



## Planning Commission

Larry Fox, Chairperson      Joseph W. Colaianne, Trustee  
Jeff Newsom, Vice-Chairperson      Keith Voight, Secretary  
Michael Mitchell, Commissioner      Sue Grissim, Commissioner  
Tom Murphy, Commissioner

**Planning Commission Meeting Agenda**  
**Hartland Township Hall**  
**Thursday, December 19, 2019**  
**7:00 PM**

1. Call to Order
2. Pledge of Allegiance
3. Roll Call
4. Approval of the Agenda
5. Approval of Meeting Minutes
  - a. Meeting Minutes of November 7, 2019
6. Call to Public
7. Public Hearing
  - a. Rezoning #19-004 Handy Lake Office
8. Old and New Business
  - a. Site Plan #19-013 Wings Etc.
  - b. Site Plan #19-010 Waldenwoods Campground Improvements
  - c. 2020 Planning Commission Meeting Calendar
9. Call to Public
10. Planner's Report
11. Committee Reports
12. Adjournment

HARTLAND TOWNSHIP PLANNING COMMISSION REGULAR MEETING **DRAFT** MINUTES  
November 7, 2019 – 7:00 PM

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1. **Call to Order:** Chair Fox called the meeting to order at 7:00 p.m.

2. **Pledge of Allegiance**

3. **Roll Call and Recognition of Visitors:**

Present – Commissioners Fox, Grissim, Mitchell, Murphy, Voight

Absent – Newsom, Colaianne

4. **Approval of the Meeting Agenda:**

**A Motion to approve the November 7, 2019 Planning Commission Meeting Agenda was made by Commissioner Grissim and seconded by Commissioner Mitchell. Motion carried unanimously.**

5. **Approval of Meeting Minutes**

a. Planning Commission - Regular Meeting – September 26, 2019

**A Motion to approve the Meeting Minutes of September 26, 2019 was made by Commissioner Mitchell and seconded by Commissioner Voight. Motion carried unanimously.**

6. **Call to the Public**

None

7. **Old and New Business:**

a. **Site Plan #19-009 Burger King Remodel**

**Director Langer summarized the request and location stating the following:**

- Request to renovate/reface the building; remove the glass atrium, mansard roof, parapet walls; modify the entrance and paint/repair the brick.
- Site Plan Review committee has seen the project.
- Painted brick is typically not allowed but as it is existing, it will be permitted.
- Site changes are minimal; repairing concrete, adding additional landscaping.
- Footprint will be slightly smaller without the glass atrium.

The Applicant's representative, Matthew Pisko, introduced himself and stated the following:

- Existing elevation is quite outdated.
- Methods have been tested in other areas.
- Reasonable, long lasting fix.
- All lighting will be compliant.

- The walls will be extended to screen the rooftop HVAC equipment.
- Drawings will be modified for the construction set.

Chair Fox reviewed to the staff letter.

Chair Fox asked if the Landscape Plan and façade change would be modified on the construction set. The Applicant stated they would. The Planning Commission had no comments.

Chair Fox stated the landscaping is not being totally replaced but is being enhanced or augmented with additional items. The Applicant confirmed.

Commissioner Grissim asked if they would be replacing the hedge along Blaine Road to screen the parking. The Applicant stated they would.

Chair Fox asked if a separate page of lighting fixtures will be provided. The Applicant stated he had already given one to staff.

Chair Fox mentioned the corrections were needed on the construction plans to match the products listed on the color renderings. The Applicant stated they would make that change.

Chair Fox asked for comments regarding painting the brick. He stated they are leaving most of the brick and intend to patch and repair missing or damaged areas. The Applicant stated they can match the exact size so the look will be uniform. Chair Fox stated other stores have used this method. The Applicant added they have with great success; if these materials work in the store in Minot, North Dakota, they should work here.

Chair Fox inquired about the parapet walls on the roof. The Applicant stated the following:

- Must be raised enough to screen the rooftop units.
- Will be proportional and not look odd.
- The stone will always be higher than the parapet walls.

The Planning Commission briefly discussed the revisions to the roof line and parapet walls.

Commissioner Murphy asked if the screening is on all sides. The Applicant stated it is.

Chair Fox mentioned the set of façade plans was not able to be updated in time for the meeting. They are trying to understand what it will look like. The changes will be shown on the construction plan and reviewed by staff prior to issuance of a Land

Use Permit. The revisions need to show that the rooftop equipment is screened on all four sides. The Applicant stated they can comply.

Commissioner Grissim asked if, with the anticipated height increase to screen equipment, they would still be well below height requirements. Director Langer confirmed.

Director Langer stated for an unknown reason, there is a gap in the sidewalk along Blaine Road that will need to be completed at some point. If not added in this phase of the project, it must happen when they make changes to the drive-through.

Commissioner Murphy stated he would like to see that as part of this phase of the project.

The Applicant stated it could be added as a condition.

Commissioner Voight stated he would like to get it on record that it will be completed understanding an extension for the sidewalk work could be granted when the Applicant returns for the next phase.

Commissioner Mitchell agreed stating he would like to have it on record as part of this phase but would be satisfied as long as it is completed at the end of the next phase.

Commissioner Murphy stated he would prefer the work be done as part of this phase as we do not know when the next phase might happen. Not having that connectivity is a safety issue.

Commissioner Voight stated it is a goal to have sidewalks from property line to property line.

The Applicant stated he is unsure of how this situation happened.

The Planning Commission briefly discussed the history of the road improvements and the topography at that location.

The Applicant stated they will look at the constructability, cross slopes and accessibility. He sees no objection.

Commissioner Murphy asked if there are currently outdoor coolers on the site. The Applicant stated there may have been at one time, but they have been fully incorporated into the architecture at this time.

Director Langer mentioned the existing pylon sign is non-conforming and will have to be completely replaced and relocated during the next phase. A reface would be allowed with the understanding it must be brought into conformance during the site

improvement phase. The Applicant stated he is hoping that can be done at the next phase. Chair Fox stated as it is one of the oldest signs in the area, they look forward to seeing it updated.

Commissioner Murphy asked about the drive-through. Chair Fox stated it is planned for the next phase.

Chair Fox asked if Burger King uses the double drive-through. The Applicant stated they do when appropriate. They are very anxious to move forward on the façade update and are aware the approvals for signage and site changes will take more time to go through the process. Those updates are important to them as well.

**Commissioner Murphy offered the following Motion:**

**Move to approve Site Plan Application #19-009, a request to amend the original site plan and remodel the existing Burger King building at 10382 Highland Road. The renovations include changes to the architecture of the building, new façade finishes on the building's exterior, and installation of additional landscaping on the site. Approval is subject to the following conditions:**

- 1. The applicant shall adequately address the outstanding items noted in the Planning Department's memorandum, dated October 31, 2019, on the Construction Plan set, subject to an administrative review by the Planning staff prior to the issuance of a land use permit.**
- 2. The building elevations shall be revised to show the parapet wall being extended, in a similar manner to the current building elevation plans, and on all four (4) sides) to sufficiently screen all rooftop equipment in compliance with the Zoning Ordinance.**
- 3. Applicant complies with any requirements of the Department of Public Works Director and Hartland Deerfield Fire Authority and all other government agencies, as applicable.**
- 4. The Applicant shall install the sidewalk where it terminates at Blaine Road to the entrance.**

**Seconded by Commissioner Mitchell. Motion carried unanimously.**

**8. Call to the Public**

None

**9. Planner Report:**

Director Langer reported the following he will bring the revised elevations to the next Planning Commission meeting.

**10. Committee Reports:**

None

**11. Adjournment:**

**A Motion to adjourn was made by Commissioner Voight and seconded by Commissioner Murphy. Motion carried unanimously. The meeting was adjourned at approximately 7:34 PM.**

# Hartland Township Planning Commission Meeting Agenda Memorandum

**Submitted By:** Troy Langer, Planning Director  
**Subject:** Rezoning #19-004 Handy Lake Office Rezoning  
**Date:** December 12, 2019

## Recommended Action

**The Planning Commission Recommends Approval** of the rezoning, based on the following findings:

1. The requested rezoning of the subject property to the SR (Suburban Residential) zoning classification is consistent with the Township's Comprehensive Development Plan, which indicates the property should be developed as Medium Urban Density Residential.
2. The subject property is currently developed and used in a single family residential use; and the rezoning will permit those property owners to use their property in a more conforming manner.
3. The requested rezoning of the subject property to SR (Suburban Residential) zoning classification is compatible with the surrounding uses and zoning, and is more appropriate than the current OS (Office Service) zoning classification.

## Discussion

Applicant: Hartland Township

## Rezoning Request

Hartland Township is submitting a request is to rezone approximately 42 parcels from OS (Office Service) to SR (Suburban Residential), located in Section 22 of Hartland Township. A list of the subject parcels and location map are provided as attachments. The parcels are part of the Melody Acres platted subdivision which was developed in phases from 1951-1954. Eleven (11) parcels are part of Melody Acres No. 1 subdivision (platted in 1951); two (2) parcels are part of Melody Acres No. 2 (platted in 1953); and twenty-nine (29) parcels are part of Melody Acres No. 4 (platted in 1954). Properties east, south, and west of the subject area are zoned SR (Suburban Residential). Properties north of the subject area have frontage on the south side of Highland Road (M-59) and are zoned OS (Office Service).

Currently 41 parcels are occupied with a single-family dwelling and one (1) parcel is vacant. Under the current OS zoning, single-family uses are not permitted, essentially making the single-family residential uses and structures nonconforming. As a result there are limitations on what improvements can be made to any structure used for single-family purposes. Section 7.2 of the Zoning Ordinance outlines the provisions regarding modifications to nonconforming use and structures. The intent of the rezoning request is to make the zoning compatible with current single-family residential use and to better align with the Comprehensive Development Plan of Hartland Township.

## Site Description

Generally, the subject area is south of Highland Road (M-59) and north of Norway. Birch provides the west boundary, with eleven (11) properties addressed off Birch. Broadview provides the east-west access, with twenty-seven (27) parcels having frontage on Broadview. Two (2) parcels on the eastern end of the

area have frontage on Norway. The remaining two (2) parcels are at the intersection of Melody Place and Broadview, and are addressed off Melody Place.

### **Background Information**

Based on file information, the subject area was zoned A-R (Agriculture-Residential) on the 1959 Zoning Map. Agricultural uses were permitted in A-R as well as single or two-family dwellings. In the 1970's the Township Zoning Map shows the property zoned as UR-1 (Urban Residential). This zoning allowed single-family detached dwellings as a permitted principal use and other uses normally associated with residential neighborhoods, which were considered conditional uses. Office-type uses were not listed as conditional uses except for medical and dental clinics.

The subject area is shown as zoned OR (Office-Research) on the 1992 Hartland Township Zoning Map. The intent of this district was to allow for research institutions and provide an area appropriate for general office uses that were intended to serve all Township residents. This zoning category did not permit residential uses.

The current Hartland Township Zoning Map (2012) has the subject area designated as OS. The zoning category change may have occurred when the zoning map was updated in 2012.

### **Zoning Districts**

Following is a discussion of the current and proposed zoning categories. Currently the subject properties are zoned OS (Office Service; Section 3.1.11) and the request is to rezone 42 properties to SR (Suburban Residential; Section 3.1.6). The 2015 Hartland Township Future Land Use Map shows zoning for these properties as Medium Urban Density Residential. Zoning regulations are provided as attachments for the zoning districts as noted above, specifically regarding the permitted principal and special land uses for each district.

#### Current Zoning

The subject properties are currently zoned OS (Office Service). The Hartland Township Zoning Ordinance under Section 3.1.11, Intent of the OS District, states:

*The intent of the "OS" Office Service District is to provide areas in the Township and an environment appropriate for various types of administrative and professional offices, as well as certain professional services which can serve a transitional use between more intense land uses (such as commercial uses) and less intensive residential uses. This district is intended to prohibit those types of retail uses and other activities that typically generate large volumes of traffic, traffic congestion, parking problems, and other impacts that could negatively affect the use of enjoyment of surrounding property.*

Residential uses are not specifically listed as a principal or special land use in OS. The minimum required lot size in OS is 20,000 square feet. The minimum lot width is 100 feet.

#### Proposed Zoning

The proposed zoning is SR (Suburban Residential). The Hartland Township Zoning Ordinance under Section 3.1.6, Intent of the SR District, states:



*The intent of this District is to permit a limited range of residentially-related uses, and to prohibit multiple-family, office, business, commercial, industrial, or other uses that would interfere with the quality of residential life in this district. It is intended development in this district be designed to preserve significant natural features. Preservation of open space, protection of flood prone areas, protection of wetlands and woodlands, and preservation of other natural features is encouraged. The District is intended to correspond with the Medium Suburban Residential future land use category of the Comprehensive Plan.*

The minimum required lot size for a single family detached dwelling in the SR zoning category is a lot width of 120 feet and lot area of 20,000 square feet (with public sewer and water) or 32,670 square feet (without public sewer and water).

Following is a chart listing the lot requirements for SR and OS zoning districts:

<b>Zoning District</b>	<b>Lot Area</b>	<b>Lot Width</b>
SR	20,000 sq. ft.*	120 feet
	32,670 sq. ft.**	
OS	20,000 sq. ft.	100 feet
*	For parcels with public sanitary sewer	
**	For parcels without public sanitary sewer	

Land uses and zoning districts for properties adjacent to the subject area for the rezoning request are as follows:

- North: OS (Office Service)
- South: SR (Suburban Residential)
- East: SR (Suburban Residential)
- West: SR (Suburban Residential)

Section 7.2 of the Zoning Ordinance outlines the standards for non-conforming structures and non-conforming uses. In particular, Section 7.2.4.A states “No nonconforming use or structure shall be enlarged, extended, expanded or structurally altered, nor shall any accessory use, building or structure be established therewith, nor shall any nonconformity be changed to a different nonconformity which increases the intensity of use or nonconformity, except as permitted in this Article.” Essentially, this provision prohibits the existing property owners from doing any addition, such as a deck, to their existing single family homes.

### **Comprehensive Plan**

The 2015 Hartland Township Comprehensive Plan Future Land Use Map designates the subject property as Medium Urban Density Residential. The Comprehensive Development Plan has the following comments regarding this category:

*General Location.* The areas adjacent to Round, Handy, and Maxfield Lakes, Millpointe subdivision, and Cobblestone Reserve site condominiums, are all included in Medium Urban Density Residential designation. The undeveloped land northeast of the Clark and Dunham Road intersection, as well as southwest of the Old US-23 and Bergin interchange, is part of this designation which when combined totals approximately 911 acres.

*Intended Land Uses.* The Medium Urban Density Residential designation is intended to reflect the existing densities and character of the identified areas and to provide opportunities for new development that is consistent with the referenced neighborhood patterns.

*Characteristics.* In the Medium Urban Density Residential areas, land can be developed at a density of approximately two (2) or three (3) dwelling units per acre. Lot sizes are anticipated to be 8,000 to 20,000 square feet per dwelling.

Future Land Use Map designations for properties adjacent to the subject site for the rezoning request are as follows:

North: Office  
South: Medium Urban Density Residential  
East: Medium Urban Density Residential  
West: Office

### **Zoning Ordinance Rezoning Criteria**

The Hartland Township Zoning Ordinance, under Section 7.4.3. provides the Planning Commission and Township Board with the following criteria to consider in making its findings and recommendation and decision:

#### *Section 7.4.3.A. Consistency with the adopted Comprehensive Plan.*

This criteria requires examination of not only the Future Land Use Map, but the language in the Comprehensive Development Plan

The Future Land Use Map designates the subject area as Medium Urban Density Residential. Per the Comprehensive Plan this zoning designation is intended for areas adjacent to Round, Handy and Maxfield Lakes and the intent is to match the existing densities. The existing parcels in the subject area generally range in size from 7,500 square feet to 34,000 square feet. Several properties are a result of the combination of two (2) platted lots; however, most of the properties are on the smaller size, being only approximately 50 feet in width and 150 feet in depth, which is approximately 7,500 square feet in lot area. The existing density appears to be compatible with the density for Medium Urban Density Residential.

The Planning Commission will have to determine if the proposed SR district is the appropriate category for the rezoning.

#### *Section 7.4.3.B. Compatibility with the site's physical, geological, hydrological and other environmental features.*

The subject area is developed with residential buildings, with the exception of one (1) vacant lot.

#### *Section 7.4.3.C. Reasonable return on investment with current classification of OS*

Historically the subject area was part of a platted subdivision (Melody Acres) and has functioned as a residential use since the 1950's. Residential uses are not permitted in OS, thus making the residential use a nonconforming use. The intent is to rezone the properties located within the subject area to SR in order to eliminate the nonconforming use status of the residential properties and be compatible with the surrounding residential area. If rezoned to SR, any and all uses in the SR classification should be considered as a potential future development on the property.

Section 7.4.3.D. Compatibility of all potential uses allowed in the proposed SR District with surrounding uses and zoning.

The properties to the north, with frontage along Highland Road, are zoned OS, and include a variety of office uses, such as a chiropractor office, financial services, and real estate offices.

Properties immediately south, east and west of the subject area are zoned SR and have residential dwellings.

The Planning Commission will need to determine if the permitted uses in the SR district are compatible with the existing and potential surrounding uses. Given that the surrounding properties on three sides are zoned SR, the proposed zoning classification appears to be compatible.

Section 7.4.3.E. Capacity of infrastructure and other public services and street system.

The properties within the subject property are served by on-site wells and public sewer, with grinder pumps.

Section 7.4.3.F. Capability of the street system to accommodate the expected traffic generated by uses allowed in the requested zoning district.

Road access to the subject area is provided from four (4) streets, three (3) of which have access from Highland Road: Birch, Melody Place, and Norway. The fourth street, Broadview, runs east to west interior to the subject area and connects to Norway and Melody Place. The existing streets appear to function for the existing residential uses, which are similar to the uses permitted in SR.

A traffic impact study was not submitted as part of this request.

Section 7.4.3.G. Apparent demand for uses permitted in the requested zoning district.

Rezoning the properties from OS to SR would promote consistency with the surrounding properties that are zoned SR and are part of the same residential platted subdivision. The SR zoning classification would eliminate the nonconforming use status of each property in the subject area, thus allowing the subject properties to function as single-family residential properties, similar to the surrounding SR properties. This would be an assist in meeting future demands for single-family properties in the Township.

Section 7.4.3.H. Ability to comply with zoning regulations.

All but one of the existing properties that are included in the rezoning request, are currently developed as single family residential. The one property that is vacant and the one vacant property is unlikely to be large enough to support an office development with adequate off-street parking spaces. As a result, the proposed rezoning will improve the ability of the existing properties to comply with the zoning regulations.

Any future development of the properties will require compliance with the current Zoning Ordinance standards and requirements.

It should be noted that the property to the north is currently zoned OS (Office Service) and developments in that category are required to comply with some additional zoning regulations where office is adjacent to a residential district. In the past, the offices constructed and developed along M-59, had backed up to residentially developed properties that were actually zoned OS (Office Service), as well. The rezoning of the subject property will make those existing office developments back up to residentially developed and residentially zoned properties.

Section 7.4.3.I. Appropriateness of the requested zoning district.

Based on the Future Land Use Map, SR is a zoning category that aligns with the Future Land Use Map (FLUM) designation Medium Urban Density Residential. Properties to the south, east, and west would also be in the same classification on the FLUM. The property to the north is designated in the Office FLUM category and those properties are developed, as such, since they have frontage along M-59.

This standard requires the Planning Commission, and ultimately, the Township Board, to determine that the proposed zoning classification is considered to be more appropriate than any other zoning classification.

Section 7.4.3.J. Amendment of permitted or special uses versus rezoning.

This request is being initiated by the Township; and there are not specific uses that are proposed with the request; instead, the goal of the rezoning request is to have the zoning be more consistent with the current use of the property. The proposed amendment would make the existing single family houses more consistent with the zoning.

Generally, it is not advisable for the Township to only consider one of the permitted uses that are permitted in a proposed rezoning request. As a result, the Planning Commission should consider all permitted uses in the proposed rezoning request and determine if the subject property is appropriate for those uses.

Section 7.4.3.K. Exclusionary and Spot Zoning Issues.

The term exclusionary zoning is generally referred to a zoning ordinance or a zoning decision that would exclude an otherwise lawful use of land. Michigan Compiled Laws (MCL) Section 125.297a of Township Zoning Act (Sec. 27a) states “[a] zoning ordinance or zoning decision shall not have the effect of totally prohibiting the establishment of a land use within a township in the presence of a demonstrated need for that land use within either the township or surrounding area within the state, unless there is no location within the township where the use may be appropriately located, or the use is unlawful.”

The Michigan State University Extension on Land Use Planning (posed on June 17, 2016 by Brad Neumann, MSU Extension) has defined “spot zoning” as: “one illegal form of rezoning is spot zoning. This practice gets its name from the appearance of small spots of different zoning districts on a zoning map that otherwise has large contiguous areas in the same zoning district around the spots. To be considered a spot zone, the property, in most cases, must meet the following four criteria:

- The area is small compared to districts surrounding the parcel in question.

- The new district allows land uses inconsistent with those allowed in the vicinity.
- The spot zone would confer a special benefit on the individual property owner not commonly enjoyed by the owners of similar property.
- The existence of the spot zone conflicts with the policies in the text of the master plan and the future land use map.

The proposed rezoning area consists of 42 parcels in the Melody Acres platted subdivision. The requested zoning SR (Suburban Residential) is consistent with land uses allowed in adjacent properties to the north, south, and west.

Section 7.4.3.L. Submittal of similar request within one year.

A similar rezoning request has not been submitted within one year.

Section 7.4.3.M. Other Factors.

The Planning Commission and/or the Township Board may consider other factors that it deems appropriate.

**Process**

Section 7.4 of the Hartland Township Zoning Ordinance outlines the process for a Zoning Map Amendment, or more commonly a “rezoning” of property. Essentially, the Township Board is the body that makes the final decision regarding a rezoning; however, the Planning Commission shall forward a recommendation to the Township Board. The Township Board may adopt the proposed rezoning, with or without modifications, or refer it back to the Planning Commission for further study and report. As a result, upon a recommendation from the Planning Commission, this request will be forwarded to the Township Board for a determination.

Although the process as noted above states the Planning Commission reviews the amendment request and makes a recommendation to the Township Board and the Township Board makes a decision, past practices for rezoning requests has included an interim step between the Planning Commission’s recommendation and the Township Board’s decision. In the alternate process the Planning Commission holds a public hearing and may recommend approval, disapproval, or approval with conditions. A copy of the Planning Commission minutes and evidence of the public hearing is then sent to the Livingston County Planning Commission for review and action. After the Livingston County Planning Commission has made a recommendation, the request is then forwarded to the Township Board for a final decision.

**Hartland Township DPW Review**

No comments

**Hartland Township’s Engineer’s Review**

No comments.

**Hartland Deerfield Fire Authority Review**

No Comments

**Attachments**

1. Site Map
2. Zoning Map
3. Future Land Use Map
4. SR Zoning District Uses
5. OS Zoning District Uses

SECTION  
22-301-

22-401-

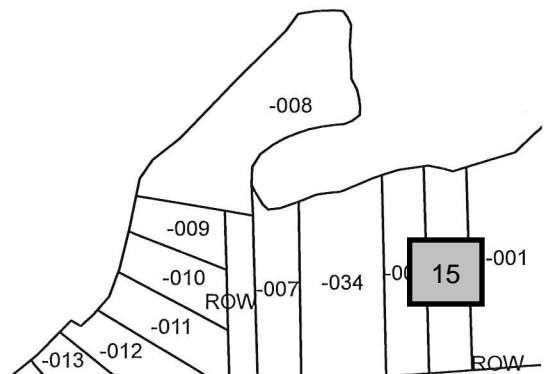
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22

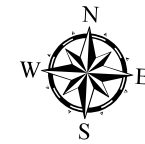
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WATER



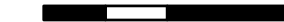
# Zoning Map

## Hartland Township Livingston County, Michigan

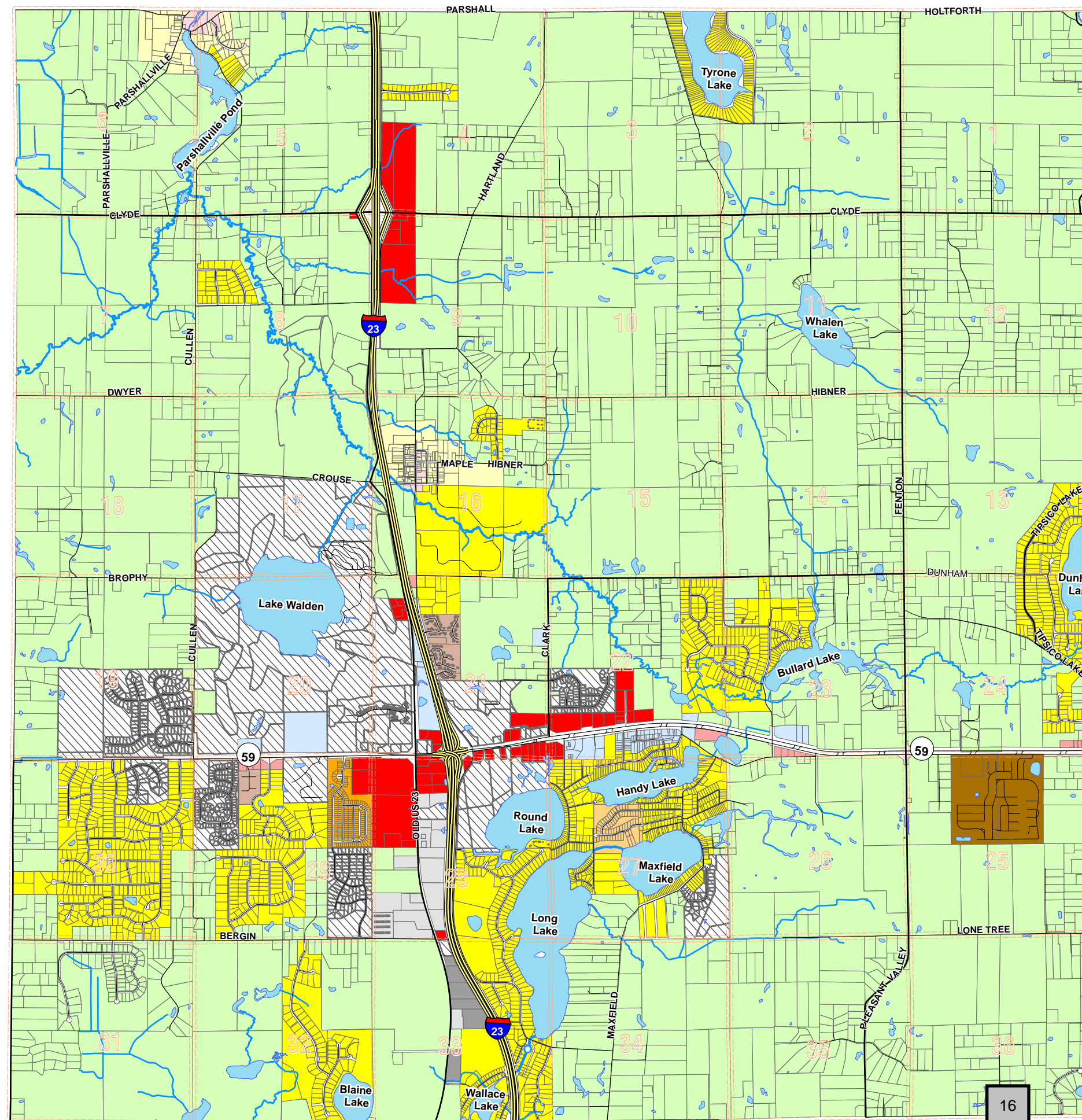


- CA - Conservation Agricultural
- RUR - Rural Residential
- RR - Residential Recreational
- STR - Settlement Residential
- RE - Rural Estate District
- SR - Suburban Residential
- MDR - Medium Density Residential
- HDR - High Density Residential
- MR - Multiple Family Residential
- MR-2 - Mobile Home Park
- OS - Office Service
- LC - Limited Commercial
- NSC - Neighborhood Service Commercial
- GC - General Commercial
- RDP - Research and Development Park
- LI - Light Industrial
- I - Industrial
- PD - Planned Development

