ALLENDALE CHARTER TOWNSHIP
PLANNING COMMISSION MEETING

October 3, 2022
7:00 p.m.
Allendale Township Public Meeting Room

1. Call the Meeting to Order

2. Roll Call

3. Communications and Correspondence:

4. Approval of the September 6, 2022 Planning Commission Minutes

5. Approval of the Agenda

6. Public Comments for *non-public hearing items*

    A. Great Lakes Excavating Service – Industrial Zoning District Processing Inquiry

7. Public Hearings:

8. Site Plan Review:

9. New Business:

10. Old Business:
    A. Marcusse Office Building – 5630 Lake Michigan Drive
    B. Griffioen Special Use Request – 10259 52nd Avenue
        - Farm equipment storage with incidental repair and service
    C. Zoning Ordinance Text Discussion – Section 23.08 – Removal of Topsoil, Sand, Gravel, or Other Materials

11. Public Comments

12. Township Board Reports

13. Commissioner and Staff Comments

14. Adjourn

<u>Next meeting October 17, 2022 at 7:00 p.m.</u>

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ALLENDALE CHARTER TOWNSHIP
PLANNING COMMISSION MEETING

September 6, 2022
7:00 p.m.
Allendale Township Public Meeting Room

1. Call the Meeting to Order
2. Roll Call:
   Present: Longcore, Adams, Westerling, Zuniga, Chapla, Nadda
   Absent: Zeinstra
   Staff and Guests Present: Planner Greg Ransford, Kelly Kuiper, Steve Griffioen
3. Communications and Correspondence:

   Communication was received that the Marcusse Office Building agenda item will be tabled for this meeting.
4. Motion by Chapla to approve of the August 15, 2022, Planning Commission Minutes as presented. Seconded by Nadda. **Approved 6-0**
5. Motion by Longcore to approve the September 6, 2022, Planning Commission Agenda with the change of striking the Marcusse Office Building from the Agenda. Seconded by Adams. **Approved 6-0**
6. Public Comments for *non-public hearing item*:

   Chairperson Longcore opened the public comment section for non-public hearing items. No comments were mad, and Chairperson Longcore closed the public comment section.
7. Public Hearings: None
8. Site Plan Review: None
9. New Business:

   A. 5015 Warner Mining Site – Annual Review

      Kelly Kuiper presented the report noting that there was only one complaint lodged to the Township regarding the condition of the road and that the complaint was resolved. The mining operation is on track to be finished within the permitted time period.

   B. Griffioen Special Use Request – 10259 52nd Avenue

      - Farm equipment storage with incidental repair and service

      Owner of the property, Steve Griffioen, presented the project.

      Planner Ransford reviewed his memo.

      Mr. Westerling asked for clarification on if he would be servicing strictly farm equipment and if it would only be his own or would he seek customers and service their equipment or vehicles. Mr. Griffioen clarified that he would be open to servicing any type of vehicle, not just farm equipment and would seek customers just by word of mouth, but that the repair would not be the primary use.

      Planner Ransford explained that the special use would run with the land. If the property would be sold, the purchaser would be able to operate under the special use if it follows the conditions, or if they would want to change it, they will have to come back to the Planning Commission unless it would be a use by right.

      Mr. Chapla is concerned that the use would turn to be more commercial that what was intended. Commissioners discussed conditions that could be placed on the approval to deter that from happening.

      Chairperson Longcore asked Planner Ransford about the extent of repairs and whether any vehicle could be repaired. Ransford noted that the language limits the incidental repair to the related farm equipment.

It would likely be reasonable for him to repair a truck or other farm related vehicle, but the language is not intended to be a typical vehicle repair shop.

Commissioners discussed the placement of the proposed building and the distance from the road and how that would be allowed under the Zoning Ordinance. They discussed how the rules apply in the Agricultural Zoning District and the Right to Farm Act. Planner Ransford will investigate this issue and ask the Township lawyer for their interpretation.

Commissioners opined that some conditions that could be placed on approval would be:

- No commercial signs.
- Limited parking.
- Barn would stay with the overall property if a split would ever be sought.
- Sidewalk would be deferred until 52nd Ave. is paved.

This project will not be set for public hearing until the interpretation of the ordinance regarding the building placement is received from legal counsel.

C. Zoning Ordinance Text Discussion – Section 23.08 – Removal of Topsoil, Sand, Gravel, or Other Materials

Planner Ransford reviewed his memo regarding the discussion of amending the Zoning Ordinance.

Commissioners discussed options for putting enforcement or penalty language in the approval. They also deliberated what "customary mining operations" means and if any other limitations could be put in place to protect neighbors of these operations.

Commissioners requested Planner Ransford look into what his other townships have, as well as Grand Haven Charter Township, in regard to limitations and if there is anything that Allendale is missing in our ordinance or if we are in line with what other townships have in their ordinances.

10. Old Business: None

11. Public Comments:

Seeing no public present, Chairperson Longcore opened and closed the public comment section.

12. Township Board Reports: None

13. Commissioner and Staff Comments:

Mr. Longcore has a question regarding a car lot selling campers on their lot as he does not believe that is an allowable use.

Mr. Longcore also questioned the signage on True Value and if that was allowed in their approval.

Mr. Zuniga is wondering about the Penski trucks in the McDonalds parking lot.

Mr. Nadda brought up Station 45, the cars parking on the grass and the cars in the back lot.

Planner Ransford will follow up with Steve Kushion regarding these questions.

14. Chairperson Longcore adjourned the meeting at 8:35 p.m.

Next meeting September 19, 2022, at 7:00 p.m.

Minutes respectfully submitted by Kelli McGovern

◊

GREAT LAKES
EXCAVATING
SERVICE

September 21, 2022

Ms. Kelli McGovern
Planning/Zoning Coordinator
Allendale Township
6676 Lake Michigan Drive
PO Box 539
Allendale, MI 49401

RE: Concrete Crushing Principal Use

Dear Ms. McGovern:

I am writing to begin a conversation with the Planning Commission regarding a principal use of concrete crushing in the industrial zoning district. Currently, concrete crushing (or concrete recycling) is only described as being accessory to a mining operation in Section 23.08.F.1.m. However, concrete crushing/recycling can be a principal use without mining activities. Landfill space is valuable and demolition activities create excess material that can still be of value in the West Michigan construction industry. Concrete can be crushed and recycled to become material for road gravel or made to various size specifications for other construction and landscaping uses. This type of use would create a space for concrete from demolition projects to be brought to a site and stockpiled for crushing. Therefore, the primary use of the site would be concrete stockpiling with the actual crushing activities able to be limited further (setbacks, time, etc.).

It is important to note that Section 16.03.K. does provide for "Asphalt, concrete or similar refining and manufacturing" as a special land use in the industrial district, however, Chapter 23 – Standards for Specific Uses, does not list specifications for a proposed application. In addition, Section 16.03.F. provides for "Salvage yards, recycling and composting." However, both of these uses appear to be more intense than a concrete crushing operation. Asphalt manufacturing involves petroleum and emissions, and a permanent salvage or recycle yard could potentially be more visually intrusive than simple concrete piles. Ultimately, these provisions suggests that concrete crushing would be a suitable use in the industrial district, but more appropriate and deliberate standards for the specific use should be considered.

In sum, I would like to determine if the current ordinance allows for this type of use under the umbrella of one of the existing permitted or special land uses listed in the industrial district and if so, what site specifications must the applicant adhere to. Or, if the ordinance can (and should) be amended to include a critical and valuable use for Allendale Township.

If it is determined that the zoning ordinance can and should be amended, I believe it would be helpful to paint a better picture for you of what a concrete crushing operation typically looks like. As mentioned above, demolition activities create excess material. This material is delivered and stockpiled. In fact, the primary use of the site would be stockpiling as the piles would be left to accumulate to a maximum size and height. The ordinance and/or site plan would be able to regulate

these items and provide for appropriate buffers from incompatible zoning districts or uses. Once the stockpiles have reached a point where it is cost effective, a mobile crushing unit would come to the site. Depending on the size of the stockpiles, the mobile crushing unit would be on-site for one (1) to two (2) weeks. This process could happen two (2) to four (4) times a year. Chester Township utilizes some of these types of limitations such as time limits on when crushing can occur including calendar time limits such as between January 1 and June 1 and September 1 and December 30 and length of occurrence at two (2) weeks maximum. It is important to keep in mind that these specifications are still tied to a traditional mining operation, therefore, we believe that Allendale Township can (and should) build on this to reflect a principal use in an industrial district if so desired.

Please do not hesitate to reach out with any questions or if you need additional information. You may reach me at (616) 485-5321 or kelly@team-gles.com.

Sincerely,

Kelly Kuiper

Fresh Coast Planning

950 Taylor Avenue, Ste 200
Grand Haven, MI 49417
www.freshcoastplanning.com

Gregory L. Ransford, MPA
616-638-1240
greg@freshcoastplanning.com

Julie Lovelace
616-914-0922
julie@freshcoastplanning.com

Sara Moring-Hilt
586-850-8784
sara@freshcoastplanning.com

Kevin Yeomans
616-821-4969
kevin@freshcoastplanning.com

MEMORANDUM

To: Allendale Charter Township Planning Commission
From: Kevin Yeomans KLY
Date: September 29, 2022
Re: Marcusse Office Building – 5630 Lake Michigan Drive – Final Review

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As you know, at your August 15, 2022 Planning Commission Meeting you directed the Applicant to make minimal changes to the plan. Additionally, since that meeting it was discovered that the square footage used to calculate parking spaces and the trip generation analysis did not include the second floor of the building. The applicant has worked with staff to remedy this, but it has delayed the engineer's ability to review the trip generation analysis. The updated plans are attached and the items you wished to see addressed have been listed below.

- Trip Generation Analysis: The applicant's engineer provided an updated analysis that resulted in the same findings as the previous analysis, which concluded that a formal Traffic Impact Study is not necessary. The Township's Engineer received the updated trip generation analysis after 5pm on 9/28/2022. Once we receive his review comments, we will transmit them to you.

- Dumpster Access: The Applicant has replaced the dumpster with rolling trash bins that will be rolled out to the street.

- Walkways to sidewalks on Lake Michigan Drive (LMD) and 56th Avenue (56th): The applicant has moved the proposed sidewalk from its previous connection along LMD to the corner where LMD and 56th meet. The Commission must determine if this is an acceptable solution to connect to both sidewalks and meet the requirements of Section 24.06.C – Sidewalks and Pedestrian Circulation.

- Parking Setback: At the last meeting the Commission approved a smaller than 30-foot parking lot setback to allow for a portion of two parking spaces to be closer than 30 feet to the west lot line. As mentioned above, it has been discovered that more parking spaces are required than was thought at your last review. With the addition of these parking spaces, the applicant is proposing more spaces to be closer than 30 feet, both on the western portion of the lot and the southeastern portion of the lot. In each location that parking spaces are proposed to be closer than 30 feet the abutting lots are master planned for General Commercial use and per Section 21.04.C – Parking Lot Construction Requirement of the Allendale Charter Township Zoning Ordinance (ACTZO), the Commission has the authority to approve these additional requests if you deem it appropriate.

- Building Appearance: As you know, the applicant was directed to bring a sample of the proposed building material to the next meeting to demonstrate its durability. After review of the material the Planning Commission must determine if they meet the requirements of Section 24.06.J – Building Appearance of the ACTZO.

The resubmission has been scheduled for your review at your October 3, 2022 meeting. If you have any questions, please let us know.

KLY
Planner

Attachments

cc: Adam Elenbaas, Supervisor

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

August 23, 2022

Mr. Gregory Ransford, MPA
Fresh Coast Planning
950 Taylor Avenue, Suite 200
Grand Haven, Michigan 49417

RE: Marcusse Const. Offices – 5630 Lake Michigan Drive
Planning Commission Review

Dear Mr. Ransford:

We have received and reviewed the planning commission application and plans for proposed site improvement related to Marcusse Construction Offices at 5630 Lake Michigan Drive. This report is intended for use by the Planning Commission in their review and is not intended to be comprehensive for construction purposes. The planning application documents were received by Fleis and VandenBrink on July 19, 2022 and plans are dated as May 2022 and July 12, 2022. It is important to note that the latest Allendale Charter Township Standard Construction Requirements will be applied to this development, dated March 2021. It is strongly recommended that the developer carefully reviews the latest requirements. F&V staff have performed a review of this report and have the following comments:

1. Site plan formatting should be updated to include the following items:
    a. Extend contours to a distance 50 feet outside boundary lines of site. Currently, boundary lines are 40 feet outside site.
    b. Show all buildings located within 100 feet of the site boundary. Not all buildings currently shown.
    c. Provide percentage of site covered by impervious surface.
2. Proposed light pole design should be provided. Poles shall not be greater than 20 feet in height when located within 150 feet of residential zoning.
3. Tenant space A & B should consider having concrete pads on north side of building extended to existing sidewalk along Lake Michigan Drive for building access.
4. Sidewalk on north side of parking lot extending east from proposed building should consider being extended to existing sidewalk along 56th Ave for connectivity.
5. The connecting drive between the south parking areas and northeast parking area utilizes a boundary setback of five feet instead of the standard thirty feet. This is permitted per Ordinance Sec 21.04.C when abutting residentially zoned properties if determined by the Planning Commission to not have an adverse effect on adjacent residents and is master planned for commercial or industrial.
6. Provide signage detail to verify compliance with Allendale Charter Township ordinance.
7. Underground stormwater detention system is proposed for the site.
    a. Applicant should provide detention calculations of system.

2960 Lucerne Drive SE
Grand Rapids, MI 49546
P: 616.977.1000
F: 616.977.1005
www.fveng.com

b. CB 125 detail appears to have a typo for the pipe invert elevation (559.20) that should be corrected.

c. CB 125 appears to be located underneath proposed landscaping area on the north side of the parking lot. Revise landscaping area or relocate CB to prevent maintenance issues.

d. At full stormwater detention capacity, CB 100, CB 105, and CB 120 will have water detained within one foot of rim grate.

e. Currently no inspection ports are shown as part the detention system. Inspection ports are optional per manufacturer.

f. No soil borings provided. Confirm that detention system design has considered the potential for high ground water.

8. Storm pipe leaving the site (71 LF – 12" STM) from CB 125 is within road right-of-way. Currently specified as 12" SLCPP (smooth lined corrugated plastic pipe). To be reviewed by Ottawa County Water Resources to confirm pipe material.
9. All references to MDOT standards shall be updated to the latest 2020 edition instead of the 2012 edition.
    a. Sheet C1 STANDARD PAVEMENT SECTION notes the use of 2012 edition.
10. Trash enclosure meets zoning requirements. However, due to location it may still be difficult for trash trucks to turn around within parking lot.
11. An existing sanitary sewer stub already exists to serve the 5630 Lake Michigan Drive and should be located near the right-of-way boundary. Depth is currently unknown. If stub is located at same depth as main (approximately 17 feet deep), construction methods should account for shoring details to remain within the ten foot wide pavement replacement section shown on the plans, or pavement replacement area should be increased to account for open cut installation to depth of 17 feet.

Please reach out with any questions.

FLEIS & VANDENBRINK

Brant Mercer, P.E., DBIA
Project Engineer

cc: Chad Doornbos, Superintendent of Public Utilities
Kelli McGovern, Planning/Zoning Assistant

Allendale
CHARTER TOWNSHIP
"Where community is more than just a concept!"

Planning Commission Application

Submission Date:_____

Application for Site Plan Review in conjunction with which of the following:

- [x] Site Plan Review Only
- [ ] New PUD Development
- [ ] Rezoning
- [ ] Zoning Amendment (including PUD)
- [ ] Special Use Application
- [ ] Other:_____

Property Owner:	SRESL LLC (Klynt Marcusse - Owner)		
Mailing Address:	7016 Tyler St. Hudsonville MI 49426		
Phone Number:	616-886-6853	Cell Phone:	
Email Address:	klyntrm@gmail.com	Fax:	
Owner's Signature:	Klynt Marcusse		

Applicant Name: (if not owner)	Same		
Mailing Address:			
Phone Number:		Cell Phone:	
Email Address:		Fax:	
Applicant's Signature:	Klynt Marcusse		

Who is the responsible party for future invoices? Check one: [x] Property Owner [ ] Applicant

Architect, Engineer, Attorney or other professionals associated with the project (attach additional sheets if necessary):

Contact:	Venture Engineering, PLLC - Jeff Brinks		
Mailing Address:	8515 Ridgebluff Dr. SW Byron Center, MI 49315		
Phone Number:	616-490-0329	Cell Phone:	
Email Address:	jbrinks@venturecivil.com	Fax:	
Address of Property:	5630 Lake Michigan Drive		

6676 Lake Michigan Drive | P.O. Box 539 | Allendale MI 49401
Phone: 616-895-6295 Fax: 616-895-6670 or 616-895-6330
www.allendale-twp.org

Permanent Parcel Number: 70 - 09 - 26 - 227 - 037					
Legal Description of Property (or attach to the application):					
See Plans.					
Lot Area:	40,930 sf	Lot Depth:	189' +/-	Lot Width:	260'+/-
Current Zoning of Parcel:	G-C	Current Use of Parcel:	Vacant		
Proposed Use of Parcel:	Office				
Name of Proposed Development (if applicable):					
Name of Proposed Buildings to be constructed:					
Square feet of gross:	5,869	Square feet of usable floor area:	5,869		
Number of Permanent Employees (if applicable):					

- Please include 5 sets of the proposed Site Plan and 1 electronic copy for staff review along with your application and escrow fee. (When ready for submission to the Planning Commission, smaller than typical plans are allowed when they can be easily interpreted and are to scale.)
- Please see Resolution 2011-2 for our full escrow fee policy. If you would like a copy of this policy it is available online or by request at the Township office.
- If your escrow is not kept up to date, according to our policy, the Township reserves the right to withhold approval of your project, issue a stop work order, or withhold final occupancy until the escrow balance is made current.

For Office Use Only

Date Received:			
Amount Paid:		Check No:	
Notes:			

1. SITE ANALYSIS PLAN CHECKLIST

This is a separate site plan showing natural and man-made features and is used to determine how the existing features of a property will be changed by the proposed project.

❖

x	Small-scale sketch of properties, streets and zoned uses of land within one-quarter mile of the site, sufficient to illustrate the existing character and development in the area of the site
x	A sketch illustrating the location of the site within the Township
NA	Existing buildings and structures
x	Current zoning of site and all abutting properties
x	Current use of site
x	Existing contour lines at two feet intervals on the subject property and to a distance of 50 feet outside the boundary lines of the site
x	Swales and existing drainage patterns
x	Existing strands of trees, tree lines and individual large trees.
NA	Water bodies, streams, creeks and wetlands on the site and within 50' of subject property
NA	Base flood elevation data (if applicable)

2. SITE PLAN CHECKLIST

See article 24 of Allendale Twp. Zoning Ordinance for actual language

❖

GENERAL INFORMATION

x Name of development
x Date on which the site plan was prepared
x North arrow and scale
x Architect, landscape architect, engineer, or professional surveyor who prepared the plan

x Name x Address x Professional seal

PROPERTY INFORMATION

x Legal description based upon the most current survey
x Small-scale sketch of properties, streets and zoned uses of land within one-quarter mile of the site, sufficient to illustrate the existing character and development in the area of the site
x A sketch illustrating the location of the site within the Township
x The size in acres and square feet of the subject property
x Property line dimensions and bearings
x Current zoning of site and all abutting properties
x Location and use of existing structures within 100 feet of the boundary of the subject property
x Proposed contour lines at not less than two feet intervals
x Percentage of site covered by impervious surface

BUILDINGS AND USES

x Location of existing and proposed buildings including: x Use x Length x Width x Height x Square Footage
NA Roof top equipment (Sec. 24.06.G.2)
x Setback of buildings from all property lines
x Architectural elevation drawings and exterior building materials (Sec. 24.06.J)

UTILITIES AND STORMWATER MANAGEMENT

Location, size and dimensions of the following:

NA Utility easements
x Water lines
x Sanitary sewer lines
x Storm drainage lines
NA Ditches and swales
x Retention and/or detention areas
x Fire hydrants
x Catch basins
NA Septic tank and drain fields and water wells if applicable
x Transformers and above ground utilities

VEHICLE CIRCULATION

Location, size and dimensions including width of the following:

x Proposed streets
x Abutting streets
x Rights-of-way
NA Service drives
X Driveways / curb cuts
X Curbs and gutters
NA Access easements serving the site
X Driveways opposite the site and driveways and intersections within 100 feet on either side of the site
X Traffic control signs
NA Master Plan streets which may cross the property

PEDESTRIAN CIRCULATION (Sec. 24.06.C)

X Location, dimensions and surface type of all sidewalks, bike paths and other walkways
X Internal walkways through the parking lot (Sec. 24.06.C.3)

PARKING (Article 21)

X Number and dimensions of spaces and aisles
X Computations to show number of spaces required
X Distance to nearest property line
X Barrier free parking spaces and sidewalk ramps
X Type of parking area surface
X Curbs and gutters
NA Loading areas

LIGHTING (Article 24.06.E)

X Location of exterior lights including building lights
X Height
X Type of fixture

OTHER REQUIRED INFORMATION

X Waste disposal facilities (Sec. 24.06.H)
NA Outdoor storage (Sec. 24.06.G)
X Signs (Article 22)
NA For residential developments (Sec. 24.05.D.17) summary schedules and views should be affixed as applicable in residential development, which gives the following data:

_____ The net residential area which is the total size of the parcel minus any portion of the site within the road right-of-way expressed in acres and in square feet
_____ The number of dwelling units proposed (by type) and the number of bedrooms for each type
_____ Typical lot size dimensions if detached housing is contemplated
_____ Typical elevation views of the front and side and rear of each type of building
_____ Proposed density of the net residential site

NA Proposed phasing

NA Location and specifications for any existing or proposed above or below ground storage facilities for any chemicals, salts, flammable materials, or hazardous materials as well as any containment structures or clear zones required by this Ordinance or by State or Federal Agencies.

_____ The Planning Commission may require written statements relative to the effects on the existing traffic capacity of streets, and the proposed development's impact on public safety, existing utilities, the environment and natural features

_____ The Planning Commission may request additional studies, graphics or other written materials from the applicant in order to assist in determining the appropriateness of the site plan

3. LANDSCAPING PLAN CHECKLIST

This is a separate plan illustrating proposed landscaping

See Articles 21A and Sec. 24.06.F of the Zoning Ordinance for actual language

❖

X Name, address and seal of landscape architect who prepared the plan

X Number of plants, type, size, location and spacing for:

- X greenbelts;
- X front yard along all streets abutting property;
- X Parking lots (Sec. 21A.04.G);

X Computations for all required landscaping

X Underground irrigation system (Sec. 21A.03.E)

NA Berms, walls and fences

NA Landscaping for multi-family buildings see also Sec. 23.06.I

NA Open space and common areas

Please note that the number of plantings required by the Ordinance may be modified (increased or decreased) by the Planning Commission based on the criteria below. If a reduction in the required landscaping is proposed please provide the reasons for this reduction on the landscaping plan relative to the criteria.

Modification of Required Landscaping. For existing and proposed uses that require site plan approval to either expand or be built, landscaping shall be installed insofar as practical. The Planning Commission in its review of the site plan has the authority to increase, decrease or otherwise modify the landscaping and screening requirements of this article. In doing so, the Commission shall consider the following criteria:

1. The amount of space on the site available for landscaping.
2. Existing landscaping on the site and on adjacent properties.
3. The type of use on the site and size of the development.
4. Existing and proposed adjacent land uses.
5. The effect the required landscaping would have on the operation of the existing or proposed land use.
6. Whether additional landscaping is necessary to mitigate the adverse effects of adjoining land uses, to reduce headlight glare, reduce noise and to otherwise achieve the objectives of this Section.

VENTURE
ENGINEERING, PLLC

8515 Ridgebluff Dr. SW • Byron Center MI 49315
venturecivil.com • 616-490-0329

Memorandum

To: Mr. Kevin Yeomans – Fresh Coast Planning

Date: August 31, 2022

From: Jeff Brinks, PE- Venture Engineering, PLLC

RE: **Marcusse Office Building- Allendale Township**

This memo is in response to the highlighted review comments in the letter dated August 23, 2022 from Brant Mercer, PE at Fleis & Vandenbrink. The following numbered responses correspond with the highlighted comments in the above-referenced letter:

7a. We have included storm water calculation with this submittal.

7b. The typo has been corrected.

7c. The sidewalk and landscaping has been revised such that maintenance for CB 125 should not be an issue.

7d. We have attempted to maintain as much separation as possible from the water table (4.4' instead of the required 3 feet) and acknowledge that at maximum capacity there will be detention storage within the storm structures. Given the infiltration rates and large amount of surface area at the bottom of the two StormTech areas, the release rate from the detention system should significantly exceed the orifice release rate such that even if the system reaches maximum capacity it would only be for a very short time.

7e. Inspection ports for maintenance of the StormTech system have been included where need to properly inspect and maintain the system.

7f. The geotechnical report is included with this submittal.

8. The plans and calculations will be submitted to the OCWRC for review and approval. The submittal has been withheld to ensure that all Township requirements have been met such that no changes to the storm water management system were necessary.

9. The reference to the 2012 MDOT specs has been revised to 2020.

11. We have obtained the record plans for the sanitary lateral from the Township and have revised the plans accordingly

Please contact me if there are any questions or if any further information is required.

