NORTHFIELD TOWNSHIP PLANNING COMMISSION
NOTICE OF REGULAR MEETING
May 16, 2018 at 7:00 p.m.
Second Floor, Public Safety Building
8350 Main Street, Whitmore Lake, MI 48189

AGENDA

1. **CALL TO ORDER**
2. **PLEDGE OF ALLEGIANCE**
3. **ROLL CALL**
4. **ADOPTION OF AGENDA**
5. **CALL TO THE PUBLIC**
6. **CLARIFICATIONS FROM COMMISSION**
7. **CORRESPONDENCE**
8. **PUBLIC HEARINGS**
   - **A.** Amend Article IV; Section 36-98(d)(2) – General Provisions: Accessory Uses & Buildings
   - **B.** Amend Article VIII; Section 36-218 (4) – SR-1 Single Family Residential: Regulations and Standards: Yard and Setback Requirements
   - **C.** Amend Article IX; Section 36-248(4) – SR-2 Single Family Residential: Regulations and Standards: Yard and Setback Requirements
   - **D.** Amend Article X; Section 36-278(4) – MR Multiple Family Residential: Regulation and Standards: Yard and Setback Requirements
   - **E.** Amend Article II – Definitions: Waterfront Setbacks
   - **F.** Amend Article II – Definitions: Equipment Services Addition
   - **G.** Amend Article XXIV; Section 36-724 Supplementary Regulations and Standards: Holiday Sales
   - **H.** Amend Article IV; Section 36-98(f) – General Provisions: Yard Measurements
9. **REPORTS OF COMMITTEES**
   - **A. Board of Trustees**
   - **B. ZBA**
   - **C. Staff**
   - **D. Planning Consultant**
   - **E. Parks and Recreation**
   - **F. Downtown Planning Group**
10. **UNFINISHED BUSINESS**
    - **A.** Jomar Drive Private Road – North of E North Territorial Road & East of US23
    - **B.** Amend Article IV; Section 36-98(d)(2) – General Provisions: Accessory Uses & Buildings
    - **C.** Amend Article VIII; Section 36-218 (4) – SR-1 Single Family Residential: Regulations and Standards: Yard and Setback Requirements
    - **D.** Amend Article IX; Section 36-248(4) – SR-2 Single Family Residential: Regulations and Standards: Yard and Setback Requirements

This notice is posted in compliance with PA 267 Of 1976 as amended (open meetings act) MCLA 41.7 2A (2) (3) and the Americans with Disabilities Act. (ADA) Individuals with disabilities requiring auxiliary aids or services should contact the Northfield Township Office, (734) 449-5000 seven days in advance.

E. Amend Article X; Section 36-278(4) – MR Multiple Family Residential: Regulation and Standards: Yard and Setback Requirements
F. Amend Article II – Definitions: Waterfront Setbacks
G. Amend Article II – Definitions: Equipment Services Addition
H. Amend Article XXIV; Section 36-724 Supplementary Regulations and Standards: Holiday Sales
I. Amend Article IV; Section 36-98(f) – General Provisions: Yard Measurements
J. Further Discussion 2018 Zoning Ordinance Schedule Urgent, Minor & Major Amendments

11. NEW BUSINESS

A. Discussion Bark Park Rules and Regulations

12. APPROVAL OF PRECEDING MINUTES: May 2, 2018 Regular Meeting

13. FINAL CALL TO THE PUBLIC

14. COMMENTS FROM THE COMMISSIONERS

15. ANNOUNCEMENT: Next Regular Meeting – June 6, 2018

16. ADJOURNMENT

This notice is posted in compliance with PA 267 Of 1976 as amended (open meetings act) MCLA 41.7 2A (2) (3) and the Americans with Disabilities Act. (ADA) Individuals with disabilities requiring auxiliary aids or services should contact the Northfield Township Office, (734) 449-5000 seven days in advance.

MCKENNA

April 23, 2018

Planning Commission
Northfield Township
8350 Main Street
Whitmore Lake, MI 48189

MEMORANDUM: Accessory Setback Clarifications – Revision #2

Dear Commissioners:

The current zoning ordinance has conflicting requirements for structures in the side yard between the general provision section and the district regulations. This memo has been revised to incorporate Planning Commissions Discussion at the April 18, 2018 meeting.

Please consider the following revisions to the clarify the setback ambiguity for side yards.

A. Sec. 36-98(d)(2)(b). - General provisions, Accessory uses and buildings

(d)

Accessory uses and buildings. Where a lot is devoted to a permitted principal use or a permitted conditional use, accessory uses are permitted as listed in the applicable zoning district. Accessory uses and buildings shall be subject to the following regulations:

(1)

Where the accessory building is attached to the principal building, it shall be subject to all regulations of the district in which located.

(2)

In any SR-1, SR-2, or MR district, accessory uses and buildings not attached to the principal building shall ~~not~~:

a.

Not be located in front of the rear line of the principal building or, in the case of a corner lot, in the required side yard;

b.

Not be located less than five feet from an interior side or rear property line;

c.

Not exceed 15 feet in height.

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B. Sec. 36-218 (4). - SR-1, Regulations and Standards

(4)

Yard and setback requirements.

a.

Front yard. Not less than 35 feet.

b.

Side yards. Least width of either yard shall not be less than ten feet, but the sum of the two side yards shall not be less than 25 feet; except in the case where the side yard on the road or street side shall not be less than 35 feet.

c.

Rear yard. Not less than 20 feet.

The requirements of this subsection (4) shall apply to every lot, ~~and~~ principle building or structure, and attached accessory building or structure. Accessory uses and buildings not attached to the principal building shall not be located less than five feet from an interior side or rear property line per Sec. 36-98(d)(2)(b).

C. Sec. 36-248 (4). - SR-2, Regulations and Standards

(4)

Yard and setback requirements.

a.

Front yard. Not less than 30 feet.

b.

Side yards. Least width of either yard shall not be less than ten feet, except in the case where the side yard on the road or street side shall not be less than 30 feet.

c.

Rear yard. Not less than 20 feet.

d.

In the case of a through lot, the frontages along streets shall be considered front yards and all buildings and structures shall meet the minimum front yard requirements.

The regulations in this subsection (4) shall apply to every lot, ~~and~~ principle building or structure, and attached accessory building or structure. Accessory uses and buildings not attached to the principal building shall not be located less than five feet from an interior side or rear property line per Sec. 36-98(d)(2)(b).

D. Sec. 36-278 (4) - MR, Regulations and Standards

(4)

Yard and setback requirements.

a.

Front yard. Not less than 50 feet.

b.

Side yards. Least width of either yard shall not be less than 15 feet, but the sum of the two side yards shall not be less than 35 feet except in the case of a corner lot or parcel where the side yard on the road or street side shall not be less than 50 feet.

c.

Rear yard. Not less than 35 feet.

d.

Accessory structures shall meet the same yard requirements.

The regulations in this subsection (4) shall apply to every lot, ~~and~~ principle building or structure, and attached accessory building or structure. Accessory uses and buildings not attached to the principal building shall not be located less than five feet from an interior side or rear property line per Sec. 36-98(d)(2)(b).

MCKENNA

March 14, 2018

Planning Commission
Northfield Township
8350 Main Street
Whitmore Lake, MI 48189

MEMORANDUM: Definitions

Dear Commissioners:

Please consider the following amendments for discussion.

A. Setbacks and Yards

Please consider the following revised definition language to address waterfront yards and setbacks:

Setback means the distance between a front, side or rear lot line and the nearest supporting member of a structure on the lot. Setbacks on waterfront lots shall be measured from the established high lake level as currently defined by the Office of the Water Resources Commissioner. The minimum required setback is the minimum distance between a front, side, or rear lot line and the nearest supporting member of a structure in order to conform to the required yard setback provisions of this chapter. See *Yard.*

Yard means an open space on the same lot with a building, unoccupied and unobstructed from the ground upward, except as otherwise permitted in this chapter. The minimum required setback is the minimum depth of a front, rear or side yard necessary to conform to the required yard setback provisions of this chapter (see illustration). When the rear yard or side yard abuts water, the yard shall be measured from the high lake level, as currently defined by the Office of the Water Resources Commissioner, to the structure (see setback).

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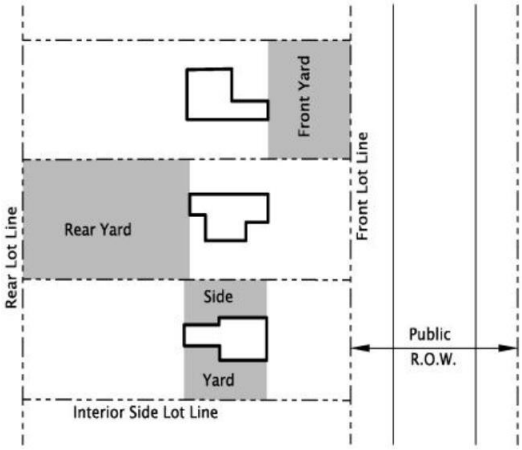

Yards

(1)

Yard, front, means an open space extending the full width of the lot, the depth of which is the minimum horizontal distance between the front lot line and the nearest line of the principal building. Unless otherwise specified, on corner lots there shall be maintained a front yard along each street frontage.

(2)

Yard, rear, means an open space extending the full width of the lot, the depth of which shall be the minimum horizontal distance between the rear lot line and the nearest line on the principal building. On corner lots, the rear yard may be opposite either street frontage, but there shall only be one rear yard.

(3)

Yard, side, means an open space between a principal building and the side lot line, extending from the front yard to the rear yard, the width of which shall be the horizontal distance from the nearest point of the side lot line to the nearest point of the principal building.

B. Equipment Services

Please consider adding the following definition for equipment services:

Equipment Services: Any commercial or industrial entity that provides installation, maintenance, and repair services for utilities and machinery; including but not limited to HVAC equipment, cable servicing, radio, television, and household appliances. This category shall exclude any commercial or industrial operation that involves warehousing, manufacturing, or assembly of such products.

MCKENNA

April 16, 2018

Planning Commission
Northfield Township
8350 Main Street
Whitmore Lake, MI 48189

MEMORANDUM: Temporary Holiday Sales

Dear Commissioners:

Please consider the following revisions to the temporary use amendments for discussion. For discussion We have also include samples from Hamburg Township (See Section 8.9) and Dexter Township (section 3.06) for discussion.

A. Add to definitions – Temporary Holiday Sales.

Temporary Holiday Sales are sales temporary in nature, lasting for less than 30 calendar days, corresponding to a recognized day of festivity or recreation in which by custom or by law normal activities, especially business or work including school, are suspended or reduced.

B. Sec. 36-724. - Temporary ~~specialty stores~~ Holiday Sales.

Temporary sales of products only at certain time of year and associated with seasonal holidays, including Christmas, Halloween, Thanksgiving, Fourth of July, and similar holidays, may take place on individual lots or structures subject to the following regulations: ~~Cutting of trees on individual lots for the purpose of Christmas tree sales and/or the sale of previously cut trees assembled on individual lots for sale shall be subject to the following regulations~~:

(1)

Temporary Holiday Sales ~~Christmas trees~~ may be conducted ~~sold~~ in AR, LC, WLD-DD, WLD-NV, WLD-W, and GC districts. Temporary Holiday Sales ~~Christmas tree sales~~ shall not be permitted in any other residentially zoned districts.

(2)

Churches, schools, or other nonprofit organizations may ~~sell Christmas trees~~ conduct Temporary Holiday Sales on property or structures owned by such institution or organization in any zoning district.

(3)

A Zoning Compliance Application shall be submitted along with fees and a sketch plan for review by the Zoning Administrator to ensure the requirements of this section are met. Unless ~~Christmas tree~~ Temporary Holiday Sales are accessory to the principal use of the site, ~~a permit~~ a Temporary Certificate of Occupancy shall be obtained from the ~~building official~~ Zoning Administrator to allow temporary use of the site for such sales. Such ~~permit~~ Temporary

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Certificate of Occupancy ~~shall~~ may be issued after an inspection of the proposed sale site is made by the Building Official and ~~or his~~ the Director of Public Safety, or their representative ~~of the proposed sale site~~. Such inspection shall include, but not limited to, any and all wiring, lighting, or other apparatus to be utilized in the sale of such ~~trees~~ items. Sales shall not commence until final site approval is obtained and issuance of a Temporary Certificate of Occupancy.

(4)

Such use and occupancy shall be temporary and shall not cause a nuisance to ~~adversely impact adjacent and~~ surrounding properties. The total duration of a Temporary Certificate of Occupancy for Temporary Holiday Sales shall not exceed 30 calendar days. Temporary Holiday Sales for Christmas may be permitted to last 45 calendar days. To the extent any proposed sale items may be regulated by the State of Michigan, as with fireworks, all licenses or permits must be obtained and presented to the Township for review with the Zoning Compliance Application. Upon inspection of the site and sketch plan, the Director of Public Safety may require a security plan, that includes limits on hours of operation, site access, site circulation, and other measures to ensure the safe operation of the Temporary Holiday Sale.

(5)

~~Tree s~~ Storage and display areas shall comply with the minimum setback requirements for the district in which the Temporary Holiday Sale ~~outdoor sale of trees~~ is located.

~~(6)~~

~~The portion of any parcel used for tree sales shall be located no closer than 250 feet from any other parcel that is zoned or used for residential purposes.~~

(~~7~~6)

All loading and parking areas shall be confined within the boundaries of the site and shall not be permitted to spill over onto adjacent roads, except where on-street parking is permitted. Such use and occupancy will not create a traffic hazard ~~and congestion~~.

(~~8~~7)

All ~~trees, parts of trees and any other~~ refuse or debris resulting from ~~Christmas tree~~ sales, and all signs, lights, poles, wires, or other items in connection therewith shall be removed from said property not later than ~~December 28 of the year~~ three days following the holidays occurrence ~~the property is so used~~ and the date of required removal shall be specified on the Temporary Certificate of Occupancy ~~appropriate permit~~ obtained from the Zoning Administrator. ~~building official~~

MCKENNA

April 23, 2018

Planning Commission
Northfield Township
8350 Main Street
Whitmore Lake, MI 48189

MEMORANDUM: Yard Measurements – Overhang Clarification

Dear Commissioners:

Please consider the following revisions to the clarify the setback ambiguity for overhang measurements and yard setbacks.

A. Sec. 36-98(f). - General provisions, Yard Measurements

(f)

Yard measurements. Yards shall be measured from the exterior faces of a structure to lot lines. ~~Yards shall be measured from t~~ The outer edge of a roof overhang or cornice ~~less two feet if the roof overhang or cornice~~ may not extend~~s~~ more than two feet ~~from the exterior face of the structure~~ into a required yard. Front and comer side yards shall be measured from existing right-of-way lines. All required yards shall be located parallel and adjacent to property lines. All required yards shall be measured from the right-of-way line of a public street, or from the right-of-way or easement line of a private street.

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May 7, 2018

Planning Commission
Northfield Township
8350 Main Street
Whitmore Lake, MI 48189

MEMORANDUM: 2018 ZONING ORDINANCE SCHEDULE URGENT, MINOR, AND MAJOR AMENDMENTS

Dear Commissioners:

To follow up from the PC meeting on 5/7/18, we have revised the following assessment and schedule for *urgent*, *minor, and minor* amendments based on consultation with the Zoning Administrator and Planning Commission.

- **Urgent amendments** are time sensitive and consistent with the Master Plan. We recommend Planning Commission proceed with these updates immediately.
- **Minor amendments** are technical changes and minor substantive changes consistent with the Master Plan. We recommend Planning Commission Pursue these changes following the technical review. More minor amendments will be identified during the technical review.
- **Major amendments** are new amendments and procedures recommended consistent with the 2014 Master Plan, and the Downtown and North Village Plans, when adopted.

A. Urgent Amendments*

Section #	Title	Issue	Proposed PC Schedule
36.29	Definitions	• Revise setback and yard definitions to address waterfront properties. • Add definition for equipment services.	3/7/18
36-724	Temporary specialty stores	• Revise to include fireworks sales and other holidays.	3/21/18, 4/4/18
36-98 (d)(2)(b) 36-218 (4) 36-248 (4) 36-278 (4)	General provisions, Accessory uses and buildings SR-1, Regulations and Standards SR-2, Regulations and Standards MR, Regulations and Standards	• Clarify the discrepancy in side yard setback measurements to resolve ambiguity	4/18/18
36-98 (f)	General provisions, Yard measurements.	• Resolve ambiguity on permitted encroachments by the overhangs	5/2/18

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B. Minor Amendments*

Section #	Title	Issue	Proposed PC Schedule
NA	Review Technical Memo	• Identify near-term amendments • Discuss amendment schedule	6/6/18
New	Temporary Structures	• Need regulations for clothing bins, firewood racks, and similar temporary structures	TBD
New Revise 36-701 Revise 36-702	Outdoor Display Storage of materials Parking and storage of vehicles.	• Add a distinction between outdoor display and outdoor storage.	TBD

Additional minor amendments will be identified in the technical review.

C. Major Amendments*

Section #	Title	Issue
36-340	WLD District(s)	• Revise uses permitted and standards
36-383	Site Plan Review	• Revise and update Site Plan review procedures and requirements to encourage flexibility, including adding sketch plans options
36-98	General Provisions	• Add land use table summarizing permitted and conditional uses by district • Include modifications to uses by district
36-902	Nonconforming uses	• Establish Class A and Class B non-conforming use status with standards and procedures
36-761	General provisions for off-street parking.	• Establish Planning Commission waiver with standards and procedures
36-722	Landscaping	• Establish Planning Commission waiver with standards and procedures
ARTICLE XXIII.I.	WLNT, Whitmore lake/north territorial overlay district	• Revise uses permitted and standards • Potentially revise district boundaries via a map amendment
36-864 (c)2	Site plan approval, Change of Use	• Clarify change of use determination procedures in a matrix or table. • Add minimum development requirements for properties that do not conform to site design, access, and safety standards
36-156 36-157	AR - Permitted and Conditional Uses	• Revise agricultural uses to make sure that agricultural tourism is supported
36-723	Natural features preservation	• Review and revise natural features requirements to ensure they are consistent with State and County regulations and consistently applied across project types.

Additional major amendments will be identified in the technical review.

- NOTE: the terms *Urgent*, *Major*, and *Minor*, are used for scheduling planning purposes only and are not meant to convey any subjective value, priority level or impac assessment.

MCKENNA

May 4, 2018

Planning Commission
Northfield Township
8350 Main Street
Whitmore Lake, Michigan 48189

Subject: Jomar Drive – Private Road Application Review #3
Applicants: James W. Kugler (Owner: Falls North Investment)
Location: Jomar Drive, north of E North Territorial Road and east of US 23

Dear Planning Commissioners:

We have reviewed the private road application for Jomar Drive submitted by applicant James W. Kugler. This is the second application for Jomar Drive. Our first review is detailed in a letter to the Planning Commission dated January 12, 2017. The proposed private road is about 1,127 feet long, extending east from the cul-de-sac of the existing portion of Jomar Drive. The private road application was also reviewed by the Township Engineer. We have reviewed the private road against the standards of the Zoning Ordinance and offer the following comments:

Private Road Comments

Section 36-719(f) requires the Planning Commission to review and decide on all private road applications. The standards for private roads are listed in Section 36-719(g) (2) of the Zoning Ordinance as follows:

1. **The roadway surface and turnaround area shall be centered in the right-of-way.**
   The site plan shows that the road will be 28 feet wide and will be centered in the 66-foot right-of-way for the roadway. The entrance from the existing Jomar Drive will be a 48.65-foot curb cut. This standard is met by the proposed private road.

2. **The connection between the right-of-way and the public road shall conform to the standards and specifications of the county road commission. The applicant shall obtain a road permit issued by the road commission prior to approval of any right-of-way by the township planning commission.**
   The proposed private road is an extension of Jomar Drive, which already has a connection between the private road right-of-way and E North Territorial Road. We will defer to the Washtenaw County Road Commission regarding the issuance of its permit, if necessary.

3. **Underground crossroad drainage shall be provided where the proposed right-of-way crosses a stream or other drainage course. Necessary culverts and treatments shall be provided in accordance with the specifications of the county road commission.**
   We defer to the Township Engineer regarding any issues with drainage, which was addressed in a letter under separate cover.

4. **The right-of-way and roadway shall be adequately drained so as to prevent flooding or erosion of the roadway. Ditches shall be located within the right-of-way. Roadway drainage shall be constructed so that the runoff water shall be conveyed to existing watercourses or water bodies. The discharged water shall not be cast upon the land of another property owner unless the water**

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is following an established watercourse. Connection to county drains shall be approved by the county drain commissioner prior to the issuance of a permit. Connection to roadside ditches within public road right-of-way shall be approved by the county road commission prior to the issuance of a permit.
We defer to the Township Engineer regarding any issues with drainage, which was addressed in a letter under separate cover.

5. **Road signs shall be erected and maintained in accordance with the Michigan Manual of Uniform Traffic Control Devices (MMUTCD).**
   No road signs are proposed on the site plan. This private road is an extension of Jomar Drive, which already has a stop sign at its intersection with E North Territorial Road. If any future signs are used on this road, they shall conform to the MMUTCD.

6. **The right-of-way shall provide for ingress, egress, drainage, and installation and maintenance of public and private utilities.**
   We will defer to the Township Engineer regarding any specific engineering issues. However, there is nothing specific on the site plan indicating any difficulty in complying with this standard.

In addition, all minimum requirements of Section 36-719(g) (3) shall also be met. The proposed width of the right-of-way is 66 feet, which meets the minimum requirements. The proposed turnaround area at the end of the road is 75 feet for the right-of-way and 50 feet for the roadway surface, both of which meet the requirements. We defer to the Township Engineer on the remaining requirements of this section.

