's concept for the wall was brick veneer over metal studs. Unfortunately, the design had assumed only a 9-inch thickness for the wall: Three and one half inches of brick, a 1-1/2 inch cavity and 4″ deep steel studs. The floor height was 14′-8″



Figure 16 Hospital - Project 1

When the project structural engineer was asked to size the steel studs, it became apparent that the 4" depth was insufficient to support the conventional veneer. Adding thickness to the exterior wall reduced building space and had a major impact on the already designed interiors and room layout. The design of the project stopped because of the problem.

Structural Brick Veneer provided a solution. However, a 4" reinforced brick wall could not span the 14'-8" as a simple span between floors. One option was to use a 5" or 6" brick to make a simple span between floors, but this did not leave enough depth for the interior studs

to support the wallboard without thickening the wall. The solution was to provide a 4" thick (specified thickness is 3.5") Structural Brick Veneer wall system supported as shown in the following Figure.

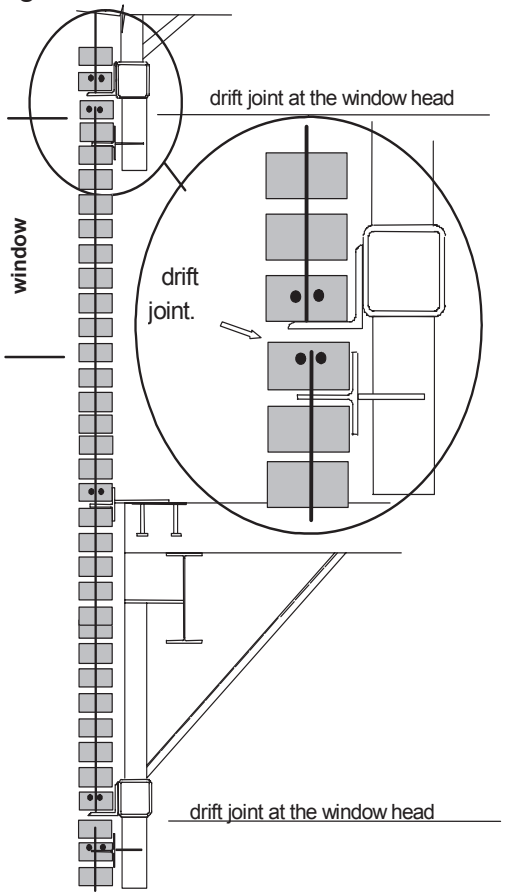


Figure 17 Project 1 – Pier Concept Between Windows

The brick masonry is supported on continuous angles located at the window head. These angles, or ledgers, are supported on a girt system suspended from hangers with kickers framing back to the underside of the slab.

Lateral bracing at the floor consists of galvanized 1/8-inch thick plate with holes for vertical reinforcement. This brace is flexible in the vertical direction and stiff in both horizontal directions.

The seismic or drift joint is located at the window head, below the ledger. The joint directly below the ledger is a caulk joint. Another lateral brace is located below the ledger. This brace is stiff perpendicular to the plane of the wall and flexible in both the horizontal in the plane of the wall and the vertical directions. This is accomplished by using a 1/8-inch thick galvanized plate with holes for the vertical reinforcement supported by two 1/8-inch thick galvanized plates welded to the bottom of the girt and welded to the plate into the brick.

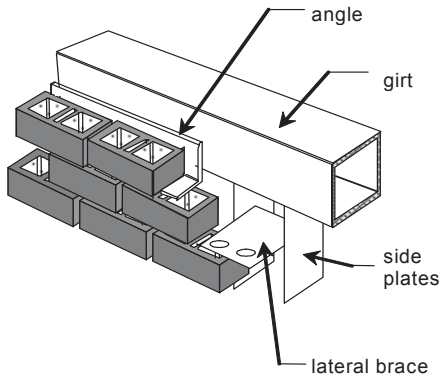


Figure 18 Lateral Connection

This configuration reduced the spans sufficiently to allow the 4" brick to resist the applied loading.

The stud wall was 26-gauge steel studs and was used only for the support of the water barrier and air barrier, and interior wallboard.



Figure 19 Drift Joint Before Ledger Installation

Dowels were welded to the ledgers, and the brick was laid by threading over the dowels. When the construction of masonry reached the head location, bars were dropped into the vertical cells and the wall solidly grouted.



Figure 20 Ledger Installation

The masonry units are nominal 4x4x12 inch with two 1-3/4 x 3-1/2 inch cells. The design f'_m was 4,000 psi .

Project 2

The second project is also a hospital addition located in an area of high seismic risk. The hospital program and site generated a geometric shape consisting of several boxy wings. A brick wall was chosen to match the old building.

The boxy nature of the floor plan made isolation for seismic lateral displacements nearly impossible with conventional veneer construction. Structural Brick Veneer was chosen because of its ability to isolate the brick veneer from the building.



Figure 21 Project 2

This Structural Brick Veneer was designed to accommodate a large lateral

seismic displacement. The building structure was a steel moment frame in one direction and a steel braced frame in the other. Because of the many corners, an unconventional approach to the isolation was used. The concept was to build a Structural Brick Veneer box in the shape of the outside wall. The box was one floor tall extending several courses above the window at the next floor. The box was then attached to the building so that it moved with each floor. The dead load support was at the floor.

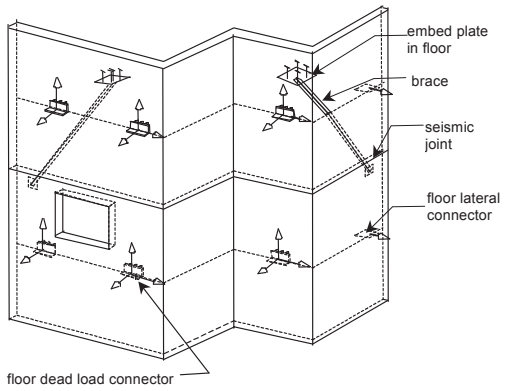


Figure 22 Hospital with Many Corners

The corners of the box resisted the wind and seismic loading perpendicular to the surfaces of the wall. The reaction of the wind and seismic load occurs in the dead load anchors as shear and over-turning. Where corners were spaced too far apart to span between them, braces were added to the underside of the slab for the floor above at a sufficient distance from the corners to accommodate the differential horizontal movement of the floor by warping of the masonry.

When the building moves laterally, the rigid corners are unaffected and the under-floor braces cause warping of the wall. The displacement perpendicular to the wall caused by the brace is at a sufficient distance from the corner to warp the wall without failure.

Continuous ledgers were not used in this situation because they would not provide adequate strength to resist the overturning forces. Consequently, the normal construction sequence needed to be modified.

The construction proceeded as follows: Beginning from the masonry below, rigid foam board was placed on the brick. Brick was then laid on top of the foam board for a height of two feet above the floor. This masonry engaged the dead load connector. At this time, the wall was grouted and allowed to cure for three days. Masonry was then laid to several courses above the window head and the process repeated for each floor. Caulk was placed over the face of the foam board that was left in the wall.

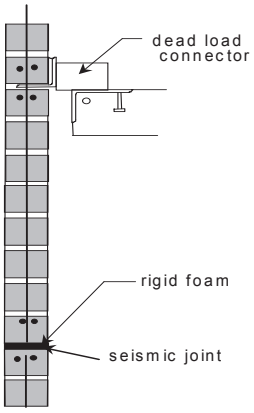


Figure 23 Temporary Rigid Foam Board Support

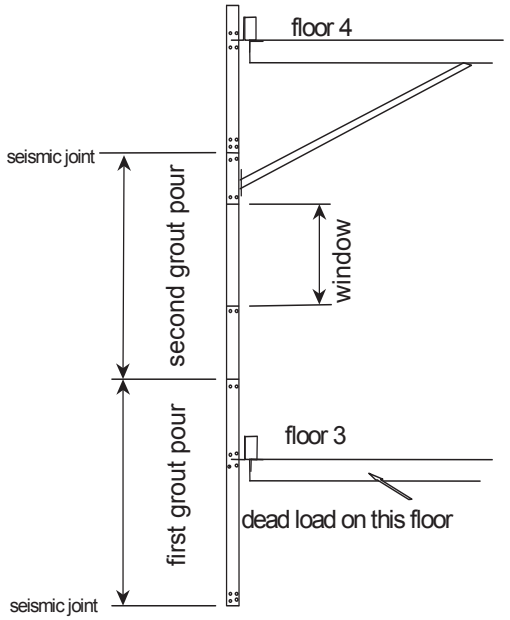


Figure 24 Construction Sequence

The design used isolated connectors instead of a ledger because, under lateral load conditions, the wall produced uplift on the floor and it was felt that the best design was to provide specific points for these forces to be reacted. The corners provide much of the needed lateral bracing, thus the number of connectors to the structure is relatively few.

The brick was a 5-inch unit. Custom shapes were provided. Additionally, the project used prefabricated Structural Brick Veneer (brick panels) where scaffolding was difficult to install or where the support of the brick was not available.

Project 3

A final example is a combination of laid-in-place Structural Brick Veneer and prefabricated Structural Brick Veneer or brick panels. Brick panels are similar to precast concrete panels except they are constructed of reinforced brick instead of reinforced concrete. The project was built on fill with friction piling used to support the load. The foundation design was such that ½ inch of differential settlement was expected in 50 feet. The building frame was a combination of steel and wood. The corners could be damaged in a moderate earthquake. The typical wall elevation is shown in the following Figure 25.

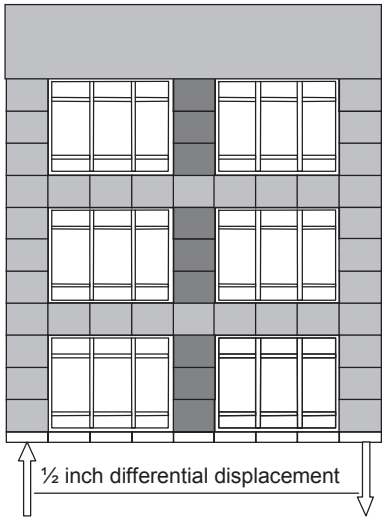


Figure 25 Building with Anticipated Differential Settlement

The solution was to use Structural Brick Veneer column elements with the dead load supported at the foundation. Lateral bracing was provided at each floor. Brick

panels were hung off the Structural Brick Veneer columns with connectors that allowed them to pivot while being stiff for loads perpendicular to the surface.

The columns were constructed of 8" brick and reinforced. They supported the entire dead load of the wall, but the lateral connectors to the building were flexible in the vertical directions so that none of the building dead load was supported on the brick. The panels were constructed of 4" brick. They were shipped 600 miles from the fabrication yard to the building location.

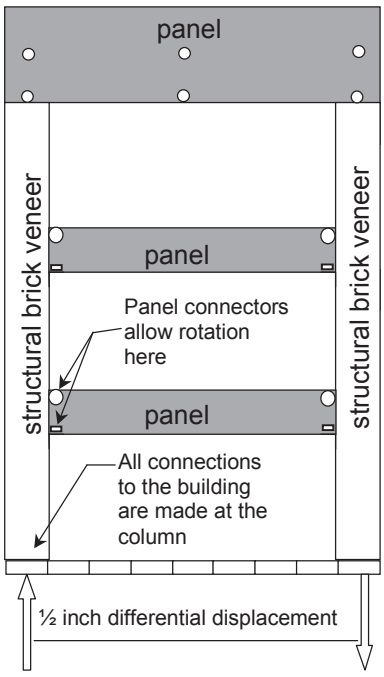


Figure 26 Concept for Settlement

3.3.2 Design for Code Loading

The reinforcement size and spacing are typically determined by conventional allowable stress design. Maximum moments usually occur at mid-span for simple configurations or at connectors for cantilevered configurations. Both horizontal and vertical reinforcement should be provided because most walls behave as plates with moments in both directions. The design often proceeds, however, by assuming simple spans with full loading in each direction.

Maximum spacing of reinforcement should be less than 4 feet with 3 feet a common value. Typically, bar sizes are No. 3 and 4 bars in 4 inch walls and No. 3, 4 and 5 bars in 5 inch and 6 inch walls.

In areas of high shear, additional reinforcement may be required. Reinforcement should also surround connectors and openings.

3.3.3 Design for Wall Cracking

An important performance criterion is to prevent the cracking of brick. This condition usually is not a structural problem for reinforced brick masonry. But, it is an aesthetic problem. The design for this performance criterion is typically done as follows:

To prevent cracking of the brick, the moments in the horizontal direction (stiff direction) are compared to the resistance of the wall in that direction, see the following figure. Failure would involve cracking of the brick unit and the head joint. Cracking due to vertical moments would result in cracking of the horizontal bed joint which is not an aesthetic problem.

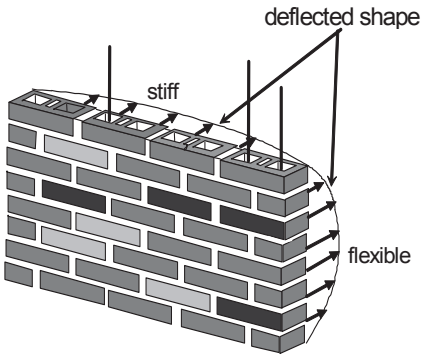


Figure 27 Stiffness of Brick Masonry

Unpublished tests and tests performed by Western States Clay Products in the early 1970's have shown that brick masonry in running bond direction is nearly 10 times as stiff as brick masonry in the vertical direction. For normal brick orientations, loads tend to run horizontally to the supports.

Most code wind loading is based on a mean return period of 50 years and this often represents a reasonable level of wind loading expected once in the life of the average building. However, in some cases, it may be appropriate to increase or decrease these levels to better match the criteria for the project.

Seismic loading would usually correspond to the moderate level earthquake. It is probably unreasonable to design to the major level earthquake to prevent an aesthetic problem.

The resistance of the wall is provided by the masonry without consideration of the reinforcement. The masonry is assumed not cracked. Without the reinforcement, the resistance is provided by the bricks and mortar joints. It is conservative to assume that there is no capacity for the head joint to resist tension stresses, consequently all of the resistance is provided by the tensile capacity of the brick. Thus, the appropriate structural section available to resist the loading is only the brick which is normally one half the gross cross-section.

There are no national standards available to provide allowable stresses for brick in tension. The brick material supplier may have information or it may be necessary to do testing. In the absence of both, using 10% of the brick's compressive strength has generally proven conservative. Because the minimal consequences of the failure and the loading are expected to occur only once in the building life, it is recommended to use a small factor of safety on the tension capacity of the brick. A value of 1.25 has been successfully applied.

3.3.4 Design of Connections

Each configuration has a unique set of reactions for each code-required load combination. The reactions must be supported by the connectors and the structure. The connectors must be of sufficient strength and ductility to meet the capacity and ductility requirements.

Materials for Connectors

Most connectors are constructed of miscellaneous steel angles, tees and plates. For Level 1 (institutional) performance they are typically galvanized. For Level 2 (commercial) performance

they are shop painted. Stainless steel connectors are probably not warranted and there are only a few known installations.

Design Methods and Assumptions

Conventional design methods apply to the design of the connectors, except for the design of the capacity of the connector to the Structural Brick Veneer. There are several additional design considerations.

First, the connector should engage more than one brick cell. Sometimes bricks have cracks as a result of manufacturing. Concentrating loads at a single cell of the brick could, if cracked, significantly reduce the capacity. Consequently, for the design of connectors in Structural Brick Veneer, the scale of the engagement into the brick should be at least two times that usually associated with connectors engaging reinforced concrete.

Next, because of the seismic requirement for connectors, “Anchorage using flat straps embedded in concrete or masonry shall be attached to or hooked around reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel or to assure that pullout of anchorage is not the initial failure mechanism”, it is often necessary to thread reinforcement through holes placed in the steel. This may restrict the flow of grout at the connection and a recommended mitigation is to use bond beams above and/or below the connector.

Construction Tolerances

An important factor in the design of a connector is construction tolerance. Structural Brick Veneer walls are located in plane and elevation with tolerances more restrictive than the supporting structure. For example, the deviation from plumb (down the height of the building) often is limited to 1/2 inch for Structural Brick Veneer. In a steel frame at the upper floors, the tolerance on the frame is 1-1/4 inches inward and 2-1/4 inches outward. The location of the slab edge is often plus or minus 1 inch.

The elevation of the floor also varies from the planned location. There are several reasons for this. First, there is construction tolerance. Second, the floor is supported on beams that deflect due to loading. Third, there is elastic shortening of the building and for concrete buildings, there is creep and shrinkage. Again, this uncertainty of floor elevation is important to the design of the connector. These tolerances have an important design and construction impact.

The connector must be designed to accommodate these deviations in dimension. The edge of floor connector should be configured to be installable with the slab edge at either extreme of the allowed tolerance. Additionally, the strength of the connector should be adequate to support the loads with the most unfavorable combination of element locations.

The configuration of the connector is often dictated by the tolerance requirements, and the resulting load eccentrici-

ties often (to the untrained eye) appear to oversize the connections.

3.4 Design Examples

Three design examples are presented. The first is a strip spandrel configuration supported on a continuous ledger. The second is the same except the veneer is supported on separate floor dead load connectors. The third example addresses seismic displacement design at a Structural Brick Veneer corner.

3.4.1 Example 1

This example is very simple and unlikely to occur in actual practice. The designer is cautioned not to apply the methods and equations contained in this example to other applications. The purpose of the example is to demonstrate a sequence of assumptions and analysis appropriate for this simple design. Different assumptions and analysis methods should be used when the design changes.

A four-story office building with a “strip window” system serves as a common application. The story height is 12'-6", the window height is 6'-0" and the sill height is 2'-6". The wind load is 30 psf and the building is classified as seismic design category D. The wind load of 30 psf (according to most codes) is typically larger than the seismic inertia load perpendicular to the surface of the veneer and this is assumed for this example. Floor to floor drift isolation is provided by a slip joint in the window head. Warping of the glass accommodates drift at the building corners. In other words, the brick corner remains rigid and moves with the floor to which it is attached.

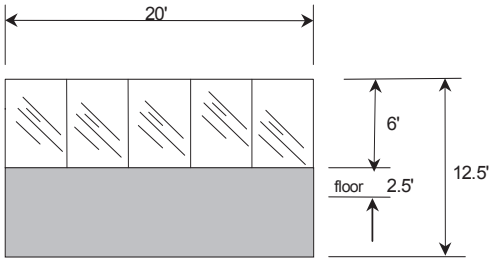


Figure 28 Strip System Example

A continuous ledger system is hung from the bottom of the spandrel beam and braced to the underside of the floor.

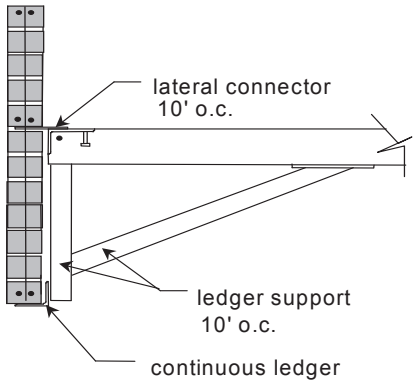


Figure 29 Support for the Wall

The hanger and brace are located at 10 feet on center. This matches the purlin spacing when the floor spans in the direction parallel to the edge of the slab. Assume 4-inch hollow brick is used. The actual thickness is 3.5 inches and the depth of the reinforcement from the surface is 1.75 inches.

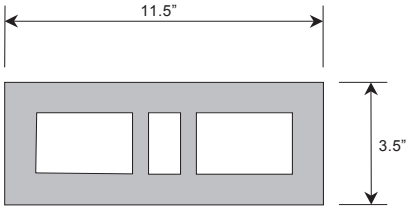


Figure 30 Brick Used in the Example

The design might proceed as follows:

The dead load on the ledger includes the weight of the brick veneer and the windows.

Wall = 40 psf x 6.5 ft = 260plf
Window = 6 psf x 6 ft = 36 plf

Total = 296 plf

Since the hangers are spaced at 10 feet, the hanger vertical load is:

296 plf x 10 ft = 2960 lbs

The ledger is designed to span between supports. In Structural Brick Veneer, the brick can also be used to span if shoring is used during construction. Assume the brick is used to span between supports, then try (2) #3 in a bond beam at the first course above the ledger.

The bending due to dead load is:

$M_A = W L^2 / 8$
$M_A = 296plf \times 10^2 ft /8 = 3700 lb\text{-}ft$

The steel ratio “ρ“ is used to calculate the capacity to resist the loading.

$\rho = A_s / bd$

Where A_s is the area of flexural reinforcement, b is the width or thickness of the masonry and d is the depth of the flexural element from the extreme compression fiber to the centroid of the reinforcement.

$\rho = .22 in^2 /(3.5 \times (78 - 4))$

$\rho = .00085$

Assume the masonry modulus of elasticity is 3,000,000 psi, and the steel modulus of elasticity is 29,000,000 psi then the modular ratio between the reinforcement and the masonry is:

$n = Es/ E_m = 9.67$

and then

$n\rho = .00085 \times 9.67 = .0082$

Most codes allow a design flexural stress for grade 60 reinforcement as:

$F_s = 24,000$ psi

Similarly, the allowable masonry stress is 1/3 the specified strength. If 4000 psi is specified, then the allowable flexural masonry compression stress is:

$F_b = 4000/3 = 1333$ psi

By summing forces in the direction along the flexural element, the following

expression for the location of the neutral axis can be obtained:

$$k = [(n\rho)^2+2n\rho]^{1/2} - n\rho$$

$$k = .12$$

A convenient term "j" is defined as:

$$j = (1 - k / 3) = .96$$

The moment capacity limited by the allowable reinforcement stress is defined as:

$$M_t = A_s\ j\ d\ F_s$$

Thus:

$$M_t = .22 \times .96 \times 74 \times 24000/12$$

$$M_t = 31{,}200 \text{ lb-ft}$$

The moment capacity limited by the allowable compression stress in the masonry is defined as:

$$M_c = bd^2kj\ F_b / 2$$

$$M_c = 3.5 \times 74^2 \times .12 \times .96 \times 1333/(2 \times 12)$$

$$M_c = 122{,}600 \text{ lb-ft}$$

Since both M_t and M_c are greater than the applied moment, M_a, the two #3 bars provide more than adequate vertical support between ledger hangers.

If shoring is provided, a similar calculation would show that the vertical support could be extended to 20 feet or more and the weight of the wall reacted at the building columns.

However, as will be seen later, the lateral support (for wind and seismic loading) will need to be 10 foot. Thus, the hanger could be spaced at 20′, but the braces back to the underside of the slab will need to be at 10′.

The wind load on the wall is 30 psf. This load acts perpendicular to the surface of the brick and the window.

Assume floor connections are spaced at 10 foot at the same location as the lateral support of the ledger.

The floor reaction is found by summing moments about the ledger:

The reaction of the window at the sill (top of the brick) is:

$$R_w = 3 \text{ ft} \times 30 \text{ psf} = 90 \text{ lb/ft}$$

The resulting moment about the ledger is:

$$M_w = 90 \text{ lb/ft} \times 6.5 \text{ ft} = 585 \text{ lb-ft/ft}$$

The moment about the ledger due to the wind loading on the brick is:

$$M_b = 30 \text{ psf} \times 6.5 \text{ ft} \times 6.5 \text{ ft} / 2$$

$$M_b = 634 \text{ lb-ft/ft}$$

The reaction resists the moments and is calculated as:

$$R_F = [\ M_b + M_w\ ] / 4$$

$$R_F = [\ 634 + 585\ ] / 4$$

$$R_F = 304.7 \text{ lb-ft/ft}$$

Since the spacing of the connectors is at 10 feet on center, the connector reaction is:

R_F = 3047 lbs

By summing forces perpendicular to the surface of the brick, the ledger lateral reaction is:

R_L = 12.5 ft x 30 psf x 10 ft - R_F

R_L = 703 lbs

Drawing the shear and moment diagrams reveals that the maximum moment occurs at the floor and is equal to the moment on the brick due to the window sill load plus the moment on the brick due to the wind on the brick:

M_w = 30 psf x 3 ft x2.5 ft

M_w = 225 lb-ft/ft

M_b = 30 psf x 2.5 ft x 2.5 ft / 2

M_b = 93.75 lb-ft/ft

$M_a = M_w + M_b$

Thus:

M_a = 318.75 lb-ft/ft

and over the 10 foot spacing becomes:

M_a = 3187.5 lb-ft

An estimate of the required reinforcement can be obtained as follows:

$A_S \cong M_a / [.9 F_s d]$

$A_S \cong$ (3187.5 x 12)/[.9 x 24,000 x 1.33 x 1.75]

$A_S \cong .75$ in^2

Where the design depth is one-half the wall thickness (1.75 inches), and the stress has been increased by 1/3 for wind short duration loading.

Try (4) #4 bars. The brick module is 6 inches. The code allows an effective width for bending of six times the thickness of the wall. The width for design can be obtained by laying out the bars in the brick cells:

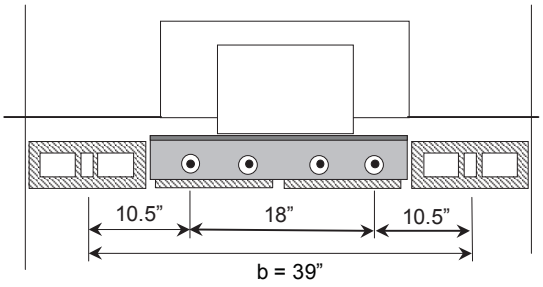


Figure 31 Plan View of Connector

And:

$\rho = A_s / bd$

$\rho = 4$ x.2 in^2 /(1.75 in x 39 in)

$\rho = .0117$

$n\rho = .113$, $k = .37$ $j = .87$

The moment limited by the allowable stress in the reinforcement is:

$M_t = A_s\ j\ d\ F_s$

$M_t = .8 \times .87 \times 1.75 \times 24{,}000 \times 1.33 / 12$

$M_t = 3250$ lb-ft

The moment limited by the allowable stress in the masonry is:

$M_c = bd^2kj\ F_b / 2$

$M_c = 39 \times 1.75^2 \times .37 \times .87 \times 4000 \times 1.33/(3 \times 2 \times 12)$

$M_c = 2840$ lb-ft n.g.

Compression at the floor in the brick is often the limiting factor.

Add (2) #4 bars for a total of 6 bars. Then

$b = 6 \times 3.5 + 5 \times 6 = 51$ in.

$n\rho = (9.67 \times 6 \times .2)/(1.75 \times 51)$

$n\rho = .13$

$k = .40 \quad j = .87$

$M_t = 4870$ lb-ft ok

$M_c = 4025$ lb-ft ok

The wind loading must span horizontally 10 feet to the vertical connector strips. Assume the window head reaction is reacted by the lateral bracing and the ledger, and the window sill reaction is reacted by the brick, then the moment in the brick is the moment caused by the window and the moment caused by the wind load on the brick.

$M_w = 30$ psf $\times$ 3 ft $\times\ 10^2 / 8$

$M_b = 30$ psf $\times$ 6.5 ft $\times\ 10^2 / 8$

$M_a = M_w + M_b$

$M_a = 3562$ lb-ft

Assume (5) bond beams with (2) #3 in each, then:

$A_s = 1.10$ in^2

$\rho = 1.10/(78 \times 1.75)$

$\rho = .00805$

$n\rho = .078, \quad k = .32 \quad j = .89$

$M_t = 1.10 \times .89 \times 1.75 \times 24000 \times 1.33 / 12$

$M_t = 4567$ lb-ft ok

$M_c = 78 \times 1.75^2 \times .32 \times .89 \times 1333 \times 1.33/(2 \times 12)$

$M_c = 5038$ lb-ft ok

The condition of dead load plus wind is satisfied by inspection, but can be checked as follows:

$[M_a/(M_t \text{ or } M_c)]_{\text{dead}} + [M_a/(M_t \text{ or } M_c)]_{\text{wind}} < 1.0$

$3700/3120 + 3562/4567 = .89 < 1.0$

The condition of inertia seismic and dead load is also satisfied by inspection since the inertia seismic load was assumed less than the 30 psf wind load. This conclusion by inspection can easily be made when designing the veneer, but should not be so easily made when designing connectors. This is because most seismic codes have special load factors and additional criteria for seismic connector design that are not typical for the wind design of a connector.

The final check is for cracking of the brick.

Assume a service load of 15 psf. The value selected should relate to the design life and the performance criteria selected for the project.

The uniform horizontal loading of the strip between the connectors is a result of the wind load acting on the windows and brick. The moment is estimated as:

$$M_w = 15 \text{ psf} \times 3 \text{ ft} \times 10^2 / 8$$

$$M_w = 562.5 \text{ lb-ft}$$

$$M_b = 15 \text{ psf} \times 6.5 \text{ ft} \times 10^2 / 8$$

$$M_b = 1218.7 \text{ lb-ft}$$

$$M_a = M_w + M_b$$

$$M_a = 1782 \text{ lb-ft}$$

The section available to resist the moment is estimated as half the wall height since half of that height is head joints.

$$I = b\, t^3 / 12$$

$$I = (78/2) \times 3.5^3 / 12 = 139.3 \text{ in}^4$$

The stress is:

$$\sigma = Mc/I$$

$$\sigma = 1782 \times 12 \times 1.75 / 139.3$$

$$\sigma = 269 \text{ psi}$$

The brick unit should have a tensile strength in excess of 269 psi times the factor of safety. If 1.25 is used, then the tensile strength needs to exceed 335 psi.

According to an unpublished test and experience, to achieve an f'_m of 4000 psi the brick strength probably exceeds 10,000 psi. Using the 10% rule of thumb, the expected tensile strength of the brick is 1000 psi.

A simple lateral connector at the floor is shown in the following figure. It consists of an embedded WT 4 x 5 with a coupler welded to the flange for the attachment of a rod.

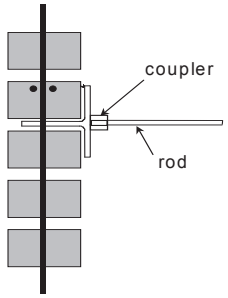


Figure 32 Simple Lateral Connector

The length of the tee will need to be determined based on the loads applied. To start, assume the tee is 22 inches long. The tee contains four 1-inch diameter holes for reinforcement placement. The capacity of the connector can be estimated by using a shear cone.

Assuming the shear cone originates at the bar then the height of the cone is:

$$h = 1.75 + .25 = 2.0 \text{ inches}$$

Assuming a 20 degree slope at the edge of the cone, the approximate surface area of the cone is:

$$A = \text{Length} \times \text{width} \times 2$$

$$A = \{2.0 / \cos 20^{\circ}\} \times 22 \times 2$$

The ends of the cone are neglected, but can be added if the capacity is insufficient.

$$A = 94 \text{ square inches}$$

Assuming the shear allowable is the same as the maximum shear allowable for beams of 50 psi (the masonry design strength exceeds 2500 psi and the 1/3 stress increase is used) then the allowable for the connector for pull-out is:

$$P = A \times 50 \text{ psi} \times 1.33$$

$$P = 94 \times 50 \times 1.33 = 6250 \text{ Lbs}$$

Another failure mode is the connector breaking the bond between the steel and masonry. The area of contact is:

$$A = \text{Length} \times \text{width} \times 2$$

$$A = 2.75 \times 22 \times 2 = 121 \text{ in}^2$$

The bond strength is assumed to be 60 psi plus the 1/3 stress increase. Thus, the capacity of the connector is estimated as:

$$P = A \times 60 \times 1.33$$

$$P = 121 \times 60 \times 1.33 = 9656 \text{ lbs}$$

The shear friction check results in:

$$A_v = V_u / \phi F_y$$

or

$$V_u = \phi A_v F_y$$

$$V_u = .4 \times 4x.2 \times 60{,}000$$

$$V_u = 19{,}200 \text{ lbs}$$

$$V = V_u / 2 = 9600 \text{ lbs}$$

The lowest allowable load is 6250 lbs compared to the applied wind load of 3047 lbs. A 10-inch long anchor would likely supply sufficient capacity, but only two of the six bars would be engaged making the design for ductility questionable.

It is assumed that the code level seismic inertial force is .315 times the force of gravity. The working stress design inertia loading is .315/1.4 or .225 times gravity. The brick weight is approximately 40 psf resulting in a surface inertial load of 9 psf and a reaction of 3047 x 9 / 30 or 914 lbs. The connector factor of safety exceeds 7 for code level seismic loads. This satisfies the additional seismic criteria for connectors by inspection.

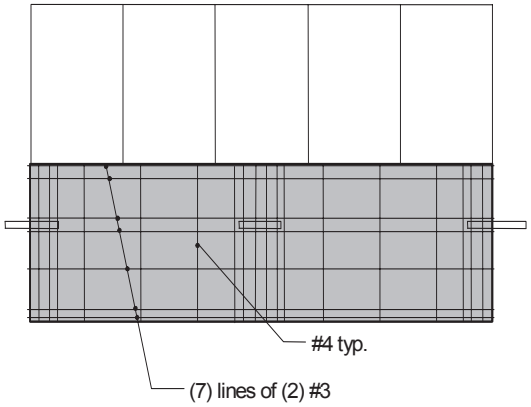


Figure 33 Final Design

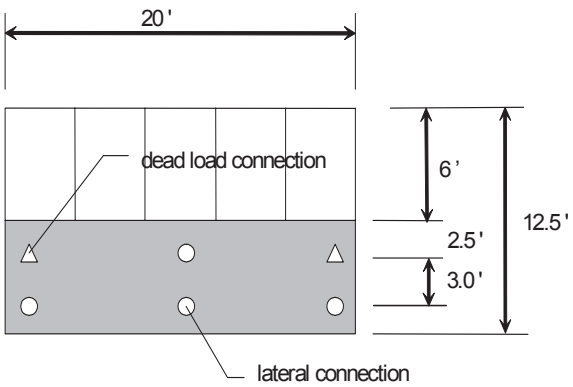


Figure 34 Location of Connectors

Limited testing of connectors has been conducted. One recent test conducted by Western States Clay Products Association validated the design methods for the connection shown above. Other tests specific to special connections on projects have been conducted. They are unpublished, but also verify the above methods.

3.4.2 Example 2

The same strip window system is used for Example 2 except that the dead load support is now on separated connectors located at the floor. Shoring will be used to construct the wall. The design example is for the in-place condition only. In actual practice, the designer of the Structural Brick Veneer would design the system for the shoring conditions as well as the in-place condition.

The following figure presents the new layout of the connections.

The veneer is assumed to have a vertical expansion joint at 20 feet on center. From the previous example, the horizontal span of the brick is limited to less than 10 feet. Thus, a lateral anchor at the floor and a brace will be required at the mid point of the panel.

The design dead load, after the wall is constructed, is the same as the previous example.

Placing the dead load anchors away from the columns will avoid interference with the building structure and make the installation easier. Assume the dead load anchors are placed at 2 feet from the column line. A vertical expansion joint is assumed at the column. The 2 feet dimension was chosen as the center of the head joint so that the connector is centered on the head joint and an even number of bars will pass through the connector. If an odd number of bars passes through the connector, then the anchor would be located at the center of a cell. Two feet three inches or

two feet nine inches from the expansion joint would be examples.
`

The reaction load on the dead load connector is:

$$R = w \times L / 2$$

$$R = 296 \times 20 \text{ ft} / 2 = 2960 \text{ lbs}$$

The maximum moment occurs at the mid span and is:

$$M_a = R \times \{L/2-s\} - W \times \{L/2\}^2 / 2$$

$$M_a = 2960 \times (10 - 2) - 296 \times 10^2 / 2$$

$$M_a = 8880 \text{ lb-ft}$$

From the previous example, the wall can support this load.

The bending out of plane on the wall due to wind is assumed reacted by braces one foot above the bottom of the brick and at the floor. The reaction at the floor can be found by summing moments about the location of the brace as follows:

$M_w = 30 \text{ psf} \times 3 \times [5.5 - 1] \text{ft}$

$$M_w = 405 \text{ lb-ft/ft}$$

$$M_b = 30 \text{ psf} \times [5.5^2 / 2 - 1^2 / 2] \text{ ft}^2$$

$$M_b = 438.75 \text{ lb-ft/ft}$$

$$R_{Floor} = [M_w + M_b] / 3$$

$$R_{Floor} = 281 \text{ lbs/ft}$$

Summing forces perpendicular to the veneer results in the horizontal brace force:

$$R_{brace} = 30 \times 12.5 - 281 = 94 \text{ lb/ft}$$

The maximum moment again occurs at the floor line and is:

$$M_a = 30 \times 3 \times 2.5 + [30 \times 2.5^2] / 2$$

$$M_a = 318.8 \text{ ft-lb/ft}$$

The contributing length of veneer for the dead load connector is about 6 feet consisting of the 2 feet of cantilever and half the distance to the center connector. The design moment is:

$$M_a = 318 \times 6 = 1908 \text{ lf-ft}$$

The layout of the connector at the column is shown in the following figure and results in 5 contributing #4 bars.

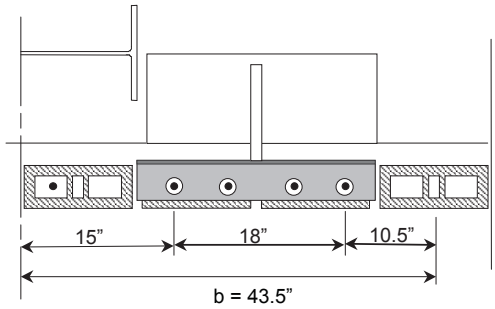


Figure 35 Plan View of Connector

Thus:

$$b = 43.5 \text{ in.}$$

$$A_s = 1.0 \text{ in}^2$$

$\rho = 1.0/(43.5 \times 1.75)$

$\rho = .013$

$n\rho = .127, \quad k = .39 \quad j = .87$

$M_t = 1.0 \times .87 \times 1.75 \times 24000 \times 1.33 / 12$

$M_t = 4060$ lb-ft ok

$M_c = 43.5 \times 1.75^2 \times .39 \times .87 \times 1333 \times 1.33/(2 \times 12)$

$M_c = 3347$ lb-ft ok

But, this may not be the only out-of plane moment in the masonry. Depending on the connector design, there could also be a significant moment added into the masonry as a result of dead load eccentricity

The connector will be designed next. Assume a configuration as shown in the following figure:

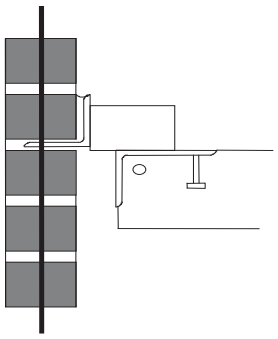


Figure 36 Dead Load Connector

The vertical reaction is 2960 lbs and the wind reaction is 6 feet x 281 lb/ft = 1686 lbs.

The eccentricity of the dead load is important to the design. It is calculated assuming an edge of slab tolerance of 1 inch as shown in the following figure.

$e = 3.5/2 + 1\ 1/2 + 1$ (tol.) $+ 3.0/2$

$e = 5.75$ in.

The resulting eccentric moment can be reacted either in the brick veneer or in the floor slab or by both. When the wall is shored, the connector installed and the shoring removed, the eccentric moment is reacted by both the wall and the floor slab. The amount of moment in each is very difficult to determine and will depend on the stiffness of the shoring as well as the manner in which the wall is built.

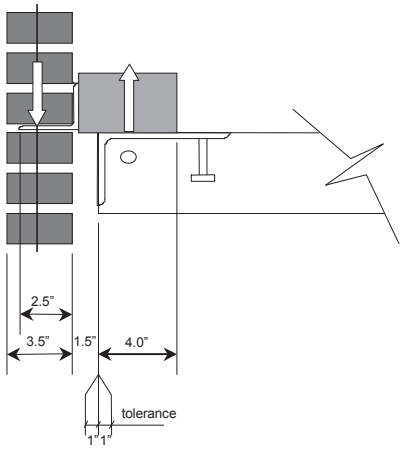


Figure 37 Dead Load Moment

A conservative approach to the design is to design assuming all of the moment is in the brick veneer and then assume all of the moment is in the floor. We will first assume the moment is in the brick veneer.

Assume the connector design is controlled by the combined dead load and wind condition. From the previous example, the dead load on the anchor is 2960 lbs.

The moment is in the brick wall, thus:

M_a = 2960 x 5.75 in

M_a = 17,202 lb-in

This moment should be combined with the wind moment resulting in:

M_a = 17,202 + 1908 x 12

M_a = 40,100 lb-in or 3340 lb-ft

The previous design using (5) #4 bars provides adequate resistance.

Now, check the local capacity of the connector to transfer the load into the veneer. Assume the moment is inserted into the veneer wall by forces consisting of shear on the horizontal leg of the angle and bearing on the vertical leg of the angle. If a triangular distribution of bearing on the vertical leg is assumed, the force is:

P = 17,202 / (6 x 2/3)

P = 4,255 lbs

Note that the moment due to wind is not included. The wind load moment is already in the veneer. The reaction of the wind at the floor must, however, be added to the horizontal leg of the angle.

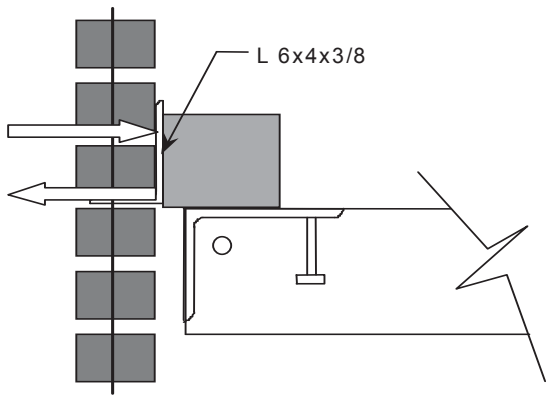


Figure 38 Resisting Moment

P = 4255 lb + 281 lb/ft x 6 ft

P = 5942 lbs

Assume the failure is in the bond between the horizontal leg of the angle and the masonry. Using 60 psi shear allowable and 2.5 inch contact length, both top and bottom, the required length of contact is:

L = 5942 / (2.5 x 2x 60 x 1.33)

L = 14.8 in

Or, using the cone pull-out check the length becomes:

P =2 x (d/cos 20^0) x L x 50 x 1.33

L = P / (141.5 x d)

L = 5942 / (141.5 x 2.0)

L = 21 in.

Therefore use a 24 inch long angle.

The shear friction method can also be used:

$A_v = V_u / \phi F_y$

or

$V_u = \phi A_v F_y$

$V_u = .4 \times 6x.2 \times 60{,}000$

$V_u = 28{,}800$ lbs

$P = 28{,}800 / 2 = 14{,}400$ lbs ok

The 2003 International Building Code requires the fasteners and body of the connector to be designed to equation 9.6.1.3-2 which is a maximum value. Lower values are likely for many structures using equation 9.6.1.3-1.

$F_p = 1.6 S_{DS} I_p W_p$

Using $S_{DS} = .75$ (a high value)

$F_p = 1.65 \times .75 \times 1.0 \times W_p$

$F_p = 1.24 \times 40$ psf $= 49.6$ psf

the design level is:

$F = 49.6$ psf $/ 1.4 = 36$ psf.

This is higher than the design wind load of 30 psf and controls.

$P = 4255$ lb $+ 281 \times \{36/30\} \times 6$

$P = 6278$ lbs

$L = 6278 / (141.5 \times 2.0)$

$L = 22$ in.

Use a 24 inch angle.

The bearing of the brick wall on the horizontal leg of the angle is seldom limiting in design and is satisfied here by inspection.

Now check assuming the moment is in the floor. By inspection, the brick veneer is adequate. The design of the plate, welds and embedded plate is all that is required. Assume the worst situation of the tolerance for the edge of slab results is 3 inches of connection between the slab embed and the plate.

The analysis is the same as would be performed for a precast concrete panel or other wall system. Examples can be found in many references.

The design results in a ½ inch thick vertical plate. The weld on the vertical leg of the angle should also be a 3/8 inch fillet 4 inches long on both sides. And the weld on the plate to the embed should be a 3/8 inch fillet 3 inches long on both sides.

Notice that the size of the weld exceeds the thickness of the plate. This is because the design factors of safety for the weld loaded by seismic forces was assumed larger than that required for the body of the connection.

The 24 inch angle is a conservative size since both the brick and slab connection are designed for the moment. If a more detailed analysis were made, the length of the angle could probably be reduced. The cost savings, however, would likely not justify the reduction in capacity.

3.4.3 Example 3

The final example will demonstrate the design of a corner for seismic isolation. Assume a 12'-6" story height. The corner is constructed of Structural Brick Veneer with a width of 10 feet from the corner. Given that the elastic seismic drift is .31 inch, the building is a specially reinforced concrete moment frame with a C_d of 5.5, and assuming the building is a hospital with the corner above the emergency entrance, the maximum expected floor drift is:

Δ = 5.5 x .31 = 1.7 inches

The corner can support part of the wind loading, but a lateral connector will be needed 10 feet away from the corner.

Since the brick is 10 times stiffer in the running bond direction, most of the resistance to the movement is reacted at the corner.

The analysis of this corner displacement is complex. It can be visualized by considering a flat rectangular panel of veneer 12'-6" by 10 feet laid flat horizontally on the floor with anchors at the corners. The analogous displacement is to lifting up one of the four corners of the flat panel while the other three are held to the floor.

The load deflection calculation for this condition is complex and includes bending in two axis and torsion. And, again the veneer is not isotropic.

Making a simplifying assumption that half the height participates with bending about the stiff direction only, then the load required to deflect the wall 1.7 inches is calculated as follows:

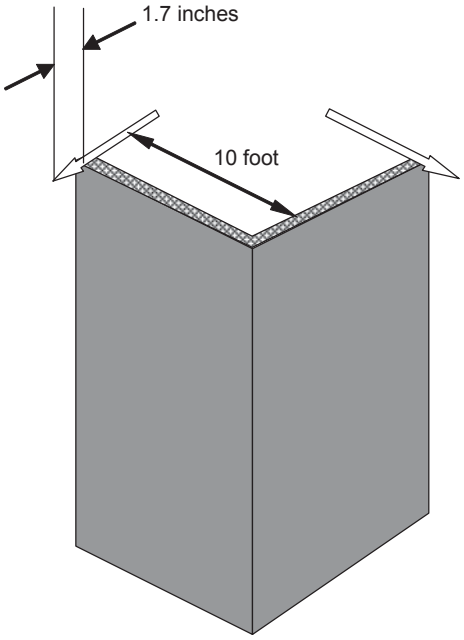


Figure 39 Warping Corner

$\Delta = PL^3/(3 \times E_m \times I)$

The head joints are assumed cracked so the contribution of the wall is half.

$I = 1/12 \times \{(6' - 3'') / 2\} \times 3.5^3$

$I = 134 \text{ in}^4$

Δ = 1.7 inches

$P = 1.7 \times 3 \times 3{,}000{,}000 \times 134 / (120^3)$

P = 1186 lbs

The resulting stress in the brick is:

$$\sigma = M\ c / I$$
$$\sigma = 1186 \times 120 \times 1.75 / 134$$

$$\sigma = 1860 \text{ psi}$$

If the entire wall height were assumed to resist the displacement, the stress would not change because the stiffness increases in proportion. Because the stress exceeds the likely tensile capacity of the brick, the wall will crack.

This is acceptable according to our criteria provided the panel remains intact. Notice that the wall will likely remain uncracked for half the ultimate displacement resulting in no damage.

Reinforcement will be required to hold the panel together.

Sufficient reinforcement must be provided to assure ductile behavior. The cracking moment is:

$$M = (1186 \times 1000 \text{ psi}) / 1860) \times 10 \times 12$$

$$M = 76{,}500 \text{ lb-in}$$

Where the tensile capacity of the brick is assumed to be 1000 psi.

The estimate of the reinforcement is:

$$A_s = 76{,}500 / (60{,}000 \times 1.75)$$

$$A_s = .72 \text{ in}^2$$

Four bond beams with two #3 bars will be sufficient. Notice that 60,000 psi was used for the steel stress. The assumed yield strength should be compared to the ultimate cracking strength since this part of the design is for ultimate seismic.

4.0 Specification

The Structural Brick Veneer System consists of several components that must be specified and detailed. The following discussion should help in this process.

4.1 Quality Control and Assurance

According to the International Building Code and ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structure,* the designer needs to specify the required inspections and quality control tests. Structural Brick Veneer projects are designed either in accordance with Chapter 2 or Chapter 3 of ACI 530-02/ASCE 5-02/TMS 402-02 or Sections 2106, 2107 or 2108 of the International Code.

The International Code requires inspections at Level 1 (Table 1704.5.1) for non-essential facilities and Level 2 (Table 1704.5.3) for essential facilities. These tables identify activities requiring full time and periodic inspection during construction.

It is recommended that prism tests for each 5000 square foot of wall be performed in accordance with Level 3 quality assurance (Table 1.15.3) in ACI 530-02/ASCE 5-02/TMS 402-02. The verification of f'_m can be either by prism test or the unit strength method.

4.2 Masonry

Generally, brick is selected for its color, texture, and size. The most common brick specified is ASTM C 652 Hollow Brick. More detailed information about the hollow brick can be found at:

http://www.bia.org/html/frmset_thnt.htm, Technical Note 41 Hollow Brick Masonry.

Most Structural Brick Veneers are constructed of bricks with nominal thickness of 4, 5 or 6 inch.

Mortar should be Type S, Portland cement, hydrated lime, and sand. Type S mortar exhibits higher flexural bond strength while providing sufficient compressive strength. Type M mortar is generally too stiff at the time of laying to result in good bond, and thus may leak more and is harder to clean.

The durability of the wall is highly influenced by the quality of the mortar joints. Care should be taken to ensure that dense joints are achieved. Joints should be tooled to a concave or "V" finish to densify the mortar surface and improve bond between the mortar and the brick. If raked joints are desired, a "deep V" may achieve the effect. Simple raked joints must be tooled after raking.

Grout is the material placed in the cells of the brick. The proportions are similar to mortar, except that sufficient water has been added to provide a fluid consistency. Grout should be poured in brick masonry with a slump exceeding 10 inches.



Figure 40 Fluid Grout

The excess water in the grout is absorbed into the brick before hydration. Reconsolidation of the grout is required to remove the voids left by the water absorbed into the brick. The specification should require reconsolidation or the additive Grout Aid.

It is recommended to add Sika Grout Aid to all installations. This is a proprietary product, but the only one known to be specifically designed for addition to grout. More information can be obtained at:

http://www.sikaconstruction.com/con/con-admixture_in_con-prod-category-ga.htm

Sika Grout Aid is a balanced blend of expanding, retarding and water-reducing agents for Portland cement grouts. It provides a slow, controlled expansion prior to the grout hardening.

Other manufacturers claim equivalence, but often lack test data to support product performance. In structural brick

masonry, the important property of the grout is to fill all of the space and voids, and to make the connection between the reinforcement and the brick unit. The strength is of secondary importance, since the brick unit compression strengths typically exceed 8000 psi.

If an additive other than the Sika Grout Aid is used, a test should be performed to assure filling of the space and bonding to the units and reinforcement. This likely means the preparing of a grout sample panel and cutting it after curing to visually confirm the performance.

The reinforcement is usually specified as ASTM A 615 Grade 60. Deformed bars are required and sizes are limited by the thickness of the wall. Generally, bars larger than No. 5 are not used. When reinforcement is to be welded, ASTM A706 bars should be specified. It is slightly more expensive but it can be welded without becoming brittle. ASTM A706 bars can be identified by a "W" mark on the bar.

Joint Reinforcement is not recommended for Level 1 projects. Experience with galvanized metal in masonry on the exterior walls indicates a life of 30 years or less.

Reinforcement bars grouted into bond beams will have an expected life greater than 30 years.

4.3 Steel for Connectors

Connectors can be designed and constructed in many forms. Most are made from ASTM A 36 structural steel angles, plate, rods, channels, tees and other available shapes. Connectors may be shop-painted for Level 2 (commercial) installations. Connectors for Level 1 (institutional) installations should be hot-dip galvanized to meet ASTM A 123 Grade 65 requirements. Connectors that are not protected can possibly corrode, stain the brick, and ultimately fail to resist the loading. Damage to galvanized coatings by welding or other field installation practices should be repaired using cold galvanizing compounds.

The use of 300 series stainless steel is generally not necessary and may be subject to galvanic corrosion if placed in contact with galvanized steel.

4.4 Flashing/Weeps

Continuous flashing is necessary for the removal of water that enters the cavity space. In masonry, water enters the surface of the wall and then gravity pulls it downward. When the masonry is interrupted by openings that provide a horizontal discontinuity, flashing is required to intercept the water and direct it out of the building.

Flashing material for the Structural Brick Veneer System is the same as the materials used in other types of brick wall construction.

Pea gravel, proprietary meshes or screens above the flashing will help to prevent mortar droppings from clogging weep holes. Weep holes should be spaced no more than 32 inches apart. Open head joint weep holes are recommended. Weep tubes and cotton wicks often fail to function when they become clogged or damaged. Screens

in open head joint weeps can be used to deter insect infestations.

It is important that the flashing extend through the thickness of the wall in order to intercept the flow. Whether or not flashing should protrude from the wall is controversial. Since the flow of water on the surface of the wall is in all directions, a flashing that protrudes from the surface intercepts the flow at caulk joint. This is the weakest point for water to penetrate the wall.

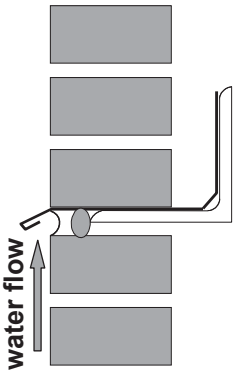


Figure 41 Protruding Flashing Detail

Flashing not protruding will allow the water to pass over the weak point. However, water intercepted by the flashing from the interior and exiting at the weep holes above the flashing may have a better chance of re-entering the building.

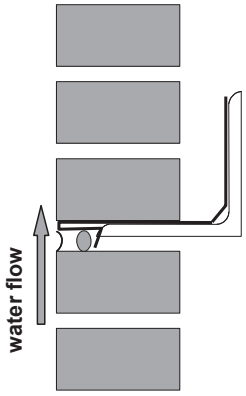


Figure 42 Flush Flashing Detail

4.5 Sealants

Sealants provide the first line of protection against rain intrusion into the system. Placement of sealants should be accomplished in conformance with the manufacturer's recommendations. Joints should be properly prepared, cleaned with solvent, primed for adhesion and backed with a backer rod.

Sealant compatibility tests (peel test) conforming to ASTM C 794 should be conducted for each type of brick unit used and all other materials in direct contact with the sealant, including flashing. The compatibility tests should also be conducted on treated (sealed) brick, unless the treatment is to be done after sealing. The compatibility tests are important to assure bond between the sealant and the brick.

4.6 Water Repellents

Water repellents are desirable for a variety of reasons. The principal reason is to limit water ingress due to wind-driven

rain. By reducing the water that enters the wall, the repellent provides several benefits, both aesthetic and related to engineering performance that would justify their use. Some of these attributes are:

1. Efflorescence control.

2. Reduction of algae growth as a result of the absence of moisture in the pores and capillaries of the masonry.

3. Atmospheric pollutants that are dissolved in precipitation are not absorbed into the masonry.

4. Freeze-thaw damage is reduced when there is no water in the substrate to freeze.

5. Thermal efficiencies of the masonry wall are maintained since water is a good thermal conductor.

Although a number of technologies have been utilized in the formation of masonry water repellents, silane/siloxane monomer and polymer blends have a proven track record. In the Pacific Northwest where there are heavy wind-driven rains, Fabrishield 761 silane/siloxane water repellent has been proven over time to be an excellent clear water repellent. These types of water repellents are formulated to penetrate into the pores and capillaries of the masonry assembly where they react with the moisture and alkalinity and actually chemically fuse onto the mineral material in the linings of the pores and capillaries. During this chemical bonding process, a conversion occurs in the repellent material that fully develops the hydro phobic (water repellent) properties.

An additional benefit to the manner in which these repellents function is that they tend to bond along the pore linings rather than build films across the pore openings. This ensures that sufficient vapor transmission can occur to maintain “breathability” in the assembly. Repellent manufacturers state a repellent life of up to 10 years, but there are numerous projects in the Pacific Northwest that have never had to have a second application.

One of the most controversial topics nationally is when and if water repellent should be used for brick construction. As outlined above, there are many positive job results obtained by properly applied clear water repellent. While most experts acknowledge the positive attributes, the primary concern is the severe problems that can occur if an improper repellent is applied. Most western states brick manufacturers are knowledgeable about the issues and can recommend which repellents will work with their products. However, the repellent manufacturer must warrantee the performance of the repellent in service. The performance problems arise when other repellent salesmen (and there are many) convince the specifier that their product is equal to the specified repellent and will save money and the “equal” product is then used. Our advice is this: DO NOT SUBSTITUTE! Demand past successful performance of the proposed coating on the specific manufacturer’s brick, for a

number of years, under the same type of exposure. Demand that the repellent manufacturer's application instructions be followed.

4.7 Backup Wall

Structural Brick Veneer installations do not require a separate backup wall. A backup wall is sometimes constructed as a second air and water vapor barrier. Many Level 2 (commercial) buildings do not require the extra water and air protection since a well-designed drainage wall is often sufficient.

If a back-up wall is used, many options are available including metal studs with sheathing. The studs are typically not designed for the wind loading since the brick wythe is structurally designed to resist the wind.

4.8 Cavity

When a backup wall is provided, the cavity or air space behind the brick can be any width. The cavity acts to provide a buffer for wind-driven rain and allows water that penetrates the Structural Brick Veneer to migrate down the back-side of the brick without migrating across the cavity space. Connectors should be designed and constructed to direct any of this water toward the back-side of the brick instead of into the building.

The cavity should be kept clear of any obstructions that might allow water to bridge across. Mortar droppings should be prevented from falling into the cavity. Construction tolerance on the cavity width should be limited to ± 1/2 inch. At each floor, fire safing is required to stop smoke and heat from moving between floors. The safing can act as a bridge for water to enter the building. Flashing over the safing should be provided.

4.9 Expansion Joints

Expansion joints need to be provided at various strategic locations in the Structural Brick Veneer wall system. Expansion joint placement is dictated by two considerations. First, expansion joints may be provided in locations where the brick wythe is likely to crack and second, to provide isolation from building movement. In Structural Brick Veneer systems, the spacing of vertical joints can be increased over that of conventional veneers because the reinforcement provides additional resis-tance to cracking.

The Brick Institute of America Technical Note 18A, Differential Movement - Ex-pansion Joints, contains a valuable discussion on the many considerations involved in expansion joints.

http://www.bia.org/html/frmset_thnt.htm

As a general rule, vertical expansion (movement) joints should be provided at the following locations:

1. At or near wall corners
2. At wall discontinuities
3. At changes in height
4. At changes in thickness
5. At changes in stiffness
6. Adjacent to dissimilar materials
7. At abutments to other building ele-ments

The joint size should be a minimum of twice the calculated amount to meet the limitations of the compressibility of the sealant. As a minimum, it is recommended that the joint not be less than 3/8 inch.

4.10 Window Anchorage

Windows are usually anchored to the Structural Brick Veneer and not to the backup wall. In some installations, connectors are included in the design to make the attachment. In other installations, powder-actuated fasteners shot into the masonry have been used to make the connection. The choice depends on the loading and local practice.

5.0 Construction

5.1 General

The construction phase of the project begins with the award of the Contract for Construction. If the Structural Brick Veneer was specified as bidder designed, then the design of the Structural Brick Veneer may begin with the beginning of the construction. In this event, there is usually limited time for the design and it should begin without delay.

Once designed, a Structural Brick Veneer project construction is similar to any other structural brick project.

The mason contractor is normally a subcontractor to the general contractor. If the Structural Brick Veneer is bidder designed, the mason contractor usually becomes responsible for the design. If the design is part of the contract documents, the mason contractor will still need to prepare shop drawings detailing the installation.

Most mason contractors do not normally prepare shop drawings for reinforcement. Thus, the responsibility for providing an adequate set of shop drawings can become lost in the process of bidding. The general contractor thinks the mason will prepare the shop drawings and the mason thinks the general contractor will prepare the shop drawings.

Often, the mason contractor does not supply the reinforcement for the wall. The general contractor supplies it. The design team should become aware of who will supply the reinforcement. It will have some influence on how the project proceeds.

Experience has shown that the preferred choice is for the mason contractor to purchase the reinforcement and supply the shop drawings. However, some mason contractors may bid high or even not bid at all as a result of this requirement. The resulting cost pressure may require the design team to be flexible about the requirement for shop drawings and their preparation.

Sometimes the general contractor will supply the shop drawings using his normal reinforcement detailer. Unfortunately, the detailer may have limited experience with masonry (the expertise is concrete) and the drawings submitted are often full of errors or items that cannot be constructed.

5.2 Construction Sequence

Several construction trades construct structural Brick Veneer. The dead load support angle (or connectors) and lateral braces are usually installed by the steel erector or the general contractor. These trades prefer to complete their work with the completion of the building structural frame. But if this is done, the mason is constrained by constructing the brick to match the installed connectors.

For example, for a Structural Brick Veneer supported on a continuous ledger, if the ledgers are all installed prior to the laying of the brick, it is nearly impossible to place the vertical reinforcement and grout the wall. It is usually necessary to delay installation of the ledgers until after the brick below is completed.

If a backup wall is constructed, it is usually installed by a different contractor and at a different time than the Structural Brick Veneer. Normal choices for the inside wall include masonry, concrete or steel studs. For a Structural Brick Veneer System, however, the masonry and concrete choices are unlikely because the stiffness and strength of the backup wall are no longer required.

When metal studs are used, it is common to sheath the outside face of the stud to provide additional water and air infiltration protection. The sheathing must be installed before the Structural Brick Veneer. Thus, the connectors typically penetrate the sheathing. This requires additional coordination between the trades.

5.3 Pre-Construction

Once the general contractor and the mason subcontractor have been selected, the engineer should verify the mason's qualifications with the local masonry institute and the local material suppliers. This information will be helpful for determining the amount of time and effort that will be needed during construction.

At an appropriate time, usually at least two months before the start of masonry construction, arrange for a preconstruction conference to discuss the masonry construction. Attendees should include:

1. The mason contractor and foreman.
2. The general contractor and superintendent.
3. The building official.
4. The architect.
5. The special inspector, when required.
6. The engineer.
7. The owner's representative.
8. The brick supplier.
9. The window supplier.
10. The dry-wall installer.

Subjects for discussion include:

1. Brick:

Determine the availability and delivery schedule of the selected brick. If the unit strength method is used to verify required masonry strength, verify that the brick will meet the required strength.

2. Initial testing:

If the unit strength method was used to establish the design strength f'_m, then mortar, grout and prism testing prior to construction are not required. However, it is recommended that when full allowable stresses were used in the design, prism testing should be conducted prior to construction. As a minimum, unit testing or manufacturer's certification is required.

For Structural Brick Veneer installations, a grouting test panel is often necessary to demonstrate the grouting procedures. The schedule should be defined. The design team, building official and special inspector should be present for the grouting demonstration.

Often the grouting demonstration panel can also be used as a color and quality control panel for the architect.

3. Testing During Construction:

Prism testing is recommended for each 5,000 square feet of wall. During construction, three prisms constitute a test, however, five are recommended. Test the first one at seven days, the next three at 28 days and hold the final sample for testing in case of a problem.

If prism tests are conducted, grout and mortar tests are usually not required.

4. Inspection:

ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures.*

The inspector should regularly check the preparation of mortar and grout to ensure proper proportions and the laying of units to ensure proper workmanship. The inspector should verify and ensure full compliance with the contract documents for the placement of reinforcement, grouting and the protection of the masonry from rain, dirt, cold and/or hot weather.

5. Observation:

Inform all participants that from time to time representatives of the design team will visit the site to ensure general compliance with the contract documents.

6. Inspection Reports:

Normally, test reports and inspection reports go to the general contractor; then to the architect; and then to the engineer. Deviations from this normal procedure should be discussed, defined and documented.

7. Submittals:

Verify that the required project submittals have been approved or are in the process of being approved.

8. Cleaning and Water Repellents:

The procedures to be used to clean and apply water repellents should be discussed. It is important that the mason contractor verify the cleaning method with the unit manufacturer. If water repellent is to be applied, the method and materials to be used should also be verified with the brick manufacturer.

Proper water repellents do not seal the wall. Masonry must breathe. Painting contractors often are not experienced with applying water repellents to masonry, and assuring understanding of proper methods is important.

9. Construction Sequence and Schedule:

The successful installation of a Structural Brick Veneer project requires co-ordination of many trades (see previous discussion). Ask the general contractor questions to ensure that the construction sequence and responsibilities have been defined. Discuss the schedule for inspection and testing. Discuss co-ordination issues. One usually missed item is the coordination with the window and door supplier. The design of the connections should be discussed.

10. Window Attachment:

As previously discussed, the attachment of the window and coordination of the flashing system will be important to the successful performance of the wall. Too often this important coordination is left to the last minute or not done at all. The pre-construction conference is a good opportunity to discuss the issue and assign responsibility.

11. Sealant Installation:

Often the sealant installer is a separate subcontractor from the Structural Brick Veneer and window contractors. The specified sealant may or may not be compatible with the brick, mortar, water repellent and window-supporting member finish. These building elements, and often others, all come together at the sealant joints. The selected sealant and installation procedures should be checked for compatibility with adjacent materials.

12. Compliance Testing

Most Structural Brick Veneer projects require compliance testing. When the brick supplier is not experienced with the system, testing of prisms in accordance with national standards should be completed before construction begins. Testing during construction is also generally required. During the pre-construction conference, the compliance testing required should be communicated to all involved.

5.4 Submittal Review

Items submitted for review include the following:

1. Mortar proportions and laboratory test:

The mortar submittal is usually only submitted by type. This is satisfactory provided the mortar is specified by proportions, not strength, and provided there is a method to control the proportions of the mortar.

The contractor may submit proportions other than by type. In this case, laboratory tests should be performed to verify the compressive strength of the mortar (ASTM C 270).

2. Grout proportions:

Specify grout in accordance with proportion requirements of ASTM C 476.

Do not specify grout by the minimum strength of 2,000 psi. The proportions will result in strengths well in excess of 2,000 psi.

Lime may be added to grout. This usually improves the grout properties by increasing flow and retention of water, resulting in improved placement and bonding to the unit.

The additive Grout Aid should be added to the grout as recommended by the manufacturer.

For batch-provided grout, the proportions are normally described by weight. The weight proportions should be converted to volume proportions for comparison with ASTM C 476.

3. Unit certifications:

The unit manufacture should provide certificates that the masonry units comply with the requirements specified.

4. Reinforcement shop drawings:

These should be scheduled to provide sufficient time for review and resubmittal prior to construction. Experience has shown that rejection of the first set of drawings is likely.

5. Connector shop drawings:

Shop drawings showing the detailing of reinforcement, connectors and embedded items need to be submitted with sufficient time for review.

6. Quality control program:

When required by the specification, the quality control program should be written by the mason contractor and submitted in time for review and discussion with all involved, including the inspector and general contractor.

5.5 Site Visits

The structural engineer should make site visits to check on the progress and quality of the work. This part of the engineer's scope of services is called construction observation. It is defined in AIA C141 Section 2.6.3 as:

"The consultant shall visit the site at intervals appropriate to the stage of construction for This Part of the Project, or as otherwise agreed with the Architect in writing, to become generally familiar with the progress and quality of the Work completed for This Part of the Project and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the consultant shall not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work for This Part of the Project. On the basis of such on-site observations as a consultant, the consultant shall keep the Architect informed of the progress of the Work for This Part of the Project and shall endeavor to guard the Owner against defects and deficiencies in such work. (More extensive site representation may be agreed to as an Additional Service, as described in Paragraph 3.2)."

5.6 Non-Conforming Quality Control Tests

Experience has shown that the field-testing of masonry is highly variable. The source of the variability can be the materials, the methods used to prepare the samples, the testing of the samples and the interpretation of the results. Before rejecting a wall because of non-conforming field-testing, the engineer should carefully assess the possible causes of the field test non-conformance and possibly remove and test samples from the actual wall.

5.6.1 Unit Compression Strength

If the Unit Strength Method for establishing and verifying the specified compression strength, f'_m, then prism tests (or unit compression tests) are required prior to and during construction. The tests prior to construction should provide assurance that the units and masonry will be satisfactory. If the test prior to construction does not comply with the required strength, then another brick may be required, or the project may have to be redesigned for a lower strength.

Sometimes the brick tests prior to construction are not performed and the units are tested during construction and do not conform. In this case, a new analysis may be required to verify strength. One option is to use Strength Design provisions based on UBC Section 2108. These methods are less sensitive to low compression strength. But, the engineer should be careful about excess deflections and other serviceability issues when designing with Strength Design.

When prism (units) are tested prior to construction and conform to the requirements, but do not conform to the requirements when tested during construction, the problem is probably in the manufacturing of the prisms or there was a change in the testing procedures or materials. The units should be tested (or re-tested). If the units still do not comply, the code allows prism testing to verify strength. Construct prism tests to verify the strength.

If the prism strengths do not comply, a redesign or change in the brick unit may be required. Non-conforming walls will likely require removal.

5.6.2 Mortar Compression

It is recommended that field-testing of mortar not be required. Prism testing every 5000 square feet of wall should be specified. However, the requirement for mortar testing often is not within the control of the structural engineer, and on many projects mortar testing becomes a requirement.

The field sampling and testing for mortar compression strength is highly variable. The following figure is a frequency distribution of field mortar compression tests taken from actual projects in California, Oregon and Washington. There are a total of 205 mortar tests. The coefficient of variation is 36%.

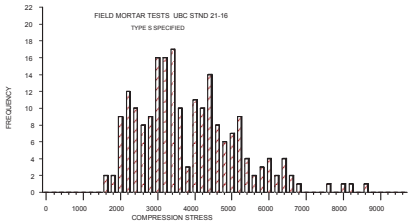


Figure 43 Variation of Field Mortar Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression mortar tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request from the mason the proportions being used.

2. Assess the method being used to control proportions.

3. Verify that the testing lab is using the procedures of ASTM C 780.

4. Visit the site and observe the mortar in the joint. Scratch the mortar with a key. If a white scratch results and the sand does not separate from the mortar, the strength of the mortar is probably acceptable. However, if the masonry is highly stressed (above 1200 psi) it may be necessary to remove a prism from the wall for testing.

The relationship between 7-day mortar strength and 28-day mortar strength is fairly consistent from sample to sample. It is useful to know the 7-day test results since they provide the engineer with an early indication of the 28 day results. The following figure presents the relationship.

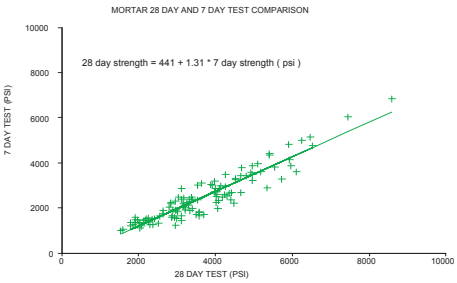


Figure 44 Mortar 7 day and 28 Day Tests

5.6.3 Grout Compression

It is recommended that field-testing of grout not be required. Prism testing every 5000 square feet of wall should be adequate quality control. However, the requirement for grout testing often is not within the control of the structural engineer, and on some projects grout testing becomes a requirement.

The field sampling and testing for grout compression strength is highly variable. The following figure is a frequency distribution of field grout compression tests taken from actual projects in California, Oregon and Washington. There are a total of 323 grout tests. The coefficient of variation is 32%.

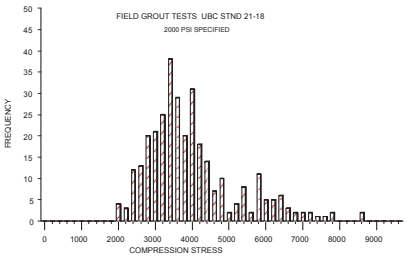


Figure 45 Variation of Field Grout Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression grout tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request from the mason the proportions being used.

2. Assess the method being used to control the proportions.

3. Verify that the testing lab is using the procedures of ASTM C1019.

4. If the cause of the low break is not identified, then taking core samples and testing them may be required.

5. The structural engineer should also consider the reason for requiring the specific grout strength. Often, the purpose of the grout is only to connect the reinforcement to the units. Even low strength grouts (1500 psi) are probably capable of making the connection. Because of the high strength of the brick, the compression contribution of the grout can often be ignored in the analysis.

The relationship between 7-day grout strength and 28-day grout strength is also consistent from sample to sample. It is useful to know the 7-day test results since they provide the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.

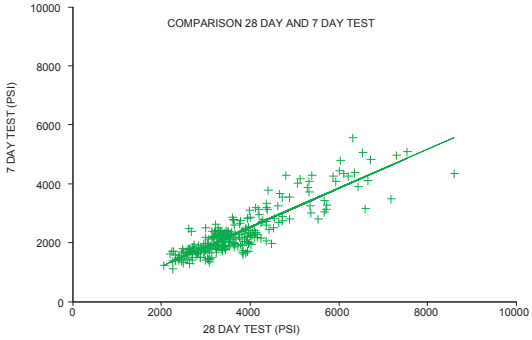


Figure 46 Seven Day and 28 Day Grout Strength

5.6.4 Prism Tests

Prism tests are less variable than either mortar or grout testing and provide the engineer with a higher level of confidence that the masonry system has the desired strength.

When prism tests do not conform, verify that the materials used (units, mortar and grout) conform to the specifications. If they do conform, then either the prism was improperly constructed or the testing procedures were not in compliance with ASTM 1314.

Improper construction of prisms includes not constructing the prism true and plumb. It is very important that the top and bottom planes of the prism are parallel. Another common problem for large cell units (8″ units and larger) is that the grout is not properly re-consolidated. Without proper re-consolidation, a dome-shaped void will often form at the mortar joint part way up the height of the prism and render the area of grout ineffective for resisting compression.

Common testing errors include not properly capping the prism so that the top and bottom planes are level and parallel, not using a testing machine with a spherical head, and not providing a thick enough loading platen to distribute the test machine load evenly to the prism. It has also been reported that some testing labs stop loading at the first sound emitted. The first sound may correlate to the failure of a concrete cylinder, but does not typically correlate to the failure of a masonry prism.

5.7 Troubleshooting During Construction

The following table is presented to assist the engineer with problems often occurring during construction. This table was developed over the years based on the experience of the authors. It has been evolving and it often seems that contractors have a special ability to create new situations not previously considered or addressed. Proceed with caution.

Troubleshooting Table for The Design and Construction of Structural Brick Veneer

PROBLEM	CAUSE	SOLUTION
Prisms fail to reach the design strength.	1. The testing lab has incorrectly tested the prism, usually by not placing the prism correctly in the machine or using a loading platen that is too thin. Or the specimens may have been damaged during transportation. 2. The bricks are below the specified strength. 3. The mortar is under specified strength. 4. Lab reported gross area stress instead of net area stress. 5. Lab stopped testing with first noise.	1. Instruct the lab to retest being careful to follow the ASTM C 1314. 2. Request that the contractor have a lab retest the brick. If still too low, change the brick or redesign. 3. Check mortar proportions. Retest the prisms. 4. Have the lab correct the report. 5. Re-test.
Mortar doesn't reach strength.	1. Incorrect proportions. 2. Incorrect testing.	1. Check mortar quality control procedures. 2. Mortar tests are unreliable. Forget about testing mortar. The code doesn't require it, if prisms are tested.
Colors do not meet expectations.	1. Bricks were not blended. 2. Sample panel has different sealer. 3. The brick production run is different from the sample run.	1. This is a problem for the architect and brick supplier. There are paints available, but results are questionable. 2. Use the sample panel sealer. 3. Approve the production run before beginning construction.
Someone calls and says more expansion joints are required.	Someone was checking on your advice. They should do this, so don't get mad.	Explain how the reinforcement reduces the need for most of the expansion joints.
The mason tells the general who tells everyone that the cells are too small to be grouted with all the congested steel.	1. The mason contractor does not have experience with grouting of reinforced hollow brick. He doesn't understand that he can make the grout with an 8 to 11 inch slump. 2. The cell is too small.	1. Prepare and grout a test panel. Be sure to invite everyone concerned. 2. Use a different cell size.

PROBLEM	CAUSE	SOLUTION
Welded bars are breaking off.	ASTM A 706 bars were not used.	Inspect bars. A "W" symbol indicates type A 706. Use the correct bars.
Contractor is not protecting his materials or work.	Sometimes the responsibility for protecting the work is left with the general contractor. He is saving money. Sometimes the responsibility is not well defined.	Write a letter to your client. Explain the consequences. Send a copy to the brick manufacturer.
Cracks in the mortar joints.	1. Shrinkage of the mortar joint. 2. Movement of the supporting structure. 3. Overloading. 4. Too rapid drying.	1. Suggest the contractor decrease the cement content of the mortar and increase the lime. 2. Check supports. 3. Check the loading, the timing of the loading and shoring removal. 4. Pre-wet the units. Wet the wall during curing. Add lime to the mortar.
Shop drawings are not prepared.	The requirement was missed or "value engineered away".	Write a letter to your client explaining the requirement. If the project is underway, require an engineer familiar with the design be on site full time.
The grout strength is specified at a minimum of 2000 psi, how can I get a prism of 4000 psi.	This is normal.	Explain that the prism does not fail in accordance with the weak link theory.
The contractor wants to high-lift grout with lifts larger than 6'	The code restricts the grout lift to 6' even though the grout pour might be higher.	The problem is blow-outs of mortar joints and the ability to reconsolidate. In hollow clay, these problems are unlikely. Have the contractor demonstrate the procedure to you and the inspector.
The contractor doesn't want clean-outs. You want high-lift grouting.	Code requires clean-outs for high-lift, in order to remove the mortar droppings.	In most Structural Brick Veneers the shear stresses are low. It is usually possible to waive the clean-out requirement.

PROBLEM	CAUSE	SOLUTION
The dowels out of the concrete foundation or ledger interfere with the unit cross webs. They miss the cells.	Improper placement of the dowels. However, it is often very difficult to get them in the right place. This situation should not occur in a Structural Brick Veneer.	Cut the unit cross webs to allow the dowel to pass or drill in new dowels. Verify that all the dowels are required to meet strength requirements. Do not, allow the dowels to be bent.
The brick masonry is cracked, with cracks extending through the units.	1. A great deal of force is required for this condition to exist. The cause is likely a problem. 2. The bricks may have been manufactured with the cracks. 3. Foundation cracks extend into brick wall.	1. Find the reason for the cracking. It is likely that something needs to be corrected. Likely candidates include frozen grout, foundation movement, or thermal movement from adjacent structure. 2. Verify the integrity of the units before use. A quick check is to bang the bricks together, If a ringing sound results instead of a thud, then the bricks are sound. 3. Foundation control joints need to be coordinated with the masonry expansion joints.
Contractor doesn't cover the walls at the end of the day.	1. The contractor is attempting to save money. 2. The responsibility for the masonry protection may have been left with the general contractor or worse, left out of all the contracts.	1. Insist on covering the walls. 2. Write a letter stating that the contractor is not in conformance with the likely result being efflorescence and other wall damage.
Corrosion of the joint reinforcement.	1. Too strong an acid cleaning without pre-wetting the wall. 2. Ungalvanized joint reinforcement.	1. Pre-wet the wall and use industry cleaners as recommended by the manufacturer of the units. 2. Use galvanized joint reinforcement.

6.0 Testing

Many different pre-construction mockup tests are available for evaluating the performance of the Structural Brick Veneer System design and construction. Pre-construction mockup testing is not necessary for all projects, and because of the costs involved, is likely feasible only for large projects. Tests are generally conducted to evaluate air, water and structural performance.

6.1 Air

When air infiltration tests are conducted on the building mockup, they should be performed in accordance with ASTM E 783, while those conducted in the laboratory should be performed in accordance with ASTM E 283. Air infiltration tests should normally be done before water penetration tests because water trapped in the brick veneer tends to reduce air leakage.

6.2 Water

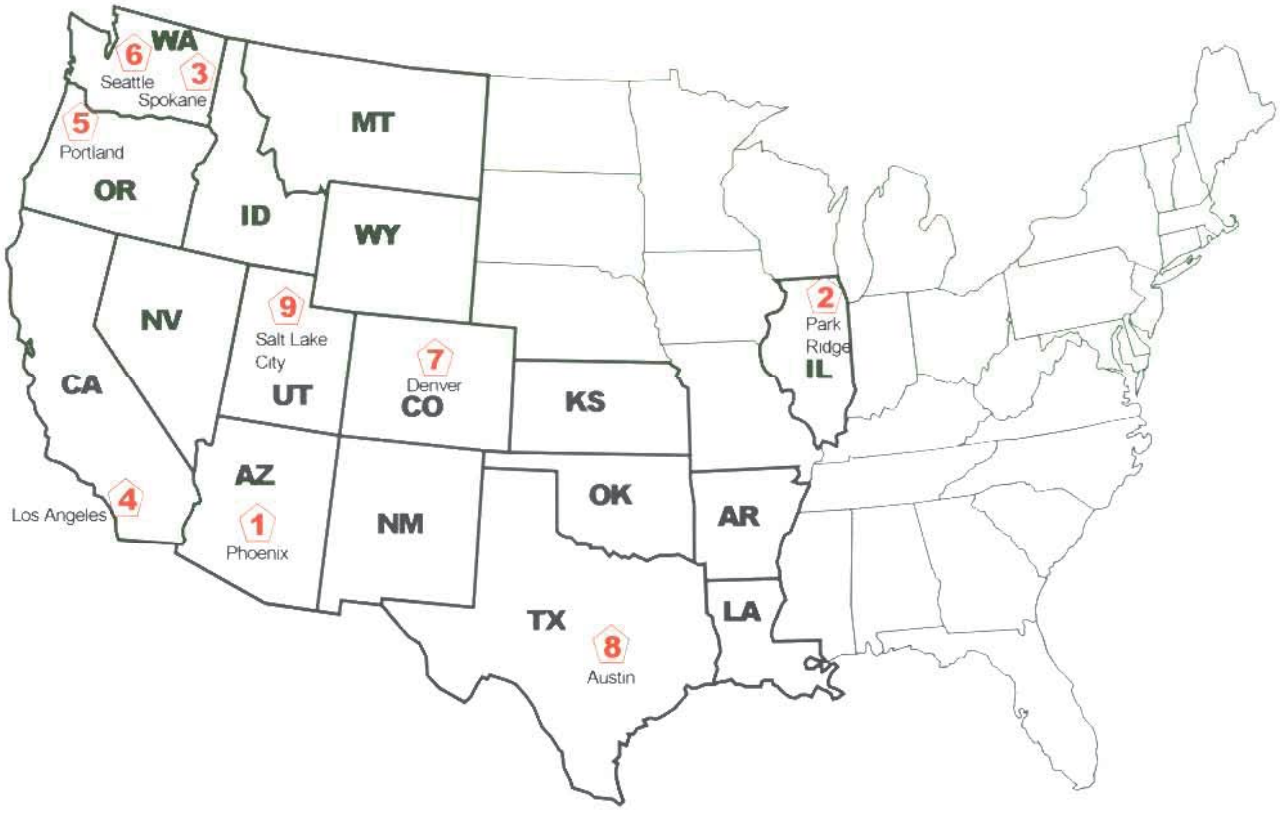
Water penetration tests for the brickwork should be performed in accordance with ASTM E 514, to measure the permeability of the constructed wall. Additional large-scale mockup tests are available using the procedures contained in AAMA 501.3, developed for testing aluminum curtain wall systems.

6.3 Structural

Structural tests measure a system's performance under lateral loading or deflection. This type of testing provides a means for accurately assessing the complex behavior of the Structural Brick Veneer System. A standard test procedure, ASTM E 330, is available for testing exterior windows and curtain walls. Brick panel strength tests can be conducted in accordance with ASTM E 72. There are no standard tests for specifically measuring seismic performance.

ALLIED ASSOCIATES AND WEB ADDRESSES

1	**Arizona Masonry Guild**	(www.masonryforlife.com)
2	**Masonry Advisory Council**	(www.maconline.org)
3	**Masonry Industry Promotion Group**	(www.masonrypromotion.com)
4	**Masonry Institute of America**	(www.masonryinstitute.org)
5	**Masonry Institute of Oregon**	(www.mioctio.org)
6	**Masonry Institute of Washington**	(www.masonryinstitute.com)
7	**Rocky Mountain Masonry Institute**	(www.rmmi.org)
8	**Southwestern Brick Institute**	(www.swbrick.com)
9	**Utah Masonry Council**	(www.utahmasonrycouncil.org)



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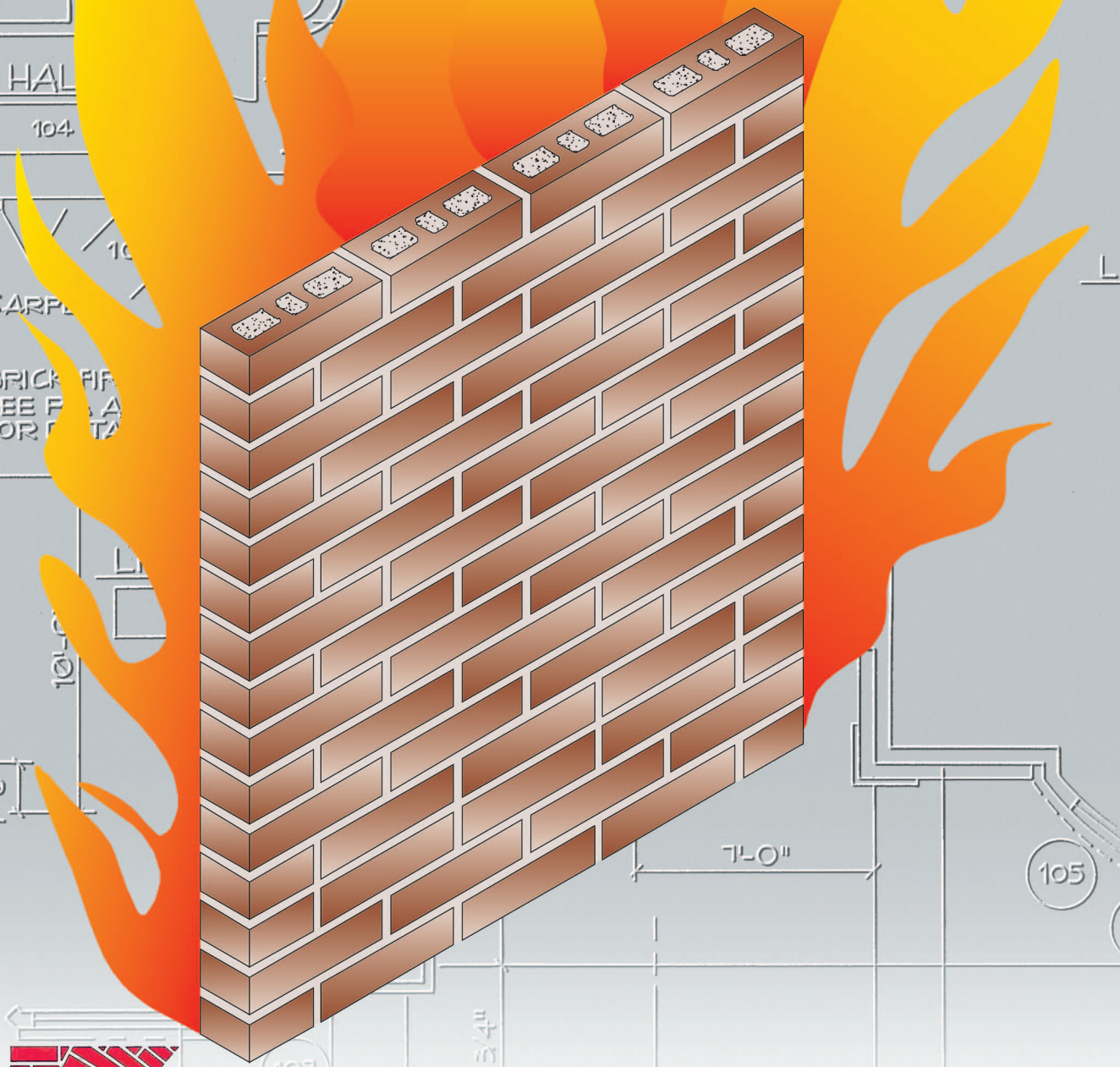
FIRE ENDURANCE RATINGS OF CLAY BRICK MASONRY



WESTERN STATES CLAY PRODUCTS ASSOCIATION

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FIRE ENDURANCE RATINGS

OF

CLAY BRICK MASONRY

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Torrance, CA 90501

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The members of Western States Clay Products Association express appreciation to Walter Dickey (1908-2002) for his tireless efforts in promoting the clay brick industry. Mr. Dickey spearheaded the initial production of this publication providing technical and editorial input that continues in this printing.

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1.0 INTRODUCTION

One of the most frequently asked questions of the designer is "How do I achieve a 1, 2, 3, or 4-hour fire rating using various clay brick masonry assemblies?"

Intuitively, we are comfortable with clay bricks as a fire resistant material because of their use as a liner in fireplaces and kilns where temperatures exceed those expected in most construction fires. In addition, we have observed the effect of fires on buildings where the only thing to remain standing is the brick. Most designers do not question that brick is non-combustible, or resistant to fire, what they question is the fire resistance of each of the brick wall configurations in hours as it relates to building code requirements.

For many wall assemblies, the information is available from BIA technical Notes 16, and the International Building Code Table 720.1. For some assemblies, the designer is allowed to use methods of calculating fire resistance. Until recently, designers had to rely on ICBO Evaluation Report #5058 to obtain 1 and 2-hour fire ratings for Adhered and Anchored Veneers. Today this information is found in Chapter 7 of the International Building Code, Table 720.1.

2.0 FIRE RESISTANCE BASICS

Fire resistance refers to the ability of a structure to act as a barrier to the spread of fire and to confine it to the area of origin. Therefore, in addition to withstanding the fire, the intent of the code is to prevent other materials adjacent to the brick from combusting after prolonged increased temperatures from fire, flame, or hot gases. Consequently, the assemblies are given a fire rating which is the time it takes for a prescribed fire on one side of an assembly to reach an average temperature on its other side that would ignite cotton waste (250°F). Refer to ASTM E119.

Fire ratings are required for load bearing and non-load bearing wall assemblies. Load bearing assemblies must be capable of withstanding the same conditions as the non-load bearing assemblies. In addition, they must be capable of supporting their prescribed design load for the duration of the fire.

Fire endurance tests alone cannot supply all of the data needed for intelligent appraisal of fire ratings of building elements. There are simply too many different types of assemblies and combinations of materials to classify them all through actual tests. Fortunately, the theory of fire endurance ratings is sufficiently advanced to offer guidance in estimating fire endurance ratings.

The ultimate goal of this guide is to bring together in one location all of the approved fire ratings for adhered veneer, anchored veneer, structural brick veneer and load bearing brick. See Table 1.

3.0 MASONRY ASSEMBLIES

Masonry fire resistant assemblies are broken down into adhered brick veneer, anchored brick veneer, structural brick veneer, and load bearing brick.

Fire rated assemblies are often required in two directions. If the fire is on the brick side, the brick assembly must resist flames, heat, and smoke from entering to the other side of the assembly prior to the rated time. If the fire is on the other side, the fire rating may be needed to protect occupants in another room or building from the same effects. In most cases, there is a structure supporting the fire resistant materials and the fire rated assembly is required on both sides to protect the structure. If the material is the structure as is the case in load bearing and structural brick veneer, the material can adequately provide fire resistance in both directions.

In a veneer system, the stud backing is the structure and must be protected in both directions. Therefore, brick most commonly provides fire resistance on the exterior side of the stud, and gypsum or some other material provides the fire resistance on the interior face of the stud.

3.1 ADHERED BRICK VENEER

Adhered brick veneer is defined as brick veneer secured and supported through adhesion to an approved bonding material applied over an approved backing. The most common wall assembly is defined by a facing of thin brick between 1/2" to 1 1/2" in thickness applied over a plaster backing. If this combined masonry layer is 1 3/4", the masonry side of the assembly qualifies for a 1-hr fire rating. If the masonry layer is 2" or more, the masonry side of the assembly qualifies for a 2-hr fire rating. In this assembly, the plaster is applied to metal lath, which in turn is applied to wood or steel framing.

The wood or steel framing members must be sized for all design loads. Steel studs are to be a minimum of 2 1/2". Wood framing is to be 2 x 4 minimum. Wider framing members can be used without degrading the fire resistance rating.

3.1.1 TEST PANEL CONSTRUCTION

The test panels were constructed similar to those for the earlier large program of gypsum board fire evaluation tests. Type X gypsum board was applied to one face of standard steel stud construction. Typical backing and adhered brick veneer was installed on the opposite face by masons experienced in such work.

The panel was designed for symmetrical resistance as required by the International Building Codes; however, if one designs for a situation in which fire exposure is limited to 1-face only, the resisting thickness can all be on one side.

3.1.2 FIRE TESTING

The veneered panels were exposed according to the procedures of ASTM E119 – standard furnace temperature rise; thermocouples on the unexposed face to show temperature rise; verification that there were no cracks that would allow passage of flame or hot spots; and resistance to hose stream exposure without penetration. Additional thermocouples were installed during construction to provide information on the thermal gradient through the section during the fire test. This information helped revise design alternates with greater accuracy.

3.1.3 RESULTS

All panels passed the three basic ASTM requirements with considerable margin. Although the results were somewhat conservative, indicating that thinner veneer might be used, no further refinements or reduction in design thickness was attempted. Precise refinements are not justified in variable hand placed materials, especially if no great cost benefits would result.

The maximum temperature rise on the unexposed face is permitted to be a maximum of 325°F for a single thermocouple and 250°F for the average of all thermocouples, at the specified time period. The test panels showed the following maximum and average rise of temperature. All withstood more hose stream exposure than required by code.

	Maximum	Average
Panel 1A:	162°F pt.	158°F
Panel 1B:	145°F pt.	135°F
Panel 2A:	129°F pt.	110°F
Panel 2B:	107°F pt.	104°F

3.1.4 CONCLUSION

Adhered brick veneer of 1 3/4" combined masonry thickness provides 1-hour of fire resistance. Adhered brick veneer of 2" combined masonry thickness provides 2-hours of fire resistance. These fire rated assemblies are found in Table 720.1(2) Items 15-2.1, and 15-2.2.

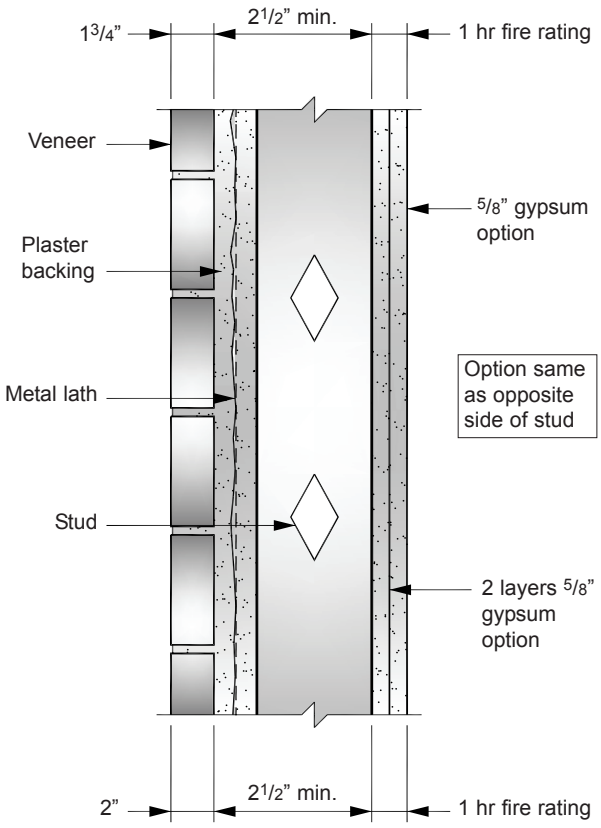


Figure 1 Adhered brick veneer.

3.2 ANCHORED BRICK VENEER

Anchored brick veneer is defined as brick veneer secured to an approved backing by mechanical fasteners. The most common wall assembly is defined by a facing of brick between 2" and 5" in width anchored through mechanical connectors to wood or steel framing.

Excerpts from Table 720.1(2)

TABLE 720.1(2) [Excerpt] RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS						
MATERIAL	ITEM NO.	CONSTRUCTION	4 hour	3 hour	2 hour	1 hour
1. Brick of clay or shale	1-1.1	Solid brick of clay or shale.	6	4.9	3.8	2.7
	1-1.2	Hollow brick, not filled.	5.0	4.3	3.4	2.3
	1-1.3	Hollow brick unit wall, grout or filled with perlite vermiculite or expanded shale aggregate.	6.6	5.5	4.4	3.0
	1-2.1	4” nominal thick units at least 75 percent solid backed with hat-shaped metal furring channel 3/4” thick formed from 0.021” sheet metal attached to the brick wall on 24” centers with approved fasteners, and 1/2” Type X gypsum wall board attached to the metal furring strips with 1” long Type S screws spaced 8” on center.	–	–	5	–

3.2.1 FIRE RESISTANCE

From the fire endurance test, additional information was provided which reduced the thickness of the veneer to 2" with a 1/2" air space for a 1-hour fire rating and a 2" veneer with a 1" air space for a 2-hour fire rating.

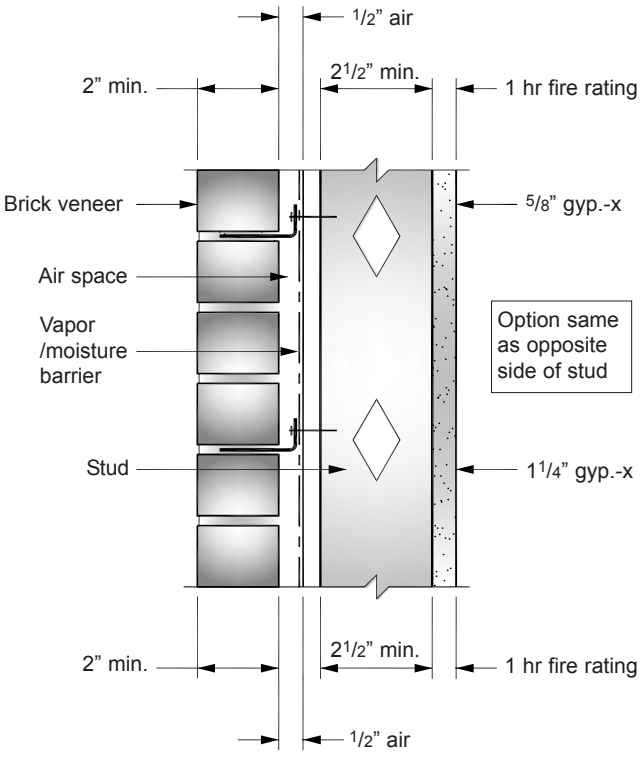


Figure 2 Anchored brick veneer.

Table 720.1(2) of the International Building Code item numbers 1-1.1 through 1-2.1 can also be used to determine the minimum equivalent thickness for brick to achieve a fire rating from 1 to 4 hours. This section of the table is used for veneer brick and structural brick in load bearing and non-load bearing construction.

3.3 STRUCTURAL BRICK VENEER

Structural Brick Veneer is defined as a masonry assembly of brick, mortar, grout, and reinforcing that is designed similar to anchored brick veneer. It carries no gravity loads other than its own weight, the weight of windows, and possibly other miscellaneous loads. In addition, it is not part of the lateral load resisting system. The difference is that the structural brick veneer is reinforced and grouted to allow the brick to span much further between wall ties. Structural brick veneer does not generally require a backup system to carry lateral loads within the panel. In the Structural brick veneer, the lateral loads are transferred through tension and compression stresses in the masonry.

3.3.1 FIRE RESISTANCE

Table 720.1(2) of the International Building Code item numbers 1-1.1 and 1-1.3 can also be used to determine the minimum brick thickness to achieve a fire rating from 1 to 4 hours. This section of the table is used for structural brick veneer. Since the structural brick veneer assembly was tested with vertical loads, the brick is capable of giving the same fire rating in both directions. No additional framing or fire resistant material is required.

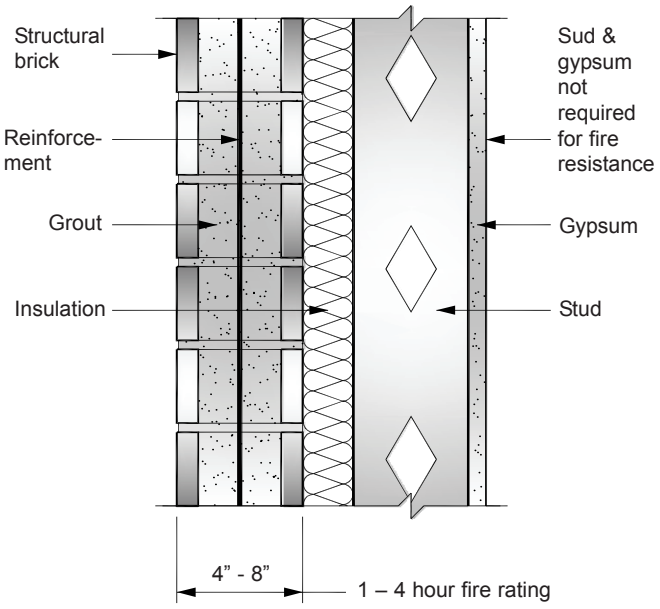


Figure 3 Structural brick veneer.

3.4 STRUCTURAL LOAD BEARING BRICK

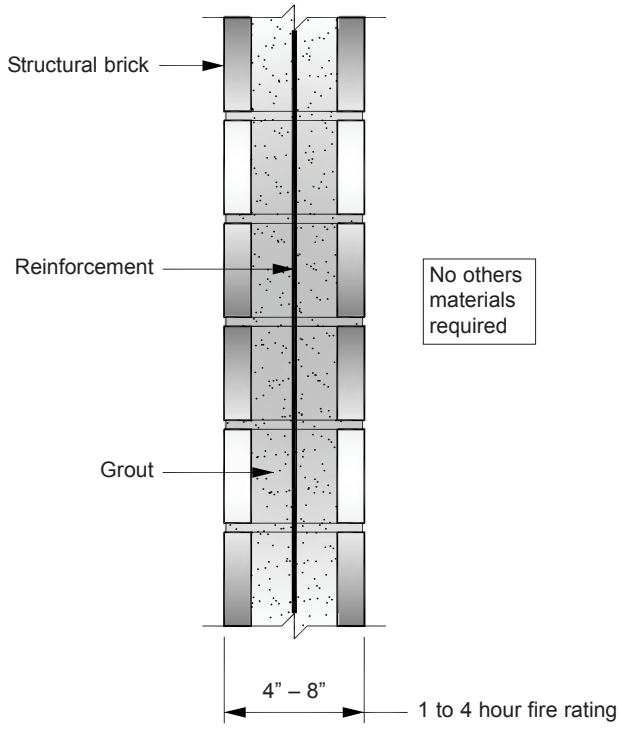


Figure 4 Structural load bearing brick.

Structural load bearing brick is defined as a masonry assembly of brick, mortar, grout and reinforcing that is designed to support all gravity and lateral loads. These masonry elements are generally part of the lateral load resisting system. Greater fire endurance performance and economics can be achieved through the use of reinforced masonry. Fire ratings of 3 and 4 hours can be achieved through the use of up to 8" of hollow clay brick as shown on Figure 4.

3.4.1 FIRE RESISTANCE

Table 720.1(2) of the International Building Code item numbers 1-1.1 through 1-2.1 can also be used to determine the minimum brick thickness to achieve a fire rating from 1 to 4 hours. This section of the table is used for structural brick in load bearing and non-load bearing construction.

4.0 CALCULATED FIRE ENDURANCE RATINGS

As it is impossible to define all of the possible configurations that might be conceived in a wall design, Section 721.4 of the IBC along with IBC Standard 7-7 provides greater assistance in designing with Clay Brick. This section and the standard list more precise rating values for thicknesses of brick, mortar, air space, cement, gypsum plaster, wall board, insulation, studs, siding, etc. They also include more precise calculations for calculating Equivalent Thickness = $T_e = V_n/LH$; R-ratings when adding plaster is defined as $R = (R_n^{0.59} + pl)1.7$ and combinations of clay brick, insulation, air and plaster can be defined using the exponential equation $R = (R_1^{0.59} + R_2^{0.59} + Rn^{0.59} + A_1 + A_2 + \ldots Pl)^{1.7}$ where R is the fire resistance of each material layer, A is the resistance of each air layer and Pl is the resistance of gypsum plaster.

Table 1 identifies a list of R, A, and Pl values for use in determining the Fire endurance of miscellaneous clay masonry assemblies.

IBC Standard 7-7 lists 8 rules that are helpful in making a quick assessment of the fire endurance of building elements when fire test data on the elements are not available.

Table 1 Fire Resistance (R) in Hours			
Masonry Assembly		**Actual Wall Thickness (inches)**	**Fire Resistance (hours)**
Adhered Veneer	**ASTM C1088**	1.75" *	1
		2" *	2
Anchored Veneer	**ASTM C216**	2" to 5"	3
Structural Veneer and Load Bearing Brick			
Solid 75%	**ASTM C216**	3.5"	1
		5.5"	2
		7.5"	3
8" Cavity wall with 2" air space		8"	3
10" Cavity wall with 2" air space		10"	4
Hollow – cells not filled	**ASTM C652**	3.5"	1
		5.5"	1
		7.5"	2
Hollow – all cells filled[1]	**ASTM C652**	3.5"	1
		5.5"	3
		7.5"	4
Air (A)		1/2" to 3 1/2"	0.30
Plaster (Pl)		1/2"	0.30
		5/8"	0.37
		3/4"	0.45

Notes:

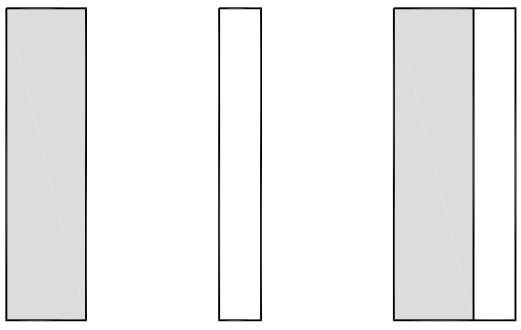
* Thickness includes plaster bedding.

1 Cells may be filled with perlite, vermiculite, expanded shale aggregate or grout.

4.1 RULE 1

The "thermal" fire endurance of a construction assembly consisting of a number of parallel layers is greater than the sum of the "thermal" fire endurance characteristic of the individual layers when exposed separately to fire.

Rule 1



$T_1 + T_2 < T_{12}$

4.2 RULE 2

The fire endurance of a construction assembly does not decrease with the addition of further layers.

Rule 2



$T_1 < T_2$

4.3 RULE 3

The fire endurance of a construction assembly containing continuous air gaps or cavities is greater than the fire endurance of similar constructions of the same weight, but containing no air gaps or cavities.

Rule 3

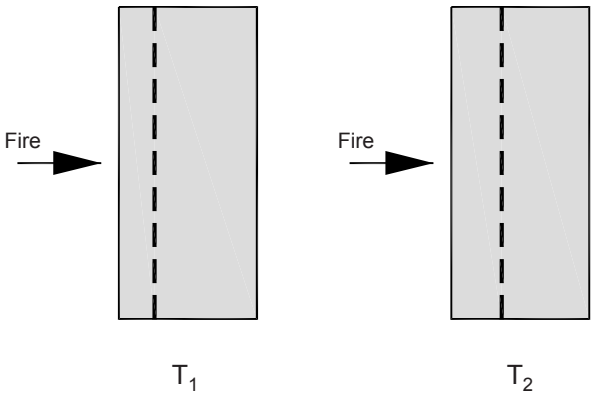


$T_1 < T_2$

4.4 RULE 4

The farther and air gap or cavity is located from the exposed surface, the more beneficial is its effect on the fire endurance.

Rule 4

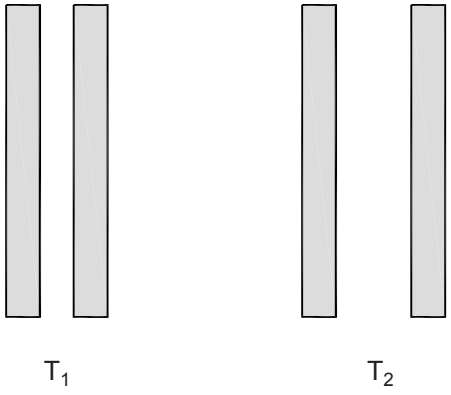


$T_1 < T_2$

4.5 RULE 5

The fire endurance of a construction assembly can not be increased by increasing the thickness of a completely enclosed air layer.

Rule 5

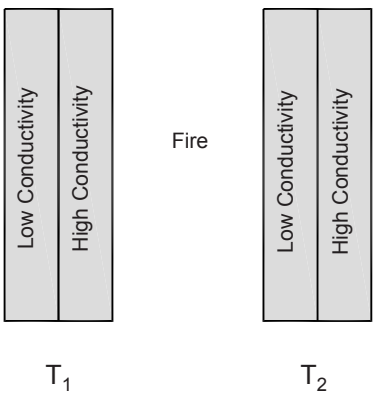


$T_1 \approx T_2$

4.6 RULE 6

Layers of materials of low thermal conductivity are better utilized on that side of the construction on which fire is more likely to happen.

Rule 6

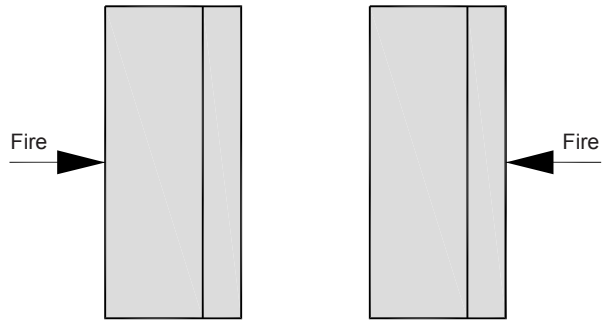


$T_1 < T_2$

4.7 RULE 7

The fire endurance of asymmetrical construction assemblies depends on the direction of heat flow.

Rule 7

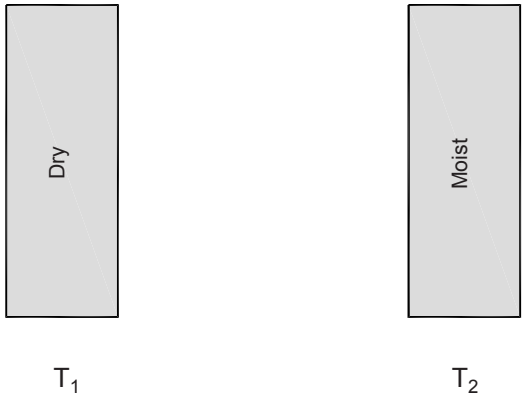


$T_1 \neq T_2$

4.8 RULE 8

The presence of moisture, if it does not result in explosive spalling, increases the fire endurance.

Rule 8



$T_1 < T_2$

5.0 CONSIDERATIONS

When backing materials are used to provide support for the fire resistive materials, the backing material shall be protected with the same fire resistance rating on both sides.

Although life safety is the primary reason for incorporating fire resistance in construction, when considering tradeoffs such as gypsum, or sprinklers, other issues should also be considered such as, fire separation, property protection, water damage, replacement costs and reuse of structure.

APPENDIX – WALL DETAILS

A.1 MATERIALS:

A.1.1 Thin Veneer Brick Units: Units are produced from clay or shale in thicknesses from 1/2 to 1 1/2 inches (12.7 to 38 mm) and comply with ASTM C1088, Grade TBS or better.

A.1.2 Face Brick Units: Units are made from clay or shale in thicknesses exceeding 1 1/2 inches (38 mm) and comply with ASTM C216 for veneer facing units; Type FBS or better and Grade SW in Severe Weather regions.

A.1.3 Hollow Brick Units: Units are made from clay or shale in thicknesses exceeding 4 inches (38 mm) and comply with ASTM C652 for hollow clay brick; Grade HBS or better and Grade SW in Severe Weather regions; Unit strength as specified for the job.

A.1.4 Mortar: Type S as set forth in Table 2103.8(1) or Table 2103.8(2) of the IBC.

A.1.5 Plaster Backing: Portland cement plaster complying with Section 718 and Section 2507 of the IBC.

A.1.6 Lath: Minimum 3.4 pounds per square yard (1.8 kg/m^3) metal lath complying with Section 2507 of the IBC.

A.1.7 Steel Framing: Framing with either gypsum plaster of gypsum wallboard must comply with Table 720.1(2) of the IBC.

A.1.8 Wood Framing: Framing with either gypsum wallboard or gypsum plaster must comply with Table 720.1(2) of the IBC.

A.2 WALL CONFIGURATION:

A.2.1 Adhered Veneer: Metal lath is installed in compliance with Section 2506.1 of the UBC. Where lath is attached to steel framing, minimum 1-inch-long (25.4 mm), No. 6 drywall screws are used. For exterior walls, a weather-resistive barrier described in Section 2510.6 of the IBC is required. The Portland cement plaster is applied in compliance with Sections 2510, 2511, and 2512 of the IBC to a minimum 3/4-inch (19.1 mm) thickness. The thin veneer units are applied in compliance with Section 1405.9 of the IBC in running bond. For one-hour fire resistance, the total thickness of plaster, mortar and brick veneer shall be at least 1 3/4 inches (45 mm). For two-hour fire resistance, the total thickness of plaster, mortar and thin brick shall be at least 2 inches (51 mm).

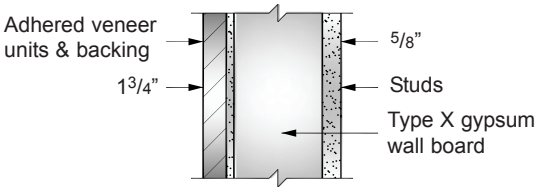
A.2.2 Anchored Veneer: Anchored veneer is installed in compliance with Section 1405.5 of the IBC for 2-to-5-inch-thick (51 to 127 mm) units and Section 1405.6 of the IBC for units up to 10 inches (254 mm) thick. Stud spacing is limited to 16 inches (406 mm) on center, and a weather-resistive barrier complying with Section 1403.2 of the IBC is required on the exterior side of exterior walls. Anchored units may be used for one-hour or two-hour fire-resistive assemblies.

A.3 INSTALLATION:

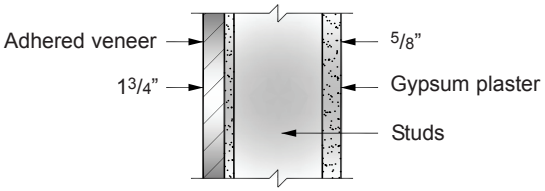
Details of one-hour and two-hour nonbearing walls are noted in Figures 5 and 6. For symmetrical one-hour fire resistance, each face shall have not less than one layer of 5/8-inch-thick (15.9 mm) Type X gypsum wallboard, or equivalent gypsum plaster, or 1 3/4 inch (45 mm) thickness of masonry veneer. For two-hour fire resistance, each face shall have not less than two layers of 5/8 inch-thick (15.9 mm) Type X gypsum wallboard, or equivalent gypsum plaster, or 2 inch (51 mm) thickness of masonry veneer.

A.3.1 Structural Brick Veneer and Structural Load Bearing Brick: Both structural brick systems are installed by combining brick, mortar, reinforcing and grout to provide a structure that combines load resistance to fire resistance. Structural brick fire ratings are generally defined by their equivalent thickness - the more solid the wall, the higher the fire rating. The International Building Code defines the minimum equivalent thickness required to achieve various fire ratings from 1 to 4 hours. Structural brick are defined as hollow without insulation and hollow with insulation. Hollow units with insulation are to be filled solid with insulation materials and the equivalent thickness is the actual thickness of the wall.

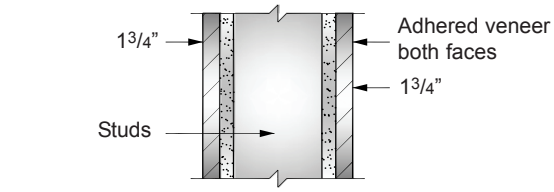
A.4 FIRE RATED WALL SECTIONS



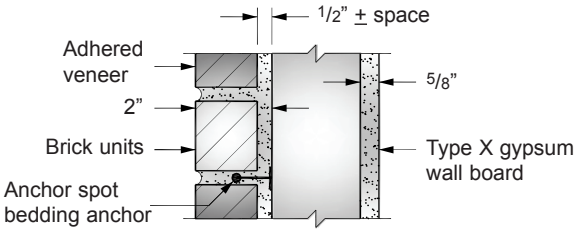
1 3/4" Adhered Brick with 5/8" Gypsum X Board



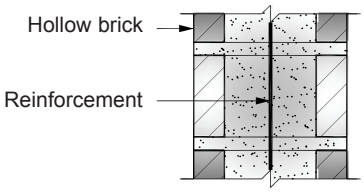
1 3/4" Adhered Brick with 5/8" Gypsum Plaster



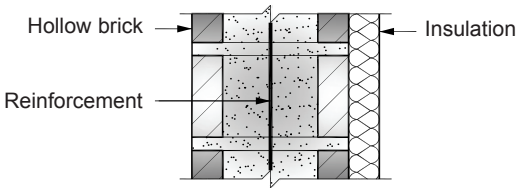
1 3/4" Adhered Brick with 1 3/4" Adhered Brick



2" Anchored Brick and 1/2" with 5/8" Gypsum X or Plaster

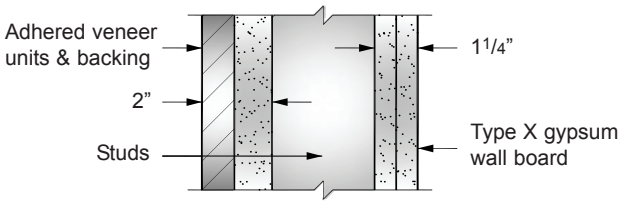


2.3" Equivalent Thickness Hollow Brick

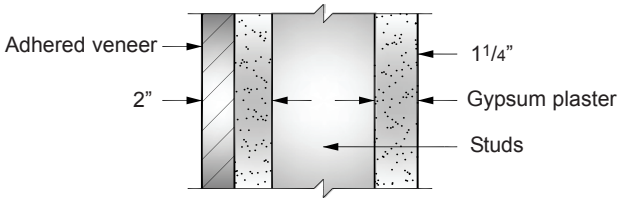


3" Equivalent Thickness Hollow Brick with Insulation

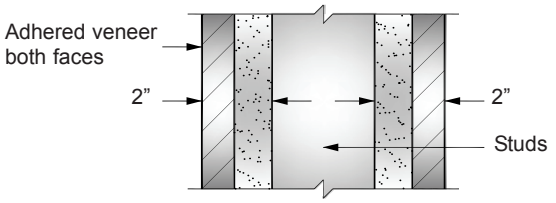
Figure 5 1–hour wall sections.



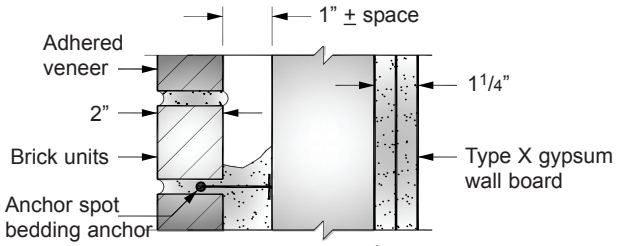
2” Adhered Brick with 1 1/4” Gypsum X Board



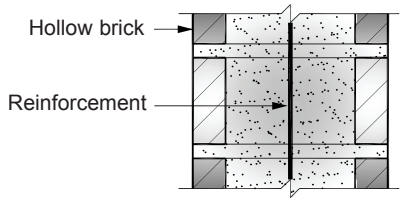
2” Adhered Brick with 1 1/4” Gypsum Plaster



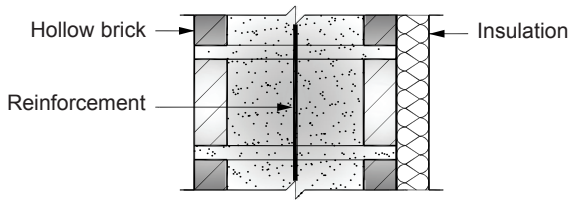
2” Adhered Brick with 2” Adhered Brick



2” Anchored Brick and 1” air with 1 1/4” Gypsum X or Plaster

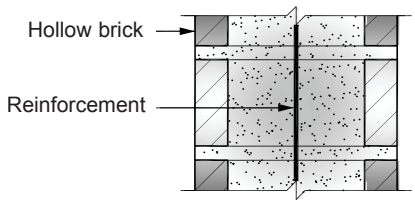


3.4” Equivalent Thickness Hollow Brick

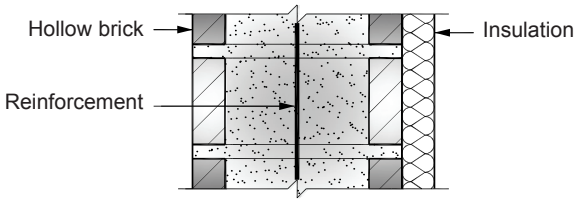


4.4” Equivalent Thickness Hollow Brick with Insulation

Figure 6 2–hour wall sections.

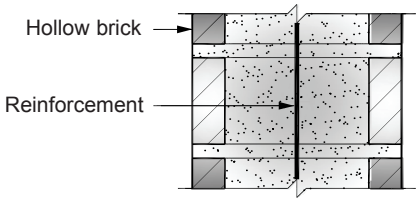


4.3” Equivalent Thickness Hollow Brick

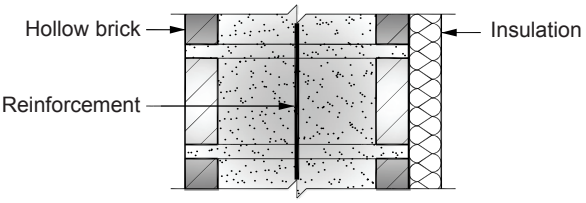


5.5” Equivalent Thickness Hollow Brick with Insulation

Figure 7 3–hour wall sections.



5.0” Equivalent Thickness Hollow Brick



6.6” Equivalent Thickness Hollow Brick with Insulation

Figure 8 4–hour wall sections.

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4	**Masonry Institute of America**	(www.masonryinstitute.org)
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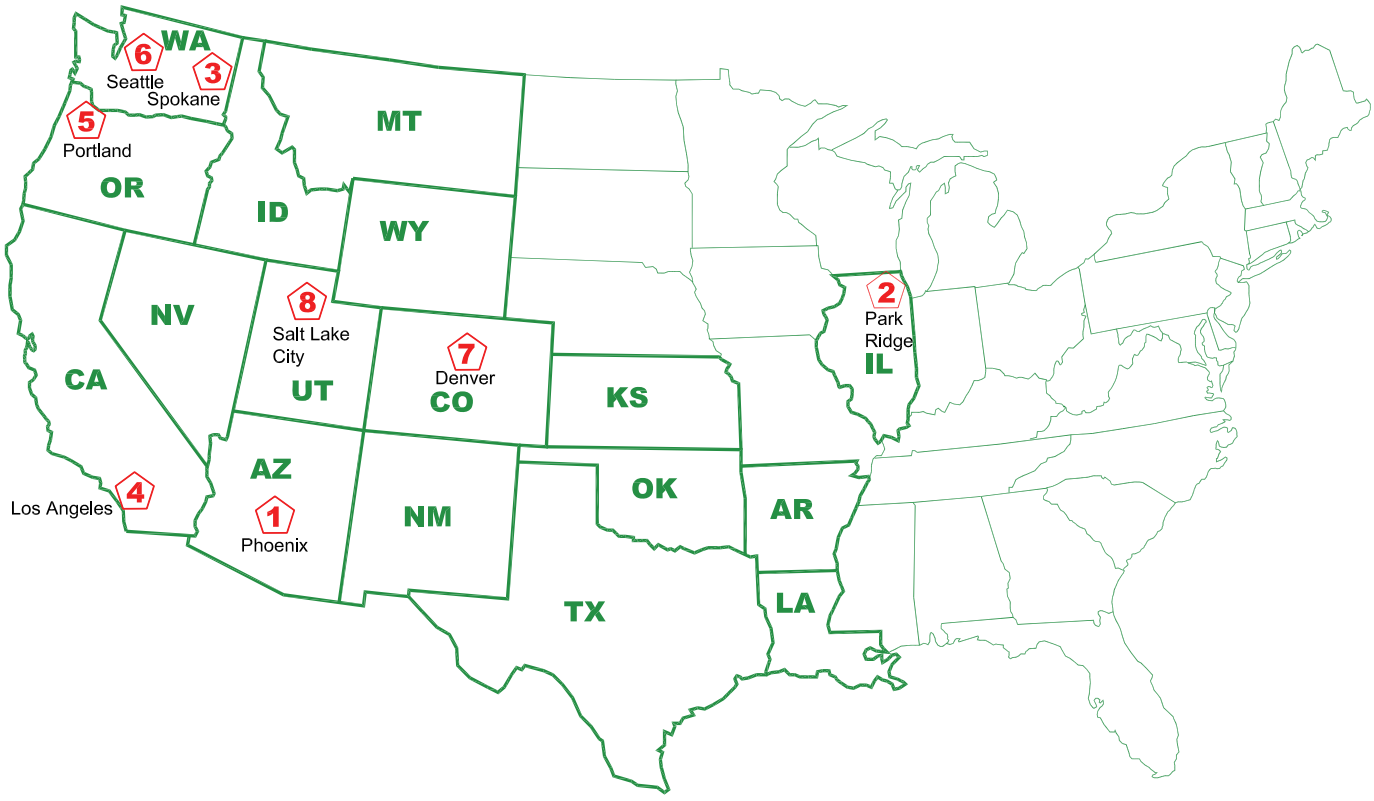

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Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088-5625

Report #: 2022-3
Date: March 25, 2022
Work Order #: 3596

Dimensions: 8x4x16 - 0440
Sample Color: Sawgrass
Lab Mix #: 1288

Test Date: March 21, 2022
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C216 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
3.6250	7.6250	7.6875	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3653.5	3521.5	3389.6	3664.3	3845.5	
Immersed Weight	2071.3	1944	2035.5	2067.6	2166.5	
Cold Water (SSD)	3913	3768	3848.5	3909.1	4095.6	
5 hour Boil (SSD)	4025	3879.5	3960	4020.6	4217.8	*AVERAGE*
24 hr. Cold Water (%)	7.1	7.0	13.5	6.7	6.5	8.2
5 hr. Boiling Water (%)	10.17	10.17	16.83	9.72	9.68	11.31
Saturation Coefficient	0.70	0.69	0.80	0.69	0.67	0.71

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	30.80	30.80	30.80	30.80	30.80	
Oven Dry Weight (grams)	3568.9	3587.4	3670	3594.4	3719.1	
1 Minute Gain in Weight	3581.1	3600.2	3681.8	3606.9	3733.5	*AVERAGE*
I.R.A (grams/min/30in.^{2})	11.9	12.5	11.5	12.2	14.0	12.4

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:29198)

Sample Number	1	2	3	4	5	
Brick Gross Area (in²)	58.60	58.60	58.60	58.60	58.60	
Brick Net Area (in²)	30.80	30.80	30.80	30.80	30.80	
Maximum Load (lbf)	387,900	472,010	417,600	436,970	409,740	*AVERAGE*
Net Compressive Strength (psi)	12,594	15,325	13,558	14,187	13,303	13,790
Gross Compressive Strength (psi)	6,619	8,055	7,126	7,457	6,992	7,250

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C216 Designation: Grade SW

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

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Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088-5625

Report #: 2024-10
Date: July 1, 2024
Work Order #: 4543
PO# 45-03690257

Dimensions: 8x4x16
Sample Color: Mountain Red Atlas
Lab Mix #: 1343

Test Date: July 1, 2024
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C216 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
3.6875	7.6250	7.1250	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3590.6	3602.3	3594	3584.5	3526.2	
Immersed Weight	2065.3	2068.8	2066	2060.4	2028.2	
Cold Water (SSD)	3804.5	3804.6	3799	3794.5	3724.6	
5 hour Boil (SSD)	3907	3906.6	3899.8	3896.8	3825.4	*AVERAGE*
24 hr. Cold Water (%)	5.95	5.62	5.70	5.86	5.63	5.8
5 hr. Boiling Water (%)	8.81	8.45	8.51	8.71	8.49	8.6
Saturation Coefficient	0.68	0.66	0.67	0.67	0.66	0.67

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	28.79	28.74	28.69	28.71	28.08	
Oven Dry Weight (grams)	3590.6	3602.3	3594	3584.5	3526.2	
1 Minute Gain in Weight	3599.9	3610.5	3601.9	3593.1	3534.8	*AVERAGE*
I.R.A (grams/min/30in.^{2})	9.80	8.56	8.26	8.98	9.18	9.0

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:31637)

Sample Number	6	7	8	9	10	
Brick Gross Area (in²)	54.32	54.32	54.32	54.32	54.32	
Brick Net Area (in²)	28.60	28.60	28.60	28.60	28.60	
Maximum Load (lbf)	409,150	403,510	398,190	391,640	388,240	*AVERAGE*
Net Compressive Strength (psi)	14,316	14,108	13,922	13,693	13,574	13,920
Gross Compressive Strength (psi)	7,532	7,428	7,330	7,209	7,147	7,330

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C216 Designation: Grade SW

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

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Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088-5625

Report #: 2025-18
Drop Off Date: May 28, 2025
Test Date: July 2, 2025
Ticket #: 7325
Po#: 4503868009

Dimensions: 8x4x16
Sample Color: Terra Cotta
Lab Mix #: 1427

Test Date: July 2, 2025
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C902 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

	Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
	3.6875	7.625	7.250	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3515.7	3481.3	3479.5	3492.8	3531.7	
Immersed Weight	2049.3	2028.8	2041.2	2041.2	2064.5	
Cold Water (SSD)	3775.9	3748.3	3764.2	3767.8	3808.9	
5 hour Boil (SSD)	3861.3	3835.3	3848.2	3850.1	3896.6	*AVERAGE*
24 hr. Cold Water (%)	7.4	7.6	8.2	7.9	7.8	7.8
5 hr. Boiling Water (%)	9.8	10.2	10.6	10.2	10.3	10.2
Saturation Coefficient	0.75	0.75	0.77	0.77	0.76	0.76

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	28.58	28.47	28.52	28.58	28.88	
Oven Dry Weight (grams)	3515.7	3481.3	3479.5	3492.8	3531.7	
1 Minute Gain in Weight	35260.0	3491.4	3490.3	3502.6	3543.1	*AVERAGE*
I.R.A (grams/min/30in.^{2})	10.8	10.6	11.4	10.3	11.8	11.0

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:31296)

Sample Number	6	7	8	9	10	
Brick Gross Area (in²)	55.28	55.28	55.28	55.28	55.28	
Brick Net Area (in²)	28.61	28.61	28.61	28.61	28.61	
Maximum Load (lb.)	355,640	359,900	332,300	322,410	317,400	*AVERAGE*
Net Compressive Strength (psi)	12,430	12,579	11,614	11,269	11,094	11,800
Gross Compressive Strength (psi)	6,433	6,510	6,011	5,832	5,741	6,110

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C902 Designation: Class SX Type II

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NOTES ON THE SELECTION, DESIGN AND CONSTRUCTION OF REINFORCED HOLLOW CLAY MASONRY









WESTERN STATES CLAY PRODUCTS ASSOCIATION

Acknowledgements

This document was sponsored by the Western States Clay Products Association and written by John G. Tawresey, formerly of KPFF Consulting Engineers, with review and comments by John Hochwalt, KPFF Consulting Engineers, and the Technical Publication and Promotion Committee of the Western States Clay Products Association. The committee members are Steve Judd, Jim Buckley, John Chrysler, Brian Healow, Jeff McNear, Don Sackett, Jim Welte, Joe Welte, and Ann Wolter. Their contribution was very valuable and greatly appreciated.

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Introduction

Reinforced Hollow Clay Masonry (RHCM), also known as "Structural Clay Brick" and "Reinforced Structural Clay Units," offers the building owner many advantages. Unfortunately, the structural engineer often overlooks these advantages. When the structural engineer offers the client alternative structural systems, steel, concrete, concrete masonry, brick veneer, concrete masonry, and wood are usually considered, but reinforced hollow brick masonry is often not.

Most structural engineers are familiar with steel, concrete, wood, and concrete masonry design. RHCM design is similar to concrete masonry design, but there are important differences.

Knowledge of RHCM structural design provides the structural engineer with a meaningful design niche.

Recognizing this lack of knowledge, the Western States Clay Products Association (WSCPA) agreed to produce this RHCM publication specifically for the structural engineer. The first edition was published in 1995, followed by a revision in 1997. This is the third edition.

The document emphasizes the information required to successfully complete a RHCM project, the first being to convince the owner, architect, and sometimes the contractor to consider the RHCM option.

The document begins with example projects followed by helpful information during the traditional project phases: Schematic Design, Design Development, Construction Documents, and Construction.

Cost is always a factor. Suggesting RHCM will usually result in the client saying: "How much does it cost?" Costs are difficult to predict. Here is one example. For the brick wall below* costs was developed by a general contractor and a mason contractor in the Pacific Northwest in August 2022.

Two options were considered; a brick veneer on steel studs and RHCM. The brick veneer required an 8-inch structural stud backing, while the RHCM required only interior partition (furring) studs. The brick veneer option costs $59.10 per square foot, and the RHCM option costs $57.33 per square foot.

This cost study only included the wall. Additional savings exist if the RHCM wall supports the roof and provides lateral resistance.

Analogous to unreinforced concrete, unreinforced brick masonry is not cost-effective. Adding reinforcement reduces cost. The purpose of this document is to provide the structural engineer with the knowledge to utilize the RHCM design niche.

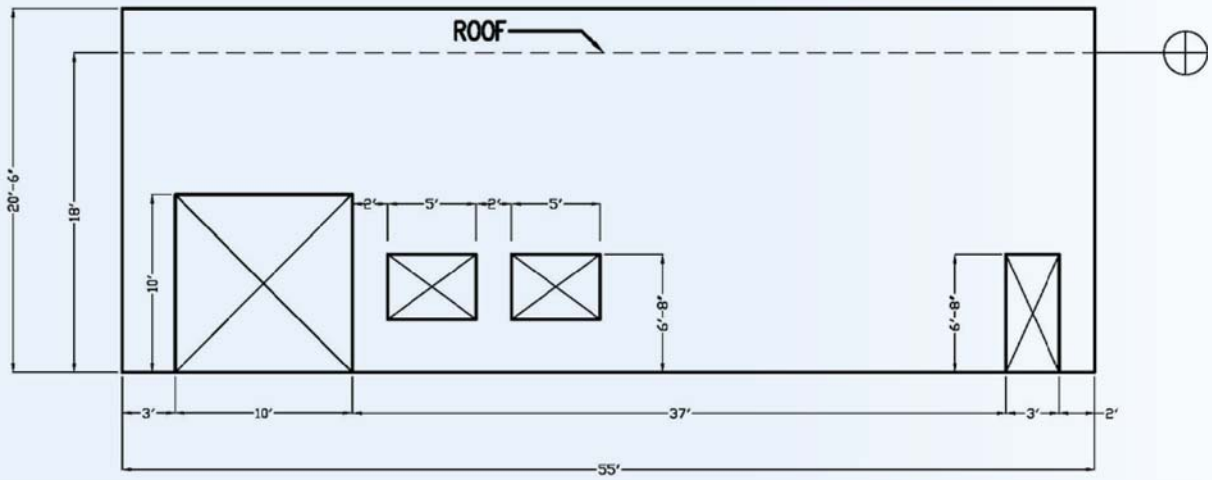


Figure 1 Cost Comparison - Brick Veneer on Metal Studs versus Reinforced Hollow Clay Masonry

What is RHCM?

The most common shapes of hollow clay units (sometimes referred to as structural clay units) are shown below. There are many shapes and sizes available. Custom shapes may be designed, fabricated, and installed on larger, more geometrically complex projects.

Hollow clay units are produced by extruding a mixture of various clays that determine color, strength, water absorption, and saturation coefficient. Different clays are combined to a fine powder, water is added, and the mixture is extruded through a steel die. The extruded column of clay is then sliced perpendicular to the extruded column at the desired unit height. The units are then placed on carts and generally fired to temperatures above 2000 F degrees in a kiln.

Following firing in the kiln, units are placed on pallets for shipping. Units are transported from the manufacturing plant to the project by truck or rail.

Masons place the units in mortar, and reinforcement is placed in the cells and bond beams. The resulting wall is grouted to bind the units, grout, and reinforcement to form the structural wall. In some situations, insulation can be placed in the ungrouted cells to enhance the thermal properties of the wall.

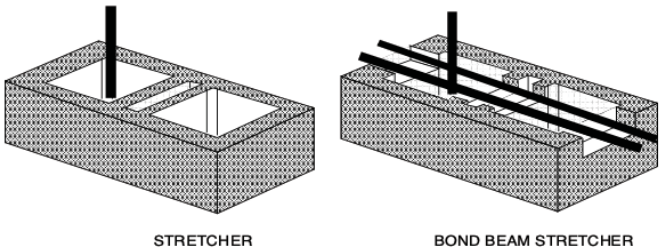


Figure 2 Typical Reinforced Hollow Clay Unit

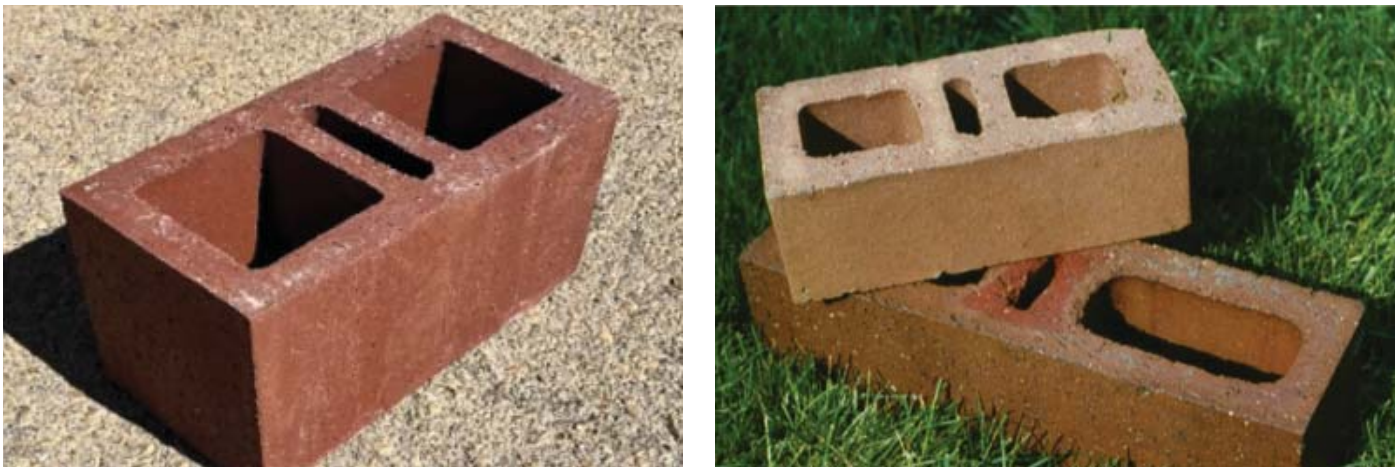


Figure 3 Hollow Clay Units (*Left:* 7 3/8" x 7 3/8" x 15 3/8", *Right:* 3 1/2" x 2 1/2" x 7 1/2", and 3 1/2" x 3 1/2" x 11 1/2")

Document Scope

Detailed information about structural design methods is not included in this document. Instead, this document contains "rules of thumb" to assist in creating the design. More detailed information on structural design methods can be found in numerous textbooks and other references. Two resources available are the Reinforced Masonry Engineering Handbook and the Masonry Designers Guide. These resources contain example designs with example structural analysis. They can be found at The Masonry Society Library.

Design software is also available from many sources.

Mostly, the information is based on Building Code Requirements and Specifications for Masonry Structures, The Masonry Society 402/602. TMS 402/602 is adopted by reference in ASCE 7 and the IBC with minor overriding provisions.

It is intended that most of the information presented is independent of the code edition selected. Specific code references are not included as code provisions change with time and may be revised by the local jurisdiction. In this document, there are statements that a provision is required by code. This statement means that the provision has existed in the code for many years or may be new and is likely to continue being a code provision. But, the provision may or may not apply to your project and may not be current. The structural engineer must check current code provisions applicable to the project based on the jurisdiction having authority.

The traditional design and construction project delivery system (design-bid-build) are assumed. In the traditional project delivery system, the structural engineer contracts with and reports to the project architect as a specialty consultant. The architect typically contracts with and reports to the owner. The contractor is selected after the design is completed, and the selection is often based on price. The contractor enters into an agreement with the owner and reports to the architect serving as the owner's representative.

Other project delivery methods exist, such as the Construction Manager/General Contractor (CM/GC) and Design-Build. Because there is usually more interaction with contractors in these alternative methods, converting a project to RHCM may be easier. However, for this publication, the traditional approach is assumed.



Figure 4 Reinforced Hollow Clay Masonry Wall with Shear Keys for the Slab Connection

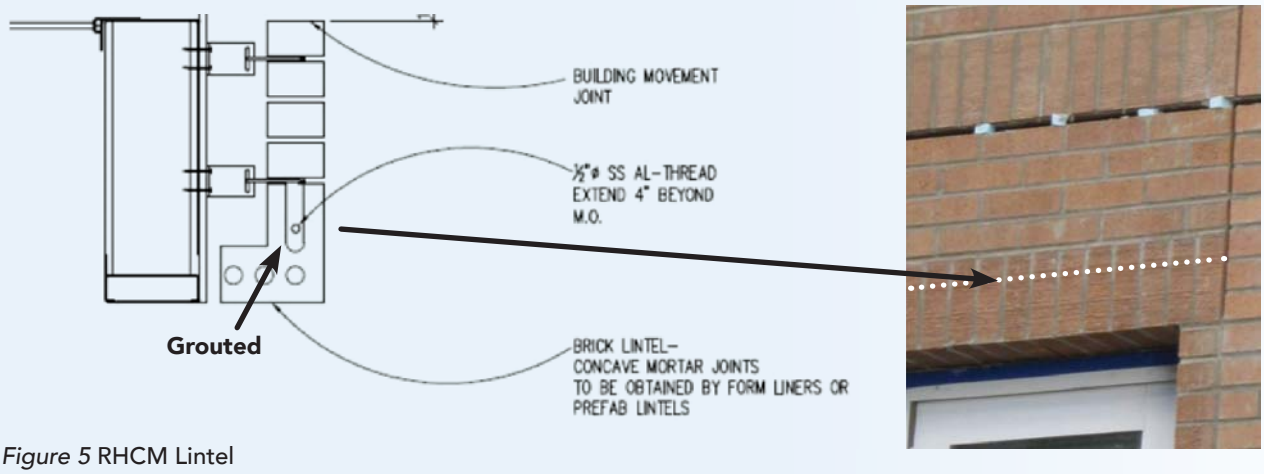


Figure 5 RHCM Lintel

Example Projects

Basic Applications

Reinforced Hollow Clay Masonry Header for Veneer

Brick veneer over various veneer backings is often used for a building's exterior wall. Above openings, the brick veneer is usually supported by steel angles called loose lintels prone to rusting. Observing the rusted angle above an opening makes it easy to determine that a wall is brick veneer. There is a better design.



Figure 6 Custom Lintel Unit for an Inset Window

Replace the steel loose lintel angle with a Reinforce Hollow Clay Masonry lintel. The simplest design is a half-hollow clay soldier. A horizontal reinforcing bar is placed in the cell, and the cell is grouted.

Because the reinforced lintel is typically exposed to water on both sides, it is recommended to use a stainless steel all-thread for the reinforcement. Stainless steel all-thread is much less expensive than stainless steel reinforcement and is readily available. For most applications, a 3/8-inch or ½-inch diameter all-thread is sufficient.

Construction is accomplished by shoring the opening, usually with wood framing. Some masons elect to prefabricate the lintel as a RHCM panel, either on-site or off-site, in a controlled environment.

Reinforced Hollow Clay Masonry Retaining Walls

Many retaining walls are constructed using concrete. Concrete forms often use brick pattern forms for the exposed surface. Why not use brick instead?

Typical hollow clay masonry design strengths (ranging between 2600 and 4000 psi) match that of concrete (higher strength than concrete masonry). Reinforcement requirements are comparable to concrete.

A significant cost advantage is the geometric flexibility of RHCM. Hollow clay masonry units are laid one unit at a time. There is flexibility to have articulated shapes for a small increase in cost.



Figure 7 Articulated Retaining Wall

The serpentine retaining wall is a classic example of the relationship between form and structure. The geometry of a RHCM retaining wall can significantly increase the structural capacity and is more economical. Varying the geometry of a concrete retaining wall is expensive. RHCM can be considered similar to reinforced concrete with the forming left in place.

Additionally, RHCM expands, and concrete and concrete masonry shrinks. In RHCM, the expansion puts the reinforcement in tension, reducing cracking and water penetration. Also, a brick retaining wall can be built from one side, often minimizing the expense of the back-side excavation.



Figure 8 RHCM Retaining Wall

RHCM Soffits, Sills, and Cantilevers

Brick veneer walls may include brick soffits, sills, and cantilevers. Instead of complicated veneer backing, RHCM can be used.

Spanning between connectors to the structure, the hollow clay masonry transforms the veneer into a structural element, eliminating the structural veneer backing. Some local building codes restrict the use of veneers on overhead horizontal surfaces. RHCM would be code compliant and solve the problem.

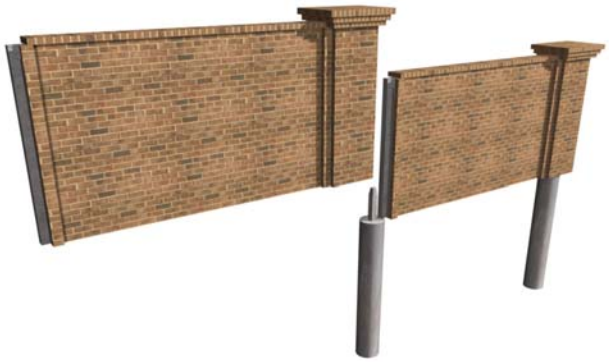


Figure 9 RHCM Cantilevered Exterior Wall

Reinforced Hollow Clay Masonry Sound Walls

RHCM sound barrier walls are cost-effective. In addition, the flexibility of color and form offers cost and aesthetic advantages.

Two schemes of sound walls are recognized, the cantilever wall and the pier and panel wall. The cantilever has a continuous footing, and the wall is designed to cantilever from the footing. The pier and panel wall has a foundation below the pier but does not require a continuous footing under the wall panels, a significant saving. The piers are designed to support the loading from the wall panel between the piers.



The Sound Transmission Class of a reinforced hollow clay wall is comparable to a concrete wall. The sound transmission class rating can be found in TMS Standard 0302-12 and Brick Industry Association Technical Note 45.



Figure 10 Pier and Panel Sound Wall

Advanced Applications

Schools

For aesthetic reasons, brick is often preferred for the exterior of a school. Often architects will opt for a brick veneer which they believe costs less. However, brick veneer has a limited life unless properly designed with items like stainless steel ties.

Additionally, school story heights add significant costs to the veneer backup system. When the veneer is converted to an RHCM structural system, the backup wall can remain inexpensive, and the brick wall can be part of the building's primary structure. There are many examples of the RHCM wall costing less than brick veneer walls.

Interior RHCM hall and classroom walls provide fire resistance and a long-lasting, durable surface that resists abuse and requires little maintenance.



Figure 11 RHCM School

Commercial/Retail

One- and two-story commercial buildings, retail malls, or other commercial developments can frequently benefit from RHCM construction. As an alternative to concrete masonry, there is an increase in initial cost for a significant improvement in aesthetics, strength, and durability.

As an alternative to a steel frame with metal stud infill walls, RHCM masonry can be used as both a bearing wall, shear wall, and enclosure wall providing structure and exterior finish simultaneously.

Long lead times for structural steel detailing and fabrication can increase the construction schedule. The construction of RHCM can usually begin shortly after the design is complete.



Figure 12 RHCM Retail Center

Small Office Buildings

The typical office building requires column-free spaces to provide flexibility for interior design. These buildings often employ moment frames or braced frames to resist lateral loads. Load-bearing walls are typically not used because they limit the flexibility of the interior space. However, RHCM shear walls can be substituted for steel braced frames or moment frames to resist lateral force. Fire-rated stairs and fire-rated elevator shafts can utilize RHCM, providing up to four-hour fire resistance with an interior brick finish. This is especially desirable when shear walls become part of the exterior aesthetics of the building or permanent partitions.

Single-Family Residential



Figure 13 Brick House

RHCM can be substituted for wood frame construction in single-family residential projects. It offers better acoustical properties, less seismic or wind drift (deflection), better fire resistance, less maintenance, insect resistance, and hail resistance. Also, stiff masonry walls may provide better performance in expansive soil locations than flexible walls.

Multi-Story Residential/Hotels

RHCM is used in medium-rise residential projects, including hotels. RHCM exhibits high compressive strength. For buildings in the four-story to the 20-story range, the full strength can be used with little or no increase in cost.



Figure 13 RHCM Residential

The high strength can mean savings and offer an advantage over other forms of construction. The RHCM system is compatible with wood, precast, cast-in-place, or prestressed floor systems. Besides aesthetics, a primary benefit of RHCM bearing wall construction is the sound separation provided by the wall mass. RHCM dwelling unit dividing walls also provide reliable fire separation and thermal mass.



Figure 15 RHCM Hotel

Institutional Facilities

Brick is often the material of choice for libraries, hospitals, fire stations, city halls, and university buildings. In these situations, using RHCM offers an alternative to brick veneer. It can perform double duty when designed to be load-bearing and may provide savings.

Even if not designed to be load-bearing, RHCM offers better seismic isolation and longer life than traditional veneers. RHCM can be designed to isolate the wall from building movements in areas of high seismic exposure. This is difficult to accomplish with conventional brick veneer, particularly at the building corners.



Figure 16 RHCM University Building

Other Applications

Small Bridges



Figure 17 Small Bridge

Building a bridge can be limited by local conditions. A RHCM brick bridge can be built almost anywhere. The materials can be transported one brick at a time. Additionally, the flexible geometry allows for more efficient structural systems.

Blast Walls

Technical information about RHCM and brick blast walls is limited. At this time, it is not a typical application. ASCE/SEI Standard 59-11 Blast Protection of Buildings addresses material and design issues. Masonry is included and, except for minor differences, is equivalent to reinforced concrete. The referenced document addresses concrete masonry. Experience indicates that because of the significant increase in strength of hollow clay masonry units over concrete masonry units, brick blast-resistant walls will perform equal to or better than concrete masonry blast-resistant walls.

The Department of Defense and the ASCE/SEI 59-11 prohibit using unreinforced or partially grouted masonry for blast resistance. This is because fragmentation of the units causes airborne debris.

Storm Shelters

Test panels made of fully grouted RHCM, produced by Interstate Brick Company, have been tested for debris impact. The test objective was to ensure compliance with a high-performance standard to protect shelter occupants from wind-borne debris. Performance criteria include preventing the perforation of the shelter by the test missile and preventing damage that could cause injuries to the occupants.

The panels tested met the debris impact guidelines of FEMA 320/361 and ICC – 500 for a tornado shelter. Again, remember that the flexibility of wall geometry gives RHCM a significant cost advantage over reinforced concrete.

Curtainwall or Reinforced Veneer, or Structural Brick Veneer

Brick veneer on metal studs is a popular curtainwall system. An alternative system is an RHCM curtainwall or reinforced veneer. A reinforced veneer is similar to a conventional veneer, except the wall is constructed with RHCM. Typical closely spaced veneer ties are replaced with intermittent connectors spaced farther apart. A typical brick veneer has ties every two square feet. Reinforced veneers have connectors every 100 square feet. The connectors carry more load, are constructed of galvanized thicker materials, offer simpler methods for isolating the veneer from the primary structure, provide less thermal bridging, and are more corrosion-resistant.

A design guide for reinforced veneer or structural brick veneer is available at the Western States Clay Products website (www.brick-wscpa.org/technical-publications.php, Design Guide for Structural Brick Veneer, Third Addition).

A reinforced veneer is sometimes called "laid-in-place panels."



Figure 18 RHCM Reinforced Veneer Hospital Exterior Wall in a High Seismic Zone

Brick Panels

Brick panels are an application for RHCM. Brick panels are constructed of hollow clay units, reinforced, fully grouted, and attached to the building in a manner comparable to a precast concrete panel. The system can speed construction, eliminate the requirement for scaffolding, and provide the designer with new opportunities not available with conventional masonry. The system has been used on many buildings ranging from single-story branch banks to 50-story office buildings.

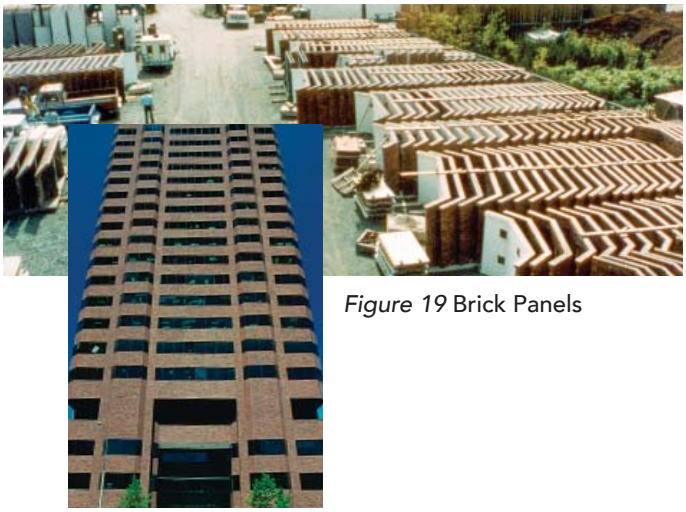
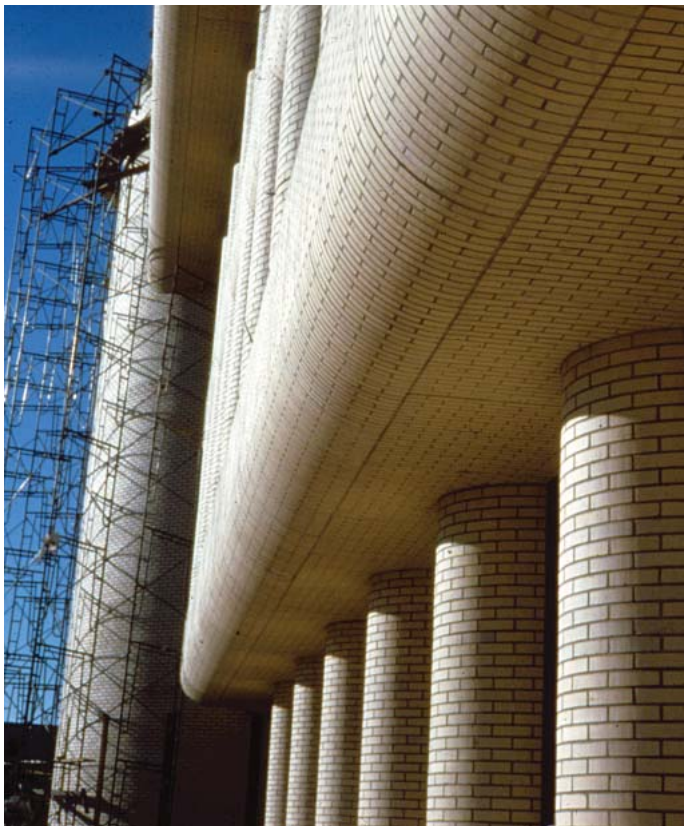


Figure 19 Brick Panels



Concrete Form

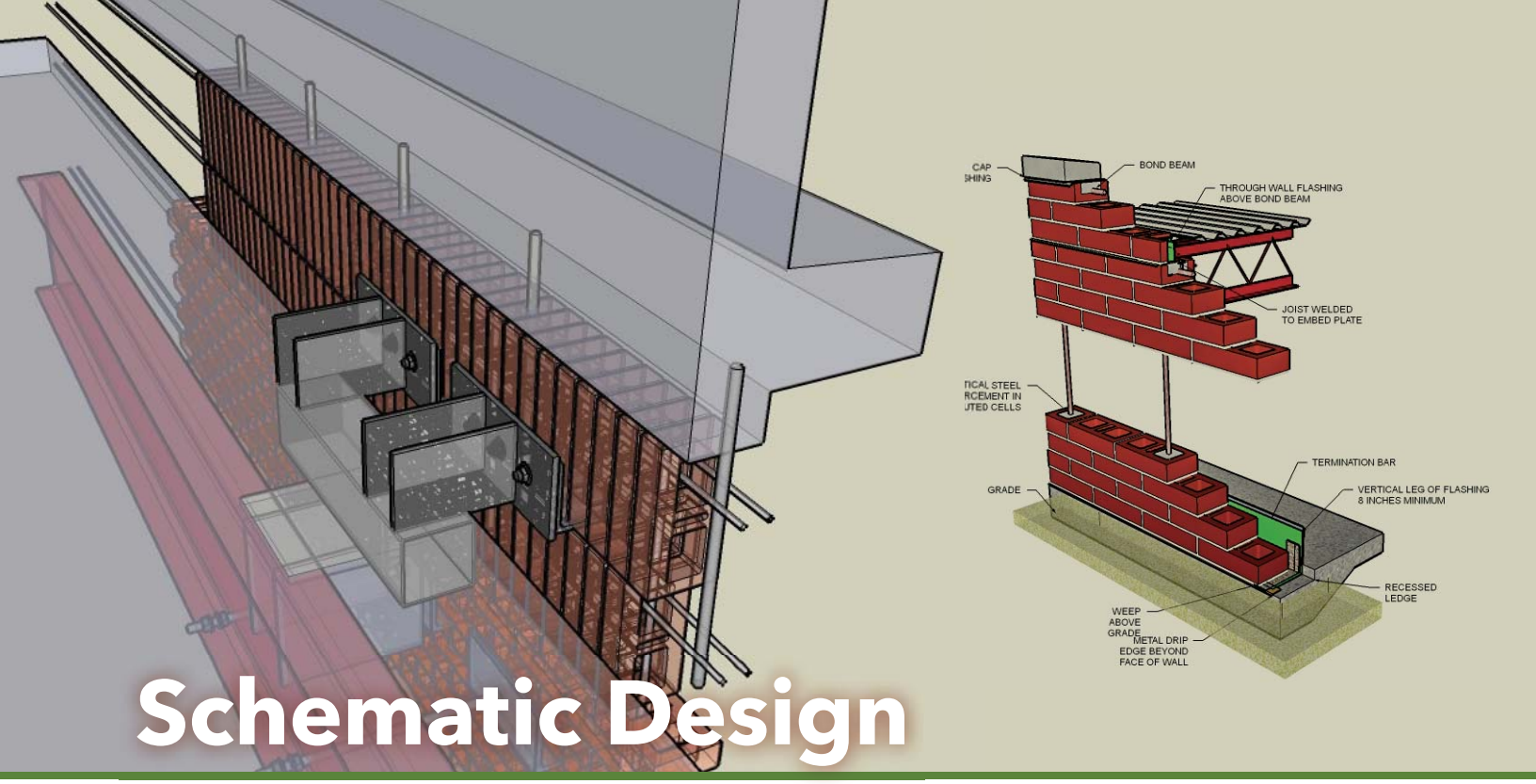
RHCM or, in some cases, unreinforced solid brick can be used as a form for concrete. When a brick exterior is desired, the brick can become the form for concrete structural columns and spandrels. In addition to increasing the element's capacity (the brick concrete form is structural and is not removed), the geometry flexibility offers interesting opportunities for unique designs.



Figure 20 RHCM Columns and Spandrels Used Both as a Form and for Structure



Figure 21 RHCM Used as the Finish Wall and Backing for Concrete Shotcrete (Gunite)



Schematic Design

Selection of the Structural System

During the schematic design phase, the architect evaluates the owner's needs and develops the project concept. Multiple design concepts are explored and developed during this phase. The structural engineer is expected to influence the selection of a structural system with choices that are cost effective for the owner.

The architect and owner will likely have defined a preliminary site plan and layout before the structural engineer's involvement. For example, if the site plan includes retaining walls, the structural engineer should include the retaining walls in the design scope, increasing the fee if possible, and suggest RHCM as a cost-saving option.

Suppose the exterior skin (curtainwall) has not been defined, and the building is of institutional quality or in a high seismic or hurricane zone. In that case, RHCM curtainwall (reinforced veneer) may be an option for significant cost reduction and enhanced performance. Reinforced veneer usually costs less than conventional brick veneer on steel studs if the story height is over 12 feet.

During the selection dialogue, the following advantages and objections could arise.

Advantages

Sustainability and Resilience

Unlike many modern construction materials, fired clay (bricks) lasts thousands of years in the environment. They are sustainable. Additionally, bricks can be recycled either by reuse or by adding ground-up bricks to clays for making new bricks.

Resilience can be developed through the geometric flexibility of RHCM. Adding intersecting walls and flanges to shear walls will increase resilience at a minimum cost.

Expansion Property

Brick masonry expands with time. This can take as long as five years. It is not reversible. In RHCM, this property places the brick in compression and the steel in tension. The result is reduced cracking and improved water penetration resistance. Expansion joints can be placed further apart or, in some cases, eliminated.

High Strength

It is relatively easy to obtain high-strength hollow clay masonry. Design strengths (f'_m) of 4,000 psi are recognized in TMS 602 Specification based on an 11,500 psi clay unit net area compressive strength. Typical unit strengths are between 10,000 and 15,000 psi. Higher unit strengths are common.

Darker colored bricks generally have higher strengths and lower absorption than lighter colored bricks. There is typically no cost premium for these higher strengths, although there may be local limitations on available colors. In load-bearing applications, the higher strengths offer an advantage over concrete masonry units.

The tensile strength of the brick masonry unit range between 700 and 1500 psi. Brick cracking in structural walls is less common than in concrete masonry (CMU).

Form and Structure

Structural capacity can be significantly increased by modifying geometry. For example, adding a pilaster to the wall. The cost to modify geometry is minimal when bricks are laid one at a time.

Speed of Construction

Most masonry materials, including hollow brick, are readily available on short notice. Therefore, it is not necessary to wait for steel fabrication.

Low Maintenance Cost

RHCM is relatively maintenance-free. Expected life far exceeds the life of metal and other light exterior wall systems. RHCM does not rot. Insects do not eat RHCM.

Aesthetic Flexibility

There are thousands of colors and textures from which to choose. The many brick placement orientations can create unique patterns that challenge the architect's creativity. Fewer expansion (or control) joints (if any) are required. Special shapes can be produced to further broaden the aesthetic possibilities.

Building a bridge can be limited by local conditions. A RHCM brick bridge can be built almost anywhere. The materials can be transported one brick at a time. Additionally, the flexible geometry allows for more efficient structural systems.

Objections

RHCM is viewed as masonry in general and carries many of the perceived negatives often associated with masonry.

Below are a few of the common objections. However, despite these objections, RHCM has been successfully used on many projects for the past 80 years and should continue to receive consideration in many projects.

Unfamiliarity with RHCM

Many designers, both architects, and engineers, are not familiar with RHCM. A simple solution is to consider RHCM as concrete masonry with the CMU units replaced with brick units.

Higher Cost

RHCM costs more than concrete masonry. But it may cost less than brick veneer on metal studs. When floor heights exceed 12 feet, many examples exist where an RHCM with only an interior partition costs less than a brick veneer with a structural steel stud backup system. This is because the backup structural steel stud wall cost exceeds the increased brick structural cost.

Water Penetration

Masonry is often perceived to leak more than other wall systems. This has proven to be inaccurate for RHCM, particularly when grouted solid. The expansion of the brick masonry against the reinforcement tends to reduce cracking and, thus, reduce leakage significantly.

Another Subcontractor

Adding the mason adds another subcontractor to the job. General contractors often resist adding a masonry subcontractor to the job. One reason is the cost of administering the masonry work. Another reason exists if the general contractor performs their own concrete work. In this situation, they will prefer concrete walls instead of masonry walls to keep a larger percentage of the project.

Unreliable Color

Colors are variable and sometimes not what was expected. Many architects have experienced difficulty in obtaining the colors desired. To a large degree, many of these problems don't exist today. More sophisticated manufacturing processes and adequate color mock-ups have nearly eliminated issues in this area.

Inexperienced with Design Methods

Many structural engineers are not familiar with masonry design methods. There are many new resources (literature and software) available. This document is one example.

Inconsistent Information

Sometimes technical answers obtained from suppliers appear inconsistent. There are many different types of masonry. There are many different uses. Communication between the masonry industry and the designer often needs clarification because of misunderstandings of intended use and terminology. Veneer brick masonry is not designed and constructed like load-bearing brick masonry. CMU masonry behaves very differently from fired clay masonry. One typical example: wetting clay units before laying is often recommended, while it is not recommended to wet CMU units before laying.

Inconsistent Standard Details

Many standard details are available, but the problem is similar to the apparent inconsistency of technical answers. Since there are so many different types of masonry, methods, and systems, a single set of standard details is not possible. Further, details vary by region. Most local masonry institutes have recommended details available.

Prices are not predictable.

Price varies from job to job. Unfortunately, it is difficult to predict the price of a masonry job. Since masonry work is labor intensive, the mason's production is a key factor. Many variables come into play. The cost of the bricks remains relatively predictable and can be obtained from the supplier.

Complicated Building Code

There are many different types of masonry and many different applications. Persistence in understanding the applicable provisions of the code is required. This document is intended to help.

Selection of Materials

When RHCM is selected for the structural system, the next step is to choose the specific type of units to be used. The choices of shape, color, texture, and pattern are almost unlimited.

Thousands of colors exist. Almost any shape can be produced. Units can be shipped thousands of miles.

Local suppliers can provide information on the available strengths, shapes, and colors. The manufacturers who are members of the Western States Clay Products Association are listed in Appendix A.

Initial Design Criteria

The likely applicable code is The Masonry Society (TMS) 402/602 *Building Code Requirements and Specification for Masonry Structures*. It is adopted by reference in the International Building Code. Associated design loads are found in the *International Building Code* and the *American Society of Civil Engineers (ASCE 7) Minimum Design Loads for Buildings and Other Structures*.

TMS 402/602 includes two design methods: Allowable Stress Design and Strength Design. The Allowable Stress Design and Strength Design methods are divided into Reinforced Masonry Design and Unreinforced Masonry Design. Hollow clay masonry can be designed as reinforced masonry or unreinforced masonry using either Allowable Stress Design or Strength Design.

The code provisions for Unreinforced Design, Reinforced Design, Strength Design, and Allowable Stress Design may be used in combination. For many years ASCE 7 has restricted combining Allowable Stress Design and Strength Design. But the IBC has typically not adopted the ASCE 7 restriction. Before combining methods, the structural engineer must verify if the mixing of design methods is allowed within the project jurisdiction.

Dimensions

It is traditional to describe the masonry unit dimensions in the order of thickness, height, and length. For example, a 6 x 4 x 12 unit is a nominal 6-inch-thick, 4-inch high, and 12-inch long unit. Nominal dimensions are one mortar joint thickness larger than the specified brick dimensions. The typical mortar joint thickness for RHCM is either 3/8 inch or 1/2 inch, depending on the manufacturer (the typical mortar joint thickness for concrete masonry units is 3/8 inch). Thus, a nominal 4-inch height unit laid with a ½-inch mortar joint has a specified height dimension of 3 ½ inches

Standard nominal thicknesses are 4, 5, 6, and 8 inches. The availability of 10 and 12-inch thick units may be limited. The typical nominal height is 4 inches (other heights are available), and the nominal length is 12 inches or 16 inches. Smaller standard-size brick units (for example, 3 ½ x 2 ½ x 7 ½) can be manufactured with cells large enough to be reinforced.

Hollow clay units are produced in accordance with ASTM C 652 H60V, where the sum of the void area is greater than 40 percent but less than 60 percent of the gross cross-sectional area.

Hollow clay masonry units have cells and cores. A cell is different from a core. A cell's cross-section exceeds 1 ½ square inches. A core's cross-section is less than 1 ½ square inches. Cores do not need to be grouted for a wall to be classified as fully grouted, but all cells need to be grouted. Reinforcement is not generally placed in cores.

Hollow clay masonry units are easily reinforced, both vertically and horizontally. Vertical reinforcement is placed in the cells that align vertically. Horizontal reinforcement is placed in bond beams that align horizontally. Smaller standard-size units manufactured with cells can also be easily reinforced. Diagonal reinforcement is very difficult to construct and is almost never designed.

Special units can be manufactured for custom patterns. The additional cost for custom units, shapes, and colors on large projects is generally small. A project that offers the opportunity for custom units provides the architect and structural engineer with an opportunity for creative, sustainable, and resilient design. One example is the custom units used in a large hospital for a six-inch thick wall that visually projected a standard four-inch corner.

For analysis, the specified dimensions of the masonry are used, except the nominal dimensions are used for the following:

1. Effective flange width.
2. Reinforcement spacing.
3. Maximum size of reinforcement based on the thickness of the unit.
4. Height-to-thickness ratios for determining design compression strength.
5. Minimum dimensions (Example: Minimum side dimension of a column is eight nominal inches).

It is desirable, but not necessary, that the plan dimensions match the unit module. Cutting units is common but can significantly add to the wall's cost. Moreover, a wall or pier of limited length (say, 14 inches long) could pose a problem with aligning cells for reinforcement.

Generally, the masonry contractor can adjust dimensions by plus or minus 1/8 inch per stretcher. This can be accomplished by unit selection or by adjusting mortar joint widths. It should be recognized that units typically are not exactly the same thickness, height, or length. Variations in specified dimensions are addressed in ASTM C 652. The dimension of a darker unit will generally be smaller than the dimension of a lighter unit. Because the thickness varies, hollow clay walls are typically laid to line on one exposed face. When both sides of the wall are exposed and considered finished, additional costs may result, either because of the increased cost for more uniform units or the potential increased cost to lay the units.

A floor height that does not divide evenly by the brick height is not a big problem. Usually, the bed joints can be adjusted. Sometimes the brick is cut. Gabled walls are typically constructed by cutting the units at an angle.

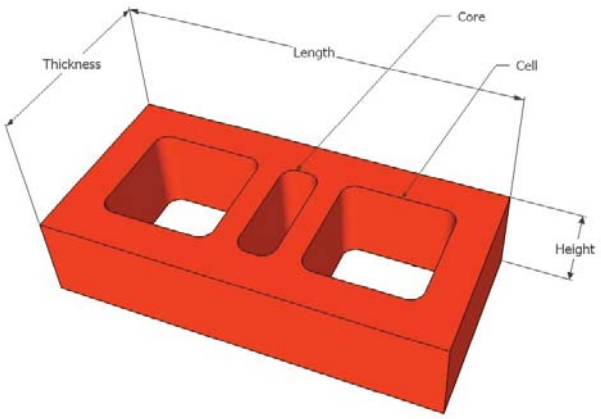


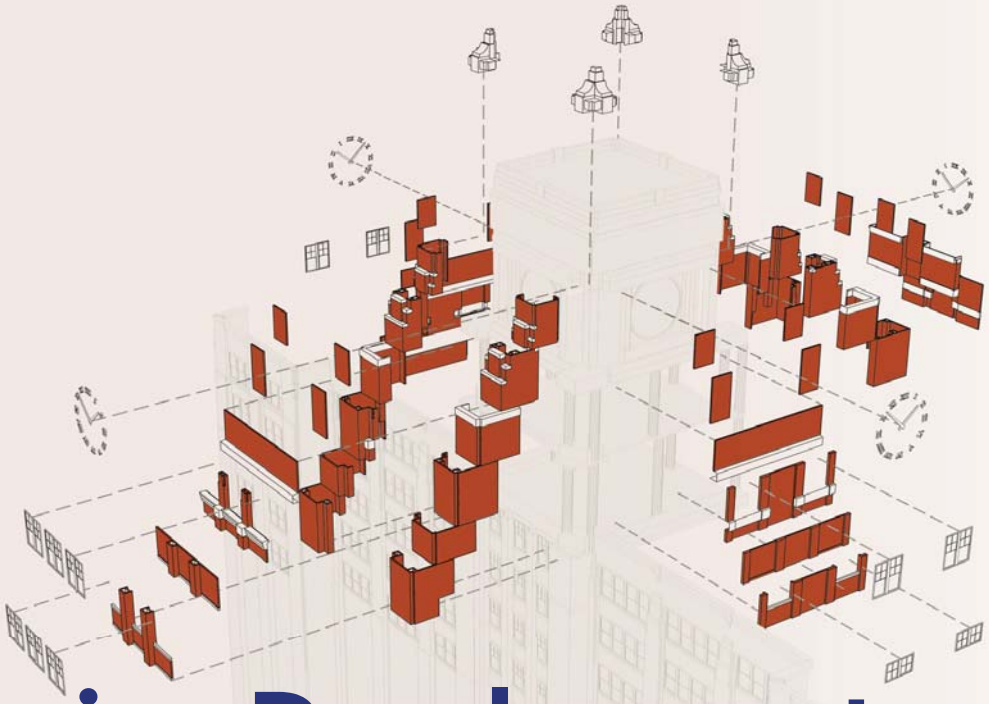
Figure 22 Dimension Order: Thickness, Height and Length



Figure 23 Custom Unit for a Four Inch Corner in a Six Inch Wall

Wall Thicknesses

It is common to use different thicknesses of walls on the same floor or to change the wall thickness from floor to floor.



Design Development

During the design development phase, the design team prepares documents consisting of drawings and specifications to fix and describe the size and character of the entire project.

During this phase, the structural engineer identifies the space required for the structural portions of the project and the elements of the structure that will control the required strength of the materials, in addition to a beginning draft of the specifications.

Bond Pattern

The building code recognizes only two bonding patterns, running bond and other than running bond (formerly defined as stack bond and that term to be used herein). For running bond, the units must overlap by more than one-quarter of the unit length. If the overlap is less than one-quarter, the pattern is classified as other than running bond for design purposes, or stack bond. The code has lower capacities for stack bond and includes prescriptive requirements for its use.

For RHCM and CMU masonry, the head joint is normally face shell bedded instead of full bedding. The structural engineer should assume that the face shell bedded head joint has no shear or tension capacity. In running bond, the head joints stair step in the wall. The code design capacities take this into account. In stack bond, the head joints line up in the wall, causing a structural discontinuity. The code provision limit capacity accordingly.

There are many bonding patterns other than stack and running bond. The orientation of the units provides the architect with many creative designs.

There are names for the orientation of units in a wall. The un-hatched face is the face exposed to view.

For unreinforced masonry, bed joint code capacities are higher than head joint code capacities. The code defines the bed joint as the horizontal layer of mortar on which the masonry is laid. The capacity is higher because of the compression on the joint during curing supplied by gravity. For example, for a soldier orientation of a unit, the head joint is the end web.

Typically, the architect will select the bonding pattern. Many designs have multiple bond patterns. Some patterns can have a significant impact on the structural design.

When the head joint limits the capacity required, using open-end units (units with the end webs removed) and fully grouting will solve the problem.

The bonding pattern may appear to create a wall that cannot be reinforced and grouted. However, there are usually methods available. Typical methods are:

- Use a single bond beam or back-to-back bond beams for vertical reinforcing in soldier courses.
- Use precast concrete or cast stone with holes (like brick cells) to pass vertical reinforcement. When using precast concrete, it is important to consider that concrete shrinks with age and that brick masonry expands. The precast should not be set until it is at least 28 days old, and the length of the precast should be limited to 10 feet with a soft caulk joint at the end. Placing sand on the surface of the caulk will make the caulk joint appear like the adjacent mortar joints.
- Use various brick thicknesses and special shapes to produce elegant walls. Flexibility is one of the most important advantages of RHCM. Rustication, quoins, and cornices are examples of a few designs that can be easily produced using different thicknesses of hollow clay.
- Work with the brick manufacturer to design custom extruded shapes.
- Use cut lintel blocks from the end of units for exposed sills and lintels.