PROPOSED SITE DEVELOPMENT PLANS FOR:

Marcusse Construction Offices

5630 LAKE MICHIGAN DRIVE

NW 1/4, SECTION 26, TOWN 7 NORTH, RANGE 14 WEST

ALLENDALE TOWNSHIP, OTTAWA COUNTY, MI

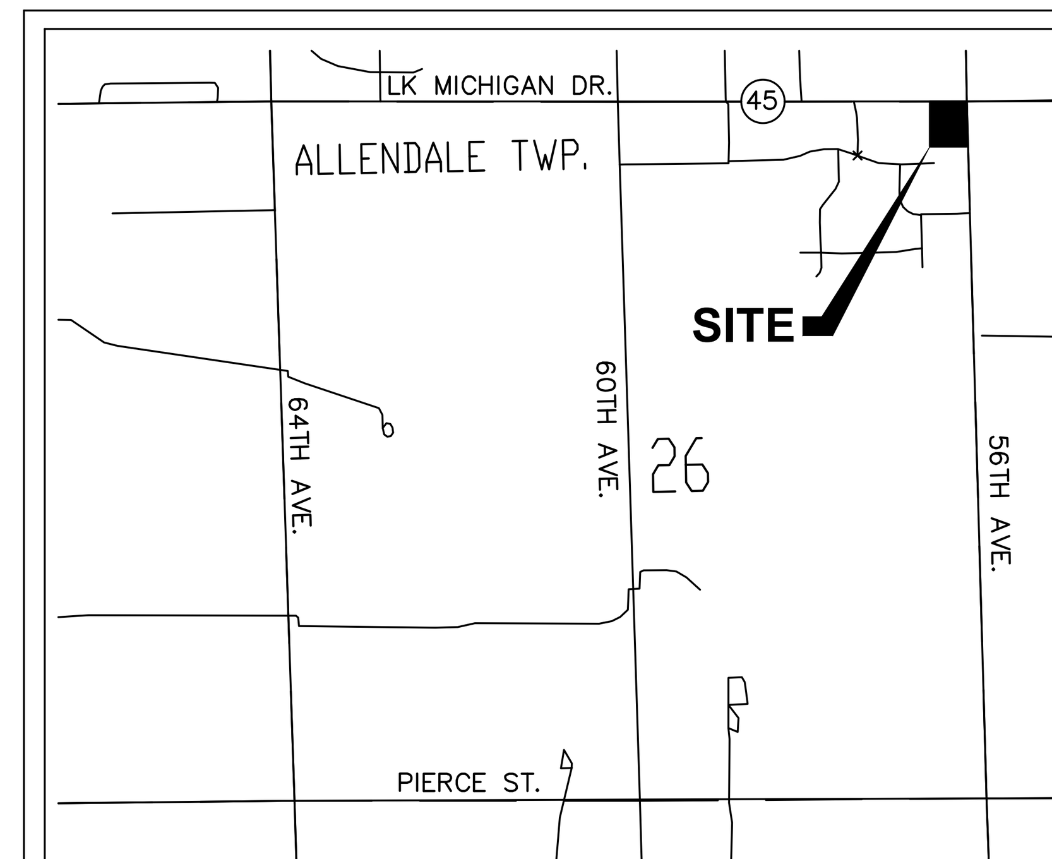
OVERALL SITE AREA MAP
NOT TO SCALE

PROPERTY DESCRIPTION: (PER WARRANTY DEED DOC. #2022-0014698)

Description of Parcels A and B combined: That part of the NE 1/4 of Section 26, T7N, R14W, Allendale Township, Ottawa County, Michigan, described as: commencing at the Northeast corner of said Section; thence S0°17'14"E 218.16 feet along the East line of the NE 1/4 of said Section; thence N89°26'24'W 33.00 feet parallel with the North line of the NE 1/4 of said Section to the place of beginning of this description; thence continuing N89°26'24"W 97.16 feet; thence S0°17'14"E 77.00 feet; thence N89°26'24'W 165.00 feet; thence N0°17'14"W 189.51 feet; thence S89°26'24"E 203.27 feet along the South right of way line of relocated Lake Michigan Drive (M-45); thence S53"36'52"E 73.41 feet along said right of way line; thence S0°17'14"E 69.53 feet to the place of beginning.
This parcel contains 0.94 acres. Subject to easements, restrictions and rights of way of record.

PPN: 70-09-26-227-037

SHEET INDEX



LOCATION MAP
NOT TO SCALE

Know what's below. Call before you dig.

REVISIONS

DATE	DESCRIPTION
07/12/22	ISSUED FOR SITE PLAN APPROVAL
08/09/22	REVISED PER TOWNSHIP REVIEW
08/18/22	REVISED PER TOWNSHIP REVIEW
08/31/22	REVISED PER TOWNSHIP REVIEW
09/19/22	REVISED PARKING PER TWP REVIEW

NOT FOR CONSTRUCTION

PROPOSED SITE IMPROVEMENTS FOR:
Marcusse Const. Offices - 5630 Lake Michigan Dr.
COVER SHEET
Allendale Charter Township Ottawa County Michigan

For: Architectural Concepts
6650 Crossings Drive SE
Grand Rapids, MI 49508
Phone: 616.554.122

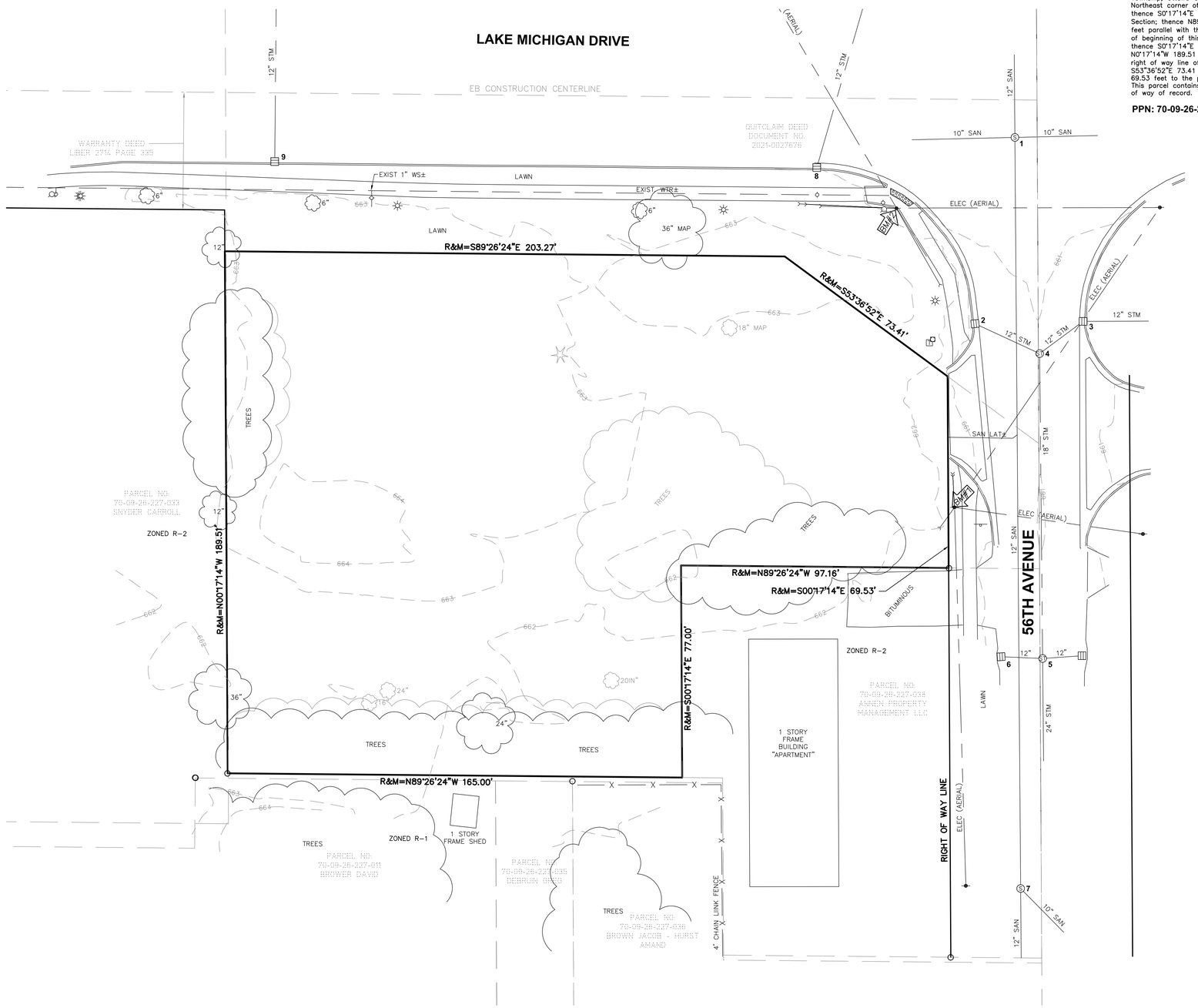
VENTURE ENGINEERING, PLLC
8515 Ridgebluff Dr. SW
Byron Center, MI 49315
616-490-0329
venturecivil.com

PROJECT NO.	22124
DRAWN BY:	JAC
CHECKED BY:	JMB
DATE:	05/2022
SHEET NO.	C

PROPERTY DESCRIPTION: (PER WARRANTY DEED DOC. #2022-0014698)

Description of Parcels A and B combined: That part of the NE 1/4 of Section 26, T7N, R14W, Allendale Township, Ottawa County, Michigan, described as: commencing at the Northeast corner of said Section; thence S0°17'14"E 218.16 feet along the East line of the NE 1/4 of said Section; thence N89°26'24"W 33.00 feet parallel with the North line of the NE 1/4 of said Section to the place of beginning of this description; thence continuing N89°26'24"W 97.16 feet; thence S0°17'14"E 77.00 feet; thence N89°26'24"W 165.00 feet; thence N0°17'14"W 189.51 feet; thence S89°26'24"E 203.27 feet along the South right of way line of relocated Lake Michigan Drive (M-45); thence S53°36'52"E 73.41 feet along said right of way line; thence S0°17'14"E 69.53 feet to the place of beginning.
This parcel contains 0.94 acres. Subject to easements, restrictions and rights of way of record.

PPN: 70-09-26-227-037



Know what's **below.** **Call** before you dig.

REVISIONS	
DATE	DESCRIPTION
07/12/22	ISSUED FOR SITE PLAN APPROVAL
08/09/22	REVISED PER TOWNSHIP REVIEW
08/18/22	REVISED PER TOWNSHIP REVIEW
08/31/22	REVISED PER TOWNSHIP REVIEW
09/19/22	REVISED PARKING PER TWP REVIEW

NOT FOR CONSTRUCTION

PROPOSED SITE IMPROVEMENTS FOR:

Marcusse Const. Offices - 5630 Lake Michigan Dr.

EXISTING CONDITIONS

Allendale Charter Township, Ottawa County, Michigan

For: Architectural Concepts

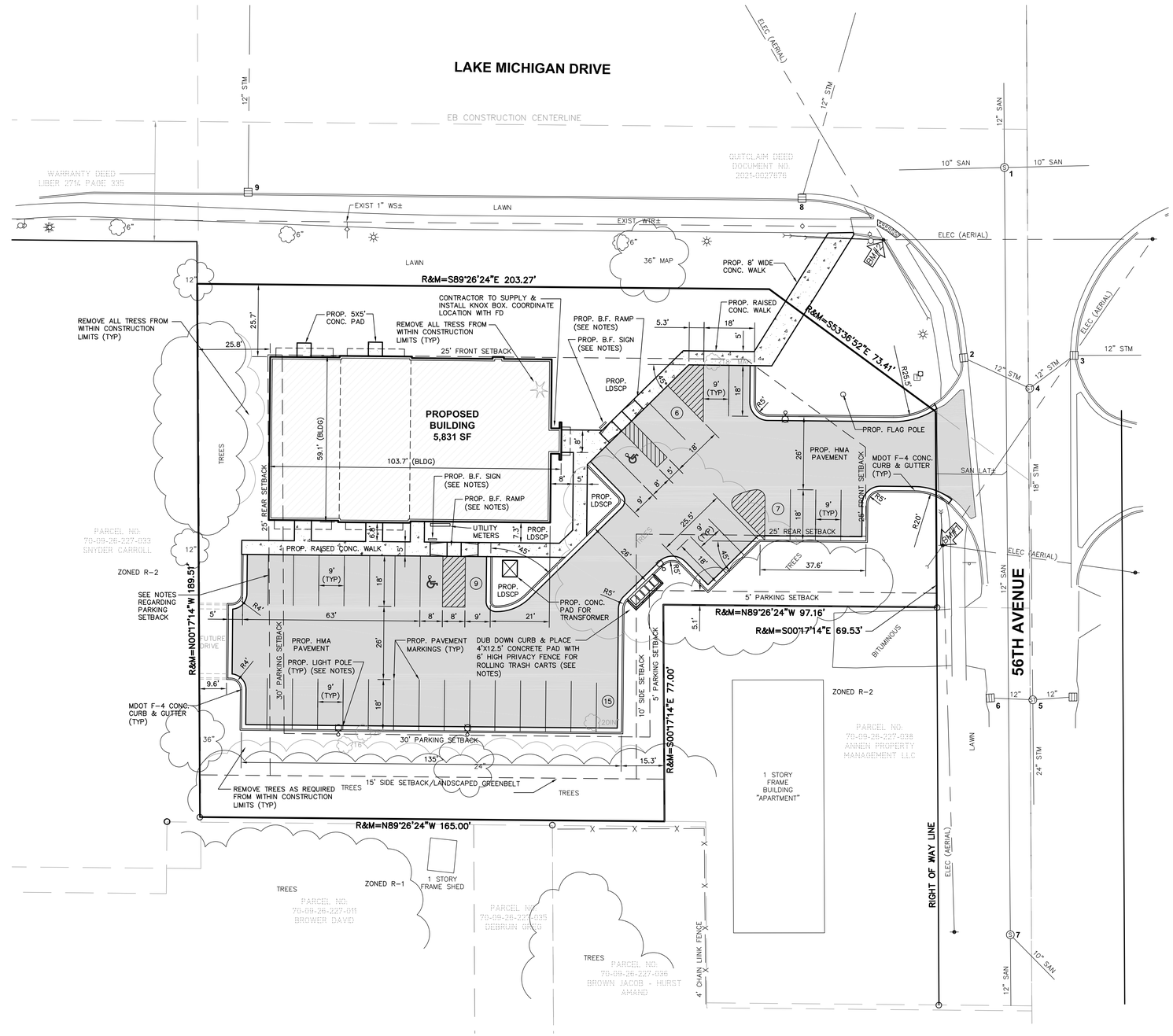
6650 Crossings Drive, SE
Grand Rapids, MI 49508
Phone: 616.554.1122

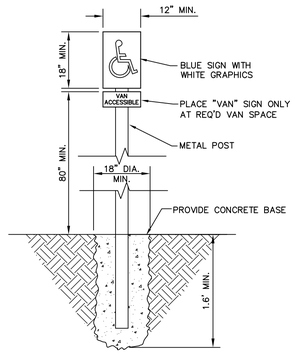
8515 Ridgebluff Dr. SW
Byron Center, MI 49315
616-490-0329
ventureciv@.com

VENTURE
ENGINEERING, PLLC

PROJECT NO.	22124
DRAWN BY:	JAC
CHECKED BY:	JMB
DATE:	05/2022
SHEET NO.	C0

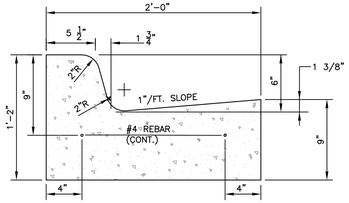
Sep 20, 2022 - 11:51am C:\Users\jkm\OneDrive\Documents\Venture Projects\22124 Marcusse Construction\C0.dwg, XREFs: [Venture TBlock] [0
By: jkm





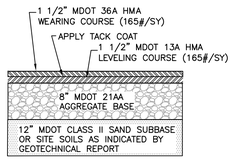
BARRIER FREE SIGN DETAIL

NOT TO SCALE



M.D.O.T. F-4 CURB & GUTTER

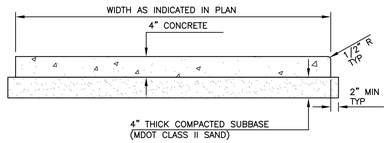
NOT TO SCALE



STANDARD PAVEMENT SECTION

NOT TO SCALE

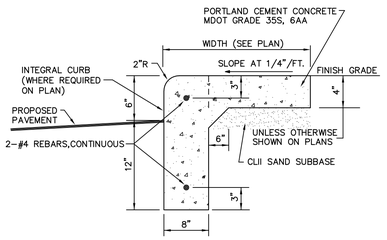
ALL MATERIAL DESIGNATIONS REFER TO MDOT. STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2020 EDITION AND SUPPLEMENTAL SPECIFICATIONS



TOOL CONTRACTION JOINT AT INTERVAL EQUAL TO WIDTH. PLACE 1" EXPANSION JOINT AT 50' INTERVAL.

STANDARD SIDEWALK

NOT TO SCALE



RAISED SIDEWALK DETAIL

NOT TO SCALE

SITE NOTES

1. SITE AREA: 40,930 SF (0.94± ACRES)
2. CURRENT ZONING: GENERAL COMMERCIAL (G-C)
3. SETBACKS REQUIRED: 25' FRONT, 10' SIDE (15' SIDE RESIDENTIAL), 25' REAR

   NOTE: A REDUCED PARKING LOT SETBACK ALONG WEST PROPERTY LINE IS REQUESTED DUE TO FUTURE COMMERCIAL ZONING OF ADJACENT PROPERTY.
4. PPN: 70-09-26-227-037
5. PARKING REQUIREMENTS:

   BUSINESS AND PROFESSIONAL OFFICES
   1 PER 300 S.F. OF GROSS FLOOR AREA
   MAIN FLOOR 5,831 S.F.
   2ND FLOOR 5,223
   11,054 S.F. / 300 = 37 SPACES REQUIRED

   37 SPACES PROVIDED (INCLUDING 2 B.F.)
6. PROPOSED BUILDING USE WILL BE OFFICE SPACE FOR A BUILDING CONTRACTOR WITH TWO TENANT SPACES FOR GENERAL OFFICE USE. NO STORAGE OF MATERIALS OR EQUIPMENT IS PROPOSED.
7. CONTRACTOR SHALL CONTACT "MISS DIG" 1-800-482-7171 (72) HOURS PRIOR TO CONSTRUCTION TO ALLOW FOR ACCURATE LOCATION OF ALL UNDERGROUND UTILITIES.
8. EXISTING UTILITIES SHOWN ARE FROM RECORD PLANS AND EVIDENCE IN THE FIELD. NO GUARANTEE IS MADE FOR ACCURACY OR THAT THE UTILITIES SHOWN ARE THE ONLY IN THE AREA. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
9. ALL CONSTRUCTION METHODS & MATERIALS SHALL COMPLY WITH CURRENT ALLENDALE TOWNSHIP, OTTAWA COUNTY & MDOT STANDARDS AND SPECIFICATIONS FOR CONSTRUCTION. NO CONSTRUCTION SHALL COMMENCE UNTIL ALL REQUIRED PERMITS HAVE BEEN ISSUED.
10. THE PROPOSED DEVELOPMENT WILL UTILIZE EXISTING AVAILABLE INFRASTRUCTURE INCLUDING ROADS, SEWAGE DISPOSAL, WATER SUPPLY AND STORM WATER MANAGEMENT. NO UNANTICIPATED DEMAND WILL BE PLACED ON TOWNSHIP SERVICES.
11. TRASH DISPOSAL FROM THE SITE WILL BE VIA RESIDENTIAL STYLE ROLLING TRASH CARTS WITH STREET PICKUP. CARTS WILL BE PLACED ON CONCRETE PAD SURROUNDED BY A 6' HIGH OPAQUE FENCE.
12. SITE LIGHTING SHALL CONSIST OF POLE MOUNTED, DOWNWARD DIRECTED, CUTOFF STYLE FIXTURES AND SHALL COMPLY WITH REQUIRED ILLUMINATION LEVELS.
13. SITE SIGNAGE SHALL CONFORM TO THE APPROVED SIGN PACKAGE REQUIREMENTS.
14. BARRIER-FREE RAMPS SHALL BE 6 FT LONG WITH A MAXIMUM SLOPE OF 1:12 AND SHALL HAVE A NON-SLIP SURFACE.
15. BARRIER-FREE SIGNAGE SHALL BE 6'-8" TO BOTTOM OF SIGN. 1 SHALL BE A "VAN" SIGN.
16. COORDINATE ALL UTILITY CONNECTIONS WITH THE APPROPRIATE UTILITY PROVIDERS PRIOR TO CONSTRUCTION.
17. WORK WITHIN 56TH AVE. R/W REQUIRES A PERMIT FROM THE OTTAWA COUNTY ROAD COMMISSION.
17. THIS PROJECT WILL BE CONSTRUCTED IN ONE PHASE.

Know what's **below.** **Call** before you dig.

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NOT FOR CONSTRUCTION

PROPOSED SITE IMPROVEMENTS FOR:

Marcusse Const. Offices - 5630 Lake Michigan Dr.

SITE LAYOUT PLAN

Allendale Charter Township, Ottawa County, Michigan

For: Architectural Concepts

6650 Crossings Drive, SE
Grand Rapids, MI 49508
Phone: 616.554.1122

8515 Ridgecliff Dr. SW
Byron Center, MI 49315
616-490-0329
ventureciv@.com

VENTURE ENGINEERING, PLLC

PROJECT NO.	22124
DRAWN BY:	JAC
CHECKED BY:	JMB
DATE:	05/2022
SHEET NO.	C1

Sep 20, 2022 - 1:53pm C:\Users\John\OneDrive\Documents\Venture Projects\22124 Marcusse Construction\Cl.dwg, XREFs: [Venture TBLK] [0] [
By: JBRR

EXIST. STRUCTURE INVENTORY

Sanitary Manhole#1
Rim:661.56
12" Tile S 643.86
12" Tile N 643.81
10" Tile W 645.36
10" Tile E 645.36

Square Catch Basin#2
Rim:660.28
12" Conc SE 656.18

Square Catch Basin#3
Rim:660.39
12" Conc SW 656.09
12" CPP E 656.74

Storm Manhole#4
Rim:660.89
12" Conc NW 655.74
12" Conc NE 655.94
18" Conc S 654.74

Storm Manhole#5
Rim:660.83
18" Conc N 654.33
24" Conc S 654.08
12" Conc E'ly 654.33
12" Conc W'ly 654.33

Square Catch Basin#6
Rim:660.20
12" Conc E'ly 656.30

Sanitary Manhole#7
Rim:660.96
12" Tile N 644.96
12" Tile S 645.06
10" Tile SE 645.06

Square Catch Basin#8
Rim:661.52
12" Conc NNE 657.87

Square Catch Basin#9
Rim:662.09
12" Conc N 658.24

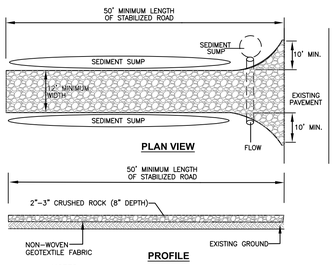
Sanitary Manhole#10
Rim:662.71
8" PVC S 655.61
8" Tile W 655.56

ELEVATION DATUM

All Elevations are based on NAVD 88 Datum.

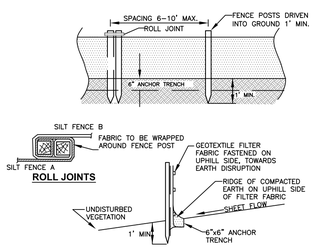
Contours are illustrated at 1.0' intervals.

Bm#1)
Elevation: 662.51
Description: R.R. Spike, south side of power pole at southwest corner on 56th avenue
Bm#2)
Elevation: 662.34
Description: R.R. Spike, west side of power pole, west side of 56th Avenue, 2nd pole south of drive.



NOTES:
1. ESTABLISH STABILIZED CONSTRUCTION ENTRANCE PRIOR TO THE INITIATION OF SITE CONSTRUCTION ACTIVITIES.
2. CARE SHOULD BE TAKEN TO PREVENT MATERIAL MOVEMENT INTO ADJACENT WETLANDS/WATERBODIES.
3. CARE SHOULD BE TAKEN TO MAINTAIN EXISTING ROADSIDE DRAINAGE VIA CULVERT INSTALLATION, WITH SEDIMENT SUMP PLACED DOWNFLOW OF CULVERT.

S53 STABILIZED CONSTRUCTION ACCESS
NOT TO SCALE



S51 SILT FENCE DETAIL
NOT TO SCALE

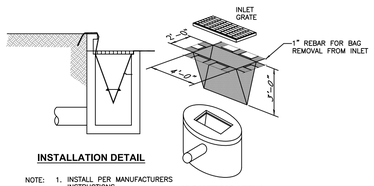
E8 PERMANENT SEEDING NOTE

ALL PROPOSED LAWN AREAS AND ALL AREAS DISTURBED BY CONSTRUCTION SHALL RECEIVE A MINIMUM OF 4" OF TOPSOIL AND LAWN SEED MIX AS INDICATED ON PLANS AND AS FOLLOWS:

PROPORTION	CLASS "A" SEED TYPE
10%	CANNON KENTUCKY BLUEGRASS
10%	GOLDRUSH KENTUCKY BLUEGRASS
20%	RONDE KENTUCKY BLUEGRASS
20%	SR5100 CHEWINGS FESCUE
20%	SR5200 CREEPING RED FESCUE
10%	SR4400 PERENNIAL RYEGRASS
10%	SR4500 PERENNIAL RYEGRASS

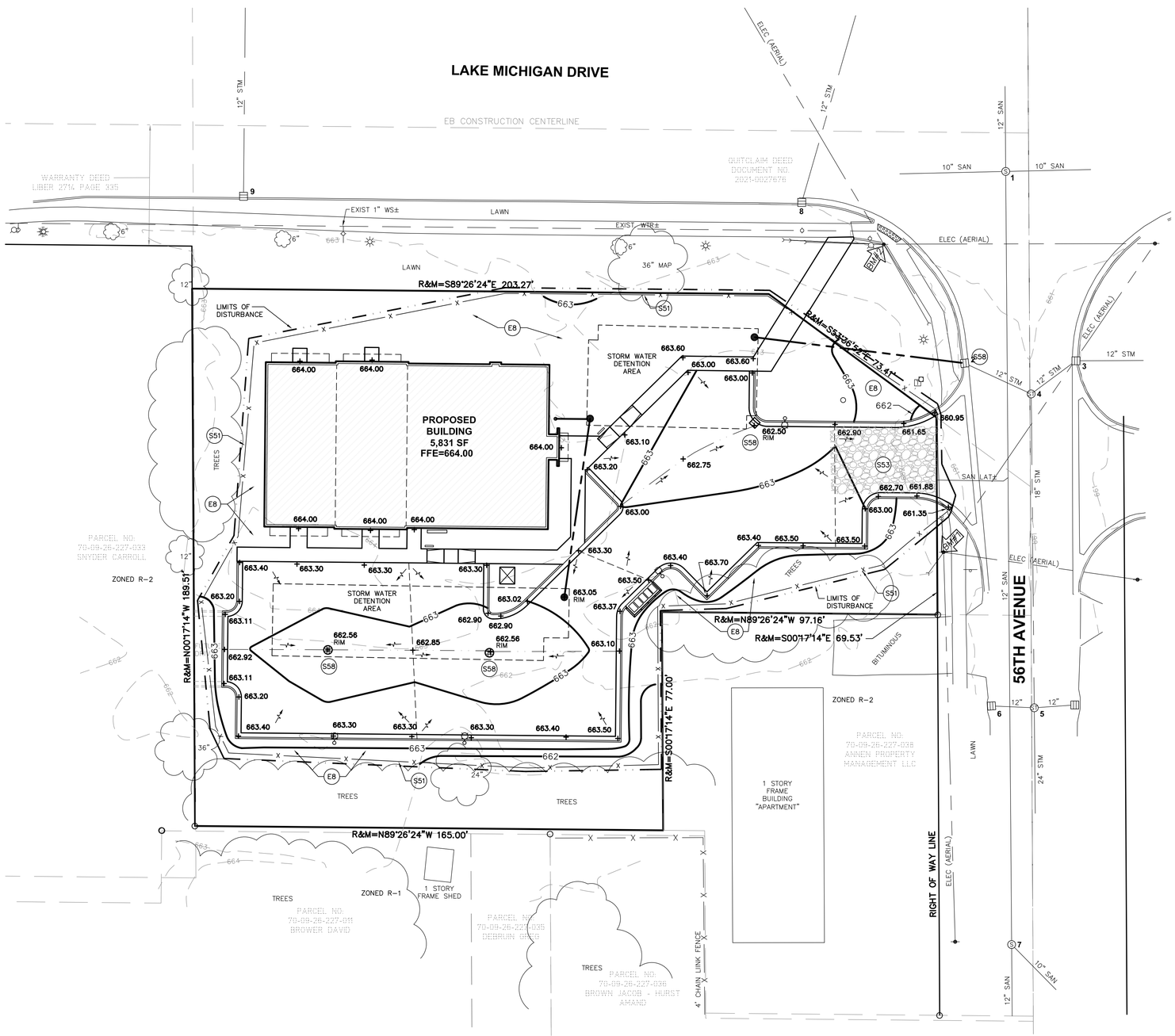
SEEDING RATE SHALL BE 4 TO 6 lbs. PER 1000 SQ. FEET.