0 0.2 0.4 0.8 Miles



Created: December 12, 2012







# Hartland Township

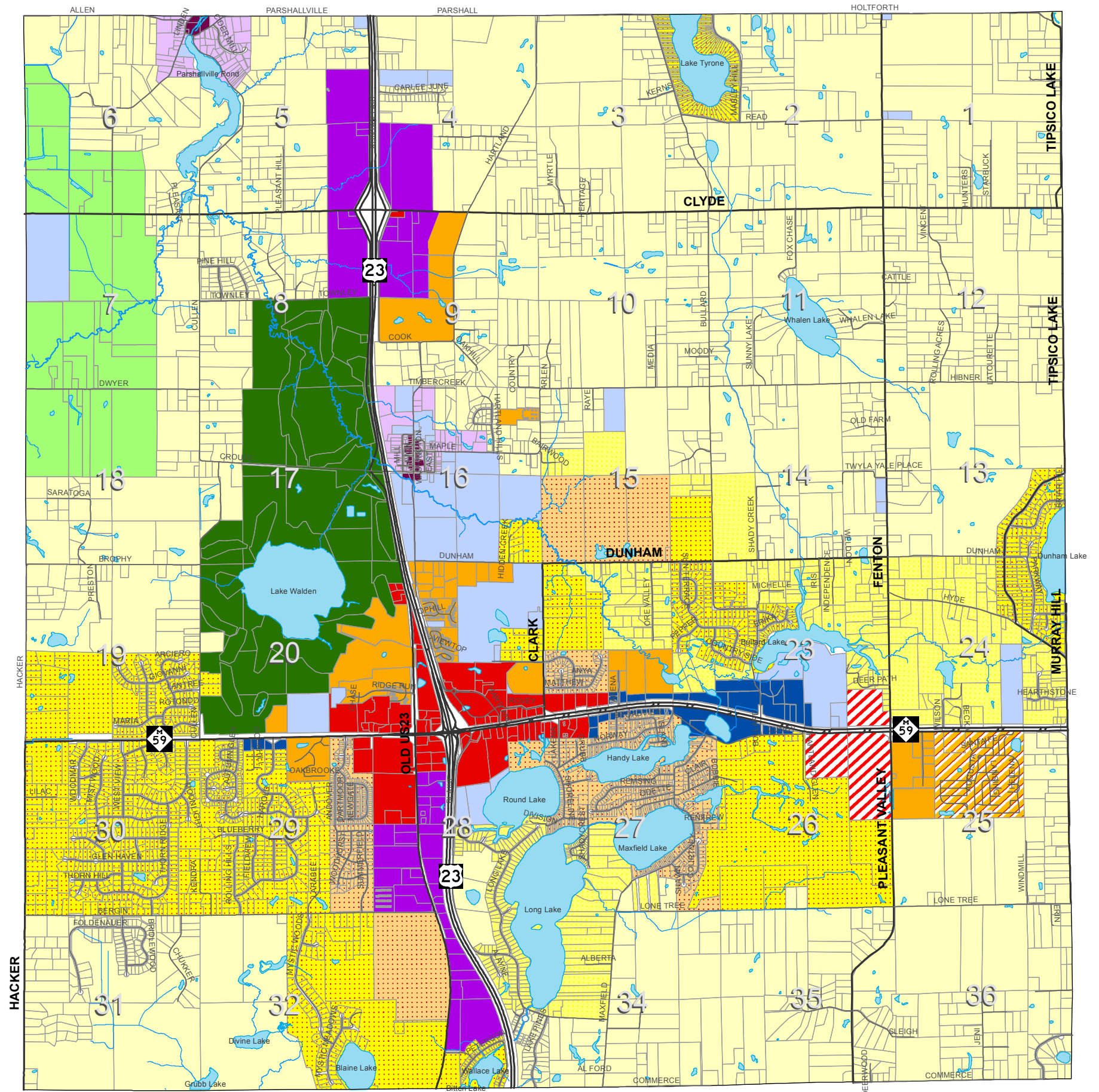
Livingston County, MI

## FUTURE LAND USE MAP

Adopted September 1, 2015

### Future Land Use Categories

-  Commercial
-  Estate Residential
-  High Density Residential
-  Low Suburban Density Residential
-  Multiple Family Residential
-  Medium Suburban Density Residential
-  Medium Urban Density Residential
-  Office
-  Planned Industrial / R & D
-  Public / Quasi-Public
-  Residential Recreation
-  Rural Residential
-  Special Planning Area
-  Village Commercial
-  Village Residential



Map Created By: Hartland Township Planning Department  
 Basemap Source: Livingston County

Recommended for Approval by the Hartland Township Planning Commission on July 30, 2015  
 Adopted by the Hartland Township Board of Trustees on September 1, 2015



## A. INTENT

The intent of the "SR" Suburban Residential District is to provide neighborhoods adjacent to lakes or with direct access to collector or arterial roads. Also, this District is intended to serve as a transition between lower density residential land uses and higher intensity land uses. This District provides areas of the Township for the construction and continued use of single family detached dwellings within stable neighborhoods. Generally, it is intended that SR zoned development occur within approved platted subdivisions or similar developments that can be expected to eventually be served by public water and sewer services.

It is further the intent of this District to permit a limited range of residentially-related uses, and to prohibit multiple family, office, business, commercial, industrial and other uses that would interfere with the quality of residential life in this district. It is intended that development in this district be designed to preserve significant natural features. Preservation of open space, protection of flood prone areas, protection of wetlands and woodlands, and preservation of other natural features is encouraged. This District is intended to correspond with the Medium Suburban Residential future land use category of the Comprehensive Plan.

**i** **User Note:** For uses listed in **bold blue**, refer to Article 4, or click on use, for use-specific standards

## B. PRINCIPAL PERMITTED USES

- i. **Single family detached dwellings**<sup>■</sup> §4.1
- ii. **Nursing or convalescent homes**,<sup>■</sup> §4.23
- iii. **Public and private parks and recreation areas**<sup>■</sup> §4.40
- iv. **Essential public services, provided there is no building or outdoor storage yard** §4.26
- v. State licensed residential facilities that provide care for up to six (6) individuals, including child day care<sup>■</sup> and adult foster care facilities<sup>■</sup>.

## D. SPECIAL LAND USES

- i. **Churches and religious institutions**<sup>■</sup> §4.20
- ii. **Adult care<sup>■</sup> and child care facilities<sup>■</sup> that provide care for seven (7) to twelve (12) individuals, including child care facilities and adult foster care facilities<sup>■</sup>** §4.12
- iii. **Public & private elementary, intermediate or high schools** §4.42
- iv. **Essential public service buildings, excluding storage yards** §4.26

## C. ACCESSORY USES

- i. **Accessory uses, buildings and structures customarily incidental to any of the above-named permitted uses** §5.14
- ii. **Home occupations**<sup>■</sup> §4.2

### 3.1.11

## OS Office Service

#### A. INTENT

The intent of the “OS” Office Service District is to provide areas in the Township and an environment appropriate for various types of administrative and professional offices, as well as certain professional services which can serve as a transitional use between more intense land uses (such as commercial uses) and less intensive residential uses. This district is intended to prohibit those types of retail uses and other activities that typically generate large volumes of traffic, traffic congestion, parking problems, and other impacts that could negatively affect the use of enjoyment of surrounding property.

**i** **User Note:** For uses listed in **bold blue**, refer to Article 4, or click on use, for use-specific standards

#### B. PRINCIPAL PERMITTED USES

- i. Professional and executive offices
- ii. Business and private schools operated for a profit completely within an enclosed building
- iii. Financial institutions without drive-through service
- iv. Medical or dental offices and clinics
- v. **Churches and religious institutions** §4.20
- vi. Essential public services, provided there is no building or outdoor storage yard
- vii. Veterinary offices<sup>m</sup> and clinics with no outdoor facilities or kennels<sup>m</sup>
- viii. Pharmacies and apothecary shops that are under 2,000 square feet.

#### D. SPECIAL LAND USES

- i. **Funeral homes, mortuaries, and crematoriums** §4.29
- ii. **Adult day care facilities<sup>m</sup> and child care centers<sup>m</sup>** §4.12
- iii. Personal fitness centers<sup>m</sup>
- iv. **Financial institutions with drive-through service** §4.57
- v. Use of the same nature or class as uses listed in this district as either a permitted Principal Use or a Special Use, but not listed elsewhere in this Zoning Ordinance, as determined by the Planning Commission

#### C. ACCESSORY USES

- i. **Accessory buildings, uses and activities customarily incidental to any of the above-named principal permitted uses** §5.14
- ii. Retail sales of goods or wares are permitted as long as they are clearly incidental to the permitted principal use.





**Board of Trustees**

William J. Fountain, Supervisor  
 Larry N. Ciofu, Clerk  
 Kathleen A. Horning, Treasurer

Joseph W. Colaianne, Trustee  
 Matthew J. Germane, Trustee  
 Glenn E. Harper, Trustee  
 Joseph M. Petrucci, Trustee

December 2, 2019

**Re: Rezoning #19-004 (Hartland Township)**

Dear Property Owner:

The Hartland Township Planning Commission will conduct a Public Hearing on **Thursday, December 19, 2019**, at or about 7:00 pm to hear comments regarding a proposed rezoning to the Hartland Township Zoning Map. The hearing will be held at the Hartland Township Hall, 2655 Clark Road, Hartland, MI.

You are in receipt of this notice because our records indicate that you are the owner of one or more of the properties listed below, for which a rezoning to the Hartland Township Zoning Map is requested. The Michigan Zoning Enabling Act (Public Act 110 of 2006, as amended) requires you receive written notice of the public hearing.

**Application: Rezoning Application #19-004**  
**Applicant: Hartland Township**  
**Request: OS (Office Service) to SR (Suburban Residential)**

Description: Proposing to rezone multiple properties as listed below:

Tax parcel #	Address	Tax Parcel #	Address
4708-22-301-005	2111 Birch	4708-22-401-038	11589 Broadview
4708-22-301-009	2071 Birch	4708-22-401-039	11603 Broadview
4708-22-301-010	2061 Birch	4708-22-401-040	11609 Broadview
4708-22-301-068	2060 Birch	4708-22-401-042	11621 Broadview
4708-22-301-069	2070 Birch	4708-22-401-043	11588 Broadview
4708-22-301-070	2080 Birch	4708-22-401-044	11580 Broadview
4708-22-301-073	2110 Birch	4708-22-401-045	11578 Broadview
4708-22-301-074	2120 Birch	4708-22-401-046	11572 Broadview
4708-22-301-080	2090 Birch	4708-22-401-047	11566 Broadview
4708-22-301-084	2095 Birch	4708-22-410-048	11560 Broadview
4708-22-301-085	2081 Birch	4708-22-401-049	11556 Broadview
4708-22-401-023	Broadview - vacant	4708-22-401-050	11552 Broadview
4708-22-401-024	2083 Melody Place	4708-22-401-052	11536 Broadview
4708-22-401-025	2084 Melody Place	4708-22-401-053	11530 Broadview
4708-22-401-026	11517 Broadview	4708-22-401-056	11512 Broadview
4708-22-401-027	11523 Broadview	4708-22-401-057	11488 Broadview
4708-22-401-029	11535 Broadview	4708-22-401-059	11460 Broadview
4708-22-401-030	11547 Broadview	4708-22-401-063	11577 Broadview
4708-22-401-032	11553 Broadview	4708-22-401-064	11518 Broadview
4708-22-401-034	11565 Broadview	4708-22-402-044	11639 Norway
4708-22-401-037	11583 Broadview	4708-22-402-052	11657 Norway

The proposed Rezoning Application may be viewed prior to the Public Hearing, at the Township Hall, Monday through Thursday, 8:30 am To 6:00 pm. The notice for the hearing will appear in the **December 1, 2019** issue of the Livingston County Press & Argus.

If you have questions, please call the Planning Department at 810-632-7498 between the hours of 8:30 am and 6:00 pm, Monday through Thursday.

Sincerely

Troy Langer  
Planning Director

# Hartland Township Planning Commission Meeting Agenda Memorandum

**Submitted By:** Troy Langer, Planning Director  
**Subject:** Site Plan Application #19-013 Wings Etc.  
**Date:** December 12, 2019

## Recommended Action

**Move to approve Site Plan Application #19-013**, a request to amend the approved site plan and install a walk-in cooler, walk-in freezer, and utility area with a ground-mounted compressor unit, all of which will be screened with a masonry wall enclosure on the rear of the building (east side of the building). Additionally the applicant is proposing an outdoor seating/dining area on the south side of the building, at 1788 Old US-23. Approval is subject to the following conditions:

1. The applicant shall adequately address the outstanding items noted in the Planning Department's memorandum, dated December 12, 2019, on the Construction Plan set, subject to an administrative review by the Planning staff prior to the issuance of a land use permit.
2. Specification sheets for all furnishings for the outdoor seating/dining area shall be submitted with the land use permit application, and are subject to the requirements outlined in Section 4.47 of the Township Zoning Ordinance.
3. Applicant complies with any requirements of the Department of Public Works Director and Hartland Deerfield Fire Authority and all other government agencies, as applicable.
4. (Any other conditions the Planning Commission deems necessary)

## Discussion

Applicant: James Luce

## Site Description

Hartland Town Center, located east of Old US-23 and south of M-59 in Section 28 of Hartland Township, and is comprised of four parcels, two of which are developed with retail/commercial buildings, and two of which are vacant (eastern two parcels). The commercial center is approximately 12.6 acres in size and is zoned GC-General Commercial. There are two multi-tenant buildings, Building A and B as depicted on the 2005 site plan. The Wings Etc. restaurant is proposing to locate in a vacant tenant space at the southwest corner of Building A. The tenant space, approximately 3,700 square feet, was occupied most recently by Ziege Games and Cromaïne Crossroads Library prior to that tenant. The tenant space has been addressed as 1788 Old US 23.

## Overview and Background Information

### Site Plan Application #261

The commercial development was approved in 1999 under Site Plan Application #261. The site was zoned PDLI-Planned Development Light Industrial at that time and three buildings were shown on the

plans. There is very little documentation regarding uses permitted or dimensional standards for the planned development.

Site Plan Application #388

On May 26, 2005 the Planning Commission considered the request for a major change to the original site plan approved under SP #261. The proposed modifications were to add an outdoor seating/dining area between the two buildings to serve the Irish Pub; add dumpster capacity; and to approve an existing outside cooler. The dumpster, cooler and screen walls were approved on November 17, 2005 under SP #406 and the outdoor seating finally approved on April 29, 2008 under SP #441.

Rezoning Application #341

In 2009 Rezoning #341 was approved to rezone subject site (12.6 acres) from PDLI-Planned Development Light Industrial to GC-General Commercial. The site plan used for REZ #341, dated May 12, 2005, is used for reference regarding parking calculations for the current request.

**Request**

The applicant is requesting to amend the approved site plan and install a walk-in cooler and walk-in freezer; and a utility area that houses a ground-mounted compressor unit for the cooler and freezer, plus oil tanks in a heated cabinet. An 8-foot high masonry wall enclosure is proposed to screen this area, which is on the east (rear) side of the building, adjacent to the parking lot. The enclosure is attached to the building, allowing for direct access to the cooler/freezer units from the building. The utility area has its own access door from the parking lot side of the enclosure. A new sidewalk, 3.5 feet in width, is proposed that goes around the perimeter of the enclosure and connects to existing sidewalks.

Additionally the applicant is proposing an outdoor seating/dining area on the south side of the building, which is 17 feet by 48 feet or approximately 816 square feet in area. The outdoor seating/dining area is covered by an awning. Fencing is shown around the outdoor seating/dining area, with a 42” high aluminum fence. Section 4.47 of the Zoning Ordinance outlines standards for outdoor seating and dining.

Following is a chart that summarizes the dimensions of the enclosure, cooler/freezer, and outdoor patio:

Item	Width	Length	Height	Area (Sq. Ft.)
Cooler/freezer unit	11’	18’	7’	198 sq. ft.
Utility Area	11’	8’	NA	88 sq. ft.
Masonry enclosure (outer dimensions)	12’	28’-10”	8’	346 sq. ft.
Outdoor dining area	17’	48’	NA	816 sq. ft.

The proposed restaurant will provide seating for approximately 138 people inside and 32 people in the outdoor patio. A floor plan has been provided. The hours of operation for the restaurant are Monday through Thursday 11 A.M.to 11 P.M.; Friday and Saturday 11 A.M. to 12 A.M.; and Sunday 11 A.M. to 10 P.M.

The outdoor dining area operates Sunday through Thursday 11A.M. to 10 P.M. and Friday and Saturday 11 A.M. to 11 P.M.

The business will employ approximately 30-40 employees.

## **Approval Procedure**

### **SITE PLAN REVIEW – Applicable Site Standards**

The applicant is requesting to amend the approved site plan for the installation of a walk-in cooler/freezer with a screen wall enclosure and an outdoor seating/dining area. A site plan application is required, to be reviewed by the Planning Commission, who will make a final decision on the site plan.

Since the exterior modifications are the only items to be reviewed as part of this request, the site plan review will be limited in scope in this memorandum. Applicable development standards of the GC-General Commercial zoning district (Section 3.1.16) and all applicable zoning standards in the Zoning Ordinance will be reviewed for the proposed project.

The proposed project also requires a land use permit from the Township as well as applicable approvals from other government agencies.

### **Site Description**

The proposed restaurant is located in Hartland Town Center, in the end tenant unit (south end) of the northern retail/commercial building (Building A). The tenant space is approximately 3,700 square feet in area. The site is served by public sanitary sewer and water. Currently there are two (2) other restaurants in the commercial center, Hartland Brewing (northwest unit in Building A) and Mackle's Table and Taps (northwest unit in Building B), which has an outdoor dining area that is proximate to the proposed Wings Etc. outdoor dining area.

### **Impact Assessment**

An Impact Assessment was not required.

### **Traffic Generation**

Traffic generation was reviewed at the time of the establishment of the retail/commercial center.

### **Site Requirements**

#### **Outdoor Seating and Dining (Sec. 4.47) – Standards & Operating Restrictions**

##### **STANDARDS**

##### **Location**

- Required – All outdoor seating and dining shall be located immediately adjacent to the establishment with which it is associated; shall not encroach upon any public right-of-way; and a minimum five (5) feet of sidewalk shall be maintained free of tables and other encumbrances.
- Proposed – Outdoor seating and dining area is directly adjacent to the Wings Etc. restaurant, in the outdoor dining area that was approved under SP #441. A twelve (12) foot wide sidewalk area is maintained without tables or encumbrances between the outdoor seating areas for Wings Etc. and Mackle's Table and Taps, as measured from perimeter fence to perimeter fence.
- Meets Requirement? – Yes
- Comment – (none)



### Defined Area

- Required – If alcoholic beverages are to be served, outdoor seating and dining areas must be enclosed by a barrier a minimum 3.5 feet above the ground; the barrier must be decorative and cannot restrict visibility; may be constructed of permanent or temporary materials that are compatible with the architectural character of the main establishment; and the barrier must meet all current fire codes, subject to review and approval of the Fire Marshal and must conform to the current Michigan Liquor Control Commission Rules and Regulations.
- Proposed – Outdoor seating and dining area is defined by a black, aluminum railing/fencing of open construction that is 3.5 feet in height, with an egress gate with push bar operation.
- Meets Requirement? – Yes
- Comment – (none)

### Capacity

- Required – Outdoor seating and dining areas shall not exceed 25% of the seating for the establishment. In this case 138 seats are proposed inside the restaurant, thus 25% equates to a maximum of 35 seats in the outdoor seating and dining area.
- Proposed – 32 seats, which equates to 23%
- Meets Requirement? – Yes
- Comment – (none)

### Screening

- Required – Appropriate screening or fencing complimentary and aesthetically pleasing to the site shall be provided as determined necessary by the Planning Commission.
- Proposed – Black, aluminum railing to define the outdoor seating and dining area.
- Meets Requirement? – **TBD** by the Planning Commission if additional screening is required.
- Comment – The proposed railing is consistent with the railing for the outdoor dining and seating area for Mackle's Table and Taps. An existing brick screen wall is situated at the east end of the outdoor seating and dining area for Wings Etc. and Mackles Table and Taps.

### Pedestrian Circulation

- Required – The seating arrangement of outdoor seating and dining areas must comply with the State of Michigan Building Code and is subject to review and approval by the Hartland Township Fire Marshal.
- Proposed – A seating plan is provided.
- Meets Requirement? – The seating arrangement plan shall be reviewed under the land use permit application.
- Comment – (none)

### Parking Spaces

- Required – No additional parking spaces are required to accommodate outdoor seating and dining spaces.
- Proposed – None proposed or required.
- Meets Requirement? – Yes
- Comment – (none)

### Furniture

- Required – Tables, chairs, table umbrellas, railings, planters, posts, and other items shall be of quality designs, materials, and workmanship to ensure safety and convenience of users and to enhance the visual and aesthetic quality of the area. All furniture must be made primarily of wood, metal, or a material of comparable quality.
- Proposed – Outdoor patio furniture specifications have not been provided; however the applicant stated he intends to comply with the Ordinance requirements.
- Meets Requirement? – A review of the furniture will occur under the land use permit application.
- Comment – Dissonant colors are not permitted.

### Waste Disposal

- Required – Appropriate waste disposal containers shall be provided for the convenience and sanitary disposal of garbage or waste within and around outdoor seating and dining areas. Containers shall be complimentary to the style of furniture.
- Proposed – Information was not provided.
- Meets Requirement? – Staff review will occur under the land use permit application.
- Comment – Dissonant colors are not permitted for waste containers. The applicant has indicated he has permission from the land owner to use the existing on-site dumpster units, east of Building A.

## OPERATING RESTRICTIONS

### Hours of Operation

- Required – All outdoor seating and dining areas shall be allowed to operate until 10:00 p.m. Sunday through Thursday and until 11:00 p.m. Friday and Saturday. All activities shall cease by the required times.
- Proposed – Sunday Through Thursday until 10:00 p.m.; Friday and Saturday until 11:00 p.m.
- Meets Requirement? – Yes
- Comment – (none)

### Season of Operation

- Required – All outdoor and dining areas shall be allowed to operate from April 1<sup>st</sup> through November 15<sup>th</sup> of a given year.
- Proposed – April 1<sup>st</sup> through November 15<sup>th</sup>
- Meets Requirement? – Yes
- Comment – (none)

### Furniture Storage

- Required – in the off-season from November 16<sup>th</sup> to March 31<sup>st</sup> of a given year, all furniture and items not fastened to the ground shall be removed and not stored outside.
- Proposed – Off-site storage is proposed.
- Meets Requirement? – Yes
- Comment – (none)

Lighting

- Required – Additional lighting shall be designed and erected in accordance with Section 5.13, Lighting, of the Zoning Ordinance.
- Proposed – Additional lighting is not proposed.
- Meets Requirement? – Yes
- Comment – (none)

Noise

- Required – No music, intercom, or other noise shall be permitted that impacts adjacent properties in accordance with the Township’s Nuisance Ordinance.
- Proposed – Information was not provided regarding proposed music, intercom or other amplified systems.
- Meets Requirement? – Applicant has been informed of the regulations.
- Comment – (none)

Patron Entrance and Exit

- Required – Patron entrance and exit from the enclosed outdoor seating and dining area at establishments serving alcohol may only occur through the main establishment or an approved fire exit, as determined by the Fire Marshal. The approved fire exit shall have an alarm to alert the establishment in the event of unauthorized use when no emergency exists
- Proposed – New gate with push-bar operation is proposed for outdoor dining area.
- Meets Requirement? – TBD during the land use permit application with a review by the Hartland Township Fire Marshal.
- Comment – (none)

Food and Beverage Service

- Required – All food and beverages shall be prepared within the main establishment. The service of alcoholic beverages is subject to the current Michigan Liquor Control Commission Rules and Regulations (MLCC).
- Proposed – Applicant to secure all applicable permits and approvals.
- Meets Requirement? – TBD by MLCC
- Comment – (none)

Display and Advertising

- Required – No outdoor seating or dining area shall be used for the display or location of merchandise, advertising materials, or signage. No permitted canopy, awning, or umbrellas shall contain advertising material or signage, except umbrellas shall be permitted to include the name of the business and/or logo located at the outer edge of the fabric with a maximum width of six (6) inches.
- Proposed – The proposed plans do not show advertising or signage on the proposed awning. The color of the proposed awning is black.
- Meets Requirement? – Yes
- Comment – (none)

**Off-Street Parking** (Sec. 5.8, parking standards for retail store PLUS restaurant, sit down with liquor license)

Off-street parking is to be reviewed as part of SP #19-013 for the proposed restaurant. The 2005 site plan for the commercial center shows parking calculations for Building “A” (northern/subject building) and Building “B” (southern building).

Based on the 2005 plans, a total of 135 parking spaces were required for the commercial center, for both buildings, with the following breakdown: Building “A” with 19,650 square feet for general commercial (1 pkg. space per 300 SF commercial); Building “B” with 3,750 gross square feet for general commercial; and 6,000 square feet for a restaurant (1 pkg space per 100 SF). The 2005 approved plan showed 203 parking spaces for the commercial center.

Using the parking formula for general retail uses (1 parking space per 300 square feet of gross floor area), 65 parking spaces are required for Building “A”. A second calculation is used for the proposed restaurant, using the current formula for a sit-down restaurant with a liquor license, as outlined below. Per Section 4.47 (Outdoor Seating and Dining) no additional parking spaces are required to accommodate outdoor seating and dining areas.

- Required – Retail (Building “A”): = 65 spaces + restaurant. Restaurant formula: 22 spaces per 1,000 sq. ft usable floor area OR 0.6 spaces per seat, whichever is greater. EQUATES TO: 83 parking spaces REQUIRED for the restaurant (interior dining: 2,218 sq. ft. usable ÷ 1,000 = 2.2; 2.2 X 22 = 49 spaces) OR 0.6 X 138 seats = 83 spaces.