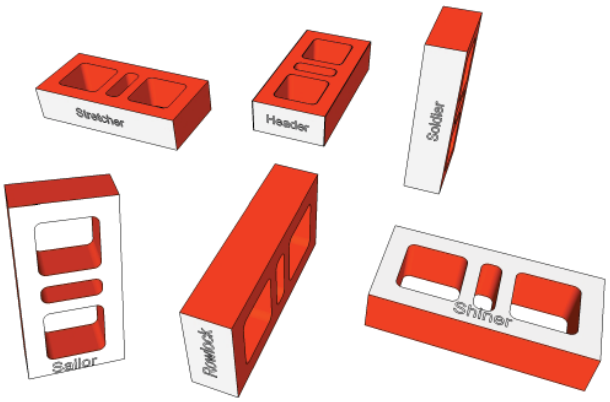


Figure 24 Unit Orientation Definitions

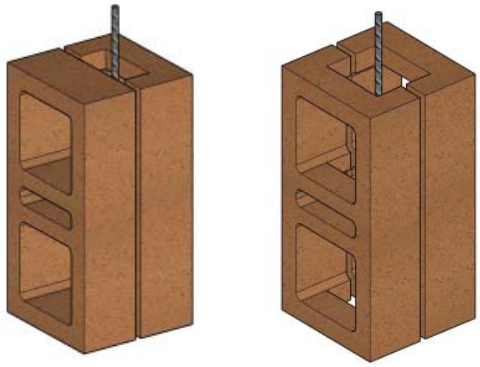


Figure 25 Soldier Reinforcement

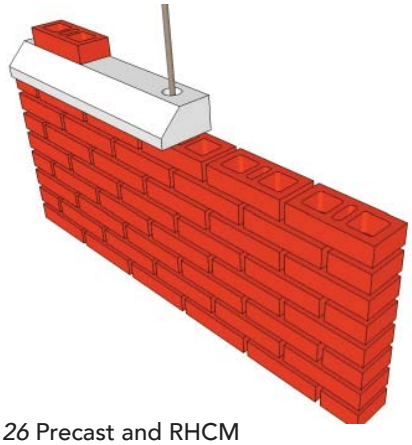


Figure 26 Precast and RHCM

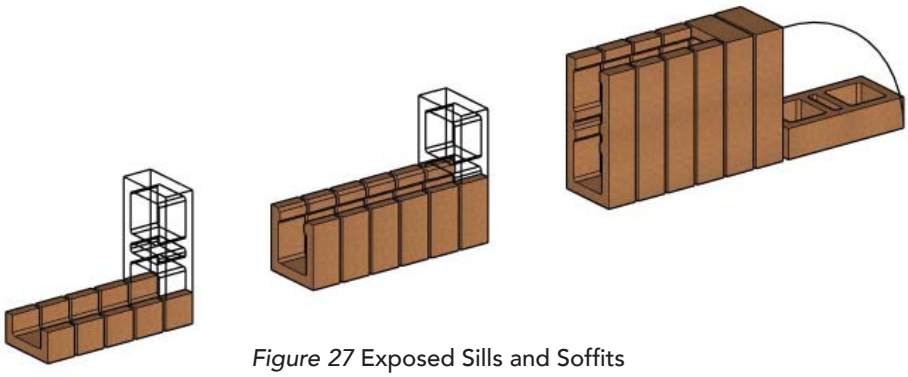


Figure 27 Exposed Sills and Soffits

Initial Sizing of Members

During meetings with the client, questions about member sizes will occur. Structural engineers tend to rely on their computer models, requiring additional time, instead of "back of the envelope" analysis on the spot. The following information will assist the engineer in quickly providing the client with the needed information.

Making money on the structural design directly correlates to the quality of the first guesses.

Designing a structure is an iterative process. It consists of guessing, checking, and resizing to meet code and performance expectations. Fortunately, whole numbers are used to select masonry member sizes, so the engineer doesn't need to run extensive analysis to get started.

Selection of the Design Strength

Masonry is composed of units, mortar, and grout. The f'_m specified is the required strength of the combination of these materials. A common incorrect assumption is that the weakest of the units, mortar or grout, determines the system's strength. This is not the case. It is common to have a combination of materials with a strength of 4000 psi, a grout strength of 2000 psi, and a mortar strength of 1800 psi. This is because laboratory or field tests, not in-the-wall tests, define the grout and mortar strengths. Laboratory and field-prepared grout and mortar test samples are cured in conditions quite different from those in the wall. The strengths in the wall are typically much higher.

Mortar and grout compression tests measure the water-to-cement ratio of the mix. In the wall, the units absorb much of the water from the grout and mortar, resulting in increased strength. Think of the unit as a sponge absorbing water. Accepted standards for the field tests of mortar and grout attempt to mimic this effect. The methods used are unreliable. Moreover, field tests of mortar and grout are sensitive to weather, temperature, sampling method, curing, handling, transportation, and testing method (Appendix D).

For this reason, the structural engineer should rely on the prism test as a measure of strength.

Unfortunately, it is rare to obtain prism test data during the design development phase. The masonry code unit strength method provides an alternative to prism testing and is recommended for the initial design.

In accordance with TMS 602, the specified strength of RHCM can be determined from the unit strength by the following equations.

$f'_m = 0.3057 * (the\ net\ area\ strength\ of\ the\ unit) + 480.39$
(Type M or S mortar)

$f'_m = 0.2439 * (the\ net\ area\ strength\ of\ the\ unit) + 487.80$
(Type N mortar)

For RHCM, the structural engineer can assume a design strength of 2,600 psi in most situations. Lower values for the hollow clay masonry are unlikely. Higher values can be obtained if required.

The modulus of elasticity for hollow clay masonry is 700 f'_m psi (for concrete masonry, it is 900 f'_m psi).

Commonly, one building element controls the required masonry strength. Reducing the strength of other elements not requiring the higher strength may or may not result in cost savings.

It is not unusual to change the wall strength or the unit thickness from floor to floor.

Changing the unit color may mean a change in the masonry strength. Consequently, the architect's choice of color may control the strength of the masonry.

Selection of Wall Thickness

Out-of-plane loads will likely control the exterior wall thickness, except for buildings over six stories, where the compression demand may control wall thickness, or in a high seismic zone, where the shear demand may control the wall thickness.



Out-of-Plane

Whether or not the architect has initially selected the wall thickness, the structural engineer will need to estimate the thickness required to resist the loads. A good initial guess can save a lot of design effort. The following table presents typical wall thicknesses for walls controlled by out-of-plane loading. Wind load is usually the controlling load (For 10-inch and thicker walls, seismic may control in high seismic areas).

Typical Height Limits for Out-of-Plane Loading

Nominal Wall Thickness (in.)[3]	Height of Wall (ft.)1.2		
	Normal Application h/t = 24	Common Application h/t = 30	Extended Application h/t = 36
4"	8	10	12
5"	10	12	15
6"	12	15	18
8"	16	20	24
10"	20	25	30
12"	24	30	36

1. h = effective height, t = nominal thickness
2. Wind loading 45 psf with .0025 net area vertical reinforcement. (f'_m = 2600 psi)
3. 10 and12-inch thick units may not be available – check with the manufacturer.

For walls with h/t ratios less than 24, there is significant capacity for compression (load bearing). Moment magnification resulting from out-of-plane deflection (small deflections) will have little or no effect on the design.

For walls with h/t ratios between 24 and 30, the compression capacity is reduced but still significant in most applications. Generally, the moment magnification factor will need to be considered in the design but will have a small effect.

For walls with h/t ratios between 30 and 36, the compression capacity is reduced, and it is necessary to consider moment magnification in the design. Walls in this category often have roof loads accumulating to a point along the wall (roof trusses). In these circumstances, the structural engineer should consider using pilasters (protruding inside, outside, or both) and span the masonry horizontally between pilasters.

Compression

Compression in the wall results from the dead load, live load, snow load, and overturning due to lateral wind or seismic forces.

The compression from dead, live, and snow loads can be easily determined by the tributary area method. The tributary area method requires engineering judgment. The dead and live load from each floor and the dead load, live load, and snow load on the roof are distributed by dividing the floor and roof into the areas between the walls (except in high snow load locations). Live load reduction should be used, and partition loads should be added if required by the code. Don't forget to include the weight of the wall.

Lateral Forces

Initial sizing for in-plane lateral loading is more complicated. Usually, the in-plane loads are due to wind or lateral seismic forces applied to the entire structure (main lateral force resisting system). For a regular geometry (the center of rigidity approximates the center of mass or the center of pressure), the first step is calculating the base shear. For irregular geometry, the first step is to educate the architect about the performance advantages of regular geometry, then determine the base shear.

Wind Base Shear

The base shear due to wind may be estimated as:

$$V_{base} = WA$$

Where W is the estimated average wind pressure on the building (generally, direct pressure on the windward elevation and plus suction on the leeward elevation) and A is the building area exposed to the wind pressure.

Seismic Base Shear

The layout of shear walls for resistance to seismic loads is important. Maintain the symmetry of shear walls. Getting the architect to add a shear wall to provide symmetry can significantly reduce the required design time. It will also improve the resilience of the building. Methods for seismic design of asymmetric geometry are available but require additional effort. Perhaps you should request an additional design fee if symmetry is not approximated.

For Seismic Design Category C and above, TMS 402 requires that along any line of lateral resistance, not more than 20 percent of the lateral resistance can be provided by columns unless the base shear is determined using a response modification factor (R) of 1.5 (not recognized by ASCE 7 or the IBC but the exception is likely within the normal standard of structural engineering care).

The base shear due to seismic can be estimated. Since Reinforced Hollow Clay Masonry buildings normally have a box system that resists seismic forces with shear walls, the estimating procedure is not very complicated. It can be estimated with hand calculations.

The base shear is:

$$V_{base} = C_s W$$

Where W is the seismic weight of the building (including partitions and sometimes snow. See ASCE 7 for the definition of seismic weight).

The value of Cs is determined by:

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}$$

Where S_{DS} is the short period design spectral response acceleration parameter, I_e is the Importance Factor, and R is the Response Modification Coefficient.

R = 5.0 for specially reinforced masonry shear walls (Seismic Design Category A, B, C, D, E, F)

R = 3.5 for intermediate reinforced masonry shear walls (Seismic Design Category A, B, C)

R = 2.0 for ordinary reinforced masonry shear walls (Seismic Design Category A, B, C)

C_s need not exceed:

$$C_s < \frac{S_{D1}}{T\left(\frac{R}{I_e}\right)}$$

Where S_{D1} is the design spectral response acceleration parameter at a period of 1 second.

The building period can be estimated as follows:

$$T_a = .02 h_n^{.75}$$

Where h_n is the height of the building, in feet.

And C_s must be greater than:

$$C_s = 0.044 S_{DS} I_e \geq 0.01$$

And, if S_1 is equal to or greater than 0.6, then C_s shall be greater than:

$$C_s = \frac{0.5 S_1}{\left(\frac{R}{I_e}\right)}$$

Where S_1 is the 5% damped mapped maximum considered earthquake spectral response acceleration parameter at a period of 1 second.

Distribution of Base Shear

The base shear, either wind or seismic, is resisted by the in-plane forces in the building walls. The amount of load in each wall can be estimated as follows.

For flexible diaphragm buildings, the base shear is distributed by the tributary area method. Flexible diaphragm buildings are constructed with wood or metal deck without concrete topping floors and roof. The tributary area method requires engineering judgment. The force in each floor diaphragm is distributed by dividing the floor into areas that split the distance between the walls. The stiffness (rigidity) of the wall is not used.

For rigid diaphragm buildings, the load is distributed to the walls in relation to the relative rigidity of the wall. Rigid diaphragm buildings are constructed with concrete, concrete plank, or concrete over metal deck floors and roof. For these buildings with wall height to length greater than 3, distribute the base shears in proportion to $(H/L)^3$. The stiffness of these walls is dominated by flexure. For walls with (H/L) less than 3, distribute the base shears to the walls in proportion to (H/L). The stiffness of these walls is dominated by shear. The value of H in the equations is the height from the base to the floor being considered.

Shear walls connected by beam elements at each floor or walls with punched window openings are sometimes designed as "coupled" shear walls. If coupled, for rigid diaphragm buildings, the length of the wall can be approximated as the sum of the walls adjacent to the coupling beam element.

Where the coupling beam stiffness is comparable to or greater than the wall stiffness, assume the wall is coupled; otherwise, assume individual walls. If coupled, the coupling beam elements have a small influence on the base shear distribution to the wall elements. The coupling beams, however, significantly affect the overturning moment. More coupling results in a lower moment because the piers and coupling beams act as a frame. This effect can be important for sizing the amount of vertical reinforcement in the wall and selecting the masonry strength.

In high seismic areas, coupling beams over interior and exterior doorways can be a problem. Distortion of the coupling beams prevents the doors from opening and traps the resident in their unit and the building.

Once the axial and shear loads are estimated, the building overturning moment can be estimated by assuming for wind that the lateral load is applied at the mid-height of the wall and for seismic that the lateral load is applied at two-thirds of the height of the wall.

Once the shear and moment are estimated, the following provides a guide for wall thickness when shear governs. This is usually the case when the H/L is less than 3. The values are conservative.

Wall Thickness for Shear

Nominal Wall Thickness (in.)[4]	Approximate Shear Capacity (lb/ft)[3]	
	Wind[1]	Seismic[2]
4"	4,000	2,500
5"	5,000	3,300
6"	6,000	4,000
8"	8,000	5,300
10"	10,000	6,600
12"	12,000	8,000

1. Approximately $2\sqrt{2600}$
2. Approximately $2\sqrt{2600}/1.5$ (Factor to increase flexural dominance of a wall)
3. Strength level and fully grouted construction
4. 10 and 12-inch thick units may not be available – check with the manufacturer.

When H/L is high, the overturning moment will often dominate the initial design of the wall. Before developing the finite element model to distribute loads to the wall, an estimate of the wall thickness is needed. One method is to assume the wall consists of two piers, each with 20 percent of the wall length.

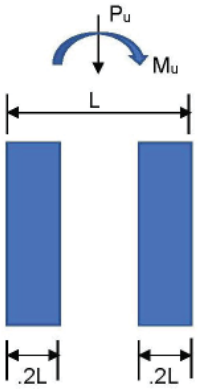


Figure 28 Model for Estimating the Design of a Wall

The axial load is divided between the two piers, and the moment is modeled as a coupled axial load on each pier. Assuming 60,000 psi reinforcement, the tension load is calculated as follows:

$$P_t = \frac{M_u}{.8L} - \frac{P_u}{2}$$

The required reinforcement is estimated as follows:

$$A_s = \frac{P_t}{60{,}000}$$

High strength reinforcement exceeding 60,000 psi yield is currently not allowed for masonry design. The area of reinforcement should appear reasonable for the wall. If not, the wall may need to be longer or more walls are needed.

The thickness of the wall will depend on the compression zone. An estimate of the compression stress can be obtained using the same model.

$$P_c = \frac{M_u}{.8L} + \frac{P_u}{2}$$

$$f_c = \frac{P_c}{.2t_{sp}L}$$

Where t_{sp} is the specified thickness of the wall, and L is the length of the wall. If the compression stress exceeds .64 f'_m , the wall needs to be increased in thickness and/or length.

One wall (or a small percentage of walls) will often not comply using the above initial method. Judgment must be employed to determine if the selected wall thickness is adequate. The above method is usually conservative, and with experience, the degree of conservatism can be readily estimated.

A more refined analysis is required during the construction document phase.

Selection of Beam or Lintel Size

An estimate of a beam or lintel size can also easily be obtained. These elements usually occur over wall openings. To estimate the beam or lintel requirements, first, calculate the applied moment. Normally the maximum moment results from full dead and live to load. If the beam is a shear wall coupling beam, then combined dead load plus seismic load normally controls.

The area of steel can be estimated as follows:

$$A_s = \frac{M_u}{.9F_y d}$$

It is best to use the same size bars in the beam or lintel as those bars used in the wall. Contractors sometimes take bars from the wrong pile. It is good practice to minimize the number of different bar sizes to simplify procurement, job site storage, and reinforcement handling.

Specifications

Specification of Materials

Units

Specify units to conform to ASTM C 652 with the minimum unit net area compression strength determined by the design requirements. ASTM C 652 requires a gross area compressive strength, not a net area compressive strength.

Mortar

Specify mortar as Type S, Portland cement-lime by proportions per ASTM C 270. Do not specify a mortar strength. Do not specify Type M mortar because Type M mortar is too hard and usually causes a crack between the unit and the mortar. For most jobs, masonry cement or mortar cement mortars are allowed by code, but local masonry preferences need to be investigated.

Preblended mortars (proportions of the ingredients are blended by the supplier with water added at the site) are specified per ASTM C 1714/C 1714M. They meet the requirements of ASTM C 270.

Do not use additives in mortar, except colors in accordance with manufacturers' recommendations.

Color additives to mortar generally do not reduce mortar bond strength or compression strength. Most color additives consist of mineral oxides except carbon black, which consists of finely ground carbon. Carbon black (for grey mortars) should be limited to 2% of the weight of the cement. When using colored mortar, follow the recommendations of the color additive manufacturer.

Grout

Specify grout per ASTM C 476 for regular or self-consolidating grout. Specify grout strength (f'g) equal to f'_m but not less than 2,000 psi (required by code). The ASTM C 476 proportions will result in strengths well in excess of 2,000 psi. Lime may be added to the grout. This usually improves the grout properties by increasing the flow and retention of water, resulting in improved placement and bonding to the unit.

Grout is normally placed at a slump of 8 to 11 inches. The high-water content is permitted because the masonry units absorb the water like a sponge before the grout sets.



Figure 29 Fluid Grout

Consolidation and Re-Consolidation

TMS 402/602 requires mechanical vibration of the grout during placement (consolidation) and, at a later time, mechanical vibration to reconsolidate.

Like concrete, mechanical vibration is used during the grout placement to increase the flow and decrease the chance of grout voids. For fluid fine grout, mechanical vibration during placement (consolidation) is likely unnecessary, and a code modification may be requested if performance is demonstrated with a grout demonstration panel.

Reconsolidation is unique to masonry. After the grout is placed in the unit, the unit absorbs water from the grout. Since the water content of the grout is high (8 to 11-inch slump or more), the volume of water removed results in voids in the grout. These voids occur somewhere between 5 minutes and forty-five minutes after the grout is placed. The amount of time depends on many factors, including the absorption of the units, the grout mix, the weather, and the height of the pour.

Reconsolidation is accomplished by placing a vibrator one foot or less into the top of the grout column for each grouted cell. When successfully done, the top of the grout will settle below its previous position, often settling 2 to 4 inches for a single lift and 4 to 8 inches for multiple lift grouting.

In some situations, mechanical reconsolidation of fine grout in small cells may not be necessary. A code modification may be appropriate if performance is demonstrated with a grout demonstration panel.

Self-consolidating grout mixed to a slump flow of 24 to 30 inches, measured in conformance to ASTM C 1611/C 1611M, may be used. For self-consolidating grout, consolidation, and re-consolidation are not required.

Sand

Specify sand per ASTM C 144. Use mortar sand for fine grout. Mortar sand is finer and produces grout that flows better, particularly in 4-inch and 5-inch hollow units. Some sands are composed of rounded granules instead of sharp granules. The rounded sands can be used in grout with less cement and water to obtain equivalent flow compared to grouts with sharper sands. Use only clean, washed sand.

Coarse aggregate for grout

Specify coarse aggregate per ASTM C404. Use only clean, washed aggregate. Coarse aggregate is not allowed in fine grout; either fine regular grout or fine self-consolidating grout.

Cement

Specify cement to conform to ASTM C 150, Types I, II, or III. Do not use air-entrained cement types IA, IIA or IIIA, etc. Low alkali cement reduces the tendency for the masonry to effloresce. If available, they are recommended.

Lime

Specify lime to conform to ASTM C 207. Do not use air entrained lime, as it will reduce the bond strength between the unit and mortar.

Reinforcement

ASTM A 615 Grade 60 reinforcement is normally used. When welding reinforcement, use ASTM A 706 bars. High strength reinforcing with specified yield strengths in excess of 60,000 psi is not currently allowed for reinforced masonry design.

Quality Assurance

IBC and TMS 402 require a minimum level of quality assurance to be included in the contract documents. It is recommended that the minimum quality assurance requirements be included in both the structural notes and the project specifications. The quality assurance program itemizes the requirements for verifying conformance with the specified materials, material storage and handling, and construction execution. It shall also set forth the procedures for reporting and review and include procedures for the resolution of non-compliance.

TMS 402/602 presents three levels of quality assurance. Level 1 is for prescriptive design methods such as veneers, glass block, and partition walls. Level 2 and Level 3 are for engineered masonry design methods that include RHCM. Level 2 is for Risk Categories I, II, or III. Level 3 is for Risk Category IV. Risk categories are defined by ASCE/SEI 7.

The primary difference between Level 2 and Level 3 quality control is that Level 2 allows more periodic inspections or less continuous inspections. The following table summarizes the quality assurance program code requirements with additional recommendations for RHCM. R means required by code. NR means not required by code but may be required for the project. P means periodic inspection. C means continuous inspection.

Quality Assurance Program

		Level 2	Level 3
Before construction			
	Verify masonry strength by prism test or the unit strength method.	R	R
	Verify compliance with mortar and grout specifications.	R	R
	Verify compliance with submittal requirements.	R	R
	Verify the grade and size of reinforcement, connectors, and anchor bolts.	R	R
	Verify and observe the construction of the sample panel, if required.	R	R
	Require a sample grout panel.	Recommended	Recommended
	Require a pre-construction meeting with the mason contractor and others.	Recommended	Recommended
During construction			
	Require verification of masonry strength every 5000 square feet of the wall.	NR	R
	Require verification that preblended mortar and grout meet specifications and submittals.	NR	R
	Require inspection of site-prepared mortar and grout.	P	P
	If self-consolidating grout, verification of conformance to the required slump flow and visual stability index is required.	R	R
	Require inspection of the grade and size of reinforcement, connectors, and anchor bolts to verify conformance to the design.	P	P
	Require inspection to verify the proper placement of masonry units and mortar joint construction.	P	P
	Require inspection to verify the size and location of structural members.	P	P
	Require inspection of the welding of reinforcement	C	C
	Require inspection to verify the type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.	P	P
	Require inspection for protection of masonry for hot and cold weather construction.	P	P
	Require inspection of the preparation of prisms and, if required, the preparation of mortar and grout specimens.	P	C
Prior to and during grouting			
	Require inspection and verification that the size of the grout space meets the specification.	P	C
	Require inspection of the size and placement of reinforcement, connections, and anchor bolts to verify conformance to the design.	P	C
	Require inspection during the placement of grout.	C	C

In addition, the quality assurance program shall also define the qualifications for testing laboratories and inspection agencies. ASTM C 1093 defines the duties and responsibilities of testing agency personnel and the technical requirements for equipment used to test masonry materials. Testing agencies qualified to test masonry are accredited or inspected for conformance to the requirements of ASTM C 1093 by a recognized evaluation authority.

It is recommended that the following be required before construction to conform to code requirements.:

1. A letter of certification provided by the unit manufacturer stating that the units meet the required strength.
2. When the mortar is not site prepared, a letter of certification provided by the mortar supplier stating that the mortar complies with the requirements.
3. When the grout is not site prepared, a letter of certification provided by the grout supplier stating that the grout complies with the requirements.
4. Prism tests per ASTM C 1314

It is recommended that prism tests be conducted during construction and for every 5000 square feet of masonry placed. Mortar and grout should be verified in the field by checking that the proper proportions are used.

Field mortar and grout tests should not be specified. They are unreliable and too variable due to the difficulty in controlling water content.

Designer Choices

Allowable Stress Design versus Strength Design

Allowable stress or working stress design was the traditional design method for hollow clay masonry. Standards and codes are now available for strength design. For some projects, the use of allowable stress design provides some advantages, or the use of strength design provides other advantages. For example, in the current codes, the maximum shear wall flexural reinforcement in ASD is less restrictive than in SD, while ASD does not have the slender wall provisions contained in SD. Care must be exercised when combining the two design methods on the same project.

Fully Grouted Versus Partial Grouted

A fully grouted wall means that all the cells are filled with grout.

Fully grouted walls perform better than partially grouted walls. Fully grouted walls resist water penetration and cracking. Sound transmission is less in fully grouted walls, a property of the wall's mass. The wall is more able to resist freeze damage because there are fewer voids in the wall.

Partial grouting requires blocking the flow of grout into the areas not intended for grout. This adds cost to the wall. However, there is an offsetting decrease in the cost of the grout material. Most contractors agree that it is less expensive to fully grout when vertical bars are spaced closer than 24 to 30 inches on center.

It is easier, and therefore takes less time, to analyze a fully grouted wall than a partially grouted wall.

Multiple Lift Versus Single Lift Grouting

Grout pours equal to or less than 5 feet 4 inches are called Low-Lift grouting. Grout pours that exceed 5 feet 4 inches are called High-Lift grouting. A grout pour is defined as the total height of masonry to be grouted before the installation of additional masonry. A grout pour consists of one or more grout lifts.

Grouting methods may be considered the contractor's means and methods and not part of the design. However, grouting methods may impact the cost and performance of a masonry wall and may be part of the designer's choice.

In hollow clay masonry, it is advantageous to use High-Lift grouting. When demonstrated with a grout demonstration panel, grout pours with heights exceeding 30 feet have been successfully accomplished. High-Lift grouting will typically have fewer voids. The reinforcement requires fewer or no splices and therefore costs less. Generally, the grout quality improves with the increased placement volume. For these reasons, it may be appropriate for the engineer to specify High-Lift grouting methods. Otherwise, the decision can be left to the contractor.

For highly stressed walls where reinforcement and grout placement are important, it is recommended that the structural engineer specify the grout pour heights and the lap locations in the wall. Where congestion of reinforcing is a concern, staggered laps and/or mechanical splices may be specified by the designer.

To verify the materials and procedures before construction, the structural engineer can recommend to the client that they specify a grouting demonstration panel. This demonstration panel is a sample of the wall built before construction and is often used as the visual mock-up. The architect, engineer, inspector, building official, owner's representative, and the general contractor should witness the grouting demonstration. Several days after the grouting, the panel can be cut open to expose the grouted cells and assess the quality of the materials and the process.

Clean-outs

Clean-outs are access ports at the bottom cell of the grout pour for access to removing mortar droppings. Mortar droppings can prevent the grout from bonding to the surface at the bottom of the grout pour. The mortar droppings cause a weak plane to resist shear forces. For partially grouted walls, clean-outs are installed at each reinforced cell. For fully grouted walls, clean-outs are spaced not less than 32" on center.

The Code requires clean-outs if the grout pour exceeds 5 feet 4 inches.

Where the in-plane or out-of-plane shear stress is less than 15 psi when using only the face shell area, clean-outs may not be necessary. The grouted cell area is not required to transfer the load. This is often the case for long walls.

To eliminate the clean-out requirement, it will be required to ask for a building code variance from the building department.

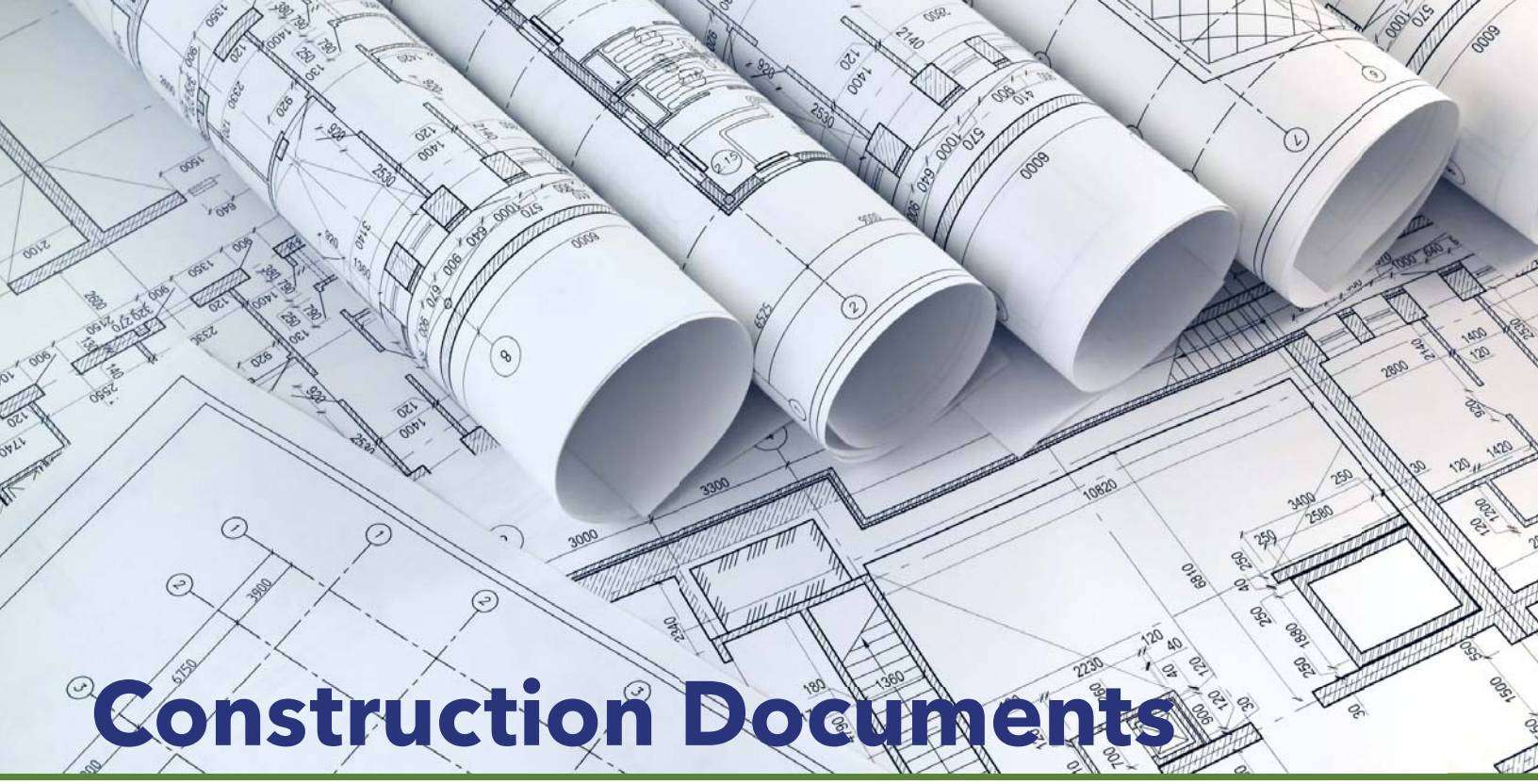
With or without clean-outs, mortar droppings should be minimized through good construction practices. Contractors can reduce droppings at the bottom of the wall by placing sponges in the cells and pulling them up as the wall is constructed. The sponges collect the mortar droppings that would otherwise need to be cleaned out at the bottom of the wall.

Horizontal Joint Reinforcement Versus Bond Beams

When horizontal reinforcement is required to resist shear forces, use bond beams. There is more confidence in the placement of bars in a bond beam than with the placement of horizontal joint reinforcement in the bed joint. This is because it is common for the joint reinforcement to be laid on the unit before the bed joint mortar is placed. The result is a void underneath the wire. It is also not unusual for the wires to be placed without lapping (butted ends). The result is incomplete embedment and development of the steel. The "butting" of horizontal joint reinforcement is a common practice in non-structural masonry and veneer. The mason may not understand the difference or importance. If joint reinforcement is used, it is recommended to require full-time inspection for its placement.

When horizontal reinforcement is not required to resist shear forces, horizontal joint reinforcement may be satisfactory and could save cost. If used, joint reinforcement must be galvanized. It is placed in the mortar joint with limited cover and must be protected from chemical attack and carbonation. Flattened or oval wire used in horizontal joint reinforcement is available in some markets. It is used to help satisfy the code wire size limitations (the wire diameter, height, cannot exceed half the bed joint height).

It is recommended that horizontal reinforcement be placed in bond beams continuously at the window sill, window and door head, and at each floor. Additionally, at least one No. 4 bar should be placed at each window and door jamb. This recommendation is for the generally good performance of the wall even when not required by code.



Construction Documents

During the construction document phase, the architect prepares the contract documents consisting of drawings and specifications set forth the detailed requirements for the construction of the project.

During the construction document phase, the structural engineer prepares the contract documents for the primary structural system consisting of drawings, including structural notes and sometimes the structural portion of the specifications.

Preparing construction documents includes structural design, analysis, drawing preparation, and writing or reviewing specifications. Each part of this process proceeds simultaneously, and they are interrelated.

Structural Analysis

Following the preliminary sizing of the primary structural elements, the global loads applied to the building are distributed to the primary structural elements. The loads are distributed to each element by methods that have become customary in structural engineering. There are several commonly used software programs available for this purpose. Stairs and ramps that are not isolated, while seldom constructed of masonry, resist wind and lateral seismic loads and must be included in the model accordingly.

For RHCM shear wall buildings, if the finite element model is used, wall expansion joints, if any, need to be modeled. If there are intersecting walls, the structural engineer needs to recognize that due to warping effects, the structural elements will have axial loads and moments resulting from torsion on the system. The design may be simplified by not connecting intersecting walls in the model. Reinforcing details can be simplified, but the overall resilience of the building is reduced. For seismic design, if the mass of the walls is included with the floors or roof, then diaphragm loads will be overestimated.

Once the loads on the walls, columns, and elements are known, the elements can be checked to ensure conformance with acceptable standards. The building code is a minimum acceptable standard. The design may or may not require a higher standard than the building code. The structural engineer should communicate options for increasing the resilience above the code minimum to the architect and owner.

A detailed discussion of the structural analysis procedures is contained in many excellent references. The following paragraphs present information commonly encountered during the structural analysis and design of RHCM structures. Appendix B provides a checklist for the design of RHCM.

Design Assumptions

The analysis for determining the strength of RHCM elements is very similar to that used to check the strength of reinforced concrete elements. Standard assumptions for strength design are:

1. Plane sections before bending remain plane after bending.
2. Masonry components (units, mortar, and grout) combine to form a homogeneous member.
3. Masonry carries no tensile stresses.
4. Reinforcement is completely surrounded by grout and bonded to the masonry materials, so they work compositely as a homogeneous material in the range of working stresses.
5. The building code limits the yield strength of reinforcement to 60,000 psi.
6. The maximum usable strain in clay masonry is 0.0035 (It is 0.0025 for concrete masonry).
7. The compression stress block height is 0.80 f'_m for a distance of 0.80 times the distance from the extreme compression fiber to the neutral axis.

Additionally, for ease of design, the following recommendations are made for the area of masonry to be used in resisting the loads.

1. For partially grouted RHCM walls, it is recommended and conservative to use the face shell area of the unit as the shear design area. For partially grouted RHCM, the code allows shear areas to be increased by counting the grouted cells, but the advantage is usually small. Also, for partially grouted walls, the nominal shear capacity is reduced by a factor of 0.70.
2. For fully grouted (sometimes referred to as solidly grouted) RHCM walls in running bond, the design area is the gross cross-sectional area of the masonry. The area of cores (most hollow clay masonry units have cores) or the void at the head joint when the masonry is laid with only face shell bedding is not subtracted from the gross area.
3. For beams with compression on the head joint and the requirement of full bedding of the head joint is not made, the design area is the face shell area for shear and flexure. This is because the head joint is filled to the face shell's depth, not the unit's full thickness. If bond beams or open-end units are used, then the design area would be the full thickness of the unit.

General

There are provisions of the code limiting the design:

1. Vertical conduits, pipes, or sleeves shall not exceed 2 percent of the net design area.
2. Pipes or conduits containing liquids, gas, or vapors at temperatures above 150 degrees Fahrenheit, pressure greater than 55 psi, or water or other liquids subject to freezing shall not be placed in the masonry.

Walls

For out-of-plane bending, the effective width "b" of the compression block is the lesser of:

1. The distance between bars.
2. In running bond, six times the nominal thickness.
3. In stack bond, the unit width.

If partially grouted, the compression area of the wall (distance to the neutral axis) needs to exclude cells not grouted. This can lead to a more complicated analysis to determine capacity.

For in-plane bending, "b" is the thickness of the wall if fully grouted. If partially grouted, the face shell area is recommended to be used. Using b as the two-face shell thicknesses is conservative.

For in-plane bending, the effective width of intersecting walls differs for compression and tension. For compression, the code allows the flange width to be 6 times the nominal thickness on each side of the intersecting wall; for tension, the maximum is 0.75 times the floor-to-floor height.

Walls Flexure Plus Compression

Flexure plus compression occurs for walls resisting lateral forces from wind or seismic loads. Software is available for checking a wall loaded with combined flexure and compression. Or, create your own. Dead load reduces the required reinforcement area when the tensile moment capacity limits an element. When intersecting walls occur, analysis can be complicated. Don't forget to include the dead load of the wall in your analysis.

For walls with a height to a nominal thickness greater than 24, second order or moment magnification effects should be considered.

Shear Walls

For shear walls resisting seismic forces, there are code-specified reinforcement requirements. For RHCM, the choices of shear wall types are Detailed Plain, Ordinary Reinforced, Intermediate Reinforced, and Special Reinforced.

The minimum reinforcement required for a Detailed Plain shear wall is shown below. Detailed Plain shear walls are only allowed in Seismic Design Categories A and B and are designed as unreinforced masonry.

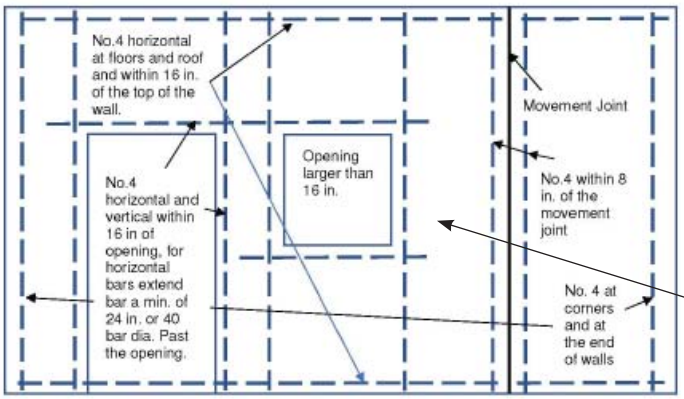


Figure 30 Minimum Reinforcement for RHCM

If your project is a Seismic Design Category C project, then Ordinary Reinforced shear walls, Reinforced Intermediate shear walls, or Special Reinforced shear walls are required. Ordinary Reinforced shear walls have the following additional requirements.

Ordinary Reinforced Shear Wall:

1. Reinforced masonry design is required.
2. Maximum spacing of vertical reinforcement is 120 inches.
3. Maximum spacing of horizontal reinforcement is 120 inches.

Intermediate Reinforced Shear Walls has the following additional requirement:

1. Maximum spacing of vertical reinforcement is 48 inches.

If your project is a Seismic Design Category D, E, or F, then Special Reinforced shear walls are required. Special Reinforced Shear Walls have the following additional requirements:

1. The maximum spacing of vertical reinforcement is smaller than 1/3 the height of the wall or 1/3 the length of the wall or 48 inches. For stacked bond masonry (less than ¼ the length of the unit overlapping), the maximum spacing is 24 inches.
2. The maximum spacing of horizontal shear reinforcement must not exceed 1/3 the height or length of the wall. For walls of short length, this can present a problem. For example, a wall consisting of a single stretcher (12-inch length) between windows will require horizontal reinforcement at 4 inches on center, or for 4-inch height units, every unit is a bond beam. In this situation, it may be best to isolate the element from the seismic resisting system. Another possible solution is a displacement compatibility analysis to demonstrate that the element can withstand the required displacements.
3. Maximum spacing of horizontal reinforcement for running bond is 48 inches and 24 inches for stack bond.

4. The sum of vertical and horizontal reinforcement must exceed .002 times the gross cross-section using specified wall dimensions, with a minimum vertical or horizontal reinforcement equal to .0007 times the gross cross-section using specified dimensions. The minimum horizontal reinforcement required for stack bond masonry is .0015 times the gross cross-section using specified dimensions.
5. Stack bond masonry must be fully grouted and use open-end units. Open-end units only need to be open on one head joint for the grout to bond to the next unit.
6. If the shear demand to only the masonry shear capacity ratio (not including the reinforcement capacity) is more than 0.40, 180-degree hooks around the vertical reinforcement at the end of the wall are required. Engineering judgment is required, and a rule of thumb is that if the shear walls' height-to-length ratio is less than 1, hooks will likely not be required.
7. The design shear capacity shall exceed a shear corresponding to 1.25 times the nominal flexural capacity but not exceed 2.0 times the factored shear demand. This provision is intended to enhance flexural ductility by increasing the wall's shear capacity.

Also, in E and F, there is an additional reinforcement requirement for walls that are not shear walls or non-participating walls.

For more detailed information on the design of Special Reinforced Masonry Shear Walls, see *Seismic design of specially reinforced masonry shear walls: A guide for practicing engineers*, NIST GCR 14-917-31, prepared by the Applied Technology Council for the National Institute of Standards and Technology, Gaithersburg, MD.

Columns

There are special code provisions for columns:

1. The distance between lateral supports of a column cannot exceed 99 times the radius of gyration of the column in the direction of support.
2. The minimum side dimension cannot be less than a nominal 8 inches.
3. The minimum number of longitudinal reinforcement bars is 4.
4. Columns must be fully grouted.
5. The area of vertical reinforcement must be greater than 0.0025 times the net area of the column and not more than 0.04 times the net area of the column.
6. The effective height of a column can be taken as the distance between inflection points. But it is recommended to use the unsupported height. For cantilevered columns, use twice the unsupported height.
7. Lateral ties of at least ¼ inch diameter shall enclose the vertical reinforcement. Spacing shall not exceed 16 longitudinal bar diameters, 48 tie diameters, or the least cross-sectional dimension of the column.
8. If allowable stress design is used, the code requires a 10% eccentricity axial load in the column. For strength design, the eccentricity is accounted for in the code equations.
9. In seismic design category C and above, when anchor bolts are used at the top of a column to connect to horizontal elements, adding two No. 4 ties within 5 inches of the top of the column is required.
10. In seismic design category D and above, lateral ties must be spaced at less than 8 inches on center and be 3/8 inch in diameter or greater.
11. In seismic design category C and above, along a line of lateral force resistance, not more than 20 percent of the resistance may be provided by masonry columns. This requirement is overly restrictive and without justification for buildings such as a single-story firehouse where one of four walls has garage door openings separated by columns. There is no reason that the columns property detailed cannot exhibit adequate ductility to accommodate seismic displacements.

    The masonry code offers an exception, but only if designed for an R of 1.5. ASCE/SEI 7 does not recognize this exception. It is not addressed in the IBC. If it is not clear which code applies, check with the authority having jurisdiction.

Placing a bearing pad, allowing lateral displacement while supporting the axial load, could be an option. Another option is to use a concrete or steel column and a brick veneer or a reinforced veneer surround.

Another possible solution is a displacement compatibility analysis demonstrating that the element can withstand the required displacements.

Fortunately, in seismic design categories A, B, and C, the code provides an exception to these restrictive column requirements for lightly loaded columns. Lightly loaded columns are defined as columns with an axial load not exceeding 2000 lbs. The requirements are only an 8-inch minimum dimension, fully grouted, more than 0.2 square inches of reinforcement, and not to exceed a height of 12 feet.

Pilasters

The code definition of a pilaster is a vertical member built integrally with a wall, with a portion of its cross-section typically projecting from one or both faces of the wall. The word typically is inserted in the definition because, in some applications, a pilaster is contained within the wall, not projecting from either side.

For the intersecting wall to be considered part of the pilaster, it needs to be connected to the pilaster element by one of the following.

1. At least 50 percent of the masonry units interlock.
2. Walls need to be anchored by steel connectors.
3. Intersecting reinforced bond beams spaced less than 48 inches on center.

The effective width for compression will depend on the pilaster's geometry and the moment's direction. The effective width is generally the same as that for intersecting walls. For compression, the code allows 6 times the nominal thickness of the intersecting wall; for tension, the maximum is 0.75 times the floor-to-floor height. When the pilaster projects from one side of the wall or unevenly on both sides of the wall, the effective width, if any, will be different depending on the direction of the moment.

When the height divided by the radius of gyration (generally equal to .288 times the thickness) exceeds 99, second-order or moment magnification effects need to be considered. This will need to be considered for both moment directions.

Bar laps and Embedment

The Code provides methods for the design of bar laps.

Alternatively, use 48 bar diameters for grade 60 reinforcement. This is conservative for RHCM units of nominal 8 inches or less for number 6 bars or less and placed at the center of the wall. For number 7 bars in 8-inch units, it is unconservative by about 10 percent.

Whenever possible, it is recommended that laps do not occur where the stress in the bar approaches the yield stress. If the stress in the bar exceeds 80% of the yield stress (48,000 psi for grade 60 bars), it is recommended to increase the lap length to 72 diameters, although not required by code.

Deflection

Deflection calculations are approximate. This results from the uncertainty about the value of the elastic modulus and the distribution and depth of cracking throughout the section. Fortunately, it is uncommon for a masonry element to be limited or sized based on the expected deflection. When deflection calculations are required, such as when height-to-thickness ratios are high, the methods presented in the building code give some indication of the deflection magnitude. The IBC provides deflection limits for exterior and interior walls with various surface finishes.

Maximum Bar Size

There are building code limitations on the sizes of reinforcement. No. 11 bar was recently allowed, but some previous codes limited the size to a No. 9. The nominal bar diameter cannot exceed one-eighth the nominal unit thickness. The maximum reinforcement in a cell is limited to 4 percent of the cell area or 8 percent with splices. The maximum diameter of the reinforcement shall not exceed one-third of the minimum dimension of the gross grout space. Additionally, there are minimum grout cover requirements for the space between the edge of rebar to the edge of the grout cell of ½" and ¼", for coarse grout and fine grout, respectively. The following table presents the typical maximum bar size for the hollow clay units. However, the cell areas vary somewhat from manufacturer to manufacturer, and dimensions should be verified on each job.

Maximum Bar Size by Cell Size

Unit Thickness (Nominal)[2]	12" Long Units		16" Long Units	
	Cell Size (Width x Length)	Max. Bar Size #	Cell Size (Width x Length)	Max. Bar Size #
4"	1 3/4 X 3 1/2	4[1]	1 3/4 x 3	4[1]
5"	2 1/2 X 3 1/2	5[1]	2 x 5	5[1]
6"	3 1/2 X 3 1/2	6[1]	3 x 5	6[1]
8"	5 X 3 1/2	8[1]	5 x 5	8[1]
10"	6 3/4 X 3 1/2	10[1]	6.5 x 5	10[1]
12"	8 1/2 X 3 1/2	11	8 x 5	11

1. Controlled by one eight of the nominal unit thickness.
2. 10 and 12-inch thick units may not be available – check with the manufacturer.

Retaining Walls

Failure of retaining walls constructed of concrete, masonry, and other materials occurs frequently. Carefully analyze the soil information (have a soil report, if not, then require one), and use proper analysis methods (it can get complicated). It is recommended to place the reinforcement in the center of the cell, not offset. Many failures are traceable to the contractor placing the bars on the wrong face of the wall. The added reinforcement costs are usually small.

Bearing, Bolts, and Shear Friction

The Code provides a design method.

Drawing Preparation

Layout

The following figure presents a typical layout of the structural drawings for a building project.

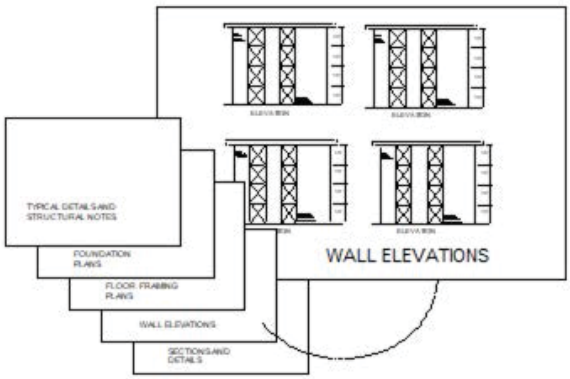


Figure 31 Recommended Drawing Layout

When RHCM is used, it is normal to prepare elevations of each wall. This may appear to be an unnecessary level of drawing detail, but experience indicates that it saves time and effort in the long run. Wall openings, expansion or movement joint locations, and reinforcing should be shown or called out on these elevation drawings. Tabulating reinforcement requirements has not proven to be a very successful method of communicating the design to the mason.

Provide a detail that shows the hollow clay unit dimensions so that the reinforcement detailers have the information to lay out the reinforcement. Additionally, expansion joints should be shown and coordinated with the architect's drawings.

Structural Notes

The structural notes are placed on the drawings to define applicable codes, loads, design assumptions, materials, and inspection requirements. Often this information is redundant to the project specifications. However, the project specifications often become lost with time. The structural notes will stay with the drawings and become useful information for some future users.

In some states, the structural notes take precedence over the specifications. In other states, the reverse is true. The architect's specification and the structural notes should state which takes precedence over the other.

The structural engineer should check the architectural specification to eliminate conflicts with the structural notes.

Details

RHCM can generally be treated like reinforced concrete, except the bond strength between the mortar and a unit is a plane of weak tension capacity. The head joints are particularly susceptible to low tension and shear capacity, and it is appropriate for the designer to assume zero tension and shear capacity for the head joint. This is important for the design of masonry connections. It is recommended that larger scale or more frequent connections be made than are typically used in reinforced concrete.

Unit dimensions restrict reinforcement spacing. Vertical bars need to be spaced to match the cell spacing, and horizontal bars need to be spaced at dimensions matching the unit height. Diagonal bars should not be used. Placing vertical bars that are 16 inches on center for a 12-inch hollow clay brick, with cells at 6 inches on center, will be generally viewed as a design error.

RHCM is normally supported on concrete or steel. The detail of the connection between the concrete or steel and the masonry is affected by the control of water and the transfer of forces. Where the exterior masonry is supported on a concrete floor or slab, it is often desirable to recess the concrete.

Water and Flashing

Water seldom completely penetrates a reinforced hollow clay wall. Instead, it enters the face of the wall and travels downward through open cells or small voids in the grout and mortar. Fully grouted walls are less susceptible to water penetration. The inside face of the wall may become damp; however, it is unusual for water to disengage from the brick or flow on the inside surface.

For this reason, the base or bottom of a wall requires flashing or another method to direct water to the exterior. The water traveling downward through the brick should be intercepted and directed outside the building. A lintel over the top of a window or door is considered a bottom of the masonry and therefore requires flashing or appropriate window head design.

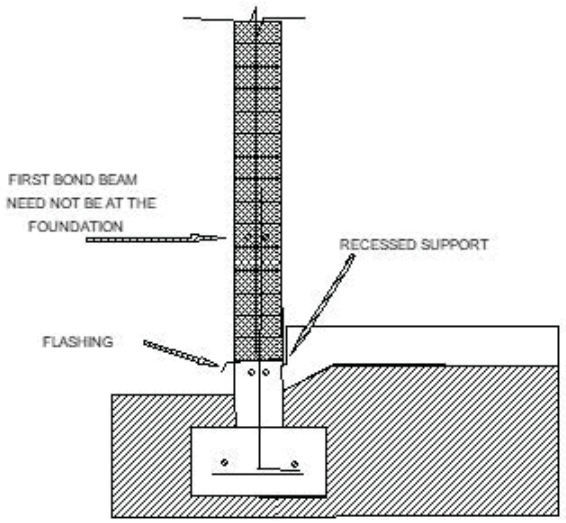


Figure 32 Wall to Foundation Detail

There are many acceptable flashing materials available. The architect should select the flashing. For the structural design, all commonly used flashing materials provide sufficient friction capacity to transfer shear loading. However, dowels will need to penetrate the flashing to transfer the shear load. Shear transfer tests indicate that the organic flashing materials transfer load better than the metal materials. This is probably because the organic materials mold to the roughness of the concrete and mortar more than the rigid material.

The code provides a method to analyze the capacity using shear friction.

Connections

Floor and roof connections to walls can take many forms. They are similar to connections to concrete walls, except the designer has more flexibility because the units are laid one at a time. Consider using embeds to connect ledgers.

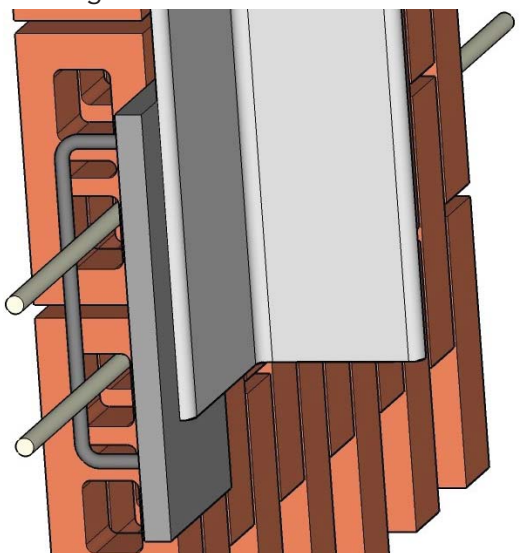


Figure 33 Embed Plate for a Ledger Connection

Movement Joints

Movement joints are challenging design item. In addition to normal thermal expansion and contraction, brick expands permanently with moisture. This permanent volumetric change is called irreversible moisture expansion and differs from concrete or CMU irreversible shrinkage and cyclic moisture expansion and contraction. Irreversible moisture expansion of brick occurs only once over an extended period of time. It does not reverse.

After the brick is fired, there is no moisture in the brick. When placed in the environment, the brick absorbs moisture through exposure to the atmosphere containing humidity or by direct contact with water. As the brick absorbs moisture, the brick irreversibly expands. The amount of permanent, irreversible expansion depends on the type of clay. The length of time required depends on the clay and exposure. The vast majority of the permanent expansion occurs between one and five years after production. TMS 402 provides a value of 0.0003 inches per inch or 3/8 inches per 100 feet for irreversible moisture expansion. This value is typically used for design. Movement joints

related to the inherent expansion of the clay brick are called expansion joints. Expansion joints are important to the performance of unreinforced clay masonry. For reinforced hollow clay masonry with horizontal reinforcement, expansion joints are less important and often are not required. As the brick expands, the reinforcement resists the expansion. The result is that the reinforcement is placed in tension, and the brick is placed in compression. The consequence is less cracking. Nevertheless, placing expansion joints at 100 feet or less is common practice.

If the wall length exceeds 20 feet, expansion joints should also be placed on one side of a corner, near the corner. Without a corner expansion joint, the expansion of the brick in the wall results in flexural stresses in the brick on the other side of the corner and may cause a crack.

Movement joints other than expansion joints may be needed to accommodate differential movement at interfaces between dissimilar materials or systems, or changes in supports or steps in foundations, or at wall intersections, depending on the design assumptions related to load transfer between walls.

Another requirement for expansion joints occurs when a brick becomes confined by another material. The following figure shows an example of hollow clay confined in a concrete frame.

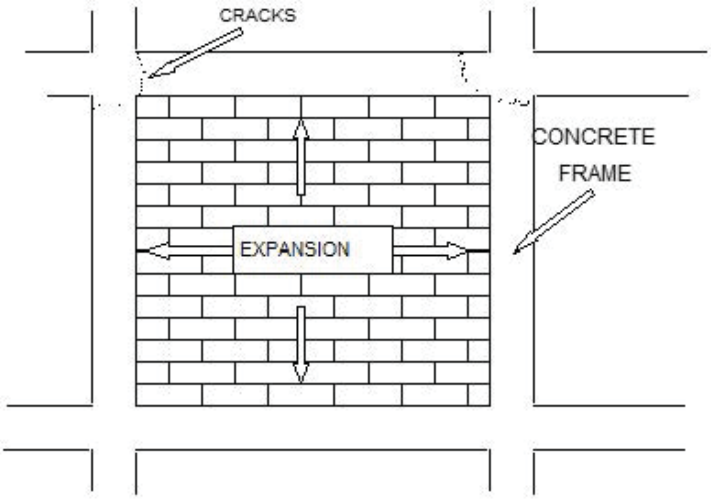


Figure 34 Brick Masonry in a Concrete Frame

Specifications

Specifications are normally prepared by the architect and reviewed by the structural engineer.

Consider including:

1. Require the mason subcontractor to prepare or oversee the preparation of reinforcing shop drawings. The shop drawing preparer should be familiar with reinforced hollow clay masonry design and construction. Concrete reinforcement detailers generally do not have an appreciation for the construction sequencing and dimensional constraints for masonry.
2. Require the water repellent to be the responsibility of the mason subcontractor. This provides a single source of responsibility in the event of problems.
3. On a large project, require a grout placement demonstration test on a sample panel prior to construction. With adequate planning, the visual mock-up panel can be used for this purpose.
4. Limit the choice of mason contractors to those experienced with the construction of RHCM. Reserve the ability to disqualify the contractor based on past performance.

The designer can influence the selection of the mason contractor through the specifications. It is recommended that the following criteria be considered in the section:

(a) Require the contractor to employ experienced masons.

(b) If available, require the mason contractor to be a member of a local masonry institute. Call the institute or the material supplier to check the contractor's qualifications or provide a list of qualified bidders.

(c) If possible and where available, require the mason to have appropriate training and be certified by the local masonry institute or council or association.

(d) Require masons who have been trained by the International Masonry Training and Education Program, of the International Masonry Institute.

5. Require a preconstruction conference.
6. Require methods other than shovel count to control proportions for mortar and grout.

7. If site mixed mortar is used, require the sand pile to be protected from rain, snow, and dust. Require the walls to be protected from rain, snow, and freezing for a minimum of 7 days after construction.

   The best practice may be to require preblended, pre-bagged mortar to maintain uniformity of material properties and color.

   Require the mason contractor to cover the wall at the end of the day. The purpose is to prevent rainwater from entering the masonry and developing water paths through the fresh mortar and grout. If not covered, the likely result is a wall that leaks and effloresces.

8. Require hot and cold weather protection. Code provisions may not be adequate. For example, in the Pacific Northwest, winter rain followed by a sudden freeze may damage the masonry.
9. Require inspection prior to grouting and during grouting.
10. Consider requiring self-consolidating grout.
11. Place a table of tolerances on the plans or include one in the structural notes. The code defines placement tolerances for reinforcement in terms of the design parameter “d”. Unfortunately, the mason contractor has no idea what “d” is.
12. Require the mason contractor to submit a written quality control program for the masonry construction.
13. For the installation of foundation dowels, provide an option to use post-installed anchors.



Construction

The project's construction phase begins with the publication of the construction contract for bidding. During the construction phase, the architect is the owner's representative and advises and consults with the owner. Instructions to the contractor are forwarded through the architect.

During the construction phase, the structural engineer advises and consults with the architect as necessary and when requested. The structural engineer responds to bidders' questions about the design. Once the contract is awarded, the structural engineer reviews submittals by the contractor of items designed by the engineer or other items affecting the engineer's design. The engineer makes periodic site observations to ensure that the contractor is in general conformance with the intent of the structural design.

A reinforced hollow clay masonry project requires about the same effort during the construction phase as other structural systems. However, there are a few unique situations. This section describes some of these situations.

Bidding and Award

The mason contractor is normally a subcontractor to the general contractor. During bidding, the general contractor will typically take bids or cost estimates from more than one mason subcontractor. During this period, the engineer will likely receive requests to clarify the contract documents.

The structural drawings show the design concept for the project. They are not detailed construction drawings. It is likely that during the bidding process, the contractor will find some missing information or contradictory information on the drawings. This is normal, and it is normal to receive questions about the design during the bidding period.

Often the mason contractor does not supply the reinforcement for the project. Instead, the general contractor supplies it. The engineer should become aware of who will supply the reinforcement. It will have some influence on how the project proceeds.

Moreover, most mason contractors do not prepare shop drawings for reinforcement. Thus, the responsibility

for providing an adequate set of shop drawings can become lost in the bidding process. The general contractor thinks the mason will prepare the shop drawings and the mason thinks the general contractor will prepare the shop drawings.

Experience has shown that the best performance occurs if the mason contractor purchases the reinforcement and supplies the shop drawings. However, some mason contractors may bid high or even not bid at all due to this requirement. The resulting cost pressure may require the engineer to be flexible about the requirement for shop drawings and their preparation.

Sometimes the general contractor will supply the shop drawings using his concrete reinforcing detailer. Unfortunately, the detailer may have limited experience with masonry (their expertise is concrete), and the drawings are often full of errors or items that cannot be constructed. An example is when the shop drawing shows bars spaced at 8 inches on center for a RHCM unit with a 6-inch module.

Submittal Review

Items submitted for review include the following:

1. Mortar proportions and laboratory test:

   The mortar submittal is usually submitted by Type (Type M, S, or N). This is satisfactory, provided the proportions are used to define the type, not strength.

   The contractor may submit by strength. In this case, laboratory tests should be performed to verify the strength of the mortar.

   Preblended dry mix mortars require submittal to verify conformance with ASTM C1714.

2. Grout proportions:

   The grout submittal is usually submitted by Type (fine or course). This is satisfactory, provided the proportions are used to define the type, not strength.

   If the design f'_m exceeds 2,000 psi, laboratory testing is required by the most recent TMS 602 to verify that the grout strength equals or exceeds f'_m. Testing is in accordance with ASTM C 1019.

   For batch-provided grout, the proportions are normally described by weight. The weight proportions should be converted to volume proportions for comparison with ASTM C 476. An example calculation of an actual grout submittal on a project follows:

Example Calculation of Volume Proportions from Weights

Item	Batch Weight (Lbs)	Conversion to Volume (Lbs/cu. ft)	Volume (cu. ft)	Proportions (by volume)
Cement	658 or 7 sacks	94[1]	7.0	1
Lime	50	40[2]	1.25	.18
Sand	2143	80[3]	26.8	3.8
Aggregate	1009	105[4]	9.6	1.37
Water	260	62.4	4.17	.6

1. 94 lbs per bag
2. One 50 lbs bag is 1 1/4 cu. ft
3. ASTM C-476 specifies 80 lbs per cu. ft for loose, damp sand (5% moisture). Dry sand weighs approximately 100 lbs per cu. ft.
4. Dry-rodded unit weight obtained from the supplier

A comparison ASTM C 476 is given in the following table.

Comparison to ASTM C 476

Item	ASTM 476	Mix
Cement	1	1
Lime	.1	.18
Sand	2.5-3.3	3.22[1]
Aggregate	1.1-2.2	1.16[1]
1. Proportions of cementitious material include both cement and lime		

The sample mix design does not comply. However, the mix design was accepted on this project because of past experience with the proportions where the additional lime in the mix improved flow while maintaining strength. ASTM C 476 allows proportions of the grout ingredients to be determined by laboratory testing or field experience if a satisfactory history of the grout mix performance is available.

3. Unit certifications:

   If the Unit Strength Method was used to establish f'_m, the structural engineer should specify that the brick supplier submits a letter stating that the bricks meet the required compressive strength.

4. Reinforcement shop drawings:

   These should be scheduled to provide sufficient time for review and resubmittal prior to construction. However, reviewing the submittal is necessary to verify that the contractor understands the design correctly. If enough time is available, re-submittal is possible without costly delays.

5. Miscellaneous metal shop drawings:

   Where miscellaneous steel connections and embedded items are included in the design, shop drawings need to be submitted with sufficient time for review.

6. Quality control program:

   TMS 402-22 requires the construction documents to include a written quality control program. A conforming quality control program should be written by the mason contractor and submitted in time for review and discussion with all involved including the inspector and general contractor.

Pre-Construction

Once the general contractor and the mason subcontractor have been selected, the engineer may verify their qualifications with the local masonry institute and material suppliers. This information will help determine the time and effort needed during construction.

At an appropriate time, usually, at least two weeks before the start of masonry construction, arrange for a preconstruction conference to discuss the masonry construction. Attendees should include:

1. The mason contractor and foreman.
2. The general contractor and superintendent.
3. The building official.
4. The architect.
5. The special inspector, when required.
6. The structural engineer.
7. The owner's representative.
8. The brick supplier or designated representative.

Subjects for discussion include:

1. Brick:

   Determine the availability and delivery schedule of the selected brick. If the unit strength method is used, verify that the brick will meet the required strength.

2. Initial testing:

   If the unit strength method was used to establish the design strength f'_m, mortar, grout, and prism testing prior to construction are not required. However, prism tests prior to construction are recommended.

   As a minimum, unit testing or manufacturer's certification is required. If a grouting test panel is to be used, define the schedule. The engineer, building official, and the special inspector should be present for the grouting demonstration. Often the grouting demonstration panel can also be used by the architect as a color and quality control panel.

3. Testing during construction:

   For risk category I, II, and III buildings, prism testing is recommended, but not required by code, for every 5,000 square feet of wall. For risk category IV buildings, prism testing is required for every 5,000 square feet of wall. Prior to construction, five prisms constitute a test. During construction, three prisms constitute a test. However, five are recommended during construction. Test the first one at seven days, the next three at 28 days, and hold the final sample for testing in case of a problem.

4. Inspection:

   The inspector should regularly check the batching of mortar and grout to ensure proper proportions or that the supplied preblended dry mortar mix meets the specifications and that the proper amount of water is added. The inspector should regularly check the laying of units to ensure proper workmanship. Continuous inspection during the placement of grout is required. The inspector should verify and ensure full compliance with the contract documents for the placement of reinforcement, grouting, consolidation, reconsolidation, top of the wall shear key, and the protection of the masonry from rain, dirt, and cold and hot weather.

5. Observation:

   Inform all participants that, from time to time, the engineer will visit the site to ensure general compliance with the contract documents.

6. Inspection Reports:

   Normally, special inspection and test reports and inspection reports go to the general contractor and the architect and then to the engineer. Deviations from this normal procedure should be discussed, defined, and documented.

7. Submittals:

   Verify that the contractor is using the approved project submittals.

8. Cleaning and Sealing:

   The procedures to clean and seal the masonry with water repellant should be discussed. It is important that the mason contractor verify the cleaning method with the unit manufacturer. If the wall is to be sealed with a water repellant, the method and materials to be used should also be verified with the brick manufacturer.

   Proper sealers do not seal the wall. The masonry must breathe. The sealers are actually only water repellents.

9. Construction Sequence and Schedule:

   Discuss the schedule for inspection and testing. Discuss coordination issues. One usually missed item is the coordination with the window and door supplier. The design of the connections should be discussed.

Site Visits

The structural engineer should make site visits to check on the progress and quality of the work. This part of the engineer's scope of services is called structural observation. Structural observation is required for most projects by the IBC and is defined as follows:

"The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents."

Structural observation does not include or waive the responsibility for the inspection required by other code sections.

Masonry walls failing during construction, particularly those employing high lift grouting, happen more frequently than they should. While it is not the structural engineer's responsibility to evaluate the contractor's means and methods, if the shoring of the wall does not look adequate, the structural engineer should inform the contractor and document that the information was given.

An example site observation form and checklist are provided in Appendix C.

Non-Conforming Quality Control Tests

Prism Compression Strength – Prior to Construction

If the prism test prior to construction does not comply with the required strength, there are many possible reasons. Often, and particularly for larger units (8 inches and above) with a specified compression strength exceeding 2,600 psi, the problem is often the testing method. It is not uncommon for the platen used to be too thin or the prism surface to be not flat. The brick may not be strong enough, or the mortar and grout may not be the appropriate mix.

Prism Compression Strength – During Construction

When prism tests do not conform, verify that the materials used (units, mortar, and grout) conform to the specifications. If they do conform, either the prism was improperly constructed, or the testing procedures did not comply with ASTM C 1314.

Prism construction errors include not constructing the prism true and plumb. It is very important that the top and bottom planes of the prism are parallel. Another common problem for large cell units (8" units and larger) is that the grout is not properly reconsolidated. Without proper reconsolidation, a dome-shaped void will often form at the mortar joint and render the area of grout ineffective for resisting compression.

Common testing errors include not properly capping the prism so that the top and bottom planes are level and parallel, not providing a thick enough loading platen to distribute the test machine load evenly to the prism, and the prism is not centered in the testing machine when loaded.

When confronted with a non-conforming wall (a low prism test for the wall), the first step is to recalculate the structural design to verify that the strength specified is required. If this does not work, the next step is to cut a prism from the wall and test it. Usually, prisms taken from the wall will test with higher compression than the sample prism. If this fails, the wall will likely need to be removed, materials changed to meet the required strength, and the wall reconstructed.

Mortar Compression

It is recommended that field testing of mortar not be required. However, the requirement for mortar testing often is outside the structural engineer's control, and on some projects, mortar testing becomes a requirement (See Appendix D for more information).

Grout Compression

It is recommended that field testing of grout not be required. However, when f'_m exceeds 2,000 psi, TMS 602-22 Section 2.2 B (Specifications for Masonry Structures) requires verification of grout strength by testing in accordance with ASTM 1019 (See Appendix D for more information). This requirement is interpreted as prior to construction rather than verification during construction.

APPENDIX A: WSCPA Members

Western States Clay Products Association
website: www.wscpa.us

Manufacturing Members

Interstate Brick Company
9780 South 5200 West
West Jordan, UT 84081-5625
Phone: (801) 280-5200
https://interstatebrick.com

McNear Brick & Block
1 McNear Brickyard Rd.
San Rafael, CA 94901-8310
Phone: (415) 453-7702
https://www.mcnear.com

H. C. Muddox/Gladding McBean
4875 Bradshaw Road
Sacramento, CA 95827
Phone: (801) 280-5200
https://www.gladdingmcbean.com

Mutual Materials Company
605 - 119th NE
Bellevue, WA 98005
Phone: (425) 452-2300
https://www.mutualmaterials.com

Summit Brick Company
601 E. 13th Street
Pueblo, CO 81001-2942
Phone: (719) 542-8278
https://www.summitbrick.com

Allied Associates Contacts

Arizona Masonry Council
3133 West Frye Road Suite 101
Chandler, AZ 85226
Phone: (602) 265-5999
https://www.azmasonry.org

Masonry Institute of America
1315 Storm Parkway
Torrance, CA 90501-5041
Phone: (310) 257-9000
https://www.masonryinstitute.org

Masonry Institute of Washington
11900 NE 1st Street, Ste 300
Bellevue, WA 98005-3049
Phone: (425) 214-7476
www.masonryinstitute.com

Rocky Mountain Masonry Institute
6145 Broadway Suite 44
Denver, CO 80216
Phone: (303) 893-3838
https://rmmi.org

Utah Masonry Council
4001 South 700 East #500
Salt Lake City, UT 84107-2177
Phone: (801) 264-6651
https://utahmasonrycouncil.org

APPENDIX B: Drawing Checklist

No.	Item	Checked
1.0	STRUCTURAL NOTES	
	Is the applicable code specified (city and date)?	
	Are the applied loads shown, including wind, seismic, and live loads?	
	Is the masonry strength f'_m specified?	
	Is the method to verify the f'_m specified? (Unit strength method.)	
	Are the units specified in accordance with ASTM C 652 with sufficient compressive strength to meet the f'_m specified?	
	Is cement specified in accordance with ASTM C 150 types I, II, or III? Is low alkaline cement available?	
	Is lime specified in accordance with ASTM C 207?	
	Is sand specified in accordance with ASTM C 144?	
	Is the mortar specified by proportions in accordance with ASTM C 270?	
	Is the grout specified in accordance with ASTM C 476?	
	Is self-consolidating grout specified in accordance with ASTM C 1611/C1611M?	
	Is high or low lift grouting specified?	
	For high lift grouting, are clean-outs to be eliminated with a code variation?	
	Is reinforcement specified in accordance with ASTM C 615 grade 60?	
	Is ASTM A 706 reinforcement specified when welded?	
	Is the quality assurance program included? (Required by code)	
	Is a grouting demonstration panel required?	
	Is there a requirement for a preconstruction meeting?	
	Are reinforcement shop drawings required?	
2.0	DESIGN	
	Is h/t less than 30? If not, verify the design includes analysis for moment magnification.	
	Are the walls at floors and roof laterally supported with straps or other methods capable of resisting at least 400 lb/ft?	
	Do the bars fit in the cells?	
	Are locations and length of laps shown? Are there locations where stresses are more than 80% of the allowable?	
	Are dowel laps sufficient?	
	Is there continuous horizontal reinforcement at the window and door head and jambs?	
	Is there continuous horizontal reinforcement at the floor?	
	Are window and door connections designed and shown on the drawings?	
	Are there expansion joints at the corners, and are they at or near the corners?	
	Are provisions made in connections to accommodate thermal and moisture expansion movement?	
	Is the brick masonry confined between other materials without expansion joints?	

No.	Item	Checked
3.0	SPECIFICATIONS (Additional items not typically in the structural notes)	
	Are the structural notes and specifications consistent?	
	Are control joint size, size, and materials specified?	
	Are control joint sealant compatibility tests required?	
	Are the cleaning methods included?	
	Does the specification allow wetting of the brick?	
	Are the joint finishes specified? If raked joints are used, is this in the analysis?	
	Are weep holes and fill materials specified?	
	Are the sealing, water repellant, procedures, and materials specified?	
	Are cold weather and hot weather construction provisions included?	
	Are requirements for protecting the work included?	
	Is it required to verify dimensions prior to laying the masonry?	
	Is a written quality control procedure required?	
	Is a color, pattern, and workmanship panel required?	

APPENDIX C: Construction Observation Checklist

No.	Item	Checked
1.0	MATERIALS	
	Are the bricks stored above ground and covered?	
	Are the bricks sound? Bang them together to see if they ring. If a thud, the bricks may need to be rejected or prism tests conducted to prove that f'_m is met.	
	Is the cement properly stored?	
	Is the lime properly stored?	
	Is the sand pile covered?	
	Does the sand appear well graded and sound?	
	Is the sand dirty?	
	Is there a method for controlling the sand proportions? Shovel count methods are not sufficiently accurate.	
	Does the person mixing the mortar know the proportions?	
	Are there any additives being added to the mortar?	
	Does the person mixing the mortar know the time limits for mixing? (10 minutes maximum.)	
	Are the grout proportions being controlled?	

No.	Item	Checked
2.0	CONSTRUCTION	
	Is the mortar dropping into the cells?	
	Are mortar fins being controlled? Are the cells clean?	
	Is the mortar being strung out too far on the bed joints?	
	Does the contractor understand cold (hot) weather construction requirements?	
	Are the walls being covered at the end of the day?	
	Is inspection being properly done?	
	Does the shoring of the masonry walls look about right?	
	Are the joints uniform in thickness and full?	
	Is the reinforcement being placed within tolerance? Is reinforcement secured against displacement? Are lap lengths correct?	
	Is the grout of sufficient slump to be placed?	
	Is the grout being vibrated during placement?	
	Is the grout being reconsolidated?	
3.0	DESIGN	
	Is the proper issue of design drawings on site?	
	Are the proper shop drawings on site?	
	Does the contractor understand the structural intent?	
	Is the inspector performing his duties properly?	
4.0	TESTING AND INSPECTION	
	Are prisms being constructed plumb and on a flat surface?	
	Are the materials being used for the prism the same as those used in the wall?	
	Are prisms being properly cured, handled, stored, and transported?	
	Is the prism grout being reconsolidated?	
	Is the frequency and quantity of testing in accordance with the contract documents?	

APPENDIX D: Field Test Data for Mortar and Grout

Field Mortar and Grout Test Data

The field sampling and testing for mortar compression strength are highly variable. Figure 1 is a frequency distribution of Type S mortar compression tests taken in the field during actual projects in California, Oregon, and Washington. There are a total of 205 mortar tests. The coefficient of variation is 36%.

With this amount of variability, it should not be surprising to get periodic non-conforming compression mortar tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request that the mason identify the proportions being used. Go to the site and observe the mixing of the mortar.
2. Assess the method being used to control proportions. Check that the correct materials are being used.
3. Verify that the testing lab is using the procedures of ASTM C 270.
4. Visit the site and observe the mortar in the joint. Scratch the mortar with a key. If a white scratch results and the sand does not separate from the mortar, the strength of the mortar is probably acceptable. However, if the masonry is highly stressed (above 1200 psi), it may be necessary to remove a prism from the wall for testing.

The relationship between 7-day mortar strength and 28-day mortar strength is not as variable as the compression strength. It is useful to know the 7-day test results since it provides the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.

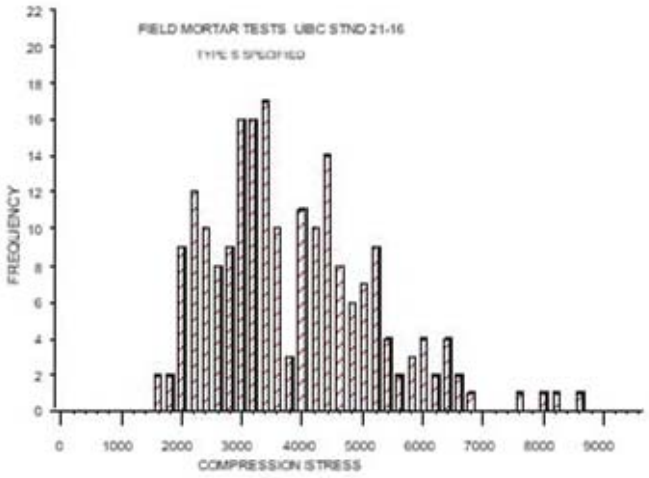


Figure 1 Field Mortar Tests

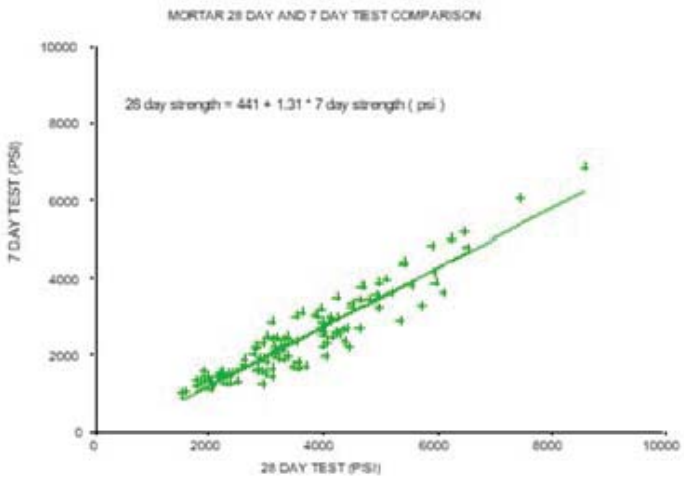


Figure 2 Comparison of 7 and 28 Day Mortar Tests

Grout Compression

It is recommended that field testing of grout not be required. However, when f'_m exceeds 2,000 psi, TMS 602-22 Section 2.2 B (Specifications for Masonry Structures) requires verification of grout strength by testing in accordance with ASTM 1019. This requirement is interpreted as prior to construction and not verification during construction.

The field sampling and testing for grout compression strength are highly variable. The following figure is a frequency distribution of field grout compression tests taken from actual projects in California, Oregon, and Washington. There are a total of 323 grout tests. The coefficient of variation is 32%.

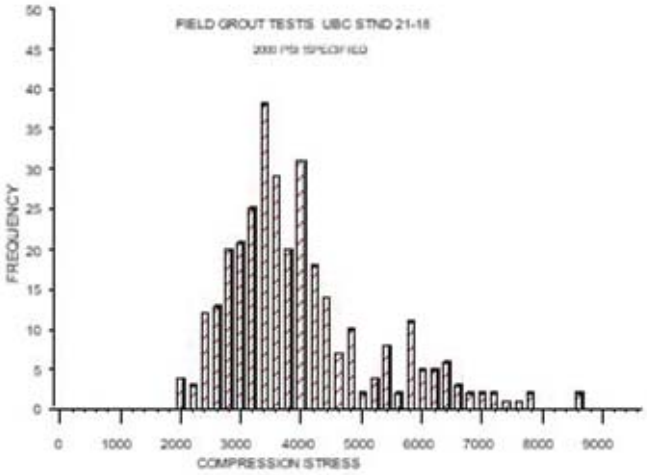


Figure 3 Field Grout Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression grout tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request that the mason identify the proportions being used.
2. Assess the method being used to control proportions.
3. Verify that the testing lab is using the procedures of ASTM 1019.
4. If the cause of the low break is not identified, then taking core samples and testing them may be required.
5. The structural engineer should also consider the reason for requiring a specific grout strength. Often, the purpose of the grout is only to connect the reinforcement to the units. Even low-strength grouts (1500 psi) are probably capable of making the connection. Because of the high strength of the brick, the compression contribution of the grout can often be ignored in the analysis. If grout strength is less than f'_m, then lap lengths should be based on the grout strength and not f'_m.

The relationship between 7-day grout strength and 28-day grout strength is not as variable as the compressive strength. It is useful to know the 7-day test results since it provides the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.



Figure 4 Comparison of 7 and 28 Day Grout Tests

APPENDIX E: Troubleshooting Table

Troubleshooting Table for the Design Structural Engineer

Problem	Cause	Solution
Prisms fail to reach the design strength.	1. The testing lab has incorrectly tested the prism, usually by not placing the prism correctly in the machine or using a loading platen that is too thin. Or the specimens may have been damaged during transportation. 2. The bricks are below the specified strength. 3. The mortar is under specified strength. 4. Lab reported gross area stress instead of net area stress.	1. Instruct the lab to retest, being careful to follow the ASTM C 1314. 2. Request that the contractor have a lab test the brick. 3. Check mortar proportions. Retest the prisms. 4. Have the lab correct the report.
Mortar doesn't reach strength.	1. Incorrect proportions. 2. Incorrect testing.	1. Check mortar quality control procedures. 2. Mortar tests are unreliable. Forget about testing mortar. The code doesn't require it.
The grout mix does not meet ASTM C 476	Wrong mix	Change the mix to conform to ASTM C 476
For f'_m exceeding 2,000 psi, the tested grout strength is less than f'_m.	1. Tested during construction 2. Incorrect testing. 3. Wrong design mix	1. Grout tests are unreliable. Forget about testing grout during construction. The code doesn't require it. 2. ASTM C 1019 is not reliable. Repeat the test using different liners. 3. Change the design mix.
The colors do not meet expectations.	1. Bricks were not blended. 2. Sample panel has a different water repellant. 3. The brick production run is different from the sample run.	1. This is a problem for the architect and brick supplier. 2. Use the sample panel sealer. 3. Approve the production run before beginning construction.
The architect calls and says more expansion joints are required.	The architect was checking on your advice. Architects should do this, so don't get mad. The architect's experience may be with concrete masonry units that require closer spaced control joints for shrinkage and is not experienced with structural reinforced hollow clay masonry.	Explain to the architect how the reinforcement reduces the need for most of the expansion joints.
The mason tells the general contractor, who tells everyone that the cells are too small to be grouted with all the congested steel.	1. The mason contractor does not have experience with the grouting of reinforced hollow brick. He doesn't understand that he can make the grout with an 8 to 11-inch slump. 2. The cell is too small.	1. Prepare and grout a test panel. Be sure to invite everyone concerned. 2. Verify that the units conform to ASTM C 652 or re-design the wall with smaller diameter reinforcement, or use mechanical connectors
Welded bars are breaking off.	ASTM A 706 bars were not used. Inspect the bars. A "W" symbol indicates type A 706. Verify that bars were properly cooled and not quenched with water after welding.	Use the correct bars.
The contractor is not protecting his materials or work.	Sometimes the responsibility for protecting the work is left to the general contractor. He is saving money. Sometimes the responsibility is not well defined.	Request your client to set up a meeting with the general contractor and the masonry contractor to address the issue.

Problem	Cause	Solution
Cracks in the mortar joints.	1. Shrinkage of the mortar joint. 2. Movement of the supporting structure. 3. Overloading. 4. Too rapid drying.	1. Suggest the contractor decrease the cement content of the mortar and increase the lime, provided it still is in conformance with ASTM C 270. 2. Check supports. 3. Check loading the timing of the loading and shoring removal. 4. Pre-wet the units. Wet the wall during curing. Add lime to the mortar. Tooling of joints may not be done at the proper time, or joints are not properly tooled.
Shop drawings are not prepared.	The requirement was missed or "value engineered away."	Write a letter to your client explaining the requirement. If the project is underway, require an engineer familiar with the design to be on site full time.
The grout strength is specified at a minimum of 2000 psi; how can I get a prism of 4000 psi?	This is normal.	Explain that the prism does not fail in accordance with the weak link theory. See the Design Development section "Selection of Masonry Strength, f'_m."
The contractor wants to grout pours to exceed the 5 feet 4-inch lift height and not provide clean-outs.	The code restricts the grout lift to 5 feet 4 inches even though the grout pour might be higher. If the lift is over the 5 feet 4-inch then it is high lift grouting.	The problem is blow-outs of mortar joints and the ability to reconsolidate. In hollow clay, these problems are unlikely. Have the contractor demonstrate the procedure to you and the inspector using a grouting demonstration panel.
The contractor doesn't want clean-outs. You want high-lift grouting.	Code requires clean-outs for high-lift in order to remove the mortar droppings.	If the shear stresses are low, it may be possible to waive the clean-out requirement. The purpose of the clean-out is for shear transfer at the bottom of the cell. If shear stresses are low, this may not be necessary, and a code exception will be necessary.
The dowels out of the concrete foundation interfere with the unit cross webs. They miss the cells.	Improper placement of the dowels. However, it is often very difficult to get them in the right place. This situation is more common than not.	Cut the unit cross webs to allow the dowel to pass or drill in new dowels. Verify that all the dowels are required to meet strength requirements. If not, allow a certain % of them to be removed. It is common to allow the dowels to be bent slightly. A 1:6 slope ratio is a commonly used maximum.
The brick masonry is cracked, with cracks extending through the units.	1. A great deal of force is required for this condition to exist. Frozen grout, foundation movement, or thermal movement from an adjacent structure are a few examples. 2. The bricks may have been manufactured with cracks. 3. Foundation cracks extend into the brick wall.	1. Find the reason for the cracking. It is likely something needs to be corrected. Likely candidates include freezing, foundation settlement, overloading and thermal movement. 2. Verify the integrity of the units before use. A quick check is to bang the bricks together; if a ringing sound results instead of a thud, then the bricks are sound. 3. Foundation control joints are not coordinated with the masonry expansion joints. It may require rework or adding a control joint.

Problem	Cause	Solution
The contractor doesn't cover the walls at the end of the day.	1. The contractor is attempting to save money. 2. The responsibility for the masonry protection may have been left with the general contractor or, worse, left out of all the contracts. 3. The contractor may not be aware of the requirements of TMS 602 to cover walls at the end of the shift.	1. Insist on covering the walls. 2. Write a letter stating that the contractor is not in conformance with the likely result being efflorescence and other wall damage.
Corrosion of the joint reinforcement.	1. Too strong of an acid cleaning without pre-wetting the wall. 2. Ungalvanized joint reinforcement.	1. Pre-wet the wall and use industry cleaners as recommended by the manufacturer of the units. 2. Use galvanized joint reinforcement.
Leaking Walls	1. Improper flashing installation. 2. Improper flashing design. 3. Poor workmanship. 4. Improper grouting. 5. Raked joints or other unprotected horizontal surfaces. 6. Water repellant not applied.	1. Correct flashing. 2. Correct flashing. 3. Repair mortar joints. 4. Pressure epoxy grout. 5. Fill joints. Cover horizontal surfaces. 6. Apply water repellant wall.
Dome shaped voids in the grout.	1. Loss of water to the unit. 2. Improper or no vibration of the grout 3. No reconsolidation	1. Use proper reconsolidation techniques. 2. Use Grout-Aid or equal. 3. Add lime to the maximum allowed. Use self-consolidating grout.
River voids in fine grout.	Loss of water to the unit.	1. This is normal, provided they are less than approximately 1/4 inch in width. 2. Use Grout-Aid or equal. 3. Add lime to the maximum allowed. 4. Reduce water in the mix.
Efflorescence on the wall.	1. Precipitation of salts at the wall surface. 2. Wall was uncovered during construction, and excessive water entered. 3. Flashing not properly detailed, not installed, or not properly installed	1. Clean the wall and then keep water from entering the wall by fixing leaks and sealing it with a water repellant. 2. Cover the wall during construction. 3. Rework the flashing

Notes on the Selection, Design and Construction of

Reinforced Hollow Clay Masonry

Is also available from Western States Clay Products Association at
http://www.brick-wscpa.org

Other technical documents are also available
Design Guide for Anchored Brick Veneer Over Steel Studs
and
Design Guide for Structural Brick Veneer

Strengths of RHCM are usually greater than the 2600 psi used in the document

- Increasing the f'm increases the capacity of the masonry. RHCM design strengths far exceed those available for concrete masonry. The assumed starting value of 2,600 psi is conservative. Some engineers start with a value of 3,500 psi. However, it is recommended to specify the lowest value necessary to meet the project demand strength requirements especially for schematic design.
- Using the higher design strength can reduce or eliminate horizontal shear reinforcing in shear walls, and shear reinforcing (stirrups) in beams, in some cases.
- For specially designed shear walls, the structural engineer may be able to eliminate the transverse reinforcement hooks at the end of the wall if the following condition is satisfied.

$$V_u / (\theta V_{nm}) \leq 0.4$$

- For intermediate and special shear walls, the ductility requirements can be mitigated by increasing f'_m to allow additional tension reinforcement. This will only occur in multi-story load-bearing applications.
- For beams with high moment demand, the limits on tension reinforcement can be increased by increasing f'_m.
- In some situations, increasing f'_m can eliminate the requirement to do a moment magnification analysis.



REINFORCED STRUCTURAL CLAY BRICK

strong, versatile solution

BY JEFF ELDER, PE

Those inexperienced in the use of reinforced structural clay brick might think that a brick is a brick and limit its application to conventional methods associated with veneer. Brick veneers are defined by their ability to support their own weight while limited by mortar to resist tension. When the mortars' resistance to tension is exceeded, brick must be joined or supported by other materials such as brick ties, shelf and ledger angles, wood, steel, concrete and other backup systems.

Researchers have spent years investigating ways to provide tensile resistance to brick. Patterned after reinforced concrete, reinforceable structural clay brick create the form and become the aggregate to support compression forces. Reinforcing steel resists the tension. Oversized holes are placed in the brick and align vertically to create a place for reinforcing steel. Grout is placed in brick cells to bond reinforcing steel to the brick.

Structural clay brick are specified under ASTM C652 as hollow, fired clay brick with a percentage void volume greater than 25%, generally ranging between 35% and 60%.

Learning Objectives

1. Reinforced Structural Clay Brick (RSCB) are designed using most of the same equations and details as Concrete Masonry Units (CMU).
2. RSCB are two to three times stronger than CMU.
3. RSCB have fire ratings of one to four hours.
4. RSCB use expansion joints whereas CMU use control joints
5. Any design detail created using brick veneer can be created using structural brick. Not every structural brick detail can be created using veneer brick.
6. RSCB can act as beams, columns, loadbearing walls, structural panels and curtain walls.
7. RSCB are available in a wide variety of colors, sizes, shapes and textures.

See page 47 for test.

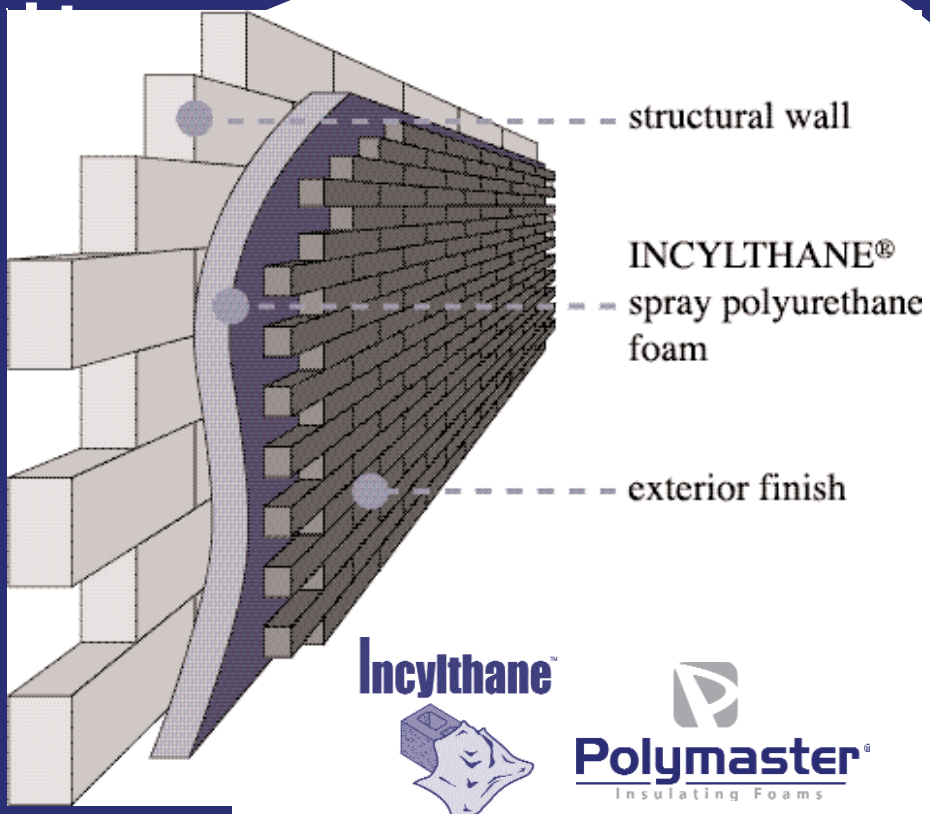
net area compressive strength of clay masonry units (psi)		net area compressive strength of masonry (psi)
TYPE M OR S MORTAR	TYPE N MORTAR	
1700	2100	1000
3350	4150	1500
4950	6200	2000
6600	8250	2500
8250	10,300	3000
9900		3500
13,200		4000

Table 1. Compressive Strength of Clay Masonry. For SI: 1 lb per square inch = 0.00689 Mpa. (IBC 2105.2.2.1.1)

2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.

mortar	type	proportions by volume (cementitious materials) PORTLAND CEMENT[a] OR BLENDED CEMENT[b]	MASONRY CEMENT[c] M	MASONRY CEMENT[c] S	MASONRY CEMENT[c] N	MORTAR CEMENT[d] M	MORTAR CEMENT[d] S	MORTAR CEMENT[d] N	hydrated lime[e] or lime putty	aggregate measured in a damp, loose condition
CEMENT-LIME	M	1	–	–	–	–	–	–	¼	
	S	1	–	–	–	–	–	–	over ¼ to ½	
	N	1	–	–	–	–	–	–	over ½ to 1¼	
	O	1	–	–	–	–	–	–	over 1¼ to 2½	
MORTAR CEMENT	M	1	–	–	–	–	–	1	–	Not less than 2¼ and not more than 3 times the sum of the separate volumes of cementitious materials
	M	–	–	–	–	1	–	–	–	
	S	½	–	–	–	–	–	1	–	
	S	–	–	–	–	–	1	–	–	
	N	–	–	–	–	–	–	1	–	
	O	–	–	–	–	–	–	1	–	
MASONRY CEMENT	M	1	–	–	1	–	–	–	–	
	M	–	1	–	–	–	–	–	–	
	S	½	–	–	1	–	–	1	–	
	S	–	–	1	–	–	1	–	–	
	N	–	–	–	1	–	–	1	–	
	O	–	–	–	1	–	–	1	–	

Table 2. Mortar Proportions [IBC 2103.7(1)]. a. Portland cement conforming to the requirements of ASTM C150, b. Blended cement conforming to the requirements of ASTM C595, c. Masonry cement conforming to the requirements of ASTM C91, d. Mortar cement conforming to the requirements of ASTM C1329, e. Hydrated lime conforming to the requirements of ASTM C207. *2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.*



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Alpha Foam Insulation
989-799-9669 • Saginaw



Fox Studio, Livonia, designed by Giffels, Hoyem, Basso, now IDS, Troy, used both 4 x 8 x 16 custom color Brownstone flashed (with center score) as a veneer and 8 x 8 x 16 (with center score) as a structural unit.

The designer must specify the type of brick. Hollow brick are designated as either HBS (hollow brick standard) or tighter spec HBX (hollow brick extra). Use HBX when a higher standard for dimensional and aesthetic tolerances are required and a higher cost can be justified.

When brick are subject to frequent conditions of freezing when saturated, the designer is directed to specify Grade SW (severe weathering) brick.

Structural clay brick are commonly available in nominal widths of 4˝, 5˝, 6˝ and 8˝. They come in nominal lengths of 8˝, 12˝ and 16˝ with heights that range from 2¼˝ to 8˝.

Compressive Strength

As strength of brick is often related to color, it is important that an architect specify the color of brick early in the design process. This allows the structural engineer to maximize the strength performance of design elements. For most manufacturers, the lighter the brick color, the lower the compressive strength of the system; conversely, the darker the color, the higher the compressive strength of the system.

The designer is referred to the specified manufacturer to obtain the *compressive strength of unit* for all colors specified. The designer is then directed to the appropriate building code to cross reference *compressive strength of unit* with design value *compressive strength of masonry.*

When using the International Building Code (IBC 2003), refer to Table 2105.2.2.1.1. (See Table 1.) Similar tables are found in the masonry section of other codes. The specified *compressive strength of masonry* is referenced by designers as the f'_m value. Values of historical test data have been adjusted statistically in the table to insure a conservative design value.

Typical allowable design values for hollow clay masonry range between 2600 psi and 5300 psi. At two to three times the standard value for concrete masonry, the use of these higher values can help to reduce deflections, wall thickness, beam depth, bar diameter and bar lap requirements.

To select an f'_m value higher than those listed in the table is acceptable; however, the value must be verified by building prisms of the brick, mortar and grout specified prior to and during construction.

type	parts by volume of portland cement or blended cement	parts by volume of hydrated lime or lime putty	aggregate, measured in a damp, loose condition	
			FINE	COARSE
FINE GROUT	1	0–1/10	2 1/4 – 3 times the sum of the volumes of the cementitious materials	-----
COARSE GROUT	1	0–1/10	2 1/4 – 3 times the sum of the volumes of the cementitious materials	1–2 times the sum of the volumes of the cementitious materials

Table 3. Grout Proportions by Volume for Masonry Construction. (IBC 2103.10) ***2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.***

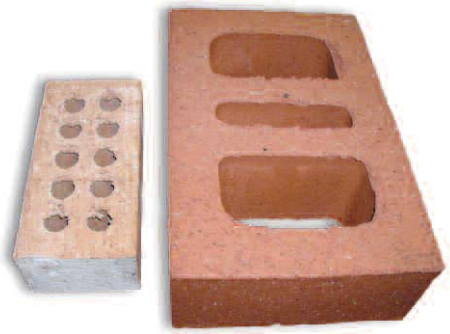
material	item number	construction	minimum required equivalent thickness for fire resistance [a, b, c] (inches)			
			4 hour	3 hour	2 hour	1 hour
BRICK OF CLAY OR SHALE	1-1.1	solid brick of clay or shale[d]	6	4.9	3.8	2.7
	1-1.2	hollow brick or tile of clay or shale, unfilled	5.0	4.3	3.4	2.3
	1-1.3	hollow brick or tile of clay or shale, grouted or filled with materials specified in Section 721.4.1.1.3	6.6	5.5	4.4	3.0

Table 4. Rated Fire-Resistance Periods of Clay Masonry Walls [IBC 721.4.1(1)]. For SI: 1˝ = 25.4 mm
a. Equivalent thickness as determinded from Section 721.4.1.1, b. Calculated fire resistance between the hourly increments listed shall be determined by linear interpolation, c. Where combustible members are framed in the wall, the thickness of solid material between the end of each member and the opposite face of the wall, or between members set in from opposite sides, shall not be less than 93% of the thickness shown, d. For units in which the net cross-sectional area of cored brick in any plane parallel to the surface containing the cores is at least 75% of the gross cross-sectional area measured in the same plane. ***2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.***





Metro Loft, Royal Oak, designed by Neumann/Smith & Associates. Re-rod and concrete pre-fab flooring attached to 8 x 4 x 12 brick single wythe walls.



Solid face brick and hollow structural unit.



Metro Loft, Royal Oak, constructed of Mission (yellowish, buffish) and Sunset, flashed to bring out color variation. Larger core holes for re-rod and grouting.

Mortar

Mortar used in reinforceable structural clay masonry assemblies is commonly specified by proportions. (See Table 2.) There are three types of mortars: Portland cement-lime, mortar cement and masonry cement. In addition, Type S mortars are prescribed for structural masonry as a minimum.

A common mistake is to over specify the mortar type. Since Type M mortars are the strongest mortars, they are often specified to insure strength of the assembly. Type M mortars have a high cement content which increases shrinkage of mortar and reduces the bond strength. In addition, the extra cement makes cleaning more difficult. Type M mortars are generally limited to below grade applications. When specifying mortars, do not call out for a mortar compressive strength testing.

Grout

Grouts for reinforceable structural clay masonry are prescribed according to Table 3 by proportion. Use coarse aggregate grout (1 part cement, 2 parts pea gravel and 3 parts sand) for applications where there is sufficient room for all of the reinforcing. Fine grouts are commonly used in smaller cells — typically 4˝ and 5˝ wide brick.

Fluidity is essential for proper placement of grout around reinforcing. A grout slump of 8˝ to 11˝ is recommended. Due to the high moisture content of grout, a volume expander, fluidifying and water reducing agent are added.

Fire Resistance

Reinforceable structural clay brick also provide fire resistance. Structural clay brick are fired in kilns at maximum temperatures around 2000°F. This allows brick to retain strength during a fire and when subjected to fire hose streams, thus enhancing public safety. Structural brick are non-combustible and do not give off toxic emissions. Prescribed code values are located in Table 4. Fire ratings from 1 to 4 hours can be achieved from this table. To select a fire rating, solid percentages of structural brick are converted to an equivalent brick thickness and compared with minimum required thicknesses for various fire ratings. Structural brick may be made solid for the intent of this table by filling all cells with grout, expanded shale, sand, pea gravel, crushed stone, slag, pumice, scoria, expanded clay, slate, slag, fly ash or cinders.

Insulative R-Values

Structural clay brick can also provide insulative properties. Uninsulated brick have insulation resistance (R)-values of approximately 0.2 R/inch. By insulating the cells that are not grouted, higher insulation values can be achieved. Structural clay brick can be insulated with perlite or foamed-in-place polyurethane to achieve R-values approaching 1-R/inch.

When insulation requirements exceed those provided above, insulate the wall the same as for brick veneer. Add a layer of closed cell polystyrene insulation to the back of the brick and fur out as required.

Reinforcement

From a design standpoint, reinforceable structural clay brick are similar to concrete masonry units (CMU). An architect or engineer familiar with the design of CMU uses many of the same details. Horizontal bar reinforcing is placed in bond beams. A grout stop fabric of paper or mesh is placed directly below bond beams to prevent grout from dropping into intentionally ungrouted cells.

Horizontal joint reinforcing is typically specified at 16˝ increments and ends are lapped 6˝. Reinforcing is typically continuous around corners. Horizontal reinforcing helps to control cracking and to transfer loads to vertical reinforcing.

Movement Joints

Concrete masonry uses control joints (CJs) in walls to control shrinkage of the concrete through the dynamic cycle of wetting and drying. CJs are commonly

recommended at spacings of 20´ to 25´ centers and are created by starting and stopping the units to form a vertical joint. Reinforcing is terminated at the joint; sealants protect the joint from the elements. In some cases, a sash block and preformed gasket are used to help control alignment of the two faces. Care should be given to the aspect ratio of the wall to insure that cracking does not occur at more frequent spacings.

With structural clay brick, expansion and contraction will occur with varying temperatures; predominant direction of movement is expansion. When expansion of brick controls the design, the movement joint needs to be free of materials that will not compress. (See Figure 1.)

Expansion joints (EJs) are not required at the same locations and spacing as in brick veneer. This is because brick veneer does not have the ability to resist tension caused from expansion. Common spacing of EJs in horizontally reinforced clay brick are generally spaced at 60´ centers. If an EJ is not preferred at the corner, horizontal reinforcing in bond beams must be continuous around the corner, a minimum of 36 bar diameters. Lap continuous reinforcing with corner bars to insure that tension created in the brick at the corner can be transferred to the reinforcing.

Where clay brick and concrete block

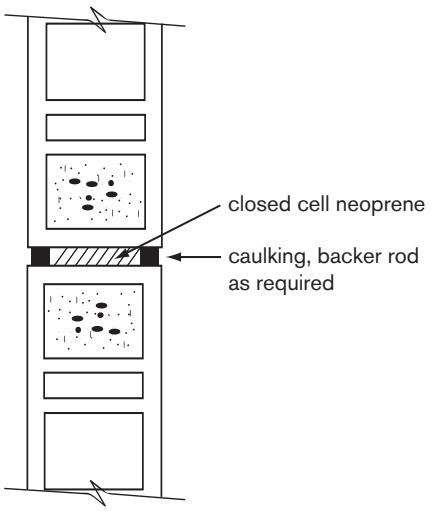
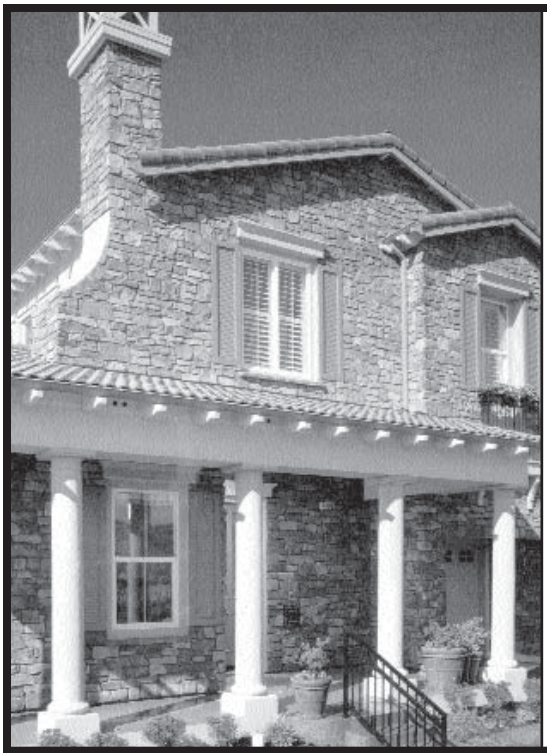


Figure 1.

Hilton Garden Inn, Detroit



GIANNOLA MASONRY COMPANY
(586) 792-2070
35086 Cordelia St. • Clinton Twp., MI 48035



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(One Block West of Livernois)
Detroit, MI 48221
PH: 313.864.3600
Toll Free: 877.294.7787
Fax: 313. 864.3734

are combined, use CJs as required for concrete block.

Moisture Control

Moisture must be controlled on a regional basis. Experience with concrete masonry unit (CMU) in an area will dictate the preferred method of treating a structure for moisture resistance. For many areas of the United States, single-wythe brick exposing both faces can be treated using a water repellent coating on the exterior face. The expansive characteristic of brick causes reinforcing to go into tension, which then places the brick into compression. This post tensioning reduces cracks and decreases moisture penetration.

When a greater resistance to moisture penetration is required, structural clay masonry must be designed similar to drainage walls with weep holes and flashing running through the wall to the back side of the insulation. Close cell extruded expanded polystyrene, other non-wicking insulations and those not affected by moisture are placed in a continuous layer on the inside face of the brick. All joints in the insulation are taped to create a moisture barrier.

Continuous insulation creates the thermal drop which forces the dew point of the wall to occur in the insulation. This reduces the chance for condensation inside the wall. Any moisture on the surface of the insulation is directed to the flashing where it is directed to the exterior of the building.

Application

Common uses of reinforceable structural clay masonry are loadbearing walls, beams, columns and piers. Other uses are structural brick veneer, curtain walls, brick panels, sound walls and retaining walls.

One and two-story buildings, even those up to 21 stories, are perfect for loadbearing masonry. For a small increase in initial cost as compared with CMU, the owner enjoys major improvements in aesthetics and strength. As an alternative for steel frame and metal stud walls, reinforced structural clay masonry can be



Embassy Suites Hotel, Livonia used both 4˝ x 8˝ x 16˝ Ironstone flashed (with center score) as a veneer and 8˝ x 8˝ x 16˝ (with center score) as a structural unit.

used as both a bearing wall and an enclosure wall providing structure and finish at the same time. Compared with wood framing, structural clay brick offer better acoustical properties, less seismic or wind drift, better fire resistance, less maintenance and no insect or mold damage.

Structural clay masonry is often installed in less time than other framing methods, reducing construction time and finance costs.

Mid-rise hotels and condominiums are a perfect choice for the structural brick curtain wall. High strength of the unit allows taller walls and fewer framing members. Perimeter beam sizes can be reduced and heavy gauge studs are replaced by light gauge ones. On some building sites with limited access, the curtain wall concept has eliminated the need for scaffolding reducing those costs.

Brick veneer on metal studs is laden with complicated construction details and extra labor. Unless properly detailed, wall ties are subject to pullout and corrosion of the stud is possible. Structural brick veneer is a popular alternative to brick veneer as wall ties, heavy structural framing and beams are replaced with reinforced hollow brick. Wall ties are replaced by less frequent structural anchors spaced every 100 sf compared with every 2 sf. Anchors are less susceptible to corrosion. Perimeter

masonry beams can be sized for L/240 deflection criteria and not the L/600 prescribed to control veneer cracking. Brick offer greater design flexibility in a wide array of colors, textures and patterns.

Sound walls and miscellaneous enclosure walls are an efficient use of structural clay masonry. Modular in size, they can accommodate large variations in land form. A wide variety of colors add structural and aesthetic advantages.

Structural clay brick are less frequently used in retaining walls. However, because of the flexibility of brick to accommodate variations in wall geometry, the structural brick retaining wall may offer more efficient design options as compared with reinforced concrete.

It is safe to say that any building designed using brick veneer can be designed using reinforced structural clay brick. The reverse is not true.

Complexity of design can be reduced, performance of materials enhanced, overall cost reduced, performance life increased by using reinforceable structural clay brick. Brick's durability is double the useful life of most building materials.

Reinforceable structural clay brick fulfills the intent of sustainable building design.

Take advantage of the structural characteristics of brick while enjoying its long list of other advantages.

For additional information on this subject, go to www.brick-wscpa.org.



Jeff Elder is sales manager for Interstate Brick Company, nationally recognized structural clay brick manufacturer in West Jordan, UT. He has served as past president and currently chairs the technical committee for Western States Clay Products Association (WSCPA), the structural research arm of the brick industry. He is a member of Masonry Standards Joint Committee, Masonry Alliance for Codes & Standards and The Masonry Society. He may be reached at jeff.elder@paccoast.com, 800-280-5290.



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INTERSTATE® BRICK

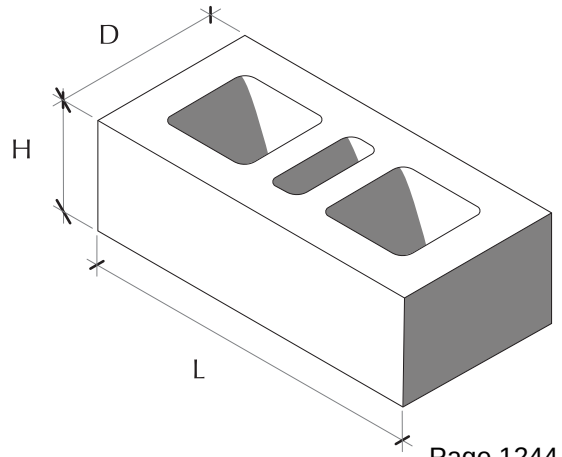
Atlas® Brick Dimensions, Weights, Coverage and Packaging

	Depth (D)		Height (H)		Length (L)		Weights		Units /Area		Packaging	
Name	in	mm	in	mm	in	mm	lbs	kg	Units /ft²	Units /m²	Type	QTY
Atlas® Utility 4 x 4 x 12	3 5/8	92	3 5/8	92	11 5/8	295	8.2	3.7	3.00	32.3	Cube	207
Atlas® Emperor® 4 x 4 x 16	3 5/8	92	3 5/8	92	15 5/8	397	11.0	5.0	2.25	24.2	Pallet	160
Atlas® Super Emperor® 4 x 8 x 16	3 5/8	92	7 5/8	194	15 5/8	397	22.5	10.2	1.13	12.1	Pallet	64
Atlas® 6 x 2 1/4 x 12	5 5/8	143	2 1/4	57	11 5/8	295	8.0	3.6	4.5	48.4	Pallet	180
Atlas® 6 x 2 1/4 x 16	5 5/8	143	2 1/4	57	15 5/8	397	10.0	4.5	3.38	36.3	Pallet	150
Atlas® 6 x 4 x 12	5 5/8	143	3 5/8	92	11 5/8	295	10.0	4.5	3	32.3	Pallet	120
Atlas® 6 x 4 x 16	5 5/8	143	3 5/8	92	15 5/8	397	14.0	6.3	2.25	24.2	Pallet	100
Atlas® 8 x 4 x 12	7 5/8	194	3 5/8	92	11 5/8	295	15.3	6.9	3.00	32.3	Pallet	100
Atlas® 8 x 2 1/4 x 16	7 5/8	194	2 1/4	57	15 5/8	397	12.7	5.7	3.38	36.3	Pallet	120
Atlas® 8 x 4 x 16	7 5/8	194	3 5/8	92	15 5/8	397	17.0	7.7	2.25	24.2	Pallet	80
Super Atlas® 8 x 8 x 16	7 5/8	194	7 5/8	194	15 5/8	397	39.0	17.6	1.13	12.1	Pallet	40
Atlas® 10 x 2 1/4 x 16	9 5/8	244	2 1/4	57	15 5/8	397	16.0	7.2	3.38	36.3	Pallet	90
Atlas® 10 x 4 x 16	9 5/8	244	3 5/8	92	15 5/8	397	20.0	9.1	2.25	24.2	Pallet	60

ONLY AVAILABLE AS SPECIAL ORDER

Weights shown are approximate dry weights. Weight will vary with moisture content and with color. Coring configuration varies depending on brick size. Please refer to individual brick sizes on the website for accurate configurations.

ONLY AVAILABLE AS SPECIAL ORDER



The Above Brick Manufactured by Interstate Brick comply with the following Specifications:

ASTM C652: Grade SW; Type HBA, HBS or HBX as specified in Purchase Order
CSA A82: Grade EG; Type HBA, HBS or HBX as specified in Purchase Order

Interstate® Brick - Standard Brick Products

Safety Data Sheet

according to the Hazard Communication Standard (CFR29 1910.1200) HazCom 2012 Date of issue: 03/26/2015 Revision date: 03/26/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name : Interstate - Standard Brick Products

Product code : Not available

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Building and construction work

1.3. Details of the supplier of the safety data sheet

Interstate Brick Company
9780 S. 5200 W.
West Jordan, UT 84088 - U.S.A.
T (801) 280-5200

1.4. Emergency telephone number

Emergency number : CHEMTREC 1 (800) 424-9300
CHEMTREC International +1 (703) 527-3887 24 hr

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Skin irritation 2
Eye irritation 2A
Skin sensitization 1B
Carcinogenicity 1A
Specific target organ toxicity - Single exposure 3
Specific target organ toxicity - Repeated exposure 1

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :



GHS07 GHS08

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : Causes skin irritation. Causes serious eye irritation. May cause an allergic skin reaction. May cause cancer. May cause respiratory irritation. Causes damage to organs through prolonged or repeated exposure.

Precautionary statements (GHS-US) : Contaminated work clothing must not be allowed out of the workplace. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Do not breathe dust. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned: Get medical advice/attention. If on skin: Wash with plenty of water. Take off contaminated clothing and wash it before reuse. If skin irritation or rash occurs: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell. Store in a well-ventilated place. Dispose of contents and container in accordance with all local, regional, national and international regulations.

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Clay/Shale Aluminum Silicates	Proprietary	90 - 95	Skin Irrit. 2 Eye Irrit. 2A Skin Sens. 1B Carc. 1A STOT SE 3 STOT RE 1
Quartz	(CAS No) 14808-60-7	40 - 75 [1]	Carc. 1A STOT RE 1
Manganese dioxide	(CAS No) 1313-13-9	< 3	Ox. Sol. 3 Acute Tox. 4 (Oral) Acute Tox. 4 (Inhalation)
Chromium oxide (Cr_2O_3)	(CAS No) 1308-38-9	< 3	Not classified
1: Quartz is present in Clay/Shale Aluminum Silicates at 40 - 75%.			

* The specific chemical identity and exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (i) of §1910.1200.

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical advice/attention if you feel unwell.

First-aid measures after skin contact : In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. If skin irritation or rash occurs: Get medical advice/attention.

First-aid measures after eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. If irritation persists, get medical attention.

First-aid measures after ingestion : If swallowed, do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical advice/attention if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : May cause respiratory irritation. May cause shortness of breath, tightness of the chest, a sore throat and cough. Repeated exposure to very high levels of repairable crystalline silica quartz can cause acute silicosis.

Symptoms/injuries after skin contact : Causes skin irritation. Symptoms may include redness, edema, drying, defatting and cracking of the skin. May cause an allergic skin reaction.

Symptoms/injuries after eye contact : Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

Symptoms/injuries after ingestion : May be harmful if swallowed. May cause stomach distress, nausea or vomiting.

4.3. Indication of any immediate medical attention and special treatment needed

Symptoms may not appear immediately. In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Treat for surrounding material.

Unsuitable extinguishing media : None known.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Products of combustion may include, and are not limited to: oxides of carbon.

5.3. Advice for firefighters

Protection during firefighting : Keep upwind of fire. Wear full fire fighting turn-out gear (full Bunker gear) and respiratory protection (SCBA).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Do not breathe dust.

6.2. Methods and material for containment and cleaning up

For containment : Contain spill, then place in a suitable container. Minimize dust generation. Do not flush to sewer or allow to enter waterways. Use appropriate Personal Protective Equipment (PPE).

Methods for cleaning up : Vacuum or sweep material and place in a disposal container. Provide ventilation.

6.3. Reference to other sections

See section 8 for further information on protective clothing and equipment and section 13 for advice on waste disposal.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Avoid contact with skin and eyes. Do not breathe dust. Avoid generating dust. Good housekeeping is important to prevent accumulation of dust. Do not swallow. Handle in accordance with good industrial hygiene and safety practice. When using do not eat, drink or smoke. Use only outdoors or in a well-ventilated area.

Hygiene measures : Launder contaminated clothing before reuse. Wash hands before eating, drinking, or smoking.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep out of the reach of children. Store in a well-ventilated place. Avoid any dust buildup by frequent cleaning and suitable construction of the storage area.

7.3. Specific end use(s)

Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Clay/Shale Aluminum Silicates (Proprietary)		
ACGIH	ACGIH TWA (mg/m³)	10 mg/m³
OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³

Quartz (14808-60-7)		
ACGIH	ACGIH TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
OSHA	OSHA PEL (TWA) (mg/m³)	((10 mg/m^3)/(%SiO_2+2) TWA (resp)) ((30 mg/m^3)/(%SiO_2+2) TWA (total)) ((250)/(%SiO_2+5) mppcf TWA (resp))

Manganese dioxide (1313-13-9)		
ACGIH	ACGIH TWA (mg/m³)	0.2 mg /m^3 (Mn)
OSHA	OSHA PEL (TWA) (mg/m³)	5 mg/m^3 (Mn)

Chromium oxide (Cr_2O_3) (1308-38-9)		
ACGIH	ACGIH TWA (mg/m³)	0.05 mg /m^3
OSHA	OSHA PEL (TWA) (mg/m³)	0.05 mg /m^3

8.2. Exposure controls

Appropriate engineering controls : Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapor, etc.) below recommended exposure limits.

Personal protective equipment : Avoid all unnecessary exposure.

Hand protection : Wear chemically resistant protective gloves.

Eye protection : Safety glasses with side shields or goggles are recommended for dust.

Skin and body protection : Wear suitable protective clothing.

Respiratory protection : A NIOSH approved dust mask or filtering facepiece is recommended in poorly ventilated areas or when permissible exposure limits may be exceeded. Respirators should be selected by and used under the direction of a trained health and safety professional following requirements found in OSHA's respirator standard (29 CFR 1910.134) and ANSI's standard for respiratory protection (Z88.2).

Environmental exposure controls : Maintain levels below Community environmental protection thresholds.

Other information : Do not eat, smoke or drink where material is handled, processed or stored. Wash hands carefully before eating or smoking. Handle according to established industrial hygiene and safety practices.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Solid

Appearance : Vitrified solid

Color : Various

Odor : Odorless

Odor threshold : No data available

pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	No data available
Relative evaporation rate (butylacetate=1)	:	No data available
Flammability (solid, gas)	:	Not flammable
Explosive limits	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Vapor pressure	:	No data available
Relative density	:	2.6
Relative vapor density at 20 °C	:	No data available
Solubility	:	Insoluble
Partition coefficient: n-octanol/water	:	No data available
Log Kow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No dangerous reaction known under conditions of normal use.

10.2. Chemical stability

Stable under normal storage conditions.

10.3. Possibility of hazardous reactions

No dangerous reaction known under conditions of normal use.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

None known.

10.6. Hazardous decomposition products

May include, and are not limited to: oxides of carbon.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified.

Interstate - Standard Brick Products	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rabbit	No data available
LC50 inhalation rat	> 5 mg/l/4h

Manganese dioxide (1313-13-9)	
LD50 oral rat	> 3478 mg/kg

Chromium oxide (Cr_2O_3) (1308-38-9)	
LD50 oral rat	>15000 mg/kg
LC50 inhalation rat	> 5.41 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.

Serious eye damage/irritation	:	Causes serious eye irritation.
Respiratory or skin sensitisation	:	May cause an allergic skin reaction.
Germ cell mutagenicity	:	Based on available data, the classification criteria are not met.
Carcinogenicity	:	May cause cancer.

Quartz (14808-60-7)	
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens

Chromium oxide (Cr_2O_3) (1308-38-9)	
IARC group	3 - Not classifiable

Reproductive toxicity	:	Based on available data, the classification criteria are not met.
Specific target organ toxicity (single exposure)	:	May cause respiratory irritation.
Specific target organ toxicity (repeated exposure)	:	Causes damage to organs through prolonged or repeated exposure. Respirable crystalline silica in the form of quartz or cristobalite from occupational sources is listed by the International Agency for Research on Cancer (IARC) and National Toxicology Program (NTP) as a lung carcinogen. Prolonged exposure to respirable crystalline silica has been known to cause silicosis, a lung disease, which may be disabling. While there may be a factor of individual susceptibility to a given exposure to respirable silica dust, the risk of contracting silicosis and the severity of the disease is clearly related to the amount of dust exposure and the length of time (usually years) of exposure.
Aspiration hazard	:	Based on available data, the classification criteria are not met.
Symptoms/injuries after inhalation	:	May cause respiratory irritation. May cause shortness of breath, tightness of the chest, a sore throat and cough. Repeated exposure to very high levels of repairable crystalline silica quartz can cause acute silicosis.
Symptoms/injuries after skin contact	:	Causes skin irritation. Symptoms may include redness, edema, drying, defatting and cracking of the skin. May cause an allergic skin reaction.
Symptoms/injuries after eye contact	:	Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.
Symptoms/injuries after ingestion	:	May be harmful if swallowed. May cause stomach distress, nausea or vomiting.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : May cause long-term adverse effects in the aquatic environment.

12.2. Persistence and degradability

Interstate - Standard Brick Products	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

Interstate - Standard Brick Products	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on the global warming : No known ecological damage caused by this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : This material must be disposed of in accordance with all local, state, provincial, and federal regulations. The generation of waste should be avoided or minimized wherever possible.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

Special transport precautions : Do not handle until all safety precautions have been read and understood.

SECTION 15: Regulatory information

15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

15.2. US State regulations

Interstate - Standard Brick Products	
State or local regulations	This product contains Crystalline Silica, Quartz and may also contain trace amounts of other chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

SECTION 16: Other information

Date of issue : 03/26/2015

Other information : None.

Disclaimer: We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind. The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for the user's own particular use.

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Centennial Village PUD
Southeast & Northeast Quadrant of the Calumet Avenue & 45th Avenue Intersection
Munster, Indiana

Traffic Impact Study
September 6, 2024

Prepared for:
Centennial Village
630 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

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Preparer Qualifications

"I certify that this TRAFFIC IMPACT STUDY has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering."

James Hus Jr., P.E., PTOE
Indiana Registration 11100293
PTOE #4205
DVG Team, Inc.



September 6, 2024

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1. Introduction and Summary

The purpose of this study is to assist the developers of the Centennial Village PUD (Planned Unit Development) and Town of Munster staff to evaluate the impacts of future traffic generated by the continuing build out of the PUD. The Centennial Village PUD is generally the area bounded by Calumet Avenue to the west, the CN Railroad to the North, what this report will refer to as S Centennial Drive to the south, and Clayhole Lake to the east.

See Exhibit 1 – Vicinity Map

The PUD is split by Centennial Drive creating a looped roadway **(See Exhibit 1)**, as well as 45th Avenue which was improved in 2021 as part of a major railroad grade separation project which has significantly improved traffic flow in the area. To the knowledge of the report preparer, there have been no significant traffic analyses performed on the surrounding roadway network pertaining to the construction of the PUD.

Surrounding Roadway Network

Calumet Avenue is a north-south arterial roadway with two through lanes in each direction. Its posted speed limit is 35 MPH. At the intersection with 45th Street, there are dual-left turn lanes and a southbound right turn lane. This intersection has an existing traffic signal.

45th Street is a east-west major collector roadway with two through lanes in each direction. Its posted speed limit is 45 MPH west of Calumet Avenue and 35 MPH east of Calumet Avenue. 45th Street runs beneath the CN railroad approximately 1,300 feet east of Calumet Avenue. At the intersection with Calumet Avenue, there are exclusive left turn lanes in each direction. Right turns are shared with the outside through lanes. At the intersection with N Centennial Drive, exclusive left and right turn lanes have been constructed.

Village Drive is a local street with a boulevard appearance, one lane in each direction, a center median, and parallel parking on both sides of the roadway in some sections. It intersects Calumet Avenue 450 feet south of 45th Street. At this location Calumet Avenue is separated by a raised concrete median causing Village Drive to function as a right-in, right-out driveway. Village drive has a speed limit of 25 MPH.

Centennial Drive is a local street with a boulevard appearance, one lane in each direction, a center median, and parallel parking on both sides of the roadway in some sections. It creates a loop within the PUD. It intersects 45th Avenue 500 feet east of Calumet Avenue and intersects Calumet Avenue 850 feet south of 45th Street. Various turn lanes are in place along Centennial Drive to allow access into individual areas of the PUD. Two roundabouts/traffic circles are constructed along Centennial Drive. The southern roundabout serves to provide access to the playground and bandshell area of Centennial Park. The intersection with 45th Avenue is unsignalized and unfinished, with no defined

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turn lanes approaching 45th Avenue. The intersection with Calumet Avenue is signalized, with single exclusive left turn, thru, and right turn lanes. The intersection of S Centennial Drive is existing and not modeled as a course of this study, but traffic on S Centennial Drive was observed to inform the findings of this study. Centennial Drive has a speed limit of 25 MPH.

The vertical profiles of all roadways described here are generally flat, with the exception of 45th Avenue as it passes beneath the CN railroad.

2. Proposed Development

The Centennial Village PUD encompasses most of the old Munster Steel property. Construction began in 2016 with its first hotel development coming online in late 2017. The purpose of the PUD is to provide the Town and its residents with "a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street". The PUD design standards and development plan have changed slightly as developments have been infilled, but it generally consists of 15 structures of varying sizes and uses, with accompanying parking and pedestrian areas.

See Exhibit 2 – Vicinity Map

For the purposes of this study, Buildings B through G **(See Exhibit 2)** can be considered complete and operational, and do not need to be calculated for future traffic generation. Uses and traffic generation for the unfinished buildings will be discussed later in this report.

3. Area Conditions

The western boundary to the PUD is commercial/office. The northern boundary is residential but buffered by the CN Railroad ROW and old 45th Avenue ROW. The eastern boundary is undeveloped/lake, and the southern boundary is recreational.

24-hour Turning Movement Data was collected at the intersections of Calumet Avenue and 45th Avenue, as well as 45th Avenue and N Centennial Drive. 24-hour roadway volume counts were collected at Village Drive east of Calumet Avenue and S Centennial Drive between the southern roundabout and the entrance to Springhill Suites.

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Non-Site 24-Hour Traffic Counts (May 2024)	
Calumet Avenue	*Through*
Total Traffic	33,100
Northbound	17,000
Southbound	16,100

North of 45th Avenue

Non-Site 24-Hour Traffic Counts (May 2024)	
Calumet Avenue	*Through*
Total Traffic	37,630
Northbound	18,870
Southbound	18,760

South of 45th Avenue

Non-Site 24-Hour Traffic Counts (May 2024)	
45th Avenue	*Through*
Total Traffic	20,750
Eastbound	11,800
Westbound	8,950

East of Calumet Avenue

Non-Site 24-Hour Traffic Counts (May 2024)	
45th Avenue	*Through*
Total Traffic	25,650
Eastbound	14,650
Westbound	11,000

West of Calumet Avenue

The INDOT Traffic Count Database System (TCDS) contains state-wide traffic data collection. Its last recording of Calumet Avenue observed 31,300 vehicles in 2018. Its last recording of 45th Avenue observed 18,150 vehicles east of Southwood Drive and 17,450 vehicles west of Calumet Avenue in 2018. It is fair to assume that the improvements to the Calumet Avenue and 45th Avenue intersection have increased the amount of motorists utilizing 45th Avenue for entry into Indiana from Illinois beyond natural population growth over the past 6 years.

See Exhibit 3 – Traffic Volume Exhibit

See Exhibit 4 – Existing AM & PM Peak Hour Volumes, Calumet Avenue & 45th Avenue

See Exhibit 5 – Existing AM & PM Peak Hour Volumes, 45th Avenue & N Centennial Drive

The intersections in their existing conditions with existing traffic are first analyzed. Existing lane configurations, storage lengths, and Peak Hour Factors were utilized. The traffic signal at Calumet Avenue & 45th Avenue was found to operate under standard phasing and a cycle length of 110 seconds. Both the phasing and cycle length were kept constant for this analysis.

Existing Level of Service (LOS) Summary Table

Intersection Name	*Existing Peak Hour LOS (Exhibit #)*	
	AM	*PM*
Calumet Ave at 45th Ave	D *(6A)*	E *(6B)*
45th Ave at N Centennial Dr (unsignalized)	B *(7A)*	E *(7B)*

Given the nearly full build out of the Town of Munster and few other known major developments, no initial adjustments were made to the existing conditions. For comparison with findings further in this report, the Calumet Avenue at 45th Avenue intersection operates at an average 62.6 seconds of control delay during its existing PM Peak Hour.

4. Projected Traffic

To assess the potential traffic impact due to the proposed development on the traffic flow of the surrounding streets and intersections, the future travel demand of the site and other future possible development was simulated. In the case of this development, likely tenants/uses are known to the Developer and outlined within the PUD documents to guide traffic projections.

The Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition was utilized as the source of estimated trips for the remaining land within the PUD. As mentioned previously, certain buildings within the PUD are complete and operational and are ignored for the purpose of traffic projections.

See Exhibit 8 – ITE Land Uses

The following tables outline the traffic generation by land use by building. The building letter designators can be followed by returned to **Exhibit 2**.

Building M – Quality Restaurant (4,240 GFA)
Land Use 931 Quality Restaurant
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	2	1	1
PM Peak Hour	Adjacent Street	33	22	11
AM Peak Hour	Generator	19	15	4
PM Peak Hour	Generator	35	21	14

Building I – General Office Building (>5,000 SF) (7,250 GFA)
Land Use 710 General Office Building
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	8	7	1
PM Peak Hour	Adjacent Street	8	1	7
AM Peak Hour	Generator	11	10	1
PM Peak Hour	Generator	10	2	8

Building N – Retail / Big Box (34,000 GFA)
Land Use 820 Shopping Center
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	32	20	12
PM Peak Hour	Adjacent Street	130	62	68
AM Peak Hour	Generator	N/A	N/A	N/A
PM Peak Hour	Generator	N/A	N/A	N/A

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Building L – Small Office Building (5,000 GFA)
Land Use 712 Small Office Building
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	10	8	2
PM Peak Hour	Adjacent Street	12	4	8
AM Peak Hour	Generator	16	10	6
PM Peak Hour	Generator	19	9	10

Buildings H, J, and K Residential COMBINED
Land Use 220 Multifamily Housing
Average Vehicle Trip Ends vs. Dwelling Units

108 Dwelling Units		*Forecasted Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	60	17	43
PM Peak Hour	Adjacent Street	72	42	30
AM Peak Hour	Generator	50	12	38
PM Peak Hour	Generator	60	38	22

Buildings H, J, and K Commercial/Retail 1st Floor COMBINED
Land Use 820 Shopping Center
Average Vehicle Trip Ends vs. per 1,000 SF GFA

61,041 SF (Total of 3 Buildings)		*Forecasted Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	57	35	22
PM Peak Hour	Adjacent Street	233	112	121
AM Peak Hour	Generator	N/A	N/A	N/A
PM Peak Hour	Generator	N/A	N/A	N/A

Building D Hotel/Conference (144 Rooms)
Land Use 310 Hotel
Average Vehicle Trip Ends vs. Rooms

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	68	40	28
PM Peak Hour	Adjacent Street	86	44	42
AM Peak Hour	Generator	N/A	N/A	N/A
PM Peak Hour	Generator	N/A	N/A	N/A

Building A Grocery Store (70,000 SF GFA)
Land Use 850 Supermarket
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	267	160	107
PM Peak Hour	Adjacent Street	647	330	317
AM Peak Hour	Generator	467	243	224
PM Peak Hour	Generator	532	277	255

Building A Potential Bank Outlot w/Drive In (2,400 SF GFA)
Land Use 912 Drive-In Bank
Average Vehicle Trip Ends vs. per 1,000 SF GFA

		Forecasted Trip Ends		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	24	14	10
PM Peak Hour	Adjacent Street	51	26	25
AM Peak Hour	Generator	37	20	17
PM Peak Hour	Generator	50	25	25

Traffic volumes vary considerably between Adjacent Street Peak Hour and Generator Peak Hour. The Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition displays varying rates depending on uses, as certain land uses experience their peak generation rates at different times from the adjacent roadway peak. As this traffic study is most interested in determining the impacts to the adjacent roadway and access points to it, a sound assumption is to utilize the adjacent street generation rates.

Additionally, this assumption is sound because of the multi-use nature of the development and the likelihood that individual building peaks will not coincide with other building peaks.

The highlighted volumes represent the traffic in and out of the development utilized for the study.

*Total Centennial Village**		*Forecasted Total Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	227	123	104
PM Peak Hour	Adjacent Street	562	283	279

*Excluding Building A Trips

Total Building A		*Forecasted Total Trip Ends*		
		Two Way	*IN*	*OUT*
AM Peak Hour	Adjacent Street	291	174	117
PM Peak Hour	Adjacent Street	698	355	343

Building A trips should be separated given the different access points available to Building A motorists

5. Analysis Methodology & Traffic Assignments

After trips are determined in the trip generation process described previously (Section 4), trip distribution was performed. Trip distribution is the process of determining the general direction that the site generated traffic is expected to travel to and from the development utilizing existing traffic patterns as a guide. Traffic assignment is the process of assigning traffic turning movements to the access points of the development and to the surrounding roadways/intersections.

The addition volume counts at Village Drive and "S" Centennial Drive shown in **Exhibit 3** inform the trip distribution process.

N Centennial Drive	IN	48%
N Centennial Drive	OUT	49%
Village Drive	IN	19%
Village Drive	OUT	17%
S Centennial Drive	IN	33%
S Centennial Drive	OUT	34%

As the data collected showed consistency between entrances and exits at each node, we can consolidate consistent assignments:

- N Centennial Drive – 48%
- Village Drive – 19%
- S Centennial Drive – 33%

Given the remaining buildings will span into areas both north and south of Village Drive but south of 45th Avenue, these assignment ratios are sound.

Building A motorists will utilize a newly constructed north leg at the intersection of 45th Avenue and N Centennial Drive, and a newly constructed driveway onto Calumet Avenue north of 45th Avenue. This driveway will function as a right-in, right-out driveway due to the presence of a raised concrete median on Calumet Avenue, similar to the south leg of the intersection mentioned previously in this study.

Building A area trips were distributed as follows:

- N Centennial Drive & 45th Avenue, new north leg – 70%
- New Calumet Avenue Driveway – 30%

During the traffic assignment process, trip reduced volumes are applied, if applicable. Pass-by trips, which are intermediate stops between an origin and a primary destination are also considered at this point in a study. Given this a multi-destination development, this should be considered. Given the complexity of the development, the number of access points, and the subjective nature of a multi-destination development, this study does not apply any pass-by trip reductions but omits adding the trips generated by the development to the greater roadway network. That is to say that the trips generated are only added to the turning movements into and out of the access points. To account for this omission, the baseline existing traffic shown in **Exhibit 3** was increased 5% throughout the network before adding development trips. This is a sound compromise given the Town of Munster is nearly 100% built out.

6. Level of Service Analysis

The Level of Service (LOS) is the classification of the quality of traffic flow at a given location. A breakdown of the various LOS conditions is given below:

LOS ‘A’ indicates free flow conditions

LOS ‘B’ indicates stable flow conditions

LOS ‘C’ indicates slight interruptions in flow

LOS ‘D’ indicates moderate interruptions in flow

LOS ‘E’ indicates unstable flow approaching capacity

LOS ‘F’ indicates a forced flow condition

Traffic engineering standards indicate a LOS of ‘D’ or better is acceptable. On some occasions, a LOS ‘E’ is considered acceptable. LOS ‘E’ becomes acceptable in high-volume suburban intersections where level of service improvements can only be achieved by major intersection improvements involving additional lanes and absorbing additional right of way.

The peak hours are defined as the heaviest traffic periods of the day. Traffic engineering standards dictate that the heaviest traffic periods of an average weekday shall be studied and the needs resulting from those analyses shall be considered sufficient for the rest of the time periods not analyzed.

The level of service was computed utilizing the recommended methodology of the Highway Capacity Manual (Sixth Edition, TRB 2016). Using the Synchro software, version 11, by Trafficware, the peak hour turn movement volumes for the full build condition were analyzed to determine their level of service at the following intersections:

- Calumet Avenue at 45th Avenue
  - No improvements considered. This intersection is modeled to observe changes.
- N Centennial Drive at 45th Avenue
  - Modeled as a signalized intersection utilizing already-constructed turn lanes

N Centennial Drive at 45th Avenue was modeled with the same cycle length as the Calumet intersection, which will be discussed later in this study.

The levels of service were then considered by approach and then by turn movement for each of the appropriate intersection movements to determine all traffic impacts.

7. Findings & Comments

The AM peak hour was found to be 10:30 – 11:30 AM. The PM peak hour was found to be 4:45 – 5:45 PM. This later AM peak hour is measurably greater than the normal AM commuting hours. Traffic is generally consistent from the AM peak hour as it rises slightly approaching the PM Peak hour.

See Exhibit 9 – AM Peak Hour Network Design Hourly Volumes, Full Build

See Exhibit 10 – PM Peak Hour Network Design Hourly Volumes, Full Build

Given that the AM Peak Hour is less defined than most signalized intersections and that the PM Peak Hour is demonstrably the more sever peak hour, the following results and discussion focus on the PM Peak Hour. The results of the level of service analysis and the exhibits containing the related details are tabulated below:

Proposed Level of Service (LOS) Summary Table – Full Build

Intersection Name	*Proposed PM Peak Hour (Exhibit #)*	
	LOS	*Average Control Delay*
Calumet Ave at 45th Ave (45th Avenue at N Centennial Drive Signalized)	E *(11)*	70.6 sec *(11)*
Calumet Ave at 45th Ave (45th Avenue at N Centennial Drive Roundabout – Calumet Avenue Optimized)	E *(12)*	73.7 sec *(12)*
Calumet Ave at 45th Ave (45th Avenue at N Centennial Drive Roundabout – Westbound Left Turn Optimized)	E *(13)*	79.2 sec *(13)*

Intersection Name	*Proposed PM Peak Hour (Exhibit #)*	
	LOS	*Average Control Delay*
45th Avenue at N Centennial Drive Signalized	C *(14)*	31.9 sec *(14)*
45th Avenue at N Centennial Drive Roundabout	C *(15)*	16.6 sec *(15)*

Desire for a roundabout at the intersection of N Centennial Drive and 45th Avenue has been discussed by the Town and Developer prior to the commission of this study. The information displayed is meant to inform the Town and Developer of the considerations which should be made while evaluating this option. The intersection of N Centennial Drive is located 510 feet east of Calumet Avenue. Section 46-1.06 of the Indiana Design Manual (IDM) states that "To operate efficiently, signalized intersections should be at least 1,300 feet apart". While commercial areas often have tighter signalized intersection spacing than 1,300 feet, extra care should be taken in the design of these intersections. As we know that 45th Avenue and N Centennial Drive will require additional intersection control measures than are in place today to continue operating with some efficiency, the same care should be taken in evaluating the potential for a roundabout.

Existing Conditions – PM Peak Hour

Referencing **Exhibit 6**, the 45th Avenue & Calumet Avenue intersection operates at a poor level of service presently. 50th Percentile Queues are contained within the available storage lanes. 95th Percentile Queues exceed storage distance for the westbound left turn movement. Queues frequently block entry into left turn lanes for eastbound and southbound traffic. The eastbound through movement volume exceeds the available capacity. All northbound movements and the westbound left turn movements operate at 90% or more of their capacity.

Dual Signalization

Referencing **Exhibit 11**, signalization of the N Centennial Drive intersection along with the traffic growth described earlier in this study demonstrates heightened levels of the scenario described in the existing condition. The eastbound through movement's volume is 12% greater than its available capacity. All northbound movements and the westbound left turn movement operate at 100% of their capacity. Precise calculation of expected queue lengths under this condition is not possible. Visual simulations of intersection performance confirm that queue spillover will consistently occur for the westbound left turn lane at Calumet Avenue back to the N Centennial Drive intersection, precluding some westbound traffic from proceeding through the N Centennial Drive intersection. Queue lengths for eastbound traffic will be excessive during the peak hour. Under extreme conditions, northbound Calumet Avenue traffic may back up to the intersection with Superior Avenue and prevent consistent travel through that intersection during that movement's green phase. This scenario assumes the three intersection traffic signals (N

Centennial/45th, Calumet/45th, and Calumet/Superior) are interconnected and coordinated for maximum efficiency.

N Centennial Drive Roundabout Conversion

Referencing **Exhibit 12**, consideration was given to the installation of a roundabout at the intersection of 45th Avenue and N Centennial Drive. Given that the need to coordinate with another 45th Avenue traffic signal is removed in this condition, certain movement's demand/capacity ratios are reduced, but generally all still function at or over their capacity similar to the condition described earlier. The westbound left turn movement at Calumet Avenue and 45th Avenue is of particular concern under this condition. The available storage of 285 feet is less than the 95th Percentile queue for this movement. This opens the potential for queued traffic to back up into the roundabout under extreme conditions. The overall level of service for Calumet Avenue & 45th Avenue is slightly less than a dual traffic signal, but otherwise similar. This scenario assumes that the traffic signal at Calumet Avenue & 45th Avenue is optimized to reduce overall delay.

N Centennial Drive Roundabout Conversion, Timing Adjustments

Referencing **Exhibit 13**, consideration was given to finding a scenario which could alleviate the concerns of queued traffic backing up into a roundabout at N Centennial Drive & 45th Avenue. The Calumet Avenue & 45th Avenue intersection is not maintained by INDOT, and the Town of Munster has control over the timing of this traffic signal.

By modifying the splits for the westbound left turn movement, timing can be adjusted such that the 95th Percentile queue reduces to approximately 215 feet. At this distance, the concerns raised under the first scenario would be eliminated. However, giving this deference to a minor movement will decrease the overall efficiency of the area's roadway network and cause northbound traffic to queue back through Superior Drive on a more consistent basis. Queueing for the eastbound through movement will increase substantially.

Exhibit 14 and **Exhibit 15** are included to show levels of service for N Centennial Drive & 45th Avenue under a signalized and roundabout condition. Both conditions operate adequately considering the primary focus of this study should be the affect these improvements and expansions have on the major roadway, Calumet Avenue.

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8. Conclusion

As clearly shown in this report (Exhibit 6), the intersection of Calumet Avenue and 45th Avenue operates at or over capacity at present. The additional traffic demand will further stress the network. When intersections operate beyond their capacity, modern modeling methods are unable to precisely determine the values needed to concretely evaluate the pros and cons of either intersection improvement type. It is this study's intent to inform both the Town and Developer of the different effects each intersection type will have on the roadway network in this section of the Town.

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Exhibit 1

Vicinity Map


Centennial Village
PUD Limits
Calumet
Ave
45th Ave
45th Ave
N Centennial Dr
Village Dr
"S" Centennial Dr
Hyatt Place Munster
Vision Boutique | Eye Doctor | Optometrist
Marathon Gas Station
Franciscan Physician Network Munster ...
Speedway
White Castle
Valvoline Instant Oil Ch
Franciscan Health Munster
Rosebud Steakhouse Centennial Village
El Salto Mexican
SpringHill Suites Chicago Southeast/Munster, IN
Centennial Park Playground
Centennial Park Amphitheater
Layous Medical Group
Franciscan Physician Network Family ...

Exhibit 2

PUD Layout


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
5,000 SF
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,188 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG D
8,400 SF
BLDG H
74,000 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
74,000 SF

Exhibit 3

Traffic Volume Data

1544 45th St - TMC Calumet Avenue & 45th Avenue

Thu May 30, 2024

Full Length (12 AM-12 AM (+1))

All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)

All Movements

ID: 1190987, Location: 41.539648, -87.509076

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg	Calumet Ave					45th St					Calumet Ave					45th St					
Direction	Southbound					Westbound					Northbound					Eastbound					
Time	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	Int
2024-05-30 12:00AM	7	22	4	0	**33**	3	5	3	0	**11**	3	19	9	0	**31**	3	12	8	0	**23**	**98**
12:15AM	4	10	0	0	**14**	5	6	1	0	**12**	1	18	2	0	**21**	2	2	7	0	**11**	**58**
12:30AM	4	11	4	0	**19**	2	1	2	0	**5**	2	8	2	0	**12**	3	3	4	0	**10**	**46**
12:45AM	0	14	0	0	**14**	0	4	2	0	**6**	1	11	4	0	**16**	1	3	5	0	**9**	**45**
Hourly Total	15	57	8	0	**80**	10	16	8	0	**34**	7	56	17	0	**80**	9	20	24	0	**53**	**247**
1:00AM	0	9	1	0	**10**	0	2	3	0	**5**	3	8	1	0	**12**	4	5	1	1	**11**	**38**
1:15AM	3	7	0	0	**10**	2	1	1	0	**4**	0	8	5	2	**15**	0	5	1	0	**6**	**35**
1:30AM	5	14	2	0	**21**	1	1	3	0	**5**	1	11	0	0	**12**	2	4	6	0	**12**	**50**
1:45AM	1	5	0	0	**6**	2	0	0	0	**2**	0	12	0	0	**12**	2	3	3	0	**8**	**28**
Hourly Total	9	35	3	0	**47**	5	4	7	0	**16**	4	39	6	2	**51**	8	17	11	1	**37**	**151**
2:00AM	1	8	3	0	**12**	0	2	1	0	**3**	0	7	1	0	**8**	1	3	5	0	**9**	**32**
2:15AM	2	9	1	0	**12**	2	0	1	0	**3**	3	6	1	0	**10**	2	2	2	0	**6**	**31**
2:30AM	2	10	1	0	**13**	4	3	0	0	**7**	2	7	0	0	**9**	0	6	6	0	**12**	**41**
2:45AM	2	8	0	0	**10**	1	0	1	0	**2**	0	10	5	1	**16**	1	2	1	0	**4**	**32**
Hourly Total	7	35	5	0	**47**	7	5	3	0	**15**	5	30	7	1	**43**	4	13	14	0	**31**	**136**
3:00AM	4	13	0	0	**17**	2	3	1	0	**6**	0	10	1	0	**11**	2	1	5	1	**9**	**43**
3:15AM	0	6	0	0	**6**	0	3	1	0	**4**	1	8	0	0	**9**	2	2	9	0	**13**	**32**
3:30AM	3	14	0	0	**17**	4	4	1	0	**9**	2	14	3	0	**19**	2	2	4	1	**9**	**54**
3:45AM	8	9	0	0	**17**	5	6	1	0	**12**	3	21	1	0	**25**	2	1	7	0	**10**	**64**
Hourly Total	15	42	0	0	**57**	11	16	4	0	**31**	6	53	5	0	**64**	8	6	25	2	**41**	**193**
4:00AM	12	4	2	0	**18**	2	8	3	0	**13**	1	31	3	0	**35**	5	4	2	0	**11**	**77**
4:15AM	21	16	0	0	**37**	7	9	7	0	**23**	3	30	8	0	**41**	2	2	7	0	**11**	**112**
4:30AM	7	30	0	0	**37**	3	8	6	0	**17**	1	34	5	1	**41**	3	1	8	0	**12**	**107**
4:45AM	8	41	2	0	**51**	13	11	13	0	**37**	2	66	9	0	**77**	11	6	11	0	**28**	**193**
Hourly Total	48	91	4	0	**143**	25	36	29	0	**90**	7	161	25	1	**194**	21	13	28	0	**62**	**489**
5:00AM	9	29	2	0	**40**	11	11	8	0	**30**	3	80	14	0	**97**	6	8	10	0	**24**	**191**
5:15AM	13	46	2	0	**61**	17	17	9	0	**43**	3	81	14	0	**98**	10	5	10	0	**25**	**227**
5:30AM	10	51	7	0	**68**	15	22	12	0	**49**	4	116	15	0	**135**	15	15	16	1	**47**	**299**
5:45AM	36	49	10	0	**95**	14	32	19	1	**66**	9	113	28	0	**150**	23	21	16	0	**60**	**371**
Hourly Total	68	175	21	0	**264**	57	82	48	1	**188**	19	390	71	0	**480**	54	49	52	1	**156**	**1088**
6:00AM	18	90	10	0	**118**	25	26	16	0	**67**	13	136	32	0	**181**	27	14	24	0	**65**	**431**
6:15AM	27	92	5	0	**124**	23	48	27	0	**98**	11	162	37	0	**210**	13	22	21	0	**56**	**488**
6:30AM	30	128	18	0	**176**	23	49	25	0	**97**	13	180	37	0	**230**	45	32	42	0	**119**	**622**
6:45AM	45	125	13	0	**183**	30	58	32	0	**120**	23	187	59	0	**269**	34	32	29	0	**95**	**667**
Hourly Total	120	435	46	0	**601**	101	181	100	0	**382**	60	665	165	0	**890**	119	100	116	0	**335**	**2208**
7:00AM	38	137	18	0	**193**	25	49	37	0	**111**	22	163	53	0	**238**	30	27	23	0	**80**	**622**
7:15AM	36	137	12	0	**185**	20	76	36	0	**132**	15	221	46	0	**282**	57	43	27	0	**127**	**726**
7:30AM	54	159	21	0	**234**	28	64	54	0	**146**	25	185	71	1	**282**	60	49	36	1	**146**	**808**
7:45AM	41	177	24	0	**242**	38	84	59	0	**181**	32	186	84	0	**302**	60	80	34	0	**174**	**899**
Hourly Total	169	610	75	0	**854**	111	273	186	0	**570**	94	755	254	1	**1104**	207	199	120	1	**527**	**3055**
8:00AM	44	152	25	0	**221**	25	57	50	0	**132**	39	180	62	0	**281**	25	24	34	0	**83**	**717**
8:15AM	38	147	39	0	**224**	36	69	53	0	**158**	43	182	43	0	**268**	66	75	49	0	**190**	**840**
8:30AM	35	166	21	0	**222**	32	52	50	0	**134**	45	164	42	0	**251**	67	52	40	0	**159**	**766**
8:45AM	30	173	38	0	**241**	25	76	52	0	**153**	38	189	50	0	**277**	62	71	41	0	**174**	**845**
Hourly Total	147	638	123	0	**908**	118	254	205	0	**577**	165	715	197	0	**1077**	220	222	164	0	**606**	**3168**
9:00AM	31	156	39	0	**226**	29	65	44	0	**138**	30	135	47	0	**212**	48	85	43	0	**176**	**752**
9:15AM	32	163	35	0	**230**	25	57	47	0	**129**	42	193	55	1	**291**	81	80	47	1	**209**	**859**
9:30AM	27	169	45	0	**241**	19	43	42	1	**105**	38	154	64	0	**256**	66	81	41	1	**189**	**791**
9:45AM	31	161	35	0	**227**	24	33	53	0	**110**	45	168	68	0	**281**	76	85	37	0	**198**	**816**
Hourly Total	121	649	154	0	**924**	97	198	186	1	**482**	155	650	234	1	**1040**	271	331	168	2	**772**	**3218**
10:00AM	27	166	39	2	**234**	25	47	40	0	**112**	25	165	43	0	**233**	88	77	55	0	**220**	**799**
10:15AM	37	184	35	0	**256**	31	47	43	0	**121**	31	166	63	0	**260**	75	92	67	0	**234**	**871**
10:30AM	20	185	37	0	**242**	33	56	43	0	**132**	57	182	63	0	**302**	87	87	51	0	**225**	**901**

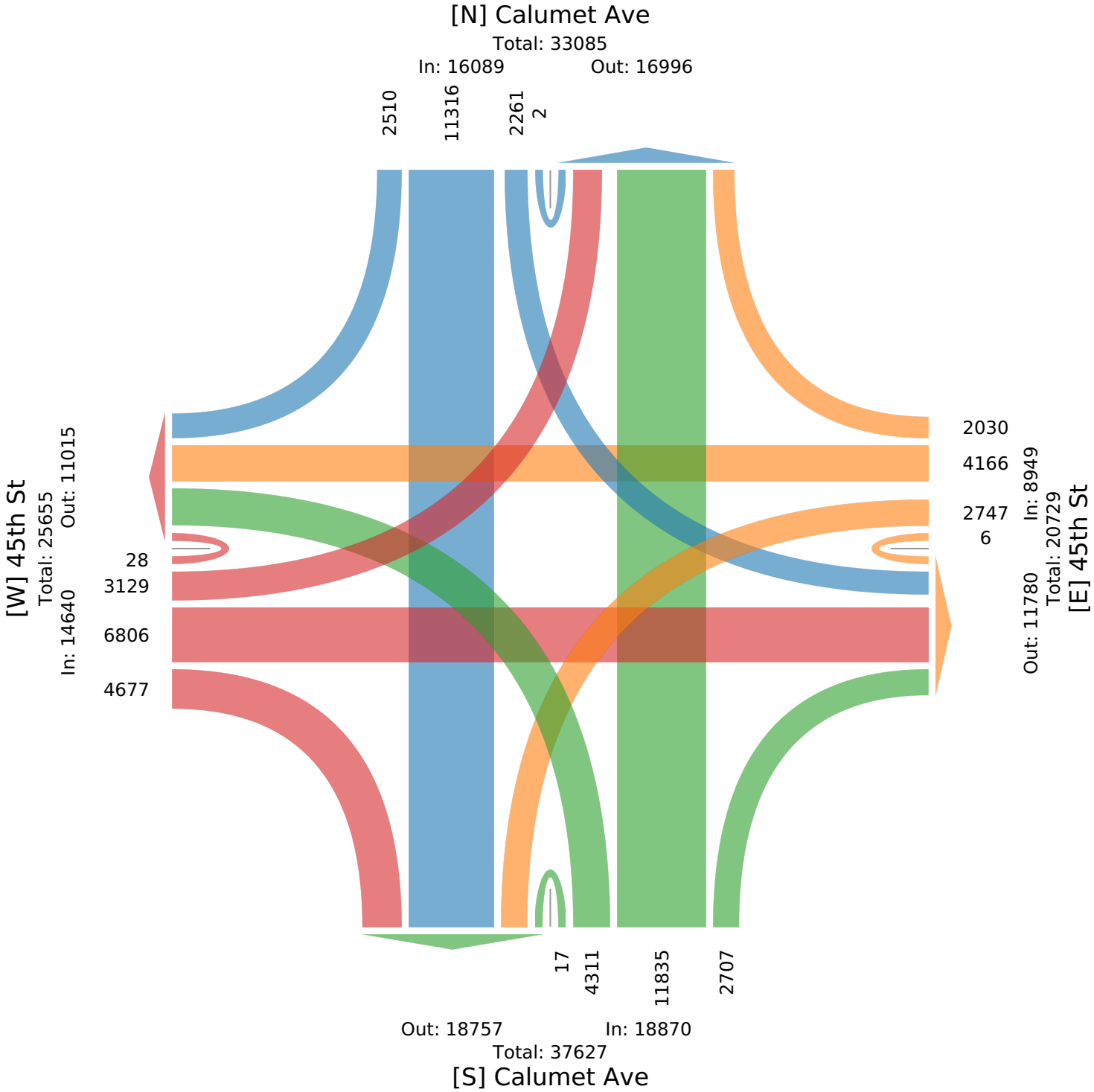
Leg	Calumet Ave					45th St					Calumet Ave					45th St					
Direction	Southbound					Westbound					Northbound					Eastbound					
Time	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	R	T	L	U	App	Int
10:45AM	38	143	27	0	**208**	35	49	53	0	**137**	41	213	64	0	**318**	76	92	58	1	**227**	**890**
Hourly Total	122	678	138	2	**940**	124	199	179	0	**502**	154	726	233	0	**1113**	326	348	231	1	**906**	**3461**
11:00AM	41	151	21	0	**213**	26	52	51	0	**129**	53	166	57	0	**276**	75	105	38	0	**218**	**836**
11:15AM	35	169	56	0	**260**	36	39	46	1	**122**	61	145	77	0	**283**	94	86	65	0	**245**	**910**
11:30AM	37	176	51	0	**264**	29	59	41	0	**129**	46	151	66	0	**263**	66	106	56	0	**228**	**884**
11:45AM	47	173	31	0	**251**	35	53	51	0	**139**	43	190	78	0	**311**	82	108	60	0	**250**	**951**
Hourly Total	160	669	159	0	**988**	126	203	189	1	**519**	203	652	278	0	**1133**	317	405	219	0	**941**	**3581**
12:00PM	43	164	38	0	**245**	50	65	47	0	**162**	45	184	88	0	**317**	106	127	60	0	**293**	**1017**
12:15PM	47	208	54	0	**309**	37	36	33	0	**106**	56	190	76	0	**322**	82	131	43	1	**257**	**994**
12:30PM	45	182	56	0	**283**	50	56	36	0	**142**	53	200	76	1	**330**	97	148	45	0	**290**	**1045**
12:45PM	37	185	40	0	**262**	36	52	58	0	**146**	33	187	68	0	**288**	97	119	76	0	**292**	**988**
Hourly Total	172	739	188	0	**1099**	173	209	174	0	**556**	187	761	308	1	**1257**	382	525	224	1	**1132**	**4044**
1:00PM	34	194	35	0	**263**	36	64	42	0	**142**	44	195	69	0	**308**	102	136	78	0	**316**	**1029**
1:15PM	45	172	33	0	**250**	30	70	49	0	**149**	50	183	86	3	**322**	78	160	68	0	**306**	**1027**
1:30PM	26	200	56	0	**282**	36	58	46	0	**140**	41	201	75	2	**319**	92	130	69	0	**291**	**1032**
1:45PM	38	198	49	0	**285**	28	66	53	0	**147**	42	247	68	0	**357**	50	91	53	0	**194**	**983**
Hourly Total	143	764	173	0	**1080**	130	258	190	0	**578**	177	826	298	5	**1306**	322	517	268	0	**1107**	**4071**
2:00PM	36	178	28	0	**242**	37	75	48	0	**160**	51	184	76	0	**311**	69	110	62	0	**241**	**954**
2:15PM	25	123	26	0	**174**	24	73	53	2	**152**	47	101	62	0	**210**	105	140	43	0	**288**	**824**
2:30PM	44	172	35	0	**251**	46	80	49	0	**175**	40	152	82	0	**274**	93	128	55	0	**276**	**976**
2:45PM	44	247	42	0	**333**	25	80	54	0	**159**	50	188	81	0	**319**	105	123	39	1	**268**	**1079**
Hourly Total	149	720	131	0	**1000**	132	308	204	2	**646**	188	625	301	0	**1114**	372	501	199	1	**1073**	**3833**
3:00PM	39	231	37	0	**307**	32	76	37	0	**145**	55	198	82	0	**335**	89	142	49	0	**280**	**1067**
3:15PM	37	220	41	0	**298**	23	70	45	0	**138**	63	189	58	0	**310**	109	165	50	1	**325**	**1071**
3:30PM	34	201	41	0	**276**	31	76	52	0	**159**	57	185	79	0	**321**	91	155	56	1	**303**	**1059**
3:45PM	41	237	36	0	**314**	29	83	49	0	**161**	60	202	66	1	**329**	115	179	44	0	**338**	**1142**
Hourly Total	151	889	155	0	**1195**	115	305	183	0	**603**	235	774	285	1	**1295**	404	641	199	2	**1246**	**4339**
4:00PM	45	251	52	0	**348**	28	74	50	0	**152**	75	181	82	0	**338**	103	176	62	0	**341**	**1179**
4:15PM	26	196	43	0	**265**	31	75	53	0	**159**	44	211	73	0	**328**	80	156	48	0	**284**	**1036**
4:30PM	27	183	40	0	**250**	26	78	52	0	**156**	76	207	64	0	**347**	81	177	48	0	**306**	**1059**
4:45PM	38	176	19	0	**233**	46	82	58	0	**186**	63	217	74	0	**354**	91	170	49	1	**311**	**1084**
Hourly Total	136	806	154	0	**1096**	131	309	213	0	**653**	258	816	293	0	**1367**	355	679	207	1	**1242**	**4358**
5:00PM	31	236	57	0	**324**	29	91	51	0	**171**	51	201	63	0	**315**	91	168	66	0	**325**	**1135**
5:15PM	35	259	52	0	**346**	38	87	57	0	**182**	63	248	77	0	**388**	76	134	33	0	**243**	**1159**
5:30PM	39	199	50	0	**288**	34	92	51	0	**177**	40	204	89	0	**333**	71	180	47	0	**298**	**1096**
5:45PM	44	204	43	0	**291**	33	65	44	0	**142**	49	168	64	0	**281**	113	161	67	0	**341**	**1055**
Hourly Total	149	898	202	0	**1249**	134	335	203	0	**672**	203	821	293	0	**1317**	351	643	213	0	**1207**	**4445**
6:00PM	52	175	41	0	**268**	45	65	38	0	**148**	65	187	64	0	**316**	81	138	59	0	**278**	**1010**
6:15PM	32	170	40	0	**242**	39	43	46	0	**128**	39	193	76	1	**309**	85	159	77	0	**321**	**1000**
6:30PM	38	170	31	0	**239**	24	88	32	0	**144**	31	211	63	0	**305**	73	141	51	0	**265**	**953**
6:45PM	34	149	33	0	**216**	27	39	30	0	**96**	41	122	80	0	**243**	83	131	42	1	**257**	**812**
Hourly Total	156	664	145	0	**965**	135	235	146	0	**516**	176	713	283	1	**1173**	322	569	229	1	**1121**	**3775**
7:00PM	26	163	36	0	**225**	22	55	28	0	**105**	50	153	45	0	**248**	63	112	40	0	**215**	**793**
7:15PM	29	125	27	0	**181**	19	64	23	0	**106**	35	138	53	0	**226**	62	101	36	0	**199**	**712**
7:30PM	31	132	31	0	**194**	26	44	18	1	**89**	35	149	47	0	**231**	55	86	37	0	**178**	**692**
7:45PM	36	113	26	0	**175**	23	53	23	0	**99**	40	116	71	0	**227**	60	95	31	1	**187**	**688**
Hourly Total	122	533	120	0	**775**	90	216	92	1	**399**	160	556	216	0	**932**	240	394	144	1	**779**	**2885**
8:00PM	33	98	21	0	**152**	12	44	28	0	**84**	43	120	51	0	**214**	44	100	26	2	**172**	**622**
8:15PM	30	112	26	0	**168**	22	42	22	0	**86**	25	123	52	0	**200**	49	98	38	0	**185**	**639**
8:30PM	38	136	36	0	**210**	25	42	16	0	**83**	25	103	37	0	**165**	41	88	27	1	**157**	**615**
8:45PM	45	112	26	0	**183**	26	52	14	0	**92**	11	97	56	0	**164**	42	63	30	0	**135**	**574**
Hourly Total	146	458	109	0	**713**	85	180	80	0	**345**	104	443	196	0	**743**	176	349	121	3	**649**	**2450**
9:00PM	18	102	27	0	**147**	14	59	19	0	**92**	23	70	51	0	**144**	24	45	23	1	**93**	**476**
9:15PM	28	111	28	0	**167**	13	48	15	0	**76**	22	70	34	0	**126**	37	40	20	1	**98**	**467**
9:30PM	26	92	26	0	**144**	13	25	19	0	**57**	20	62	37	0	**119**	21	32	10	0	**63**	**383**
9:45PM	17	69	11	0	**97**	10	33	7	0	**50**	8	72	45	0	**125**	17	17	6	2	**42**	**314**
Hourly Total	89	374	92	0	**555**	50	165	60	0	**275**	73	274	167	0	**514**	99	134	59	4	**296**	**1640**
10:00PM	20	54	10	0	**84**	8	27	14	0	**49**	13	80	44	0	**137**	20	25	14	0	**59**	**329**
10:15PM	8	47	10	0	**65**	8	38	11	0	**57**	14	71	36	0	**121**	23	22	16	1	**62**	**305**
10:30PM	12	48	7	0	**67**	7	33	5	0	**45**	9	64	31	1	**105**	10	11	11	3	**35**	**252**

Leg	Calumet Ave					45th St					Calumet Ave					45th St					
Direction	Southbound					Westbound					Northbound					Eastbound					
Time	R	T	L	U	**App**	R	T	L	U	**App**	R	T	L	U	**App**	R	T	L	U	**App**	**Int**
10:45PM	14	50	6	0	**70**	20	18	10	0	**48**	7	27	19	0	**53**	11	16	14	0	**41**	**212**
Hourly Total	54	199	33	0	**286**	43	116	40	0	**199**	43	242	130	1	**416**	64	74	55	4	**197**	**1098**
11:00PM	13	48	5	0	**66**	9	18	5	0	**32**	5	33	14	1	**53**	11	13	8	1	**33**	**184**
11:15PM	11	46	5	0	**62**	3	19	6	0	**28**	7	21	19	1	**48**	7	18	16	0	**41**	**179**
11:30PM	13	37	7	0	**57**	7	17	4	0	**28**	7	20	9	0	**36**	3	16	8	1	**28**	**149**
11:45PM	5	27	6	0	**38**	1	9	3	0	**13**	5	18	7	0	**30**	5	10	7	0	**22**	**103**
Hourly Total	42	158	23	0	**223**	20	63	18	0	**101**	24	92	49	2	**167**	26	57	39	2	**124**	**615**
Total	2510	11316	2261	2	**16089**	2030	4166	2747	6	**8949**	2707	11835	4311	17	**18870**	4677	6806	3129	28	**14640**	**58548**
% Approach	15.6%	70.3%	14.1%	0%	**-**	22.7%	46.6%	30.7%	0.1%	**-**	14.3%	62.7%	22.8%	0.1%	**-**	31.9%	46.5%	21.4%	0.2%	**-**	-
% Total	4.3%	19.3%	3.9%	0%	**27.5%**	3.5%	7.1%	4.7%	0%	**15.3%**	4.6%	20.2%	7.4%	0%	**32.2%**	8.0%	11.6%	5.3%	0%	**25.0%**	-
Motorcycles	4	14	2	0	**20**	5	10	4	0	**19**	3	11	7	0	**21**	5	16	6	0	**27**	87
% Motorcycles	0.2%	0.1%	0.1%	0%	**0.1%**	0.2%	0.2%	0.1%	0%	**0.2%**	0.1%	0.1%	0.2%	0%	**0.1%**	0.1%	0.2%	0.2%	0%	**0.2%**	0.1%
Lights	2363	10881	2205	2	**15451**	1989	4069	2693	6	**8757**	2629	11387	4147	17	**18180**	4487	6610	2920	28	**14045**	56433
% Lights	94.1%	96.2%	97.5%	100%	**96.0%**	98.0%	97.7%	98.0%	100%	**97.9%**	97.1%	96.2%	96.2%	100%	**96.3%**	95.9%	97.1%	93.3%	100%	**95.9%**	96.4%
Single-Unit Trucks	63	185	34	0	**282**	24	75	37	0	**136**	61	191	93	0	**345**	108	128	78	0	**314**	1077
% Single-Unit Trucks	2.5%	1.6%	1.5%	0%	**1.8%**	1.2%	1.8%	1.3%	0%	**1.5%**	2.3%	1.6%	2.2%	0%	**1.8%**	2.3%	1.9%	2.5%	0%	**2.1%**	1.8%
Articulated Trucks	79	231	17	0	**327**	10	10	11	0	**31**	11	231	64	0	**306**	77	49	123	0	**249**	913
% Articulated Trucks	3.1%	2.0%	0.8%	0%	**2.0%**	0.5%	0.2%	0.4%	0%	**0.3%**	0.4%	2.0%	1.5%	0%	**1.6%**	1.6%	0.7%	3.9%	0%	**1.7%**	1.6%
Buses	1	5	3	0	**9**	2	2	2	0	**6**	3	15	0	0	**18**	0	3	2	0	**5**	38
% Buses	0%	0%	0.1%	0%	**0.1%**	0.1%	0%	0.1%	0%	**0.1%**	0.1%	0.1%	0%	0%	**0.1%**	0%	0%	0.1%	0%	**0%**	0.1%

*L: Left, R: Right, T: Thru, U: U-Turn

1544 45th St - TMC
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)
All Movements
ID: 1190987, Location: 41.539648, -87.509076

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



9600 N Centennial Dr - TMC 45th Avenue & N Centennial Drive
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)
All Movements
ID: 1190988, Location: 41.539679, -87.50715

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	45th Ave Westbound				Centennial Dr Northbound				45th Ave Eastbound				
Time	T	L	U	App	R	L	U	App	R	T	U	App	Int
2024-05-30 12:00AM	12	0	0	**12**	1	0	0	**1**	0	17	0	**17**	**30**
12:15AM	12	1	0	**13**	0	0	0	**0**	0	4	0	**4**	**17**
12:30AM	5	0	0	**5**	0	0	0	**0**	0	9	0	**9**	**14**
12:45AM	7	0	0	**7**	0	0	0	**0**	0	3	0	**3**	**10**
Hourly Total	36	1	0	**37**	1	0	0	**1**	0	33	0	**33**	**71**
1:00AM	4	0	0	**4**	0	0	0	**0**	0	10	0	**10**	**14**
1:15AM	4	0	0	**4**	1	0	0	**1**	1	3	0	**4**	**9**
1:30AM	5	0	0	**5**	1	0	0	**1**	0	10	0	**10**	**16**
1:45AM	2	0	0	**2**	0	0	0	**0**	0	3	0	**3**	**5**
Hourly Total	15	0	0	**15**	2	0	0	**2**	1	26	0	**27**	**44**
2:00AM	3	0	0	**3**	0	0	0	**0**	0	6	0	**6**	**9**
2:15AM	3	0	0	**3**	0	0	0	**0**	0	6	0	**6**	**9**
2:30AM	7	0	0	**7**	1	0	0	**1**	0	10	0	**10**	**18**
2:45AM	2	0	0	**2**	0	0	0	**0**	0	2	0	**2**	**4**
Hourly Total	15	0	0	**15**	1	0	0	**1**	0	24	0	**24**	**40**
3:00AM	7	0	0	**7**	0	0	0	**0**	0	1	0	**1**	**8**
3:15AM	4	0	0	**4**	0	0	0	**0**	0	3	0	**3**	**7**
3:30AM	9	0	0	**9**	0	0	0	**0**	0	4	0	**4**	**13**
3:45AM	12	1	0	**13**	0	1	0	**1**	0	4	0	**4**	**18**
Hourly Total	32	1	0	**33**	0	1	0	**1**	0	12	0	**12**	**46**
4:00AM	9	0	0	**9**	0	1	0	**1**	0	6	0	**6**	**16**
4:15AM	18	0	0	**18**	0	0	0	**0**	0	6	0	**6**	**24**
4:30AM	15	0	0	**15**	0	0	0	**0**	0	2	0	**2**	**17**
4:45AM	33	0	0	**33**	0	0	0	**0**	2	8	0	**10**	**43**
Hourly Total	75	0	0	**75**	0	1	0	**1**	2	22	0	**24**	**100**
5:00AM	28	0	0	**28**	0	2	0	**2**	0	13	0	**13**	**43**
5:15AM	44	0	0	**44**	0	0	0	**0**	0	9	0	**9**	**53**
5:30AM	44	0	0	**44**	0	2	0	**2**	3	23	0	**26**	**72**
5:45AM	65	1	0	**66**	0	0	0	**0**	4	38	0	**42**	**108**
Hourly Total	181	1	0	**182**	0	4	0	**4**	7	83	0	**90**	**276**
6:00AM	64	1	0	**65**	1	3	0	**4**	0	37	0	**37**	**106**
6:15AM	98	2	0	**100**	2	2	0	**4**	0	35	0	**35**	**139**
6:30AM	103	3	0	**106**	1	2	0	**3**	0	50	0	**50**	**159**
6:45AM	119	3	0	**122**	4	4	0	**8**	1	69	0	**70**	**200**
Hourly Total	384	9	0	**393**	8	11	0	**19**	1	191	0	**192**	**604**
7:00AM	106	5	0	**111**	16	2	0	**18**	0	68	0	**68**	**197**
7:15AM	132	5	0	**137**	3	2	0	**5**	2	62	0	**64**	**206**
7:30AM	155	7	1	**163**	4	1	0	**5**	0	96	0	**96**	**264**
7:45AM	178	4	1	**183**	4	4	0	**8**	1	123	0	**124**	**315**
Hourly Total	571	21	2	**594**	27	9	0	**36**	3	349	0	**352**	**982**
8:00AM	145	9	0	**154**	5	1	0	**6**	0	102	0	**102**	**262**
8:15AM	151	9	0	**160**	2	2	0	**4**	1	155	0	**156**	**320**
8:30AM	139	5	0	**144**	3	2	0	**5**	0	127	0	**127**	**276**
8:45AM	148	12	0	**160**	7	2	0	**9**	0	166	0	**166**	**335**
Hourly Total	583	35	0	**618**	17	7	0	**24**	1	550	0	**551**	**1193**
9:00AM	132	2	0	**134**	7	3	0	**10**	4	153	0	**157**	**301**
9:15AM	127	5	0	**132**	4	4	0	**8**	4	150	0	**154**	**294**
9:30AM	100	4	0	**104**	7	2	0	**9**	4	157	0	**161**	**274**
9:45AM	110	2	0	**112**	7	1	0	**8**	3	159	0	**162**	**282**
Hourly Total	469	13	0	**482**	25	10	0	**35**	15	619	0	**634**	**1151**
10:00AM	113	10	0	**123**	7	1	0	**8**	2	131	1	**134**	**265**
10:15AM	111	9	0	**120**	8	4	0	**12**	5	163	0	**168**	**300**
10:30AM	132	4	0	**136**	10	2	0	**12**	2	176	0	**178**	**326**