ALL AREAS DESIGNATED FOR PERMANANT SEEDING SHALL BE HYDRO-SPRAYED.



NOTE: 1. INSTALL PER MANUFACTURERS INSTRUCTIONS.

S58 INLET PROTECTION - FABRIC DROP



MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET S-E-S-C KEYING SYSTEM

KEY	BEST MANAGEMENT PRACTICES	SYMBOL	WHERE USED
EROSION / SEDIMENT CONTROLS			
E8	PERMANENT SEEDING		Stabilization method utilized on sites where earth change has been completed (final grading attained).
S51	SILT FENCE		Use adjacent to critical areas, to prevent sediment laden sheet flow from entering these areas.
S53	STABILIZED CONSTRUCTION ACCESS		Used at every point where construction traffic enters or leaves a construction site.
S58	INLET PROTECTION FABRIC DROP		Use at stormwater inlets, especially at construction sites.

EROSION CONTROL NOTES

1. ALL EROSION CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY AND PERMIT AGENCY REQUIREMENTS.
2. GRADING WILL BE LIMITED TO WITHIN PROPERTY LINES AND/OR GRADING LIMITS.
3. THE PROPERTY IS NOT IMPACTED BY A FLOODPLAIN.
4. NO SOIL WILL BE ALLOWED TO ACCUMULATE OFF SITE. ANY SOIL TRACKED OFF SITE IS SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR.
5. ALL TRAFFIC ENTERING OR LEAVING PROPERTY SHALL USE STABILIZED CONSTRUCTION ACCESS.
6. WHERE POSSIBLE SILT FENCE IS TO PLACED 10' FROM TOE OF SLOPE TO ALLOW FOR MAINTENANCE.
7. DUST CONTROL MEASURES SHALL BE APPLIED AT ALL TIMES WITHIN THE PROJECT BY THE CONTRACTOR.
8. ALL DISTURBED AREAS SHALL BE SEEDED WITHIN 5 CALENDAR DAYS OF ACHIEVING FINAL GRADE WITH PERMANENT SEED MIXTURE.
9. ALL DISTURBED AREAS THAT WILL NOT ACHIEVE FINAL GRADE WITHIN 30 CALENDAR DAYS SHALL BE SEEDED PER TEMPORARY SEEDING SPECIFICATIONS. ALL SLOPES 1 VERTICAL: 5 HORIZONTAL OR STEEPER SHALL BE TRACK WALKED PERPENDICULAR TO SLOPE PRIOR TO TEMPORARY SEEDING.
10. ALL SLOPES GREATER THAN 1:4 SHALL BE STABILIZED WITH NORTH AMERICAN GREEN DS-75 EROSION CONTROL BLANKET OR APPROVED EQUAL, UNLESS NOTED OTHERWISE. ALL STORMWATER CHANNELS AND DITCHES SHALL BE STABILIZED WITH NORTH AMERICAN GREEN SC-250 PERMANENT EROSION CONTROL BLANKET OR APPROVED EQUAL, UNLESS NOTED OTHERWISE. BLANKETS SHALL BE INSTALLED PER MANUFACTURERS INSTRUCTIONS.
11. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED DAILY AND ANY PROBLEMS REMEDIED IMMEDIATELY.
12. PERMANENT EROSION CONTROL MEASURES SHALL BE MAINTAINED BY PROPERTY OWNER. MAINTENANCE INCLUDES REGULAR INSPECTION AND CLEANING OF ALL STORM WATER FACILITIES AND ENSURING VEGETATION IS ADEQUATE ON ALL SLOPES.
13. STOCKPILE EXCESS TOPSOIL ON SITE AS INDICATED ON PLANS OR DIRECTED BY ENGINEER AND INSTALL SILT FENCE AROUND THE PERIMETER OF THE STOCKPILE. PLACE TEMPORARY SEEDING ON STOCKPILE ONCE THE SITE HAS BEEN CLEARED AND ALL TOPSOIL HAS BEEN STOCKPILED.
14. EXISTING SOILS ONSITE ARE TYPICALLY SAND
15. TOTAL AREA OF DISTURBANCE = 0.78 ACRES±
16. ALL PROJECTS DISTURBING 1 OR MORE ACRES OR ARE WITHIN 500 FT. OF A LAKE OR STREAM REQUIRE A SOIL EROSION CONTROL PERMIT FROM THE DESIGNATED AUTHORIZED PUBLIC AGENCY.

SESC SCHEDULE

1. INSTALL SILT FENCE & INLET PROTECTION AS SHOWN. MAINTAIN SILT FENCE BY REMOVING SEDIMENT WHEN IT HAS REACHED 1/3 TO 1/2 OF THE HEIGHT OF THE FENCE.
2. CLEAR & GRUB SITE AS NECESSARY AND REMOVE EXISTING PAVEMENT AS SHOWN ON PLANS. STOCKPILE EXCESS MATERIALS AS REQUIRED. THE CONTRACTOR IS DIRECTED TO INSTALL SILT FENCE AT THE TOE OF THE SLOPE AROUND PERIMETER OF TEMPORARY STOCKPILES.
3. CONSTRUCT STORM SYSTEM.
4. PLACE INLET PROTECTION IN ALL PROPOSED CATCH BASINS IMMEDIATELY FOLLOWING INSTALLATION.
5. PERMANENT CONTROL MEASURES MUST BE COMPLETED 5 CALENDAR DAYS AFTER THE FINAL EARTH CHANGE IS COMPLETED FOR EACH AREA DISTURBED. THIS INCLUDES BLANKETS, SEEDING, MULCHING & HYDROMULCHING, AS INDICATED IN THESE PLANS.
6. FOR ALL AREAS TO BE SEEDED, THE MULCH MUST BE APPLIED IMMEDIATELY AFTER SEED APPLICATION.
7. CLEAN STORM SEWER, INLETS, AND PIPES OF ALL CONSTRUCTION SEDIMENT IMMEDIATELY FOLLOWING PROJECT COMPLETION.
8. REMOVE TEMPORARY CONTROLS SUCH AS SILT FENCE, INLET PROTECTION AND NETTING ONCE VEGETATION IS ESTABLISHED AND THE SITE HAS BEEN STABILIZED.

Know what's below. Call before you dig.

SCALE: 1" = 20'

LEGEND

- PROPOSED CONTOURS
- EXISTING CONTOURS
- DRAINAGE STRUCTURES
- PROPOSED STORM SEWER
- SILT FENCE
- +123.45 PROPOSED SPOT ELEVATION
- DIRECTION OF DRAINAGE FLOW
- SWALES
- DRAINAGE HIGH POINTS

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SITE GRADING & SESC PLAN
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For: Architectural Concepts
6650 Crossings Drive, SE Grand Rapids, MI 49508 Phone: 616.554.122

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venturecivil.com
VENTURE ENGINEERING, PLLC

PROJECT NO. 22124
DRAWN BY: JAC
CHECKED BY: JMB
DATE: 05/2022
SHEET NO. **C2**

Sep 20, 2022 - 1:54pm C:\Users\Jon\OneDrive\Documents\Venture Projects\22124 Marcusse Construction\22.dwg, XREFs: [Venture TBLK] [0] [1] [2] By: JMB

EXIST. STRUCTURE INVENTORY

Sanitary Manhole#1
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12" Tile N 643.81
10" Tile W 645.36
10" Tile E 645.36

Square Catch Basin#2
Rim:660.28
12" Conc SE 656.18

Square Catch Basin#3
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12" Conc SW 656.09
12" CPP E 656.74

Storm Manhole#4
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12" Conc NW 655.74
12" Conc NE 655.94
18" Conc S 654.74

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24" Conc S 654.08
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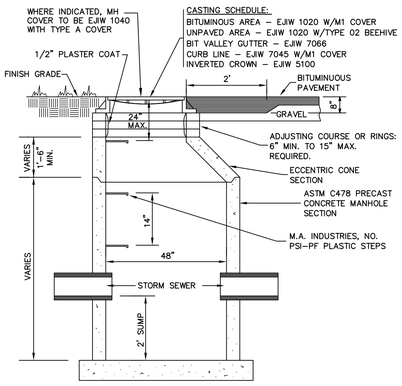
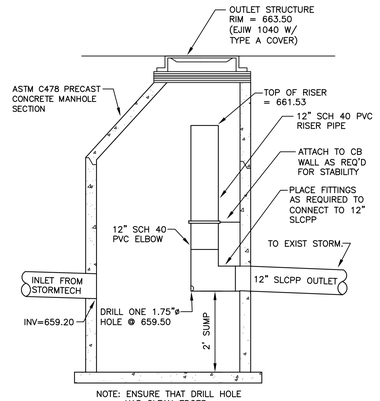


4' DIA. CATCH BASIN DETAIL

NOT TO SCALE



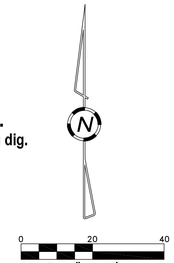
CB 125 - 4' DIA. OUTLET STRUCTURE

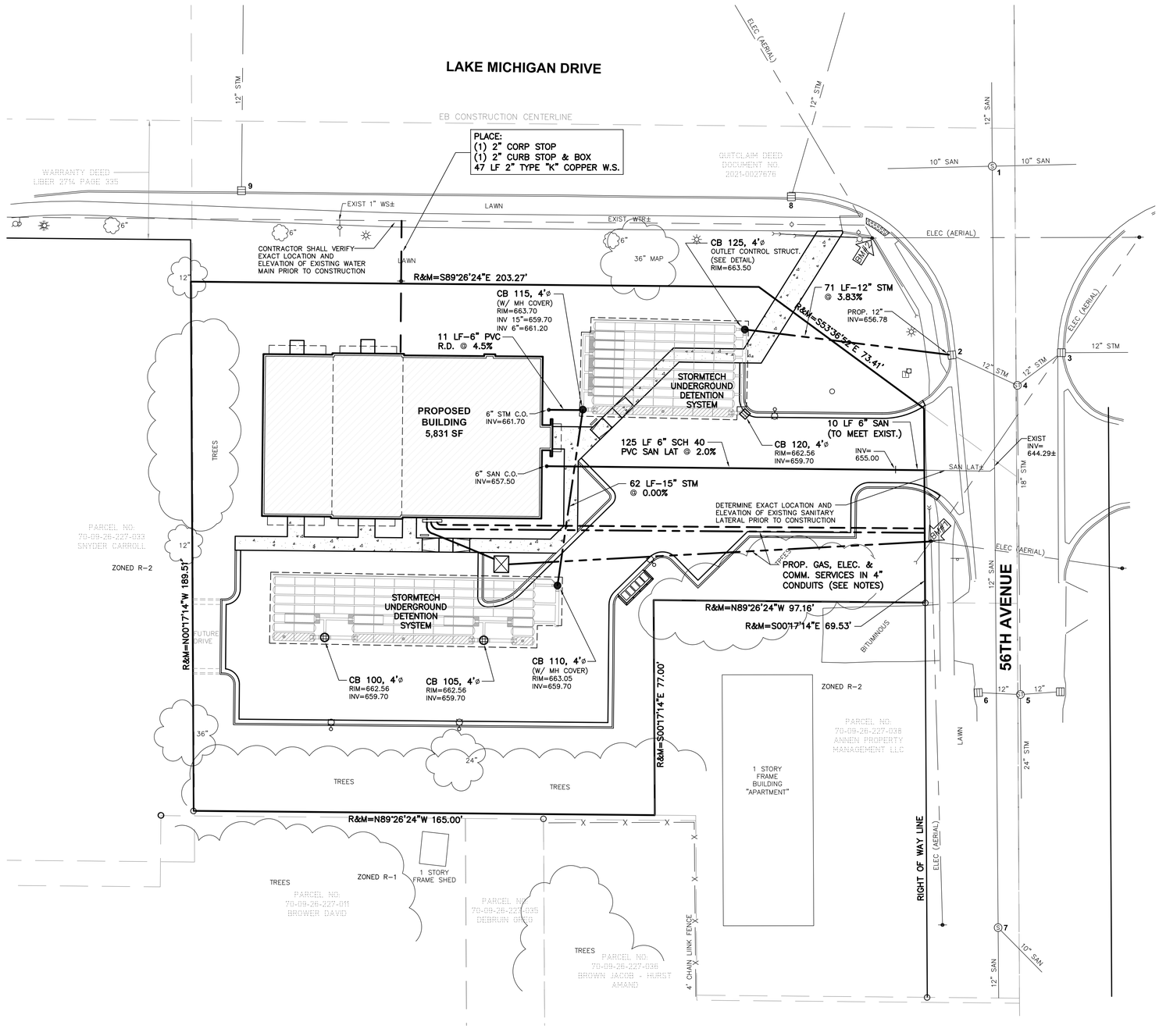
NOT TO SCALE

LEGEND

- DRAINAGE STRUCTURES
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED GAS SERVICE
- PROPOSED WATER SERVICE
- PROPOSED ELECTRIC SERVICE

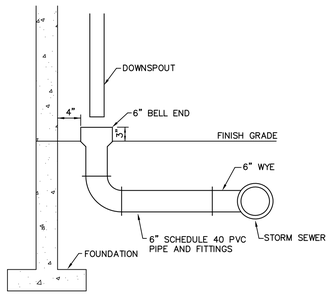
Know what's below. Call before you dig.





GENERAL NOTES:

1. EXISTING UTILITIES SHOWN ARE FROM RECORD PLANS AND EVIDENCE IN THE FIELD. NO GUARANTEE IS MADE FOR ACCURACY OR THAT THE UTILITIES SHOWN ARE THE ONLY IN THE AREA. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
2. CONTRACTOR SHALL PERFORM ALL CONSTRUCTION ACTIVITIES IN A MANNER TO MINIMIZE INCONVENIENCE TO ADJACENT PROPERTIES.
3. ALL CONSTRUCTION METHODS & MATERIALS SHALL COMPLY WITH CURRENT ALLENDALE TOWNSHIP, OTTAWA COUNTY COUNTY AND MDOT STANDARDS AND SPECIFICATIONS FOR CONSTRUCTION. NO CONSTRUCTION SHALL COMMENCE UNTIL ALL REQUIRED PERMITS HAVE BEEN ISSUED.
4. CONTRACTOR SHALL KEEP ALL FIRE LANES OPEN & ACCESSIBLE DURING CONSTRUCTION AT ALL TIMES.
5. CONSTRUCTION TRAFFIC SHALL BE MINIMIZED ON ANY NEW PAVEMENT. THE CONTRACTOR SHALL REPAIR ANY DAMAGE OR FAILURE CAUSED BY CONSTRUCTION ACTIVITIES, AS WELL AS REPAIRING LOAD DAMAGE ON THE EXISTING PAVEMENT SYSTEM TO THE SATISFACTION OF THE ENGINEER.
6. ALL CONSTRUCTION ACTIVITIES SHALL BE STAKED AND GRADED UNDER THE SUPERVISION OF A LICENSED LAND SURVEYOR.
7. ALL RUNOFF FROM THE ROOF OF THE PROPOSED BUILDING SHALL BE CONNECTED TO THE PROPOSED STORM SYSTEM AS INDICATED.
8. STORM SEWER PIPE SHALL BE SLCPP (ADS N-12 OR EQUAL) UNLESS OTHERWISE INDICATED.
9. A QUALIFIED GEOTECHNICAL ENGINEER SHALL BE CONTRACTED TO MONITOR EARTHWORK & PAVING ACTIVITIES.
10. STORM WATER WILL BE COLLECTED IN AN UNDERGROUND DETENTION SYSTEM WHICH WILL OUTLET TO THE STORM SYSTEM IN THE 56TH AVE R/W.
11. COORDINATE ALL UTILITY CONNECTIONS WITH THE APPROPRIATE UTILITY PROVIDER PRIOR TO CONSTRUCTION. AT MINIMUM, SERVICES SHALL BE PLACED IN 4" PVC CONDUIT UNDER PAVED AREAS.
12. CONTRACTOR SHALL COORDINATE WITH ALLENDALE TOWNSHIP FOR THE ABANDONMENT OF AN EXISTING 1" WATER SERVICE WITHIN THE LAKE MICHIGAN DRIVE R/W. ALL WORK SHALL CONFORM WITH ALLENDALE TOWNSHIP SPECIFICATIONS.



DOWNSPOUT DETAIL

NOT TO SCALE

REVISIONS	
DATE	DESCRIPTION
07/12/22	ISSUED FOR SITE PLAN APPROVAL
08/09/22	REVISED PER TOWNSHIP REVIEW
08/18/22	REVISED PER TOWNSHIP REVIEW
08/31/22	REVISED PER TOWNSHIP REVIEW
09/19/22	REVISED PARKING PER TWP. REVIEW

NOT FOR CONSTRUCTION

PROPOSED SITE IMPROVEMENTS FOR:

Marcusse Const. Offices - 5630 Lake Michigan Dr.

SITE UTILITIES PLAN

Allendale Charter Township — Ottawa County — Michigan

For: Architectural Concepts

6650 Crossings Drive, SE
Grand Rapids, MI 49508
Phone: 616.554.122

8515 Ridgebluff Dr. SW
Byron Center, MI 49315
616-490-0329
ventureciviil.com

VENTURE
ENGINEERING, PLLC

PROJECT NO.	22124
DRAWN BY:	JAC
CHECKED BY:	JMB
DATE:	05/2022
SHEET NO.	C3

PROJECT INFORMATION

ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™ FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

MARCUSSE CONSTRUCTION OFFICES

ALLENDALE TWP., MI

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT: NORTH

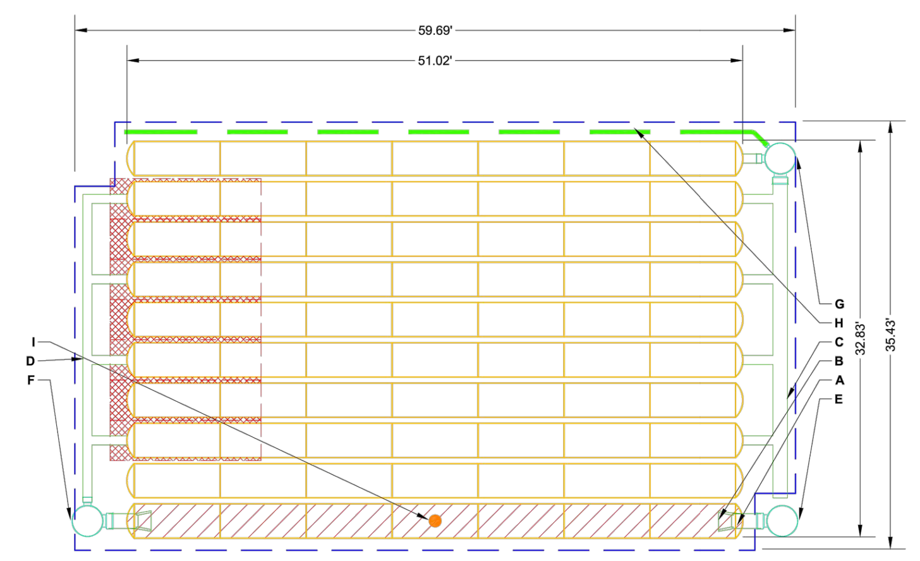
70	STORMTECH SC-310 CHAMBERS
20	STORMTECH SC-310 END CAPS
6	STONE ABOVE (in)
6	STONE BELOW (in)
40	STONE VOID
2563	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
2082	SYSTEM AREA (SF)
190.3	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS: NORTH

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	569.13
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	563.13
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	562.63
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	562.63
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	562.63
TOP OF STONE:	561.63
TOP OF SC-310 CHAMBER:	561.13
8" x 8" TOP MANIFOLD INVERT:	560.09
12" ISOLATOR ROW PLUS INVERT:	559.88
12" ISOLATOR ROW PLUS INVERT:	559.88
8" BOTTOM CONNECTION INVERT:	559.85
12" x 8" BOTTOM MANIFOLD INVERT (8" PIPE):	559.85
BOTTOM OF SC-310 CHAMBER:	559.80
12" x 8" BOTTOM MANIFOLD INVERT (12" PIPE):	559.50
UNDERDRAIN INVERT:	559.30
BOTTOM OF STONE:	559.30

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	12" BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 12" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	0.90"	
FLAMP	B	INSTALL FLAMP ON 12" ACCESS PIPE / PART#: SC31012RAMP (TYP 2 PLACES)		
MANIFOLD	C	12" x 8" REDUCING CONCENTRIC MOLDED FITTINGS (12" PIPE) 12" x 8" REDUCING CONCENTRIC MOLDED FITTINGS (8" PIPE)	-3.65" 0.60"	
MANIFOLD	D	8" x 8" TOP MANIFOLD, MOLDED FITTINGS	3.50"	
NYLOPLAST (INLET W/ ISO PLUS ROW)	E	30" DIAMETER (24.00" SUMP MIN)		
NYLOPLAST (INLET W/ ISO PLUS ROW)	F	30" DIAMETER (24.00" SUMP MIN)		2.3 CFS IN
NYLOPLAST (OUTLET)	G	30" DIAMETER (DESIGN BY ENGINEER)		2.7 CFS OUT
UNDERDRAIN	H	4" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
INSPECTION PORT	I	4" SEE DETAIL		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 12.50' OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES
- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

MARCUSSE CONSTRUCTION OFFICES — ALLENDALE TWP., MI — DATE: — PROJECT #: — DRAWN: MV — CHECKED: N/A

StormTech® Chamber System — 888-892-2694 | WWW.STORMTECH.COM — 4640 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473

SHEET 2 OF 7

PROPOSED LAYOUT: SOUTH

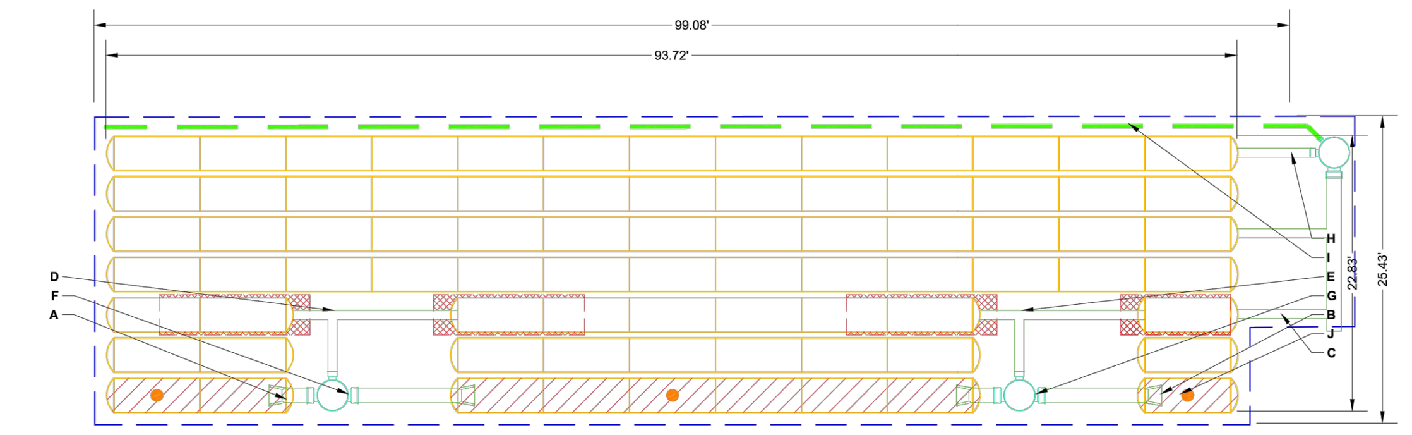
79	STORMTECH SC-310 CHAMBERS
26	STORMTECH SC-310 END CAPS
6	STONE ABOVE (in)
6	STONE BELOW (in)
40	STONE VOID
3026	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
2493	SYSTEM AREA (SF)
249.0	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS: SOUTH

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	569.53
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	563.53
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	563.03
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	563.03
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	563.03
TOP OF STONE:	562.03
TOP OF SC-310 CHAMBER:	561.53
8" x 8" TOP MANIFOLD INVERT:	560.49
8" x 8" TOP MANIFOLD INVERT:	560.49
12" ISOLATOR ROW PLUS INVERT:	560.28
12" ISOLATOR ROW PLUS INVERT:	560.28
8" BOTTOM CONNECTION INVERT:	560.25
12" x 8" BOTTOM MANIFOLD INVERT (8" PIPE):	560.25
BOTTOM OF SC-310 CHAMBER:	560.20
12" x 8" BOTTOM MANIFOLD INVERT (12" PIPE):	559.90
UNDERDRAIN INVERT:	559.70
BOTTOM OF STONE:	559.70

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	12" BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 12" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	0.90"	
FLAMP	B	INSTALL FLAMP ON 12" ACCESS PIPE / PART#: SC31012RAMP (TYP 4 PLACES)		
MANIFOLD	C	12" x 8" REDUCING CONCENTRIC MOLDED FITTINGS (12" PIPE) 12" x 8" REDUCING CONCENTRIC MOLDED FITTINGS (8" PIPE)	-3.65" 0.60"	
MANIFOLD	D	8" x 8" TOP MANIFOLD, MOLDED FITTINGS	3.50"	
MANIFOLD	E	8" x 8" TOP MANIFOLD, MOLDED FITTINGS	3.50"	
NYLOPLAST (INLET W/ ISO PLUS ROW)	F	30" DIAMETER (24.00" SUMP MIN)		0.9 CFS IN
NYLOPLAST (INLET W/ ISO PLUS ROW)	G	30" DIAMETER (24.00" SUMP MIN)		0.9 CFS IN
NYLOPLAST (OUTLET)	H	30" DIAMETER (DESIGN BY ENGINEER)		2.1 CFS OUT
UNDERDRAIN	I	4" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		
INSPECTION PORT	J	4" SEE DETAIL (TYP 3 PLACES)		



ISOLATOR ROW PLUS (SEE DETAIL/TYP 3 PLACES)