TOTAL PARKING REQUIRED = 65 + 83 = 148 spaces

- Existing parking – 203 spaces
- Meets Requirement? –Yes
- Comment – (none)

#### **Architecture / Building Materials (Sec. 5.24)**

##### Architecture Comments:

The applicant is requesting to construct a walk-in cooler and walk-in freezer with a screen wall enclosure on the rear of the building (east side of the building). The enclosure is connected to the building and access to the walk-in cooler/freezer unit is from the building. A utility area is also located within the enclosure and houses the ground-mounted compressor unit for the cooler and freezer, plus oil tanks in a heated cabinet. The utility area is accessed by a separate door, on the east side of the enclosure.

As part of this request, the applicant is also installing a concrete slab inside the enclosure. A new sidewalk, 3'-6" in width, is proposed around the enclosure, which ties into existing sidewalks on either side of the enclosure.

The applicant intends to construct the screen wall around the walk-in cooler/freezer units and utility area using a masonry product that matches the existing products on the building, in color, size, and finish. A sample brick product has been provided. The product (C-Brick) is manufactured by Grand Blanc Cement Products (Color: SED Blend). The outer dimensions of the enclosure are 12 feet by 28 feet and 10 inches, or approximately 346 square feet in area. The wall height is eight (8) feet.

#### **Other Requirements-Zoning Ordinance Standards**

Nothing additional at this time.

**Hartland Township DPW Review**

The Hartland Township DPW Director approves the contingencies noted in the letter dated November 18, 2019.

**Hartland Township Engineer's Review (HRC)**

The request does not require review by the Township's Engineer (Hubbell, Roth, and Clark).

**Hartland Deerfield Fire Authority Review**

Please see the e-mails from the Hartland Deerfield Fire Authority dated November 14, 2019 and November 20, 2019. The Fire Authority approves the project subject to the contingencies noted in the emails.

**Attachments**

1. Hartland DPW Review letter dated November 18, 2019 – *PDF version only*
2. Hartland Deerfield Fire Authority emails dated November 14 and 20, 2019 – *PDF version only*
3. Site Plans dated November 15, 2019

CC:

HRC, Twp Engineer (via email)  
R. West, Twp DPW Director (via email)  
A. Carroll, Hartland FD Fire Chief (via email)

T:\PLANNING DEPARTMENT\PLANNING COMMISSION\2019 Planning Commission Activity\SP #19-013 Wings Etc\Staff report\SP #19-013 Wings Etc staff report 12.12.2019.docx



## DEPARTMENT OF PUBLIC WORKS

Robert M. West, Public Works Director  
2655 Clark Road  
Hartland MI 48353  
Phone: (810) 632-7498

TO: Planning Department  
DATE: 11/18/2019  
DEVELOPMENT NAME: Wings Etc.  
PIN#: 4708-28-100-027  
REVIEW TYPE: Site Plan

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Site Plans for the proposed Wings Etc., proposes a 3,689 sq. ft. restaurant with a liquor license. REUs are assigned at 3.5 per 1,000 square feet for said classification, resulting in 12.91 REU's of each water and sewer required prior to occupancy. Please consult with the property owner regarding REU's.

Public Works approves the above plans subject to applicant securing the required Livingston County permits and the inclusion of the following details:

1. Water service lead location, size and materials including fittings.
2. Sanitary sewer material and sizes and connection detail sheet.
3. Monitoring manhole for sewer connection and location.
4. All existing utility infrastructure within the development envelope will be required to be upgraded to the current design and engineering standards.
5. Securing approved IPP Permit from Genesee County Drain Commission  
<https://www.gcdcwws.com/ipp-documents>

Prior to interior construction, applicant will be required to purchase a water meter from the Township.

Please feel free to contact me with any further questions or comments regarding this matter, and thank you for your time.

Robert M. West  
Public Works Director

## Martha Wyatt

---

**To:** Martha Wyatt  
**Subject:** Wings Etc. restaurant

---

**From:** Jennifer Whitbeck  
**Sent:** Wednesday, November 20, 2019 4:38 PM  
**To:** Martha Wyatt  
**Subject:** Wings Etc. restaurant

All,  
Yes the 12 feet separation between the two outdoor spaces is sufficient.

Yours In Fire Safety,

Jenn Whitbeck  
Fire Inspector  
Hartland Deerfield Fire Authority

---

**From:** Jennifer Whitbeck  
**Sent:** Thursday, November 14, 2019 1:59 PM  
**To:** Martha Wyatt  
**Subject:** Wings Etc. restaurant

All,  
The are no issues with the outdoor cooler and screen that are to be built behind the Wings Etc. restaurant.

Thank you.

Yours In Fire Safety,

Jenn Whitbeck  
Fire Inspector

On Nov 14, 2019, at 11:25 AM, Martha Wyatt <[MWyatt@hartlandtwp.com](mailto:MWyatt@hartlandtwp.com)> wrote:

Hi-  
Wings Etc. is coming to the tenant space north of Mackle's, which use to be the old Cromiane Library/Ziege Games. They are adding an outdoor cooler and screen wall on the back (east side) of the building and an outdoor patio space on the south side of the building, adjacent to Mackle's outdoor patio. Please review the attached plans and send me comments by November 20<sup>th</sup> if possible so I can get back to them with the revisions they need to do before they apply for a site plan application, which goes to the Planning Commission. Thanks.

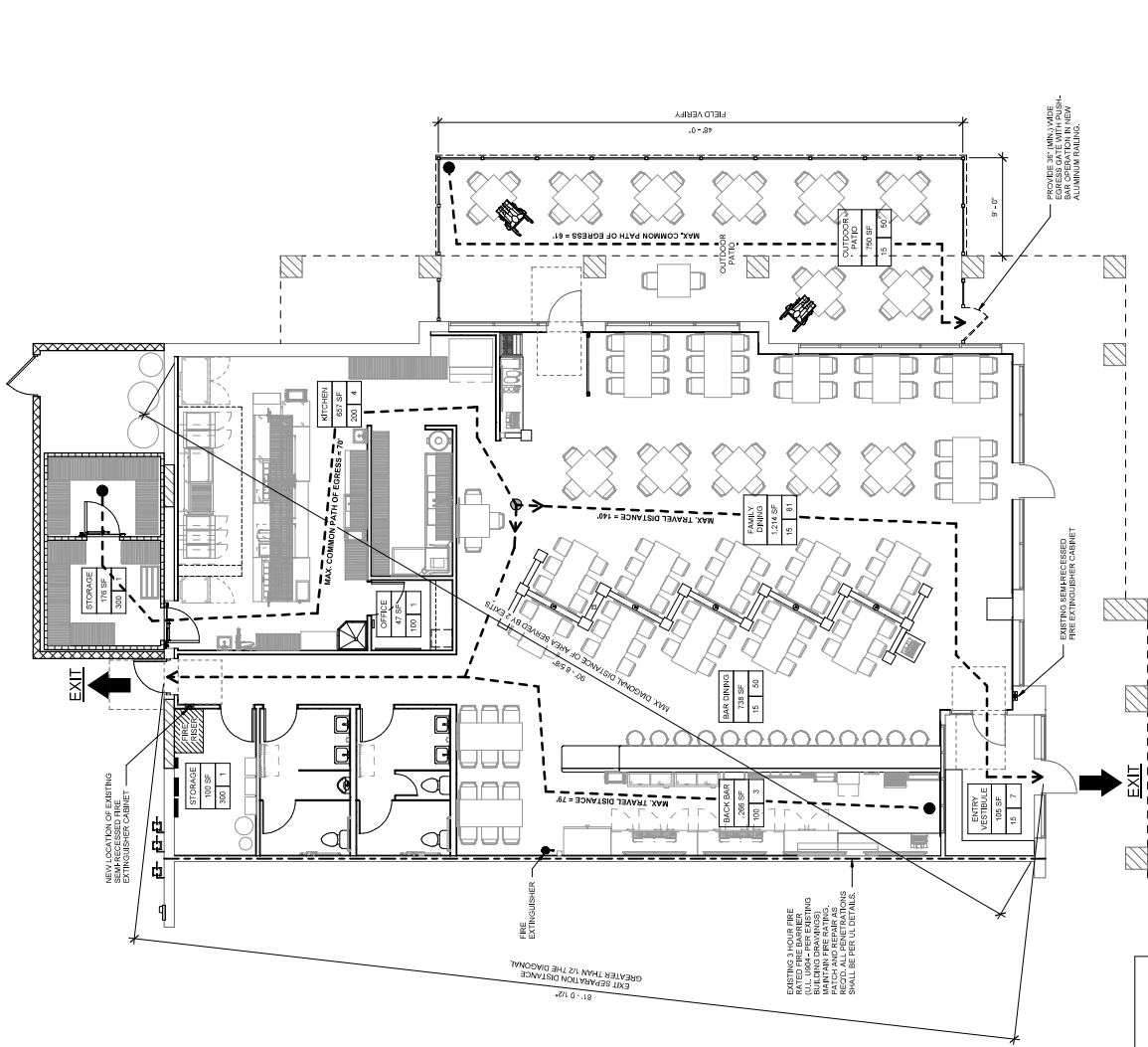
Sincerely-

<image001.png>

**Martha K. Wyatt**  
**Planner-Landscape Architect**  
2655 Clark Road | Hartland, MI 48353  
810.632.7498 o | 810.632.6950 f  
[www.hartlandtwp.com](http://www.hartlandtwp.com)  
[Facebook](#) | [Twitter](#) | [YouTube](#)  
<image002.png>

<19-A140 - Wings Etc - Hartland MI - Issued for Contr Pricing - 2019-11-12.pdf>





**RESEMBLER NOTE:**  
THE CONTRACTOR SHALL INCLUDE IN THEIR BID THE COST OF INSTALLING THE EGRESS GATE WITH POSITIVE LATCH AND ALUMINUM FINISHING WITH EACH ROOM AS THE HEIGHT SHALL BE AS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND LANDLORD. THIS WORK SHALL BE INSTALLED AND DESIGNED BY A LICENSED PROFESSIONAL. THERE WILL BE A UPREDED PERMIT SUBMITTAL.

**LIFE SAFETY PLAN LEGEND**

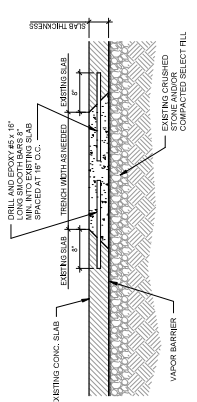
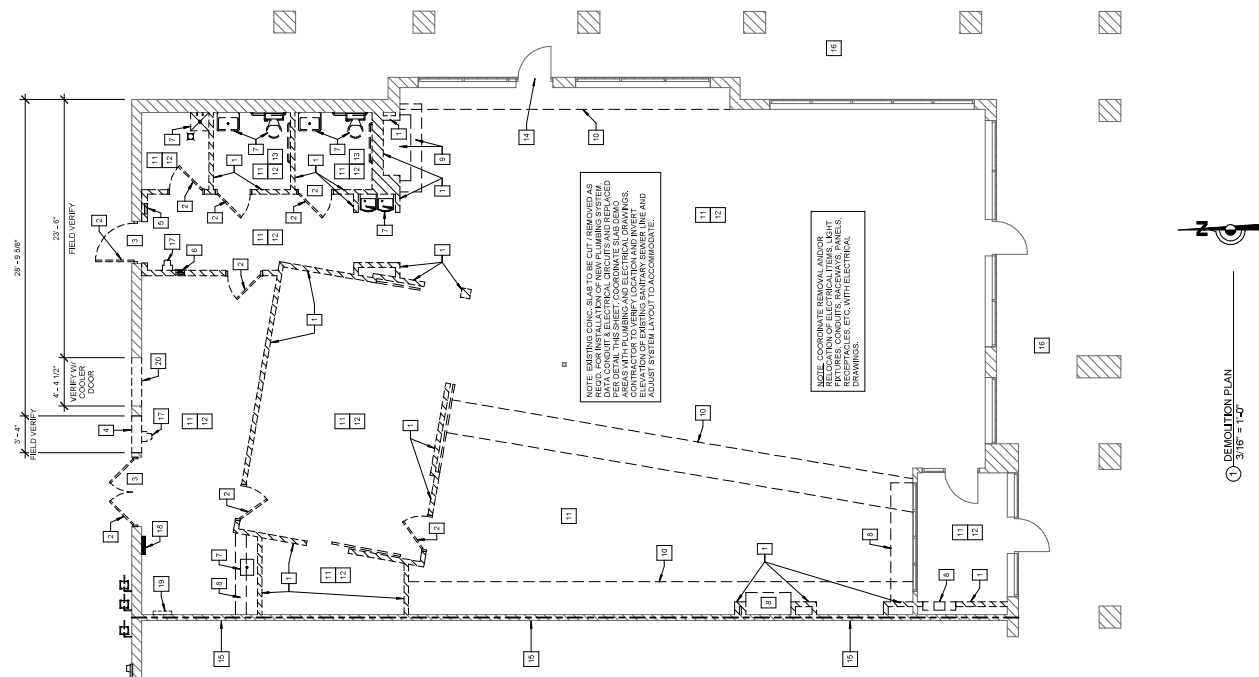
OC	OCCUPANCY CLASSIFICATION
AREA	FLOOR AREA
XXX	TOTAL OCCUPANTS FOR THIS SPACE
OC/XXX	OCCUPANCY CLASSIFICATION AND TOTAL OCCUPANTS FOR THIS SPACE

① LIFE SAFETY PLAN  
3/16" = 1'-0"



**DEMOLITION PLAN KEY NOTE LEGEND**

- 1 EXISTING WALLS TO BE REMOVED FULL HEIGHT.
- 2 EXISTING DOOR AND FRAME TO BE REMOVED. EXISTING DOORS TO BE RELOCATED TO THE SAME LOCATION AS NOTED WITH DOOR SCHEDULE. A FIELD COORDINATE WITH OWNER.
- 3 EXISTING STOREFRONT DOOR TO BE REMOVED. FILL IN EXISTING OPENING TO MATCH EXISTING.
- 4 CUT NEW OPENING IN EXISTING EXTERIOR WALL FOR NEW DOOR AND FRAME. FINISH AS NOTED IN THE NOTES.
- 5 EXISTING ELECTRICAL PANEL TO BE REMOVED/RELOCATED. COORDINATE WITH ELECTRICAL DRAWINGS.
- 6 EXISTING SEMI-RECESSED PRE-EXTINGUISHER CABINET TO BE RELOCATED.
- 7 EXISTING PLUMBING FIXTURES TO BE REMOVED/REUSE WHERE POSSIBLE. COORDINATE WITH PLUMBING DRAWINGS.
- 8 EXISTING CABINETS/MILLWORK TO BE REMOVED.
- 9 EXISTING TIERED DISPLAY SHELVING TO BE REMOVED.
- 10 EXISTING GYP. BG. SOFFIT AND FRAMING TO BE REMOVED.
- 11 EXISTING CEILING TILE, GRID, LIGHTING DIFFUSERS, ETC. TO BE REMOVED.
- 12 EXISTING FLOOR FINISH AND ANY ASSOCIATED BASE TRIM TO BE REMOVED.
- 13 IN RESTROOMS: EXISTING GRAB BARS, BABY CHANGING STATION, ACCESSORIES IN REUSABLE CONDITION TO BE RELOCATED AND REUSED. COORDINATE WITH OWNER.
- 14 MOOPY EXISTING STOREFRONT FRAMING AS REQD. TO INSTALL NEW DOOR. SEE DOOR SCHEDULE.
- 15 EXISTING PREP SCHED. BEHIND WALL TO BE REMOVED. PATCH/REPAIR ANY DAMAGE AS NECESSARY TO MAINTAIN FINISH.
- 16 EXISTING SOFFIT AND SOFFIT LIGHTING TO REMAIN.
- 17 EXISTING PRE ALARM FULL STATION TO BE RELOCATED.
- 18 EXISTING ELECTRICAL PANEL. COORDINATE WITH ELECTRICAL DRAWINGS.
- 19 EXISTING PRE ALARM CONTROL PANEL TO BE RELOCATED. COORDINATE WITH ELECTRICAL DRAWINGS.
- 20 CUT NEW OPENING IN EXISTING EXTERIOR WALL FOR ACCESS TO DOOR ACCESS. COORDINATE EXACT DIMENSIONS OF OPENING WITH COOLER MANUF.



2 SLAB REPLACEMENT DETAIL  
1\"/>

**DEMOLITION NOTES**

1. THE INFORMATION SHOWN ON THESE DRAWINGS IS BASED ON THE BEST INFORMATION AVAILABLE AT THE TIME TO THE ARCHITECT. EXISTING CONDITIONS, THE CONTRACTOR SHALL VERIFY THE SITE AND VERIFY ALL DIMENSIONS AND DISCREPANCIES SHALL BE REPORTED TO THE ARCHITECT PRIOR TO BID SUBMISSIONS.
2. DO NOT SCALE DRAWINGS.
3. CONTRACTOR TO MEET SITE PRIOR TO START OF WORK TO OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEMOLITION DEBRIS ON THESE PREMISES AND THE ADJACENT STREET SPECIFICALLY NOTED ON THESE DRAWINGS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEMOLITION DEBRIS ON THESE PREMISES AND THE ADJACENT STREET SPECIFICALLY NOTED ON THESE DRAWINGS.
5. CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, AND TOOLS NECESSARY TO COMPLETE THE WORK AS NOTED ON THESE DRAWINGS.
6. ALL MATERIALS AND EQUIPMENT TO BE SALVAGED SHALL BE REMOVED IN STRICT ACCORDANCE WITH MANUFACTURER'S E&S & STORE REMOVED ITEMS AS MAY BE DIRECTED FOR REUSE BY THE ARCHITECT AND/OR OWNER.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
8. PROVIDE ALL NECESSARY TEMPORARY BARRIERES AND OTHER FORMS OF PROTECTION AS REQUIRED BY OWNER, OSHA, AND LOCAL AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
10. COORDINATE THE LOCATION, MOVEMENT, AND REMOVAL OF EXISTING ELECTRICAL, PLUMBING, MECHANICAL, AND/OR SPECIALTY DRAWINGS FOR ANY DEMOLITION WORK.
11. REFER TO ARCHITECTURAL, PLUMBING, MECHANICAL, AND/OR SPECIALTY DRAWINGS FOR ANY DEMOLITION WORK.
12. STRUCTURAL ELEMENTS TO REMAIN UNLESS SPECIFICALLY CALLED OUT TO BE DEMOLISHED.
13. EXISTING CONSTRUCTION SHOWN AS SOLID LINES TO REMAIN. DASHED LINES REPRESENT AREAS TO BE DEMOLISHED. VERIFY EXISTING CONDITIONS IN THE FIELD PRIOR TO CONSTRUCTION. RETURN THE TENANT SPACE TO BASE BUILDING CONDITIONS.
14. ALL ITEMS TO BE REMOVED SHALL BE REMOVED ENTIRELY.
15. PROVIDE ADEQUATE PROTECTION OF ALL EXISTING UTILITIES AND DAMAGE TO REMAINING ITEMS WHICH OCCURS DURING DEMOLITION OR CONSTRUCTION.
16. CONTRACTOR TO PROTECT ALL EXISTING STOREFRONT WINDOWS AND DOORS FROM DAMAGE. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
17. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
19. CONTRACTOR SHALL PATCH ALL SURFACES DESTROYED OR DAMAGED DURING DEMOLITION OR CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
20. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
21. PATCH ALL FLOOR/CEILING PENETRATIONS WITH NEW MATERIALS AND FINISHES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
22. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
23. REMOVE ALL EXISTING FINISHES DOWN TO EXISTING SUBSTRATE. SLAB OR STRUCTURE UNLESS NOTED OTHERWISE.
24. REMOVE ALL ABANDONED OR UNUSED MATERIALS, DEVICES, AND/OR EQUIPMENT FROM THE PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
25. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
26. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
27. DISCONNECT AND REMOVE ALL EXISTING LIGHTING FIXTURES, OUTLETS, WIRING, OUTLET BOXES, EQUIPMENT DEVICES, AND/OR EQUIPMENT FROM THE PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
28. COORDINATE COMMUNICATION, DATA, AND FIRE ALARM SYSTEMS WITH THE ARCHITECT AND/OR OWNER PRIOR TO START OF WORK.
29. CONTRACTOR TO COORDINATE FLOOR FINISH, CEILING FINISH, AND/OR EQUIPMENT FROM THE PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.
30. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM ALL APPLICABLE AGENCIES.



389 LUSHERNE DRIVE  
 SOUTH ANDREWS  
 P: 864.583.2215 F: 864.583.2265  
 mail@gparcht.com

**THIS DRAWING IS AN INSTRUMENT OF SERVICE AND SOLE PROPERTY OF THE ARCHITECT. NO PART OF THIS DRAWING OR ANY INFORMATION CONTAINED HEREIN SHALL BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF THE ARCHITECT UPON DEDMAND.**

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DESIGNED BY: OWN  
 APPROVED BY: GPN



**11-15-2019 - ISSUED FOR PERMIT**

REVISIONS: No. Description Date By

CLIENT NAME:  
**WINGS ONE LLC**  
 1708 OLD US 23, HOWELL MI 48843

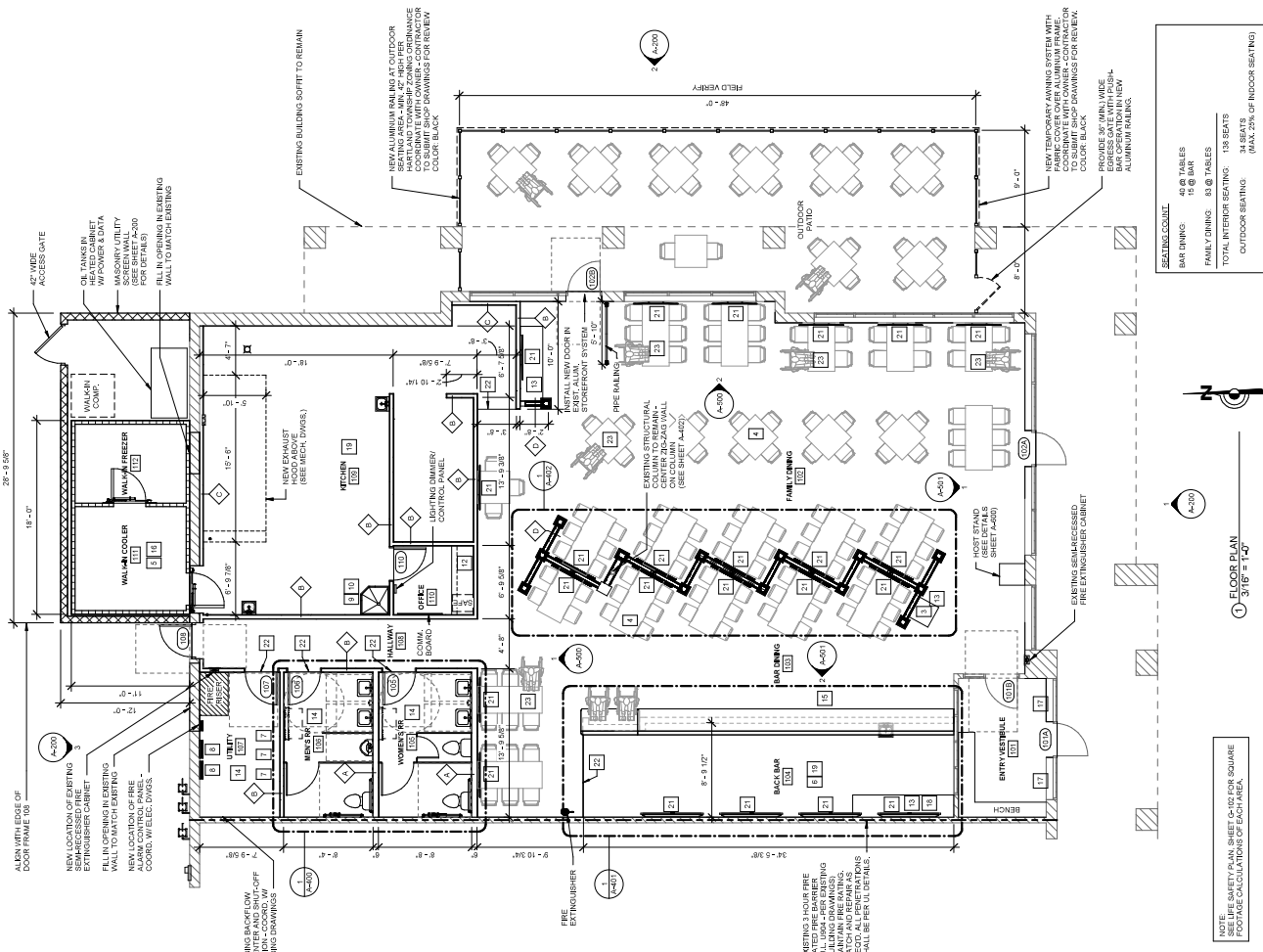


SHEET TITLE:  
**DIMENSIONED FLOOR PLAN & NOTES**

PROJECT NO.: 19-1-140  
 DATE: 11/15/2019  
 SHEET NO.:

**A-100**

SHEET OF



**SEATING COUNT**

BAR SEATING	16 @ BARS
FAMILY DINING	8 @ TABLES
TOTAL INTERIOR SEATING	138 SEATS
OUTDOOR SEATING	34 SEATS (MAX. 25% OF INDOOR SEATING)



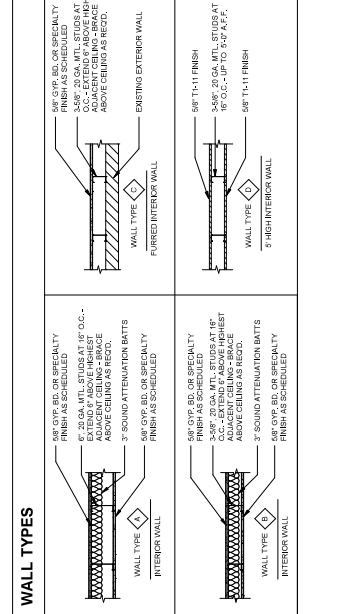
**FLOOR PLAN**  
 3/16" = 1'-0"

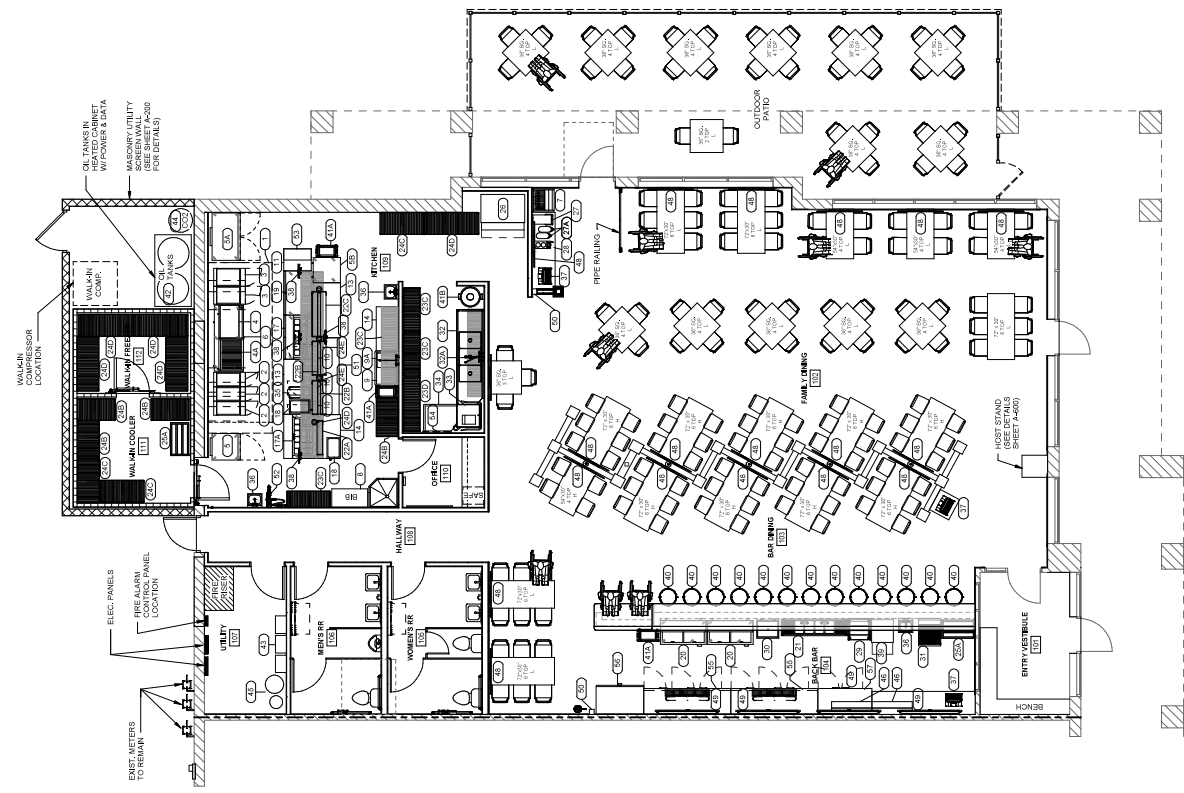
NOTE: SEATING COUNT BASED ON 16" X 30" SQUARE TABLES WITH 24" SEATING CLEARANCE.