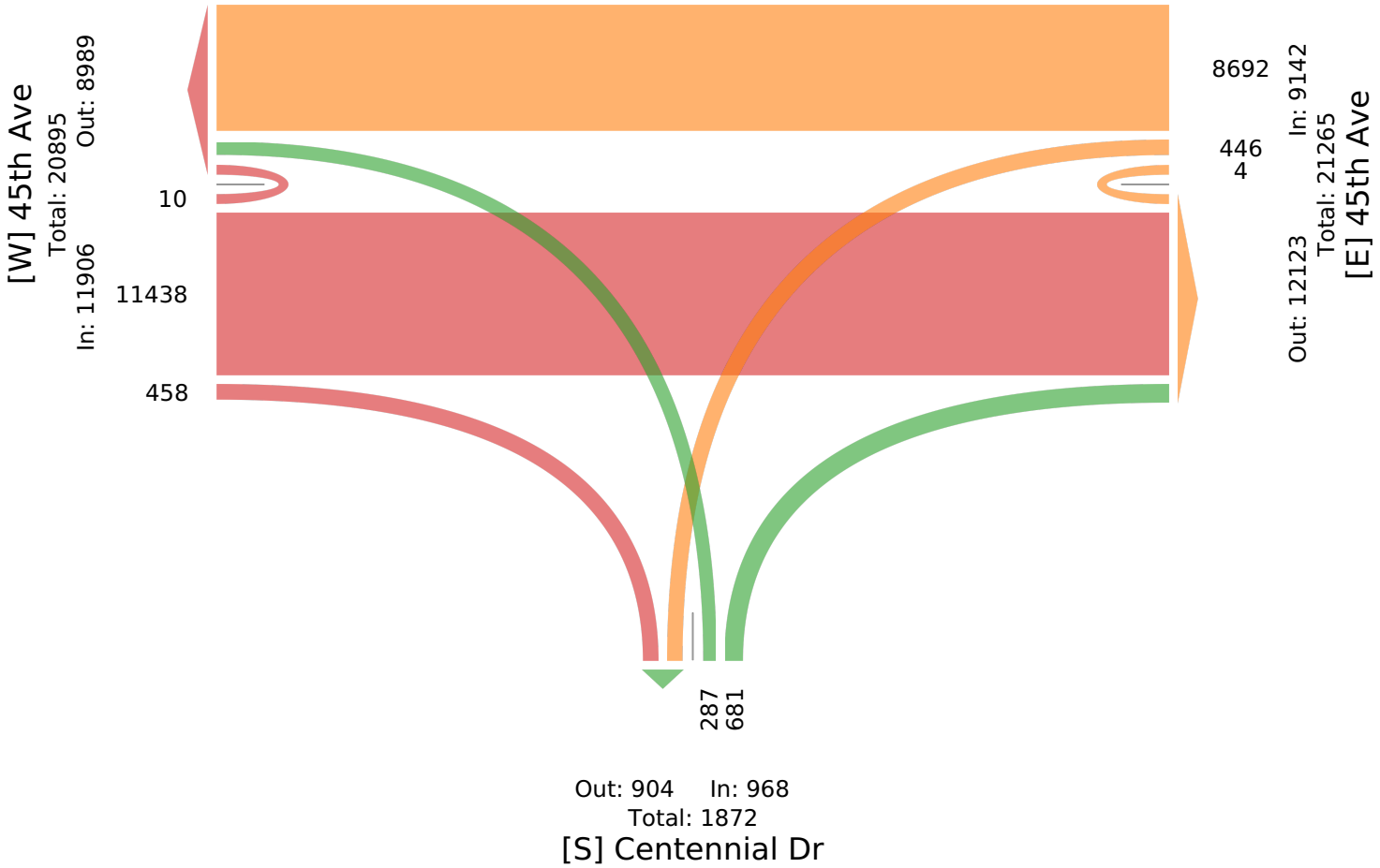
Leg	45th Ave				Centennial Dr				45th Ave				
Direction	Westbound				Northbound				Eastbound				
Time	T	L	U	**App**	R	L	U	**App**	R	T	U	**App**	**Int**
10:45AM	138	7	0	**145**	4	3	0	**7**	5	149	0	**154**	**306**
Hourly Total	494	30	0	**524**	29	10	0	**39**	14	619	1	**634**	**1197**
11:00AM	128	6	0	**134**	11	1	0	**12**	9	171	1	**181**	**327**
11:15AM	124	6	0	**130**	10	1	0	**11**	12	196	0	**208**	**349**
11:30AM	128	8	0	**136**	11	2	0	**13**	10	184	0	**194**	**343**
11:45AM	133	6	0	**139**	13	4	0	**17**	5	187	0	**192**	**348**
Hourly Total	513	26	0	**539**	45	8	0	**53**	36	738	1	**775**	**1367**
12:00PM	163	11	0	**174**	18	5	0	**23**	14	206	0	**220**	**417**
12:15PM	103	8	0	**111**	11	7	0	**18**	8	231	1	**240**	**369**
12:30PM	142	8	0	**150**	12	10	0	**22**	16	244	0	**260**	**432**
12:45PM	134	6	0	**140**	9	5	0	**14**	13	178	0	**191**	**345**
Hourly Total	542	33	0	**575**	50	27	0	**77**	51	859	1	**911**	**1563**
1:00PM	131	8	0	**139**	7	8	0	**15**	9	202	0	**211**	**365**
1:15PM	147	9	0	**156**	8	2	0	**10**	7	249	0	**256**	**422**
1:30PM	138	5	0	**143**	12	3	0	**15**	17	210	0	**227**	**385**
1:45PM	154	7	0	**161**	14	4	0	**18**	3	186	0	**189**	**368**
Hourly Total	570	29	0	**599**	41	17	0	**58**	36	847	0	**883**	**1540**
2:00PM	139	9	0	**148**	17	3	0	**20**	5	186	1	**192**	**360**
2:15PM	140	13	1	**154**	19	7	0	**26**	5	206	0	**211**	**391**
2:30PM	174	11	0	**185**	29	5	0	**34**	8	205	2	**215**	**434**
2:45PM	155	7	0	**162**	12	7	0	**19**	11	208	0	**219**	**400**
Hourly Total	608	40	1	**649**	77	22	0	**99**	29	805	3	**837**	**1585**
3:00PM	144	7	0	**151**	12	3	0	**15**	6	235	0	**241**	**407**
3:15PM	140	8	0	**148**	10	4	0	**14**	12	259	0	**271**	**433**
3:30PM	150	9	0	**159**	19	5	0	**24**	3	252	0	**255**	**438**
3:45PM	145	11	0	**156**	18	3	0	**21**	10	261	0	**271**	**448**
Hourly Total	579	35	0	**614**	59	15	0	**74**	31	1007	0	**1038**	**1726**
4:00PM	159	17	0	**176**	19	5	0	**24**	13	297	1	**311**	**511**
4:15PM	147	19	0	**166**	10	3	0	**13**	10	234	1	**245**	**424**
4:30PM	163	11	0	**174**	16	3	0	**19**	11	286	0	**297**	**490**
4:45PM	167	7	0	**174**	31	4	0	**35**	5	253	0	**258**	**467**
Hourly Total	636	54	0	**690**	76	15	0	**91**	39	1070	2	**1111**	**1892**
5:00PM	171	11	0	**182**	14	7	0	**21**	15	263	1	**279**	**482**
5:15PM	174	14	0	**188**	17	1	0	**18**	12	242	0	**254**	**460**
5:30PM	178	13	0	**191**	15	4	0	**19**	15	262	0	**277**	**487**
5:45PM	138	8	1	**147**	8	1	0	**9**	5	242	0	**247**	**403**
Hourly Total	661	46	1	**708**	54	13	0	**67**	47	1009	1	**1057**	**1832**
6:00PM	147	8	0	**155**	10	7	0	**17**	12	236	0	**248**	**420**
6:15PM	123	9	0	**132**	8	4	0	**12**	11	226	0	**237**	**381**
6:30PM	133	8	0	**141**	15	7	0	**22**	12	193	0	**205**	**368**
6:45PM	92	5	0	**97**	11	2	0	**13**	9	206	0	**215**	**325**
Hourly Total	495	30	0	**525**	44	20	0	**64**	44	861	0	**905**	**1494**
7:00PM	101	1	0	**102**	7	8	0	**15**	3	183	0	**186**	**303**
7:15PM	108	4	0	**112**	6	7	0	**13**	5	157	0	**162**	**287**
7:30PM	84	1	0	**85**	12	7	0	**19**	9	148	0	**157**	**261**
7:45PM	93	3	0	**96**	10	4	0	**14**	9	162	0	**171**	**281**
Hourly Total	386	9	0	**395**	35	26	0	**61**	26	650	0	**676**	**1132**
8:00PM	82	2	0	**84**	6	3	0	**9**	12	153	0	**165**	**258**
8:15PM	82	5	0	**87**	5	5	0	**10**	9	145	0	**154**	**251**
8:30PM	78	3	0	**81**	11	3	0	**14**	12	143	0	**155**	**250**
8:45PM	88	8	0	**96**	5	4	0	**9**	14	86	0	**100**	**205**
Hourly Total	330	18	0	**348**	27	15	0	**42**	47	527	0	**574**	**964**
9:00PM	77	1	0	**78**	9	12	0	**21**	7	89	0	**96**	**195**
9:15PM	71	5	0	**76**	5	2	0	**7**	8	84	0	**92**	**175**
9:30PM	57	2	0	**59**	4	2	0	**6**	1	78	0	**79**	**144**
9:45PM	48	2	0	**50**	9	5	0	**14**	1	41	0	**42**	**106**
Hourly Total	253	10	0	**263**	27	21	0	**48**	17	292	0	**309**	**620**
10:00PM	46	1	0	**47**	7	3	0	**10**	2	46	0	**48**	**105**
10:15PM	51	0	0	**51**	5	6	0	**11**	2	44	0	**46**	**108**
10:30PM	41	1	0	**42**	0	5	0	**5**	2	25	0	**27**	**74**

Leg	45th Ave				Centennial Dr				45th Ave				
Direction	Westbound				Northbound				Eastbound				
Time	T	L	U	**App**	R	L	U	**App**	R	T	U	**App**	**Int**
10:45PM	45	0	0	**45**	7	4	0	**11**	0	28	0	**28**	**84**
Hourly Total	183	2	0	**185**	19	18	0	**37**	6	143	0	**149**	**371**
11:00PM	22	1	0	**23**	6	8	0	**14**	1	20	1	**22**	**59**
11:15PM	22	0	0	**22**	7	6	0	**13**	2	30	0	**32**	**67**
11:30PM	24	1	0	**25**	3	3	0	**6**	2	30	0	**32**	**63**
11:45PM	13	1	0	**14**	1	0	0	**1**	0	22	0	**22**	**37**
Hourly Total	81	3	0	**84**	17	17	0	**34**	5	102	1	**108**	**226**
Total	8692	446	4	**9142**	681	287	0	**968**	458	11438	10	**11906**	**22016**
% Approach	95.1%	4.9%	0%	**-**	70.4%	29.6%	0%	**-**	3.8%	96.1%	0.1%	**-**	-
% Total	39.5%	2.0%	0%	**41.5%**	3.1%	1.3%	0%	**4.4%**	2.1%	52.0%	0%	**54.1%**	-
Motorcycles	20	3	0	**23**	1	1	0	**2**	1	31	0	**32**	57
% Motorcycles	0.2%	0.7%	0%	**0.3%**	0.1%	0.3%	0%	**0.2%**	0.2%	0.3%	0%	**0.3%**	0.3%
Lights	8503	438	4	**8945**	673	279	0	**952**	447	11123	10	**11580**	21477
% Lights	97.8%	98.2%	100%	**97.8%**	98.8%	97.2%	0%	**98.3%**	97.6%	97.2%	100%	**97.3%**	97.6%
Single-Unit Trucks	137	4	0	**141**	6	7	0	**13**	7	203	0	**210**	364
% Single-Unit Trucks	1.6%	0.9%	0%	**1.5%**	0.9%	2.4%	0%	**1.3%**	1.5%	1.8%	0%	**1.8%**	1.7%
Articulated Trucks	25	1	0	**26**	1	0	0	**1**	2	71	0	**73**	100
% Articulated Trucks	0.3%	0.2%	0%	**0.3%**	0.1%	0%	0%	**0.1%**	0.4%	0.6%	0%	**0.6%**	0.5%
Buses	7	0	0	**7**	0	0	0	**0**	1	10	0	**11**	18
% Buses	0.1%	0%	0%	**0.1%**	0%	0%	0%	**0%**	0.2%	0.1%	0%	**0.1%**	0.1%

*L: Left, R: Right, T: Thru, U: U-Turn

9600 N Centennial Dr - TMC
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses)
All Movements
ID: 1190988, Location: 41.539679, -87.50715

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



3 - Village Dr btw Calumet Ave & Drwy - 2-la... - ATR

Thu May 30, 2024
Village Drive east of Calumet Avenue
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192704, Location: 41.538481, -87.508668

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	East Westbound		West Eastbound		
Time	T	**App**	T	**App**	**Int**
2024-05-30 12:00AM	2	**2**	1	**1**	**3**
12:15AM	0	**0**	0	**0**	**0**
12:30AM	0	**0**	0	**0**	**0**
12:45AM	0	**0**	0	**0**	**0**
Hourly Total	2	**2**	1	**1**	**3**
1:00AM	0	**0**	0	**0**	**0**
1:15AM	1	**1**	0	**0**	**1**
1:30AM	0	**0**	0	**0**	**0**
1:45AM	0	**0**	0	**0**	**0**
Hourly Total	1	**1**	0	**0**	**1**
2:00AM	0	**0**	0	**0**	**0**
2:15AM	0	**0**	0	**0**	**0**
2:30AM	0	**0**	0	**0**	**0**
2:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	0	**0**	**0**
3:00AM	0	**0**	0	**0**	**0**
3:15AM	0	**0**	0	**0**	**0**
3:30AM	0	**0**	0	**0**	**0**
3:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	0	**0**	**0**
4:00AM	0	**0**	1	**1**	**1**
4:15AM	1	**1**	0	**0**	**1**
4:30AM	0	**0**	0	**0**	**0**
4:45AM	1	**1**	0	**0**	**1**
Hourly Total	2	**2**	1	**1**	**3**
5:00AM	0	**0**	0	**0**	**0**
5:15AM	0	**0**	0	**0**	**0**
5:30AM	1	**1**	0	**0**	**1**
5:45AM	0	**0**	1	**1**	**1**
Hourly Total	1	**1**	1	**1**	**2**
6:00AM	2	**2**	0	**0**	**2**
6:15AM	1	**1**	1	**1**	**2**
6:30AM	0	**0**	3	**3**	**3**
6:45AM	2	**2**	2	**2**	**4**
Hourly Total	5	**5**	6	**6**	**11**
7:00AM	1	**1**	5	**5**	**6**
7:15AM	5	**5**	2	**2**	**7**
7:30AM	3	**3**	2	**2**	**5**
7:45AM	2	**2**	3	**3**	**5**
Hourly Total	11	**11**	12	**12**	**23**
8:00AM	4	**4**	4	**4**	**8**
8:15AM	6	**6**	5	**5**	**11**
8:30AM	3	**3**	2	**2**	**5**
8:45AM	4	**4**	9	**9**	**13**
Hourly Total	17	**17**	20	**20**	**37**
9:00AM	3	**3**	2	**2**	**5**
9:15AM	7	**7**	5	**5**	**12**
9:30AM	6	**6**	7	**7**	**13**
9:45AM	3	**3**	4	**4**	**7**
Hourly Total	19	**19**	18	**18**	**37**
10:00AM	6	**6**	3	**3**	**9**
10:15AM	3	**3**	1	**1**	**4**
10:30AM	11	**11**	9	**9**	**20**
10:45AM	1	**1**	3	**3**	**4**

Leg Direction	East Westbound		West Eastbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	21	**21**	16	**16**	**37**
11:00AM	9	**9**	9	**9**	**18**
11:15AM	6	**6**	5	**5**	**11**
11:30AM	11	**11**	6	**6**	**17**
11:45AM	4	**4**	6	**6**	**10**
Hourly Total	30	**30**	26	**26**	**56**
12:00PM	8	**8**	10	**10**	**18**
12:15PM	3	**3**	9	**9**	**12**
12:30PM	6	**6**	8	**8**	**14**
12:45PM	7	**7**	6	**6**	**13**
Hourly Total	24	**24**	33	**33**	**57**
1:00PM	14	**14**	10	**10**	**24**
1:15PM	10	**10**	6	**6**	**16**
1:30PM	6	**6**	2	**2**	**8**
1:45PM	10	**10**	6	**6**	**16**
Hourly Total	40	**40**	24	**24**	**64**
2:00PM	8	**8**	2	**2**	**10**
2:15PM	3	**3**	9	**9**	**12**
2:30PM	7	**7**	8	**8**	**15**
2:45PM	4	**4**	4	**4**	**8**
Hourly Total	22	**22**	23	**23**	**45**
3:00PM	6	**6**	4	**4**	**10**
3:15PM	6	**6**	4	**4**	**10**
3:30PM	2	**2**	10	**10**	**12**
3:45PM	3	**3**	11	**11**	**14**
Hourly Total	17	**17**	29	**29**	**46**
4:00PM	5	**5**	14	**14**	**19**
4:15PM	0	**0**	8	**8**	**8**
4:30PM	6	**6**	8	**8**	**14**
4:45PM	5	**5**	7	**7**	**12**
Hourly Total	16	**16**	37	**37**	**53**
5:00PM	4	**4**	9	**9**	**13**
5:15PM	4	**4**	5	**5**	**9**
5:30PM	5	**5**	8	**8**	**13**
5:45PM	5	**5**	1	**1**	**6**
Hourly Total	18	**18**	23	**23**	**41**
6:00PM	4	**4**	4	**4**	**8**
6:15PM	4	**4**	9	**9**	**13**
6:30PM	3	**3**	7	**7**	**10**
6:45PM	5	**5**	6	**6**	**11**
Hourly Total	16	**16**	26	**26**	**42**
7:00PM	6	**6**	3	**3**	**9**
7:15PM	8	**8**	1	**1**	**9**
7:30PM	7	**7**	2	**2**	**9**
7:45PM	18	**18**	8	**8**	**26**
Hourly Total	39	**39**	14	**14**	**53**
8:00PM	4	**4**	5	**5**	**9**
8:15PM	9	**9**	2	**2**	**11**
8:30PM	10	**10**	2	**2**	**12**
8:45PM	17	**17**	1	**1**	**18**
Hourly Total	40	**40**	10	**10**	**50**
9:00PM	3	**3**	3	**3**	**6**
9:15PM	13	**13**	0	**0**	**13**
9:30PM	10	**10**	2	**2**	**12**
9:45PM	10	**10**	3	**3**	**13**
Hourly Total	36	**36**	8	**8**	**44**
10:00PM	14	**14**	0	**0**	**14**
10:15PM	13	**13**	0	**0**	**13**
10:30PM	6	**6**	0	**0**	**6**
10:45PM	2	**2**	0	**0**	**2**

Leg Direction	East Westbound		West Eastbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	35	**35**	0	**0**	**35**
11:00PM	3	**3**	0	**0**	**3**
11:15PM	2	**2**	0	**0**	**2**
11:30PM	1	**1**	0	**0**	**1**
11:45PM	1	**1**	0	**0**	**1**
Hourly Total	7	**7**	0	**0**	**7**
Total	419	**419**	328	**328**	**747**
% Approach	100%	**-**	100%	**-**	-
% Total	56.1%	**56.1%**	43.9%	**43.9%**	-
Lights	407	**407**	322	**322**	729
% Lights	97.1%	**97.1%**	98.2%	**98.2%**	97.6%
Articulated Trucks	2	**2**	0	**0**	2
% Articulated Trucks	0.5%	**0.5%**	0%	**0%**	0.3%
Buses and Single-Unit Trucks	10	**10**	6	**6**	16
% Buses and Single-Unit Trucks	2.4%	**2.4%**	1.8%	**1.8%**	2.1%

*T: Thru

3 - Village Dr btw Calumet Ave & Drwy - 2-la... - ATR

Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192704, Location: 41.538481, -87.508668

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



4 - Centennial Dr btw Centennial Dr & Spring... - ATR

Thu May 30, 2024 S Centennial Drive north of Roundabout
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192705, Location: 41.537591, -87.507249

GEWALT HAMILTON ASSOCIATES, INC.
Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US

Leg Direction	North Southbound		South Northbound		
Time	T	**App**	T	**App**	**Int**
2024-05-30 12:00AM	3	**3**	0	**0**	**3**
12:15AM	1	**1**	0	**0**	**1**
12:30AM	0	**0**	0	**0**	**0**
12:45AM	0	**0**	1	**1**	**1**
Hourly Total	4	**4**	1	**1**	**5**
1:00AM	0	**0**	0	**0**	**0**
1:15AM	1	**1**	1	**1**	**2**
1:30AM	0	**0**	2	**2**	**2**
1:45AM	0	**0**	0	**0**	**0**
Hourly Total	1	**1**	3	**3**	**4**
2:00AM	0	**0**	0	**0**	**0**
2:15AM	0	**0**	0	**0**	**0**
2:30AM	0	**0**	1	**1**	**1**
2:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	1	**1**	**1**
3:00AM	0	**0**	0	**0**	**0**
3:15AM	0	**0**	0	**0**	**0**
3:30AM	0	**0**	0	**0**	**0**
3:45AM	0	**0**	0	**0**	**0**
Hourly Total	0	**0**	0	**0**	**0**
4:00AM	0	**0**	0	**0**	**0**
4:15AM	0	**0**	0	**0**	**0**
4:30AM	2	**2**	0	**0**	**2**
4:45AM	1	**1**	1	**1**	**2**
Hourly Total	3	**3**	1	**1**	**4**
5:00AM	0	**0**	0	**0**	**0**
5:15AM	0	**0**	1	**1**	**1**
5:30AM	0	**0**	1	**1**	**1**
5:45AM	2	**2**	0	**0**	**2**
Hourly Total	2	**2**	2	**2**	**4**
6:00AM	2	**2**	1	**1**	**3**
6:15AM	0	**0**	0	**0**	**0**
6:30AM	5	**5**	5	**5**	**10**
6:45AM	3	**3**	2	**2**	**5**
Hourly Total	10	**10**	8	**8**	**18**
7:00AM	6	**6**	12	**12**	**18**
7:15AM	7	**7**	8	**8**	**15**
7:30AM	6	**6**	9	**9**	**15**
7:45AM	8	**8**	6	**6**	**14**
Hourly Total	27	**27**	35	**35**	**62**
8:00AM	7	**7**	4	**4**	**11**
8:15AM	14	**14**	9	**9**	**23**
8:30AM	6	**6**	5	**5**	**11**
8:45AM	8	**8**	12	**12**	**20**
Hourly Total	35	**35**	30	**30**	**65**
9:00AM	11	**11**	3	**3**	**14**
9:15AM	9	**9**	6	**6**	**15**
9:30AM	6	**6**	5	**5**	**11**
9:45AM	4	**4**	6	**6**	**10**
Hourly Total	30	**30**	20	**20**	**50**
10:00AM	6	**6**	6	**6**	**12**
10:15AM	5	**5**	10	**10**	**15**
10:30AM	1	**1**	8	**8**	**9**
10:45AM	9	**9**	8	**8**	**17**

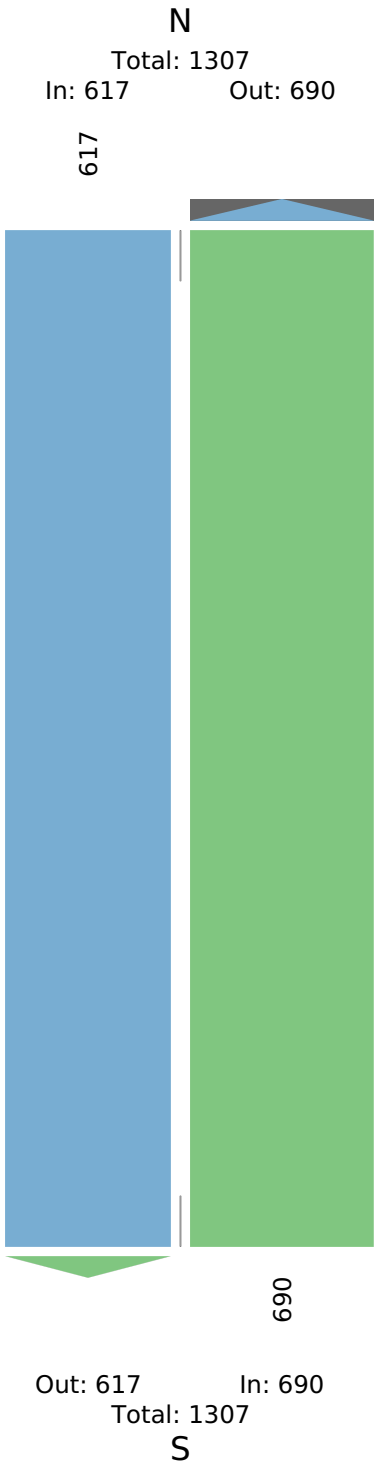
Leg Direction	North Southbound		South Northbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	21	**21**	32	**32**	**53**
11:00AM	7	**7**	11	**11**	**18**
11:15AM	12	**12**	13	**13**	**25**
11:30AM	13	**13**	11	**11**	**24**
11:45AM	11	**11**	14	**14**	**25**
Hourly Total	43	**43**	49	**49**	**92**
12:00PM	16	**16**	17	**17**	**33**
12:15PM	9	**9**	14	**14**	**23**
12:30PM	9	**9**	11	**11**	**20**
12:45PM	16	**16**	11	**11**	**27**
Hourly Total	50	**50**	53	**53**	**103**
1:00PM	17	**17**	13	**13**	**30**
1:15PM	12	**12**	11	**11**	**23**
1:30PM	7	**7**	8	**8**	**15**
1:45PM	10	**10**	9	**9**	**19**
Hourly Total	46	**46**	41	**41**	**87**
2:00PM	12	**12**	7	**7**	**19**
2:15PM	9	**9**	13	**13**	**22**
2:30PM	7	**7**	27	**27**	**34**
2:45PM	13	**13**	5	**5**	**18**
Hourly Total	41	**41**	52	**52**	**93**
3:00PM	7	**7**	15	**15**	**22**
3:15PM	17	**17**	7	**7**	**24**
3:30PM	19	**19**	15	**15**	**34**
3:45PM	13	**13**	12	**12**	**25**
Hourly Total	56	**56**	49	**49**	**105**
4:00PM	21	**21**	9	**9**	**30**
4:15PM	17	**17**	10	**10**	**27**
4:30PM	10	**10**	13	**13**	**23**
4:45PM	17	**17**	20	**20**	**37**
Hourly Total	65	**65**	52	**52**	**117**
5:00PM	13	**13**	11	**11**	**24**
5:15PM	11	**11**	16	**16**	**27**
5:30PM	12	**12**	15	**15**	**27**
5:45PM	6	**6**	10	**10**	**16**
Hourly Total	42	**42**	52	**52**	**94**
6:00PM	11	**11**	3	**3**	**14**
6:15PM	8	**8**	16	**16**	**24**
6:30PM	8	**8**	17	**17**	**25**
6:45PM	7	**7**	19	**19**	**26**
Hourly Total	34	**34**	55	**55**	**89**
7:00PM	5	**5**	18	**18**	**23**
7:15PM	6	**6**	14	**14**	**20**
7:30PM	7	**7**	20	**20**	**27**
7:45PM	5	**5**	14	**14**	**19**
Hourly Total	23	**23**	66	**66**	**89**
8:00PM	7	**7**	6	**6**	**13**
8:15PM	6	**6**	9	**9**	**15**
8:30PM	9	**9**	12	**12**	**21**
8:45PM	8	**8**	14	**14**	**22**
Hourly Total	30	**30**	41	**41**	**71**
9:00PM	9	**9**	9	**9**	**18**
9:15PM	6	**6**	8	**8**	**14**
9:30PM	4	**4**	4	**4**	**8**
9:45PM	8	**8**	10	**10**	**18**
Hourly Total	27	**27**	31	**31**	**58**
10:00PM	12	**12**	4	**4**	**16**
10:15PM	5	**5**	3	**3**	**8**
10:30PM	2	**2**	0	**0**	**2**
10:45PM	2	**2**	4	**4**	**6**

Leg Direction	North Southbound		South Northbound		
Time	T	**App**	T	**App**	**Int**
Hourly Total	21	**21**	11	**11**	**32**
11:00PM	0	**0**	1	**1**	**1**
11:15PM	4	**4**	1	**1**	**5**
11:30PM	1	**1**	2	**2**	**3**
11:45PM	1	**1**	1	**1**	**2**
Hourly Total	6	**6**	5	**5**	**11**
Total	617	**617**	690	**690**	**1307**
% Approach	100%	**-**	100%	**-**	-
% Total	47.2%	**47.2%**	52.8%	**52.8%**	-
Lights	606	**606**	677	**677**	1283
% Lights	98.2%	**98.2%**	98.1%	**98.1%**	98.2%
Articulated Trucks	2	**2**	1	**1**	3
% Articulated Trucks	0.3%	**0.3%**	0.1%	**0.1%**	0.2%
Buses and Single-Unit Trucks	9	**9**	12	**12**	21
% Buses and Single-Unit Trucks	1.5%	**1.5%**	1.7%	**1.7%**	1.6%

*T: Thru

4 - Centennial Dr btw Centennial Dr & Spring... - ATR
Thu May 30, 2024
Full Length (12 AM-12 AM (+1))
All Classes (Lights, Articulated Trucks, Buses and Single-Unit Trucks)
All Channels
ID: 1192705, Location: 41.537591, -87.507249

Provided by: Gewalt Hamilton Associates Inc.
625 Forest Edge Drive, Vernon Hills, IL, 60061, US



INDOT TCDS Counts - Last Update 2018

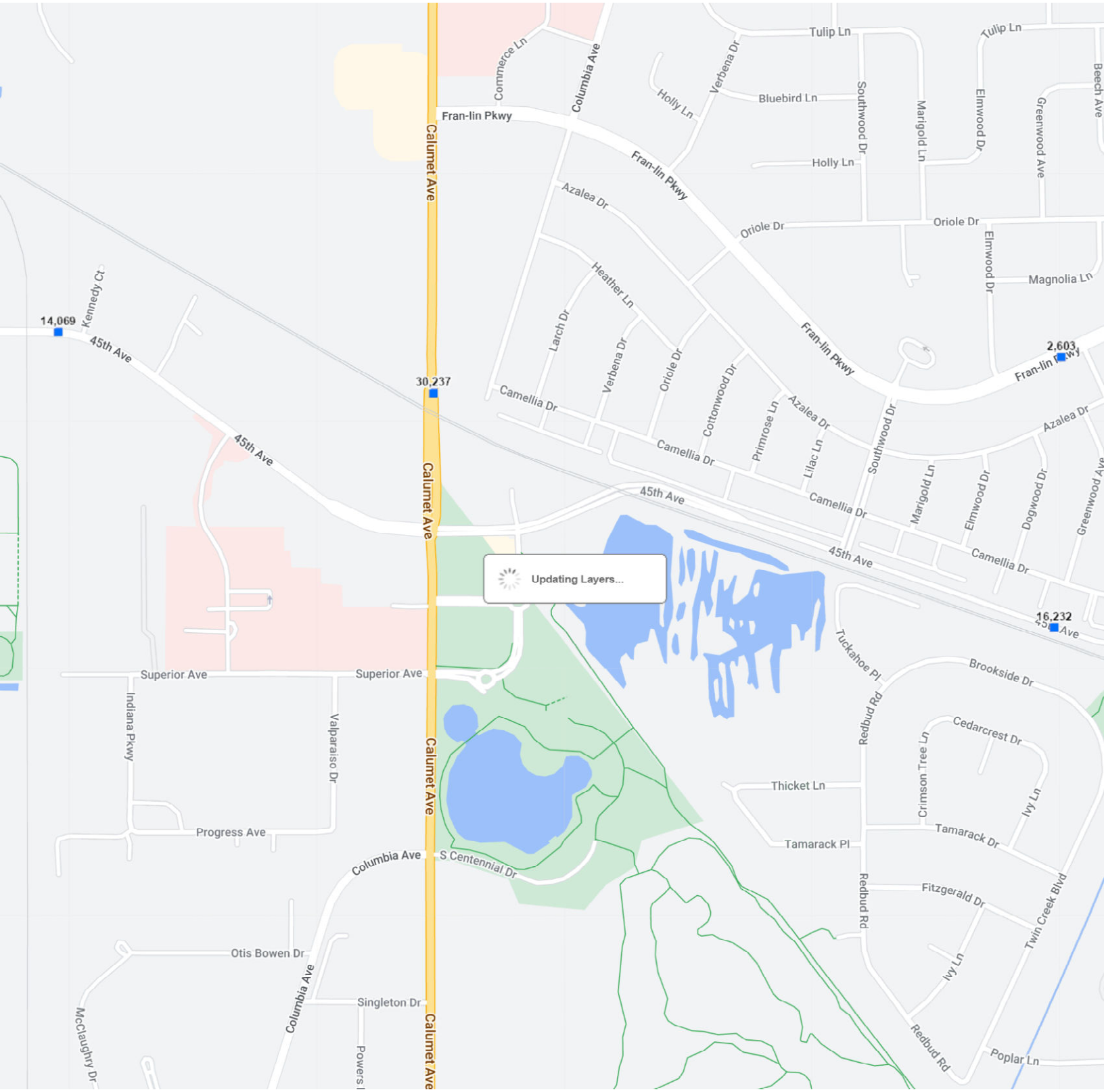
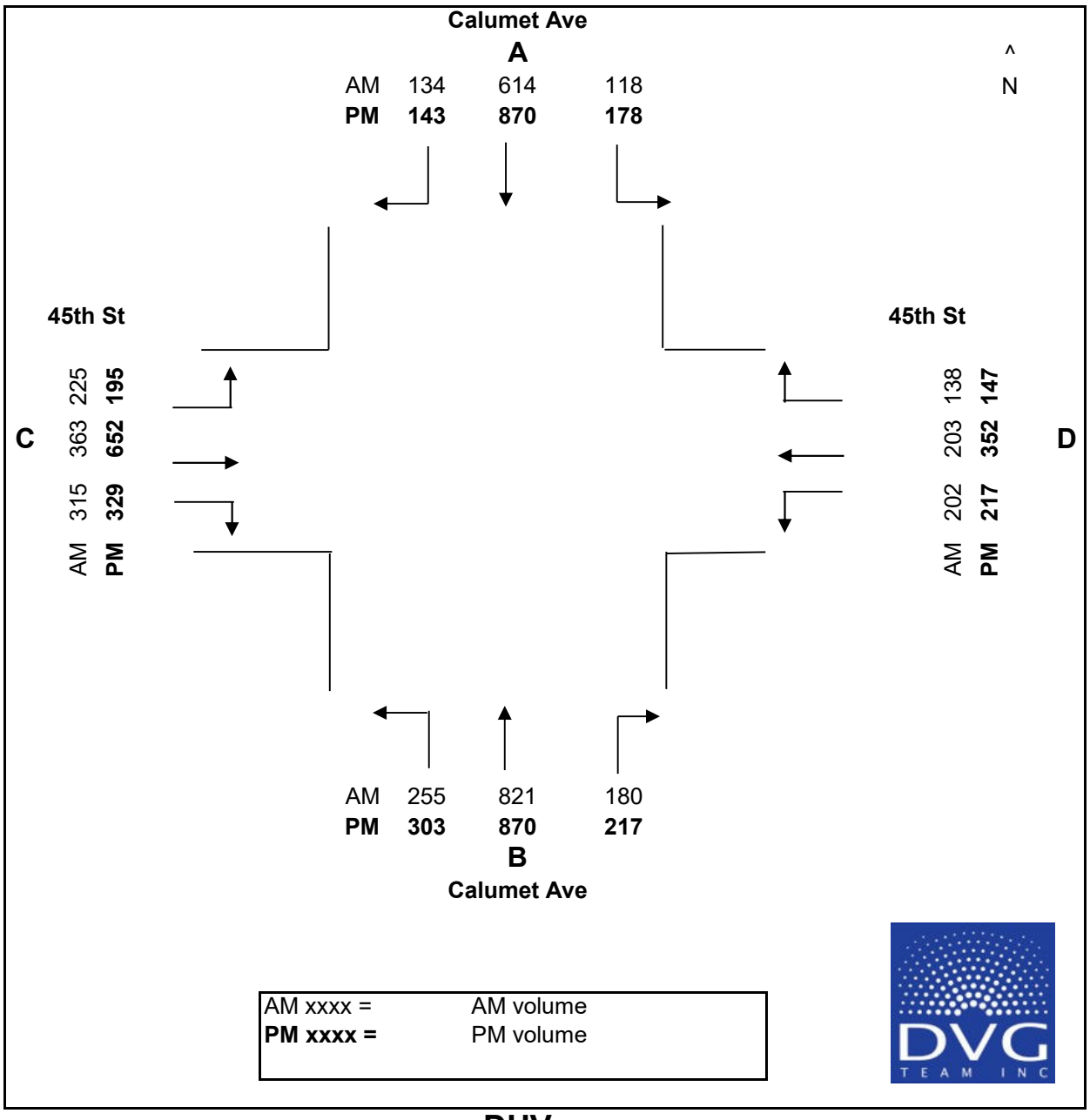


Exhibit 4

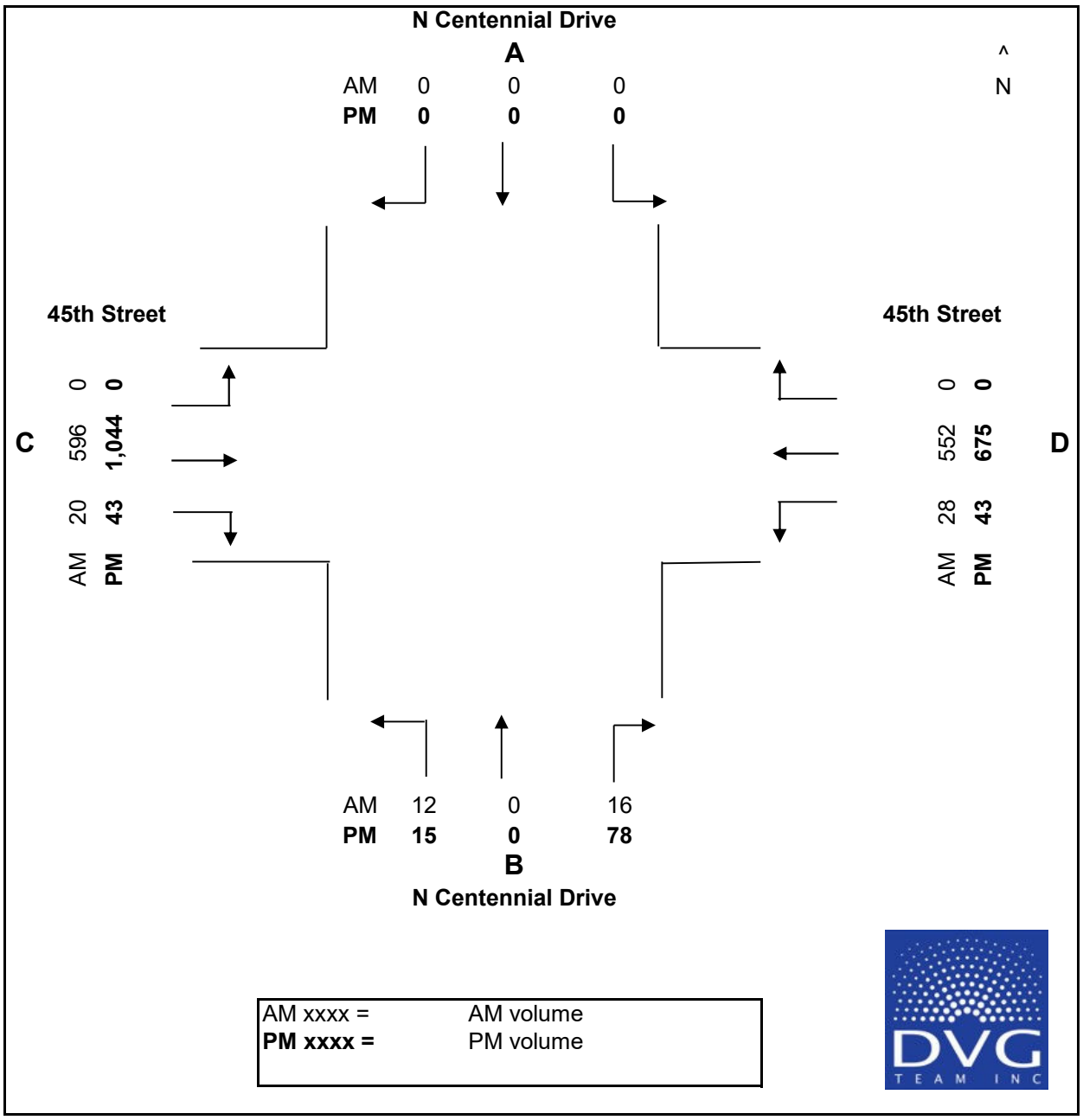
AM & PM Existing Peak Hour Volumes, Calumet Avenue & 45th Avenue



DHV
PRESENT
(2024)

Exhibit 5

AM & PM Existing Peak Hour Volumes, 45th Avenue & N Centennial Drive



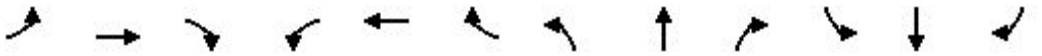
DHV
PRESENT
(2024)

Exhibit 6A

AM LOS – Existing Conditions – Calumet Avenue & 45th Avenue

HCM 6th Signalized Intersection Summary
1: 45th & Calumet

06/26/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	225	363	315	202	203	138	255	821	180	118	614	134
Future Volume (veh/h)	225	363	315	202	203	138	255	821	180	118	614	134
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	232	367	346	213	223	139	255	855	228	148	740	152
Peak Hour Factor	0.97	0.99	0.91	0.95	0.91	0.99	1.00	0.96	0.79	0.80	0.83	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	400	396	353	268	457	274	323	1227	327	207	1453	648
Arrive On Green	0.12	0.22	0.22	0.11	0.21	0.21	0.09	0.44	0.44	0.06	0.41	0.41
Sat Flow, veh/h	1781	1777	1585	1781	2138	1279	3456	2775	739	3456	3554	1585
Grp Volume(v), veh/h	232	367	346	213	184	178	255	547	536	148	740	152
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1640	1728	1777	1737	1728	1777	1585
Q Serve(g_s), s	11.0	22.3	23.9	10.1	10.0	10.5	7.9	27.3	27.3	4.6	17.1	6.9
Cycle Q Clear(g_c), s	11.0	22.3	23.9	10.1	10.0	10.5	7.9	27.3	27.3	4.6	17.1	6.9
Prop In Lane	1.00		1.00	1.00		0.78	1.00		0.43	1.00		1.00
Lane Grp Cap(c), veh/h	400	396	353	268	380	351	323	786	768	207	1453	648
V/C Ratio(X)	0.58	0.93	0.98	0.79	0.48	0.51	0.79	0.70	0.70	0.71	0.51	0.23
Avail Cap(c_a), veh/h	469	396	353	321	380	351	443	786	768	236	1453	648
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	41.9	42.5	31.0	37.9	38.1	48.8	24.7	24.7	50.8	24.3	21.3
Incr Delay (d2), s/veh	1.3	27.8	42.4	11.0	1.0	1.2	6.6	5.1	5.2	8.5	1.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	12.7	13.4	5.1	4.4	4.3	3.7	12.3	12.1	2.2	7.3	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.0	69.7	84.9	41.9	38.9	39.3	55.4	29.8	29.9	59.3	25.6	22.1
LnGrp LOS	C	E	F	D	D	D	E	C	C	E	C	C
Approach Vol, veh/h		945			575			1338			1040	
Approach Delay, s/veh		65.5			40.2			34.7			29.9	
Approach LOS		E			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	53.2	16.8	29.0	14.8	49.5	17.7	28.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	7.5	44.5	15.5	24.5	14.1	37.9	17.5	22.5
Max Q Clear Time (g_c+I1), s	6.6	29.3	12.1	25.9	9.9	19.1	13.0	12.5
Green Ext Time (p_c), s	0.0	6.5	0.2	0.0	0.3	5.5	0.3	1.5

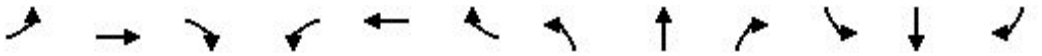
Intersection Summary	
HCM 6th Ctrl Delay	41.7
HCM 6th LOS	D

Exhibit 6B

PM LOS & Queue Report – Existing Conditions – Calumet Avenue & 45th Avenue

HCM 6th Signalized Intersection Summary
1: 45th & Calumet

06/26/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	195	652	329	217	352	147	303	870	217	178	870	143
Future Volume (veh/h)	195	652	329	217	352	147	303	870	217	178	870	143
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	264	716	366	231	367	184	356	989	252	228	1036	155
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	400	672	343	245	627	309	393	1026	260	258	1160	517
Arrive On Green	0.12	0.30	0.30	0.10	0.27	0.27	0.11	0.37	0.37	0.07	0.33	0.33
Sat Flow, veh/h	1781	2276	1162	1781	2305	1137	3456	2806	713	3456	3554	1585
Grp Volume(v), veh/h	264	559	523	231	282	269	356	625	616	228	1036	155
Grp Sat Flow(s),veh/h/ln	1781	1777	1661	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	11.5	32.5	32.5	10.3	15.1	15.5	11.2	37.9	38.2	7.2	30.5	8.0
Cycle Q Clear(g_c), s	11.5	32.5	32.5	10.3	15.1	15.5	11.2	37.9	38.2	7.2	30.5	8.0
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	400	525	491	245	483	453	393	649	637	258	1160	517
V/C Ratio(X)	0.66	1.06	1.07	0.94	0.58	0.59	0.91	0.96	0.97	0.89	0.89	0.30
Avail Cap(c_a), veh/h	429	525	491	245	483	453	393	649	637	258	1160	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.1	38.8	38.8	28.9	34.6	34.8	48.2	34.2	34.3	50.4	35.2	27.7
Incr Delay (d2), s/veh	3.4	57.5	59.3	41.7	1.8	2.1	24.1	27.2	28.5	28.5	10.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	22.1	20.9	7.1	6.6	6.4	6.1	20.6	20.5	4.1	14.5	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.5	96.3	98.1	70.7	36.4	36.9	72.3	61.4	62.8	78.9	45.9	29.1
LnGrp LOS	C	F	F	E	D	D	E	E	E	E	D	C
Approach Vol, veh/h		1346			782			1597			1419	
Approach Delay, s/veh		83.7			46.7			64.4			49.3	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	44.7	15.6	37.0	17.0	40.4	18.2	34.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.2	11.1	32.5	12.5	35.9	15.5	28.1
Max Q Clear Time (g_c+I1), s	9.2	40.2	12.3	34.5	13.2	32.5	13.5	17.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.2	0.2	2.4

Intersection Summary	
HCM 6th Ctrl Delay	62.6
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	264	1082	231	551	356	1241	228	1036	155
v/c Ratio	0.73	1.05	0.94	0.60	0.90	0.99	0.88	0.92	0.25
Control Delay	32.2	73.4	70.4	31.1	71.3	55.5	78.4	46.7	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	73.4	70.4	31.1	71.3	55.5	78.4	46.7	5.3
Queue Length 50th (ft)	110	~373	98	139	117	400	75	332	0
Queue Length 95th (ft)	135	#505	#248	196	#181	#536	#112	#384	44
Internal Link Dist (ft)		527		437		357		570	
Turn Bay Length (ft)	255		290		435		245		250
Base Capacity (vph)	375	1035	245	916	394	1251	260	1128	610
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	1.05	0.94	0.60	0.90	0.99	0.88	0.92	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Exhibit 7A

AM LOS – Existing Conditions – 45th Avenue & N Centennial Drive

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	596	20	28	552	12	16
Future Vol, veh/h	596	20	28	552	12	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	155	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	596	20	28	552	12	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	616	0	928	298
Stage 1	-	-	-	-	596	-
Stage 2	-	-	-	-	332	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	960	-	267	698
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	960	-	259	698
Mov Cap-2 Maneuver	-	-	-	-	259	-
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	679	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	404	-	-	960	-
HCM Lane V/C Ratio	0.069	-	-	0.029	-
HCM Control Delay (s)	14.6	-	-	8.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Exhibit 7B

PM LOS – Existing Conditions – 45th Avenue & N Centennial Drive

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1044	43	43	675	15	78
Future Vol, veh/h	1044	43	43	675	15	78
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	155	150	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	72	77	97	54	63
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1147	60	56	696	28	124

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1207	0	1607	574
Stage 1	-	-	-	-	1147	-
Stage 2	-	-	-	-	460	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	574	-	96	462
Stage 1	-	-	-	-	265	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	574	-	87	462
Mov Cap-2 Maneuver	-	-	-	-	87	-
Stage 1	-	-	-	-	265	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	37.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	258	-	-	574	-
HCM Lane V/C Ratio	0.588	-	-	0.097	-
HCM Control Delay (s)	37.1	-	-	11.9	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	3.4	-	-	0.3	-

Exhibit 8

ITE Land Uses

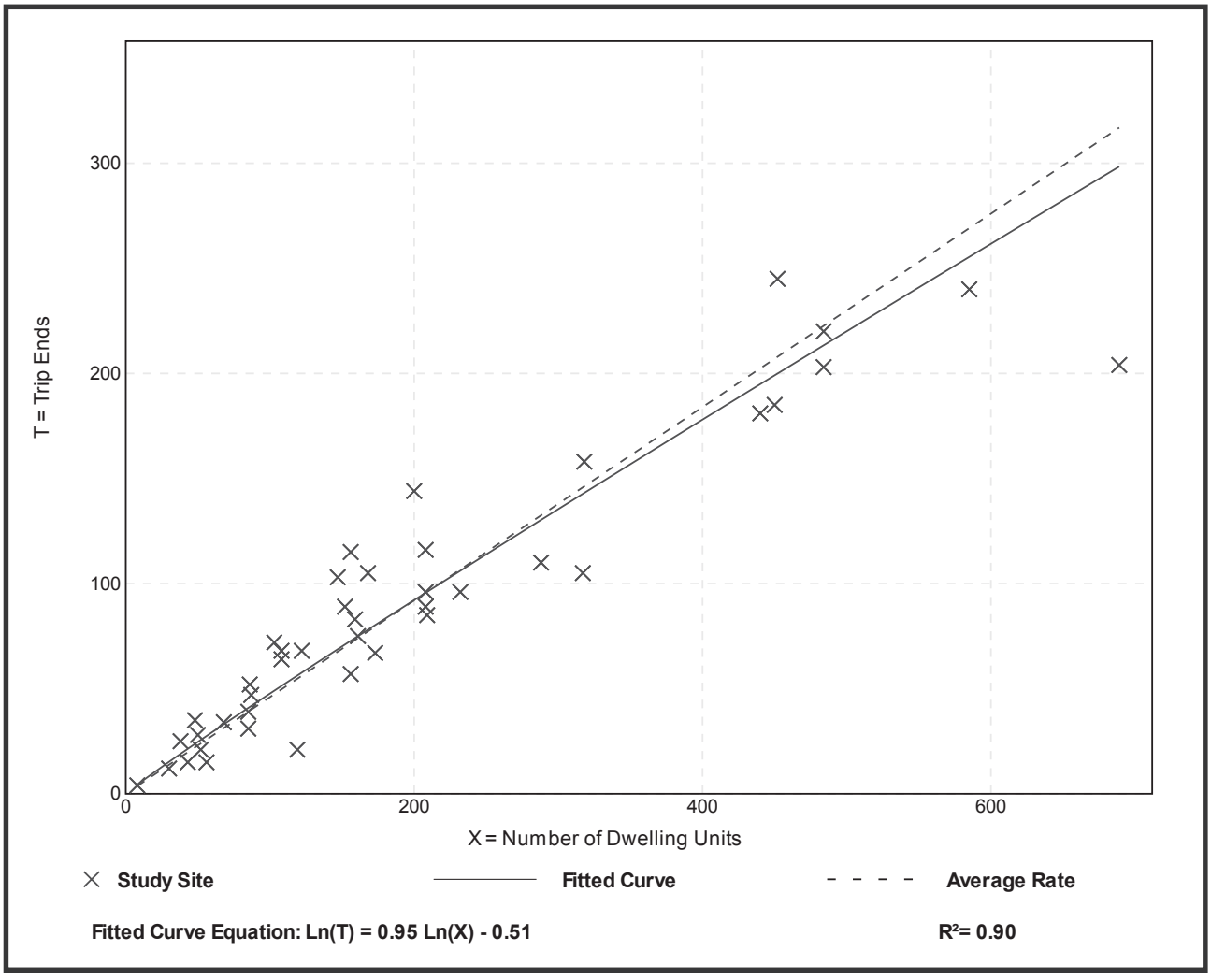
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 7 and 9 a.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	42
Avg. Num. of Dwelling Units:	199
Directional Distribution:	23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

Data Plot and Equation



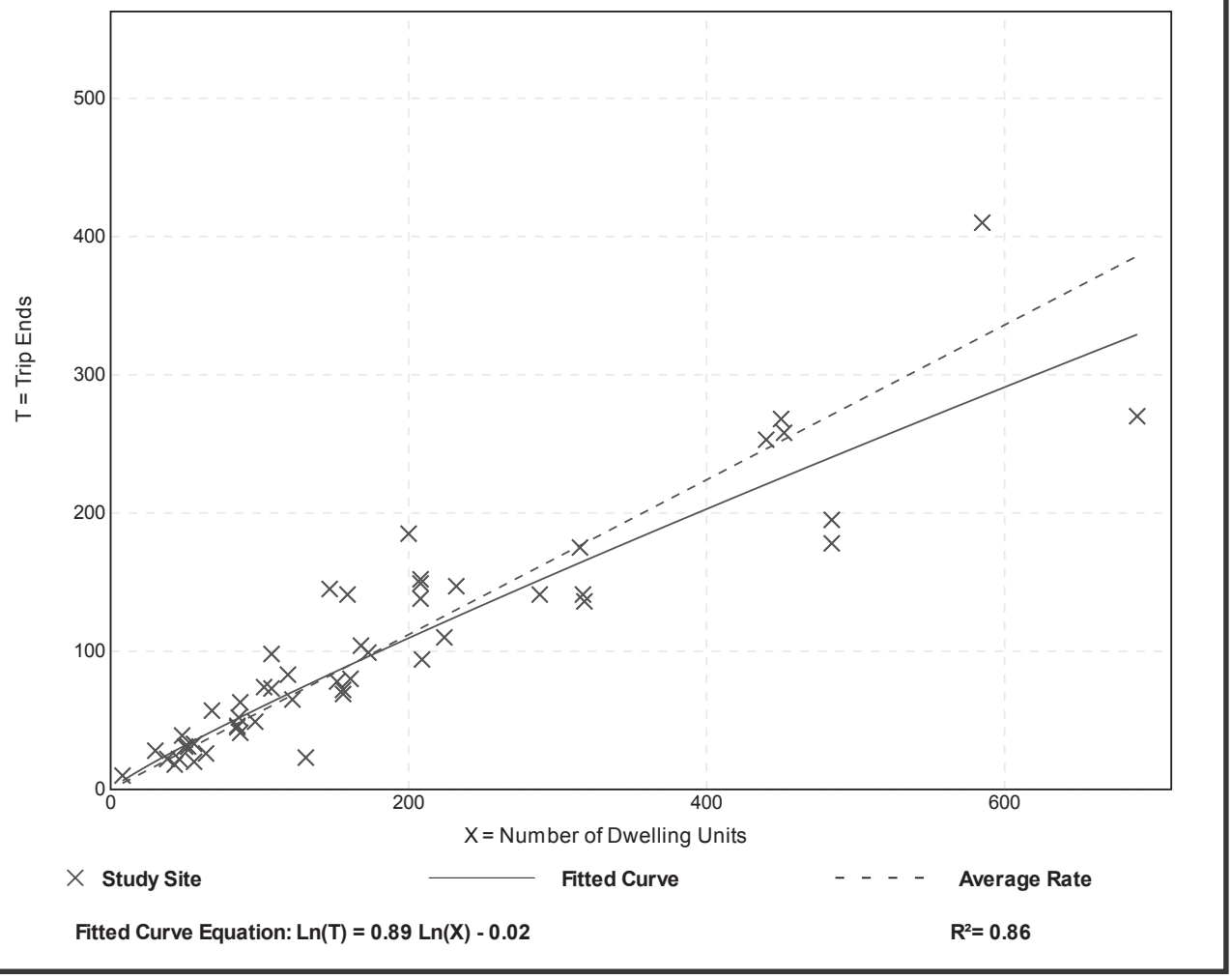
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	50
Avg. Num. of Dwelling Units:	187
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

Data Plot and Equation



Multifamily Housing (Low-Rise)
(220)

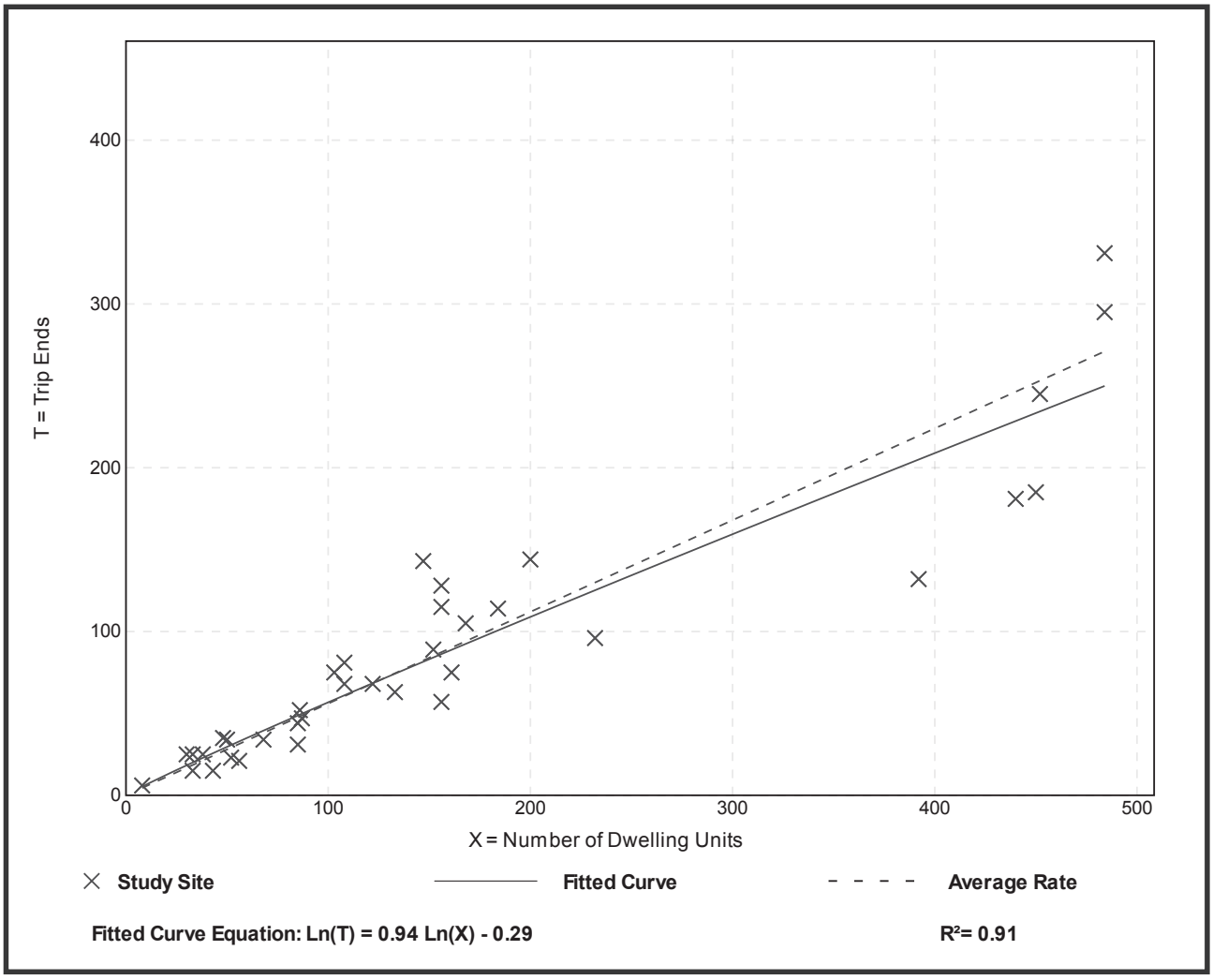
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 36
Avg. Num. of Dwelling Units: 161
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.34 - 0.97	0.15

Data Plot and Equation



Multifamily Housing (Low-Rise)
(220)

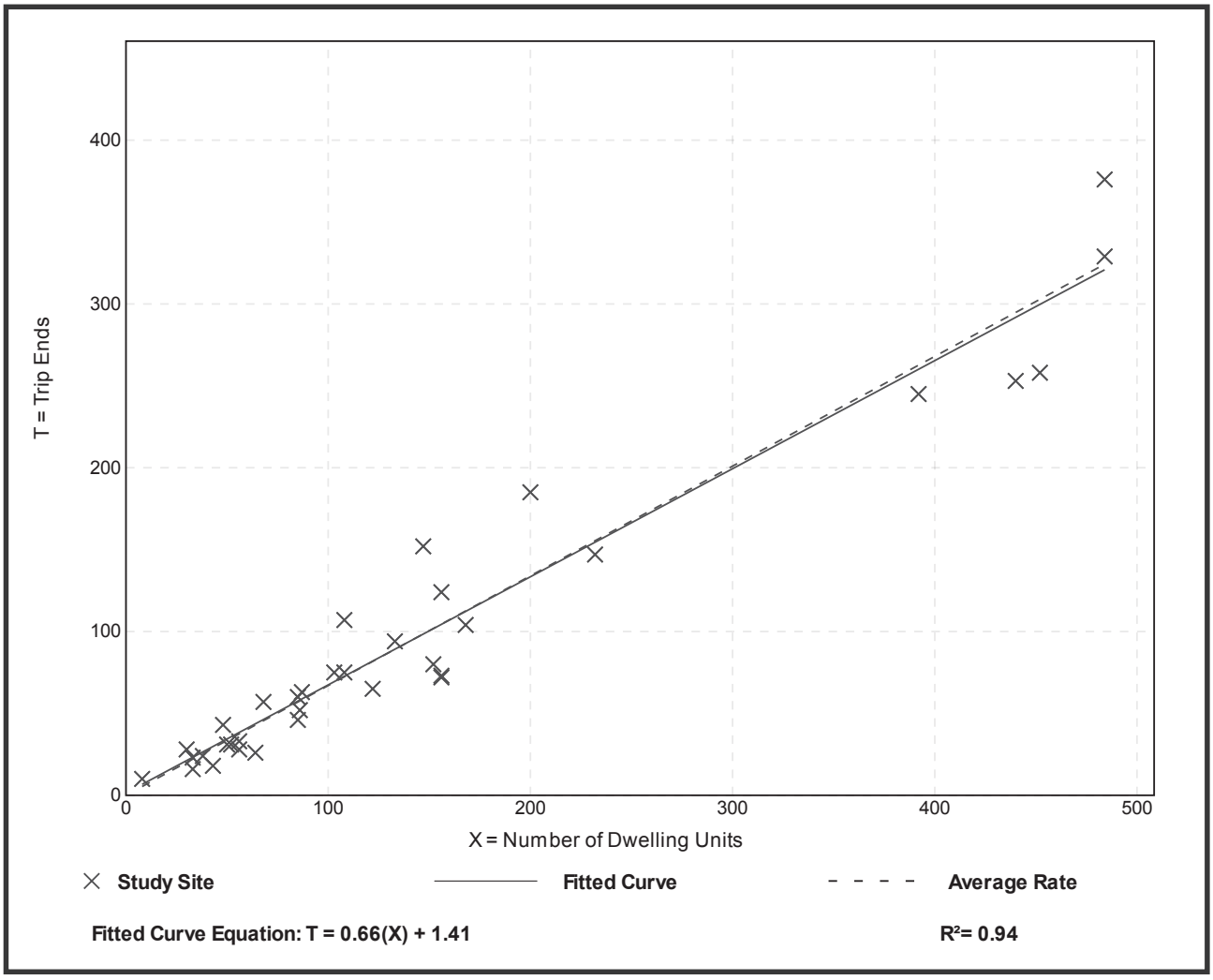
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 35
Avg. Num. of Dwelling Units: 146
Directional Distribution: 59% entering, 41% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.67	0.41 - 1.25	0.14

Data Plot and Equation



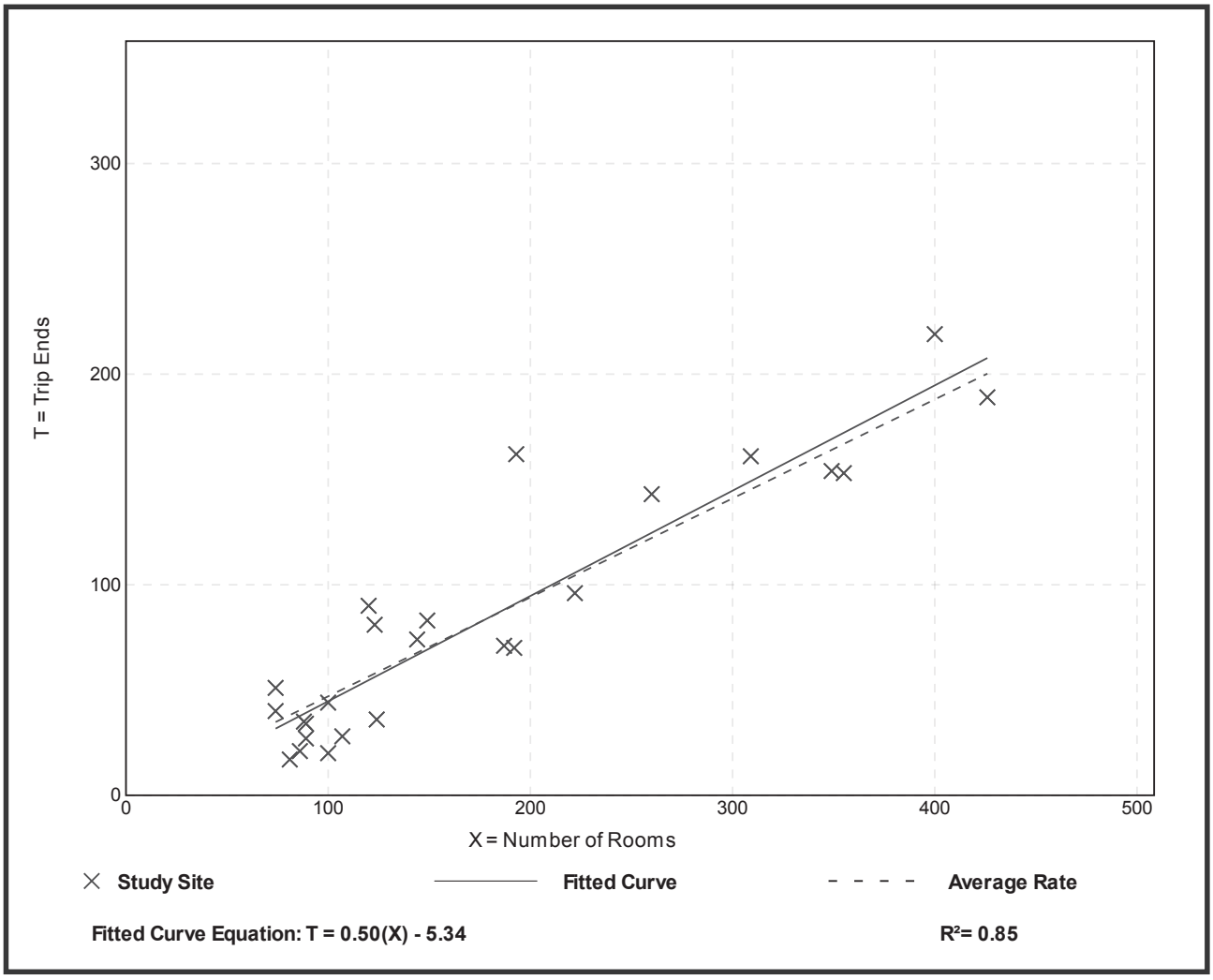
Hotel
(310)

Vehicle Trip Ends vs:	**Rooms**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	25
Avg. Num. of Rooms:	178
Directional Distribution:	59% entering, 41% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.47	0.20 - 0.84	0.14

Data Plot and Equation



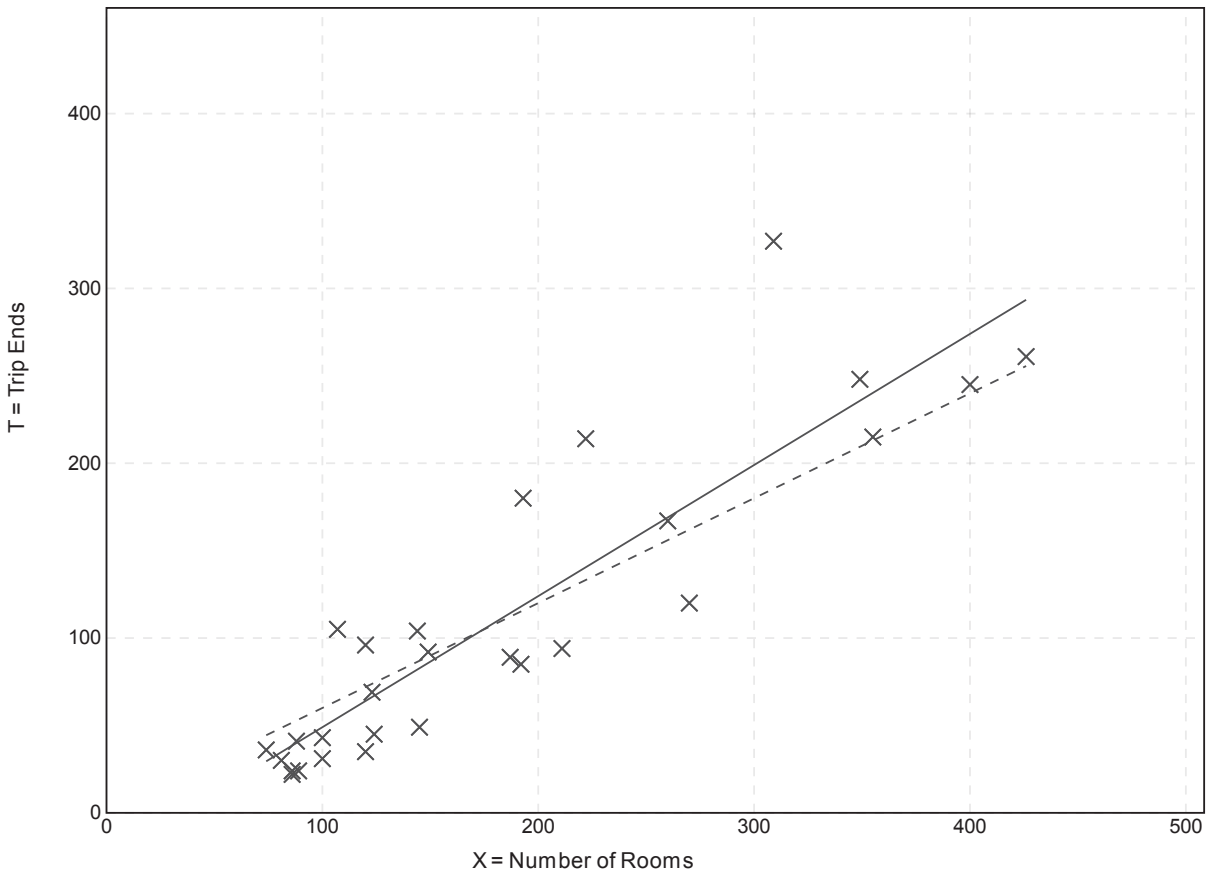
Hotel
(310)

Vehicle Trip Ends vs:	**Rooms**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	28
Avg. Num. of Rooms:	183
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.60	0.26 - 1.06	0.22

Data Plot and Equation



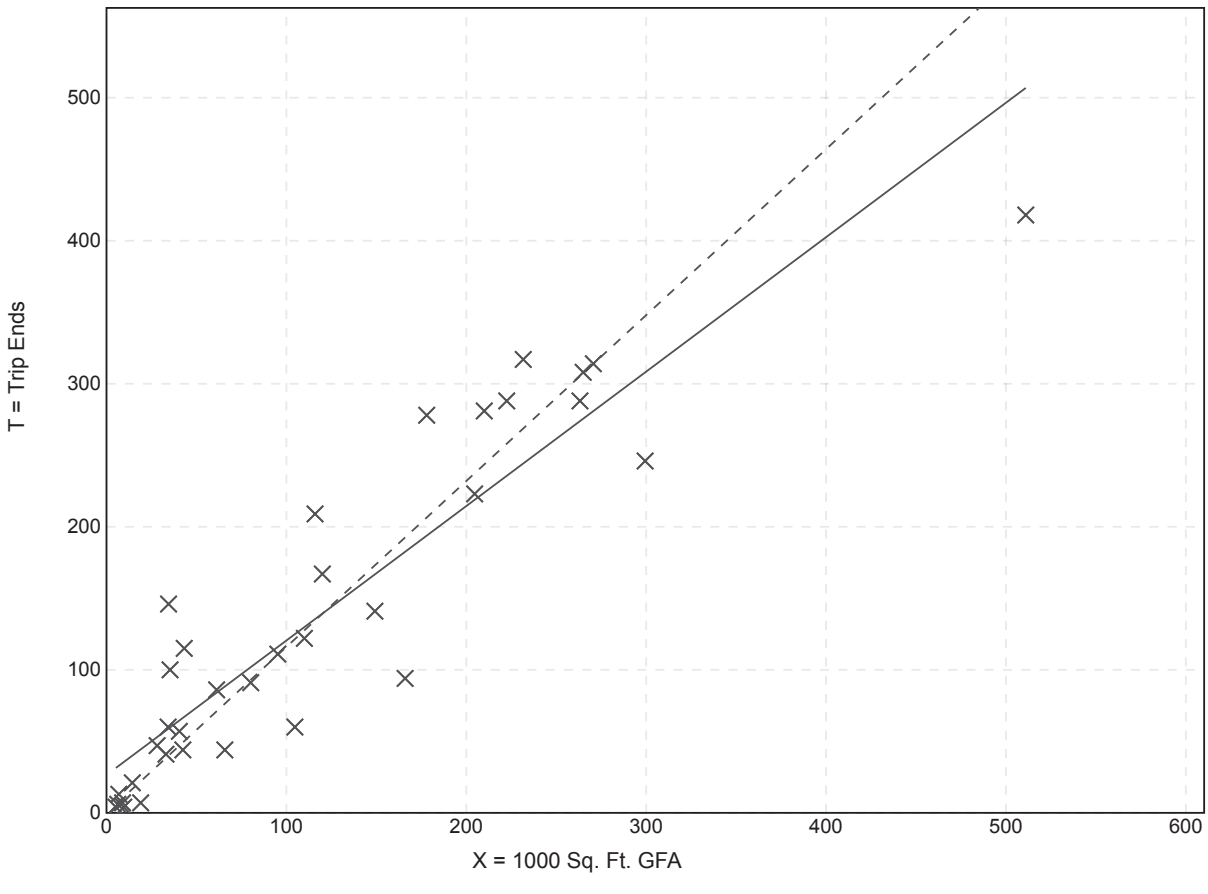
General Office Building
(710)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 35
1000 Sq. Ft. GFA: 117
Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.16	0.37 - 4.23	0.47

Data Plot and Equation



Fitted Curve Equation: T = 0.94(X) + 26.49

R^2= 0.85

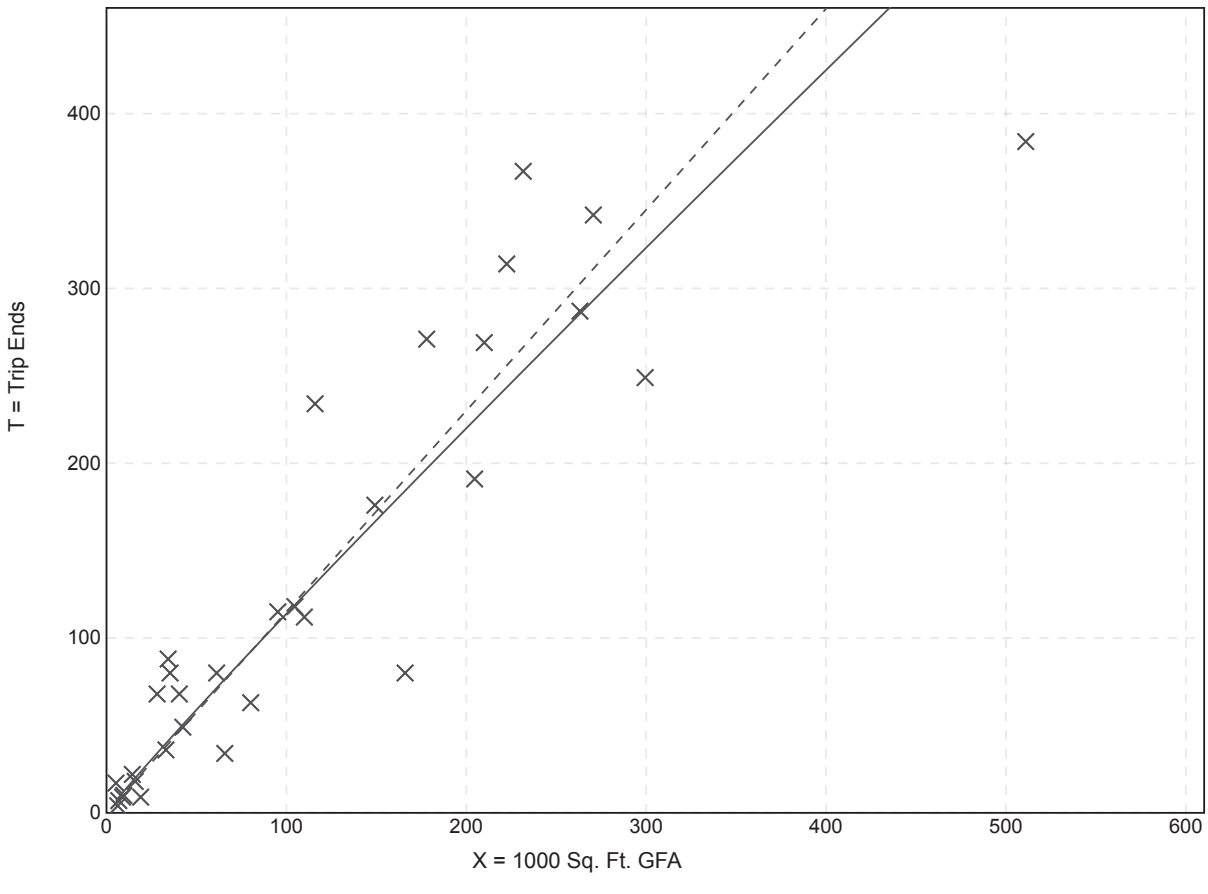
General Office Building
(710)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 32
1000 Sq. Ft. GFA: 114
Directional Distribution: 16% entering, 84% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.15	0.47 - 3.23	0.42

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.95 Ln(X) + 0.36

R^2= 0.88

General Office Building
(710)

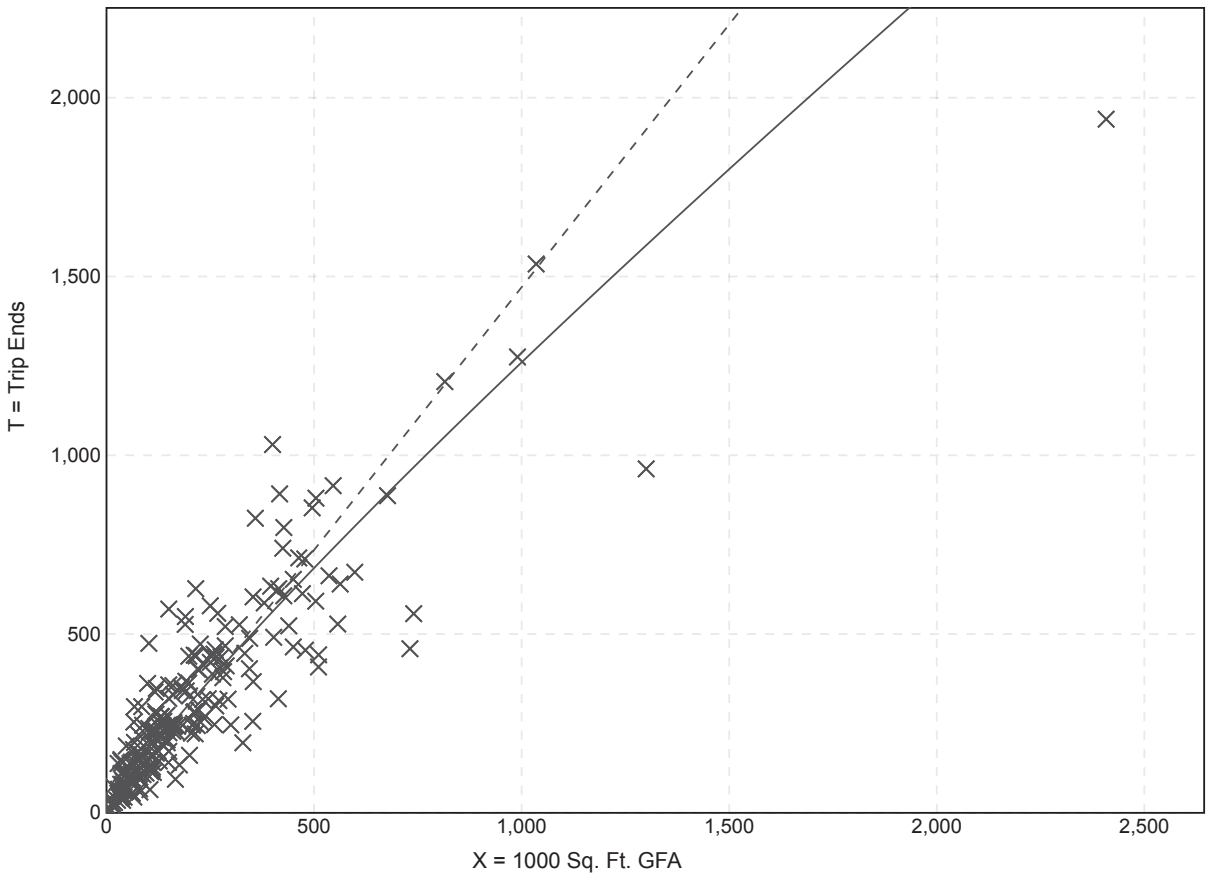
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 228
1000 Sq. Ft. GFA: 209
Directional Distribution: 88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.47	0.57 - 4.93	0.60

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.88 Ln(X) + 1.06

R^2= 0.84

General Office Building
(710)

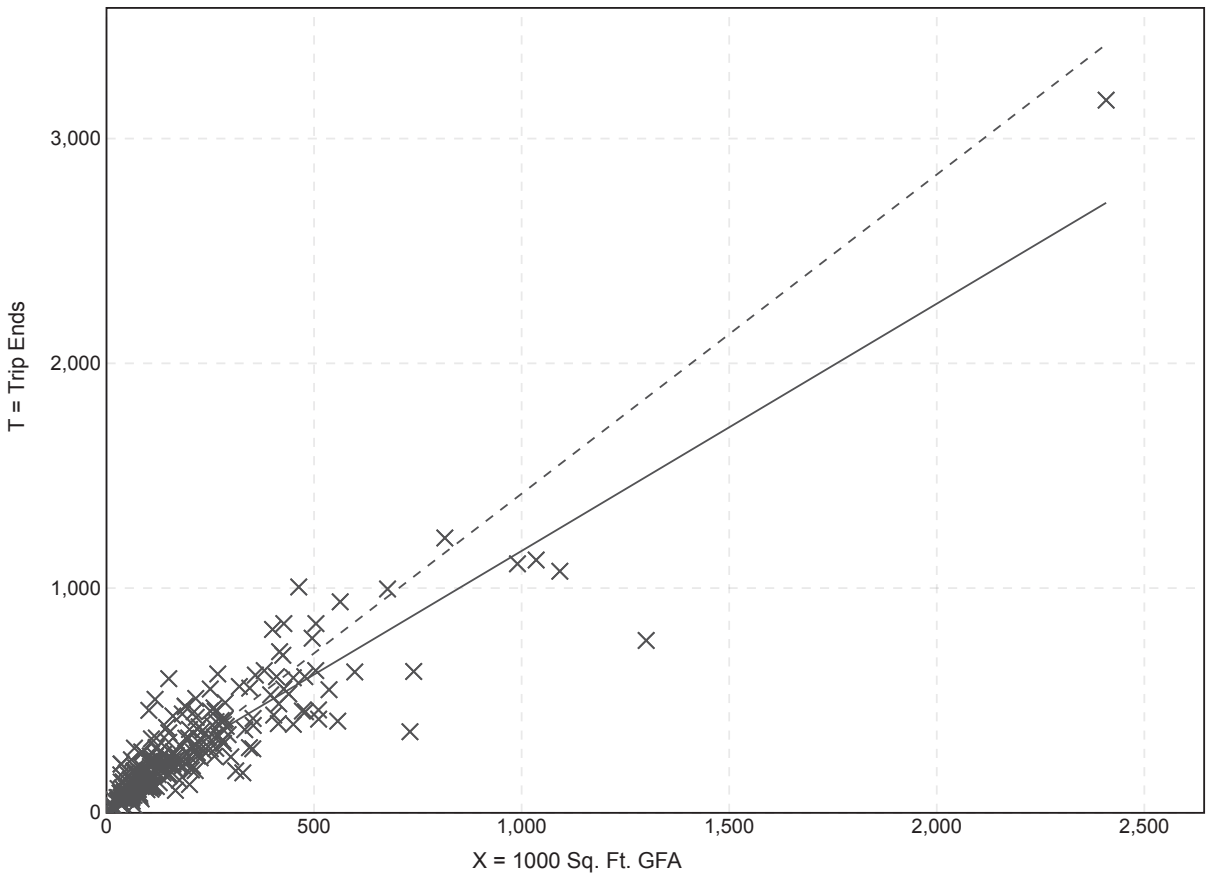
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 243
1000 Sq. Ft. GFA: 205
Directional Distribution: 18% entering, 82% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.42	0.49 - 6.20	0.61

Data Plot and Equation



Fitted Curve Equation: T = 1.10(X) + 65.39

R^2= 0.82

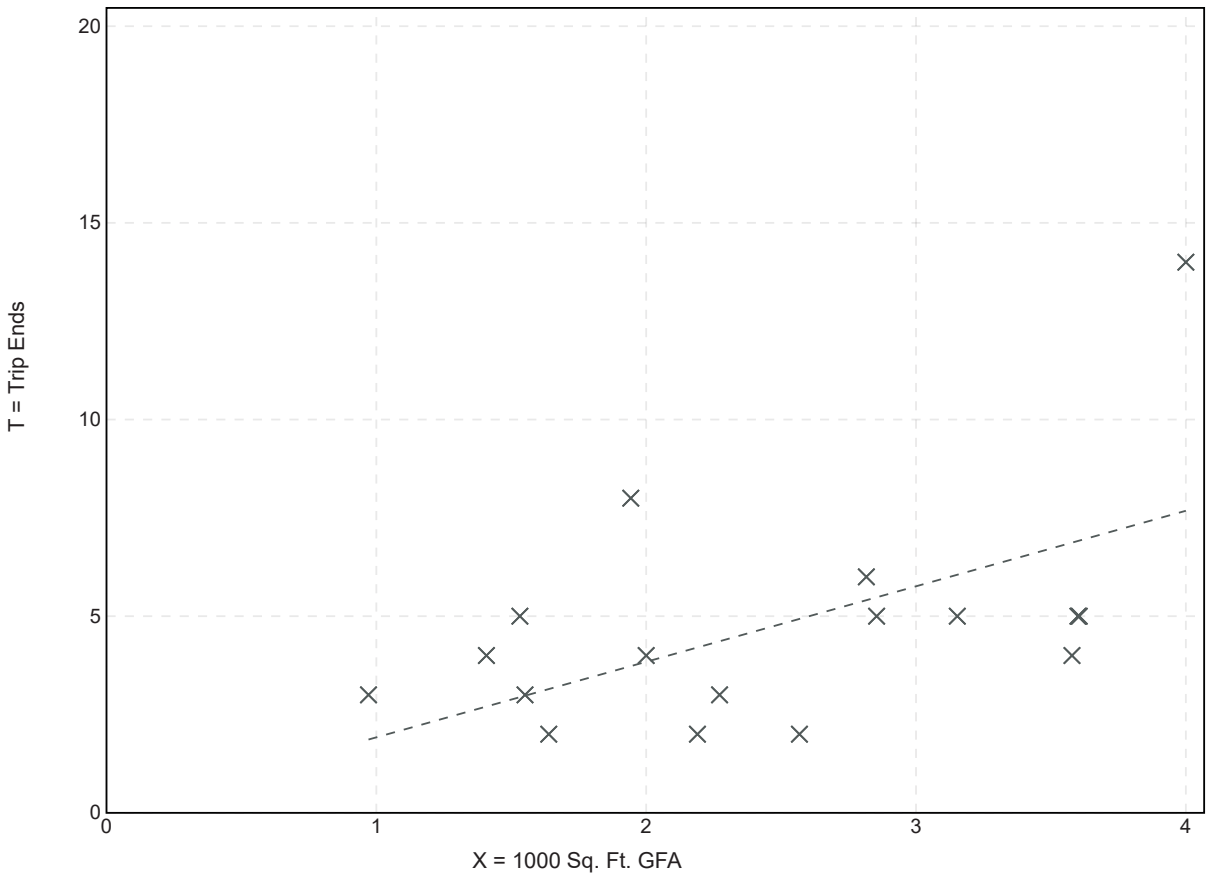
Small Office Building
(712)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 17
1000 Sq. Ft. GFA: 2
Directional Distribution: 83% entering, 18% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.92	0.78 - 4.12	0.97

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

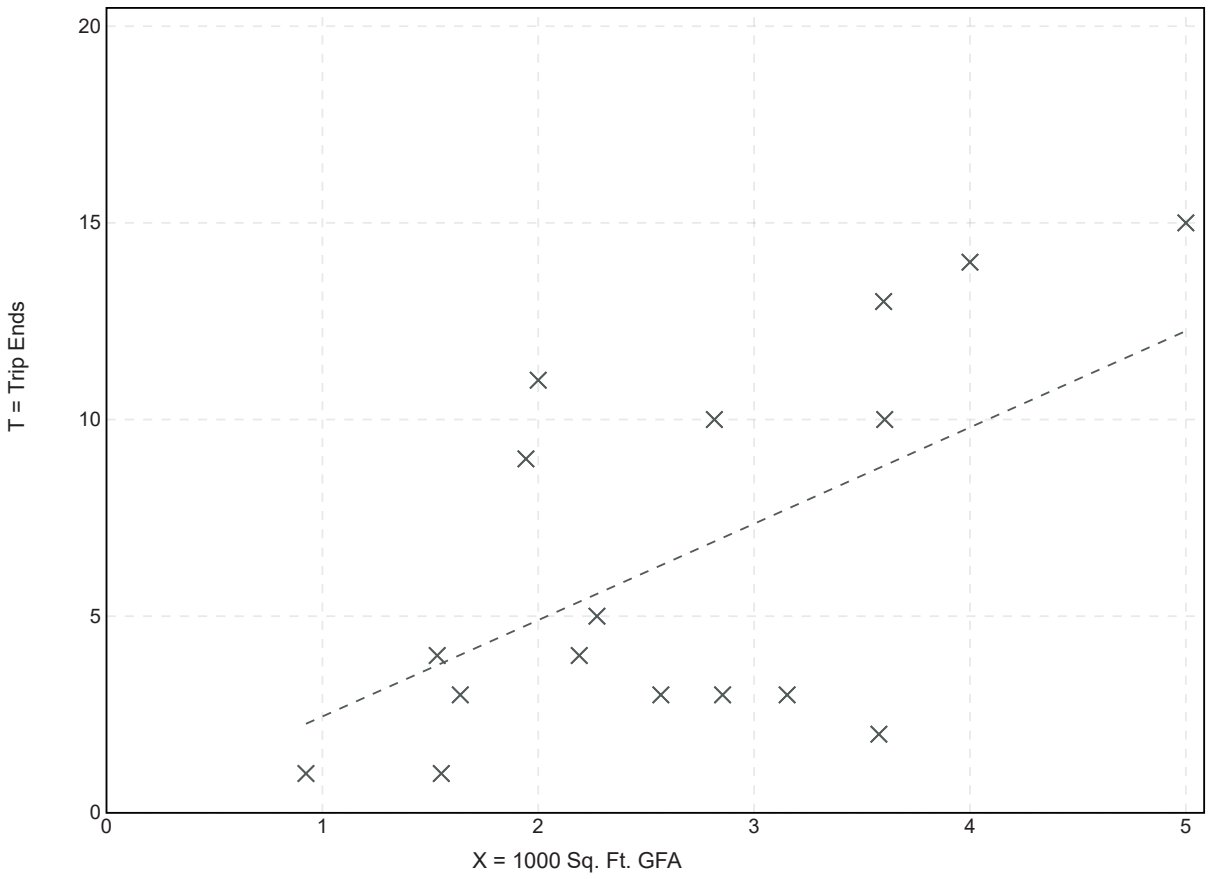
Small Office Building
(712)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 17
1000 Sq. Ft. GFA: 3
Directional Distribution: 32% entering, 68% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.45	0.56 - 5.50	1.38

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Small Office Building
(712)

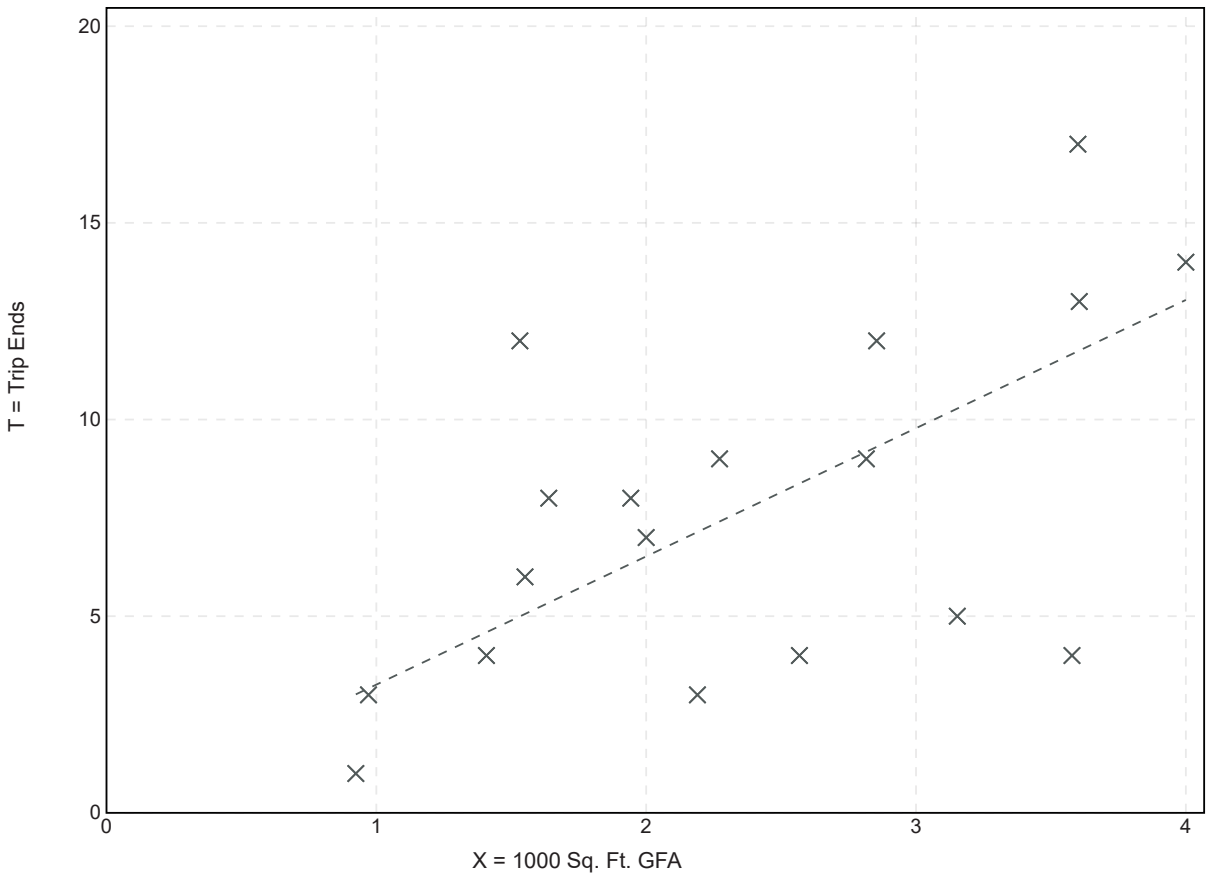
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 18
1000 Sq. Ft. GFA: 2
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.26	1.08 - 7.83	1.54

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Small Office Building
(712)

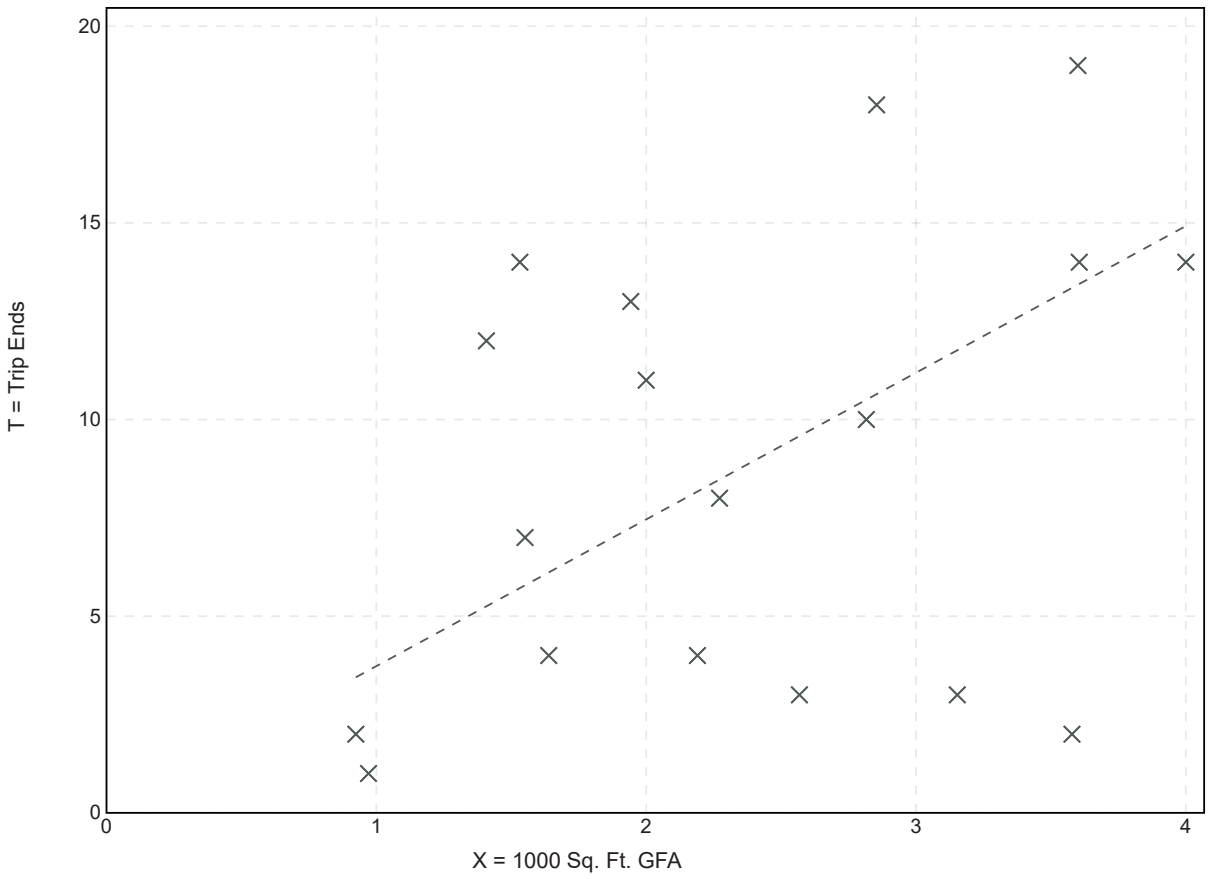
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 18
1000 Sq. Ft. GFA: 2
Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.73	0.56 - 9.14	2.37

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

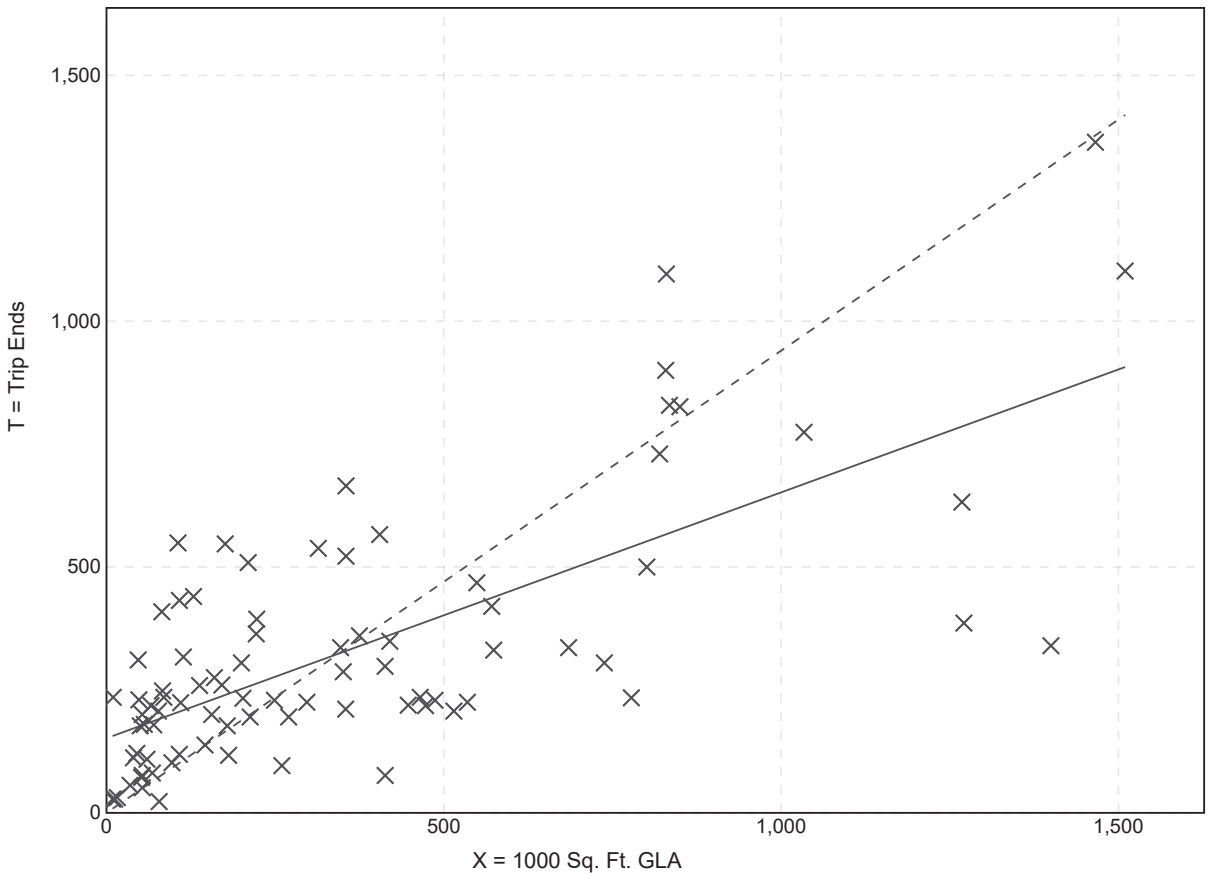
Shopping Center
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 84
1000 Sq. Ft. GLA: 351
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



Fitted Curve Equation: T = 0.50(X) + 151.78

R^2= 0.50

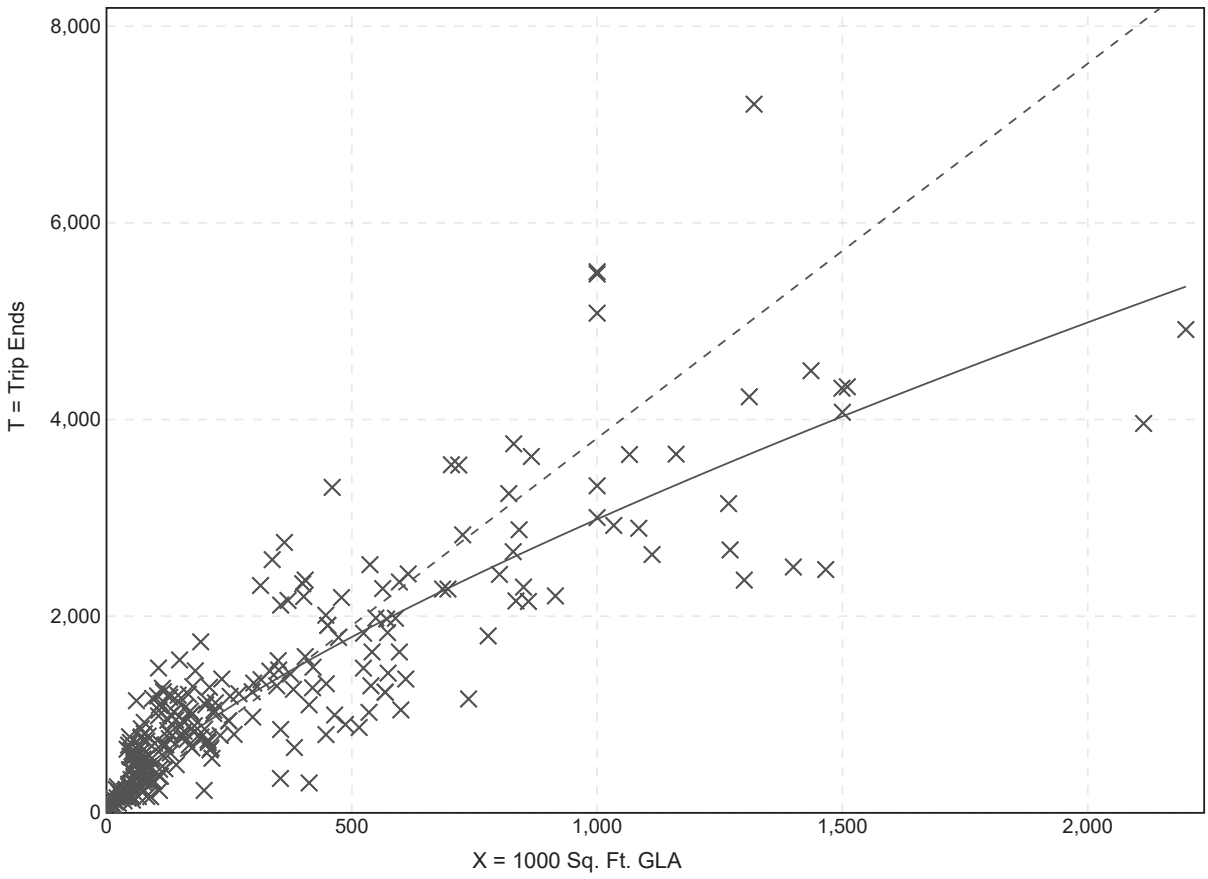
Shopping Center
(820)

Vehicle Trip Ends vs: **1000 Sq. Ft. GLA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 261
1000 Sq. Ft. GLA: 327
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.74 Ln(X) + 2.89

R^2= 0.82

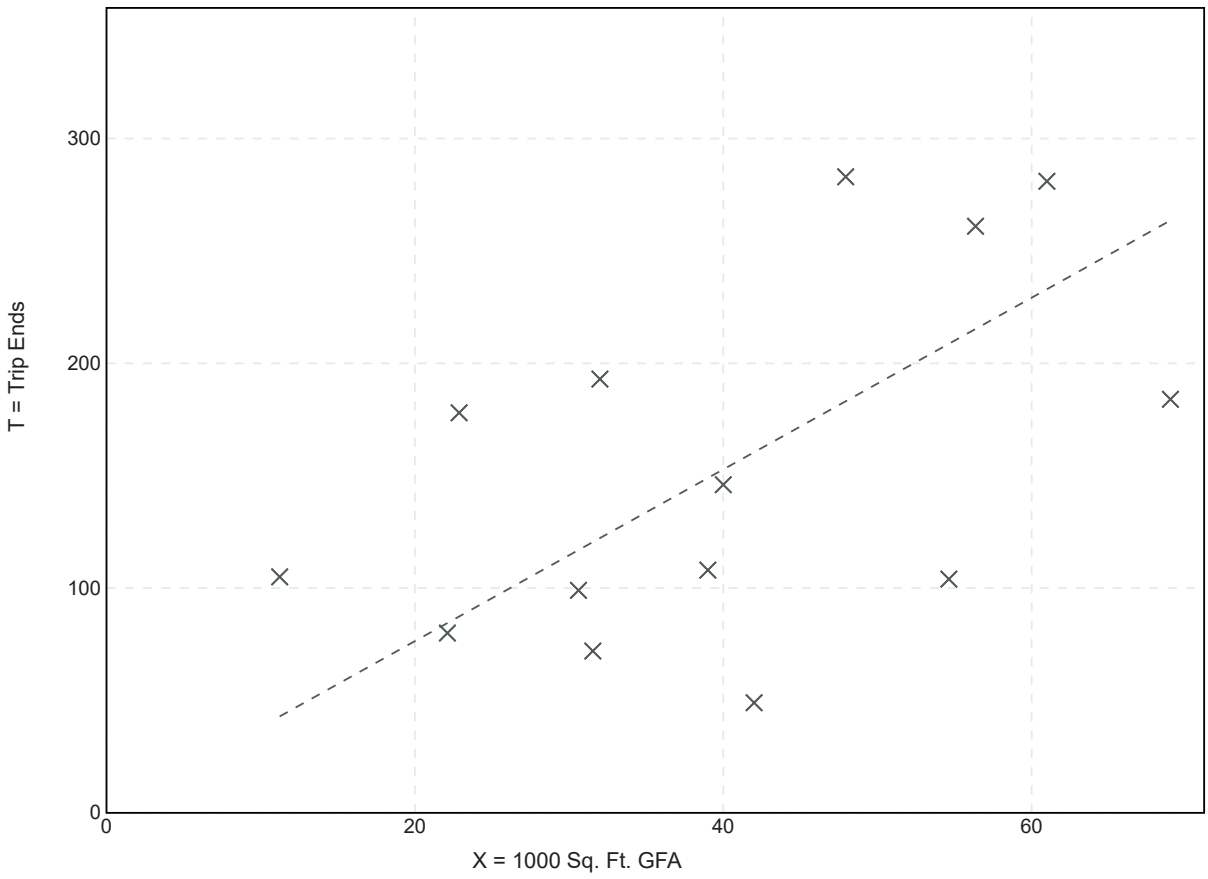
Supermarket
(850)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 14
1000 Sq. Ft. GFA: 40
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.82	1.17 - 9.35	1.89

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

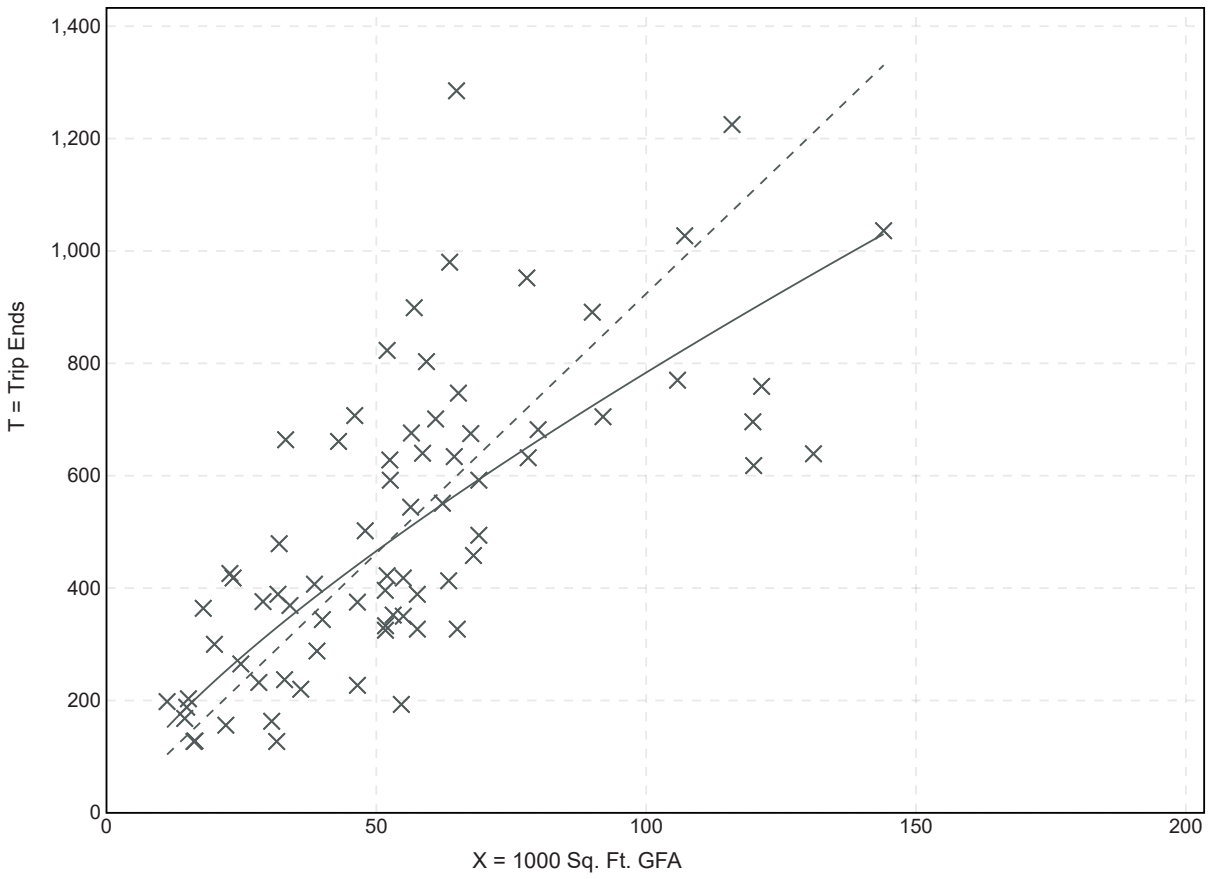
Supermarket
(850)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 73
1000 Sq. Ft. GFA: 55
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.24	3.53 - 20.30	3.69

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.75 Ln(X) + 3.21

R^2= 0.57

Supermarket
(850)

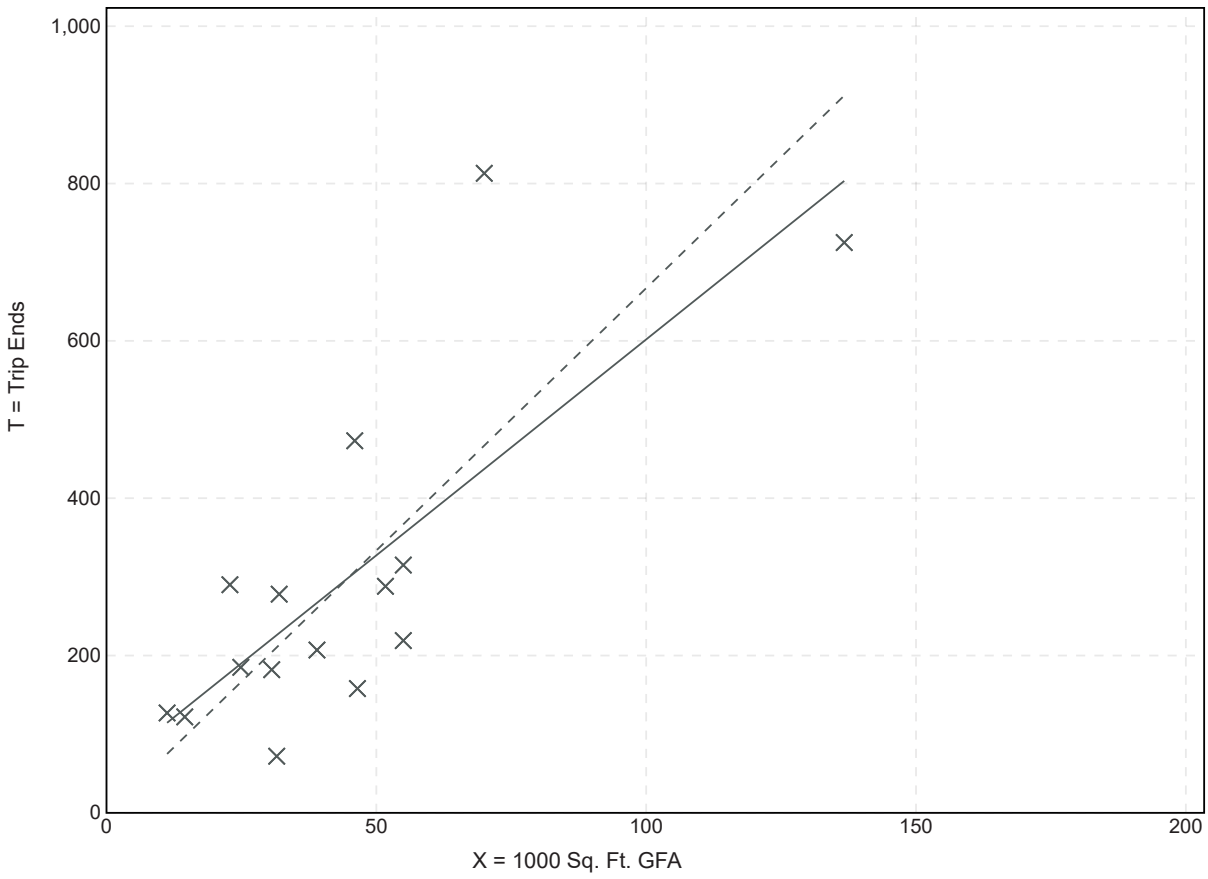
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 15
1000 Sq. Ft. GFA: 45
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
6.67	2.28 - 12.68	2.98

Data Plot and Equation



Fitted Curve Equation: T = 5.49(X) + 52.83

R^2= 0.59

Supermarket
(850)

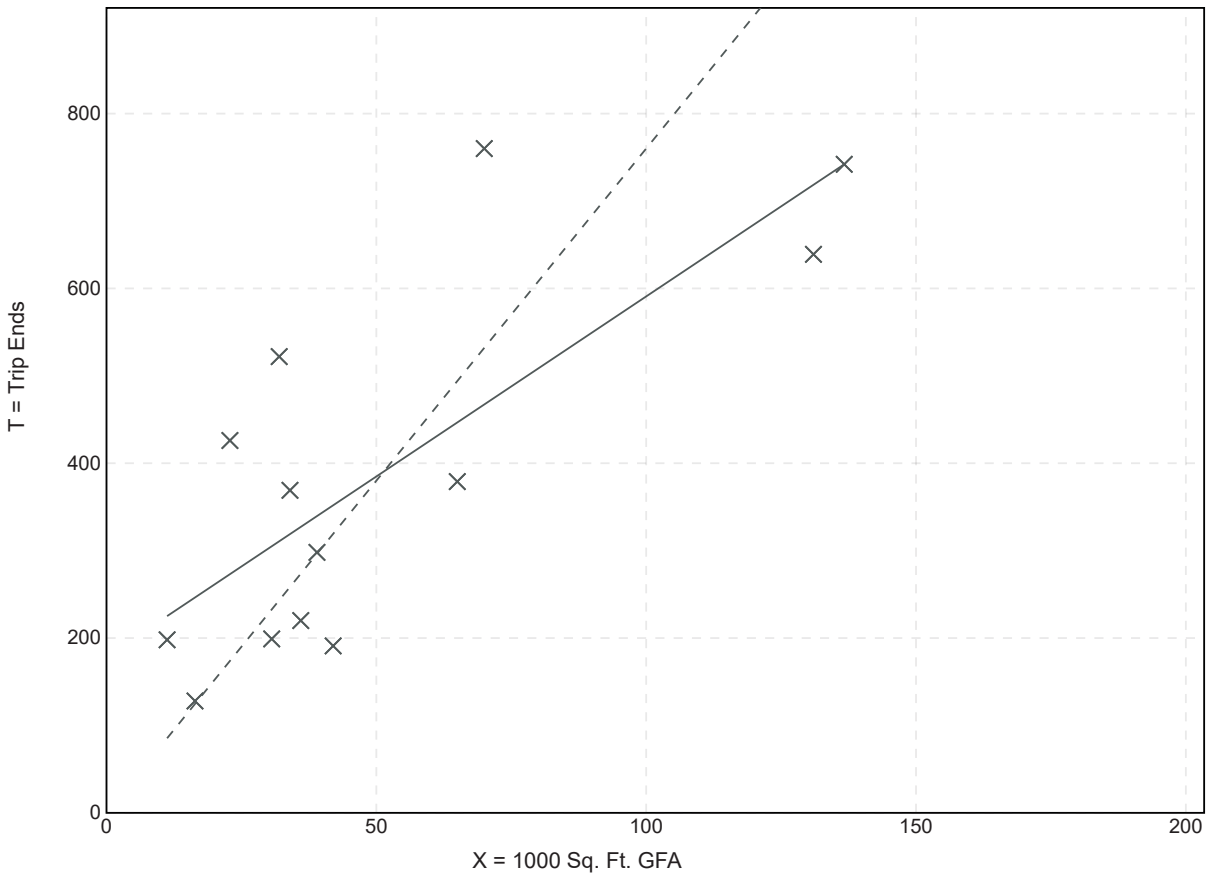
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 13
1000 Sq. Ft. GFA: 51
Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
7.60	4.55 - 18.63	3.98

Data Plot and Equation



Fitted Curve Equation: T = 4.12(X) + 178.83

R^2= 0.59

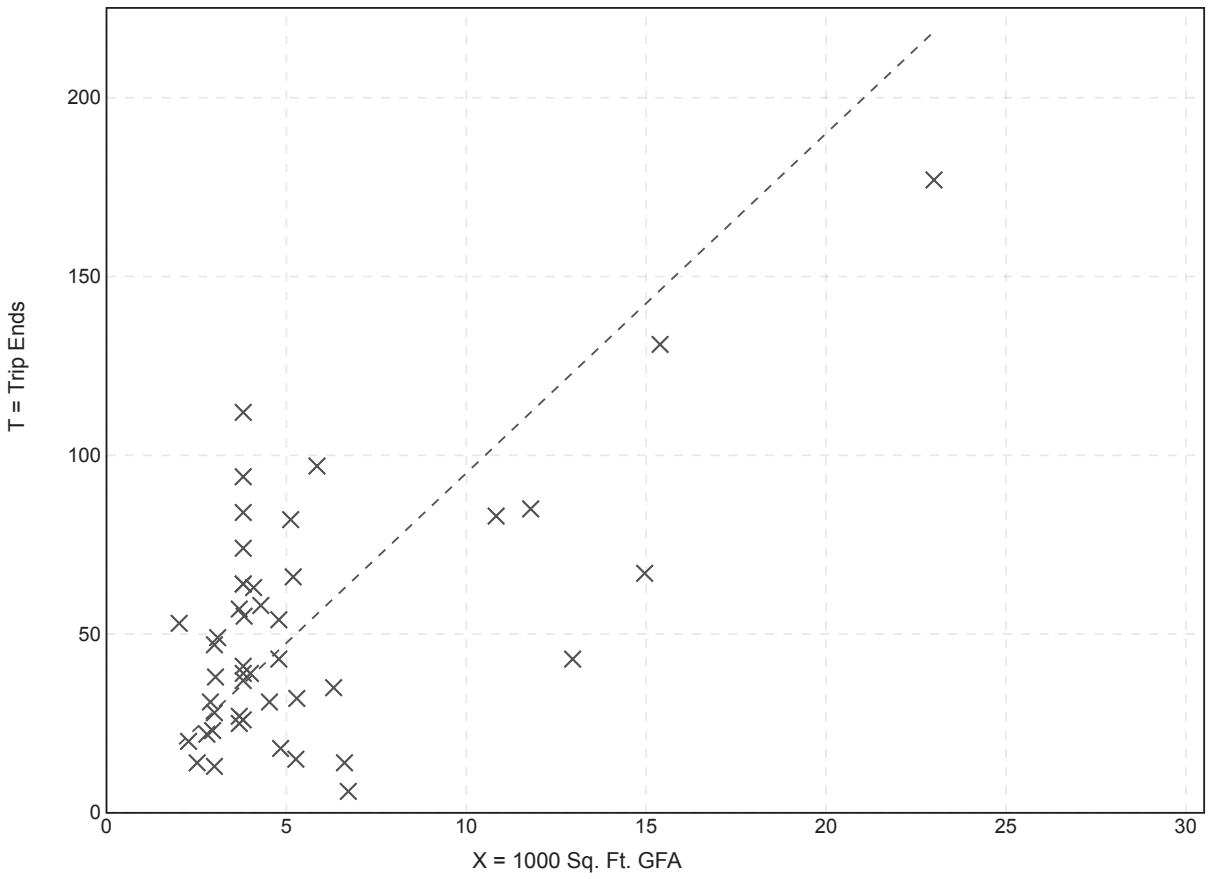
Drive-in Bank
(912)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 46
1000 Sq. Ft. GFA: 5
Directional Distribution: 58% entering, 42% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.50	0.89 - 29.47	5.85

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

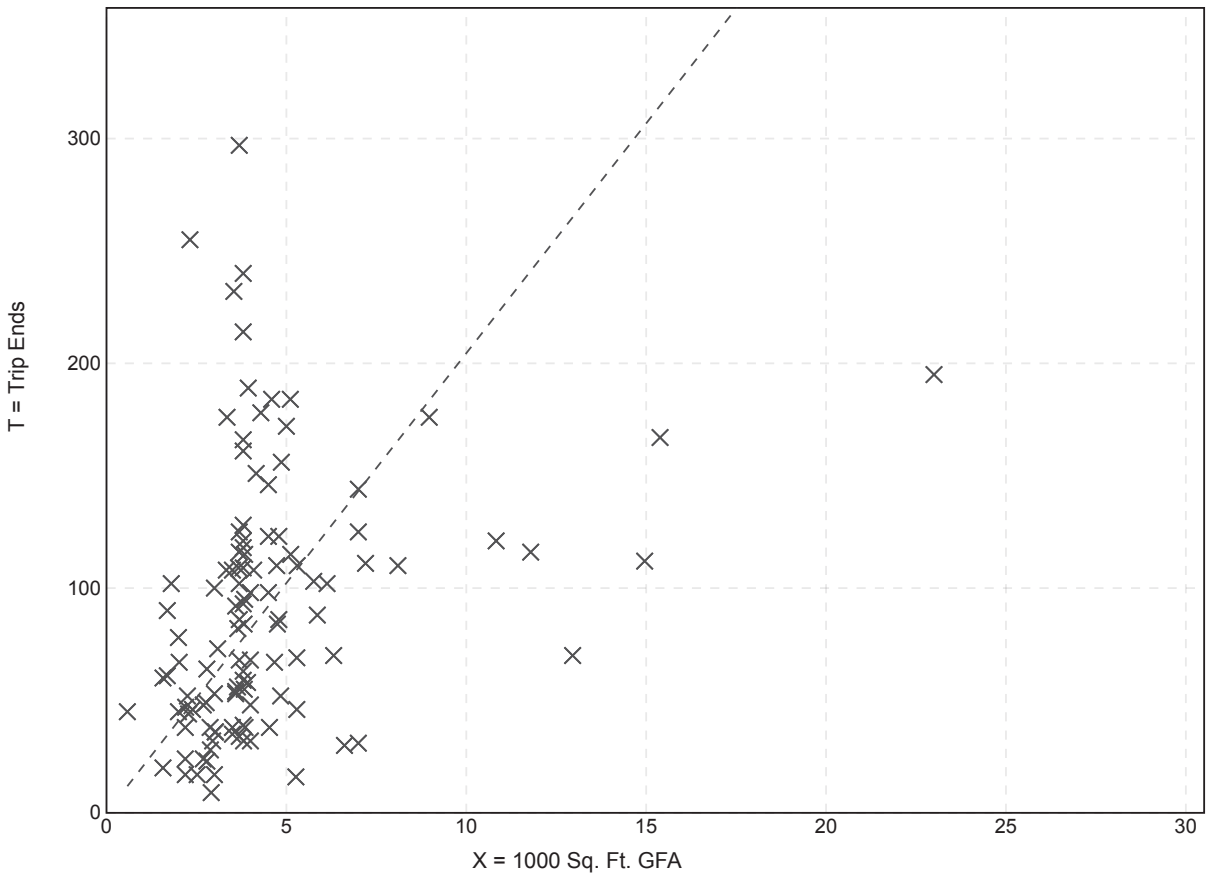
Drive-in Bank
(912)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 115
1000 Sq. Ft. GFA: 4
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
20.45	3.04 - 109.91	15.01

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Drive-in Bank
(912)

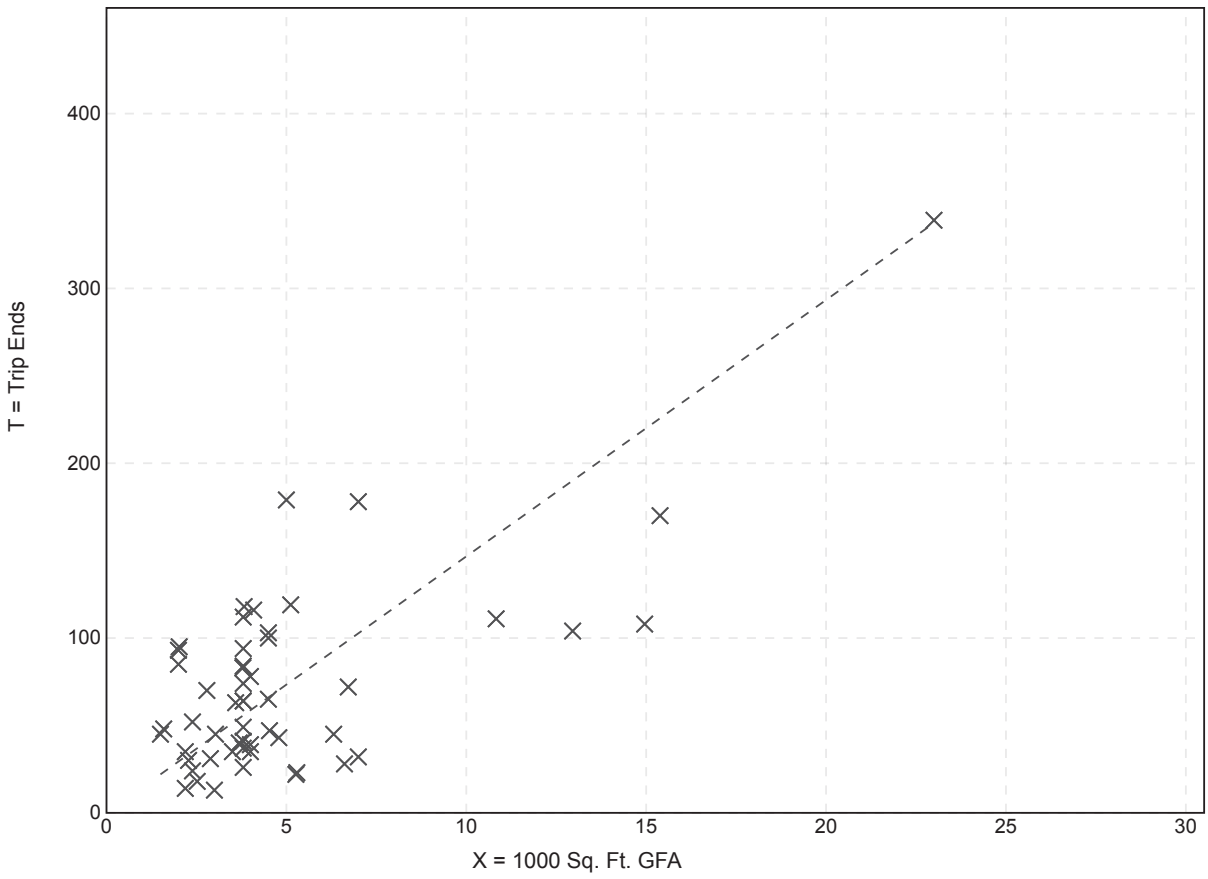
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 53
1000 Sq. Ft. GFA: 5
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
14.67	4.18 - 47.03	9.06

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Drive-in Bank
(912)

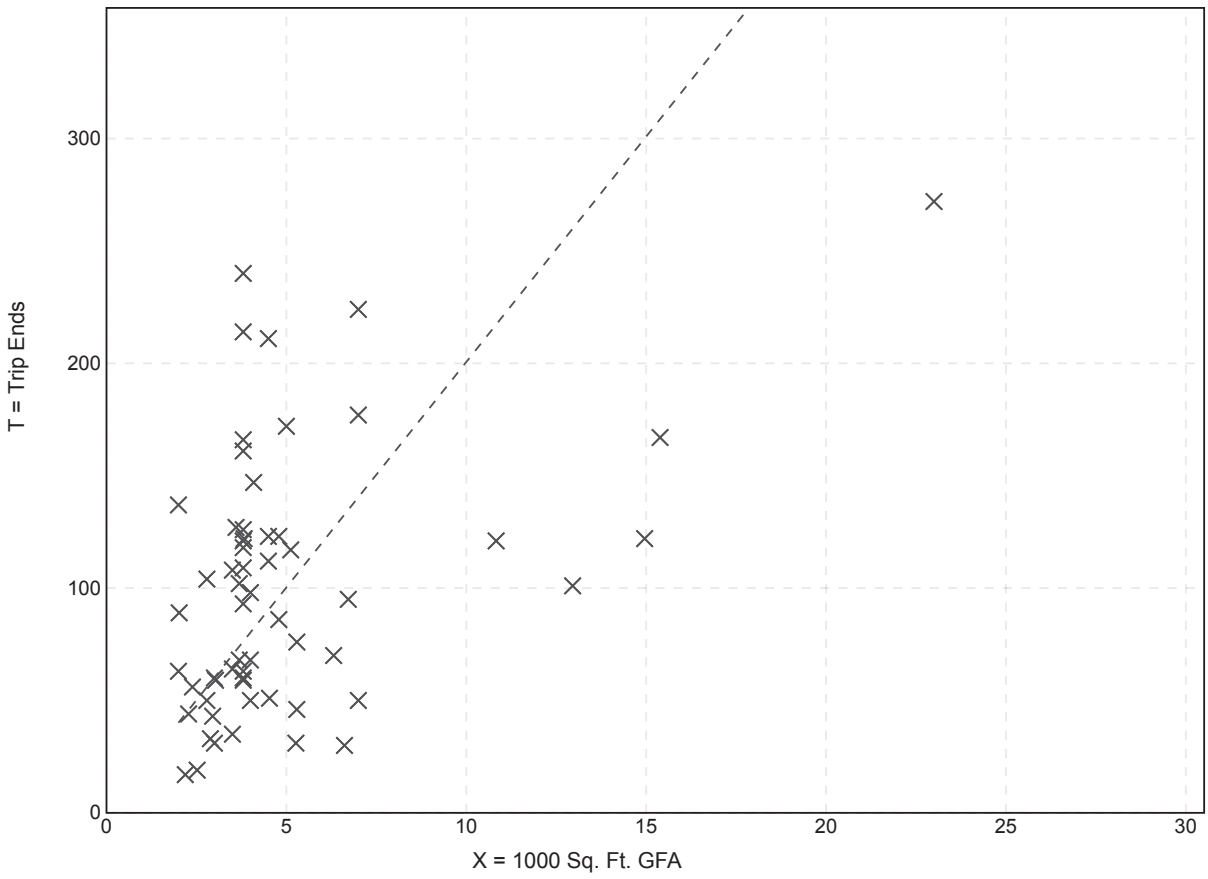
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 59
1000 Sq. Ft. GFA: 5
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
20.06	4.54 - 68.50	13.13

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

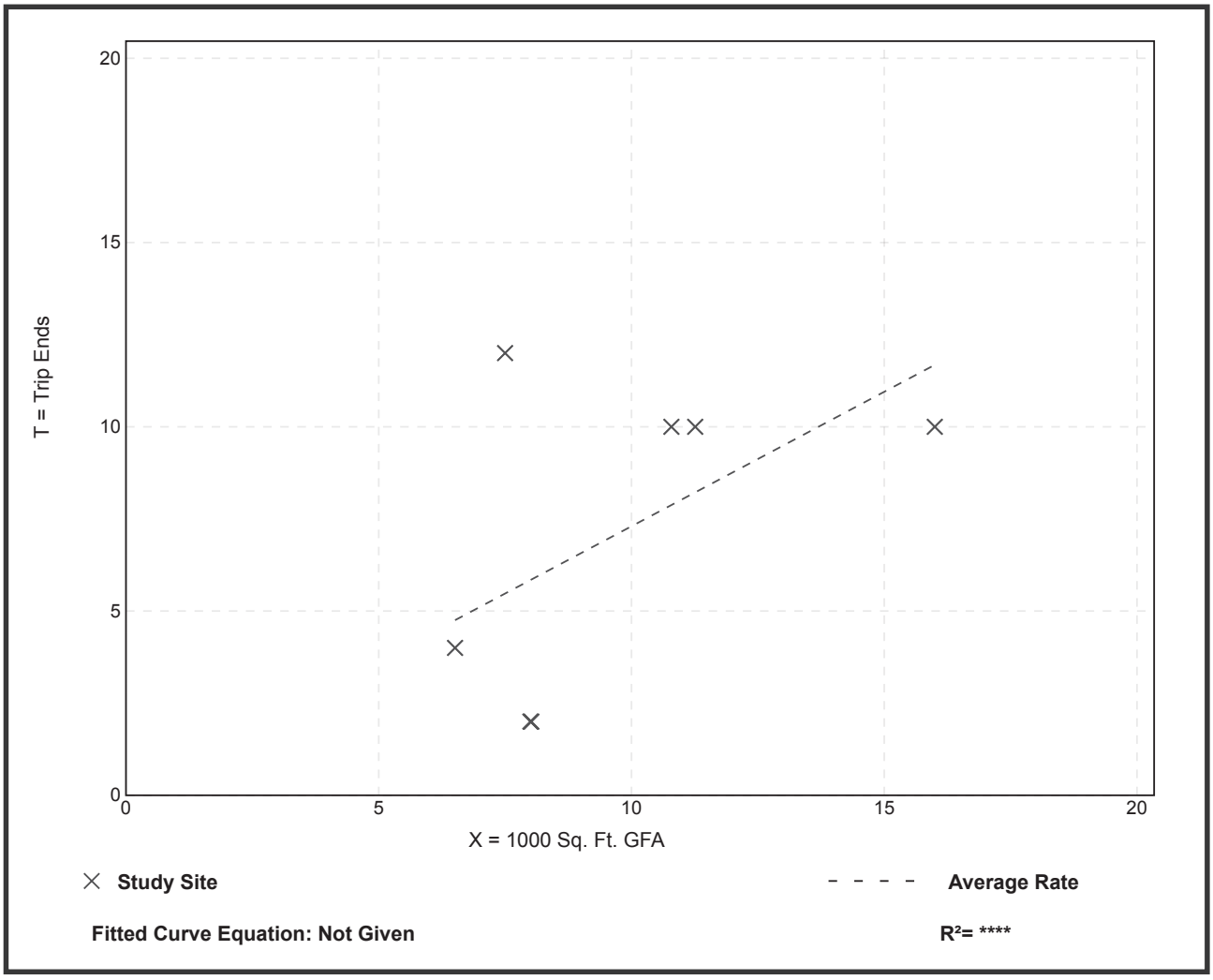
Quality Restaurant
(931)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 7
1000 Sq. Ft. GFA: 10
Directional Distribution: Not Available

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.73	0.25 - 1.60	0.42

Data Plot and Equation



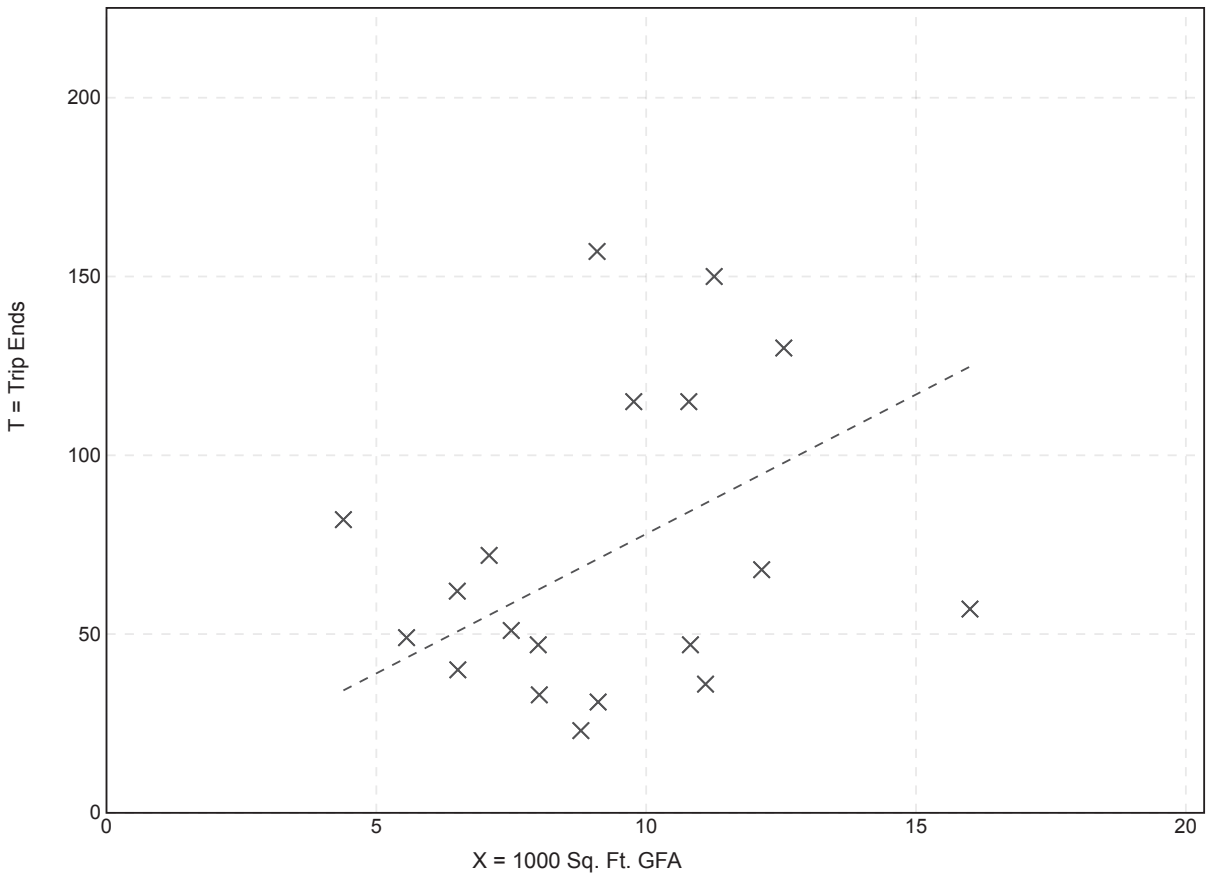
Quality Restaurant
(931)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	19
1000 Sq. Ft. GFA:	9
Directional Distribution:	67% entering, 33% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
7.80	2.62 - 18.68	4.49

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= ****

Quality Restaurant
(931)

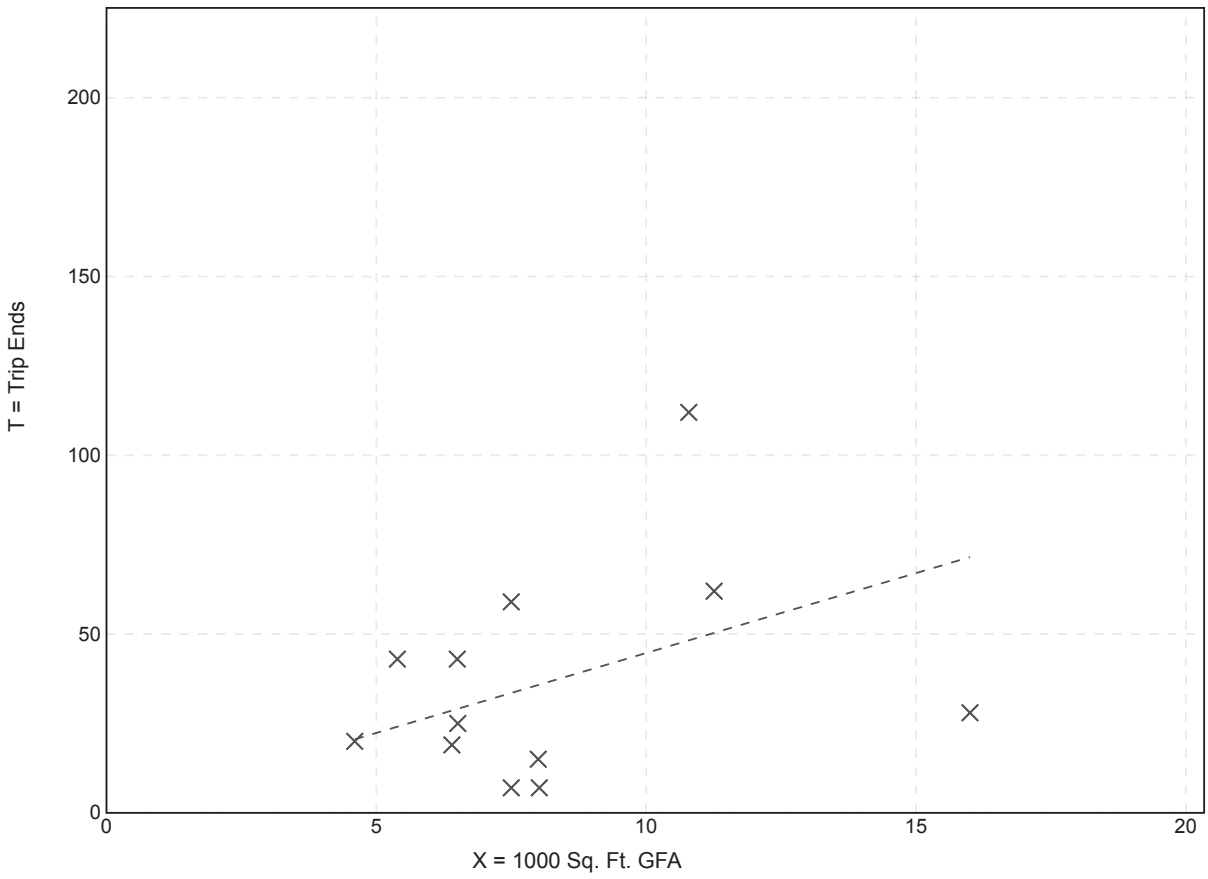
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 12
1000 Sq. Ft. GFA: 8
Directional Distribution: 80% entering, 20% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
4.47	0.87 - 10.38	3.26

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Quality Restaurant
(931)

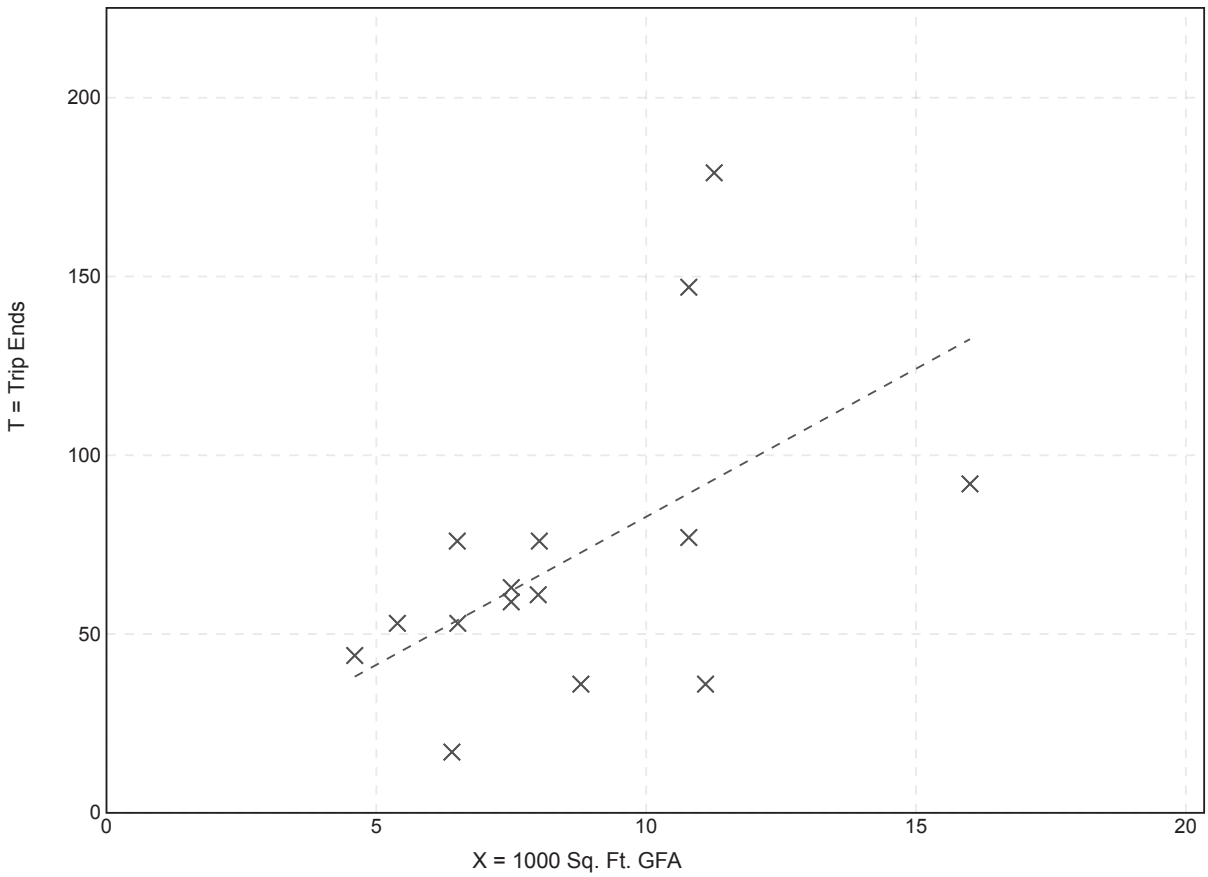
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
PM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 15
1000 Sq. Ft. GFA: 9
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
8.28	2.66 - 15.90	3.89

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

Exhibit 9

AM Peak Hour – Network Design Hourly Volumes – Full Build


45th Ave
AM Peak Hour
909
35
Calumet
1191
52
140
645
124
145
213
212
41
4
37
57
580
59
45th
236
381
331
268
862
189
63
626
48
4
36
42
N Centennial
1188
34
Village
1315
41
Greenway

Exhibit 10

PM Peak Hour – Network Design Hourly Volumes – Full Build


45th Ave
PM Peak Hour
1250
103
Calumet
1166
107
150
913
187
154
370
228
90
10
140
94
709
148
45th
205
685
345
318
914
228
145
1096
129
69
10
161
1487
90
N Centennial
Greenway
1467
84
Village

Exhibit 11

PM LOS & Queue Report – Full Build Conditions – Calumet Avenue & 45th Avenue – Dual Signals

HCM 6th Signalized Intersection Summary
1: 45th & Calumet

09/05/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Future Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	753	383	243	385	192	374	1039	265	240	1087	163
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	408	674	342	242	610	300	393	1031	262	258	1166	520
Arrive On Green	0.13	0.30	0.30	0.17	0.44	0.44	0.11	0.37	0.37	0.07	0.33	0.33
Sat Flow, veh/h	1781	2281	1158	1781	2308	1135	3456	2807	712	3456	3554	1585
Grp Volume(v), veh/h	277	586	550	243	295	282	374	656	648	240	1087	163
Grp Sat Flow(s),veh/h/ln	1781	1777	1662	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	12.1	32.5	32.5	10.9	14.1	14.5	11.8	40.4	40.4	7.6	32.6	8.5
Cycle Q Clear(g_c), s	12.1	32.5	32.5	10.9	14.1	14.5	11.8	40.4	40.4	7.6	32.6	8.5
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	408	525	491	242	469	440	393	653	640	258	1166	520
V/C Ratio(X)	0.68	1.12	1.12	1.00	0.63	0.64	0.95	1.00	1.01	0.93	0.93	0.31
Avail Cap(c_a), veh/h	456	525	491	242	469	440	393	653	640	258	1166	520
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.88	0.88	0.88	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	38.8	38.8	28.3	26.6	26.7	48.5	34.8	34.8	50.6	35.8	27.7
Incr Delay (d2), s/veh	3.5	75.3	77.7	55.4	2.4	2.8	33.2	36.5	38.9	38.0	14.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	24.7	23.4	7.9	5.3	5.1	6.8	23.3	23.3	4.6	16.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.3	114.0	116.5	83.7	28.9	29.4	81.7	71.3	73.7	88.6	50.2	29.2
LnGrp LOS	C	F	F	F	C	C	F	F	F	F	D	C
Approach Vol, veh/h		1413			820			1678			1490	
Approach Delay, s/veh		98.2			45.3			74.5			54.1	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	44.9	15.4	37.0	17.0	40.6	18.8	33.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.4	10.9	32.5	12.5	36.1	17.3	26.1
Max Q Clear Time (g_c+I1), s	9.6	42.4	12.9	34.5	13.8	34.6	14.1	16.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.1	0.3	2.4

Intersection Summary	
HCM 6th Ctrl Delay	70.6
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	277	1136	243	578	374	1304	240	1087	163
v/c Ratio	0.76	1.08	1.00	0.64	0.96	1.02	0.94	0.94	0.26
Control Delay	35.5	87.6	103.3	25.0	85.5	63.9	94.5	51.4	6.3
Queue Delay	0.0	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	95.5	103.3	25.0	85.5	63.9	94.5	51.4	6.3
Queue Length 50th (ft)	128	~451	~152	71	137	~490	88	388	5
Queue Length 95th (ft)	153	#586	#304	131	#210	#618	#131	#442	51
Internal Link Dist (ft)		527		437		357		316	
Turn Bay Length (ft)	255		290		435		245		250
Base Capacity (vph)	386	1050	242	901	390	1281	255	1161	622
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	118	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	1.22	1.00	0.64	0.96	1.02	0.94	0.94	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Exhibit 12

LOS Full Build & Queue Report – Calumet Avenue & 45th Avenue – PM Peak Hour with N Centennial Drive Roundabout – Fully Optimized Signal

HCM 6th Signalized Intersection Summary
1: 45th & Calumet

09/05/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Future Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	753	383	243	385	192	374	1039	265	240	1087	163
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	393	674	342	242	610	300	393	1031	262	258	1166	520
Arrive On Green	0.13	0.30	0.30	0.10	0.26	0.26	0.08	0.25	0.25	0.07	0.33	0.33
Sat Flow, veh/h	1781	2281	1158	1781	2308	1135	3456	2807	712	3456	3554	1585
Grp Volume(v), veh/h	277	586	550	243	295	282	374	656	648	240	1087	163
Grp Sat Flow(s),veh/h/ln	1781	1777	1662	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	12.1	32.5	32.5	10.9	16.1	16.5	11.9	40.4	40.4	7.6	32.6	8.5
Cycle Q Clear(g_c), s	12.1	32.5	32.5	10.9	16.1	16.5	11.9	40.4	40.4	7.6	32.6	8.5
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	393	525	491	242	469	440	393	653	640	258	1166	520
V/C Ratio(X)	0.70	1.12	1.12	1.00	0.63	0.64	0.95	1.00	1.01	0.93	0.93	0.31
Avail Cap(c_a), veh/h	441	525	491	242	469	440	393	653	640	258	1166	520
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.3	38.8	38.8	29.8	35.7	35.8	50.5	41.5	41.5	50.6	35.8	27.7
Incr Delay (d2), s/veh	4.4	75.3	77.7	59.0	2.7	3.1	33.2	36.5	38.9	38.0	14.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	24.7	23.4	8.5	7.2	7.0	7.1	24.7	24.7	4.6	16.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.7	114.0	116.5	88.8	38.4	39.0	83.8	77.9	80.3	88.6	50.2	29.2
LnGrp LOS	C	F	F	F	D	D	F	F	F	F	D	C
Approach Vol, veh/h		1413			820			1678			1490	
Approach Delay, s/veh		98.4			53.5			80.2			54.1	
Approach LOS		F			D			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	44.9	15.4	37.0	17.0	40.6	18.8	33.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.4	10.9	32.5	12.5	36.1	17.3	26.1
Max Q Clear Time (g_c+I1), s	9.6	42.4	12.9	34.5	13.9	34.6	14.1	18.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.1	0.3	2.1

Intersection Summary	
HCM 6th Ctrl Delay	73.7
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	277	1136	243	578	374	1304	240	1087	163
v/c Ratio	0.76	1.08	1.00	0.64	0.96	1.02	0.94	0.94	0.26
Control Delay	35.5	87.6	89.3	36.0	85.2	60.5	94.5	51.4	6.3
Queue Delay	0.0	0.4	12.8	0.0	0.0	0.0	0.0	2.1	0.0
Total Delay	35.5	88.0	102.1	36.0	85.2	60.5	94.5	53.4	6.3
Queue Length 50th (ft)	128	~451	~128	171	144	~507	88	388	5
Queue Length 95th (ft)	153	#586	#296	233	m#209	m#596	#131	#442	51
Internal Link Dist (ft)		527		437		357		316	
Turn Bay Length (ft)	255		290		435		245		250
Base Capacity (vph)	386	1050	242	901	390	1281	255	1161	622
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	1	10	0	0	0	0	27	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	1.08	1.05	0.64	0.96	1.02	0.94	0.96	0.26

Intersection Summary

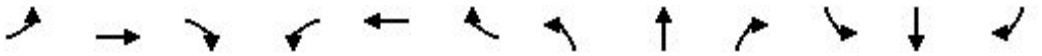
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Exhibit 13

LOS Full Build & Queue Report – Calumet Avenue & 45th Avenue – PM Peak Hour with N Centennial Drive Roundabout – Queue Sensitive Timing



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Future Volume (veh/h)	205	685	345	228	370	154	318	914	228	187	913	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	753	383	243	385	192	374	1039	265	240	1087	163
Peak Hour Factor	0.74	0.91	0.90	0.94	0.96	0.80	0.85	0.88	0.86	0.78	0.84	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	381	613	311	274	597	293	357	1108	281	234	1276	569
Arrive On Green	0.13	0.27	0.27	0.12	0.26	0.26	0.10	0.39	0.39	0.07	0.36	0.36
Sat Flow, veh/h	1781	2281	1158	1781	2308	1135	3456	2807	712	3456	3554	1585
Grp Volume(v), veh/h	277	586	550	243	295	282	374	656	648	240	1087	163
Grp Sat Flow(s),veh/h/ln	1781	1777	1662	1781	1777	1666	1728	1777	1742	1728	1777	1585
Q Serve(g_s), s	13.6	32.5	32.5	12.1	17.9	18.3	12.5	42.8	43.4	8.2	34.2	8.9
Cycle Q Clear(g_c), s	13.6	32.5	32.5	12.1	17.9	18.3	12.5	42.8	43.4	8.2	34.2	8.9
Prop In Lane	1.00		0.70	1.00		0.68	1.00		0.41	1.00		1.00
Lane Grp Cap(c), veh/h	381	477	446	274	459	431	357	701	688	234	1276	569
V/C Ratio(X)	0.73	1.23	1.23	0.89	0.64	0.65	1.05	0.94	0.94	1.02	0.85	0.29
Avail Cap(c_a), veh/h	404	477	446	379	459	431	357	701	688	234	1276	569
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.8	44.2	44.3	32.3	39.9	40.0	54.3	35.1	35.3	56.4	35.8	27.7
Incr Delay (d2), s/veh	6.0	120.0	122.6	17.1	3.0	3.5	56.1	18.6	19.9	65.4	7.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	29.9	28.3	6.4	8.1	7.8	8.2	21.5	21.6	5.7	15.7	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.9	164.2	166.8	49.4	42.9	43.6	110.4	53.7	55.2	121.8	43.1	29.0
LnGrp LOS	C	F	F	D	D	D	F	D	E	F	D	C
Approach Vol, veh/h		1413			820			1678			1490	
Approach Delay, s/veh		139.9			45.1			66.9			54.2	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	52.3	19.0	37.0	17.0	48.0	20.3	35.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.2	40.4	21.7	32.5	12.5	36.1	17.3	26.1
Max Q Clear Time (g_c+I1), s	10.2	45.4	14.1	34.5	14.5	36.2	15.6	20.3
Green Ext Time (p_c), s	0.0	0.0	0.4	0.0	0.0	0.0	0.1	1.7

Intersection Summary	
HCM 6th Ctrl Delay	79.2
HCM 6th LOS	E



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	277	1136	243	578	374	1304	240	1087	163
v/c Ratio	0.68	1.04	0.79	0.51	1.05	1.12	1.03	1.03	0.29
Control Delay	28.9	78.1	46.1	31.1	114.3	102.2	121.8	77.0	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.9	78.1	46.1	31.1	114.3	102.2	121.8	77.0	9.7
Queue Length 50th (ft)	128	~491	132	170	~164	~609	~103	~476	17
Queue Length 95th (ft)	149	#678	215	229	#241	#721	#150	#541	69
Internal Link Dist (ft)		527		437		787		521	
Turn Bay Length (ft)	255		290		435		250		250
Base Capacity (vph)	428	1088	377	1125	355	1166	233	1057	566
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.04	0.64	0.51	1.05	1.12	1.03	1.03	0.29

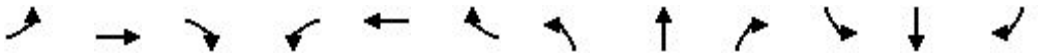
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Exhibit 14

LOS Full Build – 45th Avenue & N Centennial Drive – Signalized



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	1096	129	148	709	94	69	10	161	140	10	90
Future Volume (veh/h)	145	1096	129	148	709	94	69	10	161	140	10	90
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	158	1204	179	192	731	102	128	11	256	152	11	98
Peak Hour Factor	0.92	0.91	0.72	0.77	0.97	0.92	0.54	0.92	0.63	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	358	1324	590	236	1368	610	589	15	343	341	14	127
Arrive On Green	0.07	0.37	0.37	0.08	0.38	0.38	0.29	0.22	0.22	0.15	0.09	0.09
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	66	1529	1781	162	1447
Grp Volume(v), veh/h	158	1204	179	192	731	102	128	0	267	152	0	109
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	0	1595	1781	0	1610
Q Serve(g_s), s	5.9	35.4	3.6	7.2	17.5	2.9	1.4	0.0	17.1	4.3	0.0	7.3
Cycle Q Clear(g_c), s	5.9	35.4	3.6	7.2	17.5	2.9	1.4	0.0	17.1	4.3	0.0	7.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		0.90
Lane Grp Cap(c), veh/h	358	1324	590	236	1368	610	589	0	358	341	0	141
V/C Ratio(X)	0.44	0.91	0.30	0.81	0.53	0.17	0.22	0.00	0.75	0.45	0.00	0.77
Avail Cap(c_a), veh/h	389	1373	612	281	1444	644	589	0	358	341	0	284
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.1	32.8	4.0	25.5	26.2	8.4	27.7	0.0	39.7	40.2	0.0	49.1
Incr Delay (d2), s/veh	0.1	1.0	0.0	14.2	0.3	0.1	0.2	0.0	13.2	0.9	0.0	8.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	15.0	3.0	3.9	7.4	1.7	2.5	0.0	8.0	3.7	0.0	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.2	33.7	4.0	39.7	26.5	8.6	27.9	0.0	52.9	41.1	0.0	57.8
LnGrp LOS	C	C	A	D	C	A	C	A	D	D	A	E
Approach Vol, veh/h		1541			1025			395			261	
Approach Delay, s/veh		28.9			27.2			44.8			48.1	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.5	29.2	13.8	45.5	36.6	14.1	12.5	46.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.7	24.7	12.1	42.5	18.0	19.4	9.9	44.7
Max Q Clear Time (g_c+I1), s	6.3	19.1	9.2	37.4	3.4	9.3	7.9	19.5
Green Ext Time (p_c), s	0.2	0.8	0.1	3.6	0.3	0.3	0.1	5.8

Intersection Summary	
HCM 6th Ctrl Delay	31.9
HCM 6th LOS	C

Exhibit 14

LOS Full Build – 45th Avenue & N Centennial Drive – Signalized

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1541	1025	395	261
Demand Flow Rate, veh/h	1572	1046	403	266
Vehicles Circulating, veh/h	362	303	1544	1073
Vehicles Exiting, veh/h	977	1644	390	276
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.3	9.3	29.4	10.8
Approach LOS	C	A	D	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	L	TR	L	TR
Assumed Moves	LT	TR	LT	TR	L	TR	L	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.325	0.675	0.583	0.417
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	739	833	492	554	131	272	155	111
Cap Entry Lane, veh/h	968	1044	1021	1098	326	382	503	570
Entry HV Adj Factor	0.980	0.980	0.980	0.981	0.977	0.981	0.981	0.980
Flow Entry, veh/h	724	817	482	543	128	267	152	109
Cap Entry, veh/h	948	1023	1001	1077	319	375	493	559
V/C Ratio	0.764	0.798	0.482	0.505	0.402	0.712	0.308	0.195
Control Delay, s/veh	18.7	19.7	9.3	9.2	20.7	33.6	12.1	9.0
LOS	C	C	A	A	C	D	B	A
95th %tile Queue, veh	8	9	3	3	2	5	1	1

Building a Better World for All of Us®

MEMORANDUM

TO: Sergio Mendoza

FROM: Josh Woller, PE (Lic. (IN, FL, IL, WI)

DATE: November 21, 2025

RE: Centennial Village Traffic Study Review
SEH No. MUNST 183529 14.00

The following are comments submitted on behalf of SEH regarding the above referenced traffic study dated September 6, 2024. Updating the study should be considered based on the comments provided within this document.

General Comments for the traffic study:

Although this study is not being conducted for INDOT following the format laid out in the *Applicant's Guide to Traffic Impact Studies* would be best practice.

- Chapter 1
  - Since the completion of this study the Town has updated the traffic signal timings at the intersection of Calumet Avenue & 45th Avenue.
  - The intersection of Calumet Avenue & Superior Avenue/Centennial Drive should be included in the study since it provides direct access to the PUD and will see an increase in traffic.
- Chapter 3
  - It does not appear that the existing signal timings (2024) at Calumet Avenue and 45th Street were used for existing conditions analysis. As noted, the timings have been updated since the study was completed.
  - Table should include movement LOS and queues.
- Chapter 4
  - It is best practice to utilize the most current version of the ITE trip generation manual. The 11th edition was released in 2021. If a reason for using an older version was agreed upon it should be documented within the report.
    - A cursory review of trips using ITE Trip Generation Manual, 12th Edition was conducted. In general, the trips were relatively close with the exception of the Shopping Center.
  - Since all trips with the exception of Building A are proposed to use the same distribution combining all tables together is recommended to condense the report and to provide a total trip summary in the same table.
- Chapter 5
  - Understanding where cars will go once, they leave the site will help determine driveway distribution. Based on count data provided in Chapter 3, 22% of traffic is coming from the west, 18% from the east, 32% from the south, and 28% from the north. It is highly likely that most traffic to/from south will utilize the existing signalized intersection to avoid the

congestion at Calumet Avenue & 45th Avenue meaning more than 33% of traffic is likely to use the southern signalized intersection.
    - Description should be included on where the vehicles are going at each intersection. The reader shouldn't have to calculate this based off of existing vs build analysis scenarios.
    - Excluding Pass-by trips due to 'complexity' is not good practice. All types of trips should be properly distributed throughout the study network.
    - An across-the-board percentage increase is not an appropriate replacement for distributing trips throughout the study network.
    - Paragraph 2 is awkward and should be rephrased.
- Chapter 6
    - 45th Avenue & N. Centennial is also modeled as roundabout. That should be discussed here.
    - It would be more appropriate to include the LOS information in this section and likely just eliminate Chapter 7.
- Chapter 7
    - It would make sense to combine this with Chapter 6 since it is discussing LOS.
    - Typo on pg 15. 'Sever' should be 'severe'.
    - Tables should include movement delays and queues or a separate table for queues should be included since this is a critical item in determining the proper intersection control at N. Centennial.
    - Paragraph at the top of page 16 should be broken apart and placed within the control types discussed below.
    - Existing conditions don't need to be discussed again.
    - Include 95th percentile queues form SimTraffic.

Exhibits
- In general, exhibits should be visual tools to illustrate items.
- Traffic counts should be summarized on a single mapped exhibit.
- Development traffic routing should be shown in a single mapped exhibit.
- Build traffic volumes should be shown in a single mapped exhibit.
- Raw count data and Synchro outputs should be appendices, not the main source of finding data.

Additional Information

The Calumet Avenue corridor is extremely complex and any changes to access directly to the corridor or adjacent to the corridor need to be carefully considered. In addition to the review of the traffic study, a review of the pros and cons of each intersection control option at the 45th Avenue & N. Centennial intersection was conducted.

Roundabout

<u>Pros</u>
- Better traffic operations
- Less likely to have queues back up to the Calumet Avenue & 45th Avenue intersection
- No traffic signal coordination needed

<u>Cons</u>
- Larger footprint
- Higher construction cost
- Queues from Calumet Avenue & 45th Avenue could spill and block the intersection

Traffic Signal

Pros

- Lower construction cost
- Smaller intersection footprint
- Flexibility to adjust signal timing in the future.

Cons

- Worse traffic operations than the RAB alternative.
- Vehicle arrivals on red increase the potential for EB queues to back up to the Calumet Avenue & 45th Street intersection
- Complex signal coordination needed

Based on the pros and cons and the increased likelihood of traffic back-ups resulting from the installation of a traffic signal, a roundabout it likely to provide better functionality at the intersection and the project area as a whole.

Lastly, the proposed right-in / right-out access on Calumet Avenue to Building A should only be included if a right turn lane that has adequate length to allow for vehicle deceleration to be achieved.

Additional Review

This review document represents a preliminary planning level review. Additional reviews will be required of any design plans associated with this project.

jmw

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MUNSTER PLAN COMMISSION
MINUTES OF REGULAR MEETING
December 9, 2025

The Munster Plan Commission held a meeting on December 9, 2025, at Munster Town Hall, 1005 Ridge Road, in the Main meeting room and could be accessed remotely via Zoom webinar, a videoconference application.

Call to Order: President Baker called the meeting to order at 7:00 pm.

Moment of Silence and Pledge of Allegiance

Roll Call:
William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2025

Members in Attendance	**Members Absent:**	**Staff Present**
Jennifer Johns		Sergio Mendoza, Planning Director
Rachel Branagan		Nicole Bennett, Town Attorney
Joseph Hofferth		Denise Core, Administrative Assistant
David Nellans		
Roland Raffin		
George Shinkan		
William Baker		

President Baker said we have a quorum.

Approval of Minutes: None

Preliminary Hearings: None

Public Hearings:

PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue.

President Baker said that this is a continued public hearing. Attorney Bennet advised that this follows the normal course of introducing the petition. If there is any new evidence, the public has an opportunity to weigh in at the reopening of the public event.

Director Mendoza said the request here is for a new subdivision of Lot C, they are proposing 4 lots for 4 additional uses. At the last meeting, the Plan Commission received information regarding a roundabout because, at the previous meeting, the request was made by the commissioners to determine whether this was going to be a roundabout or a four-way intersection. They came back and said they were doing a roundabout, submitted updated documents, and then at the last month's Plan Commission meeting, they said they want both the four-way intersection and a runabout approved but the Plan Commission said that was not going to happen, they needed to decide. We received notification on November 25th that they will be proceeding with a four-way intersection for a four-lot subdivision. That is what's being proposed before the Plan Commission this evening. Since that time, we received a review from our engineer regarding the traffic study. There was a letter 2- or 3-page review letter submitted that outlines the impact based on the calculations from that traffic study. The results were that neither a roundabout nor a four-lane intersection was a better option; both required additional improvements at some point along the roadway corridors. The report for SEH said the roundabout would be slightly better at managing traffic circulation and impacts.

President Baker said that outside of doing this as a subdivision, taking from one lot to four lots, they are also looking at this as it relates to 45th Street, whether to put an intersection in or a roundabout. He asked if that was a Plan Commission thing. Director Mendoza said no, this is the request for a four-lot subdivision, however, whether it's a four-way intersection or a roundabout would impact the size of the lots. He clarified for President Baker that the Plan Commission is making their decision on whether it's an intersection or a roundabout in this petition and the recommendation from staff, based on our engineer's review of their traffic study, is to move forward with a roundabout.

Commissioner Raffin asked if staff had looked at the how the roundabout affects the intersection with Calumet Avenue and 45th Street. He said when coming home several nights, heading south, he would see the stacking that happens at that light and when heading west on 45th Street to go south on Calumet Avenue. With everyone coming to a dead stop, you'd have traffic at a dead stop at a roundabout just like at a stoplight. He asked if there was anything from the developer that would improve 45th and Calumet to make it better at the intersection. Director Mendoza said the report on the traffic study does mention that additional improvements should occur in conjunction with any improvement to that intersection, whether it's a four-way or a roundabout. It is noted that traffic will continue to get worse at full build-out, and it's actually double for full build-out with the proposed four uses, including the south part of the development itself. President Baker asked how much consideration was given by SEH to the development that's happening south of Main Street in Dyer, and the fact that everybody down there is going to get to the expressway on Calumet Avenue. Director Mendoza said the traffic study report does not include additional traffic volumes and patterns outside their scope of work. He said the traffic engineers are here

and probably better suited to interpret the traffic study itself and address those questions. President Baker said he is all for having investment in the community, but they need to make sure it's managed, not only for today and this development, but for the future and the next group of stewards that come after them, to make sure that this isn't creating more of a problem like some of the other areas of the region like Main Street and Indianapolis Boulevard. Commissioner Branagan asked about the expected timing of the traffic with the two options. Director Mendoza said he would defer that to the engineers for that interpretation. When there were no further questions for staff, he called on the petitioners to speak.

Mr. Russ Pozen of DVG at 1155 Troutline Road, Crown Point, Indiana, said they are the civil engineers. He said he had their traffic engineer who would speak upon this. He said we are talking about a plat to convert this into 4 lots. He said they are specifically requesting that it just be the traffic signal, which is the plat before the commission for the four lots. He said the original PUD has a traffic signal as a part of its requirements. He said he and their traffic engineer, and the town and the town's traffic engineer had a conversation recently to kind of coordinate some things, so he thought they were on the same page. He said some things very real to this development, and the reason they want to proceed with just a traffic signal, is a roundabout is a very lengthy construction project, especially for one as complex as this. It would be over a year and a half construction so that is a big issue for the traveling public right now, and to build that roundabout, the North Centennial Drive and 45th area would essentially be shut down for that entire construction period. He said that puts a lot of stress on Calumet and that 45th intersection and on the public and will make conditions even worse for a long, long time and that is that's not something that they want to see in the town right now. He said this development has curb cuts right now, and the drive lanes are ready and set up for a traffic signal. He said ordering the traffic signals does take a little time, but it's a lot quicker than the full build out of a roundabout. He said the developer can speak a little bit more if warranted, but they are under real timeframe issues with some of these developments that are coming, specifically with Sprouts and the Chase. They won't wait around for the construction of a roundabout. He asked his traffic manager to come up and get into some detail and answer some of the commissioner's questions.

Mr. James Hus of DVG at 1155 Troutwine Road, Crown Point, Indiana, introduced himself saying he has a 15-plus year background in transportation engineering, and he said he has intimate knowledge of this area. I was a Munster resident for the better part of his life up until 30 years ago, so he has seen the town grow. He has driven through the Calumet Avenue and 45th Street corridors both before and after the substantial improvements and investments the Town of Munster has made over the past 5 to 6 years. He said the study was developed over the past year; it conceptualized as part of the PUD, a 70,000 square foot grocery store, and at the time, it was known that Chase Bank, which was approximately 2,400 square feet, was interested in the property. He said they have a four-lot plat in front of them, which is different, but similar; they are still semi-comparing apples to apples. The most sensitive time at this intersection is the PM peak hour. He explained that the plan before them this evening represents a 19% increase in traffic in the AM, but it represents 20% less traffic in the PM. Those updates can be made to the report if they're asked to, but he wanted them to know the findings of the report are actually based on a higher traffic level than is being proposed in the plat before them this evening. He said the challenge of providing recommendations and improvements at this intersection is that a traffic engineer, or any engineer for that matter, has a toolbox, however, in the case of this specific area, there are very limited tools left. They have a communications tub for building in the southwest corner of the intersection, preventing adding lanes. He could tell them to add lanes but quite simply, they don't have the room for it. He addressed the question President Baker had made about the growth in Dyer and if they were forecasting that. He said

it's very difficult to accurately depict that, but when they develop traffic studies, they always incorporate some level of network growth. They apply this growth rate because they know development never stops. In the case of this study, there was a 5% growth rate built in (to the calculation). President Baker asked how they got a 5% growth rate when there are the 200 acres that are vacant in Dyer. Mr. Hus said he would argue that it's 5% growth rate of what is already 30,000 cars a day on Calumet Avenue; while it sounds like 5% is not a lot of traffic, 5% of 30,000 is actually a quite substantial growth rate when it comes to a traffic impact study. President Baker asked if that included the train going there. Mr. Hus said if there's a different growth rate that SEH prefers they use, they will certainly do that, but he was saying that there was network growth rate applied to the study; they did not skip that because applying growth rate is a very standard practice when you develop a traffic impact study. President Baker asked if Mr. Hus was saying that traffic's going up and up and up, and there's going to be more of it, but there's no room to do anything about it; he wasn't making any recommendations for improvements to the intersection. Mr. Hus said that was a very blunt way to put it. He said if there was room to add lanes to substantially improve the intersection, that might have been a tool that he could have recommended, but with so many property constraints separate from this development on the west and the north and south, that's not a card he has to play in terms of a recommendation. He said, getting back to the improvements at North Centennial Drive and 45th Avenue, he is not here to tell the Plan Commission that a traffic signal will be substantially better than a roundabout, but in his conversation with Josh from SEH, the one thing they both agree on is that neither option represents a substantial improvement over the other. He said Mr. Pozen just spoke to the timelines and construction impacts that favor the use of traffic signal, but he was not here to say that it's 50% better; It's not, it's a unique area and they don't have a lot of tools to greatly improve it. He said the core difference between his preference for a traffic signal and Josh's preference for a roundabout is that Josh's primary concern was ensuring that eastbound traffic doesn't back up into 45th and Calumet Avenue, which is a valid concern. He said that his primary concern was ensuring that traffic sitting at the red light going westbound doesn't back up into a roundabout when they're sitting on a red light. The one difference between the traffic signal and a roundabout is when you get to a traffic signal and there's a queue of cars in front of you, eventually a cars will stop going into the intersection. Whereas when if traffic starts backing up into a roundabout, the roundabout ceases to function. That's why when you design roundabouts, you don't put them in places where their volumes exceed 85% of their capacity. He was not saying he was right over Josh, but the reason for the separate recommendations is they are both prioritizing different concerns, both of which are valid. He said Calumet Avenue is most certainly an interconnected corridor where the signals work together. If a traffic signal were to be placed at 45th and North Centennial Drive, that would have to be synchronized with the system so that when southbound left turns are making their turns, or eastbound through Calumet, that would give as much deference so that the green time eastbound at that new traffic signal allows those vehicles to continue through. There will be more work to do to ensure that the timing plan optimizes the totality of the area. He clarified a specific point in the staff report and he was not stating that Director Mendoza was incorrect at all since the numbers he listed in the staff report on page 9 are very much correct. He said when you model intersections, control delay is the average delay that any single vehicle, on average, has to wait to go through the intersection. There are two methods that he has in his toolbox. One is the highway capacity manual, and one is a visual simulation or of how the cars move through the intersection. If you use the highway capacity manual, it looks at every intersection individually, with no consideration for the traffic moving 500,000 feet to the left, north, south, east, or west of it. He said there's no denying that if North Centennial Drive and 45th Avenue was a roundabout in the middle of a cornfield, and they threw a certain number of cars at it, a roundabout would operate better and that's what that number says, there's a 16.6 second control delay if a roundabout existed in a cornfield. If it was a traffic signal,

there would be 31 seconds of control delay. He said we all know that North Centennial Drive and 45th is by no means in a cornfield so when you model visual simulation, that's when we start to see the conditions that we all know exist today, as far as queues stretching back as far as they can. He said when that visual simulation happens, whether it's a traffic signal or a roundabout, that's when the performance becomes much, much closer together and presents the challenges that he identified and SEH identified. He said he was happy to field any questions that the commissioners have after this presentation. He reiterated that he is not saying he is right or SEH is wrong, the differential is that both of them are prioritizing different instructions. Councilor Hofferth said he appreciated the presentation. He said the property changing from one lot to four lots is obviously going to change the moving parts in and out; he asked if those four lanes would be able to sustain much more traffic. President Baker said with two spec buildings, we don't know what kind of tenants they're going to be. Councilor Hofferth said the second concern was that Calumet Avenue already struggles a lot, because in his opinion, the turn lane that goes north at Calumet and 45th should have been extended. He said he can't even imagine what it's going to look like with the increase in commerce and when everything in Dyer starts coming towards Munster and wants to turn onto 45th when it's a disaster already. He said that was supposed to expedite people through if there was a train and it's not doing that, because if you're not in the right position, you're going to have to stay and wait for the train. He said he also saw an idea of a right in, right out exiting Calumet Avenue coming into the property; that would also require another lane to kind of decelerate to turn in or turn out. He asked how that would work with what's already there. Mr. Hus said he would speak to Councilor Hofferth's second point first. He said there was a recommendation in the letter for a right turn lane. He said he had no doubt that the Indiana and every other DOT has volumetric thresholds for how many right turns versus how many other cars are in the lane when a right turn lane is warranted and it's different for a one-lane road, it's different for a two-lane road. He said he would certainly state that the number of right turns at that location will likely exceed what would otherwise be warranted for a right turn lane; he would also say is that there are truly a dozen other points in the Calumet Avenue corridor between Treadway and the expressway that also meet or exceed that warrant. He said whether it's because of right-of-way constraints or other reasons, the town has chosen not to provide right turn lanes. He said he is very familiar with the area, and he thinks he is 100% right, that is a stretch where there is not a single northbound right turn lane in that corridor. He said there is not even a right turn lane at Ridge, and we don't have one at 45th and Calumet. He is not arguing that it wouldn't be warranted on volume, but there is a deference given for consistency of corridor and it would be inconsistent with the Calumet Avenue corridor. President Baker said that intersection at 45th and Calumet was a part of this development. He said that's why there was a partnership between the town and the developer, part of that was to work on that intersection. He said it is a beautiful intersection; it just doesn't help move the traffic the way all of the studies and theories anticipated it to do. He said he understood Calumet and Ridge since that has been there since the 30's but this is the opportunity not to create another one of those down further south. He said that's the only reason it's becoming more and more of an issue not to mention the 45th right in, right out aspect. He said that is a challenge, because we continue to talk about Calumet Avenue having reduced curb cuts across the board and we're adding one. He said he had the same conversation about the curb cut when they were doing the first part of this (development) and that's causing a lot of challenges. He asked if that means they should do it again just because it was on the original plan and answered no because this is not the original plan; it keeps changing all the time. Mr. Hus said the only thing he would add is right turn lane or no right turn lane, the lack of a restricted access driveway on Calumet north of 45th would leave this quadrant with only one place to enter. That would then exacerbate the congestion at North Centennial and 45th because that would be the lot's only access point. President Baker asked Director Mendoza about the site review and what the fire department had to say about the

possibility of only one point of ingress and egress. He said he was sure the truck coming in from the north is not going to be able to go over that curb to get in there; they are going to the intersection. Director Mendoza said the fire department indicated that two points of access to the development are preferred. Mr. Pozen said that's what they have, and the right in, right out at Calumet does allow for a fire truck to get in and out. He said they would come from the intersection of Calumet and 45th; if they're going to get on that right in, right on at Calumet, they would have to go to the light and get north. President Baker said he didn't see anything about a D-cell lane on Calumet Avenue going into that right in, right out. Mr. Pozen said that was not part of this or it wasn't a part of the original. President Baker said that is a part of this; if we approve it, that's how it is and if it's not there and not approved, it won't go in. He asked what happens when the guy behind him is going 45 and he's slowing down to go to the bank.