PLACE MINIMUM 12.50' OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

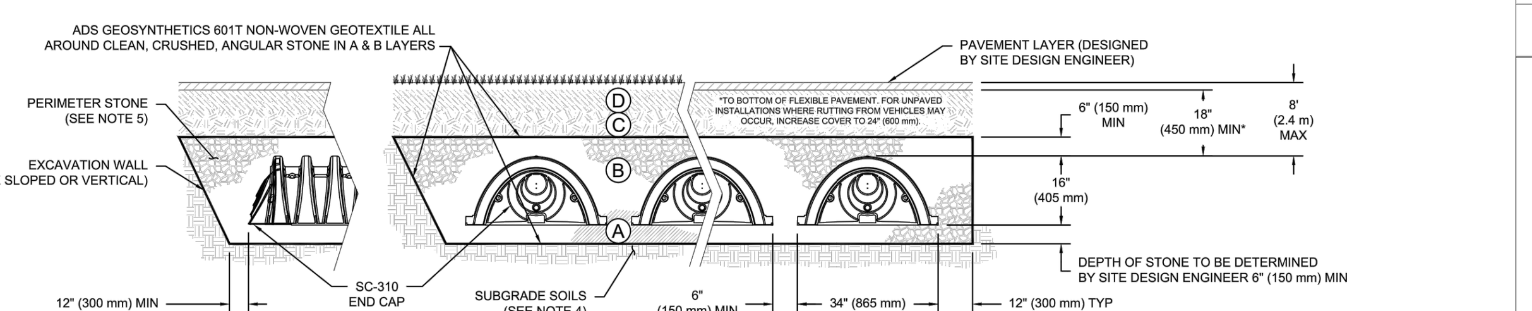
NOTES
- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

SHEET 3 OF 7

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

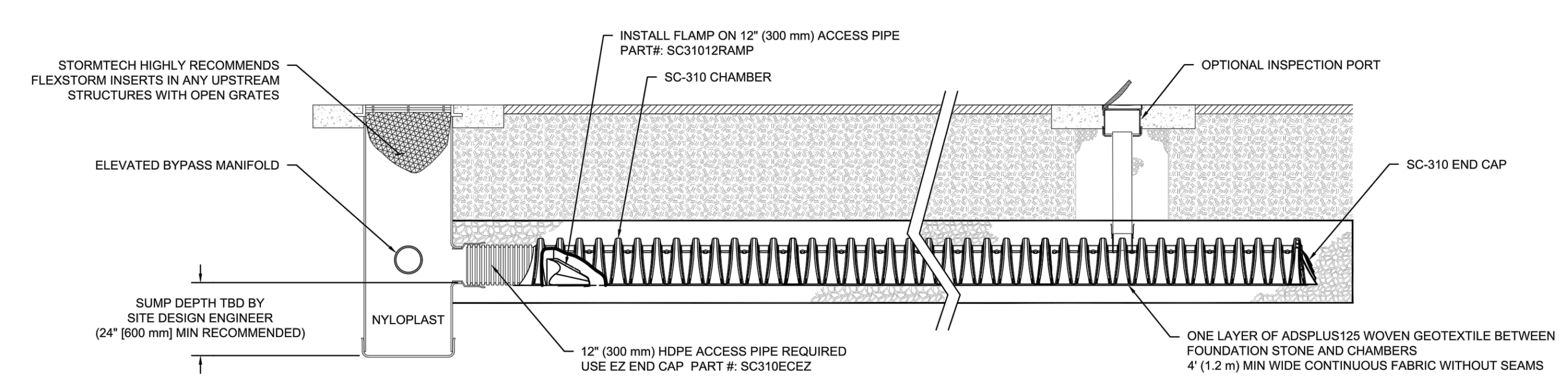
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

SHEET 4 OF 7



SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

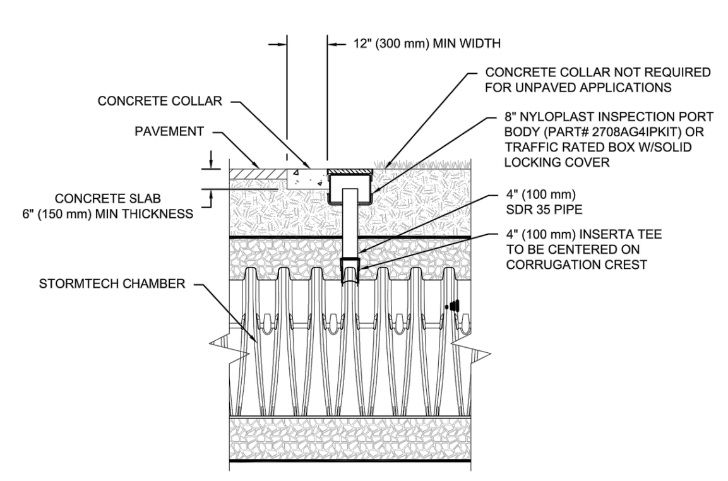
STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES
1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

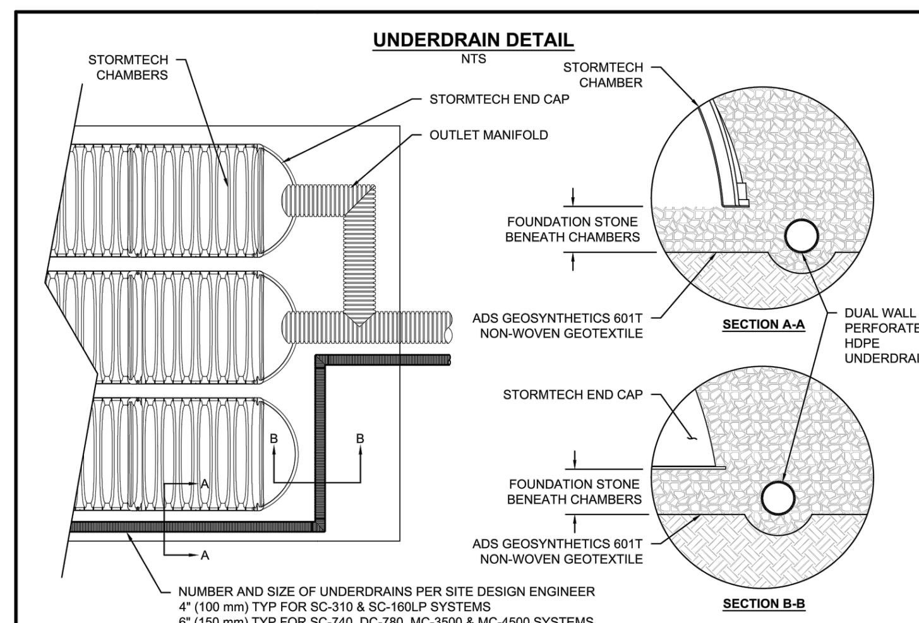


NOTE: INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

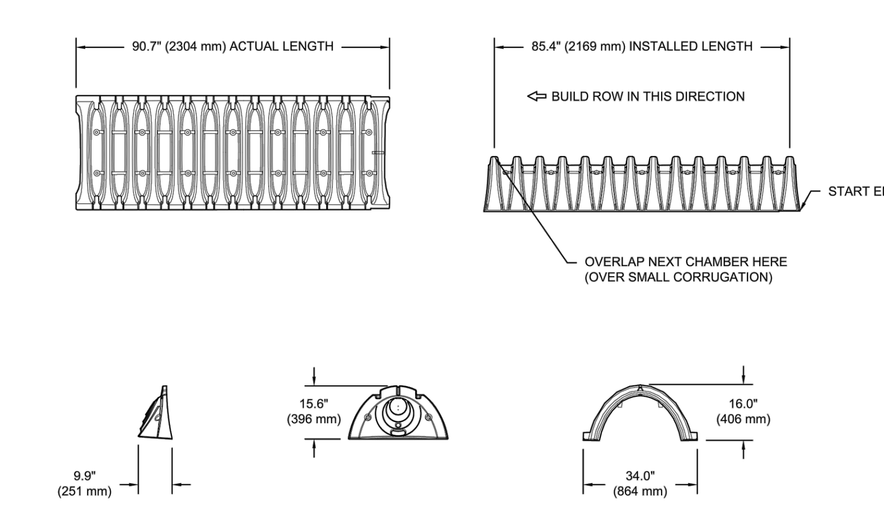
4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER)
NTS

SHEET 5 OF 7

UNDERDRAIN DETAIL
NTS



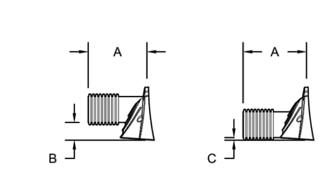
SC-310 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

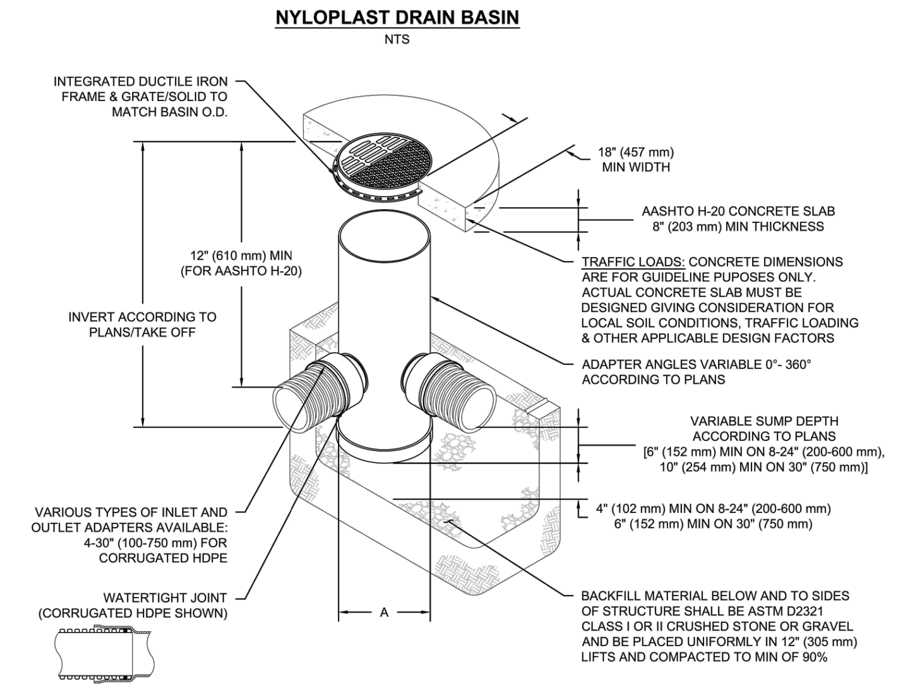
ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

SHEET 6 OF 7

NYLOPLAST DRAIN BASIN
NTS



NOTES
1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

Nyloplast® — 770-932-2443 | WWW.NYLOPLAST-US.COM — 4640 TRUEMAN BLVD HILLIARD, OH 43026 1-800-733-7473

SHEET 7 OF 7

NOT FOR CONSTRUCTION

REVISIONS

DATE	DESCRIPTION
07/12/22	ISSUED FOR SITE PLAN APPROVAL
08/09/22	REVISED PER TOWNSHIP REVIEW
08/18/22	REVISED PER TOWNSHIP REVIEW
08/31/22	REVISED PER TOWNSHIP REVIEW
09/19/22	REVISED PARKING PER TWP REVIEW

PROPOSED SITE IMPROVEMENTS FOR:

Marcusse Const. Offices - 5630 Lake Michigan Dr.

STORM WATER DETENTION DETAILS

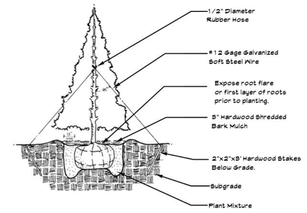
Allendale Charter Township — Ottawa County — Michigan

For: Architectural Concepts

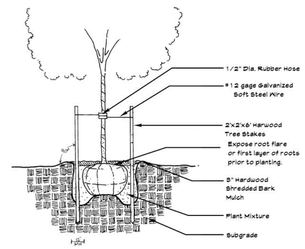
6650 Crossings Drive SE
Grand Rapids, MI 49508
Phone: 616.554.122

VENTURE ENGINEERING, PLLC
8515 Ridgebluff Dr. SW
Byron Center, MI 49315
616-490-0329
venturecivil.com

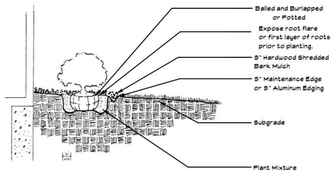
PROJECT NO.	22124
DRAWN BY:	JAC
CHECKED BY:	JMB
DATE:	05/2022
SHEET NO.	C4



Evergreen Planting Detail-5' and Taller



Deciduous Trees 3" Caliper and Smaller



Shrub Planting Detail

Ordinance Requirements:

Article 21A.04 F.1: Front Yard Requirements

For each 150' of road frontage 2 deciduous or evergreen trees, 2 ornamental trees and 3 shrubs per tree is required.

Required along Lake Michigan Drive: 276.68'/150 = 3.69 dec. or ever. trees, 3.69 ornamental trees and 22.14 shrubs

Provided along Lake Michigan Drive: 4 dec. trees, 4 ornamental trees and 22 shrubs

Required along 56th Ave.: 69.5'/150 = .93 dec. or ever. trees, .93 ornamental trees and 2.78 shrubs

Provided along 56th Ave.: 1 dec. tree, 1 ornamental tree and 3 shrubs

Article 21A.04 G: Off Street Parking Area Requirements

All parking areas consisting of 20 or more spaces shall have 20 sf of landscaping per space.

Required based on 27 parking spaces 540 sf of landscaping.

Provided based on 27 parking spaces 772 sf of landscaping.

Required one canopy tree per 20 parking spaces: 27 spaces/20 = 1.35 trees

Provided: 2 canopy trees

Section 21A.04 Greenbelt Requirements

For each 20 linear feet abutting the adjacent property, one tree shall be planted within the greenbelt. Trees shall be a mixture of evergreen, canopy and ornamental trees. Two shrubs shall be planted for each tree and each shrub shall be a minimum of thirty (30) inches at planting and reach a minimum height of five feet at maturity.

Required along West Property Line: 189.51'/20 = 9.48 dec. or ever. trees, or ornamental trees and 18.95 shrubs

Provided along West Property Line: 4 existing trees, 6 evergreen trees and 20 shrubs

Required along South Property Line: 334.16'/20 = 16.958 dec. or ever. trees, or ornamental trees and 33.916 shrubs

Provided along South Property Line: 4 existing trees, 7 evergreen trees, 6 ornamental trees and 35 shrubs

Article 24.05 F9:

I certify this landscape plan if installed as shown to be per ordinance

Notes:

1. All landscaping shall be installed by a qualified Landscape Contractor. Plant sizes specified on the landscape plan shall be the size planted. Plants smaller then specified will be rejected. Substitutions of any kind must be approved by the Landscape Architect.
2. All plantings shall be mulched with 3" shredded premium hardwood bark mulch. Trees in lawn areas shall receive a 6' diameter bark ring 3" deep.
3. The landscape contractor shall remove any twine that is wrapped around the trunk of a tree or shrub as well as the top third of any burlap. Remove excess soil on the top of the root ball to expose the root flare or first layer of roots prior to planting. Use a wire cutter to make 3-5 cuts in the wire basket to allow roots to grow through.
4. When planting trees in the lawn area or on the berm the existing soil within a 10 foot diameter shall be loosened by tilling or similar and amended with composted manure or peat at a depth of 6-12".
5. Planting areas shall be edged with a mechanical bed edger to define a border for the shedded bark mulch.
6. Parking Islands shall be back filled with at least 24" of topsoil. Amend the topsoil with composted manure and mix into the topsoil at a depth of 6-12". Any aggregate or stone from the construction of the parking lot shall be removed prior to backfill.
7. Lawn areas shall recieve at least 4" of topsoil and hydroseeded. Check with specifications for topsoil availability or contact project manager. Topsoil for lawns shall be appropriate for growing and sustaining a healthy lawn. All lawns shall be hydroseeded with a seed blend consisting of 30% Kentucky Bluegrass, 20% Perennial Ryegrass, 10% Hard Fescue, 20% Creeping Red Fescue and 20% Chewings Fescue.
8. All lawn and shrub bed areas shall be watered by an automatic irrigation system. The irrigation system shall be designed and installed by the Landscape Contractor. Shrub areas shall be irrigated with drip irrigation.
9. Maintenance of the landscape shall be provided for by the owner and include fertilizing of lawn and plant material, yearly pruning, top dressing of mulch areas every other year and provide 1" of water per week during the growing season.
10. Plant materials shall be chosen and installed in accordance with standards recommended by the County Cooperative Extension Service or American Nursery Association.

NORTH

Know what's below. Call before you dig.

DESIGN SCAPES
Residential and Commercial Landscape Design
7351 45th Avenue Hudsonville, Michigan 49426
616.662.0304

STATE OF MICHIGAN
JOYCE E. WEISE
LANDSCAPE ARCHITECT
No. 1202
LICENSED LANDSCAPE ARCHITECT

Landscape Plan Drawn By:
Joyce E. Weise PLA, ASLA

PROPOSED LANDSCAPE PLAN FOR:

Marcusse Construction Offices

5630 Lake Michigan Dr. Allendale, Michigan

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS

PROJECT NUMBER:
VE#: 22124

DRAWN BY:
Joyce E. Weise PLA, ASLA

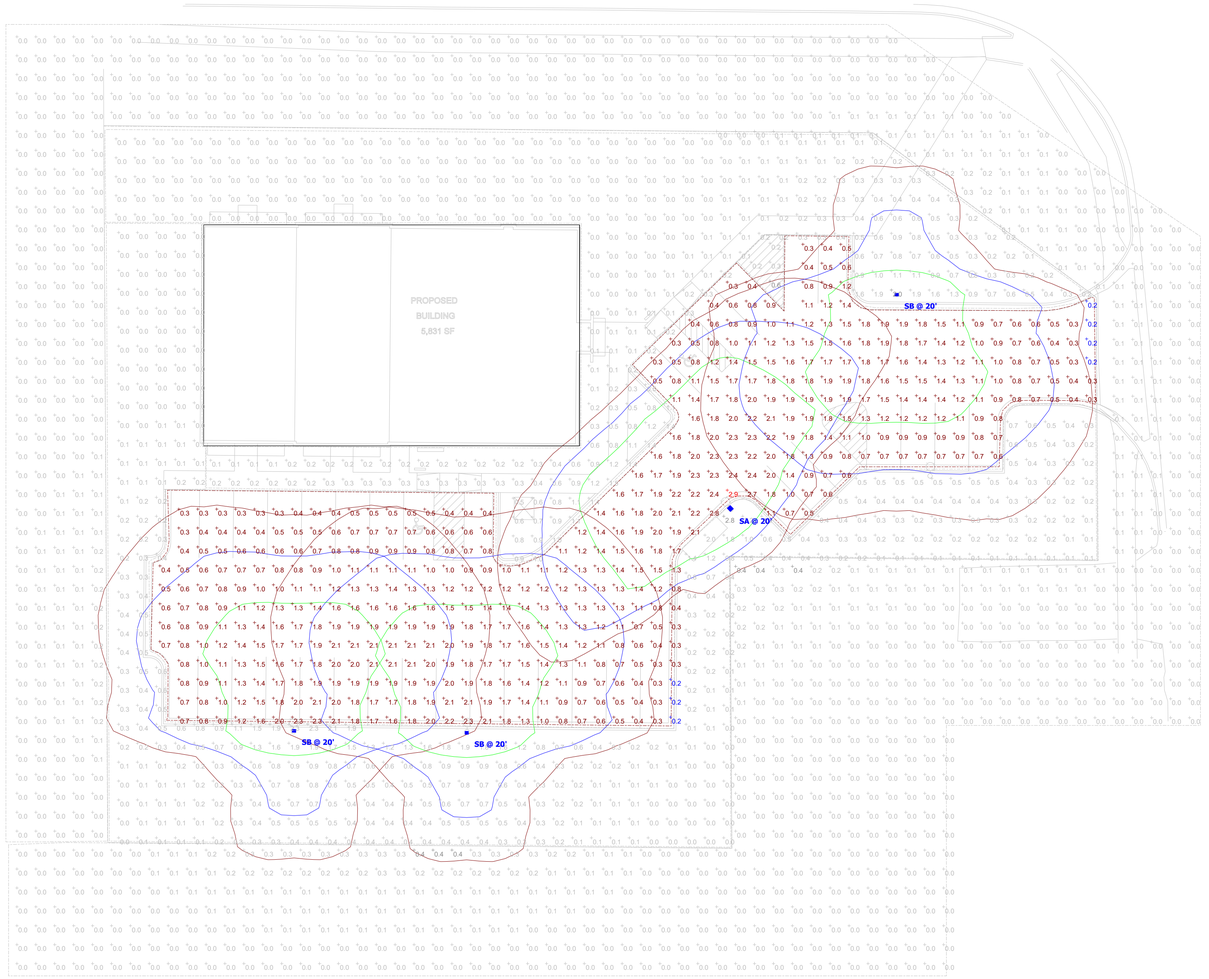
DRAWING DATE:
070722

ISSUED FOR:

07/12/22 Site Plan Approval
08/04/22 Site Plan Approval
08/25/22 Revision
09/25/22 Revision

SCALE
1"=20'

SHEET NUMBER
L-1



Plan View
Scale - 1" = 20ft

Schedule

Symbol	Label	Image	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage	Plot
	SA		1	Lithonia Lighting	DSX1 LED P2 40K T3M MVOLT HS	DSX1 LED P2 40K T3M MVOLT with houseside shield	1	7002	0.9	70	Max: 5014cd
	SB		3	Lithonia Lighting	DSX1 LED P1 40K TFTM MVOLT	DSX1 LED P1 40K TFTM MVOLT	1	6963	0.9	54	Max: 4825cd

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Property Line	+	0.0 fc	0.4 fc	0.0 fc	N/A	N/A
Parking	+	1.2 fc	2.9 fc	0.2 fc	14.5:1	6.0:1

VISUAL

MARCUSSE CONST. OFFICES
SITE PHOTOMETRICS

Designer
JAT - CLASSIC ENG
Date
09/20/2022
Scale
Not to Scale
Drawing No.

Summary

EXTERIOR WALL CONSTRUCTION @ BUMP-OUT:
- HORIZONTAL STEEL SIDING OR NICHIHA FIBER CEMENT WALL PANELS (SEE ELEVATIONS)
- TYVEK COMMERCIAL BUILDING WRAP (TAPE ALL SEAMS)
- 1/2" PLYWOOD SHEATHING
- 2 x 6 STUDS @ 16" O.C.
- 1" OX-15 STRUCTURAL SHEATHING (R-6) (TAPE ALL SEAMS)
- 2 x 6 STUDS @ 16" O.C.
- BLOWN-IN CELLULOSE INSULATION (R-21)
- 1/2" GYPSUM BOARD

EXTERIOR WALL CONSTRUCTION @ CORNER BUMP-OUT:
- HORIZONTAL STEEL SIDING OR NICHIHA FIBER CEMENT WALL PANELS (SEE ELEVATIONS)
- TYVEK COMMERCIAL BUILDING WRAP (TAPE ALL SEAMS)
- 1/2" PLYWOOD SHEATHING
- 2 x 8 STUDS @ 16" O.C.
- 1" OX-15 STRUCTURAL SHEATHING (R-6) (TAPE ALL SEAMS)
- 2 x 6 STUDS @ 16" O.C.
- BLOWN-IN CELLULOSE INSULATION (R-21)
- 1/2" GYPSUM BOARD

TYPICAL INTERIOR WALL CONSTRUCTION:
- 1/2" GYPSUM BOARD
- 2 x 4 STUDS @ 16" O.C.
- 3 1/2" FIBERGLASS BATT INSULATION
- 1/2" GYPSUM BOARD
(EXTEND WALL CONSTRUCTION UP TO UNDERSIDE OF TRUSSES ABOVE)
(2 x 6 STUDS WITH 6" FIBERGLASS BATT INSULATION WHERE NOTED)

TYPICAL BEARING WALL CONSTRUCTION:
- 1/2" GYPSUM BOARD
- 2 x 6 STUDS @ 16" O.C.
- 6" FIBERGLASS BATT INSULATION
- 1/2" GYPSUM BOARD
(EXTEND WALL CONSTRUCTION UP TO UNDERSIDE OF TRUSSES ABOVE)

TYPICAL EXTERIOR WALL CONSTRUCTION:
- LP SMARTSIDE BOARD AND BATTON SIDING OR NICHIHA FIBER CEMENT WALL PANELS (SEE ELEVATIONS)
- 1" OX-15 STRUCTURAL SHEATHING (R-6) (TAPE ALL SEAMS)
- 2 x 6 STUDS @ 16" O.C.
- BLOWN-IN CELLULOSE INSULATION (R-21)
- 1/2" GYPSUM BOARD

WOOD STAIR WITH HANDRAILS @ 34" A.F.F. AT EACH SIDE OF STAIR. EXTEND HANDRAILS AT TOP AND BOTTOM OF STAIR AND RETURN TO WALL.

WOOD STAIR WITH GUARDRAILS @ 42" A.F.F. AND 1 1/2" HANDRAILS @ 34" A.F.F. AT EACH SIDE OF STAIR. EXTEND HANDRAILS AT TOP AND BOTTOM OF STAIR AND RETURN TO WALL OR POST.

1/2" GYPSUM BOARD EACH SIDE OF 2 x 4 STUDS @ 16" O.C., TO 1" ABOVE STAIR NOSING, WITH GUARDRAIL ABOVE, SEE DETAIL #3/A-10

LOW HEIGHT WALL TO 42" A.F.F.

LINE OF CANOPY ABOVE

LINE OF FLOOR ABOVE

LINE OF BULKHEAD ABOVE

BEARING WALL CONSTRUCTION

DISPLAY TABLE BY OWNER

DISPLAY COUNTER AND TABLE BY OWNER

OPEN TO UPPER FLOOR ABOVE

RECEPTION FURNITURE BY OWNER

OFFICE FURNITURE BY OWNER, TYPICAL

WORKING KITCHEN DISPLAY AREA 110

DISPLAY AREA 102

DISPLAY AREA 103

EXTERIOR DISPLAY AREA 104

STAIR 105

CORRIDOR 106

MECHANICAL ROOM 107

PANTRY 109

CONFERENCE ROOM 111

RECEPTION 101

ENTRY 100

STAIR 134

STORAGE 133

MECHANICAL ROOM 131

H.C. UNISEX 132

H.C. UNISEX 122

MECHANICAL ROOM 121

STAIR 124

STORAGE 123

TENANT SPACE 'B' 130

TENANT SPACE 'A' 120

H.C. UNISEX 108

HI-LO EWC

WALL OVEN/MW COMBO

REF.

FRZ.