- FLOOR PLAN GENERAL NOTES**
- SEE SHEET G01 FOR PROJECT GENERAL NOTES.
  - OWNER TO APPROVE ALL FINISHES PRIOR TO CONSTRUCTION.
  - DO NOT SCALE DRAWINGS. CONSULT ARCHITECT REGARDING ANY CONFLICTS.
  - PROVIDE MOISTURE TEST OF ALL CONCRETE SLABS PRIOR TO ANY FLOOR FINISH MANUFACTURE.
  - EXISTING CONSTRUCTION, UNLESS OTHERWISE NOTED, ALL DIMENSIONS SHALL BE TO FINISH.
  - CONTRACTOR TO VERIFY ALL DIMENSIONS AND CONDITIONS OF EXISTING SPACES PRIOR TO ANY DEMO OR CONSTRUCTION WORK.
  - ALL CONTRACTORS ARE REQUIRED TO MEET THE LIFE AND REVIEW REQUIREMENTS OF ALL APPLICABLE CODES AND REGULATIONS. MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION AND FOR COORDINATION PURPOSES.
  - FINISHED FLOOR ELEVATIONS ARE FROM THE FACE OF THE SUBS. ETC. OR FACE OF EXISTING FINISH. ELEVATION UNLESS OTHERWISE NOTED.
  - ALL WALLS ARE TO EXTEND TO BOTTOM OF STRUCTURE ABOVE UNLESS OTHERWISE NOTED.
  - INTERIOR DOOR FRAME JAMBES TYPICALLY LOCATED 4" FROM EXISTING WALL UNLESS OTHERWISE NOTED.
  - ALL OTHERS: FINISHES TO BE CLASS "C" MINIMUM UNLESS NOTED OTHERWISE.
  - CONTRACTOR TO FOLLOW MANUFACTURER'S WRITTEN RECOMMENDATIONS REGARDING SURFACE PREPARATION, APPLICATION AND PROTECTION OF ALL FINISHES.
  - PROVIDE 5/8" MOISTURE RESISTANT GYPSUM BOARD, BARS OF GYPSUM, 1/2" SHEET ROCK, DIMENSIONED FOUR.
  - REF. ARCH DWG. A-102.1 FOR BAR STOOL QUANTITY REQUIREMENTS.
  - SEE PLUMB DWGS. FOR SPECIAL WALK-IN COOLER DRAIN REQUIREMENTS.
  - COMMERCIAL GRADE FALSA WOOD 2" HORIZONTAL SLAT INSTALLED ON G.C. SUBSTRATE BACK SCREWS (SEE "WOOD" IN THE WOOD SCHEDULE) WITH MATCHING VALANCES. IN-THE-WOOD 2000T COLOR WITH MATCHING VALANCES. G.C. TO PROVIDE TENANT WITH SAMPLES TO CHOOSE FROM.
  - BACK BAR CABINETS AND TOPS ALL TO BE FINISHED AND INSTALLED BY G.C. SEE INTERIOR ELEVATIONS FOR FINISH NOTES.
  - MITCHEN & BAR FLOOR TILE TO BE NON-SLIP, DARK COLORED, FLOOR TILE GROUT TO BE GRAY.
  - NOT USED.
  - WIND DIBRAY AND MOUNTING BRACKET PROVIDED BY SUPPLIER. SEE ARCH. DWG. A-107 FOR MOUNTING HEIGHTS. FLOORING TRANSITIONS TO BE NON-Trip SCHLUTER STRIPS BETWEEN VINYL FLOORING AND QUARTZ TILE. SCHLUTER TRANSITION BETWEEN VINYL PLANKS AND CERAMIC TILE BRONZE. FOR TRANSITION BETWEEN VINYL PLANKS AND QUARTZ TILE TO BE INSTALLED BETWEEN BARRACKS (KITCHEN) QUARTZ TILE TO BE ADA ACCESSIBLE MUST BE EQUIPPED WITH ADA BUSES TO ACCOMMODATE WHEELCHAIRS.
  - TABLES SHOWN TO BE ADA ACCESSIBLE MUST BE EQUIPPED WITH ADA BUSES TO ACCOMMODATE WHEELCHAIRS.

**FLOOR PLAN KEY NOTE LEGEND**

1	NOT USED.
2	NOT USED.
3	POINT OF SALE STATION. REF ARCH DWG. A-107 FOR DETAILS. G.C. TO FINISH.
4	BOOTH ETC. PROVIDED BY TENANT. CHAIRS, TABLES, BAR STOOLS PROVIDED BY MANAGER. REFER ARCH DWG. A-102.1 FOR FINISHES.
5	PRE-MANUFACTURED COOLER/FREEZER COMBINATION UNIT. PROVIDED BY MANAGER. REFER ARCH DWG. A-102.1 FOR FINISHES.
6	BAR EQUIPMENT PROVIDED BY OWNER. INSTALLED BY G.C.
7	ELECTRICAL PANEL LOCATION. REF. PLUMB DWGS. FOR SINKING INFORMATION.
8	ELECTRICAL PANEL LOCATION. SEE ELEC. DWGS. FOR ADDITIONAL SCOPE OF WORK. COORDINATE PANEL SIZING WITH ALL MITCHEN SUPPLY. (SEE PLUMBING DWGS. FOR ADDITIONAL SCOPE OF WORK).
9	INSTALL MOP RECEPTOR. DRAIN AND HOT AND COLD WATER SUPPLY. (SEE PLUMBING DWGS. FOR ADDITIONAL SCOPE OF WORK).
10	INSTALL SPLIT ABOVE MOP RECEPTOR. INTERNAL MOP BROOD HANGING SYSTEM.
11	NOT USED.
12	OFFICE DESK. INSTALLED AND PROVIDED BY G.C. SEE ARCH. DWG. A-107 FOR TYPE AND DETAILS.
13	CASEWORK, BASE AND WALL CABINETS INSTALLED AND PROVIDED BY G.C. SEE INTERIOR ELEVATIONS FOR FINISH NOTES.





① EQUIPMENT & FURNITURE PLAN  
3/16" = 1' 0"



# Hartland Township Planning Commission Meeting Agenda Memorandum

**Submitted By:** Troy Langer, Planning Director

**Subject:** Site Plan #19-010 Waldenwoods Campground Improvements

**Date:** December 12, 2019

## Recommended Action

### **Recommended motion for Site Plan Application #19-010 (Waldenwoods Campground Improvements)**

**Move to approve Site Plan Application #19-010**, a request to amend the original site plan with the following improvements: construct 76 new campsites, with a total of 409 campsites; construct additional internal access roads; construct a new emergency access drive; provide a new dry hydrant; construct new sanitary service lines, water services, and utilities to provide service to for proposed and existing camp sites; reconfigure the landscape berm; and construct detention basins for stormwater management for the proposed site improvement. Approval is subject to the following conditions:

1. The applicant shall adequately address the outstanding items noted in the Planning Department's memorandum, dated December 12, 2019, on the Construction Plan set, subject to an administrative review by the Planning staff prior to the issuance of a land use permit.
2. Applicant complies with any requirements of the Township Engineering Consultant and Hartland Deerfield Fire Authority and all other government agencies, as applicable.
3. (Any other conditions the Planning Commission deems necessary)

## Discussion

Applicant: Brian Crouse

### **Site Description**

Waldenwoods Resort and Conference Center is a 1,000+ acre resort on the west side of Old US-23 and north of Highland Road (M-59). The property is divided into several separate tax parcels under the common ownership of Waldenwoods Properties LLC, with the exception of The Majestic at Lake Walden golf course property, which is owned by Majestic Golf LLC.

The proposed project is located within the following tax parcels: #4708-16-300-015; #4708-17-200-002; #4708-17-300-009; #4708-17-400-002; #4708-20-200-004; and #4708-21-100-037.

### **Overview and Background Information**

Waldenwoods Resort and Conference Center is a campground facility, which has been operating as a campground since approximately 1925. According to the Township Assessing Records, the Cromaie Lodge was originally constructed in 1925 and remodeled in 1984. The site is situated on more than 1,000 acres, which includes an approximate 150 acre lake.

The original approval dates of the campground pre-date the Township records. Following is a summary of site plan applications associated with the development.

Site Plan #60

On March 13, 1986, the Planning Commission recommended to the Township Board to approve Site Plan #60 and Site Plan dated March 13, 1986. The Township Board approved the site plan on March 18, 1986.

Site Plan #60 permitted a sewage treatment facility on the site. Campers would bring their travel-trailer camper unit to a septic dumping station, where they would dump their camper septic tank into the dumping station. From there, the dumping station contained a tile drain, which drained to the sewage treatment facility. At that time, the proposed sewage facility was designed to accommodate 1,000 campsites. The approved site plan dated received March 13, 1986, indicates a total of 348 campsites. In addition, the approved site plan indicates an area to be used for storage of camping trailers.

Site Plan #95

In 1989, an application was made to construct cottages and pool. This application was made as a minor change to the previously approved site plan.

Site Plan #190

In 1995, an application was made for minor changes to Site Plan Review #95, to construct a membership sales office. As part of that application, the size of the proposed building was 384 square feet. The total size of all buildings on the site was 50,747 square feet in area, and after the addition, the total size of all buildings was 51,131 square feet in area. The Planning Commission approved the changes on April 13, 1995.

Site Plan #262

In 1999, an application was made for minor changes to Site Plan Review #190, to construct a twenty-four (24) foot by thirty-two (32) foot garage. On April 13, 1999, the Planning Commission approved the changes.

Site Plan #347

In 2003, an application was made for minor changes to Site Plan Review #262, to install a twenty-eight (28) foot wide by sixty-six (66) foot long double wide mobile office on the site. On May 8, 2003, the Planning Commission approved the changes.

Site Plan #532

In 2015, an application was made for minor changes to Site Plan # 347 to construct a fifty (50) foot by one-hundred (100) foot concrete pad, retroactive filling activity, gravel parking lot expansion, and storm-water management facilities. On July 16, 2015, the Planning Commission approved the changes.

Site Plan #539

On May 12, 2016 the Planning Commission approved Site Plan Application #539, a request to incorporate a walk-in cooler, install a sanitary sewer line to serve existing campsites, and complete previously approved campsites.



**Request**

The applicant is requesting to amend the approved plans for Waldenwoods Resort with several improvement projects. In no particular order, the first project is the construction of an emergency access drive/entrance, providing a secondary access to Waldenwoods Resort and Conference Center. The new emergency access drive is located off Old US-23, south of the existing main entrance to the campground.

The second project proposed is a new dry hydrant located southwest of the Cromaïne Lodge, on Lake Walden. This will provide a water source for on-site fire protection.

The third project is the expansion of the campground with the addition of 76 new campsites. Per the submitted plans for this project, 333 campsites currently exist. An additional 76 campsites are proposed bringing the total number to 409 campsites. The submitted plans state there are 75 new campsites however upon further review, the plans show 76 new campsites. This would bring the total number to 409 campsites. Staff would suggest that the construction set of plans be updated to reflect this information.

A portion of the existing berm along the east side of the campground is going to be removed in order to add several new campsites and an internal road to access those sites. A new berm will be constructed on the east (back) side of the new campsites and will tie into the existing berm. New landscaping is proposed along the new berm

As part of these improvements, the applicant is proposing to construct new sanitary service lines, water services, and utilities to provide service to the new campsites and upgrades to existing campsites. Additionally, storm water runoff generated from the proposed campground expansion will be collected and routed through a new storm conveyance system at three (3) different detention/sedimentation basins within the project area.

**Approval Procedure**

The applicant is requesting to amend the approved site plans for Waldenwoods Resort with several improvements as previously noted. The same review and approval procedure will be utilized for the current request as was applied in 2016, under the review of Site Plan Application #539. The current proposal will be treated as a site plan that can reviewed per the procedures of Section 6.1 of the Zoning Ordinance. As a result the request will be reviewed by the Planning Commission, who will make a final decision on the site plan.

The proposed project also requires a land use permit from the Township as well as applicable approvals from other government agencies.

**SITE PLAN REVIEW – Applicable Site Standards**

The proposed plans show site improvements that include the addition of 76 campsites; reconfiguration of existing roads; new interior roads for the new campsites; reconfiguration of the existing berm on the east side of the campground and new landscaping; three (3) new detention areas, new emergency access drive /entrance; a dry hydrant south of Cromaïne Lodge; and new utilities to serve the new campsites and upgrade existing campsites.

A detailed review is not required as is typically the case since the improvements are essentially related to earthwork, grading, and private utilities. A landscape plan for the new berm was submitted and will be briefly discussed in this memorandum.

In place of a detailed review of the project, comments are provided below by category for several elements of the proposed project.

#### Additional campsites

Currently 333 campsites exist in the campground. The layout of the existing campground area will be modified in order to accommodate the 76 new campsites. Sheet OD shows the development plan. Fourteen (14) new campsites are shown in the northwest corner of the site as well as an extension of the internal road. In the central area of the campground, sixteen (16) new campsites are shown. On the east side, thirty-two (32) new campsites are proposed along with new road to access the sites. In this area a portion of the existing berm will be removed in order to build the campsites and road. A new berm is proposed on the back side of the new campsites, which will tie into the remaining portion of the existing berm. South of the main entrance road, fourteen (14) new campsites are proposed. Additionally, some of the new campsites will be provided with "Walden 35-S cabins". Details on the cabins are shown on Sheet DT1.

#### Reconfiguration of the existing berm (east side of site)

An existing vegetated berm runs along the east side of the property, along the back side of the campsites labeled as "F". The existing berm averages about six (6) feet in height. Approximately the southern 700 feet of the existing berm will be removed to allow for the construction thirty-two (32) new campsites and a new internal road. A new berm will be constructed along the back (east) side of the new campsites (Campsites G4 to G19), and will vary in height, reaching six (6) feet or more in some places. Groupings of conifer trees and shrubs are also proposed on the new berm. A slope of 1:4 will be maintained along the east side of the berm facing Majestic Golf Course. In a few places, as noted on the plan, the slope on the west side of the berm may be 1:3, where it is tying into the existing berm. The applicant will provide additional information on this at the Planning Commission meeting.

Section 5.11.2.F.ii. of the Zoning Ordinance outlines the standards for berms that are used for screening between land uses. Essentially, berms are required to have slopes no steeper than one (1) foot vertical for each four (4) feet horizontal (25 percent slope). However, Section 5.11.2.G. states that "at the discretion of the Planning Commission, modifications to the required screening may be permitted when alternative screening methods, existing site conditions and/or use of the properties would meet the intent of this Section." As a result, the Planning Commission will have to determine if the slope area of the berm that is at a 1:3 slope is proper in this case.

#### Proposed Detention Areas

Three (3) new detention areas are proposed, and labeled as Detention Basin A, B, and C on the plans. The detention areas are designed to manage stormwater run-off in areas where improvements are occurring. Detailed drawings are provided showing side slopes of the detention basins. In some instances the slope exceeds 1:4. The applicant has explained in his letter, dated December 11, 2019, that this has occurred in locations where existing trees and wooded areas are being preserved. The east side slope of Detention Basin B exceeds 1:3 and is located adjacent to an internal road. In this case, fencing may be required for safety purposes. Regarding landscaping around the detention basins, in the past, landscaping around the detention areas has not been required.

#### Proposed Emergency Access Drive

The Waldenwoods development currently has one access drive into the site, via Old US-23. The construction of an emergency access drive is proposed, approximately 550 feet south of the existing entrance drive, which provides a secondary access to Waldenwoods Resort. The 28-foot wide gravel access drive will be restricted at the entrance point on Old US-23, with a gate with Knox box entry system for emergency vehicles. The access drive continues into the site and connects to an existing gravel drive and parking area by the pool house. The plans show a 26-foot wide gravel emergency access route

through this area, which then connects to the existing drive south of the campground. The Hartland Deerfield Fire Authority has provided a review letter for the project, dated October 29, 2019.

#### Dry Hydrant at Lake Walden

A dry hydrant is proposed, south of Cromaine Lodge. The purpose of the dry hydrant will be to provide a water source for on-site fire protection. The dry hydrant system will be subject to the review and approval of the Township Fire Department. A review letter dated December 11, 2019 and email dated December 10, 2019 from the Township Fire Department are provided with contingencies noted regarding the expansion of the campground.

#### Utility Upgrades

The project includes the construction of new sanitary service lines, water services, and utilities to provide service to the new campsites and upgrades to existing campsites. Per the letter from the applicant's engineer, dated December 11, 2019, the existing wastewater treatment and disposal system located on-site is private and has been licensed by the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE) under Permit #M00709. This permit allows for the discharge of up to 4,000,000 gallons of treated sewage per year, at a discharge rate of 20,000 GPD. Per the letter the existing wastewater treatment and disposal system is capable of accommodating the increase in wastewater flow generated from the proposed campground expansion.

#### Other Requirements

No comments at this time

#### Hartland Township DPW Review

No comments at this time.

#### Township Engineer's Review

The Township's Engineer (Hubbell, Roth, and Clark) has reviewed the plans and recommends site plan approval subject to items being addressed in the letter dated November 22, 2019.

#### Hartland Deerfield Fire Authority Review

Please see the review letter from the Fire Marshal's office dated December 11, 2019. The Fire Authority recommends approval subject to the contingencies outlined in the review letter.

#### Attachments

1. Hartland Township Engineer (HRC), Review Letter dated November 22, 2019-*PDF version*
2. Hartland Deerfield Fire Authority Review Letter dated October 29, 2019-*PDF version*
3. Hartland Deerfield Fire Authority email dated December 10, 2019-*PDF version*
4. Applicant Letter dated October 24, 2019- *PDF version*
5. Applicant Letter dated December 9, 2019- *PDF version*
6. Applicant Letter dated December 11, 2019-*PDF version*
7. Site Plans dated December 11, 2019

November 22, 2019

Hartland Township  
2655 Clark Road  
Hartland, MI 48353

Attn: Mr. Troy Langer, Planning Director

Re: Site Plan Review  
Waldenwoods Campground Addition  
2975 Old US Hwy 23

HRC Job No. 20191145.02

Dear Mr. Langer:

As requested, this office has reviewed the site plan for the above project as prepared by Desine, Inc. (plans dated October 18, 2019). The following items will need to be addressed:

General

1. All permits are to be obtained prior to the start of construction. At this time, the permits for this development may include Livingston County Building & Utility Services, Livingston County Road Commission ROW permit, LCDC Soil Erosion.

Water Supply

1. The proposed water supply improvements are considered private and must be designed in accordance with the Livingston County Building Department Standards.
2. The hydrant layout must be reviewed and approved by the Hartland Area Fire Department.

Sanitary Sewer

1. The proposed sanitary sewer improvements are considered private and must be designed in accordance with the Livingston County Building Department Standards.

Storm Drainage

1. The proposed storm water collection and detention systems must be designed in accordance with the Hartland Township and Livingston County Engineering Design Standards.
2. The side slopes of the detention basins must be a maximum 1:5 or fencing may be required.

Paving & Grading

1. The proposed paving and grading improvements must be designed in accordance with Hartland Township Engineering Design Standards.

2. The aggregate base material and gravel road surface material will need to be 21AA aggregate.
3. The maximum allowable grade is 1 vertical to 4 horizontal.

Subject to these items being addressed in the construction plans, we have no objection to the approval of the preliminary site plan. One (1) complete set of the construction plans should be submitted to the Township Planning Department for review.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



Paul L. Koppana, P.E.

PLK/plk

pc: Hartland Twp; M. Wyatt, B. West  
HRC; R. Alix, M. Darga, File



HARTLAND DEERFIELD FIRE AUTHORITY

# FIRE MARSHALS OFFICE

Hartland Area Fire Dept.  
3205 Hartland Road  
Hartland, MI. 48353-1825

Voice: (810) 632-7676

Fax: (810) 632-2176

E-Mail: [jwhitbeck@hartlandareafire.com](mailto:jwhitbeck@hartlandareafire.com)

December 11, 2019

To: Planning Commission  
Hartland Township  
2655 Clark Road  
Hartland, MI 48353

Attn: Troy Langer,

Re: Construction of an Additional 95 Varied Campsites/  
Dry Hydrant/Secondary Means of Egress

Based upon review of the site plan dated October 24, 2019 by Hartland Township, the project was drawn as being within the requirements for accessibility **contingent** upon the following:

- There is a maintenance agreement that specifies year around accessibility on the emergency vehicle access **(AHJ Requirement)**.
  1. The maintenance agreement must include a vertical clearance of 13'6" and a minimum of 22' width on the emergency vehicle access. This includes snow removal and any other maintenance to preserve the roadway in a constantly driveable condition.
- Crash gates are not an acceptable option for entrance into any gated community. A supra brand lock box shall be permanently mounted on the gate to ensure emergency access. Order form for the Supra Key box is provided by the fire department **(AHJ Requirement)**. **Section 506.1.1 Locks and Key switches**. As a suggestion, two boxes to be installed, one for maintenance and one for emergency access.
- Emergency service drive shall meet 33,000lbs per axle. Weight and turning radius performance cut sheet for our most restrictive apparatus has been attached with this review. Please see that all turning radiuses and clearances are met. **(County and Local Requirement)**

The Fire Marshals Office **approves with the above contingencies\*** the submittal of the Site Plan Application for *Waldenwoods Campground*. Any revised drawings affecting the Fire Department must be submitted for review.

If you have any questions or I can be of further assistance please let me know.

Yours In Fire Safety,

Jenn Whitbeck  
Fire Inspector

## Martha Wyatt

---

**To:** Martha Wyatt  
**Subject:** Waldenwoods revised plan

---

**From:** Jennifer Whitbeck  
**Sent:** Wednesday, December 11, 2019 5:41 PM  
**To:** Martha Wyatt  
**Subject:** Re: Waldenwoods revised plan

Martha,

Attached is a new letter dated for today. It is the same one just updated the date.

I don't think the dry hydrant was mentioned in any of the letters as it was approved on the plans they submitted. I did want to make a note though that the building can continue because of the installation of the dry hydrant as well as the access road.

If the dry hydrant is not going to go in then all construction is going to be stopped.

Let me know if you have any other questions.

Yours In Fire Safety,

Jenn Whitbeck  
Fire Inspector  
Hartland Deerfield Fire Authority  
810-632-7676



RECEIVED

OCT 24 2019

HARTLAND TOWNSHIP

October 24, 2018

Mr. Troy Langer, Planning Director  
Hartland Township  
2655 Clark Rd.  
Hartland, MI 48353

RE: Waldenwoods Campground Improvements, site plan application

Dear Mr. Langer:

Waldenwoods Properties is proposing improvements to the existing resort and conference center in Hartland Township. A summary of the proposed improvements on-site per the provided plan set is as follows: A new emergency access drive is to be constructed, providing a secondary access to Waldenwoods Resort and Conference Center. A new dry hydrant will be constructed Southwest of existing Crounse Lodge to provide a water source for fire protection on-site. Additionally, the existing campground is proposed to be expanded from 332 sites to 408 sites.

As part of these improvements, the applicant is proposing to construct new sanitary service lines, water services and utilities to provide service to the new campsites. Storm runoff generated from the proposed campground expansion will be collected and routed through a new storm conveyance system at three different detention / sedimentation basins proposed per construction plans.

Please find enclosed the following documentation for the above referenced project:

- Signed Application for Site Plan Review and Site Plan Review Checklist
- Application fees in the amount of \$2,000 for Site Plan Review
- Five (5) sets of plans for your review

Should you have any questions pertaining to this application, or should you require any additional information and/or documentation, please contact me at your convenience.

Respectfully

**DESINE INC.**

Wayne Perry, P.E.

Encl: Preliminary Site Plan dated October 18, 2019

173156\SPP-sub-Oct2019.doc





December 09, 2019

Mr. Troy Langer, Planning Director  
Hartland Township  
2655 Clark Rd.  
Hartland, MI 48353

RE: Waldenwoods Campground Campsite Count Revision

Dear Mr. Langer:

The following letter is for the purpose of clarifying and stating the reasons of the discrepancies on the total campsite count from the approved Site Plan SP#539 (April 12, 2016) and the submitted Plans for revision and dated Oct. 18, 2019.

The approved plans dated April 12, 2016 were created using the existing ROWE Engineering plans and line work on record as provided by the Waldenwoods owner. A complete survey of the campground area was not performed at this point in time.

After the approval of this 2016 site plan set, the inclusion of new layout ideas and future planning for the existing Waldenwoods property ensued over a period of approximately two and a half years up to the moment of this latest site plan review submittal for the plans submitted to the Township.

We surveyed the campground as part of the proposed improvements as shown on the plans submitted and dated Oct. 18, 2019. The number and location of all the existing campsites based on field observations was determined and, the existing conditions plan was corrected to reflect the surveyed information.

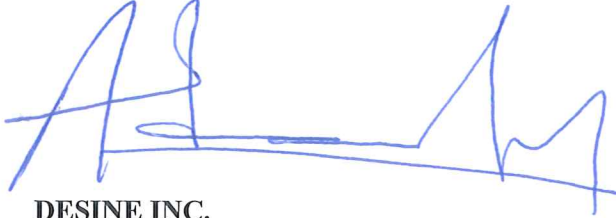
The latest Site Plan set submitted to the Township shows a total site count of 333 existing campsites, 217 of these sites are considered full hook up sites and 116 are partially hook up with only water and electric connections.