Natural Features Comments

Section 36-723 of the Zoning Ordinance includes provisions for the preservation of natural features, and Section 36-723(b) only applies the standards to "projects that require site plan review or plat approval." While review of the private road application does not qualify as site plan review or plat approval, we previously recommended the applicant address some information on wetlands and landmark trees in this application. The applicant addressed this concern by providing a natural features impact statement. Our comments are described by the following:

1. **Site Inventory Map.** Has been provided
2. **Natural Features Preservation Plan.** Has been provided
3. **Alternatives Analysis.** The applicant has stated there is no viable alternative road alignment.
4. **Mitigation Plans.** A mitigation plan for landmark trees is provided.
5. **Wetlands.** Although Section 36-723(c) includes Township standards for wetlands preservation that may not apply to private road applications, regulations of the Michigan Department of Environmental Quality (MDEQ) will apply if the wetlands are regulated by the State of Michigan. The applicant has stated that they will obtain a MDEQ Wetland Impact permit. A 50-foot wetland buffer is depicted on the plan. The plan notes the road location is designed to have the least impact on the wetland.
6. **Watercourses.** No watercourses are identified on the site.
7. **Floodplains.** The site is located in the Floodplain Zone X, outside of the 100-year floodplain.
8. **Woodlands.** Woodlands are located on the site and will be impacted by the proposed road location. No specific actions are noted to preserve the woodland outside of the tree mitigation.
9. **Landmark Trees.** For landmark trees that are removed as part of a site plan or plat application, Section 36-723(g) requires replanting of 100% of the original diameter at breast height (DBH) removed. While the

requirements of Section 36-723 would only apply to the site plan or plat applications along Jomar Drive, we recommended more clearly showing the locations of trees to be removed on Sheet 2 of the site plan. This plan shows a table with 58 total landmark trees with 37 to be removed. The proposed mitigation plan shows 33 total trees with 11 deciduous trees with 3" caliper, 4 deciduous with 2.6 inch caliper, and 18 evergreen with 2.5' caliper for a total DBH of 88'. The required DBH replacement value would be 851 DBH." Plan species, location, and schedule is provided. Mitigation is proposed at the time of construction.

We recommend that an additional 4 trees are planted and that the species be Red Oak, White Oak, and White Pine, consistent with the species being removed.

10. **Steep Slopes.** Steep slopes are noted on the plan.
11. **Habitat.** The plan includes steps to limit the disturbance of the habitats of the Indiana bat , the Northern long-eared bat, and the Eastern Massasauga Rattlesnake.

Conclusion

Although the private road meets the zoning-related standards of Section 36-719(f), we defer to the Township Engineer on items with respect to drainage, grading, permits, and other engineering features. If Planning Commission is satisfied with the Natural Features Impact Statement, we recommend that the proposed private road be approved with the following conditions:

1. An additional 4 trees are planted and that the species be Red Oak, White Oak, and White Pine, consistent with the species being removed.
2. Conditions noted in the engineering review.
3. Receipt of all required permits.

If Planning Commission is not satisfied with the Natural Features Impact Statement we recommend tabling the application for a more detailed report and analysis.

If you have any questions about this report, please contact us.

Respectfully submitted,

MCKENNA

Paul Lippens, AICP
Director of Transportation and Urban Design

cc: Steve Aynes, Township Manager
Marlene Chockley, Township Supervisor
Kathleen Manley, Township Clerk
Tim Hardesty, Township Wastewater Superintendent
William Wagner, Township Public Safety Director

Jacob Rushlow, P.E., Township Engineer, OHM
James Kugler, Falls North Investments

ARCHITECTS. ENGINEERS. PLANNERS.

OHM Advancing Communities

January 9, 2018

Northfield Township
8350 Main Street, Suite A
Whitmore Lake, Michigan 48189

Attention: **Mary Bird, Building and Zoning Department**

Regarding: **Jomar Park Phase 2 - Private Road**
Northwest ¼, Section 21, Northfield Township
Private Road Review #2
OHM Job Number 0151-17-1011

Dear Ms. Bird,

We have reviewed the plans, revision date December 7, 2017, for the Jomar Park Phase 2 Private Road according to Township guidelines and general engineering standards. A brief description of the project has been provided below, followed by our comments and recommendation.

The applicant proposes a Class A private road approximately 1,400-feet long. The proposed private road is located north of North Territorial Road on the west side of the Ann Arbor Railroad. The proposed road will connect to the existing private road Jomar Drive.

The plans are in compliance with the private road standards and requirements of section 36-719 of the Northfield Township Zoning Ordinance. The following are required prior to the start of construction.

1. Tree replacement plan that is acceptable to the Planning Consultant and the Planning Commission.
2. Planning Commission approval of the plan.
3. Receipt of outside agency permits and approvals. The required permits/approvals for this project are:
    a. MDEQ Part 303 Wetlands
    b. Northfield Township Fire Department approval of the road and dry hydrant location
    c. Northfield Township Building Department
    d. Washtenaw County Water Resources Commission for soil erosion and sedimentation control
    e. Washtenaw County Water Resources Commission for storm water management
4. Contractor's proof of general liability insurance naming Northfield Township and OHM Advisors as additionally insured. Policies are required to provide coverage up to $500,000 for each occurrence and $1,000,000 aggregate or as necessary according to Northfield Township standards.
5. Construction phase escrow in the amount of $4,500. The escrow will cover the costs associated with the pre-construction meeting, on-site inspections, field engineering (if necessary), final site inspection, and recommendation of final acceptance.
6. Submittal of six full size sets of plans for distribution. The plans shall incorporate any conditions of Planning Commission approval as well as outside permit agencies. The plans shall be dated with the final revision date.
7. A preconstruction meeting must be held. Contact OHM Advisors to schedule the meeting once the above items have been addressed.

Please feel free to contact me at (734) 466-4553 or marcus.mcnamara@ohm-advisors.com if you have any questions.

Sincerely,
OHM ADVISORS

Digitally signed by Marcus McNamara
Date: 2018.01.09 14:49:02-05'00'
Marcus J McNamara

cc: Marlene Chockley, Township Supervisor (via e-mail)
Kathleen Manley, Township Clerk (via e-mail)
Larry Roman, Township Planning Commission Chair (via e-mail)
William Wagner, Township Public Safety Director (via e-mail)
Paul Lippens, Township Planner, McKenna Associates (via e-mail)
Kurt Weiland, Township Building Official (via e-mail)
Katie Lee, WCWRC (via e-mail)
Theresa Marsik, WCWRC (via e-mail)
James Kugler, Falls North Investments (via e-mail)
Rob Wagner, Midwestern Consulting (via email)
File

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MEMORANDUM

TO: Mr. James Kugler, Falls North Investment Co.
FROM: Tina Fix, RLA
RE: Jomar Drive Natural Features Impact Statement
DATE: March 19, 2018
MC No: 16287

Below is a Natural Features Impact Statement for the Jomar Park Phase 2 Class A Private Road site plans as requested by the Northfield Township Planning Commission.

1. Site Inventory Map: Please refer to the Existing Conditions and Survey Plan. The following are identified as "Natural Features" by the Northfield Township Zoning Ordinance. The overall parcel for the development is approximately 46.02 acres. However, the area with delineated/surveyed natural features is limited to the proposed alignment of the private road in an approximately 250 foot wide swath of land, approximately 15.66 acres in size. General findings based on available digital data is provided for the remainder of the parcel.

    a. Wetlands – A wetland delineation was performed by Environmental Consulting & Technology, Inc. in June 2017 for approximately 54.7 acres of land. The wetland boundary is delineated on the Existing Conditions and Survey Plan. A copy of the wetland delineation has been provided to the Township under separate cover. Four wetlands were delineated on the site. Wetlands 1, 3, and 4 are MDEQ regulated and wetland 2 is not regulated by the MDEQ. The 50-foot wetland buffer is depicted on the Existing Conditions and Survey Plan.
    b. Watercourses – no watercourses were identified on the site.
    c. Floodplain – Per FEMA Map No. 26161C0113E dated April 3, 2012, the site is located in Zone X, areas determined to be outside the 0.2% annual chance floodplain. Zone A, 1% Annual Chance Flood area, is located immediately northeast of the site.
    d. Woodlands – Per the Northfield Township Master Plan Natural Features Map, the site contains Woodland adjacent to the forested Wetland 1 on the site. The approximate boundary of the woodland, as shown on the Natural Features Map is depicted on the Existing Conditions and Survey Plan.
    e. Landmark Trees in the development area on the site have been identified and surveyed. A tree list for Landmark Trees is included on the Existing Conditions and Survey Plan.
    f. Steep Slopes – Slopes greater than 12% have been depicted on the Existing Conditions and Survey Plan.
    g. Habitat of threatened or endangered species – A Threatened and Endangered Species report was prepared by Environmental Consulting & Technology in March 2018. Potential habitat for Indiana Bat, *Myotis sodalis*, Northern long-eared bat, *Myotis*

septentrionalis, and Eastern Massasauga, *Sisturus catenatus* were identified in the Michigan Natural Features Inventory database query for areas near the site.

h. Groundwater Recharge Areas – The site is not mapped as a Groundwater Recharge Area on the Washtenaw County Drift Aquifer and Ground Water Recharge Areas Map, dated January 2008.

NRCS Soils for the site are mapped on the Existing Conditions and Survey Plan. Edward Muck (Ed) and Sebewa loam (Sb) are identified as hydric soils.

2. Natural Features Preservation Plan – Please refer to the Existing Conditions and Survey Plan and the Natural Features Preservation and Mitigation Plan.
    a. Natural features removals – Landmark Tree removals are identified on the Existing Conditions and Survey Plan and noted in the Landmark Trees List.
    b. Identify natural features to be retained – Shown on the Natural Features Preservation and Mitigation Plan.
    c. Identify limits of soil disturbance – Shown on the Natural Features Preservation and Mitigation Plan.
    d. Identify protective measures – Shown on the Natural Features Preservation and Mitigation Plan and the Grading and Soil Erosion Control Plan in further detail.
    In order to minimize the impact to potential threatened and endangered species habitat that may exist on or near the site, the following notes have been added to the Existing Conditions Plan and the Natural Features Preservation and Mitigation Plan:
        - Trees removals shall be performed between October 1st and March 31st to avoid impacts to potential habitat for Indiana bat and Northern long-eared bat.
        - To avoid potential impacts on Eastern Massasauga Rattlesnake:
            - Use wildlife-safe materials for erosion control and site restoration. Soil disturbance areas shall be stabilized with straw mulch and no erosion control products containing plastic mesh netting or other similar material that could ensnare EMR shall be used.
            - To increase human safety and awareness of EMR, those implementing the project should first watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (https://youtu.be/-PFnXe_e02w), review the EMR factsheet (https://www.fws.gov/midwest/endangered/reptiles/eama/pdf/EMRfactsheetSep t2016.pdf), or by calling 517-351-2555.
            - Any EMR observations, or observation of any other listed threatened or endangered species, during project implementation shall be reported to the USFWS within 24 hours.

3. Alternatives Analysis
    a. Alternative approaches and/or designs
    The private road is necessary to provide access to the eastern portion of the property. Development of only the western portion of the site that is not regulated natural features is not economically feasible and is not consistent with the overall site layout as approved with Jomar Park Phase 1 site plans. Refer to the written justification in comment 3.b. below for additional consideration of alternative layouts.

b. Written justification of why design proposed must cause degree of disturbance
The site does not have road access along the north, south or west property boundaries. Therefore, the site must be accessed from the existing Jomar Drive along the southwestern edge of the property. A wetland delineation was performed on the site to determine the best location to provide access to the eastern portion of the property while minimizing impacts to natural features on the site. The proposed alignment crosses the wetland at the smallest width possible. Landmark trees were then surveyed along the potential road alignment to determine the best location for the alignment outside the wetland to minimize impacts to regulated trees.

The limits of disturbance to trees, wetland and wetland setback is minimized as much as possible while meeting requirements for private road paving and right-of-way, and stormwater management. A Class A private road is required, with a 66' wide right-of-way, a paved width of 32 feet, and stormwater runoff conveyance (ditches or curb and gutter) based on future industrial use of the property through future land divisions and a length greater than 1,000 linear feet. The proposed curb and gutter road reduces impacts adjacent to the pavement that would be necessary for roadside swales to catch and convey stormwater runoff. Proposed wetland equalization pipes underneath the private road will maintain hydrologic connectivity of the wetland on the north and south sides of the road.

Stormwater management for the increase in impervious surface is required and is located immediately adjacent to the private road to limit the impact to natural features. The proposed bioretention basins are located within areas of the woodland/wetland complex that are upland and have minimal landmark tree impacts. The proposed grading of the road allows all runoff to sheet flow to the south and into the bioretention basins via concrete spillways at low points in the road. This proposed grading eliminates the need to capture runoff on the north side of the road which in turn eliminates the need for catch basins, storm sewer, and increased impact to surrounding natural features. Impacts are again minimized by allowing runoff to enter the basins through spillways rather than constructing catch basins with piping that connects to the basins. The existing entrance to the property and the proposed cul-de-sac are located at higher elevations than the majority of the roadway, therefore, it is not feasible to convey the stormwater runoff to basins that are in existing agricultural fields instead of the wetland/woodland complex.

c. How mitigation is best plan of action
The impact to regulated wetlands is less than 0.33 acres and is limited to the greatest extent possible. Hydrologic connectivity of the wetland complex will be maintained with the equalization pipes. The loss of 8,522 square feet (0.196 acres) of wetland in this large wetland complex, estimated to be at least 15.66 acres on-site, is insignificant in relation to the overall ecological function and value of the wetland. Given the wooded nature of the areas immediate adjacent to the wetland and the overall size of the wetland in comparison to the small wetland impact, no wetland mitigation is proposed.

Landmark tree removals necessary for construction of the private road are not regulated by the site plan approval process and, therefore, mitigation requirements do not apply to this project. However, given the intent of the zoning ordinance, the applicant proposes to provide 33 mitigation trees for a total of 88" DBH on the site.

4. Mitigation Plan
    a. Written description of mitigation program - No wetland mitigation is proposed. The disturbed areas adjacent to the private road will be restored with native vegetation via seeding and erosion control blanket as appropriate. 88" DBH of mitigation trees will be installed on the property at the time of construction of the private road. The proposed tree mitigation associated with the private road is shown on the Natural Features Preservation and Mitigation Plan. Replacement calculations
    The replacement calculations are depicted on the Natural Features Preservation and Mitigation Plan.
    b. Planting plan - The proposed plantings are depicted on the Natural Features Preservation and Mitigation Plan.
    c. Planting list - The plant schedule is shown on the Natural Features Preservation and Mitigation Plan.
    d. Schedule of mitigation measures - The Landscape Notes on the Natural Features Preservation Plan identify the planting schedule for site restoration and mitigation plantings.

Testing Engineers & Consultants, Inc.
1343 Rochester Road • PO Box 249 • Troy, Michigan 48099-0249
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Engineering Client Success

50 years

TEC Report: 57970
Date Issued: August 1, 2017

Mr. James W. Kugler, President
Falls North Investments
4297 Muirfield Drive
Brighton, Michigan 48166

Re: Test Pit Observation & Soil Infiltration Testing
Proposed Storm Water Infiltration System For
Industrial Development, Jomar Drive North of E. North Territorial Drive
Northfield Township, Washtenaw County, Michigan

Dear Mr. Kugler:

This report documents the soil conditions encountered in the test pits at the proposed underground detention/infiltration system for the proposed industrial development at the cul-de-sac end of Jomar Drive in Northfield Township, Michigan.

Four test pits were excavated on June 22 and July 20, 2017 by Testing Engineers & Consultants, Inc. (TEC), subcontractor, Holsbeke Construction, utilizing both a backhoe and an excavator with a 24 inch wide bucket. Three of the test pits were rescheduled from June 22 to July 20, 2017 so a track mounted excavator could be utilized to access the heavily wooded areas. The test pits were excavated for soil infiltration tests. The test pits are identified as Test Pit Nos. 1 through 4. The test pits were excavated to depths ranging from 6 to 6 ½ feet or elevations 911.5 to 914.5 feet. The test pit locations were pre-selected by Midwestern Consulting and the excavation was observed by Mr. George Cardenas with WCWRC and Mr. Ken Majetic, Senior Environmental Scientist with TEC.

The ground surface was covered with topsoil and vegetation. The sandy clayey topsoil thickness was 12 inches.

The underlying native soils were brown sands, silty sands or sands and silts. The sand extended to depths ranging from 4 to 5 ½ feet below existing ground surface or elevations 912.5 to 915.5 feet. The sands were underlain by gray sand and gravel. Sieve analysis tests were performed on a selected sample of granular soils from each test pit. Results of the tests are attached.

Mr. James W. Kugler
Falls North Investments
August 1, 2017

TEC Report: 57970

Ground water was encountered in all four borings at depths ranging from 4 to 5 ½ feet below existing ground surface.

A double ring infiltrometer test was performed at the four test pits. The tests were performed by Ken Majetic. The double ring infiltrometer consists of two concentric rings which are driven into the ground and filled with water. The outer ring helps prevent divergent flow. The drop in the water level within the inner ring is determined and used to calculate the infiltration rate which is the drop in the water level per unit of time. The procedure outlined in the "Low Impact Design (LID) Manual for Michigan" was used. Soil infiltration testing guidelines prepared by the Washtenaw County Water Resources Commissioners were also followed.

The table below outlines the encountered depth and layer thickness of the sand, the depth at which the test was performed and the determined infiltration rate in inches per hour.

Test Pit I.D.	Soil Description	Sand Layer Depth (A)	Test Depth (A)	Measured Infiltration Rate, Inches Per Hour	Design Infiltration Rate, Inches Per Hour (B)
TP-1	Brown Gravelly Medium To Fine Sand With Trace Of Silt	1' – 5.5'	1.5' or Elev. 919.5'	39	19.5
TP-2	Brown Silty Medium To Fine Sand With Some Gravel	1' – 4'	1' or Elev. 917'	9.75	4.9
TP-3	Brown Fine Sand & Silt With Trace Of Gravel	1' – 5.5'	2.5' or Elev. 915.5'	6.75	3.4
TP-4	Brown Fine Sand With Some Silt & Trace Of Gravel	1' – 5'	2' or Elev. 917'	30	15

(A) Below existing ground surface.
(B) Based on a safety factor of 2.

A safety factor of 2 should be incorporated in the design of the infiltration by the designer. The pre-soak information and the individual water level drop readings with associated time interval are shown on the attached test forms.

Testing Engineers & Consultants, Inc.

Mr. James W. Kugler
Falls North Investments
August 1, 2017

TEC Report: 57970

We are pleased for the opportunity to provide our services. Should you have any questions or regard additional information, please feel free to contact our office.

Respectfully submitted,

TESTING ENGINEERS & CONSULTANTS, INC.

Gary E. Putt, P.E.
Senior Project Engineer

Carey J. Suhan, P.E.,
Vice President, Geotechnical
& Environmental Services

GEP/CJS/ln
Enclosure

TEST PIT LOCATION PLAN

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Test Pit No.: 1 **Job No.:** 57970

Client: Falls North Investments

Type of Rig: Backhoe

Drilling Method: Test Pit

Ground Surface Elevation: 921

Project: Industrial Development

Location: Northfield Township, Michigan

Logged By: K. Majetic

Started: 6/22/2017

Completed: 6/22/2017

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			1	Moist Dark Brown Clayey Sandy TOPSOIL			
2.5				Moist Brown Gravelly Medium To Fine SAND With Trace Of Silt			
			4				
5.0			5.5	Moist Brown SAND			
			6.5	Wet Gray SAND & Gravel			
7.5				Bottom of Borehole at 6.5'			
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2" O.D Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, tsf
DP - Direct Push
RC - Rock Core

Water Encountered: 5.5'

At Completion: 5.5'

Test Pit No. 1

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Test Pit No.: 2 **Job No.:** 57970

Project: Industrial Development

Client: Falls North Investments

Location: Northfield Township, Michigan

Type of Rig: Tracked Excavator

Logged By: K. Majetic

Drilling Method: Test Pit

Started: 7/20/2017

Ground Surface Elevation: 918

Completed: 7/20/2017

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			1	Moist Dark Brown Clayey Sandy TOPSOIL			
2.5				Moist Brown Silty Medium To Fine SAND With Some Gravel			
			4				
5.0				Wet Gray SAND & Gravel			
			6				
7.5				Bottom of Borehole at 6'			
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2") D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, tsf
DP - Direct Push
RC - Rock Core

Water Encountered: 4'

At Completion: 3.5'

Test Pit No. 2

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Test Pit No.: 3 **Job No.:** 57970

Project: Industrial Development

Client: Falls North Investments

Location: Northfield Township, Michigan

Type of Rig: Tracked Excavator

Logged By: K. Majetic

Drilling Method: Test Pit

Started: 7/20/2017

Ground Surface Elevation: 918

Completed: 7/20/2017

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			1	Moist Dark Brown Clayey Sandy TOPSOIL			
2.5				Moist Brown Fine SAND & Silt With Trace Of Gravel			
			4				
5.0			5.5	Moist Gray SAND With Some Gravel			
			6.5	Wet Gray SAND & Gravel			
7.5				Bottom of Borehole at 6.5'			
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2") D Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, tsf
DP - Direct Push
RC - Rock Core

Water Encountered: 5.5'

At Completion: 5'

Test Pit No. 3

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Test Pit No.: 4 **Job No.:** 57970

Project: Industrial Development

Client: Falls North Investments

Location: Northfield Township, Michigan

Type of Rig: Tracked Excavator

Logged By: K. Majetic

Drilling Method: Test Pit

Started: 7/20/2017

Ground Surface Elevation: 919

Completed: 7/20/2017

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			1	Moist Dark Brown Clayey Sandy TOPSOIL			
2.5				Brown Fine SAND With Some Silt & Trace Of Gravel			
			4				
5.0			5	Moist Brown SAND			
			6	Wet Gray SAND & Gravel			
7.5				Bottom of Borehole at 6'			
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2") D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of d/y weight
d - Bulk Density, pcf
qu - Unconfined Compression, tsf
DP - Direct Push
RC - Rock Core

Water Encountered: 5'

At Completion: 5'

Test Pit No. 4

Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249
248-588-6200 or 313 T-E-S-T-I-N-G
Fax 248-588-6232

MECHANICAL ANALYSIS TEST REPORT

PROJECT: Storm Water Infiltration System For Industrial Development
LOCATION: Northfield Township, Michigan
CLIENT: Falls North Investments

TEC REPORT NUMBER: 57970

DATE: Friday, June 23, 2017

Material Description: Brown Gravelly Medium to Fine Sand With Trace of Silt

Date Sampled: 6/22/17

Sample Source / Depth: TP-1 @ 1.5'

Sampled By: K. Majetic

Sample Location:

TEC Lab Sample Number: 2440

Intended Use:

Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"		0.0	100.0	
1"	32.3	3.4	96.6	
3/4"	108.4	11.5	88.5	
1/2"	187.5	19.9	80.1	
3/8"	226.3	24.0	76.0	
#4	298.0	31.6	68.4	
#10	355.6	37.7	62.3	
#20	421.8	44.8	55.2	
#30	467.7	49.6	50.4	
#40	576.5	61.2	38.8	
#100	820.7	87.1	12.9	
#200	875.1	92.9	7.1	
Total Sample	942.3	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	942.3
Weight After Wash (g)	875.1
Loss in Weight (g)	67.2
Loss by Wash (%)	7.1%

Tested By: Shreshth M.