DW

OPENING

UP

PRELIMINARY NOT FOR CONSTRUCTION

DATE	REVISION
07-12-2022	FOR SITE PLAN APPROVAL

PROPOSED BUILDING FOR:

MARCUSSE CONSTRUCTION

5630 LAKE MICHIGAN DRIVE
ALLENDALE TWP., MI 49401

ARCHITECTURAL CONCEPTS

ARCHITECTURE
PLANNING
ENGINEERING

6650 CROSSING DRIVE, S.E.
GRAND RAPIDS, MI 49508
(616) 554-1222
FAX (616) 554-1225

DATE: JULY 12, 2022

PROJECT No. 22-07

SHEET No. A-1

1 A-1 MAIN FLOOR PLAN
SCALE: 1/4" = 1'-0"

EXTERIOR WALL CONSTRUCTION @ BUMP-OUT:
- HORIZONTAL STEEL SIDING OR NICHIHA FIBER CEMENT WALL PANELS (SEE ELEVATIONS)
- TYVEK COMMERCIAL BUILDING WRAP (TAPE ALL SEAMS)
- 7/16" PLYWOOD SHEATHING
- 2 x 6 STUDS @ 16" O.C.
- 1" OX-IS STRUCTURAL SHEATHING (R-6) (TAPE ALL SEAMS)
- 2 x 6 STUDS @ 16" O.C.
- BLOWN-IN CELLULOSE INSULATION (R-21)
- 5/8" GYPSUM BOARD

EXTERIOR WALL CONSTRUCTION @ CORNER BUMP-OUT:
- HORIZONTAL STEEL SIDING OR NICHIHA FIBER CEMENT WALL PANELS (SEE ELEVATIONS)
- TYVEK COMMERCIAL BUILDING WRAP (TAPE ALL SEAMS)
- 7/16" PLYWOOD SHEATHING
- 2 x 6 STUDS @ 16" O.C.
- 1" OX-IS STRUCTURAL SHEATHING (R-6) (TAPE ALL SEAMS)
- 2 x 6 STUDS @ 16" O.C.
- BLOWN-IN CELLULOSE INSULATION (R-21)
- 5/8" GYPSUM BOARD

TYPICAL INTERIOR WALL CONSTRUCTION:
- 5/8" GYPSUM BOARD
- 2 x 4 STUDS @ 16" O.C.
- 3 1/2" FIBERGLASS BATT INSULATION
- 5/8" GYPSUM BOARD

(EXTEND WALL CONSTRUCTION UP TO UNDERSIDE OF TRUSSES ABOVE)
(2 x 6 STUDS WITH 6" FIBERGLASS BATT INSULATION WHERE NOTED)

BEARING WALL CONSTRUCTION:
- 5/8" GYPSUM BOARD
- 2 x 6 STUDS @ 16" O.C.
- 6" FIBERGLASS BATT INSULATION
- 5/8" GYPSUM BOARD

(EXTEND WALL CONSTRUCTION UP TO UNDERSIDE OF TRUSSES ABOVE)

BEARING WALL CONSTRUCTION:
- 5/8" GYPSUM BOARD
- 2 x 6 STUDS @ 16" O.C.
- 6" FIBERGLASS BATT INSULATION
- 5/8" GYPSUM BOARD

(EXTEND WALL CONSTRUCTION UP TO UNDERSIDE OF TRUSSES ABOVE)

TYPICAL EXTERIOR WALL CONSTRUCTION:
- LP SMARTSIDE BOARD AND BATTON SIDING OR NICHIHA FIBER CEMENT WALL PANELS (SEE ELEVATIONS)
- 1" OX-IS STRUCTURAL SHEATHING (R-6) (TAPE ALL SEAMS)
- 2 x 6 STUDS @ 16" O.C.
- BLOWN-IN CELLULOSE INSULATION (R-21)
- 5/8" GYPSUM BOARD

OFFICE FURNITURE BY OWNER, TYPICAL

LOW HEIGHT WALL TO 42" A.F.F.

WOOD STAIR WITH HANDRAILS @ 34" A.F.F. AT EACH SIDE OF STAIR. EXTEND HANDRAILS AT TOP AND BOTTOM OF STAIR AND RETURN TO WALL.

5/8" GYPSUM BOARD EACH SIDE OF (2) END STRINGERS, SEE DETAIL #3/A-10

WOOD STAIR WITH CENTER GUARDRAIL @ 42" A.F.F. AND 1 1/2" HANDRAILS @ 36" A.F.F. AT EACH SIDE OF STAIR. EXTEND HANDRAILS AT TOP AND BOTTOM OF STAIR AND RETURN TO WALL OR POST.

WALL MOUNTED METAL ROOF ACCESS LADDER - PAINT

FUTURE DOOR

CANOPY BELOW

LINE OF WALL ABOVE

LINE OF WALL AND CANOPY BELOW

OPEN TO BELOW

6" STUDS

10 R. @ 6.8" = 5'-8"
9 T. @ 11" = 8'-3"

7 R. @ 6.8" = 3'-11 1/2"
6 T. @ 11" = 5'-6"

OFFICE 206 | OFFICE 205 | OFFICE 204
OFFICE 207 | OFFICE 203
OFFICE 208 | OFFICE 202
OPEN CONFERENCE 201
H.C. UNISEX 231 | H.C. UNISEX 221
BREAKROOM 200
TENANT SPACE 'B' 230
TENANT SPACE 'A' 220
H.C. UNISEX 209
OPEN OFFICE 217
LARGE OFFICE 216
STORAGE 210
OFFICE 211 | OFFICE 212 | OFFICE 213 | OFFICE 214 | OFFICE 215

1 UPPER FLOOR PLAN
A-2 SCALE: 1/4" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION

DATE	REVISION
07-12-2022	FOR SITE PLAN APPROVAL

PROPOSED BUILDING FOR:

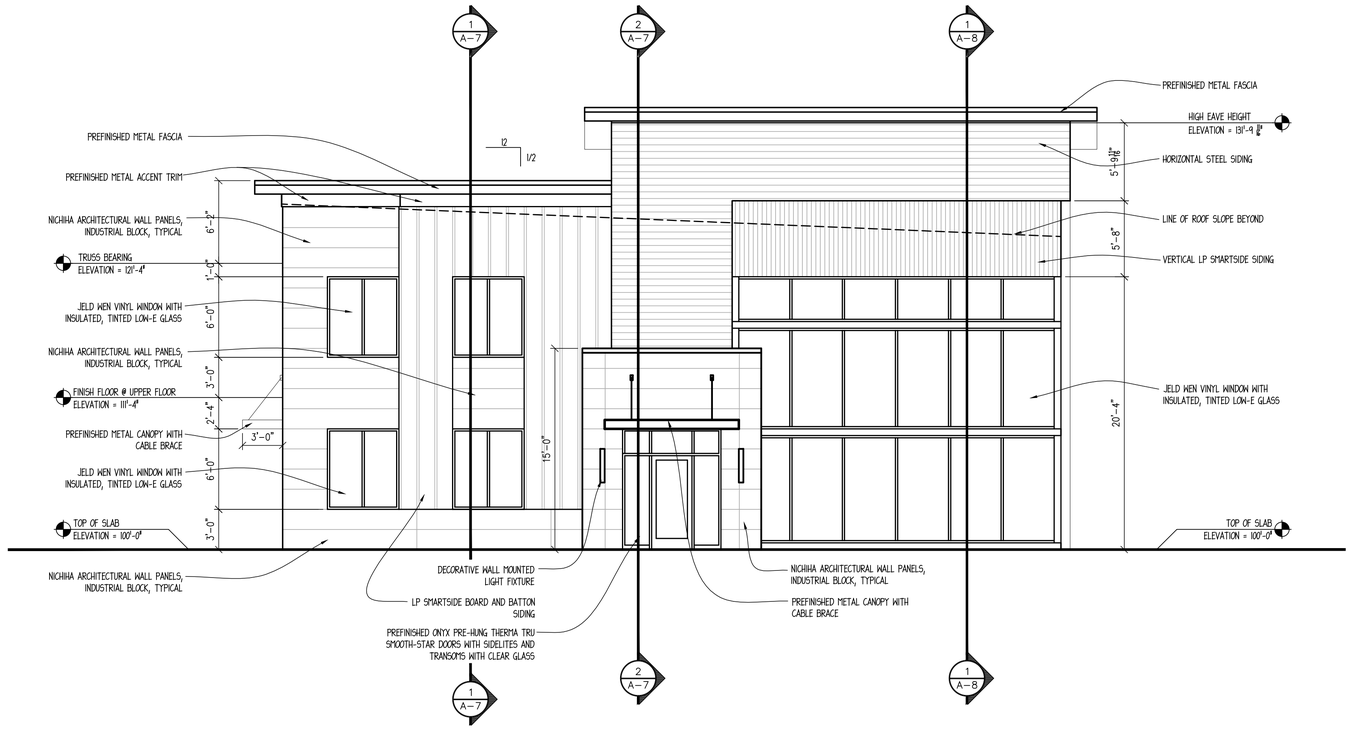
MARCUSSE CONSTRUCTION

5630 LAKE MICHIGAN DRIVE
ALLENDALE TWP., MI 49401

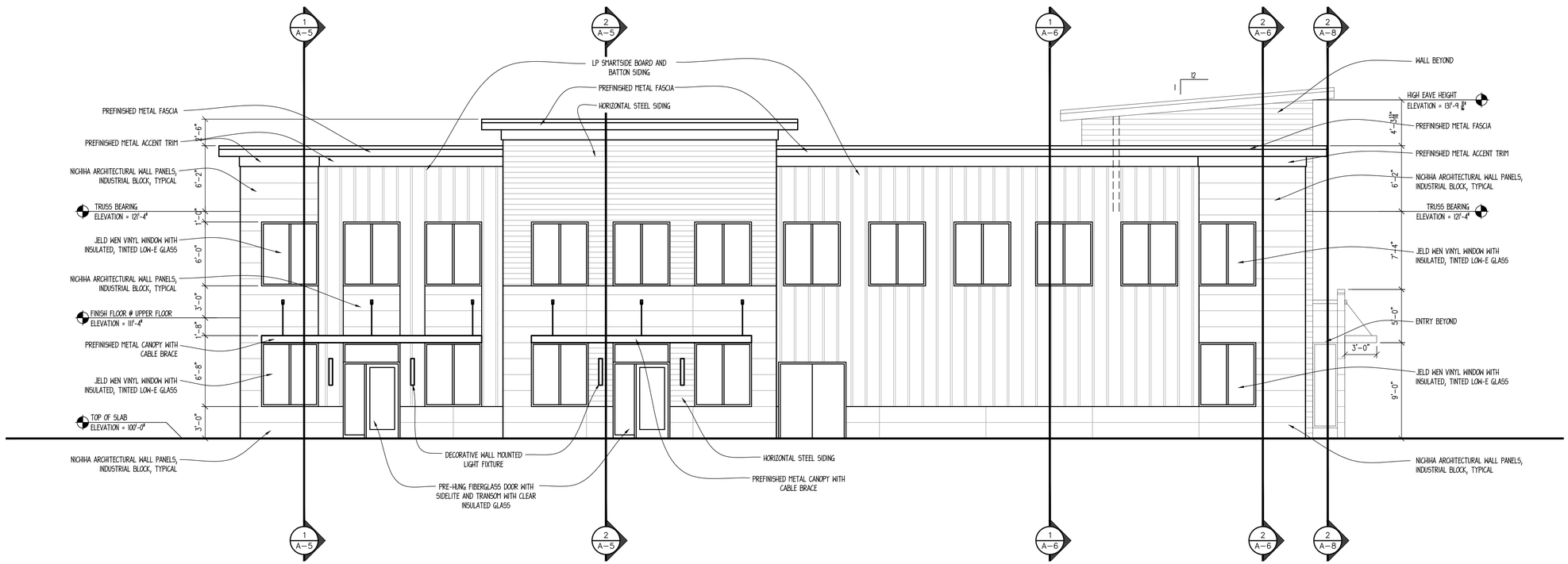
ARCHITECTURAL CONCEPTS
ARCHITECTURE
PLANNING
ENGINEERING
6650 CROSSING DRIVE, S.E.
GRAND RAPIDS, MI 49508
(616) 554-1222
FAX (616) 554-1225

DATE JULY 12, 2022 | PROJECT No. 22-07

SHEET No. A-2



2 A-3 EAST ELEVATION
SCALE: 3/16" = 1'-0"



1 A-3 SOUTH ELEVATION
SCALE: 3/16" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION

DATE	REVISION
07-12-2022	FOR SITE PLAN APPROVAL

PROPOSED BUILDING FOR:

MARCUSSE CONSTRUCTION

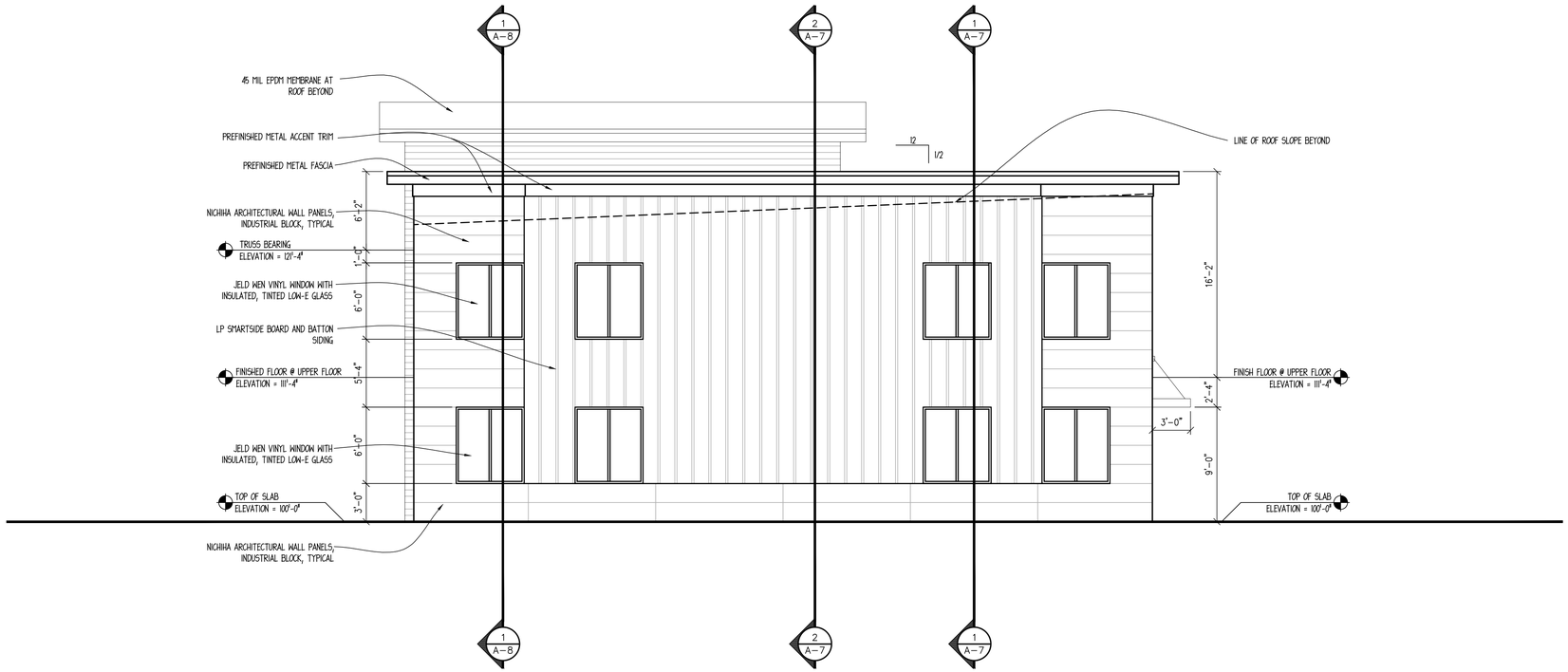
5630 LAKE MICHIGAN DRIVE
ALLENDALE TWP., MI 49401

ARCHITECTURAL CONCEPTS
ARCHITECTURE
PLANNING
ENGINEERING
6650 CROSSING DRIVE, S.E.
GRAND RAPIDS, MI 49508
(616) 554-1222
FAX (616) 554-1225

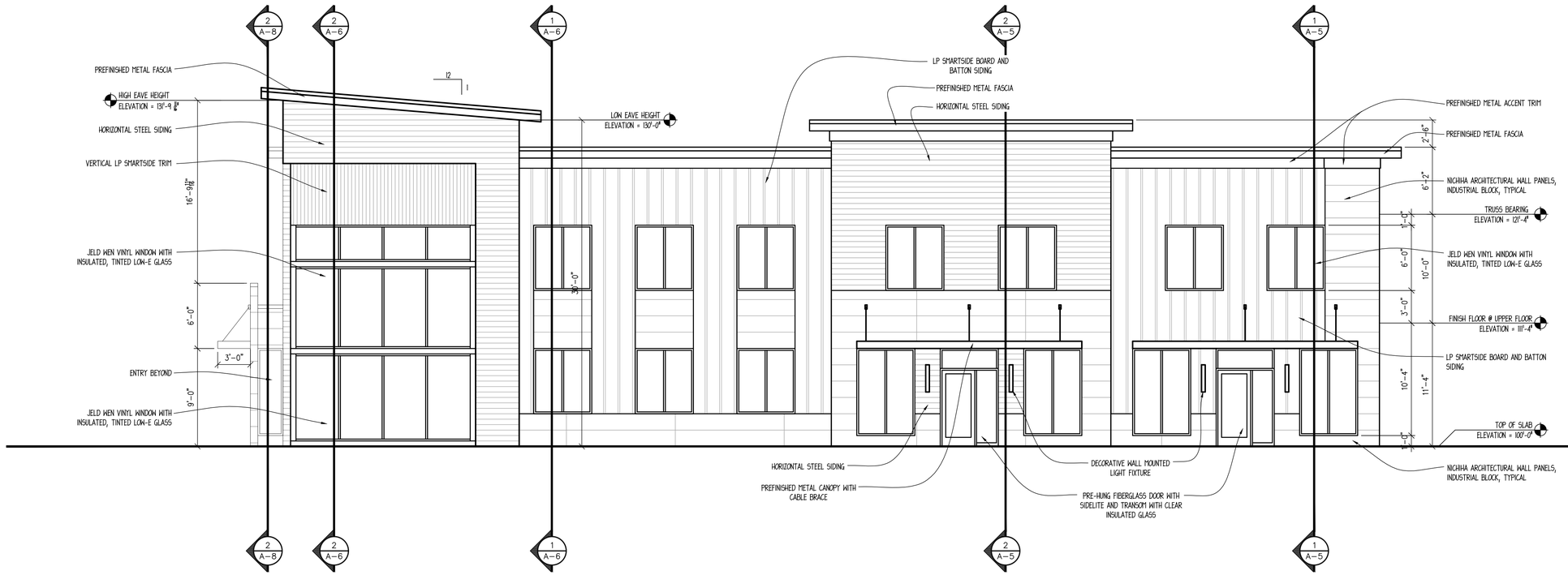
DATE JULY 12, 2022

PROJECT No. 22-07

SHEET No. A-3



2 A-4 WEST ELEVATION
SCALE: 3/16" = 1'-0"



1 A-4 NORTH ELEVATION
SCALE: 3/16" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION

DATE	REVISION
07-12-2022	FOR SITE PLAN APPROVAL

PROPOSED BUILDING FOR:

MARCUSSE CONSTRUCTION

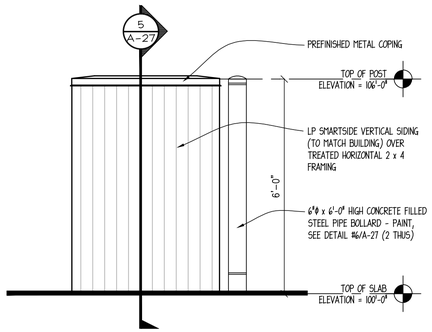
5630 LAKE MICHIGAN DRIVE
ALLENDALE TWP., MI 49401

ARCHITECTURAL CONCEPTS
ARCHITECTURE
PLANNING
ENGINEERING
6650 CROSSING DRIVE, S.E.
GRAND RAPIDS, MI 49508
(616) 554-1222
FAX (616) 554-1225

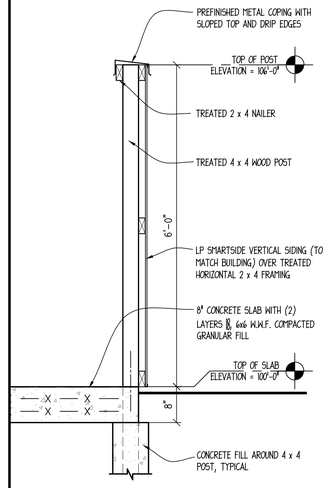
DATE JULY 12, 2022

PROJECT No. 22-07

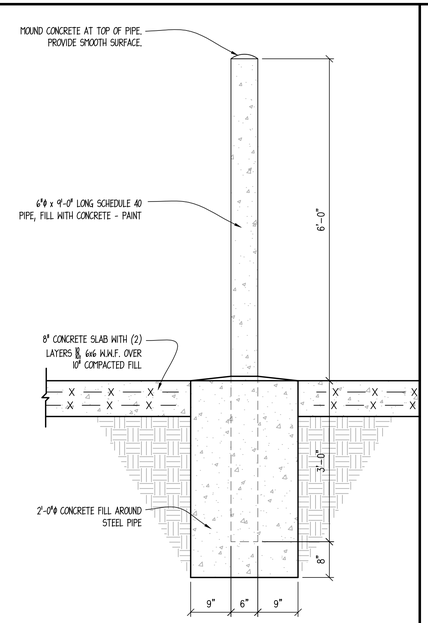
SHEET No. A-4



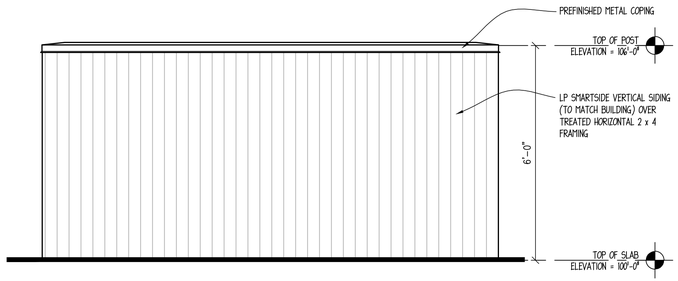
4 A-27 EAST ELEVATION (WEST ELEVATION SIM.)
SCALE: 1/2" = 1'-0"



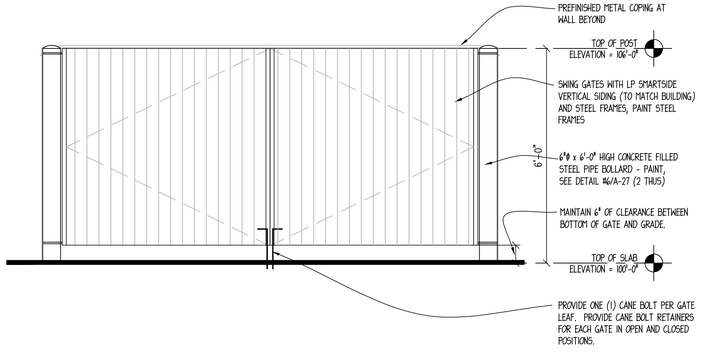
5 A-27 WALL SECTION
SCALE: 3/4" = 1'-0"



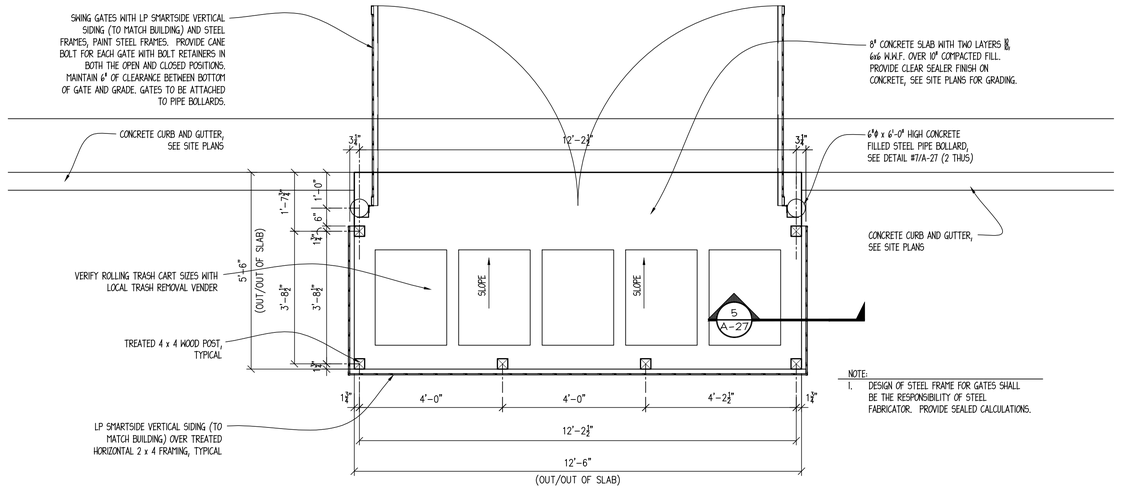
6 A-27 BOLLARD DETAIL
SCALE: 3/4" = 1'-0"



3 A-27 SOUTH ELEVATION
SCALE: 1/2" = 1'-0"



2 A-27 NORTH ELEVATION
SCALE: 1/2" = 1'-0"



1 A-27 DUMPSTER PLAN
SCALE: 1/2" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION

DATE	REVISION
08-09-2022	REVISED PER TOWNSHIP REVIEW
08-30-2022	REVISED PER TOWNSHIP REVIEW

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DATE: AUGUST 9, 2022
PROJECT No.: 22-07
SHEET No.: A-27

APPLICATION OF MATERIALS

5630 Lake Michigan Drive
Allendale TWP., MI 49401

APPLICATION OF MATERIALS

EM1 — Fascia and Soffit

Exterior Material per Specifications
Quality Edge
Fascia and Soffit
Material: Steel, Aluminum
Texture: Smooth
Finish: Pre-Finished
Color: Black
Link: https://qualityedge.com/color/518-black

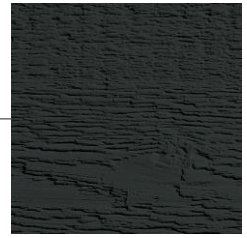
EM2 — 5" Steel Horizontal Siding

Exterior Material per Specifications
Quality Edge
Vesta Steel Siding
Material: Steel
Texture: Smooth
Finish: Matte
Color: 5" Plank 482 Gilded Grain
Link: https://qualityedge.com/color/482-gilded-grain

EM3 — Nichiha Wall Panels

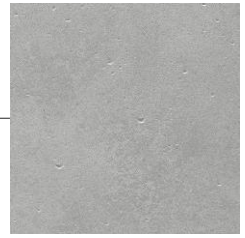
Exterior Material per Specifications
Nichiha
Architectural Wall Panels
Material: Composite
Texture: Smooth
Finish: High Gloss
Color: Miraia. Designer Series. Onyx
Link: https://www.nichiha.com/product/miraia

EM4 — LP Smart Side



Exterior Material per Specifications
LP Smart Side
Panel and Trim (Board and Batten)
Material: Engineered Wood
Texture: Cedar
Finish: Pre-Finished
Color: Abyss Black
Link: https://lpcorp.com/products/exterior/siding-trim/products/panel-vertical-siding

EM5 — Nichiha Wall Panels



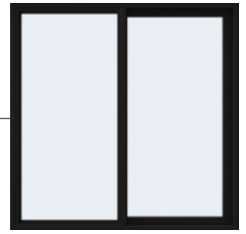
Exterior Material per Specifications
Nichiha
Architectural Wall Panels
Material: Fiber Cement
Texture: Concrete Look
Finish: Matte
Color: Industrial Block. Concrete Series. Gray
Link: https://www.nichiha.com/product/industrialblock

EM6 — Metal Canopy

Example

Exterior Material per Specifications
Aluminum Fascia
Vesta Steel Soffit
Fascia Color: Black
Soffit Color: 482 Gilded Grain
Decorative Metal Bracket and Cable Brace

W1 — Window

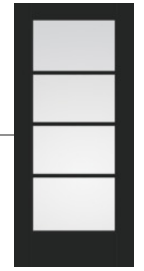


Exterior Material per Specifications
Window Example
Jeld Wen
Material: Vinyl
Texture: Smooth
Exterior Color: Black
Interior Color: White

W2 — Window

Exterior Material per Specifications
Window Example
North Star
Material: Vinyl
Texture: Smooth
Exterior Color: Black
Interior Color: Black

D1 — Exterior Door



Exterior Material per Specifications
Exterior Door Example with Sidelite(s) and Transoms
Therma Tru
Material: Fiberglass
Texture: Smooth
Finish: Pre-Finished
Interior/Exterior Color: Onyx
Glass: Clear

MARCUSSE CONSTRUCTION

Marcusse Construction Offices

Allendale Township, Ottawa County, Michigan

Storm Water Management Design

August 15, 2021

Project No.: 22124

These calculations were prepared for submittal to the Ottawa County Water Resources Commissioner by:

VENTURE
ENGINEERING, PLLC

8515 Ridgebluff Dr SW • Byron Center MI 49315 • venturecivil.com • 616-490-0329

Design Summary:

A. The current OCWRC storm water management standards were utilized for design.
B. Storm water detention for a 100-year rainfall event will be provided for storm water management.
C. The channel protection volume will be met utilizing retention below the detention outlet elevation.
D. The detention system will outlet to an existing storm system in 56th Avenue.
E. Infiltration testing for storm water management design was completed by SME. Infiltration testing was completed with the double ring infiltrometer method. Site soils are sand and infiltration rates ranged from 6.5 in/hour to 7.2 in/hour.
F. An infiltration rate of 3.25 in/hour has been utilized in the calculations. This rate is half of the lowest field measured infiltration rate.
G. The water table was determined during the infiltration testing to be at an elevation of approximately 654.90. The bottom of the stone in the Storm Tech system will be constructed at an elevation of 659.30 to provide a separation of 4.4 feet.
H. All runoff from the proposed buildings will be collected in the storm system or directly discharged to the retention area.