The approved ROWE Engineering PUD plans for the Waldenwoods property depict 361 Campsites; an expansion of 47 sites from the approved 1986 plans is being proposed at this time for a total of 408 campsites.

Exhibit "A" & Exhibit "B" attachments showing the existing and proposed campsite count conditions have been included with this document for your reference.

A revision based on these exhibits to the campsite count summary tables as shown on sheet "OD" of the site plan dated Oct. 18, 2019 shall be made prior to approval.

Respectfully

A handwritten signature in blue ink, appearing to be 'Fernando Abudeye', written over a horizontal line.

**DESINE INC.**

Fernando Abudeye

Encl: Exhibit "A" and Exhibit "B"

173156\SP-Campsite Count Revision-Dec. 09, 2019.docx

**Project: Waldenwoods Campground Expansion**  
**Location: Hartland Township, Livingston County, Michigan.**  
**Zoned: Planned Development- PD**  
**Date: 12/09/2019**

<b>EXISTING CAMPGROUND CONDITIONS</b>	
Full Hook-Up Campsites=	217
Partial Hook-Up Campsites=	116
Total Existing Campsites=	333
Overall Approved Campsites=	361
Approved Campsites <b>(Not Constructed)</b> =	28
<b>PROPOSED CAMPGROUND CONDITIONS</b>	
Full Hook-Up Upgraded Campsites=	4
Full Hook-Up Upgraded, Relocated & Re-purposed Campsites =	6
Proposed Full Hook-Up RV Campsites =	45
Proposed Full Hook Up Cabin Sites =	30
Existing Full Hook Up & Re-purposed Cabin Sites =	3
Existing Full Hook Up RV Sites =	214
Total Full Hook-Up Campsites=	302
Total Partial Hook-Up Campsites=	106
Total Proposed Campsites Count=	408

***Noted: A Partial Hook-Up site is defined by a site serviced only by electric and water. A Full Hook-Up site shall be serviced by electric, water and sanitary sewer.***

**WALDENWOODS OVERALL CAMPGROUND PROPOSED CONDITIONS**

UNIT NUMBER	NUMBER OF CAMPSITES	Exist. Full Hook-up RV Site	Exist. Partial Hook-up RV Site	Exist. Full Hook-up Upgrade, Relocation & Re-purposed to Cabin Site	Exist. Full Hook-up RV Site & Re-purposed to Cabin Site	Exist. Full Hook-Up Upgrade RV Site	Proposed New Full Hook-Up Cabin Site	Proposed New Full Hook-Up RV Site
F3 - F39	19	X						
F47 - F67	11	X						
F2 - F92	46	X						
E1 - E49	25	X						
E2 - E52	26	X						
D1 - D65	33	X						
D2 - D58	29	X						
C26 - C52	27	X						
A1 - A42	41		X					
B1 - B37	37		X					
C1 - C25	25		X					
F69 - F79	6			X				
F41-F45	3				X			
F1	1					X		
D60 - D64	3					X		
C53	1							X
D66 - D80	8							X
D67 - D69	2							x
E51 - E53	2							X
E54 - E58	3							X
G1 - G17	17							X
G18-G19	2							X
G20-G32	13						X	
W1 - W28	28						X	
<b>TOTAL =</b>	<b>408</b>							



December 11, 2019

Mr. Troy Langer, Planning Director  
Hartland Township Hall  
2655 Clark Rd.  
Hartland, MI 48353

RE: Waldenwoods Campground, Site Plan

Dear Mr. Langer:

We have revised the site plan for the Waldenwoods Resort Campground improvement project to address review comments provided by Hartland Township.

The following revisions to the plans have been provided:

- A revised cover sheet depicts sheets GR 2.2 & UT 2.4
- The proposed emergency access drive route from the connection point at the existing gravel parking area to the existing Waldenwoods Rd. located on-site has been depicted on sheets OD, SP 1.1 and GR 1.1. Dimensions of the allowable parking areas along the emergency access route have been provided for clarification
- Campsite count summary tables, provided on sheet OD, have been revised
- Labels for units G18 & G19 have been revised on sheet SP 2.1
- A label identifying the location of storm and sanitary sewer calculations has been provided on sheets UT 1.2, UT 2.1 & UT 2.2
- Sheet GR 2.1 has been revised to correctly identify the location of the gravel road x-sec and proposed maintenance access path, and labels have been added identifying proposed slopes
- Sheet UT 2.4 has been added providing the storm & sanitary sewer calculations
- Sheet GR 2.2 has been included depicting the grading and details of the proposed screening berm located East of proposed Ginkgo Rd. campsites
- The Emergency Access Vehicles "Knox Box" has been labeled on sheet AP
- Revisions to the proposed plantings, planting legend, labels and landscaping materials have been provided on sheet LA. Grading & berm details have been included on sheet GR 2.2
- Aggregate base material & gravel road surface for the emergency access drive and the campsite gravel drive cross sections have been revised on sheet DT 2
- Soil erosion control sheets on plans have been revised to depict proposed slopes.

The plans depict slopes exceeding 1:4 at a few locations for the purpose of preserving existing trees and wooded areas on the property. These areas are proposed to be stabilized, will be re-vegetated

Troy Langer  
December 11, 2019  
Page 2

with native Michigan plants, and will are not proposed as maintained landscape areas requiring mowing or additional long term maintenance.

The existing wastewater treatment and disposal system located on-site is private and has been licensed by the State of Michigan EGLE under permit #M00709. This permit allows for the discharge of up to 4,000,000 gallons of treated sewage per year, at a discharge rate of 20,000 GPD.

Waldenwoods Resort is current discharging approximately 2,400,000 gallons per year of treated wastewater from the lagoon system. Proposed improvements depict increasing the number of campsites by 76 sites, from 333 sites to a total of 409 sites. The proposed increase in campsites will generate an increase of approximately 400,000 gallons per year of additional wastewater to the treatment system. The existing wastewater treatment and disposal system is capable of accommodating the increase in wastewater flow generated from the proposed campground expansion.

We are providing eight (8) sets of the revised plans for consideration and review at the upcoming Hartland Township Planning Commission meeting. Should you have any questions pertaining to the project, please contact me at your convenience.

Respectfully

**DESINE INC.**

  
Wayne M. Perry, P.E.

Encl. – Site plans, dated 12-11-19

Cc: Brian Crouse, Waldenwoods Resort

173156\SP-Sub-Revisions-Dec.11, 2019docx

# SITE PLAN

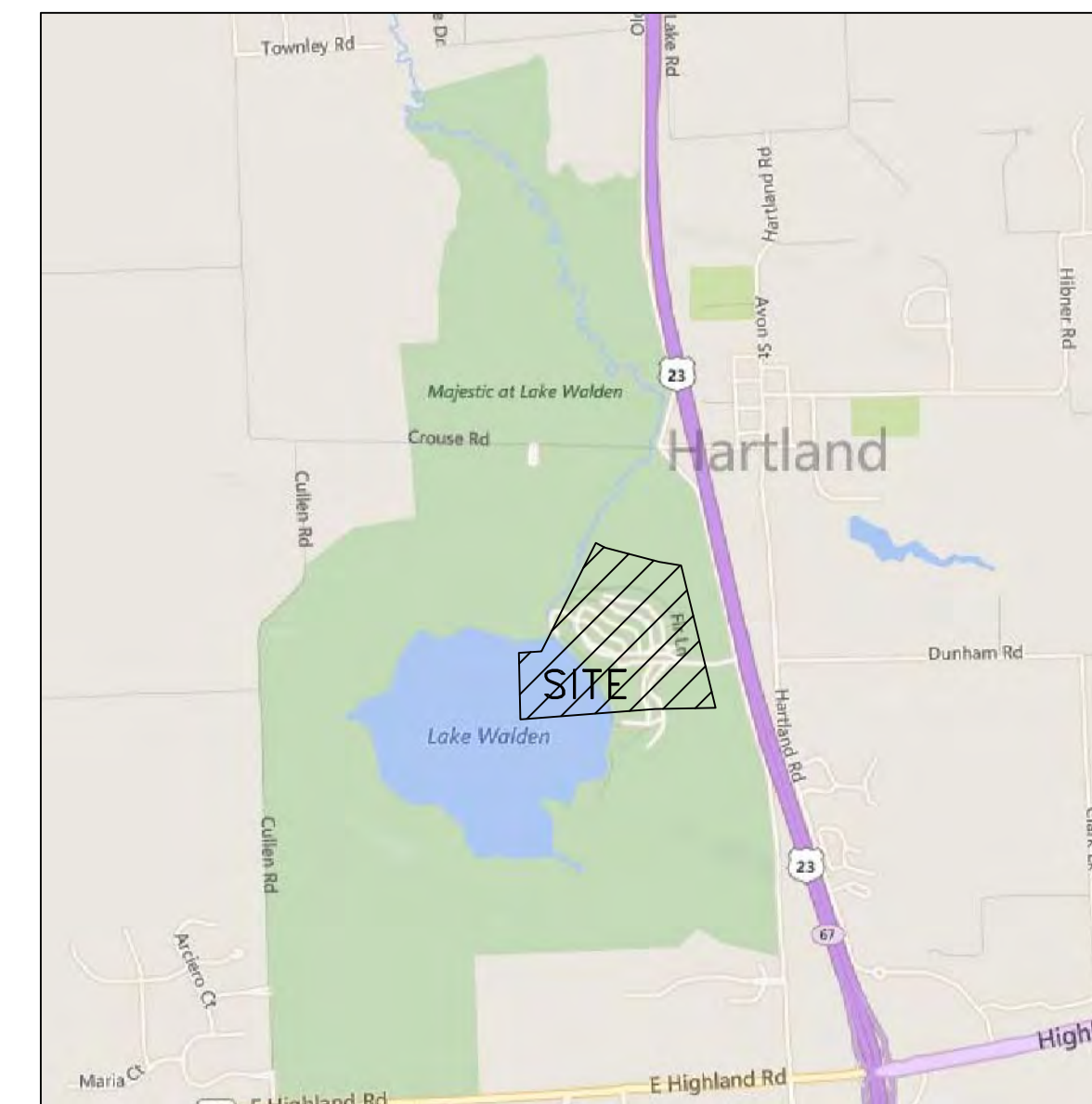
# FOR WALDENWOODS CAMPGROUND

IMPROVEMENTS PROJECT

2975 OLD US HWY 23, MI 48843

A PART OF SECTION 17, T3N, R6E

HARTLAND TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN



LOCATION MAP

SCALE: 1in. = 200ft.

BING MAPS

## SHEET INDEX

- OD OVERALL DEVELOPMENT SITE PLAN
- EX1 EXISTING CONDITIONS AND DEMOLITION PLAN (SOUTH)
- EX2 EXISTING CONDITIONS AND DEMOLITION PLAN (NORTH)

## EMERGENCY ACCESS ROAD

- SP1.1 SITE PLAN (EMERGENCY ACCESS ROAD)
- GR1.1 GRADING PLAN (EMERGENCY ACCESS DRIVE)
- UT1.1 UTILITY PLAN (EMERGENCY ACCESS DRIVE)

## OAK LANE PLANS

- SP1.2 SITE PLAN (OAK LANE)
- GR1.2 GRADING PLAN (OAK LANE)
- UT1.2 UTILITY PLAN (OAK LANE)
- UT1.3 DETENTION BASIN "A" PLAN, NOTES & DETAILS

## DRY HYDRANT PLAN

- SP1.3 DRY HYDRANT SITE PLAN AND DETAILS

## NORTH CAMPGROUND PLANS

- SP2.1 SITE PLAN (NORTH CAMPGROUND)
- SP2.2 SITE PLAN (NORTH CAMPGROUND)
- SP2.3 SITE PLAN (KITE ROAD)
- GR2.1 GRADING PLAN (KITE ROAD)
- GR2.2 BERM GRADING PLAN AND DETAILS

## UTILITY PLANS

- UT2.1 UTILITY PLAN (NORTH CAMPGROUND)
- UT2.2 UTILITY PLAN (KITE ROAD)
- UT2.3 DETENTION BASIN "C" PLAN, NOTES & DETAILS
- UT2.4 SANITARY SEWER & STORM SEWER CALCULATIONS

## SOIL EROSION CONTROL PLANS

- SE1.1 SOIL EROSION AND SEDIMENTATION CONTROL PLAN (EMERGENCY ACCESS ROAD)
- SE1.2 SOIL EROSION AND SEDIMENTATION CONTROL PLAN
- SE1.3 SOIL EROSION AND SEDIMENTATION CONTROL NOTES & DETAILS
- SE1.4 SOIL EROSION AND SEDIMENTATION CONTROL PLAN (OAK LANE)
- SE2.1 SOIL EROSION AND SEDIMENTATION CONTROL PLAN (NORTH CAMPGROUND)
- SE2.2 SOIL EROSION AND SEDIMENTATION CONTROL PLAN (KITE ROAD)

## DETAIL SHEETS

- AP WHITMORE LAKE RD. APPROACH PLAN
- LA NORTH CAMPGROUND LANDSCAPE PLAN
- WS OVERALL WATERSHED PLAN
- DT1 SITE IMPROVEMENT NOTES AND DETAILS
- DT2 SITE IMPROVEMENT NOTES AND DETAILS
- DT3 SITE IMPROVEMENT NOTES AND DETAILS

## OWNER / DEVELOPER

WALDENWOODS PROPERTIES  
9840 CROUSE ROAD.  
HOWELL, MICHIGAN 48855

## ENGINEER/SURVEYOR

DESINE INC.  
2183 PLESS DRIVE  
BRIGHTON, MICHIGAN 48114  
PHONE: (810) 227-9533



TOTAL AREA OF DISTURBANCE=14.03 AC.

DISTANCE TO NEAREST OPEN WATERCOURSE = 0 FT. (LAKE WALDEN)  
WORK WITHIN LAKE WALDEN FOR A DRY HYDRANT IS BEING PROPOSED  
A COMMERCIAL SEWC PERMIT FROM LCDC IS REQUIRED FOR THIS PROJECT  
AN MDEQ PART 301 "INLAND LAKES & STREAMS" PERMIT IS REQUIRED  
FOR THIS PROJECT

REVISED	SCALE:
DEC. 11, 2019	NONE
	PROJECT No.: 9173156
	DWG NAME: 3156 CV0
	PRINT: DEC. 11, 2019

### PARCEL No. 4708-17-400-002

**BEGINNING** at the Southeast Corner of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence S85°36'41"W 1100.00 feet along the South line of said Section 17; thence N24°59'10"W 926.39 feet; thence N26°39'20"E 154.69 feet; thence N85°36'41"E 1370.41 feet; thence S02°59'49"E 1000.00 feet along the East line of said Section 17 to the Place of Beginning. Being a part of the Southeast 1/4 of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County. Containing 29.6 acres of land, more or less. Subject to and together with all easements and restrictions affecting title to the above described premises.

### PARCEL No. 4708-17-200-002

**BEGINNING** at the East Corner of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence S02°59'49"E 177.17 feet along the East line of said Section 17; thence N43°57'30"W 231.58 feet; thence S36°34'23"W 566.56 feet; thence S18°18'56"W 90.08 feet; thence S75°26'29"E 572.11 feet; thence S02°59'49"E 969.72 feet along said East line of Section 17; thence S85°36'41"W 1370.41 feet; thence N26°39'20"E 794.72 feet; thence N23°38'57"E 393.82 feet; thence N31°31'09"E 243.60 feet; thence N48°29'38"W 144.55 feet; thence S71°59'34"W 63.46 feet; thence S72°50'24"W 270.36 feet; thence N04°03'39"W 514.40 feet; thence N89°19'36"W 1521.99 feet; thence N02°53'27"W 985.28 feet along the North-South 1/4 line of said Section 17; thence N09°30'44"E 68.29 feet; thence S07°30'02"E 265.87 feet; thence S31°23'01"E 448.06 feet; thence S03°27'46"E 305.10 feet; thence S89°37'27"E 331.17 feet; thence N02°18'18"W 172.84 feet; thence N10°16'35"W 45.36 feet; thence S75°00'44"W 35.86 feet; thence N13°25'48"W 485.06 feet; thence N16°19'14"W 575.79 feet; thence N38°13'48"W 354.78 feet; thence N01°20'23"E 220.58 feet; thence N11°16'52"E 385.37 feet; thence N02°52'26"W 122.31 feet; thence N10°44'14"E 175.06 feet; thence N85°22'02"E 2067.98 feet along the North line of said Section 17; thence S09°30'23"E 170.78 feet; thence S09°30'23"E 240.03 feet; thence S18°08'28"W 279.07 feet; thence S72°23'07"W 130.59 feet; thence S00°44'19"W 632.84 feet; thence S17°01'38"E 220.11 feet; thence S52°32'30"W 275.89 feet; thence S52°31'47"W 250.09 feet; thence S52°33'48"W 330.05 feet; thence S79°42'38"W 316.70 feet; thence S79°41'39"W 249.73 feet; thence S67°03'38"W 219.64 feet; thence S01°42'54"E 70.08 feet; thence S00°03'15"W 226.37 feet; thence S88°59'10"E 290.18 feet; thence N83°17'26"E 166.71 feet; thence N48°53'03"E 158.93 feet; thence N84°00'33"E 397.43 feet; thence N37°18'43"E 410.56 feet; thence N32°45'28"E 310.41 feet; thence S44°53'41"E 118.78 feet; thence N71°30'54"E 330.04 feet; thence N71°30'54"E 71.45 feet; thence S02°57'52"E 882.64 feet along said East line of Section 17 to the Place of Beginning. Being a part of the Northeast 1/4 and Southeast 1/4 of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County. Containing 144.3 acres of land, more or less. Subject to the rights of the public over that portion thereof taken for Crouse Road and South bound service road of Highway U.S. 23, also subject to and together with all easements and restrictions affecting title to the above described premises.

### PARCEL No. 4708-17-300-009

**BEGINNING** at the Center Post of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence N85°39'57"E 13.67 feet along the East-West 1/4 of said Section 17; thence S05°24'29"E 173.74 feet; thence S02°34'47"E 950.66 feet; thence S02°50'09"E 48.35 feet; thence S03°04'22"E 289.81 feet; thence N87°35'33"E 53.78 feet; thence S52°24'27"E 201.85 feet; thence N89°05'01"E 133.27 feet; thence N40°03'32"E 244.09 feet; thence N80°30'01"E 86.47 feet; thence S31°36'14"E 373.35 feet; thence S56°19'06"E 73.00 feet; thence N86°22'06"E 62.71 feet; thence N88°28'09"E 254.90 feet; thence N26°39'20"E 18.40 feet; thence S24°59'10"E 926.39 feet; thence S85°36'40"W 1523.28 feet along the South line of said Section 17 to intersection with the North-South 1/4 line of said Section; thence continuing S85°36'40"W 1309.08 feet along the South line of said Section 17; thence N02°55'31"W 451.91 feet; thence N82°04'52"E 109.77 feet; thence N13°01'29"E 95.06 feet; thence N62°23'13"W 157.30 feet; thence N02°55'31"W 2036.26 feet; thence N85°39'57"E 1310.65 feet along the East-West 1/4 line of said Section 17 to the Place of Beginning. **EXCEPTING** therefrom the following described parcel: Commencing at the Center Post of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence S02°53'28"E 1100.70 feet along the North-South 1/4 line of said Section 17; thence S87°06'32"W (S87°06'32"E record) 291.87 feet to the **PLACE OF BEGINNING**; thence S05°42'16"W 59.09 feet; thence S16°14'15"W 1022.59 feet; thence S27°59'04"W 583.06 feet; thence N29°33'57"W 435.16 feet; thence N19°03'17"E 61.21 feet; thence S86°44'57"E 33.40 feet; thence N10°35'15"E 416.25 feet; thence N06°18'11"E 528.68 feet; thence N41°14'01"E 365.87 feet; thence N48°20'50"E 300.45 feet; thence S71°18'05"E 123.69 feet; thence S02°05'45"E 84.81 feet; thence S02°42'41"E 162.71 feet to the Place of Beginning. Being a part of the Southwest 1/4 and Southeast 1/4 of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County. Containing 95.7 acres of land, more or less. Subject to and together with all easements and restrictions affecting title to the above described premises.

### PARCEL No. 4708-16-300-015

**BEGINNING** at the Southwest Corner of Section 16, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence N02°59'49"W 1969.72 feet along the West line of said Section 16; thence S75°26'29"E 165.45 feet; thence S75°20'11"E 197.84 feet; thence N88°57'47"E 26.01 feet; thence N87°40'40"E 63.85 feet; thence N26°16'22"W 275.23 feet; thence N43°57'30"W 499.35 feet; thence N02°59'49"W 177.17 feet along said West line of Section 16; thence N88°53'47"E 361.88 feet along the East-West 1/4 line of said Section 16; thence S13°31'36"E 2729.58 feet along the Westerly Right-of-Way of U.S. 23; thence S89°01'22"W 861.04 feet along the South line of said Section 16 to the Place of Beginning. **EXCEPTING THEREFROM**: Commencing at said Southwest Corner of Section 16; thence S02°56'11"E 0.27 feet along said West line of Section 16; thence 87°03'49"E 699.06 feet to the **PLACE OF BEGINNING**; thence S85°02'00"W 143.72 feet; thence N32°59'00"W 736.37 feet; thence N09°25'29"W 577.73 feet; thence N05°59'45"W 463.81 feet; thence N24°58'23"E 124.56 feet; thence N86°49'08"E 208.20 feet; thence N83°43'48"E 23.64 feet; thence S85°59'10"E 65.39 feet; thence S11°40'12"E 1676.57 feet; thence S00°35'44"W 117.01 feet to the Place of Beginning. Being a part of the Southwest 1/4 of Section 16, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan. Containing 19.1 acres of land, more or less. Subject to and together with all easements and restrictions affecting title to the above described premises.

### WALDENWOODS CAMPGROUND EXPANSION MATERIALS QUANTITY LIST

STORM SEWER		
12" CONC. FLARED END SECTION	9	QTY
15" RCP FLARED END SECTION	2	QTY
24" RCP FLARED END SECTION	1	QTY
4" DIA. DRAINAGE STRUCT.	12	QTY
OUTLET CONTROL STRUCT.	3	QTY
M/M COVER	1	QTY
750# BASKIN COVER	11	QTY
12" CLV RCP	736	LF
12" HDPE-S	40	LF
15" CMP	57	LF
18" HDPE-S	692	LF
24" HDPE-S	722	LF

SANITARY SEWER		
6" PVC SDR26 SANITARY SEWER LEAD	1,442	LF
8" PVC SDR26 SANITARY SEWER MAIN	2,901	LF
6" SANITARY CLEANOUT	88	QTY
6" P-TRAP	88	QTY
8"X6" WYE	57	QTY
6"X6" WYE	27	QTY
6"-45° BEND	54	QTY
6" DIAMETER STRUCTURE	16	QTY

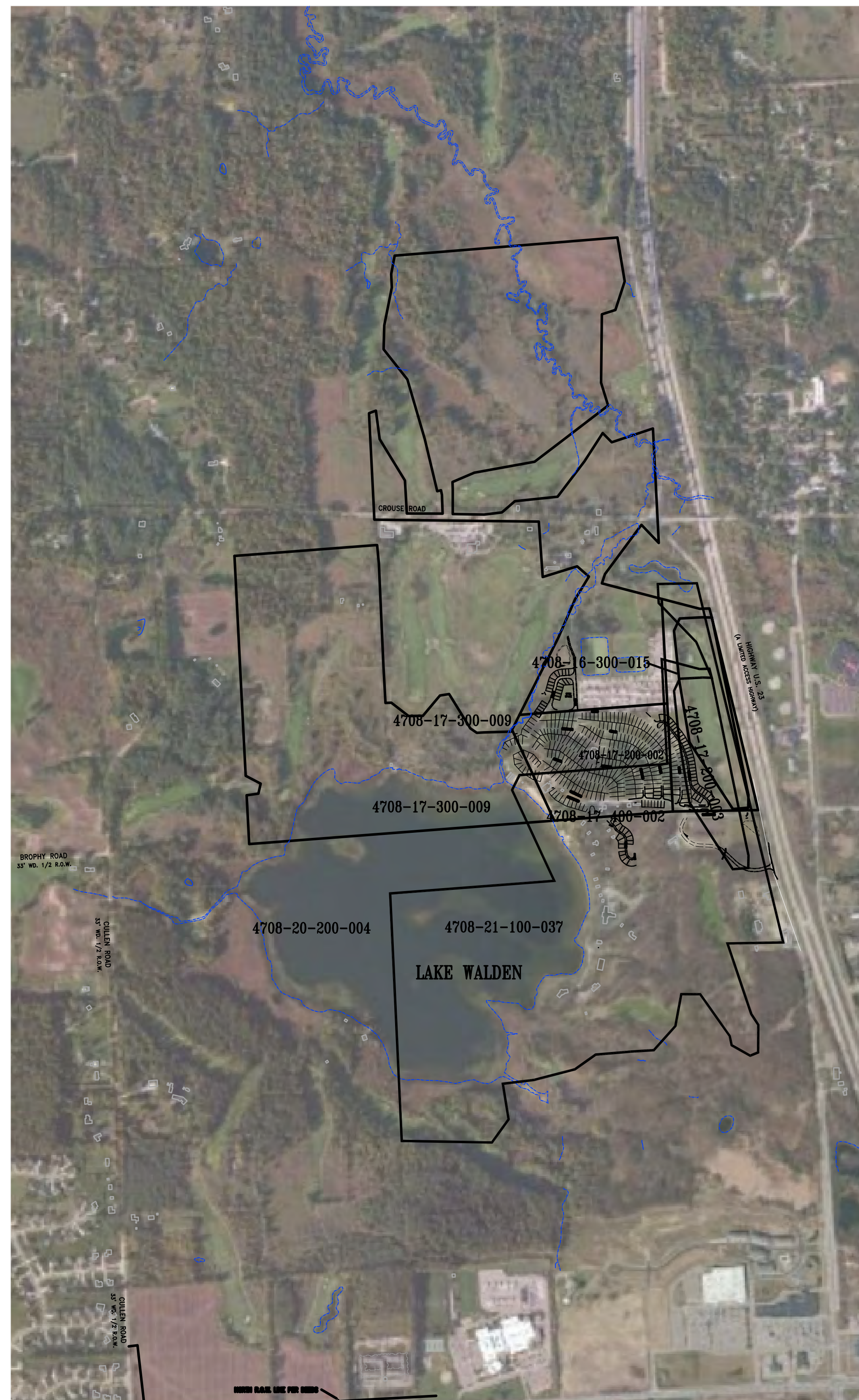
WATER MAIN (DRY HYDRANT)		
10" SDR 21 PVC	271	LF
10" SDR 21 PVC 90° ELBOW	1	QTY
10" COUPLING	1	QTY
10"X6" REDUCER	1	QTY
10" SDR 21 PVC THREADED CLEANOUT	1	QTY
6" CL. 57 D.I. IRISER PIPE	10	QTY
6" 90° D.I. ELBOW	1	QTY
6" NST DRY HYDRANT ADAPTER	1	QTY

WATER MAIN (CAMPGROUND)		
2" SDR 21 WATERMAIN	1,812	QTY
2" VALVE IN BOX	9	QTY
2" 45° BEND	15	QTY
2" 11.25° BEND	2	QTY

### PLAN DISTRIBUTION LIST

Project's Name: Waldenwoods Campground Improvements  
Project's Location: Hartland Township, Michigan.  
Job Number: 9173156

DATE OF APPLICATION	CONST. SET DATE	AGENCY	CONTACT NAME	DESCRIPTION
Dec. 11, 2019	Oct. 18, 2019	Hartland Township	Troy Langer	Site Plan Review
	Dec. 11, 2019	Hartland Township	Troy Langer	Site Plan Review



AERIAL PHOTOGRAPH

SCALE: 1in. = 750ft.