Reviewed By: G. Putt

Test Method: ASTM C117/C136 _____ AASHTO T11/T27 _____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers and Consultants, Inc.

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248-588-6200 or 313 T-E-S-T-I-N-G
Fax 248-588-6232

MECHANICAL ANALYSIS TEST REPORT

PROJECT: Storm Water Infiltration System For Industrial Development
LOCATION: Northfield Township, Michigan
CLIENT: Falls North Investments

TEC REPORT NUMBER: 57970

DATE: Tuesday, July 25, 2017

Material Description: Brown Silty Medium to Fine Sand With Some Gravel

Date Sampled: 7/20/17

Sample Source / Depth: TP-2 @ 1'

Sampled By: K. Majetic

Sample Location:

TEC Lab Sample Number: 2545

Intended Use:

Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"				
1"		0.0	100.0	
3/4"	17.2	3.7	96.3	
1/2"	31.1	6.6	93.4	
3/8"	48.7	10.4	89.6	
#4	82.1	17.5	82.5	
#10	126.5	27.0	73.0	
#20	172.5	36.8	63.2	
#30	190.7	40.6	59.4	
#40	217.6	46.4	53.6	
#100	293.8	62.6	37.4	
#200	346.9	73.9	26.1	
Total Sample	469.3	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	469.3
Weight After Wash (g)	346.9
Loss in Weight (g)	122.4
Loss by Wash (%)	26.1%

Tested By: M. Chalhoub
Reviewed By: G. Putt

Test Method: ASTM C117/C136 _____ AASHTO T11/T27 _____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers and Consultants, Inc.

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Fax 248-588-6232

MECHANICAL ANALYSIS TEST REPORT

PROJECT: Storm Water Infiltration System For Industrial Development
LOCATION: Northfield Township, Michigan
CLIENT: Falls North Investments

TEC REPORT NUMBER: 57970

DATE: Tuesday, July 25, 2017

Material Description: Brown Fine Sand & Silt With Trace of Gravel

Date Sampled: 7/20/17

Sample Source / Depth: TP-3 @ 2.5'

Sampled By: K. Majetic

Sample Location:

TEC Lab Sample Number: 2546

Intended Use:

Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"				
1"				
3/4"		0.0	100.0	
1/2"	8.7	1.8	98.2	
3/8"	17.0	3.5	96.5	
#4	33.6	6.8	93.2	
#10	54.7	11.1	88.9	
#20	78.8	16.1	83.9	
#30	97.6	19.9	80.1	
#40	117.7	24.0	76.0	
#100	212.1	43.2	56.8	
#200	307.3	62.6	37.4	
Total Sample	490.8	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	490.8
Weight After Wash (g)	307.3
Loss in Weight (g)	183.5
Loss by Wash (%)	37.4%

Tested By: M. Chalhoub

Reviewed By: G. Putt

Test Method: ASTM C117/C136 _____ AASHTO T11/T27 _____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers and Consultants, Inc.

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MECHANICAL ANALYSIS TEST REPORT

PROJECT: Storm Water Infiltration System For Industrial Development
LOCATION: Northfield Township, Michigan
CLIENT: Falls North Investments

TEC REPORT NUMBER: 57970

DATE: Tuesday, July 25, 2017

Material Description: Brown Fine Sand With Some Silt & Trace of Gravel

Sample Source / Depth: TP-4 @ 2'

Sample Location:

Intended Use:

Date Sampled: 7/20/17

Sampled By: K. Majetic

TEC Lab Sample Number: 2547

Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"				
1"				
3/4"				
1/2"		0.0	100.0	
3/8"	9.4	1.9	98.1	
#4	31.6	6.5	93.5	
#10	69.3	14.2	85.8	
#20	109.1	22.4	77.6	
#30	132.2	27.1	72.9	
#40	179.1	36.7	63.3	
#100	331.1	67.9	32.1	
#200	412.6	84.6	15.4	
Total Sample	487.7	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	487.7
Weight After Wash (g)	412.6
Loss in Weight (g)	75.1
Loss by Wash (%)	15.4%

Tested By: M. Chalhoub

Reviewed By: G. Putt

Test Method: ASTM C117/C136 _____ AASHTO T11/T27 _____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers Consultants, Inc.

DOUBLE RING INFILTROMETER TEST

TEC Project No.: 57970

Client: FALLS NORTH INVESTMENTS

Project PROPOSED INDUSTRIAL DEVELOPMENT

Test Location: TP-1

Date: JULY 20, 2017

Comments:

Test

Time Interval (min.)	Water level from top of ring (in.)
0	
10	6 5/8
20	6 1/2
30	6 3/8
40	6 1/4
50	6 1/2
60	
70	
80	
90	
100	
110	
120	

Procedure:

1.Presoak for one hour in two 30 minute intervals, refilling after each 30 minutes.

2. For last 30 minute interval:

If water drop is two inches or more use 10 minute intervals

If water level drop is less than two inches use 30 minute intervals.

3. Continue readings for a minimum of eight readings (re fill after each reading)
or
until there is 1/4 inch or less drop between the highest and lowest of four consecutive readings

Presoak

Time Interval (min.)	Water level from top of ring (in.)
30	11 1/2
60	11 1/2

Infiltation Rate (in/hr): .39

Testing Engineers Consultants, Inc.

DOUBLE RING INFILTROMETER TEST

TEC Project No.: 57970

Client: FALLS NORTH INVESTMENTS

Project: PROPOSED INDUSTRIAL BUILDING OPPORTUNITY

Test Location: TP-2

Date: JULY 20, 2017

Comments:

Test

Time Interval (min.)	Water level from top of ring (in.)
0	
10	17/8
20	1 5/4
30	1 5/8
40	1 5/8
50	
60	
70	
80	
90	
100	
110	
120	

Procedure:

1.Presoak for one hour in two 30 minute intervals, refilling after each 30 minutes.

2. For last 30 minute interval:

If water drop is two inches or more use 10 minute intervals

If water level drop is less than two inches use 30 minute intervals.

3. Continue readings for a minimum of eight readings (re fill after each reading)
or
until there is 1/4 inch or less drop between the highest and lowest of four consecutive readings

Presoak

Time Interval (min.)	Water level from top of ring (in.)
30	7
60	6 5/8

Infiltation Rate (in/hr): 9.75

Testing Engineers Consultants, Inc.

DOUBLE RING INFILTROMETER TEST

TEC Project No.: 57970

Client: FALLS NORTH INVESTMENTS

Project: PROPOSED INDUSTRIAL DEVELOPMENT

Test Location: TP-3

Date: JULY 20, 2017

Comments:

Test

Time Interval (min.)	Water level from top of ring (in.)
0	
10	1 1/2
20	1 1/4
30	1 1/4
40	1 1/8
50	1 1/8
60	
70	
80	
90	
100	
110	
120	

Procedure:

1. Presoak for one hour in two 30 minute intervals, refilling after each 30 minutes.

2. For last 30 minute interval:

If water drop is two inches or more use 10 minute intervals

If water level drop is less than two inches use 30 minute intervals.

3. Continue readings for a minimum of eight readings (re fill after each reading)
or
until there is 1/4 inch or less drop between the highest and lowest of four consecutive readings

Presoak

Time Interval (min.)	Water level from top of ring (in.)
30	5 1/4
60	5 1/4

Infiltation Rate (in/hr): 6.75

Testing Engineers Consultants, Inc.

DOUBLE RING INFILTROMETER TEST

TEC Project No.: 57970

Client: FALCON NORTH INVESTMENTS

Project: PROPOSED INDUSTRIAL BUILDING

Test Location: TP-4

Date: JULY 20, 2017

Comments:

Test

Time Interval (min.)	Water level from top of ring (in.)
0	
10	5 1/8
20	5 1/8
30	5
40	5
50	
60	
70	
80	
90	
100	
110	
120	

Procedure:

1. Presoak for one hour in two 30 minute intervals, refilling after each 30 minutes.

2. For last 30 minute interval:

If water drop is two inches or more use 10 minute intervals

If water level drop is less than two inches use 30 minute intervals.

3. Continue readings for a minimum of eight readings (re fill after each reading)
or
until there is 1/4 inch or less drop between the highest and lowest of four consecutive readings

Presoak

Time Interval (min.)	Water level from top of ring (in.)
30	10
60	10

Infiltation Rate (in/hr): 30

EVAN N. PRATT, P.E.

WATER RESOURCES COMMISSIONER
705 North Zeeb Road
P.O. Box 8645
Ann Arbor, MI 48107-8645

email: drains@ewashtenaw.org
http://drain.ewashtenaw.org

HARRY SHEEHAN
Chief Deputy Water Resources Commissioner

SCOTT A. MILLER, P.E.
Deputy Water Resources Commissioner

Telephone 734.222.6860
Fax 734.222.6803

April 10, 2018

Mr. Ted Hirsch, P.E.
Midwestern Consulting, LLC
3815 Plaza Drive
Ann Arbor, Michigan 48108

RE: Private Drive – Jomar Park Phase 2
Northfield Township, Michigan
WCWRC Project No. 2695

Dear Mr. Hirsch:

This office has reviewed the site plans for the above referenced project to be located in Northfield Township. These plans have a job number of 16287, a date of March 23, 2018, and were received on March 27, 2018. As a result of our review, we would like to offer the following comments:

1. The plans should include a location map that shows the proposed development.
2. The plans should be signed and sealed by a registered, professional engineer.
3. The engineer's certificate of outlet, accompanied by corresponding calculations and documentation, should be submitted to our office for review.
4. A storm water narrative should be prepared and submitted to our office for review.
5. Based on available site information, portions of the site are covered by hydrologic soil types B and D/B. The soil types and the areas that they cover should be presented on the grading plan. The curve numbers and runoff coefficients used on Worksheet W1 should be revised to reflect the proposed impervious and pervious areas that are underlain by hydrologic soil group B and hydrologic soil group D/B. As noted in Section VIII, Part H of the rules of this office, the first letter for split classification soil groups is the undrained classification, which should be used for the runoff calculations.
6. The maximum design infiltration rate allowed by the rules of this office is 10 inches per hour. Worksheet W11 for basin C should be revised.
7. A long-term storm water maintenance plan, including budget and responsible party, should be designed and included with the plan set.
8. Inspection of the infiltration basins following storms of 1 inch or more should be included as a task in the long-term maintenance plan.

9. A note should be added to the maintenance plan to indicate that no chemicals are allowed in stormwater features or buffer zones with the following exception: invasive species may be treated with chemicals by a certified applicator.

10. Plan sheet 7 indicates that a stormwater seed mix will be used in the basins. The extent of the seed mix should be indicated on the plans.

11. Below the maximum ponding elevation within the bioretention basins, live plantings must cover the entire area. The maximum ponding elevation should be noted on the details. Native plants are preferred. Cultivars and non-native perennials are allowable if approved by WCWRC. Plants listed on the WCWRC Rain Garden Plant List are acceptable. Invasive species are not allowed (see the City of Ann Arbor's invasive species list).

    a. Plantings should be locally adapted and appropriate to the hydric conditions proposed. For more information on individual species, see "Plants for Stormwater Design: Species Selection for the Upper Midwest" by Daniel Shaw & Rusty Schmidt.

    b. Plantings should be spaced according to each species size and growth potential to allow for sufficient coverage as required by the soil erosion permit.

12. Planting soils must be amended with a composted organic material. Soils must be free of construction debris and subsoils. A recommended soil blend includes 20 to 30 percent compost.

13. Current review fees total $651.25 with no outstanding balance. Please remit these fees upon receipt of the accompanying invoice. As requested, the invoice is being submitted directly to Falls North Investment.

At your convenience please send us a complete set of revised plans and the additional information requested above so that we may continue our review. If you have any questions, please contact our office.

Sincerely,

Theresa M. Marsik

Theresa M. Marsik, P.E.
Storm Water Engineer
(approval\Private Road – Jomar Park Phase 2 rev1)

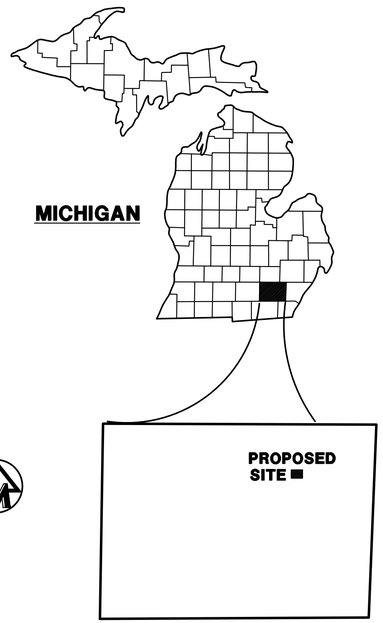
cc: James Kugler, Falls North Investment
Kathleen Manley, Northfield Township Clerk
Marcus McNamara, P.E., Northfield Township Engineer (OHM)

JOMAR PARK PHASE 2 PROPERTY

CLASS A PRIVATE ROAD

NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SECTION 21, T1S, R6E



VICINITY MAP

LEGAL DESCRIPTIONS

LEGAL DESCRIPTIONS (AS PROVIDED BY CLIENT) OF TWO PARCELS OF LAND LOCATED IN THE NORTHWEST 1/4 OF SECTION 21 AND THE NORTHEAST 1/4 OF SECTION 20, T1S, R6E, NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN.

A parcel of land (Parcel 1, Advantage Civil Engineering Job No. 98085, dated 4/27/98) located in the Northwest 1/4 of Section 21, T1S, R6E, Northfield Township, Washtenaw County, Michigan, described as beginning at the West 1/4 corner of said Section 21;
thence N01°57'07"E 1172.29 feet along the West line of said Section 21;
thence S89°45'29"E 1325.93 feet;
thence S00°54'29"W 1169.43 feet along the West line of the Ann Arbor Railroad right of way (66 feet wide);
thence N89°51'39"W 1347.32 feet along the East–West 1/4 line of said Section 21 to the POINT OF BEGINNING. Containing 35.92 acres of land, more or less. Being subject to any easements and restrictions of record, if any. Together with the following described parcel of land (Parcel C, Atwell–Hicks, Inc. Job No. 42036.03, dated 7/25/97):

Commencing at the East 1/4 corner of Section 20, T1S, R6E, Northfield Township, Washtenaw County, Michigan; thence S01°56'56"E 470.99 feet along the East line of said Section 20 for a PLACE OF BEGINNING; thence S69°02'45"W 708.91 feet; thence N00°09'01"W 794.82 feet; thence N01°56'56"W 682.13 feet; thence S01°56'56"W 518.40 feet to the Place of Beginning, being part of the Northeast 1/4 of said Section 20, containing 10.10 acres of land, more or less, being subject to and together with a 12 foot easement in favor of Detroit Edison Company, described as: Commencing at the East 1/4 corner of Section 20, T1S, R6E, Northfield Township, Washtenaw County, Michigan; thence S01°28'30"W 602.40 feet along the East line of said Section 20; thence N71°11'05"W 616.64 feet along the North proposed 60 foot right–of–way line of North Territorial Road (120 feet proposed) for a PLACE OF BEGINNING; thence N18°48'55"E 74.26 feet; thence 32'53"E 93.83 feet; thence 333.37 feet along the arc of a non–tangential circular curve to the left, radius 485.00 feet, chord bearing N11°27'05"W 324.04 feet; thence 01'57"W 76.52 feet; thence 452.05 feet along the arc of a non–tangential circular curve to the right, radius 497.00 feet, chord bearing N54°58'03"E 90.00 feet; thence 01'57"E 76.52 feet; thence 414.59 feet along the arc of a circular curve to the right, radius 495.00 feet, chord S35° 02'17"E 402.58 feet; thence S07°15'48"W 97.81 feet; thence S18°48'55"W 74.55 feet; thence bearing 05"W 12.00 feet along the North proposed 60 foot right–of–way line of said North Territorial Road; thence N71°48'55"E 73.74 feet; thence N07°15'48"E 97.19 feet; thence 405.13 feet along the arc of a non–tangential circular curve to the left, radius 483.00 feet, chord 00'11"W 393.36 feet; thence N35°01'57"W 83.63 feet; thence 402.90 feet along the arc of a non–tangential circular curve to the left, radius 75.00 feet, chord bearing S54°58'03"W 66.00 feet; thence S35°01'57"E 83.63 feet; thence 344.88 feet along the arc of a circular curve to the right, radius 417.00 feet, chord bearing 20'20"E 335.14 feet; thence S27°32'53"W 94.53 feet; 48'55"W 73.34 feet; thence N71°11'05"W 12.00 feet; S14° along the North proposed 60 foot right–of–way line of said North Territorial Road to the Place of Beginning, and being subject to and together with a variable width easement for ingress and egress, described as: Commencing at the East 1/4 corner of Section 20, T1S, R6E, Northfield Township, Washtenaw County, Michigan; thence S01°28'30"W 602.40 feet along the East line of said Section 20; thence N71°11'05"W 504.64 feet along the North proposed 60 foot right–of–way line of said North Territorial Road for a PLACE OF BEGINNING; thence continuing N71°11'05"W 100.00 feet; 48'55"E 73.34 feet; thence N27°32'53"E 94.53 feet; thence 344.88 feet along the arc of a non–tangential circular curve to the left, radius 417.00 feet, chord 20'20"W 335.14 feet; thence N35 83.63 feet; thence 402.90 feet along the arc of a non–tangential circular curve to the right, radius 75.00 feet, chord bearing N54°58'03"E 66.00 feet; thence S35 83.63 feet; thence 405.13 feet along the arc of a non–tangential circular curve to the right, radius 483.00 feet, chord bearing S11°00'11"E 393.36 feet; thence 15'48"W 97.19 feet; thence S18°48'55"W 73.34 feet to the Place of Beginning, and being subject to other easements and restrictions of record, if any.

LEGAL DESCRIPTION OF A 66 FOOT WIDE PRIVATE ROAD (JOMAR DRIVE) LOCATED IN THE NORTHWEST 1/4 OF SECTION 21 AND THE NORTHEAST 1/4 OF SECTION 20, T1S, R6E, NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN.

Commencing at the West 1/4 corner of Section 21, T1S, R6E, Northfield Township, Washtenaw County, Michigan, thence N01°57'07"E 473.07 feet along the West line of said Section 21 to the POINT OF BEGINNING;
thence Northeasterly 44.91 feet along a circular curve to the right, radius 197.00 feet, central angle 13°03'42", long chord bearing N79°28'58"E 44.81 feet;
thence N86°00'49"E 613.87 feet;
thence Southeasterly 15.12 feet along a circular curve the right, radius 15.00 feet, central angle 57°46'08", long chord bearing S65°06'07"E 14.49 feet;
thence Northwesterly 386.86 feet along a circular curve to the left, radius 75.00 feet, central angle 295°32'18", long chord bearing N03°59'11"W 80.00 feet;
thence Southwesterly 15.12 feet along a circular curve to the right, radius 15.00 feet, central angle 57°46'08", long chord bearing S57°07'45"W 14.49 feet;
thence S86°00'49"W 613.87 feet;
thence Southwesterly 63.15 feet along a circular curve to the left, radius 263.00 feet, central angle 13°45'29", long chord bearing S79°08'04"W 63.00 feet;
thence S72°15'20"W 513.26 feet;
thence Southwesterly 133.98 feet along a circular curve to the left, radius 263.00 feet, central angle 29°11'20", long chord bearing S57°39'40"W 132.54 feet;
thence S43°04'00"W 25.38 feet;
thence Southeasterly 68.34 feet along a circular curve to the right, radius 75.00 feet, central angle 52°12'30", long chord bearing S47°11'48"E 66.00 feet;
thence N43°04'00"E 25.08 feet;
thence Northeasterly 100.36 feet along a circular curve to the right, radius 197.00 feet, central angle 29°11'20", long chord bearing N57°39'40"E 99.28 feet;
thence N72°15'20"E 513.26 feet;
thence Northeasterly 2.39 feet along a circular curve to the right, radius 197.00 feet, central angle 00°41'47", long chord bearing N72°36'13"E 2.39 feet to the POINT OF BEGINNING.