Commissioner Branagan said she was, at first, all for the roundabouts. She has spent a lot of time in Fishers and Indianapolis where there are roundabouts everywhere and it works very well. She said she now understands about the traffic light If you're westbound. She had been looking forward to having a roundabout, but this might not be the right place for it. She asked why it takes so long to build a roundabout. Mr. Hus said when you construct a roundabout, there's maintenance of traffic, MOT is the engineering term. He said when installing a traffic signal to convert intersections, they might be doing some widening around the corners to make turns better, and essentially they're just plunking poles down; they have conduit they can push underneath the pavement as it sits there. It is connecting electricity, putting poles, maybe closing down a lane so they can we can expand wires, hang signal heads, energize it, and you're kind of there. He said with a roundabout, they have a straight road with a big circle in it; concrete needs to be poured, asphalt that needs to be laid, concrete needs to be cured, they have to close down and tear out a five lane section of roadway and that doesn't happen in a month. Commissioner Branagan said it was very unpopular this summer with the bridge that was closed on 45th, it caused a lot of disruption. President Baker asked if SEH said anything with regards to the construction timeline of the roundabout versus a signalized intersection. Director Mendoza said they listed pros and cons and cost, but he didn't recall a reference to a comparative timeline. President Baker said the bridge was down for the summer or 3 months and they're talking about closing this down for year. He said that would have a huge impact on the development and the businesses in them.

Councilor Nellans said he personally is for a signal; he is not a fan of roundabouts. He asked how many lanes the proposed roundabout would have. Mr. Hus said it must be a two-lane roundabout, that is, two lanes and likely more of a traditional two-lane roundabout in that the left lane as you enter will go through or left, and then the right lane will be an option to go through or right. Councilor Nellans asked if they were talking about closing that entire intersection during the construction to do the roundabout, or would they try to maintain traffic during the construction. Mr. Hus said they are not quite there yet, that work still needs to be done; he can't speak to any attempts to try to keep a lane open. He said there are pros and cons to that and whether it's actually just safer to detour. He said efforts will be made to investigate whether that's a possibility, but even if traffic is maintained, they firmly believe that the construction impacts that come with just installing a traffic signal would be substantially less. Councilor Nellans said he would agree with that, but he didn't think the roundabout would take a year. He thought it might be safer to shut down the traffic but that's a nightmare, and they've lived through that already.

Commissioner Raffin asked if they had thought outside the box to change the development layout of the property to make traffic flow better. He gave some examples and said they might have to lose some square footage, but the town would have adequate traffic flow in and would not be hung up at this intersection.

Mr. Hus said this area and the improvements to 45th have happened throughout his entire working career; he has seen it happen little by little and there are there are constraints in place. He said if he could move a lane or add a lane, that probably would have been in the recommendations, but he can't recommend that they should add a lane or buy some buildings that are less than 5 years old. Commissioner Raffin asked Director Mendoza if they had looked at the layout of this property with regard to traffic and the density that they're putting down there. Director Mendoza said the request was for our town engineers to review the traffic study. He said our engineers can be engaged in other regional or town-wide traffic studies and road improvements but that's different. President Baker asked if the staff had seen any other possible layouts for this particular site than what the commission is seeing with four lots. Director Mendoza said they are looking at everything the staff has received from site review through today. President Baker said they are doing what developers do which is to put as much square footage as they possibly can on the site, which is great, but this is now a parking field. He said we're looking at it a little bit differently than they had in the first part when this development came to the Plan Commission. At that time, it was all about walkability and that type of a situation but nobody's going to walk from Sprouts on this site, to go eat at Harvest Room. He said they have only option to look at how to subdivide this to maximize revenue and a return on investment for the developer, while still meeting some of the concerns of the municipality. There's got to be a win-win here, and with only one look, it's challenging.

Mr. Matt Kimmel, 631 Killarney Drive, Dyer, Indiana, said there were multiple site plans that they had considered with DVG and some other types of uses. He said the square footage they're proposing on the buildings that go on these four parcels is less, they are de-densifying. He said they're taking less return, because the buildings are less (square footage) than was originally planned. President Baker said he understood that but they're building four structures versus one structure. Mr. Kimmel said they are building less square footage, taking less of a footprint and giving them more parking. Councilor Hofferth asked what the approximate difference was in the reduction in density, or square footage. Mr. Kimmel said his recollection was about 65,000 total square feet compared to the original 70,000. Commissioner Johns said she was not particularly well versed in this; she would like to look to the future to see what the impact is over time but there are no speculations or guarantees of what would go into the additional two spots, or even what they would be used for over the course of time. She asked how they can put the buildings and the roads and all of those things together in the best possible way to yield the best possible future. Mr. Kimmel said, to clarify, the intended use for the building that's north of Chase is going to be a medical clinic open for typical business hours and the 3-story office building would probably be a medical office building. He said those are the intended users, not retail, so there would be less visits and so forth.

Commissioner Branagan asked the reason for staff recommending that the Plan Commission table, that is, what else was Director Mendoza waiting for. Director Mendoza said the request to table was based on the impact to the road system here. He said within the staff report, it does identify and he highlighted this, that you don't want westbound with a traffic light backing up, however within the traffic report itself, they talk about visual simulation. He quoted, "...vision simulation of the intersection performance conformed with ensued spillover will consistently occur for the westbound left turn lane, Calumet Avenue back to the North Centennial Drive intersection, including some westbound traffic from proceeding through the North Centennial Drive intersection". He said in this way, the traffic report itself is addressing, through the signal, what their concern is. He said there needs to be a more thorough review of this. He thought other components were missing like what the traffic would look like with one building, one lot and if that would change the overall review. He said what the commission has before them is a traffic study of the intersection for 4 uses on 4 lots and indicates that full build-out will double the traffic volume.

He asked if there were other plans in place to alleviate this traffic; staff supports development but at what cost. Commissioner Johns asked if there was a traffic study done when it was originally platted for one building and the light was approved within the PUD. Mr. Kimmel said he didn't think there was a traffic study done in 2013. He said the way he would answer the question about the deferral is a little bit different. He said they had met that morning after the town engineer review came in and he thought it would be good to move forward to have the meeting instead of deferring. Director Mendoza said that was part of the reason but the change from the proposed intersection to a roundabout, then back to a four-way intersection which is supported in the PUD conflicts based on the traffic engineering review. There's not much of a change, a slight separation in seconds, but it does merit some discussion to tell them how to address some of these other recommends in the staff report to help alleviate this, regardless of whether it's a roundabout or a four-way intersection. The request is 4 lots for 4 additional uses, there may be a reduction in the overall square footage, but they are also changing the lots and the uses which will affect traffic volumes.

Mr. Hus said this is not to replace an updated traffic report, but he wanted to make it clear that in the PM peak hour, which is the most critical hour, the plat before the commission is 20% less traffic than the numbers that were used in the study in the SEH review. He said that is not to say that everything will be rosy, but the traffic before them is not more than in the SEH study. President Baker asked how it could be 20% less; he asked if that was just for the plat they're looking at or is it for the entire PUD development. Mr. Hus said he is talking about just this corner. He said he doesn't come up with the numbers; he has a very thick manual from the Institute of Transportation Engineers. He said the original values that were used in this study assumed a 70,000 square foot grocery store and a 2,400 square foot drive in bank. That resulted in the numbers that were in the study and were mentioned in the staff report. He said when you look at a smaller grocer, and every land use generates traffic differently, it has a higher or lower peak hour. When you look at the use in the manual, you look at the square footage, and it tells you how much traffic in and out by the time of day since proportions in the morning are different from proportions in the evening. They know what's coming into a property, you add them all up, and that's what you can assume. He said what faith you put in that book is up to the individual, he was just saying that by the book, the PM peak hour of this four-lot plat Is about 20% less than if it was just the bank or just a much larger grocery.

Attorney Bennett asked if he was basing the numbers on medical uses. Mr. Hus said he will run it again, but he used general office for the numbers that he mentioned. He said medical is slightly higher than general office, because it has more turnover of patients coming in. Attorney Bennett said she trying to reconcile the uses to the PUD Amendment document to make sure the uses that are contemplated are supported in the PUD standards document and that the traffic study uses are consistent with the listed uses on the Centennial Village Design Standards Revised, page 9. She said she was reading from their plan which shows A would be the grocery, A1 would be the bank, A3 would be retail, single-story, and A3 would be a 2-story or 3-story office, and she wants to clarify that. Mr. Kimmel said they have signed ROI for the building north of Chase, that's a medical clinic, that is A2, in pink. He said the purple is also intended but he doesn't have any product included.

There a was a lengthy discussion driven by Attorney Bennett regarding the planned uses for the PUD and the amendment they are working through where the uses also impact the traffic study. The point of the PUD amendment was to set the standards for the PUD so the future development fall inside those PUD

standards and another amendment is not needed for the development of the 2 remaining lots. She was stressing that the documents include what is proposed.

President Baker said he had been involved in this development since 2014 and he would like to see more things happen and get finalized from the original plans and approvals, particularly the residential and the hotel.

Commissioner Raffin addressed Mr. Hus and asked if a medical use would change his calculations on traffic. Mr. Hus said whenever anyone does a traffic study, there are always assumptions made because they are so far down the road. Oftentimes, they have the lot configuration, but they don't have a specific tenant. He said the in the numbers they were talking about, the reduction, they had assumed generic retail, office, a bank with a drive in, and a grocer; any update to the study would reflect a medical office of some kind which is slightly different than a general office, a law office, for instance. He said it will be different since it's a different land use code but they're not talking about a differential of anything like 2 times when comparing a law office to a medical office, but medical is more. Commissioner Raffin said he understood that, but they should run those numbers, and the town engineer should review those numbers.

President Baker asked Attorney Bennett about this resubdivision to make sure this is not a recommendation to the Council. Attorney Bennett said he was correct in the sense that this the plat has to be approved by the Plan Commission first; all the rest cannot be finalized until this is established, because of the detail that the plat sets forth is what has to then be put forth in the standards and everything else. The plat is incorporated as part of the PUD plan and the PUD ordinance; those standards are encompassed in and is part of PUD and goes to the Council. In the way, the plat that is approved by the Plan Commission will be part of the ordinance approval.

President Baker opened the public hearing. There were no public comments. The public hearing remained open.

Motion: Commissioner Raffin moved to table PC Docket No. 25-015 until January 13, 2026, including all discussions and findings.
Second: Councilor Hofferth
Vote: Yes – 6 No – 0 Abstain – 0 Pass – 1 Motion carries.
Councilor Shinkan passed

President Baker asked Director Mendoza and Attorney Bennet to provide a list of items requested and for the petitioner to provide what's requested so they can get these petitions moving along.

PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue

President Baker opened the public hearing. There were no public comments. The public hearing remained open.

Motion: Commissioner Raffin moved to table PC Docket No. 25-016, until January 13, 2026, including all discussions and findings.
Second: Councilor Hofferth
Vote: Yes – 6 No – 0 Abstain – 0 Pass – 1 Motion carries.
Councilor Shinkan passed

PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street.

President Baker opened the public hearing. There were no public comments. The public hearing remained open.

Motion: Commissioner Raffin moved to table PC Docket No. 25-017 until January 13, 2026, including all discussions and findings.
Second: Councilor Hofferth
Vote: Yes – 6 No – 0 Abstain – 0 Pass – 1 Motion carries.
Councilor Shinkan passed

PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.

President Baker opened the public hearing. There were no public comments. The public hearing remained open.

Motion: Commissioner Raffin moved to table PC Docket No. 25-018, until January 13, 2026, including all discussions and findings.
Second: Councilor Hofferth
Vote: Yes – 6 No – 0 Abstain – 0 Pass – 1 Motion carries.
Councilor Shinkan passed

PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.

Director Mendoza said this request is for a four-lot subdivision; they are proposing to take a one-lot subdivision and parcel it out into four additional lots. Referencing page 3 of the staff report, he said they are proposing the lot in yellow as an outlot and the lot in red is a two-story self-storage facility. They would then be making a lot of record for the Danny Z's building, and the strip mall shopping center would have its own lot. As part of this subdivision, they have included sign easements and cross-access easements. He said the one thing they are still lacking from this subdivision is the review from the town engineers in regard to stormwater, and the management thereof, as well as a quote or estimate of the costs for other infrastructure improvements that will get attached to that approval. The infrastructure improvements would be tied to the subdivision process in the form of surety, so the town is protected in case the developer fails to perform the public infrastructure. President Baker asked when that usually

shows up. Director Mendoza said it shows up at the final plat approval, but it's recommended in the preliminary plat as part of the motion for approval.

There was a discussion about the need for the surety and all the required documents to be presented to the Plan Commission at the start of the petition process to avoid wasting time. Attorney Bennett said that, historically, has not been the position that's come from prior councils. She said it becomes a policy call, because the developers push to get things started. Director Mendoza we are unique in the sense that we don't have the policies and procedures guidelines for BZA and Plan Commission, whereas other communities have that, and they specifically spell out that staff shall not accept petitions unless all the boxes have been checked. The developers know they have to meet those qualifying requirements within the rules and procedures. Attorney Bennett went a step further by saying there is the policy, and there is the backing by the elected officials and department heads that support that. She said her experience in many towns is the push comes to get something through a little faster so they'll submit the information (later), and then that becomes the practice, even with rules in place, so it really does come down to having that enforcement, telling people no until they do all of their work and present it, and present it in time for staff to review- not the day of or the day before a meeting. Additional discussion ensued on the procedure and how to make it more efficient in future.

Director Mendoza concluded his briefing by saying that the staff report included that he did not receive any review of the stormwater or an estimate so, in this case, it is not the fault of the applicant, it's just additional information that we need to supply for this request. President Baker asked if there were any other questions for Mr. Mendoza. He reminded the commission that this is about the resubdivision, determining the lot lines to be recorded with the county, then they will move through the other aspects of the development. He invited the petitioner to speak.

Attorney Scott Yahne, 3 Lincoln Way, Suite 201, Valparaiso, Indiana, introduced himself and said they do own some of this and he wanted to set the stage up front. He said with the Veteran's Day holiday, it's been 3 weeks since they got back together, a week earlier than we normally would reconvene. He noted that Thanksgiving was during that time as well. He said he had some handouts that were not tied directly to the subdivision, but the architect sent something today. He knew that is not enough time for Director Mendoza to review but he was hoping to at least advance the discussion so that when they come back in January, they can address all of these items. He said, in this petition, he had Tom Connolly with him, he is one of the developers. Jared Decote, the architect, was on Zoom so he would be available to listen and join in if needed.

Attorney Yahne said for the preliminary plat subdivision they are proposing a four-lot subdivision. He said in the preliminary meeting, there were questions as to why they drew the lines where they did, why they need four lots, and there were concerns about parking. He said they had Stuart Allen and Torrenga to help them lay this out. They have a one lot PUD, a one lot subdivision right now. He said what they need is a second lot at the back of this PUD. At some point in the process, possibly in site review, it was suggested that they consider making the lot that's developed for Danny Z's, and then they contemplated future development on the northwest corner to make that another lot, presumably so they could apply some standards when the Plan Commission considers a development plan someday. He said they're going to cover this entire property with cross-easements so that parking accesses all of the spaces here. If the Plan Commission says drawing the lines for the two outlots doesn't make sense, they want to listen today and make accommodations based on those contributions. He said another item that was raised

was about the access that exists right now. He said that it's observed, but it doesn't exist legally anywhere. Once the developers acquire the property, if they need to make it a commitment as part of this process, they will commit to providing a cross-easement that will serve that other property to clean up something that wasn't done before. He said they're open to that and they will reflect it in their documents as necessary. He said they will also unify their spelling of the word "pavilion" (with one l) in all of the documents. He said they have also updated the PUD standards; he had given a rushed version of an update to Director Mendoza right before the last Plan Commission meeting; it had the word November, and it had a typo in it. He has since done a complete update of that document, including some contributions that Attorney Bennett had forwarded to him for consideration after the meeting and that he has incorporated into that updated document. He said he thought he had sent that on but realized that he hadn't because he was waiting for their architect's update to see if that would result in any changes to that document as well, and it will. He said Director Mendoza had suggested some other changes as well. He said, going to the Munster processes, he would like there to be a process where they could, for instance, review a red lined version of the Developmental Standards in the packet that can be done beforehand. He said different towns handle that differently.

Commissioner Raffin asked Director Mendoza if it matters right now how the plat shows the lots in the PUD based on future use. Director Mendoza said it depends; the main idea is to clean something up. By creating these lots, you are essentially establishing lots of record that currently do not comply with the Munster subdivision code or the zoning code. The Plan Commission would be establishing a lot of record for Danny Z's, a lot of record for the existing strip mall, and a future lot of record. In that way, at some point in time, the commission will receive a development plan for that lot of record and rather than going through the subdivision process, then going through another development process, they are planning the site for the future development now. President Baker gave some perspective then asked if there were any questions for Attorney Yahne.

Commissioner Branagan asked about the uses for Lot 3 specifically since she would hate to see a gas station there. Attorney Bennett said that is established in the standards that Attorney Yahne had indicated that he provided in a new draft today. She said they will get into those considerations; it is a work in progress. She said they are starting things with the current layout, and then whatever the decision is about where they are drawing those lines. She clarified that this petition is simply arranging the site. President Baker said staff doesn't have all the information so we're looking almost at the same setup as the previous petitions, and they are all still public meetings.

President Baker opened the public hearing for PC25-021, PC25-022, and PC25-023. There were no public comments. These public hearings remain open.

Motion: Commissioner Branagan moved to table PC Docket No. 25-021, a proposed 4-Lot Subdivision, THE PAVILION ON 45TH, LOTS 1-4, until a stormwater engineering review has been received and proposed PUD Bulk, Design, and Uses is updated, including all discussion and findings.
Second: Councilor Shinkan
Vote: Yes – 7 No – 0 Abstain – 0. Motion carries.

PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.

Motion: Commissioner Branagan moved to table PC Docket No. 25-022.
Second: Councilor Shinkan
Vote: Yes – 7 No – 0 Abstain – 0. Motion carries.

PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.

Commissioner Raffin asked that they review the architecture that shows 67% EFIS. Attorney Yahne said they are still going through the developmental standards regarding materials. The PUD standards for that whole parcel will reflect what this building will look like, as well as future buildings on Lot 1. He reminded the Plan Commission that this is limited from a visibility perspective, they are a building behind a building so they were hoping for some disparate treatment of what you can see here versus what they're burying behind the building. President Baker said he hoped they would change that mansard roof. Commissioner Raffin encouraged them to build a building with more than a 20-year lifespan that has a future use and not a stucco building.

Motion: Commissioner Branagan moved to table PC Docket No. 25-023.
Second: Councilor Shinkan
Vote: Yes – 7 No – 0 Abstain – 0. Motion carries.

Findings of Fact: None

Continued Discussion Items:

President Baker asked that the work be done on the Rules and Procures for the Plan Commission to make things easier in the new year. Director Mendoza said they have a draft, he said they would cross reference that with the subdivision code. Attorney Bennett asked Attorney Yahne for his input into the process. He said he said Economic Development representation was very helpful.

Other Business: None

Next Meeting: President Baker Raffin announced the next regular business meeting will be held on January 13, 2026.

Adjournment:

Motion: Councilor Shinkan moved to adjourn.
Second: Commissioner Raffin
Vote: Yes – 7 No – 0 Abstain – 0. Motion carries.

Meeting adjourned at 8:36pm

President Baker
Plan Commission

1.14.26
Date of Approval

Executive Secretary Sergio Mendoza
Plan Commission

1.14.26
Date of Approval

TOWN OF MUNSTER

PLAN COMMISSION REGULAR MEETING 1/13/26

Munster Town Hall: Main Meeting Room

Tuesday, January 13, 2026 at 07:00 PM

AGENDA

Join Zoom Webinar as a Viewer:
https://us02web.zoom.us/j/83006860776
Meeting ID: 830 0686 0776
Passcode: 138335

1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**

   William Baker (R), President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
   Roland Raffin (D), Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
   Jennifer Johns (R), member. Appointed by: Town Council, Initial Appointment: 01/08/2024 - Term Expiration: 12/31/2027
   Rachel Branagan (D), member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
   Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
   David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
   George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026

5. **APPROVAL OF MINUTES**
   a. November 18, 2025 PC Minutes
      Documents: November 18, 2025PC Minutes Draft v2
   b. December 9. 2025 PC Minutes
      Documents: December 9, 2025 PC Minutes Draft
6. **PRELIMINARY HEARINGS**
7. **PUBLIC HEARINGS**
   a. PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11, 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue.
      CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
      Documents: PC 25-015 Staff Report 01.13.26 CV Prelim Sub | Ex A Punch List_Review Response Letter 1.6.26 | Ex B Application | Ex C ALTA Survey Lot C (1) | Ex D Site Plan | Ex E Fire Truck Exhibit | Ex F Preliminary Plat_CV_12-22-25 | Ex G DVG Traffic Study Report | Ex H SEH Traffic Study Review | Ex I Orion Traffic Study Report | Ex J STMW Report Lots 10 - 13 | 00_SEH Review #1 Comment Response [final] | CV 1
   b. PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue.
      CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
      Documents: PC 25-016 Staff Report 01.13.26 CV PUD Amendment | Ex A Application PUD Amendment with Alta Survey | Ex B CV Design Standards 12.17.25 | Ex C Structural Brick Review Memo | Ex D Structural Brick docs | Centennial Park Structural Brick Review Memo_01092026
   c. PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market

Building to be commonly known as 800 45th Street.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC25-017 Staff Report 01.13.26 CV Sprouts Development

d. PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC25-018 Staff Report 01.13.26 development plan CV Chase Bank

e. PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC 25-021 Staff Report 01.13.26 Pavilion Prelim Sub | Ex A Application Preliminary Plat | Ex B Alta Surveys PC25-021 | Ex C Concept Lots PC25-021 | Ex D Lots overlay aerial | Ex E Preliminary Plat 12-30-2025

f. PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC 25-022 Staff Report 01.13.26 Pavilion PUD | EX A Application | Ex B PUD Amendment | Pavilion PUD Amendment rcvd 01.9.26

g. PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC 25-023 Staff Report 01.13.26 Pavilion Self Storage | Ex A Application | Ex B Alta Surveys | Ex C Site Plan 12.10.25 | Ex D Landscape Plan | Ex E Photometric | Ex F RenderingArchitecture Plan 12.10.26 | Ex G Site Eng Plans 12.10.25 | Ex H Stormwater Report | Pavilions on 45th Lot 4 Review

8. **FINDINGS OF FACT**
   a. PC25-020 DEVELOPMENT PLAN REVIEW: Jim Glascott of WT Group representing the School Town of Munster received approval with conditions for a Development Plan for the construction of ten (10) tennis courts at 8839 Calumet Avenue.
   Documents: PC25-020 Findings of Fact
   b. PC25-025 DEVELOPMENT PLAN REVIEW: Erin Gogolin of Bohler Engineering on behalf of Dutch Brothers Coffee received approval with conditions for a Development Plan for the redesign of an existing building and parking lot located at 8032 Calumet Avenue.
   Documents: PC25-025 Findings of Fact
   c. PC25-026 DEVELOPMENT PLAN REVIEW: Marc Smith of E. Anthony, Inc. on behalf of Orthopedic Specialists of Northwest Indiana (OSNI) received approval (check conditions) for a Development Plan for expansion of a 30,000 square foot parking lot located at 9900 Columbia Avenue.
   Documents: PC25-026 Findings of Fact
9. **OTHER BUSINESS**
   a. PC25-013 SUBDIVISION FINAL PLAT: Bruce Boyer on behalf of Crew Car Wash requests Final Plat approval for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION located at 111 Ridge Road.
   Documents: PC 25-013 Staff Report 01.13.26 Crew Final Sub | Ex A Application 25-013 | Ex B Final Plat 12-18-25
   b. Election of Officers: President, Vice President, Executive Secretary.
   c. Plan Commission Appointee to the Board of Zoning Appeals
   d. 2026 PC Schedule of Meeting Dates and Filing Deadlines.
   Documents: 2026 PC Schedule of Meeting Dates and Deadlines v2
10. **CONTINUED DISCUSSION ITEMS**
11. **NEXT REGULAR BUSINESS MEETING** February 10, 2026
12. **ADJOURNMENT**

Recorded meetings are archived at: https://www.youtube.com/channel/UCjZG8vgYLDwUr-sEWvNOSFQ

PLAN COMMISSION STAFF REPORT

To:	Members of the Plan Commission
From:	Sergio Mendoza, Planning Director
Meeting Date:	January 9, 2026
Agenda Item:	PC 25-016
Application Type:	PUD Amendment
Hearing:	Public, Continued from 12.9.26
Summary:	Matt Kimmel is requesting to requesting an amendment to the CENTENNIAL VILLAGE DESIGN STANDARDS to modify the size, location, and shape of lots and building on recorded lot C, as well as update sign standards and materials for all of Centennial Village PUD.

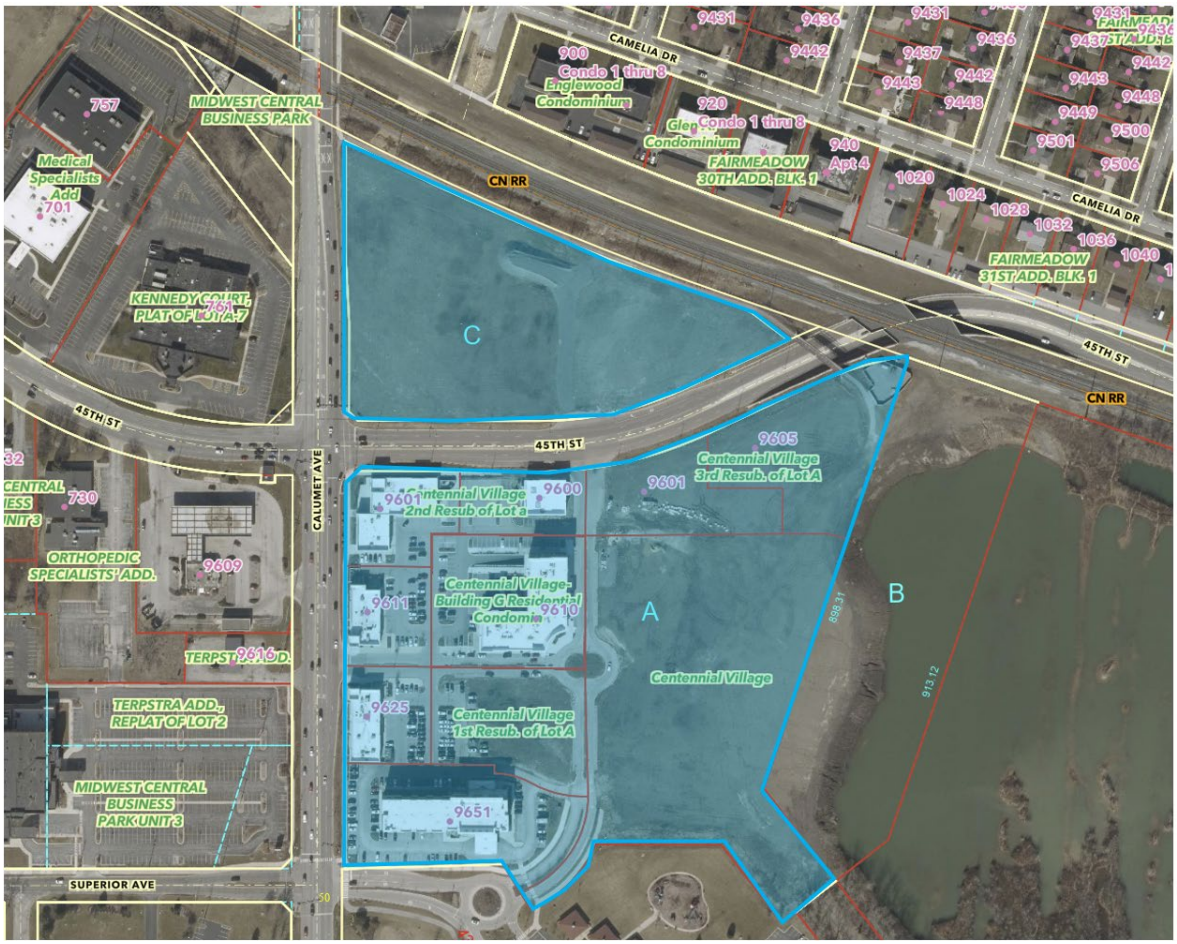
Applicant:	Matt Kimmel , Centennial Village Development.
Property Address:	9505 Calumet Avenue
Current Zoning:	PUD – CENTENNIAL VILLAGE
Adjacent Zoning:	North: CD 4 A – General Commercial and CD 4 R4 – Multifamily South: PUD – CENTENNIAL VILLAGE East: CD 4 R4 – Multifamily West: SD M Manufacturing
Applicant Requesting:	Approve PUD Amendment
Action Required:	Review of CENTENNIAL VILLAGE PUD DESIGN STANDARDS Review of Section 26-6.804. L. 9. k. xiii.

Staff Recommendation: Table Amendment to CENTENNIAL VILLAGE PUD DESIGN STANDARDS
Review PUD Amendment Standards
Review Structural Brick Memo

Attachments:
1. PUD Amendment Application, Exhibit A
2. PUD Design Standards (10/20/25), Exhibit B
3. Structural Brick Memo, Exhibit C

SITE LOCATION

The proposed Subdivision/Replat is located east of Calumet Avenue, north of 45th Street, south of the Canadian National Railroad, and west of the 45th Street underpass and Canadian National Railroad bridge intersection.

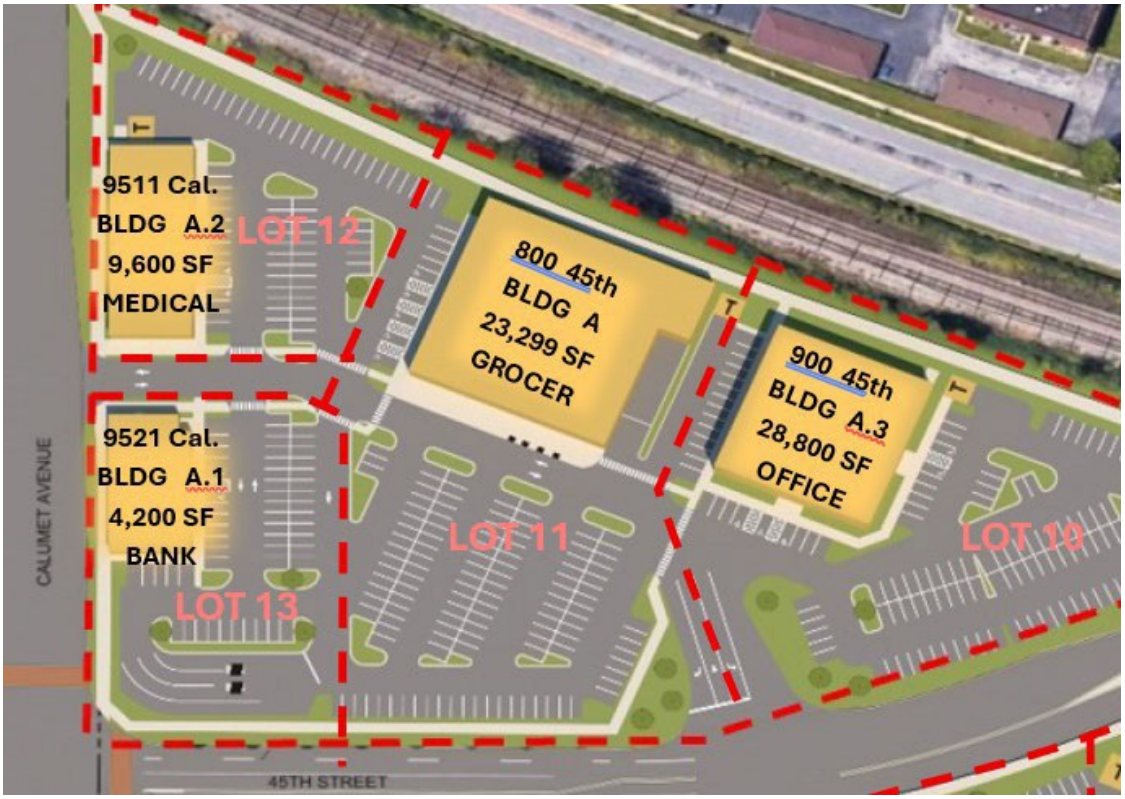


PROJECT BRIEFING

The Centennial Village PUD was approved as a development that will provide Town of Munster with a sustainable, mixed-use, walkable lifestyle community. Centennial Village was established through a Rezone action on July 22, 2013, ORDINANCE 1598. The development is currently governed by the Centennial Village PUD Design Standards and Conceptual Plan that has been amended multiple times through the following ordinances:

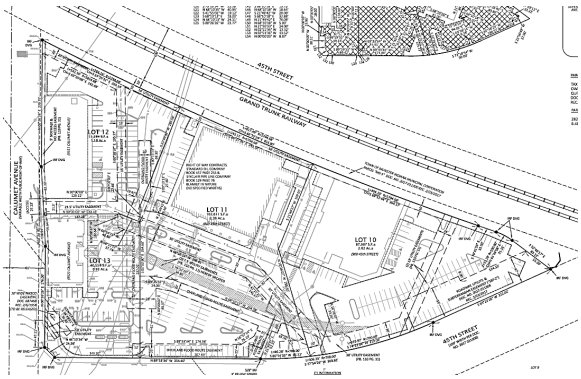
- ORDINANCE 1659, adopted June 8, 2015;
- ORDINANCE 1709, adopted March 6, 2017;
- ORDINANCE 1911, adopted August 21, 2023; and
- ORDINANCE 1930, adopted December 3, 2023.

The focus area proposed for amendment is commonly known as 9505 Calumet Avenue, Lot C in Centennial Village. The current site is approximately 6.5 acres of vacant undeveloped land zoned for mixed use development in a TIF district. Lot C was approved by the Plan Commission in March 2017 and recorded in April 2017 as CENTENNIAL VILLAGE, PB 110, PG 11, Document Number: 2017-024636. Mr. Matt Kimmel requests that the subject lot (LOT C) be reorganized as LOTS 10, 11, 12, 13 OF CENTENNIAL VILLAGE RESUBDIVISION OF LOT C. Below is modified conceptual image from the proposed PUD. However, the concept does not include a roundabout at the proposed intersection.

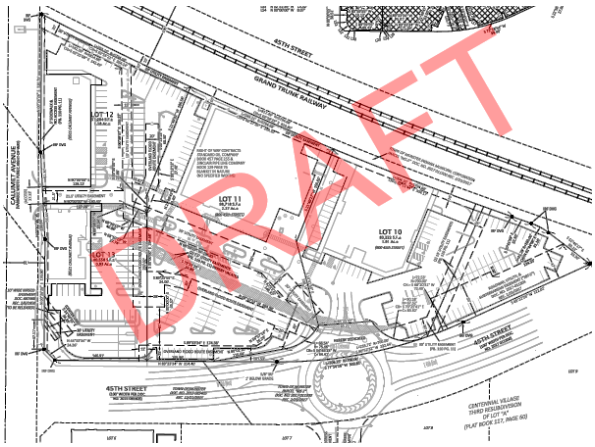


At the October 14, 2025 Preliminary Hearing, the Commissioners discussed whether the PUD Amendment accurately reflects the proposed subdivision of four (4) lots from Lot C and evaluated the potential impacts to the intersection at 45th Avenue and N. Centennial Drive. It was noted that two different intersection configurations were presented—one depicting a four-way intersection and the other a roundabout. Commissioners also discussed the implications of introducing structural brick as an approved construction material within the PUD. Following discussion, the Commissioners voted to defer the matter to allow the applicant to revise the PUD in accordance with the comments provided and to submit an updated intersection plan with a roundabout intersection.

4-way intersection with traffic signal



Roundabout



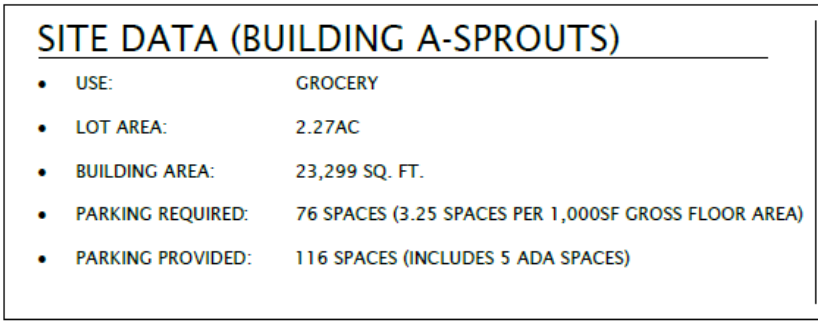
The Plan Commission directed the applicant to proceed with one preferred option, and the roundabout concept was selected for advancement.

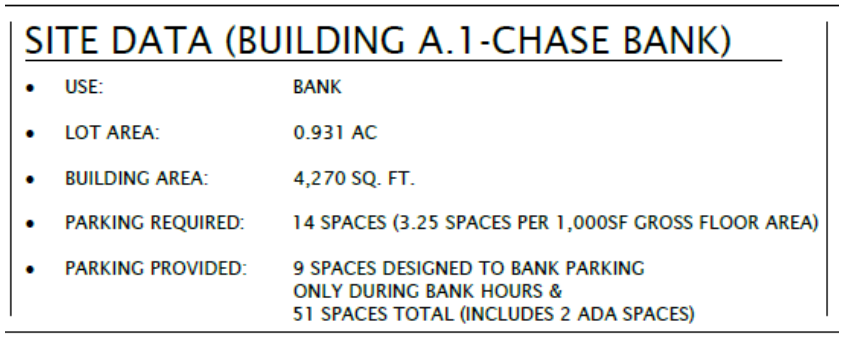
At the November 18, 2025 Plan Commission Public Hearing, the applicant presented the roundabout preliminary plat. During discussion, commissioners raised questions regarding potential impacts to other development components and whether these issues would be addressed following approval of the roundabout plat. The applicant then requested approval of both the roundabout and four-way intersection options; however, the Commission advised that such a dual-approval approach is not common and not supported by local or state procedural requirements. The item was tabled, and the applicant was instructed to return with one submittal for determination by the Commission.

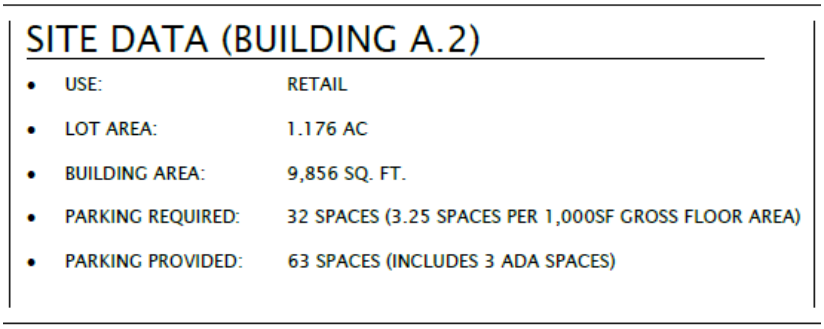
On November 25, 2025, staff received notice that the applicant intends to proceed with the plat showing only the signalized 4-way intersection option. Mr. Kimmel now submits this request pursuant to Section 26-233 of the Munster Subdivision Code, which states: *"No plat or replat of a subdivision of land located within the territorial jurisdiction of the town plan commission shall be recorded until it shall have been approved by the plan commission and such approval shall have been entered in writing on the plat by the president and secretary of the commission."* In addition, staff received a Professional Services Review Letter from the Town Engineers regarding the Traffic Study. The Traffic Study Review Letter was submitted to the Commissioner's ShareFile on December 1, 2025 and shared with the applicant on December 2, 2025.

On December 9, 2025 the Commissioners discussed how the plat must be approved first for this development because none of the subsequent items can be finalized until the plat is established, including the details that must be set in the PUD Standards through an amendment process. Additional discussion lead to the understanding that while the plat is incorporated into the PUD Ordinance, which ultimately go to the Council, it does so as part of the ordinance approval not as an amendment to the PUD itself. However, the Council could still determine that it will not approve the modification of the lot(s), citing concerns over various elements. The commission ultimately decided that not much more discussion could occur and deferred the matter until the proposed PUD Amendment supports all matters relate to the subdivision and uses identified for each proposed lot.

- Modification to lot lines and proposed buildings
  10.20.25 Design Standards, pages, 4, 9, 10, 15.







SITE DATA (BUILDING A.3)

- USE: 2 OR 3 STORY OFFICE
- LOT AREA: 1.91 AC
- BUILDING AREA: 28,800 SQ. FT.
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 110 SPACES (INCLUDES 5 ADA SPACES)

- Sign standards - change in size size, type, material, location, and quantity

10.20.25 Design Standards, page 49.

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All permanent signs located within the development shall conform to the following standards:

- Building materials – included the use of structural brick on lot 11 only

10.20.25 Design standards, page 11

Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
~~a.~~b. ~~or~~ Structural Brick: permitted only on Lot 11
~~b.~~c. Natural Masonry and Architectural Cast Stone
~~c~~d. Architectural Metal Panels
~~d~~e. Glass & Store Front Aluminum Window & Door Frames
~~e~~f. Conventional Windows and Frames

- Intersection development reference four way or roundabout, no roundabout concept included.

10.20.25 Design standards, pages 19, 45

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

2. Development Area South of 45th Street:

   a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet ~~west~~ east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

CODE REVIEW

TOWN OF MUNSTER CHARACTER BASED ZONING CODE

Section 26-6.804. L. 9. Specifics Supplemental Provisions Related to Planned Unit Developments.
(pg 402)

k. The procedure for…amending an existing SD-PUD…shall be as follows:

xiii. The Plan Commission may recommend … amendment to the SD-PUD…provided that it finds that:

I. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will not detrimentally affect present or potential property values or Uses of Adjacent property or elsewhere in Town.

II. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District adequately takes into account existing and proposed conditions and character of the land, Uses, Buildings, and Development proposed to be subject to the SD- PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and within all Adjacent Districts.

III. The proposed Development in the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District will have a beneficial effect on the Town, which could not be achieved if the SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District were not approved and the such Development was developed under the standards of any other District.

IV. Any deviation from the standards or requirements that otherwise would be applicable with another District is warranted by the design and amenities incorporated in the Development Plan.

V. The SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is necessary to address unique site conditions that are not characteristics of other sites in the Town and the application and Development Plan adequately address the same.

VI. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District and the Development proposed therein are:

1) either compatible with the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District or the land and existing or anticipated Development Adjacent to such SD-PUD Planned Unit Development Special District can be planned in coordination with the proposed Development within such SD-PUD Planned Unit Development Special District;

2) the most desirable Development and Use(s) for which the property subject to the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District is adapted; and

3) constitute responsible growth and Development.

VII. The proposed SD-PUD Planned Unit Development Special District or amendment to SD-PUD Planned Unit Development Special District is in conformance with the general intent of this Article and the Comprehensive Plan.

VIII. Existing and proposed Thoroughfares are suitable and adequate to carry anticipated traffic within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and its vicinity.

IX. Existing and proposed utility services are adequate for the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District.

X. Each phase of the proposed Development within the proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District, contains the required parking spaces, and landscape and utility areas necessary

XI. for creating and sustaining a desirable and stable environment.

XII. The proposed SD-PUD Planned Unit Development Special District or amended SD-PUD Planned Unit Development Special District and all proposed Buildings, parking accommodations, and landscape and utility areas therein can be completely Developed within five (5) years of the initial establishment of the District.

XIII. All conditions and requirements of Sections 26-6.804. L. 9. a. - .k have been satisfied.

STAFF FINDINGS AND RECOMMENDATIONS

Staff has determined that the applicant has submitted the required supporting documentation for an amendment to the CENTENNIAL VILLAGE PUD, and that the submission complies with the Public Notice requirements outlined in Section 26-6.804.L.9.k.xii for conducting a Public Hearing on this matter.

Staff further finds that both the Commission and the applicant expressed interest in reviewing and understanding the use of structural brick for the proposed Lot 11 Sprouts Market development. The applicant has provided documents referencing the proposed structural brick material and Town Engineers have submitted a memo acknowledging that structural clay brick is acceptable if the building plans are designed for it and the specified properties are met and if the plans currently call for CMU, they should be revised accordingly. While both materials are permitted under the same masonry code, they are not directly interchangeable and substituting clay brick for CMU without minor design revisions to address moisture-related expansion that could lead to cracking.

Staff supports the Commission's prior discussion recommending that matters related to this development project be tabled until a determination on the proposed subdivision is made, allowing all other related projects to proceed accordingly.

MOTION

Plan Commission may consider the following motion:

Motion to Table PC 25-016, a proposed Amendment to the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT so the applicant may resubmit Design Guidelines which support of a proposed final plat, including all discussion and findings.

Petition PC 25 - 016
Date: _____
Application Fee: $_____
Sign Fee: $_____

Town of Munster *Plan Commission Petition Application*

OWNER INFORMATION:

Matt Kimmel
Name of Owner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

APPLICANT OR PETITIONER INFORMATION (if different than above):

Matt Kimmel
Name of Applicant/Petitioner

Phone Number

631 Killarney Drive Dyer, IN 46311
Street address, City, ST, ZIP Code

matt@mkimmel.com
Email address

PROPERTY INFORMATION: Centennial Village

Business or Development Name (if applicable)

9601 & 9605 N. Centennial Drive Munster, IN 46321
Address of Property or Legal Description

PUD
Current Zoning

APPLICATION INFORMATION:

Please select what this Application is for:

☐ **Subdivision** If yes, select one of the following: ☐ **Preliminary Plat** ☐ **Final Plat**

☐ **Development Plan Review**

☑ **Rezoning (including Planned Unit Development) – Proposed Zoning District**

PUD Amendment of Centennial Village

Brief Description of Project:

Revisions to the size, location, and shape of Buildings "A", "A.1", "A.2" and "A.3"
Revisions to sign regulations and the use of structural brick in the material sections

Russ Pozen, PE
Name of Registered Engineer, Architect or Land Surveyor

(219) 281-4068
Phone Number

1155 Troutwine Road Crown Point, IN 46307
Street address, City, ST, ZIP Code

rpozen@dvgteam.com
Email address

REQUIRED ATTACHMENTS

Required Attachments for Plan Commission Applications

To ensure that adequate information is provided to the Plan Commission, please check off each of these items and provide documentation to the Community Development Department at the time of submittal of the application.

ALL APPLICATIONS	Included	N/A
Narrative statement describing project		
Property owner consent (Signature page)		
Proof of Ownership (e.g. copy of tax bill)		
Current ALTA Survey		
Vicinity Plan (A dimensioned drawing to scale of the planned building(s)/improvements in the context of the surrounding properties, including existing buildings and driveways at least one block in every direction)		

The following pages list the additional attachments required for specific applications. Please refer to your type of petition request and provide the additional required attachments.

SUBDIVISION - PRELIMINARY PLAT	Included	N/A
Single-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Report		

Commercial or Multi-Family Residential Subdivision		
Preliminary Plat		
Engineering Plans		
Storm Water Reports		
Preliminary Development Plan containing:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		

SUBDIVISION - FINAL PLAT	Included	N/A
Final Plat		
Engineering Plans		
Stormwater report		
Special Studies as required – see Site Plan Review Committee minutes		

REZONING (including PLANNED UNIT DEVELOPMENT amendments)	Included	N/A
Preliminary Development Plan containing at a minimum:		
Boundary Identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Proposed Use table		
Stormwater report		
Special Studies as Required– see Site Plan Review Committee minutes		

DEVELOPMENT PLAN	Included	N/A
Detailed Site plan including:		
Boundary identification		
Fire hydrant locations		
Accessory structures		
Parking lot design		
Utility location		
Building footprints		
Proposed curb cuts		
Drainage/detention plans		
Traffic circulation		
Ingress/egress locations		
Major topographic information		
Infrastructure improvements		
Square footage of:		
Lot or parcel		
Existing impervious surface		
Proposed total impervious (existing plus current proposal)		
Existing building		
Proposed total building (existing plus current proposal)		

Existing parking and pavement		
Proposed total parking and pavement (existing plus current proposal)		
Relevant dimensions including:		
Buildings		
Parking stalls		
Driveway widths		
Setbacks to buildings and other improvements		
Parking lot aisles, turnarounds, turning radii, etc.		
Distance from driveway to street corner if less than 200'		
Sidewalk, walkway and handicap ramp widths and locations		
Widths of abutting R.O.W.'s, roadways, and terraces.		
Full color architectural renderings of all building elevations with materials identified		
Proposed lighting for site, including:		
Photometric Plan		
Location of all light fixtures		
Pole height		
Luminaire type and manufacturer's specifications for all exterior light fixtures		
Landscaping plan drawn to scale including:		
Common and Latin plant names		
Planting specifications		
Total number of trees provided		
Total square footage of landscaped area on site and internal to the parking lot		
Identification of area used to calculate internal parking lot landscaping		
Fence detail drawing		
Dumpster enclosure detail drawing		
Sign detail drawing		
Special studies as required– see Site Plan Review Committee minutes		

NOTE: If you checked any exhibits "N/A", please explain:

ALTA/NSPS LAND TITLE SURVEY

PC25-016

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

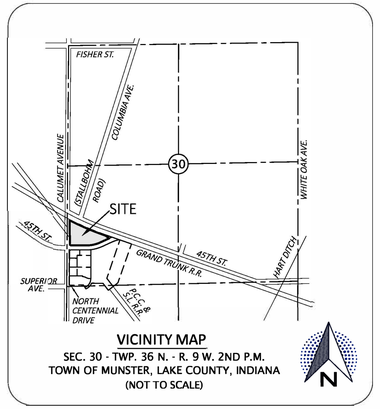
GENERAL NOTES:

1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).



VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P- DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG"- 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG"- 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF- REBAR FOUND
PB.- PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO- NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A.- LANDSCAPE AREA
PG.- PAGE
REC.- RECORDED

- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CURB INLET
- CATCH BASIN
- TRAFFIC MANHOLE
- GUY/ANCHOR
- ROAD SIGN
- PLM PIPELINE MARKER
- GAS TEST STATION
- GAS LINE VENT
- GAS VALVE
- ICV IRRIGATION CONTROL VALVE
- BOV BLOW OFF VALVE
- SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON
- ADA PAD
- ASPHALT
- W BURIED WATER LINE
- G BURIED GAS LINE
- E BURIED ELECTRIC LINE
- T BURIED COMMUNICATION LINE
- OHU OVERHEAD UTILITY WIRES
- BP BURIED BRITISH PETROLEUM PIPE LINE
- WOLVERINE BURIED WOLVERINE PIPE LINE
- SUBJECT PARCEL LINE
- ADJOINING PARCEL LINE
- SECTION/QUARTER LINE
- EASEMENT LINE
- STORM SEWER WITH FLOW DIRECTION
- SANITARY SEWER WITH FLOW DIRECTION
- WATER VALVE
- FIRE HYDRANT ASSEMBLY
- FO FIBER OPTIC MARKER POST
- TREE WITH SIZE
- EXISTING 1-FOOT CONTOUR
- xxx.x EXISTING SPOT ELEVATION
- CONCRETE
- STONE

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF - ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 2410101460) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL-RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT
ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.
ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.
ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.
ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.
ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOUGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

SCALE: 1" = 50'

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

THE ARCHITECTS PARTNERSHIP

© COPYRIGHT DVG TEAM, INC

\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY: GAH	DATE: 10/30/24
SECTION: 30-36-9	COUNTY, STATE: LAKE, IN
JOB NO.: 24-0091	

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

August 21, 2023

Revised August 07,2025

Presented October 14, 2025

Revised October 20, 2025

Revised December 17, 2025


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
5,000 SF
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,188 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
34,000 SF


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,360 SF
BLDG O
7,000 SF



Design Standards

Centennial Village Planned Unit Development

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Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail/Offices – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	3	50	5	5	5
O	Hotel	5	80	5	5	5

Building Lot A, A.1, A.2 and A.3 are located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Structural Brick: permitted only on Lot 11
c. Natural Masonry and Architectural Cast Stone
d. Architectural Metal Panels
e. Glass & Store Front Aluminum Window & Door Frames
f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 5th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 25% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 25% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 5th Floor Level Exterior Walls. The 2nd to 5th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 5th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 75% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5h Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

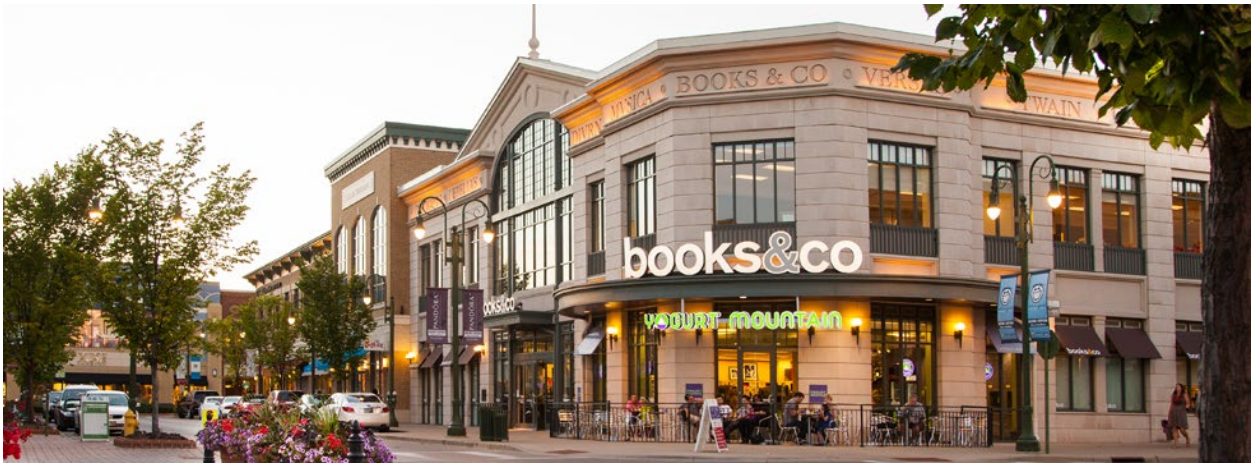
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail/Offices – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	3	Class 1 & 2	Class 3 & 4
O	Hotel	5	Class 1 & 2	Class 3 & 4

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the

existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named “Village Parkway” extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

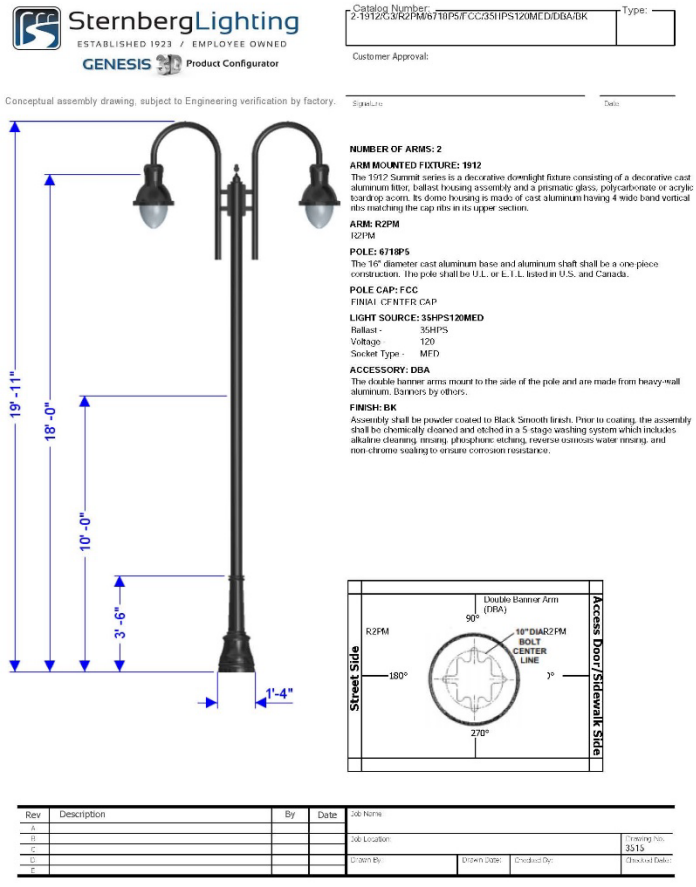
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No “shoe box” wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as “Invasive Species” as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3’) (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.



Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
45TH STREET
CALUMET AVENUE
BLDG PAD A
70,000sf
BLDG PAD L
BLDG PAD M
BLDG PAD
5,200sf
BLDG PAD F
5,200sf
BLDG PAD B
12,830sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD D
17,360sf
BLDG PAD O
7,000sf
CENTENNIAL PARK



Modified and ~~approved~~ within the red hashed line – January xx, 2026 Conceptual Plan



Modified and approved within the red hashed line –

August 21, 2023



Modified and approved within the red line – November 20, 2023

Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

Appendix 4 – Signage

by reference:

Sign Regulations for Centennial Village

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.
4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.
5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.

6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.
24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.

25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display, illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.
39. **Storefront:** The façade of a business space that contains a public entrance.
40. **Streamer**: A long, narrow flag, banner or pennant.

41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any artificial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.
2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.

3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or
        2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.
    b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.
d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **Projecting Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projecting sign per business and must be spaced at a minimum of 15 feet from other projecting or blade signs. Projecting signs are only permitted where the business does not have a blade sign.
    a. **Small Projecting Sign(s)**: May only be installed on the first story of a building. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10 sf with a maximum height of 3 ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
    b. **Large Projecting Sign(s)**: May only be installed on buildings with multiple stories and may not be installed on the first story. Sign shall be vertically oriented with the height greater than the projection of the sign. Must be 12 ft above the sidewalk elevation. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 ft from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.
10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.
11. **"Open" Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.
12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.
13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The material must be the general material sign standard compatible and consistent with the materials used to construct the building.
14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning

vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.

15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.
20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings

and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.
19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required

It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit

Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits

It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code

All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code

All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance

The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs

Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.
4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.

7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.

Building a Better World
for All of Us®

January 9, 2025

RE: Town of Munster
Centennial Village Structural
Brick – Sprouts Farmers Market
SEH No. MUNST 183529 14.00

Sergio Mendoza
Planning Director
Town of Munster
1005 Ridge Road
Munster, IN 46321

Dear Sergio:

SEH has reviewed the documents submitted for Sprouts Farmers Market building in Centennial Village. The following comments are noted by our structural engineer.

1. If the building structural plans and specifications in question call for structural clay brick, and the provided Super Atlas properties meet those specifications, then SEH does not see any structural reason not to accept the material. If the building plans call for CMU, SEH recommends requiring the plans to be updated to call for structural clay brick.

2. In general, there is no structural reason that precludes the use of structural clay brick ***if the building was designed for structural clay brick***. Both concrete masonry and clay masonry are covered in the same structural masonry code (TMS 402) and are equally valid construction in terms of the code. However, that does not mean they can be substituted for one another. If a particular building was designed for CMU, then in our opinion, the design will need (minor) revision to accommodate the different properties of structural clay brick.

3. Straight up substitution as though the two different units are equivalent may lead to problems down the road. Unit strength is not the issue here, as the provided specifications bear out our previous comments that structural clay brick is generally stronger than CMU. One potential issue is that clay brick expands from moisture and CMU does not. If this is not accounted for with proper joint type and location, excessive cracking may occur.

Please let me know if you have any questions.

Engineers | Architects | Planners | Scientists
Short Elliott Hendrickson Inc., 931 Ridge Road, Suite E, Munster, IN 46321-1756
219.513.2500 | 888.908.8166 fax | **sehinc.com**
SEH is 100% employee-owned | Affirmative Acti 9on–Equal Opportunity Employer

Sincerely,

SHORT ELLIOTT HENDRICKSON INC.

T.s.Srinivas

Satya S. Tallamraju, P.E.
Professional Engineer
(Lic. MN, IN)

STRUCTURAL BRICK INFORMATION

Physical Analysis of Concrete Masonry Units Pg 2

Hollow Brick Specs Sheet Pg 6

Compressive Strength Sheet Pg 7

Design Guide for Structural Brick Veneer Pg 8

Fire Endurance Ratings of Clay Brick Masonry Pg 70

Allied Associates and Web Addresses Pg 83

American Testing Services reports 2022, 2024, 2025 Pg 84

Reinforced Hallow Clay Manonry Pg 87

Reinforced Structural Clay Brick Pg 146

Interstate Brick Types and Safety Data Pg 152

NELSON TESTING LABORATORIES®

EXPERIENCED | INNOVATIVE | AUTHENTIC

Physical Analysis of Concrete Masonry Units

for

Northfield Block

8-in Regular

Northfield Block Company
One Hunt Court
Mundelein, IL 60060

March 7, 2022

NELSON TESTING LABORATORIES®

EXPERIENCED | INNOVATIVE | AUTHENTIC

March 7, 2022

Northfield Block Company
One Hunt Court
Mundelein, IL 60060

REPORT OF TESTS

SUBJECT:	**Physical Analysis of Concrete Masonry Units**
PROJECT:	**Northfield Block – 8 x 8 x 16-in Regular Concrete Masonry Units**
SPECIFICATION:	ASTM C90-21, "Specification for Loadbearing Concrete Masonry Units"
TEST METHODS:	ASTM C140-21, "Test Methods for Sampling and Testing Concrete Masonry Units and Related Units." ASTM C426-16, "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units" ACI 216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies."
MATERIALS:	Delivered to NTL on February 21, 2022
NTL PROJECT #:	22-1046
PAGE:	1 of 3

TEST DATA

Dates of Testing: February and March 2022

Specimen ID	1	2	3	Average
Dimensions (in)				
Height	7.7	7.6	7.7	7.7
Width	7.6	7.6	7.6	7.6
Length	15.6	15.6	15.6	15.6
Min. Face Shell Thickness (in)	1.3	1.3	1.3	1.3
Min. Web Thickness (in)	1.1	1.1	1.1	1.1
Normalized Web Area (in²/ft²)	29.2	29.3	29.2	29.2
Gross Area (in²)	118.6	118.6	118.6	118.6
Net Area (in²)	60.8	60.1	60.4	60.4

March 7, 2022
Northfield Block – 8-in Regular Concrete Masonry Units
NTL Project #22-1046

TEST RESULTS

Specimen ID	1	2	3	Average
Density (lbs/ft³)	134.0	135.0	133.7	**134.3**
*Absorption (%)	6.3	7.0	7.2	**6.9**
*Absorption (lbs/ft³)	8.5	9.5	9.7	**9.2**
Solids (%)	51.3	50.7	51.0	**51.0**
Equivalent Thickness (in)	3.9	3.9	3.9	**3.9**
**Fire Rating (hours)	2.0	2.0	2.0	**2.0**

Specimen ID	4	5	6	Average
*Compressive Load (lbs)	249,900	238,700	243,380	**243,990**
Net Compressive Strength (psi)	4,140	3,950	4,030	**4,040**

Specimen ID	7	8	9	Average
Shrinkage (%)	0.038	0.042	0.042	**0.041**

**Absorption and compressive strength testing on full units.*
***Calculations based on aggregate types.*

SUMMARY

The test results listed above complied with their corresponding requirements as set forth in ASTM C90-21, "Specification for Loadbearing Concrete Masonry Units".

March 7, 2022
Northfield Block – 8-in Regular Concrete Masonry Units
NTL Project #22-1046

Respectfully submitted,

NELSON TESTING LABORATORIES

Mark R. Nelson
President

Notes: The results listed within this report relate only to the materials submitted for testing. This report shall not be reproduced, except in full, without written approval of this laboratory. The test materials not consumed in this testing will be discarded 14 days from the date of this report unless we receive written notification requesting otherwise.

Nelson Testing Laboratories is accredited/inspected by AASHTO and CCRL under ASTM C1093.

TECHNICAL BULLETIN 3

Specification for Atlas® Hollow Brick

Part 1 Quality Assurance

Brick Tests

1. All tests shall be performed by an independent certified testing laboratory.
2. All tests shall be in accordance with ASTM C-67.

Submittals

1. Submit test report and certificate of conformance document for each type and color of brick specified on contract documents for architect's approval.
2. Test reports shall include:
   a. Compressive strength
   b. 24 hour cold water absorption
   c. 5 hour boil absorption (if required)
   d. Saturation Coefficient (if required)
   e. Initial Rate of Absorption (I.R.A.)
   f. Efflorescence
   g. Weather classification
3. Certificate of conformance shall state that brick meets or exceeds applicable ASTM specifications.

Sample Panels

1. Sample panel size shall be 4'x4' showing the proposed color range, texture, bond, mortar, workmanship, cleaning, and water repellents where applicable.
2. Final brick selection shall be made only following architect's review of sample panel.
3. Brick from manufactured material for project shall be shipped to site and sample panel erected.
4. No brick shall be shipped from manufacturer to site until architect's acceptance of job panel constructed from actual material for project. This panel shall replace all other sample panels and shall remain on site throughout construction, and become the project standard for bond, mortar, workmanship, and appearance.

Part II Products

Hollow Brick

1. Manufacturer: **Interstate Brick Company** or **H.C. Muddox**
2. ASTM C-652, Grade SW, Type HBX or better.
3. Color and texture
4. Dimensions *(width)* x *(height)* x *(length)*.
5. Minimum compressive strength 9,000 psi.
6. Maximum Saturation Coefficient 0.78 (if required).
7. Minimum IRA 6 g/ min/30 in^2.
8. Maximum IRA 30 g/min/30 in^2. Where IRA exceeds 30 g/ min/30 in^2, pre-wetting brick is recommended.
9. Shapes; where special shapes are shown on architectural drawings, manufacturer shall provide shop drawings for architect's approval prior to manufacturing shapes.

Mortar

Mortar shall conform to ASTM C 270 Type S
Proportion Specification:
1 part Portland cement (ASTM C 150 Types I, IA, II, IIA, III, IIIA or V) less than 6 months old
½ part hydrated lime (ASTM C-207)
3-½ to 4-½ parts sand (ASTM C-144)
OR
Property Specification:
Portland cement - lime mortar
Compressive strength 1800 psi
Water retention 75% minimum
Air content 12% maximum
Sand: 2 ¼ -3 ½ the sum of the separate volumes of cementitious materials sand (ASTM C-144)

Grout

Grout shall conform to ASTM C 476
Grout strength shall be greater than or equal to f'_m

Part III Execution

Bond

Bond shall be running bond unless otherwise shown on contract documents.

Jointing

Mortar joints shall be concave unless otherwise shown on contract documents.

Construction

All construction strictly adheres to International Building Code (IBC) or TMS 402/ACI530/ASCE5.

Cleaning

Cleaning shall conform to Interstate Brick Technical Bulletin 4 Brick Cleaning Recommendations, Section 040120 and BIA Technical Note #20 Cleaning Brickwork
Do not use muriatic acid or san blasting.
Contact manufacturer for recommendations.

Water Repellent & Coatings

Where water repellents are required, consult Interstate Brick Technical Bulletin 1 Water Repellent Coatings and Section 071900.

INTERSTATE® BRICK
INTERSTATE BRICK 9780 South 5200 West, West Jordan, UT 84081-5625
Phone: 801 280 5200 Toll Free (800) 233-8654 www.interstatebrick.com

H.C. MUDDOX
H.C. MUDDOX 4875 Bradshaw Road Sacramento, CA 95827-9727
Phone: (916) 859-6320 Toll Free (800) 776-1244 www.hcmuddox.com

Revision-0323

TECHNICAL BULLETIN 7

Structural Brick Compressive Strength Data Table

Selected Brick Colors	Average Net Area Unit Compressive Strength psi	(MPa)	Assumed Wall Assembly Design Strength (f'_m) psi	(MPa)
Arctic White	11,000	(75.84)	3,844	(26.50)
Autumn Red	12,000	(82.74)	4,000	(27.58)
Bronzestone	11,900	(82.05)	4,000	(27.58)
Canyon Rose	13,600	(93.77)	4,000	(27.58)
Cedar	13,200	(91.01)	4,000	(27.58)
Copperstone	14,000	(96.53)	4,000	(27.58)
Desert Sand	14,000	(96.53)	4,000	(27.58)
Golden Buff	15,400	(106.18)	4,000	(27.58)
Ironstone	14,600	(100.66)	4,000	(27.58)
Midnight Black	15,000	(103.42)	4,000	(27.58)
Monterey	14,400	(99.28)	4,000	(27.58)
Mountain Red	15,600	(107.56)	4,000	(27.58)
Ochre Buff	14,700	(101.35)	4,000	(27.58)
Park Rose	13,600	(93.77)	4,000	(27.58)
Platinum	11,000	(75.84)	3,844	(26.50)
Smokey Mountain	15,500	(106.87)	4,000	(27.58)
Tumbleweed	15,400	(106.18)	4,000	(27.58)
Walnut	12,800	(88.25)	4,000	(27.58)

1. Clay and shales are naturally occuring materials that vary, to some degree, throughout the deposits and strata layers. Consequently, various physical properties of the brick units, including the unit compressive strength values noted above are variable. The data above is based on historic data, not future projections. The data for the noted colors, and other colors, is kept on file, available upon request.

2. Assumed Wall Assembly Design Strengths f'_m, are based on TMS 602-22, Section 1.4-B-2(a), Table 1, and represent the design strength of wall assemblies comprised of masonry units, mortar, and grout. Mortar is assumed to be ASTM C270 compliant Type M, or Type S mortar. Grout is assumed to be ASTM C476 compliant grout with 28-day minimum compressive strength (f'_c) equal to or greater than f'_m.

3. Wall Assembly Design Strengths (f'_m) in excess of 4,000 psi can be acheived based on job specific prism testing.

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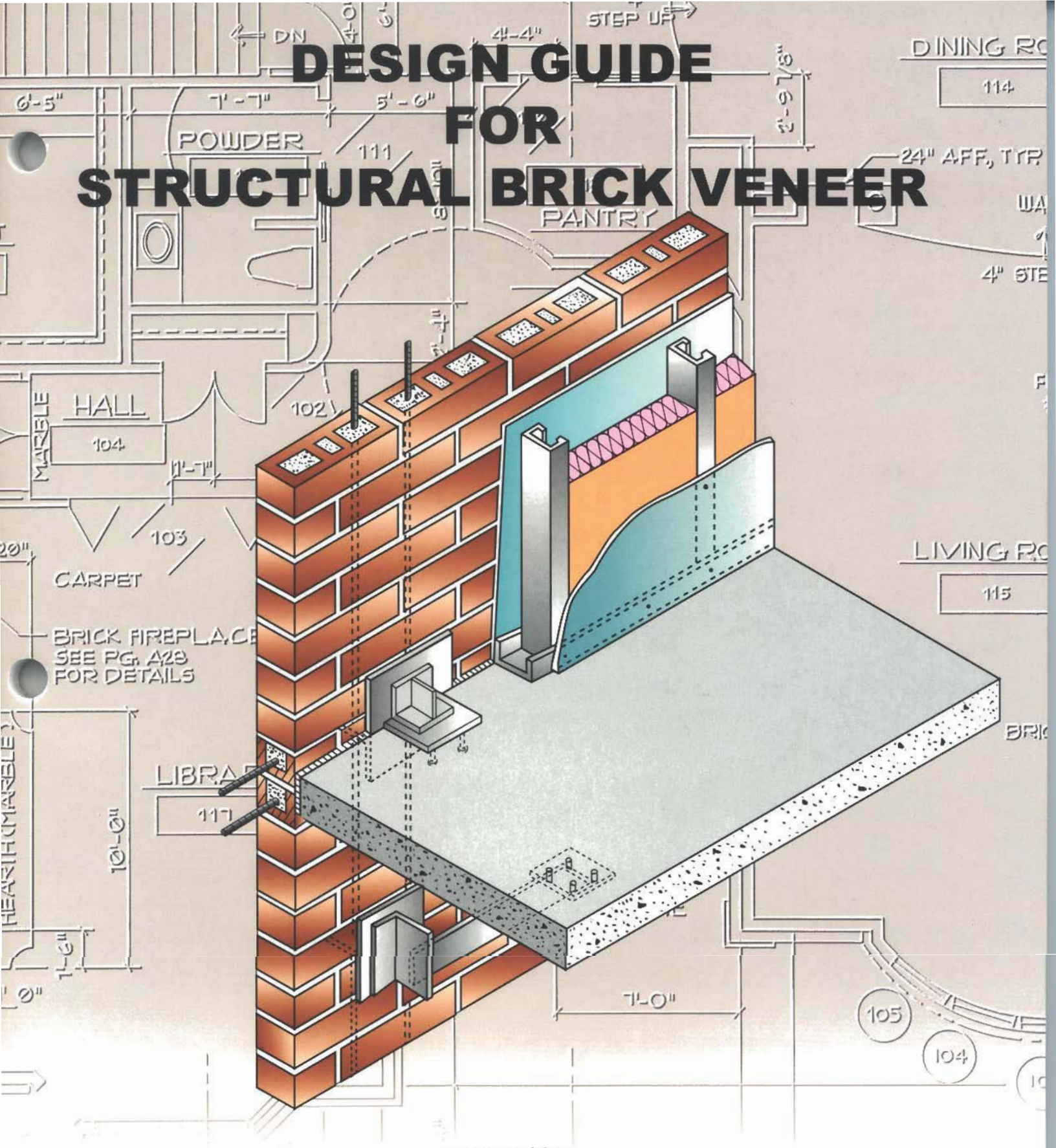
DESIGN GUIDE FOR STRUCTURAL BRICK VENEER



prepared for

Western States Clay Products Association

by

KPFF Consulting Engineers

DESIGN GUIDE

FOR

STRUCTURAL BRICK VENEER

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www.wscpa.us

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Summary

Structural Brick Veneer is a unique approach to the design and construction of brick exterior walls. Strengthening the brick with steel reinforcement provides new opportunities for reducing the cost of the wall, increasing design flexibility and improving wall performance. In use for more than thirty years, the approach has been used extensively in the Pacific Northwest.

The Structural Brick Veneer system is similar to conventional brick veneer except that the brick is reinforced to allow it to span further between ties and supports. The system allows the architect a variety of opportunities to create traditional walls or dramatic brick forms. Sloping windowsills, brick soffits, lintels without exposed ledger angles and precast concrete bands and inserts are only a few examples of the design opportunities available.

In areas of high seismic exposure, the Structural Brick Veneer system can be easily isolated from the primary structure making “immediate occupancy” performance more cost effective.

The following document will provide the structural engineer and the architect with an introduction to the design and specification of the Structural Brick Veneer system. It includes some design examples and dialogue on our experiences with the system over the past 20 years.



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1.0 Introduction

Structural Brick Veneer is the name that we have chosen to describe hollow reinforced clay brick curtainwall systems. These systems commonly replace brick veneer walls.

The Structural Brick Veneer system is similar to conventional brick veneer because it supports no gravity loads other than its own weight, the weight of windows, and possibly other miscellaneous loads. The difference is that in the Structural Brick Veneer system the masonry is reinforced to allow the brick to span further between ties and provide structural capacity to create more intricately shaped walls.

Structural Brick Veneer can be laid in place similar to conventional brick veneer, or they can be prefabricated at another location and lifted and installed to their final position.

The system has many advantages over conventional brick veneer. Some of these advantages are:

1. Greater design flexibility.
2. Reduced backup requirements.
3. Enhanced design life through heavier connections.
4. Reduced tie connections, which provides more continuous moisture barrier.
5. Greater seismic resistance and more ductility.
6. Less restrictive deflection requirements of the backup structure.
7. Reduced cost of the backup system.
8. Often lower construction cost.
9. Greater resistance to cracking.
10. Greater water resistance.

The system has been used on more than 100 projects over the last 20 years.

1.1 Purpose & Scope

The purpose of this guide is to provide the architect, structural engineer and owner with information about the design and construction of Structural Brick Veneers. It is intended to be easily understood by someone experienced with reinforced brick masonry design and construction. For those not familiar with the design of reinforced brick masonry, the Western States Clay Products Publication, "*Notes on the Selection, Design and Construction of Reinforced Hollow Clay Masonry*" is recommended.

As the design and construction of reinforced brick masonry varies from location to location, so does the design and construction of Structural Brick Veneer vary from location to location. The information and recommendations in this guide are based on the design and construction of projects in the Pacific Northwest and are not intended to replace local experience and engineering judgment.

1.2 History of the System

The origin of Structural Brick Veneer dates back to the early sixties. In 1962, a mechanical equipment penthouse was built on top of the nine-story United Fund office building in Denver, Colorado. The 15-foot high, load

bearing, 4-inch thick clay brick prefabricated panels supported long span, prestressed, twin-tee concrete slabs that were the roof structure of the penthouse. This construction was made possible by the use of a new "tensile strength intensive" exotic mortar and some backup steel reinforcing.

This 4-inch brick and exotic mortar system was used for several years thereafter in the Colorado area in prefabricated and in situ, hand-laid brick panel and curtainwall applications on many commercial buildings designed by George Hanson, P.E. of the firm of Sallada & Hanson, Engineers. This strong thin-wall system intrigued the designers who used this system on horizontal soffits, cantilevered balcony railings, post-tensioned panels, load-bearing and non-load-bearing walls on schools, office buildings, hospitals, the walls in vehicular tunnels, highway rest area toilet modules and picnic shelters. Even though this brick curtainwall system was very successful, it was relatively expensive due to the use of the high tensile strength mortar.

In the middle 1960's, Donald A. Wakefield, P.E. of the Structural Clay Products Institute developed, in Colorado, a new clay unit and method of construction that reduced the cost and allowed for the use of regular reinforcing and standard mortar and grout. This unit was a 3-1/2" x 3-1/2" x 11-l/2" hollow clay brick using ASTM C-212 recommendations. This system accommodated both horizontal and vertical reinforcing and permitted high-lift grouting.

This thinner reinforceable, hollow clay unit was more economical, ductile, flexible and more predictable; thus expanding its use in commercial curtainwall systems as well as load-bearing residences, four-story load-bearing apartment buildings, and prefabricated panels.

During the 1970's, a similar system was developed and perfected by Barkshire Panel Systems, Seattle, WA. Barkshire’s system used a 3 1/2-inch thick hollow clay brick similar to the one mentioned earlier and verified by testing conducted by Western States Clay Products Association under the direction of John G. Tawresey.

The secret to Barkshire’s system was advancements in the connections to the frame, and the technical knowledge of the overall building's physical needs.

As a consequence, the system is found on multi-story high-rise office buildings, schools, apartment buildings, residences and many other applications throughout the Northwest.

2.0 System Description

The system relies on a simple structural concept that will be described, followed by the presentation of some typical configurations and a brief discussion of weather protection.

2.1 Structural Concept

Structural Brick Veneer is essentially the same as conventional brick veneers except that the brick is reinforced. Hollow bricks that can be reinforced are a necessary part of the system.

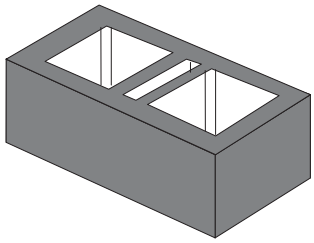


Figure 1 Typical Hollow Brick

The reinforcement increases the structural capacity of the brick wall. The spacing of the ties, typical in conventional veneers, can be increased and in most cases, the spacing can be increased to the distance between building floors or columns. The conventional veneer ties are eliminated and are replaced by more substantial connectors. The connectors are usually attached to the primary structural system of the building instead of a separate backup wall.

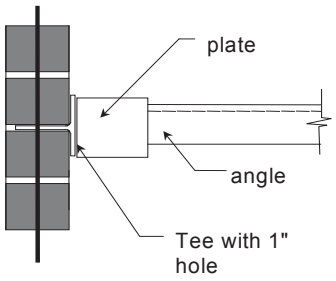


Figure 2 Typical Structural Brick Veneer Connector

Ledgers very similar to the ledgers of more conventional veneers can support the dead load of the Structural Brick Veneer.



Figure 3 Brick Supported on a Ledger

Or, separate discontinuous connectors can be used to support the dead load. These connectors are similar in design to those used to support precast concrete panels.

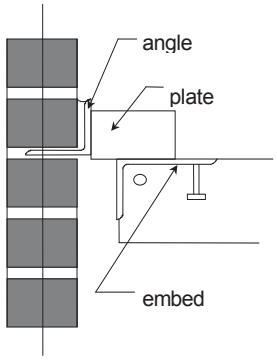


Figure 4 Typical Structural Brick Veneer Deadload Connector

Another available option is to support the dead load of the Structural Brick Veneer on the building foundation. Because the Structural Brick Veneer is designed in accordance with the

structural chapters of the code, height limitations are generally more liberal.

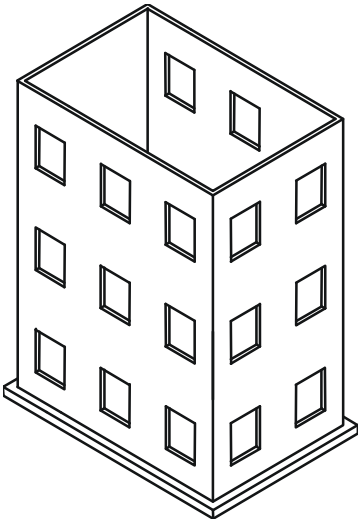


Figure 5 Dead Load on the Foundation

The connectors of the Structural Brick Veneer are designed and constructed to be flexible in one or more directions and rigid in other directions. Thus, the Structural Brick Veneer can be isolated from the movements of the building.

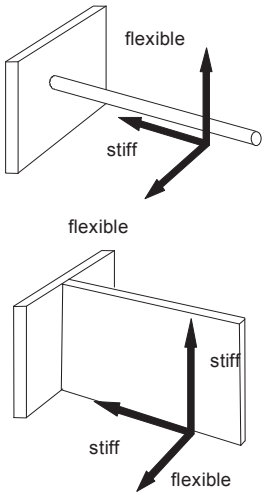


Figure 6 Flexible Connectors

The design of the Structural Brick Veneer is based on the following principles:

1. The Structural Brick Veneer is designed to be isolated from the primary building structure. For non-essential facilities, the isolation should be adequate to insure that the brick will not be damaged by a moderate earthquake. For essential facilities, the isolation should be adequate to insure that the brick will not be damaged by a maximum considered earthquake. The Structural Brick Veneer must not support the building or provide any assistance to the stability of the building as a whole.

2. Structural Brick Veneer is commonly designed to have **mortar joint** cracks at service wind and seismic loading. However, **brick cracking** should not occur. Cracking should be limited to the cracking of the horizontal bed joints at the brick to mortar interface. This is an aesthetic design criteria rather than a structural performance criteria. Experience has shown that cracking of the brick unit is considered by most owners to be a failure of the system.

3. The Structural Brick Veneer is designed to transfer the loading to the connectors and the connectors are designed to transfer the loading to the primary structure.

2.2 Concept Configurations

Structural Brick Veneer buildings can be configured in limitless ways. Because the brick wall has more capacity to resist

loading, the designer has more choices to configure and attach the wall. The number of different forms is controlled only by the designer's imagination.

The Structural Brick Veneer system offers the architect a variety of opportunities to create dramatic brick forms. Sloping windowsills, brick soffits, lintels without exposed ledger angles and precast concrete bands are only a few examples.

Sloping Sills

Sloped sills are a common accent in brick construction. Small slopes created from special brick shapes can be readily incorporated into the Structural Brick Veneer wall. Larger, more dramatically sloped sills may require shoring to construct.

Where the depth of the slope does not allow the weight of the brick veneer to cantilever from the vertical wall, then adding connections or spanning horizontally to column supports can provide alternative support.

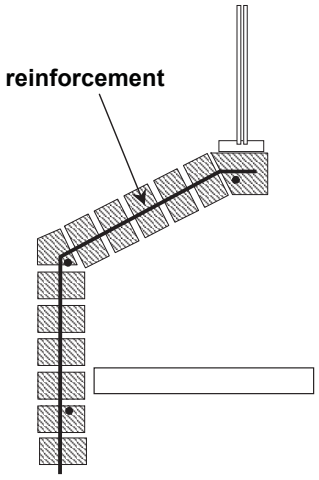


Figure 7 Sloping Sill Brick Soffits

Brick soffits can be designed and constructed similar to the conditions at a sloping sill.

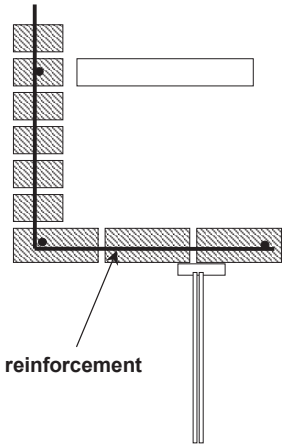


Figure 8 Brick Soffit

Brick with Concrete Masonry

Another architectural variation is to combine concrete masonry with Structural Brick Veneer. This commonly takes the form of banding, either horizontal or vertical, or as an accent pattern. In some circumstances, concrete masonry may be used instead of brick where it doesn't show. In either arrangement, concrete masonry can be incorporated into the Structural Brick Veneer with ease. The designer should recognize however that the spacing of reinforcement in brick might not match the cells in the concrete masonry. Some effort should be made to space the reinforcement to match both modules. Also, when using horizontal brick and concrete masonry bands, the designers must recognize the opposing behavior and strengths of the two materials and detail accordingly with movement joints and reinforcement. Brick will expand with exposure to moisture while concrete masonry is more dynamic and

will shrink with drying and expand with moisture. Extra reinforcement may be added to reduce the impact of this effect.

Brick with Precast Concrete

Precast concrete window sills and heads as well as accents can be successfully included in a Structural Brick Veneer System. Where the precast elements are small, they can be added by providing holes through the precast for the reinforcement. Large precast components may require separate connectors to the building frame or to the Structural Brick Veneer.

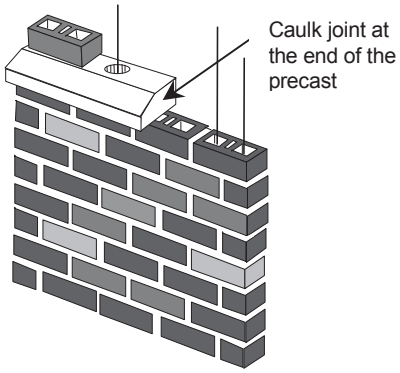


Figure 9 Precast in Structural Brick Veneer

Also, precast concrete elements shrink with time and drying, and expand with moisture. Again, the designer should consider the compatibility of the expanding brick and shrinking concrete.

2.3 Weather Protection

The primary function of the exterior wall is to protect the interior of the building from the weather.

The Structural Brick Veneer System provides two methods of weather protection. The exterior brick veneer, caulking, and windows act as the primary barrier. The interior cavity, flashing, weeps, window channels and other elements act as the secondary barrier.

The system performance depends to a large extent on the prevention of water leakage through the reinforced brick. Reinforced brick is more water-resistant than unreinforced brick. The most obvious reason is that the cracks are smaller and more evenly distributed due to the resistance provided by the reinforcement.

Another reason is that brick expands with age. When the brick is made, it contains no water. With time, the brick absorbs water and reaches equilibrium with its moist environment. The clay expands (just like unfired clay). The moisture can come from the humidity in the air. This expansion can take years.

ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures* recommends a value of .0003 inch/inch for moisture expansion of clay masonry.

When the brick expands, the reinforcement tends to resist the expansion. The reinforcement is stretched in tension and the brick masonry compressed. The consequence is smaller and sometimes there are fewer cracks.

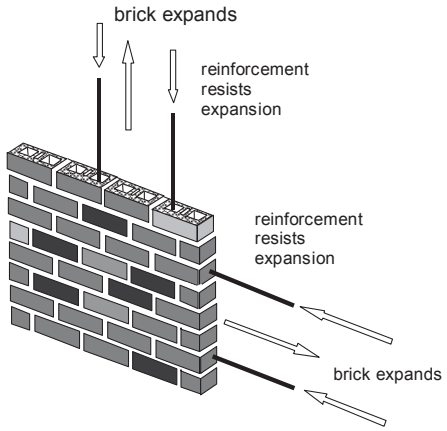


Figure 10 Brick Expanding Resisted by the Reinforcement

Even with smaller cracks, leakage can still occur. Wind-driven water flows in sheets in all directions over the wall and concentrates at discontinuities such as joints. Lateral movement of water is greatest near the windward corners. Movement upward is greatest near the top of the building. Tall buildings have greater accumulation of water flow. Greater distances between irregularities will result in larger flows.

It should be assumed that all masonry might leak and allow water to penetrate. Masonry leaks more through the mortar and brick interface than through the masonry unit itself. If the mortar and brick interface is cracked, leakage may increase.

There are two concepts used to control the water. The first is the drainage wall, and the second is the “rainscreen” principle.

A drainage wall consists of a secondary method of removing the moisture once it has penetrated the outside wall. Flashing is an example.

The principle of the rainscreen consists of providing a cavity behind the wall that equalizes the outside pressure thus preventing the water from penetrating the outside surface. A properly proportioned rainscreen wall needs no caulk on the outside barrier. Unfortunately, the available technology for designing rainscreen walls is limited and while many walls use some of the principles, most installations rely on a drainage wall system. For more information on the rainscreen walls, see Western States Clay Products publication “*Design Guide for Anchored Brick Veneer Over Steel Studs”*.

3.0 Design

Once the decision to use Structural Brick Veneer is made, the next step is to provide for a design. The Structural Brick Veneer is not part of the primary structural system and, consequently, may, or may not be designed by the building design team. It may not be in their scope of services. Thus the first issue to address is who designs the wall? Whether designed by the building design team or by a designer working for the contractor or sub-contractor, the design criteria and methods of analysis are the same. In the next paragraphs, these methods are described followed by three design examples.

3.1 Who Designs the Wall?

Structural Brick Veneer, like other wall systems, can be designed by either the design team and bid, or it can be specified as a bidder-designed item. It is done both ways.

Some owners complain to their architect that the design is incomplete without drawings and specifications to bid the exterior wall. It is like “buying a car without the wheels.” Yet, contractors design most exterior walls because they have special knowledge necessary to complete the task.

Questions that should be addressed early in the design of any wall system include the following. How much of the design of the wall should be shown on the design drawings? Where does the designer of record’s responsibilities end and the contractor’s responsibilities begin?

Often, the structural engineer of record does not show bracing because he is unaware of the wall system to be used and the method of attachment is left to the contractor. The designer should clearly identify on the drawings the responsibility for the design and construction of each component of the wall system, including bracing.

In some locations, it is common for brick veneer supports to be shown on the design drawings. In Seattle, it is common for the structural engineer of record to design precast concrete panels as part of the “standard services”. In most locations, including Seattle, the contractor prepares the design of Structural Brick Veneer.

These examples are presented to illustrate that there is no consensus about who should design an exterior wall. The “*National Practice Guidelines for the Structural Engineer of Record* ” published by the Council of American Structural Engineers clearly states that the design of curtainwall systems is not considered part of Basic Services. It is considered Additional Services under Special Services. Unfortunately, the document does not provide us with help for the bracing and stiffening problem. Nor does it show where to draw the line of responsibility between the contractor and the structural engineer of record.

No matter who designs the wall, the contractor or the engineer of record, the following information about the design criteria and methods applies.

3.2 Design Criteria

The design criteria for Structural Brick Veneer includes the applicable code sections, the appropriate design life, seismic performance, loads, allowable stresses, code prescriptive requirements and special connection requirements.

3.2.1 The Applicable Code Sections

The term “Structural Brick Veneer” may cause some confusion when applying the building code. The use of the term “Veneer” implies “non-structural”. However, the structural analysis of the Structural Brick Veneer uses the structural portions of the masonry design codes. But, they are used in combination with the performance criteria of the masonry veneer sections of the code.

3.2.2 Design Life

Design life is an important quantitative measure that defines the quality of the project. Buildings will not last forever. The owner and designer should establish a reasonable design life for each project. This requires consideration of

the economic factors such as initial cost and maintenance costs. The design life will have an impact on the selection of materials, maintenance procedures, and the selected factors of safety.

The expected performance is also an important qualitative measure for the design of the project. The minimum performance level is set by the building code, however, there are aspects of a Structural Brick Veneer System performance that are not explicitly covered by the code and require judgment.

It has been useful to define two distinct levels of expected life and performance:

Level 1 (institutional) is intended to signify a high level of quality and long life. Buildings of this type might include public or institutional buildings. Specifically, these are buildings where the additional costs associated with higher quality are judged to be necessary in meeting the overall project requirements.

Level 2 (commercial) is intended to signify a good level of quality and an average design life. Buildings of this type might include general office, industrial, and residential buildings. These are buildings where the additional cost of Level 1 (institutional) quality is not economically justified or necessary.

Increasing the quality of the connectors, improving the weather resistance of the materials and expanding on the amount of inspection and testing are the normal means to increase the design life.

3.2.3 Seismic Performance

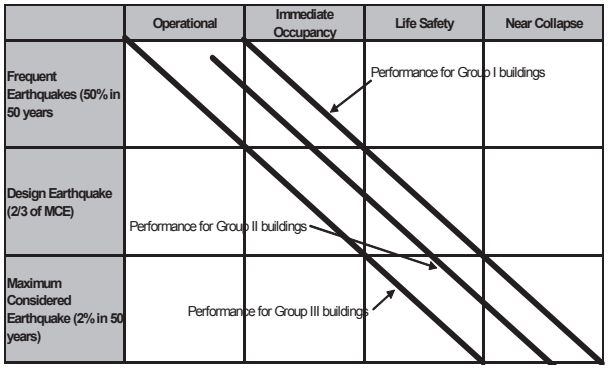
Seismic performance of Structural Brick Veneer is a complex subject since under certain levels of seismic shaking, damage can occur to the veneer. There are currently several organizations preparing standards for seismic design. The National Earthquake Hazards Reduction Program (NEHRP-2000) divides the performance of structures into four levels:

1. Operational: “Structures meeting this level when responding to an earthquake are expected to experience only negligible damage to their structural systems and minor damage to nonstructural systems” (the structural brick veneer). “Repairs if necessary can be conducted at the convenience of the owner.” “The risk to life is negligible.”
2. Immediate occupancy: “Structures meeting this level are expected to sustain more damage to nonstructural systems” (the structural brick veneer). “Exterior nonstructural wall elements and roof elements continue to provide a weather barrier, and are otherwise serviceable” (although they may be damaged).
3. Life safety: “Significant structural and nonstructural damage has occurred.” “Nonstructural elements of the structure, while secured and not presenting falling hazards, are severely damaged and can not function” (the structural brick veneer).
4. Collapse prevention: “The structure has sustained nearly complete damage. Nonstructural elements of the structure have experienced substantial damage and may have become dislodged creating falling hazards” (the structural brick veneer).

The NEHRP provisions also distinguish between building uses by assigning each structure a Seismic Use Group.

1. Group III are essential facilities requiring post-earthquake use.
2. Group II are facilities with a large number of occupants.
3. Group I are all other facilities.

Combining the performance classification with the occupancy distinction results in the following chart describing expected seismic performance.



The building code is not specific about the seismic performance of curtainwall and Structural Brick Veneer. Judgment is required on the part of the engineer to develop appropriate seismic criteria based on the project performance objective. For example, failure of a Structural Brick Veneer over the firehouse door during a major earthquake is not acceptable. Whereas, complete separation of a Structural Brick Veneer from the frame on a suburban office building with surrounding planters may be acceptable.

Because of the nature of the connections, Structural Brick Veneer can be designed to perform to a higher seismic performance level than conventional veneer. For buildings with operational performance or immediate occupancy criteria, Structural Brick Veneer offers significant advantages. If high seismic performance criteria are combined with a complex geometry, sills, soffits and articulated surfaces, it is likely that Structural Brick Veneer will be the least costly system.

3.2.4 Design Loads

Loads applied to a Structural Brick Veneer include dead load, wind load, and seismic load. The Structural Brick Veneer should support no vertical load other than its own weight. In normal practice, it may also support the weight of window systems, small air handling units and possibly some ornamentation.

Most modern building codes contain two levels of loading, service loads (allowable stress design) and ultimate loads (strength design). Both levels of loading are used in the design of Structural Brick Veneer. Local jurisdictions must be consulted for the correct design load criteria.

3.2.5 Design Assumptions and Allowable Stresses

Working Stress Design

Working stress design methods are recommended. Strength or limit states design methods are still in the development stage and have not been extensively used for the design of structural brick or Structural Brick Veneer. The ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures* contains a new strength design section, Chapter 3. It may offer less conservative designs for Structural Brick Veneers resisting out-of-plane

wind and seismic loading particularly when compared to allowable stress design that does not allow a one-third increase in allowable stress for load combinations, including wind or seismic loading.

Allowable Stresses

The allowable stresses permitted in the Structural Brick Veneer are the same as those allowed for structural reinforced masonry. The one-third increase in allowable stress is typically used for load combinations, including wind and seismic loads.

The design of connectors requires additional allowable stresses not typically included in the building codes. These additional required allowables are as follows:

1. The shear cone capacity of masonry for pull-out is typically taken as the beam allowable shear stress (1.0 x $(f'_m)^{1/2} \leq 50$ psi).

2. The shear cone angle is conservatively assumed to be 20 degrees instead of the more commonly used 45 degrees.

3. The torsion allowable stresses are assumed equal to the beam shear allowable stress (1.0 x $(f'_m)^{1/2} \leq 50$ psi). Unpublished testing on several projects has confirmed the validity of this assumption for several projects. The tests consisted of square panels fixed on three corners and lifted on the fourth corner. Failure stresses were typically 2.5 times the allowable values.

4. The concrete shear friction equation is assumed to apply with a friction factor of 0.4, ($A_v = V_u / \phi F_y$). The ultimate shear is taken as 2.0 times the design shear.

5. The tension allowable stress of the brick mortar interface is typically neglected.

6. The tensile capacity of the brick is assumed to be 10% of the compression capacity. The allowable stress is determined by applying an appropriate factor of safety for the load condition being considered. This allowable is for the brick, not the masonry. The code provides allowable tension values for the masonry in tension parallel and perpendicular to the bed joints and for different bonding patterns and mortars.

7. The allowable bond stress to plane steel is assumed to be 60 psi. or the same value as the allowable bond stress to plane bars.

Cracking of Brick

At service loads, the brick units should not crack. Cracking of the interface between the brick and mortar is acceptable. However, a cracked brick could be an aesthetic problem even though the structural capacity may be adequate. The engineer should decide the appropriate service design loading and the factor of safety to be applied.

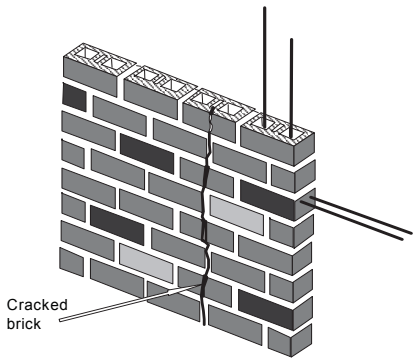


Figure 11 Cracked Brick

Code Minimum Requirements

It could be interpreted that because the Structural Brick Veneer is not classified as structural in the code, the prescriptive minimums of most structural codes do not apply. An example is that the usual minimum reinforcement spacing does not apply. However, the practice is to conform to these minimum requirements as though the Structural Brick Veneer is structural reinforced masonry.

Connector Requirements

Most seismic codes have special minimum criteria for the design of curtainwall connections. These provisions are principally directed towards precast concrete panels used as curtain wall and it is reasonable to assume they apply to Structural Brick Veneer.

One example is IBC 2003 Chapter 16, Section 1621 which references ASCE 7 (2002) Section 9.6.2.4:

> 1. Connection and panel joints shall allow for the story drift caused by relative seismic displacements (D_p) determined in Section 9.6.1.4, or ½ in. whichever is greatest.
>
> 2. Connections to permit movement in the plane of the panel for story drift shall be sliding connections using slotted or oversize holes, connections that permit movement by bending of steel, and other connections providing equivalent sliding and ductility capacity.
>
> 3. The connecting member itself shall have sufficient ductility and rotation capacity so as to preclude fracture of the concrete (masonry) or brittle failures at or near welds.
>
> 4. All fasteners in the connecting system such as bolts, inserts, welds and dowels and the body of the connectors shall be designed for the force (F_p) determined by Eq. 9.6.1.3-2 with values of R_p and a_p taken from Table 9.6.2.2 applied at the center of mass of the panel.
>
> 5. Anchorage using flat straps embedded in concrete or masonry shall be attached to or hooked around reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel or to assure that pullout of anchorage is not the initial failure mechanism.

3.2.5 Isolation from the Building

The most challenging part of the design is to isolate the Structural Brick Veneer from the building frame. There are many ways that this can be accomplished and a few will be discussed.

The amount of isolation is an important factor and the code does not provide precise criteria. There are three directions in space: vertical, horizontal in the plane of the wall, and horizontal perpendicular to the plane of the wall. The building behind

the wall, while seemingly static, is in fact subject to a variety of different movements in all three directions.

Vertical Isolation

The vertical movement can result from several different sources. The following figure shows one source.

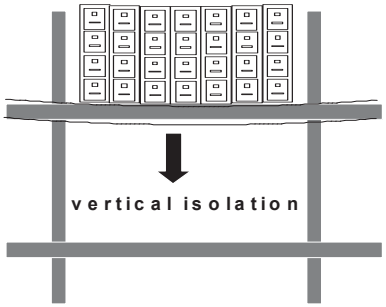


Figure 12 Differential Vertical Deflection

The different amount of vertical loading on the floors will result in a shortening of the distance between the floors. In many buildings, this can be an important factor and can result in differential deflections of greater than three-quarters of an inch. If the system does not provide compliance for this movement, the file cabinet load will be reacted by the Structural Brick Veneer instead of the floor beams and could cause failure.

If the building is constructed of concrete, the concrete shrinkage and creep will contribute to the shortening between floors. In high-rise construction, the elastic and differential elastic shortening may become important and may affect the construction schedule and sequencing.

Horizontal Isolation in the Plane of the Wall

Lateral forces from wind and seismic loading cause horizontal movement of the building frame. When one floor moves horizontally relative to the adjacent (higher or lower) floor, the wall system must accommodate the movement. If the Structural Brick Veneer is attached to both floors, then the veneer would resist the lateral forces and possibly fail. The amount of differential horizontal movement can be large; up to four inches is common in areas of high seismic activity.

A movement joint at the window head is commonly used to accommodate the horizontal movement.

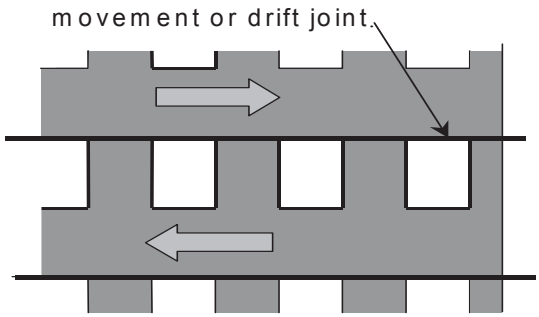


Figure 13 Horizontal Drift Joint

These joints are usually called drift joints and can be located at any horizontal plane of the building. When horizontal joints change elevation at different surfaces of the wall, it is difficult to accommodate horizontal displacement.

This concept is simple until the joint reaches the corner. Corners provide additional natural restraint, and can result in an unwanted attachment to the frame.

The following figure shows an example of a Structural Brick Veneer where the connection to the structure near the corner was designed to be rigid for forces perpendicular to the wall.

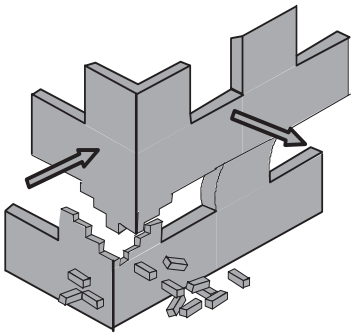


Figure 14 Corner Connected to the Structure

There are several methods available to provide isolation at a corner. One is to eliminate the corner connections and have the Structural Brick Veneer resist the loading.

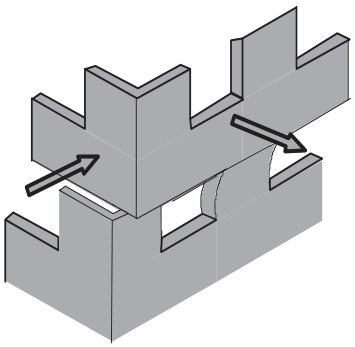


Figure 15 Corner Not Connected to the Structure

Horizontal Isolation Perpendicular to the Plane of the Wall

Another is to accommodate the movement with warping of the corner panel. This will be shown in one of the examples to follow.

For walls away from corners, horizontal movements perpendicular to the plane of the wall are accommodated by out-of - plane bending of the masonry. Typically, reinforced masonry has the capacity to accommodate large deflections in this direction and the isolation in this direction is seldom a design consideration.

Typical Deflection Magnitudes

The amount of isolation required depends on loading and expected performance. There are no known accepted national standards, but as a guide, Table 1 presents typical values and code requirements for isolation.

TYPICAL MOVEMENT DESIGN CRITERIA (1)

Movement Type	Structural System	Source of Movement	Limitations	Recommended Values	Typical Values	Isolation Method
Vertical Floors	Steel or concrete	Differential application of live load	L/600	<0.60 inch	1/4″	Compensation channel at the window head
						Soft joint under the ledger angle
	Concrete	Shrinkage with drying	(2)	(3)	1/16″	Allow the concrete to dry and cure before installing the veneer
		Creep	(2)	(3)	(3)	Provide vertical control joints every 20 to 30 feet
Vertical Columns	Steel	Differential elastic shortening	(2)	(3)	(3)	Only applies to high-rise buildings where the veneer is installed prior to finishing the building frame
	Concrete	Shrinkage	(2)	(3)	1/16″	Allow the concrete to dry and cure before installing the veneer
		Creep	(2)	(3)	1/16″	Compensation channel at the window head
						Soft joint under the ledger angle
Lateral	Frame of steel or concrete	Wind	(2)	.0025H	3/8″	Usually absorbed elastically in the system
		Seismic	Per analysis Minimum ½″	Depends on occupancy	21/2 TO 3″	Compensation channel at the window head
						Soft joint under the ledger angle
	Shear Wall	Wind	(2)	.0025H	1/8″	Usually absorbed elastically in the system
		Seismic	Per analysis Minimum ½”	Depends on occupancy	1/4 TO 1/2 ″	Compensation channel at the window head
						Soft joint under the ledger angle

1. This table should not be used for design. Each project has unique requirements.
2. No known values.
3. Depends on the structure.

3.3 Designing the Wall

The discussion describing the design of a Structural Brick Veneer wall will be divided into four parts:

1. The layout or configuration.
2. The design of the wall for code prescribed loading.
3. The design of the wall to prevent cracking of the brick.
4. The design of the connections.

In the normal process of design, all four parts are accomplished at the same time. Following the four parts, several design examples demonstrating the methods will be presented.

3.3.1 Layout or Configuration

Usually the designer begins with an architectural rendering of the wall elevations. The designer must decide on the method of isolation and the locations to react the dead load, wind and seismic loads applied to the wall.

It is difficult to describe the process for deciding the configuration of the veneer. It is part of the art of structural engineering and experience will help. Three example projects are presented to provide some insight into the issues. These represent complex applications of the Structural Brick Veneer configurations and were chosen to demonstrate the flexibility of the system. Simpler applications are more common.

Project 1

A hospital project was in the contract document phase of design. The architect's concept for the wall was brick veneer over metal studs. Unfortunately, the design had assumed only a 9-inch thickness for the wall: Three and one half inches of brick, a 1-1/2 inch cavity and 4″ deep steel studs. The floor height was 14′-8″



Figure 16 Hospital - Project 1

When the project structural engineer was asked to size the steel studs, it became apparent that the 4" depth was insufficient to support the conventional veneer. Adding thickness to the exterior wall reduced building space and had a major impact on the already designed interiors and room layout. The design of the project stopped because of the problem.

Structural Brick Veneer provided a solution. However, a 4" reinforced brick wall could not span the 14'-8" as a simple span between floors. One option was to use a 5" or 6" brick to make a simple span between floors, but this did not leave enough depth for the interior studs

to support the wallboard without thickening the wall. The solution was to provide a 4" thick (specified thickness is 3.5") Structural Brick Veneer wall system supported as shown in the following Figure.

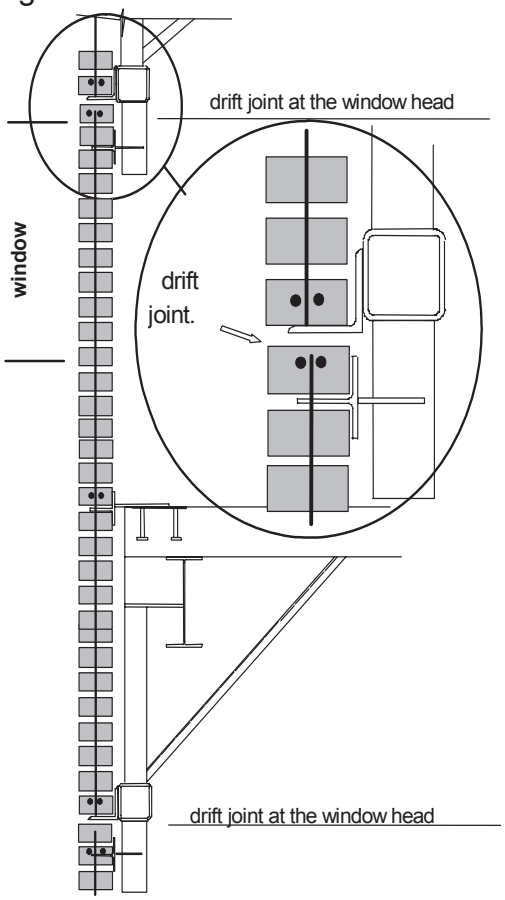


Figure 17 Project 1 – Pier Concept Between Windows

The brick masonry is supported on continuous angles located at the window head. These angles, or ledgers, are supported on a girt system suspended from hangers with kickers framing back to the underside of the slab.

Lateral bracing at the floor consists of galvanized 1/8-inch thick plate with holes for vertical reinforcement. This brace is flexible in the vertical direction and stiff in both horizontal directions.

The seismic or drift joint is located at the window head, below the ledger. The joint directly below the ledger is a caulk joint. Another lateral brace is located below the ledger. This brace is stiff perpendicular to the plane of the wall and flexible in both the horizontal in the plane of the wall and the vertical directions. This is accomplished by using a 1/8-inch thick galvanized plate with holes for the vertical reinforcement supported by two 1/8-inch thick galvanized plates welded to the bottom of the girt and welded to the plate into the brick.

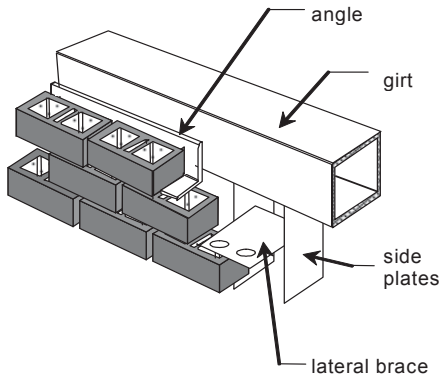


Figure 18 Lateral Connection

This configuration reduced the spans sufficiently to allow the 4" brick to resist the applied loading.

The stud wall was 26-gauge steel studs and was used only for the support of the water barrier and air barrier, and interior wallboard.



Figure 19 Drift Joint Before Ledger Installation

Dowels were welded to the ledgers, and the brick was laid by threading over the dowels. When the construction of masonry reached the head location, bars were dropped into the vertical cells and the wall solidly grouted.



Figure 20 Ledger Installation

The masonry units are nominal 4x4x12 inch with two 1-3/4 x 3-1/2 inch cells. The design f'_m was 4,000 psi .

Project 2

The second project is also a hospital addition located in an area of high seismic risk. The hospital program and site generated a geometric shape consisting of several boxy wings. A brick wall was chosen to match the old building.

The boxy nature of the floor plan made isolation for seismic lateral displacements nearly impossible with conventional veneer construction. Structural Brick Veneer was chosen because of its ability to isolate the brick veneer from the building.



Figure 21 Project 2

This Structural Brick Veneer was designed to accommodate a large lateral

seismic displacement. The building structure was a steel moment frame in one direction and a steel braced frame in the other. Because of the many corners, an unconventional approach to the isolation was used. The concept was to build a Structural Brick Veneer box in the shape of the outside wall. The box was one floor tall extending several courses above the window at the next floor. The box was then attached to the building so that it moved with each floor. The dead load support was at the floor.

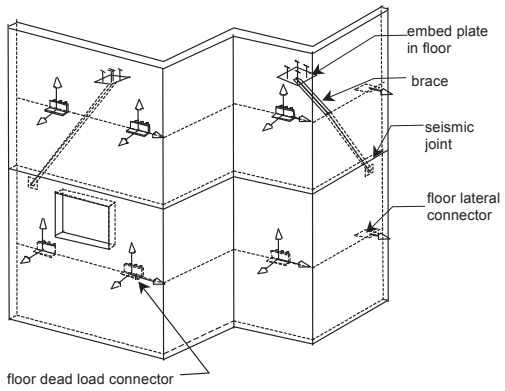


Figure 22 Hospital with Many Corners

The corners of the box resisted the wind and seismic loading perpendicular to the surfaces of the wall. The reaction of the wind and seismic load occurs in the dead load anchors as shear and over-turning. Where corners were spaced too far apart to span between them, braces were added to the underside of the slab for the floor above at a sufficient distance from the corners to accommodate the differential horizontal movement of the floor by warping of the masonry.

When the building moves laterally, the rigid corners are unaffected and the under-floor braces cause warping of the wall. The displacement perpendicular to the wall caused by the brace is at a sufficient distance from the corner to warp the wall without failure.

Continuous ledgers were not used in this situation because they would not provide adequate strength to resist the overturning forces. Consequently, the normal construction sequence needed to be modified.

The construction proceeded as follows: Beginning from the masonry below, rigid foam board was placed on the brick. Brick was then laid on top of the foam board for a height of two feet above the floor. This masonry engaged the dead load connector. At this time, the wall was grouted and allowed to cure for three days. Masonry was then laid to several courses above the window head and the process repeated for each floor. Caulk was placed over the face of the foam board that was left in the wall.

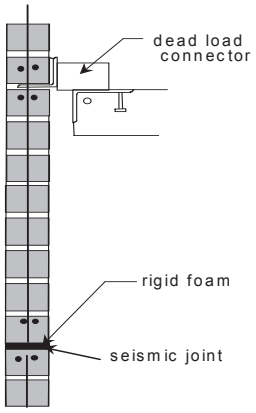


Figure 23 Temporary Rigid Foam Board Support

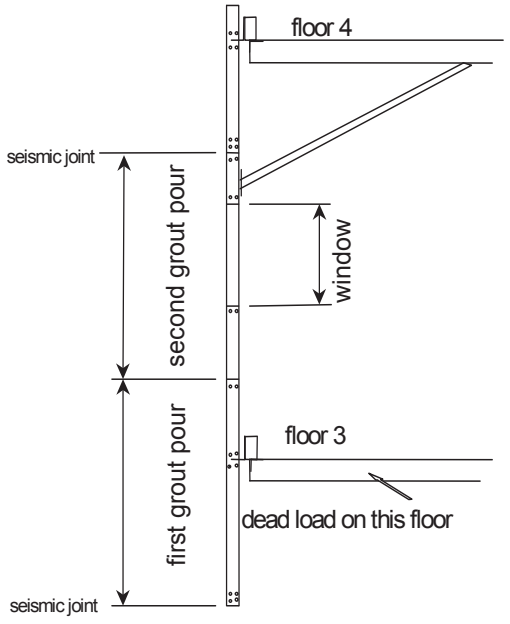


Figure 24 Construction Sequence

The design used isolated connectors instead of a ledger because, under lateral load conditions, the wall produced uplift on the floor and it was felt that the best design was to provide specific points for these forces to be reacted. The corners provide much of the needed lateral bracing, thus the number of connectors to the structure is relatively few.

The brick was a 5-inch unit. Custom shapes were provided. Additionally, the project used prefabricated Structural Brick Veneer (brick panels) where scaffolding was difficult to install or where the support of the brick was not available.

Project 3

A final example is a combination of laid-in-place Structural Brick Veneer and prefabricated Structural Brick Veneer or brick panels. Brick panels are similar to precast concrete panels except they are constructed of reinforced brick instead of reinforced concrete. The project was built on fill with friction piling used to support the load. The foundation design was such that ½ inch of differential settlement was expected in 50 feet. The building frame was a combination of steel and wood. The corners could be damaged in a moderate earthquake. The typical wall elevation is shown in the following Figure 25.

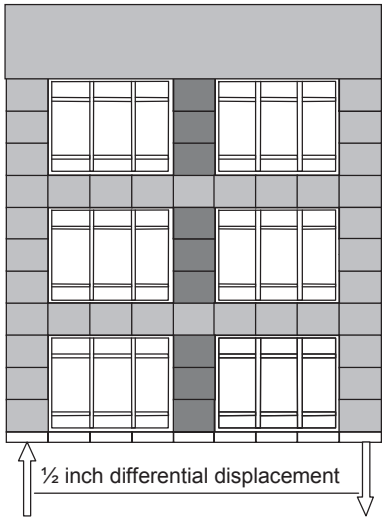


Figure 25 Building with Anticipated Differential Settlement

The solution was to use Structural Brick Veneer column elements with the dead load supported at the foundation. Lateral bracing was provided at each floor. Brick

panels were hung off the Structural Brick Veneer columns with connectors that allowed them to pivot while being stiff for loads perpendicular to the surface.

The columns were constructed of 8" brick and reinforced. They supported the entire dead load of the wall, but the lateral connectors to the building were flexible in the vertical directions so that none of the building dead load was supported on the brick. The panels were constructed of 4" brick. They were shipped 600 miles from the fabrication yard to the building location.

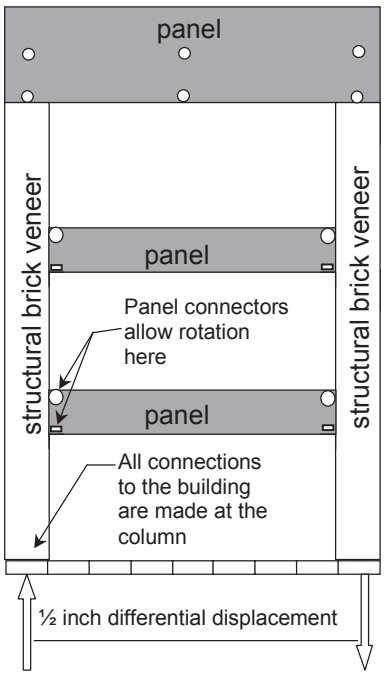


Figure 26 Concept for Settlement

3.3.2 Design for Code Loading

The reinforcement size and spacing are typically determined by conventional allowable stress design. Maximum moments usually occur at mid-span for simple configurations or at connectors for cantilevered configurations. Both horizontal and vertical reinforcement should be provided because most walls behave as plates with moments in both directions. The design often proceeds, however, by assuming simple spans with full loading in each direction.

Maximum spacing of reinforcement should be less than 4 feet with 3 feet a common value. Typically, bar sizes are No. 3 and 4 bars in 4 inch walls and No. 3, 4 and 5 bars in 5 inch and 6 inch walls.

In areas of high shear, additional reinforcement may be required. Reinforcement should also surround connectors and openings.

3.3.3 Design for Wall Cracking

An important performance criterion is to prevent the cracking of brick. This condition usually is not a structural problem for reinforced brick masonry. But, it is an aesthetic problem. The design for this performance criterion is typically done as follows:

To prevent cracking of the brick, the moments in the horizontal direction (stiff direction) are compared to the resistance of the wall in that direction, see the following figure. Failure would involve cracking of the brick unit and the head joint. Cracking due to vertical moments would result in cracking of the horizontal bed joint which is not an aesthetic problem.

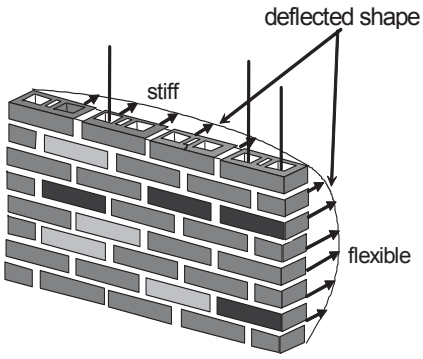


Figure 27 Stiffness of Brick Masonry

Unpublished tests and tests performed by Western States Clay Products in the early 1970's have shown that brick masonry in running bond direction is nearly 10 times as stiff as brick masonry in the vertical direction. For normal brick orientations, loads tend to run horizontally to the supports.

Most code wind loading is based on a mean return period of 50 years and this often represents a reasonable level of wind loading expected once in the life of the average building. However, in some cases, it may be appropriate to increase or decrease these levels to better match the criteria for the project.

Seismic loading would usually correspond to the moderate level earthquake. It is probably unreasonable to design to the major level earthquake to prevent an aesthetic problem.

The resistance of the wall is provided by the masonry without consideration of the reinforcement. The masonry is assumed not cracked. Without the reinforcement, the resistance is provided by the bricks and mortar joints. It is conservative to assume that there is no capacity for the head joint to resist tension stresses, consequently all of the resistance is provided by the tensile capacity of the brick. Thus, the appropriate structural section available to resist the loading is only the brick which is normally one half the gross cross-section.

There are no national standards available to provide allowable stresses for brick in tension. The brick material supplier may have information or it may be necessary to do testing. In the absence of both, using 10% of the brick's compressive strength has generally proven conservative. Because the minimal consequences of the failure and the loading are expected to occur only once in the building life, it is recommended to use a small factor of safety on the tension capacity of the brick. A value of 1.25 has been successfully applied.

3.3.4 Design of Connections

Each configuration has a unique set of reactions for each code-required load combination. The reactions must be supported by the connectors and the structure. The connectors must be of sufficient strength and ductility to meet the capacity and ductility requirements.

Materials for Connectors

Most connectors are constructed of miscellaneous steel angles, tees and plates. For Level 1 (institutional) performance they are typically galvanized. For Level 2 (commercial) performance

they are shop painted. Stainless steel connectors are probably not warranted and there are only a few known installations.

Design Methods and Assumptions

Conventional design methods apply to the design of the connectors, except for the design of the capacity of the connector to the Structural Brick Veneer. There are several additional design considerations.

First, the connector should engage more than one brick cell. Sometimes bricks have cracks as a result of manufacturing. Concentrating loads at a single cell of the brick could, if cracked, significantly reduce the capacity. Consequently, for the design of connectors in Structural Brick Veneer, the scale of the engagement into the brick should be at least two times that usually associated with connectors engaging reinforced concrete.

Next, because of the seismic requirement for connectors, “Anchorage using flat straps embedded in concrete or masonry shall be attached to or hooked around reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel or to assure that pullout of anchorage is not the initial failure mechanism”, it is often necessary to thread reinforcement through holes placed in the steel. This may restrict the flow of grout at the connection and a recommended mitigation is to use bond beams above and/or below the connector.

Construction Tolerances

An important factor in the design of a connector is construction tolerance. Structural Brick Veneer walls are located in plane and elevation with tolerances more restrictive than the supporting structure. For example, the deviation from plumb (down the height of the building) often is limited to 1/2 inch for Structural Brick Veneer. In a steel frame at the upper floors, the tolerance on the frame is 1-1/4 inches inward and 2-1/4 inches outward. The location of the slab edge is often plus or minus 1 inch.

The elevation of the floor also varies from the planned location. There are several reasons for this. First, there is construction tolerance. Second, the floor is supported on beams that deflect due to loading. Third, there is elastic shortening of the building and for concrete buildings, there is creep and shrinkage. Again, this uncertainty of floor elevation is important to the design of the connector. These tolerances have an important design and construction impact.

The connector must be designed to accommodate these deviations in dimension. The edge of floor connector should be configured to be installable with the slab edge at either extreme of the allowed tolerance. Additionally, the strength of the connector should be adequate to support the loads with the most unfavorable combination of element locations.

The configuration of the connector is often dictated by the tolerance requirements, and the resulting load eccentrici-

ties often (to the untrained eye) appear to oversize the connections.

3.4 Design Examples

Three design examples are presented. The first is a strip spandrel configuration supported on a continuous ledger. The second is the same except the veneer is supported on separate floor dead load connectors. The third example addresses seismic displacement design at a Structural Brick Veneer corner.

3.4.1 Example 1

This example is very simple and unlikely to occur in actual practice. The designer is cautioned not to apply the methods and equations contained in this example to other applications. The purpose of the example is to demonstrate a sequence of assumptions and analysis appropriate for this simple design. Different assumptions and analysis methods should be used when the design changes.

A four-story office building with a “strip window” system serves as a common application. The story height is 12'-6", the window height is 6'-0" and the sill height is 2'-6". The wind load is 30 psf and the building is classified as seismic design category D. The wind load of 30 psf (according to most codes) is typically larger than the seismic inertia load perpendicular to the surface of the veneer and this is assumed for this example. Floor to floor drift isolation is provided by a slip joint in the window head. Warping of the glass accommodates drift at the building corners. In other words, the brick corner remains rigid and moves with the floor to which it is attached.

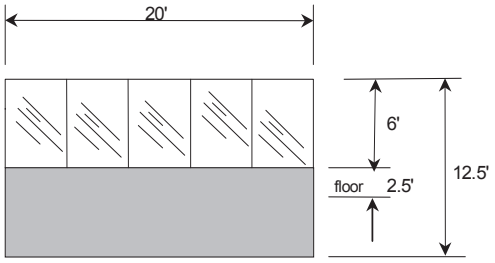


Figure 28 Strip System Example

A continuous ledger system is hung from the bottom of the spandrel beam and braced to the underside of the floor.

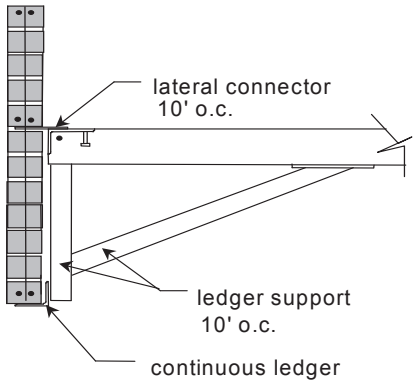


Figure 29 Support for the Wall

The hanger and brace are located at 10 feet on center. This matches the purlin spacing when the floor spans in the direction parallel to the edge of the slab. Assume 4-inch hollow brick is used. The actual thickness is 3.5 inches and the depth of the reinforcement from the surface is 1.75 inches.

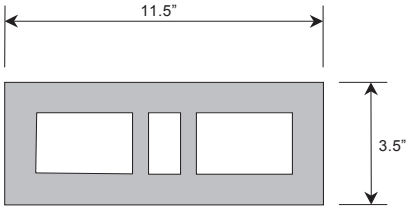


Figure 30 Brick Used in the Example

The design might proceed as follows:

The dead load on the ledger includes the weight of the brick veneer and the windows.

Wall = 40 psf x 6.5 ft = 260plf
Window = 6 psf x 6 ft = 36 plf

Total = 296 plf

Since the hangers are spaced at 10 feet, the hanger vertical load is:

296 plf x 10 ft = 2960 lbs

The ledger is designed to span between supports. In Structural Brick Veneer, the brick can also be used to span if shoring is used during construction. Assume the brick is used to span between supports, then try (2) #3 in a bond beam at the first course above the ledger.

The bending due to dead load is:

$M_A = W L^2 / 8$
$M_A = 296plf \times 10^2 ft /8 = 3700 lb\text{-}ft$

The steel ratio “ρ“ is used to calculate the capacity to resist the loading.

$$\rho = A_s / bd$$

Where A_s is the area of flexural reinforcement, b is the width or thickness of the masonry and d is the depth of the flexural element from the extreme compression fiber to the centroid of the reinforcement.

$$\rho = .22\ in^2 /(3.5 \times (78 - 4))$$

$$\rho = .00085$$

Assume the masonry modulus of elasticity is 3,000,000 psi, and the steel modulus of elasticity is 29,000,000 psi then the modular ratio between the reinforcement and the masonry is:

$$n = Es/ E_m = 9.67$$

and then

$$n\rho = .00085 \times 9.67 = .0082$$

Most codes allow a design flexural stress for grade 60 reinforcement as:

$$F_s = 24{,}000 \text{ psi}$$

Similarly, the allowable masonry stress is 1/3 the specified strength. If 4000 psi is specified, then the allowable flexural masonry compression stress is:

$$F_b = 4000/3 = 1333 \text{ psi}$$

By summing forces in the direction along the flexural element, the following

expression for the location of the neutral axis can be obtained:

$$k = [(n\rho)^2+2n\rho]^{1/2} - n\rho$$

$$k = .12$$

A convenient term "j" is defined as:

$$j = (1 - k / 3) = .96$$

The moment capacity limited by the allowable reinforcement stress is defined as:

$$M_t = A_s\ j\ d\ F_s$$

Thus:

$$M_t = .22 \times .96 \times 74 \times 24000/12$$

$$M_t = 31{,}200 \text{ lb-ft}$$

The moment capacity limited by the allowable compression stress in the masonry is defined as:

$$M_c = bd^2kj\ F_b / 2$$

$$M_c = 3.5 \times 74^2 \times .12 \times .96 \times 1333/(2 \times 12)$$

$$M_c = 122{,}600 \text{ lb-ft}$$

Since both M_t and M_c are greater than the applied moment, M_a, the two #3 bars provide more than adequate vertical support between ledger hangers.

If shoring is provided, a similar calculation would show that the vertical support could be extended to 20 feet or more and the weight of the wall reacted at the building columns.

However, as will be seen later, the lateral support (for wind and seismic loading) will need to be 10 foot. Thus, the hanger could be spaced at 20′, but the braces back to the underside of the slab will need to be at 10′.

The wind load on the wall is 30 psf. This load acts perpendicular to the surface of the brick and the window.

Assume floor connections are spaced at 10 foot at the same location as the lateral support of the ledger.

The floor reaction is found by summing moments about the ledger:

The reaction of the window at the sill (top of the brick) is:

$$R_w = 3 \text{ ft} \times 30 \text{ psf} = 90 \text{ lb/ft}$$

The resulting moment about the ledger is:

$$M_w = 90 \text{ lb/ft} \times 6.5 \text{ ft} = 585 \text{ lb-ft/ft}$$

The moment about the ledger due to the wind loading on the brick is:

$$M_b = 30 \text{ psf} \times 6.5 \text{ ft} \times 6.5 \text{ ft} / 2$$

$$M_b = 634 \text{ lb-ft/ft}$$

The reaction resists the moments and is calculated as:

$$R_F = [\ M_b + M_w\ ] / 4$$

$$R_F = [\ 634 + 585\ ] / 4$$

$$R_F = 304.7 \text{ lb-ft/ft}$$

Since the spacing of the connectors is at 10 feet on center, the connector reaction is:

R_F = 3047 lbs

By summing forces perpendicular to the surface of the brick, the ledger lateral reaction is:

R_L = 12.5 ft x 30 psf x 10 ft - R_F

R_L = 703 lbs

Drawing the shear and moment diagrams reveals that the maximum moment occurs at the floor and is equal to the moment on the brick due to the window sill load plus the moment on the brick due to the wind on the brick:

M_w = 30 psf x 3 ft x2.5 ft

M_w = 225 lb-ft/ft

M_b = 30 psf x 2.5 ft x 2.5 ft / 2

M_b = 93.75 lb-ft/ft

$M_a = M_w + M_b$

Thus:

M_a = 318.75 lb-ft/ft

and over the 10 foot spacing becomes:

M_a = 3187.5 lb-ft

An estimate of the required reinforcement can be obtained as follows:

$A_S \cong M_a / [.9 F_s d]$

$A_S \cong$ (3187.5 x 12)/[.9 x 24,000 x 1.33 x 1.75]

$A_S \cong .75$ in^2

Where the design depth is one-half the wall thickness (1.75 inches), and the stress has been increased by 1/3 for wind short duration loading.

Try (4) #4 bars. The brick module is 6 inches. The code allows an effective width for bending of six times the thickness of the wall. The width for design can be obtained by laying out the bars in the brick cells:

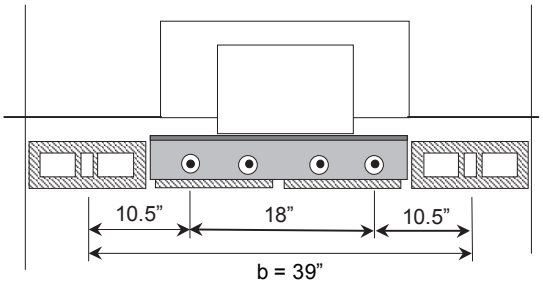


Figure 31 Plan View of Connector

And:

$\rho = A_s / bd$

$\rho = 4$ x.2 in^2 /(1.75 in x 39 in)

$\rho = .0117$

$n\rho = .113$, $k = .37$ $j = .87$

The moment limited by the allowable stress in the reinforcement is:

$M_t = A_s\ j\ d\ F_s$

$M_t = .8 \times .87 \times 1.75 \times 24{,}000 \times 1.33 / 12$

$M_t = 3250$ lb-ft

The moment limited by the allowable stress in the masonry is:

$M_c = bd^2kj\ F_b / 2$

$M_c = 39 \times 1.75^2 \times .37 \times .87 \times 4000 \times 1.33/(3 \times 2 \times 12)$

$M_c = 2840$ lb-ft n.g.

Compression at the floor in the brick is often the limiting factor.

Add (2) #4 bars for a total of 6 bars. Then

$b = 6 \times 3.5 + 5 \times 6 = 51$ in.

$n\rho = (9.67 \times 6 \times .2)/(1.75 \times 51)$

$n\rho = .13$

$k = .40 \quad j = .87$

$M_t = 4870$ lb-ft ok

$M_c = 4025$ lb-ft ok

The wind loading must span horizontally 10 feet to the vertical connector strips. Assume the window head reaction is reacted by the lateral bracing and the ledger, and the window sill reaction is reacted by the brick, then the moment in the brick is the moment caused by the window and the moment caused by the wind load on the brick.

$M_w = 30$ psf $\times$ 3 ft $\times\ 10^2 / 8$

$M_b = 30$ psf $\times$ 6.5 ft $\times\ 10^2 / 8$

$M_a = M_w + M_b$

$M_a = 3562$ lb-ft

Assume (5) bond beams with (2) #3 in each, then:

$A_s = 1.10$ in^2

$\rho = 1.10/(78 \times 1.75)$

$\rho = .00805$

$n\rho = .078, \quad k = .32 \quad j = .89$

$M_t = 1.10 \times .89 \times 1.75 \times 24000 \times 1.33 / 12$

$M_t = 4567$ lb-ft ok

$M_c = 78 \times 1.75^2 \times .32 \times .89 \times 1333 \times 1.33/(2 \times 12)$

$M_c = 5038$ lb-ft ok

The condition of dead load plus wind is satisfied by inspection, but can be checked as follows:

$[M_a/(M_t \text{ or } M_c)]_{dead} + [M_a/(M_t \text{ or } M_c)]_{wind} < 1.0$

$3700/3120 + 3562/4567 = .89 < 1.0$

The condition of inertia seismic and dead load is also satisfied by inspection since the inertia seismic load was assumed less than the 30 psf wind load. This conclusion by inspection can easily be made when designing the veneer, but should not be so easily made when designing connectors. This is because most seismic codes have special load factors and additional criteria for seismic connector design that are not typical for the wind design of a connector.

The final check is for cracking of the brick.

Assume a service load of 15 psf. The value selected should relate to the design life and the performance criteria selected for the project.

The uniform horizontal loading of the strip between the connectors is a result of the wind load acting on the windows and brick. The moment is estimated as:

$$M_w = 15 \text{ psf} \times 3 \text{ ft} \times 10^2 / 8$$

$$M_w = 562.5 \text{ lb-ft}$$

$$M_b = 15 \text{ psf} \times 6.5 \text{ ft} \times 10^2 / 8$$

$$M_b = 1218.7 \text{ lb-ft}$$

$$M_a = M_w + M_b$$

$$M_a = 1782 \text{ lb-ft}$$

The section available to resist the moment is estimated as half the wall height since half of that height is head joints.

$$I = b\, t^3 / 12$$

$$I = (78/2) \times 3.5^3 / 12 = 139.3 \text{ in}^4$$

The stress is:

$$\sigma = Mc/I$$

$$\sigma = 1782 \times 12 \times 1.75 / 139.3$$

$$\sigma = 269 \text{ psi}$$

The brick unit should have a tensile strength in excess of 269 psi times the factor of safety. If 1.25 is used, then the tensile strength needs to exceed 335 psi.

According to an unpublished test and experience, to achieve an f'_m of 4000 psi the brick strength probably exceeds 10,000 psi. Using the 10% rule of thumb, the expected tensile strength of the brick is 1000 psi.

A simple lateral connector at the floor is shown in the following figure. It consists of an embedded WT 4 x 5 with a coupler welded to the flange for the attachment of a rod.

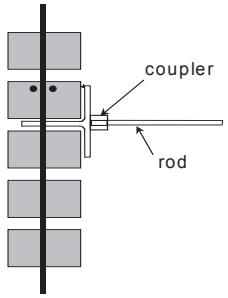


Figure 32 Simple Lateral Connector

The length of the tee will need to be determined based on the loads applied. To start, assume the tee is 22 inches long. The tee contains four 1-inch diameter holes for reinforcement placement. The capacity of the connector can be estimated by using a shear cone.

Assuming the shear cone originates at the bar then the height of the cone is:

$$h = 1.75 + .25 = 2.0 \text{ inches}$$

Assuming a 20 degree slope at the edge of the cone, the approximate surface area of the cone is:

$$A = \text{Length} \times \text{width} \times 2$$

$$A = \{2.0 / \cos 20^{\circ}\} \times 22 \times 2$$

The ends of the cone are neglected, but can be added if the capacity is insufficient.

$$A = 94 \text{ square inches}$$

Assuming the shear allowable is the same as the maximum shear allowable for beams of 50 psi (the masonry design strength exceeds 2500 psi and the 1/3 stress increase is used) then the allowable for the connector for pull-out is:

$$P = A \times 50 \text{ psi} \times 1.33$$

$$P = 94 \times 50 \times 1.33 = 6250 \text{ Lbs}$$

Another failure mode is the connector breaking the bond between the steel and masonry. The area of contact is:

$$A = \text{Length} \times \text{width} \times 2$$

$$A = 2.75 \times 22 \times 2 = 121 \text{ in}^2$$

The bond strength is assumed to be 60 psi plus the 1/3 stress increase. Thus, the capacity of the connector is estimated as:

$$P = A \times 60 \times 1.33$$

$$P = 121 \times 60 \times 1.33 = 9656 \text{ lbs}$$

The shear friction check results in:

$$A_v = V_u / \phi F_y$$

or

$$V_u = \phi A_v F_y$$

$$V_u = .4 \times 4x.2 \times 60{,}000$$

$$V_u = 19{,}200 \text{ lbs}$$

$$V = V_u / 2 = 9600 \text{ lbs}$$

The lowest allowable load is 6250 lbs compared to the applied wind load of 3047 lbs. A 10-inch long anchor would likely supply sufficient capacity, but only two of the six bars would be engaged making the design for ductility questionable.

It is assumed that the code level seismic inertial force is .315 times the force of gravity. The working stress design inertia loading is .315/1.4 or .225 times gravity. The brick weight is approximately 40 psf resulting in a surface inertial load of 9 psf and a reaction of 3047 x 9 / 30 or 914 lbs. The connector factor of safety exceeds 7 for code level seismic loads. This satisfies the additional seismic criteria for connectors by inspection.

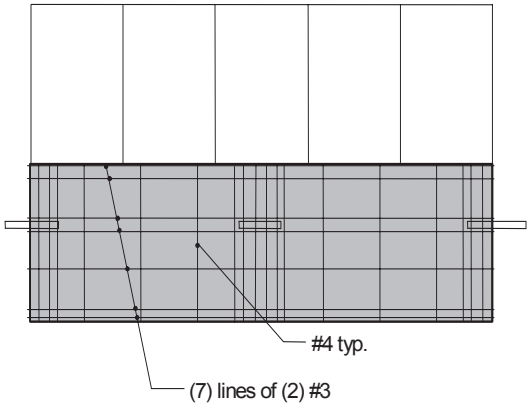


Figure 33 Final Design

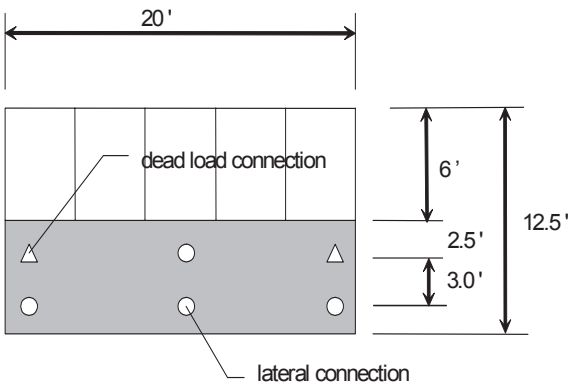


Figure 34 Location of Connectors

Limited testing of connectors has been conducted. One recent test conducted by Western States Clay Products Association validated the design methods for the connection shown above. Other tests specific to special connections on projects have been conducted. They are unpublished, but also verify the above methods.

3.4.2 Example 2

The same strip window system is used for Example 2 except that the dead load support is now on separated connectors located at the floor. Shoring will be used to construct the wall. The design example is for the in-place condition only. In actual practice, the designer of the Structural Brick Veneer would design the system for the shoring conditions as well as the in-place condition.

The following figure presents the new layout of the connections.

The veneer is assumed to have a vertical expansion joint at 20 feet on center. From the previous example, the horizontal span of the brick is limited to less than 10 feet. Thus, a lateral anchor at the floor and a brace will be required at the mid point of the panel.

The design dead load, after the wall is constructed, is the same as the previous example.

Placing the dead load anchors away from the columns will avoid interference with the building structure and make the installation easier. Assume the dead load anchors are placed at 2 feet from the column line. A vertical expansion joint is assumed at the column. The 2 feet dimension was chosen as the center of the head joint so that the connector is centered on the head joint and an even number of bars will pass through the connector. If an odd number of bars passes through the connector, then the anchor would be located at the center of a cell. Two feet three inches or

two feet nine inches from the expansion joint would be examples.
`

The reaction load on the dead load connector is:

$$R = w \times L / 2$$

$$R = 296 \times 20 \text{ ft} / 2 = 2960 \text{ lbs}$$

The maximum moment occurs at the mid span and is:

$$M_a = R \times \{L/2-s\} - W \times \{L/2\}^2 / 2$$

$$M_a = 2960 \times (10 - 2) - 296 \times 10^2 / 2$$

$$M_a = 8880 \text{ lb-ft}$$

From the previous example, the wall can support this load.

The bending out of plane on the wall due to wind is assumed reacted by braces one foot above the bottom of the brick and at the floor. The reaction at the floor can be found by summing moments about the location of the brace as follows:

$M_w = 30 \text{ psf} \times 3 \times [5.5 - 1] \text{ft}$

$$M_w = 405 \text{ lb-ft/ft}$$

$$M_b = 30 \text{ psf} \times [5.5^2 / 2 - 1^2 / 2] \text{ ft}^2$$

$$M_b = 438.75 \text{ lb-ft/ft}$$

$$R_{Floor} = [M_w + M_b] / 3$$

$$R_{Floor} = 281 \text{ lbs/ft}$$

Summing forces perpendicular to the veneer results in the horizontal brace force:

$$R_{brace} = 30 \times 12.5 - 281 = 94 \text{ lb/ft}$$

The maximum moment again occurs at the floor line and is:

$$M_a = 30 \times 3 \times 2.5 + [30 \times 2.5^2] / 2$$

$$M_a = 318.8 \text{ ft-lb/ft}$$

The contributing length of veneer for the dead load connector is about 6 feet consisting of the 2 feet of cantilever and half the distance to the center connector. The design moment is:

$$M_a = 318 \times 6 = 1908 \text{ lf-ft}$$

The layout of the connector at the column is shown in the following figure and results in 5 contributing #4 bars.

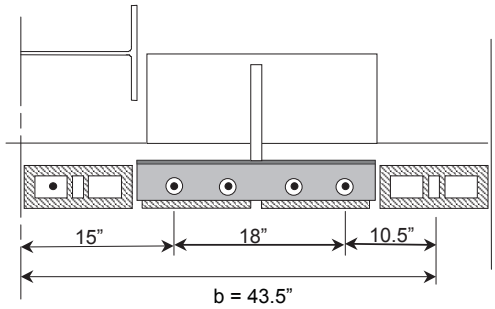


Figure 35 Plan View of Connector

Thus:

$$b = 43.5 \text{ in.}$$

$$A_s = 1.0 \text{ in}^2$$

$\rho = 1.0/(43.5 \times 1.75)$

$\rho = .013$

$n\rho = .127, \quad k = .39 \quad j = .87$

$M_t = 1.0 \times .87 \times 1.75 \times 24000 \times 1.33 / 12$

$M_t = 4060$ lb-ft ok

$M_c = 43.5 \times 1.75^2 \times .39 \times .87 \times 1333 \times 1.33/(2 \times 12)$

$M_c = 3347$ lb-ft ok

But, this may not be the only out-of plane moment in the masonry. Depending on the connector design, there could also be a significant moment added into the masonry as a result of dead load eccentricity

The connector will be designed next. Assume a configuration as shown in the following figure:

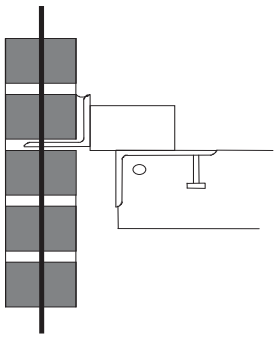


Figure 36 Dead Load Connector

The vertical reaction is 2960 lbs and the wind reaction is 6 feet x 281 lb/ft = 1686 lbs.

The eccentricity of the dead load is important to the design. It is calculated assuming an edge of slab tolerance of 1 inch as shown in the following figure.

$e = 3.5/2 + 1\ 1/2 + 1$ (tol.) $+ 3.0/2$

$e = 5.75$ in.

The resulting eccentric moment can be reacted either in the brick veneer or in the floor slab or by both. When the wall is shored, the connector installed and the shoring removed, the eccentric moment is reacted by both the wall and the floor slab. The amount of moment in each is very difficult to determine and will depend on the stiffness of the shoring as well as the manner in which the wall is built.

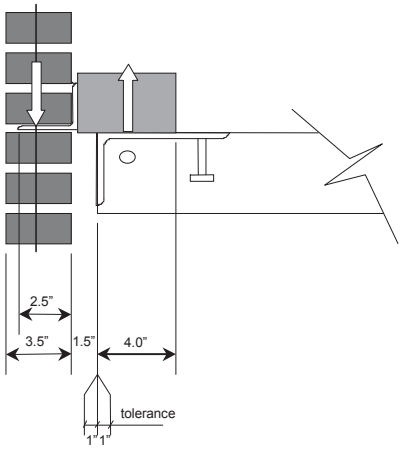


Figure 37 Dead Load Moment

A conservative approach to the design is to design assuming all of the moment is in the brick veneer and then assume all of the moment is in the floor. We will first assume the moment is in the brick veneer.

Assume the connector design is controlled by the combined dead load and wind condition. From the previous example, the dead load on the anchor is 2960 lbs.

The moment is in the brick wall, thus:

M_a = 2960 x 5.75 in

M_a = 17,202 lb-in

This moment should be combined with the wind moment resulting in:

M_a = 17,202 + 1908 x 12

M_a = 40,100 lb-in or 3340 lb-ft

The previous design using (5) #4 bars provides adequate resistance.

Now, check the local capacity of the connector to transfer the load into the veneer. Assume the moment is inserted into the veneer wall by forces consisting of shear on the horizontal leg of the angle and bearing on the vertical leg of the angle. If a triangular distribution of bearing on the vertical leg is assumed, the force is:

P = 17,202 / (6 x 2/3)

P = 4,255 lbs

Note that the moment due to wind is not included. The wind load moment is already in the veneer. The reaction of the wind at the floor must, however, be added to the horizontal leg of the angle.

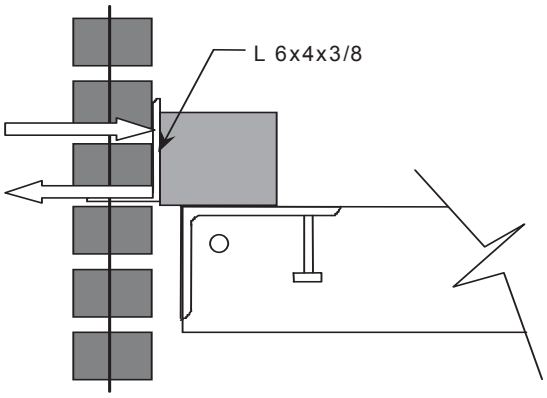


Figure 38 Resisting Moment

P = 4255 lb + 281 lb/ft x 6 ft

P = 5942 lbs

Assume the failure is in the bond between the horizontal leg of the angle and the masonry. Using 60 psi shear allowable and 2.5 inch contact length, both top and bottom, the required length of contact is:

L = 5942 / (2.5 x 2x 60 x 1.33)

L = 14.8 in

Or, using the cone pull-out check the length becomes:

P =2 x (d/cos 20^0) x L x 50 x 1.33

L = P / (141.5 x d)

L = 5942 / (141.5 x 2.0)

L = 21 in.

Therefore use a 24 inch long angle.

The shear friction method can also be used:

$A_v = V_u / \phi F_y$

or

$V_u = \phi A_v F_y$

$V_u = .4 \times 6x.2 \times 60{,}000$

$V_u = 28{,}800$ lbs

$P = 28{,}800 / 2 = 14{,}400$ lbs ok

The 2003 International Building Code requires the fasteners and body of the connector to be designed to equation 9.6.1.3-2 which is a maximum value. Lower values are likely for many structures using equation 9.6.1.3-1.

$F_p = 1.6 S_{DS} I_p W_p$

Using $S_{DS} = .75$ (a high value)

$F_p = 1.65 \times .75 \times 1.0 \times W_p$

$F_p = 1.24 \times 40$ psf $= 49.6$ psf

the design level is:

$F = 49.6$ psf $/ 1.4 = 36$ psf.

This is higher than the design wind load of 30 psf and controls.

$P = 4255$ lb $+ 281 \times \{36/30\} \times 6$

$P = 6278$ lbs

$L = 6278 / (141.5 \times 2.0)$

$L = 22$ in.

Use a 24 inch angle.

The bearing of the brick wall on the horizontal leg of the angle is seldom limiting in design and is satisfied here by inspection.

Now check assuming the moment is in the floor. By inspection, the brick veneer is adequate. The design of the plate, welds and embedded plate is all that is required. Assume the worst situation of the tolerance for the edge of slab results is 3 inches of connection between the slab embed and the plate.

The analysis is the same as would be performed for a precast concrete panel or other wall system. Examples can be found in many references.

The design results in a ½ inch thick vertical plate. The weld on the vertical leg of the angle should also be a 3/8 inch fillet 4 inches long on both sides. And the weld on the plate to the embed should be a 3/8 inch fillet 3 inches long on both sides.

Notice that the size of the weld exceeds the thickness of the plate. This is because the design factors of safety for the weld loaded by seismic forces was assumed larger than that required for the body of the connection.

The 24 inch angle is a conservative size since both the brick and slab connection are designed for the moment. If a more detailed analysis were made, the length of the angle could probably be reduced. The cost savings, however, would likely not justify the reduction in capacity.

3.4.3 Example 3

The final example will demonstrate the design of a corner for seismic isolation. Assume a 12'-6" story height. The corner is constructed of Structural Brick Veneer with a width of 10 feet from the corner. Given that the elastic seismic drift is .31 inch, the building is a specially reinforced concrete moment frame with a C_d of 5.5, and assuming the building is a hospital with the corner above the emergency entrance, the maximum expected floor drift is:

Δ = 5.5 x .31 = 1.7 inches

The corner can support part of the wind loading, but a lateral connector will be needed 10 feet away from the corner.

Since the brick is 10 times stiffer in the running bond direction, most of the resistance to the movement is reacted at the corner.

The analysis of this corner displacement is complex. It can be visualized by considering a flat rectangular panel of veneer 12'-6" by 10 feet laid flat horizontally on the floor with anchors at the corners. The analogous displacement is to lifting up one of the four corners of the flat panel while the other three are held to the floor.

The load deflection calculation for this condition is complex and includes bending in two axis and torsion. And, again the veneer is not isotropic.

Making a simplifying assumption that half the height participates with bending about the stiff direction only, then the load required to deflect the wall 1.7 inches is calculated as follows:

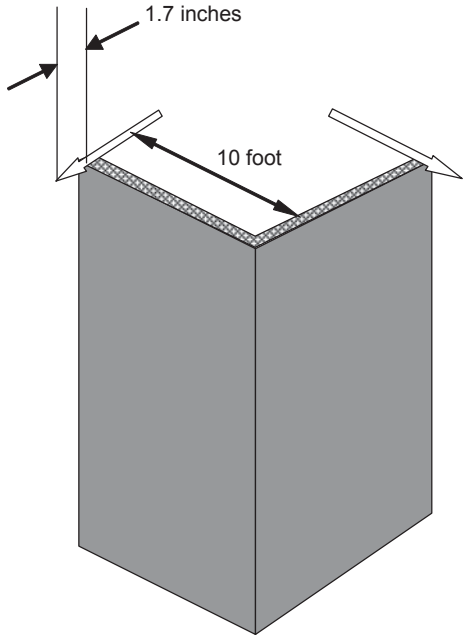


Figure 39 Warping Corner

$\Delta = PL^3/(3 \times E_m \times I)$

The head joints are assumed cracked so the contribution of the wall is half.

$I = 1/12 \times \{(6' - 3'') / 2\} \times 3.5^3$

$I = 134 \text{ in}^4$

Δ = 1.7 inches

$P = 1.7 \times 3 \times 3{,}000{,}000 \times 134 / (120^3)$

P = 1186 lbs

The resulting stress in the brick is:

$$\sigma = M\ c / I$$
$$\sigma = 1186 \times 120 \times 1.75 / 134$$

$$\sigma = 1860 \text{ psi}$$

If the entire wall height were assumed to resist the displacement, the stress would not change because the stiffness increases in proportion. Because the stress exceeds the likely tensile capacity of the brick, the wall will crack.

This is acceptable according to our criteria provided the panel remains intact. Notice that the wall will likely remain uncracked for half the ultimate displacement resulting in no damage.

Reinforcement will be required to hold the panel together.

Sufficient reinforcement must be provided to assure ductile behavior. The cracking moment is:

$$M = (1186 \times 1000 \text{ psi}) / 1860) \times 10 \times 12$$

$$M = 76{,}500 \text{ lb-in}$$

Where the tensile capacity of the brick is assumed to be 1000 psi.

The estimate of the reinforcement is:

$$A_s = 76{,}500 / (60{,}000 \times 1.75)$$

$$A_s = .72 \text{ in}^2$$

Four bond beams with two #3 bars will be sufficient. Notice that 60,000 psi was used for the steel stress. The assumed yield strength should be compared to the ultimate cracking strength since this part of the design is for ultimate seismic.

4.0 Specification

The Structural Brick Veneer System consists of several components that must be specified and detailed. The following discussion should help in this process.

4.1 Quality Control and Assurance

According to the International Building Code and ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structure,* the designer needs to specify the required inspections and quality control tests. Structural Brick Veneer projects are designed either in accordance with Chapter 2 or Chapter 3 of ACI 530-02/ASCE 5-02/TMS 402-02 or Sections 2106, 2107 or 2108 of the International Code.

The International Code requires inspections at Level 1 (Table 1704.5.1) for non-essential facilities and Level 2 (Table 1704.5.3) for essential facilities. These tables identify activities requiring full time and periodic inspection during construction.

It is recommended that prism tests for each 5000 square foot of wall be performed in accordance with Level 3 quality assurance (Table 1.15.3) in ACI 530-02/ASCE 5-02/TMS 402-02. The verification of f'_m can be either by prism test or the unit strength method.

4.2 Masonry

Generally, brick is selected for its color, texture, and size. The most common brick specified is ASTM C 652 Hollow Brick. More detailed information about the hollow brick can be found at:

http://www.bia.org/html/frmset_thnt.htm, Technical Note 41 Hollow Brick Masonry.

Most Structural Brick Veneers are constructed of bricks with nominal thickness of 4, 5 or 6 inch.

Mortar should be Type S, Portland cement, hydrated lime, and sand. Type S mortar exhibits higher flexural bond strength while providing sufficient compressive strength. Type M mortar is generally too stiff at the time of laying to result in good bond, and thus may leak more and is harder to clean.

The durability of the wall is highly influenced by the quality of the mortar joints. Care should be taken to ensure that dense joints are achieved. Joints should be tooled to a concave or “V” finish to densify the mortar surface and improve bond between the mortar and the brick. If raked joints are desired, a “deep V” may achieve the effect. Simple raked joints must be tooled after raking.

Grout is the material placed in the cells of the brick. The proportions are similar to mortar, except that sufficient water has been added to provide a fluid consistency. Grout should be poured in brick masonry with a slump exceeding 10 inches.



Figure 40 Fluid Grout

The excess water in the grout is absorbed into the brick before hydration. Reconsolidation of the grout is required to remove the voids left by the water absorbed into the brick. The specification should require reconsolidation or the additive Grout Aid.

It is recommended to add Sika Grout Aid to all installations. This is a proprietary product, but the only one known to be specifically designed for addition to grout. More information can be obtained at:

http://www.sikaconstruction.com/con/con-admixture_in_con-prod-category-ga.htm

Sika Grout Aid is a balanced blend of expanding, retarding and water-reducing agents for Portland cement grouts. It provides a slow, controlled expansion prior to the grout hardening.

Other manufacturers claim equivalence, but often lack test data to support product performance. In structural brick

masonry, the important property of the grout is to fill all of the space and voids, and to make the connection between the reinforcement and the brick unit. The strength is of secondary importance, since the brick unit compression strengths typically exceed 8000 psi.

If an additive other than the Sika Grout Aid is used, a test should be performed to assure filling of the space and bonding to the units and reinforcement. This likely means the preparing of a grout sample panel and cutting it after curing to visually confirm the performance.

The reinforcement is usually specified as ASTM A 615 Grade 60. Deformed bars are required and sizes are limited by the thickness of the wall. Generally, bars larger than No. 5 are not used. When reinforcement is to be welded, ASTM A706 bars should be specified. It is slightly more expensive but it can be welded without becoming brittle. ASTM A706 bars can be identified by a "W" mark on the bar.

Joint Reinforcement is not recommended for Level 1 projects. Experience with galvanized metal in masonry on the exterior walls indicates a life of 30 years or less.

Reinforcement bars grouted into bond beams will have an expected life greater than 30 years.

4.3 Steel for Connectors

Connectors can be designed and constructed in many forms. Most are made from ASTM A 36 structural steel angles, plate, rods, channels, tees and other available shapes. Connectors may be shop-painted for Level 2 (commercial) installations. Connectors for Level 1 (institutional) installations should be hot-dip galvanized to meet ASTM A 123 Grade 65 requirements. Connectors that are not protected can possibly corrode, stain the brick, and ultimately fail to resist the loading. Damage to galvanized coatings by welding or other field installation practices should be repaired using cold galvanizing compounds.

The use of 300 series stainless steel is generally not necessary and may be subject to galvanic corrosion if placed in contact with galvanized steel.

4.4 Flashing/Weeps

Continuous flashing is necessary for the removal of water that enters the cavity space. In masonry, water enters the surface of the wall and then gravity pulls it downward. When the masonry is interrupted by openings that provide a horizontal discontinuity, flashing is required to intercept the water and direct it out of the building.

Flashing material for the Structural Brick Veneer System is the same as the materials used in other types of brick wall construction.

Pea gravel, proprietary meshes or screens above the flashing will help to prevent mortar droppings from clogging weep holes. Weep holes should be spaced no more than 32 inches apart. Open head joint weep holes are recommended. Weep tubes and cotton wicks often fail to function when they become clogged or damaged. Screens

in open head joint weeps can be used to deter insect infestations.

It is important that the flashing extend through the thickness of the wall in order to intercept the flow. Whether or not flashing should protrude from the wall is controversial. Since the flow of water on the surface of the wall is in all directions, a flashing that protrudes from the surface intercepts the flow at caulk joint. This is the weakest point for water to penetrate the wall.

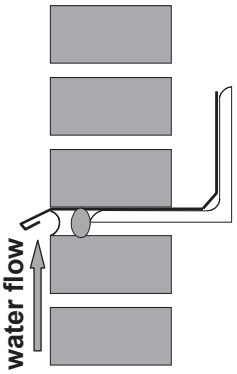


Figure 41 Protruding Flashing Detail

Flashing not protruding will allow the water to pass over the weak point. However, water intercepted by the flashing from the interior and exiting at the weep holes above the flashing may have a better chance of re-entering the building.

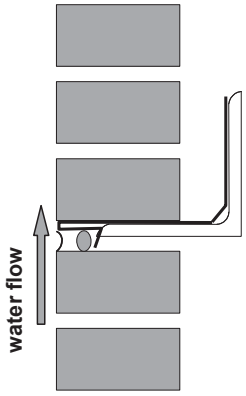


Figure 42 Flush Flashing Detail

4.5 Sealants

Sealants provide the first line of protection against rain intrusion into the system. Placement of sealants should be accomplished in conformance with the manufacturer's recommendations. Joints should be properly prepared, cleaned with solvent, primed for adhesion and backed with a backer rod.

Sealant compatibility tests (peel test) conforming to ASTM C 794 should be conducted for each type of brick unit used and all other materials in direct contact with the sealant, including flashing. The compatibility tests should also be conducted on treated (sealed) brick, unless the treatment is to be done after sealing. The compatibility tests are important to assure bond between the sealant and the brick.

4.6 Water Repellents

Water repellents are desirable for a variety of reasons. The principal reason is to limit water ingress due to wind-driven

rain. By reducing the water that enters the wall, the repellent provides several benefits, both aesthetic and related to engineering performance that would justify their use. Some of these attributes are:

1. Efflorescence control.

2. Reduction of algae growth as a result of the absence of moisture in the pores and capillaries of the masonry.

3. Atmospheric pollutants that are dissolved in precipitation are not absorbed into the masonry.

4. Freeze-thaw damage is reduced when there is no water in the substrate to freeze.

5. Thermal efficiencies of the masonry wall are maintained since water is a good thermal conductor.

Although a number of technologies have been utilized in the formation of masonry water repellents, silane/siloxane monomer and polymer blends have a proven track record. In the Pacific Northwest where there are heavy wind-driven rains, Fabrishield 761 silane/siloxane water repellent has been proven over time to be an excellent clear water repellent. These types of water repellents are formulated to penetrate into the pores and capillaries of the masonry assembly where they react with the moisture and alkalinity and actually chemically fuse onto the mineral material in the linings of the pores and capillaries. During this chemical bonding process, a conversion occurs in the repellent material that fully develops the hydro phobic (water repellent) properties.

An additional benefit to the manner in which these repellents function is that they tend to bond along the pore linings rather than build films across the pore openings. This ensures that sufficient vapor transmission can occur to maintain “breathability” in the assembly. Repellent manufacturers state a repellent life of up to 10 years, but there are numerous projects in the Pacific Northwest that have never had to have a second application.

One of the most controversial topics nationally is when and if water repellent should be used for brick construction. As outlined above, there are many positive job results obtained by properly applied clear water repellent. While most experts acknowledge the positive attributes, the primary concern is the severe problems that can occur if an improper repellent is applied. Most western states brick manufacturers are knowledgeable about the issues and can recommend which repellents will work with their products. However, the repellent manufacturer must warrantee the performance of the repellent in service. The performance problems arise when other repellent salesmen (and there are many) convince the specifier that their product is equal to the specified repellent and will save money and the “equal” product is then used. Our advice is this: DO NOT SUBSTITUTE! Demand past successful performance of the proposed coating on the specific manufacturer’s brick, for a

number of years, under the same type of exposure. Demand that the repellent manufacturer's application instructions be followed.

4.7 Backup Wall

Structural Brick Veneer installations do not require a separate backup wall. A backup wall is sometimes constructed as a second air and water vapor barrier. Many Level 2 (commercial) buildings do not require the extra water and air protection since a well-designed drainage wall is often sufficient.

If a back-up wall is used, many options are available including metal studs with sheathing. The studs are typically not designed for the wind loading since the brick wythe is structurally designed to resist the wind.

4.8 Cavity

When a backup wall is provided, the cavity or air space behind the brick can be any width. The cavity acts to provide a buffer for wind-driven rain and allows water that penetrates the Structural Brick Veneer to migrate down the back-side of the brick without migrating across the cavity space. Connectors should be designed and constructed to direct any of this water toward the back-side of the brick instead of into the building.

The cavity should be kept clear of any obstructions that might allow water to bridge across. Mortar droppings should be prevented from falling into the cavity. Construction tolerance on the cavity width should be limited to ± 1/2 inch. At each floor, fire safing is required to stop smoke and heat from moving between floors. The safing can act as a bridge for water to enter the building. Flashing over the safing should be provided.

4.9 Expansion Joints

Expansion joints need to be provided at various strategic locations in the Structural Brick Veneer wall system. Expansion joint placement is dictated by two considerations. First, expansion joints may be provided in locations where the brick wythe is likely to crack and second, to provide isolation from building movement. In Structural Brick Veneer systems, the spacing of vertical joints can be increased over that of conventional veneers because the reinforcement provides additional resis-tance to cracking.

The Brick Institute of America Technical Note 18A, Differential Movement - Ex-pansion Joints, contains a valuable discussion on the many considerations involved in expansion joints.

http://www.bia.org/html/frmset_thnt.htm

As a general rule, vertical expansion (movement) joints should be provided at the following locations:

1. At or near wall corners
2. At wall discontinuities
3. At changes in height
4. At changes in thickness
5. At changes in stiffness
6. Adjacent to dissimilar materials
7. At abutments to other building ele-ments

The joint size should be a minimum of twice the calculated amount to meet the limitations of the compressibility of the sealant. As a minimum, it is recommended that the joint not be less than 3/8 inch.

4.10 Window Anchorage

Windows are usually anchored to the Structural Brick Veneer and not to the backup wall. In some installations, connectors are included in the design to make the attachment. In other installations, powder-actuated fasteners shot into the masonry have been used to make the connection. The choice depends on the loading and local practice.

5.0 Construction

5.1 General

The construction phase of the project begins with the award of the Contract for Construction. If the Structural Brick Veneer was specified as bidder designed, then the design of the Structural Brick Veneer may begin with the beginning of the construction. In this event, there is usually limited time for the design and it should begin without delay.

Once designed, a Structural Brick Veneer project construction is similar to any other structural brick project.

The mason contractor is normally a subcontractor to the general contractor. If the Structural Brick Veneer is bidder designed, the mason contractor usually becomes responsible for the design. If the design is part of the contract documents, the mason contractor will still need to prepare shop drawings detailing the installation.

Most mason contractors do not normally prepare shop drawings for reinforcement. Thus, the responsibility for providing an adequate set of shop drawings can become lost in the process of bidding. The general contractor thinks the mason will prepare the shop drawings and the mason thinks the general contractor will prepare the shop drawings.

Often, the mason contractor does not supply the reinforcement for the wall. The general contractor supplies it. The design team should become aware of who will supply the reinforcement. It will have some influence on how the project proceeds.

Experience has shown that the preferred choice is for the mason contractor to purchase the reinforcement and supply the shop drawings. However, some mason contractors may bid high or even not bid at all as a result of this requirement. The resulting cost pressure may require the design team to be flexible about the requirement for shop drawings and their preparation.

Sometimes the general contractor will supply the shop drawings using his normal reinforcement detailer. Unfortunately, the detailer may have limited experience with masonry (the expertise is concrete) and the drawings submitted are often full of errors or items that cannot be constructed.

5.2 Construction Sequence

Several construction trades construct structural Brick Veneer. The dead load support angle (or connectors) and lateral braces are usually installed by the steel erector or the general contractor. These trades prefer to complete their work with the completion of the building structural frame. But if this is done, the mason is constrained by constructing the brick to match the installed connectors.

For example, for a Structural Brick Veneer supported on a continuous ledger, if the ledgers are all installed prior to the laying of the brick, it is nearly impossible to place the vertical reinforcement and grout the wall. It is usually necessary to delay installation of the ledgers until after the brick below is completed.

If a backup wall is constructed, it is usually installed by a different contractor and at a different time than the Structural Brick Veneer. Normal choices for the inside wall include masonry, concrete or steel studs. For a Structural Brick Veneer System, however, the masonry and concrete choices are unlikely because the stiffness and strength of the backup wall are no longer required.

When metal studs are used, it is common to sheath the outside face of the stud to provide additional water and air infiltration protection. The sheathing must be installed before the Structural Brick Veneer. Thus, the connectors typically penetrate the sheathing. This requires additional coordination between the trades.

5.3 Pre-Construction

Once the general contractor and the mason subcontractor have been selected, the engineer should verify the mason's qualifications with the local masonry institute and the local material suppliers. This information will be helpful for determining the amount of time and effort that will be needed during construction.

At an appropriate time, usually at least two months before the start of masonry construction, arrange for a preconstruction conference to discuss the masonry construction. Attendees should include:

1. The mason contractor and foreman.
2. The general contractor and superintendent.
3. The building official.
4. The architect.
5. The special inspector, when required.
6. The engineer.
7. The owner's representative.
8. The brick supplier.
9. The window supplier.
10. The dry-wall installer.

Subjects for discussion include:

1. Brick:

Determine the availability and delivery schedule of the selected brick. If the unit strength method is used to verify required masonry strength, verify that the brick will meet the required strength.

2. Initial testing:

If the unit strength method was used to establish the design strength f'_m, then mortar, grout and prism testing prior to construction are not required. However, it is recommended that when full allowable stresses were used in the design, prism testing should be conducted prior to construction. As a minimum, unit testing or manufacturer's certification is required.

For Structural Brick Veneer installations, a grouting test panel is often necessary to demonstrate the grouting procedures. The schedule should be defined. The design team, building official and special inspector should be present for the grouting demonstration.

Often the grouting demonstration panel can also be used as a color and quality control panel for the architect.

3. Testing During Construction:

Prism testing is recommended for each 5,000 square feet of wall. During construction, three prisms constitute a test, however, five are recommended. Test the first one at seven days, the next three at 28 days and hold the final sample for testing in case of a problem.

If prism tests are conducted, grout and mortar tests are usually not required.

4. Inspection:

ACI 530-02/ASCE 5-02/TMS 402-02 *Building Code Requirements for Masonry Structures.*

The inspector should regularly check the preparation of mortar and grout to ensure proper proportions and the laying of units to ensure proper workmanship. The inspector should verify and ensure full compliance with the contract documents for the placement of reinforcement, grouting and the protection of the masonry from rain, dirt, cold and/or hot weather.

5. Observation:

Inform all participants that from time to time representatives of the design team will visit the site to ensure general compliance with the contract documents.

6. Inspection Reports:

Normally, test reports and inspection reports go to the general contractor; then to the architect; and then to the engineer. Deviations from this normal procedure should be discussed, defined and documented.

7. Submittals:

Verify that the required project submittals have been approved or are in the process of being approved.

8. Cleaning and Water Repellents:

The procedures to be used to clean and apply water repellents should be discussed. It is important that the mason contractor verify the cleaning method with the unit manufacturer. If water repellent is to be applied, the method and materials to be used should also be verified with the brick manufacturer.

Proper water repellents do not seal the wall. Masonry must breathe. Painting contractors often are not experienced with applying water repellents to masonry, and assuring understanding of proper methods is important.

9. Construction Sequence and Schedule:

The successful installation of a Structural Brick Veneer project requires co-ordination of many trades (see previous discussion). Ask the general contractor questions to ensure that the construction sequence and responsibilities have been defined. Discuss the schedule for inspection and testing. Discuss co-ordination issues. One usually missed item is the coordination with the window and door supplier. The design of the connections should be discussed.

10. Window Attachment:

As previously discussed, the attachment of the window and coordination of the flashing system will be important to the successful performance of the wall. Too often this important coordination is left to the last minute or not done at all. The pre-construction conference is a good opportunity to discuss the issue and assign responsibility.

11. Sealant Installation:

Often the sealant installer is a separate subcontractor from the Structural Brick Veneer and window contractors. The specified sealant may or may not be compatible with the brick, mortar, water repellent and window-supporting member finish. These building elements, and often others, all come together at the sealant joints. The selected sealant and installation procedures should be checked for compatibility with adjacent materials.

12. Compliance Testing

Most Structural Brick Veneer projects require compliance testing. When the brick supplier is not experienced with the system, testing of prisms in accordance with national standards should be completed before construction begins. Testing during construction is also generally required. During the pre-construction conference, the compliance testing required should be communicated to all involved.

5.4 Submittal Review

Items submitted for review include the following:

1. Mortar proportions and laboratory test:

The mortar submittal is usually only submitted by type. This is satisfactory provided the mortar is specified by proportions, not strength, and provided there is a method to control the proportions of the mortar.

The contractor may submit proportions other than by type. In this case, laboratory tests should be performed to verify the compressive strength of the mortar (ASTM C 270).

2. Grout proportions:

Specify grout in accordance with proportion requirements of ASTM C 476.

Do not specify grout by the minimum strength of 2,000 psi. The proportions will result in strengths well in excess of 2,000 psi.

Lime may be added to grout. This usually improves the grout properties by increasing flow and retention of water, resulting in improved placement and bonding to the unit.

The additive Grout Aid should be added to the grout as recommended by the manufacturer.

For batch-provided grout, the proportions are normally described by weight. The weight proportions should be converted to volume proportions for comparison with ASTM C 476.

3. Unit certifications:

The unit manufacture should provide certificates that the masonry units comply with the requirements specified.

4. Reinforcement shop drawings:

These should be scheduled to provide sufficient time for review and resubmittal prior to construction. Experience has shown that rejection of the first set of drawings is likely.

5. Connector shop drawings:

Shop drawings showing the detailing of reinforcement, connectors and embedded items need to be submitted with sufficient time for review.

6. Quality control program:

When required by the specification, the quality control program should be written by the mason contractor and submitted in time for review and discussion with all involved, including the inspector and general contractor.