LGROW Design Spreadsheet
Ottawa County Water Resources Commissioner

Version 3.4

Instructions

1) After opening the spreadsheet you will need to enable the use of an embedded macro. Look for security warning above and click "Enable Content."
2) Data is entered in yellow cells. Green cells allow selection of items from pulldown menus or buttons.
3) To clear all input data entered in a worksheet, click the Clear Worksheet button at the top of the page and hit the delete key.
4) Comments are indicated by red triangles in cells. Further direction is provided in the LGROW Design Spreadsheet Tutorial.
5) The spreadsheet can be used to model a single discharge point from the site including structural BMPs in series or parallel.

Project Description

Development Name	Marcusse Construction Offices	**Design Firm**	Venture Engineering, PLLC
Address/Location	5630 Lake Michigan Drive	**Engineer**	Jeff Brinks
Developer/Owner		**Date**	6/9/2022

Run

	Select if Yes	Notes
Drainage District	☐	
Watershed Policy	☐	
Redevelopment/Addition	☐	
MS4	☐	
Hotspot	☐	
Coldwater Stream	☐	

Sensitive Areas

Description	Notes

Channel Protection Volume Basis

Pre-development Land Use Definition	Existing	Notes
Not Required	☐	
Provided Offsite	☐	
Alternative Approach	☐	

Subcatchment Connectivity

Number of Subcatchments 1

Subcatchment Name	Downstream Subcatchment	Subcatchment Description
Sub1	none	Site

LGROW Design Spreadsheet
Ottawa County Water Resources Commissioner

Subcatchment Hydrology Summary

Subcatchment Name	Existing			Developed		
	Area [ac]	% Impervious	Average CN	Area [ac]	% Impervious	Average CN
Sub1	0.94	0%	39	0.94	48%	67
Site Totals and Averages:	**0.94**	**0%**	**39**	**0.94**	**48%**	**67**

Channel Protection Volume from Structural BMPs

Subcatchment Name	Channel Protection Volume [cft]			
	Required	Upstream	Credited	Unmet
Sub1	3,889	0	3,889	0
Total	**3,889**		**3,889**	

Percent of Channel Protection Volume met by Onsite Retention	**100**
Required Extended Detention Volume [cft]	**0**
Required Extended Detention Release Rate [cfs]	**0.000**
1-year Existing Peak Discharge [cfs]	0.00

Water Quality Volume and TSS Removal

Subcatchment Name	Water Quality Volume [cft]	Volume Met	TSS			
			Generated	Upstream	Total	Removed
Sub1	1,537	Yes	1,537	0	1,537	1,230
Total	**1,537**	**Yes**	**1,537**			**1,230**
					TSS Removal Efficiency [%]	**80**
					80% TSS removal met?	**No**

LGROW Design Spreadsheet
Ottawa County Water Resources Commissioner

GVMC

Sub1: Site

Runoff

Click here for documentation

Existing Land Use	HSG	Area	Units	Curve Number Existing	Curve Number Pre-settlement
Open spaces (grass cover) - good	A	40,951	sqft	39	30
		0.94	acre	39	30

Developed Land Use	HSG	Area	Units	Curve Number	Notes
DIST: Impervious (paved parking lot, roof, driveway, etc.)	A	19,775	sqft	98	
S-BMP: Open spaces (grass cover) - good	A	21,176	sqft	39	
Notes:		0.94	acre	67	

Subcatchment Runoff Volume for Developed Land Use

Rainfall Frequency	1-year	2-year	10-year	25-year	100-year
Volume from this Subcatchment [cft]	3,333	3,889	6,122	8,102	12,270

Channel Protection Volume

Click here for documentation

Required Channel Protection Volume

		2-year Runoff Volumes [cft]	
Is Channel Protection Volume required? If no, provide reason.	Yes	Developed	Pre-developed
Required this Subcatchment [cft]	**3,889**	3,889	0
Unmet from Upstream Subcatchments [cft]	**0**		
Required Channel Protection Volume [cft]	**3,889**		

Structural BMPs used to meet Channel Protection Volume

Structural BMP	A Infiltration Area [sqft]	V Storage Volume [cft]	i Design Infiltration Rate [in/hr]	Drain Time [hr]	Volume Retained [cft]
Infiltration Bed	4,939	500	3.25	0.37	3,918
				N.A.	
				N.A.	
				N.A.	
Totals		**500**			**3,918**

Credited Channel Protection Volume	**3,889**
Percentage of Channel Protection Volume Met by Retention	**100%**

Notes:

Water Quality Volume

Click here for documentation

		Paved [ac]	Pitched Roofs [ac]	Flat Roofs/Unpaved [ac]
Sum of Directly Connected Impervious Area [ac]	0.45	0.32		0.13
Sum of Directly Connected Disturbed Pervious Area [ac]	0.00			

Required Volume this Subcatchment [cft]	**1,537**	**TSS Generated this Subcatchment**	**1,537**
Volume from Upstream Subcatchments [cft]	**0**	**TSS from Upstream Subcatchments**	**0**
Water Quality Volume to be Treated [cft]	**1,537**	**TSS to be Treated**	**1,537**

TSS Accounting

BMPs Used in Treatment Train	Treated Water Volume [cft]	TSS Removal Efficiency Tabulated	TSS Removal Efficiency Third-Party	TSS Removal Efficiency Effective	TSS Removed
PASS: Water Quality Device	1,537	--	80	80	1,230
					0
					0
					0
					0

Released Water Volume [cft]	**1,537**	**Total TSS Removed**	**1,230**
Water Quality Volume met?	**Yes**	**TSS Remaining**	**307**
		TSS Removal Efficiency [%]	**80**

Notes:

LGROW Design Spreadsheet
Ottawa County Water Resources Commissioner

GVMC

Time-of-Concentration

Click here for documentation

	Worksheet	User	Value Used
Existing [hr]	0.00		**0.10**
Developed [hr]	0.00		**0.10**

Method Selected: User

Notes:

Flood Control Volume

Click here for documentation

Detention - Routing Method

Design Storm	100-year
Total Contributing Area [ac]	0.94
Developed Peak Discharge [cfs]	2.20

Allowable Discharge Worksheet		Select
Standard Discharge [cfs] - 0.13 [cfs/ac]	0.12	◉
Alternate Discharge [cfs]		○

Credited BMP Retention Volume	Volume Retained ← This should normally be set to "Volume Retained"
Detention Required?	Yes
Allowable Discharge [cfs]	0.12
Required Storage Volume [cft]	4,350
Time to Drain [hrs]	19.7

Calculate Detention Storage Volume — Calculated

No Emergency Overflow Routes: ☐

Retention - Summary of Volumes

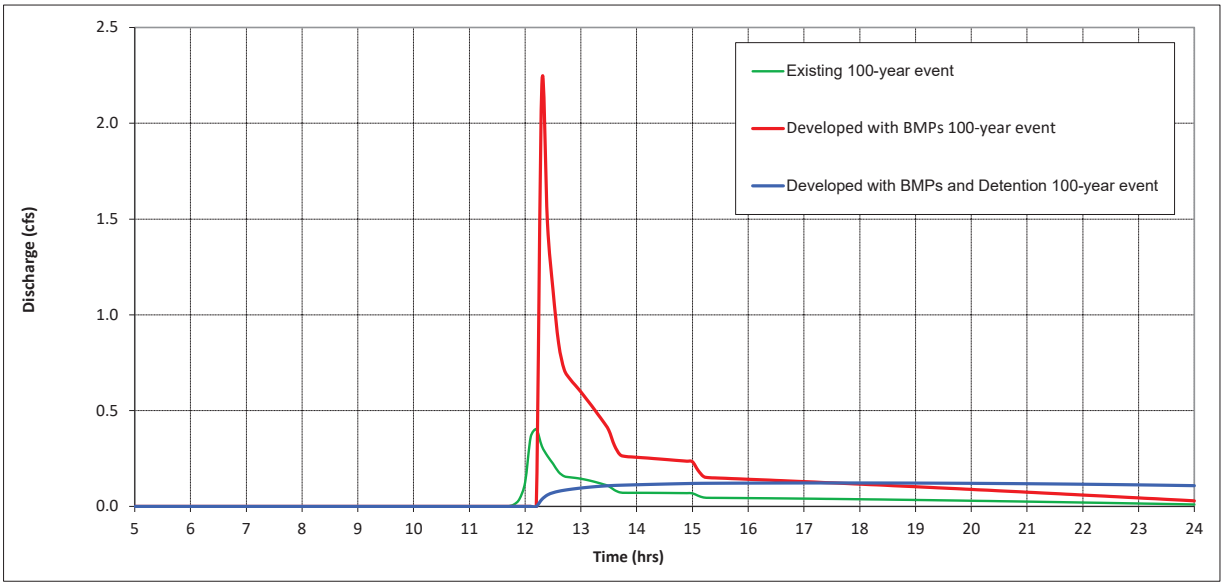
Design Storm	100-year
Site Runoff Volume [cft]	12,270
BMP Storage Volume [cft]	500
BMP Infiltrating Volume [cft]	3,418
Total Volume Provided [cft]	3,918
Runoff Volume Retained by BMPs [cft]	3,918
Unretained Runoff Volume [cft]	8,352

Required Storage Volume [cft]:

Minimum "BMP Storage Volume" that results in zero "Unretained Runoff Volume"

Notes:

Hydrograph



Plot Event: 100-year

LGROW Design Spreadsheet
Ottawa County Water Resources Commissioner

Results Summary

Volume Units: cft

Rainfall

Source and Distribution	24-hour, NOAA Atlas 14 at West Olive, MI, NRCS MSE4				
Rainfall Frequency	1-year	2-year	10-year	25-year	100-year
Rainfall Depth [in]	2.25	2.59	3.91	4.95	6.90

Pre-settlement Land Use

Time-of-Concentration [hr]	0.10				
Average Runoff [in]	0.00	0.00	0.00	0.00	0.20
Peak Discharge [cfs]	0.00	0.00	0.00	0.00	0.04
Runoff Volume [cft]	0	0	0	12	666

Existing Land Use

Time-of-Concentration [hr]	0.10				
Percent Impervious	0%	0%	0%	0%	0%
Average Runoff [in]	0.00	0.00	0.04	0.19	0.73
Peak Discharge [cfs]	0.00	0.00	0.00	0.05	0.40
Runoff Volume [cft]	0	0	127	649	2,501

Developed Land Use

Time-of-Concentration [hr]	0.10				
Percent Impervious	48%	48%	48%	48%	48%
Average Runoff [in]	0.98	1.14	1.79	2.37	3.60
Peak Discharge [cfs]	0.12	0.28	1.18	2.19	3.99
Runoff Volume [cft]	3,333	3,889	6,122	8,102	12,270
Volume Retained by BMPs [cft]	3,333	3,889	3,918	3,918	3,918
BMP Volume Credited to Detention [cft]	3,333	3,889	3,918	3,918	3,918
Volume Released [cft]	0	0	2,204	4,184	8,352
Peak Discharge Released [cfs]	0.00	0.00	0.11	0.41	2.20

Developed with BMPs and Detention

Peak Discharge Released [cfs]	0.00	0.00	0.05	0.08	0.12
Maximum Volume Detained [cft]	0	0	856	1,737	4,350

Storm Water Outlet Structure & Overflow Design

Project No. **22124**

Proj. Name: **Marcusse Construction Office Building**

Date: 06/15/22

Computed by: JMB

Site Information:

Site Area = 0.94 acres
40951 s.f.

Impervious Surface Calculation:

Proposed =	19775 s.f.		
Future =	0 s.f.		
Total Impervious Surface =	19775 s.f.	=	0.45 acres

Determine Runoff Coefficient "C":

Total Site Area (acres) = 0.94

Determine Runoff Coefficient "C":	Area	Coeff	C_w
Impervious surface =	0.45	0.95	0.43
Pervious surface =	0.49	0.2	0.10

"C" = C_w/Total A "C" = 0.56

Outlet Sizing:

Overflow pipe will be a riser pipe placed in an outlet structure discharging to an existing storm sewer at the NE corner of the property.

Allowable release rate determined by LGROW Spreadsheet:

$Q_{Allowed}$, cfs
0.12

Orifice to Outlet Pipe

Det. Basin	Event	Qallow, cfs	h, ft	A, sf	Orifice Dia, (in)	
B 1	100	0.120	2.03	0.017	1.79	**Round to 1.75"**

Where: $Q=0.6*A_{orifice}*(2*g*h)^{0.5}$

gravity, g = 32.20 (ft/s^{2})

Overflow Weir and Riser Design:

The overflow device will be sized to convey Q_{10yr} for the contributing area.

Determine the 10-year Peak Runoff

Drainage Area	Area, ac	C	I, 10-yr, in/hr	Q_{10yr}, cfs
DA 100	0.94	0.56	3.57	**1.89**

Where: Q=C*i*A

Q = Peak Runoff Rate (cfs)

C = Composite Runoff Coefficient

I = Average Rainfall Intensity (in/hr)

A = Drainage Area (acres)

Assume tc=15 min and i= Intensity (in/hr) from MDOT Drainage Manual Appendix 3 B

Design For Sharp Crested Weir (Riser Pipe)					
Det. Basin	Dia, in	L, ft	H, ft	Q_{weir}, cfs	
B 1	12	3.14	0.50	3.67	**>Q_{10yr}. Good**

Where: Q_{weir}=C*L*H^(3/2)
C=3.3 for sharp crested weirs
H= depth of water above weir, ft
L=Length of Weir = perimeter of opening of the riser pipe.

Overflow Pipe Capacity:

Check outlet using Manning's Method:

Q_{out} = (1.49/n)*A*R^(2/3)*S^(0.5)

Dia, in	n	A, sf	R	S
12	0.013	0.79	0.25	0.037

Q_{out} = *6.85* cfs **>Q_{10yr}. GOOD**

Emergency Overflow Weir Design:

The overflow will be sized to convey Q_{100yr} for the contributing area.

Determine the 100-year Peak Runoff				
Drainage Area	Area, ac	C	I, 100-yr, in/hr	Q_{100yr}, cfs
DA1	0.94	0.56	4.96	**2.62**

Where: Q=C*i*A
Q = Peak Runoff Rate (cfs)
C = Composite Runoff Coefficient
I = Average Rainfall Intensity (in/hr)
A = Drainage Area (acres)
Assume tc=15 min and i= Intensity (in/hr) from MDOT Drainage Manual Appendix 3 B

The 12" riser pipe and 12" outlet have sufficient capacity to convey the 100-yr event.

Project: **Marcusse Const. Offices - North**

Chamber Model -	SC-310	
Units -	Imperial	
	124	
Number of chambers -	70	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	559.30	ft
Amount of Stone Above Chambers -	6	in
Amount of Stone Below Chambers -	6	in
	6	
Area of system -	2082	sf Min. Area - 1661 sf min. area

StormTech SC-310 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Total Chamber *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch & St *(cubic feet)*	Cumulative Chamber *(cubic feet)*	Elevation *(feet)*
28	0.00	0.00	69.40	69.40	2563.12	561.63
27	0.00	0.00	69.40	69.40	2493.72	561.55
26	0.00	0.00	69.40	69.40	2424.32	561.47
25	0.00	0.00	69.40	69.40	2354.92	561.38
24	0.00	0.00	69.40	69.40	2285.52	561.30
23	0.00	0.00	69.40	69.40	2216.12	561.22
22	0.06	4.12	67.75	71.87	2146.72	561.13
21	0.15	10.83	65.07	75.90	2074.86	561.05
20	0.27	18.61	61.96	80.57	1998.96	560.97
19	0.54	38.14	54.15	92.28	1918.39	560.88
18	0.70	49.28	49.69	98.97	1826.11	560.80
17	0.82	57.72	46.31	104.03	1727.14	560.72
16	0.92	64.72	43.51	108.23	1623.11	560.63
15	1.01	71.05	40.98	112.03	1514.88	560.55
14	1.09	76.62	38.75	115.37	1402.85	560.47
13	1.15	80.80	37.08	117.88	1287.48	560.38
12	1.21	85.05	35.38	120.43	1169.60	560.30
11	1.27	89.24	33.70	122.95	1049.17	560.22
10	1.32	92.72	32.31	125.03	926.22	560.13
9	1.36	95.55	31.18	126.73	801.19	560.05
8	1.40	98.35	30.06	128.41	674.46	559.97
7	1.43	100.42	29.23	129.65	546.05	559.88
6	0.00	0.00	69.40	69.40	416.40	559.80
5	0.00	0.00	69.40	69.40	347.00	559.72
4	0.00	0.00	69.40	69.40	277.60	559.63
3	0.00	0.00	69.40	69.40	208.20	559.55
2	0.00	0.00	69.40	69.40	138.80	559.47
1	0.00	0.00	69.40	69.40	69.40	559.38

Project: **Marcusse Const. Offices - South**

Chamber Model -	SC-310	
Units -	Imperial	
	124	
Number of chambers -	79	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	559.70	ft
Amount of Stone Above Chambers -	6	in
Amount of Stone Below Chambers -	6	in
	6	
Area of system -	2493	sf Min. Area - 1874 sf min. area

StormTech SC-310 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Total Chamber *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch & St *(cubic feet)*	Cumulative Chamber *(cubic feet)*	Elevation *(feet)*
28	0.00	0.00	83.10	83.10	3026.43	562.03
27	0.00	0.00	83.10	83.10	2943.33	561.95
26	0.00	0.00	83.10	83.10	2860.23	561.87
25	0.00	0.00	83.10	83.10	2777.13	561.78
24	0.00	0.00	83.10	83.10	2694.03	561.70
23	0.00	0.00	83.10	83.10	2610.93	561.62
22	0.06	4.65	81.24	85.89	2527.83	561.53
21	0.15	12.22	78.21	90.43	2441.94	561.45
20	0.27	21.00	74.70	95.70	2351.51	561.37
19	0.54	43.04	65.88	108.92	2255.81	561.28
18	0.70	55.62	60.85	116.47	2146.88	561.20
17	0.82	65.14	57.04	122.18	2030.41	561.12
16	0.92	73.04	53.88	126.92	1908.23	561.03
15	1.01	80.18	51.03	131.21	1781.31	560.95
14	1.09	86.47	48.51	134.98	1650.09	560.87
13	1.15	91.19	46.62	137.81	1515.11	560.78
12	1.21	95.98	44.71	140.69	1377.30	560.70
11	1.27	100.72	42.81	143.53	1236.61	560.62
10	1.32	104.64	41.24	145.88	1093.08	560.53
9	1.36	107.83	39.97	147.80	947.20	560.45
8	1.40	110.99	38.70	149.70	799.40	560.37
7	1.43	113.33	37.77	151.10	649.70	560.28
6	0.00	0.00	83.10	83.10	498.60	560.20
5	0.00	0.00	83.10	83.10	415.50	560.12
4	0.00	0.00	83.10	83.10	332.40	560.03
3	0.00	0.00	83.10	83.10	249.30	559.95
2	0.00	0.00	83.10	83.10	166.20	559.87
1	0.00	0.00	83.10	83.10	83.10	559.78

GEOTECHNICAL EVALUATION REPORT

MARCUSSE CONSTRUCTION BUILDING
ALLENDALE TOWNSHIP, MICHIGAN

SME Project Number: 089366.00
May 24, 2022

SME

882 40th Street SE
Grand Rapids, MI 49508-2401

T (616) 406-1756

www.sme-usa.com

May 24, 2022

Mr. Klynt Marcusse
Marcusse Construction Company
6588 Center Industrial Drive
Jenison, Michigan 49428

Via Email: klyntm@marcusseconstruction.com (PDF file)

RE: Geotechnical Evaluation
Marcusse Construction Building
5630 Lake Michigan Drive
Allendale Township, Michigan 49401
SME Project No. 089366.00

Dear Mr. Marcusse:

We have completed the geotechnical evaluation for the Marcusse Construction Building project in Allendale Township, Michigan. This report presents the results of our observations and analyses, and our geotechnical engineering recommendations based on the information disclosed by the borings. A revised report will be issued that will include pavement design recommendations after SME receives a grading plan for the project.

We appreciate the opportunity to be of service. If you have questions or require additional information, please contact me.

Very truly yours,

SME

Andrew T. Bolton, PE
Project Manager / Senior Consultant

Distribution: Mr. Ken Watkins, AIA – Architectural Concepts via email (ken@archconceptsmi.com)

TABLE OF CONTENTS

1. INTRODUCTION

This report presents the results of the geotechnical evaluation performed by SME for the Marcusse Construction Building project. We performed this evaluation in general accordance with the scope of services outlined in SME Proposal No. P01375.22, dated May 3, 2022, with the exception that the pavement engineering recommendations will be provided in a revised report once we receive the grading plan for the project. Our services for this evaluation were authorized by Marcusse Construction Company.

To assist with our evaluation and preparation of this report, SME was provided a site plan drawing prepared by Architectural Concepts (latest revision date of 2/8/22), that included a layout of the existing site features and the proposed building and pavements.

1.1 SITE CONDITIONS

The project site is located at 5630 Lake Michigan Drive in Allendale Township, Michigan. The approximate location of the site is depicted on the Location Map inset on the Boring Location Diagram (Figure No.1), included in Appendix A.

At the time of our evaluation, the project site consisted of grass and tree covered areas. Based on the ground surface elevations collected at the boring locations, outlined in Section 2.1, the existing site ground surface varies from an elevation of approximately 662 feet to 664 feet; however, SME was not provided a topographic survey of the site.

We understand previous buildings associated with former development were previously located on-site. Based on our review of aerial images via Google Earth Pro, the previous buildings were demolished between March 1999 and August 2005. We have not been provided information regarding the previous buildings, but we assume the previous buildings included slab-on-grade construction. We have not been provided information regarding the demolition procedures, and the subsequent backfilling operations.

1.2 PROJECT DESCRIPTION

We understand the project will consist of a two-story, slab-on-grade office building, with a plan area of about 5,869 square feet. The building will include wood-framing. Based on our experience with similar types of projects, we anticipate structural loads will include maximum column loads of 50 kips and maximum wall loads of 4 kips per linear foot. However, specific structural loading information has not been provided to us at this time.

A paved parking lot will be constructed south and east of the proposed building. We anticipate the surfacing will consist of asphalt concrete, and the anticipated traffic loading will include primarily cars, with occasional light delivery trucks and weekly garbage trucks.

Stormwater management systems are proposed to be constructed north and/or south of the proposed building and pavement areas. The stormwater management systems will infiltrate at a depth of about 3 feet below the existing grades.

SME has not been provided the finished floor elevation, FFE, for the proposed building; however, based on the existing ground surface elevations at the boring locations and our experience, we anticipate the FFE for the proposed building will be established at 664 feet. Based on the assumed FFE and the existing grades, fills of less than 1 foot are anticipated to achieve the FFE within the proposed building footprint.

2. EVALUATION PROCEDURES

2.1 FIELD EXPLORATION

2.1.1 BORINGS

SME completed nine borings (B1 through B9) at the site on May 10, 2022. The borings each extended to depths ranging from 5 to 15 feet below existing grades for a total of 81 feet of drilling. The approximate as-drilled boring locations are shown on Figure No. 1.

SME determined the planned number, locations, and depths of the borings. SME staked the boring locations and obtained the existing ground surface elevations at the boring locations to the nearest 1/2-foot using our hand-held global positioning system (GPS) unit.

The borings were advanced with a Geoprobe rig using direct push methods. The borings included soil sampling based upon the Split-Barrel Sampling procedure. Portions of the recovered split-barrel samples were sealed in glass jars by the driller.

Groundwater level measurements in the boreholes were recorded during and immediately after completion of each boring. The driller backfilled the boreholes with the bentonite chips at completion of drilling.

Soil samples recovered from the field exploration were returned to the SME laboratory for further observation and testing.

2.1.2 INFILTRATION TEST

SME completed two infiltration tests at the site on May 10, 2022. The infiltration tests were performed to obtain an infiltration rate. The infiltration test, B8A, was completed about 5 feet east of boring B8. The infiltration test, B9A, was completed about 5 feet south of boring B9.

Venture Engineering determined the planned number, location, and depth of the infiltration tests. SME staked the infiltration test locations based on measuring from staked boring location of B8 and B9, and we estimated the approximate existing ground surface elevation data at the infiltration test locations to the nearest 1/2-foot using our GPS unit.

The boreholes to perform the infiltration test were created by advancing hollow-stem augers with the Geoprobe rig to reach the test depth. The depth for the infiltration test is shown in Table 1. After the boreholes were advanced to achieve the infiltration test depth, the augers were extracted and a 6-inch-diameter PVC outer casing (standpipe) and a 4-inch-diameter inner casing (standpipe) were inserted into the borehole. The casings were seated about 2 inches into the subgrade at the bottom of the prepared boreholes. About 2 inches of washed peastone was added inside the casings to prevent subgrade disturbance when adding water to the standpipes.