Approval/Permit	Agency	Submitted	Plans Approved	Permit/Approval Issued	Comment
Building	Northfield Twp. Building Department Mary Bird, Building Department Assistant (734) 449-5000 bird@northfieldmi.gov 8350 Main Street, Suite A Whitmore Lake, MI 48189			N/A	Per email from Northfield Twp. On 2/26/18, Bldg. Dept. does not require a permit or review of the private road
Site Plan Review	Northfield Twp. Planning Consultant (McKenna & Assoc.) Paul Lippens, Township Planning Consultant (734) 449-5000 bird@northfieldmi.gov 8350 Main Street, Suite A Whitmore Lake, MI 48189	12/23/2016 12/7/2017 3/20/2018	1/9/2018	CONDITIONAL	Contingent on administrative approval of tree mitigation plan
Fire Code Compliance	Northfield Twp. Engineering Consultant (OHM Advisors) Marcus McNamara, Township Engineer (734) 466-4553 marcus.mcnamara@ohm-advisors.com 34000 Plymouth Road Livonia, MI 48150	12/23/2016 12/7/2017	1/9/2018	YES	Per email from OHM on 2/27/18, plans are approved.
Engineering Compliance	Northfield Twp. Engineering Consultant (OHM Advisors) Marcus McNamara, Township Engineer (734) 466-4553 marcus.mcnamara@ohm-advisors.com 34000 Plymouth Road Livonia, MI 48150	12/23/2016 12/7/2017 3/20/2018	1/9/2018	CONDITIONAL	Contingent on Planning Commission approval, fees, and insurance being provided.
Soil Erosion Control	Washtenaw County Water Resources Commissioner Katie Lee, Soil Erosion Program Supervisor (734) 222-3978 leek@ewashtenaw.org 705 North Zeeb Road, P.O. Box 8645 Ann Arbor, MI 48107			NO	
Storm Water Management	Washtenaw County Water Resources Commissioner Theresa Marsik, Stormwater Engineer (734) 222-6844 marsikt@ewashtenaw.org 705 North Zeeb Road, Ann Arbor, MI 48107			NO	Approval is required; Permit requirement is T.B.D.
MDEQ Wetland Impact	Michigan Department of Environmental Quality Katherine David (517) 780-7021 davidk@michigan.gov 301 East Louis Glick Highway Jackson, MI 49201	1/9/2018 3/9/2018		NO	Updated application & additionally requested info submitted 3/9/18. Awaiting response.
Private Road Permit	Washtenaw County Road Commission Gary Streight, Project Manager (734) 761-1500 streightg@wcroads.org 555 North Zeeb Road Ann Arbor, MI 48103	3/9/2018		NO	Application and plans submitted 3/9/18. Awaiting response.

W12 - Natural Features Inventory

Existing Natural Resources	Mapped	Total Area (ac)	Protected Area (ac)
Water Bodies	No	0.00	0.00
Floodplains	No	0.00	0.00
Riparian Areas	No	0.00	0.00
Wetlands	Yes	16.32	16.09
Woodlands	Yes	20.40	18.70
Slopes (>33%)	No	0.00	0.00
Total Existing		**36.72**	**34.79**

OWNER/DEVELOPER

FALLS NORTH INVESTMENT CO.
4297 MUIRFIELD DRIVE
BRIGHTON, MI 48116
TEL: (734) 741–0500
CONTACT: JAMES KUGLER

ENGINEER

MIDWESTERN CONSULTING L.L.C.
3815 PLAZA DRIVE
ANN ARBOR, MI. 48108
TEL: (734) 995–0200
CONTACT: ROB WAGNER

SHEET INDEX

JOMAR PARK PHASE 2 - PRIVATE ROAD

JOB No. **16287**

DATE: 12/21/16
SHEET 1 OF 8

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	12/7/17
PER TOWNSHIP COMMENTS	3/20/18

CADD: WAJ, RDW, TPH
ENG: RCW
PM: RCW
TECH: BAC
Site Plan\162587CV1.DWG
FB#305

1

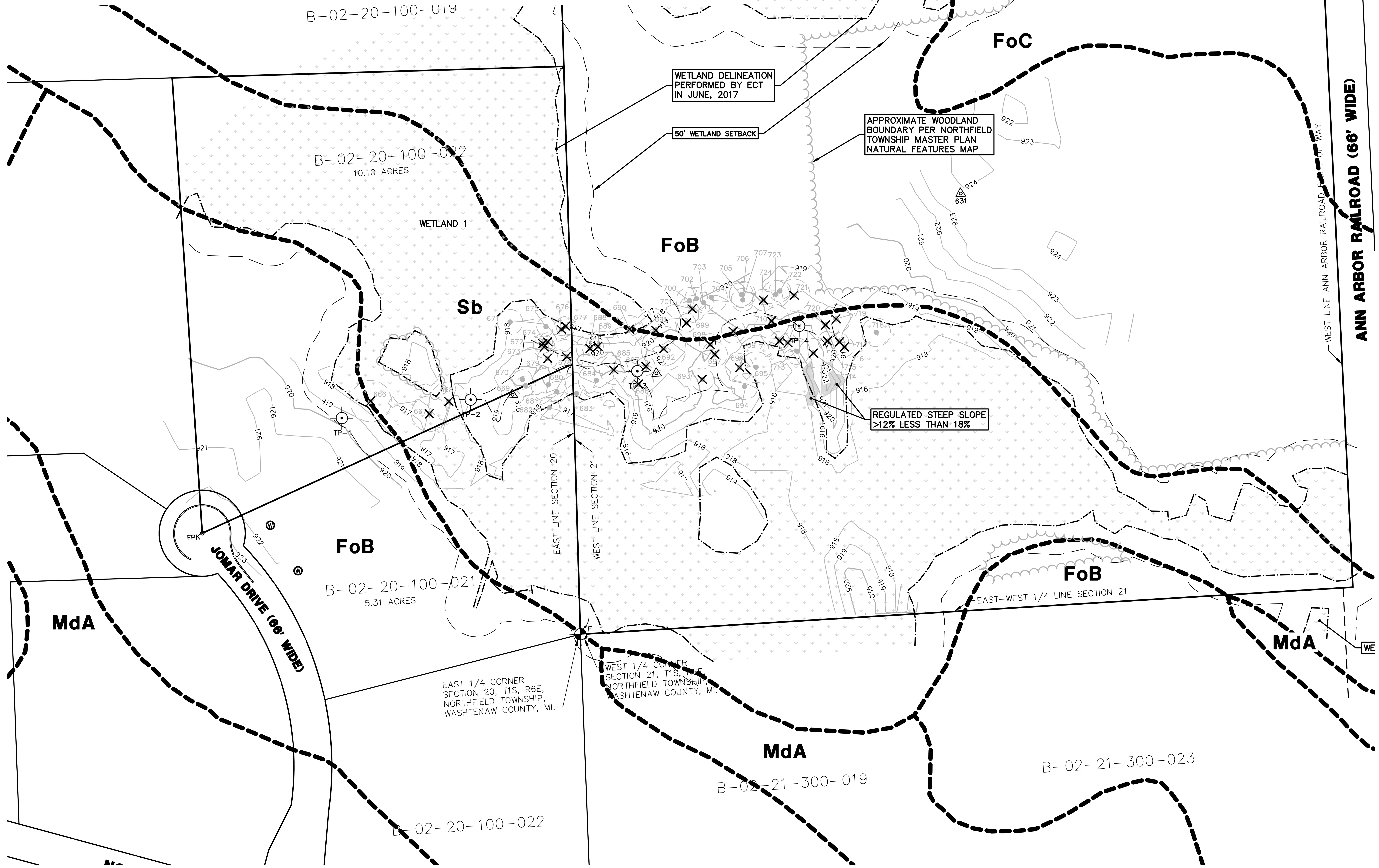
MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

RELEASED FOR:	DATE

ROBERT C. WAGNER
P.E. # 42699

NATURAL FEATURES

- WETLANDS – A WETLAND DELINEATION WAS PERFORMED BY ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC. IN JUNE 2017. FOUR WETLANDS WERE DELINEATED ON THE SITE. WETLANDS 1, 3, AND 4 ARE MDEQ REGULATED AND WETLAND 2 IS NOT REGULATED BY THE MDEQ. THE 50–FOOT WETLAND BUFFER IS DEPICTED ON THE EXISTING CONDITIONS AND SURVEY PLAN.
- WATERCOURSES – NO WATERCOURSES WERE IDENTIFIED ON THE SITE.
- FLOODPLAIN – PER FEMA MAP NO. 26161C0113E DATED APRIL 3, 2012, THE SITE IS LOCATED IN ZONE X, AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. ZONE A, 1% ANNUAL CHANCE FLOOD AREA, IS LOCATED IMMEDIATELY NORTHEAST OF THE SITE.
- WOODLANDS – PER THE NORTHFIELD TOWNSHIP MASTER PLAN NATURAL FEATURES MAP, THE SITE CONTAINS WOODLAND ADJACENT TO THE FORESTED WETLAND 1 ON THE SITE.
- LANDMARK TREES IN THE DEVELOPMENT AREA ON THE SITE HAVE BEEN IDENTIFIED AND SURVEYED. A TREE LIST FOR LANDMARK TREES IS INCLUDED ON THE EXISTING CONDITIONS AND SURVEY PLAN.
- STEEP SLOPES – SLOPES GREATER THAN 12% HAVE BEEN DEPICTED ON THE EXISTING CONDITIONS AND SURVEY PLAN.
- THREATENED AND ENDANGERED SPECIES HABITAT – A THREATENED AND ENDANGERED SPECIES REPORT WAS PREPARED BY ENVIRONMENTAL CONSULTING & TECHNOLOGY IN MARCH 2018. POTENTIAL HABITAT FOR INDIANA BAT, MYOTIS SODALIS, NORTHERN LONG–EARED BAT, MYOTIS SEPTENTRIONALIS, AND EASTERN MASSASAUGA, SISTURUS CATENATUS WERE IDENTIFIED IN THE MICHIGAN NATURAL FEATURES INVENTORY DATABASE QUERY FOR AREAS NEAR THE SITE.



LEGEND

- 838 — EXIST. CONTOUR
- ×836.2 — EXIST. SPOT ELEVATION
- WELL
- FENCE
- GUARDRAIL
- SINGLE TREE
- TREE OR BRUSH LIMIT
- EXIST. BOULDER
- SECTION CORNER
- TP–1 — INFILTRATION TEST PIT LOCATION
- S — SET IRON PIPE
- F — FOUND IRON PIPE
- S — SET MONUMENT
- F — FOUND MONUMENT
- spk — SET P.K.
- FPK — FOUND P.K.
- S — SET IRON ROD
- FIR — FOUND IRON ROD
- CONTROL PT.

SCALE: 1" = 100'

0 100 200 300

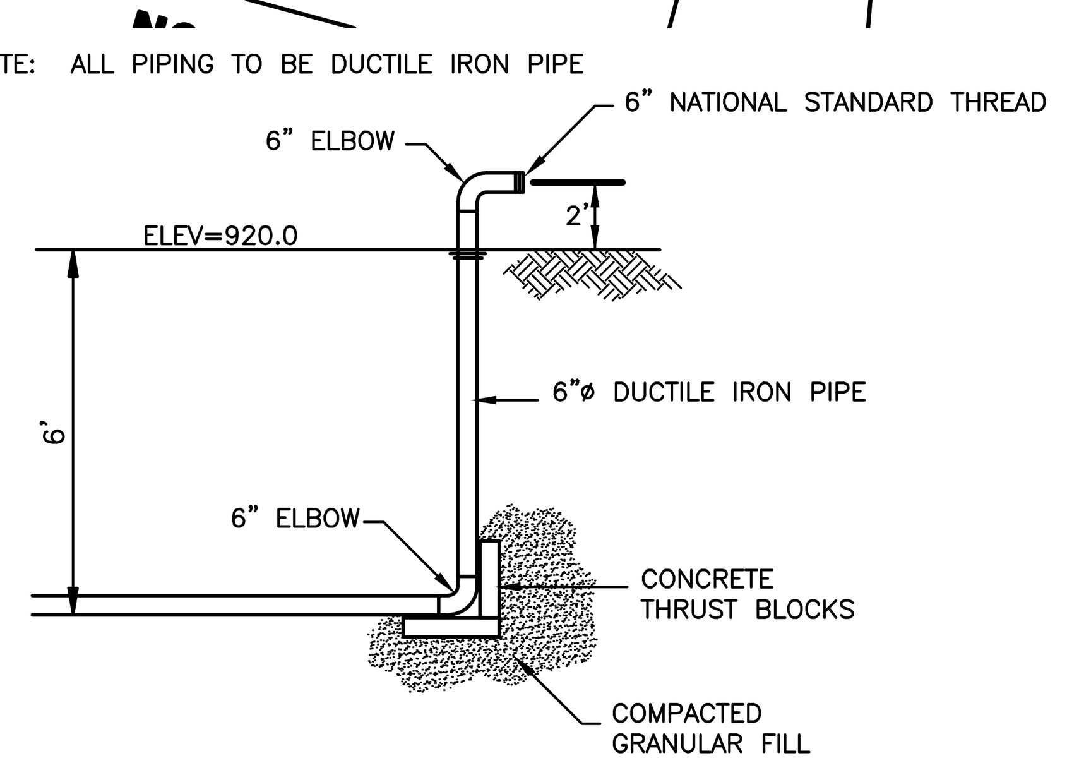
TREE LEGEND

- EXISTING LANDMARK TREE (SEE TABLE) SURVEYED 2017
- X — EXISTING LANDMARK TREE TO BE REMOVED

LANDMARK TREES

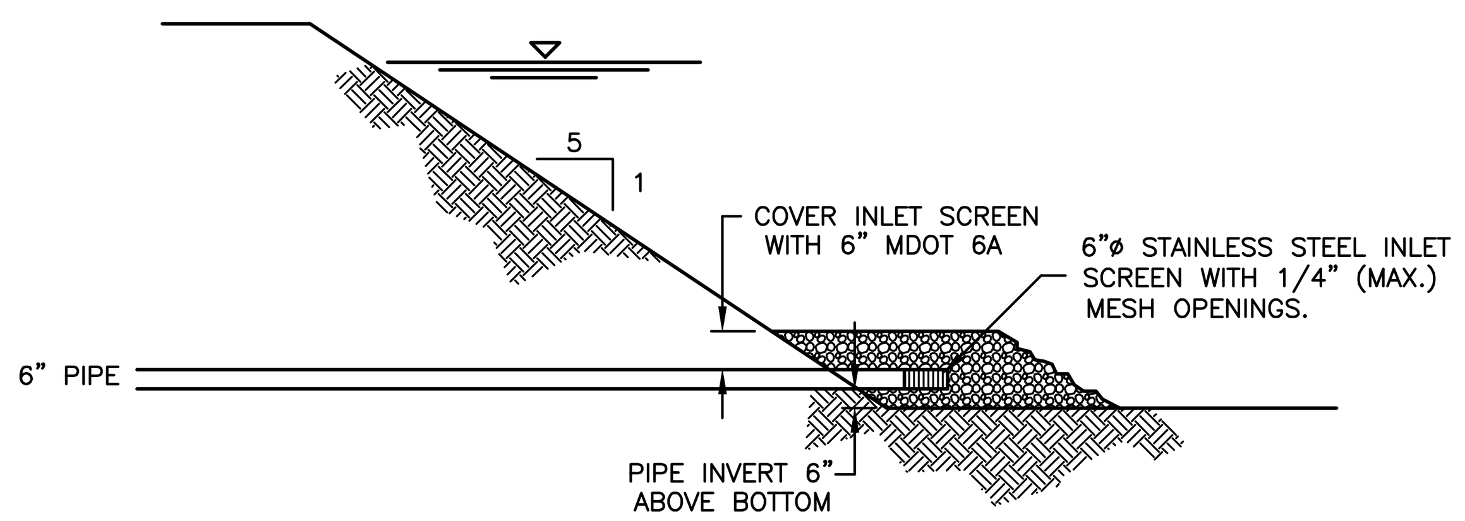
TAG#	DBH	COMMON NAME	GENUS/SPECIES	SCORE	LM	REG	NON-REG	EXEMPT	REMOVE	MITIGATION
666	36"	Cottonwood	Populus deltoides		X				X	36"
667	31"	Cottonwood	Populus deltoides		X				X	31"
668	34"	Silver Maple	Acer saccharinum		X				X	34"
669	17"	Red Oak	Quercus rubra		X					
670	17"	Red Oak	Quercus rubra		X					
671	22"	White Pine	Pinus strubus		X					
672	17"	Red Oak	Quercus rubra		X				X	17"
673	19"	Red Oak	Quercus rubra		X				X	19"
674	16"	Red Oak	Quercus rubra		X				X	16"
675	16"	Red Oak	Quercus rubra		X					
676	16"	White Oak	Quercus alba		X				X	16"
677	17"	White Oak	Quercus alba		X				X	17"
678	30"	Silver Maple	Acer saccharinum		X				X	30"
679	18"	Red Oak	Quercus rubra		X				X	18"
680	21"	Red Oak	Quercus rubra		X					
681	18"	Red Oak	Quercus rubra		X					
682	18"	Red Oak	Quercus rubra		X					
683	17"	Swamp White Oak	Quercus bicolor		X					
684	31"	White Oak	Quercus alba		X					
685	25"	White Oak	Quercus alba		X				X	25"
686	27"	White Oak	Quercus alba		X				X	27"
687	16"	White Oak	Quercus alba		X				X	16"
688	24"	Red Oak	Quercus rubra		X				X	24"
689	21"	White Oak	Quercus alba		X				X	21"
690	24"	Bur Oak	Quercus macrocarpa		X				X	24"
691	37"	Bur Oak	Quercus macrocarpa		X				X	37"
692	39"	White Oak	Quercus alba		X				X	39"
693	20"	Red Oak	Quercus rubra		X				X	20"
694	23"	Silver Maple	Acer saccharinum		X					
695	27"	Bur Oak	Quercus macrocarpa	40%	X					
696	24"	Bur Oak	Quercus macrocarpa		X				X	24"
697	22"	Black Cherry	Prunus serotina		X				X	22"
698	19"	Red Oak	Quercus rubra		X				X	19"
699	16"	Red Oak	Quercus rubra		X				X	16"
700	23"	White Pine	Pinus strobus		X					
701	23"	White Pine	Pinus strobus		X				X	23"
702	20"	White Pine	Pinus strobus		X					
703	18"	White Pine	Pinus strobus		X					
704	28"	White Pine	Pinus strobus		X					
705	21"	White Pine	Pinus strobus		X					
706	23"	White Pine	Pinus strobus		X					
707	20"	Black Cherry	Prunus serotina		X					
709	21"	Black Cherry	Prunus serotina		X				X	21"
710	31"	Red Oak	Quercus rubra		X				X	31"
711	17"	Red Oak	Quercus rubra		X				X	17"
712	16"	Red Oak	Quercus rubra		X				X	16"
713	23"	Red Oak	Quercus rubra		X				X	23"
714	25"	Red Oak	Quercus rubra		X				X	25"
715	17"	Red Oak	Quercus rubra		X				X	17"
716	17"	Red Oak	Quercus rubra		X				X	17"
717	16"	Red Oak	Quercus rubra		X				X	16"
718	25"	Silver Maple	Acer saccharinum		X					
719	25"	Red Oak	Quercus rubra		X				X	25"
720	25"	Red Oak	Quercus rubra		X				X	25"
721	28"	White Pine	Pinus strobus		X				X	28"
722	19"	White Pine	Pinus strobus		X					
723	24"	White Pine	Pinus strobus		X					
724	19"	White Pine	Pinus strobus		X				X	19"

TREES REMOVALS SHALL BE PERFORMED BETWEEN OCTOBER 1ST AND MARCH 31ST TO AVOID IMPACTS TO POTENTIAL HABITAT FOR INDIANA BAT AND NORTHERN LONG–EARED BAT. SEE NATURAL FEATURES PRESERVATION AND MITIGATION PLAN FOR NOTES ON POTENTIAL THREATENED AND ENDANGERED SPECIES HABITAT INCLUDING INDIANA BAT AND NORTHERN LONG–EARED BAT AND EASTERN MASSASAUGA RATTLESNAKE.