5.5 Site Visits

The structural engineer should make site visits to check on the progress and quality of the work. This part of the engineer's scope of services is called construction observation. It is defined in AIA C141 Section 2.6.3 as:

"The consultant shall visit the site at intervals appropriate to the stage of construction for This Part of the Project, or as otherwise agreed with the Architect in writing, to become generally familiar with the progress and quality of the Work completed for This Part of the Project and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the consultant shall not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work for This Part of the Project. On the basis of such on-site observations as a consultant, the consultant shall keep the Architect informed of the progress of the Work for This Part of the Project and shall endeavor to guard the Owner against defects and deficiencies in such work. (More extensive site representation may be agreed to as an Additional Service, as described in Paragraph 3.2)."

5.6 Non-Conforming Quality Control Tests

Experience has shown that the field-testing of masonry is highly variable. The source of the variability can be the materials, the methods used to prepare the samples, the testing of the samples and the interpretation of the results. Before rejecting a wall because of non-conforming field-testing, the engineer should carefully assess the possible causes of the field test non-conformance and possibly remove and test samples from the actual wall.

5.6.1 Unit Compression Strength

If the Unit Strength Method for establishing and verifying the specified compression strength, f'_m, then prism tests (or unit compression tests) are required prior to and during construction. The tests prior to construction should provide assurance that the units and masonry will be satisfactory. If the test prior to construction does not comply with the required strength, then another brick may be required, or the project may have to be redesigned for a lower strength.

Sometimes the brick tests prior to construction are not performed and the units are tested during construction and do not conform. In this case, a new analysis may be required to verify strength. One option is to use Strength Design provisions based on UBC Section 2108. These methods are less sensitive to low compression strength. But, the engineer should be careful about excess deflections and other serviceability issues when designing with Strength Design.

When prism (units) are tested prior to construction and conform to the requirements, but do not conform to the requirements when tested during construction, the problem is probably in the manufacturing of the prisms or there was a change in the testing procedures or materials. The units should be tested (or re-tested). If the units still do not comply, the code allows prism testing to verify strength. Construct prism tests to verify the strength.

If the prism strengths do not comply, a redesign or change in the brick unit may be required. Non-conforming walls will likely require removal.

5.6.2 Mortar Compression

It is recommended that field-testing of mortar not be required. Prism testing every 5000 square feet of wall should be specified. However, the requirement for mortar testing often is not within the control of the structural engineer, and on many projects mortar testing becomes a requirement.

The field sampling and testing for mortar compression strength is highly variable. The following figure is a frequency distribution of field mortar compression tests taken from actual projects in California, Oregon and Washington. There are a total of 205 mortar tests. The coefficient of variation is 36%.

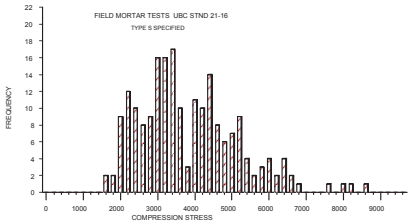


Figure 43 Variation of Field Mortar Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression mortar tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request from the mason the proportions being used.

2. Assess the method being used to control proportions.

3. Verify that the testing lab is using the procedures of ASTM C 780.

4. Visit the site and observe the mortar in the joint. Scratch the mortar with a key. If a white scratch results and the sand does not separate from the mortar, the strength of the mortar is probably acceptable. However, if the masonry is highly stressed (above 1200 psi) it may be necessary to remove a prism from the wall for testing.

The relationship between 7-day mortar strength and 28-day mortar strength is fairly consistent from sample to sample. It is useful to know the 7-day test results since they provide the engineer with an early indication of the 28 day results. The following figure presents the relationship.

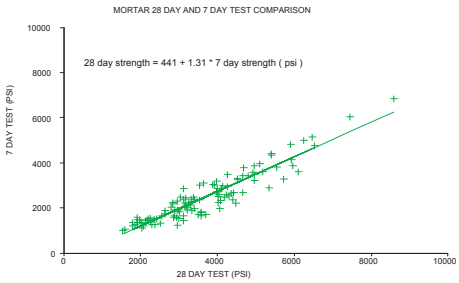


Figure 44 Mortar 7 day and 28 Day Tests

5.6.3 Grout Compression

It is recommended that field-testing of grout not be required. Prism testing every 5000 square feet of wall should be adequate quality control. However, the requirement for grout testing often is not within the control of the structural engineer, and on some projects grout testing becomes a requirement.

The field sampling and testing for grout compression strength is highly variable. The following figure is a frequency distribution of field grout compression tests taken from actual projects in California, Oregon and Washington. There are a total of 323 grout tests. The coefficient of variation is 32%.

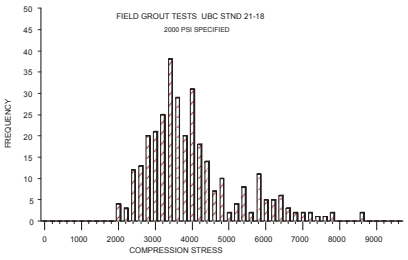


Figure 45 Variation of Field Grout Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression grout tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request from the mason the proportions being used.

2. Assess the method being used to control the proportions.

3. Verify that the testing lab is using the procedures of ASTM C1019.

4. If the cause of the low break is not identified, then taking core samples and testing them may be required.

5. The structural engineer should also consider the reason for requiring the specific grout strength. Often, the purpose of the grout is only to connect the reinforcement to the units. Even low strength grouts (1500 psi) are probably capable of making the connection. Because of the high strength of the brick, the compression contribution of the grout can often be ignored in the analysis.

The relationship between 7-day grout strength and 28-day grout strength is also consistent from sample to sample. It is useful to know the 7-day test results since they provide the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.

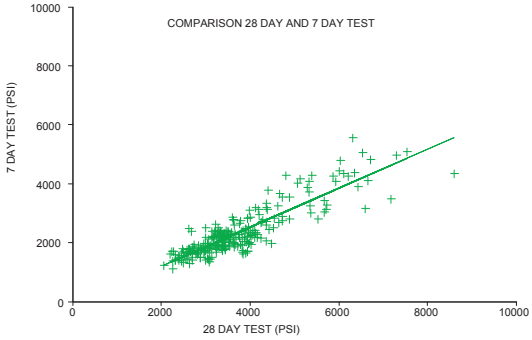


Figure 46 Seven Day and 28 Day Grout Strength

5.6.4 Prism Tests

Prism tests are less variable than either mortar or grout testing and provide the engineer with a higher level of confidence that the masonry system has the desired strength.

When prism tests do not conform, verify that the materials used (units, mortar and grout) conform to the specifications. If they do conform, then either the prism was improperly constructed or the testing procedures were not in compliance with ASTM 1314.

Improper construction of prisms includes not constructing the prism true and plumb. It is very important that the top and bottom planes of the prism are parallel. Another common problem for large cell units (8″ units and larger) is that the grout is not properly re-consolidated. Without proper re-consolidation, a dome-shaped void will often form at the mortar joint part way up the height of the prism and render the area of grout ineffective for resisting compression.

Common testing errors include not properly capping the prism so that the top and bottom planes are level and parallel, not using a testing machine with a spherical head, and not providing a thick enough loading platen to distribute the test machine load evenly to the prism. It has also been reported that some testing labs stop loading at the first sound emitted. The first sound may correlate to the failure of a concrete cylinder, but does not typically correlate to the failure of a masonry prism.

5.7 Troubleshooting During Construction

The following table is presented to assist the engineer with problems often occurring during construction. This table was developed over the years based on the experience of the authors. It has been evolving and it often seems that contractors have a special ability to create new situations not previously considered or addressed. Proceed with caution.

Troubleshooting Table for The Design and Construction of Structural Brick Veneer

PROBLEM	CAUSE	SOLUTION
Prisms fail to reach the design strength.	1. The testing lab has incorrectly tested the prism, usually by not placing the prism correctly in the machine or using a loading platen that is too thin. Or the specimens may have been damaged during transportation. 2. The bricks are below the specified strength. 3. The mortar is under specified strength. 4. Lab reported gross area stress instead of net area stress. 5. Lab stopped testing with first noise.	1. Instruct the lab to retest being careful to follow the ASTM C 1314. 2. Request that the contractor have a lab retest the brick. If still too low, change the brick or redesign. 3. Check mortar proportions. Retest the prisms. 4. Have the lab correct the report. 5. Re-test.
Mortar doesn't reach strength.	1. Incorrect proportions. 2. Incorrect testing.	1. Check mortar quality control procedures. 2. Mortar tests are unreliable. Forget about testing mortar. The code doesn't require it, if prisms are tested.
Colors do not meet expectations.	1. Bricks were not blended. 2. Sample panel has different sealer. 3. The brick production run is different from the sample run.	1. This is a problem for the architect and brick supplier. There are paints available, but results are questionable. 2. Use the sample panel sealer. 3. Approve the production run before beginning construction.
Someone calls and says more expansion joints are required.	Someone was checking on your advice. They should do this, so don't get mad.	Explain how the reinforcement reduces the need for most of the expansion joints.
The mason tells the general who tells everyone that the cells are too small to be grouted with all the congested steel.	1. The mason contractor does not have experience with grouting of reinforced hollow brick. He doesn't understand that he can make the grout with an 8 to 11 inch slump. 2. The cell is too small.	1. Prepare and grout a test panel. Be sure to invite everyone concerned. 2. Use a different cell size.

PROBLEM	CAUSE	SOLUTION
Welded bars are breaking off.	ASTM A 706 bars were not used.	Inspect bars. A "W" symbol indicates type A 706. Use the correct bars.
Contractor is not protecting his materials or work.	Sometimes the responsibility for protecting the work is left with the general contractor. He is saving money. Sometimes the responsibility is not well defined.	Write a letter to your client. Explain the consequences. Send a copy to the brick manufacturer.
Cracks in the mortar joints.	1. Shrinkage of the mortar joint. 2. Movement of the supporting structure. 3. Overloading. 4. Too rapid drying.	1. Suggest the contractor decrease the cement content of the mortar and increase the lime. 2. Check supports. 3. Check the loading, the timing of the loading and shoring removal. 4. Pre-wet the units. Wet the wall during curing. Add lime to the mortar.
Shop drawings are not prepared.	The requirement was missed or "value engineered away".	Write a letter to your client explaining the requirement. If the project is underway, require an engineer familiar with the design be on site full time.
The grout strength is specified at a minimum of 2000 psi, how can I get a prism of 4000 psi.	This is normal.	Explain that the prism does not fail in accordance with the weak link theory.
The contractor wants to high-lift grout with lifts larger than 6'	The code restricts the grout lift to 6' even though the grout pour might be higher.	The problem is blow-outs of mortar joints and the ability to reconsolidate. In hollow clay, these problems are unlikely. Have the contractor demonstrate the procedure to you and the inspector.
The contractor doesn't want clean-outs. You want high-lift grouting.	Code requires clean-outs for high-lift, in order to remove the mortar droppings.	In most Structural Brick Veneers the shear stresses are low. It is usually possible to waive the clean-out requirement.

PROBLEM	CAUSE	SOLUTION
The dowels out of the concrete foundation or ledger interfere with the unit cross webs. They miss the cells.	Improper placement of the dowels. However, it is often very difficult to get them in the right place. This situation should not occur in a Structural Brick Veneer.	Cut the unit cross webs to allow the dowel to pass or drill in new dowels. Verify that all the dowels are required to meet strength requirements. Do not, allow the dowels to be bent.
The brick masonry is cracked, with cracks extending through the units.	1. A great deal of force is required for this condition to exist. The cause is likely a problem.	1. Find the reason for the cracking. It is likely that something needs to be corrected. Likely candidates include frozen grout, foundation movement, or thermal movement from adjacent structure.
	2. The bricks may have been manufactured with the cracks.	2. Verify the integrity of the units before use. A quick check is to bang the bricks together, If a ringing sound results instead of a thud, then the bricks are sound.
	3. Foundation cracks extend into brick wall.	3. Foundation control joints need to be coordinated with the masonry expansion joints.
Contractor doesn't cover the walls at the end of the day.	1. The contractor is attempting to save money.	1. Insist on covering the walls.
	2. The responsibility for the masonry protection may have been left with the general contractor or worse, left out of all the contracts.	2. Write a letter stating that the contractor is not in conformance with the likely result being efflorescence and other wall damage.
Corrosion of the joint reinforcement.	1. Too strong an acid cleaning without pre-wetting the wall.	1. Pre-wet the wall and use industry cleaners as recommended by the manufacturer of the units.
	2. Ungalvanized joint reinforcement.	2. Use galvanized joint reinforcement.

6.0 Testing

Many different pre-construction mockup tests are available for evaluating the performance of the Structural Brick Veneer System design and construction. Pre-construction mockup testing is not necessary for all projects, and because of the costs involved, is likely feasible only for large projects. Tests are generally conducted to evaluate air, water and structural performance.

6.1 Air

When air infiltration tests are conducted on the building mockup, they should be performed in accordance with ASTM E 783, while those conducted in the laboratory should be performed in accordance with ASTM E 283. Air infiltration tests should normally be done before water penetration tests because water trapped in the brick veneer tends to reduce air leakage.

6.2 Water

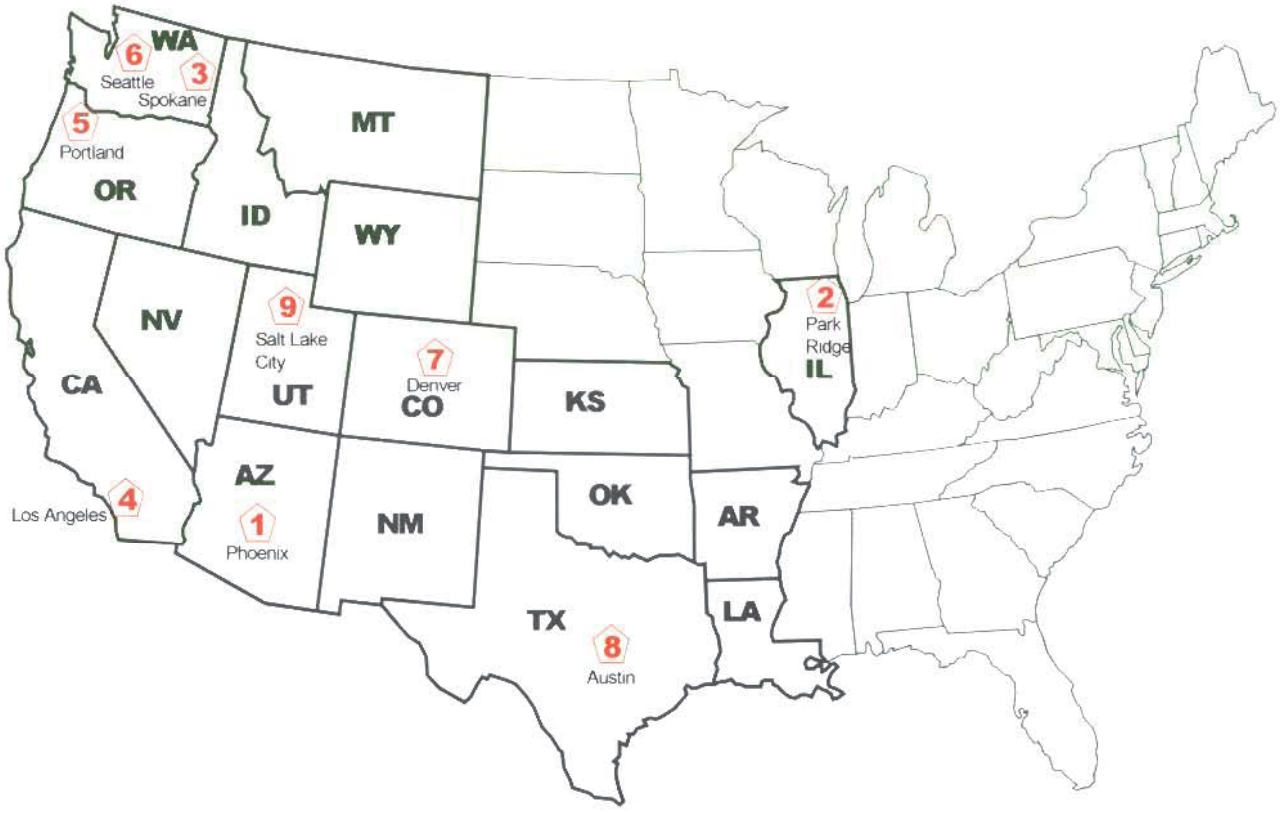
Water penetration tests for the brickwork should be performed in accordance with ASTM E 514, to measure the permeability of the constructed wall. Additional large-scale mockup tests are available using the procedures contained in AAMA 501.3, developed for testing aluminum curtain wall systems.

6.3 Structural

Structural tests measure a system's performance under lateral loading or deflection. This type of testing provides a means for accurately assessing the complex behavior of the Structural Brick Veneer System. A standard test procedure, ASTM E 330, is available for testing exterior windows and curtain walls. Brick panel strength tests can be conducted in accordance with ASTM E 72. There are no standard tests for specifically measuring seismic performance.

ALLIED ASSOCIATES AND WEB ADDRESSES

1	**Arizona Masonry Guild**	(www.masonryforlife.com)
2	**Masonry Advisory Council**	(www.maconline.org)
3	**Masonry Industry Promotion Group**	(www.masonrypromotion.com)
4	**Masonry Institute of America**	(www.masonryinstitute.org)
5	**Masonry Institute of Oregon**	(www.mioctio.org)
6	**Masonry Institute of Washington**	(www.masonryinstitute.com)
7	**Rocky Mountain Masonry Institute**	(www.rmmi.org)
8	**Southwestern Brick Institute**	(www.swbrick.com)
9	**Utah Masonry Council**	(www.utahmasonrycouncil.org)



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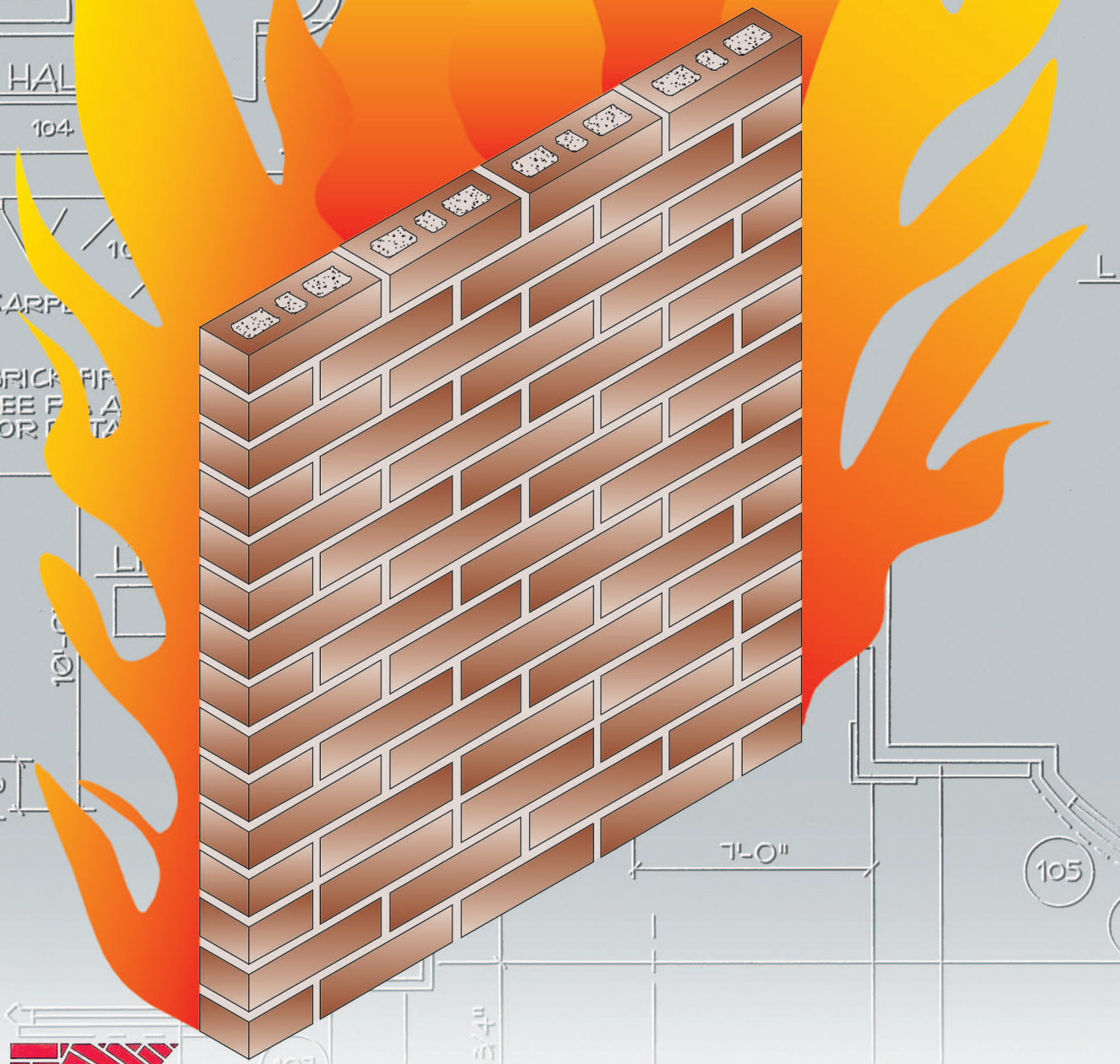
FIRE ENDURANCE RATINGS OF CLAY BRICK MASONRY



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FIRE ENDURANCE RATINGS

OF

CLAY BRICK MASONRY

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The members of Western States Clay Products Association express appreciation to Walter Dickey (1908-2002) for his tireless efforts in promoting the clay brick industry. Mr. Dickey spearheaded the initial production of this publication providing technical and editorial input that continues in this printing.

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1.0 INTRODUCTION

One of the most frequently asked questions of the designer is "How do I achieve a 1, 2, 3, or 4-hour fire rating using various clay brick masonry assemblies?"

Intuitively, we are comfortable with clay bricks as a fire resistant material because of their use as a liner in fireplaces and kilns where temperatures exceed those expected in most construction fires. In addition, we have observed the effect of fires on buildings where the only thing to remain standing is the brick. Most designers do not question that brick is non-combustible, or resistant to fire, what they question is the fire resistance of each of the brick wall configurations in hours as it relates to building code requirements.

For many wall assemblies, the information is available from BIA technical Notes 16, and the International Building Code Table 720.1. For some assemblies, the designer is allowed to use methods of calculating fire resistance. Until recently, designers had to rely on ICBO Evaluation Report #5058 to obtain 1 and 2-hour fire ratings for Adhered and Anchored Veneers. Today this information is found in Chapter 7 of the International Building Code, Table 720.1.

2.0 FIRE RESISTANCE BASICS

Fire resistance refers to the ability of a structure to act as a barrier to the spread of fire and to confine it to the area of origin. Therefore, in addition to withstanding the fire, the intent of the code is to prevent other materials adjacent to the brick from combusting after prolonged increased temperatures from fire, flame, or hot gases. Consequently, the assemblies are given a fire rating which is the time it takes for a prescribed fire on one side of an assembly to reach an average temperature on its other side that would ignite cotton waste (250°F). Refer to ASTM E119.

Fire ratings are required for load bearing and non-load bearing wall assemblies. Load bearing assemblies must be capable of withstanding the same conditions as the non-load bearing assemblies. In addition, they must be capable of supporting their prescribed design load for the duration of the fire.

Fire endurance tests alone cannot supply all of the data needed for intelligent appraisal of fire ratings of building elements. There are simply too many different types of assemblies and combinations of materials to classify them all through actual tests. Fortunately, the theory of fire endurance ratings is sufficiently advanced to offer guidance in estimating fire endurance ratings.

The ultimate goal of this guide is to bring together in one location all of the approved fire ratings for adhered veneer, anchored veneer, structural brick veneer and load bearing brick. See Table 1.

3.0 MASONRY ASSEMBLIES

Masonry fire resistant assemblies are broken down into adhered brick veneer, anchored brick veneer, structural brick veneer, and load bearing brick.

Fire rated assemblies are often required in two directions. If the fire is on the brick side, the brick assembly must resist flames, heat, and smoke from entering to the other side of the assembly prior to the rated time. If the fire is on the other side, the fire rating may be needed to protect occupants in another room or building from the same effects. In most cases, there is a structure supporting the fire resistant materials and the fire rated assembly is required on both sides to protect the structure. If the material is the structure as is the case in load bearing and structural brick veneer, the material can adequately provide fire resistance in both directions.

In a veneer system, the stud backing is the structure and must be protected in both directions. Therefore, brick most commonly provides fire resistance on the exterior side of the stud, and gypsum or some other material provides the fire resistance on the interior face of the stud.

3.1 ADHERED BRICK VENEER

Adhered brick veneer is defined as brick veneer secured and supported through adhesion to an approved bonding material applied over an approved backing. The most common wall assembly is defined by a facing of thin brick between 1/2" to 1 1/2" in thickness applied over a plaster backing. If this combined masonry layer is 1 3/4", the masonry side of the assembly qualifies for a 1-hr fire rating. If the masonry layer is 2" or more, the masonry side of the assembly qualifies for a 2-hr fire rating. In this assembly, the plaster is applied to metal lath, which in turn is applied to wood or steel framing.

The wood or steel framing members must be sized for all design loads. Steel studs are to be a minimum of 2 1/2". Wood framing is to be 2 x 4 minimum. Wider framing members can be used without degrading the fire resistance rating.

3.1.1 TEST PANEL CONSTRUCTION

The test panels were constructed similar to those for the earlier large program of gypsum board fire evaluation tests. Type X gypsum board was applied to one face of standard steel stud construction. Typical backing and adhered brick veneer was installed on the opposite face by masons experienced in such work.

The panel was designed for symmetrical resistance as required by the International Building Codes; however, if one designs for a situation in which fire exposure is limited to 1-face only, the resisting thickness can all be on one side.

3.1.2 FIRE TESTING

The veneered panels were exposed according to the procedures of ASTM E119 – standard furnace temperature rise; thermocouples on the unexposed face to show temperature rise; verification that there were no cracks that would allow passage of flame or hot spots; and resistance to hose stream exposure without penetration. Additional thermocouples were installed during construction to provide information on the thermal gradient through the section during the fire test. This information helped revise design alternates with greater accuracy.

3.1.3 RESULTS

All panels passed the three basic ASTM requirements with considerable margin. Although the results were somewhat conservative, indicating that thinner veneer might be used, no further refinements or reduction in design thickness was attempted. Precise refinements are not justified in variable hand placed materials, especially if no great cost benefits would result.

The maximum temperature rise on the unexposed face is permitted to be a maximum of 325°F for a single thermocouple and 250°F for the average of all thermocouples, at the specified time period. The test panels showed the following maximum and average rise of temperature. All withstood more hose stream exposure than required by code.

	Maximum	Average
Panel 1A:	162°F pt.	158°F
Panel 1B:	145°F pt.	135°F
Panel 2A:	129°F pt.	110°F
Panel 2B:	107°F pt.	104°F

3.1.4 CONCLUSION

Adhered brick veneer of 1 3/4" combined masonry thickness provides 1-hour of fire resistance. Adhered brick veneer of 2" combined masonry thickness provides 2-hours of fire resistance. These fire rated assemblies are found in Table 720.1(2) Items 15-2.1, and 15-2.2.

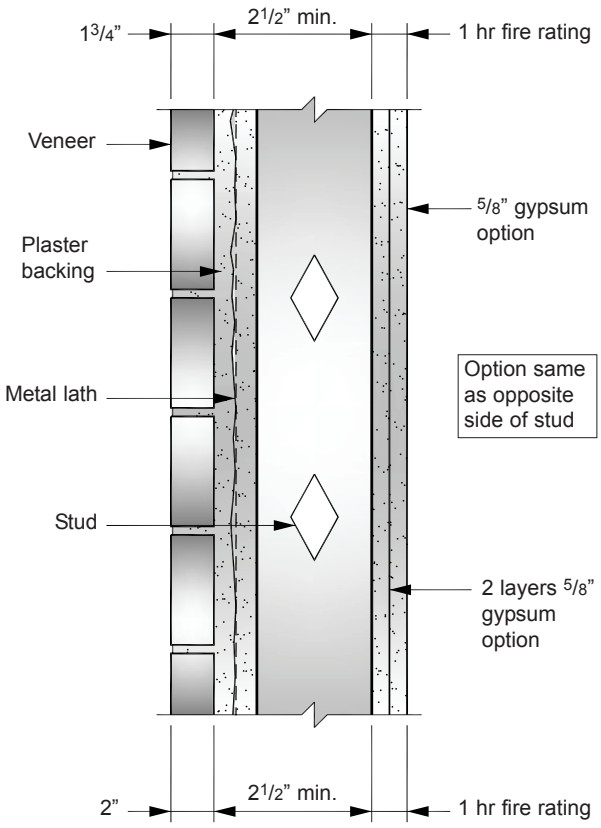


Figure 1 Adhered brick veneer.

3.2 ANCHORED BRICK VENEER

Anchored brick veneer is defined as brick veneer secured to an approved backing by mechanical fasteners. The most common wall assembly is defined by a facing of brick between 2" and 5" in width anchored through mechanical connectors to wood or steel framing.

Excerpts from Table 720.1(2)

TABLE 720.1(2) [Excerpt] RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS						
MATERIAL	ITEM NO.	CONSTRUCTION	4 hour	3 hour	2 hour	1 hour
1. Brick of clay or shale	1-1.1	Solid brick of clay or shale.	6	4.9	3.8	2.7
	1-1.2	Hollow brick, not filled.	5.0	4.3	3.4	2.3
	1-1.3	Hollow brick unit wall, grout or filled with perlite vermiculite or expanded shale aggregate.	6.6	5.5	4.4	3.0
	1-2.1	4” nominal thick units at least 75 percent solid backed with hat-shaped metal furring channel 3/4” thick formed from 0.021” sheet metal attached to the brick wall on 24” centers with approved fasteners, and 1/2” Type X gypsum wall board attached to the metal furring strips with 1” long Type S screws spaced 8” on center.	–	–	5	–

3.2.1 FIRE RESISTANCE

From the fire endurance test, additional information was provided which reduced the thickness of the veneer to 2" with a 1/2" air space for a 1-hour fire rating and a 2" veneer with a 1" air space for a 2-hour fire rating.

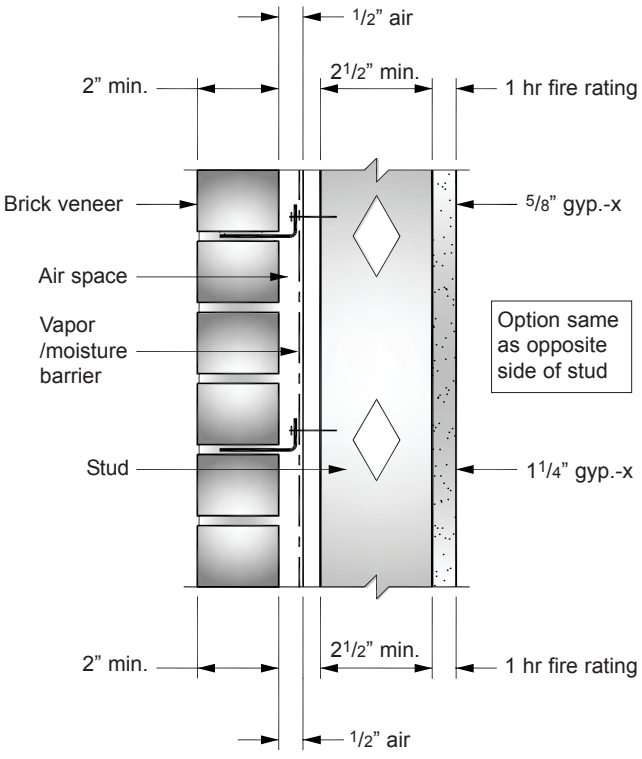


Figure 2 Anchored brick veneer.

Table 720.1(2) of the International Building Code item numbers 1-1.1 through 1-2.1 can also be used to determine the minimum equivalent thickness for brick to achieve a fire rating from 1 to 4 hours. This section of the table is used for veneer brick and structural brick in load bearing and non-load bearing construction.

3.3 STRUCTURAL BRICK VENEER

Structural Brick Veneer is defined as a masonry assembly of brick, mortar, grout, and reinforcing that is designed similar to anchored brick veneer. It carries no gravity loads other than its own weight, the weight of windows, and possibly other miscellaneous loads. In addition, it is not part of the lateral load resisting system. The difference is that the structural brick veneer is reinforced and grouted to allow the brick to span much further between wall ties. Structural brick veneer does not generally require a backup system to carry lateral loads within the panel. In the Structural brick veneer, the lateral loads are transferred through tension and compression stresses in the masonry.

3.3.1 FIRE RESISTANCE

Table 720.1(2) of the International Building Code item numbers 1-1.1 and 1-1.3 can also be used to determine the minimum brick thickness to achieve a fire rating from 1 to 4 hours. This section of the table is used for structural brick veneer. Since the structural brick veneer assembly was tested with vertical loads, the brick is capable of giving the same fire rating in both directions. No additional framing or fire resistant material is required.

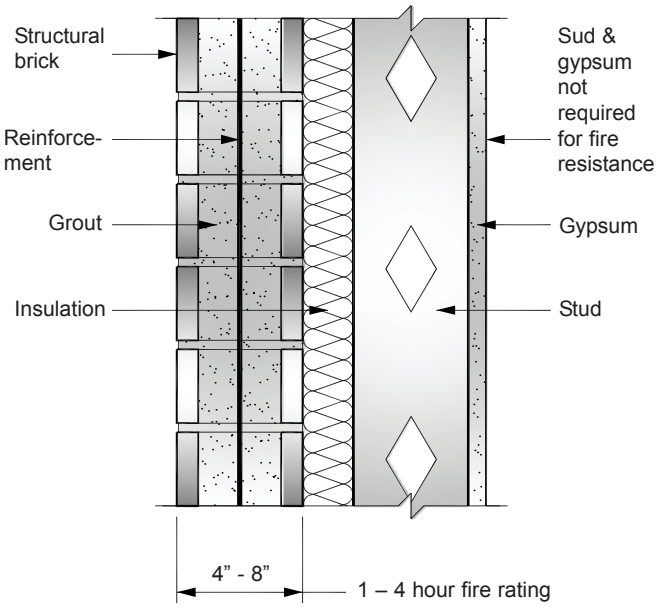


Figure 3 Structural brick veneer.

3.4 STRUCTURAL LOAD BEARING BRICK

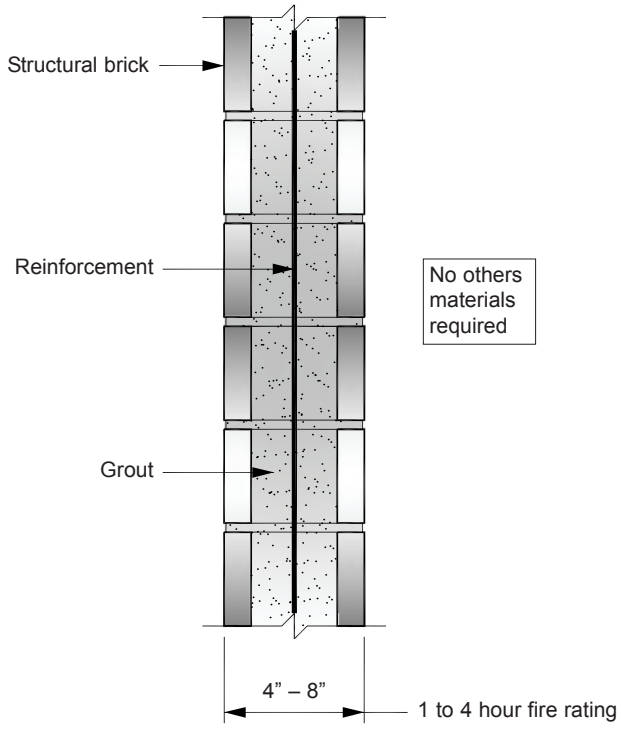


Figure 4 Structural load bearing brick.

Structural load bearing brick is defined as a masonry assembly of brick, mortar, grout and reinforcing that is designed to support all gravity and lateral loads. These masonry elements are generally part of the lateral load resisting system. Greater fire endurance performance and economics can be achieved through the use of reinforced masonry. Fire ratings of 3 and 4 hours can be achieved through the use of up to 8" of hollow clay brick as shown on Figure 4.

3.4.1 FIRE RESISTANCE

Table 720.1(2) of the International Building Code item numbers 1-1.1 through 1-2.1 can also be used to determine the minimum brick thickness to achieve a fire rating from 1 to 4 hours. This section of the table is used for structural brick in load bearing and non-load bearing construction.

4.0 CALCULATED FIRE ENDURANCE RATINGS

As it is impossible to define all of the possible configurations that might be conceived in a wall design, Section 721.4 of the IBC along with IBC Standard 7-7 provides greater assistance in designing with Clay Brick. This section and the standard list more precise rating values for thicknesses of brick, mortar, air space, cement, gypsum plaster, wall board, insulation, studs, siding, etc. They also include more precise calculations for calculating Equivalent Thickness = $T_e = V_n/LH$; R-ratings when adding plaster is defined as $R = (R_n^{0.59} + pl)1.7$ and combinations of clay brick, insulation, air and plaster can be defined using the exponential equation $R = (R_1^{0.59} + R_2^{0.59} + Rn^{0.59} + A_1 + A_2 + \ldots Pl)^{1.7}$ where R is the fire resistance of each material layer, A is the resistance of each air layer and Pl is the resistance of gypsum plaster.

Table 1 identifies a list of R, A, and Pl values for use in determining the Fire endurance of miscellaneous clay masonry assemblies.

IBC Standard 7-7 lists 8 rules that are helpful in making a quick assessment of the fire endurance of building elements when fire test data on the elements are not available.

Table 1 Fire Resistance (R) in Hours			
Masonry Assembly		**Actual Wall Thickness (inches)**	**Fire Resistance (hours)**
Adhered Veneer	**ASTM C1088**	1.75" *	1
		2" *	2
Anchored Veneer	**ASTM C216**	2" to 5"	3
Structural Veneer and Load Bearing Brick			
Solid 75%	**ASTM C216**	3.5"	1
		5.5"	2
		7.5"	3
8" Cavity wall with 2" air space		8"	3
10" Cavity wall with 2" air space		10"	4
Hollow – cells not filled	**ASTM C652**	3.5"	1
		5.5"	1
		7.5"	2
Hollow – all cells filled[1]	**ASTM C652**	3.5"	1
		5.5"	3
		7.5"	4
Air (A)		1/2" to 3 1/2"	0.30
Plaster (Pl)		1/2"	0.30
		5/8"	0.37
		3/4"	0.45

Notes:

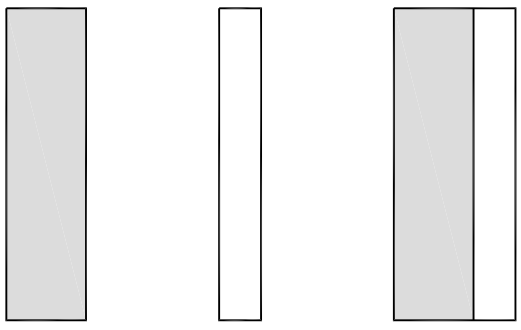
* Thickness includes plaster bedding.

1 Cells may be filled with perlite, vermiculite, expanded shale aggregate or grout.

4.1 RULE 1

The "thermal" fire endurance of a construction assembly consisting of a number of parallel layers is greater than the sum of the "thermal" fire endurance characteristic of the individual layers when exposed separately to fire.

Rule 1



$T_1 + T_2 < T_{12}$

4.2 RULE 2

The fire endurance of a construction assembly does not decrease with the addition of further layers.

Rule 2



$T_1 < T_2$

4.3 RULE 3

The fire endurance of a construction assembly containing continuous air gaps or cavities is greater than the fire endurance of similar constructions of the same weight, but containing no air gaps or cavities.

Rule 3

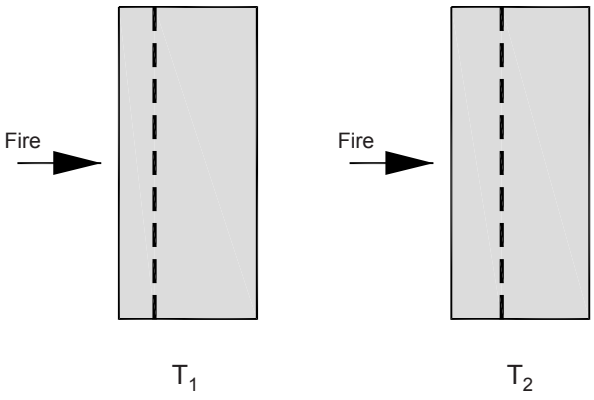


$T_1 < T_2$

4.4 RULE 4

The farther and air gap or cavity is located from the exposed surface, the more beneficial is its effect on the fire endurance.

Rule 4

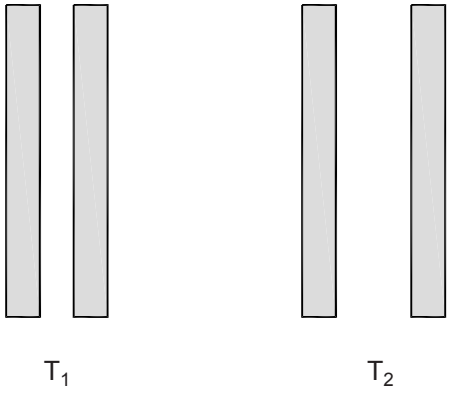


$T_1 < T_2$

4.5 RULE 5

The fire endurance of a construction assembly can not be increased by increasing the thickness of a completely enclosed air layer.

Rule 5

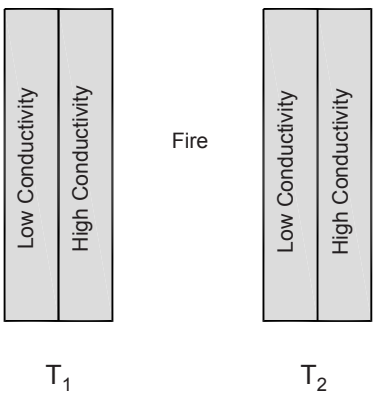


$T_1 \approx T_2$

4.6 RULE 6

Layers of materials of low thermal conductivity are better utilized on that side of the construction on which fire is more likely to happen.

Rule 6

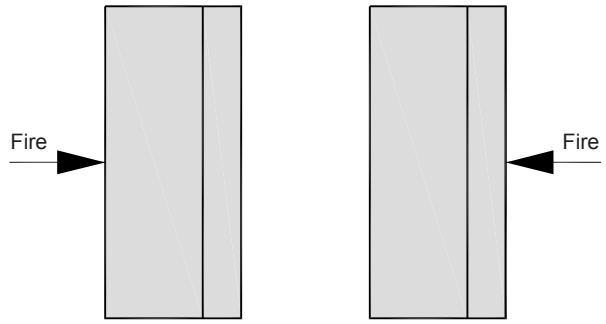


$T_1 < T_2$

4.7 RULE 7

The fire endurance of asymmetrical construction assemblies depends on the direction of heat flow.

Rule 7

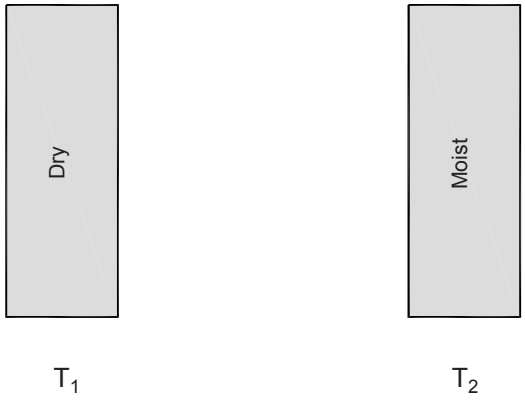


$T_1 \neq T_2$

4.8 RULE 8

The presence of moisture, if it does not result in explosive spalling, increases the fire endurance.

Rule 8



$T_1 < T_2$

5.0 CONSIDERATIONS

When backing materials are used to provide support for the fire resistive materials, the backing material shall be protected with the same fire resistance rating on both sides.

Although life safety is the primary reason for incorporating fire resistance in construction, when considering tradeoffs such as gypsum, or sprinklers, other issues should also be considered such as, fire separation, property protection, water damage, replacement costs and reuse of structure.

APPENDIX – WALL DETAILS

A.1 MATERIALS:

A.1.1 Thin Veneer Brick Units: Units are produced from clay or shale in thicknesses from 1/2 to 1 1/2 inches (12.7 to 38 mm) and comply with ASTM C1088, Grade TBS or better.

A.1.2 Face Brick Units: Units are made from clay or shale in thicknesses exceeding 1 1/2 inches (38 mm) and comply with ASTM C216 for veneer facing units; Type FBS or better and Grade SW in Severe Weather regions.

A.1.3 Hollow Brick Units: Units are made from clay or shale in thicknesses exceeding 4 inches (38 mm) and comply with ASTM C652 for hollow clay brick; Grade HBS or better and Grade SW in Severe Weather regions; Unit strength as specified for the job.

A.1.4 Mortar: Type S as set forth in Table 2103.8(1) or Table 2103.8(2) of the IBC.

A.1.5 Plaster Backing: Portland cement plaster complying with Section 718 and Section 2507 of the IBC.

A.1.6 Lath: Minimum 3.4 pounds per square yard (1.8 kg/m^3) metal lath complying with Section 2507 of the IBC.

A.1.7 Steel Framing: Framing with either gypsum plaster of gypsum wallboard must comply with Table 720.1(2) of the IBC.

A.1.8 Wood Framing: Framing with either gypsum wallboard or gypsum plaster must comply with Table 720.1(2) of the IBC.

A.2 WALL CONFIGURATION:

A.2.1 Adhered Veneer: Metal lath is installed in compliance with Section 2506.1 of the UBC. Where lath is attached to steel framing, minimum 1-inch-long (25.4 mm), No. 6 drywall screws are used. For exterior walls, a weather-resistive barrier described in Section 2510.6 of the IBC is required. The Portland cement plaster is applied in compliance with Sections 2510, 2511, and 2512 of the IBC to a minimum 3/4-inch (19.1 mm) thickness. The thin veneer units are applied in compliance with Section 1405.9 of the IBC in running bond. For one-hour fire resistance, the total thickness of plaster, mortar and brick veneer shall be at least 1 3/4 inches (45 mm). For two-hour fire resistance, the total thickness of plaster, mortar and thin brick shall be at least 2 inches (51 mm).

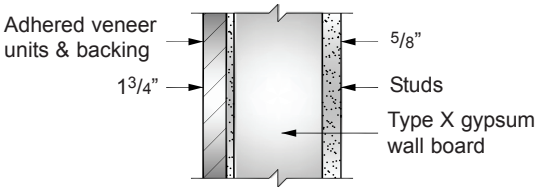
A.2.2 Anchored Veneer: Anchored veneer is installed in compliance with Section 1405.5 of the IBC for 2-to-5-inch-thick (51 to 127 mm) units and Section 1405.6 of the IBC for units up to 10 inches (254 mm) thick. Stud spacing is limited to 16 inches (406 mm) on center, and a weather-resistive barrier complying with Section 1403.2 of the IBC is required on the exterior side of exterior walls. Anchored units may be used for one-hour or two-hour fire-resistive assemblies.

A.3 INSTALLATION:

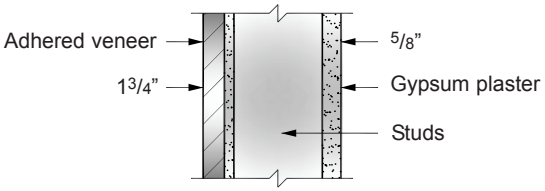
Details of one-hour and two-hour nonbearing walls are noted in Figures 5 and 6. For symmetrical one-hour fire resistance, each face shall have not less than one layer of 5/8-inch-thick (15.9 mm) Type X gypsum wallboard, or equivalent gypsum plaster, or 1 3/4 inch (45 mm) thickness of masonry veneer. For two-hour fire resistance, each face shall have not less than two layers of 5/8 inch-thick (15.9 mm) Type X gypsum wallboard, or equivalent gypsum plaster, or 2 inch (51 mm) thickness of masonry veneer.

A.3.1 Structural Brick Veneer and Structural Load Bearing Brick: Both structural brick systems are installed by combining brick, mortar, reinforcing and grout to provide a structure that combines load resistance to fire resistance. Structural brick fire ratings are generally defined by their equivalent thickness - the more solid the wall, the higher the fire rating. The International Building Code defines the minimum equivalent thickness required to achieve various fire ratings from 1 to 4 hours. Structural brick are defined as hollow without insulation and hollow with insulation. Hollow units with insulation are to be filled solid with insulation materials and the equivalent thickness is the actual thickness of the wall.

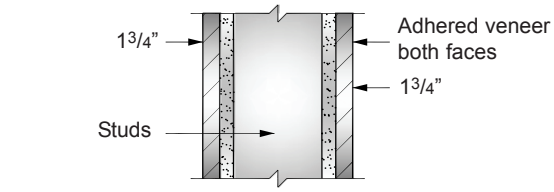
A.4 FIRE RATED WALL SECTIONS



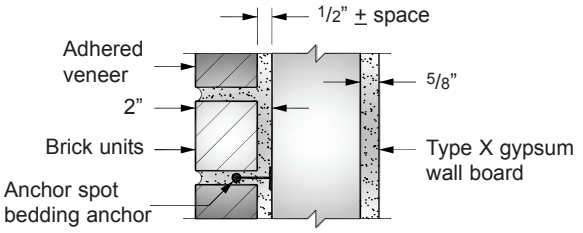
1 3/4" Adhered Brick with 5/8" Gypsum X Board



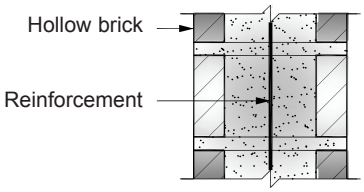
1 3/4" Adhered Brick with 5/8" Gypsum Plaster



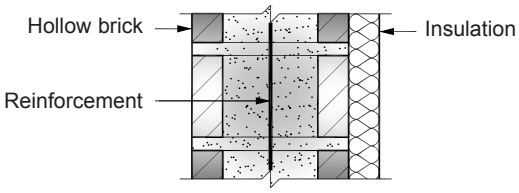
1 3/4" Adhered Brick with 1 3/4" Adhered Brick



2" Anchored Brick and 1/2" with 5/8" Gypsum X or Plaster

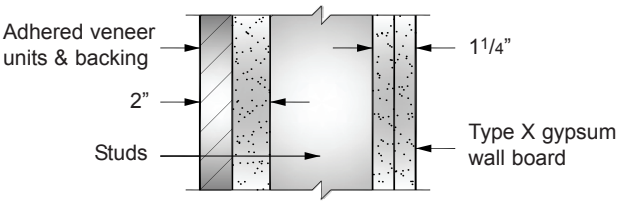


2.3" Equivalent Thickness Hollow Brick

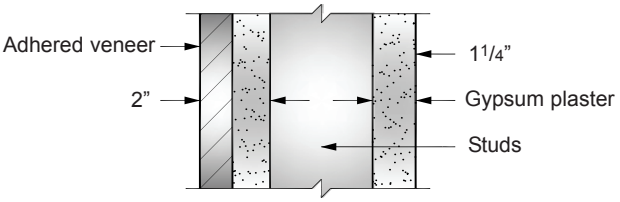


3" Equivalent Thickness Hollow Brick with Insulation

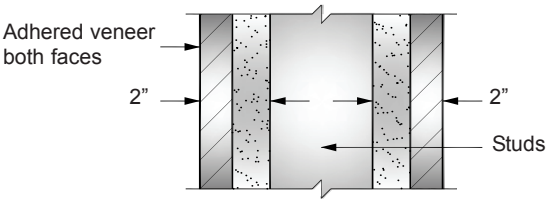
Figure 5 1–hour wall sections.



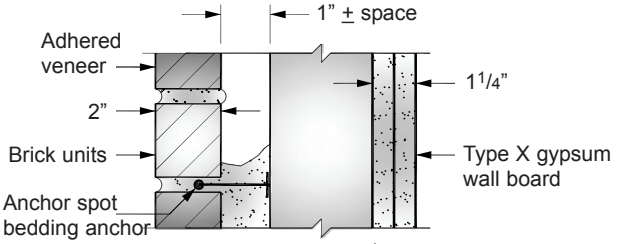
2” Adhered Brick with 1 1/4” Gypsum X Board



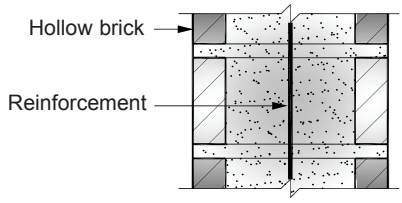
2” Adhered Brick with 1 1/4” Gypsum Plaster



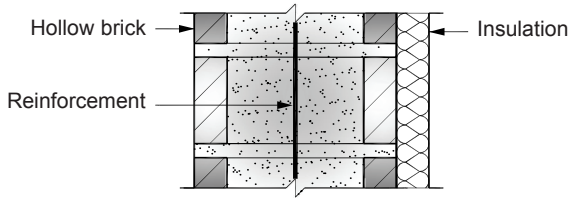
2” Adhered Brick with 2” Adhered Brick



2” Anchored Brick and 1” air with 1 1/4” Gypsum X or Plaster

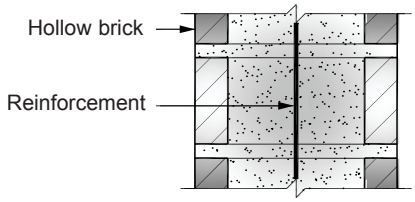


3.4” Equivalent Thickness Hollow Brick

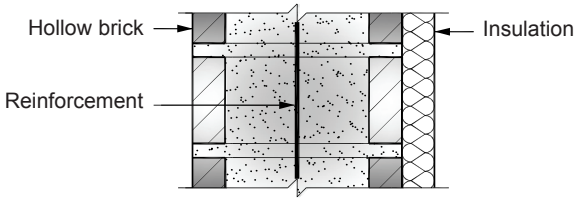


4.4” Equivalent Thickness Hollow Brick with Insulation

Figure 6 2–hour wall sections.

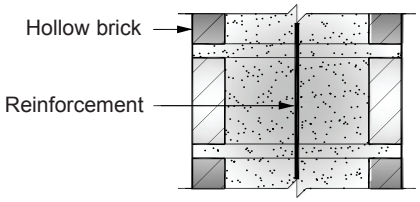


4.3” Equivalent Thickness Hollow Brick

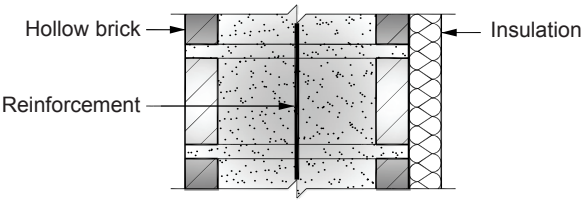


5.5” Equivalent Thickness Hollow Brick with Insulation

Figure 7 3–hour wall sections.



5.0” Equivalent Thickness Hollow Brick

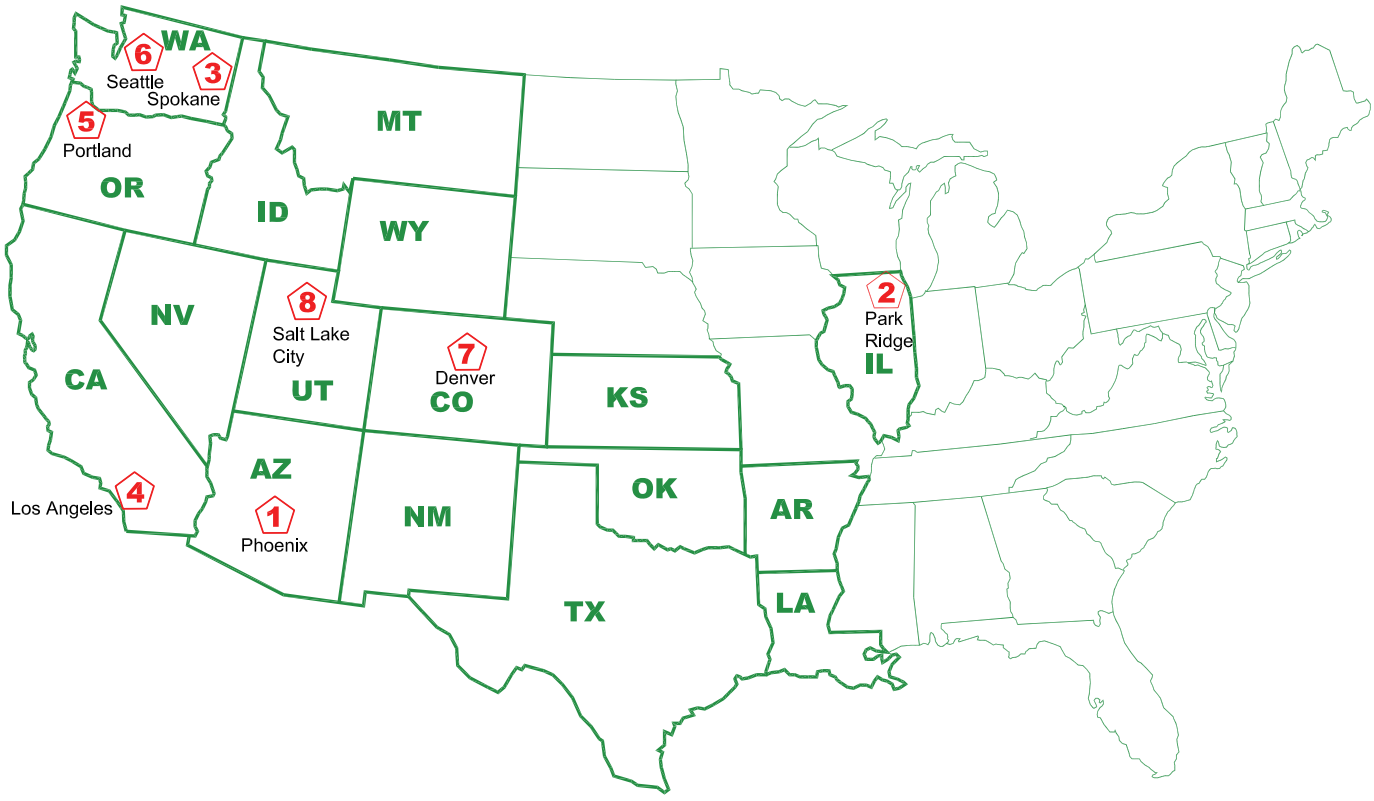


6.6” Equivalent Thickness Hollow Brick with Insulation

Figure 8 4–hour wall sections.

ALLIED ASSOCIATES AND WEB ADDRESSES

1	**Arizona Masonry Guild**	(www.masonryforlife.com)
2	**Masonry Advisory Council**	(www.maconline.org)
3	**Masonry Industry Promotion Group**	(www.masonrypromotion.com)
4	**Masonry Institute of America**	(www.masonryinstitute.org)
5	**Masonry Institute of Oregon**	(www.mioctio.org)
6	**Masonry Institute of Washington**	(www.masonryinstitute.com)
7	**Rocky Mountain Masonry Institute**	(www.rmmi.org)
8	**Utah Masonry Council**	(www.utahmasonrycouncil.org)



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atsrae@qwestoffice.net
www.americantesting.net

Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088-5625

Report #: 2022-3
Date: March 25, 2022
Work Order #: 3596

Dimensions: 8x4x16 - 0440
Sample Color: Sawgrass
Lab Mix #: 1288

Test Date: March 21, 2022
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C216 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
3.6250	7.6250	7.6875	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3653.5	3521.5	3389.6	3664.3	3845.5	
Immersed Weight	2071.3	1944	2035.5	2067.6	2166.5	
Cold Water (SSD)	3913	3768	3848.5	3909.1	4095.6	
5 hour Boil (SSD)	4025	3879.5	3960	4020.6	4217.8	*AVERAGE*
24 hr. Cold Water (%)	7.1	7.0	13.5	6.7	6.5	8.2
5 hr. Boiling Water (%)	10.17	10.17	16.83	9.72	9.68	11.31
Saturation Coefficient	0.70	0.69	0.80	0.69	0.67	0.71

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	30.80	30.80	30.80	30.80	30.80	
Oven Dry Weight (grams)	3568.9	3587.4	3670	3594.4	3719.1	
1 Minute Gain in Weight	3581.1	3600.2	3681.8	3606.9	3733.5	*AVERAGE*
I.R.A (grams/min/30in.^{2})	11.9	12.5	11.5	12.2	14.0	12.4

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:29198)

Sample Number	1	2	3	4	5	
Brick Gross Area (in²)	58.60	58.60	58.60	58.60	58.60	
Brick Net Area (in²)	30.80	30.80	30.80	30.80	30.80	
Maximum Load (lbf)	387,900	472,010	417,600	436,970	409,740	*AVERAGE*
Net Compressive Strength (psi)	12,594	15,325	13,558	14,187	13,303	13,790
Gross Compressive Strength (psi)	6,619	8,055	7,126	7,457	6,992	7,250

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C216 Designation: Grade SW

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

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Salt Lake City, UT 84115
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atsrae@qwestoffice.net
www.americantesting.net

Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088-5625

Report #: 2024-10
Date: July 1, 2024
Work Order #: 4543
PO# 45-03690257

Dimensions: 8x4x16
Sample Color: Mountain Red Atlas
Lab Mix #: 1343

Test Date: July 1, 2024
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C216 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
3.6875	7.6250	7.1250	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3590.6	3602.3	3594	3584.5	3526.2	
Immersed Weight	2065.3	2068.8	2066	2060.4	2028.2	
Cold Water (SSD)	3804.5	3804.6	3799	3794.5	3724.6	
5 hour Boil (SSD)	3907	3906.6	3899.8	3896.8	3825.4	*AVERAGE*
24 hr. Cold Water (%)	5.95	5.62	5.70	5.86	5.63	5.8
5 hr. Boiling Water (%)	8.81	8.45	8.51	8.71	8.49	8.6
Saturation Coefficient	0.68	0.66	0.67	0.67	0.66	0.67

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	28.79	28.74	28.69	28.71	28.08	
Oven Dry Weight (grams)	3590.6	3602.3	3594	3584.5	3526.2	
1 Minute Gain in Weight	3599.9	3610.5	3601.9	3593.1	3534.8	*AVERAGE*
I.R.A (grams/min/30in.^{2})	9.80	8.56	8.26	8.98	9.18	9.0

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:31637)

Sample Number	6	7	8	9	10	
Brick Gross Area (in²)	54.32	54.32	54.32	54.32	54.32	
Brick Net Area (in²)	28.60	28.60	28.60	28.60	28.60	
Maximum Load (lbf)	409,150	403,510	398,190	391,640	388,240	*AVERAGE*
Net Compressive Strength (psi)	14,316	14,108	13,922	13,693	13,574	13,920
Gross Compressive Strength (psi)	7,532	7,428	7,330	7,209	7,147	7,330

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C216 Designation: Grade SW

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

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Salt Lake City, UT 84115
P-801-487-1333--F-801-487-7141

atsrae@qwestoffice.net
www.americantesting.net

Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088-5625

Report #: 2025-18
Drop Off Date: May 28, 2025
Test Date: July 2, 2025
Ticket #: 7325
Po#: 4503868009

Dimensions: 8x4x16
Sample Color: Terra Cotta
Lab Mix #: 1427

Test Date: July 2, 2025
ASTM Test Method: ASTM C67
ASTM Classification: ASTM C902 & ASTM C652

ASTM C 652-19b Test Report for Hollow Brick (Hollow Brick Masonry Units (Made from Clay or Shale)

	Height	Width	Length	*Dimensions shown are the brick after being cut for testing*
	3.6875	7.625	7.250	

ABSORPTION

Sample Number	1	2	3	4	5	
Oven Dry Weight (grams)	3515.7	3481.3	3479.5	3492.8	3531.7	
Immersed Weight	2049.3	2028.8	2041.2	2041.2	2064.5	
Cold Water (SSD)	3775.9	3748.3	3764.2	3767.8	3808.9	
5 hour Boil (SSD)	3861.3	3835.3	3848.2	3850.1	3896.6	*AVERAGE*
24 hr. Cold Water (%)	7.4	7.6	8.2	7.9	7.8	7.8
5 hr. Boiling Water (%)	9.8	10.2	10.6	10.2	10.3	10.2
Saturation Coefficient	0.75	0.75	0.77	0.77	0.76	0.76

I.R.A (Suction)

Sample Number	1	2	3	4	5	
Brick Net Area	28.58	28.47	28.52	28.58	28.88	
Oven Dry Weight (grams)	3515.7	3481.3	3479.5	3492.8	3531.7	
1 Minute Gain in Weight	35260.0	3491.4	3490.3	3502.6	3543.1	*AVERAGE*
I.R.A (grams/min/30in.^{2})	10.8	10.6	11.4	10.3	11.8	11.0

EFFLORESCENCE

Sample Number	E1	E2	E3	E4	E5	*AVERAGE*
Examination and Rating	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced	Non Effloresced

After drying both control and testing brick, brick was determined to have not effloresced

CUT BRICK-COMPRESSIVE STRENGTH (Batch #:31296)

Sample Number	6	7	8	9	10	
Brick Gross Area (in²)	55.28	55.28	55.28	55.28	55.28	
Brick Net Area (in²)	28.61	28.61	28.61	28.61	28.61	
Maximum Load (lb.)	355,640	359,900	332,300	322,410	317,400	*AVERAGE*
Net Compressive Strength (psi)	12,430	12,579	11,614	11,269	11,094	11,800
Gross Compressive Strength (psi)	6,433	6,510	6,011	5,832	5,741	6,110

Tested Specimens Meet the Physical Requirements of ASTM Specification C652 Designation: Grade SW

Tested Specimens Meet the Physical Requirements of ASTM Specification C902 Designation: Class SX Type II

CERTIFIED TEST COPY: *Raelynn Gomez, Lab Manager*

AMERICAN TESTING SERVICES, INC.

NOTES ON THE SELECTION, DESIGN AND CONSTRUCTION OF REINFORCED HOLLOW CLAY MASONRY









WESTERN STATES CLAY PRODUCTS ASSOCIATION

Acknowledgements

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Introduction

Reinforced Hollow Clay Masonry (RHCM), also known as "Structural Clay Brick" and "Reinforced Structural Clay Units," offers the building owner many advantages. Unfortunately, the structural engineer often overlooks these advantages. When the structural engineer offers the client alternative structural systems, steel, concrete, concrete masonry, brick veneer, concrete masonry, and wood are usually considered, but reinforced hollow brick masonry is often not.

Most structural engineers are familiar with steel, concrete, wood, and concrete masonry design. RHCM design is similar to concrete masonry design, but there are important differences.

Knowledge of RHCM structural design provides the structural engineer with a meaningful design niche.

Recognizing this lack of knowledge, the Western States Clay Products Association (WSCPA) agreed to produce this RHCM publication specifically for the structural engineer. The first edition was published in 1995, followed by a revision in 1997. This is the third edition.

The document emphasizes the information required to successfully complete a RHCM project, the first being to convince the owner, architect, and sometimes the contractor to consider the RHCM option.

The document begins with example projects followed by helpful information during the traditional project phases: Schematic Design, Design Development, Construction Documents, and Construction.

Cost is always a factor. Suggesting RHCM will usually result in the client saying: "How much does it cost?" Costs are difficult to predict. Here is one example. For the brick wall below* costs was developed by a general contractor and a mason contractor in the Pacific Northwest in August 2022.

Two options were considered; a brick veneer on steel studs and RHCM. The brick veneer required an 8-inch structural stud backing, while the RHCM required only interior partition (furring) studs. The brick veneer option costs $59.10 per square foot, and the RHCM option costs $57.33 per square foot.

This cost study only included the wall. Additional savings exist if the RHCM wall supports the roof and provides lateral resistance.

Analogous to unreinforced concrete, unreinforced brick masonry is not cost-effective. Adding reinforcement reduces cost. The purpose of this document is to provide the structural engineer with the knowledge to utilize the RHCM design niche.

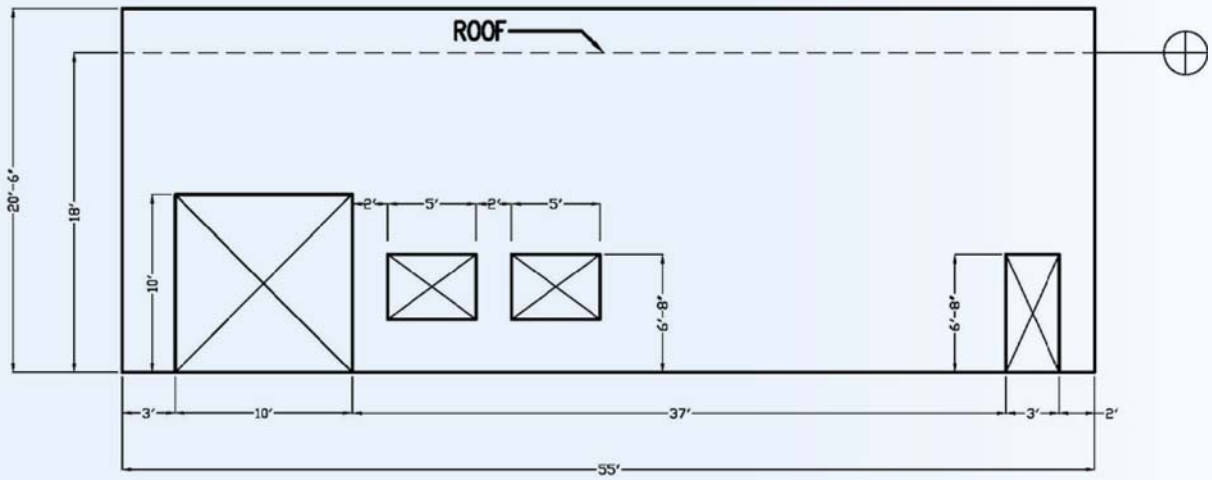


Figure 1 Cost Comparison - Brick Veneer on Metal Studs versus Reinforced Hollow Clay Masonry

What is RHCM?

The most common shapes of hollow clay units (sometimes referred to as structural clay units) are shown below. There are many shapes and sizes available. Custom shapes may be designed, fabricated, and installed on larger, more geometrically complex projects.

Hollow clay units are produced by extruding a mixture of various clays that determine color, strength, water absorption, and saturation coefficient. Different clays are combined to a fine powder, water is added, and the mixture is extruded through a steel die. The extruded column of clay is then sliced perpendicular to the extruded column at the desired unit height. The units are then placed on carts and generally fired to temperatures above 2000 F degrees in a kiln.

Following firing in the kiln, units are placed on pallets for shipping. Units are transported from the manufacturing plant to the project by truck or rail.

Masons place the units in mortar, and reinforcement is placed in the cells and bond beams. The resulting wall is grouted to bind the units, grout, and reinforcement to form the structural wall. In some situations, insulation can be placed in the ungrouted cells to enhance the thermal properties of the wall.

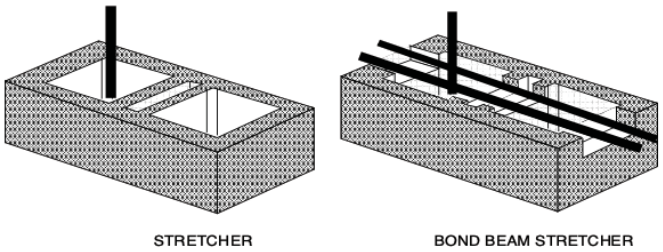


Figure 2 Typical Reinforced Hollow Clay Unit

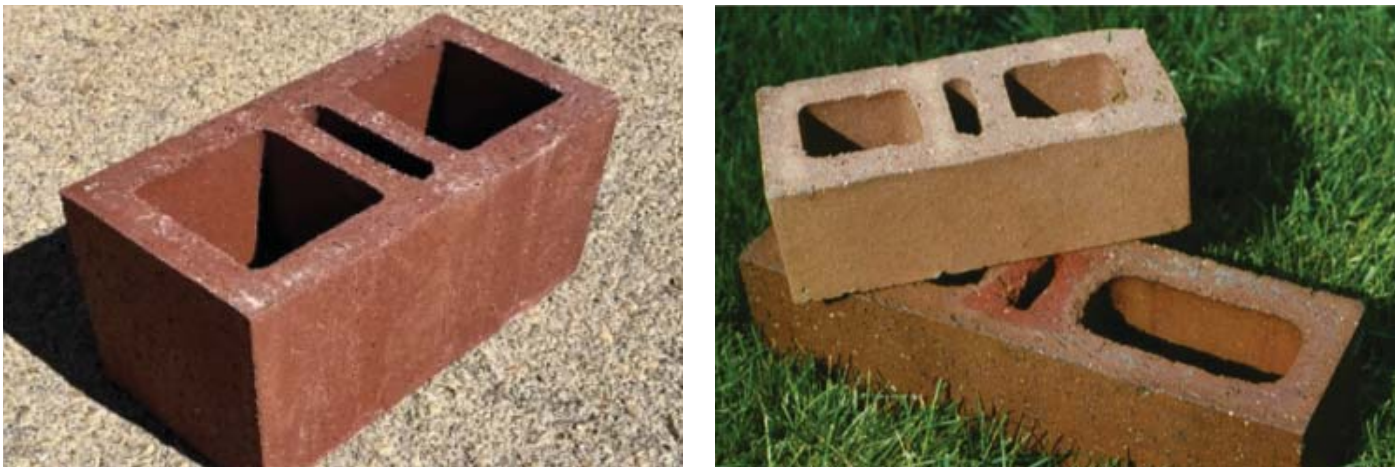


Figure 3 Hollow Clay Units (*Left:* 7 3/8" x 7 3/8" x 15 3/8", *Right:* 3 1/2" x 2 1/2" x 7 1/2", and 3 1/2" x 3 1/2" x 11 1/2")

Document Scope

Detailed information about structural design methods is not included in this document. Instead, this document contains "rules of thumb" to assist in creating the design. More detailed information on structural design methods can be found in numerous textbooks and other references. Two resources available are the Reinforced Masonry Engineering Handbook and the Masonry Designers Guide. These resources contain example designs with example structural analysis. They can be found at The Masonry Society Library.

Design software is also available from many sources.

Mostly, the information is based on Building Code Requirements and Specifications for Masonry Structures, The Masonry Society 402/602. TMS 402/602 is adopted by reference in ASCE 7 and the IBC with minor overriding provisions.

It is intended that most of the information presented is independent of the code edition selected. Specific code references are not included as code provisions change with time and may be revised by the local jurisdiction. In this document, there are statements that a provision is required by code. This statement means that the provision has existed in the code for many years or may be new and is likely to continue being a code provision. But, the provision may or may not apply to your project and may not be current. The structural engineer must check current code provisions applicable to the project based on the jurisdiction having authority.

The traditional design and construction project delivery system (design-bid-build) are assumed. In the traditional project delivery system, the structural engineer contracts with and reports to the project architect as a specialty consultant. The architect typically contracts with and reports to the owner. The contractor is selected after the design is completed, and the selection is often based on price. The contractor enters into an agreement with the owner and reports to the architect serving as the owner's representative.

Other project delivery methods exist, such as the Construction Manager/General Contractor (CM/GC) and Design-Build. Because there is usually more interaction with contractors in these alternative methods, converting a project to RHCM may be easier. However, for this publication, the traditional approach is assumed.



Figure 4 Reinforced Hollow Clay Masonry Wall with Shear Keys for the Slab Connection

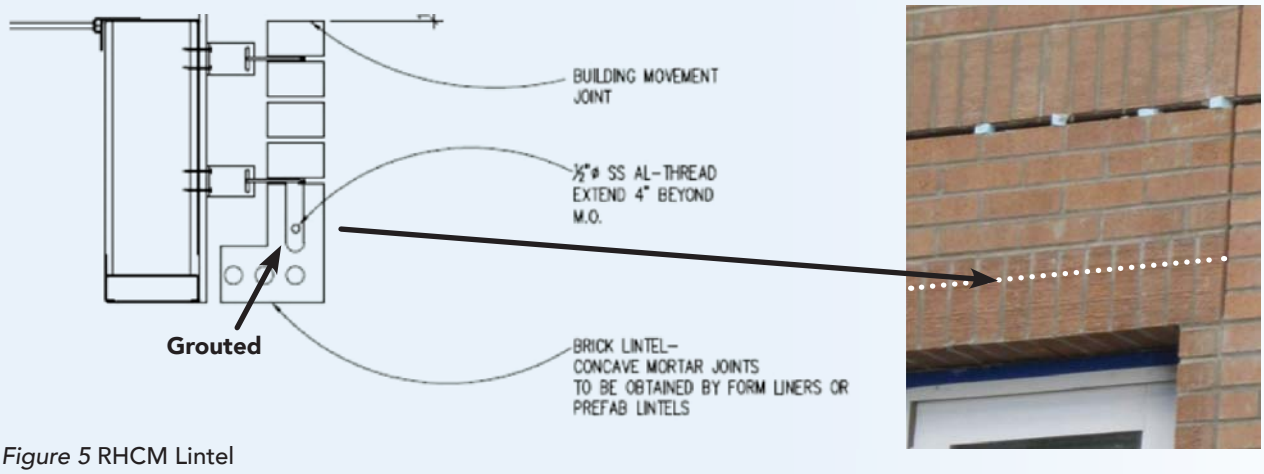


Figure 5 RHCM Lintel

Example Projects

Basic Applications

Reinforced Hollow Clay Masonry Header for Veneer

Brick veneer over various veneer backings is often used for a building's exterior wall. Above openings, the brick veneer is usually supported by steel angles called loose lintels prone to rusting. Observing the rusted angle above an opening makes it easy to determine that a wall is brick veneer. There is a better design.



Figure 6 Custom Lintel Unit for an Inset Window

Replace the steel loose lintel angle with a Reinforce Hollow Clay Masonry lintel. The simplest design is a half-hollow clay soldier. A horizontal reinforcing bar is placed in the cell, and the cell is grouted.

Because the reinforced lintel is typically exposed to water on both sides, it is recommended to use a stainless steel all-thread for the reinforcement. Stainless steel all-thread is much less expensive than stainless steel reinforcement and is readily available. For most applications, a 3/8-inch or ½-inch diameter all-thread is sufficient.

Construction is accomplished by shoring the opening, usually with wood framing. Some masons elect to prefabricate the lintel as a RHCM panel, either on-site or off-site, in a controlled environment.

Reinforced Hollow Clay Masonry Retaining Walls

Many retaining walls are constructed using concrete. Concrete forms often use brick pattern forms for the exposed surface. Why not use brick instead?

Typical hollow clay masonry design strengths (ranging between 2600 and 4000 psi) match that of concrete (higher strength than concrete masonry). Reinforcement requirements are comparable to concrete.

A significant cost advantage is the geometric flexibility of RHCM. Hollow clay masonry units are laid one unit at a time. There is flexibility to have articulated shapes for a small increase in cost.



Figure 7 Articulated Retaining Wall

The serpentine retaining wall is a classic example of the relationship between form and structure. The geometry of a RHCM retaining wall can significantly increase the structural capacity and is more economical. Varying the geometry of a concrete retaining wall is expensive. RHCM can be considered similar to reinforced concrete with the forming left in place.

Additionally, RHCM expands, and concrete and concrete masonry shrinks. In RHCM, the expansion puts the reinforcement in tension, reducing cracking and water penetration. Also, a brick retaining wall can be built from one side, often minimizing the expense of the back-side excavation.



Figure 8 RHCM Retaining Wall

RHCM Soffits, Sills, and Cantilevers

Brick veneer walls may include brick soffits, sills, and cantilevers. Instead of complicated veneer backing, RHCM can be used.

Spanning between connectors to the structure, the hollow clay masonry transforms the veneer into a structural element, eliminating the structural veneer backing. Some local building codes restrict the use of veneers on overhead horizontal surfaces. RHCM would be code compliant and solve the problem.

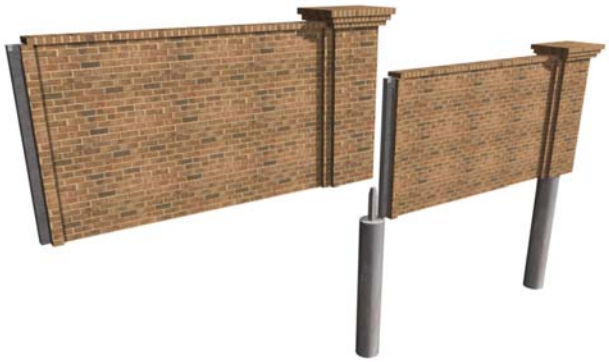


Figure 9 RHCM Cantilevered Exterior Wall

Reinforced Hollow Clay Masonry Sound Walls

RHCM sound barrier walls are cost-effective. In addition, the flexibility of color and form offers cost and aesthetic advantages.

Two schemes of sound walls are recognized, the cantilever wall and the pier and panel wall. The cantilever has a continuous footing, and the wall is designed to cantilever from the footing. The pier and panel wall has a foundation below the pier but does not require a continuous footing under the wall panels, a significant saving. The piers are designed to support the loading from the wall panel between the piers.



The Sound Transmission Class of a reinforced hollow clay wall is comparable to a concrete wall. The sound transmission class rating can be found in TMS Standard 0302-12 and Brick Industry Association Technical Note 45.



Figure 10 Pier and Panel Sound Wall

Advanced Applications

Schools

For aesthetic reasons, brick is often preferred for the exterior of a school. Often architects will opt for a brick veneer which they believe costs less. However, brick veneer has a limited life unless properly designed with items like stainless steel ties.

Additionally, school story heights add significant costs to the veneer backup system. When the veneer is converted to an RHCM structural system, the backup wall can remain inexpensive, and the brick wall can be part of the building's primary structure. There are many examples of the RHCM wall costing less than brick veneer walls.

Interior RHCM hall and classroom walls provide fire resistance and a long-lasting, durable surface that resists abuse and requires little maintenance.



Figure 11 RHCM School

Commercial/Retail

One- and two-story commercial buildings, retail malls, or other commercial developments can frequently benefit from RHCM construction. As an alternative to concrete masonry, there is an increase in initial cost for a significant improvement in aesthetics, strength, and durability.

As an alternative to a steel frame with metal stud infill walls, RHCM masonry can be used as both a bearing wall, shear wall, and enclosure wall providing structure and exterior finish simultaneously.

Long lead times for structural steel detailing and fabrication can increase the construction schedule. The construction of RHCM can usually begin shortly after the design is complete.



Figure 12 RHCM Retail Center

Small Office Buildings

The typical office building requires column-free spaces to provide flexibility for interior design. These buildings often employ moment frames or braced frames to resist lateral loads. Load-bearing walls are typically not used because they limit the flexibility of the interior space. However, RHCM shear walls can be substituted for steel braced frames or moment frames to resist lateral force. Fire-rated stairs and fire-rated elevator shafts can utilize RHCM, providing up to four-hour fire resistance with an interior brick finish. This is especially desirable when shear walls become part of the exterior aesthetics of the building or permanent partitions.

Single-Family Residential



Figure 13 Brick House

RHCM can be substituted for wood frame construction in single-family residential projects. It offers better acoustical properties, less seismic or wind drift (deflection), better fire resistance, less maintenance, insect resistance, and hail resistance. Also, stiff masonry walls may provide better performance in expansive soil locations than flexible walls.

Multi-Story Residential/Hotels

RHCM is used in medium-rise residential projects, including hotels. RHCM exhibits high compressive strength. For buildings in the four-story to the 20-story range, the full strength can be used with little or no increase in cost.



Figure 13 RHCM Residential

The high strength can mean savings and offer an advantage over other forms of construction. The RHCM system is compatible with wood, precast, cast-in-place, or prestressed floor systems. Besides aesthetics, a primary benefit of RHCM bearing wall construction is the sound separation provided by the wall mass. RHCM dwelling unit dividing walls also provide reliable fire separation and thermal mass.



Figure 15 RHCM Hotel

Institutional Facilities

Brick is often the material of choice for libraries, hospitals, fire stations, city halls, and university buildings. In these situations, using RHCM offers an alternative to brick veneer. It can perform double duty when designed to be load-bearing and may provide savings.

Even if not designed to be load-bearing, RHCM offers better seismic isolation and longer life than traditional veneers. RHCM can be designed to isolate the wall from building movements in areas of high seismic exposure. This is difficult to accomplish with conventional brick veneer, particularly at the building corners.



Figure 16 RHCM University Building

Other Applications

Small Bridges



Figure 17 Small Bridge

Building a bridge can be limited by local conditions. A RHCM brick bridge can be built almost anywhere. The materials can be transported one brick at a time. Additionally, the flexible geometry allows for more efficient structural systems.

Blast Walls

Technical information about RHCM and brick blast walls is limited. At this time, it is not a typical application. ASCE/SEI Standard 59-11 Blast Protection of Buildings addresses material and design issues. Masonry is included and, except for minor differences, is equivalent to reinforced concrete. The referenced document addresses concrete masonry. Experience indicates that because of the significant increase in strength of hollow clay masonry units over concrete masonry units, brick blast-resistant walls will perform equal to or better than concrete masonry blast-resistant walls.

The Department of Defense and the ASCE/SEI 59-11 prohibit using unreinforced or partially grouted masonry for blast resistance. This is because fragmentation of the units causes airborne debris.

Storm Shelters

Test panels made of fully grouted RHCM, produced by Interstate Brick Company, have been tested for debris impact. The test objective was to ensure compliance with a high-performance standard to protect shelter occupants from wind-borne debris. Performance criteria include preventing the perforation of the shelter by the test missile and preventing damage that could cause injuries to the occupants.

The panels tested met the debris impact guidelines of FEMA 320/361 and ICC – 500 for a tornado shelter. Again, remember that the flexibility of wall geometry gives RHCM a significant cost advantage over reinforced concrete.

Curtainwall or Reinforced Veneer, or Structural Brick Veneer

Brick veneer on metal studs is a popular curtainwall system. An alternative system is an RHCM curtainwall or reinforced veneer. A reinforced veneer is similar to a conventional veneer, except the wall is constructed with RHCM. Typical closely spaced veneer ties are replaced with intermittent connectors spaced farther apart. A typical brick veneer has ties every two square feet. Reinforced veneers have connectors every 100 square feet. The connectors carry more load, are constructed of galvanized thicker materials, offer simpler methods for isolating the veneer from the primary structure, provide less thermal bridging, and are more corrosion-resistant.

A design guide for reinforced veneer or structural brick veneer is available at the Western States Clay Products website (www.brick-wscpa.org/technical-publications.php, Design Guide for Structural Brick Veneer, Third Addition).

A reinforced veneer is sometimes called "laid-in-place panels."



Figure 18 RHCM Reinforced Veneer Hospital Exterior Wall in a High Seismic Zone

Brick Panels

Brick panels are an application for RHCM. Brick panels are constructed of hollow clay units, reinforced, fully grouted, and attached to the building in a manner comparable to a precast concrete panel. The system can speed construction, eliminate the requirement for scaffolding, and provide the designer with new opportunities not available with conventional masonry. The system has been used on many buildings ranging from single-story branch banks to 50-story office buildings.

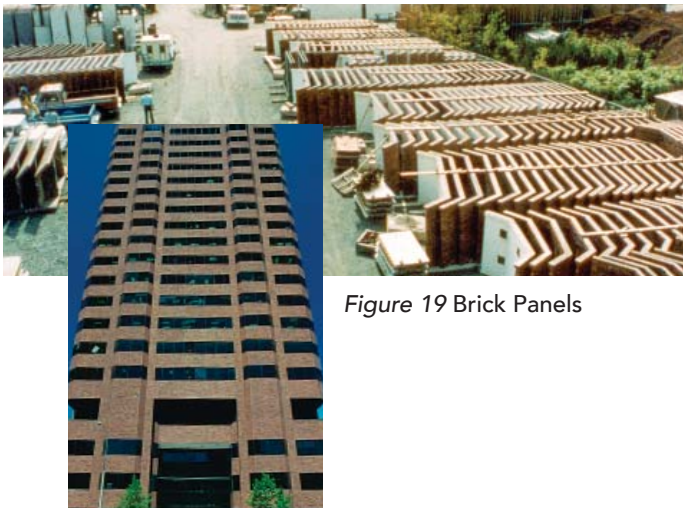
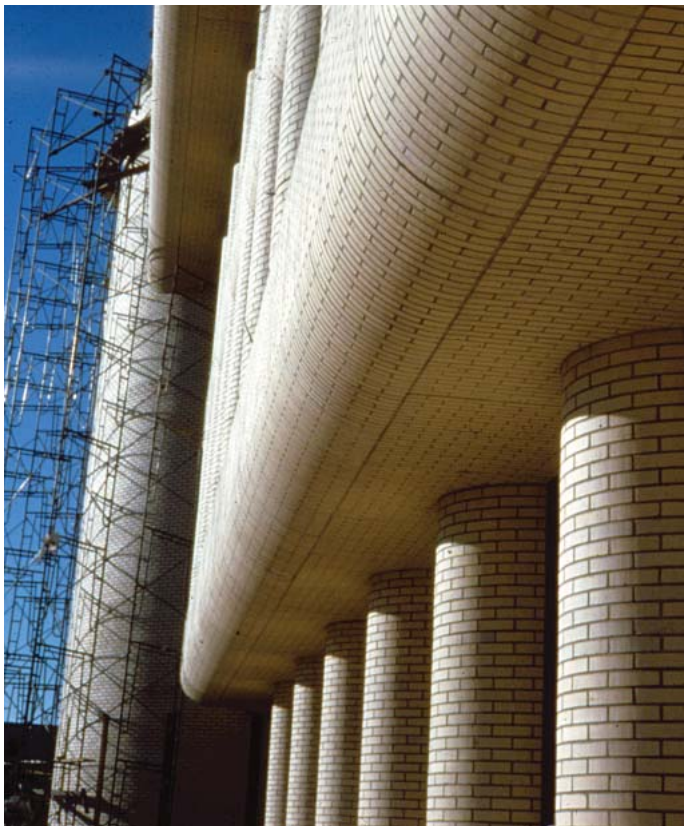


Figure 19 Brick Panels



Concrete Form

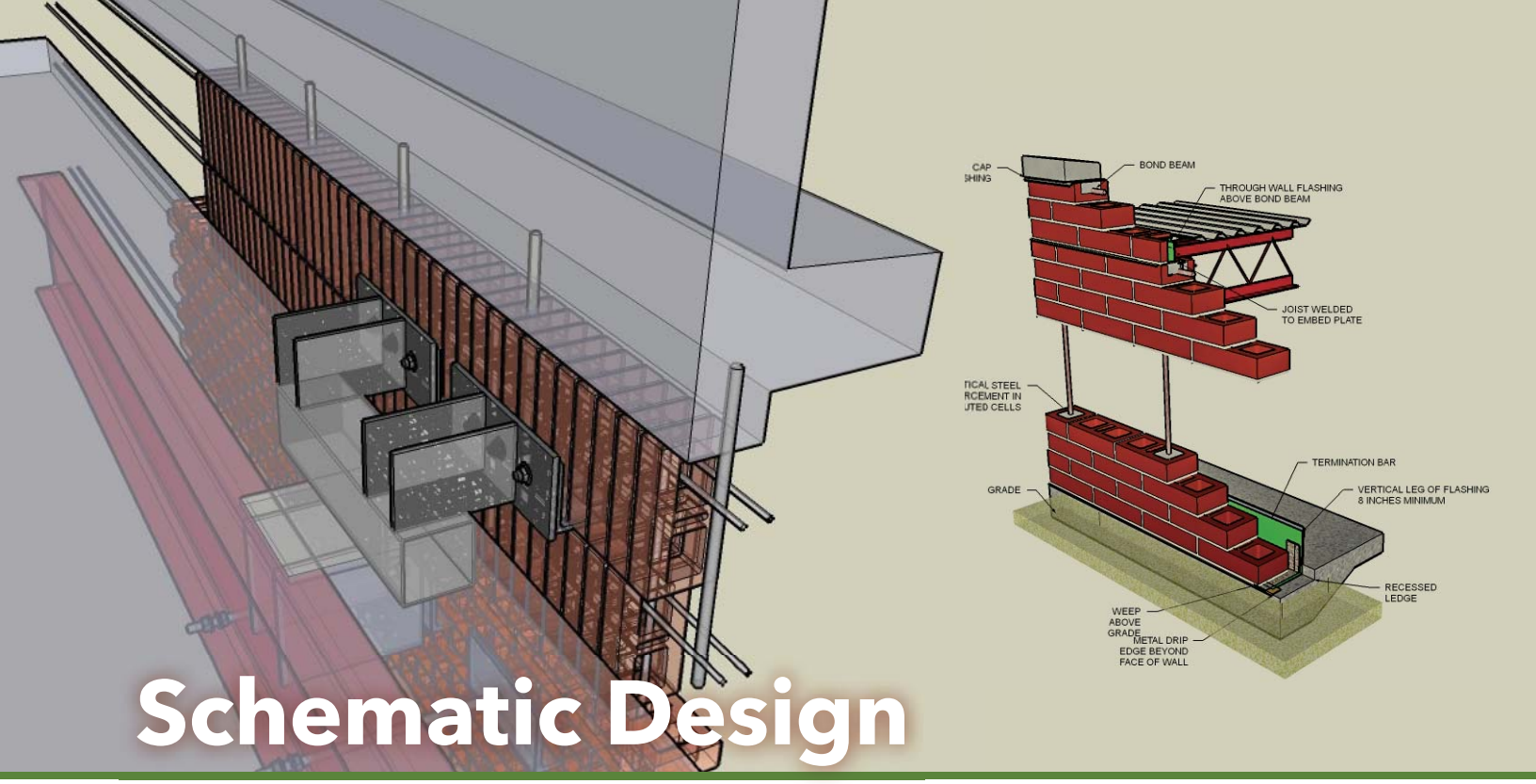
RHCM or, in some cases, unreinforced solid brick can be used as a form for concrete. When a brick exterior is desired, the brick can become the form for concrete structural columns and spandrels. In addition to increasing the element's capacity (the brick concrete form is structural and is not removed), the geometry flexibility offers interesting opportunities for unique designs.



Figure 20 RHCM Columns and Spandrels Used Both as a Form and for Structure



Figure 21 RHCM Used as the Finish Wall and Backing for Concrete Shotcrete (Gunite)



Schematic Design

Selection of the Structural System

During the schematic design phase, the architect evaluates the owner's needs and develops the project concept. Multiple design concepts are explored and developed during this phase. The structural engineer is expected to influence the selection of a structural system with choices that are cost effective for the owner.

The architect and owner will likely have defined a preliminary site plan and layout before the structural engineer's involvement. For example, if the site plan includes retaining walls, the structural engineer should include the retaining walls in the design scope, increasing the fee if possible, and suggest RHCM as a cost-saving option.

Suppose the exterior skin (curtainwall) has not been defined, and the building is of institutional quality or in a high seismic or hurricane zone. In that case, RHCM curtainwall (reinforced veneer) may be an option for significant cost reduction and enhanced performance. Reinforced veneer usually costs less than conventional brick veneer on steel studs if the story height is over 12 feet.

During the selection dialogue, the following advantages and objections could arise.

Advantages

Sustainability and Resilience

Unlike many modern construction materials, fired clay (bricks) lasts thousands of years in the environment. They are sustainable. Additionally, bricks can be recycled either by reuse or by adding ground-up bricks to clays for making new bricks.

Resilience can be developed through the geometric flexibility of RHCM. Adding intersecting walls and flanges to shear walls will increase resilience at a minimum cost.

Expansion Property

Brick masonry expands with time. This can take as long as five years. It is not reversible. In RHCM, this property places the brick in compression and the steel in tension. The result is reduced cracking and improved water penetration resistance. Expansion joints can be placed further apart or, in some cases, eliminated.

High Strength

It is relatively easy to obtain high-strength hollow clay masonry. Design strengths (f'_m) of 4,000 psi are recognized in TMS 602 Specification based on an 11,500 psi clay unit net area compressive strength. Typical unit strengths are between 10,000 and 15,000 psi. Higher unit strengths are common.

Darker colored bricks generally have higher strengths and lower absorption than lighter colored bricks. There is typically no cost premium for these higher strengths, although there may be local limitations on available colors. In load-bearing applications, the higher strengths offer an advantage over concrete masonry units.

The tensile strength of the brick masonry unit range between 700 and 1500 psi. Brick cracking in structural walls is less common than in concrete masonry (CMU).

Form and Structure

Structural capacity can be significantly increased by modifying geometry. For example, adding a pilaster to the wall. The cost to modify geometry is minimal when bricks are laid one at a time.

Speed of Construction

Most masonry materials, including hollow brick, are readily available on short notice. Therefore, it is not necessary to wait for steel fabrication.

Low Maintenance Cost

RHCM is relatively maintenance-free. Expected life far exceeds the life of metal and other light exterior wall systems. RHCM does not rot. Insects do not eat RHCM.

Aesthetic Flexibility

There are thousands of colors and textures from which to choose. The many brick placement orientations can create unique patterns that challenge the architect's creativity. Fewer expansion (or control) joints (if any) are required. Special shapes can be produced to further broaden the aesthetic possibilities.

Building a bridge can be limited by local conditions. A RHCM brick bridge can be built almost anywhere. The materials can be transported one brick at a time. Additionally, the flexible geometry allows for more efficient structural systems.

Objections

RHCM is viewed as masonry in general and carries many of the perceived negatives often associated with masonry.

Below are a few of the common objections. However, despite these objections, RHCM has been successfully used on many projects for the past 80 years and should continue to receive consideration in many projects.

Unfamiliarity with RHCM

Many designers, both architects, and engineers, are not familiar with RHCM. A simple solution is to consider RHCM as concrete masonry with the CMU units replaced with brick units.

Higher Cost

RHCM costs more than concrete masonry. But it may cost less than brick veneer on metal studs. When floor heights exceed 12 feet, many examples exist where an RHCM with only an interior partition costs less than a brick veneer with a structural steel stud backup system. This is because the backup structural steel stud wall cost exceeds the increased brick structural cost.

Water Penetration

Masonry is often perceived to leak more than other wall systems. This has proven to be inaccurate for RHCM, particularly when grouted solid. The expansion of the brick masonry against the reinforcement tends to reduce cracking and, thus, reduce leakage significantly.

Another Subcontractor

Adding the mason adds another subcontractor to the job. General contractors often resist adding a masonry subcontractor to the job. One reason is the cost of administering the masonry work. Another reason exists if the general contractor performs their own concrete work. In this situation, they will prefer concrete walls instead of masonry walls to keep a larger percentage of the project.

Unreliable Color

Colors are variable and sometimes not what was expected. Many architects have experienced difficulty in obtaining the colors desired. To a large degree, many of these problems don't exist today. More sophisticated manufacturing processes and adequate color mock-ups have nearly eliminated issues in this area.

Inexperienced with Design Methods

Many structural engineers are not familiar with masonry design methods. There are many new resources (literature and software) available. This document is one example.

Inconsistent Information

Sometimes technical answers obtained from suppliers appear inconsistent. There are many different types of masonry. There are many different uses. Communication between the masonry industry and the designer often needs clarification because of misunderstandings of intended use and terminology. Veneer brick masonry is not designed and constructed like load-bearing brick masonry. CMU masonry behaves very differently from fired clay masonry. One typical example: wetting clay units before laying is often recommended, while it is not recommended to wet CMU units before laying.

Inconsistent Standard Details

Many standard details are available, but the problem is similar to the apparent inconsistency of technical answers. Since there are so many different types of masonry, methods, and systems, a single set of standard details is not possible. Further, details vary by region. Most local masonry institutes have recommended details available.

Prices are not predictable.

Price varies from job to job. Unfortunately, it is difficult to predict the price of a masonry job. Since masonry work is labor intensive, the mason's production is a key factor. Many variables come into play. The cost of the bricks remains relatively predictable and can be obtained from the supplier.

Complicated Building Code

There are many different types of masonry and many different applications. Persistence in understanding the applicable provisions of the code is required. This document is intended to help.

Selection of Materials

When RHCM is selected for the structural system, the next step is to choose the specific type of units to be used. The choices of shape, color, texture, and pattern are almost unlimited.

Thousands of colors exist. Almost any shape can be produced. Units can be shipped thousands of miles.

Local suppliers can provide information on the available strengths, shapes, and colors. The manufacturers who are members of the Western States Clay Products Association are listed in Appendix A.

Initial Design Criteria

The likely applicable code is The Masonry Society (TMS) 402/602 *Building Code Requirements and Specification for Masonry Structures*. It is adopted by reference in the International Building Code. Associated design loads are found in the *International Building Code* and the *American Society of Civil Engineers (ASCE 7) Minimum Design Loads for Buildings and Other Structures*.

TMS 402/602 includes two design methods: Allowable Stress Design and Strength Design. The Allowable Stress Design and Strength Design methods are divided into Reinforced Masonry Design and Unreinforced Masonry Design. Hollow clay masonry can be designed as reinforced masonry or unreinforced masonry using either Allowable Stress Design or Strength Design.

The code provisions for Unreinforced Design, Reinforced Design, Strength Design, and Allowable Stress Design may be used in combination. For many years ASCE 7 has restricted combining Allowable Stress Design and Strength Design. But the IBC has typically not adopted the ASCE 7 restriction. Before combining methods, the structural engineer must verify if the mixing of design methods is allowed within the project jurisdiction.

Dimensions

It is traditional to describe the masonry unit dimensions in the order of thickness, height, and length. For example, a 6 x 4 x 12 unit is a nominal 6-inch-thick, 4-inch high, and 12-inch long unit. Nominal dimensions are one mortar joint thickness larger than the specified brick dimensions. The typical mortar joint thickness for RHCM is either 3/8 inch or 1/2 inch, depending on the manufacturer (the typical mortar joint thickness for concrete masonry units is 3/8 inch). Thus, a nominal 4-inch height unit laid with a ½-inch mortar joint has a specified height dimension of 3 ½ inches

Standard nominal thicknesses are 4, 5, 6, and 8 inches. The availability of 10 and 12-inch thick units may be limited. The typical nominal height is 4 inches (other heights are available), and the nominal length is 12 inches or 16 inches. Smaller standard-size brick units (for example, 3 ½ x 2 ½ x 7 ½) can be manufactured with cells large enough to be reinforced.

Hollow clay units are produced in accordance with ASTM C 652 H60V, where the sum of the void area is greater than 40 percent but less than 60 percent of the gross cross-sectional area.

Hollow clay masonry units have cells and cores. A cell is different from a core. A cell's cross-section exceeds 1 ½ square inches. A core's cross-section is less than 1 ½ square inches. Cores do not need to be grouted for a wall to be classified as fully grouted, but all cells need to be grouted. Reinforcement is not generally placed in cores.

Hollow clay masonry units are easily reinforced, both vertically and horizontally. Vertical reinforcement is placed in the cells that align vertically. Horizontal reinforcement is placed in bond beams that align horizontally. Smaller standard-size units manufactured with cells can also be easily reinforced. Diagonal reinforcement is very difficult to construct and is almost never designed.

Special units can be manufactured for custom patterns. The additional cost for custom units, shapes, and colors on large projects is generally small. A project that offers the opportunity for custom units provides the architect and structural engineer with an opportunity for creative, sustainable, and resilient design. One example is the custom units used in a large hospital for a six-inch thick wall that visually projected a standard four-inch corner.

For analysis, the specified dimensions of the masonry are used, except the nominal dimensions are used for the following:

1. Effective flange width.
2. Reinforcement spacing.
3. Maximum size of reinforcement based on the thickness of the unit.
4. Height-to-thickness ratios for determining design compression strength.
5. Minimum dimensions (Example: Minimum side dimension of a column is eight nominal inches).

It is desirable, but not necessary, that the plan dimensions match the unit module. Cutting units is common but can significantly add to the wall's cost. Moreover, a wall or pier of limited length (say, 14 inches long) could pose a problem with aligning cells for reinforcement.

Generally, the masonry contractor can adjust dimensions by plus or minus 1/8 inch per stretcher. This can be accomplished by unit selection or by adjusting mortar joint widths. It should be recognized that units typically are not exactly the same thickness, height, or length. Variations in specified dimensions are addressed in ASTM C 652. The dimension of a darker unit will generally be smaller than the dimension of a lighter unit. Because the thickness varies, hollow clay walls are typically laid to line on one exposed face. When both sides of the wall are exposed and considered finished, additional costs may result, either because of the increased cost for more uniform units or the potential increased cost to lay the units.

A floor height that does not divide evenly by the brick height is not a big problem. Usually, the bed joints can be adjusted. Sometimes the brick is cut. Gabled walls are typically constructed by cutting the units at an angle.

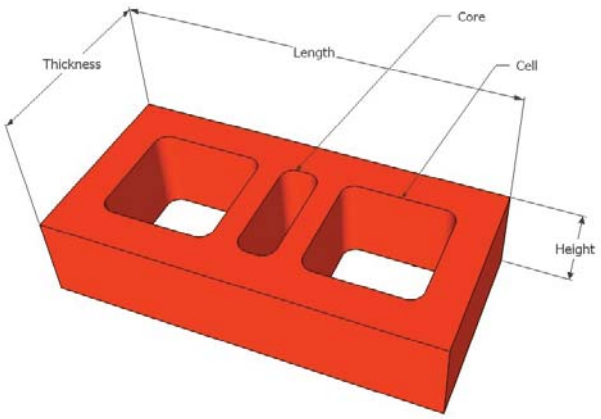


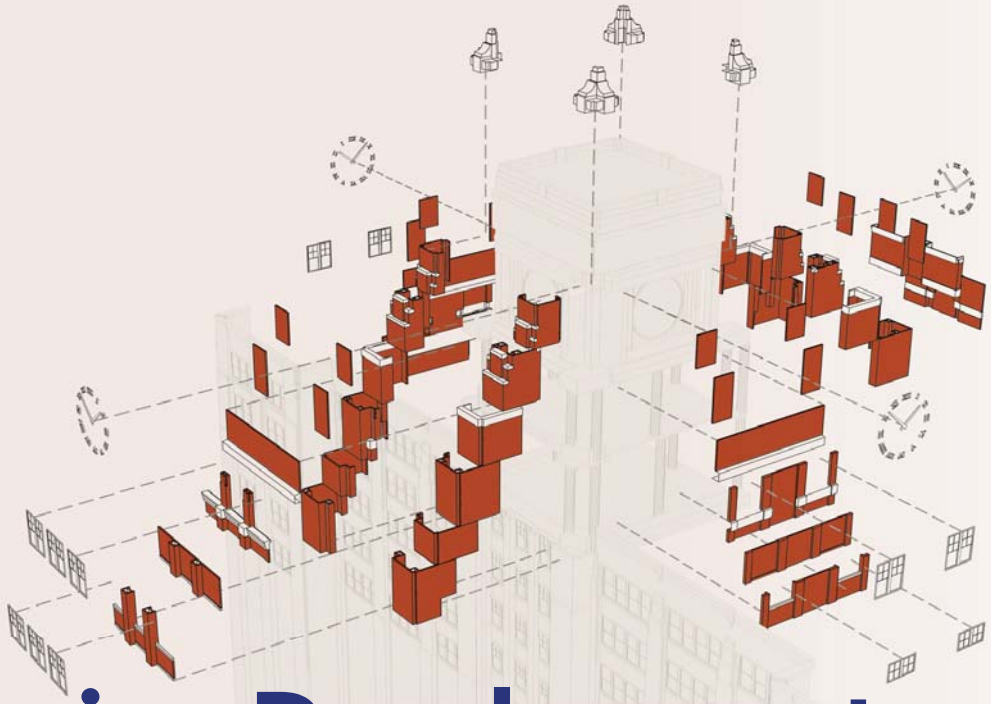
Figure 22 Dimension Order: Thickness, Height and Length



Figure 23 Custom Unit for a Four Inch Corner in a Six Inch Wall

Wall Thicknesses

It is common to use different thicknesses of walls on the same floor or to change the wall thickness from floor to floor.



Design Development

During the design development phase, the design team prepares documents consisting of drawings and specifications to fix and describe the size and character of the entire project.

During this phase, the structural engineer identifies the space required for the structural portions of the project and the elements of the structure that will control the required strength of the materials, in addition to a beginning draft of the specifications.

Bond Pattern

The building code recognizes only two bonding patterns, running bond and other than running bond (formerly defined as stack bond and that term to be used herein). For running bond, the units must overlap by more than one-quarter of the unit length. If the overlap is less than one-quarter, the pattern is classified as other than running bond for design purposes, or stack bond. The code has lower capacities for stack bond and includes prescriptive requirements for its use.

For RHCM and CMU masonry, the head joint is normally face shell bedded instead of full bedding. The structural engineer should assume that the face shell bedded head joint has no shear or tension capacity. In running bond, the head joints stair step in the wall. The code design capacities take this into account. In stack bond, the head joints line up in the wall, causing a structural discontinuity. The code provision limit capacity accordingly.

There are many bonding patterns other than stack and running bond. The orientation of the units provides the architect with many creative designs.

There are names for the orientation of units in a wall. The un-hatched face is the face exposed to view.

For unreinforced masonry, bed joint code capacities are higher than head joint code capacities. The code defines the bed joint as the horizontal layer of mortar on which the masonry is laid. The capacity is higher because of the compression on the joint during curing supplied by gravity. For example, for a soldier orientation of a unit, the head joint is the end web.

Typically, the architect will select the bonding pattern. Many designs have multiple bond patterns. Some patterns can have a significant impact on the structural design.

When the head joint limits the capacity required, using open-end units (units with the end webs removed) and fully grouting will solve the problem.

The bonding pattern may appear to create a wall that cannot be reinforced and grouted. However, there are usually methods available. Typical methods are:

- Use a single bond beam or back-to-back bond beams for vertical reinforcing in soldier courses.
- Use precast concrete or cast stone with holes (like brick cells) to pass vertical reinforcement. When using precast concrete, it is important to consider that concrete shrinks with age and that brick masonry expands. The precast should not be set until it is at least 28 days old, and the length of the precast should be limited to 10 feet with a soft caulk joint at the end. Placing sand on the surface of the caulk will make the caulk joint appear like the adjacent mortar joints.
- Use various brick thicknesses and special shapes to produce elegant walls. Flexibility is one of the most important advantages of RHCM. Rustication, quoins, and cornices are examples of a few designs that can be easily produced using different thicknesses of hollow clay.
- Work with the brick manufacturer to design custom extruded shapes.
- Use cut lintel blocks from the end of units for exposed sills and lintels.

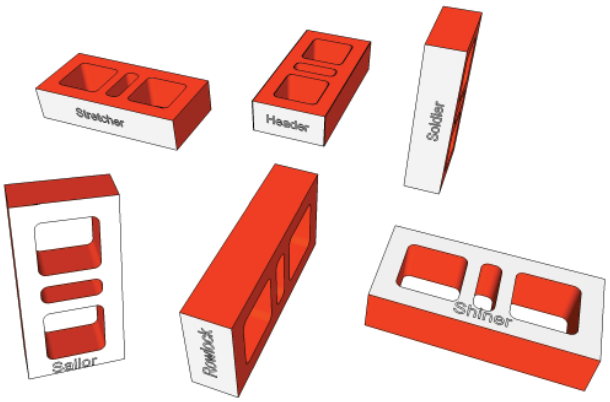


Figure 24 Unit Orientation Definitions

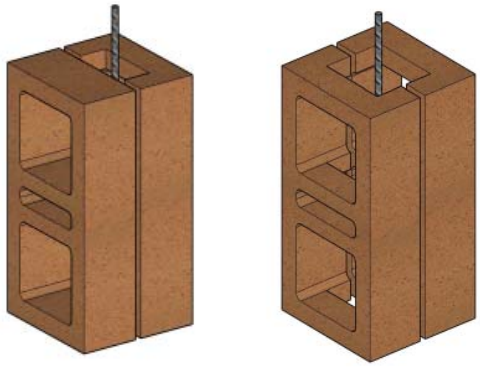


Figure 25 Soldier Reinforcement

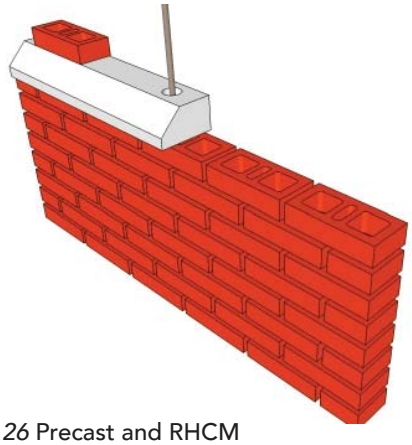


Figure 26 Precast and RHCM

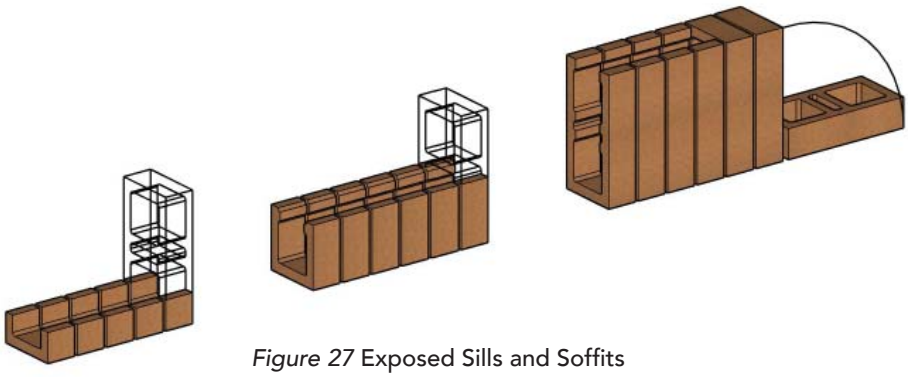


Figure 27 Exposed Sills and Soffits

Initial Sizing of Members

During meetings with the client, questions about member sizes will occur. Structural engineers tend to rely on their computer models, requiring additional time, instead of "back of the envelope" analysis on the spot. The following information will assist the engineer in quickly providing the client with the needed information.

Making money on the structural design directly correlates to the quality of the first guesses.

Designing a structure is an iterative process. It consists of guessing, checking, and resizing to meet code and performance expectations. Fortunately, whole numbers are used to select masonry member sizes, so the engineer doesn't need to run extensive analysis to get started.

Selection of the Design Strength

Masonry is composed of units, mortar, and grout. The f'_m specified is the required strength of the combination of these materials. A common incorrect assumption is that the weakest of the units, mortar or grout, determines the system's strength. This is not the case. It is common to have a combination of materials with a strength of 4000 psi, a grout strength of 2000 psi, and a mortar strength of 1800 psi. This is because laboratory or field tests, not in-the-wall tests, define the grout and mortar strengths. Laboratory and field-prepared grout and mortar test samples are cured in conditions quite different from those in the wall. The strengths in the wall are typically much higher.

Mortar and grout compression tests measure the water-to-cement ratio of the mix. In the wall, the units absorb much of the water from the grout and mortar, resulting in increased strength. Think of the unit as a sponge absorbing water. Accepted standards for the field tests of mortar and grout attempt to mimic this effect. The methods used are unreliable. Moreover, field tests of mortar and grout are sensitive to weather, temperature, sampling method, curing, handling, transportation, and testing method (Appendix D).

For this reason, the structural engineer should rely on the prism test as a measure of strength.

Unfortunately, it is rare to obtain prism test data during the design development phase. The masonry code unit strength method provides an alternative to prism testing and is recommended for the initial design.

In accordance with TMS 602, the specified strength of RHCM can be determined from the unit strength by the following equations.

$f'_m = 0.3057 * (the\ net\ area\ strength\ of\ the\ unit) + 480.39$ (Type M or S mortar)

$f'_m = 0.2439 * (the\ net\ area\ strength\ of\ the\ unit) + 487.80$ (Type N mortar)

For RHCM, the structural engineer can assume a design strength of 2,600 psi in most situations. Lower values for the hollow clay masonry are unlikely. Higher values can be obtained if required.

The modulus of elasticity for hollow clay masonry is 700 f'_m psi (for concrete masonry, it is 900 f'_m psi).

Commonly, one building element controls the required masonry strength. Reducing the strength of other elements not requiring the higher strength may or may not result in cost savings.

It is not unusual to change the wall strength or the unit thickness from floor to floor.

Changing the unit color may mean a change in the masonry strength. Consequently, the architect's choice of color may control the strength of the masonry.

Selection of Wall Thickness

Out-of-plane loads will likely control the exterior wall thickness, except for buildings over six stories, where the compression demand may control wall thickness, or in a high seismic zone, where the shear demand may control the wall thickness.



Out-of-Plane

Whether or not the architect has initially selected the wall thickness, the structural engineer will need to estimate the thickness required to resist the loads. A good initial guess can save a lot of design effort. The following table presents typical wall thicknesses for walls controlled by out-of-plane loading. Wind load is usually the controlling load (For 10-inch and thicker walls, seismic may control in high seismic areas).

Typical Height Limits for Out-of-Plane Loading

Nominal Wall Thickness (in.)[3]	Height of Wall (ft.)1.2		
	Normal Application h/t = 24	Common Application h/t = 30	Extended Application h/t = 36
4"	8	10	12
5"	10	12	15
6"	12	15	18
8"	16	20	24
10"	20	25	30
12"	24	30	36

1. h = effective height, t = nominal thickness
2. Wind loading 45 psf with .0025 net area vertical reinforcement. (f'_m = 2600 psi)
3. 10 and12-inch thick units may not be available – check with the manufacturer.

For walls with h/t ratios less than 24, there is significant capacity for compression (load bearing). Moment magnification resulting from out-of-plane deflection (small deflections) will have little or no effect on the design.

For walls with h/t ratios between 24 and 30, the compression capacity is reduced but still significant in most applications. Generally, the moment magnification factor will need to be considered in the design but will have a small effect.

For walls with h/t ratios between 30 and 36, the compression capacity is reduced, and it is necessary to consider moment magnification in the design. Walls in this category often have roof loads accumulating to a point along the wall (roof trusses). In these circumstances, the structural engineer should consider using pilasters (protruding inside, outside, or both) and span the masonry horizontally between pilasters.

Compression

Compression in the wall results from the dead load, live load, snow load, and overturning due to lateral wind or seismic forces.

The compression from dead, live, and snow loads can be easily determined by the tributary area method. The tributary area method requires engineering judgment. The dead and live load from each floor and the dead load, live load, and snow load on the roof are distributed by dividing the floor and roof into the areas between the walls (except in high snow load locations). Live load reduction should be used, and partition loads should be added if required by the code. Don't forget to include the weight of the wall.

Lateral Forces

Initial sizing for in-plane lateral loading is more complicated. Usually, the in-plane loads are due to wind or lateral seismic forces applied to the entire structure (main lateral force resisting system). For a regular geometry (the center of rigidity approximates the center of mass or the center of pressure), the first step is calculating the base shear. For irregular geometry, the first step is to educate the architect about the performance advantages of regular geometry, then determine the base shear.

Wind Base Shear

The base shear due to wind may be estimated as:

$$V_{base} = WA$$

Where W is the estimated average wind pressure on the building (generally, direct pressure on the windward elevation and plus suction on the leeward elevation) and A is the building area exposed to the wind pressure.

Seismic Base Shear

The layout of shear walls for resistance to seismic loads is important. Maintain the symmetry of shear walls. Getting the architect to add a shear wall to provide symmetry can significantly reduce the required design time. It will also improve the resilience of the building. Methods for seismic design of asymmetric geometry are available but require additional effort. Perhaps you should request an additional design fee if symmetry is not approximated.

For Seismic Design Category C and above, TMS 402 requires that along any line of lateral resistance, not more than 20 percent of the lateral resistance can be provided by columns unless the base shear is determined using a response modification factor (R) of 1.5 (not recognized by ASCE 7 or the IBC but the exception is likely within the normal standard of structural engineering care).

The base shear due to seismic can be estimated. Since Reinforced Hollow Clay Masonry buildings normally have a box system that resists seismic forces with shear walls, the estimating procedure is not very complicated. It can be estimated with hand calculations.

The base shear is:

$$V_{base} = C_s W$$

Where W is the seismic weight of the building (including partitions and sometimes snow. See ASCE 7 for the definition of seismic weight).

The value of Cs is determined by:

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)}$$

Where S_{DS} is the short period design spectral response acceleration parameter, I_e is the Importance Factor, and R is the Response Modification Coefficient.

R = 5.0 for specially reinforced masonry shear walls (Seismic Design Category A, B, C, D, E, F)

R = 3.5 for intermediate reinforced masonry shear walls (Seismic Design Category A, B, C)

R = 2.0 for ordinary reinforced masonry shear walls (Seismic Design Category A, B, C)

C_s need not exceed:

$$C_s < \frac{S_{D1}}{T\left(\frac{R}{I_e}\right)}$$

Where S_{D1} is the design spectral response acceleration parameter at a period of 1 second.

The building period can be estimated as follows:

$$T_a = .02 h_n^{.75}$$

Where h_n is the height of the building, in feet.

And C_s must be greater than:

$$C_s = 0.044 S_{DS} I_e \geq 0.01$$

And, if S_1 is equal to or greater than 0.6, then C_s shall be greater than:

$$C_s = \frac{0.5 S_1}{\left(\frac{R}{I_e}\right)}$$

Where S_1 is the 5% damped mapped maximum considered earthquake spectral response acceleration parameter at a period of 1 second.

Distribution of Base Shear

The base shear, either wind or seismic, is resisted by the in-plane forces in the building walls. The amount of load in each wall can be estimated as follows.

For flexible diaphragm buildings, the base shear is distributed by the tributary area method. Flexible diaphragm buildings are constructed with wood or metal deck without concrete topping floors and roof. The tributary area method requires engineering judgment. The force in each floor diaphragm is distributed by dividing the floor into areas that split the distance between the walls. The stiffness (rigidity) of the wall is not used.

For rigid diaphragm buildings, the load is distributed to the walls in relation to the relative rigidity of the wall. Rigid diaphragm buildings are constructed with concrete, concrete plank, or concrete over metal deck floors and roof. For these buildings with wall height to length greater than 3, distribute the base shears in proportion to $(H/L)^3$. The stiffness of these walls is dominated by flexure. For walls with (H/L) less than 3, distribute the base shears to the walls in proportion to (H/L). The stiffness of these walls is dominated by shear. The value of H in the equations is the height from the base to the floor being considered.

Shear walls connected by beam elements at each floor or walls with punched window openings are sometimes designed as "coupled" shear walls. If coupled, for rigid diaphragm buildings, the length of the wall can be approximated as the sum of the walls adjacent to the coupling beam element.

Where the coupling beam stiffness is comparable to or greater than the wall stiffness, assume the wall is coupled; otherwise, assume individual walls. If coupled, the coupling beam elements have a small influence on the base shear distribution to the wall elements. The coupling beams, however, significantly affect the overturning moment. More coupling results in a lower moment because the piers and coupling beams act as a frame. This effect can be important for sizing the amount of vertical reinforcement in the wall and selecting the masonry strength.

In high seismic areas, coupling beams over interior and exterior doorways can be a problem. Distortion of the coupling beams prevents the doors from opening and traps the resident in their unit and the building.

Once the axial and shear loads are estimated, the building overturning moment can be estimated by assuming for wind that the lateral load is applied at the mid-height of the wall and for seismic that the lateral load is applied at two-thirds of the height of the wall.

Once the shear and moment are estimated, the following provides a guide for wall thickness when shear governs. This is usually the case when the H/L is less than 3. The values are conservative.

Wall Thickness for Shear

Nominal Wall Thickness (in.)[4]	Approximate Shear Capacity (lb/ft)[3]	
	Wind[1]	Seismic[2]
4"	4,000	2,500
5"	5,000	3,300
6"	6,000	4,000
8"	8,000	5,300
10"	10,000	6,600
12"	12,000	8,000

1. Approximately $2\sqrt{2600}$
2. Approximately $2\sqrt{2600}/1.5$ (Factor to increase flexural dominance of a wall)
3. Strength level and fully grouted construction
4. 10 and 12-inch thick units may not be available – check with the manufacturer.

When H/L is high, the overturning moment will often dominate the initial design of the wall. Before developing the finite element model to distribute loads to the wall, an estimate of the wall thickness is needed. One method is to assume the wall consists of two piers, each with 20 percent of the wall length.

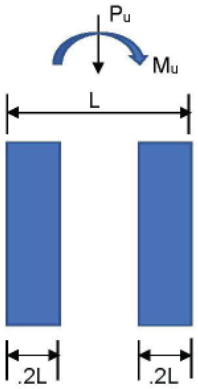


Figure 28 Model for Estimating the Design of a Wall

The axial load is divided between the two piers, and the moment is modeled as a coupled axial load on each pier. Assuming 60,000 psi reinforcement, the tension load is calculated as follows:

$$P_t = \frac{M_u}{.8L} - \frac{P_u}{2}$$

The required reinforcement is estimated as follows:

$$A_s = \frac{P_t}{60{,}000}$$

High strength reinforcement exceeding 60,000 psi yield is currently not allowed for masonry design. The area of reinforcement should appear reasonable for the wall. If not, the wall may need to be longer or more walls are needed.

The thickness of the wall will depend on the compression zone. An estimate of the compression stress can be obtained using the same model.

$$P_c = \frac{M_u}{.8L} + \frac{P_u}{2}$$

$$f_c = \frac{P_c}{.2t_{sp}L}$$

Where t_{sp} is the specified thickness of the wall, and L is the length of the wall. If the compression stress exceeds .64 f'_m , the wall needs to be increased in thickness and/or length.

One wall (or a small percentage of walls) will often not comply using the above initial method. Judgment must be employed to determine if the selected wall thickness is adequate. The above method is usually conservative, and with experience, the degree of conservatism can be readily estimated.

A more refined analysis is required during the construction document phase.

Selection of Beam or Lintel Size

An estimate of a beam or lintel size can also easily be obtained. These elements usually occur over wall openings. To estimate the beam or lintel requirements, first, calculate the applied moment. Normally the maximum moment results from full dead and live to load. If the beam is a shear wall coupling beam, then combined dead load plus seismic load normally controls.

The area of steel can be estimated as follows:

$$A_s = \frac{M_u}{.9F_y d}$$

It is best to use the same size bars in the beam or lintel as those bars used in the wall. Contractors sometimes take bars from the wrong pile. It is good practice to minimize the number of different bar sizes to simplify procurement, job site storage, and reinforcement handling.

Specifications

Specification of Materials

Units

Specify units to conform to ASTM C 652 with the minimum unit net area compression strength determined by the design requirements. ASTM C 652 requires a gross area compressive strength, not a net area compressive strength.

Mortar

Specify mortar as Type S, Portland cement-lime by proportions per ASTM C 270. Do not specify a mortar strength. Do not specify Type M mortar because Type M mortar is too hard and usually causes a crack between the unit and the mortar. For most jobs, masonry cement or mortar cement mortars are allowed by code, but local masonry preferences need to be investigated.

Preblended mortars (proportions of the ingredients are blended by the supplier with water added at the site) are specified per ASTM C 1714/C 1714M. They meet the requirements of ASTM C 270.

Do not use additives in mortar, except colors in accordance with manufacturers' recommendations.

Color additives to mortar generally do not reduce mortar bond strength or compression strength. Most color additives consist of mineral oxides except carbon black, which consists of finely ground carbon. Carbon black (for grey mortars) should be limited to 2% of the weight of the cement. When using colored mortar, follow the recommendations of the color additive manufacturer.

Grout

Specify grout per ASTM C 476 for regular or self-consolidating grout. Specify grout strength (f'g) equal to f'_m but not less than 2,000 psi (required by code). The ASTM C 476 proportions will result in strengths well in excess of 2,000 psi. Lime may be added to the grout. This usually improves the grout properties by increasing the flow and retention of water, resulting in improved placement and bonding to the unit.

Grout is normally placed at a slump of 8 to 11 inches. The high-water content is permitted because the masonry units absorb the water like a sponge before the grout sets.



Figure 29 Fluid Grout

Consolidation and Re-Consolidation

TMS 402/602 requires mechanical vibration of the grout during placement (consolidation) and, at a later time, mechanical vibration to reconsolidate.

Like concrete, mechanical vibration is used during the grout placement to increase the flow and decrease the chance of grout voids. For fluid fine grout, mechanical vibration during placement (consolidation) is likely unnecessary, and a code modification may be requested if performance is demonstrated with a grout demonstration panel.

Reconsolidation is unique to masonry. After the grout is placed in the unit, the unit absorbs water from the grout. Since the water content of the grout is high (8 to 11-inch slump or more), the volume of water removed results in voids in the grout. These voids occur somewhere between 5 minutes and forty-five minutes after the grout is placed. The amount of time depends on many factors, including the absorption of the units, the grout mix, the weather, and the height of the pour.

Reconsolidation is accomplished by placing a vibrator one foot or less into the top of the grout column for each grouted cell. When successfully done, the top of the grout will settle below its previous position, often settling 2 to 4 inches for a single lift and 4 to 8 inches for multiple lift grouting.

In some situations, mechanical reconsolidation of fine grout in small cells may not be necessary. A code modification may be appropriate if performance is demonstrated with a grout demonstration panel.

Self-consolidating grout mixed to a slump flow of 24 to 30 inches, measured in conformance to ASTM C 1611/C 1611M, may be used. For self-consolidating grout, consolidation, and re-consolidation are not required.

Sand

Specify sand per ASTM C 144. Use mortar sand for fine grout. Mortar sand is finer and produces grout that flows better, particularly in 4-inch and 5-inch hollow units. Some sands are composed of rounded granules instead of sharp granules. The rounded sands can be used in grout with less cement and water to obtain equivalent flow compared to grouts with sharper sands. Use only clean, washed sand.

Coarse aggregate for grout

Specify coarse aggregate per ASTM C404. Use only clean, washed aggregate. Coarse aggregate is not allowed in fine grout; either fine regular grout or fine self-consolidating grout.

Cement

Specify cement to conform to ASTM C 150, Types I, II, or III. Do not use air-entrained cement types IA, IIA or IIIA, etc. Low alkali cement reduces the tendency for the masonry to effloresce. If available, they are recommended.

Lime

Specify lime to conform to ASTM C 207. Do not use air entrained lime, as it will reduce the bond strength between the unit and mortar.

Reinforcement

ASTM A 615 Grade 60 reinforcement is normally used. When welding reinforcement, use ASTM A 706 bars. High strength reinforcing with specified yield strengths in excess of 60,000 psi is not currently allowed for reinforced masonry design.

Quality Assurance

IBC and TMS 402 require a minimum level of quality assurance to be included in the contract documents. It is recommended that the minimum quality assurance requirements be included in both the structural notes and the project specifications. The quality assurance program itemizes the requirements for verifying conformance with the specified materials, material storage and handling, and construction execution. It shall also set forth the procedures for reporting and review and include procedures for the resolution of non-compliance.

TMS 402/602 presents three levels of quality assurance. Level 1 is for prescriptive design methods such as veneers, glass block, and partition walls. Level 2 and Level 3 are for engineered masonry design methods that include RHCM. Level 2 is for Risk Categories I, II, or III. Level 3 is for Risk Category IV. Risk categories are defined by ASCE/SEI 7.

The primary difference between Level 2 and Level 3 quality control is that Level 2 allows more periodic inspections or less continuous inspections. The following table summarizes the quality assurance program code requirements with additional recommendations for RHCM. R means required by code. NR means not required by code but may be required for the project. P means periodic inspection. C means continuous inspection.

Quality Assurance Program

		Level 2	Level 3
Before construction			
	Verify masonry strength by prism test or the unit strength method.	R	R
	Verify compliance with mortar and grout specifications.	R	R
	Verify compliance with submittal requirements.	R	R
	Verify the grade and size of reinforcement, connectors, and anchor bolts.	R	R
	Verify and observe the construction of the sample panel, if required.	R	R
	Require a sample grout panel.	Recommended	Recommended
	Require a pre-construction meeting with the mason contractor and others.	Recommended	Recommended
During construction			
	Require verification of masonry strength every 5000 square feet of the wall.	NR	R
	Require verification that preblended mortar and grout meet specifications and submittals.	NR	R
	Require inspection of site-prepared mortar and grout.	P	P
	If self-consolidating grout, verification of conformance to the required slump flow and visual stability index is required.	R	R
	Require inspection of the grade and size of reinforcement, connectors, and anchor bolts to verify conformance to the design.	P	P
	Require inspection to verify the proper placement of masonry units and mortar joint construction.	P	P
	Require inspection to verify the size and location of structural members.	P	P
	Require inspection of the welding of reinforcement	C	C
	Require inspection to verify the type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.	P	P
	Require inspection for protection of masonry for hot and cold weather construction.	P	P
	Require inspection of the preparation of prisms and, if required, the preparation of mortar and grout specimens.	P	C
Prior to and during grouting			
	Require inspection and verification that the size of the grout space meets the specification.	P	C
	Require inspection of the size and placement of reinforcement, connections, and anchor bolts to verify conformance to the design.	P	C
	Require inspection during the placement of grout.	C	C

In addition, the quality assurance program shall also define the qualifications for testing laboratories and inspection agencies. ASTM C 1093 defines the duties and responsibilities of testing agency personnel and the technical requirements for equipment used to test masonry materials. Testing agencies qualified to test masonry are accredited or inspected for conformance to the requirements of ASTM C 1093 by a recognized evaluation authority.

It is recommended that the following be required before construction to conform to code requirements.:

1. A letter of certification provided by the unit manufacturer stating that the units meet the required strength.
2. When the mortar is not site prepared, a letter of certification provided by the mortar supplier stating that the mortar complies with the requirements.
3. When the grout is not site prepared, a letter of certification provided by the grout supplier stating that the grout complies with the requirements.
4. Prism tests per ASTM C 1314

It is recommended that prism tests be conducted during construction and for every 5000 square feet of masonry placed. Mortar and grout should be verified in the field by checking that the proper proportions are used.

Field mortar and grout tests should not be specified. They are unreliable and too variable due to the difficulty in controlling water content.

Designer Choices

Allowable Stress Design versus Strength Design

Allowable stress or working stress design was the traditional design method for hollow clay masonry. Standards and codes are now available for strength design. For some projects, the use of allowable stress design provides some advantages, or the use of strength design provides other advantages. For example, in the current codes, the maximum shear wall flexural reinforcement in ASD is less restrictive than in SD, while ASD does not have the slender wall provisions contained in SD. Care must be exercised when combining the two design methods on the same project.

Fully Grouted Versus Partial Grouted

A fully grouted wall means that all the cells are filled with grout.

Fully grouted walls perform better than partially grouted walls. Fully grouted walls resist water penetration and cracking. Sound transmission is less in fully grouted walls, a property of the wall's mass. The wall is more able to resist freeze damage because there are fewer voids in the wall.

Partial grouting requires blocking the flow of grout into the areas not intended for grout. This adds cost to the wall. However, there is an offsetting decrease in the cost of the grout material. Most contractors agree that it is less expensive to fully grout when vertical bars are spaced closer than 24 to 30 inches on center.

It is easier, and therefore takes less time, to analyze a fully grouted wall than a partially grouted wall.

Multiple Lift Versus Single Lift Grouting

Grout pours equal to or less than 5 feet 4 inches are called Low-Lift grouting. Grout pours that exceed 5 feet 4 inches are called High-Lift grouting. A grout pour is defined as the total height of masonry to be grouted before the installation of additional masonry. A grout pour consists of one or more grout lifts.

Grouting methods may be considered the contractor's means and methods and not part of the design. However, grouting methods may impact the cost and performance of a masonry wall and may be part of the designer's choice.

In hollow clay masonry, it is advantageous to use High-Lift grouting. When demonstrated with a grout demonstration panel, grout pours with heights exceeding 30 feet have been successfully accomplished. High-Lift grouting will typically have fewer voids. The reinforcement requires fewer or no splices and therefore costs less. Generally, the grout quality improves with the increased placement volume. For these reasons, it may be appropriate for the engineer to specify High-Lift grouting methods. Otherwise, the decision can be left to the contractor.

For highly stressed walls where reinforcement and grout placement are important, it is recommended that the structural engineer specify the grout pour heights and the lap locations in the wall. Where congestion of reinforcing is a concern, staggered laps and/or mechanical splices may be specified by the designer.

To verify the materials and procedures before construction, the structural engineer can recommend to the client that they specify a grouting demonstration panel. This demonstration panel is a sample of the wall built before construction and is often used as the visual mock-up. The architect, engineer, inspector, building official, owner's representative, and the general contractor should witness the grouting demonstration. Several days after the grouting, the panel can be cut open to expose the grouted cells and assess the quality of the materials and the process.

Clean-outs

Clean-outs are access ports at the bottom cell of the grout pour for access to removing mortar droppings. Mortar droppings can prevent the grout from bonding to the surface at the bottom of the grout pour. The mortar droppings cause a weak plane to resist shear forces. For partially grouted walls, clean-outs are installed at each reinforced cell. For fully grouted walls, clean-outs are spaced not less than 32" on center.

The Code requires clean-outs if the grout pour exceeds 5 feet 4 inches.

Where the in-plane or out-of-plane shear stress is less than 15 psi when using only the face shell area, clean-outs may not be necessary. The grouted cell area is not required to transfer the load. This is often the case for long walls.

To eliminate the clean-out requirement, it will be required to ask for a building code variance from the building department.

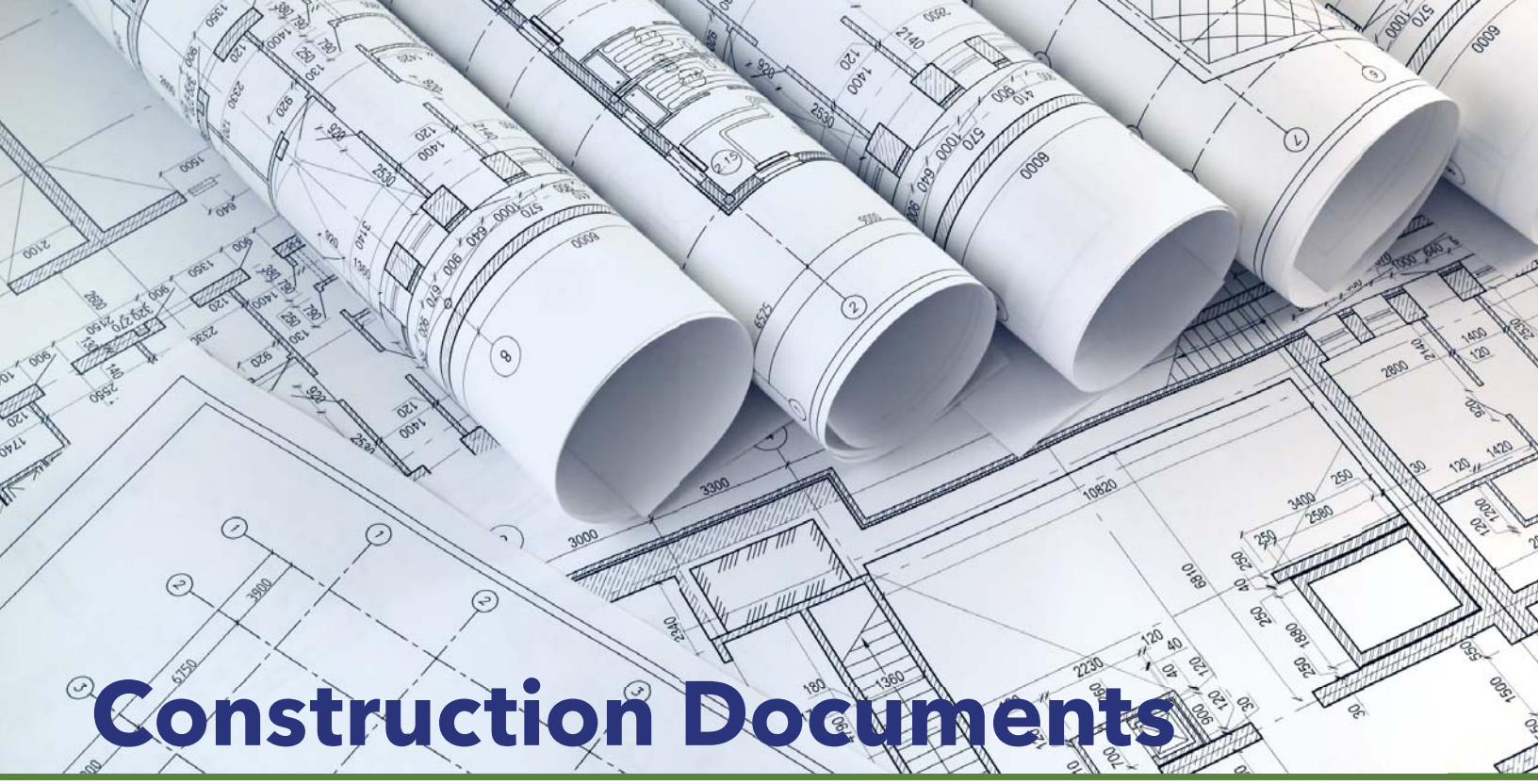
With or without clean-outs, mortar droppings should be minimized through good construction practices. Contractors can reduce droppings at the bottom of the wall by placing sponges in the cells and pulling them up as the wall is constructed. The sponges collect the mortar droppings that would otherwise need to be cleaned out at the bottom of the wall.

Horizontal Joint Reinforcement Versus Bond Beams

When horizontal reinforcement is required to resist shear forces, use bond beams. There is more confidence in the placement of bars in a bond beam than with the placement of horizontal joint reinforcement in the bed joint. This is because it is common for the joint reinforcement to be laid on the unit before the bed joint mortar is placed. The result is a void underneath the wire. It is also not unusual for the wires to be placed without lapping (butted ends). The result is incomplete embedment and development of the steel. The "butting" of horizontal joint reinforcement is a common practice in non-structural masonry and veneer. The mason may not understand the difference or importance. If joint reinforcement is used, it is recommended to require full-time inspection for its placement.

When horizontal reinforcement is not required to resist shear forces, horizontal joint reinforcement may be satisfactory and could save cost. If used, joint reinforcement must be galvanized. It is placed in the mortar joint with limited cover and must be protected from chemical attack and carbonation. Flattened or oval wire used in horizontal joint reinforcement is available in some markets. It is used to help satisfy the code wire size limitations (the wire diameter, height, cannot exceed half the bed joint height).

It is recommended that horizontal reinforcement be placed in bond beams continuously at the window sill, window and door head, and at each floor. Additionally, at least one No. 4 bar should be placed at each window and door jamb. This recommendation is for the generally good performance of the wall even when not required by code.



Construction Documents

During the construction document phase, the architect prepares the contract documents consisting of drawings and specifications set forth the detailed requirements for the construction of the project.

During the construction document phase, the structural engineer prepares the contract documents for the primary structural system consisting of drawings, including structural notes and sometimes the structural portion of the specifications.

Preparing construction documents includes structural design, analysis, drawing preparation, and writing or reviewing specifications. Each part of this process proceeds simultaneously, and they are interrelated.

Structural Analysis

Following the preliminary sizing of the primary structural elements, the global loads applied to the building are distributed to the primary structural elements. The loads are distributed to each element by methods that have become customary in structural engineering. There are several commonly used software programs available for this purpose. Stairs and ramps that are not isolated, while seldom constructed of masonry, resist wind and lateral seismic loads and must be included in the model accordingly.

For RHCM shear wall buildings, if the finite element model is used, wall expansion joints, if any, need to be modeled. If there are intersecting walls, the structural engineer needs to recognize that due to warping effects, the structural elements will have axial loads and moments resulting from torsion on the system. The design may be simplified by not connecting intersecting walls in the model. Reinforcing details can be simplified, but the overall resilience of the building is reduced. For seismic design, if the mass of the walls is included with the floors or roof, then diaphragm loads will be overestimated.

Once the loads on the walls, columns, and elements are known, the elements can be checked to ensure conformance with acceptable standards. The building code is a minimum acceptable standard. The design may or may not require a higher standard than the building code. The structural engineer should communicate options for increasing the resilience above the code minimum to the architect and owner.

A detailed discussion of the structural analysis procedures is contained in many excellent references. The following paragraphs present information commonly encountered during the structural analysis and design of RHCM structures. Appendix B provides a checklist for the design of RHCM.

Design Assumptions

The analysis for determining the strength of RHCM elements is very similar to that used to check the strength of reinforced concrete elements. Standard assumptions for strength design are:

1. Plane sections before bending remain plane after bending.
2. Masonry components (units, mortar, and grout) combine to form a homogeneous member.
3. Masonry carries no tensile stresses.
4. Reinforcement is completely surrounded by grout and bonded to the masonry materials, so they work compositely as a homogeneous material in the range of working stresses.
5. The building code limits the yield strength of reinforcement to 60,000 psi.
6. The maximum usable strain in clay masonry is 0.0035 (It is 0.0025 for concrete masonry).
7. The compression stress block height is 0.80 f'_m for a distance of 0.80 times the distance from the extreme compression fiber to the neutral axis.

Additionally, for ease of design, the following recommendations are made for the area of masonry to be used in resisting the loads.

1. For partially grouted RHCM walls, it is recommended and conservative to use the face shell area of the unit as the shear design area. For partially grouted RHCM, the code allows shear areas to be increased by counting the grouted cells, but the advantage is usually small. Also, for partially grouted walls, the nominal shear capacity is reduced by a factor of 0.70.
2. For fully grouted (sometimes referred to as solidly grouted) RHCM walls in running bond, the design area is the gross cross-sectional area of the masonry. The area of cores (most hollow clay masonry units have cores) or the void at the head joint when the masonry is laid with only face shell bedding is not subtracted from the gross area.
3. For beams with compression on the head joint and the requirement of full bedding of the head joint is not made, the design area is the face shell area for shear and flexure. This is because the head joint is filled to the face shell's depth, not the unit's full thickness. If bond beams or open-end units are used, then the design area would be the full thickness of the unit.

General

There are provisions of the code limiting the design:

1. Vertical conduits, pipes, or sleeves shall not exceed 2 percent of the net design area.
2. Pipes or conduits containing liquids, gas, or vapors at temperatures above 150 degrees Fahrenheit, pressure greater than 55 psi, or water or other liquids subject to freezing shall not be placed in the masonry.

Walls

For out-of-plane bending, the effective width "b" of the compression block is the lesser of:

1. The distance between bars.
2. In running bond, six times the nominal thickness.
3. In stack bond, the unit width.

If partially grouted, the compression area of the wall (distance to the neutral axis) needs to exclude cells not grouted. This can lead to a more complicated analysis to determine capacity.

For in-plane bending, "b" is the thickness of the wall if fully grouted. If partially grouted, the face shell area is recommended to be used. Using b as the two-face shell thicknesses is conservative.

For in-plane bending, the effective width of intersecting walls differs for compression and tension. For compression, the code allows the flange width to be 6 times the nominal thickness on each side of the intersecting wall; for tension, the maximum is 0.75 times the floor-to-floor height.

Walls Flexure Plus Compression

Flexure plus compression occurs for walls resisting lateral forces from wind or seismic loads. Software is available for checking a wall loaded with combined flexure and compression. Or, create your own. Dead load reduces the required reinforcement area when the tensile moment capacity limits an element. When intersecting walls occur, analysis can be complicated. Don't forget to include the dead load of the wall in your analysis.

For walls with a height to a nominal thickness greater than 24, second order or moment magnification effects should be considered.

Shear Walls

For shear walls resisting seismic forces, there are code-specified reinforcement requirements. For RHCM, the choices of shear wall types are Detailed Plain, Ordinary Reinforced, Intermediate Reinforced, and Special Reinforced.

The minimum reinforcement required for a Detailed Plain shear wall is shown below. Detailed Plain shear walls are only allowed in Seismic Design Categories A and B and are designed as unreinforced masonry.

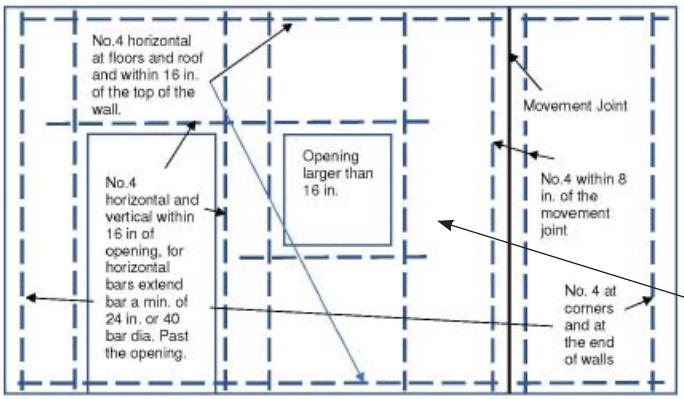


Figure 30 Minimum Reinforcement for RHCM

If your project is a Seismic Design Category C project, then Ordinary Reinforced shear walls, Reinforced Intermediate shear walls, or Special Reinforced shear walls are required. Ordinary Reinforced shear walls have the following additional requirements.

Ordinary Reinforced Shear Wall:

1. Reinforced masonry design is required.
2. Maximum spacing of vertical reinforcement is 120 inches.
3. Maximum spacing of horizontal reinforcement is 120 inches.

Intermediate Reinforced Shear Walls has the following additional requirement:

1. Maximum spacing of vertical reinforcement is 48 inches.

If your project is a Seismic Design Category D, E, or F, then Special Reinforced shear walls are required. Special Reinforced Shear Walls have the following additional requirements:

1. The maximum spacing of vertical reinforcement is smaller than 1/3 the height of the wall or 1/3 the length of the wall or 48 inches. For stacked bond masonry (less than ¼ the length of the unit overlapping), the maximum spacing is 24 inches.
2. The maximum spacing of horizontal shear reinforcement must not exceed 1/3 the height or length of the wall. For walls of short length, this can present a problem. For example, a wall consisting of a single stretcher (12-inch length) between windows will require horizontal reinforcement at 4 inches on center, or for 4-inch height units, every unit is a bond beam. In this situation, it may be best to isolate the element from the seismic resisting system. Another possible solution is a displacement compatibility analysis to demonstrate that the element can withstand the required displacements.
3. Maximum spacing of horizontal reinforcement for running bond is 48 inches and 24 inches for stack bond.

4. The sum of vertical and horizontal reinforcement must exceed .002 times the gross cross-section using specified wall dimensions, with a minimum vertical or horizontal reinforcement equal to .0007 times the gross cross-section using specified dimensions. The minimum horizontal reinforcement required for stack bond masonry is .0015 times the gross cross-section using specified dimensions.
5. Stack bond masonry must be fully grouted and use open-end units. Open-end units only need to be open on one head joint for the grout to bond to the next unit.
6. If the shear demand to only the masonry shear capacity ratio (not including the reinforcement capacity) is more than 0.40, 180-degree hooks around the vertical reinforcement at the end of the wall are required. Engineering judgment is required, and a rule of thumb is that if the shear walls' height-to-length ratio is less than 1, hooks will likely not be required.
7. The design shear capacity shall exceed a shear corresponding to 1.25 times the nominal flexural capacity but not exceed 2.0 times the factored shear demand. This provision is intended to enhance flexural ductility by increasing the wall's shear capacity.

Also, in E and F, there is an additional reinforcement requirement for walls that are not shear walls or non-participating walls.

For more detailed information on the design of Special Reinforced Masonry Shear Walls, see *Seismic design of specially reinforced masonry shear walls: A guide for practicing engineers*, NIST GCR 14-917-31, prepared by the Applied Technology Council for the National Institute of Standards and Technology, Gaithersburg, MD.

Columns

There are special code provisions for columns:

1. The distance between lateral supports of a column cannot exceed 99 times the radius of gyration of the column in the direction of support.
2. The minimum side dimension cannot be less than a nominal 8 inches.
3. The minimum number of longitudinal reinforcement bars is 4.
4. Columns must be fully grouted.
5. The area of vertical reinforcement must be greater than 0.0025 times the net area of the column and not more than 0.04 times the net area of the column.
6. The effective height of a column can be taken as the distance between inflection points. But it is recommended to use the unsupported height. For cantilevered columns, use twice the unsupported height.
7. Lateral ties of at least ¼ inch diameter shall enclose the vertical reinforcement. Spacing shall not exceed 16 longitudinal bar diameters, 48 tie diameters, or the least cross-sectional dimension of the column.
8. If allowable stress design is used, the code requires a 10% eccentricity axial load in the column. For strength design, the eccentricity is accounted for in the code equations.
9. In seismic design category C and above, when anchor bolts are used at the top of a column to connect to horizontal elements, adding two No. 4 ties within 5 inches of the top of the column is required.
10. In seismic design category D and above, lateral ties must be spaced at less than 8 inches on center and be 3/8 inch in diameter or greater.
11. In seismic design category C and above, along a line of lateral force resistance, not more than 20 percent of the resistance may be provided by masonry columns. This requirement is overly restrictive and without justification for buildings such as a single-story firehouse where one of four walls has garage door openings separated by columns. There is no reason that the columns property detailed cannot exhibit adequate ductility to accommodate seismic displacements.

    The masonry code offers an exception, but only if designed for an R of 1.5. ASCE/SEI 7 does not recognize this exception. It is not addressed in the IBC. If it is not clear which code applies, check with the authority having jurisdiction.

Placing a bearing pad, allowing lateral displacement while supporting the axial load, could be an option. Another option is to use a concrete or steel column and a brick veneer or a reinforced veneer surround.

Another possible solution is a displacement compatibility analysis demonstrating that the element can withstand the required displacements.

Fortunately, in seismic design categories A, B, and C, the code provides an exception to these restrictive column requirements for lightly loaded columns. Lightly loaded columns are defined as columns with an axial load not exceeding 2000 lbs. The requirements are only an 8-inch minimum dimension, fully grouted, more than 0.2 square inches of reinforcement, and not to exceed a height of 12 feet.

Pilasters

The code definition of a pilaster is a vertical member built integrally with a wall, with a portion of its cross-section typically projecting from one or both faces of the wall. The word typically is inserted in the definition because, in some applications, a pilaster is contained within the wall, not projecting from either side.

For the intersecting wall to be considered part of the pilaster, it needs to be connected to the pilaster element by one of the following.

1. At least 50 percent of the masonry units interlock.
2. Walls need to be anchored by steel connectors.
3. Intersecting reinforced bond beams spaced less than 48 inches on center.

The effective width for compression will depend on the pilaster's geometry and the moment's direction. The effective width is generally the same as that for intersecting walls. For compression, the code allows 6 times the nominal thickness of the intersecting wall; for tension, the maximum is 0.75 times the floor-to-floor height. When the pilaster projects from one side of the wall or unevenly on both sides of the wall, the effective width, if any, will be different depending on the direction of the moment.

When the height divided by the radius of gyration (generally equal to .288 times the thickness) exceeds 99, second-order or moment magnification effects need to be considered. This will need to be considered for both moment directions.

Bar laps and Embedment

The Code provides methods for the design of bar laps.

Alternatively, use 48 bar diameters for grade 60 reinforcement. This is conservative for RHCM units of nominal 8 inches or less for number 6 bars or less and placed at the center of the wall. For number 7 bars in 8-inch units, it is unconservative by about 10 percent.

Whenever possible, it is recommended that laps do not occur where the stress in the bar approaches the yield stress. If the stress in the bar exceeds 80% of the yield stress (48,000 psi for grade 60 bars), it is recommended to increase the lap length to 72 diameters, although not required by code.

Deflection

Deflection calculations are approximate. This results from the uncertainty about the value of the elastic modulus and the distribution and depth of cracking throughout the section. Fortunately, it is uncommon for a masonry element to be limited or sized based on the expected deflection. When deflection calculations are required, such as when height-to-thickness ratios are high, the methods presented in the building code give some indication of the deflection magnitude. The IBC provides deflection limits for exterior and interior walls with various surface finishes.

Maximum Bar Size

There are building code limitations on the sizes of reinforcement. No. 11 bar was recently allowed, but some previous codes limited the size to a No. 9. The nominal bar diameter cannot exceed one-eighth the nominal unit thickness. The maximum reinforcement in a cell is limited to 4 percent of the cell area or 8 percent with splices. The maximum diameter of the reinforcement shall not exceed one-third of the minimum dimension of the gross grout space. Additionally, there are minimum grout cover requirements for the space between the edge of rebar to the edge of the grout cell of ½" and ¼", for coarse grout and fine grout, respectively. The following table presents the typical maximum bar size for the hollow clay units. However, the cell areas vary somewhat from manufacturer to manufacturer, and dimensions should be verified on each job.

Maximum Bar Size by Cell Size

Unit Thickness (Nominal)[2]	12" Long Units		16" Long Units	
	Cell Size (Width x Length)	Max. Bar Size #	Cell Size (Width x Length)	Max. Bar Size #
4"	1 3/4 X 3 1/2	4[1]	1 3/4 x 3	4[1]
5"	2 1/2 X 3 1/2	5[1]	2 x 5	5[1]
6"	3 1/2 X 3 1/2	6[1]	3 x 5	6[1]
8"	5 X 3 1/2	8[1]	5 x 5	8[1]
10"	6 3/4 X 3 1/2	10[1]	6.5 x 5	10[1]
12"	8 1/2 X 3 1/2	11	8 x 5	11

1. Controlled by one eight of the nominal unit thickness.
2. 10 and 12-inch thick units may not be available – check with the manufacturer.

Retaining Walls

Failure of retaining walls constructed of concrete, masonry, and other materials occurs frequently. Carefully analyze the soil information (have a soil report, if not, then require one), and use proper analysis methods (it can get complicated). It is recommended to place the reinforcement in the center of the cell, not offset. Many failures are traceable to the contractor placing the bars on the wrong face of the wall. The added reinforcement costs are usually small.

Bearing, Bolts, and Shear Friction

The Code provides a design method.

Drawing Preparation

Layout

The following figure presents a typical layout of the structural drawings for a building project.

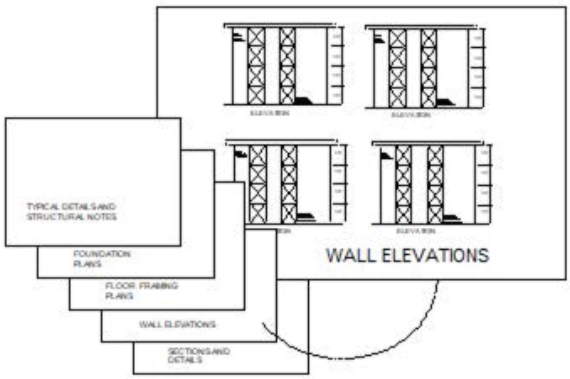


Figure 31 Recommended Drawing Layout

When RHCM is used, it is normal to prepare elevations of each wall. This may appear to be an unnecessary level of drawing detail, but experience indicates that it saves time and effort in the long run. Wall openings, expansion or movement joint locations, and reinforcing should be shown or called out on these elevation drawings. Tabulating reinforcement requirements has not proven to be a very successful method of communicating the design to the mason.

Provide a detail that shows the hollow clay unit dimensions so that the reinforcement detailers have the information to lay out the reinforcement. Additionally, expansion joints should be shown and coordinated with the architect's drawings.

Structural Notes

The structural notes are placed on the drawings to define applicable codes, loads, design assumptions, materials, and inspection requirements. Often this information is redundant to the project specifications. However, the project specifications often become lost with time. The structural notes will stay with the drawings and become useful information for some future users.

In some states, the structural notes take precedence over the specifications. In other states, the reverse is true. The architect's specification and the structural notes should state which takes precedence over the other.

The structural engineer should check the architectural specification to eliminate conflicts with the structural notes.

Details

RHCM can generally be treated like reinforced concrete, except the bond strength between the mortar and a unit is a plane of weak tension capacity. The head joints are particularly susceptible to low tension and shear capacity, and it is appropriate for the designer to assume zero tension and shear capacity for the head joint. This is important for the design of masonry connections. It is recommended that larger scale or more frequent connections be made than are typically used in reinforced concrete.

Unit dimensions restrict reinforcement spacing. Vertical bars need to be spaced to match the cell spacing, and horizontal bars need to be spaced at dimensions matching the unit height. Diagonal bars should not be used. Placing vertical bars that are 16 inches on center for a 12-inch hollow clay brick, with cells at 6 inches on center, will be generally viewed as a design error.

RHCM is normally supported on concrete or steel. The detail of the connection between the concrete or steel and the masonry is affected by the control of water and the transfer of forces. Where the exterior masonry is supported on a concrete floor or slab, it is often desirable to recess the concrete.

Water and Flashing

Water seldom completely penetrates a reinforced hollow clay wall. Instead, it enters the face of the wall and travels downward through open cells or small voids in the grout and mortar. Fully grouted walls are less susceptible to water penetration. The inside face of the wall may become damp; however, it is unusual for water to disengage from the brick or flow on the inside surface.

For this reason, the base or bottom of a wall requires flashing or another method to direct water to the exterior. The water traveling downward through the brick should be intercepted and directed outside the building. A lintel over the top of a window or door is considered a bottom of the masonry and therefore requires flashing or appropriate window head design.

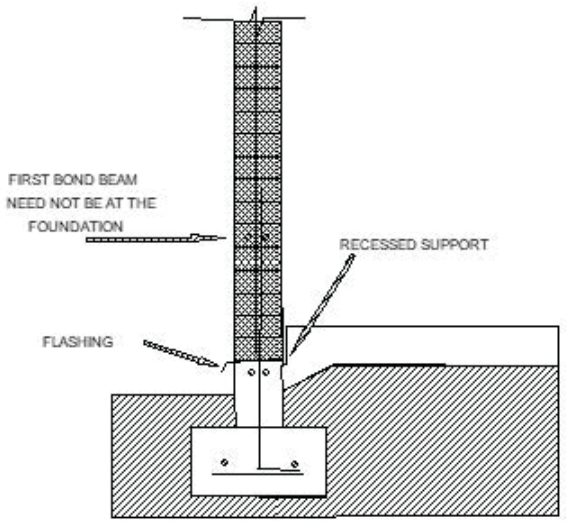


Figure 32 Wall to Foundation Detail

There are many acceptable flashing materials available. The architect should select the flashing. For the structural design, all commonly used flashing materials provide sufficient friction capacity to transfer shear loading. However, dowels will need to penetrate the flashing to transfer the shear load. Shear transfer tests indicate that the organic flashing materials transfer load better than the metal materials. This is probably because the organic materials mold to the roughness of the concrete and mortar more than the rigid material.

The code provides a method to analyze the capacity using shear friction.

Connections

Floor and roof connections to walls can take many forms. They are similar to connections to concrete walls, except the designer has more flexibility because the units are laid one at a time. Consider using embeds to connect ledgers.

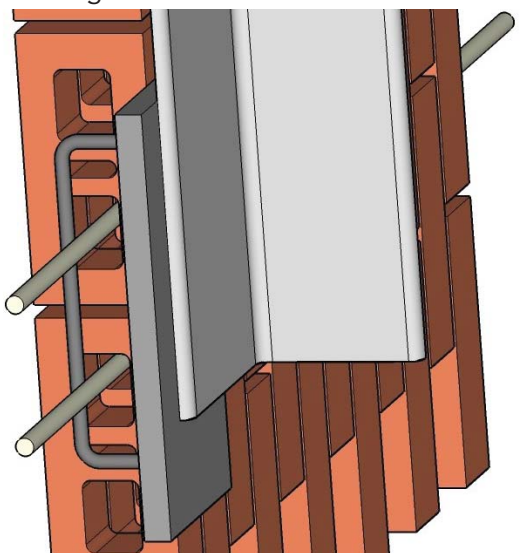


Figure 33 Embed Plate for a Ledger Connection

Movement Joints

Movement joints are challenging design item. In addition to normal thermal expansion and contraction, brick expands permanently with moisture. This permanent volumetric change is called irreversible moisture expansion and differs from concrete or CMU irreversible shrinkage and cyclic moisture expansion and contraction. Irreversible moisture expansion of brick occurs only once over an extended period of time. It does not reverse.

After the brick is fired, there is no moisture in the brick. When placed in the environment, the brick absorbs moisture through exposure to the atmosphere containing humidity or by direct contact with water. As the brick absorbs moisture, the brick irreversibly expands. The amount of permanent, irreversible expansion depends on the type of clay. The length of time required depends on the clay and exposure. The vast majority of the permanent expansion occurs between one and five years after production. TMS 402 provides a value of 0.0003 inches per inch or 3/8 inches per 100 feet for irreversible moisture expansion. This value is typically used for design. Movement joints

related to the inherent expansion of the clay brick are called expansion joints. Expansion joints are important to the performance of unreinforced clay masonry. For reinforced hollow clay masonry with horizontal reinforcement, expansion joints are less important and often are not required. As the brick expands, the reinforcement resists the expansion. The result is that the reinforcement is placed in tension, and the brick is placed in compression. The consequence is less cracking. Nevertheless, placing expansion joints at 100 feet or less is common practice.

If the wall length exceeds 20 feet, expansion joints should also be placed on one side of a corner, near the corner. Without a corner expansion joint, the expansion of the brick in the wall results in flexural stresses in the brick on the other side of the corner and may cause a crack.

Movement joints other than expansion joints may be needed to accommodate differential movement at interfaces between dissimilar materials or systems, or changes in supports or steps in foundations, or at wall intersections, depending on the design assumptions related to load transfer between walls.

Another requirement for expansion joints occurs when a brick becomes confined by another material. The following figure shows an example of hollow clay confined in a concrete frame.

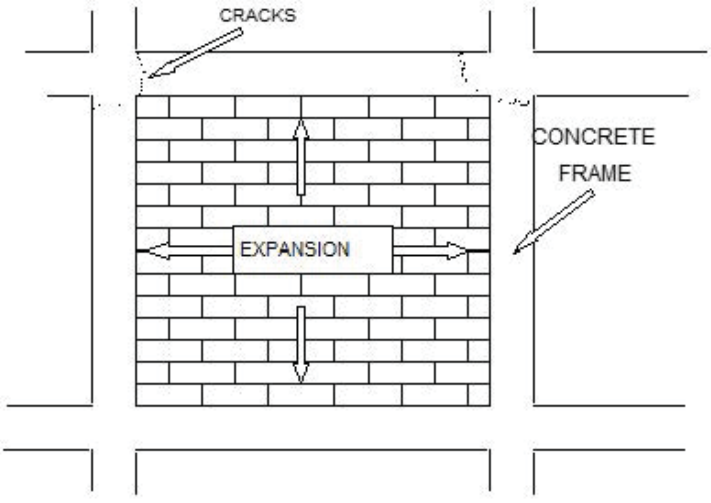


Figure 34 Brick Masonry in a Concrete Frame

Specifications

Specifications are normally prepared by the architect and reviewed by the structural engineer.

Consider including:

1. Require the mason subcontractor to prepare or oversee the preparation of reinforcing shop drawings. The shop drawing preparer should be familiar with reinforced hollow clay masonry design and construction. Concrete reinforcement detailers generally do not have an appreciation for the construction sequencing and dimensional constraints for masonry.
2. Require the water repellent to be the responsibility of the mason subcontractor. This provides a single source of responsibility in the event of problems.
3. On a large project, require a grout placement demonstration test on a sample panel prior to construction. With adequate planning, the visual mock-up panel can be used for this purpose.
4. Limit the choice of mason contractors to those experienced with the construction of RHCM. Reserve the ability to disqualify the contractor based on past performance.

The designer can influence the selection of the mason contractor through the specifications. It is recommended that the following criteria be considered in the section:

(a) Require the contractor to employ experienced masons.

(b) If available, require the mason contractor to be a member of a local masonry institute. Call the institute or the material supplier to check the contractor's qualifications or provide a list of qualified bidders.

(c) If possible and where available, require the mason to have appropriate training and be certified by the local masonry institute or council or association.

(d) Require masons who have been trained by the International Masonry Training and Education Program, of the International Masonry Institute.

5. Require a preconstruction conference.
6. Require methods other than shovel count to control proportions for mortar and grout.

7. If site mixed mortar is used, require the sand pile to be protected from rain, snow, and dust. Require the walls to be protected from rain, snow, and freezing for a minimum of 7 days after construction.

   The best practice may be to require preblended, pre-bagged mortar to maintain uniformity of material properties and color.

   Require the mason contractor to cover the wall at the end of the day. The purpose is to prevent rainwater from entering the masonry and developing water paths through the fresh mortar and grout. If not covered, the likely result is a wall that leaks and effloresces.

8. Require hot and cold weather protection. Code provisions may not be adequate. For example, in the Pacific Northwest, winter rain followed by a sudden freeze may damage the masonry.
9. Require inspection prior to grouting and during grouting.
10. Consider requiring self-consolidating grout.
11. Place a table of tolerances on the plans or include one in the structural notes. The code defines placement tolerances for reinforcement in terms of the design parameter “d”. Unfortunately, the mason contractor has no idea what “d” is.
12. Require the mason contractor to submit a written quality control program for the masonry construction.
13. For the installation of foundation dowels, provide an option to use post-installed anchors.



Construction

The project's construction phase begins with the publication of the construction contract for bidding. During the construction phase, the architect is the owner's representative and advises and consults with the owner. Instructions to the contractor are forwarded through the architect.

During the construction phase, the structural engineer advises and consults with the architect as necessary and when requested. The structural engineer responds to bidders' questions about the design. Once the contract is awarded, the structural engineer reviews submittals by the contractor of items designed by the engineer or other items affecting the engineer's design. The engineer makes periodic site observations to ensure that the contractor is in general conformance with the intent of the structural design.

A reinforced hollow clay masonry project requires about the same effort during the construction phase as other structural systems. However, there are a few unique situations. This section describes some of these situations.

Bidding and Award

The mason contractor is normally a subcontractor to the general contractor. During bidding, the general contractor will typically take bids or cost estimates from more than one mason subcontractor. During this period, the engineer will likely receive requests to clarify the contract documents.

The structural drawings show the design concept for the project. They are not detailed construction drawings. It is likely that during the bidding process, the contractor will find some missing information or contradictory information on the drawings. This is normal, and it is normal to receive questions about the design during the bidding period.

Often the mason contractor does not supply the reinforcement for the project. Instead, the general contractor supplies it. The engineer should become aware of who will supply the reinforcement. It will have some influence on how the project proceeds.

Moreover, most mason contractors do not prepare shop drawings for reinforcement. Thus, the responsibility

for providing an adequate set of shop drawings can become lost in the bidding process. The general contractor thinks the mason will prepare the shop drawings and the mason thinks the general contractor will prepare the shop drawings.

Experience has shown that the best performance occurs if the mason contractor purchases the reinforcement and supplies the shop drawings. However, some mason contractors may bid high or even not bid at all due to this requirement. The resulting cost pressure may require the engineer to be flexible about the requirement for shop drawings and their preparation.

Sometimes the general contractor will supply the shop drawings using his concrete reinforcing detailer. Unfortunately, the detailer may have limited experience with masonry (their expertise is concrete), and the drawings are often full of errors or items that cannot be constructed. An example is when the shop drawing shows bars spaced at 8 inches on center for a RHCM unit with a 6-inch module.

Submittal Review

Items submitted for review include the following:

1. Mortar proportions and laboratory test:

   The mortar submittal is usually submitted by Type (Type M, S, or N). This is satisfactory, provided the proportions are used to define the type, not strength.

   The contractor may submit by strength. In this case, laboratory tests should be performed to verify the strength of the mortar.

   Preblended dry mix mortars require submittal to verify conformance with ASTM C1714.

2. Grout proportions:

   The grout submittal is usually submitted by Type (fine or course). This is satisfactory, provided the proportions are used to define the type, not strength.

   If the design f'_m exceeds 2,000 psi, laboratory testing is required by the most recent TMS 602 to verify that the grout strength equals or exceeds f'_m. Testing is in accordance with ASTM C 1019.

   For batch-provided grout, the proportions are normally described by weight. The weight proportions should be converted to volume proportions for comparison with ASTM C 476. An example calculation of an actual grout submittal on a project follows:

Example Calculation of Volume Proportions from Weights

Item	Batch Weight (Lbs)	Conversion to Volume (Lbs/cu. ft)	Volume (cu. ft)	Proportions (by volume)
Cement	658 or 7 sacks	94[1]	7.0	1
Lime	50	40[2]	1.25	.18
Sand	2143	80[3]	26.8	3.8
Aggregate	1009	105[4]	9.6	1.37
Water	260	62.4	4.17	.6

1. 94 lbs per bag
2. One 50 lbs bag is 1 1/4 cu. ft
3. ASTM C-476 specifies 80 lbs per cu. ft for loose, damp sand (5% moisture). Dry sand weighs approximately 100 lbs per cu. ft.
4. Dry-rodded unit weight obtained from the supplier

A comparison ASTM C 476 is given in the following table.

Comparison to ASTM C 476

Item	ASTM 476	Mix
Cement	1	1
Lime	.1	.18
Sand	2.5-3.3	3.22[1]
Aggregate	1.1-2.2	1.16[1]
1. Proportions of cementitious material include both cement and lime		

The sample mix design does not comply. However, the mix design was accepted on this project because of past experience with the proportions where the additional lime in the mix improved flow while maintaining strength. ASTM C 476 allows proportions of the grout ingredients to be determined by laboratory testing or field experience if a satisfactory history of the grout mix performance is available.

3. Unit certifications:

   If the Unit Strength Method was used to establish f'_m, the structural engineer should specify that the brick supplier submits a letter stating that the bricks meet the required compressive strength.

4. Reinforcement shop drawings:

   These should be scheduled to provide sufficient time for review and resubmittal prior to construction. However, reviewing the submittal is necessary to verify that the contractor understands the design correctly. If enough time is available, re-submittal is possible without costly delays.

5. Miscellaneous metal shop drawings:

   Where miscellaneous steel connections and embedded items are included in the design, shop drawings need to be submitted with sufficient time for review.

6. Quality control program:

   TMS 402-22 requires the construction documents to include a written quality control program. A conforming quality control program should be written by the mason contractor and submitted in time for review and discussion with all involved including the inspector and general contractor.

Pre-Construction

Once the general contractor and the mason subcontractor have been selected, the engineer may verify their qualifications with the local masonry institute and material suppliers. This information will help determine the time and effort needed during construction.

At an appropriate time, usually, at least two weeks before the start of masonry construction, arrange for a preconstruction conference to discuss the masonry construction. Attendees should include:

1. The mason contractor and foreman.
2. The general contractor and superintendent.
3. The building official.
4. The architect.
5. The special inspector, when required.
6. The structural engineer.
7. The owner's representative.
8. The brick supplier or designated representative.

Subjects for discussion include:

1. Brick:

   Determine the availability and delivery schedule of the selected brick. If the unit strength method is used, verify that the brick will meet the required strength.

2. Initial testing:

   If the unit strength method was used to establish the design strength f'_m, mortar, grout, and prism testing prior to construction are not required. However, prism tests prior to construction are recommended.

   As a minimum, unit testing or manufacturer's certification is required. If a grouting test panel is to be used, define the schedule. The engineer, building official, and the special inspector should be present for the grouting demonstration. Often the grouting demonstration panel can also be used by the architect as a color and quality control panel.

3. Testing during construction:

   For risk category I, II, and III buildings, prism testing is recommended, but not required by code, for every 5,000 square feet of wall. For risk category IV buildings, prism testing is required for every 5,000 square feet of wall. Prior to construction, five prisms constitute a test. During construction, three prisms constitute a test. However, five are recommended during construction. Test the first one at seven days, the next three at 28 days, and hold the final sample for testing in case of a problem.

4. Inspection:

   The inspector should regularly check the batching of mortar and grout to ensure proper proportions or that the supplied preblended dry mortar mix meets the specifications and that the proper amount of water is added. The inspector should regularly check the laying of units to ensure proper workmanship. Continuous inspection during the placement of grout is required. The inspector should verify and ensure full compliance with the contract documents for the placement of reinforcement, grouting, consolidation, reconsolidation, top of the wall shear key, and the protection of the masonry from rain, dirt, and cold and hot weather.

5. Observation:

   Inform all participants that, from time to time, the engineer will visit the site to ensure general compliance with the contract documents.

6. Inspection Reports:

   Normally, special inspection and test reports and inspection reports go to the general contractor and the architect and then to the engineer. Deviations from this normal procedure should be discussed, defined, and documented.

7. Submittals:

   Verify that the contractor is using the approved project submittals.

8. Cleaning and Sealing:

   The procedures to clean and seal the masonry with water repellant should be discussed. It is important that the mason contractor verify the cleaning method with the unit manufacturer. If the wall is to be sealed with a water repellant, the method and materials to be used should also be verified with the brick manufacturer.

   Proper sealers do not seal the wall. The masonry must breathe. The sealers are actually only water repellents.

9. Construction Sequence and Schedule:

   Discuss the schedule for inspection and testing. Discuss coordination issues. One usually missed item is the coordination with the window and door supplier. The design of the connections should be discussed.

Site Visits

The structural engineer should make site visits to check on the progress and quality of the work. This part of the engineer's scope of services is called structural observation. Structural observation is required for most projects by the IBC and is defined as follows:

"The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents."

Structural observation does not include or waive the responsibility for the inspection required by other code sections.

Masonry walls failing during construction, particularly those employing high lift grouting, happen more frequently than they should. While it is not the structural engineer's responsibility to evaluate the contractor's means and methods, if the shoring of the wall does not look adequate, the structural engineer should inform the contractor and document that the information was given.

An example site observation form and checklist are provided in Appendix C.

Non-Conforming Quality Control Tests

Prism Compression Strength – Prior to Construction

If the prism test prior to construction does not comply with the required strength, there are many possible reasons. Often, and particularly for larger units (8 inches and above) with a specified compression strength exceeding 2,600 psi, the problem is often the testing method. It is not uncommon for the platen used to be too thin or the prism surface to be not flat. The brick may not be strong enough, or the mortar and grout may not be the appropriate mix.

Prism Compression Strength – During Construction

When prism tests do not conform, verify that the materials used (units, mortar, and grout) conform to the specifications. If they do conform, either the prism was improperly constructed, or the testing procedures did not comply with ASTM C 1314.

Prism construction errors include not constructing the prism true and plumb. It is very important that the top and bottom planes of the prism are parallel. Another common problem for large cell units (8" units and larger) is that the grout is not properly reconsolidated. Without proper reconsolidation, a dome-shaped void will often form at the mortar joint and render the area of grout ineffective for resisting compression.