The infiltration tests generally followed the double-ring infiltrometer field test procedures outlined in Appendix E in the Low Impact Development (LID) Manual for Michigan (dated 2008) prepared by the Southeast Michigan Council of Governments (SEMCOG). To conduct the infiltration tests, the test soil was pre-soaked by filling both standpipes with about 12 inches of water. The water was observed to drain (i.e., drop) within the inner standpipe at a rate of greater than 2 inches per 30 minutes during the pre-soaking period. After pre-soaking, the standpipes were filled with about 12 inches of water above the bottom or test elevation, and then the water level drop in the inner standpipe was recorded at time intervals of 10 minutes. This procedure was repeated until four consecutive water level changes (i.e., distance the water dropped over the prescribed time interval) were recorded to be within a 1/4-inch of one

another. The water level drop recorded within the inner standpipe during the final time interval was used to calculate the infiltration rate at the test locations.

After completion of the infiltration tests, the standpipes were removed. The boreholes used to conduct the infiltration tests were backfilled with auger cuttings.

2.2 LABORATORY TESTING

The laboratory testing program consisted of visual soil classification on recovered samples in general accordance with ASTM D-2488. Based on the laboratory testing, we assigned a group symbol to the various soil strata encountered based on the Unified Soil Classification System (USCS).

Upon completion of the laboratory testing, we prepared boring logs that include the soil descriptions, penetration resistances, pertinent field observations, and the results of the laboratory testing. Each log also includes the existing ground surface elevation as estimated by SME. The boring logs are included in Appendix A. Explanations of symbols and terms used on the boring logs are provided on the Boring Log Terminology sheet included in Appendix A.

Soil samples are normally retained in our laboratory for 60 days and are then disposed, unless instructed otherwise.

3. SUBSURFACE CONDITIONS

3.1 SOIL CONDITIONS

The soil conditions encountered at the boring locations generally consisted of surficial materials (e.g. topsoil) overlying existing sand fill, and underlain by natural sands that extended to the explored depths of the borings. However, existing sand fill was not encountered at boring location B7.

The existing sand fill extended to depths ranging from about 3 to 6 feet below the existing ground surface, corresponding to an elevation ranging from approximately 657.0 to 660.2 feet. The existing sand fill was encountered in a very loose to medium dense condition. The existing sand fill contained brick fragments in borings B2, B3, and B5.

Thickness measurements of surficial materials reported on the boring logs should be considered approximate since mixing of the surficial materials with the underlying subgrade can occur while advancing the augers and it is difficult to measure the thickness of surficial materials in small-diameter boreholes. Therefore, if accurate surficial material thickness measurements are required for inclusion in bid documents or purposes of design, additional evaluations such as shallow test pits or hand augers should be performed through the topsoil.

It is sometimes difficult to distinguish between fill and natural soils based on samples and cuttings from small-diameter boreholes, especially when portions of the fill do not contain man-made materials, debris, topsoil or organic layers, and when the fill appears similar in composition to the local natural soils. Therefore, the delineation of fill described above and on the boring logs should be considered approximate only.

The soil profile included on the boring logs is a generalized description of the conditions encountered. The stratification depths described above and shown on the boring logs indicate a zone of transition from one soil type to another and do not show exact depths of change from one soil type to another. The soil descriptions are based on visual classification of the soils encountered. Soil conditions may vary between or away from the boring locations. Please refer to the boring logs for the soil conditions at the specific boring locations.

3.2 GROUNDWATER CONDITIONS

Groundwater was encountered in borings B1, B2, B3, B8, and B9 during and upon completion of drilling at depths ranging from 7 to 8 feet below the existing ground surface, corresponding to an elevations ranging from 654.9 to 656.2 feet. Groundwater was not encountered in the remaining borings that terminated between approximate elevations 656.8 and 657.8 feet. Based on the relatively permeable nature of the granular soils encountered, we believe the groundwater conditions reported herein are representative of the groundwater depth/elevation at the time of the field exploration.

Groundwater depth/elevation, and the rate of infiltration into excavations, should be expected to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater conditions indicated by the borings represent conditions at the time the readings were taken. The actual groundwater levels at the time of construction may vary.

4. ANALYSIS AND RECOMMENDATIONS

4.1 SITE PREPARATION AND EARTHWORK

4.1.1 EXISTING FILL CONSIDERATIONS

Based on information obtained from the borings, existing fill was encountered in the proposed development areas. We are not aware, nor have been provided with, records depicting the type of fill material, and if the fill was placed in suitable lifts and to a specified density under the observation of a geotechnical engineer. The existing fill contained construction debris, e.g., brick, and was encountered in a very loose and loose condition, thus, the majority of the existing fill is not considered to be engineered fill. Therefore, the existing fill is considered undocumented and uncontrolled.

Based on the condition of the existing fill encountered in the borings, the existing fill is not suitable for foundation support of the proposed building. However, based on the condition of the existing fill encountered in the borings, and the proposed type of construction, we believe the existing fill can remain below the floor slab provided:

- The subgrade is properly evaluated by SME and prepared as described in Section 4.
- Unsuitable fill is undercut and replaced with engineered fill.
- The Owner accepts the associated risks described below.

The increased risks associated with supporting slabs-on-grade over the existing fill at this site could include greater than typical post-construction settlement, resulting in differential movements and associated cracking of the slabs. These risks can be reduced, but not eliminated, if SME further evaluates the existing fill at floor slab subgrades. If the risks described above are not acceptable to the Owner, the existing fill should be completely removed from within the proposed building footprint and replaced with engineered fill.

If the existing fill will remain in-place for support of the floor slabs, further evaluation of the existing fill during construction must be conducted by SME. Further evaluation should include observing the condition of the fill in hand-auger borings or shallow test pits, testing the fill using a dynamic cone penetrometer (DCP), observing the condition of the fill in the sides of the foundation excavations, and observing the response of the surface of the fill when subjected to a proofroll. Existing fill to remain in-place should be of sufficient strength and free of deleterious materials, such as excessive debris and organics. Unsuitable existing fill that cannot be improved in-place should be removed (i.e., undercut) and replaced with engineered fill that is placed and compacted per the requirements outlined in Section 4.1.4 of this report.

The recommendations provided in the following report sections are based on the assumption that existing fill will be removed below proposed foundations, and suitable existing fill will remain in-place and be used to support the floor slabs. If the Owner does not accept the stated assumptions and risks, please contact SME for revised recommendations.

4.1.2 SITE SUBGRADE PREPARATION

Existing foundations, floor slabs, below-grade walls, and other below-grade structures from previous development on-site should be completely removed to expose suitable natural sands and replaced with properly prepared engineered fill. Existing utilities within the proposed building footprint should be rerouted around the proposed building. We recommend abandoned utilities be removed and the excavations backfilled with granular engineered fill to establish the design subgrade level.

The proposed building and pavement areas and areas to receive engineered fill should be cleared of topsoil, vegetation, trees, roots, existing unsuitable fill, and other deleterious materials to expose suitable underlying inorganic subgrade. After clearing and stripping, we anticipate the exposed subgrade will consist of suitable existing sand fill or natural sands.

After clearing and stripping, and after cutting to design subgrade levels, but before placing fill to raise grades, SME should further evaluate the existing fill. Unsuitable existing fill should be improved in-place or be removed (i.e., undercut) to expose suitable underlying subgrade soils. The undercuts to remove unsuitable fill should be backfilled with engineered fill meeting the requirements of Section 4.1.4 of this report. After the existing fill has been further evaluated and improved, as necessary, we recommend the exposed subgrade be proofrolled. Proofrolling should be performed in the presence of SME with a fully-loaded, tandem-axle dump truck or other pneumatic-tire construction equipment. Areas of unsuitable (e.g., loose, yielding) subgrade revealed during proofrolling should be improved in-place, or removed (undercut) and replaced with engineered fill. Special attention during proofrolling should be directed to the response of the existing fill as a means to judge the suitability of the fill for support of overlying floor slabs and foundations.

The silty sands and clayey sands (identified with USCS group symbols of “SM” and “SC”, respectively) encountered in the borings, are moisture sensitive and susceptible to disturbance if they become wet and are trafficked by construction equipment. It will likely be more difficult and costly to attempt construction at this site during periods of seasonally cooler and/or wet weather. The warmer summer months will be the seasonally optimal time period to perform earthwork activities at this site in order to minimize disturbance of the silty sands, and to reduce the need for undercutting of disturbed materials and performing subgrade remediation.

If the subgrade becomes disturbed during the earthwork operations, it will be necessary to mechanically improve the disturbed subgrade by moisture conditioning (i.e. aerating and drying) and compacting the soil; removing and replacing the disturbed soils with engineered fill, crushed aggregate, or crushed concrete; or stabilizing the surface by placing a geogrid and crushed aggregate. The success of moisture conditioning the existing soils will be dependent on the weather conditions at the time of construction, as discussed further in Section 4.1.4. To protect areas of exposed subgrade from disturbance, placement of crushed aggregate or crushed concrete, possibly with a geotextile for separation, could be required.

After the exposed subgrade is evaluated (as described above) and improved as necessary, engineered fill may be placed on the exposed subgrade to establish final design subgrade levels. See Section 4.1.4 of this report for materials and compaction requirements for engineered fill.

4.1.3 SUBGRADE PREPARATION FOR FLOOR SLABS

We anticipate the final floor slab subgrade for the proposed building will consist of engineered fill overlying existing sand fill overlying natural sands, existing sand fill overlying natural sands, or natural sands. These soils are considered suitable for support of floor slabs, provided the subgrade is prepared

as described in Sections 4.1.1 and 4.1.2, the Owner is willing to accept the stated risks of leaving the existing fill in-place for support of floor slabs, and engineered fill is placed and compacted per Section 4.1.4. We recommend a subgrade modulus k (30) of 100 psi per inch be used to design floor slabs supported on properly prepared subgrade as described above. The recommend subgrade modulus k (30) is based on correlations with soil type developed from plate load tests conducted using a 30-inch diameter plate with 0.05-inches of deflection.

Prior to concrete placement for floor slabs, SME should observe and test the building pad subgrade to identify areas that were disturbed during construction activities and to verify the final subgrade conditions are suitable for floor slab support. Unsuitable subgrade identified by SME should be improved by compaction in place, or removed and replaced with engineered fill. Final subgrade areas that are accessible with large equipment should be proofrolled, and areas inaccessible to proofrolling equipment should be evaluated with hand-operated equipment, such as cone penetrometers, hand auger probes, and density gauges.

The top 6 inches of the slab subbase should consist of an approved MDOT Class II granular material to provide a leveling surface for construction of the slab and a moisture capillary break between the slab and the underlying soils. MDOT 21AA dense-graded aggregate can be used as subbase material, instead of the Class II granular material, for improved stability and greater resistance to disturbance due to construction traffic. The thickness of dense-graded aggregate required to stabilize and protect the subgrade will depend on the condition of subgrade soils during construction and the type and volume of construction equipment to traffic the prepared subgrade. The leveling surface must be compacted per the "Engineered Fill Requirements" section of this report as discussed in Section 4.1.4.

A vapor retarder should be provided below floor slabs that are to receive an impermeable floor finish/seal or a floor covering which would retard vapor transmission. The location of the vapor retarder (relative to the subbase) should be determined by the design Architect/Engineer based on the intended floor usage, planned finishes, and ACI recommendations.

We recommend separating slabs by isolation joints from structural walls and columns to permit relative movement. A minimum of 6 inches of engineered fill should be placed between the bottom of the slab and the top of the shallow foundation below, to allow for relative settlements.

The slab-on-grade subgrade soils should be protected from frost action during winter construction. Frozen soils must be thawed and compacted, or removed and replaced prior to slab-on-grade construction.

4.1.4 ENGINEERED FILL REQUIREMENTS

Fill placed within structural areas, including utility trench backfill, should be an approved material, free of frozen soil, organics, debris, particle sizes that will hinder compaction, and other deleterious materials. Fill placed in structural areas should be compacted to a minimum of 95 percent of the maximum dry density determined in accordance with the Modified Proctor test. Fill should be spread in level layers with a loose thickness appropriate for the type of equipment used to obtain compaction. Sand fill should be compacted with a smooth-drum vibratory roller or vibratory plate compactors, including either walk-behind types or plate compactors mounted on a backhoe or excavator (i.e., a hoe-pac). Thinner lifts will be required in confined spaces and where compaction is achieved with hand-operated equipment.

Based on the information from the borings, the natural sands and existing sand fill should be suitable for re-use as engineered fill, provided the material meets the requirements listed in the previous paragraph. We recommend imported fill consist of MDOT Class II granular material.

Drying/aeration of the sands with a significant amount of silt and clay (identified with USCS group symbols of “SM” and “SC”, respectively) will be necessary to allow for proper compaction. The need for moisture conditioning will be affected by seasonal weather conditions at the time the earthwork is

performed, and the condition of the site soils. If the silty and clayey sands cannot be suitably moisture conditioned, it will be necessary for the contractor to import greater quantities of granular fill (sand) to use as engineered fill on the site, and it may be necessary to export the existing silty and clayey sands if suitable on-site disposal areas are not available. The project specifications should include provisions for moisture conditioning of soils to be placed and compacted on-site as engineered fill. Contractors should anticipate the need for moisture conditioning and structure their bids accordingly.

In utility trenches or foundation excavations, and in other areas where compaction is accomplished primarily by smaller plate compaction equipment, an approved granular material containing relatively low amounts of silt or clay, such as MDOT Class II granular material, should be used as backfill. Thinner lift sizes may be required to achieve the required density in areas where smaller compaction equipment is used. MDOT Class II granular material should also be used in areas requiring drainage or where the fill will serve as a capillary break.

Coarse crushed aggregate used to backfill undercuts or to stabilize subgrades should consist of a well-graded, crushed natural aggregate or crushed concrete ranging from 1 to 3 inches in size with no more than 7 percent by weight passing the No. 200 sieve should be used. In cases where granular engineered fill will be placed over the crushed aggregate, the surface of the coarse crushed material should be choked with a layer of at least 6 inches of dense-graded aggregate, such as MDOT 21AA, or covered with a suitable non-woven geotextile, to mitigate the potential for migration of the granular materials into the coarser crushed aggregate.

4.2 FOUNDATIONS

4.2.1 SUBGRADE VERIFICATION

To verify the subgrade exposed at the foundation bearing surfaces is suitable for the recommended maximum net allowable soil bearing pressure, and to verify necessary improvements at or below the foundation subgrade have been performed properly, the final foundation subgrades must be evaluated and tested by SME during construction. By performing the geotechnical evaluation for this project, and preparing this geotechnical evaluation report, SME is the geotechnical engineer of record for this project and is best suited to verify the recommendations of this report, and the design requirements of this project, are in fact incorporated into the construction.

4.2.2 SHALLOW SPREAD FOUNDATIONS

We recommend supporting the proposed building on shallow spread foundations bearing on suitable natural sands or on engineered fill overlying suitable natural sands. Suitable natural sands were generally encountered below the surficial topsoil and existing sand fill. We recommend a maximum net allowable soil bearing pressure of 2,500 pounds per square-foot (psf) for design of shallow foundations bearing on suitable soils described above. The recommended design net allowable soil bearing pressure is based on a global safety factor of three or more (for general shear failure).

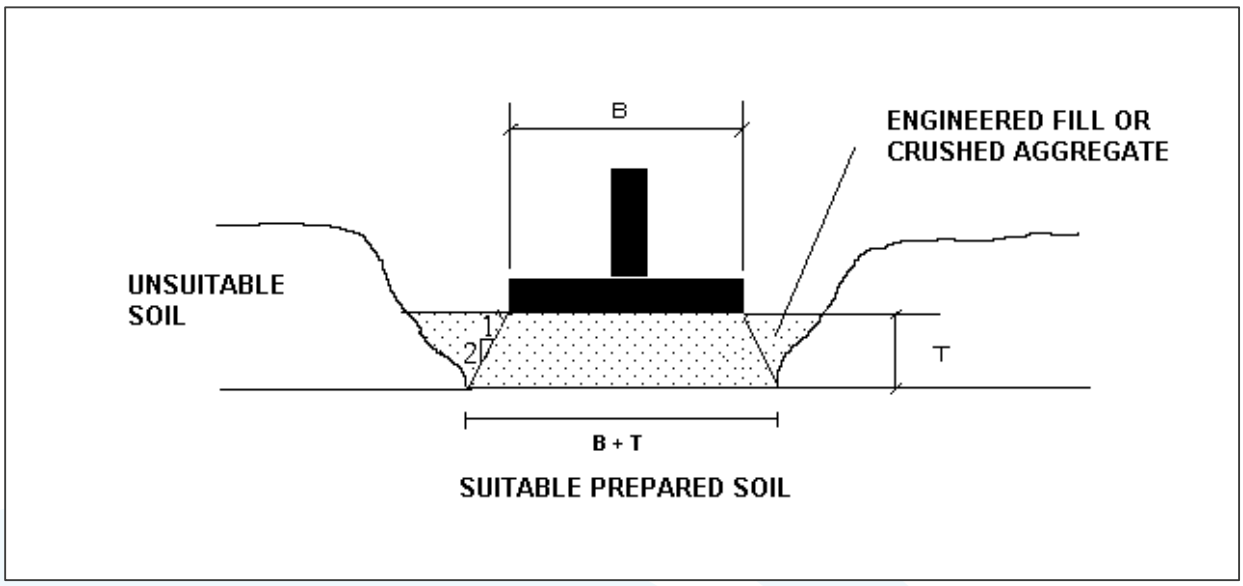
For bearing capacity and settlement considerations, we recommend continuous (wall) foundations have a minimum width of 18 inches and isolated (column) foundations have a minimum dimension of 30 inches. In cases where structural loading is light, the minimum recommended foundation size, and not the design bearing pressure, may govern the size of the foundation.

Foundations should be situated a minimum of 42 inches below final site grade in unheated areas for protection against frost action during normal winters. Interior foundations in heated areas of the building can be constructed at shallower levels on suitable soils just below the floor slab. The foundations and proposed bearing soils should be protected from freezing during construction if work occurs in the winter months.

We estimate total settlement for shallow spread or continuous foundations using the recommended maximum net allowable bearing pressure and bearing on suitable soils, as described above, should be 1 inch or less and differential settlements should not exceed about one-half the total settlement for similarly loaded foundations. We base the settlement estimates on the available boring information, the estimated structural loads, our experience with similar structures and soil conditions, and field verification of suitable bearing soils by SME.

4.2.3 FOUNDATION INSTALLATION

Once each foundation area is exposed, SME must observe and test the foundation subgrades to verify suitable bearing conditions are present. Soils that cannot be suitably improved in-place must be undercut to expose suitable soils below. Foundations can be constructed at this lower level where suitable subgrade is encountered, or the design foundation bearing level can be re-established using engineering fill or crushed aggregate placed as backfill in the undercut excavation. Where the undercut is backfilled to re-establish the design bearing level, the undercut excavation to remove unsuitable soils should extend laterally on a two vertical to one horizontal slope from the edge of the foundations. Please refer to the following Typical Foundation Undercutting Diagram.



Sands were generally encountered near the ground surface. Therefore, we believe sloughing and caving of foundation excavation sidewalls will probably occur and believe it will be necessary to slope back the foundation excavations and vertically form the foundations and foundation walls for this project.

To reduce the incidence and severity of subgrade disturbance, we recommend placing concrete as soon as possible (e.g., preferably the same day) after excavating for foundations and performing any required subgrade improvements. Disturbed soils must be removed from foundation excavations and replaced with engineered fill, crushed aggregates, or concrete.

4.3 SEISMIC SITE CLASS

Based on the subsurface information obtained from the borings to a maximum depth of 15 feet, seismic site Class D applies to this site in accordance with the 2015 MBC referencing Table 20.3-1 in ASCE Standard ASCE/SEI 7-10.

4.4 CONSTRUCTION CONSIDERATIONS

We do not anticipate significant groundwater seepage into excavations that remain above about elevation 656.2 feet. However, accumulations from precipitation events, surface run-off, or perched groundwater sources could be encountered at elevations above about 656.2 feet. Standard sump pit and pumping procedures should be adequate to control these accumulations above an elevation of 656.2 feet on a localized basis. Excavations extending below the groundwater will likely require a high capacity dewatering system that is designed by a qualified professional engineer. A working surface of either crushed aggregate or crushed concrete may be required to protect the exposed subgrade where seepage is encountered.

The contractor must take precautions to protect the adjacent existing buildings, pavements, and utilities during construction of the proposed buildings. Care must be exercised during the excavating and compacting operations so that excessive vibrations do not cause settlement of the existing buildings, pavements, and utilities, and to avoid undermining existing foundations, floor slabs, pavements, or utilities during excavation for new foundations and utilities.

The need for moisture conditioning (i.e., aerating and drying) site silty and clayey sands, and the success of moisture conditioning, will be dependent on the weather conditions at the time of construction. During cold and wet periods of the year, the silty sands may become saturated and disturbed and it may not be feasible to sufficiently dry the soils so that they are stable and can be adequately compacted. If these conditions occur, it will be necessary for the contractor to import greater quantities of clean granular fill (sand) to use as engineered fill on the site, and it would be necessary to export the clayey and silty soils if on-site disposal in non-structural areas is not feasible.

The contractor must provide safely sloped excavations or an adequately constructed and braced shoring system in accordance with federal, state and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, use appropriate shoring to resist the extra pressure due to the superimposed loads.

The contractor should remove ponded surface water and prevent run-off from reaching foundation excavations and areas of prepared subgrade. We recommend the contractor establish positive surface drainage at the onset of construction to mitigate the potential for subgrade disturbance.

Handling, transportation and disposal of excavated materials and groundwater should be performed in accordance with applicable regulatory requirements.

5. INFILTRATION TEST RESULTS

Table 1 below summarizes the location, depths, and elevations of the infiltration tests. Table 1 also includes the USCS Group Symbol based on our visual classification of the soil present at the infiltration tests depth based on the condition encountered in the adjacent boring. The infiltration rates calculated from the double-ring infiltrometer field tests described above are also presented in Table 1, below.

TABLE 1: DOUBLE-RING INFILTROMETER FIELD TEST DATA

INFILTRATION TEST LOCATION	TEST DEPTH (FEET +/-)	TEST ELEVATION (FEET +/-)	USCS GROUP SYMBOL[1]	INFILTRATION RATE (IN/HR)[2]
B8A	3.4	659.8	SP	6.5
B9A	3.0	658.9	SP-SM	7.2

NOTES:
1. Unified Soil Classification System (USCS) designation of soil encountered at the test depths in boring B8 and B9 adjacent to the test locations.
2. Infiltration rate is provided in units of inches per hour (in/hr.).

The infiltration rate reported in Table 1 should be considered the maximum rate for the tested soil at the tested depth/elevation, under the initial head of 12 inches for the infiltration test. Variations in soil and groundwater conditions can result in different infiltration rates away from the boring/test location.

Where infiltration is considered in the design of the stormwater management systems, an engineered stormwater management system would be required. The engineered system would likely encompass a defined area that consists of several feet of well-draining granular soils, suitable distance above the groundwater (e.g., freeboard), and a subsurface drainage outlet.

The engineered system will need to be designed by a professional civil engineer registered in the State of Michigan. We recommend an SME representative observe and document the construction of the engineered system to verify the system was installed in accordance with the project plans and specifications.

Factors, such as the buildup of soil fines or debris, over time, can result in a reduction in the design infiltration rate. It is important to use sediment forebays and other filtering or separation methods to prevent fine soil and debris from entering stormwater management systems that rely on infiltration drainage. Provisions should be included for performing routine maintenance to maintain suitable infiltration properties.

6. SIGNATURES

Report Prepared By:

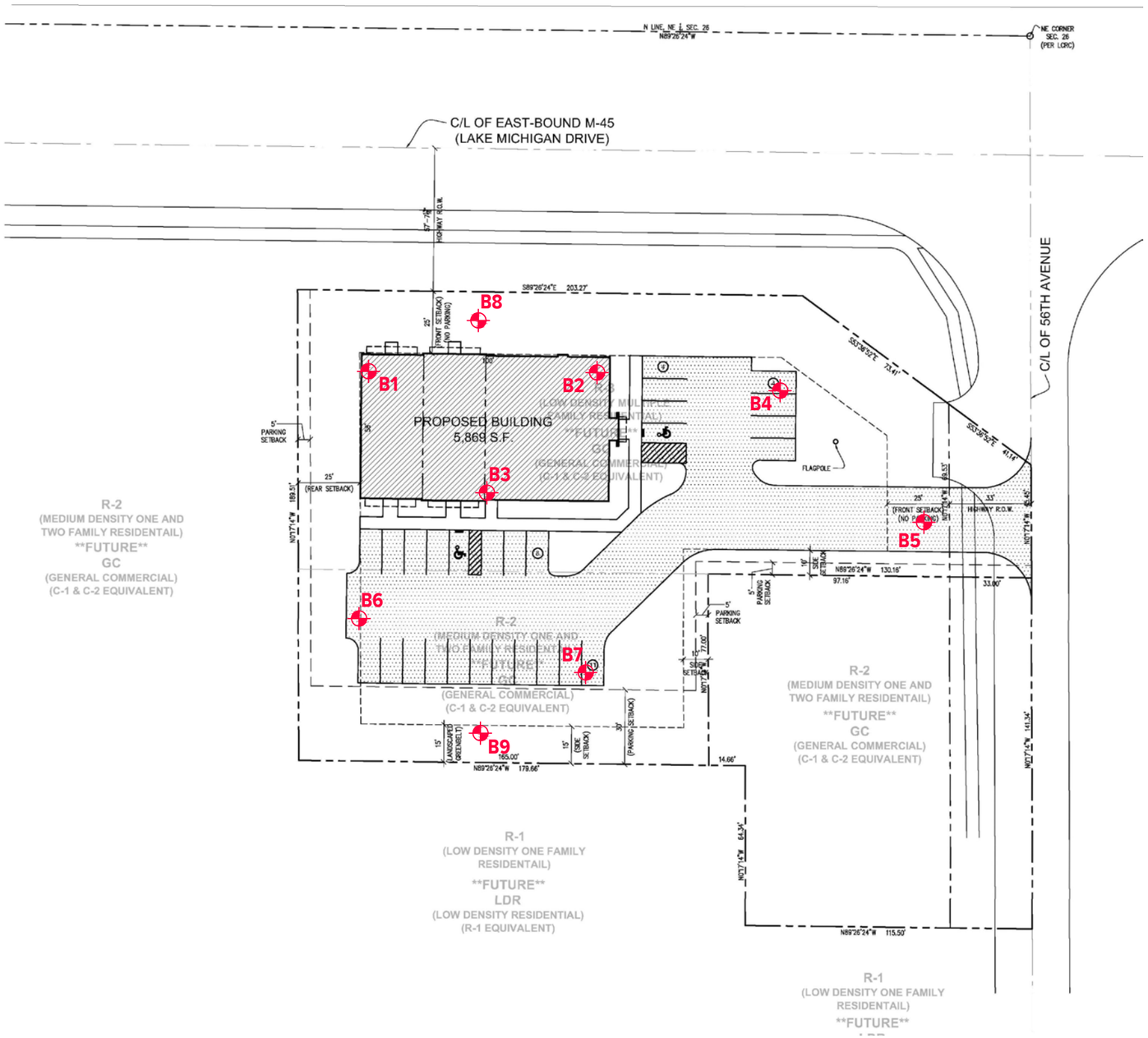
Noah B. Spicer, EIT
Senior Staff Engineer

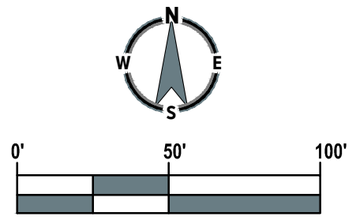
Report Reviewed By:

Andrew T. Bolton, PE
Senior Consultant

APPENDIX A

BORING LOCATION DIAGRAM (FIGURE NO. 1)
BORING LOG TERMINOLOGY
BORING LOGS (B1 THROUGH B9)





GRAPHIC SCALE: 1" = 50'

LEGEND

APPROXIMATE BORING LOCATION

LOCATION MAP

NOT TO SCALE

NOTE:
1. BASE DRAWING INFORMATION TAKEN FROM A DRAWING TITLED "PROPOSED BUILDING FOR : MARCUSSE CONSTRUCTION" (SHEET C-1) WITH A LATEST REVISION DATE OF 2/8/2022 PREPARED BY ARCHITECTURAL CONCEPTS.