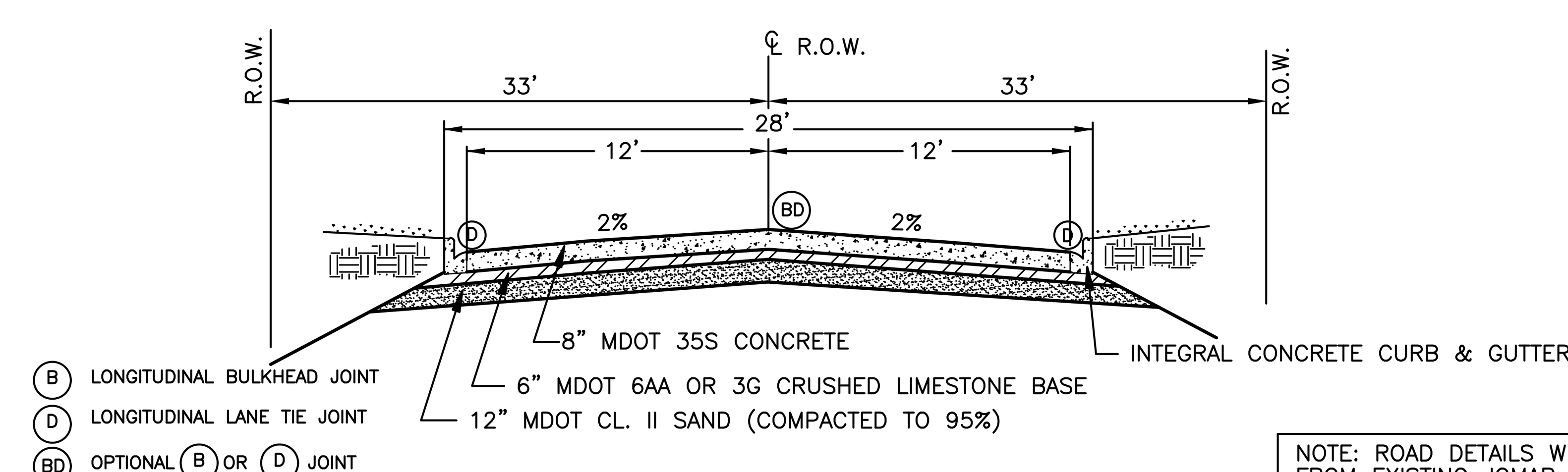
DRY HYDRANT DETAIL

NOT TO SCALE



FIRE SUPPLY INLET DETAIL

NOT TO SCALE



NOTE: ROAD DETAILS WERE DUPLICATED FROM EXISTING JOMAR DRIVE PLANS ATWELL–HICKS, INC. 10/18/96

JOMAR DRIVE EXISTING CROSS SECTION

NO SCALE

SOILS DESCRIPTION

General Soils Description: USDA Custom Soil Resource Report for Washtenaw County, Michigan

Ed	Edwards muck, 0-2 percent slopes (Hydric Soil) Depressions on plains, depressions on moraines. Very poorly drained; runoff class: very low. Hydrologic soil group: C/D
FoB	Fox sandy loam, 2 to 6 percent slopes, till plain Outwash plains, outwash terraces. Well drained; runoff class: low. Hydrologic soil group: B
FoC	Fox sandy loam, 6 to 12 percent slopes Hills on terraces, hills on outwash plains. Well drained; runoff class: medium. Hydrologic soil group: B
MdA	Matherton sandy loam, 0 to 4 percent slopes Drainageways on outwash plains, drainageways on terraces Somewhat poorly drained; runoff class: low. Hydrologic soil group: B/D
Sb	Sebewa loam, 0 to 2 percent slopes; disintegration moraine (Hydric Soil) Drainageways on stream terraces, drainageways Poorly drained; runoff class: negligible. Hydrologic soil group: B/D

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JOMAR PARK PHASE 2 - PRIVATE ROAD

NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN
PRIVATE ROAD DESIGN
EXISTING CONDITIONS AND SURVEY PLAN

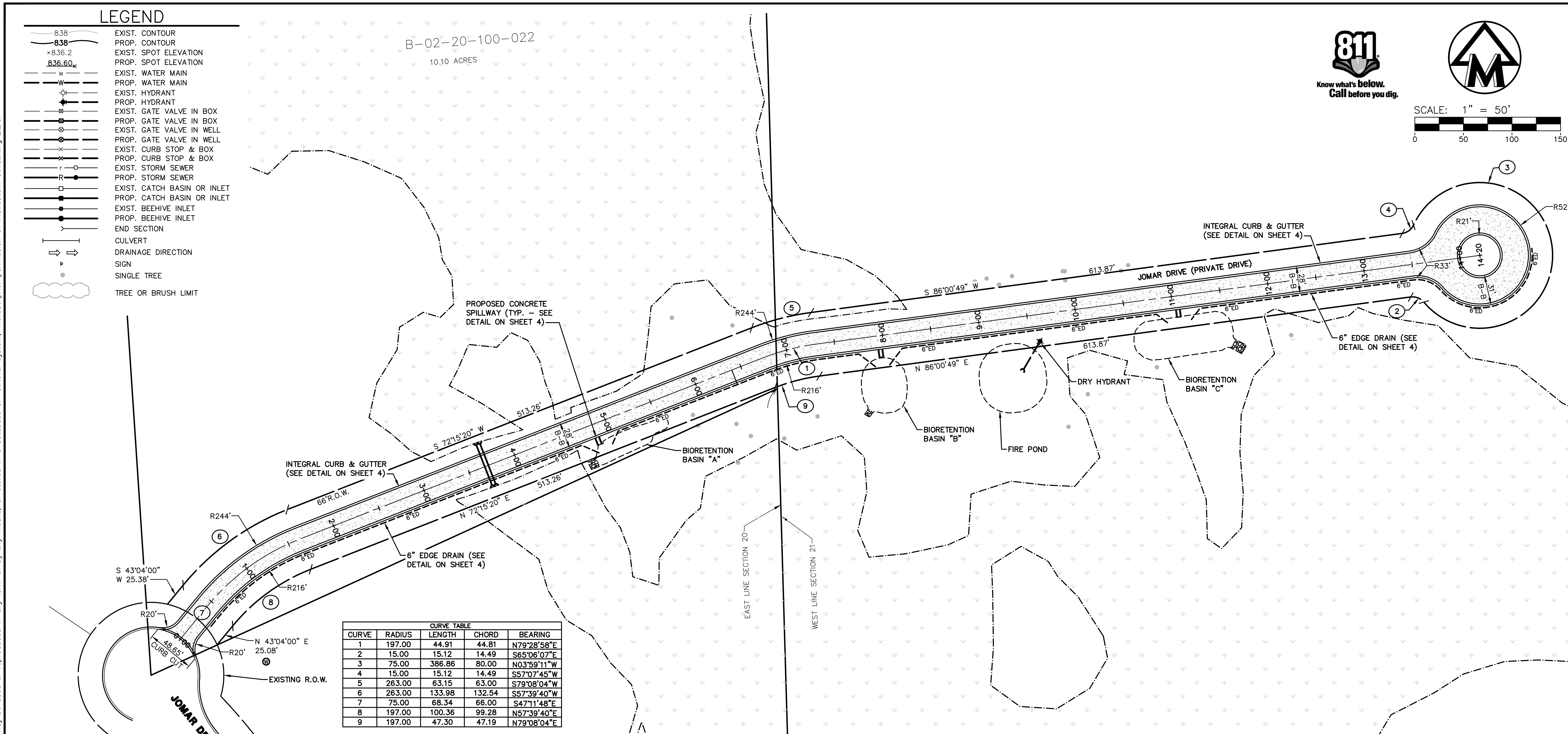
2

JOB No. 16287

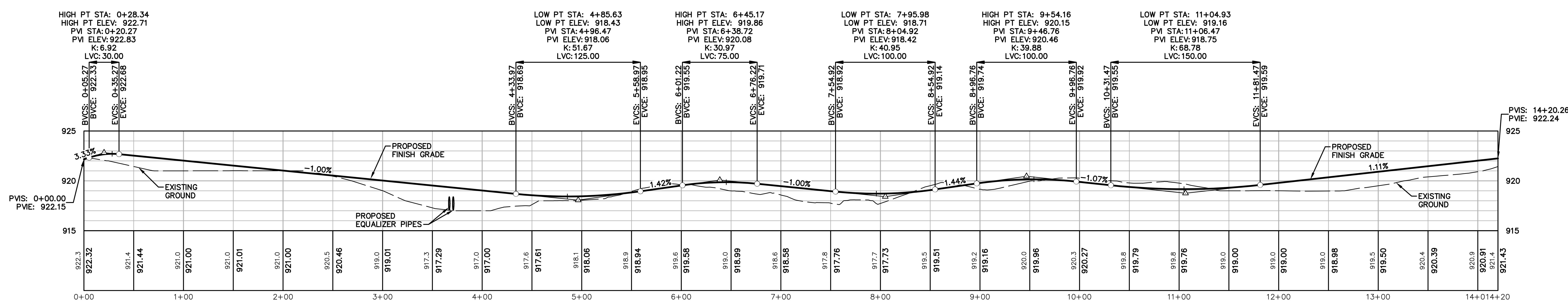
REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	12/7/17
PER TOWNSHIP COMMENTS	3/20/18

DATE: 12/21/16
SHEET 2 OF 8
CADD: WAJ, RDW, TPH
ENG: RCW
PM: RCW
TECH: BAC
Site Plan\16287EX1.dwg
FB#305, 313, 617A

M:\Civil3d_Proj\16287\Site Plan\16287EX1.dwg, 3/20/2018 11:16 AM, Rachel D. Wandmacher, None



CURVE TABLE				
CURVE	RADIUS	LENGTH	CHORD	BEARING
1	197.00	44.91	44.81	N79°28'58"E
2	15.00	15.12	14.49	S65°06'07"E
3	75.00	386.86	80.00	N03°59'11"W
4	15.00	15.12	14.49	S57°07'45"W
5	263.00	63.15	63.00	S79°08'04"W
6	263.00	133.98	132.54	S57°39'40"W
7	75.00	68.34	66.00	S47°11'48"E
8	197.00	100.36	99.28	N57°39'40"E
9	197.00	47.30	47.19	N79°08'04"E



The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

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JOMAR PARK PHASE 2 - PRIVATE ROAD

NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN
PRIVATE ROAD DESIGN
DIMENSIONAL ROAD PLAN & PROFILE

3

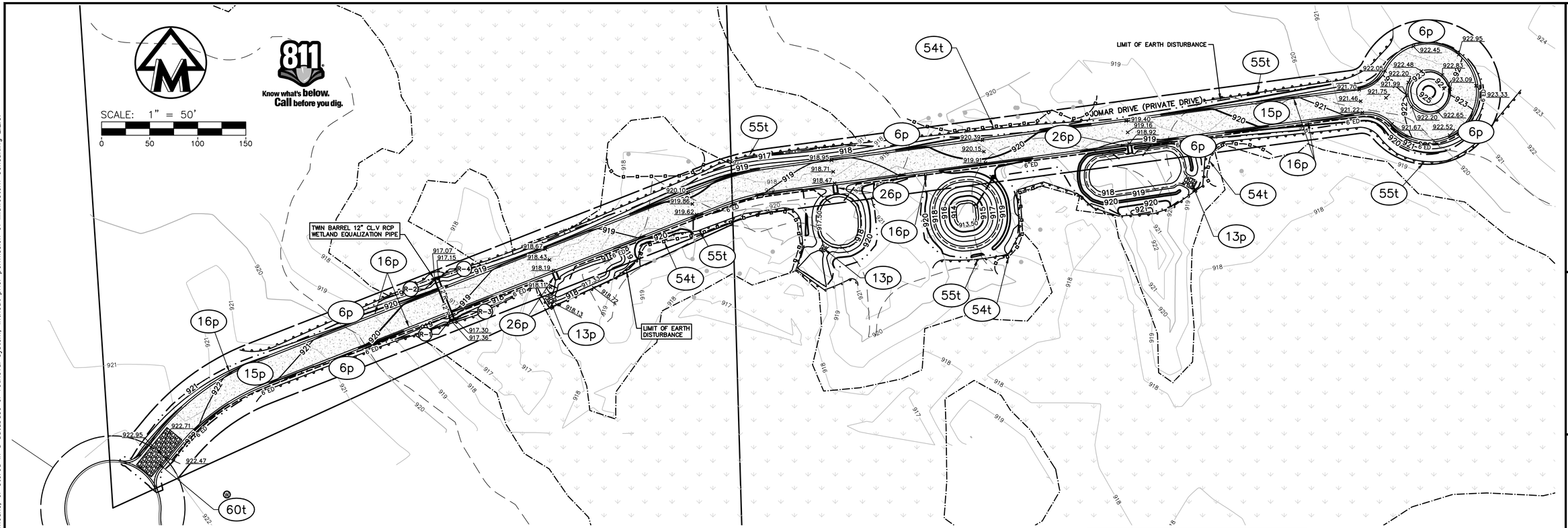
DATE: 10/05/2017
SHEET 3 OF 8
CADD: TPH
ENG: RCW
PM: RCW
TECH:
Site Plan\16287PR1.dwg
FB#205, 313, 617A

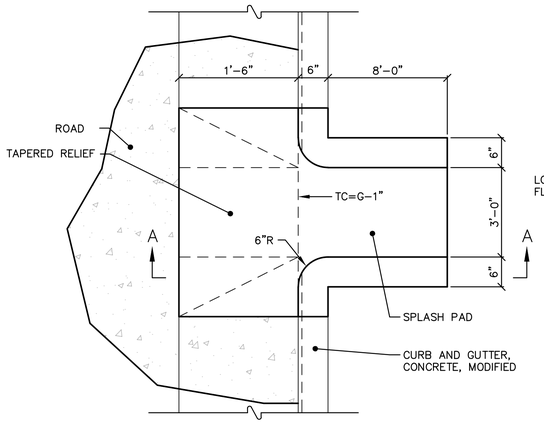
REVISIONS:	DATE
PER TOWNSHIP COMMENTS	12/7/17
PER TOWNSHIP COMMENTS	3/20/18

JOB No. 16287

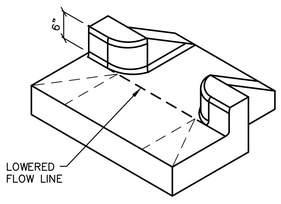
SCALE: 1" = 50'
0 50 100 150

Know what's below. Call before you dig.





PLAN



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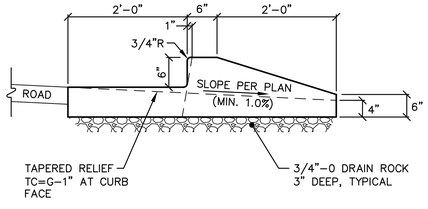
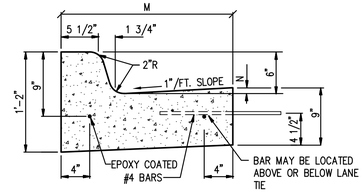


SECTION A–A

SPILLWAY, CONCRETE DETAIL

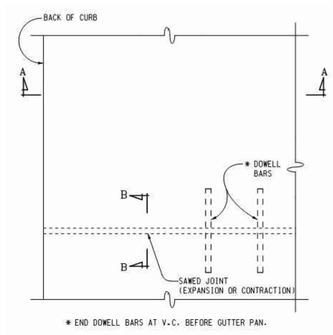
NOT TO SCALE



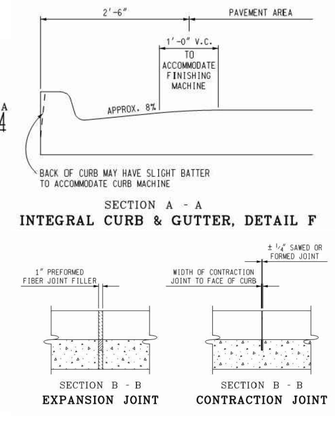
DETAIL	DIMENSIONS M	DIMENSIONS N	LANE TIES	CONCRETE CU. YD./LIN. FT.
F1	1'-6"	7/8"	AS SHOWN	0.0484
F2	1'-6"	7/8"	OMITTED	0.0484
F3	2'-0"	1 3/8"	AS SHOWN	0.0610
F4	2'-0"	1 3/8"	OMITTED	0.0610
F5	2'-6"	1 7/8"	AS SHOWN	0.0737
F6	2'-6"	1 7/8"	OMITTED	0.0737

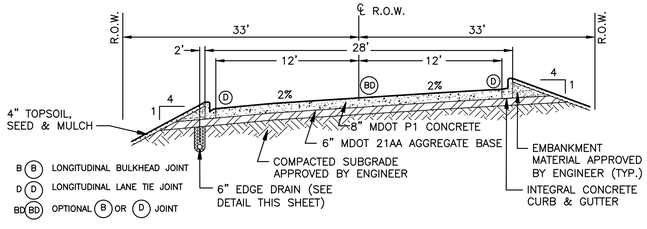
MDOT TYPE F CONCRETE CURB & GUTTER

NO SCALE



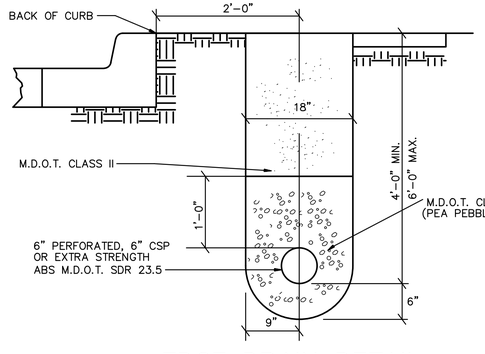
PLAN AT TRANSVERSE JOINT





JOMAR DRIVE PROPOSED CROSS SECTION

NO SCALE



EDGE DRAIN DETAIL

NO SCALE

LEGEND

838	EXIST. CONTOUR
838	PROP. CONTOUR
×836.2	EXIST. SPOT ELEVATION
36.60×	PROP. SPOT ELEVATION
W	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
GV	EXIST. GATE VALVE IN BOX
GV	PROP. GATE VALVE IN BOX
GV	EXIST. GATE VALVE IN WELL
GV	PROP. GATE VALVE IN WELL
CSB	EXIST. CURB STOP & BOX
CSB	PROP. CURB STOP & BOX
S	EXIST. STORM SEWER
S	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	PROP. BEEHIVE INLET
	END SECTION
	CULVERT
	DRAINAGE DIRECTION
	SIGN
	SINGLE TREE
	TREE OR BRUSH LIMIT
	FENCE
	SILTFENCE
	LIMITS OF DISTURBANCE
	CONSTRUCTION FENCE

SOIL EROSION AND SEDIMENT CONTROL MEASURES

t – INDICATES TEMPORAY CONTROL MEASURE
p – INDICATES PERMANENT CONTROL MEASURE

6	SEEDING WITH MULCH AND/OR MATTING	26	SLOPE DRAIN (PAVED CHUTE)
13	RIPRAP, RUBBLE, GABIONS	54	CONSTRUCTION FENCE OR SNOW FENCE
15	PAVING	55	GEOTEXTILE SILT FENCE
16	CURB & GUTTER	60	MUD TRACKING MAT

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JOMAR PARK PHASE 2 - PRIVATE ROAD

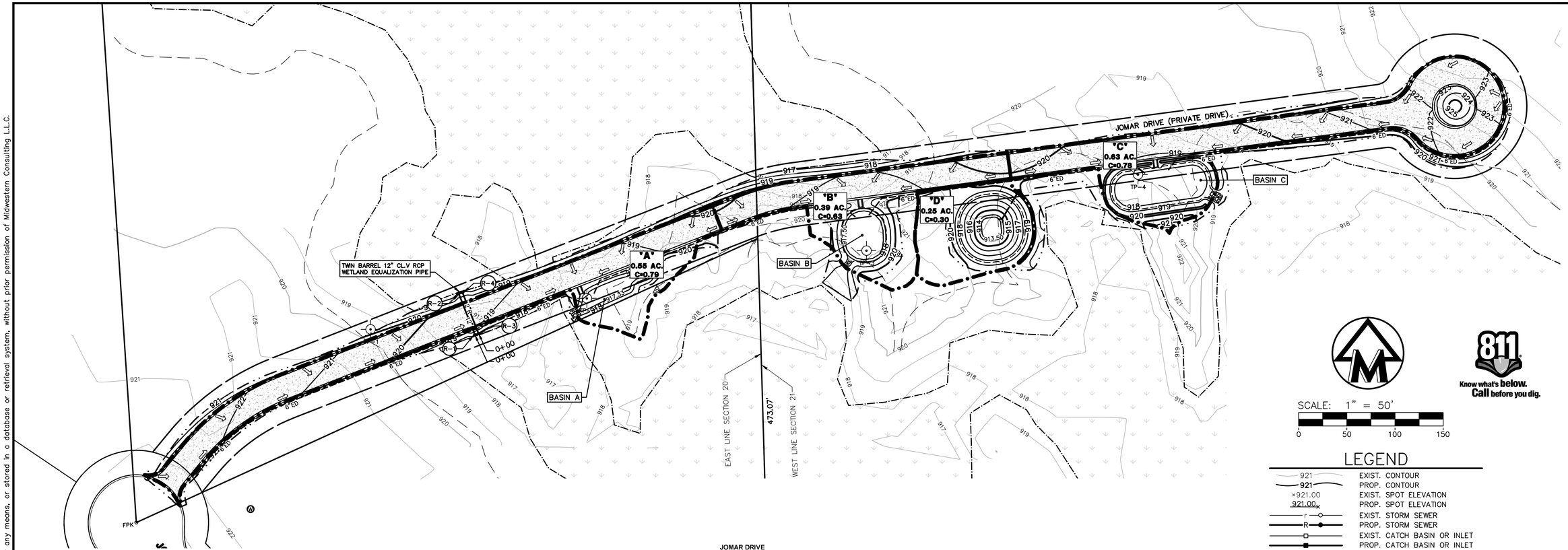
NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN
PRIVATE ROAD DESIGN
GRADING & SOIL EROSION CONTROL PLAN

4

JOB No. 16287

REVISIONS:	REV. DATE:
PER TOWNSHIP COMMENTS	3/20/18
PER TOWNSHIP COMMENTS	

DATE: 12/21/16
SHEET 4 OF 8
CADD: WAJ, RDW, TPH
ENG: RDW
PM: RDW
TECH: BAG
Site Plan\16287SP1.dwg
Plotted: 3/20/2018, 11:17A



JOMAR DRIVE
16287
Midwestern Consulting
3/7/2018

SCALE: 1" = 50'
0 50 100 150

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

LEGEND

921	EXIST. CONTOUR
921	PROP. CONTOUR
×921.00	EXIST. SPOT ELEVATION
921.00×	PROP. SPOT ELEVATION
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	PROP. BEEHIVE INLET
	END SECTION
	CULVERT
	DRAINAGE DIRECTION
	SINGLE TREE
	TREE OR BRUSH LIMIT
	LIMITS OF DISTURBANCE
	PROPOSED DRAINAGE AREA LIMITS
TP-1	TEST PIT LOCATION

JOMAR PARK PHASE 2 PROPERTY: CLASS A PRIVATE ROAD
Dry Hydrant Basin Calculations
Midwestern Consulting, LLC - Project 16287
16-Aug-17

Dry Hydrant Basin

Dry Hydrant Basin Storage Information

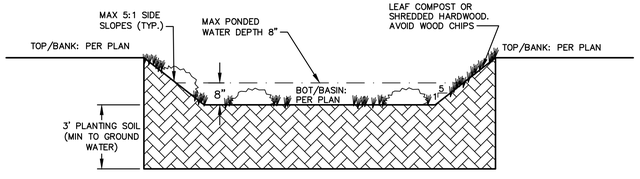
Elevation (ft)	Area (sft)	Volume (cft)	Cum. Volume (cft)
913.50	395	-	-
914.00	593	247	247
915.00	1,109	851	1,098
916.00	1,781	1,445	2,543
917.00	2,610	2,196	4,739
918.00	3,597	3,104	7,842
918.40	4,036	1,527	9,369
919.00	4,741	2,633	12,002
920.00	6,041	5,391	17,393

Total Volume = 17,393 cft
= 130,106 gal

Volume w/ 1.6' of ice = 9,369 cft
= 70,082 gal

FIRE PROTECTION OBJECTIVE

A DEPTH OF 6.5' IS PROVIDED FOR FIRE WATER. THIS PROVIDES 130,106 GALLONS OF WATER WHEN THERE IS NO ICE ON THE POND. WITH 1.6' OF ICE ON THE POND, THE FIRE WATER AVAILABLE IS 70,082 GALLONS. THE REQUIRED VOLUME OF WATER PER THE NORTHFIELD TWP FIRE DEPT. IS 40,000 GALLONS.