AERIAL PHOTOGRAPHY BY:



Aerial photographic underlay is an unrectified image and is oriented to the engineering line work within reasonable accuracy and precision, and may not accurately depict current site conditions.

**WALDENWOODS OVERALL CAMPGROUND PROPOSED CONDITIONS**

UNIT NUMBER	NUMBER OF CAMPSITES	Exist. Full Hook-up Site	Exist. Partial Hook-up Site	Exist. Full Hook-up Upgrade, Relocation & Re-purposed to Cabin Site	Exist. Full Hook-up RV Site & Re-purposed to Cabin Site	Exist. Full Hook-up Upgrade RV Site	Proposed New Full Hook-up Cabin Site	Proposed New Full Hook-up RV Site
F3 - F39	19	X						
F47 - F67	11	X						
F2 - F92	46	X						
E1 - E49	25	X						
E2 - E52	26	X						
D1 - D65	33	X						
D2 - D58	29	X						
C26 - C52	27	X						
A1 - A42	41		X					
B1 - B37	37		X					
C1 - C25	25		X					
F69 - F79	6			X				
F43 - F45	3				X			
FL	1					X		
D60 - D64	3						X	
C53	1							X
D66 - D80	8							X
D67 - D69	2							X
E51 - E53	2							X
E54 - E58	3							X
G1 - G17	17							X
G18 - G19	2							X
G20 - G32	13							X
W1 - W28	28							X
<b>TOTAL =</b>	<b>408</b>							

Project: Waldenwoods Campground Expansion  
 Location: Hartland Township, Livingston County, Michigan.  
 Zoned: Planned Development-PD  
 Date: 12/09/2019

EXISTING CAMPGROUND CONDITIONS	
Full Hook-Up Campsites =	217
Partial Hook-Up Campsites =	116
Total Existing Campsites =	333
Overall Approved Campsites =	361
Approved Campsites (Not Constructed) =	28
PROPOSED CAMPGROUND CONDITIONS	
Full Hook-Up Upgraded Campsites =	4
Full Hook-Up Upgraded, Relocated & Re-purposed Campsites =	6
Proposed Full Hook-Up RV Campsites =	45
Proposed Full Hook-Up Cabin Sites =	30
Existing Full Hook-Up & Re-purposed Cabin Sites =	3
Existing Full Hook-Up RV Sites =	214
<b>Total Full Hook-Up Campsites =</b>	<b>302</b>
<b>Total Partial Hook-Up Campsites =</b>	<b>106</b>
<b>Total Proposed Campsites Count =</b>	<b>408</b>

Noted: A Partial Hook-Up site is defined by a site serviced only by electric and water. A Full Hook-Up site shall be serviced by electric, water and sanitary sewer.

**U.S. 23 (LIMITED ACCESS HWY.)**

**WHITMORE LAKE RD. (OLD U.S. 23)**  
 (L.C.R.C. JURISDICTION)

**PART OF # 4708-17-200-003**  
 MALESTIC GOLF, LLC  
 9840 CROUSE RD.  
 HOWELL, MI. 48855  
 ZONING CODE: PDRR

**SEE SHEET SP2.1**

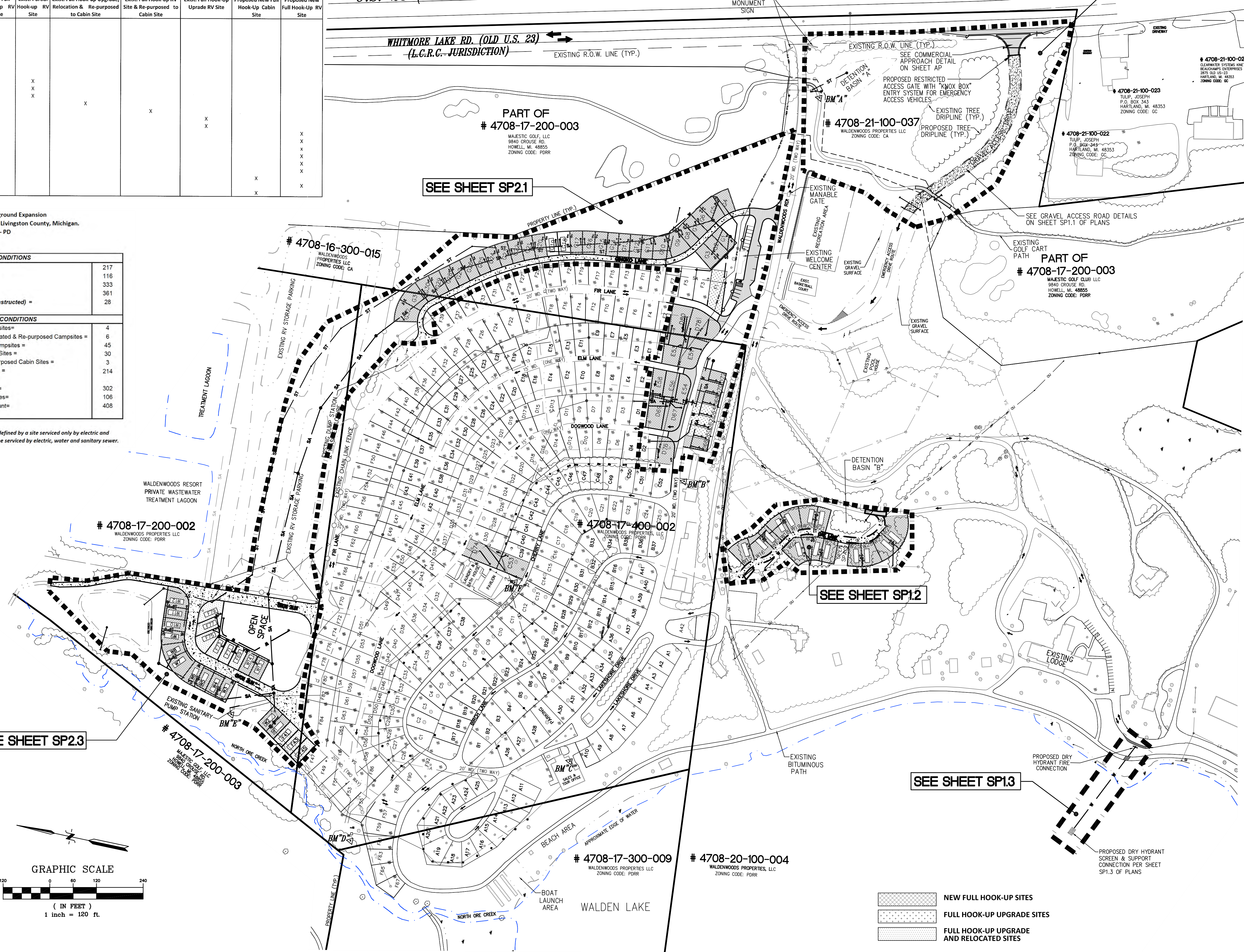
**SEE SHEET SP1.1**

**LEGEND**

- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- = SIGN
- = SOIL BORING / BENCHMARK W/IDENTIFIER
- = LIGHT BASE
- = STREET LIGHT
- = OVERHEAD TRAFFIC SIGNAL
- = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- = AIR CONDITIONER UNIT
- = UTILITY MANHOLE (AS LABELED)
- = UTILITY POLE W/OUT WIRE
- = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = DECIDUOUS TREE W/IDENTIFIER
- = CONIFEROUS TREE W/IDENTIFIER
- = FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- = GUARD RAIL
- = EDGE OF GRAVEL
- = CONCRETE CURB (UNLESS OTHERWISE STATED)
- = SANITARY SEWER MANHOLE W/IDENTIFIER
- = SANITARY SEWER PIPE
- = CLEAN OUT
- = STORM WATER MANHOLE W/IDENTIFIER
- = CATCH BASIN W/IDENTIFIER
- = CONTROL STRUCTURE
- = FLARED END SECTION
- = STORM WATER DRAINAGE PIPE
- = HYDRANT
- = WATER SHUT OFF
- = WATER VALVE
- = WATER VALVE BOX
- = WATER MAIN
- = PROPOSED SANITARY RISER CONNECTION
- = PROPOSED WATER RISER
- = PROPOSED RECREATIONAL VEHICLE POST
- = PROPOSED WATER MAIN
- = PROPOSED SANITARY SEWER
- = PROPOSED STORM SEWER
- = PROPOSED EDGE OF PAVEMENT
- = PROPOSED PAVEMENT
- = PROPOSED GRAVEL ROAD
- = TRAFFIC FLOW ARROWS

**BENCHMARKS**

- BENCHMARK #A: NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS." ELEVATION = 962.99
- BENCHMARK #B: NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET. ELEVATION = 978.25
- BENCHMARK #C: CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING. ELEVATION = 968.03
- BENCHMARK #D: SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55
- BENCHMARK #E: CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17
- BENCHMARK #F: SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILION BUILDING. ELEVATION = 961.74



- NEW FULL HOOK-UP SITES
- FULL HOOK-UP UPGRADE SITES
- FULL HOOK-UP UPGRADE AND RELOCATED SITES

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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. FIRE MARSHALLS OFFICE COMMENTS			
CHECK: WMP						



**OVERALL DEVELOPMENT SITE PLAN**

CLIENT:  
 WALDENWOODS PROPERTIES  
 C/O BRIAN CROUSE  
 9840 CROUSE ROAD  
 HOWELL, MI. 48855  
 810-632-6135

SCALE: 1"=120'  
 PROJECT No.: 9173156  
 DWG NAME: 3156-0D  
 ISSUED: DEC. 11, 2019

**OD**





**BENCHMARKS**

**BENCHMARK #1 (SITE)**  
"X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE."  
ELEVATION = 956.03 (NAVO 88)

**BENCHMARK #A:**  
NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
ELEVATION = 982.99

**BENCHMARK #B:**  
NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET.  
ELEVATION = 978.25

**BENCHMARK #C:**  
CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING.  
ELEVATION = 968.03

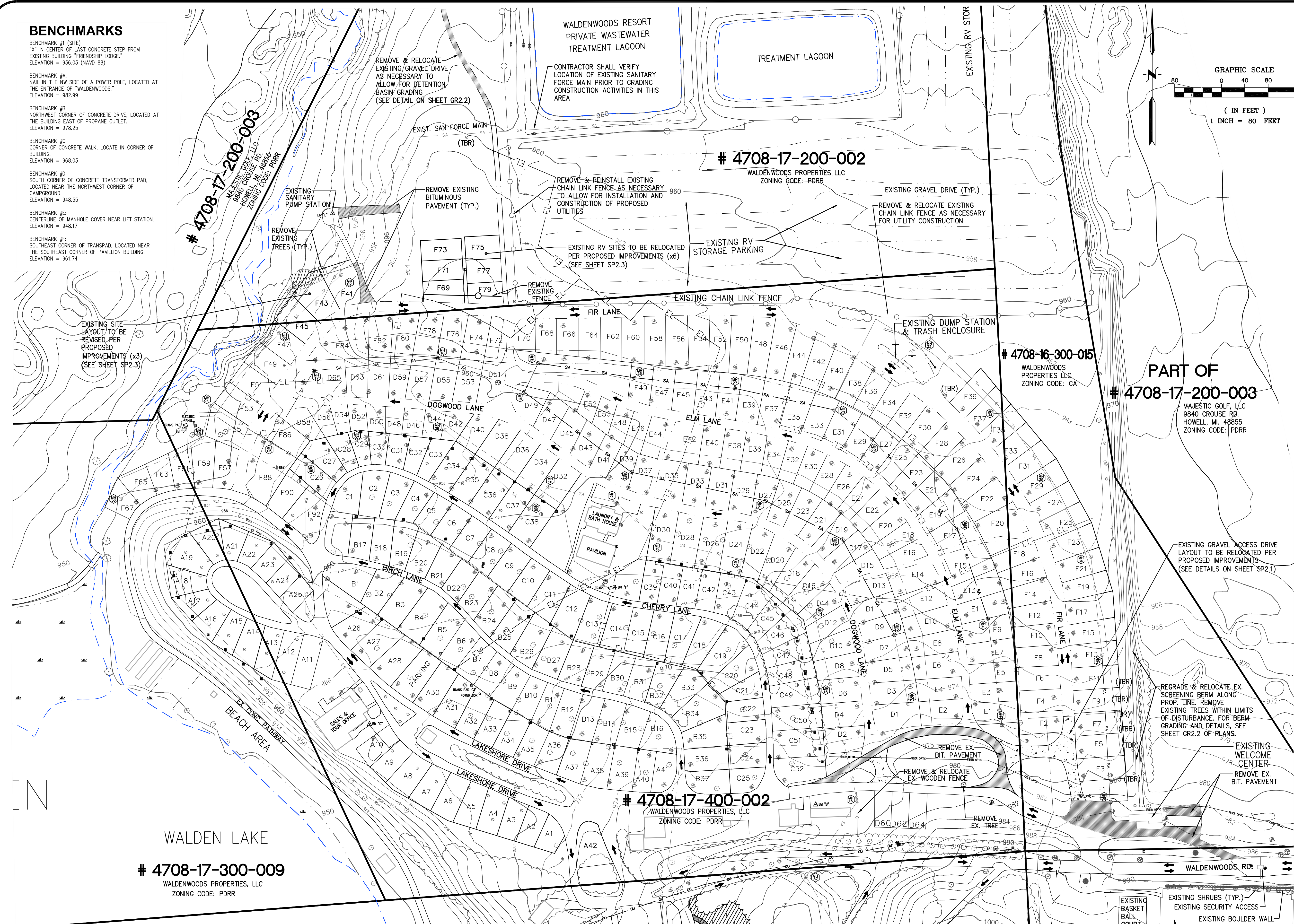
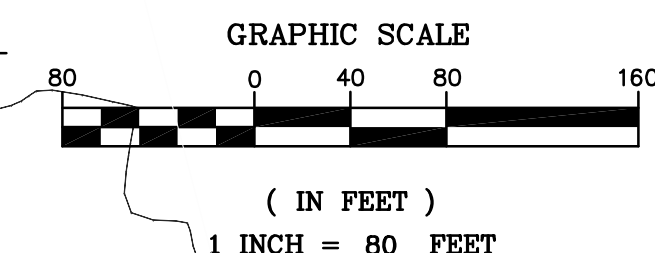
**BENCHMARK #D:**  
SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND.  
ELEVATION = 948.55

**BENCHMARK #E:**  
CENTERLINE OF MANHOLE COVER NEAR LIFT STATION.  
ELEVATION = 948.17

**BENCHMARK #F:**  
SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILION BUILDING.  
ELEVATION = 961.74

**LEGEND**

- MISC. STRUCTURE (AS LABELED)
- BOLLARD
- SIGN
- SOIL BORING / BENCHMARK W/IDENTIFIER
- LIGHT BASE
- STREET LIGHT
- OVERHEAD TRAFFIC SIGNAL
- UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- UTILITY POLE W/GUY WIRE
- AIR CONDITIONER UNIT
- UTILITY MANHOLE (AS LABELED)
- UTILITY POLE W/GUY WIRE
- OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- DECIDUOUS TREE W/IDENTIFIER
- CONIFEROUS TREE W/IDENTIFIER
- BUSH
- FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- GUARD RAIL
- EDGE OF GRAVEL
- CONCRETE CURB (UNLESS OTHERWISE STATED)
- SANITARY SEWER MANHOLE W/IDENTIFIER
- SANITARY SEWER PIPE
- CLEAN OUT
- STORM WATER MANHOLE W/IDENTIFIER
- CATCH BASIN W/IDENTIFIER
- CONTROL STRUCTURE
- FLARED END SECTION
- STORM WATER DRAINAGE PIPE
- HYDRANT
- WATER SHUT OFF
- WATER VALVE
- WATER VALVE BOX
- WATER MAIN
- GAS SHUT OFF
- U/G GAS
- SPOT ELEVATION
- 1' CONTOUR
- 5' CONTOUR
- TRAFFIC FLOW ARROWS



- DEMOLITION NOTES:**
- The demolition specifications of the Local Municipality are a part of this work. Refer to the General Notes on the project plans for additional requirements.
  - Contractor shall contact the 811 Underground Public Utility Locating System or other appropriate local underground utility locating Agency, a minimum of three (3) working days prior to performing demolition work. Existing utility information on the project plans may be from information disclosed to this firm by the Utility Companies, Local, County or State Agencies, and/or various other sources. No guarantee is given as to the completeness or accuracy thereof. Prior to construction, locations and depths of all existing utilities (in possible conflict with the proposed improvements) shall be verified in the field.
  - Contractor shall contact the appropriate Agencies to coordinate disconnect of the electric, gas, phone, cable and other public utilities as necessary prior to performing demolition work.
  - Contractor shall contact the appropriate Agencies to coordinate removal and/or relocation of any underground and/or overhead public utility lines as necessary prior to performing demolition work.
  - Contractor shall recycle and/or dispose of all demolition debris in accordance with the appropriate Local, County, State and Federal regulations.
  - All bituminous and concrete pavement to be removed shall be saw cut at the limits of removal to provide for a clean straight edge for future abutment.
  - All existing irrigation lines to be removed shall be terminated at the limits of demolition or as necessary to allow for construction of the proposed site improvements. Ends of pipe shall be capped and the location of marked for future connection.
  - All existing water main and sanitary sewer to be removed shall be terminated at the limits of demolition or as indicated on the project plans. Temporary plugs shall be installed in the ends of pipe in accordance with the appropriate Agency and the locations of marked for future connection. Permanent plugs shall be installed in the ends of pipe in accordance with the appropriate Agency. The Contractor shall record the location of all permanent plugs and provide the location information to the appropriate Agency.
  - All existing light sources to be removed shall have their power cables removed up to the power source or properly terminated for future connection at the limits of demolition or as necessary to allow for construction of the proposed site improvements. Removal and termination of power cables shall be performed in accordance with local electric codes.
  - All existing utility meters to be removed shall be properly removed to allow for reuse. Any existing utility meters that are not to be reused as a part of this project shall be returned to the appropriate Agency.
  - All trenches and/or excavations resulting from the demolition of underground utilities, building foundations, etc. that are located within the 1 on 1 influence zone of proposed structures, paved areas and/or other areas subject to vehicular traffic shall be backfilled with MDOT Class III granular material (or better) to the proposed subgrade elevation. Backfill shall be shall be placed using the controlled density method (12" maximum lifts, compacted to 95% maximum unit weight, Modified Proctor).

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FOR EXISTING CONDITIONS AND DEMOLITION PLAN (SOUTH) SEE SHEET EX1 OF PLANS

**EXISTING CONDITIONS AND DEMOLITION PLAN (NORTH)**



DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS			
CHECK: WMP						

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=80'  
PROJECT NO.: 9173156  
DWG NAME: 3156-EXIST  
ISSUED: DEC. 11, 2019

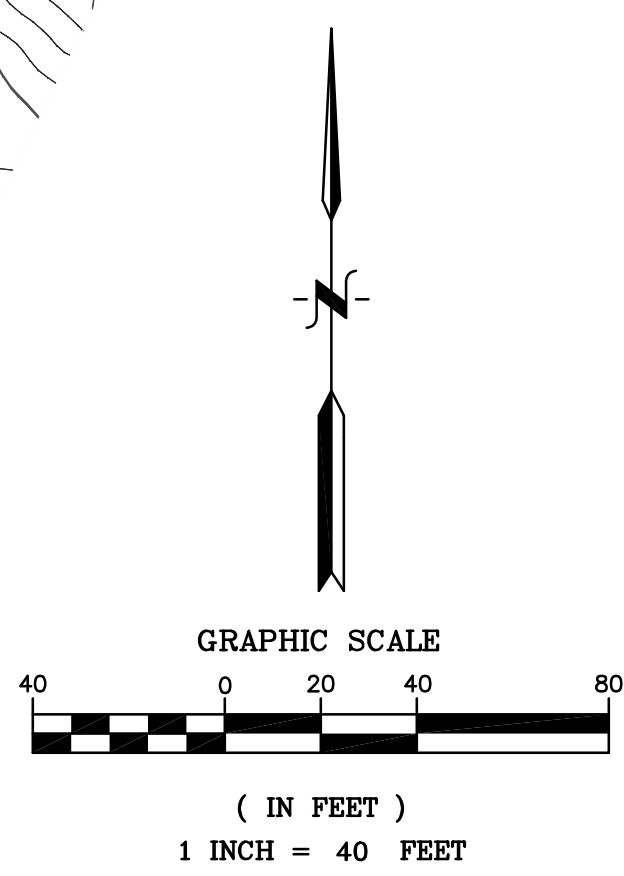
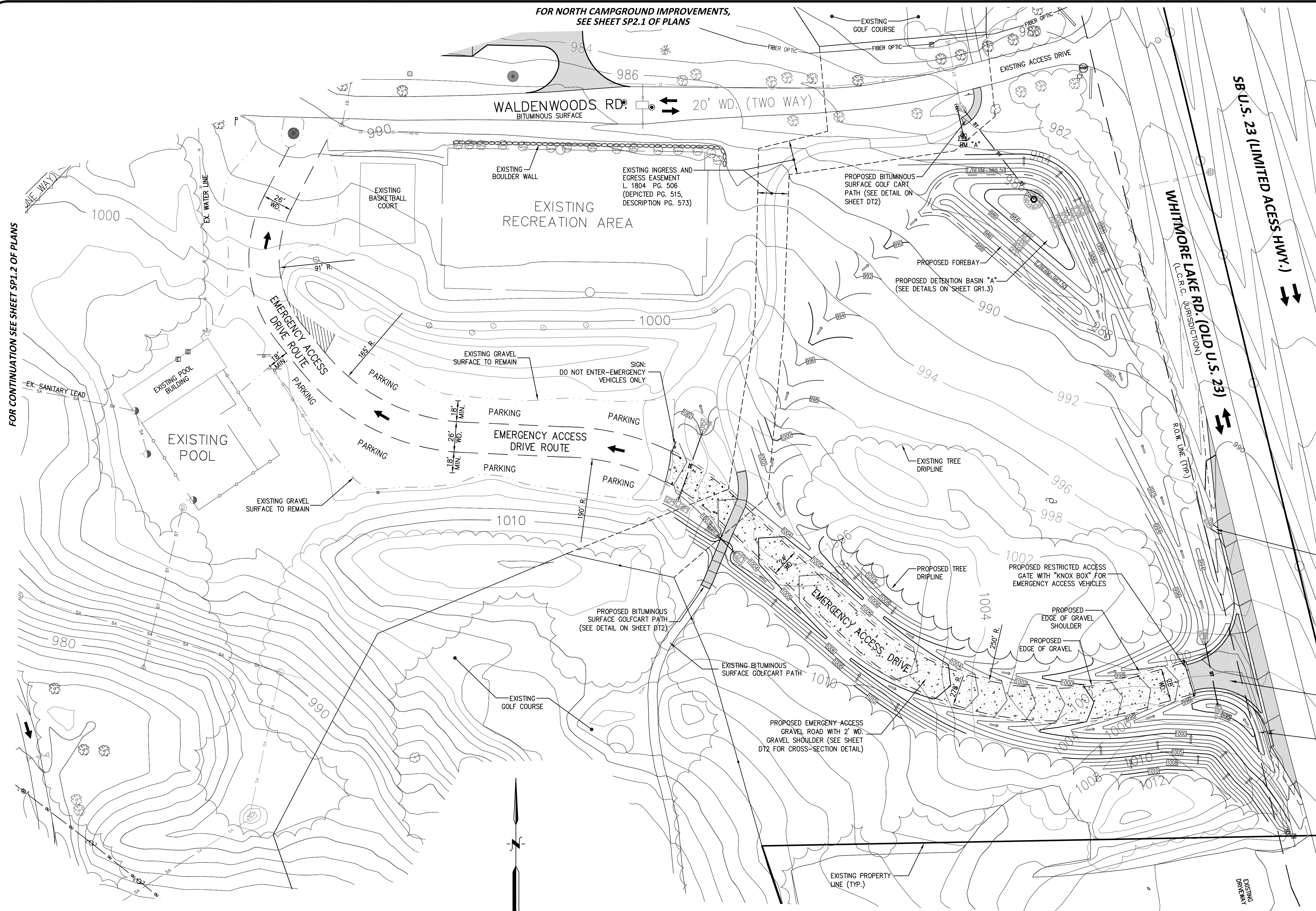
**EX2**

FOR NORTH CAMPGROUND IMPROVEMENTS,  
SEE SHEET SP2.1 OF PLANS

**LEGEND**

- MISC. STRUCTURE (AS LABELED)
- BOLLARD
- SOIL BORING / BENCHMARK W/IDENTIFIER
- LIGHT BASE
- STREET LIGHT
- OVERHEAD TRAFFIC SIGNAL
- UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- AIR CONDITIONER UNIT
- UTILITY MANHOLE (AS LABELED)
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- SANITARY SEWER PIPE
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- CATCH BASIN W/IDENTIFIER
- CONTROL STRUCTURE
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- STORM WATER DRAINAGE PIPE
- HYDRANT
- WATER SHUT OFF
- WATER VALVE
- WATER VALVE BOX
- WATER MAIN
- GAS SHUT OFF
- U/G GAS
- SPOT ELEVATION
- 1' CONTOUR
- 5' CONTOUR
- PROPOSED SANITARY RISER CONNECTION
- PROPOSED WATER RISER
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- PROPOSED WATER MAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF GRAVEL
- PROPOSED GRAVEL ROAD
- PROPOSED BITUMINOUS PAVEMENT
- TRAFFIC FLOW ARROWS

FOR CONTINUATION SEE SHEET SP1.2 OF PLANS



PROPOSED CONCRETE SPILLWAY  
(SEE DETAIL ON SHEET DT3 OF PLANS)

PROPOSED COMMERCIAL  
DRIVEWAY APPROACH PER  
LCRC STANDARDS (SEE DETAIL  
ON SHEET AP OF PLANS)