Common testing errors include not properly capping the prism so that the top and bottom planes are level and parallel, not providing a thick enough loading platen to distribute the test machine load evenly to the prism, and the prism is not centered in the testing machine when loaded.

When confronted with a non-conforming wall (a low prism test for the wall), the first step is to recalculate the structural design to verify that the strength specified is required. If this does not work, the next step is to cut a prism from the wall and test it. Usually, prisms taken from the wall will test with higher compression than the sample prism. If this fails, the wall will likely need to be removed, materials changed to meet the required strength, and the wall reconstructed.

Mortar Compression

It is recommended that field testing of mortar not be required. However, the requirement for mortar testing often is outside the structural engineer's control, and on some projects, mortar testing becomes a requirement (See Appendix D for more information).

Grout Compression

It is recommended that field testing of grout not be required. However, when f'_m exceeds 2,000 psi, TMS 602-22 Section 2.2 B (Specifications for Masonry Structures) requires verification of grout strength by testing in accordance with ASTM 1019 (See Appendix D for more information). This requirement is interpreted as prior to construction rather than verification during construction.

APPENDIX A: WSCPA Members

Western States Clay Products Association
website: www.wscpa.us

Manufacturing Members

Interstate Brick Company
9780 South 5200 West
West Jordan, UT 84081-5625
Phone: (801) 280-5200
https://interstatebrick.com

McNear Brick & Block
1 McNear Brickyard Rd.
San Rafael, CA 94901-8310
Phone: (415) 453-7702
https://www.mcnear.com

H. C. Muddox/Gladding McBean
4875 Bradshaw Road
Sacramento, CA 95827
Phone: (801) 280-5200
https://www.gladdingmcbean.com

Mutual Materials Company
605 - 119th NE
Bellevue, WA 98005
Phone: (425) 452-2300
https://www.mutualmaterials.com

Summit Brick Company
601 E. 13th Street
Pueblo, CO 81001-2942
Phone: (719) 542-8278
https://www.summitbrick.com

Allied Associates Contacts

Arizona Masonry Council
3133 West Frye Road Suite 101
Chandler, AZ 85226
Phone: (602) 265-5999
https://www.azmasonry.org

Masonry Institute of America
1315 Storm Parkway
Torrance, CA 90501-5041
Phone: (310) 257-9000
https://www.masonryinstitute.org

Masonry Institute of Washington
11900 NE 1st Street, Ste 300
Bellevue, WA 98005-3049
Phone: (425) 214-7476
www.masonryinstitute.com

Rocky Mountain Masonry Institute
6145 Broadway Suite 44
Denver, CO 80216
Phone: (303) 893-3838
https://rmmi.org

Utah Masonry Council
4001 South 700 East #500
Salt Lake City, UT 84107-2177
Phone: (801) 264-6651
https://utahmasonrycouncil.org

APPENDIX B: Drawing Checklist

No.	Item	Checked
1.0	STRUCTURAL NOTES	
	Is the applicable code specified (city and date)?	
	Are the applied loads shown, including wind, seismic, and live loads?	
	Is the masonry strength f'_m specified?	
	Is the method to verify the f'_m specified? (Unit strength method.)	
	Are the units specified in accordance with ASTM C 652 with sufficient compressive strength to meet the f'_m specified?	
	Is cement specified in accordance with ASTM C 150 types I, II, or III? Is low alkaline cement available?	
	Is lime specified in accordance with ASTM C 207?	
	Is sand specified in accordance with ASTM C 144?	
	Is the mortar specified by proportions in accordance with ASTM C 270?	
	Is the grout specified in accordance with ASTM C 476?	
	Is self-consolidating grout specified in accordance with ASTM C 1611/C1611M?	
	Is high or low lift grouting specified?	
	For high lift grouting, are clean-outs to be eliminated with a code variation?	
	Is reinforcement specified in accordance with ASTM C 615 grade 60?	
	Is ASTM A 706 reinforcement specified when welded?	
	Is the quality assurance program included? (Required by code)	
	Is a grouting demonstration panel required?	
	Is there a requirement for a preconstruction meeting?	
	Are reinforcement shop drawings required?	
2.0	DESIGN	
	Is h/t less than 30? If not, verify the design includes analysis for moment magnification.	
	Are the walls at floors and roof laterally supported with straps or other methods capable of resisting at least 400 lb/ft?	
	Do the bars fit in the cells?	
	Are locations and length of laps shown? Are there locations where stresses are more than 80% of the allowable?	
	Are dowel laps sufficient?	
	Is there continuous horizontal reinforcement at the window and door head and jambs?	
	Is there continuous horizontal reinforcement at the floor?	
	Are window and door connections designed and shown on the drawings?	
	Are there expansion joints at the corners, and are they at or near the corners?	
	Are provisions made in connections to accommodate thermal and moisture expansion movement?	
	Is the brick masonry confined between other materials without expansion joints?	

No.	Item	Checked
3.0	SPECIFICATIONS (Additional items not typically in the structural notes)	
	Are the structural notes and specifications consistent?	
	Are control joint size, size, and materials specified?	
	Are control joint sealant compatibility tests required?	
	Are the cleaning methods included?	
	Does the specification allow wetting of the brick?	
	Are the joint finishes specified? If raked joints are used, is this in the analysis?	
	Are weep holes and fill materials specified?	
	Are the sealing, water repellant, procedures, and materials specified?	
	Are cold weather and hot weather construction provisions included?	
	Are requirements for protecting the work included?	
	Is it required to verify dimensions prior to laying the masonry?	
	Is a written quality control procedure required?	
	Is a color, pattern, and workmanship panel required?	

APPENDIX C: Construction Observation Checklist

No.	Item	Checked
1.0	MATERIALS	
	Are the bricks stored above ground and covered?	
	Are the bricks sound? Bang them together to see if they ring. If a thud, the bricks may need to be rejected or prism tests conducted to prove that f'_m is met.	
	Is the cement properly stored?	
	Is the lime properly stored?	
	Is the sand pile covered?	
	Does the sand appear well graded and sound?	
	Is the sand dirty?	
	Is there a method for controlling the sand proportions? Shovel count methods are not sufficiently accurate.	
	Does the person mixing the mortar know the proportions?	
	Are there any additives being added to the mortar?	
	Does the person mixing the mortar know the time limits for mixing? (10 minutes maximum.)	
	Are the grout proportions being controlled?	

No.	Item	Checked
2.0	CONSTRUCTION	
	Is the mortar dropping into the cells?	
	Are mortar fins being controlled? Are the cells clean?	
	Is the mortar being strung out too far on the bed joints?	
	Does the contractor understand cold (hot) weather construction requirements?	
	Are the walls being covered at the end of the day?	
	Is inspection being properly done?	
	Does the shoring of the masonry walls look about right?	
	Are the joints uniform in thickness and full?	
	Is the reinforcement being placed within tolerance? Is reinforcement secured against displacement? Are lap lengths correct?	
	Is the grout of sufficient slump to be placed?	
	Is the grout being vibrated during placement?	
	Is the grout being reconsolidated?	
3.0	DESIGN	
	Is the proper issue of design drawings on site?	
	Are the proper shop drawings on site?	
	Does the contractor understand the structural intent?	
	Is the inspector performing his duties properly?	
4.0	TESTING AND INSPECTION	
	Are prisms being constructed plumb and on a flat surface?	
	Are the materials being used for the prism the same as those used in the wall?	
	Are prisms being properly cured, handled, stored, and transported?	
	Is the prism grout being reconsolidated?	
	Is the frequency and quantity of testing in accordance with the contract documents?	

APPENDIX D: Field Test Data for Mortar and Grout

Field Mortar and Grout Test Data

The field sampling and testing for mortar compression strength are highly variable. Figure 1 is a frequency distribution of Type S mortar compression tests taken in the field during actual projects in California, Oregon, and Washington. There are a total of 205 mortar tests. The coefficient of variation is 36%.

With this amount of variability, it should not be surprising to get periodic non-conforming compression mortar tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request that the mason identify the proportions being used. Go to the site and observe the mixing of the mortar.
2. Assess the method being used to control proportions. Check that the correct materials are being used.
3. Verify that the testing lab is using the procedures of ASTM C 270.
4. Visit the site and observe the mortar in the joint. Scratch the mortar with a key. If a white scratch results and the sand does not separate from the mortar, the strength of the mortar is probably acceptable. However, if the masonry is highly stressed (above 1200 psi), it may be necessary to remove a prism from the wall for testing.

The relationship between 7-day mortar strength and 28-day mortar strength is not as variable as the compression strength. It is useful to know the 7-day test results since it provides the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.

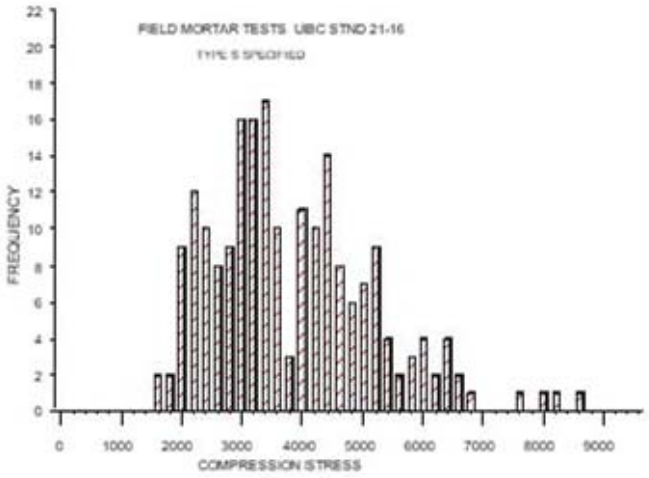


Figure 1 Field Mortar Tests

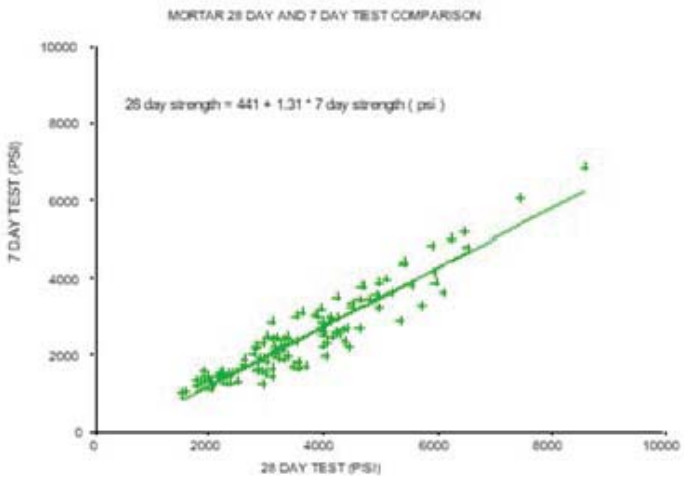


Figure 2 Comparison of 7 and 28 Day Mortar Tests

Grout Compression

It is recommended that field testing of grout not be required. However, when f'_m exceeds 2,000 psi, TMS 602-22 Section 2.2 B (Specifications for Masonry Structures) requires verification of grout strength by testing in accordance with ASTM 1019. This requirement is interpreted as prior to construction and not verification during construction.

The field sampling and testing for grout compression strength are highly variable. The following figure is a frequency distribution of field grout compression tests taken from actual projects in California, Oregon, and Washington. There are a total of 323 grout tests. The coefficient of variation is 32%.

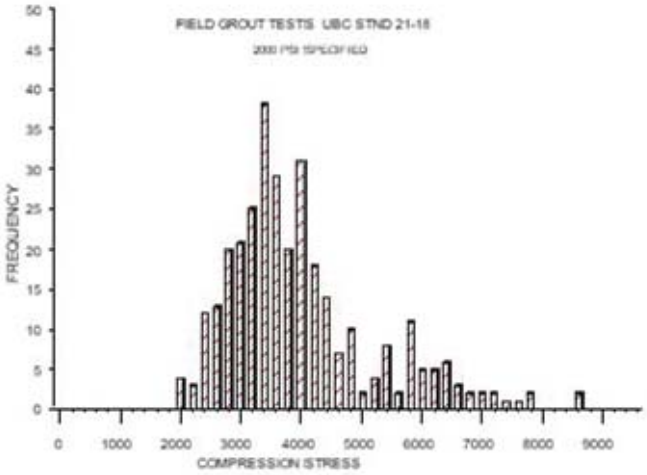


Figure 3 Field Grout Tests

With this amount of variability, it should not be surprising to get periodic non-conforming compression grout tests. If the non-conformance occurs regularly, then the following steps are recommended:

1. Request that the mason identify the proportions being used.
2. Assess the method being used to control proportions.
3. Verify that the testing lab is using the procedures of ASTM 1019.
4. If the cause of the low break is not identified, then taking core samples and testing them may be required.
5. The structural engineer should also consider the reason for requiring a specific grout strength. Often, the purpose of the grout is only to connect the reinforcement to the units. Even low-strength grouts (1500 psi) are probably capable of making the connection. Because of the high strength of the brick, the compression contribution of the grout can often be ignored in the analysis. If grout strength is less than f'_m, then lap lengths should be based on the grout strength and not f'_m.

The relationship between 7-day grout strength and 28-day grout strength is not as variable as the compressive strength. It is useful to know the 7-day test results since it provides the engineer with an early indication of the 28-day results. The following figure presents the relationship for the same projects.



Figure 4 Comparison of 7 and 28 Day Grout Tests

APPENDIX E: Troubleshooting Table

Troubleshooting Table for the Design Structural Engineer

Problem	Cause	Solution
Prisms fail to reach the design strength.	1. The testing lab has incorrectly tested the prism, usually by not placing the prism correctly in the machine or using a loading platen that is too thin. Or the specimens may have been damaged during transportation. 2. The bricks are below the specified strength. 3. The mortar is under specified strength. 4. Lab reported gross area stress instead of net area stress.	1. Instruct the lab to retest, being careful to follow the ASTM C 1314. 2. Request that the contractor have a lab test the brick. 3. Check mortar proportions. Retest the prisms. 4. Have the lab correct the report.
Mortar doesn't reach strength.	1. Incorrect proportions. 2. Incorrect testing.	1. Check mortar quality control procedures. 2. Mortar tests are unreliable. Forget about testing mortar. The code doesn't require it.
The grout mix does not meet ASTM C 476	Wrong mix	Change the mix to conform to ASTM C 476
For f'_m exceeding 2,000 psi, the tested grout strength is less than f'_m.	1. Tested during construction 2. Incorrect testing. 3. Wrong design mix	1. Grout tests are unreliable. Forget about testing grout during construction. The code doesn't require it. 2. ASTM C 1019 is not reliable. Repeat the test using different liners. 3. Change the design mix.
The colors do not meet expectations.	1. Bricks were not blended. 2. Sample panel has a different water repellant. 3. The brick production run is different from the sample run.	1. This is a problem for the architect and brick supplier. 2. Use the sample panel sealer. 3. Approve the production run before beginning construction.
The architect calls and says more expansion joints are required.	The architect was checking on your advice. Architects should do this, so don't get mad. The architect's experience may be with concrete masonry units that require closer spaced control joints for shrinkage and is not experienced with structural reinforced hollow clay masonry.	Explain to the architect how the reinforcement reduces the need for most of the expansion joints.
The mason tells the general contractor, who tells everyone that the cells are too small to be grouted with all the congested steel.	1. The mason contractor does not have experience with the grouting of reinforced hollow brick. He doesn't understand that he can make the grout with an 8 to 11-inch slump. 2. The cell is too small.	1. Prepare and grout a test panel. Be sure to invite everyone concerned. 2. Verify that the units conform to ASTM C 652 or re-design the wall with smaller diameter reinforcement, or use mechanical connectors
Welded bars are breaking off.	ASTM A 706 bars were not used. Inspect the bars. A "W" symbol indicates type A 706. Verify that bars were properly cooled and not quenched with water after welding.	Use the correct bars.
The contractor is not protecting his materials or work.	Sometimes the responsibility for protecting the work is left to the general contractor. He is saving money. Sometimes the responsibility is not well defined.	Request your client to set up a meeting with the general contractor and the masonry contractor to address the issue.

Problem	Cause	Solution
Cracks in the mortar joints.	1. Shrinkage of the mortar joint. 2. Movement of the supporting structure. 3. Overloading. 4. Too rapid drying.	1. Suggest the contractor decrease the cement content of the mortar and increase the lime, provided it still is in conformance with ASTM C 270. 2. Check supports. 3. Check loading the timing of the loading and shoring removal. 4. Pre-wet the units. Wet the wall during curing. Add lime to the mortar. Tooling of joints may not be done at the proper time, or joints are not properly tooled.
Shop drawings are not prepared.	The requirement was missed or "value engineered away."	Write a letter to your client explaining the requirement. If the project is underway, require an engineer familiar with the design to be on site full time.
The grout strength is specified at a minimum of 2000 psi; how can I get a prism of 4000 psi?	This is normal.	Explain that the prism does not fail in accordance with the weak link theory. See the Design Development section "Selection of Masonry Strength, f'_m."
The contractor wants to grout pours to exceed the 5 feet 4-inch lift height and not provide clean-outs.	The code restricts the grout lift to 5 feet 4 inches even though the grout pour might be higher. If the lift is over the 5 feet 4-inch then it is high lift grouting.	The problem is blow-outs of mortar joints and the ability to reconsolidate. In hollow clay, these problems are unlikely. Have the contractor demonstrate the procedure to you and the inspector using a grouting demonstration panel.
The contractor doesn't want clean-outs. You want high-lift grouting.	Code requires clean-outs for high-lift in order to remove the mortar droppings.	If the shear stresses are low, it may be possible to waive the clean-out requirement. The purpose of the clean-out is for shear transfer at the bottom of the cell. If shear stresses are low, this may not be necessary, and a code exception will be necessary.
The dowels out of the concrete foundation interfere with the unit cross webs. They miss the cells.	Improper placement of the dowels. However, it is often very difficult to get them in the right place. This situation is more common than not.	Cut the unit cross webs to allow the dowel to pass or drill in new dowels. Verify that all the dowels are required to meet strength requirements. If not, allow a certain % of them to be removed. It is common to allow the dowels to be bent slightly. A 1:6 slope ratio is a commonly used maximum.
The brick masonry is cracked, with cracks extending through the units.	1. A great deal of force is required for this condition to exist. Frozen grout, foundation movement, or thermal movement from an adjacent structure are a few examples. 2. The bricks may have been manufactured with cracks. 3. Foundation cracks extend into the brick wall.	1. Find the reason for the cracking. It is likely something needs to be corrected. Likely candidates include freezing, foundation settlement, overloading and thermal movement. 2. Verify the integrity of the units before use. A quick check is to bang the bricks together; if a ringing sound results instead of a thud, then the bricks are sound. 3. Foundation control joints are not coordinated with the masonry expansion joints. It may require rework or adding a control joint.

Problem	Cause	Solution
The contractor doesn't cover the walls at the end of the day.	1. The contractor is attempting to save money. 2. The responsibility for the masonry protection may have been left with the general contractor or, worse, left out of all the contracts. 3. The contractor may not be aware of the requirements of TMS 602 to cover walls at the end of the shift.	1. Insist on covering the walls. 2. Write a letter stating that the contractor is not in conformance with the likely result being efflorescence and other wall damage.
Corrosion of the joint reinforcement.	1. Too strong of an acid cleaning without pre-wetting the wall. 2. Ungalvanized joint reinforcement.	1. Pre-wet the wall and use industry cleaners as recommended by the manufacturer of the units. 2. Use galvanized joint reinforcement.
Leaking Walls	1. Improper flashing installation. 2. Improper flashing design. 3. Poor workmanship. 4. Improper grouting. 5. Raked joints or other unprotected horizontal surfaces. 6. Water repellant not applied.	1. Correct flashing. 2. Correct flashing. 3. Repair mortar joints. 4. Pressure epoxy grout. 5. Fill joints. Cover horizontal surfaces. 6. Apply water repellant wall.
Dome shaped voids in the grout.	1. Loss of water to the unit. 2. Improper or no vibration of the grout 3. No reconsolidation	1. Use proper reconsolidation techniques. 2. Use Grout-Aid or equal. 3. Add lime to the maximum allowed. Use self-consolidating grout.
River voids in fine grout.	Loss of water to the unit.	1. This is normal, provided they are less than approximately 1/4 inch in width. 2. Use Grout-Aid or equal. 3. Add lime to the maximum allowed. 4. Reduce water in the mix.
Efflorescence on the wall.	1. Precipitation of salts at the wall surface. 2. Wall was uncovered during construction, and excessive water entered. 3. Flashing not properly detailed, not installed, or not properly installed	1. Clean the wall and then keep water from entering the wall by fixing leaks and sealing it with a water repellant. 2. Cover the wall during construction. 3. Rework the flashing

Notes on the Selection, Design and Construction of

Reinforced Hollow Clay Masonry

Is also available from Western States Clay Products Association at
http://www.brick-wscpa.org

Other technical documents are also available
Design Guide for Anchored Brick Veneer Over Steel Studs
and
Design Guide for Structural Brick Veneer

Strengths of RHCM are usually greater than the 2600 psi used in the document

- Increasing the f'm increases the capacity of the masonry. RHCM design strengths far exceed those available for concrete masonry. The assumed starting value of 2,600 psi is conservative. Some engineers start with a value of 3,500 psi. However, it is recommended to specify the lowest value necessary to meet the project demand strength requirements especially for schematic design.
- Using the higher design strength can reduce or eliminate horizontal shear reinforcing in shear walls, and shear reinforcing (stirrups) in beams, in some cases.
- For specially designed shear walls, the structural engineer may be able to eliminate the transverse reinforcement hooks at the end of the wall if the following condition is satisfied.

$$V_u / (\theta V_{nm}) \leq 0.4$$

- For intermediate and special shear walls, the ductility requirements can be mitigated by increasing f'_m to allow additional tension reinforcement. This will only occur in multi-story load-bearing applications.
- For beams with high moment demand, the limits on tension reinforcement can be increased by increasing f'_m.
- In some situations, increasing f'_m can eliminate the requirement to do a moment magnification analysis.



REINFORCED STRUCTURAL CLAY BRICK

strong, versatile solution

BY JEFF ELDER, PE

Those inexperienced in the use of reinforced structural clay brick might think that a brick is a brick and limit its application to conventional methods associated with veneer. Brick veneers are defined by their ability to support their own weight while limited by mortar to resist tension. When the mortars' resistance to tension is exceeded, brick must be joined or supported by other materials such as brick ties, shelf and ledger angles, wood, steel, concrete and other backup systems.

Researchers have spent years investigating ways to provide tensile resistance to brick. Patterned after reinforced concrete, reinforceable structural clay brick create the form and become the aggregate to support compression forces. Reinforcing steel resists the tension. Oversized holes are placed in the brick and align vertically to create a place for reinforcing steel. Grout is placed in brick cells to bond reinforcing steel to the brick.

Structural clay brick are specified under ASTM C652 as hollow, fired clay brick with a percentage void volume greater than 25%, generally ranging between 35% and 60%.

Learning Objectives

1. Reinforced Structural Clay Brick (RSCB) are designed using most of the same equations and details as Concrete Masonry Units (CMU).
2. RSCB are two to three times stronger than CMU.
3. RSCB have fire ratings of one to four hours.
4. RSCB use expansion joints whereas CMU use control joints
5. Any design detail created using brick veneer can be created using structural brick. Not every structural brick detail can be created using veneer brick.
6. RSCB can act as beams, columns, loadbearing walls, structural panels and curtain walls.
7. RSCB are available in a wide variety of colors, sizes, shapes and textures.

See page 47 for test.

net area compressive strength of clay masonry units (psi)		net area compressive strength of masonry (psi)
TYPE M OR S MORTAR	TYPE N MORTAR	
1700	2100	1000
3350	4150	1500
4950	6200	2000
6600	8250	2500
8250	10,300	3000
9900		3500
13,200		4000

Table 1. Compressive Strength of Clay Masonry. For SI: 1 lb per square inch = 0.00689 Mpa. (IBC 2105.2.2.1.1)

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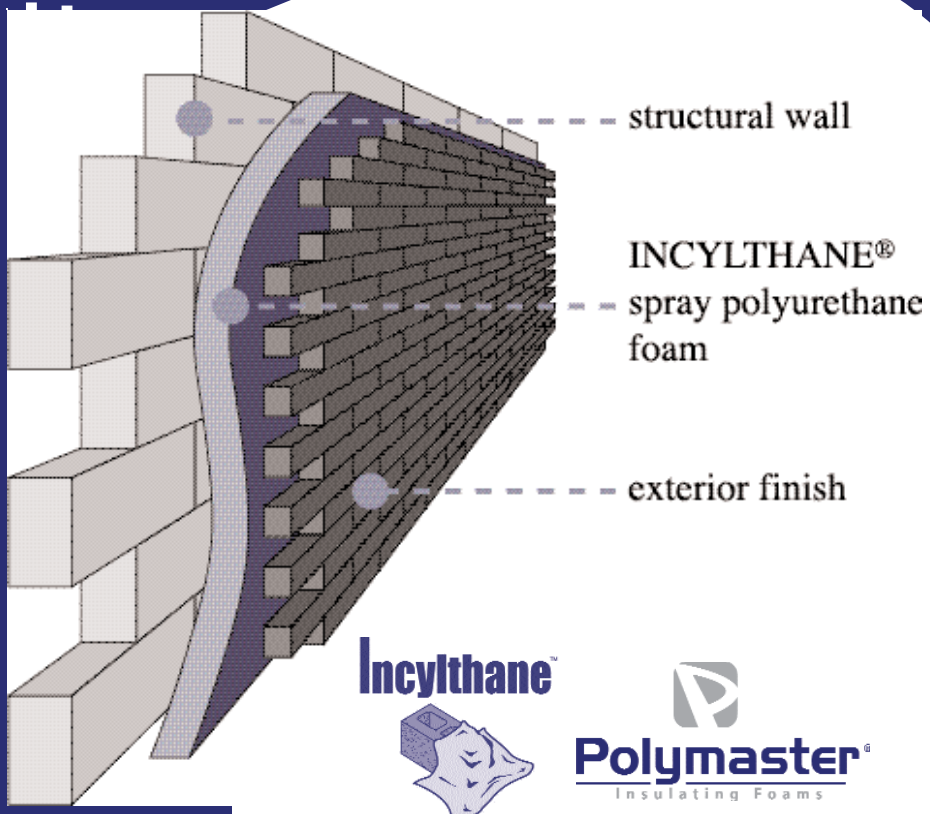
mortar	type	proportions by volume (cementitious materials) PORTLAND CEMENT[a] OR BLENDED CEMENT[b]	MASONRY CEMENT[c] M	MASONRY CEMENT[c] S	MASONRY CEMENT[c] N	MORTAR CEMENT[d] M	MORTAR CEMENT[d] S	MORTAR CEMENT[d] N	hydrated lime[e] or lime putty	aggregate measured in a damp, loose condition
CEMENT-LIME	M	1	–	–	–	–	–	–	¼	
	S	1	–	–	–	–	–	–	over ¼ to ½	
	N	1	–	–	–	–	–	–	over ½ to 1¼	
	O	1	–	–	–	–	–	–	over 1¼ to 2½	
MORTAR CEMENT	M	1	–	–	–	–	–	1	–	Not less than 2¼ and not more than 3 times the sum of the separate volumes of cementitious materials
	M	–	–	–	–	1	–	–	–	
	S	½	–	–	–	–	–	1	–	
	S	–	–	–	–	–	1	–	–	
	N	–	–	–	–	–	–	1	–	
	O	–	–	–	–	–	–	1	–	
MASONRY CEMENT	M	1	–	–	1	–	–	–	–	
	M	–	1	–	–	–	–	–	–	
	S	½	–	–	1	–	–	1	–	
	S	–	–	1	–	–	1	–	–	
	N	–	–	–	1	–	–	1	–	
	O	–	–	–	1	–	–	1	–	

Table 2. Mortar Proportions [IBC 2103.7(1)]. a. Portland cement conforming to the requirements of ASTM C150, b. Blended cement conforming to the requirements of ASTM C595, c. Masonry cement conforming to the requirements of ASTM C91, d. Mortar cement conforming to the requirements of ASTM C1329, e. Hydrated lime conforming to the requirements of ASTM C207. *2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.*

REE.



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Fox Studio, Livonia, designed by Giffels, Hoyem, Basso, now IDS, Troy, used both 4 x 8 x 16 custom color Brownstone flashed (with center score) as a veneer and 8 x 8 x 16 (with center score) as a structural unit.

The designer must specify the type of brick. Hollow brick are designated as either HBS (hollow brick standard) or tighter spec HBX (hollow brick extra). Use HBX when a higher standard for dimensional and aesthetic tolerances are required and a higher cost can be justified.

When brick are subject to frequent conditions of freezing when saturated, the designer is directed to specify Grade SW (severe weathering) brick.

Structural clay brick are commonly available in nominal widths of 4˝, 5˝, 6˝ and 8˝. They come in nominal lengths of 8˝, 12˝ and 16˝ with heights that range from 2¼˝ to 8˝.

Compressive Strength

As strength of brick is often related to color, it is important that an architect specify the color of brick early in the design process. This allows the structural engineer to maximize the strength performance of design elements. For most manufacturers, the lighter the brick color, the lower the compressive strength of the system; conversely, the darker the color, the higher the compressive strength of the system.

The designer is referred to the specified manufacturer to obtain the *compressive strength of unit* for all colors specified. The designer is then directed to the appropriate building code to cross reference *compressive strength of unit* with design value *compressive strength of masonry.*

When using the International Building Code (IBC 2003), refer to Table 2105.2.2.1.1. (See Table 1.) Similar tables are found in the masonry section of other codes. The specified *compressive strength of masonry* is referenced by designers as the f'_m value. Values of historical test data have been adjusted statistically in the table to insure a conservative design value.

Typical allowable design values for hollow clay masonry range between 2600 psi and 5300 psi. At two to three times the standard value for concrete masonry, the use of these higher values can help to reduce deflections, wall thickness, beam depth, bar diameter and bar lap requirements.

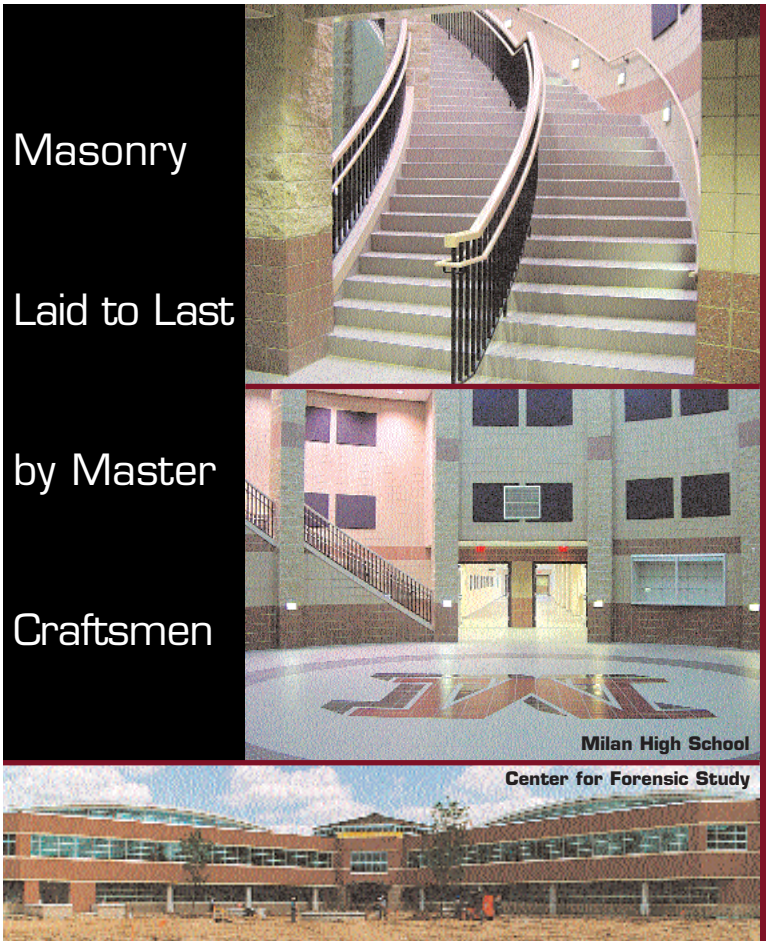
To select an f'_m value higher than those listed in the table is acceptable; however, the value must be verified by building prisms of the brick, mortar and grout specified prior to and during construction.

type	parts by volume of portland cement or blended cement	parts by volume of hydrated lime or lime putty	aggregate, measured in a damp, loose condition	
			FINE	COARSE
FINE GROUT	1	0–1/10	2 1/4 – 3 times the sum of the volumes of the cementitious materials	-----
COARSE GROUT	1	0–1/10	2 1/4 – 3 times the sum of the volumes of the cementitious materials	1–2 times the sum of the volumes of the cementitious materials

Table 3. Grout Proportions by Volume for Masonry Construction. (IBC 2103.10) ***2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.***

material	item number	construction	minimum required equivalent thickness for fire resistance [a, b, c] (inches)			
			4 hour	3 hour	2 hour	1 hour
BRICK OF CLAY OR SHALE	1-1.1	solid brick of clay or shale[d]	6	4.9	3.8	2.7
	1-1.2	hollow brick or tile of clay or shale, unfilled	5.0	4.3	3.4	2.3
	1-1.3	hollow brick or tile of clay or shale, grouted or filled with materials specified in Section 721.4.1.1.3	6.6	5.5	4.4	3.0

Table 4. Rated Fire-Resistance Periods of Clay Masonry Walls [IBC 721.4.1(1)]. For SI: 1˝ = 25.4 mm
a. Equivalent thickness as determinded from Section 721.4.1.1, b. Calculated fire resistance between the hourly increments listed shall be determined by linear interpolation, c. Where combustible members are framed in the wall, the thickness of solid material between the end of each member and the opposite face of the wall, or between members set in from opposite sides, shall not be less than 93% of the thickness shown, d. For units in which the net cross-sectional area of cored brick in any plane parallel to the surface containing the cores is at least 75% of the gross cross-sectional area measured in the same plane. ***2003 International Building Code. Copyright 2003. Falls Church, Virginia: International Code Council, Inc. Reproduced with permission. All rights reserved.***



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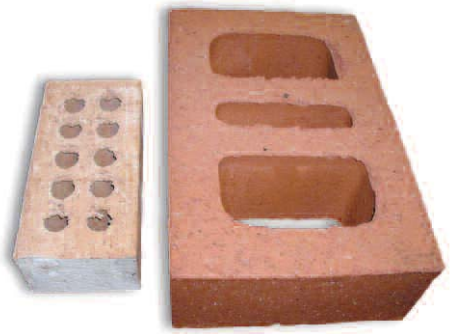
Metro Loft, Royal Oak, designed by Neumann/Smith & Associates. Re-rod and concrete pre-fab flooring attached to 8 x 4 x 12 brick single wythe walls.



Solid face brick and hollow structural unit.



Metro Loft, Royal Oak, constructed of Mission (yellowish, buffish) and Sunset, flashed to bring out color variation. Larger core holes for re-rod and grouting.

Mortar

Mortar used in reinforceable structural clay masonry assemblies is commonly specified by proportions. (See Table 2.) There are three types of mortars: Portland cement-lime, mortar cement and masonry cement. In addition, Type S mortars are prescribed for structural masonry as a minimum.

A common mistake is to over specify the mortar type. Since Type M mortars are the strongest mortars, they are often specified to insure strength of the assembly. Type M mortars have a high cement content which increases shrinkage of mortar and reduces the bond strength. In addition, the extra cement makes cleaning more difficult. Type M mortars are generally limited to below grade applications. When specifying mortars, do not call out for a mortar compressive strength testing.

Grout

Grouts for reinforceable structural clay masonry are prescribed according to Table 3 by proportion. Use coarse aggregate grout (1 part cement, 2 parts pea gravel and 3 parts sand) for applications where there is sufficient room for all of the reinforcing. Fine grouts are commonly used in smaller cells — typically 4˝ and 5˝ wide brick.

Fluidity is essential for proper placement of grout around reinforcing. A grout slump of 8˝ to 11˝ is recommended. Due to the high moisture content of grout, a volume expander, fluidifying and water reducing agent are added.

Fire Resistance

Reinforceable structural clay brick also provide fire resistance. Structural clay brick are fired in kilns at maximum temperatures around 2000°F. This allows brick to retain strength during a fire and when subjected to fire hose streams, thus enhancing public safety. Structural brick are non-combustible and do not give off toxic emissions. Prescribed code values are located in Table 4. Fire ratings from 1 to 4 hours can be achieved from this table. To select a fire rating, solid percentages of structural brick are converted to an equivalent brick thickness and compared with minimum required thicknesses for various fire ratings. Structural brick may be made solid for the intent of this table by filling all cells with grout, expanded shale, sand, pea gravel, crushed stone, slag, pumice, scoria, expanded clay, slate, slag, fly ash or cinders.

Insulative R-Values

Structural clay brick can also provide insulative properties. Uninsulated brick have insulation resistance (R)-values of approximately 0.2 R/inch. By insulating the cells that are not grouted, higher insulation values can be achieved. Structural clay brick can be insulated with perlite or foamed-in-place polyurethane to achieve R-values approaching 1-R/inch.

When insulation requirements exceed those provided above, insulate the wall the same as for brick veneer. Add a layer of closed cell polystyrene insulation to the back of the brick and fur out as required.

Reinforcement

From a design standpoint, reinforceable structural clay brick are similar to concrete masonry units (CMU). An architect or engineer familiar with the design of CMU uses many of the same details. Horizontal bar reinforcing is placed in bond beams. A grout stop fabric of paper or mesh is placed directly below bond beams to prevent grout from dropping into intentionally ungrouted cells.

Horizontal joint reinforcing is typically specified at 16˝ increments and ends are lapped 6˝. Reinforcing is typically continuous around corners. Horizontal reinforcing helps to control cracking and to transfer loads to vertical reinforcing.

Movement Joints

Concrete masonry uses control joints (CJs) in walls to control shrinkage of the concrete through the dynamic cycle of wetting and drying. CJs are commonly

recommended at spacings of 20´ to 25´ centers and are created by starting and stopping the units to form a vertical joint. Reinforcing is terminated at the joint; sealants protect the joint from the elements. In some cases, a sash block and preformed gasket are used to help control alignment of the two faces. Care should be given to the aspect ratio of the wall to insure that cracking does not occur at more frequent spacings.

With structural clay brick, expansion and contraction will occur with varying temperatures; predominant direction of movement is expansion. When expansion of brick controls the design, the movement joint needs to be free of materials that will not compress. (See Figure 1.)

Expansion joints (EJs) are not required at the same locations and spacing as in brick veneer. This is because brick veneer does not have the ability to resist tension caused from expansion. Common spacing of EJs in horizontally reinforced clay brick are generally spaced at 60´ centers. If an EJ is not preferred at the corner, horizontal reinforcing in bond beams must be continuous around the corner, a minimum of 36 bar diameters. Lap continuous reinforcing with corner bars to insure that tension created in the brick at the corner can be transferred to the reinforcing.

Where clay brick and concrete block

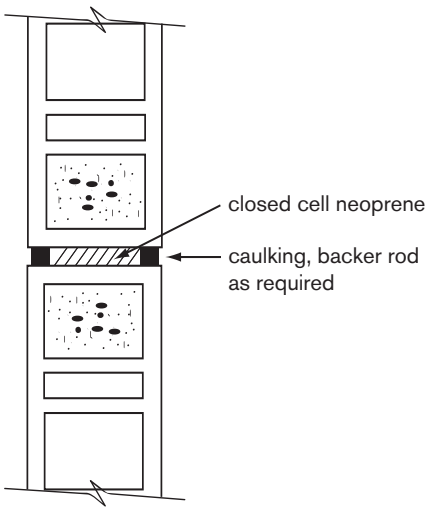


Figure 1.

Hilton Garden Inn, Detroit



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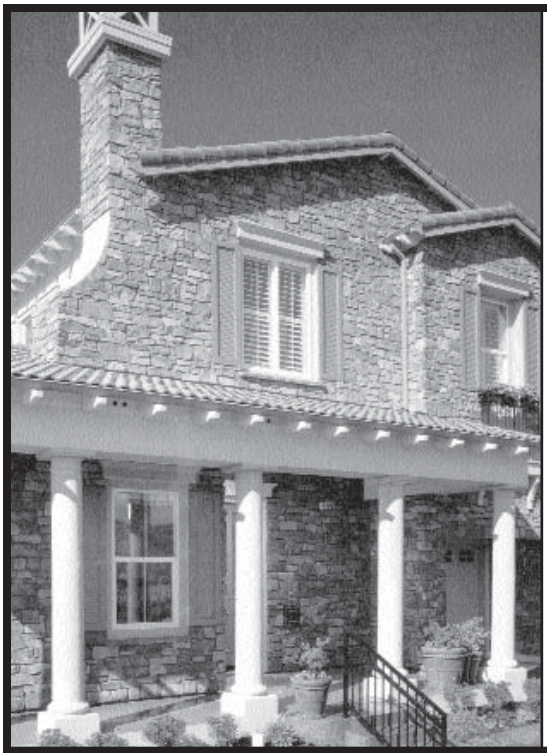

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are combined, use CJs as required for concrete block.

Moisture Control

Moisture must be controlled on a regional basis. Experience with concrete masonry unit (CMU) in an area will dictate the preferred method of treating a structure for moisture resistance. For many areas of the United States, single-wythe brick exposing both faces can be treated using a water repellent coating on the exterior face. The expansive characteristic of brick causes reinforcing to go into tension, which then places the brick into compression. This post tensioning reduces cracks and decreases moisture penetration.

When a greater resistance to moisture penetration is required, structural clay masonry must be designed similar to drainage walls with weep holes and flashing running through the wall to the back side of the insulation. Close cell extruded expanded polystyrene, other non-wicking insulations and those not affected by moisture are placed in a continuous layer on the inside face of the brick. All joints in the insulation are taped to create a moisture barrier.

Continuous insulation creates the thermal drop which forces the dew point of the wall to occur in the insulation. This reduces the chance for condensation inside the wall. Any moisture on the surface of the insulation is directed to the flashing where it is directed to the exterior of the building.

Application

Common uses of reinforceable structural clay masonry are loadbearing walls, beams, columns and piers. Other uses are structural brick veneer, curtain walls, brick panels, sound walls and retaining walls.

One and two-story buildings, even those up to 21 stories, are perfect for loadbearing masonry. For a small increase in initial cost as compared with CMU, the owner enjoys major improvements in aesthetics and strength. As an alternative for steel frame and metal stud walls, reinforced structural clay masonry can be



Embassy Suites Hotel, Livonia used both 4˝ x 8˝ x 16˝ Ironstone flashed (with center score) as a veneer and 8˝ x 8˝ x 16˝ (with center score) as a structural unit.

used as both a bearing wall and an enclosure wall providing structure and finish at the same time. Compared with wood framing, structural clay brick offer better acoustical properties, less seismic or wind drift, better fire resistance, less maintenance and no insect or mold damage.

Structural clay masonry is often installed in less time than other framing methods, reducing construction time and finance costs.

Mid-rise hotels and condominiums are a perfect choice for the structural brick curtain wall. High strength of the unit allows taller walls and fewer framing members. Perimeter beam sizes can be reduced and heavy gauge studs are replaced by light gauge ones. On some building sites with limited access, the curtain wall concept has eliminated the need for scaffolding reducing those costs.

Brick veneer on metal studs is laden with complicated construction details and extra labor. Unless properly detailed, wall ties are subject to pullout and corrosion of the stud is possible. Structural brick veneer is a popular alternative to brick veneer as wall ties, heavy structural framing and beams are replaced with reinforced hollow brick. Wall ties are replaced by less frequent structural anchors spaced every 100 sf compared with every 2 sf. Anchors are less susceptible to corrosion. Perimeter

masonry beams can be sized for L/240 deflection criteria and not the L/600 prescribed to control veneer cracking. Brick offer greater design flexibility in a wide array of colors, textures and patterns.

Sound walls and miscellaneous enclosure walls are an efficient use of structural clay masonry. Modular in size, they can accommodate large variations in land form. A wide variety of colors add structural and aesthetic advantages.

Structural clay brick are less frequently used in retaining walls. However, because of the flexibility of brick to accommodate variations in wall geometry, the structural brick retaining wall may offer more efficient design options as compared with reinforced concrete.

It is safe to say that any building designed using brick veneer can be designed using reinforced structural clay brick. The reverse is not true.

Complexity of design can be reduced, performance of materials enhanced, overall cost reduced, performance life increased by using reinforceable structural clay brick. Brick's durability is double the useful life of most building materials.

Reinforceable structural clay brick fulfills the intent of sustainable building design.

Take advantage of the structural characteristics of brick while enjoying its long list of other advantages.

For additional information on this subject, go to www.brick-wscpa.org.



Jeff Elder is sales manager for Interstate Brick Company, nationally recognized structural clay brick manufacturer in West Jordan, UT. He has served as past president and currently chairs the technical committee for Western States Clay Products Association (WSCPA), the structural research arm of the brick industry. He is a member of Masonry Standards Joint Committee, Masonry Alliance for Codes & Standards and The Masonry Society. He may be reached at jeff.elder@paccoast.com, 800-280-5290.



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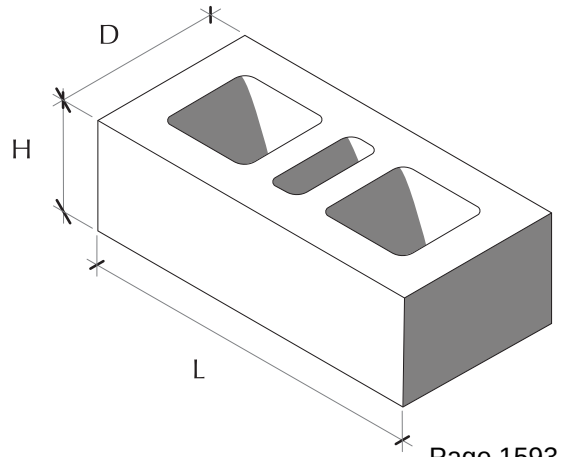
Atlas® Utility 4 x 4 x 12	3 5/8	92	3 5/8	92	11 5/8	295	8.2	3.7	3.00	32.3	Cube	207
Atlas® Emperor® 4 x 4 x 16	3 5/8	92	3 5/8	92	15 5/8	397	11.0	5.0	2.25	24.2	Pallet	160
Atlas® Super Emperor® 4 x 8 x 16	3 5/8	92	7 5/8	194	15 5/8	397	22.5	10.2	1.13	12.1	Pallet	64
Atlas® 6 x 2 1/4 x 12	5 5/8	143	2 1/4	57	11 5/8	295	8.0	3.6	4.5	48.4	Pallet	180
Atlas® 6 x 2 1/4 x 16	5 5/8	143	2 1/4	57	15 5/8	397	10.0	4.5	3.38	36.3	Pallet	150
Atlas® 6 x 4 x 12	5 5/8	143	3 5/8	92	11 5/8	295	10.0	4.5	3	32.3	Pallet	120
Atlas® 6 x 4 x 16	5 5/8	143	3 5/8	92	15 5/8	397	14.0	6.3	2.25	24.2	Pallet	100
Atlas® 8 x 4 x 12	7 5/8	194	3 5/8	92	11 5/8	295	15.3	6.9	3.00	32.3	Pallet	100
Atlas® 8 x 2 1/4 x 16	7 5/8	194	2 1/4	57	15 5/8	397	12.7	5.7	3.38	36.3	Pallet	120
Atlas® 8 x 4 x 16	7 5/8	194	3 5/8	92	15 5/8	397	17.0	7.7	2.25	24.2	Pallet	80
Super Atlas® 8 x 8 x 16	7 5/8	194	7 5/8	194	15 5/8	397	39.0	17.6	1.13	12.1	Pallet	40
Atlas® 10 x 2 1/4 x 16	9 5/8	244	2 1/4	57	15 5/8	397	16.0	7.2	3.38	36.3	Pallet	90
Atlas® 10 x 4 x 16	9 5/8	244	3 5/8	92	15 5/8	397	20.0	9.1	2.25	24.2	Pallet	60

ONLY AVAILABLE AS SPECIAL ORDER

Weights shown are approximate dry weights. Weight will vary with moisture content and with color. Coring configuration varies depending on brick size. Please refer to individual brick sizes on the website for accurate configurations.

ONLY AVAILABLE AS SPECIAL ORDER



The Above Brick Manufactured by Interstate Brick comply with the following Specifications:

ASTM C652: Grade SW; Type HBA, HBS or HBX as specified in Purchase Order
CSA A82: Grade EG; Type HBA, HBS or HBX as specified in Purchase Order

Interstate® Brick - Standard Brick Products

Safety Data Sheet

according to the Hazard Communication Standard (CFR29 1910.1200) HazCom 2012 Date of issue: 03/26/2015 Revision date: 03/26/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name : Interstate - Standard Brick Products

Product code : Not available

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Building and construction work

1.3. Details of the supplier of the safety data sheet

Interstate Brick Company
9780 S. 5200 W.
West Jordan, UT 84088 - U.S.A.
T (801) 280-5200

1.4. Emergency telephone number

Emergency number : CHEMTREC 1 (800) 424-9300
CHEMTREC International +1 (703) 527-3887 24 hr

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Skin irritation 2
Eye irritation 2A
Skin sensitization 1B
Carcinogenicity 1A
Specific target organ toxicity - Single exposure 3
Specific target organ toxicity - Repeated exposure 1

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :



GHS07 GHS08

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : Causes skin irritation. Causes serious eye irritation. May cause an allergic skin reaction. May cause cancer. May cause respiratory irritation. Causes damage to organs through prolonged or repeated exposure.

Precautionary statements (GHS-US) : Contaminated work clothing must not be allowed out of the workplace. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Do not breathe dust. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned: Get medical advice/attention. If on skin: Wash with plenty of water. Take off contaminated clothing and wash it before reuse. If skin irritation or rash occurs: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell. Store in a well-ventilated place. Dispose of contents and container in accordance with all local, regional, national and international regulations.

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Clay/Shale Aluminum Silicates	Proprietary	90 - 95	Skin Irrit. 2 Eye Irrit. 2A Skin Sens. 1B Carc. 1A STOT SE 3 STOT RE 1
Quartz	(CAS No) 14808-60-7	40 - 75 [1]	Carc. 1A STOT RE 1
Manganese dioxide	(CAS No) 1313-13-9	< 3	Ox. Sol. 3 Acute Tox. 4 (Oral) Acute Tox. 4 (Inhalation)
Chromium oxide (Cr_2O_3)	(CAS No) 1308-38-9	< 3	Not classified
1: Quartz is present in Clay/Shale Aluminum Silicates at 40 - 75%.			

* The specific chemical identity and exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (i) of §1910.1200.

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical advice/attention if you feel unwell.

First-aid measures after skin contact : In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. If skin irritation or rash occurs: Get medical advice/attention.

First-aid measures after eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. If irritation persists, get medical attention.

First-aid measures after ingestion : If swallowed, do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical advice/attention if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : May cause respiratory irritation. May cause shortness of breath, tightness of the chest, a sore throat and cough. Repeated exposure to very high levels of repairable crystalline silica quartz can cause acute silicosis.

Symptoms/injuries after skin contact : Causes skin irritation. Symptoms may include redness, edema, drying, defatting and cracking of the skin. May cause an allergic skin reaction.

Symptoms/injuries after eye contact : Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

Symptoms/injuries after ingestion : May be harmful if swallowed. May cause stomach distress, nausea or vomiting.

4.3. Indication of any immediate medical attention and special treatment needed

Symptoms may not appear immediately. In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Treat for surrounding material.

Unsuitable extinguishing media : None known.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Products of combustion may include, and are not limited to: oxides of carbon.

5.3. Advice for firefighters

Protection during firefighting : Keep upwind of fire. Wear full fire fighting turn-out gear (full Bunker gear) and respiratory protection (SCBA).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Do not breathe dust.

6.2. Methods and material for containment and cleaning up

For containment : Contain spill, then place in a suitable container. Minimize dust generation. Do not flush to sewer or allow to enter waterways. Use appropriate Personal Protective Equipment (PPE).

Methods for cleaning up : Vacuum or sweep material and place in a disposal container. Provide ventilation.

6.3. Reference to other sections

See section 8 for further information on protective clothing and equipment and section 13 for advice on waste disposal.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Avoid contact with skin and eyes. Do not breathe dust. Avoid generating dust. Good housekeeping is important to prevent accumulation of dust. Do not swallow. Handle in accordance with good industrial hygiene and safety practice. When using do not eat, drink or smoke. Use only outdoors or in a well-ventilated area.

Hygiene measures : Launder contaminated clothing before reuse. Wash hands before eating, drinking, or smoking.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep out of the reach of children. Store in a well-ventilated place. Avoid any dust buildup by frequent cleaning and suitable construction of the storage area.

7.3. Specific end use(s)

Not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Clay/Shale Aluminum Silicates (Proprietary)		
ACGIH	ACGIH TWA (mg/m³)	10 mg/m³
OSHA	OSHA PEL (TWA) (mg/m³)	15 mg/m³

Quartz (14808-60-7)		
ACGIH	ACGIH TWA (mg/m³)	0.025 mg/m³ (respirable fraction)
OSHA	OSHA PEL (TWA) (mg/m³)	((10 mg/m^3)/(%SiO_2+2) TWA (resp)) ((30 mg/m^3)/(%SiO_2+2) TWA (total)) ((250)/(%SiO_2+5) mppcf TWA (resp))

Manganese dioxide (1313-13-9)		
ACGIH	ACGIH TWA (mg/m³)	0.2 mg /m^3 (Mn)
OSHA	OSHA PEL (TWA) (mg/m³)	5 mg/m^3 (Mn)

Chromium oxide (Cr_2O_3) (1308-38-9)		
ACGIH	ACGIH TWA (mg/m³)	0.05 mg /m^3
OSHA	OSHA PEL (TWA) (mg/m³)	0.05 mg /m^3

8.2. Exposure controls

Appropriate engineering controls : Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapor, etc.) below recommended exposure limits.

Personal protective equipment : Avoid all unnecessary exposure.

Hand protection : Wear chemically resistant protective gloves.

Eye protection : Safety glasses with side shields or goggles are recommended for dust.

Skin and body protection : Wear suitable protective clothing.

Respiratory protection : A NIOSH approved dust mask or filtering facepiece is recommended in poorly ventilated areas or when permissible exposure limits may be exceeded. Respirators should be selected by and used under the direction of a trained health and safety professional following requirements found in OSHA's respirator standard (29 CFR 1910.134) and ANSI's standard for respiratory protection (Z88.2).

Environmental exposure controls : Maintain levels below Community environmental protection thresholds.

Other information : Do not eat, smoke or drink where material is handled, processed or stored. Wash hands carefully before eating or smoking. Handle according to established industrial hygiene and safety practices.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Solid

Appearance : Vitrified solid

Color : Various

Odor : Odorless

Odor threshold : No data available

pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	No data available
Relative evaporation rate (butylacetate=1)	:	No data available
Flammability (solid, gas)	:	Not flammable
Explosive limits	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Vapor pressure	:	No data available
Relative density	:	2.6
Relative vapor density at 20 °C	:	No data available
Solubility	:	Insoluble
Partition coefficient: n-octanol/water	:	No data available
Log Kow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No dangerous reaction known under conditions of normal use.

10.2. Chemical stability

Stable under normal storage conditions.

10.3. Possibility of hazardous reactions

No dangerous reaction known under conditions of normal use.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

None known.

10.6. Hazardous decomposition products

May include, and are not limited to: oxides of carbon.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified.

Interstate - Standard Brick Products	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rabbit	No data available
LC50 inhalation rat	> 5 mg/l/4h

Manganese dioxide (1313-13-9)	
LD50 oral rat	> 3478 mg/kg

Chromium oxide (Cr_2O_3) (1308-38-9)	
LD50 oral rat	>15000 mg/kg
LC50 inhalation rat	> 5.41 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.

Serious eye damage/irritation	:	Causes serious eye irritation.
Respiratory or skin sensitisation	:	May cause an allergic skin reaction.
Germ cell mutagenicity	:	Based on available data, the classification criteria are not met.
Carcinogenicity	:	May cause cancer.

Quartz (14808-60-7)	
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens

Chromium oxide (Cr_2O_3) (1308-38-9)	
IARC group	3 - Not classifiable

Reproductive toxicity	:	Based on available data, the classification criteria are not met.
Specific target organ toxicity (single exposure)	:	May cause respiratory irritation.
Specific target organ toxicity (repeated exposure)	:	Causes damage to organs through prolonged or repeated exposure. Respirable crystalline silica in the form of quartz or cristobalite from occupational sources is listed by the International Agency for Research on Cancer (IARC) and National Toxicology Program (NTP) as a lung carcinogen. Prolonged exposure to respirable crystalline silica has been known to cause silicosis, a lung disease, which may be disabling. While there may be a factor of individual susceptibility to a given exposure to respirable silica dust, the risk of contracting silicosis and the severity of the disease is clearly related to the amount of dust exposure and the length of time (usually years) of exposure.
Aspiration hazard	:	Based on available data, the classification criteria are not met.
Symptoms/injuries after inhalation	:	May cause respiratory irritation. May cause shortness of breath, tightness of the chest, a sore throat and cough. Repeated exposure to very high levels of repairable crystalline silica quartz can cause acute silicosis.
Symptoms/injuries after skin contact	:	Causes skin irritation. Symptoms may include redness, edema, drying, defatting and cracking of the skin. May cause an allergic skin reaction.
Symptoms/injuries after eye contact	:	Causes serious eye irritation. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.
Symptoms/injuries after ingestion	:	May be harmful if swallowed. May cause stomach distress, nausea or vomiting.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : May cause long-term adverse effects in the aquatic environment.

12.2. Persistence and degradability

Interstate - Standard Brick Products	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

Interstate - Standard Brick Products	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on the global warming : No known ecological damage caused by this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : This material must be disposed of in accordance with all local, state, provincial, and federal regulations. The generation of waste should be avoided or minimized wherever possible.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

Special transport precautions : Do not handle until all safety precautions have been read and understood.

SECTION 15: Regulatory information

15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

15.2. US State regulations

Interstate - Standard Brick Products	
State or local regulations	This product contains Crystalline Silica, Quartz and may also contain trace amounts of other chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

SECTION 16: Other information

Date of issue : 03/26/2015

Other information : None.

Disclaimer: We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind. The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for the user's own particular use.

MUNSTER PLAN COMMISSION
MINUTES OF REGULAR MEETING
January 13, 2026

The Munster Plan Commission held a meeting on January 13, 2026, at Munster Town Hall, 1005 Ridge Road, in the Main meeting room and could be accessed remotely via Zoom webinar, a videoconference application.

Call to Order: President Baker called the meeting to order at 7:00 pm.

Moment of Silence and Pledge of Allegiance

Roll Call:

William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026

Members in Attendance	**Members Absent:**	**Staff Present**
William Baker	Jennifer Johns	Sergio Mendoza, Planning Director
Rachel Branagan		Nicole Bennett, Town Attorney
Joseph Hofferth		Denise Core, Administrative Assistant
David Nellans		
Roland Raffin		
George Shinkan		

President Baker announced we have a quorum.

Approval of Minutes:

November 18, 2025, PC Minutes

Motion: Councilor Shinkan moved to approve the minutes from November 18, 2025.
Second: Member Raffin
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Motion: Councilor Shinkan moved to approve the minutes from December 9, 2025.
Second: Member Raffin
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Preliminary Hearings: None

Public Hearings:

PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue. This matter was a continuation of a previously opened public hearing.

Director Mendoza was invited to speak first on behalf of the petitioner. He explained that, following prior requests, updated documents had been submitted including information related to the required traffic study. President Baker invited the petitioner's representative to speak.

Mr. Russ Posen from DVG at 1155 Troutwine Road, Crown Point, IN, introduced himself and noted that a traffic engineer from DVG was present to address technical questions. Mr. Posen noted there were four petitions for this development, they would concentrate on the first two beginning with the plat. He summarized the proposed project, describing it as a four-lot development on the northern portion of the property originally known as Lot C, located north of 45th Street and east of Calumet Avenue. The original Planned Unit Development (PUD) contemplated a single large lot, but the current proposal seeks to divide it into four separate lots. The plat establishes access plans including space for a traffic signal and a right-in/right-out entrance along Calumet Avenue. Internal site planning includes shared ingress, egress, and parking easements.

Mr. Pozen compared the updated development program to the original PUD, which had provided for a 70,000-square-foot grocery store. The current plan proposes four developments totaling just under 67,000 square feet. The updated traffic analysis evaluated anticipated uses, including grocer, retail, office, and a potential medical office space which uses a higher rate. He confirmed that parking needs would be met, with approximately 360 parking spaces planned where the PUD requires a maximum of 246.

Mr. Pozen emphasized that the traffic study further concluded that at peak hours, the proposed four-lot development would generate less traffic than the originally approved 70,000-square-foot grocery store. He said that the updated traffic evaluation addressed the Commission's prior questions and included coordination between DVG's traffic engineer and the Town's traffic engineer to ensure an appropriate assessment of the surrounding conditions.

Mr. James Hus, a traffic engineer with DVG, 1155 Troutwine Road, Crown Point, IN, reported that a revised traffic study had been submitted to address questions raised by SEH and town staff. He noted

that while not all issues were fully resolved, the study now reflects updated trip generation figures based on the most recent development docket. According to the revised analysis, replacing the previously assumed 71,000 square foot grocery store with the proposed use in the northeast quadrant of the PUD results in an estimated 12% reduction in morning peak trips and a 35% reduction in evening peak trips.

Mr. Hus emphasized that delays at the adjacent intersections remain a concern but are largely attributable to long standing site constraints, including the unusually close spacing of the two intersections, land configuration, and surrounding railroad infrastructure. These conditions were established more than a decade ago and cannot be modified. He also referenced a 2015 study indicating that after the realignment of 45th Street, regional traffic patterns shifted, increasing the use of 45th Avenue as a primary route. Traffic counts from 2024 confirm that current conditions differ materially from earlier assumptions, contributing to present congestion independent of the PUD's impact. He stressed that while the PUD does bring traffic with it, the congestion in the area in not solely caused by that; he was explaining that there are delays and why.

He stated that there was no additional substantial information beyond what had been discussed at the previous meeting and reiterated that the development team continues to work within the fixed constraints of the existing North Centennial Drive intersection. Both a traffic signal and a roundabout present advantages and disadvantages.

Councilor Nellans asked whether the proposed traffic signal would operate as a smart, traffic responsive system. Mr. Hus confirmed that it would not operate on random cycles and would need to coordinate with the larger Calumet corridor signal network, given Calumet Avenue's higher traffic volume. The system would also monitor vehicles entering from adjacent properties to determine signal changes.

Director Mendoza confirmed for President Baker that the town's engineers had reviewed the petitioner's materials and those engineers were present to respond to questions. President Baker asked for the town's position on whether a stoplight, a roundabout, or no change would provide the greatest improvement.

Mr. Satya Tallamraju, a professional engineer from SEH, introduced himself. He is working on behalf of the Town to summarize findings related to the traffic study and the operational impacts of potential intersection alternatives. He explained that the study evaluated volumes, levels of service, and operational impacts using traffic modeling software. Based on the data, both a roundabout and a traffic signal would create operational impacts on the adjacent intersections at 45th Street and Calumet Avenue. Since signals in close proximity must be coordinated, any new signal would need to communicate with the existing ones. Given the spacing, both alternatives would cause disruptions. He said SEH sought the least impactful option. In addition to the roundabout and signal options, he added a right-in/right-out configuration as another alternative. He asked Mr. Woller to provide additional information.

Mr. Joshua Woller, a traffic engineer from SEH, had joined the meeting remotely. He confirmed that SEH had reviewed DVG's Synchro models and the supporting report and found that both the roundabout and signal alternatives would produce differing, but notable, impacts. Existing congestion issues at 45th and

Calumet, especially during the PM peak, already cause traffic to back up through the proposed intersection location. With either a signal or a roundabout, vehicles on a daily basis would likely back up to the intersection and become stuck, potentially creating gridlock. The analysis indicated that a roundabout would be less likely than a signal to cause queues extending back to Calumet, though both alternatives pose operational challenges depending on driver behavior.

Mr. Woller explained that a right-in/right-out option limits movements but offers the least impact on existing roadway operations despite circulation challenges for the development. He also noted that the traffic signal alternative would require coordination with the existing 45th and Calumet signal, but because traffic volumes in all major movements at that intersection are relatively balanced, there is no ideal time to stop traffic on 45th without causing significant backups. As a result, the development would likely experience delays under either a signal or roundabout, though the need to keep 45th traffic moving would most likely disadvantage the development with backup and circulation issues. He emphasized that the existing congestion is not caused by the proposed development, though the development will contribute to overall demand. The updated development plan, which reduces the size of the grocery store, lowers trip generation because grocery stores generate more traffic than banks or medical offices. While this results in fewer new trips and slight reductions in delay, existing queues and congestion remain. President Baker asked if the right-in/right-out was off 45th into this parcel. Mr. Woller said that was an option that was evaluated in the study. He added that consideration would likely have to be given to a right-in/right-out on Calumet as well for eastbound vehicles to enter coming north of the intersection, and that also presents challenges from circulation. He stressed that, given the existing conditions, they are looking at this strictly from the position of what is the safest alternative and the least impactful to the existing network.

President Bakker asked for the definition of "impact" within the traffic study. Mr. Tallamraju explained in detail that impacts are measured primarily through delay, which is used to assign a Level of Service (LOS). Existing conditions already operate at or near capacity. Mr. Tallamraju added that LOS A is considered excellent and LOS B is acceptable, whereas LOS E and F are unacceptable. Mr. Woller concluded that, based on current conditions and expected performance, his highest level of comfort is with the right-in/right-out configuration, followed by a roundabout, with a traffic signal as the least favorable option.

The discussion continued with a comprehensive explanation from Mr. Woller regarding how trip generation was calculated for the proposed development. Mr. Tallamraju described that trip generation figures were prepared for both the morning and evening peak hours, identifying the volume of new vehicle trips anticipated from the development and adding those volumes to the existing baseline traffic present on the network. This approach also incorporated a pass by traffic component, acknowledging that certain land uses, such as grocery stores, attract a higher share of drivers already traveling through the corridor, who may stop as part of an existing trip rather than generating an entirely new one. Examples were provided comparing grocery stores with lower pass by uses such as banks and medical offices.

The discussion transitioned to the level of service at the affected intersections. Mr. Woller said that current operations are poor, functioning at approximately Level of Service E during peak periods. Mr. Pozen and Mr. Hus clarified that a formal level of service analysis for a right-in/right-out access configuration was not completed, because such limited access would fundamentally alter the type of development possible on the site. In particular, a grocery store, which is central to the proposed plan, would not locate on a parcel limited to right-in/right-out access. The proposed traffic signal is therefore integral to the development program being presented. Mr. Pozen added that certain development options were not evaluated because they were not viable under restricted access conditions.

President Baker sought clarification on whether traffic impacts would differ between a grocery store of 75,000 square feet versus one of 65,000 square feet. Mr. Woller indicated that specific trip generation numbers could be provided with additional analysis but noted in general terms that greater development intensity produces greater traffic. Additional uncertainty was introduced by the fact that two of the proposed buildings on the subdivided lots do not yet have confirmed tenants, meaning their eventual land use and corresponding traffic impacts remain unknown. These uses could range widely from high volume generators such as fitness centers to lower volume professional offices, and this variability contributed to the complexity of the evaluation being presented.

Councilor Nellans expressed concern regarding the right-in/right-out option, noting that such restricted access would substantially limit drivers' ability to travel north or south along Calumet Avenue. From a practical standpoint, he noted that many drivers choose destinations based on convenience, and imposing access restrictions would deter some patrons who would not want to reroute or make additional maneuvers. This, in his view, would negatively affect both existing uses in Centennial Village, such as Windy City Social, and future tenants like the proposed grocery store. Councilor Nellans further offered that he was not in favor of a roundabout either; his preference is for a signal.

Mr. Pozen agreed that people generally prefer direct access and that developments succeed when they align with the convenience expectations of the community. He emphasized that restricting access could push consumer spending outside the Town of Munster, diminishing economic activity in the area. He noted that this development has amenities that are important to the community and are ones that people want to use; that creates traffic. He reiterated that a grocery store would not locate on a parcel with restricted access, further underscoring the importance of a signalized intersection to the viability of the project.

President Baker noted that there was also the request to subdivide the existing single lot, originally designated for a grocery store under the Planned Unit Development, into four separate lots to accommodate multiple uses. Director Mendoza explained that the need for a traffic study originated specifically from examining how the shift from one large development to four distinct parcels would affect traffic volumes and circulation patterns. The subdivision would potentially introduce multiple independent users, creating new access and traffic considerations. President Baker noted how each new lot could influence overall operations in and around the development area, especially given the unknown uses associated with two of the parcels.

Commissioner Raffin asked whether the engineering teams had evaluated widening 45th Street or Calumet Avenue to alleviate congestion and allow for additional turn lanes. Mr. Tallamraju responded that they had not been asked to study such widening. Mr. Hus explained that there are several proposals that could have been made but there are numerous physical constraints preventing any substantial road expansion. Specific examples were provided, including buildings constructed within ten feet of the right-of-way, sensitive communications infrastructure beneath the southwest corner, and extremely limited space along the west leg of the intersection. These factors, combined with prior development patterns and right-of-way decisions, severely limit opportunities for meaningful widening. He explained that while a blank slate approach might allow for additional lanes or turn movements, the practical limitations of the built environment prevent many of the ideal treatments from being implemented.

Discussion continued around possible solutions as well as challenges with them. President Baker and Commissioner Raffin suggested that this is a wide open space at this time and repositioning the building layouts might be considered. Mr. Pozen explained that creating a lane on 45th would be complicated by adjacent buildings and would offer limited operational benefits. He and Mr. Hus noted that any new lane would also need to be balanced that on the roadway. Mr. Hus said that SEH would also agree that the westbound through movement at the PM peak major hour is not as bad as the interface at the westbound left turn, how much length it has to run out, and the complications that the close-proximity intersection create. Mr. Tallamraju and Mr. Hus discussed problems with all eastbound traffic. Mr. Hus added that when their models prioritized Calumet, it just got worse.

President Baker asked if they were proposing a deceleration lane to turn right at the proposed northbound curb cut. Mr. Hus said they were not; he said he could make the argument that one was warranted but also that there are zero northbound turn lanes on Calumet. Mr. Hus noted that right turn lanes are absent along most of Calumet Avenue, not due to policy choices, but because corridor development patterns left little room for expansion. He said if he had been asked about this 30 years, there would be right turn lanes not just here, but at 6-12 more intersections. President Baker suggested that it would be good, from a safety perspective, to create an avenue to allow people to get out of the flow of traffic.

Several commissioners commented on other areas along Calumet that could benefit from turn lanes. Commissioner Branagan questioned whether historical decisions should preclude improvements now. Mr. Hus explained that turn lanes are inconsistent with the Calumet Avenue corridor and physical limitations rendered the option impractical in this setting. The conversation also referenced difficulties at nearby commercial driveways, such as the backup issues near Jewel Osco, to illustrate challenges that arise when right turn movements lack adequate space for separation from through traffic. Mr. Hus reiterated that many areas along Calumet Avenue have similar challenges and that modifying the intersection geometry in this area would require impacts to existing private improvements that would be disproportionate to the expected benefits.

Traffic challenges on 45th Street were also examined. Councilor Nellans raised the possibility of adjusting building placement within the proposed development to permit additional turn lanes or to create more spatial flexibility for roadway improvements. Mr. Hus noted that westbound left turn lanes create

queuing problems due to limited storage and nearby intersections, and that westbound through lanes are not the primary issue. Instead, the eastbound left turn lane is considered the most significant operational problem. Previous adjustments to traffic signal timing, which were intended to prioritize Calumet Avenue, inadvertently worsened eastbound congestion. These issues highlight the complexity of balancing traffic movements in a constrained multileg intersection, where changes intended to alleviate one problem often intensify another. The commissioners discussed the potential for lane reconfiguration, including reassignment of left turn lanes to create deceleration or right turn lanes; however, engineers explained such reallocations are not feasible because opposing double left movements are already at or near capacity. Realigning lanes or shifting geometry would introduce new operational problems and would not provide meaningful relief under projected traffic conditions.

Councilor Nellans acknowledged that alternative building configurations might have provided more options had they been considered earlier in the corridor's development. However, because prior phases of Centennial Village placed buildings close to Calumet Avenue, the current proposal is constrained by legacy decisions. Discussion reflected that while these limitations cannot be undone, the Commission must, nonetheless, focus on achieving the most functional layout possible for the remaining undeveloped parcel. He further emphasized that development should continue despite traffic challenges, as economic growth in the area remains important. He recognized that traffic would remain challenging regardless of which improvements are made but expressed support for a development layout that maximizes usability and economic benefit within the limits of the existing roadway network.

President Baker acknowledged that this was a continued public hearing, the public session remained open from previous meetings. He invited any final questions from the Commission before opening the floor for public comment. With no public speakers coming forward, President Baker closed the public hearing and returned the matter to the Commission for deliberation.

Councilor Hofferth expressed that, after hearing the engineering perspectives from both sides, there was no clear or convincing conclusion regarding the proposed changes. Concerns were raised about existing traffic congestion and the likelihood that disruptions or delays at the affected intersections would increase. Based on these concerns, he moved to deny PC25-015, the 4-lot subdivision. The motion failed due to the lack of a second.

Motion: Councilor Hofferth moved to deny PC Docket No. 25-015.
Second: (None)
Vote: Yes – 0; No – 0; Abstain – 0. Motion failed.

Commissioner Raffin asked whether SEH could explore the impact of adding additional lanes to help alleviate traffic heading west and north. He recognized such exploration would likely require the petitioner to redesign lot layouts and building placements. He noted that it is extremely difficult for the Plan Commission to decide this without every possible piece of information. Attorney Bennett explained that the petitioner was not asking for that. Unless the petitioner requests those changes, possibly to keep the project moving along, studying them could be an unnecessary use of resources. She emphasized that consideration must be limited to the petitioner's actual request, not the Commission's preferences for alternative site configurations.

Mr. Pozen clarified that previous evaluations had already examined turn lanes on 45th Street. Additional widening was not feasible due to constraints such the property to the west which they don't own or control and large existing utilities. He reiterated that their proposal did not include turn lanes because they did not believe additional lanes would materially improve traffic operations. He clarified that they are not proposing that. President Baker suggested that they could add land on the southern portion of the parcel, they could shift everything and still line it up.

The discussion turned to the broader development context. Councilor Nellans emphasized the importance of developing the land despite traffic challenges, noting that past decisions had been criticized but development still proceeded. Commissioner Branagan questioned the practical difference between denial and tabling. Attorney Bennett explained that would depend on whether the petitioner was willing to entertain options beyond the current proposal; any further considerations depend on what the petitioner is requesting and willing to change. She stressed that the petitioner has made their request and that is what the Plan Commission can consider; this is not a negotiation.

Mr. Pozen clarified that the request before the Commission was limited to reconfiguring one lot into four lots without altering the roadway network. They reaffirmed that their proposal included a signal at 45th and North Centennial and a right-in/right-out access on Calumet Avenue. He emphasized that their traffic evaluations showed that additional turn lanes would not meaningfully improve conditions and that the current plan represents the most viable approach within existing constraints. He stated that the proposed uses for the four lots would result in less traffic impact than was previously approved under the existing PUD. He noted that the developer already possesses the right to build a grocery store with a traffic signal under the current PUD. Delays or additional right-in/right-out requirements could jeopardize existing agreements with prospective tenants, including high-quality users whose commitments may lapse if the matter continued to be tabled. He said they are bringing good amenities to the town; they have presented good data and are presenting as is.

Commissioner Raffin and President Baker raised renewed concerns about safety and congestion, citing examples of other intersections in town and expressing the belief that an added turn lane could help separate traffic movements and potentially reduce accidents. Mr. Pozen and Mr. Hus reiterated that although traffic volumes may support certain warrants, physical constraints and prior analysis indicated that improvements such as additional width or turn lanes would not address the underlying congestion.

Commission Raffin made a motion to deny PC25-015 . It was seconded by Councilor Hofferth.

Mr. Matt Kimmel argued that rejecting the proposal would leave the land undeveloped indefinitely and undermine ongoing development momentum, whereas the proposed plan represented the most efficient approach. He emphasized the town's significant investment and the need for decisive action to support economic growth.

During comment, Commissioner Raffin suggested that site adjustments, vertical density, or rearrangement of buildings could address issues. Councilor Nellans referenced historical challenges with the property, including past claims that it was undevelopable except for uses such as a high tech car wash, and argued that the current proposal offers substantially greater community benefits. He stated his support for advancing the plan despite anticipated traffic increases, emphasizing the need for

economic development. Councilor Shinkan expressed concern about the long duration of the review process, noting that petitioners, staff, and consultants had collaborated for more than a year with no resolution. He raised the issue of the town's reputation for being unfriendly to business. He noted that Sprouts and Chase Bank are quality establishments that should not be dismissed. He stated he would vote no to the denial. Commissioner Raffin noted that this meeting was the first time they had heard substantive traffic input from SEH, the town's consultant on traffic, and highlighted the need for a holistic approach to traffic issues across the community rather than isolated modifications. President Baker expressed discomfort with the ultimatum as well as with the change from one to four lots and in the way it is laid out.

A vote was taken on Commissioner Raffin's the motion to deny PC25-015 which was seconded by Councilor Hofferth. The motion failed with 2 voting yes and 4 voting no.

Motion: Commissioner Raffin moved to deny PC Docket No. 25-015.
Second: Councilor Hofferth
Vote: Yes – 2; No – 4; Abstain – 0. Motion failed.

Councilor Nellans made a motion to approve the petition. Councilor Shinkan seconded the motion. Commissioner Raffin said he wanted to give SEH more time to look at ways to improve that area. Councilor Nellans raised concerns about demands placed on petitioners to resolve intersection-wide issues. He noted that improvements to that intersection may fall under the town's responsibility.

Councilor Nellans motion to approve PC25-015 which was seconded by Councilor Shinkan failed with 3 voting yes and 3 voting no.

Motion: Councilor Nellans moved to approve PC Docket No. 25-015.
Second: Councilor Shinkan
Vote: Yes – 3; No – 3; Abstain – 0. Motion failed.

A discussion followed on what alternatives remained beyond denial, approval, or tabling. Attorney Bennett clarified that tabling was permissible but warned that it was unclear what could materially change before the next meeting unless additional information or revised positions emerged. Director Mendoza noted that the petitioner also has the option to withdraw or return.

Councilor Nellans made a new motion to approve PC25-015 with a caveat that SEH is asked to do a study to see if this piece of property can be tweaked to improve traffic on it; the report could then be taken to the petitioner to accept what the Plan Commission is asking for or not. President Baker asked Attorney Bennett if this open ended motion could be acted upon. Attorney Bennett said not without a conclusion that could then be negotiated with the petitioner to accept; a condition could not be from the outcome of a study.

The motion to approve PC25-015 conditioned on the results of further study by SEH failed for lack of a second.

Motion: Councilor Nellans moved to approve PC Docket No. 25-015 conditioned on further study by the town's engineers for presentation to the petitioner.
Second: (None)
Vote: Yes – 0; No – 0; Abstain – 0. Motion failed.

Commissioner Raffin asked Director Mendoza if he could initiate an additional study of this intersection by SEH. Director Mendoza answered that he could submit that request to the Town Manager who could work with the Town Council to authorize that work. Commissioner Raffin asked if that could happen quickly.

Further discussion focused on whether an additional traffic study, particularly regarding deceleration and turn lane configurations on Calumet Avenue, could be performed. Mr. Pozen explained that modifications on the east side of the intersection would require improvements on the west side, including property acquisition or cooperation from third parties, which are beyond the petitioner's control. Councilor Nellans said the petitioner does not own the property, but the town has the opportunity to request forfeiture or eminent domain, noting that broader intersection redesigns would be a municipal responsibility and not an appropriate condition on the petitioner. Attorney Bennett noted that these property considerations are not conditions that the petitioner has any control over so that is separate from this petition.

Commissioner Raffin made a motion to table PC25-015. The motion failed for lack of a second.

Motion: Commissioner Raffin moved to table PC Docket No. 25-015..
Second: (None)
Vote: Yes – 0; No – 0; Abstain – 0. Motion failed.

Discussion continued among the commissioners on possible next steps.

Mr. Pozen stated that, after speaking with Mr. Kimmel, the developer, they are still presenting as is. They are, however, considering Councilor Nellan's statement of approval contingent upon an evaluation of Calumet Avenue turn lanes. He stated a willingness to collaborate with the town and SEH to evaluate whether adjustments on Calumet Avenue might improve traffic conditions. Attorney Bennett clarified that such an evaluation cannot be a condition of approval and would instead require a motion to table the petition for further study. She recommended that if a motion was made to table the petition, the motion should include reopening the public hearing at the next meeting.

Councilor Nellans made a motion to table PC25-015 with the condition that the petitioner will work with the town to look at a deceleration lane to see what it adds and for both the town traffic engineer and the petitioner's traffic engineer to study that for the next meeting. President Baker confirmed there was a motion to table until next month and to keep the public hearing open. Commissioner Raffin seconded the motion.

President Baker asked for a timeline on this. Councilor Nellans asked if the engineers and site designers could complete the analysis and site plans within two to three weeks so they would be ready for the next meeting. Mr. Pozen said yes.

Councilor Nellan's motion to table PC25-015 until February 10, 2026, keeping the public hearing open which was seconded by Commissioner Raffin proceeded to a vote. The motion passed with 5 voting yes and 1 voting no. President Baker voted no.

Motion: Councilor Nellans moved to table PC Docket No. 25-015, until February 10, 2026, keeping the public hearing open and including all discussions and findings.
Second: Commissioner Raffin
Vote: Yes – 5; No – 1; Abstain – 0. Motion carries.

PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue. This matter was a continuation of a previously opened public hearing.

PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street. This matter was a continuation of a previously opened public hearing.

PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue. This matter was a continuation of a previously opened public hearing.

President Baker questioned whether the remaining Plan Commission items related to Centennial Village should be addressed despite the absence of an approved plat. Attorney Bennet indicated that action on these items would be futile until the plat issue is resolved, her guidance was given that the items could still be formally called together in compliance with procedural rules, allowing the public hearings, which had been left open, to continue.

President Baker proceeded to call three petitions: PC25-016, a PUD amendment, PC25-017 a development plan for Sprouts, and PC25-018 a development plan for Chase. He invited any members of the public wishing to speak on the three cases to come forward. When no speakers came forward, President Baker left the public hearing open and brought the discussion back to the commission.

Councilor Nellans made a motion to table all three items, PC25-016, PC25-017, and PC25-018 pending approval of the plat and to keep the public hearing open. Councilor Hofferth seconded the three motions. No further discussion followed. The motion passed with 6 voting yes and 0 voting no.

Motion: Councilor Nellans moved to table PC Docket No. 25-016, until February 10, 2026. The public hearing remained open.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Motion: Councilor Nellans moved to table PC Docket No. 25-017, until February 10, 2026. The public hearing remained open.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Motion: Councilor Nellans moved to table PC Docket No. 25-018, until February 10, 2026. The public hearing remained open.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC. This matter was a continuation of a previously opened public hearing.

Director Mendoza noted there were no changes from the previous month's proposal and explained that the subdivision's approval was dependent on the approval of the associated Planned Unit Development (PUD). He also reported that information regarding required public infrastructure improvements had been received earlier in the day, including sidewalk extensions along the frontage of the property along 45th Street and to the south along Fran Lin. The estimated cost of these improvements was approximately $65,000.00 and would be tied to the final plat approval. It would ultimately be secured as part of the public infrastructure improvements at the time of final plat consideration.

President Baker questioned whether all necessary paperwork for the petitions had been submitted. Director Mendoza clarified that while the plat documents were complete, the plat approval remains contingent on the PUD because the proposed uses for the new lots impact whether the subdivision configuration was appropriate. President Baker asked why the plat was dependent on the PUD amendment approval. Director Mendoza explained that the commissioners may approve the subdivision in advance, but they would be doing so without the full underlying PUD policies in place. He further clarified that the subdivision merely creates lots, but the PUD establishes the development standards tied to those lots.

President Baker questioned whether the hearings for all related petitions could be called together. Attorney Bennett recommended calling all three petitions: the subdivision, PUD amendment, and development plan review together, however, each of the motions should be addressed individually.

President Baker called two additional petitions to be included in the discussion with PC25-021.

PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.

PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.

Director Mendoza noted that updated documents had recently been submitted but had not yet been reviewed sufficiently to provide formal comments, so the applicant was asked to speak.

Attorney Scott Yahne, 3 Lincoln Way, Suite 201, Valparaiso, IN, representing G.H.K. Development, appeared and noted that members of the design team were in attendance in person and via Zoom. He explained that extensive revisions had been made since the prior meeting, including continuous submittals throughout the holidays. He explained that a new development standards document had gone through multiple iterations with staff including substantial redlining and the addition of standards that may be used town-wide in future applications. He noted that comments he had received the previous day included input that appeared to originate from a commissioner, Commissioner Raff, though he was unsure whether all commissioners had seen those comments.

Attorney Yahne stated that updated architectural elevations and renderings had also been submitted. He wished to focus only on outstanding issues, particularly concerns regarding proposed building materials, so the team could "cross final T's and dot final I's" and reach closure. He asserted that only a small number of issues remained and that once the development standards were resolved, the subdivision plat could be approved because it hinges on that document. He reiterated that the development standards document was the key component of the PUD amendment.

Director Mendoza acknowledged that significant communication had taken place, but the development standards document still required staff review before it would be ready for presentation to the Commission. He noted that while versions had been exchanged with the applicant, none had yet been formally shared with the Commission for consideration.

No new evidence was presented that would invite public comment.

Councilor Nellans made a motion to table PC25-021, PC25-022, and PC25-023. Attorney Yaney noted that the petitioners are facing contract timing issues, though he acknowledged that this was not the Commission's responsibility. Councilor Hofferth seconded the motion to table the three petitions. Director Mendoza clarified the documents that are incomplete until a full review by staff pertained specifically to the PUD amendment and the development plan review.

President Baker sought confirmation from Director Mendoza about whether the outstanding documents could realistically be reviewed before the next meeting. Director Mendoza explained that the proposed PUD amendment and development plan required further refinement and updates were needed before the Commission could conduct a final review. He emphasized that discussions and revisions should occur outside the Commission prior to their consideration.

Attorney Yahne expressed frustration with the process citing it just isn't working. He expressed concern about ongoing delays and the extended timeline he has experienced, referencing multiple redline versions and uncertainties about how long further revisions might take.

Councilor Shinkan noted the impact on yet another business coming to town and 6 months later, they have no answers. Councilor Nellans commented on the challenges created when applications are received without having provided complete information. Commissioner Branagan questioned why

incomplete items continue to be placed on agendas, citing the inefficiency of spending meeting time on matters not yet prepared for action.

Attorney Bennett provided that "incomplete" can be subjective; however, the ordinance outlines required submission materials. Historically, the town has allowed petitions to advance once all items were submitted, with final vetting occurring before the Commission rather than after staff resolution. This longstanding practice often results in protracted exchanges, continued drafts, and extended discussion during meetings. She said this has been a practice for decades, but she noted that the Town is evaluating updates to tighten up these processes. In particular, revisions often require significant back-and-forth, especially for PUDs due to their complexity and the need to reconcile ordinance requirements, staff expectations, and petitioner proposals.

A vote was taken on Councilor Nellan's motion to table PC25-021, PC25-022, and PC25-023 and continue the public hearings which had been seconded by Councilor Hofferth. The motion for the three petitions passed with 6 voting yes and 0 voting no.

Motion: Councilor Nellans moved to table PC Docket No. 25-021, until February 10, 2026. The public hearing remained open.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Motion: Councilor Nellans moved to table PC Docket No. 25-022, until February 10, 2026. The public hearing remained open.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Motion: Councilor Nellans moved to table PC Docket No. 25-023 until February 10, 2026. The public hearing remained open.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Following the vote, Attorney Yahne commented that the filing process began on September 16, 2025, and that numerous drafts and iterations had already been submitted. He described a two-hour meeting with Director Mendoza (the week prior) and stated that he had addressed and responded to all the comments; no further response had been received. He emphasized the complexity of the documents and the difficulty of balancing legal requirements, existing site conditions, and new development standards. He noted that extensive timelines and worksheets had been prepared for stakeholders, who are asking for clarity on the anticipated schedule. He reiterated the challenge of interpreting requested legal language seeking guidance on how to translate staff comments into compliant ordinance text.

Findings of Fact:

PC25-020 DEVELOPMENT PLAN REVIEW: Jim Glascott of WT Group representing the School Town of Munster received approval with conditions for a Development Plan for the construction of ten (10) tennis courts at 8839 Calumet Avenue.

Motion: Councilor Nellans moved to approve Findings of Fact for PC25-020.
Second: Councilor Shinkan
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

DEVELOPMENT PLAN REVIEW: Erin Gogolin of Bohler Engineering on behalf of Dutch Brothers Coffee received approval with conditions for a Development Plan for the redesign of an existing building and parking lot located at 8032 Calumet Avenue.

Motion: Councilor Shinkan moved to approve the Findings of Fact for PC Docket No. 25-025.
Second: Councilor Nellans
Vote: Yes –6; No – 0; Abstain – 0. Motion carries.

PC25-026 DEVELOPMENT PLAN REVIEW: Marc Smith of E. Anthony, Inc. on behalf of Orthopedic Specialists of Northwest Indiana (OSNI) received approval (check conditions) for a Development Plan for expansion of a 30,000 square foot parking lot located at 9900 Columbia Avenue.

Motion: Councilor Nellans moved to approve Findings of Fact for PC25-026
Second: Commissioner Shinkan
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Other Business:

PC25-013 SUBDIVISION FINAL PLAT: Bruce Boyer on behalf of Crew Car Wash requests Final Plat approval for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION located at 111 Ridge Road.

Director Mendoza reported that preliminary plat approval had been granted in November, and the applicants had completed all requirements as needed and the mylars are ready for final signature, including installation of public infrastructure and inspection steps; no surety is required. The plat combines multiple lots and parcels into a single lot of record to maintain accessory uses in compliance with zoning ordinances.

Motion: Councilor Nellans moved to approve the PC Docket No. PC25-013, a final plat for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION located at 111 Ridge Road.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Election of Officers: President, Vice President, Executive Secretary.

The Commission proceeded to the annual election of officers. Each position was voted on individually.

For President, Commissioner Raffin nominated Mr. Baker. The motion was seconded by Commissioner Branagan. President Baker accepted the nomination. With no additional nominations, the Commission approved this appointment unanimously.

Motion: Commissioner Raffin moved to nominate Bill Baker for President of the Plan Commission.
Second: Commissioner Branagan
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

For Vice President, Commissioner Branagan nominated Commissioner Raffin. Councilor Hofferth seconded the motion. Commissioner Raffin accepted the nomination. With no additional nominations, the Commission approved this appointment unanimously.

Motion: Commissioner Branagan moved to nominate Roland Raffin for Vice President of the Plan Commission.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

For Executive Secretary, Councilor Shinkan nominated Director Mendoza. Councilor Nellans seconded the nomination. Director Mendoza accepted the nomination. With no additional nominations, the Commission approved his appointment unanimously. With no additional nominations, the Commission approved this appointment unanimously.

Motion: Councilor Shinkan moved to nominate Sergio Mendoza as Executive Secretary of the Plan Commission.
Second: Councilor Nellans
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Plan Commission Appointee to the Board of Zoning Appeals.

Councilor Shinkan nominated Commissioner Branagan to the Plan Commission appointment to the Board of Zoning Appeals. Councilor Hofferth seconded the motion. Rachel Brannigan was nominated for the position. After a motion and second, the Commission voted unanimously in favor of her appointment. The appointees were congratulated.

Motion: Councilor Shinkan moved to nominate Rachel Branagan as the Plan Commission appointee to the Board of Zoning Appeals.
Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

2026 PC Schedule of Meeting Dates and Filing Deadlines.

The Plan Commission reviewed the 2026 Planning Commission meeting dates and filing deadlines. Director Mendoza explained that the updated schedule differs from 2025 by further identifying formal filing deadlines. The first column of the schedule identifies filing deadlines for new applications, while the second column outlines deadlines for submission of review materials required for staff analysis. These deadlines provide staff adequate time to review submissions, prepare reports, and communicate necessary information with commissioners. The second column the lists the dates, approximately two weeks after the prior meeting, that applications already in process must submit updated materials for that information to be incorporated into the next staff report.

President Baker asked how this would be enforced. Director Mendoza explained that the rules and regulations already contain the necessary language and only requires adoption or passage through a resolution. At this time, the Plan Commission just needs to accept and understand these guidelines.

Attorney Bennett explained in detail the need to define the deadlines. If an application or required information is not submitted by the established deadlines, staff cannot advance the application. For new filings, missing a filing deadline results in the application not being placed on the next meeting agenda. For continued applications, the petition must remain on the agenda even if updated documents are not received, because continued public hearings must remain listed. However, staff will not provide updated reports if deadlines are missed, and such matters will likely result in a motion to table.

Commissioner Branagan asked if the petitioners are aware of staff recommendation. Attorney Bennett said all agendas and reports are publicly available on the town website. She clarified that petitioners may respond to staff questions during review, but any substantively updated documents intended for the next meeting must meet established deadlines so staff can properly evaluate the materials and prepare guidance.

Motion: Councilor Shinkan moved to accept the 2026 Plan Commission Schedule of Meeting Dates and Filing Deadlines.
Second: Councilor Nellans
Vote: Yes –6; No – 0; Abstain – 0. Motion carries.

Continued Discussion Items:

Councilor Nellans asked that the Plan Commission request that the town use the town engineer to evaluate traffic conditions at the intersection of 45th and Calumet. He noted that this concern was a broader town responsibility rather than an issue tied to a specific subdivision or petition. He emphasized that, without a formal request, no action was likely to occur, and the Plan Commission should therefore initiate a request for the town engineer to provide a proposal.

President Baker supported expanding this into a comprehensive traffic study of all the major corridors including Calumet Avenue, Ridge Road, Main Street, and 45th Street to assist future development and investment. A discussion ensued among the commissioners regarding possible improvements

Attorney Bennett clarified that while the Plan Commission may raise the concern, but this would not be related to any specific petition; any resulting action must be taken by the Town Council. Initiating the discussion at the Plan Commission level helps begin the process, which would then proceed through staff to the Town Council for consideration.

Next Meeting: President Baker announced that the next regular meeting is scheduled for February 10, 2026.

Adjournment:

Motion: Councilor Shinkan moved to adjourn.
Second: Councilor Nellans

Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Meeting adjourned at 8:59pm

~~President Baker~~ ROLAND RAFFIN
Plan Commission

2/10/26
Date of Approval

Executive Secretary Sergio Mendoza
Plan Commission

2·10·26
Date of Approval

TOWN OF MUNSTER

PLAN COMMISSION REGULAR MEETING 2/10/26

Munster Town Hall: Main Meeting Room

Tuesday, February 10, 2026 at 07:00 PM

AGENDA

Join Zoom Webinar as a Viewer:
https://us02web.zoom.us/j/83006860776
Meeting ID: 830 0686 0776
Passcode: 138335

1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**

William Baker (R), President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin (D), Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns (R), member. Appointed by: Town Council, Initial Appointment: 01/08/2024 - Term Expiration: 12/31/2027
Rachel Branagan (D), member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026

5. **APPROVAL OF MINUTES**
    a. January 13, 2026, PC Minutes
    Documents: 2026.01.13 PC Minutes draft
6. **PRELIMINARY HEARINGS**
7. **PUBLIC HEARINGS**
    a. PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11, 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue.
    CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
    Documents: PC25-15 Staff Report Addendum CV Lot C 2.10.26 | 01_Calumet&45th_Delay Summary Memo [final] | 02_Full Synchro Reports_all scenarios [final] | 03_EXHB_Existing Conditions | 04_EXHB_EBWBLTLs_Impact & Delay Exhibit | Centennial Village_Overall Development Plan_with Turn Lane | Preliminary Plat_Centennial Village 1st Resub Lot C_R-3_2-9-26 | 05_EXHB_Acceptable LOS_Impact & Delay Exhibit | CVP_Overall Site Plan if Dedicate ROW(Rev5)
    b. PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue.
    CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
    Documents: PC25-16, 17, 18 Staff Report Addendum PUD 2.10.26 | Centennial Village PUD Amend.CV Design Standards Revised 02.10.26
    c. PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street.
    CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025

Documents: PC25-16, 17, 18 Staff Report Addendum PUD 2.10.26 | CVP_Overall Site Plan if Dedicate ROW(Rev5)

d. PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC25-16, 17, 18 Staff Report Addendum PUD 2.10.26 | 20260113 Chase Munster Landscape | CVP_Overall Site Plan if Dedicate ROW(Rev5)

e. PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC25-21 Staff Report Addendum Pavilion 4-Lot 2.10.26 | Preliminary Plat 12-30-2025.

f. PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC25-22 Staff Report Addendum PUD Amendment Pavilion 4-Lot 2.10.26 | 2026.02.06 G.H.K. requested PUD ORD (Dev. Stand.) - Pav on 45th

g. PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.
CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
Documents: PC25-23 Staff Report Addendum Development Plan Lot 4 Self Storage 2.10.26 | A9.03 - EXTERIOR ELEVATIONS - COLOR | Site Plan 12.10.25 | Landscape Plan | Photometric | Rendering Architecture Plan 12.10.26 | Site Eng Plans 12.10.25 | Stormwater Report

h. PC26-001 DEVELOPMENT PLAN REVIEW: David R. Hill of M2Ke Design, LLC, on behalf of Laborers' International Union of North America, Local 41, requests review of a Development Plan for a second story addition to an existing one-story brick Union Hall building located at 550 Superior Avenue.
Documents: PC26-001 Staff Report 02.10.26 Laborer Union rev2.18 | PC26-001 PC Application | Laborer Union Hall Site Plan | Laborers Local 41 Bid Drawing Set | Model 23 Scene 1V2 with Signage | Model 23 Scene3 with Signage | anchor_s_com_tre2014_trendstone_002c | Echelon-Cut-Sheets_Quik-Brik-Traditional | Echelon Masonry | northfield_ech_jun21_com_trendstone_mesastone_006_preview-1 | York MASTER-BRIK-Cutsheet | York Rustic-Face-Cutsheet

8. **FINDINGS OF FACT**
   a. PC25-013 SUBDIVISION FINAL PLAT: Bruce Boyer on behalf of Crew Car Wash received Final Plat approval for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION located at 111 Ridge Road.
   Documents: PC 25-013 Findings - Final Plat for Crew Car Wash (2026-02-10)
9. **OTHER BUSINESS**
   a. 2026 PC Schedule of Meeting Dates and Filing Deadlines Update
   Documents: 2026 PC Mtgs 1.14.26
   b. PC Rules and Regulations
10. **CONTINUED DISCUSSION ITEMS**
11. **NEXT REGULAR BUSINESS MEETING** March 10, 2026
12. **ADJOURNMENT**

Recorded meetings are archived at: https://www.youtube.com/channel/UCjZG8vgYLDwUr-sEWvNOSFQ

ADDENDUM
PLAN COMMISSION STAFF REPORT
PC 25-016; PC 25-017; PC 25-018

To: Members of the Plan Commission

From: Sergio Mendoza, Planning Director

Meeting Date: February 10, 2026

Agenda Item: PC 25-016: PUD AMENDMENT, Centennial Village
PC 25-017: DEVELOPMENT PLAN, Lot 11 – Sprouts Market
PC 25-018: DEVELOPMENT PLAN, Lot 13 – Chase Bank

Subject: Addendum to January 13, 2026 Plan Commission Staff Reports

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PURPOSE
This memorandum is an addendum to the January 13, 2026 staff report regarding a proposed:

- PLANNED UNIT DEVELOPMENT (PUD) AMENDMENT, Centennial Village
- DEVELOPMENT PLAN, Lot 11 – Sprouts Market
- DEVELOPMENT PLAN, Lot 13 – Chase Bank

This addendum identifies updates, findings, and recommendations to the above-listed agenda items discussed between staff, the applicant, and agents through subsequent correspondence since the January 13, 2026 Plan Comision (PC) meeting, now for consideration at the February 10, 2026, PC meeting.

UPDATE
Since preparation of the original Staff Report, staff has noted that a proposed subdivision modification will require corresponding updates to a proposed PUD Amendment and associated development plans within Centennial Village. Specifically, the proposed subdivision changes impact the previously submitted development plans for the Chase Bank and Sprouts Market sites thereby influencing development and design standards found in the Centennial Village Codes. The applicant/agent has submitted a revised PUD Amendment and landscape plan for Lot 13 (Chase Bank) but these documents and plans, along with Lot 10 (Sprouts Market) must be revised to remain consistent with an approved preliminary subdivision configuration.

Pursuant to **Section 26-6.804.L.9 SPECIFIC SUPPLEMENTAL PROVISION RELATED TO PLANNED UNIT DEVELOPMETS** of the Town of Munster Zoning Code, any material change to the subdivision layout, lot configuration, or development pattern must be reflected in an updated PUD Amendment**.** Because appropriate updated PUD documentation has not yet been submitted for review, the Plan Commission does not currently have sufficient information to complete a full review or make the findings required under the PUD Amendment standards.

STAFF FINDINGS AND RECOMMENDATION

Staff finds that the proposed subdivision modifications materially affect the approved and proposed development framework within the Centennial Village PUD and requires corresponding PUD Amendments. Staff further finds that the Development Plans for the Chase Bank and Sprouts Market sites have not yet been materialized to be consistent with the proposed subdivision changes and in support of the PUD Amendment.

Staff advises that with only an incomplete working draft of a PUD and no coordinating development plans updated, there is an inability to offer required findings under Section 26-6.804.L.9 of the Town Code for approval to proceed with a proper motion of the requested PUD Amendment. In the interest of orderly and coordinated development and lacks the support to meet the public's interest due process. staff recommends to TABLE PC 25-016; PC 25-017; PC 25-018 to the March 10, 2026 Plan Commission meeting to allow the applicant adequate time to resubmit a complete and coordinated standards for a PUD Amendment reflecting the proposed subdivision revisions, and; revised Development Plans for the Chase Bank, and; development plan for Sprouts Market sites all demonstrating consistency with the updated subdivision and PUD framework prior to any Plan Commission action on these interests.

Staff requests that these findings supplement and refine the analysis contained in the original staff report and should be considered part of the full record, while all other findings, analysis, and recommendations in the original staff report remain unchanged unless otherwise noted.

The Plan Commission may consider the following three motions:

- *Motion to Table PC 25-016, a Public Hearing for a proposed Amendment to the Centennial Village Planned Unit Development, to the March 10, 2026 Plan Commission meeting to allow the applicant time to submit an updated PUD Amendment reflecting the proposed subdivision (PC 25-015), including all findings and discussions.*

- *Motion to Table PC 25-017, a Public Hearing for a proposed Development Plan for proposed Lot 10 of Centennial Village to the March 10, 2026 Plan Commission meeting to allow the applicant time to submit a revised Development Plan for a proposed Sprouts Market supported by an updated PUD Amendment (PC 25-016), including all findings and discussions.*

- *Motion to Table PC 25-018, a Public Hearing for a proposed Development Plan for proposed Lot 13 of Centennial Village to the March 10, 2026 Plan Commission meeting to allow the applicant time to submit a revised Development Plan for a proposed Chase Bank supported by an updated PUD Amendment (PC 25-016), including all findings and discussions.*

ATTACHMENTS:

- Working Draft of a proposed PUD AMENDMENT dated 01/23/26 (*59 pages*)
- Chase Bank Landscape Plan (*2 pages*)

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

~~Revised~~ August 21, 2023

Revised August 07,2025

Presented October 14, 2025

Revised October 20, 2025

Revised December 17, 2025


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
BLDG M
6,950 SF
BLDG B
11,613 SF
BLDG F
1,400 SF
BLDG I
22,188 SF
BLDG C
4,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG K
71,040 SF
BLDG D
8,400 SF
BLDG E
57,500 SF
BLDG N
24,000 SF


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,813 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG D
6,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG O
7,000 SF


CALUMET AVENUE
45TH STREET
BLDG A
BLDG A.2
BLDG A.3
BLDG A.1
BLDG B
BLDG C
BLDG D
BLDG E
BLDG F
BLDG G
BLDG H
BLDG I
BLDG J
BLDG K
BLDG L
BLDG M
BLDG N
BLDG O

Design Standards
Centennial Village Planned Unit Development

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Section 8: Parking – Site and Under Building
Section 9: Site Lighting
Section 10: Site Landscaping & Common Areas
Section 11: Signage
Section 12: Refuse & Recycling Management
Section 13: Screening of Loading & Service Areas
Section 14: Site Furniture, Fixtures & Equipment
Section 15: Utility Service
Section 16: Storm Water Management
Section 17: Subdivision of Land and Site Development Approval

Appendices:

1: Centennial Village PUD Final Subdivision Plat
2: Plan of Development
3: Infrastructure Development Plan Set
4: Sign Regulations for Centennial Village

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	~~Retail – Anchor~~Grocery - Anchor	1	35	~~30~~5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail/Offices – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	~~23~~1	50~~35~~	5	5	5
O	Hotel~~Retail – Single Tenant~~	5~~1~~	80~~25~~	5	5	5

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Building Lot A, A.1, A.2 and A.3 ~~are~~is located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

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Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
~~a.~~b. ~~or~~ Structural Brick: permitted only on Lot 11
~~b.~~c. Natural Masonry and Architectural Cast Stone
~~c.~~d. Architectural Metal Panels
~~d.~~e. Glass & Store Front Aluminum Window & Door Frames
~~e.~~f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 54th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 2530% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 2530% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 54th Floor Level Exterior Walls. The 2nd to 54th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, ~~wall~~ for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 54th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 750% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5-4th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

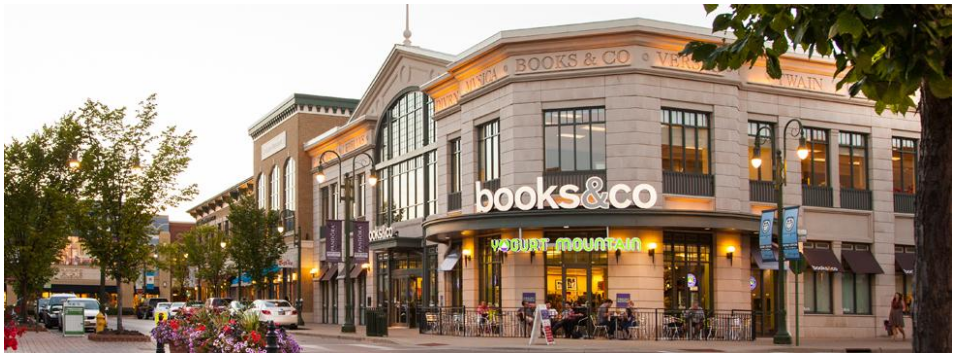
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	~~Retail – Anchor~~Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail/Offices – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	~~2~~3~~1~~	Class 1 & 2	Class 3 & 4~~N/A~~
O	Hotel~~Retail – Single Tenant~~	5~~1~~	Class 1 & 2	Class 3 & 4~~N/A~~

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet ~~west~~ east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the

existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

   a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
   b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
   c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
   d. Where feasible, tandem parking spaces may be provided in under building parking garages.
   e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
   f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
   g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

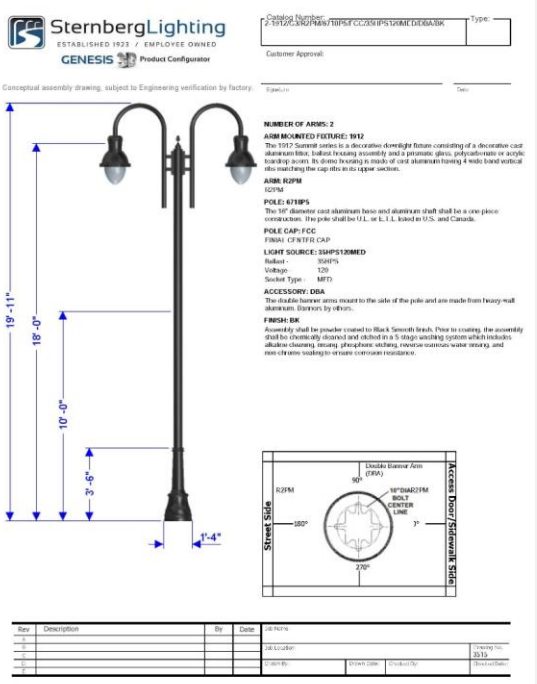
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No "shoe box" wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet

Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2
Trees for Parkway Planting

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1
Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering

Common Name	Scientific Name
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as "Invasive Species" as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3') (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.

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~~15.~~23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.~~edition of the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs. Additionally, the Centennial Village Planned Unit Development building and site sign design shall comply with the following standards:~~

~~1. Prohibited signs:~~

~~a. Signs that extend above the highest point of a roof line~~

~~b. Billboards~~

~~c. Signs painted or mounted upon the exterior side or rear wall of any principal or accessory structure except as otherwise identified in the Design Standards.~~

~~d. Signs which contain blinking, pulsating, flashing, or moving lighting.~~

~~e. Neon Lighting Signs~~

~~2. Traffic Control Signs including street name, stop signs, parking signs, directional signs and other traffic control signs that are used to implement public safety and wayfinding within the development shall be of an ornamental design similar to the site lighting posts and fixtures, following the decorative style of the Genesis Series by Sternburg Lighting.~~

~~3. No sign shall be located to block or obscure the vision of motor vehicle drivers for safe travel through streets and parking areas.~~

~~4. No sign shall be erected, located or maintained to prevent access to any door, window, public walkway or fire escape.~~

~~5. Materials and color palettes for signs shall follow the approved materials and colors defined in the Town of Munster Zoning Ordinance, Land Development Code Chapter 26, Article VI, Division 10, Signs.~~

~~6. A sign located on the main entry door or adjacent to the main entry door identifying the business name, hours of operation, address shall not exceed 6 square feet in total area.~~

~~7. Each business within multi-tenant buildings will be permitted one principal sign. Such signs may be wall mounted and with a total sign area as calculated below:~~

~~a. The total area of all signs for each business shall not exceed 1 square foot of sign area for each 30 feet of interior retail or business space, excluding storage area. Each business shall be allowed a minimum of 12 square feet of sign area. The maximum total square footage of sign area for a business shall not exceed:~~

~~i. 75 square feet for businesses having a total gross floor area of 0 square feet to 5,000 square feet.~~

~~ii. 125 square feet for businesses having a total gross floor area of 5,001 square feet to 20,000 square feet.~~

~~iii. 200 square feet for businesses having a total gross floor area of 20,001 square feet and larger~~

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8. Signs affixed to the exterior of a building shall be architecturally compatible with the style, composition, materials, colors and details of the building. Box Panel signs shall not be permitted on any building within the development.

9. The location of tenant signs shall be integrated with the building façade design and not obstruct architectural details and wall signs shall not extend more than 12 inches out from the exterior face of the building for "non-projection or non-blade" signs.

10. Projecting and Blade Signs extending perpendicular from the wall of a principal structure may be permitted so long as they do not interfere with clear vision to other adjacent business signs and do not interfere with the safe movement of vehicles and pedestrians. The Centennial Village PUD shall evaluate all requests for Projecting and Blade signs on a case by case basis and determine its approval based on the sign's design, materials and number of adjacent projecting banner signs. Projecting and Blade Signs may not extend a distance greater than 4 feet from a principal structure wall, be a minimum of 8 feet from the bottom of the sign to the top of the sidewalk below, may not exceed a total of 15 square feet and shall be counted against the total maximum business signage area.



11. Awning signs are permitted within the Centennial Village PUD following the approved sign design criteria, standards, materials and colors for awning signs defined in the Town of Munster Ordinance 1679.

12. In cases where businesses have rear or side parking lots or adjoins a public street, an additional sign developed to the same restrictions identified in Section 11 – Signage, shall be permitted only on one side or rear of the building.

13. Business signs shall be permitted to be back lighted or front lighted provided the sign illumination does not cause a nuisance to adjoining businesses and properties.

14. A sign bearing the name of a business of the principal tenant occupying space in the rear or upper floors of a building shall be allowed at the principal structure entrance to the business and the area of such sign identifying such business shall not exceed 4 square feet.

15. Free Standing Monument Signs shall be located and permitted to identify the Centennial Village PUD development areas at the locations as defined below:

a. Lot A – Identifying the development parcel north of 45th Street
b. Lot B – Identifying the development parcel south of 45th Street
c. Lot E – Identifying the development parcel south of 45th Street and the Lot E use

16. Free Standing Monument Signs shall have a maximum total surface area for any display surface of 100 square feet and a maximum height of 6 feet. The calculation of display surface does not include the surface area of the sign structure that the display surface is mounted.

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~~17. All signs and sign structures shall be maintained in good repair and safe condition. The owner of each sign shall be responsible for the proper maintenance of their respective sign. A sign shall be at all times legible, working and safe for the public.~~

~~18. No sign shall be constructed within the development unless the sign information has been reviewed and approved by the Centennial Village PUD developer and the proper permits and approvals have been granted by the Town of Munster.~~

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Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side

of Calumet Avenue. The development's water distribution system design will provide a water supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the

45th Street Town of Munster public improvement project. It is anticipated that storm water from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of ~~15~~ 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
45TH STREET
CALUMET AVENUE
CENTENNIAL PARK
BLDG PAD A
70,000sf
BLDG PAD L
BLDG PAD M
BLDG PAD F
5,200sf
BLDG PAD
5,200sf
BLDG PAD B
12,930sf
BLDG PAD C
5,800sf
BLDG PAD C
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD O
7,000sf
BLDG PAD D
17,360sf



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January xx, 2026 Conceptual Plan

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Modified and approved within the red hashed line ~~.~~

August 21, 2023~~Conceptual Plan~~



Modified and approved within the red line – November 20, 2023

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Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

Appendix 4 – Signage

by reference:

Sign Regulations for Centennial Village

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.

4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.
5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised

letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.

24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.
25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display,

illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.

39. **Storefront:** The façade of a business space that contains a public entrance.
40. **Streamer**: A long, narrow flag, banner or pennant.
41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any artificial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.

2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.
3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or

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2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.

b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.

d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **Projecting Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projecting sign per business and must be spaced at a minimum of 15 feet from other projecting or blade signs. Projecting signs are only permitted where the business does not have a blade sign.

   a. **Small Projecting Sign(s)**: May only be installed on the first story of a building. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10 sf with a maximum height of 3 ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.

   b. **Large Projecting Sign(s)**: May only be installed on buildings with multiple stories and may not be installed on the first story. Sign shall be vertically oriented with the height greater than the projection of the sign. Must be 12 ft above the sidewalk elevation. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 ft from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.

9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.

10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.

11. **"Open" Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.

12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.

13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The

material must be the general material sign standard compatible and consistent with the materials used to construct the building.

14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.
15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl

or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.

20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.

19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required
It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit
Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits
It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code
All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code
All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance
The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs
Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

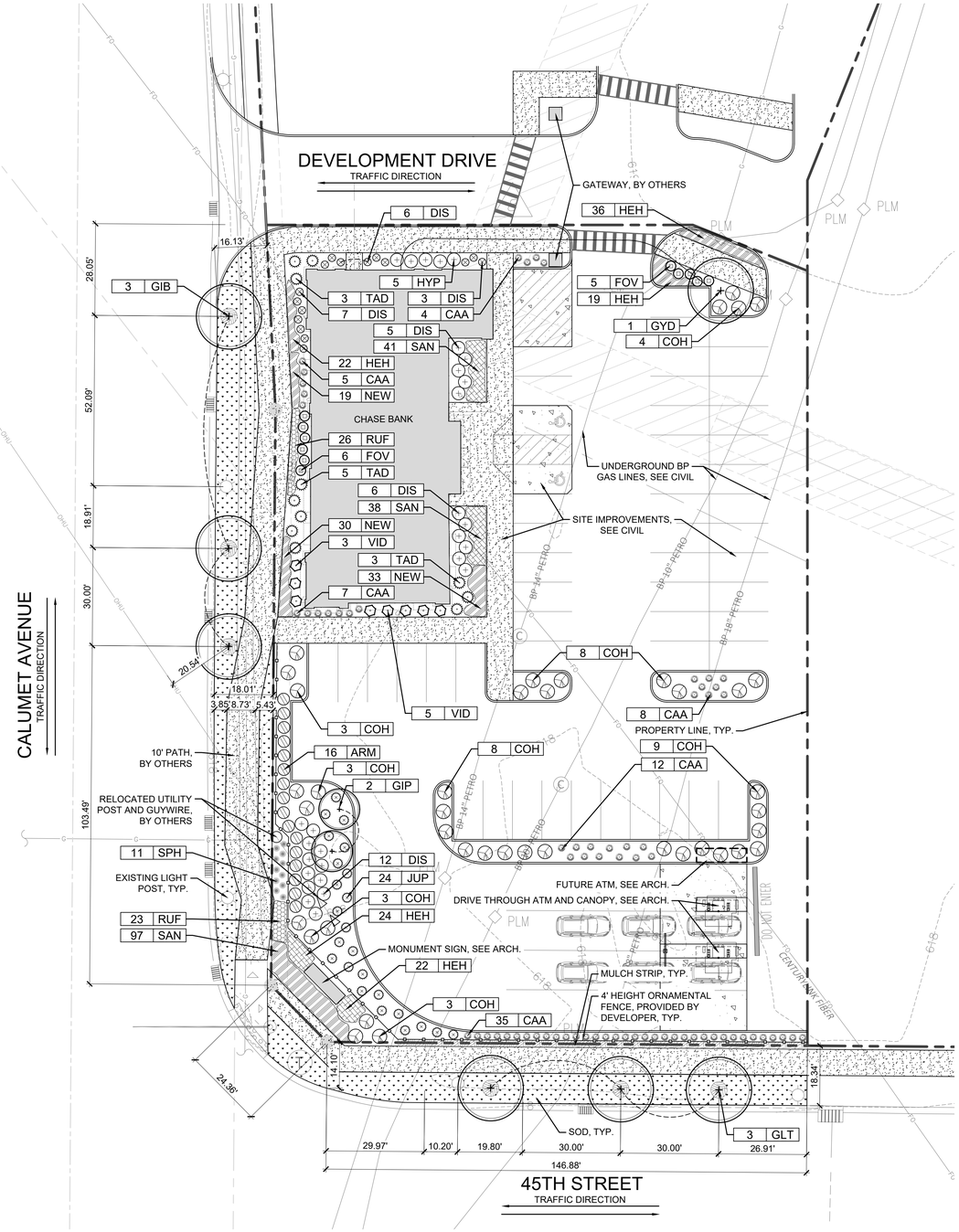
1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend

beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.

4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.
7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.



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20' 0 10' 20' 40'

Scale: 1 inch = 20 feet

LEGEND:

- PROPERTY LINE
- BUILDING
- CONCRETE PAVEMENT AND BASE
- CONCRETE WALK AND BASE
- ORNAMENTAL FENCE
- SHADE TREE
- DECIDUOUS SHRUBS
- EVERGREEN SHRUBS
- ORNAMENTAL GRASSES
- SOD
- PERENNIAL / GROUNDCOVER AREAS
- MULCH, 3" DEPTH

Plant Schedule

Chase Bank - Munster, IN

Qty.	Key	Botanical name	Common name	Size	Notes
		SHADE TREES			
3	GIB	Ginkgo biloba	Ginkgo	2.5" B&B	Central leader
2	GIP	Ginkgo biloba 'Princeton Sentry'	Princeton Sentry Ginkgo	2.5" B&B	Central leader
3	GLT	Gleditsia triacanthos 'Skyline'	Skyline Honeylocust	2.5" B&B	Central leader
1	GYD	Gymnocladus dioicus 'Espresso'	Espresso Kentucky Coffeetree	2.5" B&B	Central leader
		DECIDUOUS SHRUBS			
16	ARM	Aronia melanocarpa 'Morton'	Iroquois Beauty Chokeberry	24" B&B	5' o.c.
41	COH	Cotoneaster 'Hessei'	Hesse Cotoneaster	#5 Cont.	5' o.c.
39	DIS	Dierville x splendens 'SMNDSS'	Kodiak Fresh Bush Honeysuckle	#5 Cont.	3' o.c.
11	FOV	Forsythia viridissima 'Bronxensis'	Bronx Dwarf Forsythia	#3 Cont.	3' o.c.
5	HYP	Hydrangea paniculata 'Jane'	Little Lime Hydrangea	24" B&B	4' o.c.
8	VID	Viburnum dentatum 'Christom'	Blue Muffin Viburnum	24" B&B	5' o.c.
		EVERGREEN SHRUBS			
12	JUP	Juniperus x pfitzeriana 'Sea Green'	Sea Green Juniper	24" B&B	5' o.c.
11	TAD	Taxus × media 'Densiformis'	Dense Spreading Yew	24" B&B	5' o.c.
		PERENNIALS			
123	HEH	Hemerocallis 'Happy Returns'	Happy Returns Daylily	#1 Cont.	18" o.c.
82	NEW	Nepeta racemosa 'Walker's Low'	Walker's Low Catmint	#1 Cont.	18" o.c.
176	SAN	Salvia nemorosa 'Caradonna'	Caradonna Sage	#1 Cont.	18" o.c.
49	RUF	Rudbeckia fulgida 'Viette's Little Suzy'	Little Suzy Black-Eyed Susan	#1 Cont.	18" o.c.
		ORNAMENTAL GRASSES			
71	CAA	Calamagrostis acutiflora 'Karl Foerster'	Karl Foerster Feather Reed Grass	#1 Cont.	36" o.c.
11	SPH	Sporobolus heterolepis	Prairie Dropseed	#1 Cont.	24" o.c.

SWORN STATEMENTS:

The undersigned acknowledges that the landscape planting plan shown on the attached landscape plan(s) for the property at:

9521 Calumet Ave, Town of Munster, Indiana

has to the best of the undersigned applicant's knowledge, been designed and will be installed, maintained, and replaced, as required, by current and subsequent owners in accordance with the requirements of the Town of Munster Municipal Code, the landscaping standards of the Town of Munster Zoning Ordinance, and the Guide to the Town of Munster Landscape Ordinance.

Existing parkway and on-site interior trees are to be protected while project is under construction and will be replaced by current and subsequent owner if damaged.

Owner's Name and Signature

The undersigned LANDSCAPE ARCHITECT, registered in the State of indiana, acknowledges that the landscape planting plan and construction details shown on the attached landscape plan(s) for the property at:

9521 Calumet Ave, Town of Munster, Indiana

has been designed in accordance with the requirements of the Town of Munster Municipal Code, the landscaping standards of the Town of Munster Zoning Ordinance, and the Guide to the Town of Munster Landscape Ordinances.

#LA21900010
exp. 12/31/25

Keven Graham FASLA, PLA
TERRA Engineering Ltd.
225 W. Ohio Street, Fourth Floor
Chicago, Illinois 60610
ph: 312.467.0123

CHASE BANK

9521 Calumet Ave,
Munster, IN 46321

Client

CHASE

Project Team

LANDSCAPE ARCHITECT

TERRA landscapearchitecture
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ARCHITECT

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Chicago, IL. 60604
312-583-9800

CIVIL ENGINEER

KIMLEY HORN
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Suite 600
Warrenville, IL. 60555
630-487-5550

Revisions

Date	Issue
09/04/2025	Submittal
09/19/2025	Submittal
01/13/2026	Submittal

Stamp

KEVEN GRAHAM REGISTERED NO. LA21900010 STATE OF INDIANA LANDSCAPE ARCHITECT

Title

LANDSCAPE PLAN

Sheet No.

L1.0

TERRA Project No. 18-162-058

Jan 13, 2026 - 11:30am
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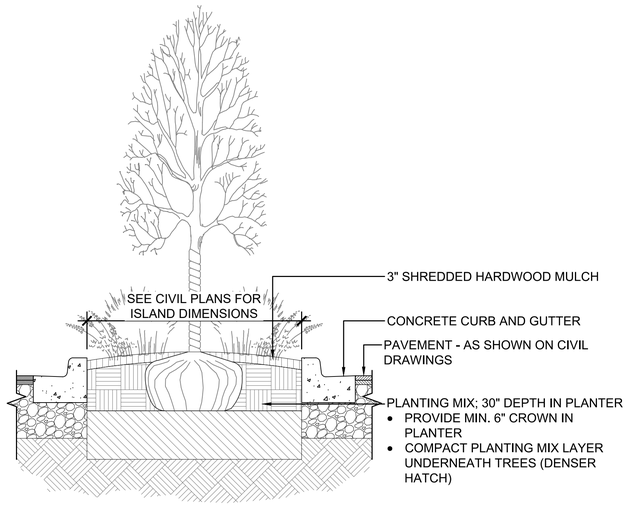
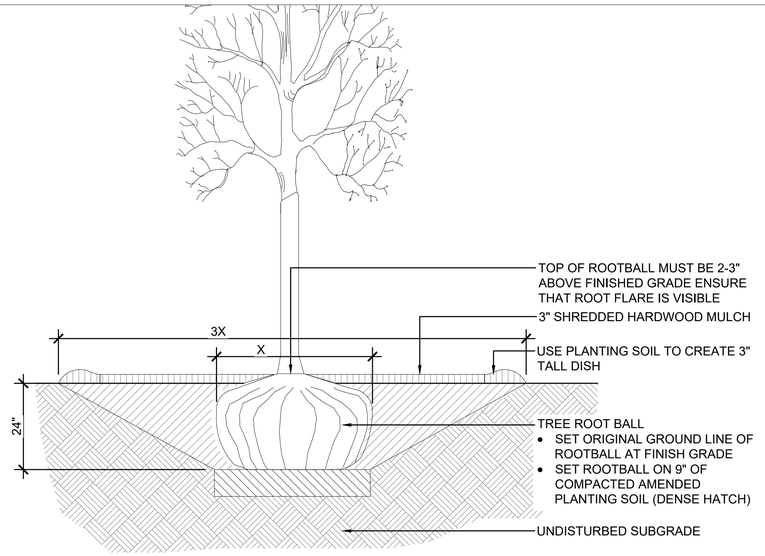
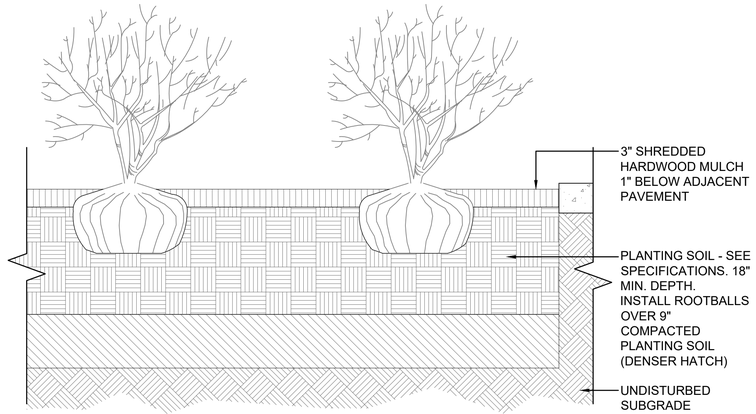
Craig M



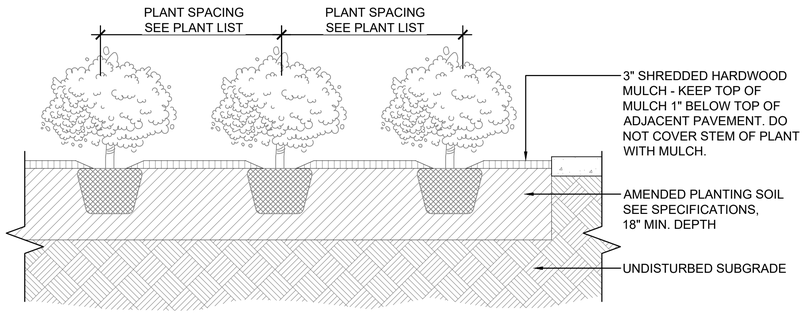
1 SHADE TREE PLANTING - PARKING LOT ISLAND
SCALE: NTS



2 SHADE/ORNAMENTAL TREE PLANTING DETAIL
SCALE: NTS



3 SHRUB PLANTING DETAIL
SCALE: NTS



4 GROUNDCOVER / PERENNIAL PLANTING DETAIL
SCALE: NTS

CHASE BANK
9521 Calumet Ave,
Munster, IN 46321

Client

CHASE

Project Team

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KEVEN GRAVAN REGISTERED NO: LA21900010 STATE OF INDIANA LANDSCAPE ARCHITECT

Title

LANDSCAPE DETAILS

Sheet No.

L2.0

TERRA Project No. 18-162-058

Jan 13, 2026 - 11:30am
M:_2018\18-162 The Architects Partnership\18-162-058 - Munster IN\Design\Site\Drawings\L2.0 Landscape Details.dwg
Original

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

August 21, 2023

Revised August 07,2025

Presented October 14, 2025

Revised October 20, 2025

Revised December 17, 2025

Revised February 10, 2026


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
5,000 SF
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,188 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
34,000 SF


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,360 SF
BLDG O
7,000 SF



Design Standards

Centennial Village Planned Unit Development

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Section 8: Parking – Site and Under Building
Section 9: Site Lighting
Section 10: Site Landscaping & Common Areas
Section 11: Signage
Section 12: Refuse & Recycling Management
Section 13: Screening of Loading & Service Areas
Section 14: Site Furniture, Fixtures & Equipment
Section 15: Utility Service
Section 16: Storm Water Management
Section 17: Subdivision of Land and Site Development Approval

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2: Plan of Development
3: Infrastructure Development Plan Set
4: Sign Regulations for Centennial Village

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail/Offices – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	3	50	5	5	5
O	Hotel	5	80	5	5	5

Building Lot A, A.1, A.2 and A.3 are located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Structural Brick: permitted only on Lot 11
c. Natural Masonry and Architectural Cast Stone
d. Architectural Metal Panels
e. Glass & Store Front Aluminum Window & Door Frames
f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 5th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 25% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 25% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 5th Floor Level Exterior Walls. The 2nd to 5th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 5th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 75% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5h Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

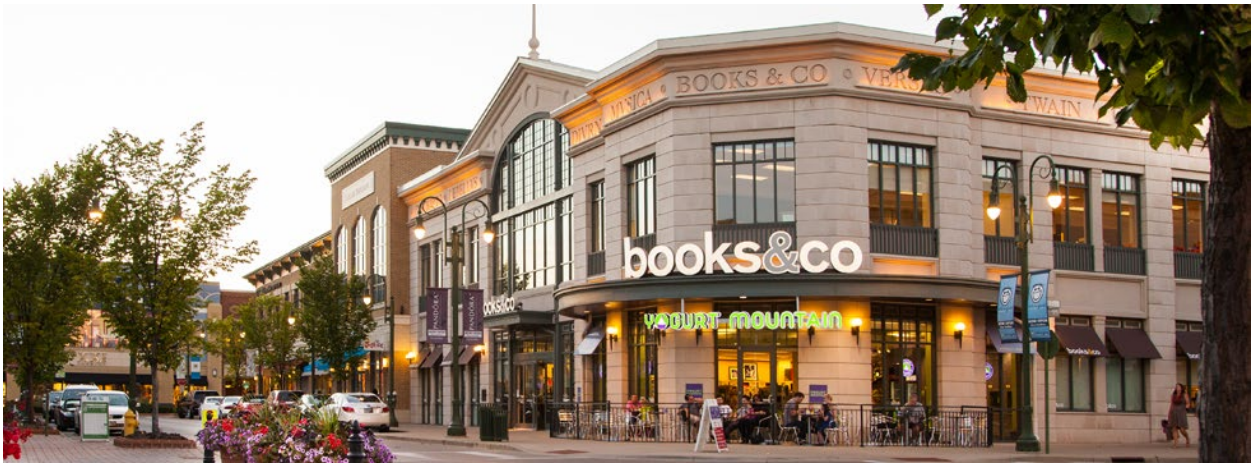
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail/Offices – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	3	Class 1 & 2	Class 3 & 4
O	Hotel	5	Class 1 & 2	Class 3 & 4

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

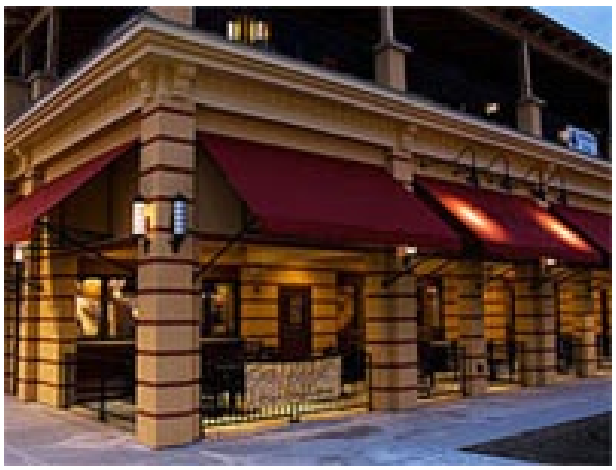
5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide, except the sidewalk adjacent to 45th Avenue, southernmost of Lot 10, Lot 11 and Lot 13 is not required. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide, except Western most Lot 11, Southern most Lot 12 & Northern most Lot 13 shall be minimum 6-feet wideWhere sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

3. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

4. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

5. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

6. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.**Section 8: Parking – Site and Under Building Parking Areas**

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.
    h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees and/orshrubs and/or perennial flowers.

i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

   a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
   b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
   c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
   d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

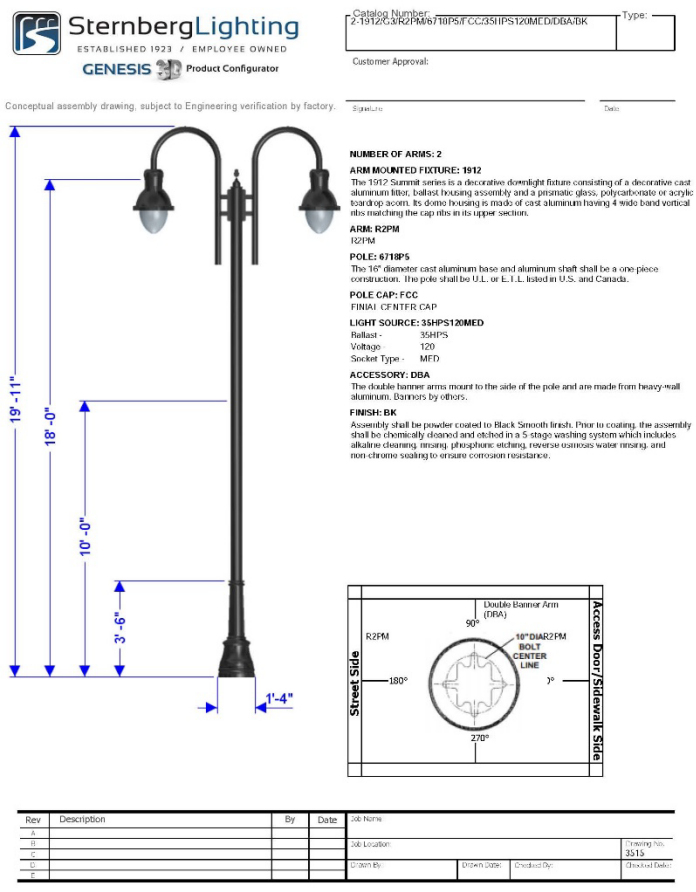
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No “shoe box” wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as “Invasive Species” as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island landscape width shall be of a minimum 7 feet wide to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3’) (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 0.5 feet from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 6,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

Section 11 – Signage

All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.



Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
45TH STREET
CALUMET AVENUE
BLDG PAD A
70,000sf
BLDG PAD L
BLDG PAD M
BLDG PAD
5,200sf
BLDG PAD F
5,200sf
BLDG PAD B
12,830sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD O
7,000sf
BLDG PAD D
17,360sf
CENTENNIAL PARK



Modified and ~~approved~~ within the red hashed line –

January xx, 2026 Conceptual Plan



Modified and approved within the red hashed line –

August 21, 2023



Modified and approved within the red line – November 20, 2023

Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

Appendix 4 – Signage

by reference:

Sign Regulations for Centennial Village

Sign Regulations for Centennial Village

Town of Munster

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.
4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.
5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.

6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.
24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.

25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display, illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.
39. **Storefront:** The façade of a business space that contains a public entrance.
40. **Streamer**: A long, narrow flag, banner or pennant.

41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any artificial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.
2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.

3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or
        2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.
    b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.
d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **Projecting Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projecting sign per business and must be spaced at a minimum of 15 feet from other projecting or blade signs. Projecting signs are only permitted where the business does not have a blade sign.
    a. **Small Projecting Sign(s)**: May only be installed on the first story of a building. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10 sf with a maximum height of 3 ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
    b. **Large Projecting Sign(s)**: May only be installed on buildings with multiple stories and may not be installed on the first story. Sign shall be vertically oriented with the height greater than the projection of the sign. Must be 12 ft above the sidewalk elevation. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 ft from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.
10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.
11. **"Open" Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.
12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.
13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The material must be the general material sign standard compatible and consistent with the materials used to construct the building.
14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning

vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.

15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.
20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings

and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.
19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required

It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit

Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits

It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code

All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code

All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance

The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs

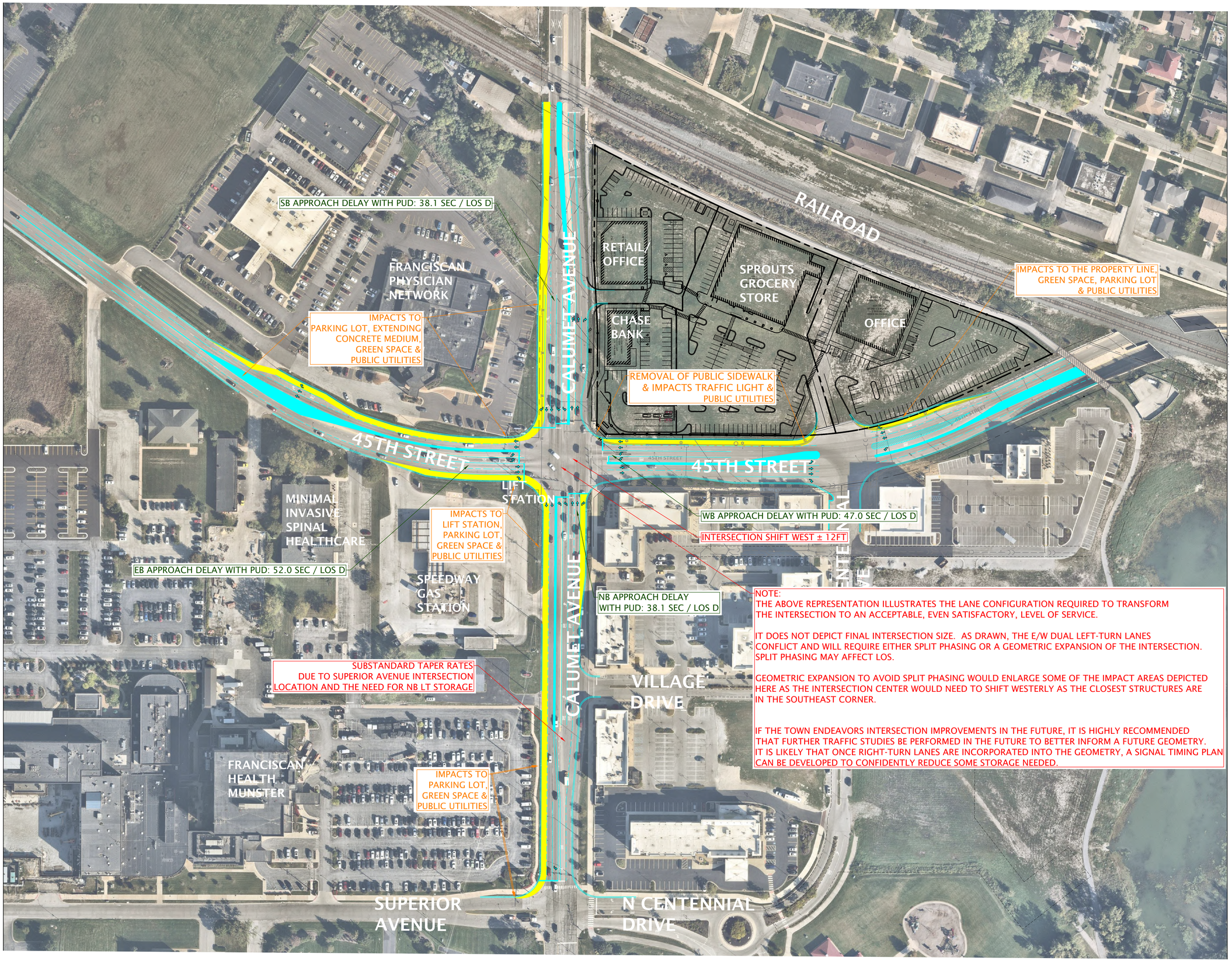
Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.
4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.

7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.



DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION

01/20/26

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

NOT FOR CONSTRUCTION

Centennial Village - Lot 11

ROADWAY GEOMETRY
ACCEPTABLE LOS GEOMETRY

N

0' 40' 80'
SCALE: 1" = 80'

© COPYRIGHT 2017 DVG TEAM, INC

DESIGN BY	DATE
GMPF	01/20/26
PROJECT NO.	
25-0081	
EX 3	

SITE DATA (BUILDING A-LOT 11- SPROUTS)

- USE: GROCERY
- LOT AREA: 2.32 AC
- BUILDING AREA: 23,299 SQ. FT.
- PARKING REQUIRED: 76 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 125 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (BUILDING A.1- LOT 13 - CHASE BANK)

- USE: BANK
- LOT AREA: 0.84 AC
- BUILDING AREA: 4,270 SQ. FT.
- PARKING REQUIRED: 14 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 17 SPACES DESIGNED TO BANK PARKING ONLY DURING BANK HOURS & 39 SPACES TOTAL (INCLUDES 2 ADA SPACES)

SITE DATA (BUILDING A.2 - LOT 12)

- USE: RETAIL OR OFFICE
- LOT AREA: 1.15 AC
- BUILDING AREA: 10,297 SQ. FT.
- PARKING REQUIRED: IF RETAIL: 34 SPACES (3.25 SPACES PER 1,000SF GROSS FLOOR AREA) IF OFFICE: 41 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 53 SPACES (INCLUDES 3 ADA SPACES)

SITE DATA (BUILDING A.3-LOT 10)

- USE: 2 or 3 STORY OFFICE
- LOT AREA: 1.95 AC
- BUILDING AREA: 28,800 SQ. FT. (TOTAL)
- PARKING REQUIRED: 115 SPACES (4 SPACES PER 1,000SF GROSS FLOOR AREA)
- PARKING PROVIDED: 125 SPACES (INCLUDES 5 ADA SPACES)

SITE DATA (TOTAL-ALL FOUR BUILDINGS)

- LOT AREA (TOTAL): 6.26 AC
- PARKING REQUIRED: 246 SPACES
- PARKING PROVIDED: 325 SPACES (DURING BANK HOURS) 342 SPACES (DURING NON-BANK HOURS)

LEGEND

- CONCRETE SIDEWALK
- CONCRETE PAVEMENT
- 4" (MIN) TOPSOIL & SEEDING/LANDSCAPING (SEE LANDSCAPE PLAN)
- ASPHALT PAVEMENT
- STRIPING (PAINT, 4" WIDE)
- BARRIER CURB & GUTTER

NOTES

1. DIMENSIONING SHALL BE TO FACE OF CURB; RADII SHALL BE BACK OF CURB UNLESS OTHERWISE NOTED.

45TH AVENUE

GRAND TRUNK RAILWAY

TAX ID: 45-07-30-502.001-000-027
GRAND TRUNK RAILWAY

TOWN OF MUNSTER INDIANA MUNICIPAL CORPORATION
PARCEL "MS-5" DOC. NO. 2017 011300 REC. 2/23/2017

CALUMET AVENUE
(VARIABLE WIDTH PUBLIC RIGHT-OF-WAY)

RETAIL/OFFICE BLDG "A.2"
10,297 SQ.FT.
LOT 12
50,001 SQ.FT.(1.15 AC)
ADDRESS: 9111 Calumet Ave

GROCERY - SPROUTS
BLDG "A"
23,299 SQ.FT.
LOT 11
101,061 SQ.FT.
2.32 AC
ADDRESS: 800 45th Street
F/F: 619.85

BLDG "A.3"
28,800 SQ.FT TOTAL
LOT 10
84,935 SQ.FT.
1.95 AC
ADDRESS: 900 45th Street

45TH STREET
(100' WIDTH PER DOC. NO. 2017 011300)

45TH STREET
(100' WIDTH PER DOC. NO. 2015 085405)

TOWN OF MUNSTER
DOC. NO. 2015 085405
REC. 12/21/2015

TOWN OF MUNSTER
PARCEL "MS 2"
DOC. NO. 2017 011300
REC. 2/23/2017

CENTENNIAL VILLAGE
THIRD RESUBDIVISION
OF LOT "A"
(PLAT BOOK 117, PAGE 60)

CENTENNIAL VILLAGE
SECOND RESUBDIVISION
OF LOT "A"
(PLAT BOOK 111, PAGE 87)

LOT 6
TAX ID. 45-07-30-352-012.000-027
CV BDG B, LLC
QUIT CLAIM DEED
DOC. NO. 2020 033105
REC. 6/04/2020

LOT 7
TAX ID. 45-07-30-352-013.000-027
CV BDG F LLC
QUITCLAIM DEED
DOC. NO. 2023-027145
REC. 9/19/2023

LOT 8
TAX ID. 45-07-30-352-014.000-027
CV BDG E LLC
QUITCLAIM DEED
DOC. NO. 2024-007164
REC. 2/28/2024

LOT 9
TAX ID. 45-07-30-352-015.000-027
CV BDG M LLC
QUITCLAIM DEED
DOC. NO. 2024-006628
REC. 2/20/2024

SITE BENCHMARK
SAW CUT CROSS
ELEV=618.50 (NAVD88)

N 89°33'34" W 354.40'

S 89°33'34" E 374.38'

N 89°25'55" W 384.68'

S 89°25'55" E 24.00'

N 00°26'05" E 140.00' (P,M)

S 00°26'05" W 140.00' (P,M)

N 89°34'34" W 149.86' (P,M)

S 52°46'17" E 83.13' (P,M)

S 85°42'40" W 66.15'

N 78°03'47" W 129.00'

S 11°27'26" W 213.06'

S 00°12'26" W 232.02' (P,M)

L=306.25' R=700.00' S 77°54'26" W 303.81

L=81.84' R=685.00' S 87°01'02" W 81.79'

L=41.23' R=670.00' S 85°53'39" W 41.23'

C1 INFORMATION
L=41.23' R=670.00'
S 85°53'39" W 41.23'

RIM 615.75
W INV. 608.67
N INV. 606.37
NE INV. N/A
BTTM 605.56

RIM 615.77
E INV. 612.15

RIM 615.48
W INV. 611.77
N INV. 611.28
S INV. 611.28

RIM 615.27
W INV. N/A
N INV. 607.09
E INV. 606.98
S INV. 606.73

RIM 614.70
E INV. 610.94

RIM 614.87
W INV. 609.50

RIM 614.22
S INV. 610.62

RIM 612.61
S INV. 609.45

RIM 609.05
INV. 604.43

RIM 605.22

RIM 617.36
N INV. 611.44
E INV. 611.34

RIM 618.10
N INV. 611.80
S/W INV. 610.87

RIM 617.74
N INV. 611.44
E INV. 611.34

RIM 617.16
INV (W). 612.34
INV (N,E,S). 610.76

RIM 616.74
N INV. 612.99
S INV. 612.91

RIM 617.89

RIM 617.36
W INV. 613.25
S INV. 613.35

RIM 616.47
W INV. 613.83
S INV. 613.93

RIM 617.76
E INV. 613.83

RIM 618.00

RIM 618.67

RIM 617.45

RIM 617.51

RIM 617.52

RIM 617.79

RIM 618.60

RIM 618.00

RIM 618.50

RIM 618.34
RIM 610.40
INV 610.50

RIM 614.34
RIM 610.40
INV 610.50

RIM 616.24
W INV. 609.41
S INV. 609.99

MH NOT FOUND
SEE AS-BUILT
518-1669
RIM 616.24
W INV. 609.41
S INV. 609.99

RIM 616.41
S/W INV. 611.87 (P,M)

RIM 616.41
S/W INV. 611.87 (P,M)

RIM 616.41
S/W INV. 611.87 (P,M)

MUNSTER PLAN COMMISSION
MINUTES OF REGULAR MEETING
February 10, 2026

The Munster Plan Commission held a meeting on February 10, 2026, at Munster Town Hall, 1005 Ridge Road, in the Main meeting room and could be accessed remotely via Zoom webinar, a videoconference application.

CALL to ORDER: Commissioner Raffin called the meeting to order at 7:00 pm.

MOMENT of SILENCE and PLEDGE of ALLEGIANCE

ROLL CALL:

William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council President, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026

Members in Attendance	**Members Absent:**	**Staff Present**
Jennifer Johns	William Baker	Sergio Mendoza, Planning Director
Rachel Branagan		Nicole Bennett, Town Attorney
Joseph Hofferth		Denise Core, Administrative Assistant
David Nellans		
Roland Raffin		
George Shinkan		

Vice President Raffin announced we have a quorum.

APPROVAL of MINUTES:

January 13, 2026, PC Minutes

Motion: Councilor Shinkan moved to approve the minutes from January 13, 2026.
Second: Councilor Nellans
Vote: Yes – 5; No – 0; Abstain – 1. Motion carries.
Commissioner Johns abstained explaining she was not in attendance at the January 13, 2026, meeting.

PRELIMINARY HEARINGS: None

PUBLIC HEARINGS:

PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village requests review of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue. This matter was a continuation of a previously opened public hearing.

Director Mendoza reported that DVG and the Centennial Village team met with town staff and representatives to address concerns raised at the previous meeting, specifically in regard to the proposed amendments to the Planned Unit Development (PUD). He said the developer is now proposing a new right-in access from Calumet Avenue, as well as an additional 15-foot public right-of-way dedication along 45th Avenue. He said staff had also reviewed the updated traffic study memorandum, outlining improvements that would raise the intersection's performance at full build-out from a Level of Service (LOS) E to D through realignment and expanded turn lanes. He said it was estimated that this improvement would reduce the average delay to approximately 40 to 45 seconds during signal cycles at full buildout. He said the development team could expand on the new proposal. When there were no questions for staff, Commissioner Raffin called on the applicants to introduce themselves.

Mr. Russ Pozen from DVG, 1155 Troutwine Road, Crown Point, IN, speaking for the developer, elaborated on the traffic analyses conducted jointly with SEH. He commented on the plat, explaining that there is a 15-foot dedication along 45th that tapers off to the east as you get to the underpass. He said the intersection improvements, adding turn lanes on 45th Street and on Calumet Avenue, could reduce delays from approximately 76 seconds to 46 seconds, which they characterized as a significant enhancement given the volume of traffic in the area. He emphasized that achieving an LOS C is unrealistic under current conditions, making LOS D a meaningful and practical improvement. He said the town will need to manage the property acquisition, realignment, and other related work that is out of the control of their development. He reported that the developer acknowledged that the additional 15-foot right-of-way dedication constrained the site plan, requiring revisions to accommodate anchor tenants Sprouts and Chase Bank, both of whom faced reductions in available parking. He said multiple iterations were conducted to satisfy both users while maintaining project feasibility. He said the PUD will have to be amended to reflect the changes to the site needed to fit everything in the reduced land area.

Commissioner Raffin said he sat through one of the meetings and appreciated the work that was put in by all parties to come up with this plan, which is a great improvement.

Commissioner Branagan asked for clarification on the sidewalk on Calumet Avenue, asking if they were taking a portion of sidewalk away or if was just ending. Mr. Pozen said the site plan they are looking at will be revised to reflect the proposed changes. He explained that by removing 15 feet from their south property, that shifted the site up. He addressed pedestrian circulation, noting that the commissioners had raised concerns about sidewalk continuity along Calumet Avenue and 45th Street. He explained that an east–west sidewalk along 45th Street cannot be accommodated on-site due to the right-of-way dedication area being needed for future turn lanes and utility adjustments; any such sidewalk would ultimately be part of Town improvements within the newly dedicated right-of-way. Commissioner Branagan said she specifically wanted to know how the existing sidewalk would connect. Mr. Pozen said the displayed plan

does not show the fully redesigned plan, but he did confirm that a 10-foot sidewalk along Calumet Avenue will run the full frontage and connect to existing pedestrian infrastructure at the Calumet/45th intersection. Commissioner Raffin noted that the project also preserves multiple access points to the regional bikeway system located behind the site. Mr. Pozen added there are a lot of connectivity through the development.

Commissioner Raffin announce that this is a continued public hearing and asked members of the public to come forward if they wanted to speak. When no members of the public came forward, Commissioner Raffin brought the meeting back to the Plan Commission for deliberation.

Councilor Hofferth expressed appreciation for the collaborative effort between staff, the developer, and consultants, noting that significant progress had been made in addressing prior concerns. He made a motion to approve this petition with conditions.

Motion: Councilor Hofferth moved to grant Preliminary Plat Approval for PC Docket No. 25-015, a 4-Lot subdivision to be known as: LOTS 10, 11, 12, and 13 of CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT C, including all discussions and findings, subject to the following conditions:

1. The applicant shall design and install a dedicated right-turn lane along Calumet Avenue, in accordance with Town Engineer approval.
2. The applicant shall dedicate an additional fifteen (15) feet of public right-of-way along 45th Street. Said dedication shall be shown on the preliminary and final plats and recorded in a form acceptable to the Town Engineer and Town Attorney.
3. The Plan Commission waives the requirements of public infrastructure improvements and any surety requirements between North Centennial Drive and the Calumet Avenue right-of-way, excluding all North Centennial Drive improvements and traffic signal related requirements.

Second: Councilor Shinkan
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue. This matter was a continuation of a previously opened public hearing.

Director Mendoza reported that staff received updates this morning (2/10/26) but has not had the opportunity to review the proposed changes to the development plan or verify their consistency with the amended four-lot subdivision. These updates may affect both the overall development plan and associated codified language; therefore, staff recommends tabling the item to allow adequate time for review and for any necessary revisions to be made for next month.

Mr. Russ Pozen of DVG at 1155 Troutwine Road, Crown Point, IN, said he had hoped for a more contingency style format for this. Attorney Bennett said this this is an ordinance and ordinances cannot have contingencies. Ordinances go to the Town Council for approval.

Commissioner Raffin asked Mr. Pozen to briefly outline the changes to save time at the next meeting.

Mr. Pozen noted the following items:

- Several previously discussed elements remain unchanged, including the requirement for structural brick on the Sprouts lot only.
- The proposed language regarding the future far east Lot 10 continues to allow a two- or three-story configuration without altering the total permitted square footage.
- Adjustments have been made to reflect the modified site circulation, referencing the required sidewalk widths on the Chase lot, the future north lot and the west lot. The west area, the northernmost and the southernmost sidewalk widths have to be 6 feet instead of 8 feet; they condensed the site so much, they cannot fit the wider sidewalks. He also made note of the removal of the 45th Street sidewalk.
- The proposed signage package remains consistent with prior discussions, aligning Town signage expectations with the operational needs of a grocery store.
- The landscaping requirements on the Chase lot have been revised to reduce the number of required trees due to site constraints and existing pipeline easements, with supplemental shrubs added where feasible.

With no formal updates presented, the public was not invited to comment.

Motion: Commissioner Johns moved to table PC Docket No. 25-016, a Public Hearing for a proposed Amendment to the Centennial Village Planned Unit Development, to the March 10, 2026, Plan Commission meeting to allow the applicant time to submit an updated PUD Amendment reflecting the proposed subdivision (PC25-015), including all findings and discussions. The public hearing will remain open.
Second: Councilor Hofferth
Vote: Yes – 6 No – 0; Abstain – 0. Motion carries.

PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street. This matter was a continuation of a previously opened public hearing.

Director Mendoza reported that staff has not yet reviewed an updated development plan reflecting the recent primary approval for the lot. Staff must verify that the plan aligns with the applicable codes and the proposed PUD. The revised plat has not been submitted, so staff recommends deferring this item to allow the applicant time to provide an updated development plan specific to this site.

Mr. Russ Pozen of DVG, 1155 Troutwine Road, Crown Point, IN noted that although the site has been slightly condensed, the parking count remains acceptable at approximately 125 spaces, and the building footprint and layout have not substantively changed.

Commissioner Raffin said no major concerns are anticipated pending staff's formal review.

With no formal updates presented, the public was not invited to comment.

Motion: Councilor Hofferth moved to table PC Docket No. 25-017, a Public Hearing for a proposed Development Plan for proposed Lot 10 of Centennial Village to the March 10, 2026, Plan Commission meeting to allow the applicant time to submit a revised Development Plan for a proposed Sprouts Market supported by an updated PUD Amendment (PC 25-016), including all findings and discussions. The public hearing will remain open.
Second: Councilor Shinkan
Vote: Yes – 6 No – 0; Abstain – 0. Motion carries.

PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue. This matter was a continuation of a previously opened public hearing.

Director Mendoza reported that this is a similar situation as the previous petition; staff is requesting that this item be tabled. Although a landscape plan was submitted, it is expected to change. It does not correspond with the currently proposed design of the right-turn entrance on Calumet Avenue. A revised plan will need to be submitted to reflect those updates.

Mr. Russ Pozen of DVG, 1155 Troutwine Road, Crown Point, IN, noted that some landscape reductions will be necessary due to site constraints. For example, trees cannot be installed along 45th Street within the right-of-way because future construction would require their removal. The overall design will remain the same. Attorney Bennett noted that the updated standards for these lots will be incorporated into the ordinance. The ordinance will include language specific to these lots which will prevent the creation of non-conforming conditions and reduce the need for future variances.

With no formal updates presented, the public was not invited to comment

Motion: Councilor Shinkan moved to table PC Docket No. 25-018, a Public Hearing for a proposed Development Plan for proposed Lot 13 of Centennial Village to the March 10, 2026, Plan Commission meeting to allow the applicant time to submit a revised Development Plan for a proposed Chase Bank supported by an updated PUD Amendment (PC 25-016), including all findings and discussions. The public hearing will remain open.
Second: Councilor Nellans
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc., requests review of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC. This matter was a continuation of a previously opened public hearing.

Director Mendoza reported that no changes have been made to the proposed subdivision over the past several months. The only updates relate to the PUD, which has been revised to reflect the appropriate uses for the proposed four lots. He said comments were received from the Town Engineer and that any approval will require review and inspection by the Public Works Department and the Town Engineer, particularly regarding stormwater improvements, sidewalks along 45th Street, and water service

configurations, including fire suppression. He stated that Approval letters from Public Works and the Fire Department must be on file as conditions of approval of the plat.

Commissioner Raffin asked the commissioners if they had questions for staff. When there were no questions, he asked if anyone wished to speak on behalf if the petitioner.

Attorney Scott Yahne of 3 Lincolnway, Suite 201, Valparaiso, IN, the petitioner's representative, reported that they have worked through the items that held them up last time and they are in a good place. He noted that the PUD document has been significantly improved, modernized, reorganized, and made easier to interpret thanks to the collaboration with Attorney Bennett and Director Mendoza. The amended version is a much friendlier version for the commissioners to interpret is more forward facing. He noted that Tom, the owner's representative, and Jared, the architect, were available in person and via Zoom, respectively. He concluded by saying the team is prepared to answer any questions.

Councilor Shinkan made a motion to approved PC25-021 with conditions.

Commissioner Raffin opened the public hearing. With no comments offered, the public hearing was closed, and the motion was seconded.

Motion: Councilor Shinkan moved to approve PC Docket No. 25-021, a proposed SUBDIVISION: THE PAVILION ON 45TH, LOTS 1-4 including all findings and discussions, subject to the following conditions:

1. All public improvements shall be installed per Section 26-293 of the Subdivision Control Ordinance in accordance with Town Engineer review and Public Works inspection.
2. That all building water service configurations, including potable, irrigation, and fire suppression systems be submitted for review and accepted by approval letters from the Town Munster Public Works and Fire Departments.

Second: Commissioner Johns
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.

Director Mendoza reported that staff and the applicant have collaborated extensively to align the subdivision plan, future uses, and redevelopment expectations for Lots 1–4 and the entire site. The updated PUD is comprehensive and provides adequate guidance for certain materials and uses for future development while protecting existing structures and allowing appropriate enhancements. He stated that staff recommends that a condition for approval include the condition that Section 1, subsection C, subsection 3 of the PUD Ordinance undergo additional legal review before the Town Council considers the ordinance.

Commissioner Raffin said during review of the proposed amendments, the Commission discussed ensuring that future buildings comply with current zoning and building standards. He expressed his concern and objection to the inclusion of a hotel as a use; adding that a hotel is not compatible with the character of the site. Director Mendoza said that could be added as a condition of approval.

Attorney Scott Yahne, 3 Lincolnway, Suite 201, Valparaiso, IN, reported that they can scratch hotel use from the list of permitted uses. He said prior to this meeting, he and staff have collaborated on finalizing language the language in Section 1(C)(3). Attorney Bennett noted that this is the section Director Mendoza had referenced and it has two primary concerns. One is to identify that the certificate of occupancy relates to development on that lot, not only the structure. The other is with the existing storage units in the tenant space on Lot 3. One of the considerations is that it currently exists. The intention is to move that to Lot 4, but the concern is with the legal status of those leases on the existing storage units on Lot 3. She explained that there will be an end time on the leases in accordance with those leases. The final language will be completed promptly to ensure the ordinance is accurate and consistent with existing lease obligations.

Attorney Bennett stated that this ordinance will repeal and replace all prior PUD ordinances for the property.

Commissioner Raffin opened the public hearing. With no comments offered, the public hearing was closed.

Motion: Commissioner Johns moved to send a favorable recommendation to the Town Council for PC Docket No. 25-022, an AMENDMENT TO THE PAVILION ON 45TH PLANNED UNIT DEVELOPMENT, including all findings and discussions with the following conditions:

1. Legal reviews and updates the language in SECTION I. C. 3. prior to Town Council consideration.
2. Hotel use be removed from the list of permitted uses.

Second: Councilor Hofferth
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., requests review of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.

Director Mendoza reported that no substantive changes have been made to the development plan in the last 4 months. The plan remains consistent with the proposed PUD.

Scott Yaney of 3 Lincoln Way, Suite 201, Valparaiso, IN, presented the updated building design. He explained that while the site plan has not changed, they have a new building to propose. They submitted revised elevations that incorporate additional brick. He said although this building sits behind another building, they feel they have substantially updated the look and feel of the building in response to Commissioner Branagan's prior comments. He concluded by saying that he thought the updated design aligns with the Commission's expectations, and the project architect is available for any technical questions.

Commission Branagan thanked the applicant for considering previous feedback and improving the building's appearance.

Commissioner Raffin opened public hearing. No members of the public provided comment. The hearing was then closed.

Motion: Commissioner Johns moved to approve PC Docket No. 25-023, a Development Plan for a self-storage facility on proposed lot 4 of The Pavilion on 45th, including all findings and discussions.
Second: Commissioner Branagan
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Commissioner Raffin thanked everyone for their cooperation and effort throughout the review process. He acknowledged the amount of time and effort that went into this project.

PC26-001 DEVELOPMENT PLAN REVIEW: David R. Hill of M2Ke Design, LLC, on behalf of Laborers' International Union of North America, Local 41, requests review of a Development Plan for a second story addition to an existing one-story brick Union Hall building located at 550 Superior Avenue.

Director Mendoza reported that the Laborers' Union Hall is proposing a partial second floor addition to the existing structure to provide additional conference space. The project includes a new façade that will wrap the existing structure and create a more modern architectural appearance. The second floor will feature a balcony. A small horizontal addition, approximately 40 feet by 8 feet, will serve as a new vestibule providing access to the second floor conference area and storage space.

Director Mendoza said the primary item requiring Plan Commission consideration is the proposed use of architectural or structural masonry units, that will be used to accomplish that architectural style. He explained that material differs somewhat from materials explicitly listed in the zoning code. All other aspects of the project comply with applicable regulations. There are no impacts to parking or site circulation. Any future changes involving lighting, signage, or tree removal and replacement will require separate review.

Commissioner Raffin asked if the commissioners had any questions for staff. Councilor Shinkan commented that it is a beautiful building. Commissioner Raffin asked if there was anyone wishing to speak on behalf of the petitioner.

David R. Hill, architect, 11008 North Landing Road, Monticello, IN, addressed a few comments that Director Mendoza made. He acknowledged that the signage shown in the rendering will be submitted through a separate approval process; they have alternate signage concepts prepared, if needed. He explained that on the north end of the building there is a lot of landscaping. There are a number of small trees and bushes. The west half of the addition is designed with a steel frame to preserve as much of that landscaping as possible. What will be disturbed is the area where the vestibule is going. He stated that any disturbed plantings will be replaced in accordance with town standards.

Mr. Hill noted that the existing building has good bones with a steel structural frame, which supports the planned upgrades and façade improvements. He thought it would be a dramatic change in the overall appearance.

Commissioner Raffin opened the public hearing. There were no public comments; he closed the public hearing.

Motion: Councilor Shinkan moved to approve PC Docket No. 26-001, a proposed Development Plan for a second-story addition and façade update with building materials as presented, including all discussion and findings, with the condition that the applicant comply with the Town's tree placement standards and all lighting and signage codes, or seek a variance from the Board of Zoning Appeals.
Second: Councilor Nellans
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

FINDINGS of FACT:

PC25-013 SUBDIVISION FINAL PLAT: Bruce Boyer on behalf of Crew Car Wash received Final Plat approval for a 1-Lot Subdivision, a replat of Lots 25, 26, 27, 28, and 29 to create Lot 1 of CREW CAR WASH SUBDIVISION located at 111 Ridge Road.

Motion: Councilor Hofferth moved to approve Findings of Fact for PC25-013.
Second: Councilor Nellans
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

OTHER BUSINESS:

2026 PC Schedule of Meeting Dates and Filing Deadlines Update

Director Mendoza reported there was a motion to accept the changes to the deadlines presented last month. This document corrects some of the dates that were incorrect and he wanted to share that with the public.

The commissioners agreed to accept the final revisions made to the 2026 PC Schedule of Meeting Dates and Deadlines which were adopted on January 13, 2025.

PC Rules and Regulations

Director Mendoza gave an update on the progress of the Plan Commission Rules and Regulations. He said we have a draft version that will be sent out by email for the Plan Commission members to review. he said that over the past few weeks, there's been some discussion on items that should be added. These include special meetings or special needs sessions, who runs the meeting when someone is absent, and other information to outline procedures for the commission itself. He said they may have noticed a change in the lineup behind the roll call and votes. He said they had done some research on this and found, for example, that some communities proceed with naming their elected officials first. That is the practice that we are going to implement as a part of the new regulations.

Commissioner Raffin thanked Director Mendoza adding that they look forward to seeing that. He asked if the commissioners had any discussion on the PC rules and regulations. There was no discussion and no action was required of the commission.

CONTINUED DISCUSSION ITEMS: None

Next Meeting: Vice President Raffin announced that the next regular meeting is scheduled for March 10, 2026.

ADJOURNMENT:

Motion: Councilor Shinkan moved to adjourn.
Second: Councilor Nellans
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Meeting adjourned at 7:57pm

Vice President ~~Boland Raffin~~ WILLIAM BAKER
Plan Commission

3/10/26
Date of Approval

Executive Secretary Sergio Mendoza
Plan Commission

3.10.26
Date of Approval

TOWN OF MUNSTER

PLAN COMMISSION REGULAR MEETING 3/10/26

Munster Town Hall: Main Meeting Room

Tuesday, March 10, 2026 at 07:00 PM

AGENDA

Join Zoom Webinar as a Viewer:
https://us02web.zoom.us/j/83006860776
Meeting ID: 830 0686 0776
Passcode: 138335

1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**

   William Baker (R), President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
   Roland Raffin (D), Vice President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
   Jennifer Johns (R), member. Appointed by: Town Council President, Initial Appointment: 01/08/2024 - Term Expiration: 12/31/2027
   Rachel Branagan (D), member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
   Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
   David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
   George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026

5. **APPROVAL OF MINUTES**
   a. February 10, 2026, PC Minutes
      Documents: 2026.02.10 PC MInutes draft
6. **PRELIMINARY HEARINGS**
7. **PUBLIC HEARINGS**
   a. PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue.
      CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
      Documents: PC25-16 Staff Report Addendum PUD 3.10.26 | Centennial Village PUD Amend.CV Design Standards Revised 02.23.2026
   b. PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street.
      CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
      Documents: PC25-17 Staff Report Addendum Sprouts 3.10.26 | 20260223-IFP Site Civil Plan Set_CVP Sprouts | 20260218 Sprouts Munster Landscape Plan
   c. PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.
      CONTINUED PUBLIC HEARING FROM DECEMBER 9, 2025
      Documents: PC25-18 Staff Report Addendum Chase 3.10.26 | 20260223-IFP Site Civil Plan Set_CVP Chase Bank | 20260217 Chase Munster Landscape Plan
8. **FINDINGS OF FACT**
   a. PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village received conditional approval of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to

create Lots 10, 11, 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue.
Documents: PC 25-015 Findings - Prelim Plat PUD w Ex A - Centennial Village Replat of Lot C (2026-03-10)

b. PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc. received conditional approval of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.
Documents: PC 25-021 Findings - Prelim Plat PUD w Ex. A - The Pavilion at 45 (2026-03-10)

c. PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., received a favorable recommendation with conditions to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.
Documents: PC 25-022 Findings - Amend PUD Ord - The Pavilion at 45 (2026-03-10)

d. PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., received approval of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.
Documents: PC 25-023 Findings - Dev. Plan for PUD - The Pavilion at 45 (2026-03-10)

e. PC26-001 DEVELOPMENT PLAN REVIEW: David R. Hill of M2Ke Design, LLC, on behalf of Laborers' International Union of North America, Local 41, received approval of a Development Plan for a second story addition to an existing one-story brick Union Hall building located at 550 Superior Avenue.
Documents: PC 26-001 Findings - Dev. Plan for Laborers Int'l Union (2026-03-10)

9. **OTHER BUSINESS**
   a. PC Rules and Regulations
   b. Zoning Code Amendment
10. **CONTINUED DISCUSSION ITEMS**
11. **NEXT REGULAR BUSINESS MEETING** April 14, 2026
12. **ADJOURNMENT**

Recorded meetings are archived at: https://www.youtube.com/channel/UCjZG8vgYLDwUr-sEWvNOSFQ

ADDENDUM
PLAN COMMISSION STAFF REPORT
PC 25-016

To: Members of the Plan Commission

From: Sergio Mendoza, Planning Director

Meeting Date: March 10, 2026

Agenda Item: PC 25-016: PUD AMENDMENT, Centennial Village

Subject: Addendum to February 10, 2026 Plan Commission Staff Report Addendum

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PURPOSE
This memorandum is an addendum to the February 10, 2026 staff report addendum regarding a proposed PLANNED UNIT DEVELOPMENT (PUD) AMENDMENT for Centennial Village. This addendum identifies updates, findings, and recommendations to the above-listed agenda items since the original filing on October 14, 2025 and continued Public Hearing from December 9, 2025, now for consideration at the March 10, 2026, Plan Commission (PC) meeting.

UPDATE
Last month's Staff Report Addendum, staff has noted that a proposed subdivision modification will require corresponding updates to a proposed Centennial Village PUD Amendment, pursuant to **Section 26-6.804.L.9 SPECIFIC SUPPLEMENTAL PROVISION RELATED TO PLANNED UNIT DEVELOPMENT**. Specifically, updates to the proposed 4-Lot subdivision and Development Plans for the Chase Bank and Sprouts Market. The applicant/agent has submitted a revised PUD Amendment which includes language referencing Clayhole Lake, roundabout, and total number of lots. Additional updates include uses for a grocer, financial institution, and retail/office uses. Other updates include an increase to building size and floor heights. The updated PUD also proposed the use of structural brick exclusive to Lot 11 and the distribution of material (reduction in class 3 and increase of accent material). The. Finally, the PUD repeals and replaces the sign standards in its entirety and adjusts parking island requirements. The full PUD Amendment may be found in the February 27, 2026 Plan Commission ShareFile and "EXCERPTS" of the PUD amendments are attached as part of this addendum staff report for consideration.

STAFF FINDINGS AND RECOMMENDATION
At the February 10, 2026 Plan Commission meeting the PUD Amendment interest was deferred to the March 10, 2026 Plan Commission meeting to allow the applicant adequate time to resubmit a complete and coordinated standard for a PUD Amendment reflecting the proposed subdivision revisions, and; revised Development Plans for the Chase Bank, and; development plan for Sprouts Market. Since the

initial public hearing schedule, the applicant and Plan Commission have maintained due process protocols and finds under Section 26-6.804.L.9 of the Town Code proposed updates to be orderly and coordinated development in the public's interest and staff would encourage a proper motion of the requested PUD Amendment.

Staff finds that the proposed PUD Amendments offer a framework consistent with the recent preliminary plat approval for a 4-Lot Subdivision and support the previous discussion regarding two Development Plans, one for Chase Bank and the second for Sprouts Market. Staff notes that while Clayhole Lake and a roundabout are referenced in this PUD Amendment, no standards or plans have been presented in support thereof. Additionally, the proposed uses and building materials are consistent with previous months of review and reports. Finally, the repeal and replace of this development's sign codes were born from the business tenant needs and change to parking standards were a result of right-of-way dedication to support road realignment and traffic safety.

Finally, if there are no additional changes or updates to the proposed PUD Amendment from the Plan Commission, staff would encourage the applicant to update the proposed PUD Amendment with items cited in the attached "EDITS" primarily consisting of scriveners and flow updates. Staff requests that these findings supplement and refine the analysis contained in previous staff reports and be considered part of the full record, while all other findings, analysis, and recommendations in the original staff report remain unchanged unless otherwise noted.

MOTION:
The Plan Commission may consider the following motion:

- *Motion to send a FAVORABLE RECOMMENDATION to the Town Council for PC 25-016, a proposed Amendment to the Centennial Village Planned Unit Development with the condition that the recommended EDITS attached in the March 10, 2026 Addendum Staff Report be complete, including all findings and discussions.*

ATTACHMENTS:
- Draft of a proposed PUD AMENDMENT dated 01/23/26 (*59 pages*)
- EXCERPTS (4 pages)
- EDITS (1 page)

Centennial Village Planned Unit Development Amendment

EXCERPTS:

- Page 6 – language to added referencing Clayhole Lake:

Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood.

- Page 9 – additional use and standards identified:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	~~Retail – Anchor~~Grocery - Anchor	1	35	~~30~~5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail/Offices – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70~~65~~	5	5	5
N	Retail - Anchor	~~2~~3~~1~~	50~~35~~	5	5	5
O	Hotel~~Retail – Single Tenant~~	5~~1~~	80~~25~~	5	5	5

- Page 11 – building material for specific lot:

Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
~~a.~~b. ~~or~~ Structural Brick: permitted only on Lot 11

- Page 12 – build material class reduction and building height increase:

Class 3 – Primary Exterior Building Materials – 2nd to 54th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 2530% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 2530% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 54th Floor Level Exterior Walls. The 2nd to 54th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, ~~wall~~ for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

- Page 13 – Accent material increase and building height increase:

Class 4 – Accent Materials – 2nd to 54th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 750% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5-4th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

- Page 15 – Distribution of material for certain buildings:

The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	~~Retail – Anchor~~Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail/Offices – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4

- Page 19 – reference to a Roundabout:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet ~~west~~ east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

- Page 29 – additional parking standards and exclusive standards reference to proposed Lot 13:

15. Trees and plants identified as "Invasive Species" as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3') (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.