BIORETENTION AREA DETAIL

PER WCWRC RULES & GUIDELINES, REV. 10/17/16
NO SCALE

Rational C Values:

Soil Type	Impervious	Pervious	Steep Pervious (>8%)	Water
A	0.95	0.20	0.25	1.00
B	0.95	0.30	0.35	1.00
C	0.95	0.35	0.40	1.00
D	0.95	0.50	0.55	1.00

Area ID	sft area	# house	# drive	Road/Swlk Pvmt (sft)	Roof Area (sft)	Driveway Area (sft)	Water (sft)	total imp. (sft)	Woods (sft)	Vegetated (sft)	Soil Type	Imp. C	Perv. C	CxA (sft)	CxA (ac)	Area (ac)	C Value	
A	24,000	0	0	18,187	0	0	0	18,187	0	5,813	B	0.95	0.30	19,022	0.437	0.551	0.79	Basin A
B	16,848	0	0	8,652	0	0	0	8,652	0	8,196	B	0.95	0.30	10,678	0.245	0.387	0.63	Basin B
C	27,366	0	0	20,235	0	0	0	20,235	0	7,131	B	0.95	0.30	21,363	0.490	0.628	0.78	Basin C
D	10,844	0	0	0	0	0	0	0	0	10,844	B	0.95	0.30	3,253	0.075	0.249	0.30	Free Release

TOTALS

Basin Tributary Areas	sft area	# house	# drive	Road/Swlk Pvmt (sft)	Roof Area (sft)	Driveway Area (sft)	Water (sft)	total imp. (sft)	Woods (sft)	Vegetated (sft)	Soil Type	Imp. C	Perv. C	CxA (sft)	CxA (ac)	Area (ac)	C Value
Basin A	24,000	0	0	18,187	0	0	0	18,187	0	5,813	B	0.95	0.30	19,022	0.44	0.55	0.79
Basin B	16,848	0	0	8,652	0	0	0	8,652	0	8,196	B	0.95	0.30	10,678	0.25	0.39	0.63
Basin C	27,366	0	0	20,235	0	0	0	20,235	0	7,131	B	0.95	0.30	21,363	0.49	0.63	0.78
Dry Hydrant Basin	10,844	0	0	0	0	0	0	0	0	10,844	B	0.95	0.30	3,253	0.07	0.25	0.30

Test Pit I.D.	Soil Description	Sand Layer Depth (A)	Test Depth (A)	Measured Infiltration Rate, Inches Per Hour	Design Infiltration Rate, Inches Per Hour (B)
TP-1	Brown Gravelly Medium To Fine Sand With Trace Of Silt	1' – 5.5'	1.5' or Elev. 919.5'	39	19.5
TP-2	Brown Silty Medium To Fine Sand With Some Gravel	1' – 4'	1' or Elev. 917'	9.75	4.9
TP-3	Brown Fine Sand & Silt With Trace Of Gravel	1' – 5.5'	2.5' or Elev. 915.5'	6.75	3.4
TP-4	Brown Fine Sand With Some Silt & Trace Of Gravel	1' – 5'	2' or Elev. 917'	30	15

(A) Below existing ground surface.
(B) Based on a safety factor of 2.

NOTE: TEST PIT ELEVATIONS STATED IN INFILTRATION REPORT (TEC, INC. – 08/01/2017) WERE ADJUSTED BASED ON LOCATIONS OF PITS RELATIVE TO AVAILABLE TOPOGRAPHIC INFORMATION.
DESIGN PARAMETERS FOR BIORETENTION AREAS ARE AS FOLLOWS:

TP–1
TEST PIT EXISTING GROUND ELEVATION = 919.5 (REPORTED @ 921.0)
GROUND WATER @ 5.5' = 914.0 (REPORTED @ 915.5)
MIN. INFILTRATION LEVEL = 917.0
INFILTRATION TEST PERFORMED @ ELEVATION 918.0 (REPORTED @ 919.5)

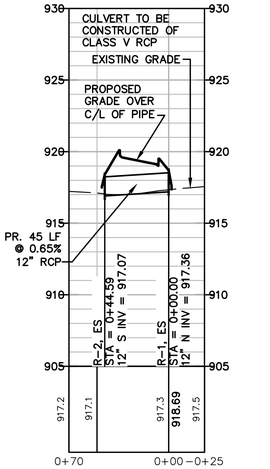
TP–2
TEST PIT EXISTING GROUND ELEVATION = 918.0 (REPORTED @ 918.0)
GROUND WATER @ 4' = 914.0 (REPORTED @ 914.0)
MIN. INFILTRATION LEVEL = 917.0
INFILTRATION TEST PERFORMED @ ELEVATION 917.0 (REPORTED @ 917.0)

TP–3
TEST PIT EXISTING GROUND ELEVATION = 920.0 (REPORTED @ 918.0)
GROUND WATER @ 5.5' = 914.5 (REPORTED @ 912.5)
MIN. INFILTRATION LEVEL = 917.5
INFILTRATION TEST PERFORMED @ ELEVATION 917.5 (REPORTED @ 915.5)

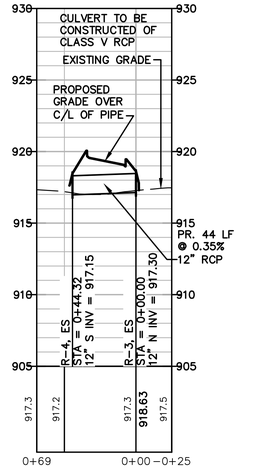
TP–4
TEST PIT EXISTING GROUND ELEVATION = 920.0 (REPORTED @ 919.0)
GROUND WATER @ 5' = 915.0 (REPORTED @ 914.0)
MIN. INFILTRATION LEVEL = 918.0
INFILTRATION TEST PERFORMED @ ELEVATION 918.0 (REPORTED @ 917.0)

ALL PROPOSED INFILTRATION SURFACES ARE LOCATED A MINIMUM OF 3' ABOVE LEVEL OF GROUNDWATER.

WETLAND EQUALIZATION PIPE PROFILES



EAST PIPE
HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 5'



WEST PIPE
HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 5'

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JOMAR PARK PHASE 2 - PRIVATE ROAD

NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN
PRIVATE ROAD DESIGN
DRAINAGE AREA PLAN

5

JOB No. 16287

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	3/20/18
PER TOWNSHIP COMMENTS	

DATE: 10/5/17
SHEET 5 OF 8
CADD:
ENG: RCW
PM: RCW
TECH:
Site Plan \16287DA1.dwg
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BIORETENTION BASIN A

JOMAR PARK PHASE 2 PROPERTY: CLASS A PRIVATE ROAD
Stormwater Basin Calculations
Midwestern Consulting, LLC - Project 16287
7-Mar-18

Bioretention Basin A
W1 - Determining Post-Development Cover Types, Areas, Curve Numbers, and Runoff Coefficients

Total Site Area (Property Limits) **35.92 ac**
Total Site Area (Bioretention Basin A Zone) **0.55 ac** * (the area draining to this basin)
Total Site Area Excluding "Self-Crediting" BMPs* (Basin A Zone) **0.55 ac**
*** Used for remainder of calculations below**

Rational Method Variables
(for first flush)

0.20 for pervious surfaces, Soil Type A
0.50 for pervious surfaces, Soil Type D
0.95 for house roofs, driveways, and roadways
1.00 for water surfaces (2-year pond elevation)

Cover Type	Soil Type	Area (sft)	Area (ac)	Runoff Coeff. (C)	(C) (Area)
House Roofs	NA	0	0.00	0.95	-
Driveways	NA	0	0.00	0.95	-
Roadways	NA	18,187	0.42	0.95	0.40
Landscaping	B	5,813	0.13	0.30	0.04
Water Surface	NA	0	0.00	1.00	-
Total		24,000	0.55	0.79	0.44

Total - Sum(C)(Area) 0.44 ac
Area Total 0.55 ac
Weighted C - (Sum(C)(Area))/(Area Total) 0.79

Pervious

NRCS Variables
(for bankfull and 100-year calculations)

39 for Landscaping, Good Condition, Soil Type A
80 for Landscaping, Good Condition, Soil Type D

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) (Area)
Landscaping	B	5,813	0.13	80	0.11
Total		5,813	0.13	80	0.11

Total - Sum(C)(Area) 0.11 ac
Area Total 0.13 ac
Weighted C - (Sum(C)(Area))/(Area Total) 80.0

Impervious

NRCS Variables
(for bankfull and 100-year calculations)

98 for House Roofs
98 for Driveways and Roadways
98 for water surfaces (2-year pond elevation)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) (Area)
House Roofs	NA	0	0.00	98	-
Driveways	NA	0	0.00	98	0.00
Roadways	NA	18,187	0.42	98	0.41
Water Surface	NA	0	-	98	0.00
Total		18,187	0.42	98	0.41

Total - Sum(C)(Area) 0.41 ac
Area Total 0.42 ac
Weighted C - (Sum(C)(Area))/(Area Total) 98.0

W2 - First Flush Runoff Calculations (Vff)

A. Vff = 1" x 1'/12" x 43560 sft/ac x A x C 1,585 cft
0.04 ac-ft

W8 - Time of Concentration (Tc-hrs)

A. Assume 15-minute minimum time of concentration 0.25 hr

W9 - Runoff Summary & On-Site Infiltration Requirement

A. Summary from Previous Worksheets
First Flush Volume (Vff) **1,585 cft** **0.04 ac-ft**

W11 - Determine Applicable BMPs and Associated Volume Credits
One test pit with an infiltration test was performed in the location of the bioretention basin: The measured infiltration rate was 9.8 in/hr. Applying a safety factor of 2 results in a design infiltration rate of 4.9 in/hr.

		Storage Volume (cft)		Design Infilt.	Infilt. Volume in	*Max. Allowable*	Total Volume
Proposed BMP	Area (sft)	Surface	Soil	Rate (in/hr)	6-hour storm (cft)	*48-hour Drawdown*	Reduction (cft)
Bioretention Basin (Elev 917.33-918)	941	834	0	4.90	2,305	*18,444*	3,140

Max. Allowable 48-hour drawdown must be greater than storage volume used for infiltration credit reduction.

Total Volume Reduction Credit by Proposed Structural BMPs (cft) 3,140
Runoff Volume Infiltration Requirement (Vinf) from Worksheet 9 (cft) 1,585
Runoff Volume Credit (cft) 1,555

W12 - Natural Features Inventory
SEE COVER SHEET FOR NATURAL FEATURES INVENTORY
W14 - Storage-Elevation Data

Bioretention Basin Storage Information

	Elevation (ft)	Area (sft)	Volume (cft)	Cum. Volume (cft)	Cum. Volume (ac-ft)	Cum. Det'n Volume (cft)
	917.33	941	-	-	0.00	0
8" Ponding Elevation & Overflow Structure	918.00	1,550	834	834	0.02	0

BIORETENTION BASIN B

JOMAR PARK PHASE 2 PROPERTY: CLASS A PRIVATE ROAD
Stormwater Basin Calculations
Midwestern Consulting, LLC - Project 16287
16-Aug-17

Bioretention Basin B
W1 - Determining Post-Development Cover Types, Areas, Curve Numbers, and Runoff Coefficients

Total Site Area (Property Limits) **35.92 ac**
Total Site Area (Bioretention Basin B Zone) **0.39 ac** * (the area draining to this basin)
Total Site Area Excluding "Self-Crediting" BMPs* (Basin B Zone) **0.39 ac**
*** Used for remainder of calculations below**

Rational Method Variables
(for first flush)

0.20 for pervious surfaces, Soil Type A
0.50 for pervious surfaces, Soil Type D
0.95 for house roofs, driveways, and roadways
1.00 for water surfaces (2-year pond elevation)

Cover Type	Soil Type	Area (sft)	Area (ac)	Runoff Coeff. (C)	(C) (Area)
House Roofs	NA	0	0.00	0.95	-
Driveways	NA	0	0.00	0.95	-
Roadways	NA	8,652	0.20	0.95	0.19
Landscaping	B	8,196	0.19	0.30	0.06
Water Surface	NA	0	0.00	1.00	-
Total		16,848	0.39	0.63	0.25

Total - Sum(C)(Area) 0.25 ac
Area Total 0.39 ac
Weighted C - (Sum(C)(Area))/(Area Total) 0.63

Pervious

NRCS Variables
(for bankfull and 100-year calculations)

39 for Landscaping, Good Condition, Soil Type A
80 for Landscaping, Good Condition, Soil Type D

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) (Area)
Landscaping	B	8,196	0.19	80	0.15
Total		8,196	0.19	80	0.15

Total - Sum(C)(Area) 0.15 ac
Area Total 0.19 ac
Weighted C - (Sum(C)(Area))/(Area Total) 80.0

Impervious

NRCS Variables
(for bankfull and 100-year calculations)

98 for House Roofs
98 for Driveways and Roadways
98 for water surfaces (2-year pond elevation)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) (Area)
House Roofs	NA	0	0.00	98	-
Driveways	NA	0	0.00	98	0.00
Roadways	NA	8,652	0.20	98	0.19
Water Surface	NA	0	-	98	0.00
Total		8,652	0.20	98	0.19

Total - Sum(C)(Area) 0.19 ac
Area Total 0.20 ac
Weighted C - (Sum(C)(Area))/(Area Total) 98.0

W2 - First Flush Runoff Calculations (Vff)

A. Vff = 1" x 1'/12" x 43560 sft/ac x A x C 890 cft
0.02 ac-ft

W8 - Time of Concentration (Tc-hrs)

A. Assume 15-minute minimum time of concentration 0.25 hr

W9 - Runoff Summary & On-Site Infiltration Requirement

A. Summary from Previous Worksheets
First Flush Volume (Vff) **890 cft** **0.02 ac-ft**

W11 - Determine Applicable BMPs and Associated Volume Credits
One test pit with an infiltration test was performed in the location of the bioretention basin: The measured infiltration rate was 6.8 in/hr. Applying a safety factor of 2 results in a design infiltration rate of 3.4 in/hr.

		Storage Volume (cft)		Design Infilt.	Infilt. Volume in	*Max. Allowable*	Total Volume
Proposed BMP	Area (sft)	Surface	Soil	Rate (in/hr)	6-hour storm (cft)	*48-hour Drawdown*	Reduction (cft)
Bioretention Basin (Elev 917-917.67)	1,680	1,821	0	3.40	2,856	*22,848*	4,677

Max. Allowable 48-hour drawdown must be greater than storage volume used for infiltration credit reduction.

Total Volume Reduction Credit by Proposed Structural BMPs (cft) 4,677
Runoff Volume Infiltration Requirement (Vinf) from Worksheet 9 (cft) 890
Runoff Volume Credit (cft) 3,787

W12 - Natural Features Inventory
SEE COVER SHEET FOR NATURAL FEATURES INVENTORY
W14 - Storage-Elevation Data

Bioretention Basin Storage Information

	Elevation (ft)	Area (sft)	Volume (cft)	Cum. Volume (cft)	Cum. Volume (ac-ft)	Cum. Det'n Volume (cft)
	917.50	1,680	-	-	0.00	0
8" Ponding Elevation & Overflow Structure	918.17	3,755	1,821	1,821	0.04	0

BIORETENTION BASIN C

JOMAR PARK PHASE 2 PROPERTY: CLASS A PRIVATE ROAD
Stormwater Basin Calculations
Midwestern Consulting, LLC - Project 16287
16-Aug-17

Bioretention Basin C
W1 - Determining Post-Development Cover Types, Areas, Curve Numbers, and Runoff Coefficients

Total Site Area (Property Limits) **35.92 ac**
Total Site Area (Bioretention Basin C Zone) **0.63 ac** * (the area draining to this basin)
Total Site Area Excluding "Self-Crediting" BMPs* (Basin C Zone) **0.63 ac**
*** Used for remainder of calculations below**

Rational Method Variables
(for first flush)

0.20 for pervious surfaces, Soil Type A
0.50 for pervious surfaces, Soil Type D
0.95 for house roofs, driveways, and roadways
1.00 for water surfaces (2-year pond elevation)

Cover Type	Soil Type	Area (sft)	Area (ac)	Runoff Coeff. (C)	(C) (Area)
House Roofs	NA	0	0.00	0.95	-
Driveways	NA	0	0.00	0.95	-
Roadways	NA	20,235	0.46	0.95	0.44
Landscaping	B	7,131	0.16	0.30	0.05
Water Surface	NA	0	0.00	1.00	-
Total		27,366	0.63	0.78	0.49

Total - Sum(C)(Area) 0.49 ac
Area Total 0.63 ac
Weighted C - (Sum(C)(Area))/(Area Total) 0.78

Pervious

NRCS Variables
(for bankfull and 100-year calculations)

39 for Landscaping, Good Condition, Soil Type A
80 for Landscaping, Good Condition, Soil Type D

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) (Area)
Landscaping	B	7,131	0.16	80	0.13
Total		7,131	0.16	80	0.13

Total - Sum(C)(Area) 0.13 ac
Area Total 0.16 ac
Weighted C - (Sum(C)(Area))/(Area Total) 80.0

Impervious

NRCS Variables
(for bankfull and 100-year calculations)

98 for House Roofs
98 for Driveways and Roadways
98 for water surfaces (2-year pond elevation)

Cover Type	Soil Type	Area (sft)	Area (ac)	Curve Number	(CN) (Area)
House Roofs	NA	0	0.00	98	-
Driveways	NA	0	0.00	98	0.00
Roadways	NA	20,235	0.46	98	0.46
Water Surface	NA	0	-	98	0.00
Total		20,235	0.46	98	0.46

Total - Sum(C)(Area) 0.46 ac
Area Total 0.46 ac
Weighted C - (Sum(C)(Area))/(Area Total) 98.0

W2 - First Flush Runoff Calculations (Vff)

A. Vff = 1" x 1'/12" x 43560 sft/ac x A x C 1,780 cft
0.04 ac-ft

W8 - Time of Concentration (Tc-hrs)

A. Assume 15-minute minimum time of concentration 0.25 hr

W9 - Runoff Summary & On-Site Infiltration Requirement

A. Summary from Previous Worksheets
First Flush Volume (Vff) **1,780 cft** **0.04 ac-ft**

W11 - Determine Applicable BMPs and Associated Volume Credits
One test pit with an infiltration test was performed in the location of the bioretention basin: The measured infiltration rate was 30.0 in/hr. Applying a safety factor of 2 results in a design infiltration rate of 15.0 in/hr.

		Storage Volume (cft)		Design Infilt.	Infilt. Volume in	*Max. Allowable*	Total Volume
Proposed BMP	Area (sft)	Surface	Soil	Rate (in/hr)	6-hour storm (cft)	*48-hour Drawdown*	Reduction (cft)
Bioretention Basin (Elev 917-917.67)	3,043	2,313	0	15.00	22,823	*182,580*	25,135

Max. Allowable 48-hour drawdown must be greater than storage volume used for infiltration credit reduction.