SME
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Project
MARCUSSE CONSTRUCTION BUILDING

Project Location
ALLENDALE TOWNSHIP, MICHIGAN

Sheet Name
BORING LOCATION DIAGRAM

No.	Revision Date

Date 05/23/2022
CADD MNR
Designer NBS
Scale AS NOTED
Project 089366.00
Figure No. 1

BORING LOG TERMINOLOGY

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOIL (more than 50% of material is larger than No. 200 sieve size.)			
GRAVEL More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravel (Less than 5% fines)	GW	Well-graded gravel; gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravel; gravel-sand mixtures, little or no fines
	Gravel with fines (More than 12% fines)	GM	Silty gravel; gravel-sand-silt mixtures
		GC	Clayey gravel; gravel-sand-clay mixtures
SAND 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sand (Less than 5% fines)	SW	Well-graded sand; sand-gravel mixtures, little or no fines
		SP	Poorly graded sand; sand-gravel mixtures, little or no fines
	Sand with fines (More than 12% fines)	SM	Silty sand; sand-silt-gravel mixtures
		SC	Clayey sand; sand–clay-gravel mixtures
FINE-GRAINED SOIL (50% or more of material is smaller than No. 200 sieve size)			
SILT AND CLAY Liquid limit less than 50%		ML	Inorganic silt; sandy silt or gravelly silt with slight plasticity
		CL	Inorganic clay of low plasticity; lean clay, sandy clay, gravelly clay
		OL	Organic silt and organic clay of low plasticity
SILT AND CLAY Liquid limit 50% or greater		MH	Inorganic silt of high plasticity, elastic silt
		CH	Inorganic clay of high plasticity, fat clay
		OH	Organic silt and organic clay of high plasticity
HIGHLY ORGANIC SOIL		PT	Peat and other highly organic soil

OTHER MATERIAL SYMBOLS

Topsoil, Void, Sandstone, Asphalt Concrete, Glacial Till, Siltstone, Aggregate Base, Coal, Limestone, Portland Cement Concrete, Shale, Fill

LABORATORY CLASSIFICATION CRITERIA

GW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with PI greater than 7	
SW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with PI greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent……GW, GP, SW, SP
More than 12 percent……GM, GC, SM, SC
5 to 12 percent……Cases requiring dual symbols

- SP-SM or SW-SM (SAND with Silt or SAND with Silt and Gravel)
- SP-SC or SW-SC (SAND with Clay or SAND with Clay and Gravel)
- GP-GM or GW-GM (GRAVEL with Silt or GRAVEL with Silt and Sand)
- GP-GC or GW-GC (GRAVEL with Clay or GRAVEL with Clay and Sand)

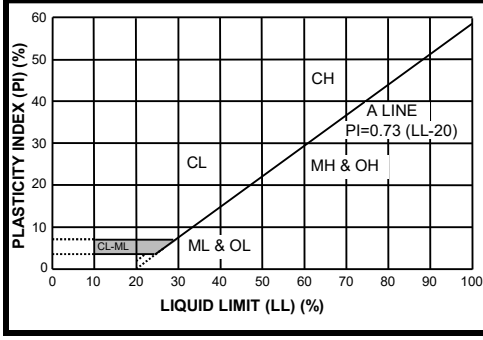
If the fines are CL-ML:

- SC-SM (SILTY CLAYEY SAND or SILTY CLAYEY SAND with Gravel)
- SM-SC (CLAYEY SILTY SAND or CLAYEY SILTY SAND with Gravel)
- GC-GM (SILTY CLAYEY GRAVEL or SILTY CLAYEY GRAVEL with Sand)

PARTICLE SIZES

Boulders	-	Greater than 12 inches
Cobbles	-	3 inches to 12 inches
Gravel- Coarse	-	3/4 inches to 3 inches
Fine	-	No. 4 to 3/4 inches
Sand- Coarse	-	No. 10 to No. 4
Medium	-	No. 40 to No. 10
Fine	-	No. 200 to No. 40
Silt and Clay	-	Less than (0.074 mm)

PLASTICITY CHART



VISUAL MANUAL PROCEDURE

When laboratory tests are not performed to confirm the classification of soils exhibiting borderline classifications, the two possible classifications would be separated with a slash, as follows:

For soils where it is difficult to distinguish if it is a coarse or fine-grained soil:

- SC/CL (CLAYEY SAND to Sandy LEAN CLAY)
- SM/ML (SILTY SAND to SANDY SILT)
- GC/CL (CLAYEY GRAVEL to Gravelly LEAN CLAY)
- GM/ML (SILTY GRAVEL to Gravelly SILT)

For soils where it is difficult to distinguish if it is sand or gravel, poorly or well-graded sand or gravel; silt or clay; or plastic or non-plastic silt or clay:

- SP/GP or SW/GW (SAND with Gravel to GRAVEL with Sand)
- SC/GC (CLAYEY SAND with Gravel to CLAYEY GRAVEL with Sand)
- SM/GM (SILTY SAND with Gravel to SILTY GRAVEL with Sand)
- SW/SP (SAND or SAND with Gravel)
- GP/GW (GRAVEL or GRAVEL with Sand)
- SC/SM (CLAYEY to SILTY SAND)
- GM/GC (SILTY to CLAYEY GRAVEL)
- CL/ML (SILTY CLAY)
- ML/CL (CLAYEY SILT)
- CH/MH (FAT CLAY to ELASTIC SILT)
- CL/CH (LEAN to FAT CLAY)
- MH/ML (ELASTIC SILT to SILT)

DRILLING AND SAMPLING ABBREVIATIONS

2ST	–	Shelby Tube – 2" O.D.
3ST	–	Shelby Tube – 3" O.D.
AS	–	Auger Sample
GS	–	Grab Sample
LS	–	Liner Sample
NR	–	No Recovery
PM	–	Pressuremeter
RC	–	Rock Core diamond bit. NX size, except where noted
SB	–	Split Barrel Sample 1-3/8" I.D., 2" O.D., except where noted
VS	–	Vane Shear
WS	–	Wash Sample

OTHER ABBREVIATIONS

WOH	–	Weight of Hammer
WOR	–	Weight of Rods
SP	–	Soil Probe
PID	–	Photo Ionization Device
FID	–	Flame Ionization Device

DEPOSITIONAL FEATURES

Parting	–	as much as 1/16 inch thick
Seam	–	1/16 inch to 1/2 inch thick
Layer	–	1/2 inch to 12 inches thick
Stratum	–	greater than 12 inches thick
Pocket	–	deposit of limited lateral extent
Lens	–	lenticular deposit
Hardpan/Till	–	an unstratified, consolidated or cemented mixture of clay, silt, sand and/or gravel, the size/shape of the constituents vary widely
Lacustrine	–	soil deposited by lake water
Mottled	–	soil irregularly marked with spots of different colors that vary in number and size
Varved	–	alternating partings or seams of silt and/or clay
Occasional	–	one or less per foot of thickness
Frequent	–	more than one per foot of thickness
Interbedded	–	strata of soil or beds of rock lying between or alternating with other strata of a different nature

DESCRIPTION OF RELATIVE QUANTITIES

The visual-manual procedure uses the following terms to describe the relative quantities of notable foreign materials, gravel, sand or fines:

Trace	–	particles are present but estimated to be less than 5%
Few	–	5 to 10%
Little	–	15 to 25%
Some	–	30 to 45%
Mostly	–	50 to 100%

CLASSIFICATION TERMINOLOGY AND CORRELATIONS

Cohesionless Soils

Relative Density	N_{60} (N-Value) (Blows per foot)
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	51 to 80
Extremely Dense	Over 81

Cohesive Soils

Consistency	N_{60} (N-Value) (Blows per foot)	Undrained Shear Strength (kips/ft^2)
Very Soft	<2	0.25 or less
Soft	2 - 4	> 0.25 to 0.50
Medium	5 - 8	> 0.50 to 1.0
Stiff	9 - 15	> 1.0 to 2.0
Very Stiff	16 - 30	> 2.0 to 4.0
Hard	> 30	> 4.0 or greater

Standard Penetration 'N-Value' = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted. N60 values as reported on boring logs represent raw N-values corrected for hammer efficiency only.

5/24/22 10:38:59 AM

BORING B 1

BORING DEPTH: 15 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION: 663.5 FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
663.0	0	6-inches of TOPSOIL			
	0.5				
		FILL- Fine to Medium SILTY SAND- Brown- Moist- Very Loose (SM)	SB1	16	2 1 2
660.0	3.5				
			SB2	12	3 4 5
	5		SB3	12	6 4 4
655		Fine to Medium SAND- Brown- Moist to Wet- Loose to Medium Dense (SP)	SB4	12	2 3 4
	10				
650			SB5	10	2 5 7
648.5	15.0				
	15	END OF BORING AT 15.0 FEET.			

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

SHEAR STRENGTH (KSF)
▽ HAND PENE.
⊠ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
1 2 3 4

REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.0	655.5
▼ **AT END OF BORING:**	8.0	655.5

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:01 AM

BORING B 2

BORING DEPTH: 15 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION: 663 FT

ELEV (FT)	DEPTH (FT)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
	0				
	0.5	6-inches of TOPSOIL			
660		FILL- Fine to Medium SILTY SAND- Brown- Moist- Loose (SM)	SB1	12	4 5 5
	4.0		SB2	12	3 8 5
	5	FILL- Fine to Medium SAND with Silt- Frequent Brick Fragments- Brown- Moist- Medium Dense (SP-SM)			
	6.0		SB3	10	3 1 2
655 ▽▼			SB4	8	2 3 4
	10	Fine to Medium SAND- Brown- Moist to Wet- Very Loose to Medium Dense (SP)			
650			SB5	8	5 6 8
	15				
	15.0	END OF BORING AT 15.0 FEET.			

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

▽ HAND PENE.
⊠ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF)
1 2 3 4

REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.0	655.0
▼ **AT END OF BORING:**	8.0	655.0

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:02 AM

BORING B 3

BORING DEPTH: 15 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION: 663.7 FT

DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
0 – 0.5	6-inches of TOPSOIL			
0.5 – 3.5 (663.2 – 660.2)	FILL- Fine to Medium SAND- Few Gravel- Brown- Moist- Loose (SP)	SB1	12	4 5 5
3.5 – 6.0 (660.2 – 657.7)	FILL- Fine to Medium SILTY SAND- Occasional Brick Fragments- Brown- Moist- Loose (SM)	SB2	12	4 4 5
6.0 – 15.0 (657.7 – 648.7)	Fine to Medium SAND- Brown- Moist to Wet- Loose to Medium Dense (SP)	SB3	12	4 4 4
		SB4	10	2 3 4
		SB5	8	4 7 10
15.0 (648.7)	END OF BORING AT 15.0 FEET.			

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

SHEAR STRENGTH (KSF)
▽ HAND PENE.
⊠ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
1 2 3 4

REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.0	655.7
▼ **AT END OF BORING:**	8.0	655.7

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:03 AM

BORING B 4

BORING DEPTH: 5 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	REMARKS
	0		ELEVATION: 662.4 FT				
	0.5		6-inches of TOPSOIL				
660			661.9				
			FILL- Fine to Medium SILTY SAND- Brown- Moist- Very Loose (SM)	SB1	12	3 2 2	
	3.5		658.9				
			Fine to Medium SAND- Brown- Moist- Loose (SP)	SB2	16	4 4 3	
	5.0		657.4				
655	5		END OF BORING AT 5.0 FEET.				
650	10						
	15						

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

SHEAR STRENGTH (KSF)
1 2 3 4

▽ HAND PENE.
⊠ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:03 AM

BORING B 5

BORING DEPTH: 5 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION (ELEVATION: 662.4 FT)	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ (10 20 30 40)	DRY DENSITY (pcf) -- ■ (90 100 110 120) / MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)	HAND PENE. ▽ / TORVANE SHEAR ☒ / UNC. COMP. ● / VANE SHEAR (PK) ⊡ / VANE SHEAR (REM) × / TRIAXIAL (UU) ⌖ SHEAR STRENGTH (KSF) (1 2 3 4)	REMARKS
662.4	0									
661.9	0.5		6-inches of TOPSOIL							
			FILL- Fine to Medium SILTY SAND- Frequent Brick Fragments- Brown- Moist- Very Loose (SM)	SB1		5 2 1	3			
658.9	3.5		Fine to Medium SAND- Brown- Moist- Medium Dense (SP)	SB2		5 7 7	14			
657.4	5.0		END OF BORING AT 5.0 FEET.							
660										
655										
650										
	5									
	10									
	15									

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:04 AM

BORING B 6

PAGE 1 OF 1

BORING DEPTH: 5 FEET

PROJECT NAME: Marcusse Construction Building

PROJECT NUMBER: 089366.00

CLIENT: Marcusse Construction Company

PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○ (10 20 30 40)	DRY DENSITY (pcf) -- ■ (90 100 110 120) MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)	▽ HAND PENE. ⊠ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU) SHEAR STRENGTH (KSF) (1 2 3 4)	REMARKS
	0		ELEVATION: 662.8 FT							
			0.5 6-inches of TOPSOIL 662.3							
660			FILL- Fine SAND with Silt- Brown- Moist- Very Loose (SP-SM)	SB1		1 1 1	2			
			3.5 659.3							
			Fine to Medium SAND with Clay- Brown- Moist- Loose (SP-SC)	SB2		3 2 3	5			
	5		5.0 657.8 END OF BORING AT 5.0 FEET.							
655										
	10									
650										
	15									

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:05 AM

BORING B 7

BORING DEPTH: 5 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION (FEET)	DEPTH (FEET)	SYMBOLIC PROFILE	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES	HAMMER EFFICIENCY: 60% DATE: N_{60} -- ○	DRY DENSITY (pcf) -- ■ / MOISTURE & ATTERBERG LIMITS (%) PL MC LL	SHEAR STRENGTH (KSF) ▽ HAND PENE. ⊠ TORVANE SHEAR ● UNC. COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ⊕ TRIAXIAL (UU)	REMARKS
	0		ELEVATION: 661.8 FT				10 20 30 40	90 100 110 120 / 10 20 30 40	1 2 3 4	
			0.5 6-inches of TOPSOIL 661.3							
660			Fine SAND- Brown- Moist- Very Loose (SP)	SB1	12	1 1 1	2			
			3.5 658.3							
			Fine to Medium SAND- Brown- Moist- Very Loose (SP)	SB2		3 2 2	4			
	5		5.0 656.8 END OF BORING AT 5.0 FEET.							
655										
	10									
650										
	15									

GROUNDWATER & BACKFILL INFORMATION

GROUNDWATER WAS NOT ENCOUNTERED

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:06 AM

BORING B 8

BORING DEPTH: 8 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION: 663.2 FT

DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
0 – 0.5 (662.7)	6-inches of TOPSOIL			
0.5 – 2.0 (662.7 – 661.2)	FILL- Fine to Medium SAND- Brown- Moist- Loose (SP)	SB1	16	2 2 3 5
2.0 – 3.0 (661.2 – 660.2)	FILL- Fine to Medium SILTY SAND- Dark Brown- Moist- Medium Dense (SM)	SB2	20	6 6 6 5
3.0 – 8.0 (660.2 – 655.2)	Fine to Medium SAND- Brown- Moist to Wet- Medium Dense to Very Loose (SP)	SB3	16	1 4 4 3
		SB4	24	3 1 1 1
8.0 (655.2)	END OF BORING AT 8.0 FEET.			

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○ (5, 12, 8, 2)
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

HAND PENE. ▽
TORVANE SHEAR ⊠
UNC. COMP. ●
VANE SHEAR (PK) ⊡
VANE SHEAR (REM) ×
TRIAXIAL (UU) ⊕
SHEAR STRENGTH (KSF)
1 2 3 4

REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	7.0	656.2
▼ **AT END OF BORING:**	7.0	656.2

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

5/24/22 10:39:07 AM

BORING B 9

BORING DEPTH: 8 FEET

PROJECT NAME: Marcusse Construction Building
PROJECT NUMBER: 089366.00
CLIENT: Marcusse Construction Company
PROJECT LOCATION: Allendale Township, Michigan

DATE STARTED: 5/10/22 **COMPLETED:** 5/10/22 **BORING METHOD:** Geoprobe

DRILLER: DM (JSS) **RIG NO.:** GP2822-ATV **LOGGED BY:** NBS **CHECKED BY:** ATB

ELEVATION: 661.9 FT

DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	SPT BLOWS PER SIX INCHES
0.3 (661.6)	4-inches of TOPSOIL	SB1	20	1 2 2 1
3.5 (658.4)	FILL- Fine to Medium SAND with Silt- Brown- Moist- Very Loose (SP-SM)	SB2	24	1 2 1 1
4.0 (657.9)	FILL- Fine to Medium CLAYEY SAND- Brown- Moist- Very Loose (SC)	SB3		1 2 3 1
6.0 (655.9)	Fine to Medium SAND with Clay- Brown- Moist- Loose (SP-SC)	SB4		7 6 7 9
8.0 (653.9)	Fine to Medium SAND- Brown- Moist to Wet- Medium Dense (SP)			
	END OF BORING AT 8.0 FEET.			

HAMMER EFFICIENCY: 60%
DATE:
N_{60} -- ○
10 20 30 40

DRY DENSITY (pcf) -- ■
90 100 110 120

MOISTURE & ATTERBERG LIMITS (%)
PL MC LL
10 20 30 40

▽ HAND PENE.
⊠ TORVANE SHEAR
● UNC. COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
⊕ TRIAXIAL (UU)
SHEAR STRENGTH (KSF)
1 2 3 4

REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	7.0	654.9
▼ AT END OF BORING:	7.0	654.9

BACKFILL METHOD: Bentonite Chips

NOTES:
1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
3. No hammer efficiency data was available, and the graphic output illustrates the field measured blow counts.

APPENDIX B

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT
GENERAL COMMENTS
LABORATORY TESTING PROCEDURES

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

GENERAL COMMENTS

BASIS OF GEOTECHNICAL REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in the soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME should be contacted to reevaluate the recommendations of this report. SME should be retained to continue our services through construction to observe and evaluate the actual subsurface conditions relative to the recommendations made in this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS

SME should be retained to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM

Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk, and expectations for performance and maintenance.

FIELD VERIFICATION OF GEOTECHNICAL CONDITIONS

SME should be retained to verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

PROJECT INFORMATION FOR CONTRACTOR

This report and any future addenda or other reports regarding this site should be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor should promptly describe the nature and extent of the differing conditions in writing and SME should be notified so that we can verify those conditions. The construction contract should include provisions for dealing with differing conditions and contingency funds should be reserved for potential problems during earthwork and foundation construction. We would be pleased to assist you in developing the contract provisions based on our experience.

The contractor should be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site should be made available for review by bidders and the successful contractor.

THIRD PARTY RELIANCE/REUSE OF THIS REPORT

This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.

LABORATORY TESTING PROCEDURES

VISUAL ENGINEERING CLASSIFICATION

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

MOISTURE CONTENT

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110º C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

HAND PENETROMETER TESTS

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

TORVANE SHEAR TESTS

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for 4 hours in a muffle furnace at a high temperature (approximately 440º C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

ATTERBERG LIMITS TESTS

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a ½-inch thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool ½ inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content and the corresponding number of blows is plotted. The liquid limit is defined as the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.

Passionate People Building
and Revitalizing our World

SME

Vriesman & Korhorn

September 28, 2022
1111

Mr. Jeffrey Brinks, P.E.
Venture Engineering, PLLC
8515 Ridgebluff Drive SW
Byron Center, MI 49315

RE: Marcusse Construction Offices Trip Generation Analysis

Dear Mr. Brinks:

VK Civil has completed a trip generation analysis for the proposed Marcusse Construction Offices on the corner of Lake Michigan Drive and 56th Avenue in Allendale Charter Township, Ottawa County. This revised memo is for the 2-story building with 11,054 square feet floor area.

Using standard ITE trip generation methods and assuming this building to be a Small Office Building, ITE Land Use Code 712, we estimate the development will generate the following trips:

- **21 trips during the AM Peak Hour (17 entry, 4 exit)**
- **27 trips during the PM Peak Hour (9 entry, 18 exit)**
- **179 total trips a day (89 entry, 90 exit)**

These values are still below the thresholds of fifty (50) peak hour directional trips or seven hundred fifty (750) trips during a typical day as set forth in Section 24.06L(1) of Allendale Charter Township's Zoning Ordinance. Based on this, a traffic impact study should not be required.

Thank you for your consideration in this matter. If you have any questions or concerns, please do not hesitate to call.

Sincerely,

Vriesman & Korhorn

Aaron Van Proyen, P.E., PTOE

AVP/zeb

Fresh Coast Planning

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Kevin Yeomans
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kevin@freshcoastplanning.com

MEMORANDUM

To: Allendale Charter Township Planning Commission
From: Kevin Yeomans KLY
Date: September 27, 2022
Re: 10259 52nd Avenue, Griffioen – Special Use Request

Pursuant to the direction of the Planning Commission at your September 6, 2022 meeting, we contacted the Township's legal counsel to confirm whether Mr. Griffioen's proposed use should be considered a principal structure together with the dwelling pursuant to Section 3.12 – Principal Building on a Lot of the Allendale Charter Township Zoning Ordinance (ACTZO) or an accessory structure pursuant to Section 3.11 – Accessory Uses and Buildings of the ACTZO. A summary of his response is as follows:

"Section 3.12 states that "agricultural use farm buildings shall collectively be considered to be one principal use." Farm buildings are defined in Article 32 as "any building or accessory structure other than a farm dwelling unit, which is used for farm operations, such as but not limited to a barn, silo, grain bin, farm implement storage building, or milk house." Therefore, in the present situation it would be my interpretation that Section 3.12 would control over 3.11 of the ACTZO."

Following the legal counsel's interpretation, no additional accessory building requirements have been placed on Mr. Griffioen's proposed structure. This matter is scheduled to return for your review at your October 3, 2022 meeting.

Planning Commission Considerations & Recommendations

Considerations

As the Planning Commission deliberates regarding this application, we believe the following warrant review and consideration. These items are repeated from our initial memo and a copy of our initial memo has been attached.

- If the proposed pad is sufficient to provide for off-street parking and two spaces can be deferred or if six spaces are necessary.
- If the proposed landscaping plan is sufficient.
- If the installation of sidewalks can be deferred until 52nd Avenue is paved or another arrangement.
- If a trip generation analysis will be required.
- If the standards of section 24.06.J – Building Appearance apply to this project.

Recommendations

Pending the results of your deliberations, the Planning Commission must determine if you are prepared to schedule a public hearing for the project or would like to meet with the applicant again to review his final site plan before scheduling for a public hearing.

If you have any questions, please let us know.

KLY
Planner

Attachments

cc: Adam Elenbaas, Township Supervisor

Fresh Coast Planning

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Kevin Yeomans
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MEMORANDUM

To: Allendale Charter Township Planning Commission
From: Gregory L. Ransford
Date: September 27, 2022
Re: Mining and Noise Regulations Comparison Table

Pursuant to your September 6, 2022 meeting, attached is a table comparing the mining requirements for Allendale Charter Township, Tallmadge Charter Township, Jamestown Charter Township, and Grand Haven Charter Township. In addition, the table compares the same communities regarding noise regulations specific to a decibel level separate from mining operations.

As you will note, mining provisions for Tallmadge Charter Township and Jamestown Charter Township are generally identical with the exception of a few setback requirements.

This matter is scheduled as an Old Business item at your October 3, 2022 meeting. If you have any questions, please let us know.

GLR
Planner

cc: Supervisor Elenbaas

Attachment

Mining Comparison

	Entry Road	Cut or Excavation Setback	Machinery for Processing	Storage or Stockpiles	Equipment for mining/processing and interior truck access drives	Cut or Excavation Setback to Existing Water	Fencing	Hours of Operation	Noise
Allendale Charter Township									
	Asphalt, concrete, or similar dustless hard surface for 30 feet in length	25 feet to all lines 100 feet to principal building on adjoining property	250 feet to all lot lines	250 feet to a principal building or adjoining property	250 feet to a principal building or adjoining property	100 feet, unless EGLE authorizes less	Required at all times	M-F; 7:00am to 6:00pm Saturday; 8:00am to 1:00pm Sundays and legal holidays prohibited	Cannot be disturbing
Jamestown Charter Township									
	Asphalt, concrete, or other dustless means when within 300 feet of an occupied property for any roads used for the operation	30 feet to street 40 feet to residential or commercial property 25 feet to woodlot, farmland, or pastureland property	100 feet to all lot lines, 200 feet to any residence	-	100 feet to all lot lines, 200 feet to any residence (equipment) No setback noted for interior truck access	-	Discretion of the Board of Trustees	-	Measures to control noise shall be provided
Grand Haven Charter Township									
	-	-	-	-	50 feet to all lot lines (equipment)	-	-	-	-
Tallmadge Charter Township									
	Asphalt, concrete, or other dustless means when within 500 feet of an occupied property for any roads used for the operation	30 feet to street 40 feet to residential or commercial property 25 feet to woodlot, farmland, or pastureland property	100 feet to all lot lines, 500 feet to any residence	-	100 feet to all lot lines, 500 feet to any residence (equipment) No setback noted for interior truck access	-	Discretion of the Board of Trustees	-	Measures to control noise shall be provided

General Noise Comparison

	Permitted Noise Levels		
Allendale Charter Township	Noise is not regulated by a decibel meter		
Jamestown Charter Township		7:00am to 9:00pm	9:00pm to 7:00am
	Residential dBA	-	-
	Commercial dBA	-	-
	Industrial dBA	65	65
Grand Haven Charter Township		7:00am to 9:00pm	9:00pm to 7:00am
	Residential dBA	65	55
	Commercial dBA	70	60
	Industrial dBA	70	70
		7:00am to 9:00pm	9:00pm to 7:00am
Tallmadge Charter Township	Residential dBA	60	45
	Commercial dBA	60	45
	Industrial dBA	60	45