~~15.~~23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

- Pages 29 through 39 – new sign standards to replace previous sign standards for all lots:

~~All signs located within the development shall be regulated and conform to the current Sign Regulations for Centennial Village as included in Appendix 4.~~

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

Page 50 – change in total number of building sites:

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of ~~15~~ 18 building sites. Construction to be completed on all building

Centennial Village Planned Unit Development Amendment

EDITS:

- Remove images on pages 2 through 4
- Pages 10, 21, 44 "Pensey" to read "Pennsy" throughout the document
- Page 6, change "insure" to read "ensure"
- Page 15 (item I), change "Retaill" to read "Retail"
- Page 20, change "thorough fare" to read "thoroughfare"
- Page 28, change "Amerlanchier Arborea" to read "Amelanchier Arborea"
  "Dommon Chokecherry" to read "Common Chokecherry"
  "Weigla" to read "Weigela"
  "Hydrangea Aborescens" to read "Hydrangea Arborescens"
  "Syringa Retuculate" to read "Syringa Reticulata
- Page 45, change "NISPCO" to read "NIPSCO"
- Consider creating a Section 18 as a "catch all" to include standards not identified in this PUD default to the Town Stands.
- Remove Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat. If the developer wishes to keep this information for reference, then it may be acceptable to incorporate these images into the body of the PUD Code under Section 17 – Subdivision of Land and Site Development Approvals. However, this may require multiple plats to support the 18 building site referenced within the proposed PUD Amendment.
- Remove Appendix 2 – Centennial Village Planned Unit Development Plan of Development. If the developer wishes to keep this information for historical purposes, then it may be acceptable to incorporate these images into the body of the PUD Code as "Section 19 - Concept Site Development Amendments."
- Remove Appendix 3 – Infrastructure Development Plan Set from the proposed PUD Zoning update and include them as part of an Approved Development Plan per SECTION 26-804.F

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

August 21, 2023

Revised August 07,2025

Presented October 14, 2025

Revised October 20, 2025

Revised December 17, 2025

Revised February 23, 2026


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
5,000 SF
BLDG M
6,950 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG I
22,188 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG O
98,480
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,560 SF
BLDG N
34,000 SF


BLDG A
70,000 SF
CALUMET AVENUE
45TH STREET
PEDESTRIAN BRIDGE
BLDG L
16,000 SF
BLDG M
6,950 SF
BLDG I
22,188 SF
BLDG B
13,833 SF
BLDG F
5,400 SF
BLDG C
6,600 SF
BLDG G
77,920 SF
BLDG J
71,040 SF
BLDG N
42,175 SF
BLDG H
74,000 SF
BLDG D
8,400 SF
BLDG K
71,040 SF
BLDG E
57,360 SF
BLDG O
7,000 SF



Design Standards

Centennial Village Planned Unit Development

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Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to insure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail/Offices – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	3	50	5	5	5
O	Hotel	5	80	5	5	5

Building Lot A, A.1, A.2 and A.3 are located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pensey Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pensey Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Structural Brick: permitted only on Lot 11
c. Natural Masonry and Architectural Cast Stone
d. Architectural Metal Panels
e. Glass & Store Front Aluminum Window & Door Frames
f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 5th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 25% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 25% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 5th Floor Level Exterior Walls. The 2nd to 5th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 5th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 75% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5h Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

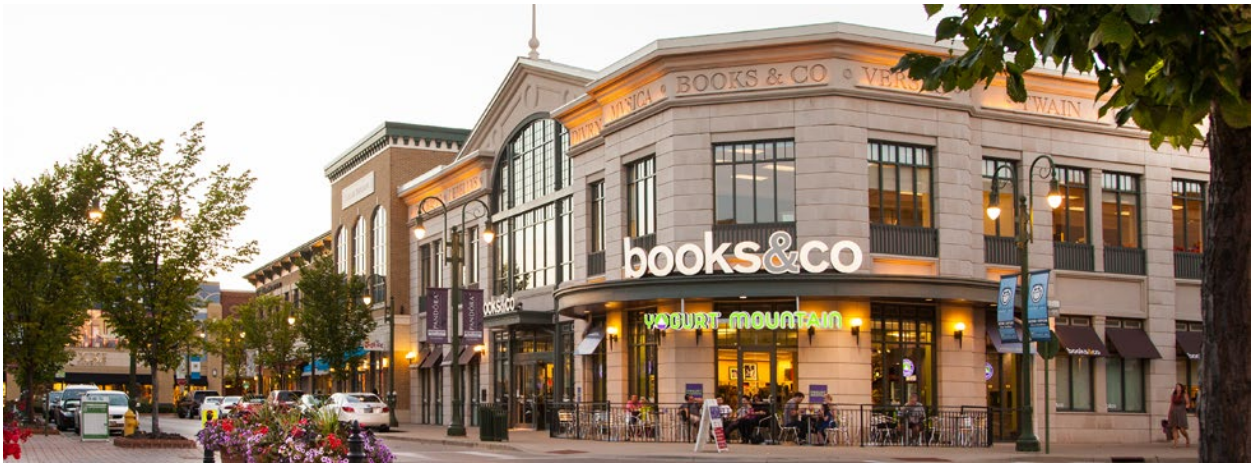
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail/Offices – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retaill – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	3	Class 1 & 2	Class 3 & 4
O	Hotel	5	Class 1 & 2	Class 3 & 4

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

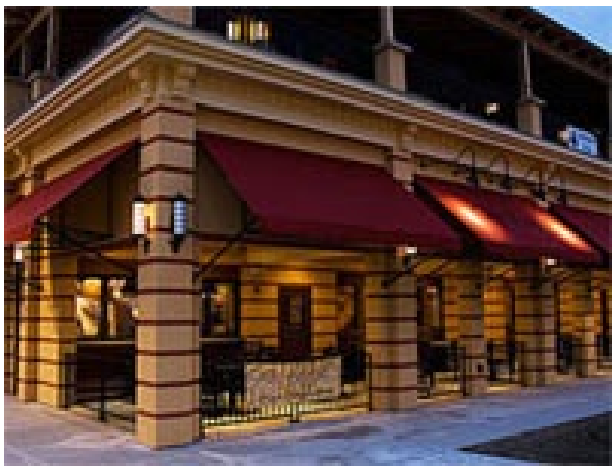
5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the

existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thorough fare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pensey Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pensey Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pensey Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

   a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
   b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
   c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
   d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

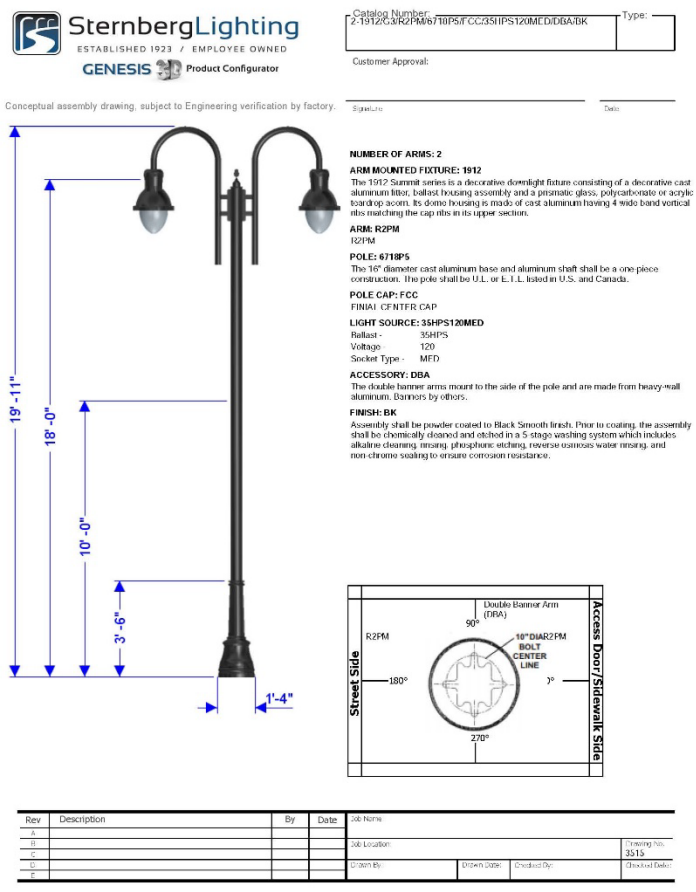
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No “shoe box” wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Retuculate	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amerlanchier Arborea
Dommon Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigla	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Aborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as “Invasive Species” as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3’) (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.
4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.

5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.

24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.
25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display, illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.
39. **Storefront:** The façade of a business space that contains a public entrance.

40. **Streamer**: A long, narrow flag, banner or pennant.
41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any artificial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.
2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.

3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or
        2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.
    b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.
d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **Projecting Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projecting sign per business and must be spaced at a minimum of 15 feet from other projecting or blade signs. Projecting signs are only permitted where the business does not have a blade sign.
    a. **Small Projecting Sign(s)**: May only be installed on the first story of a building. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10 sf with a maximum height of 3 ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
    b. **Large Projecting Sign(s)**: May only be installed on buildings with multiple stories and may not be installed on the first story. Sign shall be vertically oriented with the height greater than the projection of the sign. Must be 12 ft above the sidewalk elevation. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 ft from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.
10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.
11. **"Open" Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.
12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.
13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The material must be the general material sign standard compatible and consistent with the materials used to construct the building.
14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning

vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.

15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.
20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings

and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.
19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required

It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit

Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits

It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code

All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code

All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance

The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs

Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.
4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.

7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.



Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NISPCO
Gas	NISPCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

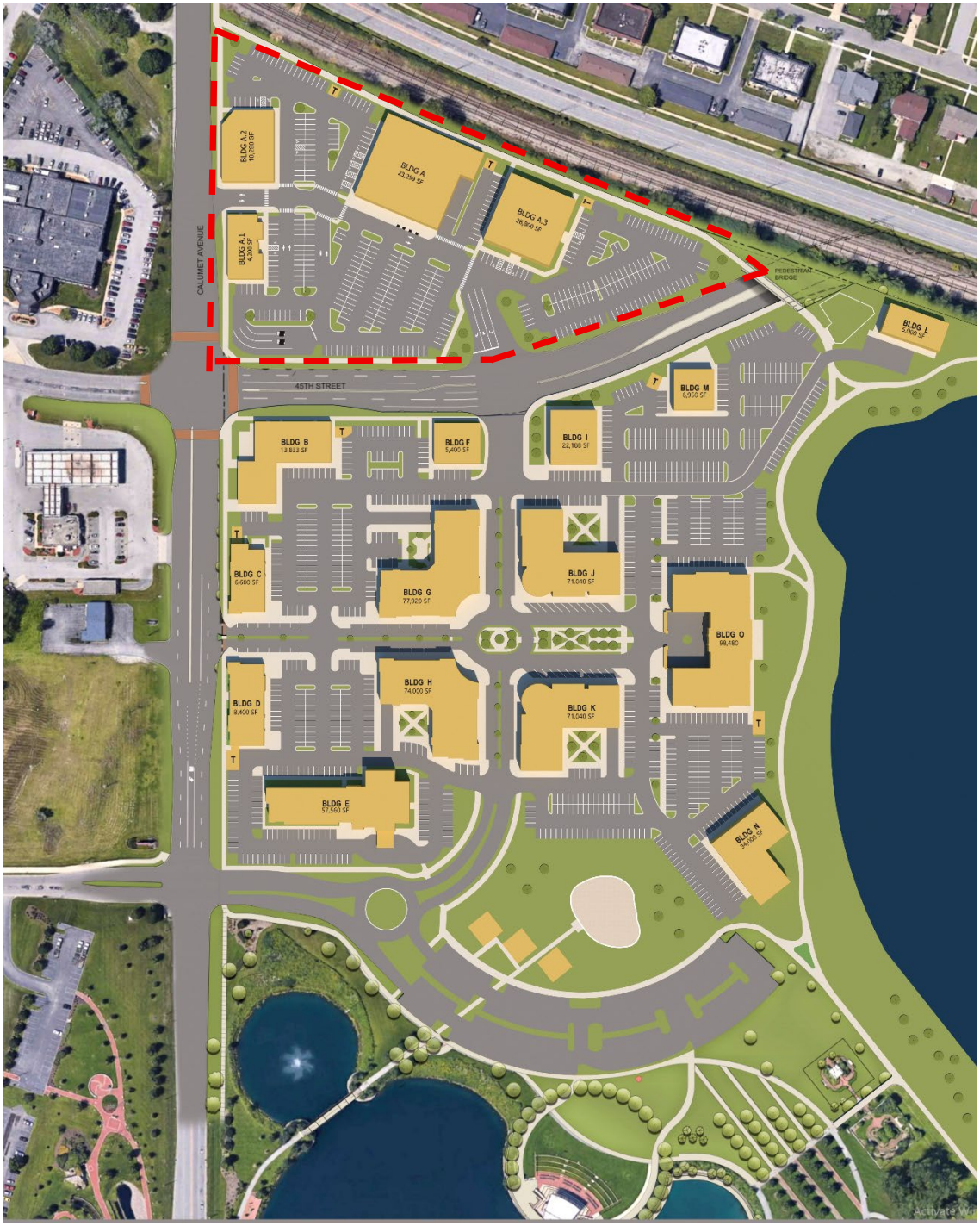
The Centennial Village PUD consists of 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Appendix 1 – Centennial Village Planned Unit Development Final Subdivision Plat

Appendix 2 – Centennial Village Planned Unit Development Plan of Development


45th St
BLDG PAD A
70,000sf
45TH STREET
CALUMET AVENUE
BLDG PAD L
BLDG PAD M
BLDG PAD
5,200sf
BLDG PAD F
5,200sf
BLDG PAD B
12,830sf
BLDG PAD C
5,800sf
BLDG PAD G
19,783 sf/
17,590 RETAIL
BLDG PAD J
17,760sf
BLDG PAD N
42,175sf
BLDG PAD D
8,000sf
BLDG PAD H
19,783 sf/
17,590 RETAIL
BLDG PAD K
17,760sf
BLDG PAD D
17,360sf
BLDG PAD O
7,000sf
CENTENNIAL PARK



Modified and ~~approved~~ within the red hashed line –

March xx, 2026 Conceptual Plan



Modified and approved within the red hashed line –

August 21, 2023



Modified and approved within the red line – November 20, 2023

Appendix 3 – Infrastructure Development Plan Set

by reference:

DVG Engineering Plans Title “Centennial Village - Phase 1A” and “Centennial Village - Phase 1B”

MUNSTER PLAN COMMISSION
MINUTES OF REGULAR MEETING
March 10, 2026

The Munster Plan Commission held a meeting on March 10, 2026, at Munster Town Hall, 1005 Ridge Road, in the Main meeting room and could be accessed remotely via Zoom webinar, a videoconference application.

CALL to ORDER: President baker called the meeting to order at 7:00 pm.

MOMENT of SILENCE and PLEDGE of ALLEGIANCE

ROLL CALL:

William Baker, President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
Roland Raffin, Vice-President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
Jennifer Johns, member. Appointed by: Town Council President, Initial Appointment: 12/17/2018 - Term Expiration: 12/31/2027
Rachel Branagan, member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026

Members in Attendance	Members Absent:	Staff Present
Jennifer Johns	Roland Raffin	Sergio Mendoza, Planning Director
Rachel Branagan		Nicole Bennett, Town Attorney
Joseph Hofferth		Denise Core, Administrative Assistant
David Nellans		
George Shinkan		
William Baker		

President Baker announced we have a quorum.

APPROVAL of MINUTES:

February 10, 2026, PC Minutes

Motion: Councilor Shinkan moved to approve the minutes from February 10, 2026.
Second: Commissioner Branagan
Vote: Yes – 5; No – 0; Abstain – 1. Motion carries.
President Baker abstained.

PRELIMINARY HEARINGS: None

PUBLIC HEARINGS:

PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village requests to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue. This matter was a continuation of a previously opened public hearing.

Director Mendoza reported that this is a continued public hearing. The applicant is here with updates to the Centennial Village, particularly to Lot C, which has recently received plan approval for a 4-lot subdivision. As part of the preliminary plat approval, they have made edits to the Design Guidelines and Standards for the overall development, which support proposed lots 10 through 13. As part of their request for the amendments to the update, it includes the proposed uses for the former Lot C , as well as changes to floor levels including the location of accent material, discussion for a potential roundabout in the future, and changes in standards for the parking, particularly those that would be impacting lots 10 through 13, and based on previous approval, reconfiguring those lots and meeting those standards for the additional 15 foot right-of-way along 45th Avenue. They also proposed brand new sign standards. The design standards that are in place now, the existing code, is incorporated within the body of the PUD. He said this was borne out of interest from their tenants asking for signage requirements that are not in their current code. He said there are additional edits requested by the staff and he would ask that the Commission consider that as part of any motion.

Mr. Russ Pozen of DVG at 1155 Troutwine Road, Crown Point, IN, said he would review the highlights of data that has been sent to the Commission before. He said they have made updates to this PUD which is going from one building to four. They also tried to modify some of the maximum heights and the number of floors for some of the retail buildings. He asked the commissioners to bear in mind that, in principle, they are adhering to the total square footage for every building that they list in the PUD. He said they are modifying it a little bit, but they always maintain that total square footage. If they go higher on some unit lots, the footprint does have to go down. That's consistent everywhere, with the new lots and anything in the existing PUD. He said they added some materials to the PUD, structural brick to Lot 11 only, which is the grocer. In addition to making sure that all the details were clear, he listed other additions. He said they updated the landscape requirements on the Chase lot, which is Lot 13. He said they have a lot of BP pipelines, so they reduced the number of trees and plantings in that area because they just can't make it work but they did get more green space on their newly submitted layout as compared to the overall site plan from their last time before the Commission. He said when they accommodated the right turn lane, that reduced the property by dedicating the right-of-way. He said Director Mendoza had mentioned some of the items that they worked on. He said Director Mendoza and the Town Attorney made some requests of them and he saw no issues with those. He said they even gave them some suggestions that he thinks are good and that they'll consider. He said it is all spelled out in the PUD for the commissioners. He offered to answer questions.

Councilor Nellans asked if everything they're talking about is in the northeast parcel of land, east of Calumet, and north of the present Centennial Village development. Mr. Pozen responded that the PUD ordinance

encompasses everything, but they are really dealing with the changes that came about on the north, which is where they added the lots. He said it includes everything that they're updating, whether it's signage, total square footage, or landscaping; in principle, it applies to everything. Councilor Nellans asked if this is something the organization can live with. Mr. Pozen answered, yes, absolutely, they looked at all these specific buildings and anything else they need and they are very comfortable with them.

Commissioner Branagan asked why there are two different landscaping companies for the Sprout's location versus the Chase location. Mr. Posen said he was lucky to be the engineer for both of the properties but there are different architects and teams for each property, there are different contracts. Chase has their own architect and a landscape architect that they are working with; Sprouts has a local architect. Commissioner Branagan asked if everybody's talking. Mr. Posen stated that everybody's talking and everybody has the PUD ordinance and is fully aware of it. He said, ultimately, Matt Kimmel makes sure they are staying cohesive with the overall Centennial Village product.

Commissioner Johns said she understands that if they add building height, the building square footage would remain the same but asked why that is. Mr. Posen answered that some of that is efficiency in construction and some of that is to potentially make it a little easier to possibly add some parking here and there. He said they want to give themselves some options. He explained that since they started this thing a long time ago, they've learned some things. They think it's nice to have the flexibility, if they need a little extra space, it's a better to have that capability for construction. He said they are not guaranteed on the total height. It depends on the efficiency and the users, which is some retail and some office. He said some of them like three stories and they've got to give (Centennial Village) the flexibility to give different end users and what they like. Commissioner Johns asked if they are maintaining retail on the first floor on all of them and residential on the second through fourth or second through fifth floors. Mr. Posen said second through fifth for the H, J and K buildings. Commissioner Johns stated that there will be no commercial or retail on more than one floor in those buildings. Mr. Posen confirmed that is correct for those buildings.

President Baker opened the public hearing. There were no public comments, the public hearing was closed.

Councilor Shinkan made a motion that was seconded by Commissioner Branagan. Councilor Hofferth shared that he appreciated the willingness of the Centennial Village team to come in and sit down with them to really hash this out to make it happen. He said he had made the motion that nobody liked, but he appreciated the opportunity and was very happy that this project is going forward with a good, sound plan to fix what needed to be fixed.

> **Motion:** Councilor Shinkan moved to send a favorable recommendation to the Town Council for PC25-016, a proposed Amendment to the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT with the condition that the recommended EDITS attached in the March 10, 2026, Addendum Staff Report be completed, including all findings and discussions.
> **Second:** Commissioner Branagan
> **Vote:** Yes – 6 No – 0; Abstain – 0. Motion carries.

PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street. This matter was a continuation of a previously opened public hearing.

Director Mendoza asked Mr. Pozen which lot (document) he wanted to discuss. Mr. Pozen asked for the site plan to be brought to the screen first. Director Mendoza gave a quick briefing. He reported that the lot size dimensions did change as identified in the staff report. He said the minimal impact to the lot change are due to the additional right-of-way acquisition along 45th Avenue. He said there have been some changes to the overall parking. It still exceeds the minimum parking requirements and includes changes to the landscape islands, which were referenced with the PUD in the previous discussion. He said everything seems to comply with the proposed PUD amendments and was just a little bit reconfigured in that sense. He said with regards to materials, lighting, and landscaping, everything else is the same and just on a smaller footprint of the lot itself.

Mr. Russ Posen, 1155 Troutline Road, Crown Point, Indiana, said the architect was in attendance if the commissioners had questions on the material, but he thought they had seen it before. He said they have enough parking; 76 spaces are required, they provide 125. They have a truck dock that is on the east side; the front it and the sides of it will be masonry and have the ability to be closed so it can be shielded from the traveling public in the normal day-to-day operations.

When there were no questions for Mr. Pozen, President Baker opened the public hearing.

Mr. Sean Pruzin of 1157 Bluebird Lane, introduced himself. He said he walks his dog along the railroad tracks in this area. He said Windy City Social has a similar layout and the problem is the east side of that parking lot is almost never used; parking may remain mostly empty (in this new development) as well. He asked what the view will look like along the bike path that's parallel to the railroad tracks. He asked why there a second Chase Bank when there is one about a mile down the street. Several commissioners advised that they are moving. Mr. Pruzin said this may be a personal critique, but that's a lot of parking. He thought the retail in the easternmost lot and the grocery store could share parking. He concluded by saying those were his concerns as a citizen.

Commissioner Branagan said it makes her think about architects who ask themselves how they can make the parking lot as small as possible and most painful for people parking, citing Trader Joe's in the city. She said she understands what Mr. Pruzin was saying, but she feels like having ample parking in our suburban situation is necessary. Councilor Shinkan noted that we need a specific number of parking spots per square footage. Director Mendoza confirmed this by saying that the PUD identifies the number of parking spaces required per square footage, so they are complying with the code that's been established. He commented on Mr. Pruzin's questions by first explaining that he, the DVG team and other staff members have looked at reconfiguring the location of these buildings. Their concern was that it would impact negatively on the overall parking based on the configuration of the lots themselves and with the buildings themselves. He said they have a triangle lot with squares in it so you're trying to figure out how to maximize the space. Since walkability is the intent of the overall site plan, they also needed to identify that it's walkable and identify sidewalks. With regard to the view from the tracks and what's facing along the trail, he explained that the code also

requires that it would be what's identified as a 360 architecture; this is architecture that would be all the way around using the same materials. There will not be gray cinderblock facing towards the tracks, it will have a finished product all the way around each one of those buildings.

Councilor Shinkan asked if there is a fence, too. Mr. Pozen said there is no fence on that side but on the landscape plan, there is arborvitae and other landscaping. He reiterated that the building itself is completely four-sided, brick and whatnot. He said they are meeting code for parking, but they are also a grocer and typically grocers prefer about five (spaces) to 1000 (square feet), and they are actually at that mark. The rest of the parking needs to serve the other buildings. He said they are trying to be as efficient as possible, but they need this for the development. He said the facade where the walking path is will have a nice looking building; it's all brick and is pretty. They have landscaping along that side, that is, what could fit there. He said there will be a nice green wall here and there so it will look broken up, which is nice.

With no further comments, President Baker closed the public hearing.

President Baker asked if there is a rendering of this Sprouts or is the most recent one from last year. Director Mendoza said It's been the same rendering for the past few months; he referenced the rendering in the December meeting packet. President Baker asked if the rendering in the December packet show the brick encasement for the brick fencing or the truck dock. Director Mendoza confirmed it did. He connected to the Munster website and displayed the rendering for the commissioners.

Commissioner Branagan asked if the petitioners have an estimated timeline. Mr. Pozen said after they get these approvals, they're definitely looking for the site development, SWPPP, approval as soon as possible so they can start breaking ground in the spring when the weather gets a little better. The building architecture and everything else will come as fast as possible but it'll come after that.

> **Motion:** Councilor Shinkan moved to approve PC25-017, a Development Plan for Sprouts Market located on Lot 11 of Centennial Village Development, with the condition of an adopted CENTENNIAL VILLAGE PLAN UNIT DEVELOPMENT amendment, including all findings and discussion.
> **Second:** Commissioner Branagan
> **Vote:** Yes – 6 No – 0; Abstain – 0. Motion carries.

PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village requests review of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.

Director Mendoza said these are the plans that have been before the Commission for the past 5 months. He reported that there are no changes except for the lot sizes. The proposed lot is now .83, previously it was .93, so they are losing about .10 acre. The cause of that is the right turn lane on Calumet Avenue, as well as additional right-of-way acquisition on 45th Street for future lane reconfiguration and realignment. He said there is no change to the building. There have been changes to the parking requirements with regards to what's required; 14 parking spaces are required and they are providing 39, which is down from 51. That is a reconfiguration of the overall lot sizes and reallocating the parking spaces. He said they've introduced the landscape and new species have been introduced. For the most part, they've increased their plant species

with a deduction in quantity from 47 species to 41. The idea is that, with all the departments and their PUD as well, they would offer the buffer screen for the parking and enhance landscape along the proposed ATM area on the corner of 45th. He said nothing has changed but they can go back to previous staff reports and look at those designs if they'd like.

President Baker asked if they are still taking the garbage across the street.

Mr. Russ Posen of DVG, 1155 Troutline Road, Crown Point, Indiana, said the trash enclosure is separate from the building, but it'll look like it is part of the building because it has enclosed walls that are the same material. He added that the transformer and the dumpsters will be in there. President Baker asked if the truck could get in and out. Mr. Pozen said they have enough distance to get the garbage truck in and out because they're striping where parking was. He said they will have that 18 feet plus the 24 foot drive aisle. He said you need about 45 feet, give or take, in front of a dumpster and they do have that.

Mr. Pozen said he thought Director Mendoza summed it up. He said they still have the fence on the south and the southwest corner that is part of the PUD. They also have a little enhanced landscaping near the west. He said not everything is tall trees because they have to deal with pipelines, but they did try to make it as robust as possible to safely screen the ATMs while still making sure you can see them. You don't want to block off any visual for ATMs because that's dangerous. He thought they are adhering to the Town's request when it comes to landscape and enhanced treatments of this area. He said the architect is present if there were any questions about the Chase building.

Commissioner Branagan said if she were coming from the south, driving north and turning right into that right lane. She would then take another right into the site, take another right in front of the bank, go through that bank of parking and then she takes another right. She asked if that was the point of the ATM directional. Mr. Posen said you can find your way; this is as efficient as they could make this site work to have the exposure for the building itself to the road and to get all the parking and the ATM to work. He said they have all these pipelines so he could only put things in so many places.

President Baker opened the public hearing. There were no public comments, the public hearing was closed.

Motion: Commissioner Branagan moved to approve PC25-018, a Development Plan for Chase Bank located on Lot 13 of Centennial Village Development, with the condition of an adopted CENTENNIAL VILLAGE PLAN UNIT DEVELOPMENT amendment, including all findings and discussion.
Second: Councilor Nellans
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

FINDINGS of FACT:

PC25-015 SUBDIVISION PRELIMINARY PLAT: Matt Kimmel of Centennial Village received conditional approval of a Preliminary Plat for a proposed 4-Lot Subdivision, a replat of Lot C to create Lots 10, 11, 12, and 13 of CENTENNIAL VILLAGE RESUBDIVISION located at 9505 Calumet Avenue.

Motion: Commissioner Johns moved to approve the Findings of Fact for PC25-015.
Second: Councilor Hofferth
Vote: Yes – 5; No – 0; Abstain – 1. Motion carries.

President Baker abstained.

PC25-021 SUBDIVISION PRELIMINARY PLAT: Scott Yahne Attorney on behalf of G.H.K. Developments, Inc. received conditional approval of a Preliminary Plat for a proposed replat of 45th AVE ADDITION LOT 1 to 4-Lot Subdivision to be known as 45TH STREET PROPERTIES, LLC.

Motion: Councilor Hofferth moved to approve the Findings of Fact for PC25-021.
Second: Councilor Nellans
Vote: Yes – 5; No – 0; Abstain – 1. Motion carries.
President Baker abstained.

PC25-022 PUD AMENDMENT: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., received a favorable recommendation with conditions to amend the PAVILION at 45th PLANNED UNIT DEVELOPMENT.

Motion: Councilor Hofferth moved to approve the Findings of Fact for PC25-022.
Second: Councilor Nellans
Vote: Yes – 5; No – 0; Abstain – 1. Motion carries.
President Baker abstained.

PC25-023 DEVELOPMENT PLAN REVIEW: Scott Yahne, Attorney, on behalf of G.H.K. Developments, Inc., received approval of a Development Plan for a 117,000 square foot, 2-story self-storage facility on proposed Lot 4 of The Pavilion on 45th to be commonly known as 9749 Fran-Lin Parkway.

Motion: Councilor Hofferth moved to approve the Findings of Fact for PC25-023.
Second: Councilor Nellans
Vote: Yes – 5; No – 0; Abstain – 1. Motion carries.
President Baker abstained.

PC26-001 DEVELOPMENT PLAN REVIEW: David R. Hill of M2Ke Design, LLC, on behalf of Laborers' International Union of North America, Local 41, received approval of a Development Plan for a second story addition to an existing one-story brick Union Hall building located at 550 Superior Avenue.

Motion: Councilor Shinkan moved to approve the Findings of Fact for PC26-001.
Second: Councilor Nellans
Vote: Yes – 5; No – 0; Abstain – 1. Motion carries.
President Baker abstained.

OTHER BUSINESS:

PC Rules and Regulations

Director Mendoza reported that we have a draft of the Rules and Regulations that has been edited, however, based on recent changes to the state statute, we have to go back and make further revisions to ensure we are complying with new regulations that have been put forth through the state requirements. President Baker said we will look forward to this again next month

Zoning Code Amendment

Director Mendoza said they have been talking about this for two years, and almost two years of work has been done on this. He said they have significant amounts of this Zoning Code Amendment to present in May. He wanted to let the commissioners know that this entire document will be presented to the commissioners for their consideration soon and, as he had mentioned to some members, he'd like them to select their favorite sections for discussion. Councilor Shinkan said it should be printed out for them.

CONTINUED DISCUSSION ITEMS: None

Next Meeting: President Baker announced that the next regular meeting is scheduled for April 14, 2026.

ADJOURNMENT:

Motion: Councilor Nellans moved to adjourn.
Second: Councilor Shinkan
Vote: Yes – 6; No – 0; Abstain – 0. Motion carries.

Meeting adjourned at 7:36 pm

President William Baker
Plan Commission

4/14/26
Date of Approval

Executive Secretary Sergio Mendoza
Plan Commission

4.14.26
Date of Approval

EXHIBIT A

Design Standards

Centennial Village – A Planned Unit Development
A Mixed-Use Walkable Lifestyle Community

Town of Munster, Indiana

February 15, 2017

August 21, 2023

Revised August 07,2025

Presented October 14, 2025

Revised October 20, 2025

Revised December 17, 2025

Revised February 23, 2026

Revised March 23, 2026

Design Standards
Centennial Village Planned Unit Development

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Section 10: Site Landscaping & Common Areas
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Section 1: Purpose & Intent

The purpose of the Centennial Village Development is to provide the Town of Munster with a sustainable, mixed use, Walkable Lifestyle Community adjacent to the key regional thoroughfares of Calumet Avenue and 45th Street. The Centennial Village PUD is a partnership with the Town of Munster to combine the former Munster Steel redevelopment site with certain land areas of the Town owned Centennial Park (including Clayhole Lake) to create a landmark development neighborhood. Additionally, the Centennial Village PUD will provide the Town of Munster the necessary land area to facilitate design and construction of the Calumet Avenue and 45th Street public infrastructure realignment improvements and underpass crossings of the CN Railroad line.

Centennial Village will include commercial, office, residential, recreational and entertainment land uses. The Centennial Village PUD is intended to support high quality development with the flexibility to adapt to the unique conditions of the site, the proposed Town public roadway infrastructure improvements, market demands and phasing of development implementation plan. The Centennial Village Development Plan has been created to meet the development goals of Town of Munster's 2010 Comprehensive Master Plan which calls for redeveloping the former Munster Steel site, improving Clay Hole Lake as a major public open space and to integrate the Centennial Village development with the existing Centennial Park and Pennsy Greenway Trail.

The mixed land uses and development density proposed within the Centennial Village PUD is essential to meet the development goals of the Town of Munster as outlined in the Development Agreement between the Town and the Centennial Village developer. The mixed use development plan is required to establish the level of commercial vitality and economic return to the Town of Munster in Tax Increment to support the approved TIF Bonds that have been granted to the project. The treatment of building design, parking, landscaping, site improvements and pedestrian spaces as outlined in the Centennial Village PUD Design Standards is essential to creating the pedestrian oriented environment for the Centennial Village walkable lifestyle community.

The Centennial Village PUD Design Standards are intended to ensure the proper development of the project site to achieve the economic return goals of the Town of Munster, to improve the quality of life for existing Munster residents, to add significant architectural buildings and development areas to the Munster business landscape and to attract new businesses and residents to the Munster Community.



Section 2: Uses

The Centennial Village PUD shall permit the following uses within the development plan area:

2.1 Permitted Uses

1. Those permitted uses contained within the Town of Munster C-2 Zoning District excepting those further defined as Prohibited Uses in this Section.
2. Retail & Service Uses
    a. Art Galleries & Supplies
    b. Bakeries
    c. Banks & Financial Institutions
    d. Barber & Beauty Shops
    e. Beer, Wine & Spirits Shops – 1 Allowed within Development
    f. Book Stores
    g. Computer Sales & Service
    h. Communication Equipment Sales & Service
    i. Custom Clothing and Apparel Stores
    j. Decorating Shops
    k. Department Stores
    l. Electrical and Household Appliance stores
    m. Financial Services
    n. Fitness Spas and Clubs
    o. Florist Shops
    p. Garden Supply Stores
    q. General Retail Stores
    r. Grocery Stores
    s. Hardware Stores
    t. Optical Shops
    u. Personal Care Shops
    v. Household Furniture, Furnishings & Appliances
    w. Jewelry Stores
    x. Music Shops
    y. Photography Studios
    z. Paint & Wallpaper Stores
    aa. Pet Supply & Care Establishments
    bb. Shoe Sales and Service Shops
    cc. Sporting Goods Stores
    dd. Tailor Shops
    ee. Travel Service Stores
    ff. Toy Stores

3. Recreation & Entertainment
    a. Theaters
    b. Community Centers
    c. Public Outdoor Recreation

4. Hospitality
    a. Hotels
    b. Restaurants
5. Education
    a. Schools such as those for teaching performance art and business vocations
    b. K-12 academic enhancement schools
6. Offices
    a. Business
    b. Medical
    c. Professional & Personal Services
7. Residential
    a. Multi-family Dwellings
    b. Multi-family Senior Living Facilities
8. Accessory Uses
    a. Drive Thru Service to Customers of a Business will be permitted only by review and action by the Town of Munster Board of Zoning Appeals.

2.2 Prohibited Uses

The Centennial Village PUD shall prohibit the following uses within the development plan area:

1. Any use which emits an obnoxious odor, fumes or sound which can be heard or smelled outside of any building in the Centennial Village Area.
2. Any operation primarily used as a warehouse operation, manufacturing refining, smelting, agricultural, industrial, or mining operation.
3. Food Catering Establishments operating as the Primary Business
4. Pawn Shop, Flea Market, Salvage Store or Auction House
5. Manufactured Home Park, Trailer Court, labor Camp, Junk Yard or Stockyard
6. Mortuary or Funeral Home
7. Adult Use Establishments as defined and regulated in the Town Municipal Code
8. Tattoo Parlor & Piercings operating as the Primary Business
9. Any Unlawful or Illegal Purpose
10. Any Use that is a Public or Private Nuisance
11. Automotive Vehicle Sales
12. Automotive Retail
13. Storage Facilities where storage is the Primary Business
14. Tobacco Stores
15. Any Business dealing with Guns and Ammunition
16. All “Prohibited Uses” defined and listed in the Defined Terms, pages 8, 9 & 10 of the Centennial Park Development, Development Agreement dated September 5, 2013

Section 3 – Setback & Height Requirements

The Architectural Style proposed for the Centennial Village Lifestyle Community is modeled after a Neo-Traditional Urban Design promoting buildings placed near the street in mixed use, multi-story buildings. The public roadway right of ways serving the Centennial Village PUD include Calumet Avenue adjacent to the west side of the site and 45th Street adjacent to the north side of the southerly PUD parcel and adjacent to the south side of the northerly PUD parcel.

The Centennial Village PUD may be platted and subdivided into individual lots for each proposed building pad identified in the Development Plan. All pedestrian and vehicular circulation routes within the development parcel boundary shall serve all the subdivision lots and shall be privately owned and maintained. All subdivided lots shall be provided with pedestrian and vehicular circulation routes platted with access easements, cross access easements and cross parking easements to achieve the urban Neo-Traditional design objective.

The following is a listing of the proposed Development Plan lots with the associated Setback and Building Height Requirements:

Building Lot	Building Use Description	No. of Floors (Stories)	Maximum Building Height (ft)	Front Yard Building Setback @ Main Entry (ft)	Side Yard Building Setback (ft)	Rear Yard Building Setback (ft)
A	–Grocery - Anchor	1	35	5	5	5
A.1	Bank	1	25	5	5	5
A.2	Retail/Offices – Single Story	1	25	5	5	5
A.3	Office – 2 Story or 3 Story	2 or 3	55	5	5	5
B	Retail – Multi Tenant	1	25	5	5	5
C	Retail – Multi Tenant	1	25	5	5	5
D	Retail – Multi Tenant	1	25	5	5	5
E	Hotel	4	50	5	5	5
F	Retail – Multi Tenant	1	25	5	5	5
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	65	5	5	5
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
I	Retail – Multi Tenant	3	55	5	5	5
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4-5	70	5	5	5
L	Residential - Multifamily	3	55	5	5	5
M	Retail – Single Tenant	2	55	5	5	5
N	Retail - Anchor	3	50	5	5	5
O	Hotel	5	80	5	5	5

Building Lot A, A.1, A.2 and A.3 are located on the northeast corner of Calumet Avenue and 45th Street. Its main entry is proposed to front either 45th Street or Calumet Avenue and therefore has 2 Front Yards.

Buildings on Lot B, C, D, and E are adjacent to Calumet Avenue and Buildings B, F, I and M are adjacent to 45th Street. The main entries to Buildings B, C, D, E, F & I all are proposed to face inward to the development as depicted on the Development Plan and as such their front yard is considered with respect to the lot line closest and across from the main entry to each respective building. The lot line adjacent to the Calumet Avenue and 45th Street is the rear yard or side yard lot line as depicted on the Development Plan.

Building Height is defined as the vertical distance from the average elevation of the adjoining ground level or the established finish floor elevation, whichever is lower to:

1. The highest point of the cornice or parapet wall of a flat roof;
2. The deck line of a mansard roof;
3. A point directly above the highest wall of a shed roof ;
4. The uppermost point of a round or other arch type roof;
5. The mean distance from the eave line to the ridge or peak of the highest point on a pitched or gabled, hipped and gambrel styled roof

The Pennsy Greenway Pedestrian Path, Sidewalks and Parking areas are permitted to be located within the designated building setbacks. The Pennsy Greenway Pedestrian Path and Sidewalks shall be permitted to be placed running longitudinally over property lines so part of the path or sidewalk is located partially on public right of way and within the setback area of the development.

Section 4: Building Materials and Architectural Design Standards

Building Materials and Architectural Design for all buildings within the Centennial Village PUD for both the Commercial and Residential development areas will follow a Neo Traditional Architectural Design Style. The Neo Traditional Architectural Design Style is a contemporary architecture that borrows historical building design elements designed and constructed using modern materials. Neo Traditional Architectural Design Style is contemporary architecture that is inspired by historic styles. Neo Traditional Buildings suggest the past, using decorative details to add a nostalgic aura to a modern-day contemporary structure design style.

Neo Traditional Architecture Design Style to be developed in the Centennial Village PUD shall utilize a variety of building materials and architectural elements. The variety of building materials will be distributed throughout the development based on a class of material as listed below:



Class 1 – Primary Exterior Building Materials / Building – 1st Floor

Allowable building materials on Class 1 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Structural Brick: permitted only on Lot 11
c. Natural Masonry and Architectural Cast Stone
d. Architectural Metal Panels
e. Glass & Store Front Aluminum Window & Door Frames
f. Conventional Windows and Frames

Class 1 Primary Building Materials as a total sum will comprise of a minimum of 75% of the total exterior wall surface area on Class 1 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 75% of the building wall surface area. Class 1 Building Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 2 – Accent Materials – 1st Floor

Allowable building materials on Class 2 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Structural Steel

Class 2 Accent Exterior Building Materials as a total sum will comprise of a maximum of 25% of the wall surface area on Class 2 building walls. Class 2 Buildings Materials as defined in this Section shall only be allowed on 1st Floor Level Exterior Walls. The First Floor Level is defined from the line created at the building wall by finish exterior ground elevation grade to the top of the wall for single story buildings and to the 2nd Level Floor line for multi-story buildings.

Class 3 – Primary Exterior Building Materials – 2nd to 5th Floors

Allowable building materials on Class 3 Exterior Building Walls shall comprise of one or more of the following materials:

a. Brick
b. Natural Masonry and Architectural Cast Stone
c. Architectural Metal Panels
d. Glass & Store Front Aluminum Window & Door Frames
e. Conventional Windows and Frames including Operable Aluminum or Vinyl Clad Windows

Class 3 Primary Building Materials as a total sum will comprise of a minimum of 25% of the total exterior wall surface area on Class 3 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 25% of the building wall surface area. Class 3 Materials as defined in this Section shall only be allowed on 2nd to 5th Floor Level Exterior Walls. The 2nd to 5th Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor exterior wall , excluding parapet walls and decorative trim and cornices, for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.

Class 4 – Accent Materials – 2nd to 5th Floors

Allowable building materials on Class 4 Exterior Building Walls shall comprise of one or more of the following materials:

a. Architectural Masonry
b. Spandrel Glass and Opaque Panels
c. Exterior Insulation Finishing System (EIFS)
d. Architectural Metal Panels Accents
e. Natural Wood Panels & Siding
f. Manufactured Wood Panels & Siding
g. Aluminum Fascia and Soffit Material
h. Structural Steel

Class 4 Accent Building Materials as a total sum will comprise of a maximum of 75% of the wall surface area on Class 4 building walls. Architectural Pre-cast Wall Panels will be considered as a primary material provided that a Brick or similar Architectural Stone is precast into the panel meeting the minimum of 70% of the building wall surface area. Class 4 Materials as defined in this Section shall only be allowed on 2nd to 4th Floor Level Exterior Walls. The 2nd to 5h Level exterior wall surface is defined from the 2nd Level Floor line to the top of the upper most floor wall for buildings with flat roofs or to the uppermost level soffit or fascia line for buildings with sloped roofs.



General Building Design Requirements

1. The color and material of Service Doors shall be coordinate with the color tones and materials of the Primary Materials and match the design of the buildings they serve. Service doors shall be permitted on Class 1 and Class 2 wall surfaces and be counted as a Class 1 Primary Material.

2. Doors, Door Frames, Window surfaces and Window Frames shall be permitted on all classes of materials and be counted in the quantity of Primary Materials.

3. Bright accent colors such as bright orange, bright yellow or fluorescent colors shall be minimized and in no case shall such coloring exceed 5% of any exterior wall area.

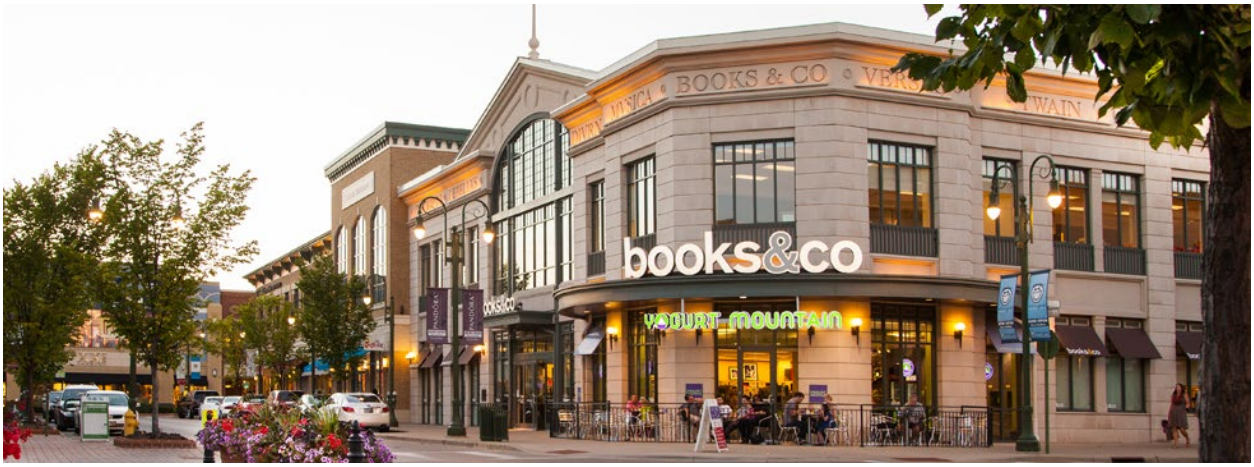
4. Brick or stone exteriors shall not be painted without the prior approval of the Town of Munster Plan Commission.

5. Equipment used for mechanical, processing, bulk storage tanks or equipment used for suppressing noise and odor that protrudes from a side of a building or is located on the ground adjacent to a building shall be screened from public view as much as practical with Class 1 & 3 Primary Building Materials matching the design of the building and landscaping treatments.

6. Equipment used for mechanical, processing and bulk storage tanks placed on roofs of buildings shall be screened from public view as much as practical with Class 2 & 4 Accent Building Materials matching the design of the building.

7. Pre-engineered metal and wood pole buildings are prohibited.

8. The general architectural design for all buildings in the PUD shall reflect a unique architectural style. The design form, materials and colors for each building may have an architectural relationship only to other buildings within the Centennial Village PUD. Architectural design used as a branding marketing technique to identify a particular business identity is not permitted within the development.



The distribution of Architectural Class Materials on all buildings throughout the project site is summarized in the table below:

Building Lot	Building Use Description	No. of Floors (Stories)	Building Materials on Exterior of First Floor	Building Materials on Exterior of 2nd thru 4th Floor
A	Grocery-Anchor	1	Class 1 & 2	N/A
A.1	Bank	1	Class 1 & 2	N/A
A.2	Retail/Offices – Single Story	1	Class 1 & 2	N/A
A.3	Office – 2 or 3 Story	2 or 3	Class 1 & 2	Class 3 & 4
B	Retail – Multi Tenant	1	Class 1 & 2	N/A
C	Retail – Multi Tenant	1	Class 1 & 2	N/A
D	Retail – Multi Tenant	1	Class 1 & 2	N/A
E	Hotel	4	Class 1 & 2	Class 3 & 4
F	Retail – Multi Tenant	1	Class 1 & 2	N/A
G	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4	Class 1 & 2	Class 3 & 4
H	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
I	Retail – Multi Tenant	3	Class 1 & 2	Class 3 & 4
J	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
K	Retail – Multi Tenant 1st Floor, Residential 2nd to 4th Floor	4 or 5	Class 1 & 2	Class 3 & 4
L	Residential – Multifamily	3	Class 1 & 2	Class 3 & 4
M	Retail – Single Tenant	2	Class 1 & 2	Class 3 & 4
N	Retail – Anchor	3	Class 1 & 2	Class 3 & 4
O	Hotel	5	Class 1 & 2	Class 3 & 4

Section 5: Building Design Elements

In addition to Exterior Building Material Standards, all buildings within the Centennial Village PUD shall comply with the following Building Design Elements requirements.

1. Building facades shall provide architectural detail and character that contain windows at the ground level in areas oriented to the pedestrian activities of the development to create views into buildings with focus to building main entries. The building and pedestrian interface is a crucial part of the urban design and the design shall provide visual interest, create opportunities for pedestrian socialization and overall pedestrian safety and comfort.



2. The use and appearance of all exterior building materials within the development shall be compatible with adjacent and surrounding buildings.

3. The use and appearance of all exterior building materials used on side and rear building walls of any building shall be similar to and compatible with its front building wall.

4. All buildings shall be located such that the front doors of the building front a public street or parking areas. Any building with a building wall adjacent to a public street that does not provide for the front door to front the public street shall design the building wall adjacent to the public street with Primary Building Materials and with design features to make the adjacent wall to the public street look as if it is a main entry wall.

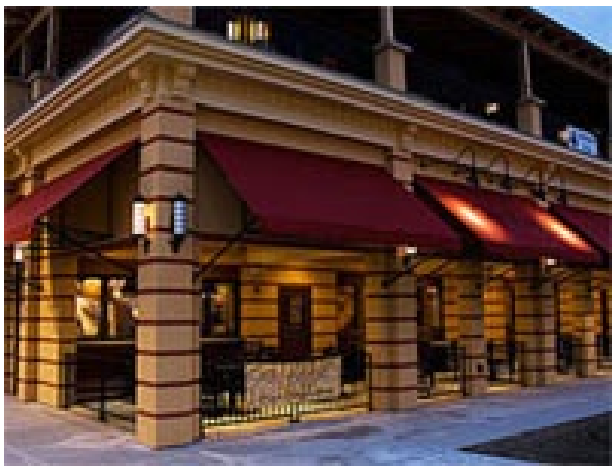
5. Parking Garages shall be located to the rear or interior of the site. Entrance ramps to underground parking areas shall be located near service areas of buildings and screened from public view with landscaping or other structural screening walls.

6. Main entries to buildings shall be emphasized through the use of architectural features such as covered roof overhangs, increased building heights with columns, featured roof elements, and recession or extension of the building façade or other architectural details that highlight the importance of the entrances.

7. The rear entrance to a building can be utilized as an additional primary entrance when parking areas are located in the interior of a block as is typical for a traditional urban development plan. When rear building entrances are used as an additional primary entrance, the entries should be improved to include signs, lighting, canopies, windows, landscaping and other complementary elements to create a safe and inviting access to the additional building entry.

8. All building fronts shall include a minimum of 6 architectural details following the items listed below:

    a. Cornice Architectural Details
    b. Architectural Awning including Structural Steel or Canvas Awning
    c. Parapet Wall Detailing
    d. Brick Coursing changes such as soldier coursing, row lock coursing and stack bond coursing
    e. Masonry Stone Accenting around windows, doors and roof lines
    f. Entry Feature Columns
    g. A visually pleasing, clearly articulated entry which presents the obvious entry location from the street, sidewalk and parking area.
    h. A combination of horizontal and vertical design features
    i. Contrasting but complimentary materials and colors
    j. Irregular building shapes
    k. Horizontal offsets in the entry door wall relative to the primary front façade wall
    l. Vertical offsets in the roof line of the entry door wall relative to the primary front façade wall
    m. Varying roof lines and accents



9. Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

    a. Awnings
    b. Trellis
    c. Window Lintels
    d. Cornice Line delineating the change between the First Floor level and the 2nd Floor level
    e. Brick detailing such as quoins or corbels delineating the change between the First Floor level and the 2nd Floor level
    f. A change in Primary Building materials between the First Floor level and the 2nd Floor level

10. All buildings within the development will utilize a variety of complimentary architectural materials, design elements, colors and the use of vertical and horizontal design features in such a way so that no one building is identical or monotonous with any other building. The Neo Traditional Design Style defined for the Centennial Village project encourages the architectural, color and building material differences between buildings on all lots within the development.



Section 6: Site Circulation – Vehicular & Service

The Centennial Village Site will be provided vehicular access from public right of ways depicted in the Development Plan and specifically defined below:

1. Development Area North of 45th Street:

    a. Full Access Entry Driveway on the north side of 45th Street approximately 500 feet west of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout and designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 200-feet north of the 45th Street center line.

2. Development Area South of 45th Street:

    a. Full Access Entry Driveway on the south side of 45th Street approximately 500 feet east of the Calumet Avenue center line. The Full Access Entry Driveway will be controlled by a traffic control signal or a Roundabout designed in coordination with the Town of Munster's 45th Street public infrastructure project.

    b. Right in – Right out entry drive on the east side of Calumet Avenue approximately 400-feet south of the 45th Street center line.

    c. Full Access Entry Driveway at the Centennial Drive and Calumet Avenue intersection. The Centennial Drive Entry Driveway shall be shared by the Centennial Village PUD area and the Town of Munster Centennial Park. The existing Centennial Drive Traffic Signal and intersection at Calumet Avenue will be modified by the Centennial Village PUD to accommodate the additional traffic generated by the development project.

3. The Development Plan for the development area south of 45th Street is divided into 4 development quadrants by the location of 2 main access roadways. The site is divided by a main north-south roadway and an east-west roadway. All vehicular roadways within the Centennial Village PUD shall be privately constructed, owned and maintained.

4. The main north-south thoroughfare named "Centennial Drive" will be developed to intersect with Calumet Avenue at the southwest corner of the site, extend easterly to connect with the

existing Centennial Park parking lot, then extend northerly to a proposed Centennial Drive Town Center Green round about, and then further extend north to intersect with 45th Street.

5. The main east-west thoroughfare named "Village Parkway" extends easterly from Calumet Avenue at the west central edge of the site into the Centennial Drive Town Center Green round about.

6. All parking areas located within each of the 4 quadrants shall be connected to both Centennial Drive and Village Parkway.

7. Centennial Drive and Village Parkway shall have 12-foot minimum vehicular travel lane widths. The minimum lane width of Centennial Drive at the Calumet Avenue and 45th Street intersections shall be 11-feet wide. Lane widths shall be measured from the center line of any lane striping to the face of curb. For conditions where there is not lane striping, the lane width shall be measured between face of curb to face of the opposite curb.

8. Minimum cross slopes perpendicular to the direction of travel shall be 2%. Minimum longitudinal slope of the curb gutter flow line shall be 0.50%.

9. The minimum pavement cross section for roadways and parking lots shall consist of 10-inches of No. 53 aggregate placed on a stable subgrade with 3-inches of H.A.C. Binder Course and 1 ½-inches of H.A.C. Surface Course. The final pavement cross section specification will be developed to accommodate the specific subgrade conditions where roadways and parking lots are placed.

10. Minimum combination curb and gutter sections widths shall be a combination of a 6-inch wide curb with a 12-inch wide gutter flag.

11. Boulevards located in the center of Centennial Drive and Village Parkway shall be bordered at the street with a 6-inch wide stand up curb.

12. Cross Access Easements and shared Public Common Space Agreements will be developed during the subdivision platting process to provide for the sharing of parking, vehicular circulation and pedestrian access among all property owners, business tenants and residents within the development.

Section 7: Site Circulation – Pedestrian

The Centennial Village PUD is located adjacent to the recreational activities within Centennial Park including the regional Pennsy Greenway Trail. The Centennial Village PUD site design shall emphasize pedestrian connections with Centennial Park walkways, the Pennsy Greenway Trail and future sidewalks proposed by the Town of Munster in the 45th Street and Calumet Avenue public infrastructure improvement plans.

1. The Pennsy Greenway Trail will be extended from the south boundary of the Centennial Village PUD and extend along the west shore line of Clay Hole Lake to the south right of way line of the new 45th Street right of way. This trail extension will be completed by the Centennial Village PUD and will be constructed to standards matching the existing trail south of the Centennial Village PUD.

2. Pedestrian walkways adjacent to and within the Centennial Drive corridor connecting Calumet Avenue to 45th Street shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings within the Village Parkway corridor shall be a minimum of 10-feet wide. Pedestrian walkways adjacent to buildings in all other areas of the development shall be a minimum of 8-feet wide.

3. Where sidewalks are integral with parking area curbs within parking areas of the development, the minimum sidewalk width shall be 5-feet.

4. All sidewalks shall be constructed of Portland Cement Concrete and shall be a minimum of 4-inches in thickness for pedestrian use only areas and a minimum of 6-inches in thickness for vehicular service loadings areas and shall be placed on a minimum of 4-inches of base sand or No. 53 aggregate.

5. Pedestrian routes crossing streets and driveways within the development shall be constructed with a material contrasting with the pavement material of the street or driveway. Acceptable materials for pedestrian route street and driveway crossings shall include colored concrete, paver bricks and paver blocks.

6. All pedestrian routes crossing streets and driveways within the development will be provided with ADA Accessible Ramps meeting the design requirements of all State and Federal Accessibility Requirements.

7. Sidewalks within the development and the Calumet Avenue and 45th Street right of ways will be maintained by the Centennial Village PUD. Snow removal of sidewalks within the development and the will Calumet Avenue & 45th Street right of ways will be the responsibility of the Centennial Village PUD.

8. The Centennial Village PUD shall plat the appropriate pedestrian access easements during the site development and subdivision platting process through the Town of Munster Plan Commission.

Section 8: Parking – Site and Under Building Parking Areas

The Centennial Village PUD is an urban development plan designed to provide for shared parking for all lots within the development. All building lots within the development will be platted with Cross Access Easements and all parking lots shall be designed to be interconnected for both pedestrian and vehicular access. Off-street and on-street parking shall be provided within the development on common parking lots, along circulation roadways and in parking structures.

1. The total minimum number of parking spaces required for the Centennial Village PUD shall be calculated on the following basis:

Land Use	Minimum Required Parking
Retail – Single Tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Retail – Multi-tenant	3.25 parking spaces per 1,000 sf of Gross Building Floor Area
Restaurant	1.0 space per 4 customer seats
Office Uses	4.0 parking spaces per 1,000 sf of Gross Building Floor Area
Hotel	1.05 parking spaces per number of Hotel Room Units
Residential – Multi-family	1.25 spaces per Residential Unit

Off-street parking for commercial uses shall be sufficient to provide parking for employees of all proposed uses as well as customer parking. Spaces reserved for employees may be designated by means of striping and signage. The location, quantity, signage and design standards for parking spaces for the disabled shall be designed to meet the requirements of all State and Federal Accessibility Requirements.

2. Parking Areas shall be designed to conform to the following standards:

    a. Parking space dimensions (other than those designed for the disabled) perpendicular to the parking area drive aisles shall be a minimum of 18-feet long and 9-feet wide. Angle parking shall maintain a full 18-foot x 9-foot block within the angled parking space. Parking spaces shall be dimensioned in relation to face of curbs and walks and to the centerline of parking space striping lines.
    b. Parking space dimensions parallel to roadways within the development shall be a minimum of 20-feet long by 8-feet wide.
    c. Parking spaces in under building parking garages may be a minimum of 17-foot x 9-foot with 20-foot drive aisles.
    d. Where feasible, tandem parking spaces may be provided in under building parking garages.
    e. Parking space dimensions for the disabled shall meet the design requirements of the Federal Americans with Disabilities Act.
    f. Parking lots shall be constructed of Hot Asphaltic Concrete, Portland Cement Concrete or other acceptable hard surface material approved by the Town of Munster Plan Commission and meeting Town Standards.
    g. All parking areas shall be edged with Portland Cement Concrete vertical curbs, curb and gutters and mono-thically formed curb sidewalks.

h. Parking areas shall be landscaped in Planting Areas as defined in the Centennial Village PUD Development Plan. The parking area Planting Areas shall be landscaped with Trees, shrubs and perennial flowers.
i. Parking area landscaping shall conform to an approved Landscaping Plan and to the design standards defined in the Site Landscaping – Section 10.

3. Parking Areas shall be owned, operated and maintained by the Centennial Village PUD land and building owners. The parking areas shall be kept clean and well maintained and shall conform to the following operations standards:

   a. Striping defining parking areas, loading and service zones, stop bars, directional arrows, lane division and other pavement markings shall be clearly visible at all times. Parking area striping shall be re-painted when the parking area markings are faded and compromises safety to patrons of the development.
   b. Failed pavement shall be properly repaired to assure safe and convenient travels within the development.
   c. Snow removal of sidewalk, parking areas and driveways within the Centennial Village PUD shall be the responsibility of the Centennial Village PUD owners. Snow removal shall be completed during any snow event on all building lots within the development on a unified basis. Snow shall be placed on the perimeter and islands of parking areas and driveways. During heavier snow events, snow will be removed from the site and deposited at designated locations into Clay Hole Lake. The Development Plan shall identify the specific designated snow deposit areas. The design of the snow deposit areas shall be detailed and designed to accommodate the needed grading and structural loading of the snow removal equipment.
   d. Parking areas shall be regularly cleaned of debris.

Section 9 – Site Lighting

Site lighting shall be decorative in nature and consistent with the architectural design of buildings within the development. All site lighting within the Centennial Village PUD shall adhere to the following requirements for illumination of parking areas, pedestrian walkways and roadways.

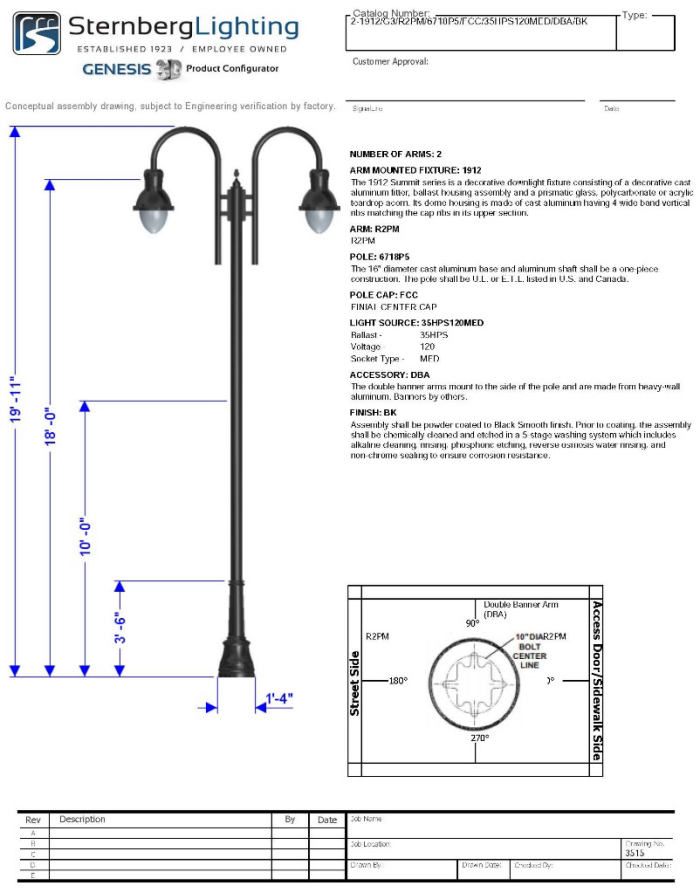
1. All exterior lighting shall be designed and constructed to direct light away from adjacent properties.

2. All exterior lighting shall be arranged and designed with a common light fixture type and with a variety of heights based on lighting system use. Vehicular and pedestrian level lights shall illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly viewed by pedestrian or vehicular traffic in adjacent public right of ways.

3. Lighting shall be designed such that there is a minimum of 0.5 foot-candles at any property line. A photometric plan inclusive of all site and building sconce lighting for each fixture shall be submitted for review by the Town of Munster at each site plan review application. Photometric lighting levels within parking, roadway and pedestrian areas shall be illuminated to a range of 3 to 10 foot candles.

4. Lighting which is flashing or revolving in nature or that otherwise resembles a traffic control signal shall not be permitted in any development area where it could cause a hazard for pedestrian or vehicular traffic.

5. Parking areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Parking Lot lighting shall have a maximum height to the top of the fixture of 26-feet.



6. Roadway areas shall be adequately lighted for the safety of pedestrian and vehicular movements using decorative style lighting with a design style equal to the "Genesis Series" model manufactured by Sternberg Lighting. No "shoe box" style lighting shall be permitted. Roadway area lighting shall have a maximum height to the top of the fixture of 22-feet.

7. Pedestrian walkways not lighted by parking or roadway lighting shall be adequately lighted for the safety of pedestrians using decorative style lighting with a design style equal to the “Genesis Series” model manufactured by Sternberg Lighting. Pedestrian area lighting shall have a maximum height to the top of the fixture of 14-feet. Pedestrian walkways can also be illuminated using decorative wall sconce lighting matching the style of parking and roadway lighting mounted on buildings adjacent to pedestrian walkways. No “shoe box” wall mounted fixture lighting shall be permitted.

8. Decorative wall mounted or ground mounted lighting may be used on building fronts visible from streets and parking areas to illuminate building entries and highlight building architectural features.

9. Lighting Pole and Fixture locations shall be out of the way of service and pedestrian access to buildings throughout the development site.

Section 10 – Site Landscaping

Landscaping for the Centennial Village PUD shall be required in accordance with a final detailed Landscaping Plan approved by the Town of Munster Plan Commission for each building and development phase at the Site Development Plan submittal. All areas of the site not occupied by buildings, parking areas and other site improvements or paving shall be planted with trees, shrubs, hedges, perennials, annual flowers, ground cover and or grasses unless such plantings shall cause a public safety or safe sight line condition for vehicles and pedestrians. Site Landscaping within the Centennial Village PUD shall adhere to the following requirements:

1. Landscaping Design Standards and Specifications shall generally follow the requirements of Article X of Chapter 26 of the Munster Land Development Code.

2. Landscaping shall be integrated with other functional and ornamental site design elements such as pedestrian paths and walkways, site furniture, fountains, trellises, gazebos, screen walls and public art.

3. Plant suitability, maintenance and compatibility with site and construction features shall be considered in the final landscape design plans for each building lot. Plantings should be designed with repetition, structured patterns and complimentary textures and colors and should reinforce the overall character of the development. After construction, maintenance of plants and landscaping will be completed to a high standard, keeping lawns, grasses and plants regularly groomed, planted areas free from weeds and debris, and plants that have died replaced.

4. All stumps and other tree parts, litter, brush, weeds and vegetation debris shall be removed from the development and lawfully disposed. If trees and limbs are reduced to chips, they may be used as mulch in landscaped areas. Areas which are to remain as undeveloped open space shall be cleaned of all vegetation debris.

5. Landscaping of cut and fill areas for the creation of proper drainage shall be constructed with grading slopes and plant materials to prevent soil erosion.

6. Planted landscaping shall meet the following specification at the time of planting unless otherwise specified in the Landscape Plan.

    a. Deciduous trees shall be at least a 2 ½-inch caliper and have an average 8-foot height
    b. Evergreen trees shall be a minimum of 6-feet in height
    c. Shrubs shall be 3-feet in height

7. Material and installation specifications for all trees, shrubs, bushes, annuals and perennials shall be specified to meet local horticultural standards and meet the local growing and climatic conditions. The materials and installation shall be appropriate for an Urban Development environment. Shrub plant selection shall be made using drought tolerant vegetation to the extent possible. Plant materials shall be nursery stock grown conforming to ANSI Z60.1. No trees planted in the development shall be topped, tipped or deformed in any way at the time of planting.

8. Within one year from the time of installation, all dead or dying plants and lawns shall be replaced in kind in the locations and specifications in accordance with the Landscape Plan.

9. Tree spacing shall be determined and identified in the Landscape Plan based on the tree species type. As a general guide to the Landscape Plan basis of design, larger maturing trees shall be planted a minimum of 30-feet on center. Smaller maturing trees shall be planted at a minimum of 20-feet on center. Larger maturing trees will generally be planted along street frontages, right of ways and on the perimeter edges of the development.

10. Refuse and recycling collection areas and other building utility service areas shall be screened with a combination of structural screen walls and landscaping designed to match the building architecture it services. The screen walls shall be a minimum of 5-feet in height with a corresponding landscaping buffer against the wall designed to grow in height to match the height of the screen wall. A mixture of hardy flowering and/or decorative evergreen and deciduous trees will be planted with bushes and shrubs in the screen wall buffer against the screen wall and with a decorative stone ground cover.

11. Larger landscape areas will be provided with irrigation systems. The following areas may be serviced with irrigation systems:

    a. Center Green Boulevard Area between Buildings J & K
    b. Main Sign Location at the Southeast Corner of 45th Street & Calumet Avenue
    c. Boulevard Islands on Village Parkway
    d. Boulevard Islands on Centennial Drive
    e. Outdoor Plazas in the rear of Buildings G, H, J & K
    f. Outdoor Plazas on the sides of Buildings N

12. Maintenance of all Landscaping within the Centennial Village PUD shall be completed by the Centennial Village development.

13. Acceptable for tree plantings within planting islands and parkways are set out in Table 10-13-1 and Table 10-13-2:

Table 10-13-1
Trees for Parking Lot Islands and General Landscaping

Common Name	Scientific Name	Mature Height
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	30-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet

Table 10-13-2 Trees for Parkway Planting		
Common Name	**Scientific Name**	**Mature Height**
Chinquapin Oak	Quercus Muehlenbergii	80-feet
Burr Oak	Quercus Macrocarpa	80-feet
American Elm	Ulmus Americana	70-feet
Hackberry	Celtis Occidentalis	60-feet
Kentucky Coffee Tree	Gymnocladus	60-feet
American Linden	Tilia Americana	60-feet
Skyline Honey Locust	Gleditsia Triacanthos	60-feet
Shingle Oak	Quercus Imbarcaria	50-feet
Hills Oak	Quercus Ellipsoidallis	50-feet
Scarlet Oak	Quercus Coccinea	50-feet
Sugar Maple	Acer Saccharum	50-feet
Swamp White Oak	Quercus Bicolor	50-feet
Sour Gum	Nyssa Sylvatica	40-feet
Littleleaf Linden	Tilia Cordata	40-feet
Ironwood	Ostrya Virginiana	30-feet
Japanese Tree Lilac	Syringa Reticulata	20-feet
Blue Beech American Hornbeam	Carpinus Caroliniana	20-feet
Serviceberry	Amelanchier Sp.	20-feet
Nannyberry Viburnum	Viburnum Lentago	18-feet

14. Acceptable for shrub plantings within planting islands and general landscape areas are set out in Table 10-14-1 and Table 10-14-2:

Table 10-14-1 Shrubs for Parking Lot Islands and General Landscaping – Spring Flowering	
Common Name	**Scientific Name**
Spicebush	Lindera Benzoin
Downy Serviceberry	Amelanchier Arborea
Common Chokecherry	Prunus Viriniana
Forsythia	Forsythia Spp.
Lilac	Syringa Spp.
Viburnums	Viburnum Spp.
Currant Gooseberry	Ribes Spp.
Weigela	Weigela Spp.
Smoketree	Cotinus Coggyria
Beautybush	Kolkwitzia Amabilis
Red Twig Dogwood	Cornus Alba Sibirica

Table 10-14-2 Shrubs for Parking Lot Islands and General Landscaping – Summer Flowering	
Common Name	**Scientific Name**
Buttonbush	Cephalanthus Occidentalis
American Elderberry	Sambucus Canadensis
Common Ninebark	Physocarpus Opulifolius
Black Chokeberry	Aronia Melanocarpa
Winterberry	Ilex Verticillata
Wild Hydrangea	Hydrangea Arborescens
Virginia Sweetspire	Itea Virginica
Butterfly Bush	Buddleia Davidii
Sumac	Rhus Spp.
Coralberry, Snowberry	Symphoricarpos Spp.

15. Trees and plants identified as “Invasive Species” as defined by the Indiana Department of Natural Resources shall not be planted within the Centennial Village PUD.
16. Parking Areas and Parking Lots shall contain at least one landscape island for every twenty-six (26) parking spaces. Parking Lots with more than one landscape island shall have such islands distributed throughout the Parking Lot.
17. Interior parking rows shall be terminated with a landscape island or striping at the end.
18. Each parking island shall be of a minimum size to accommodate any landscape and light poles.
19. Parking islands shall contain a minimum of landscape with shrubs.
20. Rows of parking fronting on drive aisles, including alleys, shall be provided with a minimum of three feet (3’) (excluding curbs) landscape buffer.
21. The Parking Area or Parking Lot shall be screened from the public right-of-way with any landscape or ornamental fence, a minimum of 2 feet and 5 inches from the public right-of-way.
22. All lots, except Lot 13. For every 3,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot, except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
    a. Lot 13. For every 4,000 square feet of Parking Area or Parking Lot, at least one tree shall be installed or preserved within the Parking Area or Parking Lot , except to the extent that Trees outside of the Lot containing the Parking Area or Parking Lot area are allowed to satisfy this requirement as set forth in the Article X of Chapter 26 of the Munster Land Development Code.
23. No parking space shall be more than 200 ft, a Tree within the Lot, as measured from the center of the Tree to the nearest line demarcating the space.

Purpose

The sign regulations set forth are made in accordance with an overall plan and program for the public safety, area development, preservation of property values, and the general welfare of the Town of Munster and Centennial Village. The intent is to safeguard the general welfare of the property owner, to maintain the beauty and aesthetic atmosphere of the community while balancing this with the growth and development of the area. All signs located within the development shall conform to the following standards:

General Standards:

1. Signs necessary to inform the public, such as traffic control, street name, directional and special parking restrictions that are used to implement public safety and wayfinding within the development, that do not exceed four (4) square feet in area, are permitted.
2. *Obstruction of vision of drivers.* No sign higher than 3 ½ ft shall be placed in such a manner that it would block or obscure the vision of the driver of a motor vehicle stopped at a stop sign, traffic light, or entrance to a public or private street of record for a sight triangle distance of 30 feet in which there is oncoming traffic.
3. Wind resistance shall withstand a wind pressure of not less than 20 pounds per square foot of surface area.
4. Elimination, signs shall be removed within six (6) months for: inoperable signs, damaged signs, signs of vacated business.

Definitions

In this code, the definitions contained in this section shall be observed and applied, except when the context herein clearly indicates otherwise.

1. **Address Sign:** A sign that identifies the numerical and street address of a property or building shall be a series of 10" black individual numbers mounted on the cast stone corner of the building, similar to the existing address signs. There is a separate ordinance for address numbers because fire code has specific requirements, unless you want all yours to look uniform, then you need to create standards.
2. **Attention-getting-device**: Any pennant, flag, valance, banner, propeller, spinner, streamer, search light, balloon and similar device or ornamentation designed for purposes of promotion or advertising or attracting attention.
3. **Attraction Panels with changeable letters**: Panels on which individual letters may be temporarily affixed to advertise tenants, special sales, products, or other facts non-essential to the identity of the basic business conducted on the premises.
4. **Awning**: A structure, typically made from a canvas or metal material, attached to a building, and intended to provide shelter or decoration over a walkway, window or building entrance.

5. **Awning or Canopy Sign:** A sign that includes letters, numbers, logos and graphics affixed to or imprinted on an Awning or Canopy.
6. **Back-Lit Sign**: An externally illuminated sign made of individual, opaque characters that is illuminated by lighting located behind each individual character and wherein the light is not visible except as a silhouette or halo around each individual character.
7. **Blade Sign**: A sign attached perpendicular to the façade of a store for the primary purpose of identifying the storefront from an adjacent sidewalk.
8. **Billboard**: A single or double-faced ground sign including changeable copy signs, used for the display of commercial information not associated with the conduct of a business or enterprise located on the same premises of such sign. Also referred to as an off-premise advertising sign.
9. **Building Frontage**: The distance between side building lines (building width) measured at the front building line.
10. **Canopy**: see Awning.
11. **Commercial Poster Board Sign:** a large temporary sign or display used for advertising made of foam board or similar rigid substrate.
12. **Construction or Development Sign**: A temporary sign that is installed on a construction or development site during construction and shall include development information.
13. **Directory Wall Sign:** A small sign, placed on the wall by the public entrance(s) to an internally accessed multi-tenant building. It identifies the tenant's names and locations.
14. **Door Sign:** A sign or symbol on a door that identifies the occupant.
15. **Electronic or Digital Sign**: a display screen used to display information using a LED or LCD to display content.
16. **Externally Illuminated Sign**: A sign illuminated by a source of light which is cast upon or falls upon the surface of the sign to illuminate by reflection only.
17. **Façade**: Any face of a building with architectural treatment.
18. **Façade Measurement**: The overall measurement of one side of a building (corner to corner) horizontal and linear measurement in feet.
19. **Flag**: A sign bearing any non-commercial emblem, design or insignia, including but not limited to countries, states, cities, or other civic institution, or other ideological perspective.
20. **Flashing Sign**: Any illuminated sign which exhibits changing natural or artificial light or color effects by any means whatsoever.
21. **Freestanding Sign**: A sign that has its own structural support and stands on the ground independently of any building. Includes: ground signs, monument signs, pillar signs, roundabout signs, and entry/ arched drive under signs.
22. **Ground Sign**: A sign completely or principally self-supported by posts or other supports independent of any building or other structure, anchored in or upon the ground.
23. **Internally Illuminated Sign**: A sign, all or any part of the letter or design of which is made of incandescent, neon or other types of lamps; or a sign with painted, flush or raised letters lighted by an electric lamp or lamps attached thereto; or a sign having a border of LED, incandescent or fluorescent lamps thereto attached and reflecting light thereon; or a transparent glass sign whether lighted by electricity or other illuminant.

24. **Light Pole Banners**: A banner hung on light poles between two horizontal sign posts.
25. **Neon Sign**: A sign consisting of glass tubes and various neon gases that emit different color light, or that is made of LED lights to look similar to the glass tube lights.
26. **Memorial, Tablet or Cornerstone Sign**: A sign that is a marker to commemorate an event, building or person.
27. **Monument Sign:** A sign that is generally placed perpendicular to the road so that it is visible to both directions of traffic. Monument signs are freestanding signs supported by a concrete foundation with a solid base and are typically constructed of durable materials of a permanent nature that are like the type, color, and scale as the building(s) that it identifies.
28. **Mural**: painting or other work of art executed directly on a wall.
29. **Parcel Frontage**: The distance between side lot lines (lot width) measured at the front lot line or along the setback line, whichever is less.
30. **Pennant**: A long, narrow, relatively small flag, often triangular, used for signaling or identification.
31. **Pillar Sign:** A masonry or stone pillar that is at a minimum 2 times in height compared to its width or depth with lettering or logo attached, typically located near or in the medium of a road, street or drive aisle.
32. **Plaque sign:** A small wall sign that identifies a building or its builder, or the name and occupation or profession of the occupant of the premises on which the sign is located. May also be referred to as an architectural sign or nameplate sign.
33. **Portable Sign**: Any sign that is not permanently affixed to a building, structure or the ground; a sign designed to be moved from place to place. These signs include, but are not limited to, signs attached to wood or metal frames designed to be self-supporting and moveable; paper, cardboard or canvas signs wrapped around supporting poles. Also included are those signs commonly trailer mounted, which are designed to be moved from place to place.
34. **Portable Sidewalk Sign**: A sign made of a rigid material (i.e. not a banner, placard or pennant), not attached to the ground or a building, and designed to be carried and moved daily.
35. **Projecting Sign**: A sign supported by a building or other structure and which projects over any street, sidewalk, alley or other public way or public easement, or which projects more than twelve inches from the face of any building, structure, or supporting wall.
36. **Property Sale, Lease, or Rental Sign**: A sign indicating the sale, rental or lease of Real Estate.
37. **Roof Sign**: A sign erected, constructed upon, supported, extending above, or maintained in whole or in part upon, above, or over the roof of a building or structure.
38. **Sign**: The term "Sign" shall mean and include every sign, billboard, ground sign, wall sign, roof sign, illuminated sign, projecting sign, temporary sign, marquee, awning, canopy, and street clock, and shall include any announcement, declaration, demonstration, display, illustration, insignia, or logo used to direct attention to, advertise or promote the interests of any person when the same is in view of the general public.
39. **Storefront:** The façade of a business space that contains a public entrance.

40. **Streamer**: A long, narrow flag, banner or pennant.
41. **Box Sign**: A sign that is an enclosed box shaped structure (typically square or rectangular) with or without internal lighting which can be single or double sided.
42. **Roundabout Sign**: A sign located within the center of a roundabout.
43. **Entry/ Arched Drive Under Sign**: A permanent sign mounted over a road, or street and supported by structural and decorative posts.
44. **Traffic Directional Sign**: A sign that identifies and provides directions for the circulation of traffic on or through private property.
45. **Wall Sign**: A sign mounted or attached to the outside surface of a wall in a plane parallel to that of the supporting wall.
46. **Window Sign**: A sign painted on, attached or affixed to or placed against any window, or hung within 4 feet behind the window.

Measurement of Sign Area: All signs shall be measured as per the following Sign calculation standards:

1. Sign area:
    a. The area of a sign as regulated herein shall be the product of the total width and the total height of the smallest rectangle that encompasses all such lettering, devices or graphics.
    b. Where said display area is on a background, the background is included in the computation.
    c. For signs having two (2) sides, the maximum display area shall be permitted on both sides and the total area of one side shall be deemed to be the total sign area.
    d. The supporting structures and mounting hardware shall not be included in the sign area computation.
2. Freestanding sign height:
    a. The vertical distance measures from the highest point of the sign to the finished grade of the ground immediately beneath the sign.
    b. Any artificial berm is not to exceed 12 inches.

Permitted Signs: If materials are not specified below, they may be wood, metal, acrylic or glass, copy may also be directly printed, painted, or applied vinyl, for each type of sign.

1. **Ground Sign(s)**: One ground sign shall be permitted for each lot or parcel provided the lot or parcel has at least 100 feet of frontage on a public or private street of record, that the height of such sign does not exceed 8 feet, that the sign is located a minimum of 10 feet from all property lines, and that the square footage shall not exceed 80 square feet. These signs can be illuminated.
2. **Entryway/ Arched Drive Under Sign(s):** A maximum of one sign per entryway to Centennial Village from a public street may be allowed provided each sign shall not exceed 90 square feet in area and mounting height shall not exceed24 feet in height. These signs can be illuminated.

3. **Roundabout Sign(s):** One sign may be allowed for each Roundabout provided it does not exceed 90 square feet in area, is located 10 feet from all street curb lines and does not exceed 8 feet in height. These signs can be illuminated.
4. **Monument Sign(s):** One monument sign is allowed at each entrance to a public street or road to/from Centennial Village. The maximum area is 100 sf and height is 10 ft located a minimum of 10 feet from any street curb line. Sign base to be same material(s) and scale as nearest building wall, sign face to be brick, stone, wood, metal, or glass and copy to be channel letters, acrylic, or metal. The letters and logos can be internally illuminated.
5. **Wall Sign(s):**
    a. Businesses, except grocery stores. Each business is permitted one wall sign per business façade, with a maximum of two signs total per business, except that no wall signage is permitted on the façade facing the public plaza/residential entrances on buildings G, H, J and K. Sign area shall not exceed 1.5 sf of sign area per linear feet of business façade on which the signage is affixed. For single story buildings the overall sign height may not exceed 3 ft. For buildings two story or greater the sign height shall not exceed 4 ft in height, unless the business facade is setback >100 ft from the street curbline, then the sign height may not exceed 5 ft in height. Permitted wall signs shall not be mounted covering architectural features and shall be mounted no higher than the height of the building parapet wall and no lower than five feet (5') above average surrounding grade.
    b. Grocery stores. Each grocery business is permitted multiple signs on the primary/front façade, with a combined sign area not to exceed 3.7 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign heights shall not to exceed 8.5 ft in height. An additional wall sign is permitted on another façade not to exceed 1.8 sf of sign area per linear feet of business façade on which the signage is affixed and the overall sign height shall not to exceed 8.5 ft in height.
6. **Door Sign(s):** Shall be permitted on public entrance doors subject to the standards listed below.
    a. The size shall not exceed more than 8 SF and shall be cut vinyl letters or logos.
7. **Window Sign(s):** Shall be permitted subject to the standards listed below.
    a. The sum total of all window signs shall not exceed:
        1. 40 percent of the total glass area of the windows on which they are located for opaque or perforated window decals or
        2. 30 percent of the total glass area of the windows on which they are located for cut vinyl signs with individual letters, logos, and insignia.
    b. Window signs shall not have any moving parts.

c. A series of windows that are separated by frames and supporting material of less than six inches in width may be considered as a single window for the purpose of computation.
d. No wood or acrylic sign to be hung inside of the windows and no illumination.

8. **Projecting Sign(s)**: A sign which is typically used in pedestrian friendly areas and may project outward from a building at a 90-degree angle. Copy may be placed on both sides of the sign. One projecting sign per business and must be spaced at a minimum of 15 feet from other projecting or blade signs. Projecting signs are only permitted where the business does not have a blade sign.
    a. **Small Projecting Sign(s)**: May only be installed on the first story of a building. Must be 8 ft above the sidewalk elevation. Sign area may not exceed 10 sf with a maximum height of 3 ft and must not project more than 4 ft from the face of the building including frame or hardware. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
    b. **Large Projecting Sign(s)**: May only be installed on buildings with multiple stories and may not be installed on the first story. Sign shall be vertically oriented with the height greater than the projection of the sign. Must be 12 ft above the sidewalk elevation. Sign area may not exceed 50 sf, may not extend above the roof line and must not project more than 5 ft from the face of the building including frame or hardware, depth shall not exceed 18 inches. Materials may include wood, metal, glass or acrylic and may be externally illuminated.
9. **Directory Wall Sign(s):** One sign per ground floor entrance to an internally accessed multi-tenant building, with a maximum of 10 sf and a minimum of 3 ft above grade. Materials may include wood, metal, glass or acrylic. It shall be located within 6 ft of the entrance of the building. These signs can be illuminated.
10. **Plaque Sign(s)**: One sign per building and must be no larger than 3 sf and must be mounted more than 3 ft above grade and no higher than 7 ft above grade. Should be within 5 ft of the entrance of the building. Sign material may include wood, stone, metal, acrylic or glass. Shall not be illuminated.
11. **"Open" Sign(s):** Open signs may be illuminated and may not exceed more than 2 sf and one per public entrance located anywhere in the business space.
12. **Light Pole Banners**: A banner affixed to each private light pole may be allowed for a limited time not to exceed 90 days total in any one calendar year.
13. **Memorial, Tablets or Cornerstone Sign(s):** One sign per building that names, dates or provides history of the building is allowed and must not be larger than 6 sf. The material must be the general material sign standard compatible and consistent with the materials used to construct the building.
14. **Awning or Canopy Sign(s)**: Letters, numbers or logo graphics on one vertical side of the awning or canopy and no more than two signs per business. The letter height may not exceed 10". The sign area must not exceed 75% of the canopy or awning

vertical façade area. Copy shall be metal, acrylic, professionally painted, vinyl, or screen-printed. No illumination is allowed.

15. **Portable Sidewalk Sign(s)**: The sign structure shall not exceed 4 feet in height and 9 square feet in area. The sign face shall not exceed 6 square feet in area. One sign per storefront, per façade, is permitted. Signs shall only be displayed during business hours and shall be removed at any time the business is not open. The sign shall be located a maximum of 12 feet from the entrance. The sign shall not interfere with any pedestrian area or block necessary sight lines for pedestrians or vehicles. Under no circumstances shall a sign cause the sidewalk to be less than 4 feet in usable width. A sign shall be of sufficient weight or design to prevent its movement in the wind. Changeable copy on the sign shall be permitted provided the sign is designed to accommodate changeable copy (for example, chalk board signs). Changeable copy signs using individual plastic letters are generally discouraged (but still permitted). The sign shall be plastic, metal, wood, chalkboard, dry-erase board, or paper with weatherproof protector.
16. **Blade Sign(s)**: One circular blade sign is allowed per tenant storefront for any type of building and must be spaced at a minimum of 15 feet from other projecting or blade signs. Formed plastic and injection molded plastic, are prohibited. A minimum clearance of 7'-8" is required between the sidewalk and the bottom of the sign. The maximum allowed horizontal projection is 3'-11" from the storefront. The maximum allowed area is 9 square feet. The maximum allowed depth of the sign panel shall be 8". Blade signs may be illuminated. May only be installed on the first story of a building. Blade signs are only permitted where the business does not have a projecting sign.
17. **Murals**: Artistic wall murals are permitted on walls that face the Pennsy Greenway local/regional trail system on portions of the wall that do not have windows. The mural must not be distracting to automobile drivers and requires Plan Commission approval as part of development plan review for each building.
18. **Pillar Sign(s):** Vertical pillar signs must be a minimum of 6 ft in height and not exceed 12 ft in height and must be square in plan not smaller than 3 ft in depth or width and not greater than 5 ft in depth or width. The pillar may have a maximum of 6 sf of sign area on each side and the materials can be metal, wood or acrylic. These shall not be illuminated except for landscape lighting.
19. **Construction or Development Signs**: A site under construction or development shall be allowed one sign with a maximum area of 64 sf and height of 10 ft and be located a minimum of 15 ft from the lot line. Material may be wood, metal, vinyl or canvas and properly secured to the ground. The sign must be removed upon obtaining a certificate of occupancy.
20. **Property Sale, Lease, or Rental Signs**: For Commercial property, signs shall be inside glass windows or mounted on posts not to exceed 32 sf. For new residential property, the signs must be inside glass windows or mounted on balcony railings

and shall not exceed 20 sf. Not to exceed more than one sign per unit for both commercial and new residential units. For sales or rental of previously occupied residential property, no signs are allowed.

Prohibited Signs

The following signs are hereby expressly prohibited for erection, construction, repair, alteration or relocation within Centennial Village, except as otherwise hereinafter specifically provided:

1. Billboards, except as otherwise provided for by law.
2. Roof Signs
3. Signs on fences
4. Signs in the shape of products sold.
5. Pennants
6. Streamers
7. Signs on vehicles, boats, or trailers, except for vehicles that are parked within 50 ft of the public entrance of a business storefront for a maximum of 4 hours per day.
8. Signs which move or have moving parts, which movement is caused either by the wind or mechanically.
9. Signs using reflective paints or tape.
10. Neon Signs
11. Flashing Signs
12. Commercial Signs not advertising bona fide businesses conducted, or a product sold or service provided on the same premises where the sign is to be located.
13. Portable Signs: including but not limited to portable signs carried by a person for the purpose of advertising a retail business or commercial sales event, except as otherwise permitted herein.
14. Signs hung across any street, alley, or public right-of-way, except as otherwise permitted herein.
15. Signs which contain statement, words, pictures or other depictions of an obscene, indecent or immoral character and which offend public morals or decency.
16. Ground and wall signs advertising or displaying interest rates or the price of merchandise, commodities, goods or services for sale or lease except as may otherwise be specifically allowed by other provisions of this Ordinance.
17. Internally illuminated signs with a transparent or translucent background that transmits light.
18. Miscellaneous attention-getting devices, other than signs which conform to the provisions contained herein.
19. Signs in conflict with traffic signals, vehicular or pedestrian travel, or which impede access to fire hydrants and fire lanes and exits, and other signs which impede or impair the public health, safety and welfare.
20. Signs painted on the walls or windows of any building, except as otherwise permitted herein.
21. Signs on microwave, radio, transmission or receiving towers and satellite dishes.

Permits Required

It shall be unlawful for any person to erect, construct, alter, change any lettering or graphics on or relocate any sign, except as otherwise permitted herein, within Centennial Village without first obtaining a permit from the Community Development Department and paying the fee required.

Application For Permit

Application for a permit shall be made upon forms provided by the Community Development Department and shall include the required information.

Issuance Of Permits

It shall be the duty of the Community Development Department, who shall be the enforcing officer, upon the filing of an application for a permit, to examine such plans and specifications and other data and the premises upon which it is proposed to erect, construct, alter or relocate the sign and issue a permit if all requirements of these regulations are satisfied. Prior to final issuance of a permit, the Community Development Department must receive approval from the Centennial Village developer or Managing Member of Centennial Village LLC.

Building Code

All signs shall comply with the requirements of the Indiana Building Code and any amendments thereto as adopted by the Town from time to time.

Electrical Code

All signs in which any electrical wiring and/or connections are to be used shall comply with the Indiana Electrical Code and any amendments thereto as adopted by the Town from time to time.

Painting And/Or Maintenance

The owner of any sign shall paint and otherwise maintain all parts and supports thereof as necessary to maintain the sign in a clean and attractive condition comparable to its original condition and to prevent rusting, rotting or deterioration.

Externally Illuminated Signs

Externally illuminated signs shall be allowed subject to the type and manner of illumination being specifically restricted by the following:

1. Color temperature of lighting shall not exceed 3000K.
2. Light fixtures are to be full cut off or fully shielded and directed down.
3. Lighting shall be uniformly distributed over the area of the sign or portion thereof and not extend beyond the edges of the sign except that lighting for back-lit signs may extend beyond the edges of the sign text but not beyond the edges of the sign structure or building wall upon which the sign is located.
4. The lighting shall not shine into dwellings or create a traffic hazard.
5. The light reflectance when measured perpendicular one foot from the surface of the sign shall not exceed 70 foot candles at its brightest area when measured with a standard light meter.
6. Illumination shall be what is known as white and not colored light and shall not be blinking, fluctuating or moving.

7. Light rays shall shine only upon the sign or upon the property within the premises and shall not spill over the property lines in any direction.

Variances

Variances from the requirements of these Regulations may be requested by the filing of a BZA Application with the Community Development Department Planning Director and shall follow the procedure set forth in the Town of Munster Zoning Ordinance.



Section 12 – Refuse & Recycling Management

The handling of refuse and recycling materials generated by the development is an important function for businesses within the Centennial Village PUD. Pick up and removal of these materials from the site shall be scheduled during times that do not conflict with normal hours of operation for the majority of businesses within the development.

All trash, recycling and related material handling equipment shall be stored within the principal structure, within an attached structure accessible from the principal structure or within an un-attached refuse enclosure structure nearby the building it serves. Trash, recycling and related material handling equipment and structures shall be totally screened from view from public streets, residential areas and main vehicular and pedestrian routes within the development. Trash and recycling structures and enclosures shall be constructed of the same materials and design style of the principal structure it serves. The structures and enclosures shall be constructed with these materials on 3 sides and provided with an opaque easily operated access door or gate. The door or gate shall remain closed at all times other than when the material is being picked up and removed.

The location of trash and recycling structure enclosures will be positioned so that the removal equipment can readily access the storage containers and not conflict with service requirements of the site improvements and buildings within the development.

Section 13 – Screening of Loading & Service Areas

The screening requirements to visually enhance loading and service areas to buildings within the development shall utilize architectural screen walls, landscape hedging and architectural fencing.

1. The perimeter views of all external loading and service areas must be screened from public right of ways, residential areas and main vehicular and pedestrian routes with the development except at the points of access.

2. Architectural screen walls and architectural fencing shall be constructed of the same materials and design style of the principal structure it serves. Such walls shall be a minimum of 5-feet in height measured from the finish grade at the base of the wall.

3. Landscape hedges and shrubs used to screen loading and service areas shall maintain a minimum opaqueness of 80% throughout the entire year and shall be a minimum of 5-feet in height at full maturity. Landscaping shall be maintained and any dead plantings shall be promptly replaced.

4. The screening of loading and service areas shall maintain a collective minimum opaqueness of 80% throughout the entire year.

5. Loading and service areas are not permitted to be screen where equipment is required to access the buildings and utility service areas.

6. No outdoor storage of materials shall be permitted.

Section 14 – Site Furniture, Fixtures & Equipment

Site Furniture & Equipment will be incorporated into the final site design of all Buildings. Clear internal pedestrian circulation routes and connections to the Pennsey Greenway Trail will be provided as defined in the Development Plan. Featured locations within development such as key circulation corners shall be highlighted with enhanced design of pedestrian crossings and be provided with other pedestrian amenities as defined in this section.



1. The individual site development plans for all buildings will where applicable include detail design of the listed site amenities:

    a. Bicycle Racks
    b. Decorative Trash Receptacles
    c. Pedestrian Benches
    d. Decorative Plant Containers
    e. Fountains
    f. Public Art

2. Traffic Control Signs including Stop Signs, Traffic Directional Signs and Street Signs will be designed to match the design style of the Site Lighting System Fixtures.

3. The design of Bike Racks, Refuse Dispensers and Pedestrian Benches will be designed to match the design style of the Lighting System Fixtures.







Section 15 – Utility Service

All buildings within the Centennial Village Development shall be serviced with public utilities from the Town of Munster Municipal Utilities and Public Utilities with Franchise service agreements within the Town of Munster. Specifically, the development will be provided with the following utilities and associated utility service providers:

Utility Type	Utility Service Company
Sanitary Sewer	Town of Munster Sanitary Sewer Utility
Storm Water	Centennial Village PUD
Water	Town of Munster Water Utility
Electric	NIPSCO
Gas	NIPSCO
Communication	AT&T
Communication	Comcast

1. Sanitary Sewer Service for the development areas on the south side of 45th Street will be provided by connecting to an existing 10-inch PVC sanitary sewer line located on the south side of Centennial Drive between Calumet Avenue and the Centennial Park parking lot. A new 10-inch sanitary sewer will connect into the existing manhole located on the west side of the Centennial Park parking lot and extend north into the new Centennial Drive.

   Sanitary Sewer Service for the development area on the north side of 45th Street will be provided by connecting to an existing gravity sewer located at the southeast corner of Calumet Avenue and the CN Railroad. A new 8-inch sanitary sewer will connect into the existing manhole located on the east side of Calumet Avenue and extend east parallel with the north property line of Lot A.

   All Sanitary Sewer Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Sanitary Sewer Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All sanitary sewer mains shall be constructed of SDR 26 PVC piping and constructed in accordance with the Munster Sanitary Sewer Utility standard specifications. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

   Sanitary Sewer Service lines connecting buildings to the Sanitary Sewer Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The sanitary sewer service lines shall be constructed of SDR 26 PVC piping with fittings, manholes and gasket materials meeting the specifications defined in the Munster Sanitary Sewer Utility Use Ordinance.

2. Water Service for domestic and fire service for the development areas on the south side of 45th Street will be provided by connecting to an existing 12-inch water main located on the west side of Calumet Avenue. The development's water distribution system design will provide a water

supply loop that connects to the existing 12-inch Calumet Avenue water main with a proposed 12-inch water main at Centennial Drive. The new 12-inch water main will extend along the route of Centennial Drive to 45th Street and extend north under the Grand Trunk Canadian National Railroad and connect to an existing 16-inch water main on 45th Street north of the Grand Trunk Canadian National Railroad. All proposed water main crossings of Calumet Avenue will be bored under Calumet Avenue and the Grand Trunk Canadian National Railroad. No open cuts of Calumet Avenue will be permitted.

There will be two 8-inch water main inner loops that will extend through the areas west and east of the proposed 12-inch Centennial Drive water main to service the buildings along Calumet Avenue and adjacent to Clay Hole Lake and all buildings located in the 4 quadrants of the development.

All Water Main Lines shall be platted in public utility easements and be dedicated to the Town of Munster Water Utility for ownership and maintenance. All public utility easements shall be a minimum of 20-feet in width and will be in locations that provide the Utility immediate access for maintenance. All water mains shall be constructed of Class 52 ductile iron piping and constructed in accordance with the Munster Water Utility standard specifications. Fire hydrants shall be spaced and located in accordance with Town Ordinance and with the approval of the Munster Fire Department. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by and paid for by the Centennial Village PUD within 7 days of any repair by the Town of Munster to the utility infrastructure.

Water Service lines connecting buildings to the Water Main Lines shall be the owned and maintained by the ownership entity of the building it serves. The water service lines shall be constructed of Type K copper or Class 52 ductile iron piping with valves, fittings, hydrants and gasket materials meeting the specifications defined in the Munster Water Utility Use Ordinance.

3. Electric and Gas service shall be provided by NIPSCO. Existing Electric Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific electric service plan for the development will route electric lines underground to building pad mount transformers. The underground electric route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific electric service design shall be completed by NIPSCO.

   Existing Gas Service mains are located on the east side of Calumet Avenue. The specific gas service plan for the development will route lines underground in a joint trench with the proposed electric lines to building meters. The underground gas route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific gas service design shall be completed by NIPSCO.

   All Electric and Gas Lines shall be platted in public utility easements and be dedicated to the NIPSCO for ownership and maintenance. All NIPSCO utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement,

concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the NIPSCO to the utility infrastructure.

4. Communication service shall be provided by AT&T and Comcast. Existing Communication Service overhead transmission lines are located on the east and west sides of Calumet Avenue. The specific communication service plan for the development will route communication copper and potentially fiber lines underground to building service entry points. The underground communication route plan will to the extent possible parallel the water and sanitary sewer utility routes. The specific communication service design shall be completed by the respective communication utility company.

   All Communication Lines shall be platted in public utility easements and be dedicated to the specific utility for ownership and maintenance. All communication utility easements shall be a minimum of 10-feet in width and will be in locations that provide the Utility immediate access for maintenance. Restoration repairs of the ground surface conditions including asphalt pavement, concrete pavement, landscaping and hardscaping shall be made by the Centennial Village PUD within 7 days of any repair by the AT&T and Comcast to the utility infrastructure.

Section 16 – Storm Water Management

Storm Water Runoff from the site shall meet the quantity and quality requirements of the Storm Water Ordinance of the Town of Munster. All storm water shall be permitted to discharge directly into Clay Hole Lake. Clay Hole Lake shall provide the storm water quantity management for all of the Centennial Village PUD development area.

1. The storm water collection system shall be designed following the Munster Storm Water Ordinance and sized to convey the 10-year, 24-hour storm event.

2. The on-site storm water collection system shall be designed to respect the natural drainage patterns of the site and adjacent properties. Inlets, catch basin and manholes shall generally be located to collect storm water along the outer edges of the development so that the development grading plan can match existing adjacent grades.

3. Locations of Inlets, Catch Basins and Manholes will be positioned to avoid main pedestrian walking routes, trash enclosures, parking spaces and main building entries.

4. Storm Sewer collection system piping shall meet the specifications of INDOT Type 2 pipe and shall include Reinforced Concrete Pipe (RCP), Poly Vinyl Chloride (PVC), and High Density Ribbed Polypropylene pipe material.

5. Building roof drains and footing drains may be connected directly to underground storm sewer system piping to minimize overland runoff to inlets.

6. Clay Hole Lake shall provide the storm water quantity storage requirement of the development. The water's edge of Clay Hole Lake shall be treated and landscaped to provide safe usage of the lake for pedestrians. The storm water management plan for Clay Hole Lake will incorporate the lake as a visual and recreational amenity of the development.

7. The storm water collection system shall be designed with storm water quality structural BMPs to remove suspended solids, oil and gas residuals, snow removal salts, and other pollutants from storm water runoff. The storm water quality system shall be incorporated into the pre and post construction Storm Water Pollution Prevention Plan for the development (SWPPP). The SWPPP construction and post construction period activity shall be strictly adhered and be submitted to the Town of Munster for Storm Water Permitting.

8. A storm water management plan shall be submitted with final site engineering design plans for each building phase of the development. The plan shall include storm water collection system sizing, quantity and quality calculations following the Town of Munster Storm Water Ordinance.

9. An IDEM Rule 5 NOI shall be submitted to the Indiana Department of Environmental Management for all construction related soil disturbing activities.

10. The Centennial Village PUD shall be permitted to modify the positions and locations of building, parking, curbing and other site improvements to accommodate the storm sewer routing for the 45th Street Town of Munster public improvement project. It is anticipated that storm water

from the north side of the CN railroad will be routed through the Building A site and extend to 45th Street near the proposed 45th traffic signal. From the signal area, storm sewer routing is anticipated to extend to the south side of 45th Street along Buildings I, M & L to eventually discharge into Clay Hole Lake. Additionally, a storm water pumping station is proposed adjacent to 45th Street between buildings M & L. Any modifications to the Centennial Village PUD due to the 45th Street storm water system shall be permitted to be completed administratively with the Town of Munster's administrative staff.

11. Maintenance of the Centennial Village storm sewer collection system and conveyance piping shall be the responsibility of the Centennial Village PUD excepting the 60-inch storm sewer and collection system designed and constructed by the Town of Munster to drain areas north of the Grand Trunk Canadian National Railroad and the 45th Street realignment project. The 60-inch storm sewer and collection system generally runs through the east half of the Centennial Village parcel north of 45th Street and the northeast quadrant of the Centennial Village parcel south of 45th Street.

12. Overland Flow Paths resulting from the 100-year Storm Event shall be determined, clearly shown as hatched areas on the plans and clearly situated within drainage easements. The drainage easements shall be clearly marked as Overland Flow Paths on the Final Plats. No improvements that can impeded the flow of stormwater shall be constructed within these easements.

Section 17 – Subdivision of Land and Site Development Approvals

The Centennial Village PUD consists of 18 building sites. Construction to be completed on all building sites shall submit to the Town of Munster Plan Commission an application for Site Development Plan Approval following Article IX of Chapter 26 of the Town of Munster Land Development Code. The development will complete the appropriate application documentation at the time of each building site development and process the Development Plan Approval through the Munster Plan Commission as outlined in Town Ordinance.

Certain building sites within the Centennial Village PUD may have benefit to execute the subdivision of land in accordance with Article V of Chapter 26 of the Town of Munster Land Development Code. The development will determine on a building site basis how best to hold land ownership interest. The Munster Plan Commission will review and approve all petitions and plats for the subdivision of lots within the Centennial Village PUD.

Section 18 – Other Standards

Any standards not identified in this PUD, shall default to the Town of Munster current Ordinances and Zoning Codes.

Section 19 - Concept Site Development Plans & Building Sizes

The Centennial Village PUD building sites consist of the building sizes (sq.ft) listed below. These building sizes are approximate and can vary slightly. Each building site's final building size shall be approved during the Final Site Development Plan Approval process following Article IX of Chapter 26 of the Town of Munster Land Development Code.

Building A:	23,300 sq.ft	**Building K:**	71,040 sq.ft
Building A.1:	4,300 sqf.ft	**Building L:**	5,000 sq.ft
Building A.2:	10,300 sq.ft	**Building M:**	6,950 sq.ft
Building A.3:	28,800 sq.ft	**Building N:**	34,000 sq.ft
Building B:	13,833 sq.ft	**Building O:**	98,480 sq.ft
Building C:	6,600 sq.ft		
Building D:	8,400 sq.ft		
Building E:	57,560 sq.ft		
Building F:	5,400 sq.ft		
Building G:	77,920 sq.ft		
Building H:	74,000 sq.ft		
Building I:	22,188 sq.ft		
Building J:	71,040 sq.ft		

Note: Square footage (sq.ft) of buildings listed above is the total, regardless of the number of floors in each building.

Current Overall Concept Site Development Plan



Previous Overall Concept Site Development Plan



Previous Overall Concept Site Development Plan



Previous Overall Concept Site Development Plan



TOWN OF MUNSTER

PLAN COMMISSION REGULAR MEETING 4/14/26

Munster Town Hall: Main Meeting Room

Tuesday, April 14, 2026 at 07:00 PM

AGENDA

Join Zoom Webinar as a Viewer:
https://us02web.zoom.us/j/83006860776
Meeting ID: 830 0686 0776
Passcode: 138335

1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **ROLL CALL**

   William Baker (R), President, Appointed by: Town Council, Initial Appointment: 01/15/2007 -Term Expiration: 12/31/2026
   Roland Raffin (D), Vice President, Appointed by: Town Council, Initial Appointment: 03/12/2007 - Term Expiration: 12/31/2026
   Jennifer Johns (R), member. Appointed by: Town Council President, Initial Appointment: 01/08/2024 - Term Expiration: 12/31/2027
   Rachel Branagan (D), member, Appointed by: Town Council, Initial Appointment: 06/01/2022 - Term Expiration: 12/31/2027
   Joseph Hofferth, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
   David B. Nellans, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026
   George Shinkan, Town Council Rep., Appointed by: Town Council President, Initial Appointment: 01/06/2025 - Term Expiration: 12/31/2026

5. **APPROVAL OF MINUTES**
   a. March 10, 2026, PC Minutes
      Documents: 2026.03.10 PC Minutes draft
6. **PUBLIC HEARINGS**
7. **PRELIMINARY HEARINGS**
   a. PC26-002 PUD AMENDMENT: Bill Hollahan of Absolute Advertising on behalf of Franciscan Health Munster requests to amend the FRANCISCAN ALLIANCE PLANNED UNIT DEVELOPMENT (PUD) to include revisions to the sign standards at 701 Superior Avenue.
      Documents: PC 26-002 Preliminary Hearing Staff Report Franciscan Sign PUD Amendment | Ex A Application-PUD Amendment Signs PC26-002 | Ex B PUD Sign standards FRANCISCAN HEALTH | Ex C Sign Types | Ex D Sign Site Plan
8. **FINDINGS OF FACT**
   a. PC25-016 PUD AMENDMENT: Matt Kimmel of Centennial Village received a favorable recommendation to amend the CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT to revise the CV Design Standards and Site Plan to include revisions to the sign standards and the size, location, and shape of buildings and lots of Lot C located at 9505 Calumet Avenue.
      Documents: Centennial Village PUD Amend.CV Design Standards Revised 03.23.2026 | PC 25-016 Findings - Amend PUD Ord - Centennial Village PUD (2026-03-10)
   b. PC25-017 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village received conditional approval of a Development Plan on proposed Lot 11 for a 23,299 square foot, 1-story Sprouts Market Building to be commonly known as 800 45th Street.
      Documents: PC 25-017 Findings - Dev. Plan for PUD - Sprouts Market, Lot 11 Cent.Vill. (2026-03-10)
   c. PC25-018 DEVELOPMENT PLAN REVIEW: Matt Kimmel of Centennial Village received conditional approval of a Development Plan on proposed Lot 13 for a 4,270 square foot, 1-story Chase Bank Building to be commonly known as 9521 Calumet Avenue.

Documents: PC 25-018 Findings - Dev. Plan for PUD - Chase Bank Lot 13 Cent.Vill. (2026-03-10)

9. **OTHER BUSINESS**
    a. PC Rules and Regulations
10. **NEXT REGULAR BUSINESS MEETING** May 12, 2026
11. **ADJOURNMENT**

Recorded meetings are archived at: https://www.youtube.com/channel/UCjZG8vgYLDwUr-sEWvNOSFQ

MUNSTER PLAN COMMISSION

PC DOCKET NO. 25-016

PETITIONER/OWNER:
Matt Kimmel, Member
CPV Partners LLC
631 Killarney Drive
Dyer, IN 46311

APPLICATION: PUD Amendment -
Centennial Village Planned Unit Development

PROPERTY:
Centennial Village Planned Unit Development
9505 Calumet Avenue
Munster, IN 46321

FINDINGS OF FACT

I. Application has been made to the Town of Munster Plan Commission by Petitioner/Owner, Matt Kimmel, Member of CV BDG A, LLC; CV BDG B, LLC; CV BDG C, LLC; CV BDG D, LLC; CV BDG F, LLC; CV BDG I, LLC; CV BDG M, LLC; CPV Partners, LLC; CV Development, LLC; and Centennial Village, LLC requesting to amend the Centennial Village Planned Unit Development ("PUD") District ordinances to update the Centennial Village PUD Design Standards applicable to all lots in the Centennial Village PUD District.

II. The property within the Centennial Village PUD was originally approved as a planned unit development district on July 22, 2013 by Ordinance 1598. Thereafter, Ordinance 1598 was amended by Ordinance 1659 (June 8, 2015), Ordinance 1709 (March 6, 2017), Ordinance 1911 (August 21, 2023) and Ordinance 1930 (December 3, 2023).

III. The Centennial Village Planned Unit Development Design Standards, dated February 15, 2017, were approved by Ordinance 1709 (March 6, 2017) and were recorded as Document Number 2017-024635 on April 21, 2017 in the Office of the Recorder of Lake County, Indiana. Thereafter, the Centennial Village Planned Unit Development Design Standards were amended July 11, 2023 and approved by Ordinance 1911 (August 21, 2023).

IV. Centennial Village Planned Unit Development District includes the following properties:

A. Common address: 9651 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-008.000-027
Legally described as:

LOT 1 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

B. Common address: 9625 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-007.000-027
Legally described as:

LOT 2 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS

DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

C. Common address: 9611 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-006.000-027
Legally described as:

LOT 3 IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

D. Common addresses: 9610 N. Centennial Drive, Munster, IN 46321
Parcel Nos.: 45-07-30-353-**001**.000-027 through 45-07-30-353-**070**.000-027 (70 LOTS)
Legally described as:

CENTENNIAL VILLAGE- BUILDING G RESIDENTIAL CONDOMINIUM UNIT PURSUANT TO THE TERMS AND CONDITIONS OF THE DECLARATION OF CENTENNIAL VILLAGE-BUILDING G RESIDENTIAL CONDOMINIUM RECORDED AS DOCUMENT 2021-53790 ON NOVEMBER 10, 2021 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA, AND LOCATED ON LOT 4 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

E. Common address: 9620 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-011.000-027;
Legally described as:

LOT 5 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

F. Common address: 9601 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-012.000-027;
Legally described as:

LOT 6 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, AS PER PLAT THEREOF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

G. Common address: 9600 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-013.000-027;
Legally described as:

LOT 7 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS PER PLAT THEROF

SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

H. Common address: 9601 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-014.000-027
Legally described as:

LOT 8 IN CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS SHOWN IN PLAT BOOK 117, PAGE 60, RECORDED AS DOCUMENT NUMBER 2023-028515 ON OCTOBER 13, 2023 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

I. Common address: 9605 N. Centennial Drive, Munster, IN 46321
Parcel No.: 45-07-30-352-015.000-027
Legally described as:

LOT 9 IN CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA AS SHOWN IN PLAT BOOK 117, PAGE 60, RECORDED AS DOCUMENT NUMBER 2023-028515 ON OCTOBER 13, 2023 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

J. Common address: 9505 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-352-005.000-027
Legally described as:

LOT A IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA, EXCEPTING THEREFROM, ALL OF LOT 4 AND LOT 5 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT A, AS SHOWN IN PLAT BOOK,111 PAGE 53 RECORDED AS DOCUMENT NUMBER 2018-042432 ON JULY 9, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA, AND ALSO EXCEPTING THEREFROM, ALL OF LOT 6 AND LOT 7 IN CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", AS PER PLAT THEREOF SHOWN IN PLAT BOOK,111 PAGE 87 RECORDED AS DOCUMENT NUMBER 2018-070571 ON OCTOBER 15, 2018 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

K. Common Address: East of Calumet Ave. & South of 45th St., Munster IN 46321
Parcel No.: 45-07-30-352-009.000-027
Legally described as:

LOT B IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

L. Common address: 9505 Calumet Avenue, Munster, IN 46321
Parcel No.: 45-07-30-351-006.000-027;
Legally described as:

> LOT C IN CENTENNIAL VILLAGE, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

Upon final plat approval, to be known as:

> LOTS 11, 12, 13, AND 14 IN CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT C, A PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, ACCORDING TO THE PLAT OF SUBDIVISION RECORDED IN PLAT BOOK 110, PAGE 11, RECORDED AS DOCUMENT NUMBER 2017–24636 ON APRIL 2, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY INDIANA.

(Hereafter, jointly referred to as the "Property.")

V. The matter having come before the Munster Plan Commission on December 9, 2025, January 13, 2026, February 10, 2026, and March 10, 2026 for Public Hearing. The Notices were examined for sufficiency. Publication pursuant to the Town of Munster's Zoning Ordinance was accomplished. Petitioner appeared by Russ Pozen, PE, DVG Team. Petitioner presented evidence, documentation, and information regarding the application to amend the Design Standards for the Property. The Public Hearing was opened. Remonstrances were heard. The Public Hearing was closed.

VI. Based upon the testimony and evidence presented by Petitioner, and having given due consideration and paid reasonable regard to the requirements of the Zoning Ordinance of the Town of Munster, as amended from time to time, now by a vote of six (6) in favor, zero (0) opposed, and zero (0) abstained, upon motion duly made and seconded, voted to send a favorable recommendation to the Munster Town Council for PC 25-016, a proposed amendment to the Centennial Village Planned Unit Development with the condition that the recommended edits attached in the March 10, 2026 Addendum Staff Report be complete, including all findings and discussion. In making such determination, the Munster Plan Commission makes the following written Findings of Fact

A. The Property is currently zoned as a Planned Unit Development District.

B. Petitioner requests to amend the Design Standards for all lots in the Planned Unit Development District.

C. The Plan Commission has paid reasonable regard to the following, as required by I.C. 36-7-4-603:

(1) The Comprehensive Plan and any other applicable, adopted planning studies or reports;

(2) The current conditions and the character of current structures and uses in each district;

(3) The most desirable use of which the land in each district is adapted;

(4) The conservation of property values throughout the Town; and

(5) Responsible growth and development.

D. The Plan Commission has paid reasonable regard to the requirements of the Munster Zoning Code, Sec. 26-6.804.L.9., regarding a Planned Unit Development District.

E. The Findings of the Munster Plan Commission are based upon and in accordance with the Munster Subdivision Control and Zoning Ordinances and Indiana state statutes, and shall not be construed or interpreted to be a determination by the Munster Plan Commission of compliance or noncompliance with covenants, restrictions, or limitations on the Property defined herein, if any; and,

F. Petitioner shall comply with all requirements of the Munster Municipal Code and Indiana state statutes relating to the applicable building permits, licensing/registration of contractors, inspections, etc., that are required for construction as permitted herein. Additionally, no approval of the Munster Plan Commission shall be construed or interpreted as approval of any variance from the terms of the Munster Zoning Ordinance which are under the exclusive jurisdiction of the Munster Board of Zoning Appeals.

WHEREFORE, based upon the above evidence and Findings, the Town of Munster Plan Commission by a vote of six (6) in favor, zero (0) opposed, and zero (0) abstained, sent a favorable recommendation to the Munster Town Council to approve PC 25-016, a proposed amendment to the Centennial Village Planned Unit Development, with the proposed edits. The Munster Plan Commission took the above official action on March 10, 2026. Findings of Fact approved on the 14th day of April 2026.

MUNSTER PLAN COMMISSION

By: _____
William Baker, Chairman

ATTEST:

_____
Sergio Carrera Mendoza, Executive Secretary

Attachments: None

To: Town Council

From: Wendy Mis, Clerk-Treasurer

Meeting Date: May 4, 2026

Subject: Release retainage CCMG 2024 - 2

Summary

The Town of Munster received a Community Crossing Matching Grant for street paving under the 2024-2 call.

The streets to be paved included Cardinal, Heather, Oakwood, Woodlawn, Broadmoor**.**

On February 17, 2025, the Town Council awarded the contract for the CCMG 2024-2 paving project to Milestone Contractors North, Inc. for a total of $3,276,740.00.

Change Order #1 for an increase of $111,496.00 was approved at the August 18, 2025 meeting.

The final contract cost will be $3,341,118.42. SEH, the Town's engineering consultant, has reviewed and recommends the release of final retainage in the amount of $334,111.85

Financial Impact

Funding Source:
Budgeted Amount:
Cost: $ 334,111.85

Recommended Council Action

By motion and voice vote, approve the final release of retainage for Cardinal, Heather, Oakwood, Woodlawn, Broadmoor (CCMG 2024-2) in the amount of $334,111.85.

Attachments:

1. MUNST 180213_RETAINAGE Payment_Reccomendation Letter_04172026
2. CCMG 24-1 Balancing
3. Cert of Comp signed

April 17, 2026

RE: Town of Munster
Paving and Water Main Improvements
CCMG 24-2
Cardinal, Heather, Oakwood, Woodlawn, Broadmoor
SEH No. MUNST 180213
Application for Retainage Payment

Jim Marino
Town Manager
Town of Munster
1005 Ridge Road
Munster, IN 46321

Dear Mr. Marino,

Milestone Contractors has submitted the enclosed pay application for final retainage release in the amount of $334,111.85 on the above referenced project. A breakdown of expense based on fund is provided below.

Fund	**Retainage**
Paving	$131,426.82
Concrete Curb	$43,753.10
Concrete (sidewalk, curb ramp, driveways)	$10,763.52
Storm/Sanitary	$52,074.18
Watermain	$96,094.23
Total	**$334,111.85**

SEH has been onsite observing the construction and field verifying pay quantities; we have reviewed the pay application and recommend it for payment. Please do not hesitate to contact me if you have any questions or require additional information.

Sincerely,

T.s.Srinivas
Satya Tallamraju, PE

Attachments

cc: Bob Valois, Director of Operations
Patricia Abbott, Controller/Interim Town Manager

Milestone

Progress Billing Invoice

Remit To:
Milestone Contractors, L.P.
P.O. Box 933030
Cleveland, OH 44193

Invoice #: **258011-RET**
Date: **3/31/2026**

Project: **2024-2 Munster CCMG- P**

To:
TOWN OF MUNSTER
1005 RIDGE ROAD
MUNSTER, IN 46321

Our Contract No. **258011-**
Payment Terms **NET 30 DAYS**
From:
To:
Customer No: **21300**

Customer Ref:

For Billing Inquiries, Please Call:
Anita . Chapman 219-924-5900:

	Amount

Bill Number: 8 **Project:** 2024-2 Munster CCMG- P

ORIGINAL CONTRACT	3,276,740.00
CHANGE ORDERS	111,496.00
CURRENT CONTRACT	3,341,118.42

CURRENT

BILLING THIS ESTIMATE	334,111.85
LESS RETAINAGE WITHHELD	0.00
ADD RETAINAGE RELEASED	0.00
DUE THIS ESTIMATE	334,111.8

VALUE OF WORK TO DATE	3,341,118.42
LESS RETAINAGE WITHHELD	
TOTAL	3,007,386.58
LESS PREVIOUS INVOICE	3,007,386.58
SUB TOTAL DUE THIS ESTIMATE	334,111.85

Please Pay From This Invoice
No Statement Issued

Milestone

FINAL
Payment to Follow

AFFIDAVIT AND WAIVER OF LIEN

STATE OF *INDIANA*)
) SS:
COUNTY OF *LAKE*)

Anita A Chapman being duly sworn states that they are the **Project Accountant** of **Milestone Contractors, L.P.** having contracted with **TOWN OF MUNSTER** to furnish certain materials and/or labor as follows: **ASPHALT PAVING** for a project known as **2024-2 Munster CCMG- P** (MCLP Job# 258011) located at **MUNSTER, IN** and owned by ***TOWN OF MUNSTER*** and does further state:

FINAL WAIVER:

that the final balance due from the owner is the sum of
three hundred thirty four thousand one hundred eleven and 85/ 100 *Dollars*
the payment of which has been promised as the sole consideration for this Affidavit and Final Waiver of Lien which shall become effective upon receipt of such payment.

THEREFORE, the undersigned waives and releases unto the Owner of said premises any and all lien or claim whatsoever on the above-described property and improvements thereon on account of labor or material or both, furnished by the undersigned thereto, and further certifies that no other party has any claim or right to a lien on account of any work performed or material furnished to the undersigned for said project, and within the scope of this affidavit and waiver.

Milestone Contractors, L.P.

Anita A Chapman

Project Accountant

Subscribed and sworn to before me this: *15th day of April, 2026*

Notary Public: Melinda A Lawson
Melinda A Lawson

My Commission Expires: August 16, 2031

County of Residence: Lake

NOTARY PUBLIC SEAL INDIANA
MELINDA A LAWSON
Notary Public, State of Indiana
Lake County
Commission Number NP0671680
My Commission Expires
August 16, 2031

APPLICATION AND CERTIFICATE FOR PAYMENT

Invoice #: 258011-08

To Owner: TOWN OF MUNSTER
1005 RIDGE ROAD

MUNSTER, IN 46321

Project: 258011- 2024-2 Munster CCMG- P

Application No. : 8

Period To: 11/30/2025

Distribution to :
- ☐ Owner
- ☐ Architect
- ☐ Contractor
- ☐
- ☐

From Contractor: Milestone Contractors, L.P.
Remit to P.O. Box 933030
Cleveland, OH 44193

Via Architect:

Project Nos:

Contract Date:

Contract For:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet is attached.

1. Original Contract Sum		$3,276,740.00
2. Net Change By Change Order		$111,496.10
3. Contract Sum To Date		$3,388,236.10
4. Total Completed and Stored To Date		$3,341,118.42
5. Retainage :		
a. 10.00% of Completed Work	$0.00	
b. 0.00% of Stored Material	$0.00	
Total Retainage		$334,111.85
6. Total Earned Less Retainage		$3,007,006.58
7. Less Previous Certificates For Payments		$3,007,006.58
8. Current Payment Due		$334,111.85
9. Balance To Finish, Plus Retainage		$0.00

CHANGE ORDER SUMMARY	Additions	Deductions
Total changes approved in previous months by Owner	$111,496.10	
Total Approved this Month	$0.00	$0.00
TOTALS	$111,496.10	$0.00
Net Changes By Change Order	**$111,496.10**	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information, and belief, the work covered by this Application for Payment has been completed in accordance with the Contract Documents. That all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR: ***Milestone Contractors, L.P.***

By: _____ *Anita A Chapman* **Date:** *4/13/2026*

State of: *IN* **County of:** *Lake*

Subscribed and sworn to before me this: *13th day of April, 2026*

Notary Public: _____
Melinda A Lawson

MELINDA A LAWSON
Notary Public, State of Indiana
Lake County
Commission Number NP0671680
My Commission Expires
August 16, 2031

My Commission expire *8/16/2031* **County of Residence** *Lake*

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the above application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information, and belief, the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor

AMOUNT CERTIFIED

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By:_____ Date:_____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment, and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CONTINUATION SHEET

Application and Certification for Payment, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Application No. : 7
Application Date : 04/14/2026
To: 11/30/2025
Architect's Project No.:

Invoice # : 258011-08 **Contract :** 258011- 2024-2 Munster CCMG- P

A	B	C	D	E	F	G		H	I
Item No.	Description of Work	Scheduled Value	Work Completed		Materials Presently Stored	Total Completed and Stored To Date	%	Balance To Finish	Retainage
			From Previous Application (D+E)	This Period In Place	(Not in D or E)	(D+E+F)	(G / C)	(C-G)	
1	Construction Engineering	10,000.00	10,000.00	0.00	0.00	10,000.00	100.00%	0.00	
2	MOB	132,002.37	132,002.37	0.00	0.00	132,002.37	100.00%	0.00	
3	Sidewalk Conc. Remove Only	2,960.00	2,992.00	0.00	0.00	2,992.00	100.00%	0.00	
4	Excavation, Common	130,789.00	119,419.75	0.00	0.00	119,419.75	100.00%	0.00	
5	Temporary Erosion Control	4,080.00	4,080.00	0.00	0.00	4,080.00	100.00%	0.00	
6	No. 2 Stone	68,240.00	0.00	0.00	0.00	0.00	0.00%	0.00	
7	Subgrade Treatment, Type III	11,385.00	9,483.50	0.00	0.00	9,483.50	100.00%	0.00	
8	Geotextile	33,101.25	33,192.25	0.00	0.00	33,192.25	100.00%	0.00	
9	Compacted Agg. Base, NO 53	296,780.00	320,395.32	0.00	0.00	320,395.32	100.00%	0.00	
10	Milling Asphalt, 1.5"	2,187.50	2,358.50	0.00	0.00	2,358.50	100.00%	0.00	
11	Milling Asphalt, 4"	9,292.50	9,325.26	0.00	0.00	9,325.26	100.00%	0.00	
12	HMA Surface Type B, 9.5mm	144,420.00	146,146.08	0.00	0.00	146,146.08	100.00%	0.00	
13	HMA Intermediate, Type B, 19.0mm	271,918.00	237,850.04	0.00	0.00	237,850.04	100.00%	0.00	
14	Asphalt for Tack	12,100.00	5,676.00	0.00	0.00	5,676.00	100.00%	0.00	
15	Curb Ramps, Conc.	-67,508.10	0.00	0.00	0.00	0.00	0.00%	0.00	
16	Sidewalk, Conc., Remove & Replace	72,610.00	104,643.20	0.00	0.00	104,643.20	100.00%	0.00	
17	Curb & Gutter, Conc., Remove & Repl	384,461.00	373,296.00	0.00	0.00	373,296.00	100.00%	0.00	
18	PCCP for APP, 6" Remove & Replace	117,180.00	148,867.20	0.00	0.00	148,867.20	100.00%	0.00	
19	HMA for APP., Remove & Replace	3,625.00	2,489.65	0.00	0.00	2,489.65	100.00%	0.00	
20	MOT	28,500.00	28,500.00	0.00	0.00	28,500.00	100.00%	0.00	
21	Sign Assembly, Remove & Replace	15,131.88	3,642.86	0.00	0.00	3,642.86	10.00%	0.00	
22	Grooving for Pavement Markings	3,601.50	2,721.00	0.00	0.00	2,721.00	100.00%	0.00	
23	Line, Thermo, Solid, Yellow, 4"	4,012.00	2,988.60	0.00	0.00	2,988.60	100.00%	0.00	
24	Line, Thermo, Solid, White, 4"	69.70	95.20	0.00	0.00	95.20	100.00%	0.00	
25	Thermo, Stop Line, White, 24"	936.00	1,209.00	0.00	0.00	1,566.50	100.00%	0.00	
26	Thermo, Crosswalk Line, White, 6"	832.60	1,071.80	0.00	0.00	1,137.35	100.00%	0.00	
27	Thermo, ONLY	130.00	130.00	0.00	0.00	130.00	100.00%	0.00	
28	Thermo, Lane Arrow	260.00	260.00	0.00	0.00	260.00	100.00%	0.00	
29	Milling Asphalt, 5.5"	25,935.00	27,311.55	0.00	0.00	27,311.55	100.00%	0.00	
30	Milling Asphalt, 7"	60,515.00	57,335.20	0.00	0.00	57,335.20	100.00%	0.00	
31	Traffic Loop, Assembly	7,294.01	7,294.01	0.00	0.00	7,294.01	100.00%	0.00	
32	Speed Hump	7,000.00	0.00	0.00	0.00	0.00	0.00%	0.00	

CONTINUATION SHEET

Application and Certification for Payment, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Application No. : 7
Application Date : 04/14/2026
To: 11/30/2025
Architect's Project No.:

Invoice # : 258011-08 **Contract : 258011- 2024-2 Munster CCMG- P**

A	B	C	D	E	F	G		H	I
Item No.	Description of Work	Scheduled Value	Work Completed		Materials Presently Stored	Total Completed and Stored To Date	% (G / C)	Balance To Finish (C-G)	Retainage
			From Previous Application (D+E)	This Period In Place	(Not in D or E)	(D+E+F)			
33	Curb Ramp, Conc.	67,508.10	64,234.98	0.00	0.00	64,234.98	100.00%	0.00	
101	Storm Structure, Remove	12,930.54	13,691.16	0.00	0.00	13,691.16	100.00%	0.00	
102	Pipe, Remove	20,377.70	21,562.45	0.00	0.00	21,562.45	100.00%	0.00	
103	Pipe, Type 2, Circular 10"	2,993.66	3,063.28	0.00	0.00	3,063.28	100.00%	0.00	
104	Pipe, Type 2, Circular 12"	215,787.75	184,741.75	0.00	0.00	184,741.75	100.00%	0.00	
105	Pipe, Type 2, Circular 18"	56,225.07	112,295.25	0.00	0.00	112,295.25	100.00%	0.00	
113	Sanitary Sewer Service, ADJ.	1,695.10	1,440.84	0.00	0.00	1,440.84	100.00%	0.00	
114	Sanitary Castring, Furnish & Adjust to	2,602.11	2,602.11	0.00	0.00	2,602.11	100.00%	0.00	
115	Storm Casting, Furnish & Adjust to Gr	19,845.00	19,845.00	0.00	0.00	19,845.00	100.00%	0.00	
116	Casting, Furnish & Adjust to Grade AD	2,770.80	0.00	0.00	0.00	0.00	0.00%	0.00	
117	Storm Sewer, Manhole, 4' Dia., Install	40,000.00	44,000.00	0.00	0.00	44,000.00	100.00%	0.00	
118	Storm Sewer, Catch Basin, 4' Dia., Ins	94,500.00	99,000.00	0.00	0.00	99,000.00	100.00%	0.00	
201	Water Main, PVC, 8"	410,385.20	411,003.25	0.00	0.00	411,003.25	100.00%	0.00	
202	Water Main Connection	92,485.80	92,485.80	0.00	0.00	92,485.80	100.00%	0.00	
203	Fire Hydrant Assembly, Install	63,458.04	63,458.04	0.00	0.00	63,458.04	100.00%	0.00	
204	Fire Hydrant Assembly, Remove	7,991.52	7,991.52	0.00	0.00	7,991.52	100.00%	0.00	
205	Gate Valve, 8"	34,813.08	34,813.08	0.00	0.00	34,813.08	100.00%	0.00	
206	Insertion Valve, 8"	36,039.42	24,026.28	0.00	0.00	24,026.28	100.00%	0.00	
207	Hot Tap, 6"	7,535.37	15,070.74	0.00	0.00	15,070.74	100.00%	0.00	
208	Hot Tap 8"	18,141.64	27,212.46	0.00	0.00	27,212.46	100.00%	0.00	
209	Water Valve, Casting, Furnish & Adjus	494.32	494.32	0.00	0.00	494.32	100.00%	0.00	
210	Water Service 3/4" Recon. Near Side	112,096.17	141,158.14	0.00	0.00	141,158.14	100.00%	0.00	
211	Water Service 3/4" Recon. Far Side	173,610.40	143,228.58	0.00	0.00	143,228.58	100.00%	0.00	
212	Water Service 1" Recon. Near Side	4,400.00	0.00	0.00	0.00	0.00	0.00%	0.00	
213	Water Service 1" Recon. Far Side	4,700.00	0.00	0.00	0.00	0.00	0.00%	0.00	
214	Water Service 1.25" Recon. Near Side	5,000.00	0.00	0.00	0.00	0.00	0.00%	0.00	
215	Storm Sewer Manhole	18,500.00	18,500.00	0.00	0.00	18,500.00	100.00%	0.00	
	Grand Totals	**3,341,118.42**	**3,341,118.42**	**0.00**	**0.00**	**3,341,118.42**	**100.00%**	**0.00**	

April 16, 2026

RE: Town of Munster
Paving and Water Main Improvements
CCMG 24-2
Cardinal, Heather, Oakwood, Woodlawn, Broadmoor
SEH No. MUNST 180213
Final Balancing Pay Application

Jim Marino
Town Manager
Town of Munster
1005 Ridge Road
Munster, IN 46321

Dear Mr. Marino,

Milestone Contractors L.P. has submitted the enclosed final balancing pay application for work on the above referenced project.

SEH has been onsite observing the construction and field verifying pay quantities; we have reviewed this pay application and recommend it for submittal to the Town. No payment is due with this application. Please do not hesitate to contact me if you have any questions or require additional information.

Sincerely,

T.s.Srinivas
Satya Tallamraju, PE

Attachments

cc: Bob Valois, Director of Operations
Patricia Abbott, Controller
Laura Pramuk, Administrative Secretary

DOCUMENT 01 23 63

CHANGE ORDER

NUMBER: 2

PROJECT: Paving and Watermain Improvements CCMG 24-2

DATE OF ISSUANCE:01/23/2026 EFFECTIVE DATE:01/23/2026

OWNER: Town of Munster

OWNER'S Contract No. MUNST 180213

CONTRACTOR: Milestone Contractors, L.P. ENGINEER: SEH of Indiana

You are directed to make the following changes in the Contract Documents.

Description:

ADD: Item #B215 Storm Sewer Manhole, 7ft Dia., Furnish and Install: 1 EA at $18,500/EA.

Reason for Change Order:

The 7 foot diameter manhole was required to avoid a gas line to make the connection to the existing storm sewer feasible. The angle of the existing pipes and proximity to the gas line required the additional size and will provide stormwater storage benefits. This includes all equipment, labor, excavation, stone backfill, pipe removal, and connections to the manhole.

Attachments:

Milestone Pricing for added Item #B215.

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
Original Contract Price $ 3,276,740.00	Original Contract Times Substantial Completion: _____ Ready for final payment: _____ days or dates
Net changes from previous Change Orders No. _0_ to No. _1__ $ 92,996.10	Net changes from previous Change Orders No. ___ to No. ___ _____ (days)
Contract Price prior to this Change Order $ 3,369,736.10	Contract Times prior to this Change Order Substantial Completion: _____ Ready for final payment: _____ days or dates
Net Increase (~~Decrease~~) of this Change Order $ 18,500	Net Increase (Decrease) of this Change Order _____ (days)
Contract Price with all approved Change Orders $ 3,388,236.10	Contract Times with all approved Change Orders Substantial Completion: _____ Ready for final payment: _____ days or dates

RECOMMENDED:

By: _____
Engineer (Authorized Signature)

Date: 1/23/2026

APPROVED:
Town of Munster

By: _____
Town Manager

Date: 1/29/26

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Date: 1-29-2026

END OF SECTION

APPLICATION AND CERTIFICATE FOR PAYMENT

Invoice #:

To Owner: TOWN OF MUNSTER
1005 RIDGE ROAD

MUNSTER, IN 46321

Project: 258011- 2024-2 Munster CCMG- P

Application No. :

Period To: 11/30/2025

Distribution to :
- ☐ Owner
- ☐ Architect
- ☐ Contractor
- ☐
- ☐

From Contractor: Milestone Contractors, L.P.
Remit to P.O. Box 933030
Cleveland, OH 44193

Via Architect:

Project Nos:

Contract For:

Contract Date:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract
Continuation Sheet is attached.

1. Original Contract Sum		$3,276,891.98
2. Net Change By Change Order		$111,496.10
3. Contract Sum To Date		$3,388,388.08
4. Total Completed and Stored To Date		$3,341,118.42
5. Retainage :		
a 10.00% of Completed Work	$334,111.85	
b 0.00% of Stored Material	$0.00	
Total Retainage		$334,111.85
6. Total Earned Less Retainage		$3,007,006.57
7. Less Previous Certificates For Payments		$3,006,625.83
8. Current Payment Due		$0.00
9. Balance To Finish, Plus Retainage		$334,111.85

CHANGE ORDER SUMMARY	Additions	Deductions
Total changes approved in previous months by Owner	$111,496.10	
Total Approved this Month	$0.00	$0.00
TOTALS	$111,496.10	$0.00
Net Changes By Change Order	**$111,496.10**	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information, and belief, the work covered by this Application for Payment has been completed in accordance with the Contract Documents. That all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR: ***Milestone Contractors, L.P.***

By: *Anita A Chapman* **Date:** *4/13/2026*

State of: *IN* **County of:** *Lake*

Subscribed and sworn to before me this: *13th day of April, 2026*

Notary Public: *Melinda A Lawson*

Melinda A Lawson
Notary Public, State of Indiana
Lake County
Commission Number NP0671680
My Commission Expires
August 16, 2031

My Commission expire *8/16/2031* **County of Residence** *Lake*

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the above application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information, and belief, the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor

AMOUNT CERTIFIED $380.74

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By:_____ Date:_____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment, and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CONTINUATION SHEET

Application and Certification for Payment, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Application No. : 7
Application Date : 04/14/2026
To: 11/30/2025
Architect's Project No.:

Invoice # : **Contract : 258011- 2024-2 Munster CCMG- P**

A	B	C	D	E	F	G		H	I
Item No.	Description of Work	Scheduled Value	Work Completed		Materials Presently Stored	Total Completed and Stored To Date	% (G / C)	Balance To Finish (C-G)	Retainage
			From Previous Application (D+E)	This Period In Place	(Not in D or E)	(D+E+F)			
1	Construction Engineering	10,000.00	10,000.00	0.00	0.00	10,000.00	100.00%	0.00	
2	MOB	132,002.37	132,002.37	0.00	0.00	132,002.37	100.00%	0.00	
3	Sidewalk Conc. Remove Only	2,960.00	2,992.00	0.00	0.00	2,992.00	100.00%	0.00	
4	Excavation, Common	130,789.00	119,419.75	0.00	0.00	119,419.75	100.00%	0.00	
5	Temporary Erosion Control	4,080.00	4,080.00	0.00	0.00	4,080.00	100.00%	0.00	
6	No. 2 Stone	68,240.00	0.00	0.00	0.00	0.00	0.00%	0.00	
7	Subgrade Treatment, Type III	11,385.00	9,483.50	0.00	0.00	9,483.50	100.00%	0.00	
8	Geotextile	33,101.25	33,192.25	0.00	0.00	33,192.25	100.00%	0.00	
9	Compacted Agg. Base, NO 53	296,780.00	320,395.32	0.00	0.00	320,395.32	100.00%	0.00	
10	Milling Asphalt, 1.5"	2,187.50	2,358.50	0.00	0.00	2,358.50	100.00%	0.00	
11	Milling Asphalt, 4"	9,292.50	9,325.26	0.00	0.00	9,325.26	100.00%	0.00	
12	HMA Surface Type B, 9.5mm	144,420.00	146,146.08	0.00	0.00	146,146.08	100.00%	0.00	
13	HMA Intermediate, Type B, 19.0mm	271,918.00	237,850.04	0.00	0.00	237,850.04	100.00%	0.00	
14	Asphalt for Tack	12,100.00	5,676.00	0.00	0.00	5,676.00	100.00%	0.00	
15	Curb Ramps, Conc.	-67,508.10	0.00	0.00	0.00	0.00	0.00%	0.00	
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22	Grooving for Pavement Markings	3,601.50	2,721.00	0.00	0.00	2,721.00	100.00%	0.00	
23	Line, Thermo, Solid, Yellow, 4"	4,012.00	2,988.60	0.00	0.00	2,988.60	100.00%	0.00	
24	Line, Thermo, Solid, White, 4"	69.70	95.20	0.00	0.00	95.20	100.00%	0.00	
25	Thermo, Stop Line, White, 24"	936.00	1,209.00	0.00	0.00	1,566.50	100.00%	0.00	
26	Thermo, Crosswalk Line, White, 6"	832.60	1,071.80	0.00	0.00	1,137.35	100.00%	0.00	
27	Thermo, ONLY	130.00	130.00	0.00	0.00	130.00	100.00%	0.00	
28	Thermo, Lane Arrow	260.00	260.00	0.00	0.00	260.00	100.00%	0.00	
29	Milling Asphalt, 5.5"	25,935.00	27,311.55	0.00	0.00	27,311.55	100.00%	0.00	
30	Milling Asphalt, 7"	60,515.00	57,335.20	0.00	0.00	57,335.20	100.00%	0.00	
31	Traffic Loop, Assembly	7,294.01	7,294.01	0.00	0.00	7,294.01	100.00%	0.00	
32	Speed Hump	7,000.00	0.00	0.00	0.00	0.00	0.00%	0.00	

CONTINUATION SHEET

Application and Certification for Payment, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Application No. : 7
Application Date : 04/14/2026
To: 11/30/2025
Architect's Project No.:

Invoice # :
Contract : 258011- 2024-2 Munster CCMG- P

A	B	C	D	E	F	G		H	I
Item No.	Description of Work	Scheduled Value	Work Completed		Materials Presently Stored	Total Completed and Stored To Date	%	Balance To Finish	Retainage
			From Previous Application (D+E)	This Period In Place	(Not in D or E)	(D+E+F)	(G / C)	(C-G)	
33	Curb Ramp, Conc.	67,508.10	64,234.98	0.00	0.00	64,234.98	100.00%	0.00	
101	Storm Structure, Remove	12,930.54	13,691.16	0.00	0.00	13,691.16	100.00%	0.00	
102	Pipe, Remove	20,377.70	21,562.45	0.00	0.00	21,562.45	100.00%	0.00	
103	Pipe, Type 2, Circular 10"	2,993.66	3,063.28	0.00	0.00	3,063.28	100.00%	0.00	
104	Pipe, Type 2, Circular 12"	215,787.75	184,741.75	0.00	0.00	184,741.75	100.00%	0.00	
105	Pipe, Type 2, Circular 18"	56,225.07	112,295.25	0.00	0.00	112,295.25	100.00%	0.00	
113	Sanitary Sewer Service, ADJ.	1,695.10	1,440.84	0.00	0.00	1,440.84	100.00%	0.00	
114	Sanitary Castring, Furnish & Adjust to	2,602.11	2,602.11	0.00	0.00	2,602.11	100.00%	0.00	
115	Storm Casting, Furnish & Adjust to Gr	19,845.00	19,845.00	0.00	0.00	19,845.00	100.00%	0.00	
116	Casting, Furnish & Adjust to Grade AD	2,770.80	0.00	0.00	0.00	0.00	0.00%	0.00	
117	Storm Sewer, Manhole, 4' Dia., Install	40,000.00	44,000.00	0.00	0.00	44,000.00	100.00%	0.00	
118	Storm Sewer, Catch Basin, 4' Dia., Ins	94,500.00	99,000.00	0.00	0.00	99,000.00	100.00%	0.00	
201	Water Main, PVC, 8"	410,385.20	411,003.25	0.00	0.00	411,003.25	100.00%	0.00	
202	Water Main Connection	92,485.80	92,485.80	0.00	0.00	92,485.80	100.00%	0.00	
203	Fire Hydrant Assembly, Install	63,458.04	63,458.04	0.00	0.00	63,458.04	100.00%	0.00	
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206	Insertion Valve, 8"	36,039.42	24,026.28	0.00	0.00	24,026.28	100.00%	0.00	
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208	Hot Tap 8"	18,141.64	27,212.46	0.00	0.00	27,212.46	100.00%	0.00	
209	Water Valve, Casting, Furnish & Adjus	494.32	494.32	0.00	0.00	494.32	100.00%	0.00	
210	Water Service 3/4" Recon. Near Side	112,096.17	141,158.14	0.00	0.00	141,158.14	100.00%	0.00	
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212	Water Service 1" Recon. Near Side	4,400.00	0.00	0.00	0.00	0.00	0.00%	0.00	
213	Water Service 1" Recon. Far Side	4,700.00	0.00	0.00	0.00	0.00	0.00%	0.00	
214	Water Service 1.25" Recon. Near Side	5,000.00	0.00	0.00	0.00	0.00	0.00%	0.00	
215	Storm Sewer Manhole	18,500.00	18,500.00	0.00	0.00	18,500.00	100.00%	0.00	
	Grand Totals	**3,341,118.42**	**3,341,118.42**	**0.00**	**0.00**	**3,341,118.42**	**100.00%**	**0.00**	**334,111.85**

TOWN OF MUNSTER

CONTRACTOR: Milestone Contractors L.P.

Final Balancing Pay Application for CCMG 24-2

Item #	Pay Item Description	Unit of Measure	A	B	C = A x B	D	E	F = B + D	G = C + E	H	I	J	K	L = H + J	M = A x L	N = M / G	O = F - L	P = G - M
			ORIGINAL CONTRACT			CHANGE ORDERS		CURRENT CONTRACT		PREVIOUS APPLICATIONS		THIS PERIOD		TOTAL TO DATE			BALANCE TO COMPLETE	
			Unit Price	Quantity	Amount	Quantity (+) or (-)	Amount (+) or (-)	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	% of Current Contract	Quantity	Amount
	ITEM A - PAVEMENT																	
1	CONSTRUCTION ENGINEERING	LSUM	$10 000 00	1 00	$10 000 00		$0 00	1 00	$10 000 00	1 00	$10 000 00		$0 00	1 00	$10 000 00	100 00%	0 00	$0 00
2	MOBILIZATION AND DEMOBILIZATION	LSUM	$132 002 37	1 00	$132 002 37		$0 00	1 00	$132 002 37	1 00	$132 002 37		$0 00	1 00	$132 002 37	100 00%	0 00	$0 00
3	SIDEWALK CONCRETE, REMOVE ONLY	SYS	$40 00	74 00	$2 960 00		$0 00	74 00	$2 960 00	74 80	$2 992 00		$0 00	74 80	$2 992 00	101 08%	-0 80	$0 00
4	EXCAVATION, COMMON	CYS	$31 00	3 830 00	$118 730 00	389 00	$12 059 00	4 219 00	$130 789 00	3,852 25	$119 419 75		$0 00	3,852 25	$119 419 75	91 31%	366 75	$11 369 25
5	TEMPORARY EROSION CONTROL	DOL	$1 00	4 080 00	$4 080 00		$0 00	4 080 00	$4 080 00	4,080 00	$4 080 00		$0 00	4,080 00	$4 080 00	100 00%	0 00	$0 00
6	NO. 2 STONE	TON	$80 00	853 00	$68 240 00		$0 00	853 00	$68 240 00		$0 00		$0 00		$0 00	0 00%	853 00	$68 240 00
7	SUBGRADE TREATMENT, TYPE III	SYS	$0 50	22 770 00	$11 385 00		$0 00	22 770 00	$11 385 00	18,967 00	$9 483 50		$0 00	18,967 00	$9 483 50	83 30%	3803 00	$1 901 50
8	GEOTEXTILE	SYS	$1 75	18 915 00	$33 101 25		$0 00	18 915 00	$33 101 25	18,967 00	$33 192 25		$0 00	18,967 00	$33 192 25	100 27%	-52 00	$0 00
9	COMPACTED AGGREGATE BASE, NO. 53	TON	$35 50	8 360 00	$296 780 00		$0 00	8 360 00	$296 780 00	9,025 22	$320 395 31		$0 00	9 025 22	$320 395 31	107 96%	-665 22	$0 00
10	MILLING ASPHALT, 1.5 IN	SYS	$2 50	875 00	$2 187 50		$0 00	875 00	$2 187 50	943 40	$2 358 50		$0 00	943 40	$2 358 50	107 82%	-68 40	$0 00
11	MILLING ASPHALT, 4 IN	SYS	$3 15	2 950 00	$9 292 50		$0 00	2 950 00	$9 292 50	2,960 40	$9 325 26		$0 00	2,960 40	$9 325 26	100 35%	-10 40	$0 00
12	HMA SURFACE TYPE B, 9.5 mm	TON	$87 00	1 660 00	$144 420 00		$0 00	1 660 00	$144 420 00	1,679 84	$146 146 08		$0 00	1,679 84	$146 146 08	101 20%	-19 84	$0 00
13	HMA INTERMEDIATE, TYPE B, 19.0 mm	TON	$78 00	2 620 00	$204 360 00	822 00	$64 936 00	3 442 00	$271 918 00	3,010 76	$237 850 04		$0 00	3,010 76	$237 850 04	87 47%	431 24	$34 067 96
14	ASPHALT FOR TACK COAT	TON	$1 100 00	11 00	$12 100 00		$0 00	11 00	$12 100 00	5 16	$5 676 00		$0 00	5 16	$5 676 00	46 91%	5 84	$6 424 00
15	CURB RAMPS, CONCRETE	SYS	$227 30	0 00	$0 00	297 00	$67 508 10	297 00	$67 508 10	282 60	$64 234 98		$0 00	282 60	$64 234 98	95 15%	14 40	$3 273 12
NA15	CURB RAMPS, CONCRETE	SYS	$197 00	297 00	$58 509 00	-297 00	-$58 509 00	0 00	$0 00									$0 00
16	SIDEWALK, CONCRETE, REMOVE & REPLACE	SYS	$106 00	685 00	$72 610 00		$0 00	685 00	$72 610 00	987 20	$104 643 20		$0 00	987 20	$104 643 20	144 12%	-302 20	$0 00
17	CURB & GUTTER, CONCRETE, REMOVE & REPLACE	LFT	$38 50	9 986 00	$384 461 00		$0 00	9 986 00	$384 461 00	9,896 00	$373 256 00		$0 00	9,896 00	$373 256 00	97 10%	290 00	$11 165 00
18	PCCP FOR APPROACHES, 6 IN, REMOVE & REPLACE	SYS	$108 00	1 085 00	$117 180 00		$0 00	1 085 00	$117 180 00	1,378 40	$148 867 20		$0 00	1,378 40	$148 867 20	127 04%	-293 40	$0 00
19	HMA FOR APPROACHES, REMOVE & REPLACE	TON	$145 00	25 00	$3 625 00		$0 00	25 00	$3 625 00	17 17	$2 489 65		$0 00	17 17	$2 489 65	68 68%	7 83	$1 135 35
20	MAINTAINING TRAFFIC	LSUM	$28 500 00	1 00	$28 500 00		$0 00	1 00	$28 500 00	1 00	$28 500 00		$0 00	1 00	$28 500 00	100 00%	0 00	$0 00
21	SIGN ASSEMBLY, REMOVE AND REINSTALL	EACH	$280 22	54 00	$15 131 88		$0 00	54 00	$15 131 88	13 00	$3 642 86		$0 00	13 00	$3 642 86	24 07%	41 00	$11 489 02
22	GROOVING FOR PAVEMENT MARKINGS	LFT	$0 75	4 802 00	$3 601 50		$0 00	4 802 00	$3 601 50	3,628 00	$2 721 00		$0 00	3,628 00	$2 721 00	75 55%	1174 00	$880 50
23	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN	LFT	$0 85	4 720 00	$4 012 00		$0 00	4 720 00	$4 012 00	3,516 00	$2 988 60		$0 00	3,516 00	$2 988 60	74 49%	1204 00	$1 023 40
24	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN	LFT	$0 85	82 00	$69 70		$0 00	82 00	$69 70	112 00	$95 20		$0 00	112 00	$95 20	136 59%	-30 00	$0 00
25	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN	LFT	$6 50	144 00	$936 00		$0 00	144 00	$936 00	186 00	$1 209 00	55 00	$357 50	241 00	$1 566 50	167 36%	-97 00	$0 00
26	TRANSVERSE MARKING, THERMOPLASTIC, CROSSWALK LINE, WHITE, 6 IN	LFT	$1 15	724 00	$832 60		$0 00	724 00	$832 60	932 00	$1 071 80	57 00	$65 55	989 00	$1 137 35	136 60%	-265 00	$0 00
27	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, ONLY	EACH	$130 00	1 00	$130 00		$0 00	1 00	$130 00	1 00	$130 00		$0 00	1 00	$130 00	100 00%	0 00	$0 00
28	PAVEMENT MESSAGE MARKING, THERMOPLASTIC, LANE INDICA	EACH	$130 00	2 00	$260 00		$0 00	2 00	$260 00	2 00	$260 00		$0 00	2 00	$260 00	100 00%	0 00	$0 00
29	MILLING ASPHALT, 5.5 IN	SYS	$5 25	4 940 00	$25 935 00		$0 00	4 940 00	$25 935 00	5,202 20	$27 311 55		$0 00	5,202 20	$27 311 55	105 31%	-262 20	$0 00
30	MILLING ASPHALT, 7 IN	SYS	$6 50	9 310 00	$60 515 00		$0 00	9 310 00	$60 515 00	8,820 80	$57 335 20		$0 00	8,820 80	$57 335 20	94 75%	489 20	$3 179 80
31	TRAFFIC LOOP, ASSEMBLY	LSUM	$7 294 01	1 00	$7 294 01		$0 00	1 00	$7 294 01	1 00	$7 294 01		$0 00	1 00	$7 294 01	100 00%	0 00	$0 00
101	SPEED HUMP	EACH	$3,500 00		$0 00	2 00	$7 000 00	2 00	$7 000 00		$0 00		$0 00		$0 00	0 00%	2 00	$7 000 00
	TOTAL ITEM A - PAVEMENT				$1,835,861.31		$92,996.10		$1,928,857.41		$1,859,011.31		$423.05		$1,859,434.36	96.40%		$161,146.90
	ITEM B - STORM/SANITARY SEWER																	
1	STORM STRUCTURE, REMOVE	EACH	$760 62	17 00	$12 930 54		$0 00	17 00	$12 930 54	18 00	$13 691 16		$0 00	18 00	$13 691 16	105 88%	-1 00	$0 00
2	PIPE, REMOVE	LFT	$47 39	430 00	$20 377 70		$0 00	430 00	$20 377 70	455 00	$21 562 45		$0 00	455 00	$21 562 45	105 81%	-25 00	$0 00
3	PIPE, TYPE 2, CIRCULAR 10 IN	LFT	$69 62	43 00	$2 993 66		$0 00	43 00	$2 993 66	44 00	$3 063 28		$0 00	44 00	$3 063 28	102 33%	-1 00	$0 00
4	PIPE, TYPE 2, CIRCULAR 12 IN	LFT	$90 25	2291 00	$215 787 75		$0 00	2 391 00	$215 787 75	2,047 00	$184 741 75		$0 00	2,047 00	$184 741 75	85 61%	344 00	$31 046 00
5	PIPE, TYPE 2, CIRCULAR 18 IN	LFT	$154 88	363 00	$56 225 07		$0 00	363 00	$56 225 07	725 00	$112 295 25		$0 00	725 00	$112 295 25	199 72%	-362 00	$0 00
6	SANITARY SEWER SERVICE, ADJ	LFT	$847 55	2 00	$1 695 10		$0 00	2 00	$1 695 10	1 70	$1 440 84		$0 00	1 70	$1 440 84	85 00%	0 30	$254 26
7	SANITARY CASTING, FURNISH AND ADJUST TO GRADE	EACH	$867 37	3 00	$2 602 11		$0 00	3 00	$2 602 11	3 00	$2 602 11		$0 00	3 00	$2 602 11	100 00%	0 00	$0 00
8	STORM CASTING, FURNISH AND ADJUST TO GRADE	EACH	$945 00	21 00	$19 845 00		$0 00	21 00	$19 845 00	21 00	$19 845 00		$0 00	21 00	$19 845 00	100 00%	0 00	$0 00
9	CASTING, FURNISH AND AJUST TO GRADE (ADA COMPLIANT)	EACH	$923 60	3 00	$2 770 80		$0 00	3 00	$2 770 80		$0 00		$0 00		$0 00	0 00%	3 00	$2 770 80
10	STORM SEWER, MANHOLE, 4 FT. DIA., INSTALL	EACH	$4 000 00	10 00	$40 000 00		$0 00	10 00	$40 000 00	11 00	$44 000 00		$0 00	11 00	$44 000 00	110 00%	-1 00	$0 00
11	STORM SEWER, CATCH BASIN, 4 FT. DIA., INSTALL	EACH	$4 500 00	21 00	$94 500 00		$0 00	21 00	$94 500 00	22 00	$99 000 00		$0 00	22 00	$99 000 00	104 76%	-1 00	$0 00
215	STORM SEWER MANHOLE, 7 FT. DIA., FURNISH AND INSTALL	EAH	$18 500 00			$1 00	$18 500 00	1 00	$18 500 00	1 00	$18 500 00		$0 00	1 00	$18 500 00	100 00%	0 00	$0 00
	TOTAL ITEM B - STORM/SANITARY SEWER				$469,727.73		$18,500.00		$488,227.73		$520,741.84		$0.00		$520,741.84	106.66%		$34,071.06
	ITEM C - WATER MAIN																	
1	WATER MAIN, PVC, 8 IN	LFT	$123 61	3320 00	$410 385 20		$0 00	3 320 00	$410 385 20	3,325 00	$411 003 25		$0 00	3,325 00	$411 003 25	100 15%	-5 00	$0 00
2	WATER MAIN CONNECTION	EACH	$7 707 15	12 00	$92 485 80		$0 00	12 00	$92 485 80	12 00	$92 485 80		$0 00	12 00	$92 485 80	100 00%	0 00	$0 00
3	FIRE HYDRANT ASSEMBLY, INSTALL	EACH	$10 576 34	6 00	$63 458 04		$0 00	6 00	$63 458 04	6 00	$63 458 04		$0 00	6 00	$63 458 04	100 00%	0 00	$0 00
4	FIRE HYDRANT ASSEMBLY, REMOVE	EACH	$1 331 92	6 00	$7 991 52		$0 00	6 00	$7 991 52	6 00	$7 991 52		$0 00	6 00	$7 991 52	100 00%	0 00	$0 00
5	GATE VALVE, 8 IN	EACH	$3 868 12	9 00	$34 813 08		$0 00	9 00	$34 813 08	9 00	$34 813 08		$0 00	9 00	$34 813 08	100 00%	0 00	$0 00
6	INSERTION VALVE, 8 IN	EACH	$12 013 14	3 00	$36 039 42		$0 00	3 00	$36 039 42	2 00	$24 026 28		$0 00	2 00	$24 026 28	66 67%	1 00	$12 013 14
7	HOT TAP, 6 IN	EACH	$7 535 37	1 00	$7 535 37		$0 00	1 00	$7 535 37	2 00	$15 070 74		$0 00	2 00	$15 070 74	200 00%	-1 00	$0 00
8	HOT TAP, 8 IN	EACH	$9 070 82	2 00	$18 141 64		$0 00	2 00	$18 141 64	3 00	$27 212 46		$0 00	3 00	$27 212 46	150 00%	-1 00	$0 00
9	WATER VALVE, CASTING, FURNISH AND ADJUST TO GRADE	EACH	$494 32	1 00	$494 32		$0 00	1 00	$494 32	1 00	$494 32		$0 00	1 00	$494 32	100 00%	0 00	$0 00
10	WATER SERVICE, 3/4 IN, RECONNECTION, NEAR SIDE	EACH	$4 151 71	27 00	$112 096 17		$0 00	27 00	$112 096 17	34 00	$141 158 14		$0 00	34 00	$141 158 14	125 93%	-7 00	$0 00
11	WATER SERVICE, 3/4 IN, RECONNECTION, FAR SIDE	EACH	$4 340 26	40 00	$173 610 40		$0 00	40 00	$173 610 40	33 00	$143 228 58		$0 00	33 00	$143 228 58	82 50%	7 00	$30 381 82
12	WATER SERVICE, 1 IN, RECONNECTION, NEAR SIDE	EACH	$4 400 00	1 00	$4 400 00		$0 00	1 00	$4 400 00		$0 00		$0 00		$0 00	0 00%	1 00	$4 400 00
13	WATER SERVICE, 1 IN, RECONNECTION, FAR SIDE	EACH	$4 700 00	1 00	$4 700 00		$0 00	1 00	$4 700 00		$0 00		$0 00		$0 00	0 00%	1 00	$4 700 00
14	WATER SERVICE, 1.25 IN, RECONNECTION, NEAR SIDE	EACH	$5 000 00	1 00	$5 000 00		$0 00	1 00	$5 000 00		$0 00		$0 00		$0 00	0 00%	1 00	$5 000 00
	TOTAL ITEM C - WATER MAIN				$971,150.96		$0.00		$971,150.96		$960,942.21		$0.00		$960,942.21	98.95%		$56,494.96
	TOTAL ITEM A - PAVEMENT				$1,835,861.31		$92,996.10		$1,928,857.41		$1,859,011.31		$423.05		$1,859,434.36	96.40%		$161,146.90
	TOTAL ITEM B - STORM/SANITARY SEWER				$469,727.73		$18,500.00		$488,227.73		$520,741.84		$0.00		$520,741.84	106.66%		$34,071.06
	TOTAL ITEM C - WATERMAIN				$971,150.96		$0.00		$971,150.96		$960,942.21		$0.00		$960,942.21	98.95%		$56,494.96

TOWN OF MUNSTER

CONTRACTOR: Milestone Contractors L.P.

Final Balancing Pay Application for CCMG 24-2

			A	B	C = A x B	D	E	F = B + D	G = C + E	H	I	J	K	L = H + J	M = A x L	N = M / G	O = F - L	P = G - M
Item #	Pay Item Description	Unit of Measure		ORIGINAL CONTRACT		CHANGE ORDERS		CURRENT CONTRACT		PREVIOUS APPLICATIONS		THIS PERIOD		TOTAL TO DATE			BALANCE TO COMPLETE	
			Unit Price	Quantity	Amount	Quantity (+) or (-)	Amount (+) or (-)	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	% of Current Contract	Quantity	Amount
	TOTAL BID (ITEMS A, B, C)				$3,276,740.00		$111,496.10		$3,388,236.10		$3,340,695.36		$423.05		$3,341,118.42	98.61%		$251,714.92
	Total Contract Breakdown																	
	Fund # Paving				$1,375,830.31		$25,488.00		$1,401,318.31		$1,313,845.13		$423.05		$1,314,268.18			$146,710.78
	Fund # Concrete Curb				$384,461.00		$67,508.10		$451,969.10		$437,530.98		$0.00		$437,530.98			$14,438.12
	Fund # Concrete Sidewalk				$75,570.00		$0.00		$75,570.00		$107,635.20		$0.00		$107,635.20			$0.00
	Fund # Storm/Sanitary				$468,727.73		$18,500.00		$488,227.73		$520,741.84		$0.00		$520,741.84			$34,071.06
	Fund # Watermain				$971,150.96		$0.00		$971,150.96		$960,942.21		$0.00		[illegible]			$56,484.96
					$3,276,740.00		$111,496.10		$3,388,236.10		$3,340,695.36		$423.05		$3,341,118.42			$251,714.92
												CCMG	$423.05					
	Total Retentions Held Breakdown																	
	Fund # Paving										$131,384.51		$42.31		$131,426.82			$14,671.08
	Fund # Concrete Curb										$43,753.10		$0.00		$43,753.10			$1,443.81
	Fund # Concrete Sidewalk										$10,763.52		$0.00		$10,763.52			$0.00
	Fund # Storm/Sanitary										$52,074.18		$0.00		$52,074.18			$3,407.11
	Fund # Watermain										$96,094.22		[illegible]		$96,094.22			$5,649.50
											$334,069.53		$42.30		$334,111.84			$25,171.50
												CCMG	$42.31					
	Total Net Contract Breakdown																	
	Fund # Paving										$1,182,460.62		$380.74		$1,182,841.36			$132,039.70
	Fund # Concrete Curb										$393,777.88		$0.00		$393,777.88			$12,994.31
	Fund # Concrete Sidewalk										$96,871.68		$0.00		$96,871.68			$0.00
	Fund # Storm/Sanitary										$468,667.66		$0.00		$468,667.66			$30,663.95
	Fund # Watermain										$864,847.99		$0.01		$864,848.00			$50,845.46
											$3,006,625.83		$380.75		$3,007,006.58			$226,543.42
												CCMG	$380.74					
	Current Contract Total =		$3,388,236.10															
	Percent Completed To-Date =		99.61%															
	Previous Work Completed =		$3,340,695.36															
	Less 10% Retainage =		$334,069.53															
	Amount Previously Paid =		$3,006,625.83															
	Work Completed this Period =		$423.05															
	Less 10% Retainage =		$42.30															
	Amount Due this Pay Period =		$380.75															
	Total Work Completed including this Period =		$3,341,118.42															
	Less 10% Retainage =		$334,111.84															
	Total Amount Paid including this Period =		$3,007,006.58															

DOCUMENT 00 65 16

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT: Paving and Watermain Improvements CCMG 24-2
Cardinal Dr., Heather Dr., Oakwood Ct., Woodlawn Ave. & Broadmoor Ave.

ENGINEER: SEH,Inc

CONTRACTOR'S PROJECT NO.: 180213

TO: (owner) Town of Munster
1005 Ridge Road
Munster, IN 46321

CONTRACTOR: Milestone Contractors, L.P.

CONTRACT FOR: Town of Munster

CONTRACT DATE: February 27, 2024

DATE OF ISSUANCE: October 17, 2025

PROJECT OR DESIGNATED PORTION SHALL INCLUDE:

The Work performed under this Contract has been reviewed and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby established as October 31, 2025, which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

DEFINITION OF DATE OF SUBSTANTIAL COMPLETION
The Date of Substantial Completion of the Work or designated portion thereof is the Date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.

A list of items to be completed or corrected, prepared by the Engineer and verified by the Contractor is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The date of commencement of warranties for items on the attached list will be the date of final payment unless otherwise agreed to in writing.

SEH, Inc	Satya S. Tallamraju,PE	October 17, 2025
ENGINEER	BY	DATE

The Contractor will complete or correct the Work on the list of items attached hereto within 14 days from the above Date of Substantial Completion.

Milestone Contractors, LP		10-17-2025
CONTRACTOR	BY	DATE

The OWNER is not aware of any substantial deficiencies of the Work and will assume full operation and maintenance responsibilities on the date of Substantial Completion, or final payment, whichever is applicable. Equipment for which an adjustment in operation and maintenance cost is required shall be negotiated within 60 days of the date indicated below.

The Owner accepts the Work or designated portion thereof as substantially complete and will assume full possession thereof on the date of Substantial Completion, or final payment, whichever is applicable.

Town of Munster _____ 4/16/26

OWNER BY Jim Marino DATE

TOWN MANAGER

TITLE

Distribution to:
OWNER _____
ENGINEER _____
CONTRACTOR _____
FIELD _____
OTHER _____

END OF SECTION

To: Town Council

From: Sergio Mendoza, Community Development Director

Meeting Date: May 4, 2026

Subject: Layous 501 45th St.- Release of Surety

Summary

The purpose of this memo is to request the Town Council authorize the release and return of funds currently held in escrow represented as Cashier's Check dated 02/03/25 in the amount of THIRTY-SEVEN THOUSAND AND 00/100 DOLLARS ($37,000.00).

The funds were deposited into escrow from one (1) Cashier Check described as follows:

BANK OF AMERICA, Cashier Check No. 5232001670

The funds were collected pursuant to SECTION 26-6.125 A. 1., Security for Compliance & Completion of an approved Site Plan. The Building Inspector, Zoning Enforcement Inspector, and Town Engineer performed a site inspection and determined compliance with the Town of Munster standards and approvals have been achieved.

Financial Impact

Funding Source:
Budgeted Amount:
Cost:

Recommended Council Action

By motion and roll call vote, to authorize the Clerk-Treasurer to release surety funds held in escrow for 501 45th St. in the amount of $37,000.00.

Developers Escrow Refund-GL # 88830150-9600-63901
Via Meridiana Contractors LLC
17W 110 W 22nd Street, Suite 760, Oakbrook Terrace, IL, 60181

Attachments:

1. 1. Contractor Scope of Work
2. 2. Surety
3. 3. Inspection Punch List
4. 4. Engineer Review
5. 5. FINAL CO

Via Meridiana Contractors LLC
17W 110 W 22nd Street, Suite 760
Oakbrook Terrace, IL 60181
Mobile: 702-308-9788
www.vmc-group.net

January 30, 2025

PROJECT: **Layous Pulmonary Clinic**

LOCATION: **501 45th Steet, Munster, IN 46321**

SUBJECT: **Punchlist Breakdown Costs**

ATTENTION: **Town of Munster**
Glenn R. Rhodes

Punchlist Breakdown Costs

#	Item Description	Value
1	Roof Top Units are not screened	$ 3,500.00
2	North apron is not CIP concrete per approved geometric plan sheet no. C2.00, rev. 1, dated 10/27/23	$ 2,500.00
3	45 spaces on approved site plan (req by code) – there are only 43 spaces	architect is reviewing and will reply to the Town
4	Two parking spaces on the north side of the building are less than 8 ft in width – town requires 9 ft minimum	$ 2,000.00
5	ADA parking space and access aisles are to be painted with blue lines	$ 250.00
6	ADA signage is to be installed at each ADA space, height from bottom of sign to grade to be a minimum of 48”, one space must also have van accessible labeling as well	$ 200.00
7	Parking lot screening (42” high ornamental fence not installed as shown on approved landscape plan)	$ 3,500.00
8	Landscaping needs to be finished per Landscape Plan and approved Findings of Fact from PC23-002 (Note: existing tree that was to remain has been cut down)	$ 7,500.00

9	There is no irrigation system, business are required to have one	$	11,000.00
10	We need Final Survey or As-Builts for Engineering to check slopes/grades	$	2,500.00
11	The curb should be continuous along the north property line and on the south side of the north apron	$	2,000.00
12	Dumpster enclosure is in different location and not constructed as shown on approved site plan and detail drawing	Architect is reviewing and will reply to the Town	
13	The landscaped island at the northwest corner of the building is not as shown on the approved site plan	$	2,000.00
14	Suite numbers/letters needed at every entrance	$	50.00
15	Public Works review and approval		
16	Fire Department review and approval		
	TOTAL COST	**$**	**37,000.00**

All work to be completed by May 31, 2025.

Ghanem Muslmani
Sr. Construction Manager

Ghanem Muslmani

BANK OF AMERICA

Cashier's Check

No. 5232001670

Notice to Purchaser - In the event that this check is lost, misplaced or stolen, a sworn statement and 90-day waiting period will be required prior to replacement. This check should be negotiated within 90 days.

Void After 90 Days 30-1/1140 NIL

Date 02/03/25 12:25:20 PM

Woodridge
743 1000613 014

Pay BANK OF AMERICA THREE SEVEN ZERO ZERO ZERO ZERO ZERO **$37,000.00**

Thirty Seven Thousand and 00/100 Dollars

To The Order Of TOWN OF MUNSTER
501 W. 45TH ST- DEPOSIT

Remitter (Purchased By): VIA MERIDIANA CONTRACTORS LLC

Bank of America, N.A.
SAN ANTONIO,TX

AUTHORIZED SIGNATURE

⑈5232001670⑈ ⑆114000019⑆ 1641004142⑈

THE ORIGINAL DOCUMENT HAS A WHITE REFLECTIVE WATERMARK ON THE BACK. HOLD AT AN ANGLE TO VIEW WHEN CHECKING THE ENDORSEMENTS.

This space is intentionally left blank.

Notice to Purchaser - In the event that this check is lost, misplaced or stolen, a sworn statement and 90-day waiting period will be required prior to replacement. This check should be negotiated within 90 days.

Cashier's Check - Customer Copy

No. 5232001670

Void After 90 Days 30-1/1140 NIL

Date 02/03/25 12:25:20 PM

Woodridge
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501 W. 45TH ST- DEPOSIT

Remitter (Purchased By): VIA MERIDIANA CONTRACTORS LLC

Bank of America, N.A.
SAN ANTONIO,TX

DCI for Surety bond Per Janet Process under MSESCROW

Not-Negotiable
Customer Copy
Retain for your Records

1641004142

PROJECT PUNCH LIST

Project: **Layous Medical Group- 501 45th St** Date of Current Issue: 4/9/26
Contractor: **BCT Construction LLC** Date of Original Issue: 12/27/24
Date(s) of Inspection(s): 12/27/24; 1/3/25; 12/11/25; 12/26/2025
Inspected by: Glenn Rhodes, Nicole Mazur; Bob Valois

Below is a partial list of items which must be completed or corrected prior to final acceptance of the project.

Item No.	Item Description	Current Status	Accepted	
			By	Date
1	Roof Top Units are not screened	Completed	GR/NM	12/11/25
2	North apron is not CIP concrete per approved geometric plan sheet no. C2.00, rev. 1, dated 10/27/23	Replaces with concrete	GR/NM	12/11/25
3	45 spaces on approved site plan (req by code) – there are only 43 spaces	Additional spaces added	GR/NM	12/11/25
4	Two parking spaces on the north side of the building are less than 8 ft in width – town requires 9 ft minimum	Re-striped	GR/NM	12/11/25
5	ADA parking space and access aisles are to be painted with blue lines	Completed	GR/NM	4/9/26
6	ADA signage is to be installed at each ADA space, height from bottom of sign to grade to be a minimum of 60", one space must also have van accessible labeling as well	Completed	GR/NM	4/9/26
7	Parking lot screening (42" high ornamental fence not installed as shown on approved landscape plan)	Completed	GR/NM	12/11/25

8	Landscaping needs to be finished per Landscape Plan and approved Findings of Fact from PC23-002 (Note: existing tree that was to remain has been cut down)	Completed	GR/NM	4/9/26
9	There is no irrigation system, business are required to have one	Completed	GR/NM	12/11/25
10	We need Final Survey or As-Builts for Engineering to check slopes/grades	Rec'd 12/3/25	DW	1/8/26
11	The curb should be continuous along the north property line and on the south side of the north apron	Updated on As-builts		1/8/26
12	Dumpster enclosure is in different location and not constructed as shown on approved site plan and detail drawing	Updated on As-builts		1/8/26
13	The landscaped island at the northwest corner of the building is not as shown on the approved site plan	Updated on As-builts		1/8/26
14	Suite numbers/letters needed at every entrance	Completed	GR/NM	12/11/25
15	Public Works review and approval	Completed	CS	12/2025
16	Fire Department review and approval	Completed	MH	04/22/26
17	"No exit/entrance only" and "Exit only/do not enter" signs have been relocated	Completed	GR/NM	4/9/26

Building a Better World for All of Us®

January 8, 2026

RE: 501 45th Street
Engineering Review of Completed Site
SEH No. MUNST 183529 14.00

Mr. Sergio Mendoza
Town of Munster
1005 Ridge Road
Munster, IN 46321

Dear Sergio:

As requested, SEH has completed a review of the final development site at 501 45th Street. SEH staff visited the site on January 7, 2026, to document completed conditions as compared to the original proposal and submitted record drawings. The following items are noted.

1. The final dumpster location is further east than shown on the original plans, presumably in response to existing telecommunication pedestals and fiber optic vault.
2. As a result of the relocation, three parking stalls along the building were eliminated. Three parallel parking stalls were painted along the north driveway edge to make up for the lost stalls. The total overall number of parking stalls has been preserved.
3. It's recommended that the paint markings for the pedestrian path leading from the front door to the sidewalk along 45th Street be improved.
4. The one-way directional signage at both the entrance and exit driveways should be enhanced. The current signs are understated, and during the site visit a driver was observed entering the exit driveway.

The overall functionality of the completed site is in significant conformance with the approved site plan.

If you have any questions, please feel free to contact me.

Sincerely,

David A. Walter

David A. Walter, P.E.
Senior Professional Engineer
(Lic. WI, MN, IN)

DW

\\sehinc.com\panzura\pzprojects\ko\m\munst\common\site plan review\501 45th\ltr engineeering review_501 45th.docx

CERTIFICATE OF OCCUPANCY

PROPERTY OWNERSHIP:
JTR Layous LLC
1334 Muirfield Dr
Schererville, IN 46375

PERMIT HOLDER:
Via Meridiana Contractors, LLC
8821 ROBERT RD
Darien, IL 60561

The afore described structure or portion thereof has been inspected for compliance with the requirements of current building code for the occupancy and divsion of occupancy and the use for which the proposed occupancy is classified.

Address	501 45TH ST
Subdivision	KENNEDY COURT (1.118 AC) LOT 6 (A RE-SU
Parcel	45-06-25-402-002.000-027
Construction Type	IV
Use Classification	B
Permit Number	P23-1255
CO Date Finaled	04/27/2026
Edition of Building Code	2014 Indiana Building Code
Occupancy Load	00
Sprinklers	Yes
Zoning	SD-M

SPECIAL STIPULATIONS:

Suite 1 & Suite 3
Suite 2 not finished at this time

04/27/2026

Signature of Building Official **Date**

To: Town Council

From: Patricia Abbott, Controller

Meeting Date: May 4, 2026

Subject: Change Orders 1 and 2: Pedestrian Bridges Over Ditches

---

Summary

INDOT awarded the Pedestrian Bridge Project, also referred to as Bridges Over Ditches, to Gariup Construction Co., Inc. on May 7, 2025, in the amount of $1,765,700.00. Council confirmed that action on June 2, 2025. SEH has presented two change orders for the project.

Change Order #1 is for a decreased number of helical piles which are used as underpinning for the bridges. The plans called for 2,230 linear feet but only 1,250 linear feet were necessary. Gariup is requesting a unit price revision from $125.00/linear foot to $170.04/linear foot. The change order would result in a $66,200.00 decrease in the contract cost.

Change Order #2 would increase the quantity of stone and geotextile fabric and bollard at the Martha Street connection. This is to allow NIPSCO truck access and access control to the area. SEH had requested NIPSCO approval about three months ago, and it has now been granted. The change order would result in an increase to the contract cost of $18,728.00. Combined, the two change orders result in a net decrease of $47,922.00.