Total Volume Reduction Credit by Proposed Structural BMPs (cft) 25,135
Runoff Volume Infiltration Requirement (Vinf) from Worksheet 9 (cft) 1,780
Runoff Volume Credit (cft) 23,355

W12 - Natural Features Inventory
SEE COVER SHEET FOR NATURAL FEATURES INVENTORY
W14 - Storage-Elevation Data

Bioretention Basin Storage Information

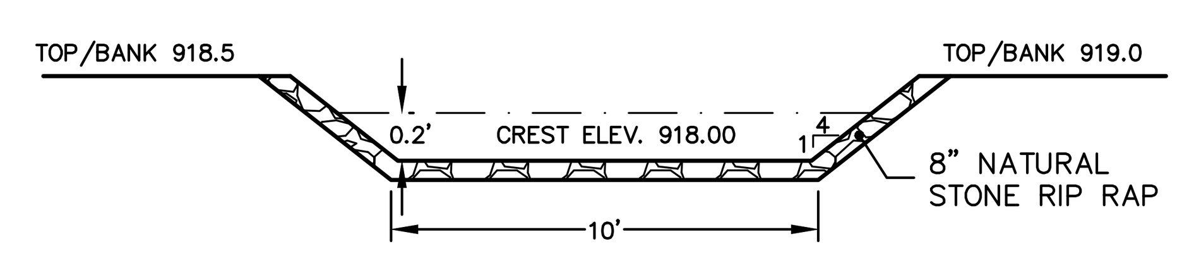
	Elevation (ft)	Area (sft)	Volume (cft)	Cum. Volume (cft)	Cum. Volume (ac-ft)	Cum. Det'n Volume (cft)
	918.00	3,043	-	-	0.00	0
8" Ponding Elevation & Overflow Structure	918.67	3,861	2,313	2,313	0.05	0

BROAD–CRESTED WEIR DISCHARGE FORMULA
(PER MDOT STORMWATER DRAINAGE MANUAL, CHAPTER 8)

$Q = CLH^{3/2}$
Q = DISCHARGE
C = BROAD–CRESTED WEIR COEFFICIENT (SEE TABLE 8–6)
L = BROAD CRESTED WEIR LENGTH
H = HEAD ABOVE WEIR CREST

Table 8-6 Broad-Crested Weir Coefficient C Values as a Function of Weir Crest Breadth and Head (feet)

Measured Head	Breadth of Crest of Weir (feet)										
H* (feet)	0.5	0.75	1.0	1.5	2.0	2.5	3.0	4.0	5.0	10.0	15.0
0.2	2.80	2.75	2.69	2.62	2.54	2.48	2.44	2.38	2.34	2.49	2.68
0.4	2.92	2.80	2.72	2.64	2.61	2.6	2.58	2.54	2.50	2.56	2.70
0.6	3.08	2.89	2.75	2.64	2.61	2.6	2.68	2.69	2.70	2.70	2.70
0.8	3.30	3.04	2.85	2.68	2.6	2.6	2.67	2.68	2.68	2.69	2.64
1.0	3.32	3.14	2.98	2.75	2.66	2.64	2.65	2.67	2.68	2.68	2.63
1.2	3.32	3.20	3.08	2.86	2.7	2.65	2.64	2.67	2.66	2.69	2.64
1.4	3.32	3.26	3.20	2.92	2.77	2.68	2.64	2.65	2.65	2.67	2.64
1.6	3.32	3.29	3.28	3.07	2.89	2.75	2.68	2.66	2.65	2.64	2.63
1.8	3.32	3.32	3.31	3.07	2.88	2.74	2.68	2.66	2.65	2.64	2.63
2.0	3.32	3.31	3.30	3.03	2.85	2.76	2.72	2.68	2.65	2.64	2.63
2.5	3.32	3.32	3.31	3.28	3.07	2.89	2.81	2.72	2.67	2.64	2.63
3.0	3.32	3.32	3.32	3.32	3.2	3.05	2.92	2.73	2.66	2.64	2.63
3.5	3.32	3.32	3.32	3.32	3.32	3.19	2.97	2.76	2.68	2.64	2.63
4.0	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.7	2.64	2.63
4.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.74	2.64	2.63
5.0	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.64	2.63
5.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.64	2.63

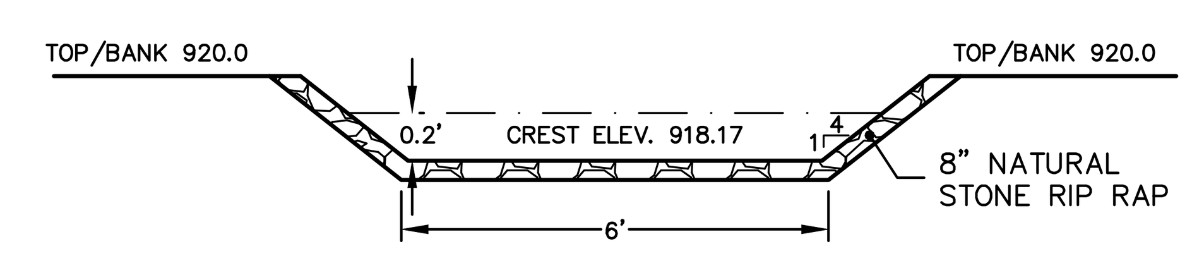


BASIN A

REQUIRED:
Q=CIA
=(0.76)(4.3)(0.59)
= 1.93 CFS

PROVIDED:
$Q=CLH^{3/2}$
= $(2.49)(10)(0.2)^{3/2}$
= 2.23 CFS

RIP–RAP OVERFLOW
NO SCALE

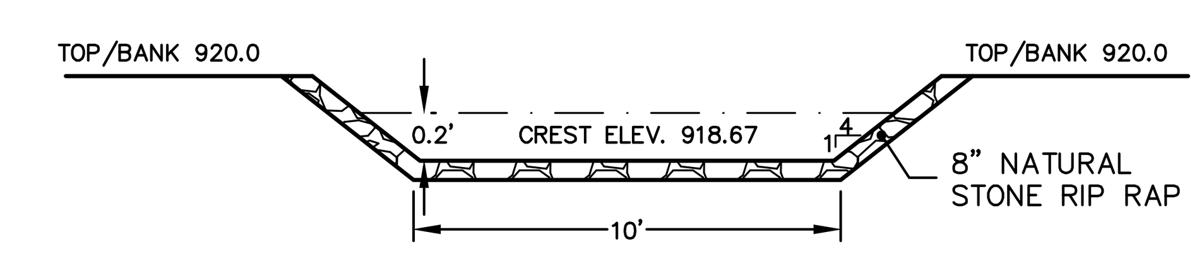


BASIN B

REQUIRED:
Q=CIA
=(0.63)(4.3)(0.39)
= 1.06 CFS

PROVIDED:
$Q=CLH^{3/2}$
= $(2.49)(6)(0.2)^{3/2}$
= 1.34 CFS

RIP–RAP OVERFLOW
NO SCALE



BASIN C

REQUIRED:
Q=CIA
=(0.78)(4.3)(0.63)
= 2.11 CFS

PROVIDED:
$Q=CLH^{3/2}$
= $(2.49)(10)(0.2)^{3/2}$
= 2.23 CFS

RIP–RAP OVERFLOW
NO SCALE

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Land Development • Land Surveying • Institutional • Municipal
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JAMES KUGLER
(734) 741-0500

JOMAR PARK PHASE 2 - PRIVATE ROAD
NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN
PRIVATE ROAD DESIGN
DRAINAGE CALCULATIONS

6

DATE: 10/5/17
SHEET 6 OF 8
CADD: RCW, TPH
ENG: RCW
PM: RCW
TECH:
Site Plan\16287DA1.dwg
FB#305, 313, 617A

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	12/7/17
PER TOWNSHIP COMMENTS	3/20/18

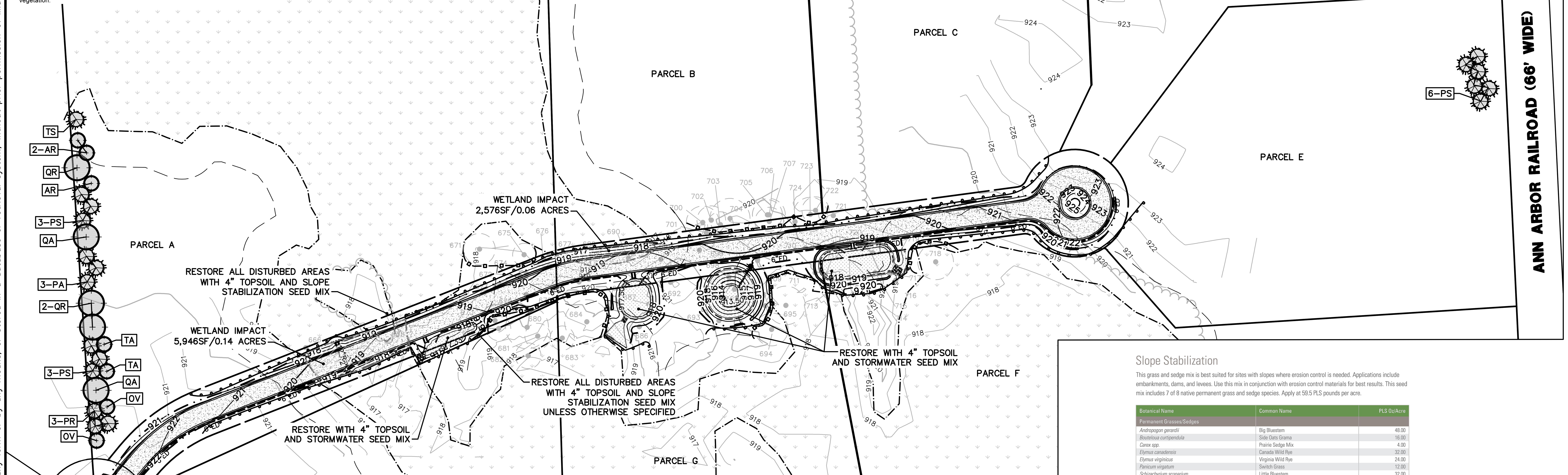
JOB No. 16287

LANDSCAPE NOTES

1. For any plant quantity discrepancies between the plan view and the plant schedules, the plant schedule shall take precedence.
2. Plant materials shall be selected and installed in accordance with standards established by Northfield Township and shall be guaranteed by the contractor for two growing seasons.
3. All diseased, damaged or dead material shown on the site plan as proposed plantings shall be replaced by the end of the following growing season.
4. Restore disturbed areas with a minimum of four (4) inches of topsoil and then seed/ fertilize/mulch.
5. After the first growing season, only fertilizers that contain NO phosphorus shall be used on the site.
6. Stormwater management basin areas shall be seeded with Stormwater Seed Mix from Cardno Native Plant Nursery, or equivalent as approved by landscape architect, as noted on Natural Features Preservation and Mitigation Plan. All other disturbed areas shall be seeded with Slope Stabilization Seed Mix. Temporary Cover seed shall be applied at same time as permanent seeding per supplier's recommendation. Seeding rates and installation techniques shall be confirmed with supplier.
7. Native seeding installation shall be performed by a qualified contractor with documented experience of successful established native seeding. Seed shall be installed per manufacturer's specification via hand broadcast.
8. All seeded areas shall be mulched with straw mulch at the rate of two (2) bales per 1,000 square feet.
9. Deciduous plants shall be planted between March 1 and May 15 and from October 1 until the prepared soil becomes frozen. Evergreen plants shall be planted between March 1 and June 1 and from August 15 to September 15.
10. Native seeding areas shall be seeded after May 1, (when soil is free of frost and in workable condition), but before June 15 or after October 1, but before November 30 (or prior to ground freezing) or as approved by Landscape Architect. If the contractor installs seeding outside timeframe noted above, then watering shall be performed at a regular interval and during dry periods to ensure germination, establishment, and growth of native vegetation.
11. All trees to be located a minimum of 10 feet from public utilities.
12. All single trunk, deciduous trees shall have a straight and a symmetrical crown with a central leader. One sided trees or those with thin or open crowns shall not be accepted.
13. All evergreen trees shall be branched fully to the ground, symmetrical in shape and have not been sheared in the last three (3) growing seasons.
14. Proposed trees will be planted a minimum of 15 feet apart.
15. Planting Soil: Existing, in-place or stockpiled topsoil. Supplement with imported topsoil as needed. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments to produce planting soil:
    a. Ratio of Loose Compost to Topsoil by Volume: 1:4.
    b. Weight of Lime per 1000 Sq. Ft.: Amend with lime only on recommendation of soil test to adjust soil pH.
    c. Weight of Sulfur or Aluminum Sulfate per 1,000 Sq. Ft.: Amend with sulfur or aluminum sulfate only on recommendation of soil test to adjust soil pH.
    d. Volume of Sand: Amend with sand only on recommendation of Landscape Architect to adjust soil texture.
    e. Weight of Slow-Release Fertilizer per 1,000 Sq. Ft.: Amend with fertilizer only on recommendation of soil test to adjust soil fertility.
16. Mitigation trees shall be under warranty by the contractor for 2 growing seasons. During the 2 year establishment period for the installed deciduous mitigation trees:
    a. The trunk of young trees shall be wrapped in late autumn and wrap shall be removed in early spring
    b. Burlap screening or wrapping shall be installed on the southwest and windward sides from late autumn to early spring.
    c. Trees shall be watered in spring and autumn and during dry conditions at a frequency determined by certified arborist.
    d. Mulching around trees shall be maintained at a depth of 2 to 3 inches

PLANT SCHEDULE

	Code	Scientific Name	Common Name	Root	Size	Spacing	Notes
2.5" Deciduous							
3	AR	Acer rubrum	Red Maple	B&B	2.5" cal.	20' o.c.	
2	OV	Ostrya virginiana	Hop-Hornbeam	B&B	2.5" cal.	20' o.c.	
2	TA	Tilia americana	American Basswood	B&B	2.5" cal.	20' o.c.	
7							
3" Deciduous							
2	QA	Quercus alba	White Oak	B&B	3" cal.	35' o.c.	
6	QR	Quercus rubra	Northern Red Oak	B&B	3" cal.	35' o.c.	
8							
Evergreen							
3	PA	Picea abies	Norway Spruce	B&B	6' ht	20' o.c.	Full
3	PR	Pinus resinosa	Red Pine	B&B	6' ht	20' o.c.	Full
12	PS	Pinus strobus	Eastern White Pine	B&B	6' ht	20' o.c.	Full
1	TS	Tsuga canadensis	Canadian Hemlock	B&B	6' ht	20' o.c.	Full
19							



NATURAL FEATURES IMPACT STATEMENT

Below is a Natural Features Impact Statement for the Jomar Park Phase 2 Class A Private Road site plans as requested by the Northfield Township Planning Commission.

1. Site Inventory Map: Please refer to the Existing Conditions and Survey Plan. The following are identified as "Natural Features" by the Northfield Township Zoning Ordinance. The overall parcel is approximately 46.02 acres. However, natural features survey/delineation was limited to the proposed alignment of the private road in an approximately 250 foot wide swath of land. General findings based on available digital data is provided for the remainder of the parcel.
    a. Wetlands – A wetland delineation was performed by Environmental Consulting & Technology, Inc. in June 2017 for approximately 54.7 acres of land. The wetland boundary is delineated on the Existing Conditions and Survey Plan. A copy of the wetland delineation has been provided to the Township under separate cover. Four wetlands were delineated on the site. Wetlands 1, 3, and 4 are MDEQ regulated and wetland 2 is not regulated by the MDEQ. The 50-foot wetland buffer is depicted on the Existing Conditions and Survey Plan.
    b. Watercourses – no watercourses were identified on the site.
    c. Floodplain – Per FEMA Map No. 26161C0113E dated April 3, 2012, the site is located in Zone X, areas determined to be outside the 0.2% annual chance floodplain. Zone A, 1% Annual Chance Flood area, is located immediately northeast of the site.
    d. Woodlands – Per the Northfield Township Master Plan Natural Features Map, the site contains Woodland adjacent to the forested Wetland 1 on the site. The approximate boundary of the woodland, as shown on the Natural Features Map is depicted on the Existing Conditions and Survey Plan.
    e. Landmark Trees in the development area on the site have been identified and surveyed. A tree list for Landmark Trees is included on the Existing Conditions and Survey Plan.
    f. Steep Slopes – Slopes greater than 12% have been depicted on the Existing Conditions and Survey Plan.
    g. Habitat of threatened or endangered species – A Threatened and Endangered Species report was prepared by Environmental Consulting & Technology in March 2018. Potential habitat for Indiana Bat, *Myotis sodalis*, Northern long-eared bat, *Myotis septentrionalis*, and Easter massassauga, *Sisturus catenatus* were identified in the Michigan Natural Features Inventory database query for areas near the site.
    h. Groundwater Recharge Areas – The site is not mapped as a Groundwater Recharge Area on the Washtenaw County Drift Aquifer and Ground Water Recharge Areas Map, dated January 2008.

    NRCS Soils for the site are mapped on the Existing Conditions and Survey Plan. Edward Muck (Ed) and Sebewa loam (Sb) are identified as hydric soils.

2. Natural Features Preservation Plan – Please refer to the Existing Conditions and Survey Plan and the Natural Features Preservation and Mitigation Plan.
    a. Natural features removals – Landmark Tree removals are identified on the Existing Conditions and Survey Plan and noted in the Landmark Trees List.
    b. Identify natural features to be retained – Shown on the Natural Features Preservation and Mitigation Plan.
    c. Identify limits of soil disturbance – Shown on the Natural Features Preservation and Mitigation Plan.
    d. Identify protective measures – Shown on the Natural Features Preservation and Mitigation Plan and the Grading and Soil Erosion Control Plan in further detail. In order to minimize the impact to potential threatened and endangered species habitat that may exist on or near the site, the following notes have been added to the Existing Conditions Plan and the Natural Features Preservation and Mitigation Plan:
        - Trees removals shall be performed between October 1st and March 31st to avoid impacts to potential habitat for Indiana bat and Northern long-eared bat.
        - To avoid potential impacts on Eastern Massasauga Rattlesnake:
            - Use wildlife-safe materials for erosion control and site restoration. Soil disturbance areas shall be stabilized with straw mulch and no erosion control products containing plastic mesh netting or other similar material that could ensnare EMR shall be used.
            -
            - To increase human safety and awareness of EMR, those implementing the project should first watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (https://youtu.be/-PFnXe_eo2w), review the EMR factsheet (https://www.fws.gov/midwest/endangered/reptiles/eama/pdf/EMRfactsheetSep t2016.pdf), or by calling 517-351-2555.
            - Any EMR observations, or observation of any other listed threatened or endangered species, during project implementation shall be reported to the USFWS within 24 hours.

3. Alternatives Analysis
    a. Alternative approaches and/or designs
    The private road is necessary to provide access to the eastern portion of the property. Development of only the western portion of the site that is not regulated natural features is not economically feasible and is not consistent with the overall site layout as approved with Jomar Park Phase 1 site plans. Refer to the written justification in comment 3.b. below for additional consideration of alternative layouts.
    b. Written justification of why design proposed must cause degree of disturbance
    The site does not have road access along the north, south or west property boundaries. Therefore, the site must be accessed from the existing Jomar Drive along the southwestern edge of the property. A wetland delineation was performed on the site to determine the best location to provide access to the eastern portion of the property while minimizing impacts to natural features on the site. The proposed alignment crosses the wetland at the smallest width possible. Landmark trees were then surveyed along the potential road alignment to determine the best location for the alignment outside the wetland to minimize impacts to regulated trees.

    The limits of disturbance to trees, wetland and wetland setback is minimized as much as possible while meeting requirements for private road paving and right-of-way, and stormwater management. A Class A private road is required, with a 66' wide right-of-way, a paved width of 32 feet, and stormwater runoff conveyance (ditches or curb and gutter) based on future industrial use of the property through future land divisions and a length greater than 1,000 linear feet. The proposed curb and gutter road reduces impacts adjacent to the pavement that would be necessary for roadside swales to catch and convey stormwater runoff. Proposed wetland equalization pipes underneath the private road will maintain hydrologic connectivity of the wetland on the north and south sides of the road.

    Stormwater management for the increase in impervious surface is required and is located immediately adjacent to the private road to limit the impact to natural features. The proposed bioretention basins are located within areas of the woodland/wetland complex that are upland and have minimal landmark tree impacts. The proposed grading of the road allows all runoff to sheet flow to the south and into the bioretention basins via concrete spillways at low points in the road. This proposed grading eliminates the need to capture runoff on the north side of the road which in turn eliminates the need for catch basins, storm sewer, and increased impact to surrounding natural features. Impacts are again minimized by allowing runoff to enter the basins through spillways rather than constructing catch basins with piping that connects to the basins. The existing entrance to the property and the proposed cul-de-sac are located at higher elevations than the majority of the roadway, therefore, it is not feasible to convey the stormwater runoff to basins that are in existing agricultural fields instead of the wetland/woodland complex.
    c. How mitigation is best plan of action
    The impact to regulated wetlands is less than 0.33 acres and is limited to the greatest extent possible. Hydrologic connectivity of the wetland complex will be maintained with the equalization pipes. The loss of 8,522 square feet (0.196 acres) of wetland in this large wetland complex, estimated to be at least 15.99 acres on-site, is insignificant in relation to the overall ecological function and value of the wetland. Given the wooded nature of the areas immediate adjacent to the wetland and the overall size of the wetland in comparison to the small wetland impact, no wetland mitigation is proposed.

    Landmark tree removals necessary for construction of the private road are not regulated by the site plan approval process and, therefore, mitigation requirements do not apply to this project. However, given the intent of the zoning ordinance, the applicant proposes to provide 33 mitigation trees for a total of 88" DBH on the site.

4. Mitigation Plan
    a. Written description of mitigation program - No wetland mitigation is proposed. The disturbed areas adjacent to the private road will be restored with native vegetation via seeding and erosion control blanket as appropriate. 88" DBH of mitigation trees will be installed on the property at the time of construction of the private road. The proposed tree mitigation associated with the private road is shown on the Natural Features Preservation and Mitigation Plan. Replacement calculations
    The replacement calculations are depicted on the Natural Features Preservation and Mitigation Plan.
    b. Planting plan - The proposed plantings are depicted on the Natural Features Preservation and Mitigation Plan.
    c. Planting list - The plant schedule is shown on the Natural Features Preservation and Mitigation Plan.
    d. Schedule of mitigation measures - The Landscape Notes on the Natural Features Preservation Plan identify the planting schedule for site restoration and mitigation plantings.

Stormwater

A wetland seed mix for saturated soils in a detention pond or for seeding a saturated basin, this mix will tolerate highly fluctuating water levels and poor water quality associated with urban stormwater wetlands and ponds. For detention basins that experience long, dry periods, use the Economy Prairie seed mix in the upper third to half of the basin area in combination with this mix. This seed mix includes at least 10 of 12 native permanent grass and sedge species and 12 of 16 native forb species. Apply at 32.81 PLS pounds per acre.