PROPOSED W1-2R POLE  
MOUNTED ROAD SIGN LOCATION

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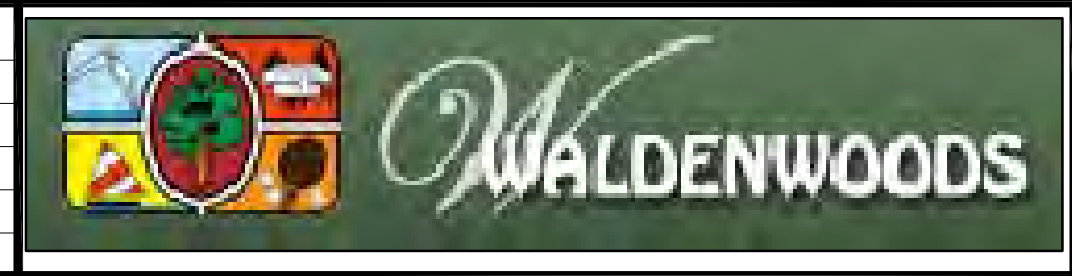
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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION
	1	12/04/19	REVISED PER HARTLAND TWP. FIRE MARSHALLS OFFICE COMMENTS
DRAFT: L.F.	2	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS
CHECK: WMP			

REVISION #	DATE	REVISION-DESCRIPTION



**SITE PLAN  
(EMERGENCY ACCESS ROAD)**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

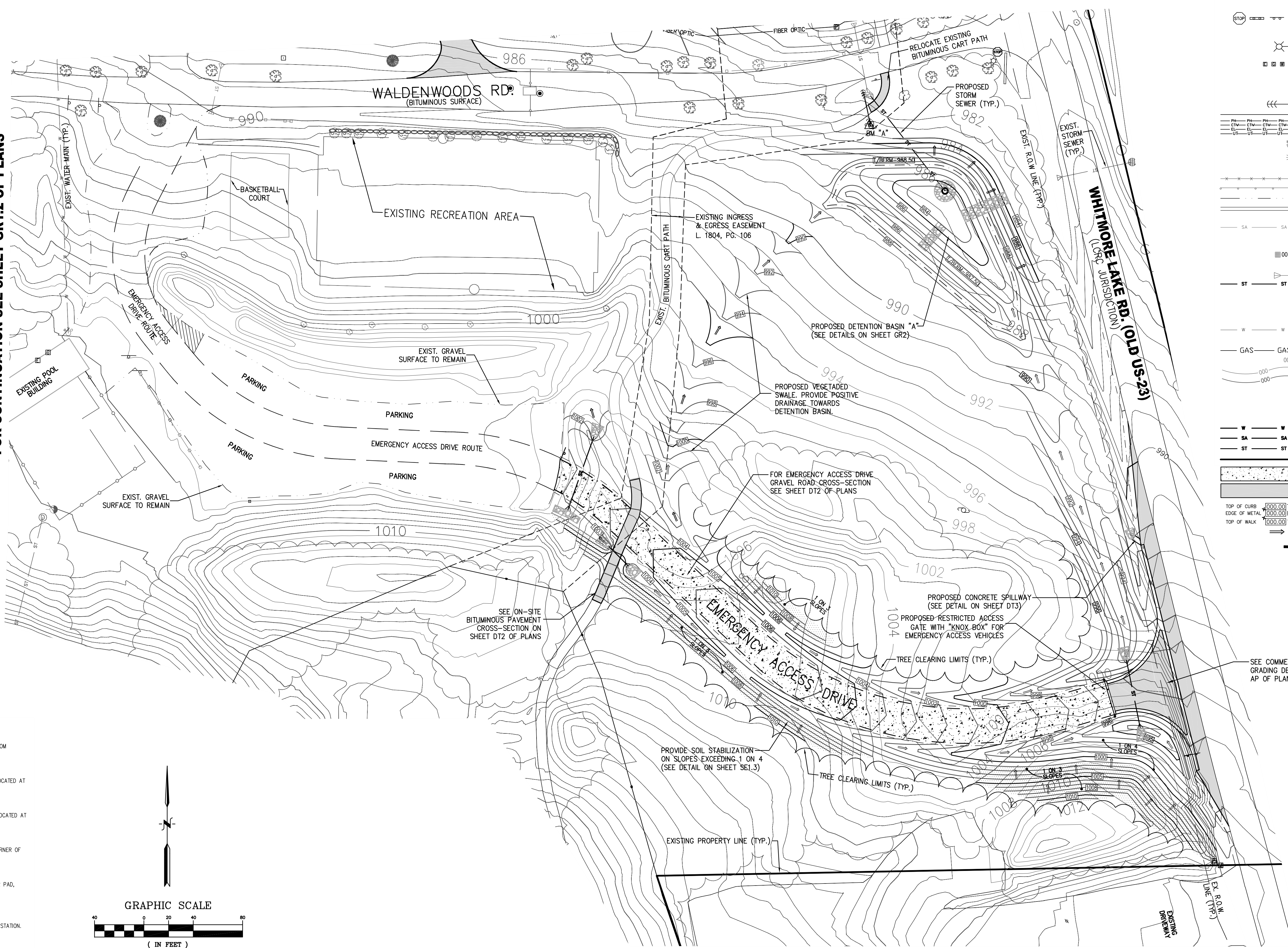
SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-SP1.1  
ISSUED: DEC. 11, 2019

**SP1.1**

**LEGEND**

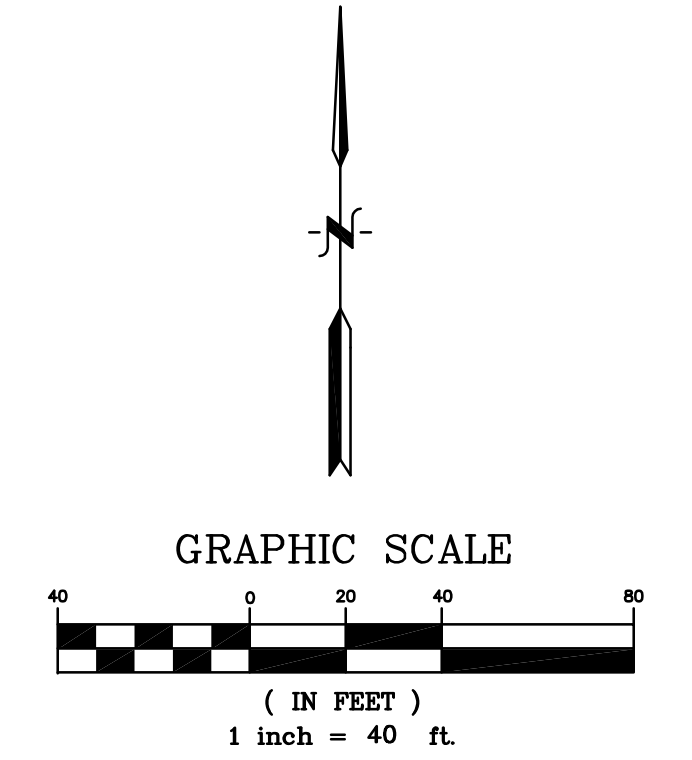
- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- = SIGN
- = SOIL BORING / BENCHMARK W/IDENTIFIER
- = LIGHT BASE
- = STREET LIGHT
- = OVERHEAD TRAFFIC SIGNAL
- = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- = AIR CONDITIONER UNIT
- = UTILITY MANHOLE (AS LABELED)
- = UTILITY POLE W/GUY WIRE
- = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
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- = SANITARY SEWER PIPE
- = CLEAN OUT
- = STORM WATER MANHOLE W/IDENTIFIER
- = CATCH BASIN W/IDENTIFIER
- = CONTROL STRUCTURE
- = FLARED END SECTION
- = STORM WATER DRAINAGE PIPE
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- = WATER SHUT OFF
- = WATER VALVE
- = WATER VALVE BOX
- = WATER MAIN
- = GAS SHUT OFF
- = U/G GAS
- = SPOT ELEVATION
- = 1' CONTOUR
- = 5' CONTOUR
- = PROPOSED SANITARY RISER CONNECTION
- = PROPOSED WATER RISER
- = PROPOSED RECREATIONAL VEHICLE POST
- = PROPOSED WATER MAIN
- = PROPOSED SANITARY SEWER
- = PROPOSED STORM SEWER
- = PROPOSED EDGE OF PAVEMENT
- = PROPOSED GRAVEL ACCESS ROAD
- = PROPOSED BITUMINOUS PAVEMENT
- = PROPOSED SPOT ELEVATIONS
- = PROPOSED FLOW ARROW
- = TRAFFIC FLOW ARROWS

FOR CONTINUATION SEE SHEET GR1.2 OF PLANS



**BENCHMARKS**

- BENCHMARK #1 (SITE)  
"X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE."  
ELEVATION = 956.03 (NAVD 88)
- BENCHMARK #A:  
NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
ELEVATION = 982.99
- BENCHMARK #B:  
NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET.  
ELEVATION = 979.25
- BENCHMARK #C:  
CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING.  
ELEVATION = 968.03
- BENCHMARK #D:  
SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND.  
ELEVATION = 948.55
- BENCHMARK #E:  
CENTERLINE OF MANHOLE COVER NEAR LIFT STATION.  
ELEVATION = 948.17
- BENCHMARK #F:  
SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILION BUILDING.  
ELEVATION = 961.74



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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F. CHECK: WMP	1	12/04/19	REVISED PER HARTLAND TWP. FIRE MARSHALLS OFFICE COMMENTS			
	2	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS			



**GRADING PLAN  
EMERGENCY ACCESS  
DRIVE**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-GRD  
ISSUED: DEC. 11, 2019

**GR1.1**

END SECTION "A" EXISTING CONDITIONS:	
Area:	4.1 Acres
Time of Concentration (Tc): <sup>f</sup>	15 Min.
Roughness Coefficient (C):	0.37
10-yr. Storm Intensity (I) f:	3.38 in/hr.
Pipe Diameter:	12 in.
Pipe Area (A):	0.79 sf.
Wetted Perimeter (πD):	3.14 ft.
Hydraulic Radius (R):	0.25
Pipe Slope (S):	0.0802 ft/ft
Pipe Roughness Coefficient (n):	0.022
Pipe Material:	CMP

Expected Storm Runoff Calculation:	
$Q_{10yr} = C * A * I$	
$Q_{10yr} = 5.13$ cfs	

Proposed Culvert Pipe Capacity Calculation:	
$Q = \frac{1.486 * A * R^2 * S^{1/2}}{n}$	
$Q = 5.96$ cfs > 5.13 cfs <b>OK</b>	

<sup>f</sup>: 10 Yr. storm intensity taken from the MDOT Drainage Manual, Rainfall Intensity Duration Table for Zone 10 and a Tc = 15 Min.

END SECTION "B" PROP. CONDITIONS:	
Area:	3.16 Acres
Time of Concentration (Tc): <sup>f</sup>	15 Min.
Roughness Coefficient (C):	0.43
10-yr. Storm Intensity (I) f:	3.38 in/hr.
Pipe Diameter:	12 in.
Pipe Area (A):	0.79 sf.
Wetted Perimeter (πD):	3.14 ft.
Hydraulic Radius (R):	0.25
Pipe Slope (S):	0.0802 ft/ft
Pipe Roughness Coefficient (n):	0.022
Pipe Material:	CMP

Expected Storm Runoff Calculation:	
$Q_{10yr} = C * A * I$	
$Q_{10yr} = 4.59$ cfs	

Proposed Culvert Pipe Capacity Calculation:	
$Q = \frac{1.486 * A * R^2 * S^{1/2}}{n}$	
$Q = 5.96$ cfs > 4.59 cfs <b>OK</b>	

<sup>f</sup>: 10 Yr. storm intensity taken from the MDOT Drainage Manual, Rainfall Intensity Duration Table for Zone 10 and a Tc = 15 Min.

END SECTION "B" EXISTING CONDITIONS:	
Area:	0.69 Acres
Time of Concentration (Tc): <sup>f</sup>	15 Min.
Roughness Coefficient (C):	0.51
10-yr. Storm Intensity (I) f:	3.38 in/hr.
Pipe Diameter:	15 in.
Pipe Area (A):	1.23 sf.
Wetted Perimeter (πD):	3.93 ft.
Hydraulic Radius (R):	0.31
Pipe Slope (S):	0.0445 ft/ft
Pipe Roughness Coefficient (n):	0.022
Pipe Material:	CMP

Expected Storm Runoff Calculation:	
$Q_{10yr} = C * A * I$	
$Q_{10yr} = 1.19$ cfs	

Proposed Culvert Pipe Capacity Calculation:	
$Q = \frac{1.486 * A * R^2 * S^{1/2}}{n}$	
$Q = 8.05$ cfs > 1.19 cfs <b>OK</b>	

<sup>f</sup>: 10 Yr. storm intensity taken from the MDOT Drainage Manual, Rainfall Intensity Duration Table for Zone 10 and a Tc = 15 Min.

IL-100 TO FES-100A CULVERT DESIGN CALCULATIONS:	
Area:	1.28 Acres
Time of Concentration (Tc): <sup>f</sup>	15 Min.
Roughness Coefficient (C):	0.24
10-yr. Storm Intensity (I) f:	3.38 in/hr.
Pipe Diameter:	15 in.
Pipe Area (A):	1.23 sf.
Wetted Perimeter (πD):	3.93 ft.
Hydraulic Radius (R):	0.31
Pipe Slope (S):	0.0105 ft/ft
Pipe Roughness Coefficient (n):	0.022
Pipe Material:	CMP

Expected Storm Runoff Calculation:	
$Q_{10yr} = C * A * I$	
$Q_{10yr} = 1.04$ cfs	

Proposed Culvert Pipe Capacity Calculation:	
$Q = \frac{1.486 * A * R^2 * S^{1/2}}{n}$	
$Q = 3.91$ cfs > 1.04 cfs <b>OK</b>	

<sup>f</sup>: 10 Yr. storm intensity taken from the MDOT Drainage Manual, Rainfall Intensity Duration Table for Zone 10 and a Tc = 15 Min.

END SECTION "B" EXISTING CONDITIONS:	
Area:	3.72 Acres
Time of Concentration (Tc): <sup>f</sup>	15 Min.
Roughness Coefficient (C):	0.2
10-yr. Storm Intensity (I) f:	3.38 in/hr.
Pipe Diameter:	15 in.
Pipe Area (A):	1.23 sf.
Wetted Perimeter (πD):	3.93 ft.
Hydraulic Radius (R):	0.31
Pipe Slope (S):	0.0445 ft/ft
Pipe Roughness Coefficient (n):	0.022
Pipe Material:	CMP

Expected Storm Runoff Calculation:	
$Q_{10yr} = C * A * I$	
$Q_{10yr} = 2.51$ cfs	

Proposed Culvert Pipe Capacity Calculation:	
$Q = \frac{1.486 * A * R^2 * S^{1/2}}{n}$	
$Q = 8.05$ cfs > 2.51 cfs <b>OK</b>	

<sup>f</sup>: 10 Yr. storm intensity taken from the MDOT Drainage Manual, Rainfall Intensity Duration Table for Zone 10 and a Tc = 15 Min.

IL-101 TO FES-101A CULVERT DESIGN CALCULATIONS:	
Area:	0.37 Acres
Time of Concentration (Tc): <sup>f</sup>	15 Min.
Roughness Coefficient (C):	0.16
10-yr. Storm Intensity (I) f:	3.38 in/hr.
Pipe Diameter:	12 in.
Pipe Area (A):	0.79 sf.
Wetted Perimeter (πD):	3.14 ft.
Hydraulic Radius (R):	0.25
Pipe Slope (S):	0.0217 ft/ft
Pipe Roughness Coefficient (n):	0.013
Pipe Material:	RCP

Expected Storm Runoff Calculation:	
$Q_{10yr} = C * A * I$	
$Q_{10yr} = 0.20$ cfs	

Proposed Culvert Pipe Capacity Calculation:	
$Q = \frac{1.486 * A * R^2 * S^{1/2}}{n}$	
$Q = 5.25$ cfs > 0.20 cfs <b>OK</b>	

<sup>f</sup>: 10 Yr. storm intensity taken from the MDOT Drainage Manual, Rainfall Intensity Duration Table for Zone 10 and a Tc = 15 Min.

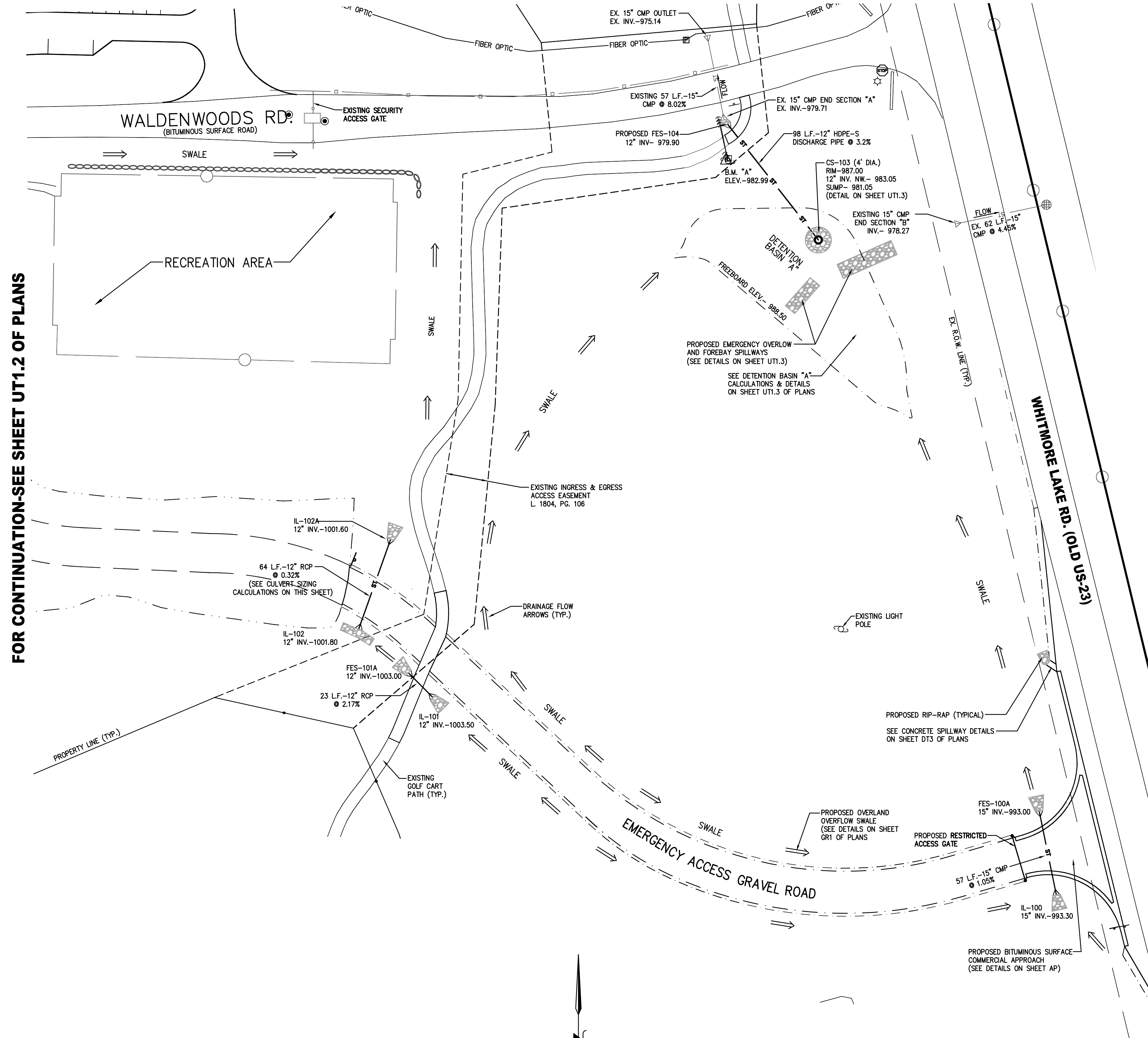
IL-102 TO FES-102A CULVERT DESIGN CALCULATIONS:	
Area:	0.27 Acres
Time of Concentration (Tc): <sup>f</sup>	15 Min.
Roughness Coefficient (C):	0.23
10-yr. Storm Intensity (I) f:	3.38 in/hr.
Pipe Diameter:	12 in.
Pipe Area (A):	0.79 sf.
Wetted Perimeter (πD):	3.14 ft.
Hydraulic Radius (R):	0.25
Pipe Slope (S):	0.0032 ft/ft
Pipe Roughness Coefficient (n):	0.013
Pipe Material:	RCP

Expected Storm Runoff Calculation:	
$Q_{10yr} = C * A * I$	
$Q_{10yr} = 0.21$ cfs	

Proposed Culvert Pipe Capacity Calculation:	
$Q = \frac{1.486 * A * R^2 * S^{1/2}}{n}$	
$Q = 2.02$ cfs > 0.21 cfs <b>OK</b>	

<sup>f</sup>: 10 Yr. storm intensity taken from the MDOT Drainage Manual, Rainfall Intensity Duration Table for Zone 10 and a Tc = 15 Min.

FOR CONTINUATION-SEE SHEET UT1.2 OF PLANS



LEGEND	
	MISC. STRUCTURE (AS LABELED)
	BOLLARD
	SIGN
	SOIL BORING / BENCHMARK W/IDENTIFIER
	LIGHT BASE
	STREET LIGHT
	OVERHEAD TRAFFIC SIGNAL
	UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATCH BOX, MAIL BOX)
	AIR CONDITIONER UNIT
	UTILITY MANHOLE (AS LABELED)
	UTILITY POLE W/GUY WIRE
	OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
	U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
	SANITARY SEWER MANHOLE W/IDENTIFIER
	SANITARY SEWER PIPE
	CLEAN OUT
	STORM WATER MANHOLE W/IDENTIFIER
	CATCH BASIN W/IDENTIFIER
	CONTROL STRUCTURE
	FLARED END SECTION
	STORM WATER DRAINAGE PIPE
	HYDRANT
	WATER SHUT OFF
	WATER VALVE
	WATER VALVE BOX
	WATER MAIN
	GAS SHUT OFF
	U/G GAS
	PROPOSED SANITARY RISER CONNECTION
	PROPOSED WATER RISER
	PROPOSED RECREATIONAL VEHICLE POST
	PROPOSED WATER MAIN
	PROPOSED SANITARY SEWER
	PROPOSED STORM SEWER
	PROPOSED EDGE OF PAVEMENT

BENCHMARKS	
BENCHMARK #1 (SITE)	"X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
BENCHMARK #A:	NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS." ELEVATION = 982.99
BENCHMARK #B:	NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET. ELEVATION = 978.25
BENCHMARK #C:	CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING. ELEVATION = 968.03
BENCHMARK #D:	SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55
BENCHMARK #E:	CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17
BENCHMARK #F:	SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74

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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						



UTILITY PLAN  
(EMERGENCY ACCESS ROAD)

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

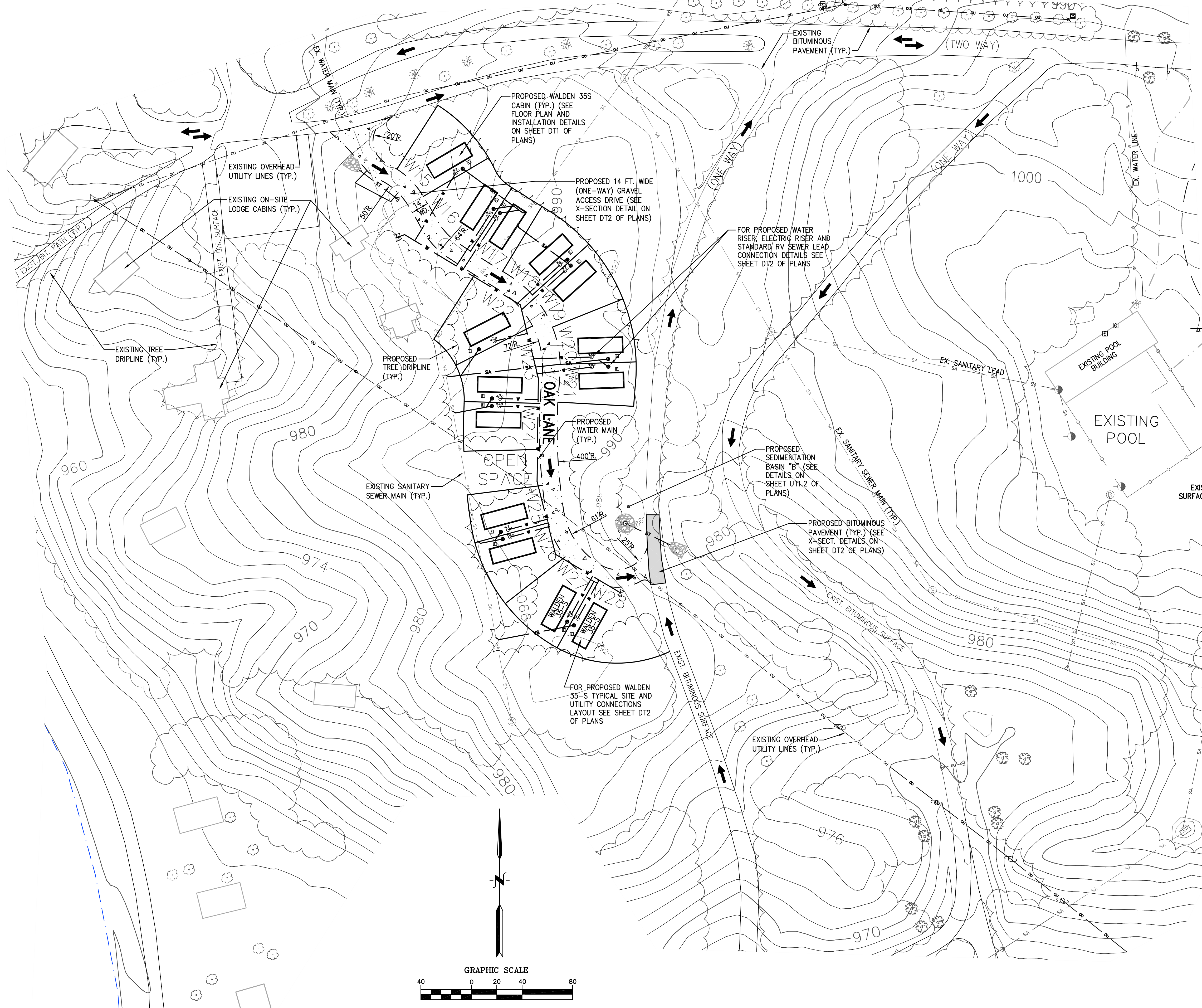
SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-UT1.1  
ISSUED: DEC. 11, 2019