Once approved by Council, the change orders will be forwarded to INDOT for their approval.

Financial Impact

Funding Source: GO Bonds and Cost Share from Town of Highland
Budgeted Amount:
Cost: Reduction in cost of $47,922.00

Recommended Council Action

By motion and roll call vote, approve Change Order #1 for a decrease of $66,200.00 and Change Order #2 for an increase of $18,728.00 bringing the total contract amount for the Bridges Over Ditches construction to $1,718,228.00.

Attachments:

1. SEH Recommendation Letter
2. Change Order #1
3. Change Order #2

SEH of Indiana

Building a Better World for All of Us®

April 15, 2026

RE: Town of Munster
Bridges over Ditches
SEH No. 157901

Mark Heintz
Director of Parks and Recreation
1005 Ridge Road
Munster, IN 46321

Dear Mr. Heintz:

I am requesting that Change Order No. 1 & 2 be placed on the next Town of Munster Council meting agenda for review and approval. I recommend that the Change Order be approved.

The Change Order No. 1 would subtract the total length of the original length of Helical's at 2,230LF then per spec section 104.02(c). We used less then 75% which led to a change in conditions per spec 104.02(c). This resulted in a increase in price of the LF per helical from $125 to $170.04 with a increase of $45.04 per LF. With a new total of $212,550 and with the subtraction of the original amount $278,750.00 we have a net negative of $66,200.00.

The Change Order No. 2 would a increase of unit priced items and one item added. NIPSCO per agreement of lease of the land requested a turnaround area down in the Peninsula at the T intersection. They specified that a pump truck could drive down there and turn around. We gave them a detail that would work and with that we have a total cost of $13,428.00 for the increase of stone and geotextile fabric. They also requested a bollard be placed at the head of the trail at Martha street to keep homeowners from parking in their corridor. That is a line item add with a price of $5,300.00. With a grand total of $18,278.00 for Change Order 2.

The items associated with Change Orders No. 1 & 2 will result in a **NET DECREASE** of the contract price of $47,922.00. The current contact amount is $1,765,700.00 with a decrease to $1,717,778.00

Attachments:
Plan&Profile sheet 10 &12
Construction Change Order & Time Extension Summary
Change Order Request Form INDOT

Sincerely,

Nate Kaczka
Civil Engineer

Indiana Department of Transportation

Contract: R -34603 **Construction Change Order & Time Extension Summary** **CO Number:** 0001

District: LaPorte **Letting Date:** 05/07/2025 **Prime Contractor:** GARIUP CONSTRUCTION CO INC

County: LAKE **Area Engineer:** Matthew Erickson

PEMS : Nathaniel Kaczka

Change Order Date: 4/15/2026 **CO Type:** GENERAL **CO Status:** Draft

Entered By: Nathaniel Kaczka **CO Approval Date:**

Description: This change order is to adjust the unit cost for installing Helical Piles. The Contractor is entitled to an adjusted unit cost per INDOT Standard Specifications 104.02 (c). **Last Updated Date:** 4/15/2026

Awarded Contract Amount: $1,765,700.00 **Last Updated By:** Nathaniel Kaczka

CO 0001 Amount: -$66,200.00 **Percent:** -3.749 **Non-participating:**

Total Previous Approved Changes: **Percent:** -3.749 **Time Adjustment:**

Modified Contract Amount: $1,765,700.00 **Approval Level:**

Explanation: This change order is to adjust the unit cost for installing Helical Piles. The Contractor is entitled to an adjusted unit cost per INDOT Standard Specifications 104.02. CLN 0032 Pile, Helical is 15.8% of the original contract amount. Since this item is more than 5%, it is considered a major item per standard specifications 101.33. Planned quantity for CLN 0032 Pile, Helical was 2,230LF. 1,250LF was installed due to stiffer ground conditions than shown on the plans/borings. As this pay item quantity is decreased by 56% (less than 75%) of the original contract quantity, this difference meets the criteria of a significant change as defined in standard specifications section 104.2(c). A contract time adjustment is not required. The INDOT project manager has concurred with this change order.

Increases/Decreases

Item Description	Item ID	PLN	CLN	Project	Category	Item Source	Quantity Inc/Dec	Unit	Unit Price	Dollar Amount
PILE, HELICAL	701-11931	0032	0032	1173597	0001	Original	-2,230.000	LFT	$125.00	-$278,750.00

Total: -$278,750.00

New Items

Item Description	Item ID	PLN	CLN	Project	Category	Quantity	Unit	Unit Price
PILE, HELICAL	701-11931	0046	0046	1173597	0001	1,250.000	LFT	$170.04

Total: $212,550.00

Project/Category Summary

Project	Project Description	Category	Category Description	Dollar Amount
1173597	BIKE AND PEDESTRIAN FACILITIES	0001	BIKE AND PEDESTRIAN FACILITIES	-$66,200.00

Net Change Order Amount: -$66,200.00

Approvals

Date/Time Approved	Approval Decision	Name	Approval Decision Group

It is the intent of the parties that this change order is full and complete compensation for the work described above. Notification and consent to this change order is hereby acknowledged.

Contractor:_____ **Signed By:**_____

Date:_____

Note: Other required State and FHWA signatures will be obtained electronically through AASHTOWare Project system.

APPROVED FOR LOCAL AGENCY

Signature	Title	Date
Signature	**Title**	**Date**

SUBMITTED FOR CONSIDERATION

PE/S

CHANGE ORDER REQUEST FORM

CONTRACT NO. R-34603 DATE OF SUBMISSION 4/10/2026

PROJECT DESCRIPTION *(route / intersection / bridge no(s).)*	Ped bridges over Hart Ditch and Cady Marsh Ditch
CHANGE ORDER REQUEST SUMMARY DESCRIPTION	NIPSCO Construction Changes
PROPOSED SOLUTION SUMMARY	Gariup to install construction changes on drawings received 4/7/2026

NOTE: Upon request from Engineer, enter detailed description on page 2.

ONSET DATE OF CHANGE	4/7/2026		

PROPOSED COST AND TIME ADJUSTMENT

COST **COST INCREASE / (DECREASE):** $ 18,728.00

The cost adjustment shall include lump sum and estimated totaled unit-priced item costs. Attach a separate sheet of unit price items including item description, unit of measurement, estimated quantity and unit price.

CHECK APPROPRIATE BOXES PER APPROPRIATE BASIS OF COST CHANGE:

☐ 109.03 Altered Quantities ■ 109.05(a) Agreed Price ☐ 109.05(b) Force Account ☐ 109.05.02 Delay Costs

PROPOSED COST CHANGE INCLUDES: ■ Labor ■ Material ■ Equipment ☐ Lease Agreement ☐ Subcontractor

TIME ADJUSTMENT **INCREASE / (DECREASE):** **(work days)** 5

CHECK APPROPRIATE BOXES PER APPROPRIATE BASIS OF TIME CHANGE:

■ 108.08(a) Excusable, Non-Compensable ☐ 108.08(b) Excusable, Compensable

*NOTE: If **Compensable**, attach details based on 109.05.2(a) Allowable Delay Costs.*

SUPPLEMENTAL INFORMATION

Additional information may be entered by the contractor.

CHANGE ORDER ORIGINATION:	■ INDOT / LPA ☐ Contractor
DOCUMENTS AFFECTED:	
☐ **Contract Specifications (ref. doc name/no.)**	
■ **Contract Plans (ref. doc name/no.)**	
CHANGE ORDER AFFECTS DBE PARTICIPATION:	☐ yes ■ no (if yes, attach details)

UPON WRITTEN REQUEST FROM THE ENGINEER, PROVIDE ADDITIONAL DETAIL

DATE RECEIVED REQUEST FOR ADDITIONAL DETAIL		**SUBMITTAL DATE OF ADDITIONAL DETAIL**	

DETAILED DESCRIPTION / JUSTIFICATION:

(Include location(s), actions of contractor, owner, and other stakeholders, key events and related cause(s), discoveries, discussions, meetings, and effect on the contract if no action is taken. Also include references to key documents attached or available to support this change order request.)

PROPOSED SOLUTION – ADDITIONAL DETAILS:

(Include proposed scope of work, means & methods, materials, equipment, utility relocation required, subcontracted scope and the effect on the contract schedule. Also include references to attached documents including, but not limited to, sketches, calculations, photos, material information, and submittals and meeting minutes.)

SIGNATURES

Contractor:

Name: (print) Alex F. Gariup

(signature) _____ Date: 4/10/2026

Project Engineer/Supervisor: *(signature is to acknowledge receipt of the document and does not signify agreement of the change order)*

Name: (print) Nathaniel Kaczka

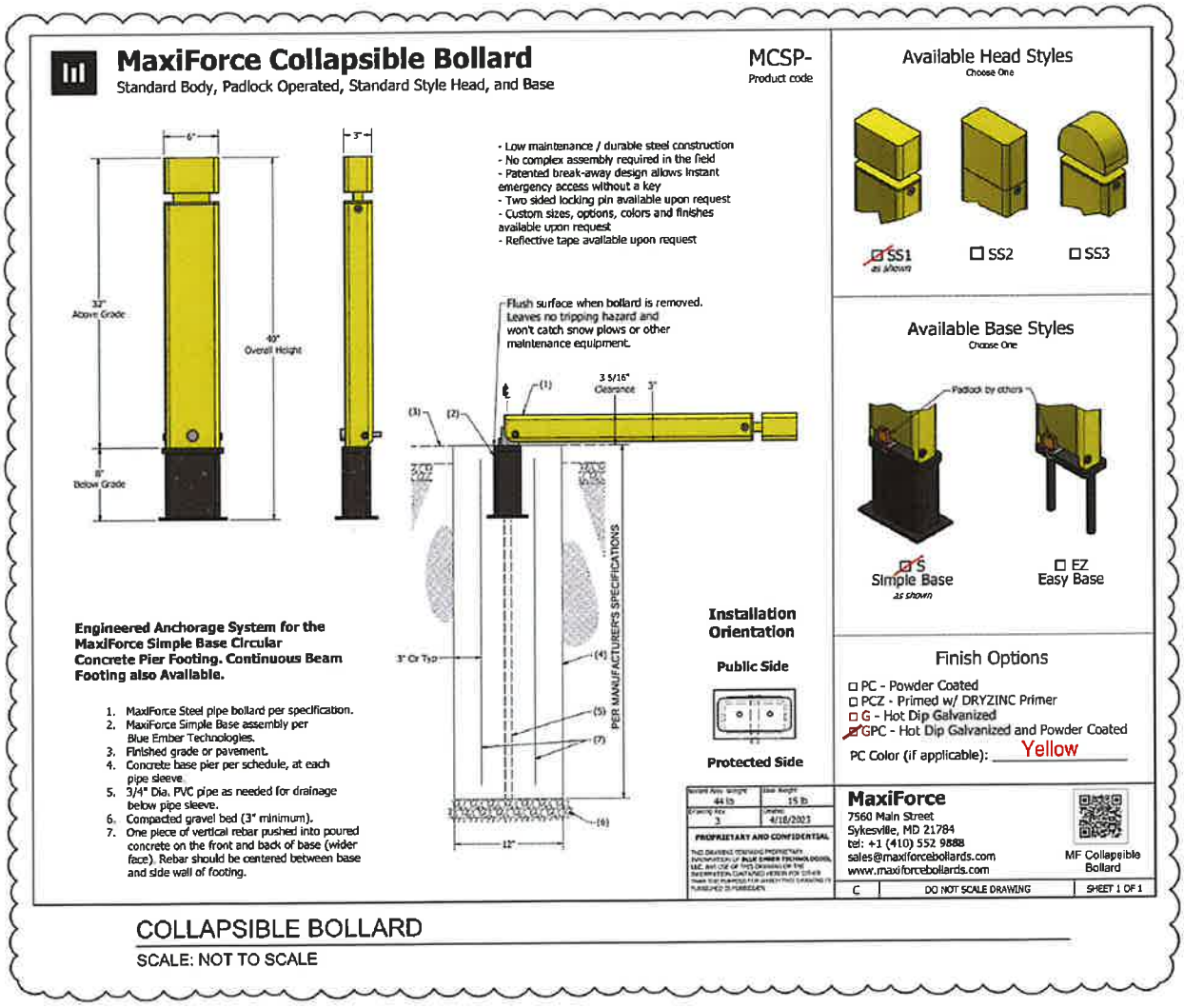
(signature) _____ Date: 4/15/26

NOTE: The Contractor and PE/S should retain a signed copy of this document for record.

ATTACHMENT: UNIT PRICE ITEMS DETAIL

Attach or paste a unit price item detail.

Description	Quantity	Unit	Unit Price	Total Price
Geotextile	316	SYS	$ 3.00	$ 948.00
#53s	160	TON	$ 78.00	$ 12,480.00
Bollard	1	EA	$ 5,300.00	$ 5,300.00
				$ 18,728.00



COLLAPSIBLE BOLLARD

SCALE: NOT TO SCALE

MaxiForce Collapsible bollard is quoted as show in above detail. SS1 head, Simple Base, ~~Powder Coated~~ Yellow. Leadtime is 4-6 weeks. Gariup needs approval on quote by 4/17/26 in order for bollard to arrive on site on or before substantial completion date. If approval is not given by 4/17/2026, this quote is invalid and a revised quote will be sent with additional time adjustments.

"GPC" - Hot Dip Galvanized and Powder Coated

Indiana Department of Transportation

Contract: R -34603 **Construction Change Order & Time Extension Summary** **CO Number:** 0002

District: LaPorte **Letting Date:** 05/07/2025 **Prime Contractor:** GARIUP CONSTRUCTION CO INC

County: LAKE **Area Engineer:** Matthew Erickson

PEMS : Nathaniel Kaczka

Change Order Date: 4/15/2026 **CO Type:** GENERAL **CO Status:** Draft

Entered By: Nathaniel Kaczka **CO Approval Date:**

Description: After Pre-Construction meeting NIPSCO approached us and identified additional construction requirements for their equipment access for the Service pole on the North of the trail per Phil Patrick. **Last Updated Date:** 4/15/2026

Awarded Contract Amount: $1,765,700.00 **Last Updated By:** Nathaniel Kaczka

CO 0002 Amount: $18,728.00 **Percent:** 1.061 **Non-participating:**

Total Previous Approved Changes: **Percent:** 1.061 **Time Adjustment:** 5

Modified Contract Amount: $1,765,700.00 **Approval Level:**

Explanation: At the site visit with NIPSCO personal, they identified access issues that was not brought up well the project was getting designed. NIPSCO gave us requirements that needed to be met so their trucks and access the service pole down in the Peninsula with a stone pad. The stone pad requirements are as follow 12" thick and large enough to fit their 3 largest vehicles which are a Mack, Granite, 86BR, Gr106B, Peterbuilt 548 H8, Peterbuilt 567 H8. We received these requirements from Phil Patrick from NiSource Survey & Land. Their also requirement was the stone pad to be on the North Side of the Trail around STA 103+73.60 - STA 104+50.25 next to their Service pole. Their other request was a collapsible bollard at the head of the trail off Martha St. their want for the bollard is police the corridor and keep residents from parking on the corridor going forward. Their will be a dual lock on the bollard so the towns and NIPSCO will have access to the trail if needed.

Increases/Decreases

Item Description	Item ID	PLN	CLN	Project	Category	Item Source	Quantity Inc/Dec	Unit	Unit Price	Dollar Amount
COMPACTED AGGREGATE, NO. 53	301-12234	0018	0018	1173597	0001	Original	160.000	CYS	$78.00	$12,480.00
GEOTEXTILE FOR PAVEMENT, TYPE 1A	214-12236	0017	0017	1173597	0001	Original	316.000	SYS	$3.00	$948.00

Total: $13,428.00

New Items

Item Description	Item ID	PLN	CLN	Project	Category	Quantity	Unit	Unit Price
BOLLARD	802-03896	0047	0047	1173597	0001	1.000	EACH	$5,300.00

Total: $5,300.00

Time Adjustments

Time ID	Time Description	Time Type	Original	Current	Adjustment	New
00 DT	COMPLETION DATE	Completion Date	5/29/2026	5/29/2026	N/A	6/3/2026

Indiana Department of Transportation

Project/Category Summary

Project	Project Description	Category	Category Description	Dollar Amount
1173597	BIKE AND PEDESTRIAN FACILITIES	0001	BIKE AND PEDESTRIAN FACILITIES	$18,728.00
			Net Change Order Amount:	$18,728.00

Approvals

Date/Time Approved	Approval Decision	Name	Approval Decision Group

It is the intent of the parties that this change order is full and complete compensation for the work described above. Notification and consent to this change order is hereby acknowledged.

Contractor:_____ **Signed By:**_____

Date:_____

Note: Other required State and FHWA signatures will be obtained electronically through AASHTOWare Project system.

APPROVED FOR LOCAL AGENCY

Signature	**Title**	**Date**
Signature	**Title**	**Date**

SUBMITTED FOR CONSIDERATION

PE/S

CHANGE ORDER REQUEST FORM

CONTRACT NO. R-34603-A **DATE OF SUBMISSION** March 3, 2026

PROJECT DESCRIPTION *(route / intersection / bridge no(s).)*	"Bridges over Ditches" ; bike & pedestrian facilities over Hart Ditch & Cady Marsh Ditch in Munster, Indiana
CHANGE ORDER REQUEST SUMMARY DESCRIPTION	Significant change for helical piers (CLN 0032 - PILE, HELICAL) per spec section 104.02(c)
PROPOSED SOLUTION SUMMARY	Cost difference per LF to be provided

NOTE: Upon request from Engineer, enter detailed description on page 2.

ONSET DATE OF CHANGE	11/19/2025 - 11/21/2025		

PROPOSED COST AND TIME ADJUSTMENT

COST **COST INCREASE / (DECREASE):** $ $45.04 per LF

The cost adjustment shall include lump sum and estimated totaled unit-priced item costs. Attach a separate sheet of unit price items including item description, unit of measurement, estimated quantity and unit price.

CHECK APPROPRIATE BOXES PER APPROPRIATE BASIS OF COST CHANGE:

☐ 109.03 Altered Quantities ■ 109.05(a) Agreed Price ☐ 109.05(b) Force Account ☐ 109.05.02 Delay Costs

PROPOSED COST CHANGE INCLUDES: ■ Labor ■ Material ■ Equipment ☐ Lease Agreement ☐ Subcontractor

TIME ADJUSTMENT **INCREASE / (DECREASE):** **(work days)** N/A

CHECK APPROPRIATE BOXES PER APPROPRIATE BASIS OF TIME CHANGE:

☐ 108.08(a) Excusable, Non-Compensable ☐ 108.08(b) Excusable, Compensable

*NOTE: If **Compensable**, attach details based on 109.05.2(a) Allowable Delay Costs.*

SUPPLEMENTAL INFORMATION

Additional information may be entered by the contractor.

CHANGE ORDER ORIGINATION:	☐ INDOT / LPA ■ Contractor
DOCUMENTS AFFECTED:	
☐ **Contract Specifications (ref. doc name/no.)**	
☐ **Contract Plans (ref. doc name/no.)**	
CHANGE ORDER AFFECTS DBE PARTICIPATION:	☐ yes ■ no (if yes, attach details)

UPON WRITTEN REQUEST FROM THE ENGINEER, PROVIDE ADDITIONAL DETAIL

DATE RECEIVED REQUEST FOR ADDITIONAL DETAIL		**SUBMITTAL DATE OF ADDITIONAL DETAIL**	

DETAILED DESCRIPTION / JUSTIFICATION:

(Include location(s), actions of contractor, owner, and other stakeholders, key events and related cause(s), discoveries, discussions, meetings, and effect on the contract if no action is taken. Also include references to key documents attached or available to support this change order request.)

Per spec section 104.2(c), the installed quantity of CLN 0032 PILE, HELICAL vs. planned bid quantity constitutes a significant change.

PROPOSED SOLUTION – ADDITIONAL DETAILS:

(Include proposed scope of work, means & methods, materials, equipment, utility relocation required, subcontracted scope and the effect on the contract schedule. Also include references to attached documents including, but not limited to, sketches, calculations, photos, material information, and submittals and meeting minutes.)

Increase of $49.99/LF to be paid through a change order to help offset lost production costs, as labor/material/equipment, and other GCs were spread over the proposed 2,230LF.

Planned quantity for CLN 0032 PILE, HELICAL was 2,230LF. Only 1,250LF was installed due to stiffer ground conditions than shown on the plans/borings. As this pay item makes up more than 5% of the total contract, this difference meets the criteria of a significant change as defined in spec section 104.2(c).

SIGNATURES

Contractor:

Name: (print) Alex F. Gariup

(signature) _____ Date: 3/3/2026

Project Engineer/Supervisor: *(signature is to acknowledge receipt of the document and does not signify agreement of the change order)*

Name: (print) Nathaniel Kaczka

(signature) _____ Date: 04/15/26

NOTE: The Contractor and PE/S should retain a signed copy of this document for record.

ATTACHMENT: UNIT PRICE ITEMS DETAIL

Attach or paste a unit price item detail.

Gariup Construction

Extra Work Summary **Date: March 3, 2025**

Project Number: R-34603-A
Project Name: "Bridges over Ditches" ; Bike & Pedestrian facilities over Hart Ditch & Cady Marsh Ditch
Title: Significant Change for Helical Piers (CLN 0032 - PILE, HELICAL) per spec 104.02(c)

Item Number	Description	Quantity	Unit	Unit Cost	Mark-up Rule	Mark-up Cost	Total Unit	Total Cost per Foot
1	Increased Engineering Fees	1	LF	$ 4.39	7%	$ 0.31	$ 4.70	$ 4.70
2	Additional Labor Costs	1	LF	$ 18.45	20%	$ 3.69	$ 22.14	$ 22.14
3	Increased Equipment Costs	1	LF	$ 15.20	12%	$ 1.82	$ 17.02	$ 17.02
4	Material Re-Handling Costs	1	LF	$ 1.05	12%	$ 0.13	$ 1.18	$ 1.18
		Total Extra Work =			**1 LF**			**$ 45.04**

To: Town Council

From: Patricia Abbott, Controller

Meeting Date: May 4, 2026

Subject: Supplemental Agreement #3: Main Street Design Engineering

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Summary

At the March 7, 2022, meeting, Council approved a contract with DLZ Indiana, LLC for Phase I design of the Main Street Complete Street Redesign and Reconstruction Project at an amount not to exceed $751,840.00. At the October 7, 2024, meeting, Council approved Supplemental Agreement #1 bringing the contract total to $898,440.00. This was due to changes in how Council wanted the road designed. Supplemental Agreement #2 approved on April 21, 2025, was for the addition of sidewalks to the design that the Town of Dyer requested. This brought the total to $948,140.00.

During the National Environmental Policy Act (NEPA) work, some properties considered to be possibly historical were found on the south side of the street. INDOT is requiring a full Section 106 (historic and archaeological investigation). As a result, additional work will be needed, including the engagement of a qualified Professional Cultural Subconsultant who can perform a Phase 1a archeological survey and report, historic properties report and other work as will be needed based on their findings.

The additional cost will be $69,900.00, and it is believed funding can be secured from NIRPC. DLZ is requesting approval of a supplemental agreement to begin this work and to document the additional costs to NIRPC to secure funding.

Financial Impact

Funding Source: Local Option Income Tax - Economic Development and NIRPC funding request
Budgeted Amount:
Cost: $69,900.00

Recommended Council Action

By motion and roll call vote, approve the Supplemental Letter Agreement No. 3 from DLZ for a new contract total of $1,018,040.00.

Attachments:

1. Main Street Supplemental Agreement #3

SUPPLEMENTAL AGREEMENT NO. 3

This Supplemental Agreement No. 3 is made and entered into_____ 2026, by and between the Town of Munster Town Council, Indiana acting by and through its proper officials, hereinafter referred to as the "LPA" and DLZ Indiana, LLC 900 Ridge Road, Suite L, Munster, Indiana 46321, hereinafter referred to as the "CONSULTANT".

WITNESSETH

WHEREAS, the LPA and the CONSULTANT did on April 21, 2025, enter into a Supplemental Agreement No. 2, on October 7, 2024, enter into a Supplemental Agreement No. 1, and on March 7, 2022, enter into an agreement, for the preparation of construction documents for the construction of improvements including roadway, trail, sidewalk, and drainage work necessary to complete Main Street from Columbia/Sheffield Avenue to the west approach to the bridge over Hart Ditch, and,

WHEREAS, the CONSULTANT has determined that the environmental document preparation is 65% complete with the MPPA completed, and,

WHEREAS, the LPA directed the CONSULTANT to complete a full Section 106 investigation, and,

WHEREAS, the LPA has concurred with CONSULTANT's determination of additional work and requests the additional services not included in the original Agreement be performed by the CONSULTANT.

NOW THEREFORE, the LPA and CONSULTANT desire to amend the above referenced Agreement by the following:

I. Revise Line 3 of Section IV COMPENSATION as follows:

Contract. The maximum amount payable under this Contract shall not exceed **$1,018,040.00**.

II. Revise Item II.F.4.,6., and 8. of Appendix "A" as follows:

4. Prepare a Red Flag Investigation using the current INDOT template, including IDEM Virtual File Cabinet Data review. Update the Red Flag Investigation using the current, including IDEM Virtual File Cabinet Data Review Due to the requested changes to the design. **Updates required due to the passage of time.**
6. Complete USFWS IPaC programmatic consultation. **Updates required due to the passage of time.**
8. Prepare a Draft CE, using the appropriate current INDOT document template, for INDOT review/comment. **Updates required due to the passage of time.**

III. Add Item II.F.14. of Appendix "A" as follows:

14. INDOT reviewed the Section 106 Minor Project Programmatic Agreement (MPPA) submittal prepared under the base NEPA services and determined that a Standard Section 106 Review is required. Qualified Professional Cultural Subconsultant services are required. The Standard review consists of the following elements:

a. Consulting Party Invitation
b. Phase Ia Archaeological Survey and Report

c. Historic Properties Report
d. Effects Analysis Report (if required)
e. Section 800.11 and Findings Documentation

IV. Add Item II.W.31. of Appendix "A" as follows:

31. Schedule in Appendix C and Exhibit B3. is based on a Section 106 No Effects Report.

V. Revise Item B.2. of Appendix "C" as follows:

2. Stage 2 Plans within ~~101~~ **15** days after the ~~Preliminary Field Check~~ **Categorical Exclusion is Released for Public Involvement.**

VI. Revise Item D.1-3. Of Appendix "C" as follows:

1. Title Work obtained within ~~62~~ **59** days after the ~~Preliminary Field Check~~ **NEPA Release for Public Involvement**.
2. R/W engineering, plats and legal description begins ~~26~~ **37** days after Title Work begins and is completed within ~~26~~ **38** days after ~~Stage 2 Plans~~ **NEPA Final Approval**.
3. APA within ~~16~~ **39** calendar days after R/W Engineering.

VII. Revise Item E. of Appendix "C" as follows:

The letting date for this project is anticipated to be in ~~September 2024~~ ~~October 2027~~ **November 2029** based on a notice to proceed ~~for Supplemental Agreement No. 1 of October 9, 2024~~ ~~on May 9, 2022~~**for Supplemental Agreement No. 3 of April 20, 2026**. The schedule is shown graphically as well as **Exhibit B3**.

VIII. Revise Item A.1 of Appendix "D" in its entirety as follows:

1. The CONSULTANT shall receive as payment for the work performed under this Agreement the total fee not to exceed **$1,018,040.00** unless a modification of this agreement is approved in writing by the LPA.

IX. Revise Item A.2 of Appendix "D" in its entirety as follows:

2. The CONSULTANT will be paid for the work performed under Appendix "A" of this Agreement on a Lump Sum basis in accordance with the following schedule, except as noted in the items below:

TASK	Design Phase Items	Estimated Amounts
a.	Roadway Configuration Study	$11,300.00
b.	Aesthetic Design Report	$22,870.00
c.	Project Management	**$53,200.00**
d.	Topographic Survey Data Collection	$43,900.00
e.	Location Control Route Survey Plat	$7,500.00
f.	Environmental Document Preparation (NEPA) **– with Section 106**	**$93,200.00**
f1.	**Section 106 – Effects Report, As Required**	**$7,400.00**
g.	Waters of the US Determination Report	$6,700.00
h.	Routine Wetland Delineation, As Required	$7,100.00
i.	Geotechnical Services	$20,100.00
j.	Roadway Design and Plan Development and includes	$433,000.00
	Traffic Signal Design and Plan Development ($29,100.00)	
k.	Planting Design	$17,300.00
l.	Pedestrian Lighting Design	$22,600.00
m.	Custom Signing	$8,500.00
n.	Pavement Design	$9,500.00
o.	IDEM Rule 5 Permit	$5,500.00
p.	USACE Section 404 Permit	$12,200.00
q.	IDEM Section 401 Permit	$12,500.00
r.	IDNR Construction in a Floodway Permit, As Required	$4,000.00
s.	Lake County Drainage Board Application, As Required	$2,500.00
t.	Utility Coordination Services	$29,300.00
u.	Public Hearing, Hourly Rate, As Required*	$17,200.00
	Sub Total	**$847,370.00**

	Right of Way Phase Items	Estimated Amount
v.	Right of Way Services	$135,670.00
1.	Title Research (27 parcels @ est. $450.00/parcel=$12,150.00)*, As Required	
2.	Title Research Update (27 parcels @ est. $233.00/parcel=$6,291.00)*, As Required	
3.	R/W Engineering (27 parcels @ $3,050.00/parcel=$82,350.00), As Required	
4.	R/W Staking (27 parcels @ $450.00/parcel=$12,150.00), As Required	
5.	Early Assessment Right of Way Cost Estimate (Est. 27 parcels @ $130.00/parcel=$3,510.00), As Required	
6.	Appraisal Problem Analysis (Est. 27 parcels @ $255.00/parcel=$6,885.00)*, As Required	
7.	As Required, including cost-to-cure estimates, rate schedule changes, changes to appraisal type, etc.=$12,334.00 (Approximately 10%)	
	Sub Total	**$135,670.00**

	Bid and Construction Phase Items	Estimated Amount
w.	Bid Phase Services, Pre-Construction Conference, Construction Phase Office Services and Utility Coordination during project construction, Hourly Rate *	$35,000.00
	Sub Total	**$35,000.00**

	Total	**$1,018,040.00**

* Items A.2.u., and A.2.w. will be invoiced on an hourly rate basis, as defined below, and/or as reimbursable/Subconsultant Items. Items A.2.v.1.-A.2.v.7. will be invoiced on a unit cost basis. The amounts are estimated only, and the final amount shall not exceed their respective amounts, without prior written approval from the LPA, in accordance with Section VI, paragraph 6 of this Agreement and/or a subsequent approved amendment to the Agreement.

Toll telephone calls, printing, mailing, FAX costs required for the permits enumerated hereinabove will not be reimbursable expenses and the costs thereof are included in the itemized costs as shown herein in Appendix "D".

The cost of permit application/regulatory fees will be considered as a reimbursable expense.

The CONSULTANT shall not be paid for any services performed by the LPA or not required to develop this project.

X. The total compensation to be paid to DLZ Indiana, LLC, as outlined in the original agreement will increase from **$948,140.00** to **$1,018,040.00**, an increase of **$69,900.00** for services outlined in this Supplemental Agreement No. 3. All other conditions as set forth in the original Agreement dated March 7, 2022, the Supplemental Agreement No. 1 dated October 7, 2024, and the Supplemental Agreement No. 2 dated April 21, 2025 shall remain in full force, except as herein modified.

IN TESTIMONY WHEREOF, the parties hereto have executed this Supplemental Agreement No. 3.

CONSULTANT:

DLZ INDIANA, LLC

Laurie D. Johnson, P.E.
Vice President

LOCAL PUBLIC AGENCY:

TOWN OF MUNSTER

George Shinkan
Ward 1

Joe Hofferth
Ward 2

Chuck Gardiner
Ward 3

David B. Nellans
Ward 4

Jonathan Petersen
Ward 5

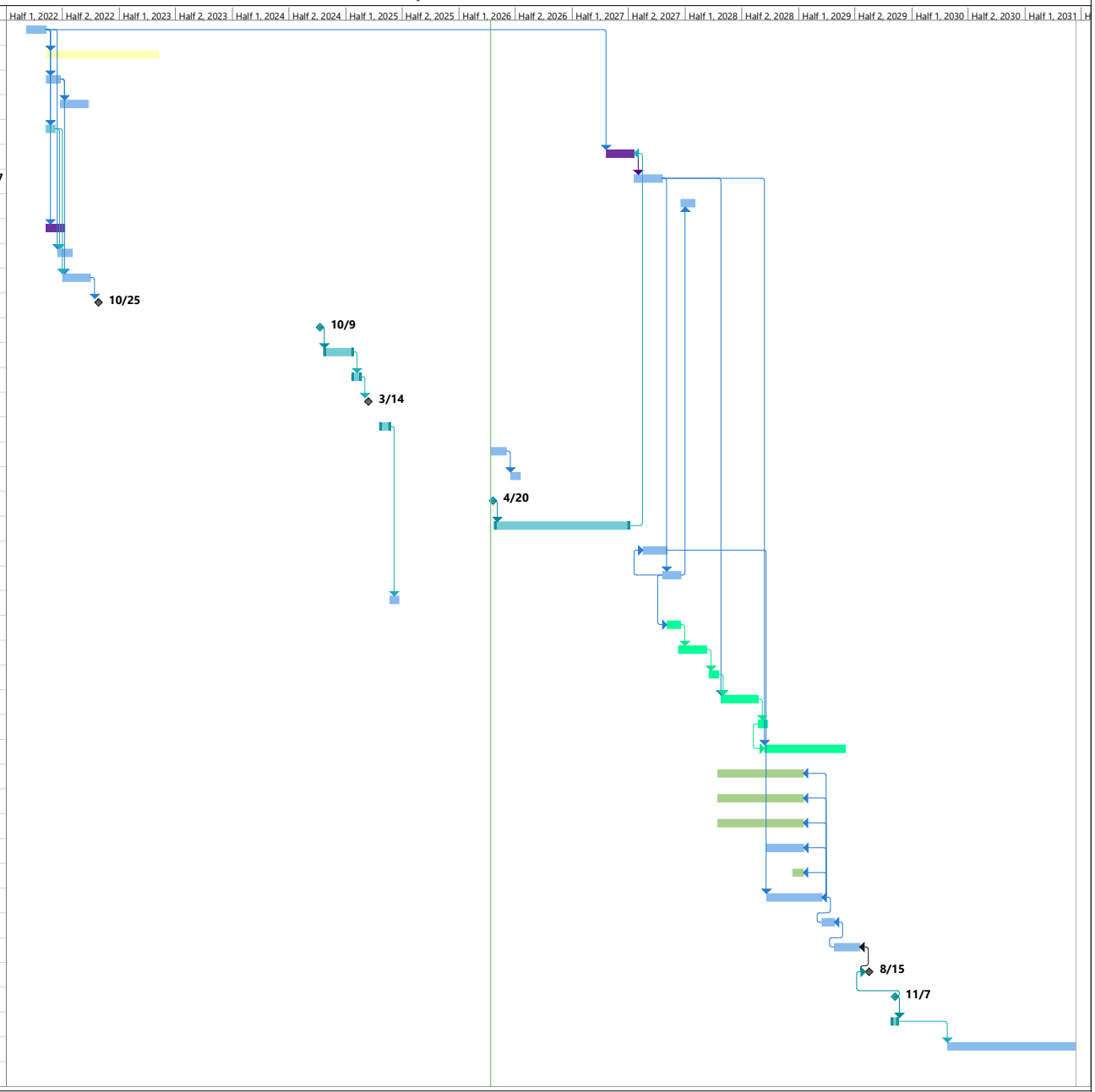
ATTEST:

Wendy Mis
Clerk-Treasurer

Exhibit B3

Main Street, Phase 1 - Columbia/Sheffield Avenue to Hart Ditch Project Schedule

ID	Task Name	Duration	Start	Finish
1	Notice to Proceed	63 edays	Mon 3/7/22	Mon 5/9/22
2	NICTD Coordination	364 edays	Mon 5/9/22	Mon 5/8/23
3	Topographic Survey	45 edays	Tue 5/10/22	Fri 6/24/22
4	LCRSP	90 edays	Fri 6/24/22	Thu 9/22/22
5	Roadway Configuration Study	30 edays	Mon 5/9/22	Wed 6/8/22
6	NEPA	**90 edays**	**Tue 4/20/27**	**Mon 7/19/27**
7	**NEPA Review for Release Public Involvement**	**91 edays**	**Mon 7/19/27**	**Mon 10/18/27**
8	**NEPA for Final Approval**	**45 edays**	**Fri 12/17/27**	**Mon 1/31/28**
9	Wetland Delineation	60 edays	Mon 5/9/22	Fri 7/8/22
10	Aesthetics Analysis	47 edays	Wed 6/15/22	Mon 8/1/22
11	Stage 1 Plans/Preliminary Field Check Plans	90 edays	Fri 7/1/22	Thu 9/29/22
12	Preliminary Field Check Meeting	0 edays	Tue 10/25/22	Tue 10/25/22
13	SA #1 NTP	0 days	Wed 10/9/24	Wed 10/9/24
14	Revised Preliminary Field Check Plans	90 edays	Thu 10/24/24	Wed 1/22/25
15	Hydraulic Updates and Variance	26 edays	Wed 1/22/25	Mon 2/17/25
16	Second Preliminary Field Check Meeting	0 days	Fri 3/14/25	Fri 3/14/25
17	Redesign for Sidewalk	30 edays	Tue 4/22/25	Thu 5/22/25
18	Geotechnical Investigation	**49 edays**	**Mon 4/13/26**	**Mon 6/1/26**
19	Pavement Design	**32 edays**	**Mon 6/15/26**	**Fri 7/17/26**
20	**SA #3 NTP**	**0 days**	**Mon 4/20/26**	**Mon 4/20/26**
21	**Full Section 106 & Reviews(No Effects)**	**431 edays**	**Mon 4/27/26**	**Fri 7/2/27**
22	Stage 2 Plans - to LPA	**77 edays**	**Tue 8/17/27**	**Tue 11/2/27**
23	Public Hearing	**60 edays**	**Mon 10/18/27**	**Fri 12/17/27**
24	Early Assessment of R/W Cost Estimate	**29 edays**	**Thu 5/22/25**	**Fri 6/20/25**
25	Title and Encumbrance	**44 edays**	**Tue 11/2/27**	**Thu 12/16/27**
26	R/W Engineering	**91 edays**	**Thu 12/9/27**	**Thu 3/9/28**
27	Appraisal Problem Analysis	**32 edays**	**Thu 3/16/28**	**Mon 4/17/28**
28	Appraisal - Future Agreement - N/C	**119 edays**	**Tue 4/25/28**	**Tue 8/22/28**
29	Review Appraisal - Future Agreement - N/C	**30 edays**	**Tue 8/22/28**	**Thu 9/21/28**
30	Buying - Future Agreement - N/C	**260 edays**	**Tue 9/12/28**	**Wed 5/30/29**
31	USACE Section 404 Permit	**276 edays**	**Fri 4/14/28**	**Mon 1/15/29**
32	IDEM Section 401 Permit	**276 edays**	**Fri 4/14/28**	**Mon 1/15/29**
33	IDNR CiaF Permit	**276 edays**	**Fri 4/14/28**	**Mon 1/15/29**
34	Lake County Drainage Board Application	**120 edays**	**Mon 9/18/28**	**Tue 1/16/29**
35	Rule 5 (CSGP) Permit	**34 edays**	**Tue 12/12/28**	**Mon 1/15/29**
36	Stage 3 Plans	**179 edays**	**Mon 9/18/28**	**Fri 3/16/29**
37	INDOT Review	**40 edays**	**Fri 3/16/29**	**Wed 4/25/29**
38	Final Tracing Plans	**82 edays**	**Wed 4/25/29**	**Mon 7/16/29**
39	Ready for Contracts	**0 edays**	**Wed 8/15/29**	**Wed 8/15/29**
40	Letting	**0 edays**	**Wed 11/7/29**	**Wed 11/7/29**
41	Tree Clearing	**17 edays**	**Mon 10/29/29**	**Thu 11/15/29**
42	Construction	**413 edays**	**Thu 4/25/30**	**Thu 6/12/31**
43				



Project: Exh B1 Munster Main S
Date: Mon 4/13/26

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress

N/C - Not in Contract

To: Town Council

From: Patricia Abbott, Controller

Meeting Date: May 4, 2026

Subject: CCMG 2026-2: Approval of LPA Agreement

Summary

On April 16, 2026, Munster received the Award letter for CCMG 2026-2 in the amount of $1,000,000.00 for the following roads.

Road	From	To
Singleton Drive	Columbia Avenue	Calumet Avenue
Ridgeway Avenue	Calumet Avenue	Tapper Avenue
Baring Avenue	Lambert Lane	Ada Lane
Primrose Lane	Camellia Drive	Azalea Drive
Cedar Court	Harrison Court	End
Oakwood Court	33rd Avenue	Fairway Avenue
State Line Road	Ridge Road	175th
Indiana Parkway	Superior	Progress
Progress	Indiana Parkway	Valparaiso Avenue
Valparaiso Avenue	Progress Avenue	Superior Avenue
New Devon	Carnaby Place	Leceister Road
River Drive	Frederick Avenue	Harrison Avenue
Exeter	Margo Lane	Norwich Lane

INDOT has presented the Local Public Agency (LPA) contract for signature. This is the agreement between the Town and INDOT for the funding. Council must approve all contracts. INDOT requires one person to be designated to sign all documents related to the project. Resolution 2157 was approved by Council on November 3, 2025, for this purpose and named the Town Manager as the signer.

Financial Impact

Funding Source: Community Crossing Matching Grant
Budgeted Amount: $1,000,000.00
Cost: Total Project Cost is $2,441,637.10.

Recommended Council Action

By motion and roll call vote, approve the LPA agreement with INDOT for the CCMG 2026-2 funding.

Attachments:

1. Local Roads Matching Grant Agreement

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LOCAL ROADS AND BRIDGES MATCHING GRANT AGREEMENT

Contract #00000000000000000000100940

This Grant Agreement (this "Grant Agreement"), entered into by and between the Indiana Department of Transportation (the "State") and **TOWN OF MUNSTER**, a Local Unit, (the "Grantee"), is executed pursuant to the terms and conditions set forth herein. In consideration of those mutual undertakings and covenants, the parties agree as follows:

1. Purpose of this Grant Agreement; Funding Source. The purpose of this Grant Agreement is to enable the State to award a Grant of up to $**1,000,000.00** (the "Grant"), representing **50**% of the eligible costs of the project (the "Project") described in **Attachment A** of this Grant Agreement, which is incorporated fully herein. The funds shall be used exclusively in accordance with the provisions contained in this Grant Agreement and in conformance with Indiana Code ch. 8-23-30 establishing the authority to make this Grant, as well as any rules adopted thereunder. The funds received by the Grantee pursuant to this Grant Agreement shall be used only to implement the Project or provide the services in conformance with this Grant Agreement and for no other purpose.

FUNDING SOURCE:

State Funds: Program Title: Local Road and Bridge Matching Grant Fund (I.C. ch. 8-23-30).

2. Representations and Warranties of the Grantee.
A. The Grantee expressly represents and warrants to the State that it is statutorily eligible to receive these Grant funds and that the information set forth in its Grant Application is true, complete and accurate. The Grantee expressly agrees to promptly repay all funds paid to it under this Grant Agreement should it be determined either that it was ineligible to receive the funds, or it made any material misrepresentation on its grant application.

B. The Grantee certifies by entering into this Grant Agreement that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from entering into this Grant Agreement by any federal or state department or agency. The term "principal" for purposes of this Grant Agreement is defined as an officer, director, owner, partner, key employee or other person with primary management or supervisory responsibilities, or a person who has a critical influence on or substantive control over the operations of the Grantee.

C. The Grantee has committed matching funds from one of the following revenue sources in accordance with Ind. Code § 8-23-30-3: (1) any money the local unit is authorized to use for a local road or bridge project; (2) special distribution of local income tax under Ind. Code § 6-3.6-9-17; or (3) local rainy day fund under Ind. Code § 36-1-8-5.1.

D. The Grantee uses an approved transportation asset management plan submitted to Purdue University's Local Technical Assistance Program (LTAP) and made available to the State.

3. Implementation of and Reporting on the Project.
The Grantee shall implement and complete the Project in accordance with **Attachment A** and with the plans and specifications contained in its Grant Application, which is on file with the State and is incorporated by reference. Modification of the Project shall require prior written approval of the State.

4. Term. This Grant Agreement commences on the date approved by the State Budget Agency, and shall remain in effect for two (2) years. Unless otherwise provided herein, it may be extended upon the written agreement of the parties and in conformance with Ind. Code § 5-22-17-4, and as permitted by Ind. Code ch. 8-23-30.

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The Grantee understands that the Grantee must procure materials and/or a contractor for the Project no later than three (3) months from the date of the award letter, attached hereto as **Attachment B** and incorporated fully herein. If the Grantee fails to procure a contractor by three (3) months from the date of the award letter, the Grantee forfeits the Grant, the grant funds shall not be distributed to the Grantee, but shall be redistributed as all other funds under Indiana Code ch. 8-23-30.

5. Grant Funding. Pursuant to Ind. Code ch. 8-23-30, the Grantee agrees to the following:

A. The Grantee may use the State funds only for the Project described in **Attachment A**;

B. If the Grantee uses the grant funds for any purpose other than construction of the Project as described in **Attachment A**, the Grantee:

i. must immediately repay all grant funds provided to the State; and
ii. may not participate in the grant program during the succeeding State fiscal year.

C. The Grantee shall provide local matching funds equal to not less than **50%** of the total contract amount;

D. Disbursement of grant funds will not be made until the Grantee's submission of the Project Material Bid for Force Account Work or a fully executed contract with a contractor;

E. The State's participation in the Project is strictly limited to the grant funds awarded herein. The Grantee understands and agrees that the State is under no obligation to pay for or participate in any cost increases, change orders, cost overruns or additional Project expenses of any kind.

6. Payment of Grant Funds.
A. If advance payment of all or a portion of the Grant funds is permitted by statute or regulation, and the State agrees to provide such advance payment, advance payment shall be made only upon submission of a proper claim setting out the intended purposes of those funds. After such funds have been expended, Grantee shall provide State with a reconciliation of those expenditures. Otherwise, all payments shall be made thirty-five (35) days in arrears in conformance with State fiscal policies and procedures. As required by IC § 4-13-2-14.8, all payments will be by the direct deposit by electronic funds transfer to the financial institution designated by the Grantee in writing unless a specific waiver has been obtained from the Indiana Auditor of State.

B. Requests for payment of grant funds will be processed only upon receipt of a Notification of Contractor Award and Funding letter and all required documentation.

C. Pursuant to Ind. Code ch. 8-23-30, Local Road and Bridge Grant Funds made available to the Grantee by the State will be used to pay the Grantee up to **50% of the eligible Project costs based upon the accepted contractor's low bid**. The maximum amount of state funds allocated to the Project shall not exceed $**1,000,000.00**.

D. Pursuant to Ind. Code § 8-23-30, the Grantee's **50%** match shall be paid from one of the identified revenue sources. The remainder of the Project costs greater than the total of the State's grant and the Grantee's **50%** match shall be borne by the Grantee and may be paid how the Grantee chooses. In the interest of clarity and to avoid misunderstanding, the State shall not pay the Grantee for any costs relating to the Project except as specifically provided herein, unless the Parties enter into an amendment to this Grant Agreement.

In Process

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7. Project Monitoring by the State. The State may conduct on-site or off-site monitoring reviews of the Project during the term of this Grant Agreement and for up to ninety (90) days after it expires or is otherwise terminated. The Grantee shall extend its full cooperation and give full access to the Project site and to relevant documentation to the State or its authorized designees for the purpose of determining, among other things:

A. whether Project activities are consistent with those set forth in **Attachment A**, the Grant Application, and the terms and conditions of the Grant Agreement;

B. that Grantee is making timely progress with the Project, and that its project management, financial management and control systems, procurement systems and methods, and overall performance are in conformance with the requirements set forth in this Grant Agreement and are fully and accurately reflected in Project reports submitted to the State.

8. Compliance with Audit and Reporting Requirements; Maintenance of Records.
A. The Grantee shall submit to an audit of funds paid through this Grant Agreement and shall make all books, accounting records and other documents available at all reasonable times during the term of this Grant Agreement and for a period of three (3) years after final payment for inspection by the State or its authorized designee. Copies shall be furnished to the State at no cost.

B. The Grantee shall file the annual financial report required by Ind. Code § 5-11-1-4 in accordance with the State Board of Accounts Uniform Compliance Guidelines for Examination of Entities Receiving Financial Assistance from Governmental Sources. All grant documentation shall be retained and made available to the State Board of Accounts if and when requested.

C. A final audit construction invoice detailing the actual costs of construction and proof of payment to the contractor must be submitted to the State within thirty (30) days of completion of the Project. If for any reason, including overpayment of grant funds to the Grantee, the Grantee is required to repay to the State the sum or sums of state funds paid to the Grantee under the terms of this Grant Agreement, then the Grantee shall repay to the State such sum or sums within forty-five (45) days after receipt of a billing from the State. Payment for any and all costs incurred by the Grantee which are not eligible for state funding shall be the sole obligation of the Grantee.

D. If for any reason the State finds noncompliance and requires a repayment of state funds previously paid to the Grantee, the Grantee is required to submit such sum or sums within thirty (30) days after receipt of a billing from the State. If the Grantee has not paid the full amount due within sixty (60) calendar days past the due date, the State may proceed in accordance with Ind. Code § 8-14-1-9 to compel the Auditor of the State of Indiana to make a mandatory transfer of funds for the Grantee's allocation of the Motor Vehicle Highway Account to the State's Local Road and Bridge Matching Grant Fund account until the amount due has been repaid.

9. Compliance with Laws.
A. The Grantee shall comply with all applicable federal, state and local laws, rules, regulations and ordinances, and all provisions required thereby to be included herein are hereby incorporated by reference. The enactment or modification of any applicable state or federal statute or the promulgation of rules or regulations thereunder after execution of this Grant Agreement shall be reviewed by the State and the Grantee to determine whether the provisions of this Grant Agreement require formal modification.

B. The Grantee and its agents shall abide by all ethical requirements that apply to persons who have a business relationship with the State as set forth in IC § 4-2-6, *et seq*., IC § 4-2-7, *et seq*. and the regulations promulgated thereunder. **If the Grantee has knowledge, or would have acquired knowledge with reasonable inquiry, that a state officer, employee, or special state appointee, as those terms are defined in IC 4-2-6-1, has a financial interest in the Grant, the Grantee shall ensure compliance with the disclosure requirements in IC § 4-2-6-10.5 prior to the execution of this Grant Agreement.** If the Grantee is not familiar with these ethical requirements, the Grantee should refer any questions to the Indiana State Ethics Commission, or visit the Inspector General's website at http://www.in.gov/ig/. If the

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Grantee or its agents violate any applicable ethical standards, the State may, in its sole discretion, terminate this Grant immediately upon notice to the Grantee. In addition, the Grantee may be subject to penalties under IC §§ 4-2-6, 4-2-7, 35-44.1-1-4, and under any other applicable laws.

C. The Grantee certifies by entering into this Grant Agreement that neither it nor its principal(s) is presently in arrears in payment of taxes, permit fees or other statutory, regulatory or judicially required payments to the State. The Grantee agrees that any payments currently due to the State may be withheld from payments due to the Grantee. Additionally, payments may be withheld, delayed, or denied and/or this Grant suspended until the Grantee is current in its payments and has submitted proof of such payment to the State.

D. The Grantee warrants that it has no current, pending or outstanding criminal, civil, or enforcement actions initiated by the State, and agrees that it will immediately notify the State of any such actions. During the term of such actions, the Grantee agrees that the State may suspend funding for the Project. If a valid dispute exists as to the Grantee's liability or guilt in any action initiated by the State or its agencies, and the State decides to suspend funding to the Grantee, the Grantee may submit, in writing, a request for review to the Indiana Department of Administration (IDOA). A determination by IDOA shall be binding on the parties. Any disbursements that the State may delay, withhold, deny, or apply under this section shall not be subject to penalty or interest.

E. The Grantee warrants that the Grantee and any contractors performing work in connection with the Project shall obtain and maintain all required permits, licenses, registrations, and approvals, and shall comply with all health, safety, and environmental statutes, rules, or regulations in the performance of work activities for the State. Failure to do so may be deemed a material breach of this Grant Agreement and grounds for immediate termination and denial of grant opportunities with the State.

F. The Grantee affirms that, if it is an entity described in IC Title 23, it is properly registered and owes no outstanding reports to the Indiana Secretary of State.

G. As required by IC § 5-22-3-7:

(1)The Grantee and any principals of the Grantee certify that:

(A) the Grantee, except for de minimis and nonsystematic violations, has not violated the terms of:

(i) IC § 24-4.7 [Telephone Solicitation of Consumers];

(ii) IC § 24-5-12 [Telephone Solicitations]; or

(iii) IC § 24-5-14 [Regulation of Automatic Dialing Machines];

in the previous three hundred sixty-five (365) days, even if IC 24-4.7 is preempted by federal law; and

(B) the Grantee will not violate the terms of IC § 24-4.7 for the duration of this Grant Agreement, even if IC §24-4.7 is preempted by federal law.

(2)The Grantee and any principals of the Grantee certify that an affiliate or principal of the Grantee and any agent acting on behalf of the Grantee or on behalf of an affiliate or principal of the Grantee, except for de minimis and nonsystematic violations,

(A) has not violated the terms of IC § 24-4.7 in the previous three hundred sixty-five (365) days, even if IC § 24-4.7 is preempted by federal law; and

(B) will not violate the terms of IC § 24-4.7 for the duration of this Grant Agreement even if IC § 24-4.7 is preempted by federal law.

10. Debarment and Suspension.

A. The Grantee certifies by entering into this Grant Agreement that it is not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from entering into this Grant by any federal agency or by any department, agency or political subdivision of the State. The term "principal" for purposes of this Grant Agreement means an officer, director, owner, partner, key employee or other person

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with primary management or supervisory responsibilities, or a person who has a critical influence on or substantive control over the operations of the Grantee.

B. The Grantee certifies that it has verified the suspension and debarment status for all subcontractors receiving funds under this Grant Agreement and shall be solely responsible for any recoupments or penalties that might arise from non-compliance. The Grantee shall immediately notify the State if any subcontractor becomes debarred or suspended, and shall, at the State's request, take all steps required by the State to terminate its contractual relationship with the subcontractor for work to be performed under this Grant Agreement.

11. Drug-Free Workplace Certification. As required by Executive Order No. 90-5, April 12, 1990, issued by the Governor of Indiana, the Grantee hereby covenants and agrees to make a good faith effort to provide and maintain a drug-free workplace. Grantee will give written notice to the State within ten (10) days after receiving actual notice that the Grantee, or an employee of the Grantee in the State of Indiana, has been convicted of a criminal drug violation occurring in the workplace. False certification or violation of the certification may result in sanctions including, but not limited to, suspension of grant payments, termination of the Grant and/or debarment of grant opportunities with the State of Indiana for up to three (3) years.

In addition to the provisions of the above paragraphs, if the total amount set forth in this Grant Agreement is in excess of $25,000.00, the Grantee certifies and agrees that it will provide a drug-free workplace by:

A. Publishing and providing to all of its employees a statement notifying them that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the Grantee's workplace and specifying the actions that will be taken against employees for violations of such prohibition; and

B. Establishing a drug-free awareness program to inform its employees of: (1) the dangers of drug abuse in the workplace; (2) the Grantee's policy of maintaining a drug-free workplace; (3) any available drug counseling, rehabilitation, and employee assistance programs; and (4) the penalties that may be imposed upon an employee for drug abuse violations occurring in the workplace; and

C. Notifying all employees in the statement required by subparagraph (A) above that as a condition of continued employment the employee will: (1) abide by the terms of the statement; and (2) notify the Grantee of any criminal drug statute conviction for a violation occurring in the workplace no later than five (5) days after such conviction; and

D. Notifying in writing the State within ten (10) days after receiving notice from an employee under subdivision (C)(2) above, or otherwise receiving actual notice of such conviction; and

E. Within thirty (30) days after receiving notice under subdivision (C)(2) above of a conviction, imposing the following sanctions or remedial measures on any employee who is convicted of drug abuse violations occurring in the workplace: (1) take appropriate personnel action against the employee, up to and including termination; or (2) require such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state or local health, law enforcement, or other appropriate agency; and

F. Making a good faith effort to maintain a drug-free workplace through the implementation of subparagraphs (A) through (E) above.

12. Employment Eligibility Verification. As a condition precedent to entering this contract, and as required by IC § 22-5-1.7 and Executive Order 25-29, the Grantee swears or affirms under the penalties of

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perjury that the Grantee has not knowingly employed, and will not knowingly employ, an unauthorized alien. The Grantee further affirms that:

A. The Grantee has enrolled in and verified the work eligibility status of all his/her/its employees through the E-Verify program as defined in IC § 22-5-1.7-3. The Grantee is not required to participate should the E-Verify program cease to exist. Additionally, the Grantee is not required to participate if the Grantee is self-employed and does not employ any employees.

B. The Grantee has not knowingly employed or contracted with, and shall not knowingly employ or contract with, an unauthorized alien. The Grantee has not retained, and shall not retain, an employee, and has not contracted and shall not contract with a person that the Grantee subsequently learned or learns is an unauthorized alien.

C. The Grantee his/her/its subcontractors who perform work under this Contract to certify to the Grantee that the subcontractor does not knowingly employ or contract with an unauthorized alien and that the subcontractor has enrolled and is participating in the E-Verify program. The Grantee agrees to maintain this certification throughout the duration of the term of a contract with a subcontractor and to provide any and all such certifications to the State promptly upon request.

The State may terminate for default if the Grantee fails to cure a breach of this provision no later than thirty (30) days after being notified by the State.

13. Funding Cancellation. As required by Financial Management Circular 3.3 and IC § 5-22-17-5, when the Director of the State Budget Agency makes a written determination that funds are not appropriated or otherwise available to support continuation of performance of this Grant Agreement, it shall be canceled. A determination by the Director of the State Budget Agency that funds are not appropriated or otherwise available to support continuation of performance shall be final and conclusive.

14. Governing Law. This Grant Agreement shall be governed, construed, and enforced in accordance with the laws of the State of Indiana, without regard to its conflict of laws rules. Suit, if any, must be brought in the State of Indiana.

15. Information Technology Accessibility Standards. Any information technology related products or services purchased, used or maintained through this Grant must be compatible with the principles and goals contained in the Electronic and Information Technology Accessibility Standards adopted by the Architectural and Transportation Barriers Compliance Board under Section 508 of the federal Rehabilitation Act of 1973 (29 U.S.C. §794d), as amended.

16. Insurance. The Grantee shall maintain insurance with coverages and in such amount as may be required by the State or as provided in its Grant Application.

17. Nondiscrimination. Pursuant to the Indiana Civil Rights Law, specifically IC § 22-9-1-10, and in keeping with the purposes of the federal Civil Rights Act of 1964, the Age Discrimination in Employment Act, and the Americans with Disabilities Act:

A. The Grantee covenants that it shall not discriminate against any employee or applicant for employment relating to this Grant with respect to the hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment, because of the employee's or applicant's race, color, national origin, religion, sex, age, disability, ancestry, status as a veteran, or any other characteristic protected by federal, state, or local law ("Protected Characteristics"). The Grantee certifies compliance with applicable federal laws, regulations, and executive orders prohibiting discrimination based on the Protected Characteristics in the provision of services. Breach of this subparagraph may be

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regarded as a material breach of this Contract, including for purposes of IC 5-11-5.5-2, but nothing in this paragraph shall be construed to imply or establish an employment relationship between the State and any applicant or employee of the Grantee or any subcontractor.

B. Grantee covenants that it does not and shall not operate any programs or engage in any practices promoting Diversity, Equity, and Inclusion (DEI), or other similar goals, that violate Indiana or Federal Civil Rights Laws by treating a person differently on the basis of race or sex, such as by considering race or sex when making recruitment, hiring, disciplinary, promotion, or employment decisions; requiring employees to participate in training or educational programs that employ racial or sex stereotypes; or attempting to achieve racial or sex balancing in the Contractor's workforce. The Parties agree that a breach of this subparagraph is a material breach of this Contract, including for purposes of IC 5-11-5.5-2, but nothing in this paragraph shall be construed to imply or establish an employment relationship between the State and any applicant or employee of the Grantee or any subcontractor.

18. Notice to Parties. Whenever any notice, statement or other communication is required under this Grant, it will be sent by E-mail or first-class U.S. mail service to the following addresses, unless otherwise specifically advised.

A. Notices to the State shall be sent to:

Office of LPA/MPO and Grant Administration
Attention: Director of LPA/MPO and Grant Administration
100 North Senate Avenue, Room N758-LPA
Indianapolis, IN 46204
E-mail: indotlpampo@indot.in.gov

With a copy to:

Chief Legal Counsel/Deputy Commissioner
Indiana Department of Transportation
100 N Senate Avenue, Room N758-Legal
Indianapolis, IN 46204-2216

B. Notices to the State regarding project management shall be sent to respective District Office:

Marcia Blansett
LaPorte District
315 East Boyd Blvd.
LaPorte, IN 46350
Email: mblansett@indot.in.gov

C. Notices to the Grantee shall be sent to:

Town of Munster
ATTN: George Shinkan
1005 Ridge Road
Munster, IN 46321
Email: gshinkan@munster.org

As required by IC § 4-13-2-14.8, payments to the Grantee shall be made via electronic funds transfer in accordance with instructions filed by the Grantee with the Indiana Auditor of State.

E-Process

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19. Order of Precedence; Incorporation by Reference. Any inconsistency or ambiguity in this Grant Agreement shall be resolved by giving precedence in the following order: (1) this Grant Agreement, (2) Exhibits prepared by the State, (3) Invitation to Apply for Grant; (4) the Grant Application; and (5) Exhibits prepared by Grantee. All of the foregoing are incorporated fully herein by reference.

20. Public Record. The Grantee acknowledges that the State will not treat this Grant as containing confidential information, and will post this Grant on the transparency portal as required by Executive Order 05-07 and IC § 5-14-3.5-2. Use by the public of the information contained in this Grant shall not be considered an act of the State.

21. Termination for Breach.
A. Failure to complete the Project and expend State, local and/or private funds in accordance with this Grant Agreement may be considered a material breach, and shall entitle the State to suspend grant payments, and to suspend the Grantee's participation in State grant programs until such time as all material breaches are cured to the State's satisfaction.

B. The expenditure of State or federal funds other than in conformance with the Project or the Budget may be deemed a breach. The Grantee explicitly covenants that it shall promptly repay to the State all funds not spent in conformance with this Grant Agreement.

22. Termination for Convenience. Unless prohibited by a statute or regulation relating to the award of the Grant, this Grant Agreement may be terminated, in whole or in part, by the State whenever, for any reason, the State determines that such termination is in the best interest of the State. Termination shall be effected by delivery to the Grantee of a Termination Notice, specifying the extent to which such termination becomes effective. The Grantee shall be compensated for completion of the Project properly done prior to the effective date of termination. The State will not be liable for work on the Project performed after the effective date of termination. In no case shall total payment made to the Grantee exceed the original grant.

23. Travel. No expenses for travel will be reimbursed unless specifically authorized by this Grant.

24. Provision Applicable to Grants with tax-funded State Educational Institutions: "Separateness" of the Parties. The State acknowledges and agrees that because of the unique nature of State Educational Institutions, the duties and responsibilities of the State Educational Institution in these Standard Conditions for Grants are specific to the department or unit of the State Educational Institution. The existence or status of any one contract or grant between the State and the State Educational Institution shall have no impact on the execution or performance of any other contract or grant and shall not form the basis for termination of any other contract or grant by either party.

25. State Boilerplate Affirmation Clause. I swear or affirm under the penalties of perjury that I have not altered, modified, changed or deleted the State's standard contract clauses (as contained in the *2022 SCM Template*) in any way except as follows: Payment of Claims; the Compliance with Audit and Reporting Requirements; Maintenance of Records were modified to include statutory and program requirements.

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Non-Collusion, Acceptance

The undersigned attests, subject to the penalties for perjury, that the undersigned is the Grantee, or that the undersigned is the properly authorized representative, agent, member or officer of the Grantee. Further, to the undersigned's knowledge, neither the undersigned nor any other member, employee, representative, agent or officer of the Grantee, directly or indirectly, has entered into or been offered any sum of money or other consideration for the execution of this Grant Agreement other than that which appears upon the face hereof. **Furthermore, if the undersigned has knowledge that a state officer, employee, or special state appointee, as those terms are defined in IC § 4-2-6-1, has a financial interest in the Grant, the Grantee attests to compliance with the disclosure requirements in IC § 4-2-6-10.5.**

Agreement to Use Electronic Signatures

I agree, and it is my intent, to sign this Grant Agreement by accessing State of Indiana Supplier Portal using the secure password assigned to me and by electronically submitting this Grant Agreement to the State of Indiana. I understand that my signing and submitting this Grant Agreement in this fashion is the legal equivalent of having placed my handwritten signature on the submitted Grant Agreement and this affirmation. I understand and agree that by electronically signing and submitting this Grant Agreement in this fashion I am affirming to the truth of the information contained therein. I understand that this Grant Agreement will not become binding on the State until it has been approved by the Department of Administration, the State Budget Agency, and the Office of the Attorney General, which approvals will be posted on the Active Contracts Database: https://secure.in.gov/apps/idoa/contractsearch/

In Witness Whereof, the Grantee and the State have, through their duly authorized representatives, entered into this Grant Agreement. The parties, having read and understood the foregoing terms of this Grant Agreement, do by their respective signatures dated below agree to the terms thereof.

Town of Munster

By: _____

Title: Town Manager

Date: _____

Indiana Department of Transportation

By: _____

(for) Lyndsay Quist, Commissioner

Date: _____

Electronically Approved by:
Department of Administration

By: (for) Brandon Clifton, Commissioner

Electronically Approved by:
State Budget Agency

By: (for) Chad Ranney, Director

Approved as to Form and Legality:
Form approval has been granted by the Office of the Attorney General pursuant to IC 4-13-2-14.3(e) on July 18, 2025.
FA 25-33

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ATTACHMENT A

PROJECT DESCRIPTION

Des. No.: **2600740**

Application ID: **15178**

Program: **Local Roads and Bridges Matching Grants**

Type of Project: **HMA Overlay Minor Structural**

Location:

Route Name	From	To
SINGLETON DR	Calumet Avenue	Columbia Avenue
RIDGEWAY AVE	Calumet Ave	Tapper
BARING AVE	LAMBERT	ADA
PRIMROSE LN	Camellia Dr	Azalea Dr
CEDAR CT	Harrison Ave	End
OAKWOOD AVE	33rd Ave	Fairway Ave
STATE LINE AVE	Ridge Rd	175th
INDIANA PKWY	Superior Ave	Progress Ave
PROGRESS AVE	Indiana Ave	Valparaiso Ave
VALPARAISO DR	Progress Ave	Superior Ave
NEW DEVON ST	Carnaby Pl	Leceister Rd
EXETER RD	Margo Ln	Norwich Dr
RIVER DR	Frederick Ave	Harrison Ave

A general scope/description of the Project is as follows:

Full depth pavement removal, 2" and 3" (as needed) HMA paving, 30% curb removal and 25% sidewalk removal on each of the following streets: Singleton Drive from Columbia Ave to Calumet Ave, Ridgeway Avenue from Calumet Ave to Tapper Ave, Baring Avenue Lambert Ln to Ada Ln, Primrose Lane from Camellia Dr to Azalea Dr, Cedar Court from Harrison Ct to end, Oakwood Court from 33rd Ave to Fairway Ave, State Line Road from Ridge to 175th, Indiana Parkway from Superior to Progress, Progress Drive from Indiana Pkwy to Valparaiso Ave, Valparaiso Avenue from Progress Ave to Superior Ave, New Devon from Carnaby Pl to Leceister Rd, River Drive from Frederick Ave to Harrison Ave, and Exeter from Margo Ln to Norwich Ln.

The maximum amount of state funds allocated to the Project shall not exceed $1,000,000.00.

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ATTACHMENT B

AWARD LETTER

INDIANA DEPARTMENT OF TRANSPORTATION
100 North Senate Avenue
Room N758 - LPA
Indianapolis, Indiana 46204
PHONE: (855) 463-6848
LPAQuestions@indot.in.gov
Mike Braun, Governor
Lyndsay Quist, Commissioner

April 16, 2026

Town of Munster
George Shinkan
1005 Ridge Road
Munster, IN 46321

RE: Community Crossing Matching Grant Fund 2026-2 Award Letter

Dear George Shinkan:

The Indiana Department of Transportation (INDOT) has completed the review and selection of projects for funding in the 2026-2 Community Crossings Matching Grant Fund Program. Your community has preliminarily been awarded Community Crossings Matching Grant Funds based upon your estimates the following:

Application ID	Preliminary Awarded Amount	Location Priority
15178	$1,000,000.00	All
TOTAL	**$1,000,000.00**	

Preliminary award amounts are contingent upon the following:

- INDOT must receive a copy of the fully executed contract with a contractor or material supplier.
- Contractor/material supply contracts must be submitted no later than March 1, 2026. Failure to meet this date will result in the forfeiture of your funds. No exceptions.
- The Local Public Agency (LPA) must use DocuSign to electronically sign the Local Roads and Bridges Matching Grant Agreement. Your grant agreement has already been requested, and you should receive it soon.
- Once all documentation listed above is received, reviewed, and contracts fully executed INDOT will transfer the agreed upon contract amount into your account.

The Community Crossings Matching Grant Funds, which are administered by INDOT, will be used for funding up to 50 percent of the construction of your project or the purchase of materials. These grant dollars will enable you to help build and improve Indiana's infrastructure.

If you have any questions, please contact Marcia Blansett, (219) 325-7564 or mblansett@indot.in.gov.

The State of Indiana looks forward to partnering with all Hoosier communities, both urban and rural, to invest in road and bridge infrastructure projects. Improvement to local roads and bridges will bring about economic development, create jobs, and strengthen local transportation networks for all of Indiana.

Sincerely,

Kathy Eaton-McKalip

Director of Local Programs
Indiana Department of Transportation

In Process

To: Town Council

From: Steve Scheckel, Police Chief

Meeting Date: May 4, 2026

Subject: Police Equipment Destruction Request

Summary

In the process of outfitting patrol vehicles, Lt. Thomas Kuhlenschmidt has identified outdated equipment that is no longer compatible with the current Whelen Core System, which integrates the lights, siren, and hazard bars into one single unit. The old CDM1250 radios are outdated and VHF only. The APX7500 radios that came out of the older vehicles are no longer serviced by Motorola and have been replaced by the APX8500. The seven (7) APX7500 radios listed below have been transferred to Public Works to utilize. The department also no longer uses tablets in vehicles, as they have been replaced with Panasonic Toughbooks. The list of equipment that is no longer viable or needs to be removed from inventory is as follows:

Incompatible Equipment
17 Whelen Light Controllers
12 Whelen Hazard Controllers
20 Tablet Holders for Vehicles
7 Whelen Light Bars (viable lights and opticoms removed)
6 Front Bull Bars for Vehicles (no longer usable with the current model)

Radios
CDM 1250 109IACG373 APX7500 656CQM0748
CDM 1250 103TFN9826 APX7500 527CVM0665
CDM1250 103THY0364 APX7500 656CQM0761
CDM 1250 103TEYB729 APX7500 656CQM0744
CDM 1250 103TBGA856 APX7500 656CQM0746
CDM1250 103TMW9629 APX7500 656CQM0742
CDM1250 103TEYB727 APX7500 656cqm0751
CDM 1250 103tewn667
CDM1250 103tjsc606

Tablets
Acer Tablet 23C8596F-558F-4FAD-B5D1-E69577C787E5

Acer Tablet 51A4C9FB-54DE-4B5F-A218-BEF41218B5A6
Along with the vehicle equipment, there are a few items within the department's inventory no longer used or viable. This list includes:

GPS Money Tracker (not used since early 2000's)
4 Work Lights (non-functioning)

Financial Impact

Funding Source:
Budgeted Amount:
Cost:

Recommended Council Action
By motion and roll call vote, authorize the Munster Police Department to destroy or transfer surplus property as presented.

Attachments:
None

To: Town Council

From: Laura Pramuk, Administrative Assistant

Meeting Date: May 4, 2026

Subject: Main Street Paving Proposal

Summary

The asphalt on the section of Main Street from the Hart's Ditch bridge to Calumet Avenue is failing and is in need of replacement. The asphalt is crumbling and has several potholes. The Town of Dyer notified us that they have obtained a proposal for Milestone Contractors to repave this section of the road that is within Dyer's border. This prompted us to obtain a proposal from Milestone to repave the same section of road within Munster's border. Milestone will repave our portion of the road at the same time as they will resurface the southern half of the road located in Dyer.

The scope of the project is mill pavement to a depth of 2". Sweep and apply a tack coat. Overlay with 2" HMA Surface and stripe the new pavement. Flaggers for traffic control are included. The cost of the proposal is $72,461.45.

Financial Impact

Funding Source: MVH - Restricted
Budgeted Amount:
Cost: $72,461.45

Recommended Council Action

By motion and roll call vote approve Milestone Contractors L.P. proposal for paving Main Street from the Hart's Ditch bridge to Calumet Avenue in the amount of $72,461.45.

Attachments:

1. Milestone Contractors Proposal

Milestone Contractors L.P.
1700 East Main Street
Griffith, IN 46319
Phone: (219) 924-5900

PROPOSAL

(Contract Binding Upon Credit Approval and Acceptance)

Date: April 7, 2026

To: Town of Munster
Attn: Russ
Area: Approximately 5,401 Square Yards

Project: Main Street Paving
Estimate No. G01791
Estimator: Greg Hoffman

We propose to furnish only the material(s), labor, equipment and/or services (collectively "Work") for the above Project at the Price(s) and in accordance with terms stated below. We may, without notice, deem this Proposal to have been withdrawn if: (1) not accepted within 14 days following the date hereof, and/or (2) the results of a credit check do not meet our internal credit approval standards. UPON TIMELY ACCEPTANCE AND CREDIT APPROVAL AS PROVIDED ABOVE, THIS PROPOSAL SHALL BECOME A BINDING CONTRACT.

- Mill pavement to a depth of 2".
- Sweep and apply a tack coat.
- Overlay with 2" HMA Surface.
- Stripe new pavement.

Lump Sum:.....$72,461.45

Notes

- Work to be completed at the same time as Dyer's half of Main Street.
- Flaggers will be utilized for traffic control.

Terms and conditions include those on reverse side and/or continuation sheet(s)

SUBMITTED as of the Date stated above on behalf of Milestone Contractors L.P.

By: Greg Hoffman Title: Senior Estimator

CUSTOMER ACCEPTANCE: This Proposal including description(s) of Work and all other terms and conditions herein stated, are hereby accepted and authorization is hereby given to commence the Work accordingly.

Signature _____ Title _____ Date _____

Milestone – Proposal / Contract - Revised 04-26-2022

Conditions and Clarifications / Special Provisions

1. Our price includes **(OR)** does not include Indiana State Sales Tax.
2. Milestone hereby certifies that it (elects) to enact PG asphalt binder cost adjustments. You must elect this or this proposal is null and void. **(OR)** Proposed pricing is based upon material costs through **DATE**. Any costs increases incurred by us thereafter shall, at our option, be grounds for a corresponding increase in pricing payable by customer for the work, with a reasonable allowance for overhead and profit.
3. Our price does not include:
   a) Permits, testing or inspection fees;
   b) Bonds; such as performance bonds, maintenance bonds, warranty bonds, etc.
   c) Fees or assessment of any type;
   d) Construction engineering or layout;
   e) Saw cutting;
   f) Traffic control or traffic control devices.
   g) Building or removing any temporary ramps. We will require the General Contractor to provide their own people to work with us full time, at the GC's expense, to install and remove temporary ramps so that we can pave through the drive and street approaches. The GC is also to provide any cleaning required where temporary ramps are installed on the asphalt pavement.
4. Our price is based on plans and specifications prepared by **FIRM/NAME** dated **DATE**.
5. Our price includes # mobilizations. Please add an additional $ / each additional mobilization.
6. Our price is based on no retainage being withheld. **(OR)** If project is delayed for the owner's convenience, Milestone will be due all retainage withheld for work that is completed.
7. If Milestone is directed to install any item of work not within specifications, a standard waiver of warranty will need to be signed.
8. All excavation, grading, including fine grading and compaction is by others. Subgrade is to be prepared on grade, compacted and approved by Owner/Architect/Engineer prior to placing compacted aggregate base or asphalt pavement. **(OR)** All excavation and rough grading is to be performed by others. Subgrade to be within +/- 0.1 ft of final grade and approved prior to fine grading.
9. Subgrade treatment requirements must be met such that the density requirements of the asphalt are achievable. If the subgrade is soft or yielding and we are instructed to pave, then any density penalties on the asphalt will be paid by others.
10. All bonuses assessed by INDOT shall be passed onto Milestone based on the unit prices on this quotation, Milestone will not be responsible for asphalt penalties that are assessed by INDOT unless Milestone is notified in time that would allow for additional testing or appeal. Milestone will only be responsible monetarily for penalties based on the unit prices that are on this quote, not the generals marked up unit prices. All correspondence relating to asphalt penalties should be faxed to Milestone.
11. The above prices are a package quote, please do not remove any items without calling for a revised quote.
12. We shall be provided with suitable access to our work area. If our work is dependent upon or must be under taken in conjunction with the work of others, such other work shall be so performed and completed as to permit us to perform our work hereunder in a normal uninterrupted single-shift operation on a Monday thru Friday. (Holidays excluded)
13. Any stone base lost due to construction traffic or construction staging will be considered an extra.
14. If additional materials, including bituminous material is required due to faulty/unsuitable subgrade or subbase, billing will be based on actual material used.
15. Additional stone base, if required, to insure proper drainage and stabilize existing subbase will be furnished, delivered and spread complete in place @ **$ /Ton**.
16. We cannot guarantee proper pavement drainage on slopes less than one percent.
17. We acknowledge the receipt of Addendums #___.

General Terms and Conditions

These terms shall supersede any different terms stated in any other documents that have been or may hereafter be issued or executed for the above Project or Work. Customer's acceptance of this Proposal may occur by signature below, or by any act or expression manifesting Customer's intention to proceed hereunder, including but not limited to Customer's approval, directive or authorization for us to commence Work. We shall not be bound by any additional or different terms stated by Customer in any prior or future expression concerning the Project, or by any modifications or additions to terms stated herein, unless separately agreed to by us in writing.

1. Customer shall (a) not cause, create or allow others to cause or create any conflict, delay or hindrance in our performance of Work; (b) provide and expedite responses to submittals and inquiries, and provide sufficient and timely information, permits and approvals; (c) assure access to and make all provisions for our entry upon lands, including easements and rights of way; (d) assure and guarantee that products of our Work remain free of damage, deterioration or other adverse or detrimental conditions due to deficiencies or inadequacies in design, inspections or other work undertaken by or for Customer or others; (e) take such other action and manage the Project in other respects to enable us to perform Work in an uninterrupted, expedited and single-shift operation; and (f) indemnify us and hold us harmless as to any losses, costs and damages arising from third party claims and caused in whole or part by the Customer or others for whose acts Customer is responsible.
2. We shall not be held responsible for or otherwise become obligated with respect to any of the following:
   a) Conforming to any original or updated scheduling that is has not been expressly approved by us beforehand in writing;
   b) Delays, hindrances or other adverse and unavoidable conditions and circumstances (including adverse weather) not exclusively caused by us and within our control, or which render our performance impossible, impracticable or unduly burdensome or costly;
   c) Damages to or conflicts with utilities or other physical structures or conditions (or the removal or relocation thereof), the existence or location of which were omitted or misstated by plans, surveys, reports, markings or other information relied upon by us in the course of planning or executing Work;
   d) Providing any services, labor, materials or equipment that is not specifically included in the description of Work contained in this Proposal or duly signed change order or other written modification of these terms; provided, we may elect to perform additional or extra work or services pursuant to any request or directive from Customer without mutual written agreement specifying the basis for payment for same, and in such case we will be compensated based on our

standard rates and charges in effect when such work or services are rendered, and we shall also be entitled to an appropriate scheduling extension if and as needed.

e) Errors, inconsistencies or deviations shown by or inherent in plans, drawings, surveys or other information furnished to us by Customer or others and relied upon by us in performance of the Work;

f) Utilizing means, methods, techniques or procedures which would result in added costs, delays, inefficiencies or other unplanned adverse impacts upon our Work;

g) Performing any Work in an area affected by asbestos, polychlorinated biphenyl (PCB) or other hazardous material or toxic condition or substance (as those terms are defined by law or common trade practices) which has not been rendered harmless;

h) Damage to or deterioration or diminished performance characteristics of our Work or other property resulting from any cause or condition beyond our exclusive and direct control, including, but not limited to those caused by (i) failures, discrepancies, deficiencies or other inadequacies in construction performed or undertaken by Customer or others, whether or not the existence of such failure or inadequacy was known or discoverable by us at or prior to the time our Work was undertaken by us, and (ii) deferral or postponement of any part of the Work due to weather or seasonal conditions, or for Customer's convenience.

i) Any special, incidental, consequential or liquidated damages.

3. If we encounter any condition or circumstance in performing Work that differs materially from that described herein or indicated in applicable plans or specifications or other Project information that has been provided to us as of this date, or is not of the type generally encountered in performing the type and nature of Work described herein, then we shall be entitled to an equitable adjustment in price and/or allotted time for performance of the Work. If Work is delayed or accelerated for any reason beyond our control, compensation shall be equitably adjusted and time for performance shall be extended to account for such delay or acceleration.

4. Subject to conditions and limitations stated elsewhere in this Proposal, our Work will be of good quality in accordance with generally accepted trade standards and free from material defects not inherent in the quality specified or permitted to be performed or installed. Such warranty excludes any remedy for damage or defect caused by or resulting from abuse, modifications not executed by Subcontractor, errors or deficiencies inherent in the selection of products, methods or procedures specified or permitted by the Subcontract Documents, improper or insufficient maintenance, improper operations, or normal wear and tear under normal usage, or inadequacies caused or aggravated by deficient work or inspections performed by others. This warranty shall be in force for a limited period of one (1) year following the last day when significant construction activities for the affected Work were last performed by us, or one (1) year after substantial completion of the entire Work, whichever occurs first. This warranty shall be in lieu of any other express or implied warranty in respect of the Work. No claim arising from any actual or alleged defects or deficiencies in our Work shall be valid unless (i) we substantially neglect or refuse to address the circumstance(s) giving rise thereto within fourteen (14) days after receipt of written notice from Customer describing the defect or deficiency and requesting correction of same, and (ii) expiration of seven days (7) following our receipt of an additional written notice from Customer stating the claim or other action intended to be taken by Customer. Failure of Contractor or any other party to give such notices to us shall conclusively be deemed a release and waiver of any claim in respect of any actual or alleged defect, deficiency or other inadequacy in our Work.

5. Except as otherwise specifically provided herein, Customer shall make payments for Work based upon monthly invoices for Work rendered and within thirty (30) days following receipt of invoice. Failure to provide written notice objecting to any invoiced charges within ten (10) days following receipt of invoice shall be deemed an acceptance and approval of same. No retainage shall be withheld from any interim or final payment. Past due payments shall bear interest at the rate of two percent (2%) per month. Customer's obligation to make payment shall not be conditioned upon Customer's receipt of payment from any third party.

6. We may cease performing work and terminate further contractual obligations concerning our Work upon (i) any substantial failure of the Customer to perform in accordance with the terms hereof, and/or (ii) nonpayment of amounts remaining unpaid for 10 days or longer after such amounts first become due, and/or (iii) Customer's bankruptcy or actual or threatened insolvency. In such case, we shall be entitled to payment for all Work executed and for all loss and damages pertaining to Work remaining to be performed, including reasonable allowances for overhead and profit.

7. Any controversy or claim arising out of or related to this Proposal or rendering of Work shall, at our sole discretion, be settled by arbitration conducted in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect. Such arbitration, if implemented, shall not impair any mechanics' lien or bond claim rights or similar remedies. We shall not be bound by any award, judgment or other form of decision or adjudication in connection with any claim or dispute in any proceeding in which we are not lawfully joined as a party.

8. In any action, claim or defense asserted by us to enforce any obligation of Customer hereunder, including but not limited to payment obligation(s), we shall be entitled to recover attorney fees and other expenses of arbitration or litigation.

To: Town Council

From: Jim Marino, Town Manager

Meeting Date: May 4, 2026

Subject: Baker Tilly Financial Analysis Services Agreement - Centennial Village Development

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Summary

The town has previously engaged the services of Baker Tilly Advisory Group to conduct a financial analysis of the Ridge Road/Calumet Avenue TIF District. The proposed Centennial Village development was included as a component of the overall analysis. The town has been reviewing a proposal from the developer of Centennial Village, Matt Kimmel, for vacant land at the northeast corner of Calumet Avenue and 45th Street. An analysis that breaks out this development (referred to as Segment II) from Baker Tilly's previous review is needed to adequately understand the financial implications of this development on its own. The findings of this analysis will be used to assist with negotiating a development agreement with the developer.

The financial analysis will include the following:

- Prepare an estimate of real and depreciable personal property assessed value for the proposed development based on investment information provided by the developer.
- Prepare a preliminary tax increment feasibility analysis to estimate the incremental property tax revenues that might be created by the Project and provide an estimate of the amount of bonds such revenues might support and potential incentive value. Discuss bond options and security needed to market bonds, if applicable.
- Review developer-prepared tax increment projections and bonding capacity analysis, and provide written feedback to the Client, if applicable.
- Prepare a financing feasibility analysis based upon a proposed split of tax increment between a developer and the Client, if applicable.
- Prepare a preliminary analysis utilizing both new and existing tax increment considering any outstanding obligations payable from the existing TIF, and additional or leveraged funding such as grants, developer contributions or concessions and other sources of funds, and provide additional incentive options. Research new sources of potential revenue, if applicable.

Baker Tilly's engagement letter includes pricing for five different services. Only one service, Section A in an amount not to exceed $25,000, is necessary at this time. If one or more of the other four services are determined to be needed, Baker Tilly will be engaged separately at the appropriate time. The developer will reimburse the town for the fees charged by Baker Tilly.

Financial Impact

Funding Source: Other Professional Services
Budgeted Amount:
Cost: $25,000

Recommended Council Action
By motion and roll call vote, approve an agreement with Baker Tilly Advisory Group for financial analysis services for an amount not to exceed $25,000.

Attachments:
1. Baker Tilly Centennial Village Development Analysis Agreement

Baker Tilly Advisory Group, LP
9229 Delegates Row
Suite 400
Indianapolis, IN 46240
United States of America

T: +1 (317) 465 1500
F: +1 (317) 465 1550

bakertilly.com

April 27, 2026

Munster Redevelopment Commission
1005 Ridge Road
Munster, IN 46321

RE: Engagement Letter Agreement Related to Services

This letter agreement (the Engagement Letter or Agreement) is to confirm our understanding of the basis upon which Baker Tilly Advisory Group, LP (Baker Tilly) and its affiliates are being engaged by the Munster Redevelopment Commission (the Client) to assist the Client with advisory services.

Scope, Objectives and Approach

It is anticipated that projects undertaken in accordance with this Engagement Letter will be at the request of the Client. The scope of services, additional terms and associated fee for individual engagements will be contained in a Scope Appendix or Appendices to this Engagement Letter. Authorization to provide services will commence upon execution and return of this Engagement Letter and one or more Appendices.

Management's Responsibilities

It is understood that Baker Tilly will serve in an advisory capacity with the Client. The Client is responsible for management decisions and functions, and for designating an individual with suitable skill, knowledge or experience to oversee the services we provide. The Client is responsible for evaluating the adequacy and results of the services performed and accepting responsibility for such services. The Client is responsible for establishing and maintaining internal controls, including monitoring ongoing activities.

The procedures we perform in our engagement will be heavily influenced by the representations that we receive from Client personnel. Accordingly, false representations could cause material errors to go undetected. The Client, therefore, agrees that Baker Tilly will have no liability in connection with claims based upon our failure to detect material errors resulting from false representations made to us by any Client personnel and our failure to provide an acceptable level of service due to those false representations.

The ability to provide service according to timelines established and at fees indicated will rely in part on receiving timely responses from the Client. The Client will provide information and responses to deliverables within the timeframes established in a Scope Appendix unless subsequently agreed otherwise in writing.

The responsibility for auditing the records of the Client rests with the Client's separately retained auditor and the work performed by Baker Tilly shall not include an audit or review of the records or the expression of an opinion on financial data.

Ownership of Intellectual Property

Unless otherwise stated in a specific Scope Appendix, subject to Baker Tilly's rights in Baker Tilly's Knowledge (as defined below), Client shall own all intellectual property rights in the deliverables developed under the applicable Scope Appendix or Appendices (Deliverables). Notwithstanding the foregoing, Baker Tilly will maintain all ownership right, title and interest to all Baker Tilly's Knowledge. For purposes of this Agreement "Baker Tilly's Knowledge" means Baker Tilly's proprietary programs, modules, products, inventions, designs, data, or other information, including all copyright, patent, trademark and other intellectual property rights related thereto, that are (1) owned or developed by Baker Tilly prior to the Effective Date of this Agreement or the applicable Scope Appendix or Appendices (Baker Tilly's Preexisting Knowledge) (2) developed or obtained by Baker Tilly after the Effective Date, that are reusable from client to client and project to project, where Client has not paid for such development; and (3) extensions, enhancements, or modifications of Baker Tilly's Preexisting Knowledge which do not include or incorporate Client's confidential information. To the extent that any Baker Tilly Knowledge is incorporated into the Deliverables, Baker Tilly grants to Client a non-exclusive, paid up, perpetual royalty-free worldwide license to use such Baker Tilly Knowledge in connection with the Deliverables, and for no other purpose without the prior written consent of Baker Tilly. Additionally, Baker Tilly may maintain copies of its work papers for a period of time and for use in a manner sufficient to satisfy any applicable legal or regulatory requirements for records retention.

The supporting documentation for this engagement, including, but not limited to work papers, is the property of Baker Tilly and constitutes confidential information. We may have a responsibility to retain the documentation for a period of time sufficient to satisfy any applicable legal or regulatory requirements for records retention. If we are required by law, regulation or professional standards to make certain documentation available to required third parties, the Client hereby authorizes us to do so.

Timing and Fees

Specific services will commence upon execution and return of a Scope Appendix to this Engagement Letter and our professional fees will be based on the rates outlined in such Scope Appendix.

Unless otherwise stated, in addition to the fees described in a Scope Appendix the Client will pay all of Baker Tilly's reasonable out-of-pocket expenses incurred in connection with the engagement. All out of pocket costs will be passed through at cost and will be in addition to the professional fee.

Dispute Resolution

Except for disputes related to confidentiality or intellectual property rights, all disputes and controversies between the parties hereto of every kind and nature arising out of or in connection with this Engagement Letter or the applicable Scope Appendix or Appendices as to the existence, construction, validity, interpretation or meaning, performance, nonperformance, enforcement, operation, breach, continuation, or termination of this Agreement or the applicable Scope Appendix or Appendices as shall be resolved as set forth in this section using the following procedure: In the unlikely event that differences concerning the services or fees provided by Baker Tilly should arise that are not resolved by mutual agreement, both parties agree to attempt in good faith to settle the dispute by engaging in mediation administered by the American Arbitration Association under its mediation rules for professional accounting and related services disputes before resorting to litigation or any other dispute resolution procedure. Each party shall bear their own expenses from mediation and the fees and expenses of the mediator shall be shared equally by the parties. If the dispute is not resolved by mediation, then the parties agree to expressly waive trial by jury in any judicial proceeding involving directly or indirectly, any matter (whether sounding in tort, contract, or otherwise) in any way arising out of, related to, or connected with this Agreement or the applicable Scope Appendix or Appendices as or the relationship of the parties established hereunder.

Because a breach of any of the provisions of this Engagement Letter or the applicable Scope Appendix or Appendices as concerning confidentiality or intellectual property rights will irreparably harm the non-breaching party, Client and Baker Tilly agree that if a party breaches any of its obligations thereunder, the non-breaching party shall, without limiting its other rights or remedies, be entitled to seek equitable relief (including, but not limited to, injunctive relief) to enforce its rights thereunder, including without limitation protection of its proprietary rights. The parties agree that the parties need not invoke the mediation procedures set forth in this section in order to seek injunctive or declaratory relief.

Limitation on Damages

To the extent allowed under applicable law, the aggregate liability (including attorney's fees and all other costs) of either party and its present or former partners, principals, agents or employees to the other party related to the services performed under an applicable Scope Appendix or Appendices shall not exceed the fees paid to Baker Tilly under the applicable Scope Appendix or Appendices to which the claim relates, except to the extent finally determined to have resulted from the gross negligence, willful misconduct or fraudulent behavior of the at-fault party. Additionally, in no event shall either party be liable for any lost profits, lost business opportunity, lost data, consequential, special, incidental, exemplary or punitive damages, delays or interruptions arising out of or related to this Engagement Letter or the applicable Scope Appendix or Appendices even if the other party has been advised of the possibility of such damages.

Each party recognizes and agrees that the warranty disclaimers and liability and remedy limitations in this Engagement Letter are material bargained for bases of this Engagement Letter and that they have been taken into account and reflected in determining the consideration to be given by each party under this Engagement Letter and in the decision by each party to enter into this Engagement Letter.

The terms of this section shall apply regardless of the nature of any claim asserted (including, but not limited to, contract, tort or any form of negligence, whether of you, Baker Tilly or others), but these terms shall not apply to the extent finally determined to be contrary to the applicable law or regulation. These terms shall also continue to apply after any termination of this Engagement Letter.

You accept and acknowledge that any legal proceedings arising from or in conjunction with the services provided under this Engagement Letter must be commenced within twelve (12) months after the performance of the services for which the action is brought, without consideration as to the time of discovery of any claim.

Other Matters

E-Verify Program
Baker Tilly participates in the E-Verify program. For the purpose of this paragraph, the E-Verify program means the electronic verification of the work authorization program of the Illegal Immigration Reform and Immigration Responsibility Act of 1996 (P.L. 104-208), Division C, Title IV, s.401(a), as amended, operated by the United States Department of Homeland Security or a successor work authorization program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work authorization status of newly hired employees under the Immigration Reform and Control Act of 1986 (P.L. 99-603). Baker Tilly does not employ any "unauthorized aliens" as that term is defined in 8 U.S.C. 1324a(h)(3).

Investments
Baker Tilly certifies that pursuant to Indiana Code 5-22-16.5 *et seq*. Baker Tilly is not now engaged in investment activities in Iran. Baker Tilly understands that providing a false certification could result in the fines, penalties, and civil action listed in I.C. 5-22-16.5-14.

Non-Discrimination
Pursuant to Indiana Code §22-9-1-10, Baker Tilly and its subcontractors, if any, shall not discriminate against any employee or applicant for employment to be employed in the performance of this Engagement Letter, with respect to hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment, because of race, religion, color, sex, disability, national origin, ancestry, or veteran status. Breach of this covenant may be regarded as a material breach of this Engagement Letter.

Baker Tilly certifies that, except for de minimis and non-systematic violations, it has not violated the terms of I.C. 24-4.7, I.C. 24-5-12, or I.C. 24-5-14 in the previous three hundred sixty-five (365) days, even if I.C. 24-4.7 is preempted by federal law, and that Baker Tilly will not violate the terms of I.C. 24-4.7 for the duration of the Engagement Letter, even if I.C. 24-4.7 is preempted by federal law. Baker Tilly further certifies that any affiliate or principal of Baker Tilly and any agent acting on behalf of Baker Tilly or on behalf of any affiliate or principal of Baker Tilly, except for de minimis and non-systematic violations, has not violated the terms of I.C. 24-4.7 in the previous three hundred sixty-five (365) days, even if I.C. 24-4.7 is preempted by federal law, and will not violate the terms of I.C. 24-4.7 for the duration of the Engagement Letter, even if I.C. 24-4.7 is preempted by federal law.

Anti-Nepotism
Baker Tilly is aware of the provisions under IC 36-1-21 et seq. with respect to anti-nepotism in contractual relationships with governmental entities. The Firm is not aware of any relative (as defined in IC 36-1-21-3) of any elected official (as defined in IC 36-1-21-2) of the Client who is an owner or an employee of the Firm.

In the event Baker Tilly is requested by the Client; or required by government regulation, subpoena, or other legal process to produce our engagement working papers or its personnel as witnesses with respect to its Services rendered for the Client, so long as Baker Tilly is not a party to the proceeding in which the information is sought, Client will reimburse Baker Tilly for its professional time and expenses, as well as the fees and legal expenses incurred in responding to such a request.

Neither this Agreement, any Engagement Letter, any claims nor any rights or licenses granted hereunder may be assigned, delegated or subcontracted by Client without the written consent of Baker Tilly. Baker

Tilly may assign and transfer this Agreement and any Letter to any successor that acquires all or substantially all of the business or assets of Baker Tilly by way of merger, consolidation, other business reorganization, or the sale of interests or assets.

In the event that any provision of this Engagement Letter or statement of work contained in a Scope Appendix hereto is held by a court of competent jurisdiction to be unenforceable because it is invalid or in conflict with any law of any relevant jurisdiction, the validity of the remaining provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Engagement Letter or statement of work did not contain the particular provisions held to be unenforceable. The unenforceable provisions shall be replaced by mutually acceptable provisions which, being valid, legal and enforceable, come closest to the intention of the parties underlying the invalid or unenforceable provision. If the services should become subject to the independence rules of the U.S. Securities and Exchange Commission with respect to Client, such that any provision of this Engagement Letter would impair Baker Tilly's independence under its rules, such provision(s) shall be of no effect.

Termination

Both the Client and Baker Tilly have the right to terminate this Engagement Letter, or any work being done under an individual Scope Appendix at any time after reasonable advance written notice. On termination, all fees and charges incurred prior to termination shall be paid promptly. Unless otherwise agreed to by the Client and Baker Tilly, the scope of services provided in a Scope Appendix will terminate 60 days after completion of the services in such Appendix.

Important Disclosures

Incorporated as Attachment A and part of this Engagement Letter are important disclosures. These include disclosures that apply generally and those that are applicable in the event Baker Tilly is engaged to provide municipal advisory services.

This Engagement Letter, including the attached Disclosures as updated from time to time, comprises the complete and exclusive statement of the agreement between the parties, superseding all proposals, oral or written, and all other communications between the parties. Both parties acknowledge that work performed pursuant to the Engagement Letter will be done through Scope Appendices executed and made a part of this document.

Any rights and duties of the parties that by their nature extend beyond the expiration or termination of this Engagement Letter shall survive the expiration or termination of this Engagement Letter or any statement of work contained in a Scope Appendix hereto.

If this Engagement Letter is acceptable, please sign below and return one copy to us for our files.

Sincerely,

BAKER TILLY ADVISORY GROUP, LP



Matthew R. Eckerle, Principal

Signature Section:

The terms as set forth in this Engagement Letter are agreed to on behalf of the Client by:

Name: _____

Title: _____

Date: _____

Attachment A
Important Disclosures

Non-Exclusive Services

Client acknowledges and agrees that Baker Tilly and its affiliates, including but not limited to Baker Tilly US, LLP, Baker Tilly Advisory Group, LP, Baker Tilly Municipal Advisors, LLC, Baker Tilly Capital, LLC, and Baker Tilly Wealth Management, LLC, is free to render services to the Client or others and that Baker Tilly does not make its services available exclusively to the Client.

Affiliated Entities

Baker Tilly US, LLP and Baker Tilly Advisory Group, LP (BTAG) and its subsidiary entities provide professional services through an alternative practice structure in accordance with the AICPA Code of Professional Conduct and applicable laws, regulations and professional standards. Baker Tilly US, LLP is a licensed independent CPA firm that provides attest services to clients. BTAG and its subsidiary entities provide tax and business advisory services to their clients. BTAG, and its subsidiary entities are not licensed CPA firms. BTAG and its subsidiaries and Baker Tilly US, LLC are independent members of Baker Tilly International. Baker Tilly International Limited is an English company. Baker Tilly International provides no professional services to clients. Each member firm is a separate and independent legal entity, and each describes itself as such. BTAG, Baker Tilly US, LLP, nor any other member firms of Baker Tilly International has any liability for each other’s acts or omissions. The name Baker Tilly and its associated logo is used under licensed with Baker Tilly International Limited.

Baker Tilly Wealth Management, LLC (BTWM), a U.S. Securities and Exchange Commission (SEC) registered investment adviser, controlled by BTAG. BTWM may provide services to the Client in connection with the investment of proceeds from an issuance of securities through Baker Tilly Investment Services, a Division of BTWM. In such instances, services will be provided under a separate engagement, for an additional fee. Notwithstanding the foregoing, Baker Tilly may act as solicitor for and recommend the use of BTWM, but the Client shall be under no obligation to retain BTWM or to otherwise utilize BTWM relative to Client's investments. The fees paid with respect to investment services are typically based in part on the size of the issuance proceeds and Baker Tilly may have incentive to recommend larger financings than would be in the Client's best interest. Baker Tilly will manage and mitigate this potential conflict of interest by this disclosure of the affiliated entity's relationship, a Solicitation Disclosure Statement when Client retains BTWM's services and adherence to fiduciary duty and/or fair dealing obligations to the Client.

Baker Tilly Capital, LLC (BTC) is a limited-service broker-dealer, controlled by BTAG, specializing in merger and acquisition, capital sourcing, project finance and corporate finance advisory services. BTC does not participate in any municipal offerings advised on by its affiliate Baker Tilly Municipal Advisors. Any services provided to Client by BTC would be done so under a separate engagement for an additional fee.

Baker Tilly Municipal Advisors (BTMA), controlled by BTAG, is a registered municipal advisor pursuant to Section 15B of the Securities Exchange Act, as amended and the rules and regulations adopted by the Municipal Securities Rulemaking Board (MSRB). As such, BTMA may provide certain specific municipal advisory services to the Client. BTMA is neither a placement agent to the Client nor a broker/dealer. The offer and sale of any bonds is made by the Client in the sole discretion of the Client, and under its control and supervision. The Client acknowledges that BTMA does not undertake to sell or attempt to sell bonds or other debt obligations and will not take part in the offer or sale thereof.

Moss Adams Wealth Advisors, LLC (MAWA), controlled by BTAG, is an SEC registered investment adviser. MAWA provides portfolio management, financial planning and retirement consulting services to its clients. Baker Tilly may provide services to the Client in connection with human resources consulting, including, but not limited to, executive recruitment, talent management and community survey services. In such instances, services will be provided under a separate scope of work for an additional fee. Certain executives of the Client may have been hired after the services of Baker Tilly were utilized and may make decisions about whether to engage other services of Baker Tilly or its affiliates. Notwithstanding the foregoing, Baker Tilly may recommend the use of Baker Tilly or a subsidiary, but the Client shall be under no obligation to retain Baker Tilly or an affiliate or to otherwise utilize either relative to the Client's activities.

Conflict Disclosure Applicable to Municipal Advisory Services Provided by BTMA

Legal or Disciplinary Disclosure. BTMA is required to disclose to the SEC information regarding criminal actions, regulatory actions, investigations, terminations, judgments, liens, civil judicial actions, customer complaints, arbitrations and civil litigation involving BTMA. Pursuant to MSRB Rule G-42, BTMA is required to disclose any legal or disciplinary event that is material to the Client's evaluation of BTMA or the integrity of its management or advisory personnel.

There are no criminal actions, regulatory actions, investigations, terminations, judgments, liens, civil judicial actions, customer complaints, arbitrations or civil litigation involving BTMA. Copies of BTMA filings with the SEC can currently be found by accessing the SEC's EDGAR system Company Search Page which is currently available at https://www.sec.gov/edgar/searchedgar/companysearch.html and searching for either Baker Tilly Municipal Advisors, LLC or for our CIK number which is 0001616995. The MSRB has made available on its website (www.msrb.org) a municipal advisory client brochure that describes the protections that may be provided by MSRB rules and how to file a complaint with the appropriate regulatory authority.

Contingent Fee. The fees to be paid by the Client to BTMA are or may be based on the size of the transaction and partially contingent on the successful closing of the transaction. Although this form of compensation may be customary in the municipal securities market, it presents a conflict because BTMA may have an incentive to recommend unnecessary financings, larger financings or financings that are disadvantageous to the Client. For example, when facts or circumstances arise that could cause a financing or other transaction to be delayed or fail to close, BTMA may have an incentive to discourage a full consideration of such facts and circumstances, or to discourage consideration of alternatives that may result in the cancellation of the financing or other transaction.

Hourly Fee Arrangements. Under an hourly fee form of compensation, BTMA will be paid an amount equal to the number of hours worked multiplied by an agreed upon billing rate. This form of compensation presents a potential conflict of interest if BTMA and the Client do not agree on a maximum fee under the applicable Appendix to this Engagement Letter because BTMA will not have a financial incentive to recommend alternatives that would result in fewer hours worked. In addition, hourly fees are typically payable by the Client whether or not the financing transaction closes.

Fixed Fee Arrangements. The fees to be paid by the Client to BTMA may be in a fixed amount established at the outset of the service. The amount is usually based upon an analysis by the Client and BTMA of, among other things, the expected duration and complexity of the transaction and the work documented in the Scope Appendix to be performed by Baker Tilly. This form of compensation presents a potential conflict of interest because, if the transaction requires more work than originally contemplated, Baker Tilly may suffer a loss.

Thus, Baker Tilly may recommend less time-consuming alternatives or fail to do a thorough analysis of alternatives.

BTMA manages and mitigates conflicts related to fees and/or other services provided primarily through clarity in the fee to be charged and scope of work to be undertaken and by adherence to MSRB Rules including, but not limited to, the fiduciary duty which it owes to the Client requiring BTMA to put the interests of the Client ahead of its own and BTMA's duty to deal fairly with all persons in its municipal advisory activities.

To the extent any additional material conflicts of interest have been identified specific to a scope of work the conflict will be identified in the respective Scope Appendix. Material conflicts of interest that arise after the date of a Scope Appendix will be provided to the Client in writing at that time.

SCOPE APPENDIX to
Engagement Letter dated: April 27, 2026
Between Munster Redevelopment Commission, and
Baker Tilly Advisory Group, LP

RE: Project Evaluation and Feasibility Analysis, Debt Issuance, TIF Creation, TIF Amendment – Centennial Village Segment II

DATE: April 27, 2026

This Scope Appendix is attached by reference to the above-named engagement letter (the Engagement Letter) between Munster Redevelopment Commission (the Client) and Baker Tilly Advisory Group, LP (Baker Tilly) and relates to services to be provided by Baker Tilly Municipal Advisors, LLC (BTMA).

SCOPE OF WORK

BTMA agrees to furnish and perform the following services for the Client.

A. Project Evaluation and Feasibility

1. In connection with a proposed economic development project or prospect (the Project), discuss with Client (or Client representative) the proposed Project; potential incentives and/or related infrastructure needs; the use of tax increment financing (TIF), tax abatement and other sources of revenue and funding; preliminary financing options and feasibility analyses; timing and investment information needed for analysis; other issues and considerations.
2. Prepare an estimate of real and depreciable personal property assessed value for the proposed development based on investment information provided by the company, the developer or its representatives. Prepare schedules of real and depreciable personal property tax abatement reductions, if applicable.
3. Prepare a preliminary tax increment feasibility analysis to estimate the incremental property tax revenues that might be created by the Project and provide an estimate of the amount of bonds such revenues might support and potential incentive value. Discuss bond options and security needed to market bonds if applicable.
4. Review developer-prepared tax increment projections and bonding capacity analysis, and provide written feedback to the Client, if applicable.
5. Prepare financing feasibility analysis based upon a proposed split of tax increment between a developer and the Client, if applicable.
6. Prepare a preliminary analysis utilizing both new and existing tax increment considering any outstanding obligations payable from the existing TIF, and additional or leveraged funding such as grants, developer contributions or concessions and other sources of funds, and provide additional incentive options. Research new sources of potential revenue, if applicable.
7. Discuss preliminary financing feasibility with Client and company representatives and advisors. Attend meetings and participate in conference calls as requested.
8. If requested by the Client, prepare additional financing feasibility analyses and options as discussions and negotiations evolve.

B. General Municipal Advisory Services (If Necessary)

Unless otherwise agreed to by the parties, in connection with any request for services relative to any financial topic, new project concept planning or other financially related topic or project (each referred to herein as a Project), BTMA shall perform the following services, as applicable:

1. Provide general financial advice relative to a Project.
2. Survey the resources available to determine the financial feasibility of a Project.

3. Assist in the development of a plan including alternative approaches for a particular Project that may be available and appropriate for such Project.
4. Assist the Client in selecting an approach for a Project.
5. Advise the Client generally on current market conditions, financial impacts of federal, state or other laws, and other general information and economic data that might be relevant to a Project.
6. Assist Client, as requested, in identifying other professional services that may be necessary to a Project.
7. Assist Client in coordinating the activities of the working group for a Project as needed.
8. Assist with the review of documents provided that are relevant to the development of a plan and alternative approaches for a Project.
9. Assist the Client with other components of a Project as requested and agreed upon.

C. Securities Issuance (If Necessary)

Unless otherwise agreed to by the parties, in connection with any request for services relative to any debt issuance including modifying or refunding of a prior issuance or other financings (each referred to herein as a Transaction), BTMA shall perform the following services, as applicable:

1. Develop a preliminary estimate of project costs and provide a financial feasibility to assist the Client in its determination of what type of financing is most suitable to meet the needs of the Client for the issuance (the Debt Obligation).
2. Assist the Client in determining an appropriate method of sale for the Debt Obligation (e.g., competitive, negotiated, private placement.)
3. Provide for the Client's consideration an amount, the security, maturity structure, call provisions, estimated pricing, and other terms and conditions of the Debt Obligation.
4. Advise the Client on current market conditions, financial impacts of federal, state, or other laws, and other general information and economic data that might normally be expected to influence the ability to borrow or interest rates of the Debt Obligation.
5. Assist the Client in the analysis of advisability of securing a credit rating, and the selection of a credit rating firm or firms for the Debt Obligation and further assist in the development and presentation of information to obtain a credit rating or credit ratings for the Debt Obligation.
6. Assist the Client in the analysis of utilizing credit enhancement and aid in seeking such credit enhancement if such credit enhancements would be advantageous to the Client.
7. Assist Client in coordinating the financing activities between various parties to any Transaction as needed.
8. Assist Client in identifying other professional services that may be necessary for the issuance or post -issuance requirements of the Debt Obligation.
9. Assist the Client in connection with the preparation, composition, review, and distribution of an offering document (e.g., Preliminary and Final Official Statement, Offering Circular, Term Sheet, or Private Placement Memorandum, as applicable) of the type and nature generally prepared in connection with the sale of municipal securities, which will disclose technical data, information and schedules relating to the Client, the project, and the Debt Obligation.
10. Provide relevant information for and assist with the review of other primary financing documents, including but not limited to the relevant governing body issuance resolutions/ordinances, bond purchase agreement, and official notice of sale.

11. Communicate with potential underwriters or investors, as appropriate to any Transaction, to ensure that each is furnished with information the Client has deemed to be material to render an independent, informed purchase or investment decision concerning the Client's proposed financing.
12. Facilitate the sale of Debt Obligations through receipt and analysis of bids in a competitive sale or analysis of pricing and terms offered by an underwriter or purchaser in a negotiated or private placement sale.
13. Coordinate with the proper parties to ensure the efficient delivery of the Debt Obligations to the applicable purchaser and receipt of proceeds.

D. Assist with the Creation of New Tax Increment Finance (TIF) Area (If Necessary)

1. Work with the Client and its advisors to analyze the boundaries of the proposed TIF Area and potential assessed value impacts of proposed new construction/demolition projects within the proposed TIF Area.
2. Assist in preparation of 1% Test certification for the Department of Local Government, if applicable.
3. Provide information required by the Client’s attorney for preparing resolutions and other legal documents required to establish the proposed TIF Area, if needed.
4. Prepare, on behalf of the Client, an analysis and a statement disclosing the impact of the proposed TIF Area upon the overlapping taxing units (the Impact Statement) and facilitate the delivery of the Impact Statement to the overlapping taxing units.
5. Meet with representatives of the overlapping taxing units to discuss questions, comments or concerns related to the creation of the proposed TIF Area, as needed.
6. At the request of the Client, attend meetings and required public hearings to explain the impact of the creation of the proposed TIF Area and to address any questions.

E. Assist with the Amendment or Expansion of an Existing Tax Increment Finance (TIF) Area

1. Work with the Client and its advisors to analyze the boundaries of the existing and amended TIF Area and potential assessed value impacts of proposed new construction/demolition projects within the amended TIF Area.
2. Provide information required by the Client’s attorney for preparing resolutions and other legal documents required to amend or expand the TIF Area, if needed.
3. Prepare, on behalf of the Client, an analysis and a statement disclosing the impact of the amended TIF Area upon the overlapping taxing units (the Impact Statement) and facilitate the delivery of the Impact Statement to the overlapping taxing units.
4. Meet with representatives of the overlapping taxing units to discuss questions, comments or concerns related to the amendment or expansion of the TIF Area, as needed.
5. At the request of the Client, attend meetings and required public hearings to explain the impact of the amendment or expansion of the TIF Area and to address any questions.

COMPENSATION AND INVOICING

For services as set forth in the scope sections above fees shall be:

Scope Section(s)	Fee	Not to Exceed
A	Time and Expense*	$25,000
B, C	$50,000 (assuming a private placement)	
D, E	Time and Expense	

Standard Hourly Rates by Job Classification
1/1/2026

Title	Hourly Rate
Principals / Directors	$510 - $705
Managers / Senior Managers	$330 - $480
Consultants / Analysts / Senior Consultants	$210 - $320
Support / Paraprofessionals / Interns	$120 - $230

**Billing rates are subject to change periodically due to changing requirements and economic conditions. The Client will be notified thirty (30) days in advance of any change to fees. If Client does not dispute such change in fees within that thirty (30) day period, Client will be deemed to have accepted such change. The fees billed will be the fees in place at the time services are provided. Actual fees will be based upon experience of the staff assigned and the complexity of the engagement.*

The above fees shall include all expenses incurred by Baker Tilly except for direct, project-related expenses such as travel costs and charges of other entities such as rating agencies, bond and official statement printers, couriers, newspapers, bond insurance companies, bond counsel and local counsel, and electronic bidding services, including Parity®.

Technology Fee: In addition to our professional fees, our invoices will include a 5% fee for software, technology, and data security specifically related to the issuance of municipal securities.

BILLING PROCEDURES

Normally, you will receive a monthly statement showing fees and costs incurred in the prior month. Occasionally, we may bill on a less frequent basis if the time involved in the prior month was minimal or if other arrangements are made. The account balance is due and payable on receipt of the statement.

Nonattest Services

As part of this engagement, we will perform certain nonattest services. For purposes of the Engagement Letter and this Scope Appendix, nonattest services include services that the *Government Auditing Standards* refers to as nonaudit services.

We will not perform any management functions or make management decisions on your behalf with respect to any nonattest services we provide.

In connection with our performance of any nonattest services, you agree that you will:

- Continue to make all management decisions and perform all management functions, including approving all journal entries and general ledger classifications when they are submitted to you.
- Designate an employee with suitable skill, knowledge, and/or experience, preferably within senior management, to oversee the services we perform.
- Evaluate the adequacy and results of the nonattest services we perform.
- Accept responsibility for the results of our nonattest services.
- Establish and maintain internal controls, including monitoring ongoing activities related to the nonattest function.

Conflicts of Interest

Attachment A to the Engagement Letter contains important disclosure information that is applicable to this Scope Appendix.

We are unaware of any additional conflicts of interest related to this Scope Appendix that exist at this time.

Termination

This Scope Appendix will terminate according to the terms of the Engagement Letter.

If this Scope Appendix is acceptable, please sign below and return one copy to us for our files. We look forward to working with you on this important project.

Sincerely,

BAKER TILLY ADVISORY GROUP, LP



Matthew R. Eckerle, Principal

Signature Section:

The services and terms as set forth in this Scope Appendix are agreed to on behalf of the Client by:

Name: _____

Title: _____

Date: _____

To: Town Council

From: Jim Marino, Town Manager

Meeting Date: May 4, 2026

Subject: Reimbursement Agreement for Centennial Village Development Financial Services

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Summary

The town has previously engaged the services of Baker Tilly Advisory Group to conduct a financial analysis of the Ridge Road/Calumet Avenue TIF District. The proposed Centennial Village development was included as a component of the overall analysis. The town has been reviewing a proposal from the developer of Centennial Village, Matt Kimmel, for vacant land at the northeast corner of Calumet Avenue and 45th Street. An analysis that breaks out this development (referred to as Segment II) from Baker Tilly's previous review is needed to adequately understand the financial implications of this development on its own. The findings of this analysis will be used to assist with negotiating a development agreement with the developer. The developer has agreed to reimburse the Town for the cost of the analysis. The developer signed the attached reimbursement agreement that requires Town Council approval.

Financial Impact

Funding Source: N/A
Budgeted Amount:
Cost:

Recommended Council Action

By motion and roll call vote, approve a reimbursement agreement between the Town of Munster and Centennial Village, LLC for an amount not to exceed $25,000.

Attachments:

1. Reimbursement Agreement
2. Baker Tilly Centennial Village Development Analysis Agreement

REIMBURSEMENT AGREEMENT

This Agreement made this 4th day of May 2026 between the Town of Munster **("Town")** and Centennial Village, LLC (**"Developer"**) for the reimbursement of fees and expenses to the Town under a proposed agreement between the Town and Baker Tilly for a financial analysis for Segment III of the Centennial Village development project in Munster, Indiana (the **"Project")**

RECITALS:

1. Developer is the owner of approximately 6.5 acres of land located within a Tax Increment Financing District (TIF District) in the Town of Munster.
2. The Developer is proposing to construct four buildings that includes a grocery store, a bank, a medical use and a building for a tenant to be determined.
3. The Developer is requesting TIF District and other financial incentives from the Town.
4. The Town solicited a proposal from Baker Tilly Advisory Group (Baker Tilly) for a financial analysis of the developer's Project which is attached as **Exhibit "A"** and includes an estimated not-to-exceed cost of $25,000.
5. The Town has asked the Developer to confirm that he shall be responsible for the reimbursement to the Town of the cost of the financial analysis and the Developer is agreeable to such reimbursement as set forth herein.

NOW THEREFORE, the parties to this Agreement agree as follows:

1. The Developer agrees to reimburse the Town for the financial analysis as follows:
    a. The $25,000 shall be billed as a not-to-exceed amount.
    b. Any request for reimbursement to the Town from the Developer shall be due and payable within 30 days of such request.
    c. In the event that the Developer pauses the financial analysis and then proceeds with a materially different development plan, Baker Tilly shall provide a proposed change order to reflect the additional costs of such change.

IN WITNESS THEREOF, the Parties have executed this Agreement on the date first mentioned above.

By: _____ _____

Joseph Hofferth, Town Council President — Date

Town of Munster ("Town")

By: _____ 4/30/26

Matt Kimmel — Date

Centennial Village, LLC

Baker Tilly Advisory Group, LP
9229 Delegates Row
Suite 400
Indianapolis, IN 46240
United States of America

T: +1 (317) 465 1500
F: +1 (317) 465 1550

bakertilly.com

April 27, 2026

Munster Redevelopment Commission
1005 Ridge Road
Munster, IN 46321

RE: Engagement Letter Agreement Related to Services

This letter agreement (the Engagement Letter or Agreement) is to confirm our understanding of the basis upon which Baker Tilly Advisory Group, LP (Baker Tilly) and its affiliates are being engaged by the Munster Redevelopment Commission (the Client) to assist the Client with advisory services.

Scope, Objectives and Approach

It is anticipated that projects undertaken in accordance with this Engagement Letter will be at the request of the Client. The scope of services, additional terms and associated fee for individual engagements will be contained in a Scope Appendix or Appendices to this Engagement Letter. Authorization to provide services will commence upon execution and return of this Engagement Letter and one or more Appendices.

Management's Responsibilities

It is understood that Baker Tilly will serve in an advisory capacity with the Client. The Client is responsible for management decisions and functions, and for designating an individual with suitable skill, knowledge or experience to oversee the services we provide. The Client is responsible for evaluating the adequacy and results of the services performed and accepting responsibility for such services. The Client is responsible for establishing and maintaining internal controls, including monitoring ongoing activities.

The procedures we perform in our engagement will be heavily influenced by the representations that we receive from Client personnel. Accordingly, false representations could cause material errors to go undetected. The Client, therefore, agrees that Baker Tilly will have no liability in connection with claims based upon our failure to detect material errors resulting from false representations made to us by any Client personnel and our failure to provide an acceptable level of service due to those false representations.

The ability to provide service according to timelines established and at fees indicated will rely in part on receiving timely responses from the Client. The Client will provide information and responses to deliverables within the timeframes established in a Scope Appendix unless subsequently agreed otherwise in writing.

The responsibility for auditing the records of the Client rests with the Client's separately retained auditor and the work performed by Baker Tilly shall not include an audit or review of the records or the expression of an opinion on financial data.

Ownership of Intellectual Property

Unless otherwise stated in a specific Scope Appendix, subject to Baker Tilly's rights in Baker Tilly's Knowledge (as defined below), Client shall own all intellectual property rights in the deliverables developed under the applicable Scope Appendix or Appendices (Deliverables). Notwithstanding the foregoing, Baker Tilly will maintain all ownership right, title and interest to all Baker Tilly's Knowledge. For purposes of this Agreement "Baker Tilly's Knowledge" means Baker Tilly's proprietary programs, modules, products, inventions, designs, data, or other information, including all copyright, patent, trademark and other intellectual property rights related thereto, that are (1) owned or developed by Baker Tilly prior to the Effective Date of this Agreement or the applicable Scope Appendix or Appendices (Baker Tilly's Preexisting Knowledge) (2) developed or obtained by Baker Tilly after the Effective Date, that are reusable from client to client and project to project, where Client has not paid for such development; and (3) extensions, enhancements, or modifications of Baker Tilly's Preexisting Knowledge which do not include or incorporate Client's confidential information. To the extent that any Baker Tilly Knowledge is incorporated into the Deliverables, Baker Tilly grants to Client a non-exclusive, paid up, perpetual royalty-free worldwide license to use such Baker Tilly Knowledge in connection with the Deliverables, and for no other purpose without the prior written consent of Baker Tilly. Additionally, Baker Tilly may maintain copies of its work papers for a period of time and for use in a manner sufficient to satisfy any applicable legal or regulatory requirements for records retention.

The supporting documentation for this engagement, including, but not limited to work papers, is the property of Baker Tilly and constitutes confidential information. We may have a responsibility to retain the documentation for a period of time sufficient to satisfy any applicable legal or regulatory requirements for records retention. If we are required by law, regulation or professional standards to make certain documentation available to required third parties, the Client hereby authorizes us to do so.

Timing and Fees

Specific services will commence upon execution and return of a Scope Appendix to this Engagement Letter and our professional fees will be based on the rates outlined in such Scope Appendix.

Unless otherwise stated, in addition to the fees described in a Scope Appendix the Client will pay all of Baker Tilly's reasonable out-of-pocket expenses incurred in connection with the engagement. All out of pocket costs will be passed through at cost and will be in addition to the professional fee.

Dispute Resolution

Except for disputes related to confidentiality or intellectual property rights, all disputes and controversies between the parties hereto of every kind and nature arising out of or in connection with this Engagement Letter or the applicable Scope Appendix or Appendices as to the existence, construction, validity, interpretation or meaning, performance, nonperformance, enforcement, operation, breach, continuation, or termination of this Agreement or the applicable Scope Appendix or Appendices as shall be resolved as set forth in this section using the following procedure: In the unlikely event that differences concerning the services or fees provided by Baker Tilly should arise that are not resolved by mutual agreement, both parties agree to attempt in good faith to settle the dispute by engaging in mediation administered by the American Arbitration Association under its mediation rules for professional accounting and related services disputes before resorting to litigation or any other dispute resolution procedure. Each party shall bear their own expenses from mediation and the fees and expenses of the mediator shall be shared equally by the parties. If the dispute is not resolved by mediation, then the parties agree to expressly waive trial by jury in any judicial proceeding involving directly or indirectly, any matter (whether sounding in tort, contract, or otherwise) in any way arising out of, related to, or connected with this Agreement or the applicable Scope Appendix or Appendices as or the relationship of the parties established hereunder.

Because a breach of any of the provisions of this Engagement Letter or the applicable Scope Appendix or Appendices as concerning confidentiality or intellectual property rights will irreparably harm the non-breaching party, Client and Baker Tilly agree that if a party breaches any of its obligations thereunder, the non-breaching party shall, without limiting its other rights or remedies, be entitled to seek equitable relief (including, but not limited to, injunctive relief) to enforce its rights thereunder, including without limitation protection of its proprietary rights. The parties agree that the parties need not invoke the mediation procedures set forth in this section in order to seek injunctive or declaratory relief.

Limitation on Damages

To the extent allowed under applicable law, the aggregate liability (including attorney's fees and all other costs) of either party and its present or former partners, principals, agents or employees to the other party related to the services performed under an applicable Scope Appendix or Appendices shall not exceed the fees paid to Baker Tilly under the applicable Scope Appendix or Appendices to which the claim relates, except to the extent finally determined to have resulted from the gross negligence, willful misconduct or fraudulent behavior of the at-fault party. Additionally, in no event shall either party be liable for any lost profits, lost business opportunity, lost data, consequential, special, incidental, exemplary or punitive damages, delays or interruptions arising out of or related to this Engagement Letter or the applicable Scope Appendix or Appendices even if the other party has been advised of the possibility of such damages.

Each party recognizes and agrees that the warranty disclaimers and liability and remedy limitations in this Engagement Letter are material bargained for bases of this Engagement Letter and that they have been taken into account and reflected in determining the consideration to be given by each party under this Engagement Letter and in the decision by each party to enter into this Engagement Letter.

The terms of this section shall apply regardless of the nature of any claim asserted (including, but not limited to, contract, tort or any form of negligence, whether of you, Baker Tilly or others), but these terms shall not apply to the extent finally determined to be contrary to the applicable law or regulation. These terms shall also continue to apply after any termination of this Engagement Letter.

You accept and acknowledge that any legal proceedings arising from or in conjunction with the services provided under this Engagement Letter must be commenced within twelve (12) months after the performance of the services for which the action is brought, without consideration as to the time of discovery of any claim.

Other Matters

E-Verify Program
Baker Tilly participates in the E-Verify program. For the purpose of this paragraph, the E-Verify program means the electronic verification of the work authorization program of the Illegal Immigration Reform and Immigration Responsibility Act of 1996 (P.L. 104-208), Division C, Title IV, s.401(a), as amended, operated by the United States Department of Homeland Security or a successor work authorization program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work authorization status of newly hired employees under the Immigration Reform and Control Act of 1986 (P.L. 99-603). Baker Tilly does not employ any "unauthorized aliens" as that term is defined in 8 U.S.C. 1324a(h)(3).

Investments
Baker Tilly certifies that pursuant to Indiana Code 5-22-16.5 *et seq*. Baker Tilly is not now engaged in investment activities in Iran. Baker Tilly understands that providing a false certification could result in the fines, penalties, and civil action listed in I.C. 5-22-16.5-14.

Non-Discrimination
Pursuant to Indiana Code §22-9-1-10, Baker Tilly and its subcontractors, if any, shall not discriminate against any employee or applicant for employment to be employed in the performance of this Engagement Letter, with respect to hire, tenure, terms, conditions or privileges of employment or any matter directly or indirectly related to employment, because of race, religion, color, sex, disability, national origin, ancestry, or veteran status. Breach of this covenant may be regarded as a material breach of this Engagement Letter.

Baker Tilly certifies that, except for de minimis and non-systematic violations, it has not violated the terms of I.C. 24-4.7, I.C. 24-5-12, or I.C. 24-5-14 in the previous three hundred sixty-five (365) days, even if I.C. 24-4.7 is preempted by federal law, and that Baker Tilly will not violate the terms of I.C. 24-4.7 for the duration of the Engagement Letter, even if I.C. 24-4.7 is preempted by federal law. Baker Tilly further certifies that any affiliate or principal of Baker Tilly and any agent acting on behalf of Baker Tilly or on behalf of any affiliate or principal of Baker Tilly, except for de minimis and non-systematic violations, has not violated the terms of I.C. 24-4.7 in the previous three hundred sixty-five (365) days, even if I.C. 24-4.7 is preempted by federal law, and will not violate the terms of I.C. 24-4.7 for the duration of the Engagement Letter, even if I.C. 24-4.7 is preempted by federal law.

Anti-Nepotism
Baker Tilly is aware of the provisions under IC 36-1-21 et seq. with respect to anti-nepotism in contractual relationships with governmental entities. The Firm is not aware of any relative (as defined in IC 36-1-21-3) of any elected official (as defined in IC 36-1-21-2) of the Client who is an owner or an employee of the Firm.

In the event Baker Tilly is requested by the Client; or required by government regulation, subpoena, or other legal process to produce our engagement working papers or its personnel as witnesses with respect to its Services rendered for the Client, so long as Baker Tilly is not a party to the proceeding in which the information is sought, Client will reimburse Baker Tilly for its professional time and expenses, as well as the fees and legal expenses incurred in responding to such a request.

Neither this Agreement, any Engagement Letter, any claims nor any rights or licenses granted hereunder may be assigned, delegated or subcontracted by Client without the written consent of Baker Tilly. Baker

Tilly may assign and transfer this Agreement and any Letter to any successor that acquires all or substantially all of the business or assets of Baker Tilly by way of merger, consolidation, other business reorganization, or the sale of interests or assets.

In the event that any provision of this Engagement Letter or statement of work contained in a Scope Appendix hereto is held by a court of competent jurisdiction to be unenforceable because it is invalid or in conflict with any law of any relevant jurisdiction, the validity of the remaining provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Engagement Letter or statement of work did not contain the particular provisions held to be unenforceable. The unenforceable provisions shall be replaced by mutually acceptable provisions which, being valid, legal and enforceable, come closest to the intention of the parties underlying the invalid or unenforceable provision. If the services should become subject to the independence rules of the U.S. Securities and Exchange Commission with respect to Client, such that any provision of this Engagement Letter would impair Baker Tilly's independence under its rules, such provision(s) shall be of no effect.

Termination

Both the Client and Baker Tilly have the right to terminate this Engagement Letter, or any work being done under an individual Scope Appendix at any time after reasonable advance written notice. On termination, all fees and charges incurred prior to termination shall be paid promptly. Unless otherwise agreed to by the Client and Baker Tilly, the scope of services provided in a Scope Appendix will terminate 60 days after completion of the services in such Appendix.

Important Disclosures

Incorporated as Attachment A and part of this Engagement Letter are important disclosures. These include disclosures that apply generally and those that are applicable in the event Baker Tilly is engaged to provide municipal advisory services.

This Engagement Letter, including the attached Disclosures as updated from time to time, comprises the complete and exclusive statement of the agreement between the parties, superseding all proposals, oral or written, and all other communications between the parties. Both parties acknowledge that work performed pursuant to the Engagement Letter will be done through Scope Appendices executed and made a part of this document.

Any rights and duties of the parties that by their nature extend beyond the expiration or termination of this Engagement Letter shall survive the expiration or termination of this Engagement Letter or any statement of work contained in a Scope Appendix hereto.

If this Engagement Letter is acceptable, please sign below and return one copy to us for our files.

Sincerely,

BAKER TILLY ADVISORY GROUP, LP



Matthew R. Eckerle, Principal

Signature Section:

The terms as set forth in this Engagement Letter are agreed to on behalf of the Client by:

Name: _____

Title: _____

Date: _____

Attachment A
Important Disclosures

Non-Exclusive Services

Client acknowledges and agrees that Baker Tilly and its affiliates, including but not limited to Baker Tilly US, LLP, Baker Tilly Advisory Group, LP, Baker Tilly Municipal Advisors, LLC, Baker Tilly Capital, LLC, and Baker Tilly Wealth Management, LLC, is free to render services to the Client or others and that Baker Tilly does not make its services available exclusively to the Client.

Affiliated Entities

Baker Tilly US, LLP and Baker Tilly Advisory Group, LP (BTAG) and its subsidiary entities provide professional services through an alternative practice structure in accordance with the AICPA Code of Professional Conduct and applicable laws, regulations and professional standards. Baker Tilly US, LLP is a licensed independent CPA firm that provides attest services to clients. BTAG and its subsidiary entities provide tax and business advisory services to their clients. BTAG, and its subsidiary entities are not licensed CPA firms. BTAG and its subsidiaries and Baker Tilly US, LLC are independent members of Baker Tilly International. Baker Tilly International Limited is an English company. Baker Tilly International provides no professional services to clients. Each member firm is a separate and independent legal entity, and each describes itself as such. BTAG, Baker Tilly US, LLP, nor any other member firms of Baker Tilly International has any liability for each other’s acts or omissions. The name Baker Tilly and its associated logo is used under licensed with Baker Tilly International Limited.

Baker Tilly Wealth Management, LLC (BTWM), a U.S. Securities and Exchange Commission (SEC) registered investment adviser, controlled by BTAG. BTWM may provide services to the Client in connection with the investment of proceeds from an issuance of securities through Baker Tilly Investment Services, a Division of BTWM. In such instances, services will be provided under a separate engagement, for an additional fee. Notwithstanding the foregoing, Baker Tilly may act as solicitor for and recommend the use of BTWM, but the Client shall be under no obligation to retain BTWM or to otherwise utilize BTWM relative to Client's investments. The fees paid with respect to investment services are typically based in part on the size of the issuance proceeds and Baker Tilly may have incentive to recommend larger financings than would be in the Client's best interest. Baker Tilly will manage and mitigate this potential conflict of interest by this disclosure of the affiliated entity's relationship, a Solicitation Disclosure Statement when Client retains BTWM's services and adherence to fiduciary duty and/or fair dealing obligations to the Client.

Baker Tilly Capital, LLC (BTC) is a limited-service broker-dealer, controlled by BTAG, specializing in merger and acquisition, capital sourcing, project finance and corporate finance advisory services. BTC does not participate in any municipal offerings advised on by its affiliate Baker Tilly Municipal Advisors. Any services provided to Client by BTC would be done so under a separate engagement for an additional fee.

Baker Tilly Municipal Advisors (BTMA), controlled by BTAG, is a registered municipal advisor pursuant to Section 15B of the Securities Exchange Act, as amended and the rules and regulations adopted by the Municipal Securities Rulemaking Board (MSRB). As such, BTMA may provide certain specific municipal advisory services to the Client. BTMA is neither a placement agent to the Client nor a broker/dealer. The offer and sale of any bonds is made by the Client in the sole discretion of the Client, and under its control and supervision. The Client acknowledges that BTMA does not undertake to sell or attempt to sell bonds or other debt obligations and will not take part in the offer or sale thereof.

Moss Adams Wealth Advisors, LLC (MAWA), controlled by BTAG, is an SEC registered investment adviser. MAWA provides portfolio management, financial planning and retirement consulting services to its clients. Baker Tilly may provide services to the Client in connection with human resources consulting, including, but not limited to, executive recruitment, talent management and community survey services. In such instances, services will be provided under a separate scope of work for an additional fee. Certain executives of the Client may have been hired after the services of Baker Tilly were utilized and may make decisions about whether to engage other services of Baker Tilly or its affiliates. Notwithstanding the foregoing, Baker Tilly may recommend the use of Baker Tilly or a subsidiary, but the Client shall be under no obligation to retain Baker Tilly or an affiliate or to otherwise utilize either relative to the Client's activities.

Conflict Disclosure Applicable to Municipal Advisory Services Provided by BTMA

Legal or Disciplinary Disclosure. BTMA is required to disclose to the SEC information regarding criminal actions, regulatory actions, investigations, terminations, judgments, liens, civil judicial actions, customer complaints, arbitrations and civil litigation involving BTMA. Pursuant to MSRB Rule G-42, BTMA is required to disclose any legal or disciplinary event that is material to the Client's evaluation of BTMA or the integrity of its management or advisory personnel.

There are no criminal actions, regulatory actions, investigations, terminations, judgments, liens, civil judicial actions, customer complaints, arbitrations or civil litigation involving BTMA. Copies of BTMA filings with the SEC can currently be found by accessing the SEC's EDGAR system Company Search Page which is currently available at https://www.sec.gov/edgar/searchedgar/companysearch.html and searching for either Baker Tilly Municipal Advisors, LLC or for our CIK number which is 0001616995. The MSRB has made available on its website (www.msrb.org) a municipal advisory client brochure that describes the protections that may be provided by MSRB rules and how to file a complaint with the appropriate regulatory authority.

Contingent Fee. The fees to be paid by the Client to BTMA are or may be based on the size of the transaction and partially contingent on the successful closing of the transaction. Although this form of compensation may be customary in the municipal securities market, it presents a conflict because BTMA may have an incentive to recommend unnecessary financings, larger financings or financings that are disadvantageous to the Client. For example, when facts or circumstances arise that could cause a financing or other transaction to be delayed or fail to close, BTMA may have an incentive to discourage a full consideration of such facts and circumstances, or to discourage consideration of alternatives that may result in the cancellation of the financing or other transaction.

Hourly Fee Arrangements. Under an hourly fee form of compensation, BTMA will be paid an amount equal to the number of hours worked multiplied by an agreed upon billing rate. This form of compensation presents a potential conflict of interest if BTMA and the Client do not agree on a maximum fee under the applicable Appendix to this Engagement Letter because BTMA will not have a financial incentive to recommend alternatives that would result in fewer hours worked. In addition, hourly fees are typically payable by the Client whether or not the financing transaction closes.

Fixed Fee Arrangements. The fees to be paid by the Client to BTMA may be in a fixed amount established at the outset of the service. The amount is usually based upon an analysis by the Client and BTMA of, among other things, the expected duration and complexity of the transaction and the work documented in the Scope Appendix to be performed by Baker Tilly. This form of compensation presents a potential conflict of interest because, if the transaction requires more work than originally contemplated, Baker Tilly may suffer a loss.

Thus, Baker Tilly may recommend less time-consuming alternatives or fail to do a thorough analysis of alternatives.

BTMA manages and mitigates conflicts related to fees and/or other services provided primarily through clarity in the fee to be charged and scope of work to be undertaken and by adherence to MSRB Rules including, but not limited to, the fiduciary duty which it owes to the Client requiring BTMA to put the interests of the Client ahead of its own and BTMA's duty to deal fairly with all persons in its municipal advisory activities.

To the extent any additional material conflicts of interest have been identified specific to a scope of work the conflict will be identified in the respective Scope Appendix. Material conflicts of interest that arise after the date of a Scope Appendix will be provided to the Client in writing at that time.

RE: Project Evaluation and Feasibility Analysis, Debt Issuance, TIF Creation, TIF Amendment – Centennial Village Segment II

DATE: April 27, 2026

This Scope Appendix is attached by reference to the above-named engagement letter (the Engagement Letter) between Munster Redevelopment Commission (the Client) and Baker Tilly Advisory Group, LP (Baker Tilly) and relates to services to be provided by Baker Tilly Municipal Advisors, LLC (BTMA).

SCOPE OF WORK

BTMA agrees to furnish and perform the following services for the Client.

A. Project Evaluation and Feasibility

1. In connection with a proposed economic development project or prospect (the Project), discuss with Client (or Client representative) the proposed Project; potential incentives and/or related infrastructure needs; the use of tax increment financing (TIF), tax abatement and other sources of revenue and funding; preliminary financing options and feasibility analyses; timing and investment information needed for analysis; other issues and considerations.
2. Prepare an estimate of real and depreciable personal property assessed value for the proposed development based on investment information provided by the company, the developer or its representatives. Prepare schedules of real and depreciable personal property tax abatement reductions, if applicable.
3. Prepare a preliminary tax increment feasibility analysis to estimate the incremental property tax revenues that might be created by the Project and provide an estimate of the amount of bonds such revenues might support and potential incentive value. Discuss bond options and security needed to market bonds if applicable.
4. Review developer-prepared tax increment projections and bonding capacity analysis, and provide written feedback to the Client, if applicable.
5. Prepare financing feasibility analysis based upon a proposed split of tax increment between a developer and the Client, if applicable.
6. Prepare a preliminary analysis utilizing both new and existing tax increment considering any outstanding obligations payable from the existing TIF, and additional or leveraged funding such as grants, developer contributions or concessions and other sources of funds, and provide additional incentive options. Research new sources of potential revenue, if applicable.
7. Discuss preliminary financing feasibility with Client and company representatives and advisors. Attend meetings and participate in conference calls as requested.
8. If requested by the Client, prepare additional financing feasibility analyses and options as discussions and negotiations evolve.

B. General Municipal Advisory Services (If Necessary)

Unless otherwise agreed to by the parties, in connection with any request for services relative to any financial topic, new project concept planning or other financially related topic or project (each referred to herein as a Project), BTMA shall perform the following services, as applicable:

1. Provide general financial advice relative to a Project.
2. Survey the resources available to determine the financial feasibility of a Project.

3. Assist in the development of a plan including alternative approaches for a particular Project that may be available and appropriate for such Project.
4. Assist the Client in selecting an approach for a Project.
5. Advise the Client generally on current market conditions, financial impacts of federal, state or other laws, and other general information and economic data that might be relevant to a Project.
6. Assist Client, as requested, in identifying other professional services that may be necessary to a Project.
7. Assist Client in coordinating the activities of the working group for a Project as needed.
8. Assist with the review of documents provided that are relevant to the development of a plan and alternative approaches for a Project.
9. Assist the Client with other components of a Project as requested and agreed upon.

C. Securities Issuance (If Necessary)

Unless otherwise agreed to by the parties, in connection with any request for services relative to any debt issuance including modifying or refunding of a prior issuance or other financings (each referred to herein as a Transaction), BTMA shall perform the following services, as applicable:

1. Develop a preliminary estimate of project costs and provide a financial feasibility to assist the Client in its determination of what type of financing is most suitable to meet the needs of the Client for the issuance (the Debt Obligation).
2. Assist the Client in determining an appropriate method of sale for the Debt Obligation (e.g., competitive, negotiated, private placement.)
3. Provide for the Client's consideration an amount, the security, maturity structure, call provisions, estimated pricing, and other terms and conditions of the Debt Obligation.
4. Advise the Client on current market conditions, financial impacts of federal, state, or other laws, and other general information and economic data that might normally be expected to influence the ability to borrow or interest rates of the Debt Obligation.
5. Assist the Client in the analysis of advisability of securing a credit rating, and the selection of a credit rating firm or firms for the Debt Obligation and further assist in the development and presentation of information to obtain a credit rating or credit ratings for the Debt Obligation.
6. Assist the Client in the analysis of utilizing credit enhancement and aid in seeking such credit enhancement if such credit enhancements would be advantageous to the Client.
7. Assist Client in coordinating the financing activities between various parties to any Transaction as needed.
8. Assist Client in identifying other professional services that may be necessary for the issuance or post -issuance requirements of the Debt Obligation.
9. Assist the Client in connection with the preparation, composition, review, and distribution of an offering document (e.g., Preliminary and Final Official Statement, Offering Circular, Term Sheet, or Private Placement Memorandum, as applicable) of the type and nature generally prepared in connection with the sale of municipal securities, which will disclose technical data, information and schedules relating to the Client, the project, and the Debt Obligation.
10. Provide relevant information for and assist with the review of other primary financing documents, including but not limited to the relevant governing body issuance resolutions/ordinances, bond purchase agreement, and official notice of sale.

11. Communicate with potential underwriters or investors, as appropriate to any Transaction, to ensure that each is furnished with information the Client has deemed to be material to render an independent, informed purchase or investment decision concerning the Client's proposed financing.
12. Facilitate the sale of Debt Obligations through receipt and analysis of bids in a competitive sale or analysis of pricing and terms offered by an underwriter or purchaser in a negotiated or private placement sale.
13. Coordinate with the proper parties to ensure the efficient delivery of the Debt Obligations to the applicable purchaser and receipt of proceeds.

D. Assist with the Creation of New Tax Increment Finance (TIF) Area (If Necessary)

1. Work with the Client and its advisors to analyze the boundaries of the proposed TIF Area and potential assessed value impacts of proposed new construction/demolition projects within the proposed TIF Area.
2. Assist in preparation of 1% Test certification for the Department of Local Government, if applicable.
3. Provide information required by the Client’s attorney for preparing resolutions and other legal documents required to establish the proposed TIF Area, if needed.
4. Prepare, on behalf of the Client, an analysis and a statement disclosing the impact of the proposed TIF Area upon the overlapping taxing units (the Impact Statement) and facilitate the delivery of the Impact Statement to the overlapping taxing units.
5. Meet with representatives of the overlapping taxing units to discuss questions, comments or concerns related to the creation of the proposed TIF Area, as needed.
6. At the request of the Client, attend meetings and required public hearings to explain the impact of the creation of the proposed TIF Area and to address any questions.

E. Assist with the Amendment or Expansion of an Existing Tax Increment Finance (TIF) Area

1. Work with the Client and its advisors to analyze the boundaries of the existing and amended TIF Area and potential assessed value impacts of proposed new construction/demolition projects within the amended TIF Area.
2. Provide information required by the Client’s attorney for preparing resolutions and other legal documents required to amend or expand the TIF Area, if needed.
3. Prepare, on behalf of the Client, an analysis and a statement disclosing the impact of the amended TIF Area upon the overlapping taxing units (the Impact Statement) and facilitate the delivery of the Impact Statement to the overlapping taxing units.
4. Meet with representatives of the overlapping taxing units to discuss questions, comments or concerns related to the amendment or expansion of the TIF Area, as needed.
5. At the request of the Client, attend meetings and required public hearings to explain the impact of the amendment or expansion of the TIF Area and to address any questions.

COMPENSATION AND INVOICING

For services as set forth in the scope sections above fees shall be:

Scope Section(s)	Fee	Not to Exceed
A	Time and Expense*	$25,000
B, C	$50,000 (assuming a private placement)	
D, E	Time and Expense	

Standard Hourly Rates by Job Classification
1/1/2026

Title	Hourly Rate
Principals / Directors	$510 - $705
Managers / Senior Managers	$330 - $480
Consultants / Analysts / Senior Consultants	$210 - $320
Support / Paraprofessionals / Interns	$120 - $230

**Billing rates are subject to change periodically due to changing requirements and economic conditions. The Client will be notified thirty (30) days in advance of any change to fees. If Client does not dispute such change in fees within that thirty (30) day period, Client will be deemed to have accepted such change. The fees billed will be the fees in place at the time services are provided. Actual fees will be based upon experience of the staff assigned and the complexity of the engagement.*

The above fees shall include all expenses incurred by Baker Tilly except for direct, project-related expenses such as travel costs and charges of other entities such as rating agencies, bond and official statement printers, couriers, newspapers, bond insurance companies, bond counsel and local counsel, and electronic bidding services, including Parity®.

Technology Fee: In addition to our professional fees, our invoices will include a 5% fee for software, technology, and data security specifically related to the issuance of municipal securities.

BILLING PROCEDURES

Normally, you will receive a monthly statement showing fees and costs incurred in the prior month. Occasionally, we may bill on a less frequent basis if the time involved in the prior month was minimal or if other arrangements are made. The account balance is due and payable on receipt of the statement.

Nonattest Services

As part of this engagement, we will perform certain nonattest services. For purposes of the Engagement Letter and this Scope Appendix, nonattest services include services that the *Government Auditing Standards* refers to as nonaudit services.

We will not perform any management functions or make management decisions on your behalf with respect to any nonattest services we provide.

In connection with our performance of any nonattest services, you agree that you will:

- Continue to make all management decisions and perform all management functions, including approving all journal entries and general ledger classifications when they are submitted to you.
- Designate an employee with suitable skill, knowledge, and/or experience, preferably within senior management, to oversee the services we perform.
- Evaluate the adequacy and results of the nonattest services we perform.
- Accept responsibility for the results of our nonattest services.
- Establish and maintain internal controls, including monitoring ongoing activities related to the nonattest function.

Conflicts of Interest

Attachment A to the Engagement Letter contains important disclosure information that is applicable to this Scope Appendix.

We are unaware of any additional conflicts of interest related to this Scope Appendix that exist at this time.

Termination

This Scope Appendix will terminate according to the terms of the Engagement Letter.

If this Scope Appendix is acceptable, please sign below and return one copy to us for our files. We look forward to working with you on this important project.

Sincerely,

BAKER TILLY ADVISORY GROUP, LP



Matthew R. Eckerle, Principal

Signature Section:

The services and terms as set forth in this Scope Appendix are agreed to on behalf of the Client by:

Name: _____

Title: _____

Date: _____

To: Town Council

From: Jim Marino, Town Manager

Meeting Date: May 4, 2026

Subject: Baker Tilly Financial Analysis Services Agreement - Kenmara Development

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Summary

On August 18, 2025, the Town Council approved an agreement with Baker Tilly Advisory Group to perform an economic impact study for a certified technology park proposed by Gary Warfel of Saxon Partners. The agreement was for an amount not to exceed $25,000. The analysis was put on hold until an agreement was reached with the developer to reimburse the town for the cost of Baker Tilly's analysis. The three-party reimbursement agreement between the Town, Saxon Partners and Baker Tilly is now ready for Council approval.

After approval of the agreement with Baker Tilly in August last year, it was discovered that the total cost for their analysis is $50,000, not $25,000 as was originally approved. Therefore, the agreement with Baker Tilly needs to be approved again at an amount not to exceed $50,000.

Financial Impact

Funding Source: Other Professional Services
Budgeted Amount:
Cost: Not to Exceed $50,000

Recommended Council Action

By motion and roll call vote, approve an agreement with Baker Tilly Advisory Group for financial analysis services for an amount not to exceed $50,000.

Attachments:

1. Baker Tilly Kenmara Development Analysis Agreement

RE: Project Evaluation and Feasibility Analysis

DATE: August 5, 2025

This Scope Appendix is attached by reference to the above-named engagement letter (the Engagement Letter) between the Munster Redevelopment Commission, Indiana (the Client) and Baker Tilly Advisory Group, LP (Baker Tilly) and relates to services to be provided by Baker Tilly Municipal Advisors, LLC (BTMA).

SCOPE OF WORK

BTMA agrees to furnish and perform the following services.

A. Project Evaluation and Feasibility

1. In connection with a proposed economic development project or prospect (the Project), discuss with Client (or Client representative) the proposed Project; potential incentives and/or related infrastructure needs; the use of tax increment financing (TIF), tax abatement and other sources of revenue and funding; preliminary financing options and feasibility analyses; timing and investment information needed for analysis; other issues and considerations.
2. Prepare an estimate of real and depreciable personal property assessed value for the proposed development based on investment information provided by the company, the developer or its representatives. Prepare schedules of real and depreciable personal property tax abatement reductions, if applicable.
3. Prepare a preliminary tax increment feasibility analysis to estimate the incremental property tax revenues that might be created by the Project and provide an estimate of the amount of bonds such revenues might support and potential incentive value. Discuss bond options and security needed to market bonds if applicable.
4. Review developer-prepared tax increment projections and bonding capacity analysis, and provide written feedback to the Client, if applicable.
5. Prepare financing feasibility analysis based upon a proposed split of tax increment between a developer and the Client, if applicable.
6. Prepare a preliminary analysis utilizing both new and existing tax increment considering any outstanding obligations payable from the existing TIF, and additional or leveraged funding such as grants, developer contributions or concessions and other sources of funds, and provide additional incentive options. Research new sources of potential revenue, if applicable.
7. Discuss preliminary financing feasibility with Client and company representatives and advisors. Attend meetings and participate in conference calls as requested.
8. If requested by the Client, prepare additional financing feasibility analyses and options as discussions and negotiations evolve.

BTAG agrees to furnish and perform the following services.

B. Economic Analysis

1. Baker Tilly employs a mixed-methods approach in applied economic analysis that leverages our experience in development advisory, real estate deal structuring and underwriting, municipal finance, and industry cluster analysis. Our analysis methodologies are designed to deliver market insights that assist clients in understanding the economic impacts of their assets' performance. By developing a holistic perspective across our diverse specialties, we are able to analyze the direct, indirect, and induced impacts of projects across multiple geographies.

2. The economic potential and alternatives analysis of the project's development scenarios will be further supported with Baker Tilly's extensive access to public and proprietary datasets. Our integrated data ecosystem allows our team to access key details about industry cluster performance, real estate markets, and commercial business activity across communities to understand local economic drivers and the potential for future investment. Our data sources help build a comprehensive perspective about market dynamics related to trends in labor, land, and capital in a given market, with sources including: ESRI Business Analyst, PolicyMap, Placer.ai, CoStar, GreenStreet, IBISWorld, Lightcast, and IMPLAN.

   Project Objective:

   > To work across Baker Tilly's multi-disciplinary team to evaluate the project's development scenarios with market-driven insights to understand the economic benefits of given alternatives – including job creation, economic productivity, and tax revenues – and the dynamics of local residential and commercial real estate markets to contextualize potential impacts.

   Task 1: Economic Benefit Analysis of Development Scenarios

   Our economic benefit analysis balances qualitative and quantitative considerations to model project impacts to relevant municipal jurisdictions and assess the alignment of community priorities with the modeling results. Our methods will forecast the various tax revenues that will be generated, localized spending, and potential jobs that will be created, utilizing data-driven best practices and impact modeling in IMPLAN and Lightcast.

   a) Conduct cost segmentation of the project's pro forma to appropriate allocate the project's capital expenditures into IMPLAN's cost specifications based on the project's delivery schedule.

   b) Build time series analysis of the project's delivery schedule to quantify impacts in inflation-adjusted dollars to appropriately account for changes in the time value of construction costs versus operational impacts.

   c) Build geography exclusion into the economic event modeling to appropriately account for inter-regional business activity and leakages through multi-regional input-output (MRIO) analysis.

   d) Analyze the impacts of ongoing business operations after project delivery with Lightcast modeling to assess the gross revenue spending and job creation of tenants.

   Proposed budget for Task 1: $10,000

   Task 2: Market Verification of Development Scenarios & Delivery Schedule

   To frame project impacts within the appropriate economic context, we will develop a market perspective that assesses conditions within the project's micro-market, surrounding submarkets, and metro environment. Our team will verify and provide additional context into neighborhood, citywide, and regional factors that will influence and/or enhance the development scenarios, including macro-level trends in community growth factors related to residential markets, commercial business activity, and industry clusters.

   a) Analyze residential, visitor, and worker socio-economic profiles to map migration trends, daily commute patterns, and spending potential.
   b) Identify and map core real estate types in the delivery pipeline of the relevant surrounding micro- and submarkets to understand potential new unit volumes and product quality that will enter the market during the project's delivery schedule.
   c) If necessary, conduct a retail gap analysis and Experian Mosaic customer segmentation to assess potential tenanting strategies for mixed-use development scenarios.

   Proposed budget for Task 2: $15,000

Final Deliverable of Analysis Results

- **Comprehensive Report:** A comprehensive report that summarizes the analysis findings in an Executive Summary and includes additional sections that detail construction impacts, operational impacts, relevant market context, and the analysis methodologies used. The comprehensive report can be used as a strong reference and visual aid to discuss the project with stakeholders.

Proposed budget for all services within Task 1, Task 2, and production of the final deliverable: $25,000

COMPENSATION AND INVOICING

Fees for services set forth in the Scope Appendix will be billed at standard billing rates based upon the actual time and expenses incurred and will not exceed Twenty-Five Thousand Dollars ($25,000) each for Scope Items A and B without further authorization from the Client.

Standard Hourly Rates by Job Classification
9/1/2024

Title	Hourly Rate
Principals / Directors	$420 - $660
Managers / Senior Managers	$290 - $440
Consultants / Analysts / Senior Consultants	$185 - $300
Support / Paraprofessionals / Interns	$115 - $195

**Billing rates are subject to change periodically due to changing requirements and economic conditions. The Client will be notified of any change to fees. If Client does not dispute such change in fees within thirty (30) days of receiving the notification, Client will be deemed to have accepted such change. The fees billed will be the fees in place at the time services are provided. Actual fees will be based upon experience of the staff assigned and the complexity of the engagement.*

The above fees shall include all expenses incurred except for direct, project-related expenses such as travel costs.

BILLING PROCEDURES

Normally, you will receive a monthly statement showing fees and costs incurred in the prior month. Occasionally, we may bill on a less frequent basis if the time involved in the prior month was minimal or if other arrangements are made. The account balance is due and payable on receipt of the statement.

Nonattest Services

As part of this engagement, we will perform certain nonattest services. For purposes of the Engagement Letter and this Scope Appendix, nonattest services include services that the *Government Auditing Standards* refers to as nonaudit services.

We will not perform any management functions or make management decisions on your behalf with respect to any nonattest services we provide.

In connection with our performance of any nonattest services, you agree that you will:

- Continue to make all management decisions and perform all management functions, including approving all journal entries and general ledger classifications when they are submitted to you.
- Designate an employee with suitable skill, knowledge, and/or experience, preferably within senior management, to oversee the services we perform.
- Evaluate the adequacy and results of the nonattest services we perform.
- Accept responsibility for the results of our nonattest services.
- Establish and maintain internal controls, including monitoring ongoing activities related to the nonattest function.

Conflicts of Interest

Attachment A to the Engagement Letter contains important disclosure information that is applicable to this Scope Appendix.

We are unaware of any additional conflicts of interest related to this Scope Appendix that exist at this time.

Termination

This Scope Appendix will terminate according to the terms of the Engagement Letter.

If this Scope Appendix is acceptable, please sign below and return one copy to us for our files. We look forward to working with you on this important project.

Signature,

BAKER TILLY ADVISORY GROUP, LP





Jolena Presti, Managing Director

Matthew R. Eckerle, Principal

Signature Section:

The services and terms as set forth in this Scope Appendix are agreed to on behalf of the Client by:

Name: _____

Title: _____

Date: _____

To: Town Council

From: Jim Marino, Town Manager

Meeting Date: May 4, 2026

Subject: Reimbursement Agreement for Kenmara Development Financial Services Analysis

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Summary

On August 18, 2025, the Town Council approved an agreement with Baker Tilly Advisory Group to perform an economic impact study for a certified technology park proposed by Gary Warfel of Saxon Partners. The analysis was put on hold until an agreement was reached with the developer to reimburse the town for the cost of Baker Tilly's analysis. The three-party reimbursement agreement between the Town, Saxon Partners and Baker Tilly is now ready for Council approval.

Financial Impact

Funding Source: N/A
Budgeted Amount:
Cost:

Recommended Council Action

By motion and roll call vote, approve a reimbursement agreement between the Town of Munster, SPIN Munster, LLC, and Baker Tilly for an amount not to exceed $50,000.

Attachments:

1. Reimbursement Agreement

REIMBURSEMENT AGREEMENT

This Agreement made this 4th day of May 2026 between the Town of Munster located at 1005 Ridge Road, Munster, Indiana 46321 **("Town")**, SPIN Munster, LLC located at 25 Recreation Park Drive, Suite 204, Hingham, MA 02043 **("Saxon"),** and Baker Tilly located at 9229 Delegates Row, Suite 400, Indianapolis, IN 46240 **("Baker Tilly")** for the reimbursement of fees and expenses to the Town under a proposed agreement between the Town and Baker Tilly for an updated economic impact study (the **"Study"**) for the Kenmara project in Munster, Indiana **(**the **"Project"** or **"Kenmara")**.

RECITALS:

1. Saxon is the owner of approximately 81-acres of land located in the Town of Munster, of which 59-acres (the **"Property")** is being considered for commercial development (the **"Project"**). Prior to 2024, Saxon advanced plans for a commercial mixed-use development on the Property, centered primarily on professional office space consistent with the Property's CD-4.B zoning.
2. In 2023, the Town contracted Baker Tilly to complete an Economic Impact Study for the planned mixed-use development. That study, entitled "*The Economic Impact of Kenmara Project in Munster Indiana*", dated June 2023, projected a 30-year fiscal net benefit to the Town of Munster in the amount of $320 million.
3. Saxon reimbursed the Town for the cost of the Economic Impact Study billed by Baker Tilly in the amount of $25,000 in September 2023.
4. In connection with the proposed mixed use development Project, Saxon and the Town entered into the Phase 1A Development Agreement dated July 17, 2023 to provide for the extension of Fisher Street into the Property. That agreement anticipated Saxon arranging for NIPSCO to deed a a parcel of land to the Town in order to facilitate the Fisher Street extension and that parcel was deeded to the Town in 2025.
5. On November 3rd, 2025, the Town approved Ordinance No. 2001 providing a new PUD zone for the Property which allows for technology uses consistent with Indiana Code IC 36-7-32 for Certified Technology Parks (the "Kenmara Technology Park PUD District"). The Ordinance provides that the associated Standards for Bulk and Design (the "Standards") shall be reviewed and approved by the Town and that an update to the Phase 1A Development Agreement shall be finalized and approved by the Town.
6. The fiscal benefit to the Town from the technology uses are expected to represent a significant improvement from the uses under the prior zoning and the Town solicited a proposal from Baker Tilly for an updated Economic Impact Study which is attached as **Exhibit "A"** and includes an estimated not-to-exceed cost of $50,000 as follows:
    a. $25,000 for Project Evaluation and Feasibility related primarily to potential incentives, tax increment financing (TIF), tax abatement, preliminary feasibility analyses, and other issues.
    b. $25,000 for Economic Benefit Analysis of Development Scenarios, Market Verification, and Delivery Schedule.
7. In order facilitate the updated Economic Impact Study, Saxon will need to provide Baker Tilly with an updated development plan that reflects the scale and nature of the

technology tenants that Saxon believes are likely to be included in the Project and conforms to the Standards approved by the Town.

8. The Town has asked Saxon to confirm that it shall be responsible for the reimbursement to the Town of the cost of the new Economic Impact Study and Saxon is agreeable to such reimbursement as set forth herein.

NOW THEREFORE, the parties to this Agreement agree as follows:

1. Once the Standards for Bulk and Design have been approved by the Town, Saxon shall have its engineers provide an updated development plan to Baker Tilly that is in conformance with the approved Standards and reflects the approved technology uses. Such plan shall include the scale and nature of the tenants that Saxon anticipates for the Project in order to facilitate an appropriate update to the Economic Impact Study.

2. Many of the potential technology tenants for the Project will require Saxon to execute non-disclosure agreements. Saxon and Baker Tilly agree to work together under any such required non-disclosure agreements in preparing the updated Economic Impact Study. Such Study will provide the scale and nature of the proposed technology uses but may explicitly exclude the names of some or all of the potential tenants unless/until such potential tenants agree to waive their non-disclosure requirements.

3. Saxon shall solicit feedback from prospective tenants and shall work with Baker Tilly to ensure that the updated Study reflects the most current expectations for the Project. In the event of a material change in the expected development plan, Saxon shall promptly notify the Town and Baker Tilly and the Study shall be paused until the development plan is updated. All fees and expenses earned by Baker Tilly pursuant to this agreement prior to any such pause shall be reimbursable to the Town by Saxon, but Baker Tilly shall cease further work until Saxon has confirmed an updated development plan for the study.

4. Saxon agrees to reimburse the Town for the new Economic Impact Study as follows:
    a. Each $25,000 phase of the new Economic Impact Study shall be billed as a not-to-exceed amount.
    b. Any request for reimbursement to the Town from Saxon for the progress on the new Economic Impact Study shall be due and payable within 30 days of such request.
    c. In the event that Saxon pauses the Study and then proceeds with a materially different development plan, Baker Tilly shall provide a proposed change order to reflect the additional costs of such change.

[Signature Page Follows]

IN WITNESS THEREOF, the Parties have executed this Agreement on the date first mentioned above.

By: _____

Joseph Hofferth, Town Council President

Town of Munster ("Town")

By: _____

Donald S. Smith, Manager
SPIN Munster, LLC ("Saxon")

By: _____

Matt Eckerle, Principal
Baker Tilly Advisory Group ("Baker Tilly")

EXHIBIT “A”

(See Attached)

To: Town Council

From: Jim Marino, Town Manager

Meeting Date: May 4, 2026

Subject: Executive Recruitment Services

Summary

In light of the open position for the Public Works Director of Operations, it is necessary to initiate the recruitment process to fill this vacancy. The town follows a practice of employing an executive recruitment service for management-level positions. This approach was previously utilized to fill the vacancies for the Director of Operations, Town Manager, and most recently, the Assistant Town Manager roles. CPS HR Consulting was contracted to manage the recruitment for the Assistant Town Manager position. I have requested a proposal from CPS HR Consulting to conduct the recruitment for the Director of Operations position.

Financial Impact

Funding Source: Other Professional Services
Budgeted Amount:
Cost: $25,000

Recommended Council Action

By motion and roll call vote, approve execution of a consulting services agreement with CPS HR Consulting to provide executive recruitment services in the amount of $25,000.

Attachments:

1. CPS HR Consulting Recruitment Services Proposal

CONSULTING SERVICES AGREEMENT

Town of Munster

Executive Recruitment Services for Public Works Director

This Consulting Services Agreement (Agreement) is by and between Cooperative Personnel Services, dba CPS HR Consulting, a California Joint Powers Authority (CPS HR) and the Agency named in the signature block at the end of this Agreement (Agency, hereafter referred to as Client), and is effective as of April 13, 2026 (Effective Date). CPS HR and the Client shall be collectively referred to herein as the "Parties" and individually as a "Party."

A. Purpose. This Agreement defines CPS HR consulting services, policies and procedures.

B. Services. CPS HR will provide certain consulting services (Services) to Client as set forth in the Statements of Work (attached hereto as Exhibit ("A"). CPS HR shall perform only the Services requested by Client, at the times, dates, and locations specified by Client.

C. Compensation.

1. Payment. Client will compensate CPS HR for Services by paying certain fees as set forth in the Statement of Work. If applicable, Client will reimburse CPS HR for business expenses as set forth in the Statement of Work. Payment and collection will be based on Indiana Code 5-17-5, Chapter 5. Prompt Payment.

2. Funding. Client certifies that funding for compensation payable to CPS HR under this Agreement has been approved by Client's governing body, either as a part of the general operating budget or as a specific item. Client further certifies that it anticipates sufficient cash will be available for payment of compensation as required above.

3. Late Payment. Penalty for late payments of amounts due on public contracts will be in accordance with Indiana Code 5-17-5, Chapter 5. Prompt Payment.

D. Taxes. Except as expressly stated in the Statement of Work, the fees listed therein are in addition to, and not in lieu of, any additional fees, assessments, levies, taxes, etc. assessed against the transactions contemplated herein (Taxes). With the exception of Taxes imposed on CPS HR' net income, all Taxes shall be Client's responsibility. Client shall pay any Taxes, which CPS HR may be required to collect and remit, upon invoice.

E. Term and Termination of Agreement.

1. Term. The term of this Agreement is from April 13, 2026 through October 31, 2026.

2. Immediate Termination upon Material Breach. Either Party may terminate this Agreement immediately upon any material breach by the other Party.

3. Termination without Cause. Either Party may terminate the Agreement without cause upon written notice to the other Party.

4. Payment on Termination. Upon termination without cause, Client shall pay CPS HR for all work performed through the effective date of termination. For termination upon material breach, Client shall pay CPS HR for all work performed which is in compliance with the terms of the Statement of Work.

F. Limited Warranty.

1. Warranty. CPS HR represents and warrants that: (i) it has the authority to enter into this Agreement; (ii) it will comply with applicable law; and (iii) it will provide Services in a workmanlike manner consistent with industry standards.

G. Work Product.

1. Ownership. Upon CPS HR' receipt of fees due under the Agreement, all studies, reports, documents and other writings prepared by CPS HR and its subcontractors, produced as a result of CPS HR' work, or delivered by CPS HR to Client in the course of performing services (collectively, "Work Product") shall become the property of Client and Client shall have the right to use the materials without further compensation to CPS HR or its subcontractors.

2. Retention of Rights. Notwithstanding Client's ownership of the Work Product, Client acknowledges and agrees that: (i) CPS HR has the right to re-use any of its know-how, ideas, concepts, methods, processes, or similar information, however characterized, whether in tangible or intangible form, and whether used by CPS HR in the performance of Services or not, at any time and without limitation, and (ii) CPS HR retains ownership of any and all of its intellectual property rights that existed prior to the Effective Date including, but not limited to, all methods, concepts, designs, reports, programs, and templates as well as all training materials, testing or assessment products, survey content and copyrightable works.

H. Release of Information to Third Parties. Each Party understands that information provided to government entities may be subject to disclosure under a public records or freedom of information act. Each Party hereto (each, a Recipient) shall protect and keep confidential all non-public information disclosed to Recipient by the other Party (each, a Discloser) and identified as confidential by Discloser, and shall not, except as may be authorized by Discloser in writing, use or disclose any such Confidential Information during and after the term of this Agreement. If CPS HR or Client receives a request for disclosure of Confidential Materials, such as a subpoena or a public records or freedom of information request, that Party shall immediately notify the other Party of the request. Upon request, Client or CPS HR shall maintain the confidentiality of the Confidential Materials pending the grant or denial of a protective order or the decision of a court or administrative body as to whether the requested materials must be disclosed under the applicable public records statute. Client and CPS HR shall cooperate with each other in seeking any relief necessary to maintain the confidentiality of the Confidential Materials. Each Party shall defend, indemnify and hold the other harmless from any claim or administrative appeal, including costs, expenses, and any attorney fees, related to that Party pursuing protection of the Confidential Materials from disclosure.

I. Indemnification. CPS HR agrees to indemnify, defend, and hold Client, its agents, officers, employees and volunteers harmless from and against loss or damage (including reasonable attorney's fees) arising from or related to a claim of bodily injury or property damage resulting from CPS HR' willful misconduct or negligent performance of this Agreement; provided that, Client notifies CPS HR in a commercially reasonable time, in writing of any such claim and gives CPS HR (at CPS HR' expense) sole control of the defense of same and all negotiations for its settlement or compromise. CPS HR' liability to indemnify Client shall be reduced to the extent that such loss or damage was caused or contributed to by the act, omission, direction or negligence of Client, its agents, officers, employees and volunteers over which CPS HR does not have direct control.

J. Limitation of Liability. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED HEREIN, NEITHER PARTY HERETO SHALL HAVE ANY LIABILITY OR RESPONSIBILITY FOR ANY INDIRECT, INCIDENTAL, EXEMPLARY, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, DAMAGES ARISING FROM LOSS OF PROFITS OR DATA), EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. CPS HR' LIABILITY FOR DAMAGES HEREUNDER SHALL NOT EXCEED THE AMOUNT OF FEES PAID BY CLIENT TO CPS HR.

K. Miscellaneous.

1. Notices. Any notice to the parties required or permitted under this Agreement shall be given in writing and shall be sent to the persons at the address listed in the Statement of Work.

2. Dispute Resolution; Remedies.
(a) In the event of a dispute, the parties may agree to pursue mediation or either binding or nonbinding arbitration to resolve their dispute, under such rules as the parties may agree.

(b) If either CPS HR or Client determines it appropriate to file a judicial action, suit will be filed in Lake County, Indiana.

3. Attorneys Fees. If any legal action or arbitration or other proceeding is brought to enforce or construe the term of this Agreement or because of an alleged dispute, breach or default in connection with any provision of this Agreement, the successful or prevailing Party shall be entitled to recover reasonable attorneys fees and other costs incurred in that action, arbitration or proceeding in addition to any other relief to which it may be entitled.

4. Governing Law. This Agreement will be governed by the laws of the State of Indiana without regard to its rules concerning conflict of laws.

5. Force Majeure. Neither Party shall be liable for delays caused by fire, accident, labor dispute, war, insurrection, riot, act of government, superior force, or any other cause reasonably beyond its control.

6. Retention of Records. CPS HR will retain all data, documents, and records pertaining to this Agreement for four years from the date of Client's final payment; for any further period that is required by law; and until all federal/state audits are complete and exceptions resolved. Upon request, CPS HR will make these records available to authorized representatives of the Client or any government representative through the retention period. At the end of the retention period, per CPS HR's Destruction Policy, CPS HR will destroy all data, documents, and records related to the Services provided under this Agreement.

7. Waiver. The failure of any Party at any time or times to require performance of any provision of this Agreement shall in no manner affect its right to enforce that provision at a later time. Nor shall the waiver by either Party of a breach of any provision of this Agreement be taken or held to be a waiver of the provision itself. No waiver shall be enforceable unless made in writing and signed by the Party granting the waiver.

8. Entire Agreement; Modifications. This Agreement constitutes the entire agreement between the parties regarding the subject matter hereof and supersedes all other agreements, representations and warranties. All modifications and supplements to this Agreement must be in writing and signed by both parties.

9. Counterparts; Facsimile Signature; Electronic Signature. This Agreement may be executed in any number of counterparts. If this Agreement or any counterpart is signed and then faxed or e-mailed by PDF or otherwise, the faxed or -mailed copy bearing the signature shall be as good as the original, wet-ink signed copy for all intents and purposes.

10. Authority to Sign. The person signing this Agreement on behalf of the Client (the Principal Signer) represents that he or she is the head of the agency or is otherwise duly authorized to sign this Agreement and to bind the Client.

11. Ambiguities. As this Agreement has been voluntarily and freely negotiated by both parties, the rule that ambiguous contractual provisions are construed against the drafter of the provision shall be inapplicable to this Agreement.

Cooperative Personnel Services dba
CPS HR Consulting
2450 Del Paso Rd. Ste 220, Sacramento, CA 95834

By: _____
Authorized Signature

Name: _____

Title: _____

Town of Munster
1005 Ridge Road, Munster, IN 46321

By: _____
Authorized Signature

Name: _____

Title: _____

Exhibit A
Statement of Work

All changes to this SOW must be mutually agreed to and executed in writing by duly authorized representatives of both parties as an amendment to this SOW. Capitalized terms used herein shall have the meanings ascribed to them in the Agreement.

1. SERVICES: CPS HR shall assist the Town of Munster with the recruitment of a new Public Works Director as detailed in the following table.

2.

Task	Description
Phase I - Develop Candidate Profile and Recruitment Strategy	
1	Development of Timeline & Workplan
2	Meetings with Hiring Manager/Key Stakeholders
3	Develop Candidate Profile
4	Develop Recruitment Brochure
Phase II – Aggressive, Proactive, and Robust Recruitment	
1	Place Paid Advertising
2	Identify and Contact Potential Candidates
3	Review Application Materials
4	Conduct Screening Interviews
5	Submit Client Report
6	Client Meeting to Select Semifinalists
7	Notify Candidates
Phase III – Selection	
1	Prepare Assessment
2	Schedule Candidates; Coordinate Travel
3	Prepare Evaluation manuals
4	Facilitate Finalist Selection Process
5	Conduct Reference/Background Checks
6	Assist in Negotiation (if requested)

3. CLIENT RESPONSIBILITIES:

   a. Client must timely perform all those Client roles and responsibilities set forth in this SOW. Successful completion of this project within the time specified depends largely upon an effective working relationship between Client and CPS HR project staff. For this reason, CPS HR requests that Client designate an individual to coordinate communication, meetings, interview schedules, and review of products with the project team.

   b. Any work products developed during the activities described above will be submitted to Client's Project Representative for review, comment and/or approval. This is a critical step to ensure accurate, reliable, and valid products.

4. CPS HR PROJECT MANAGER: Pamela Derby pderby@cpshr.us

5. CLIENT PROJECT MANAGER: Jim Marino jmarino@munster.org

6. SERVICE FEES:

   a. All Services provided to Client by CPS HR hereunder are priced on a FIXED PRICE basis. All amounts are based upon the following assumptions. Any deviations from the following assumptions may result in an increase in the Fees: (i) Client will timely perform its responsibilities as set forth in this SOW; and (ii) Services will normally be performed during normal business hours, Monday through Friday, 8:00 a.m. to 5:00 p.m., excluding CPS HR holidays ("Normal Business Hours").

b. Professional Services Fees: The professional fixed fee of $25,000 covers all CPS HR services associated with Phases I, II, and III of the recruitment process.

c. Additional Expenses Not Included: Travel expenses for candidates who are invited forward in the interview process are NOT included. However, should the Client desire CPS HR's Travel Team to assist with these arrangements, CPS HR can provide assistance. Travel expenses will be billed at cost and in addition to the fixed fee amount listed herein. Candidate travel related expenses will not exceed $5,000.

d. Invoices: CPS HR will invoice Client at the fixed fee rate of billed upon completion of each phase per the following schedule:

Phase I: $10,000
Phase II: $10,000
Phase III: $5,000

Optional Candidate Travel Expenses: Invoiced at cost as incurred not more frequently than once a month.

e. Payment: Client will pay CPS HR in accordance with Indiana Code 5-17-5, Chapter 5. Prompt Payment.

f. One-Year Guarantee: If the employment of the candidate selected and appointed by the Client, as a result of a full executive recruitment (Phases I, II, and III), comes to an end before the completion of the first year of service, CPS HR will provide the Client with professional services to appoint a replacement. Professional consulting services will be provided at no cost. The Client would be responsible only for reimbursable expenses. This guarantee does not apply to situations in which the successful candidate is promoted or re-assigned within the organization during the one-year period. Additionally, should the initial recruitment efforts not result in a successful appointment, CPS HR will extend the aggressive recruiting efforts and screen qualified candidates until an offer is made and accepted. CPS HR does not provide a guarantee for candidates placed as a result of a partial recruitment effort.

7. In the event the project is terminated early, CPS HR will be paid such amount as is due for professional services performed and out-of-pocket expenses incurred up to and including the effective date of termination.

8. This SOW covers work requested and performed prior to the commencement of this SOW.