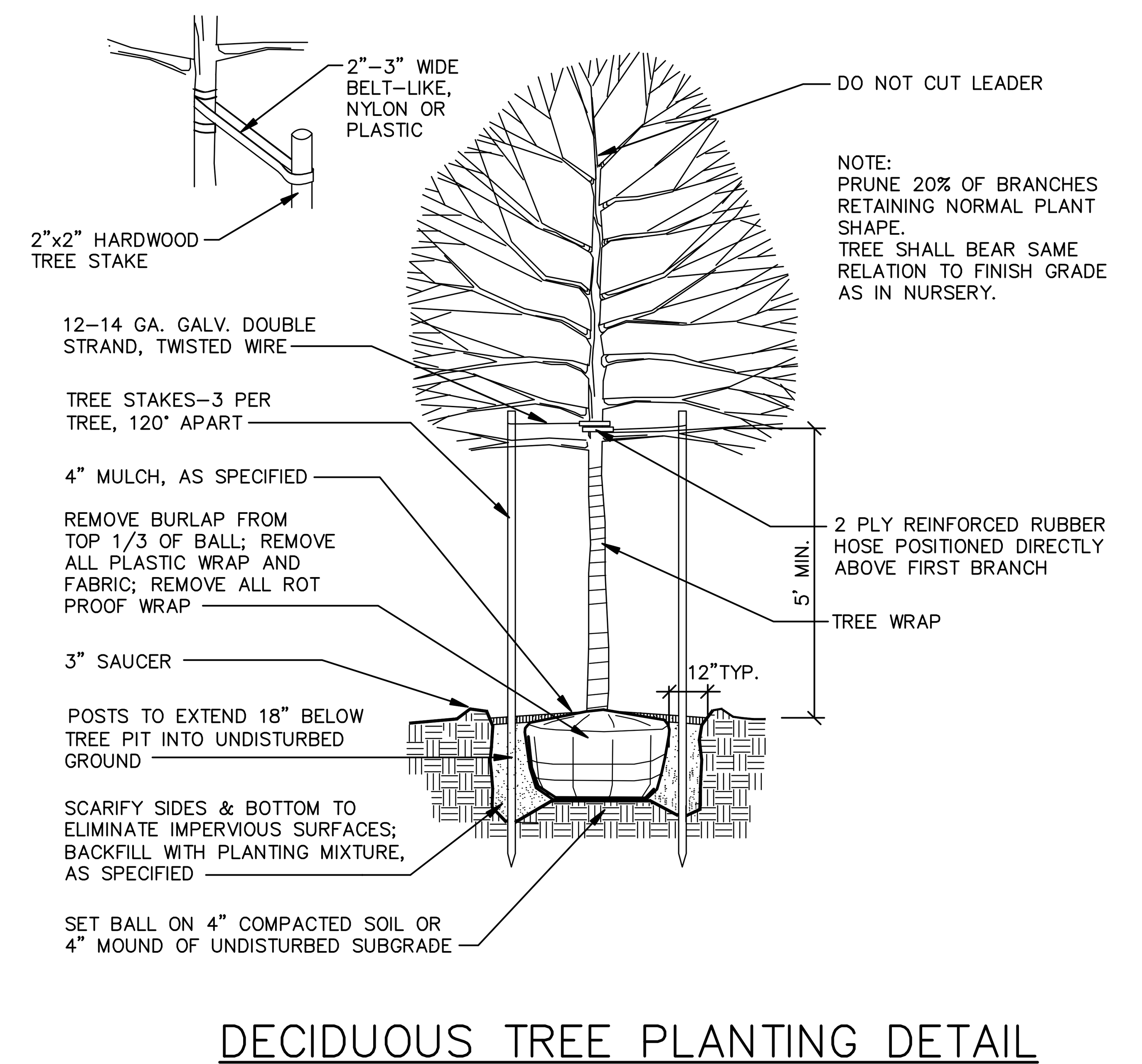
Botanical Name	Common Name	PLS Oz/Acre
Permanent Grasses/Sedges		
Bolboschoenus fluviatilis	River Bulrush	0.25
Carex cristatella	Crested Oval Sedge	2.00
Carex lurida	Bottlebrush Sedge	3.00
Carex vulpinoidea	Brown Fox Sedge	6.00
Elymus virginicus	Virginia Wild Rye	13.50
Glyceria striata	Fowl Manna Grass	1.25
Juncus effusus	Common Rush	2.00
Leersia oryzoides	Rice Cut Grass	1.00
Panicum virgatum	Switch Grass	2.00
Schoenoplectus tabernaemontani	Softstem Bulrush	3.00
Scirpus atrovirens	Dark Green Rush	2.00
Scirpus cyperinus	Wool Grass	1.00
	Total	37.00
Temporary Cover		
Avena sativa	Common Oat	360.00
Lolium multiflorum	Annual Rye	100.00
	Total	460.00
Forbs		
Alisma spp.	Water Plantain Mix	4.25
Asclepias incarnata	Swamp Milkweed	1.50
Bidens spp.	Bidens Mix	2.00
Helenium autumnale	Sneezeweed	2.00
Iris virginica	Blue Flag	4.00
Lycopus americanus	Common Water Horehound	0.25
Mimulus ringens	Monkey Flower	1.00
Oligoneuron riddellii	Riddell's Goldenrod	0.50
Penthorum sedoides	Ditch Stonecrop	0.50
Polygonum spp.	Pinkweed Mix	4.00
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	1.00
Rudbeckia triloba	Brown-Eyed Susan	1.50
Sagittaria latifolia	Common Arrowhead	1.00
Senna hebecarpa	Wild Senna	1.00
Symphyotrichum novae-angliae	New England Aster	1.50
Thalictrum dasycarpum	Purple Meadow Rue	2.00
	Total	28.00

Slope Stabilization

This grass and sedge mix is best suited for sites with slopes where erosion control is needed. Applications include embankments, dams, and levees. Use this mix in conjunction with erosion control materials for best results. This seed mix includes 7 of 8 native permanent grass and sedge species. Apply at 59.5 PLS pounds per acre.

Botanical Name	Common Name	PLS Oz/Acre
Permanent Grasses/Sedges		
Andropogon gerardii	Big Bluestem	48.00
Bouteloua curtipendula	Side Oats Grama	16.00
Carex spp.	Prairie Sedge Mix	4.00
Elymus canadensis	Canada Wild Rye	32.00
Elymus virginicus	Virginia Wild Rye	24.00
Panicum virgatum	Switch Grass	12.00
Schizachyrium scoparium	Little Bluestem	32.00
Sorghastrum nutans	Indian Grass	32.00
	Total	200.00
Temporary Cover		
Avena sativa	Common Oat	512.00
Lolium multiflorum	Annual Rye	240.00
	Total	752.00

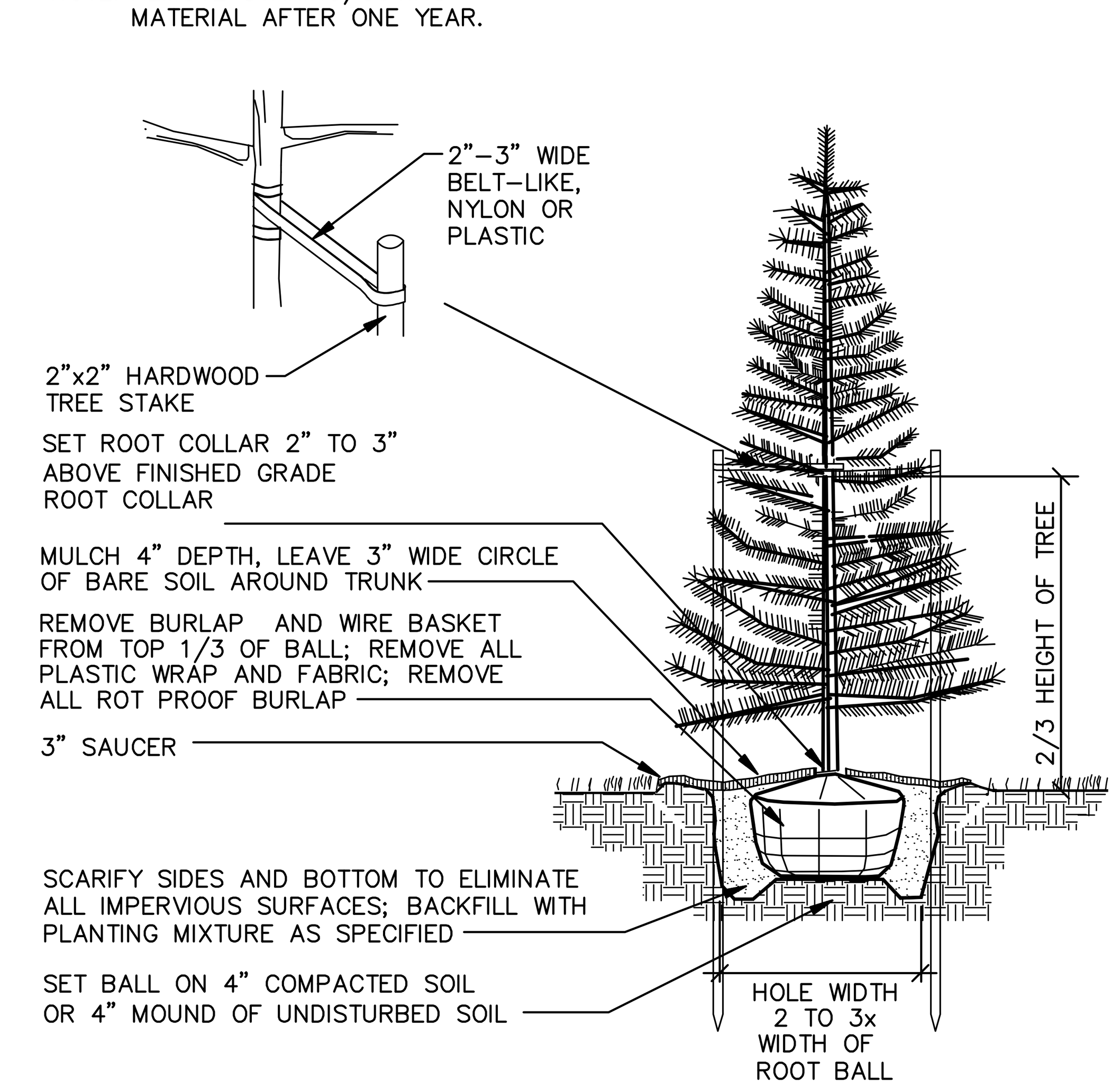
NOTE: REMOVE STAKING/GUYING MATERIAL AFTER ONE YEAR.



DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE

NOTE: REMOVE STAKING/GUYING MATERIAL AFTER ONE YEAR.



EVERGREEN TREE PLANTING DETAIL

NOT TO SCALE

SCALE: 1" = 80'

0 80 160 240

LEGEND

- WELL
- SECTION CORNER
- S — SET IRON PIPE
- F — FOUND IRON PIPE
- S — SET MONUMENT
- F — FOUND MONUMENT
- SPK — SET P.K.
- FPK — FOUND P.K.
- SIR — SET IRON ROD
- FIR — FOUND IRON ROD
- CONTROL PT.
- CENTERLINE
- PROPERTY LINE
- EXISTING LANDMARK TREE (SEE TABLE) SURVEYED 2017
- PROPOSED DECIDUOUS MITIGATION TREE
- PROPOSED EVERGREEN MITIGATION TREE
- PROPOSED SILT FENCE
- PROPOSED CONSTRUCTION FENCE

MITIGATION CALCULATIONS

Landmark Trees	Qty	DBH
Landmark Trees removals <16 health	0	
Landmark Trees removals >16 health	37	851"
Proposed Mitigation Schedule	Qty	DBH
Proposed mitigation with road construction	33 trees	88
Landscape Requirements		
Proposed Mitigation	Qty	DBH
3" cal. Deciduous tree	11	33."
2.5" cal. Deciduous tree	4	10."
6' ht Evergreen (2.5" eq) tree	18	45."
Total	**33**	**88."**

NOTES:

1. TREE SURVEY IN 2017 WAS LIMITED TO AREAS IMPACTED BY THE PROPOSED PRIVATE ROAD.
2. EXACT LOCATION OF MITIGATION TREES TO BE DETERMINED IN THE FIELD BASED ON FUTURE DEVELOPMENT LAYOUT.
3. TREES REMOVALS SHALL BE PERFORMED BETWEEN OCTOBER 1ST AND MARCH 31ST TO AVOID IMPACTS TO POTENTIAL HABITAT FOR INDIANA BAT AND NORTHERN LONG–EARED BAT.
4. TO AVOID POTENTIAL IMPACTS ON EASTERN MASSASAUGA RATTLESNAKE:
    4.1. USE WILDLIFE–SAFE MATERIALS FOR EROSION CONTROL AND SITE RESTORATION. SOIL DISTURBANCE AREAS SHALL BE STABILIZED WITH STRAW MULCH AND NO EROSION CONTROL PRODUCTS CONTAINING PLASTIC MESH NETTING OR OTHER SIMILAR MATERIAL THAT COULD ENSNARE EMR SHALL BE USED.
    4.2. TO INCREASE HUMAN SAFETY AND AWARENESS OF EMR, THOSE IMPLEMENTING THE PROJECT SHOULD FIRST WATCH MDNR'S "60–SECOND SNAKES: THE EASTERN MASSASAUGA RATTLESNAKE" VIDEO (HTTPS://YOUTU.BE/–PFNXE_E02W), REVIEW THE EMR FACTSHEET (HTTPS://WWW.FWS.GOV/MIDWEST/ENDANGERED/REPTILES/EAMA/PDF/EMRFACTSHEETSEP T2016.PDF), OR BY CALLING 517–351–2555.
    4.3. ANY EMR OBSERVATIONS, OR OBSERVATION OF ANY OTHER LISTED THREATENED OR ENDANGERED SPECIES, DURING PROJECT IMPLEMENTATION SHALL BE REPORTED TO THE USFWS WITHIN 24 HOURS.

MIDWESTERN CONSULTING
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JOMAR PARK PHASE 2 - PRIVATE ROAD

NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN
PRIVATE ROAD DESIGN
NATURAL FEATURES PRESERVATION AND MITIGATION PLAN

7

JOB No. 16287		DATE: 12/7/17
REVISIONS:	REV. DATE	SHEET 7 OF 8
PER TOWNSHIP COMMENTS	03/08/18	CADD: TRF
PER TOWNSHIP COMMENTS	3/20/18	ENG: RCW
		PM: RCW
		TECH:
		Site Plan\16287LP1.dwg
		FB#305, 313, 617A

M:\Civil3d_Proj\16287\Site Plan\16287LP1.dwg, 3/20/2018 11:17 AM, Rachel D. Wandmacher, None

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

JOB No. 16287	DATE: 3/20/18	8	**JOMAR PARK PHASE 2 - PRIVATE ROAD** NORTHFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN PRIVATE ROAD DESIGN OVERALL NATURAL FEATURES
REVISIONS: REV. DATE	SHEET 8 OF 8		
	CADD:		
	ENG: RCW		
	PM: RCW		
	TECH:		
	Site Plan\16287NATFEAT.dwg		
	F#s 305, 313, 617A		

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Northfield Township Dog Park Rules

1. All dogs must display current license and vaccination tags.
2. Users of this facility do so at their own risk. Dog behavior can be unpredictable around other dogs and strangers.
3. Dog owners and handlers are strictly liable for any damage or injury caused by their dog(s).
4. Dog handlers must be 18 years of age or older. Children under 18 are not allowed in the park unless accompanied by an adult.
5. All dogs must remain leashed until they are within the designated, fenced area.
6. Dogs must not be left unattended. Dogs must be in view and under the voice command of their owner at all times.
7. Dog handlers are responsible for cleaning up after their dogs. Plastic bags are to be used to remove solid waste and placed in the trash receptacle. Visitors to the dog park are asked to collect clean, appropriate plastic bags and donate them to the park when they visit by putting them in the container provided.
8. Dogs in heat and puppies under four months of age are not permitted in the park.
9. Dogs that fight or exhibit aggressive behavior must be immediately removed from the park by their owner.
10. No more than two dogs per handler are allowed at one time.
11. No smoking, food or alcohol is allowed within the park.
12. Users of the dog park are encouraged to bring fresh water to the park and make it available to others in the dish(es) provided.
13. Please be courteous to our neighbors and remove your dog(s) if their barking is not controlled.
14. Children must be watched carefully at all times and supervised for their safety.
15. Individuals failing to comply with posted rules are subject to citation, expulsion, or arrest, as well as dog impound.
16. Park hours are dawn to dusk. Under no circumstances before 6 a.m. or after 10 p.m. will you be permitted in the park (hours are subject to closures for required maintenance operations).
17. **For non-emergencies at the dog park, please call 734.449.2880. If you need emergency assistance, please call 911.**

NORTHFIELD TOWNSHIP
PLANNING COMMISSION
Minutes of Regular Meeting
May 2, 2018

1. CALL TO ORDER

The meeting was called to order by Chair Roman at 7:00 P.M. at 8350 Main Street.

2. PLEDGE OF ALLEGIANCE

3. ROLL CALL AND DETERMINATION OF QUORUM

Roll call:

Janet Chick	Absent with notice
Brad Cousino	Absent with notice
Eamonn Dwyer	Present
Sam Iaquinto	Present
Cecilia Infante	Present
Larry Roman	Present
John Zarzecki	Present

Also present:
Assessing & Building Assistant Mary Bird
Planning Consultant Paul Lippens, McKenna Associates
Recording Secretary Lisa Lemble
Members of the Community

4. ADOPTION OF AGENDA

▶ **Motion:** Iaquinto moved, Roman supported, that the agenda be adopted as presented.
Motion carried 5—0 on a voice vote.

5. FIRST CALL TO THE PUBLIC

Tawn Beliger, Township Board Trustee, 8365 Earhart Road, asked for assistance in making rules posted at the Bark Park enforceable.

6. CLARIFICATIONS FROM THE COMMISSION

Regarding the type of regulations brought up by Beliger during First Call to the Public Lippens said this is a general code ordinance issue and should be directed to the Board. He noted the Planning Commission could make an advisory recommendation. Iaquinto said the Township Board has not acted on this issue despite a request from the Parks and Recreation Committee. It was agreed to place this on the next Planning Commission agenda.

7. CORRESPONDENCE

None.

8. PUBLIC HEARINGS

None.

9. REPORTS

9A. Board of Trustees
No report.

9B. ZBA
No report.

9C. Staff Report
Nothing to report.

9D. Planning Consultant
Lippens noted the deadline for submittal of responses to the Request for Proposals for North Village has been revised to June 20th based on requests from developers for additional time to prepare proposals.

9E. Parks and Recreation
Iaquinto said the community garden will be in operation this year, and anyone interested in a plot should contact Jennifer Carlisle in the Township office.

9F. Downtown Planning Group
Infante reported that on April 23rd the group passed motions to request the Board of Trustees to engage a building inspector for 75 Barker Road and to request authorization from the Township Board to manage the waterfront part of the North Village property.

10. UNFINISHED BUSINESS

10A. Further Discussion on Accessory Setback Clarifications.

Lippens referred to the proposal to clarify accessory setbacks based on the Commission's discussion on April 18th.

▶ **Motion:** Roman moved, Zarzecki supported, that the Planning Commission accept the memo regarding Accessory Setback Clarifications, Revision #2, as written, and to forward it to the Board of Trustees for approval.
Motion carried 5—0 on a roll call vote.

Lippens noted that a public hearing for this zoning ordinance amendment and for the Temporary Sales

amendment recommended for approval at the April 18th meeting need to be scheduled for public hearings.

- **Motion:** Roman moved, Zarzecki supported, to set public hearings for both the Temporary Holiday Sales and the Accessory Setback Clarifications, Revision #2 zoning ordinance amendments. **Motion carried 5—0 on a roll call vote.**

11. NEW BUSINESS

11A. Discussion on Yard Measurements: Overhang Clarification.

Lippens referred to his memo regarding Section 36-98(f) to make it clearer that roof overhangs up to two feet are allowed within required setbacks.

Commissioners agreed the proposed language is clearer.

- **Motion:** Roman moved, Iaquinto supported, that the Planning Commission accept the memo regarding Yard Measurements: Overhang Clarification, to set this amendment to the zoning ordinance for public hearing, and to forward it to the Township Board of Trustees for approval. **Motion carried 5—0 on a roll call vote.**

12. MINUTES

- **Motion:** Roman moved, Iaquinto supported, that the minutes of the April 18, 2018, regular meeting be approved as presented, and to dispense with the reading. **Motion carried 5—0 on a voice vote.**

13. SECOND CALL TO THE PUBLIC

Tawn Beliger thanked the Commission for their assistance regarding Bark Park regulations. David Gordon, 5558 Hellner Road shared a joke.

14. COMMENTS FROM THE COMMISSIONERS

Zarzecki noted the Township will hold a Clean-up Day on June 9th.

15. ANNOUNCEMENT OF NEXT MEETING

May 16, 2018, at 7:00 P.M. at the Public Safety Building was announced as the next regular Commission meeting time and location.

16. ADJOURNMENT

- **Motion:** Roman moved, Iaquinto supported, that the meeting be adjourned. **Motion carried 5—0 on a voice vote.**

The meeting was adjourned at 7:24 P.M.

Prepared by Lisa Lemble.
Corrections to the originally issued minutes are indicated as follows:
Wording removed is ~~stricken through~~;
Wording added is underlined.

Adopted on _____, 2018.

_____ _____
Larry Roman, Chair John Zarzecki, Secretary

Official minutes of all meetings are available on the Township's website at
http://www.twp-northfield.org/government/