UT1.1

FOR NORTH CAMPGROUND IMPROVEMENTS SEE SHEETS SP2.1 - SP2.3 OF PLANS

**LEGEND**

- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- = SIGN
- = SOIL BORING / BENCHMARK W/IDENTIFIER
- = LIGHT BASE
- = STREET LIGHT
- = OVERHEAD TRAFFIC SIGNAL
- = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- = AIR CONDITIONER UNIT
- = UTILITY MANHOLE (AS LABELED)
- = UTILITY POLE W/OUT WIRE
- = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = DECIDUOUS TREE W/IDENTIFIER
- = CONIFEROUS TREE W/IDENTIFIER
- = BUSH
- = FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- = GUARD RAIL
- = EDGE OF GRAVEL
- = CONCRETE CURB (UNLESS OTHERWISE STATED)
- = SANITARY SEWER MANHOLE W/IDENTIFIER
- = SANITARY SEWER PIPE
- = CLEAN OUT
- = STORM WATER MANHOLE W/IDENTIFIER
- = CATCH BASIN W/IDENTIFIER
- = CONTROL STRUCTURE
- = FLARED END SECTION
- = STORM WATER DRAINAGE PIPE
- = HYDRANT
- = WATER SHUT OFF
- = WATER VALVE
- = WATER VALVE BOX
- = WATER MAIN
- = GAS SHUT OFF
- = U/G GAS
- = SPOT ELEVATION
- = 1' CONTOUR
- = 5' CONTOUR
- = PROPOSED SANITARY RISER CONNECTION
- = PROPOSED WATER RISER
- = PROPOSED RECREATIONAL VEHICLE POST
- = PROPOSED WATER MAIN
- = PROPOSED SANITARY SEWER
- = PROPOSED STORM SEWER
- = PROPOSED EDGE OF PAVEMENT
- = PROPOSED EDGE OF GRAVEL
- = PROPOSED GRAVEL ROAD
- = PROPOSED BITUMINOUS PAVEMENT
- = TRAFFIC FLOW ARROWS



FOR CONTINUATION SEE SHEET SP1.1 OF PLANS

**BENCHMARKS**

- BENCHMARK #1 (SITE): "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE". ELEVATION = 956.03 (NAVD 88)
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- BENCHMARK #D: SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55
- BENCHMARK #E: CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17
- BENCHMARK #F: SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74

FOR PROPOSED DRY HYDRANT IMPROVEMENTS SEE SHEET SP1.3 OF PLANS

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						

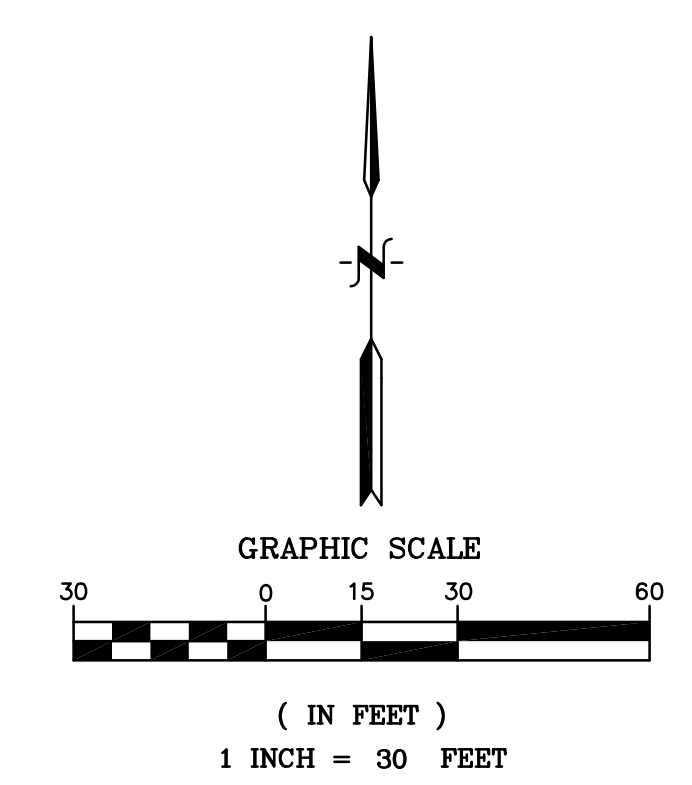
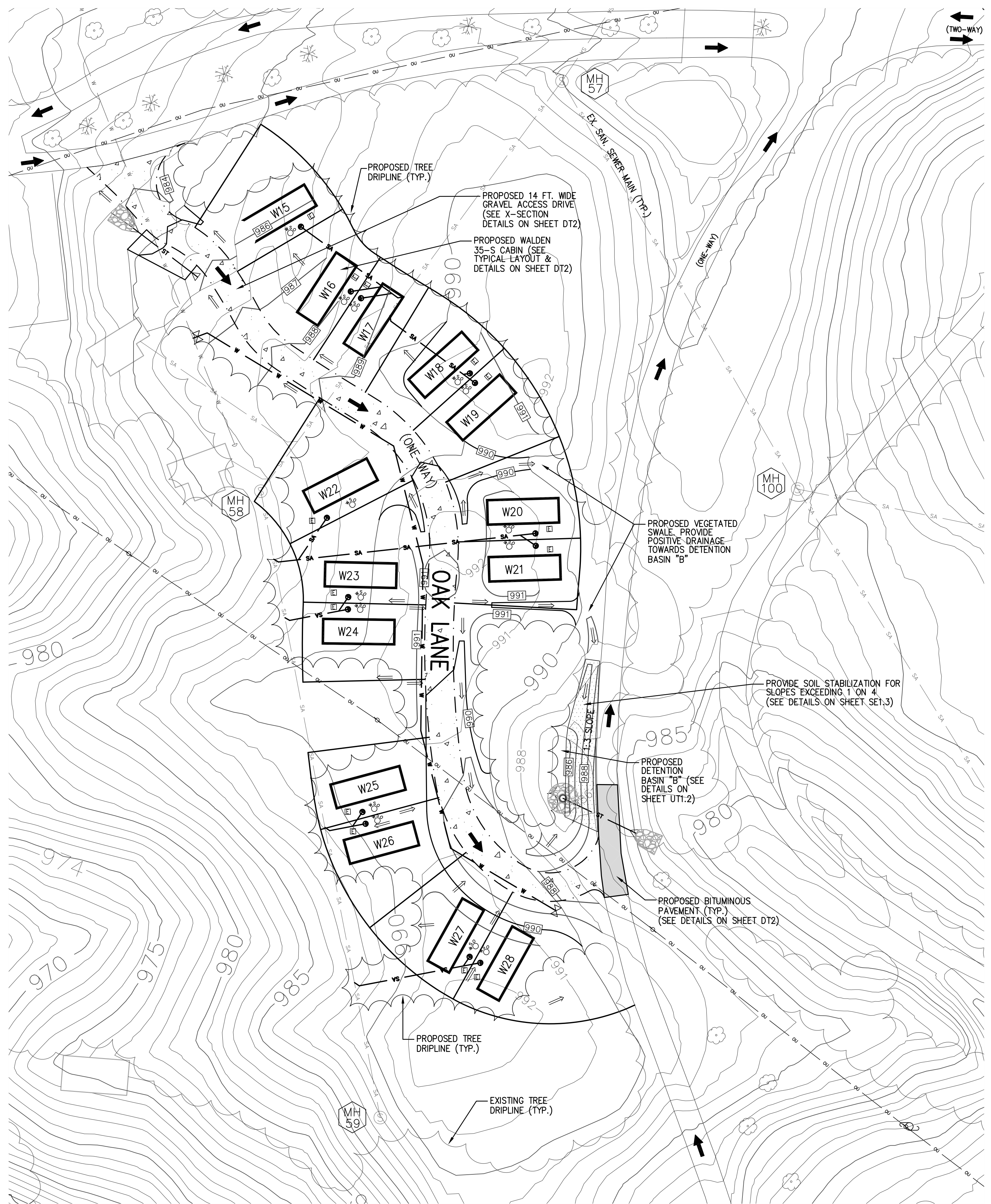


**SITE PLAN (OAK LANE)**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-SP1.1  
ISSUED: DEC. 11, 2019

**SP1.2**



- ### LEGEND
- = MISC. STRUCTURE (AS LABELED)
  - = BOLLARD
  - = STONE
  - = SOIL BORING / BENCHMARK W/IDENTIFIER
  - = LIGHT BASE
  - = STREET LIGHT
  - = OVERHEAD TRAFFIC SIGNAL
  - = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
  - = AIR CONDITIONER UNIT
  - = UTILITY MANHOLE (AS LABELED)
  - = UTILITY POLE W/GUY WIRE
  - = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
  - = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
  - = DECIDUOUS TREE W/IDENTIFIER
  - = CONIFEROUS TREE W/IDENTIFIER
  - = BUSH
  - = FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
  - = GUARD RAIL
  - = EDGE OF GRAVEL
  - = CONCRETE CURB (UNLESS OTHERWISE STATED)
  - = SANITARY SEWER MANHOLE W/IDENTIFIER
  - = SANITARY SEWER PIPE
  - = CLEAN OUT
  - = STORM WATER MANHOLE W/IDENTIFIER
  - = CATCH BASIN W/IDENTIFIER
  - = CONTROL STRUCTURE
  - = FLARED END SECTION
  - = STORM WATER DRAINAGE PIPE
  - = HYDRANT
  - = WATER SHUT OFF
  - = WATER VALVE
  - = WATER VALVE BOX
  - = WATER MAIN
  - = GAS SHUT OFF
  - = U/G GAS
  - = SPOT ELEVATION
  - = 1' CONTOUR
  - = 5' CONTOUR
  - = PROPOSED SANITARY RISER CONNECTION
  - = PROPOSED WATER RISER
  - = PROPOSED RECREATIONAL VEHICLE POST
  - = PROPOSED WATER MAIN
  - = PROPOSED SANITARY SEWER
  - = PROPOSED STORM SEWER
  - = PROPOSED EDGE OF PAVEMENT
  - = PROPOSED GRAVEL ACCESS ROAD
  - = PROPOSED BITUMINOUS PAVEMENT
  - = PROPOSED SPOT ELEVATIONS
  - = PROPOSED FLOW ARROW
  - = TRAFFIC FLOW ARROWS

### BENCHMARKS

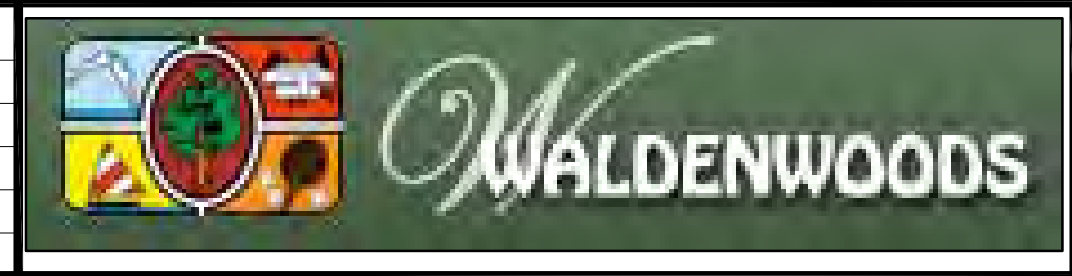
- BENCHMARK #1 (SITE):  
"X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE."  
ELEVATION = 956.03 (NAVD 88)
- BENCHMARK #A:  
NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
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ELEVATION = 948.55
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ELEVATION = 948.17
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SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILION BUILDING.  
ELEVATION = 961.74

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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS
CHECK: WMP			

REVISION #	DATE	REVISION-DESCRIPTION



## GRADING PLAN (OAK LANE)

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=30'  
PROJECT No.: 9173156  
DWG NAME: 3156-GRD  
ISSUED: DEC. 11, 2019

# GR1.2

SEDIMENTATION BASIN 'B' VOLUME CALCULATIONS				
POND DEPTH (FT)	ELEV.	CONTOUR AREA (SF)	INCREMENTAL VOLUME (CF)	TOTAL VOLUME (CF)
Bottom	986.00	286	0	0
1.00	987.00	785	515	515
2.00	988.00	1,928	1,314	1,829
2.50	988.50	2,422	1,085	2,915

Total Designed Detention Volume = **2,915** ft<sup>3</sup>

SEDIMENTATION BASIN 'B' ELEVATION CALCULATIONS				
	ELEV.	VOLUME (CF)	ENTER VOLUME	ELEVATION CALC
First Flush Elevation				
Lower	986.00	0	335	986.65
Higher	987.00	515		

An emergency overland overflow spillway is being proposed at an elevation of 988.50

SEDIMENTATION BASIN 'B' STORM WATER RUN-OFF							
	0.70	0.90	0.80	0.20	0.15	1.00	(ACRES)
Gravel							
Pavement							
Building							
Lawn							
Woods							
Water							
Area							
"C" Factor							
	0.06	0.00	0.08	0.32	0.10	0.00	0.56
							0.33

### Sedimentation Basin "B" Emergency Spillway Calculation

Project: Waldenwoods Expansion  
 Project #: 9173156  
 Date: 3/21/2019

Dimensions for the proposed Spillway have been calculated using the following equation:

$$Q = 3.33 * (L - 0.2H) * H^{1.5}$$

Where:

- C = 0.33
- A = 0.56 Ac.
- I = 4.68 in. (100 Yr. Intensity for Zone 10 & 15 Min. Tc per MDOT Drainage Manual)
- Q = 0.865 cfs (Computed flow per Rational Method and)
- H = 0.50 ft. (Depth of flow)
- L = ft. (Spillway's cross section width)

Therefore:

$$L = 0.2H + \frac{Q}{3.33H^{1.5}}$$

$$L = 1 \text{ ft.}$$

A spillway cross section width of **4 ft.** is being proposed for construction.

### CONTROL STRUCTURE CALCULATIONS (CS-201)

CS-201:  
 Tributary Area: A = 0.56 Acres  
 Compound Runoff Coefficient: C = 0.33  
 Orifice Flow Coefficient: c = 0.60  
 Allowable Outflow Rate: Qa = 0.11 CFS  
 First Flush Volume = 1815 x A x C Vff = 336 CF  
 Low Water Level: LWL = 986.00  
 First Flush Elevation: Xff = 986.65  
 High Water Level (Set @ Freeboard Elevation): HWL = 987.50

FIRST FLUSH:  
 Qff = Vff \* (1 / 24 hrs) \* (1 / 3600 sec) = 0.0039 CFS  
 Hff = Xff - LWL = 0.65 FT  
 Aif = Qff / (c \* SQRT(2 \* 32.2 \* Hff)) = 0.0010 SF  
 Nff = Aif / 0.0031 = 0.32 1.25" Holes

Use Nff = 1 3/4" Holes at Centerline Elevation = 985.90

NOTED: For proposed Control Structure orifice locations, see detail on sheet UT1.2 of plans.

### SEDIMENTATION BASIN 'B' 100 YR. VOLUME CALCULATION

Tributary Area (A) = 0.56 Acres  
 Run-off Coefficient (C) = 0.33  
 Design Constant (K) = 0.19  
 Allowable Outflow Rate (Qo) = 0.11 cfs

### LCDC REQUIREMENTS

100 YEAR STORM						
1	2	3	4	5	6	7
Duration (Minutes)	Duration (Seconds)	Intensity (100-yr Storm) (in/hr)	Col. #2 x Col. #3 (Inches)	Inflow Volume = Col. #4 x K (Cu. Ft.)	Outflow Volume = Col. #2 x Qo (Cu. Ft.)	Storage Volume = Col. #5 - Col. #6 (Cu. Ft.)
5	300	9.17	2.750	509	34	475
10	600	7.86	4.714	872	67	805
15	900	6.88	6.188	1,145	101	1,044
20	1,200	6.11	7.333	1,357	134	1,222
30	1,800	5.00	9.000	1,665	202	1,463
60	3,600	3.24	11.647	2,155	403	1,752
90	5,400	2.39	12.913	2,389	605	1,784
120	7,200	1.90	13.655	2,526	806	1,720
180	10,800	1.34	14.488	2,680	1,210	1,471
240	14,400	1.04	14.943	2,765	1,613	1,152

Note: > Figures in Columns (3) are computed by the formula I = 275 / (t + 25) (i.e. 100-yr Curve)

\* Allowable outflow rate Qo is computed by one of the following cases:

Case 1: Qo = capacity of existing discharge conduit or channel. cfs / Acre

Case 2: Qo = q \* A where q = Permissible discharge rate per acre of tributary area = 0.20 cfs / Acre

### NOTED:

The required 100 Yr. storage is to be provided within existing 'Walden Lake' on-site. A minimum of 5% of the required storage shall be provided for sedimentation prior to discharging to Lake Walden.

Therefore:  
 Required Sedimentation Storage Volume = 1,784 CF x 0.05 = 89 CF  
 Sedimentation for the First Flush of a 100 yr. storm is being proposed.

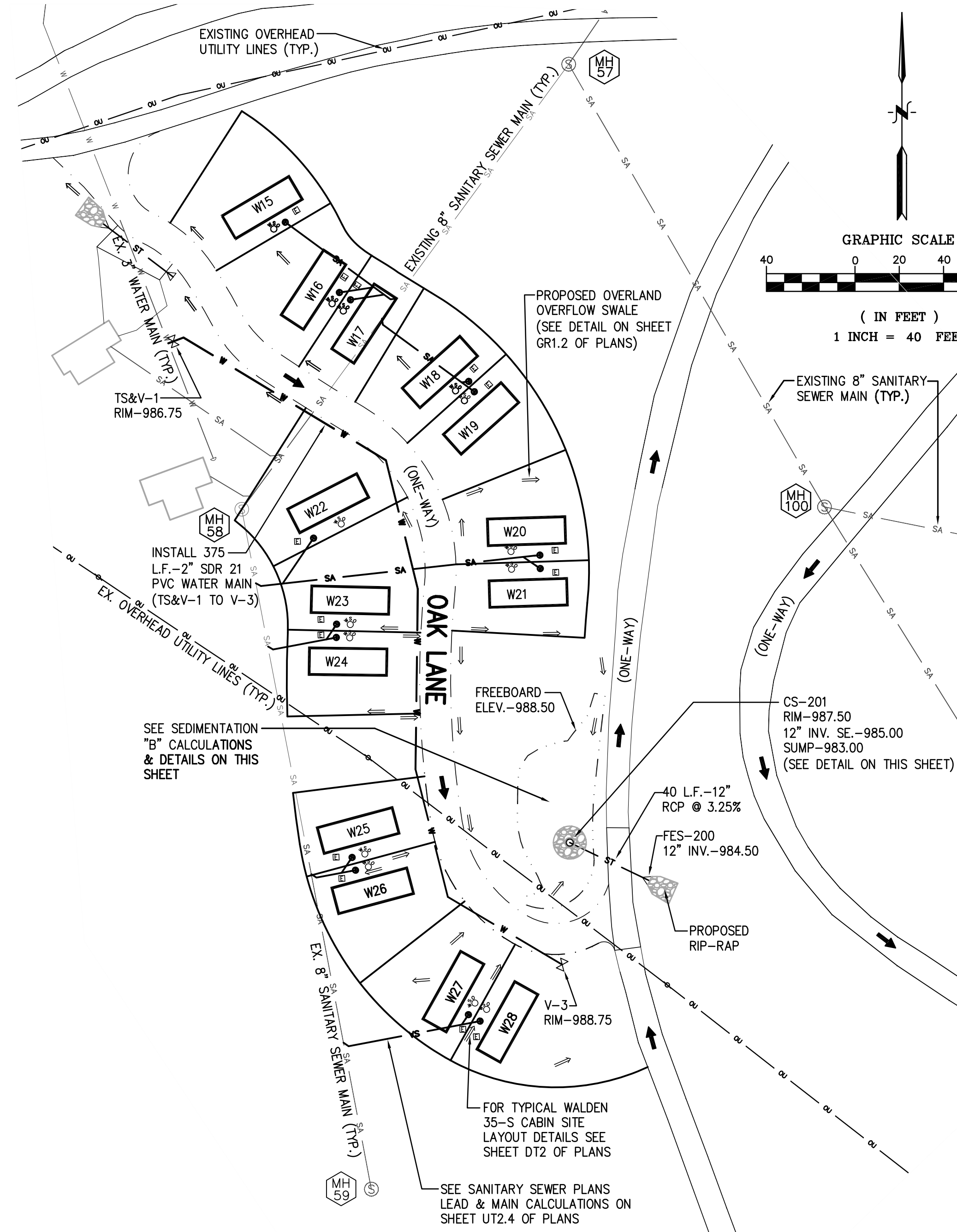
First Flush Volume: (1,815) (A) (C) = 335 cf

(1,815) (0.56) (0.33) = 335 cf

KEY		
CONTROL STRUCTURE DESIGNATION		CS-201
A	MATERIAL TYPE, SEE NOTE 2	CMP
B	STRUCTURE INSIDE DIAMETER	4'
C	RIM ELEVATION WITHOUT GRATE	987.50
D	INVERT ELEVATION OUTLET PIPE	985.00
E	TOP OF STONE ELEVATION	987.00
F	OUTLET PIPE DIAMETER	12"
G	OUTLET PIPE MATERIAL	RCP
H	STRUCTURE HEIGHT WITHOUT GRATE	4.50'
J	SUMP HEIGHT	2'
K	RESTRICTOR OPENING DIA. IN OUTLET PIPE	N/A
L	FIRST ROW OF HOLES	
	CENTERLINE ELEVATION	N/A
	HOLE DIAMETER	N/A
	NUMBER OF HOLES IN ROW	N/A
M	SECOND ROW OF HOLES	
	CENTERLINE ELEVATION	N/A
	HOLE DIAMETER	N/A
	NUMBER OF HOLES IN ROW	N/A
N	THIRD ROW OF HOLES	
	CENTERLINE ELEVATION	N/A
	HOLE DIAMETER	N/A
	NUMBER OF HOLES IN ROW	N/A

### CONTROL STRUCTURE NOTES:

- Control Structure and Grate shall be factory built. Contractor shall provide Engineer with Shop Drawings for Control Structure and Grate. Contractor shall obtain Engineer's Approval of Shop Drawings prior to Control Structure installation.
- Control Structure shall be constructed of material noted in Item A of KEY. CMP shall be corrugated metal pipe with corrosion resistant coating and shall conform to the specifications for corrugated metal pipe per AASHTO Designation M26. HDPE shall be high density polyethylene pipe with a smooth interior and shall conform to the specifications for high density polyethylene pipe per AASHTO Designation M294 Type S.
- Control Structure Base shall be a reinforced 3000 PSI air entrained concrete base. Control Structure shall be embedded into the concrete base providing a full strength water tight connection as illustrated in the Basin Control Structure Detail.
- Provide a watertight connection between the Control Structure and Outlet Pipe as follows:  
 For a CMP Outlet Pipe from a CMP Control Structure: Factory weld a CMP Pipe Stub to the Control Structure with full strength continuous weld all around Pipe Stub. Coat welded area with corrosion resistant paint. OR Provide a bolted CMP saddle with watertight gasket.  
 For an HDPE Outlet Pipe from an HDPE Control Structure: Factory weld an HDPE pipe stub to the Control Structure with full strength PE weld all around pipe both inside and outside of Control Structure. OR Provide a bolted HDPE saddle with watertight gasket.  
 For an RCP Outlet Pipe from a CMP or HDPE Control Structure: Seal Outlet Pipe to outside of Control Structure with an 18" minimum thickness 2500 PSI cast in place concrete donut all around Outlet Pipe. AND Seal Outlet Pipe to inside of Control Structure with a 2" minimum thickness bead of bitumastic tar all around Outlet Pipe.
- Construct berm over Outlet Pipe as necessary to provide 12" minimum cover.
- Grate shall be built to fit over the outside edge of the Control Structure and to be secured to the Control Structure with six (6) 1/4" minimum diameter removable galvanized screws. All joints shall be welded full strength per current AWS code. Grate shall be factory coated with bitumastic or corrosion resistant paint. Grate shall be constructed of 1/2" minimum diameter round or square steel bar creating a square grid pattern with a maximum 3"x3" opening size. Outside of Grate shall be wrapped with a 1/4" minimum x 3" minimum flat stock steel.



FOR CONTINUATION-SEE SHEET UT1.1 OF PLANS

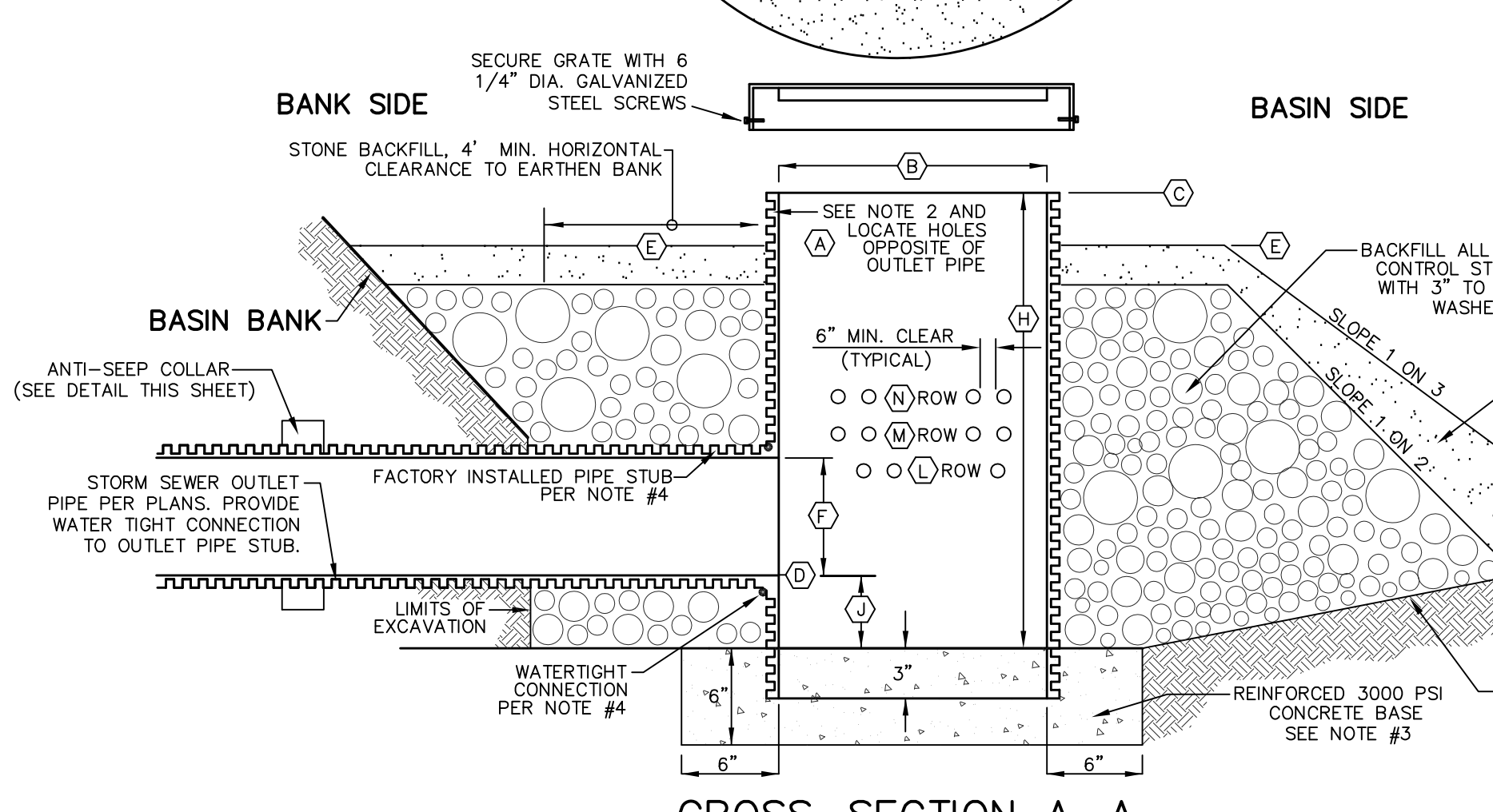
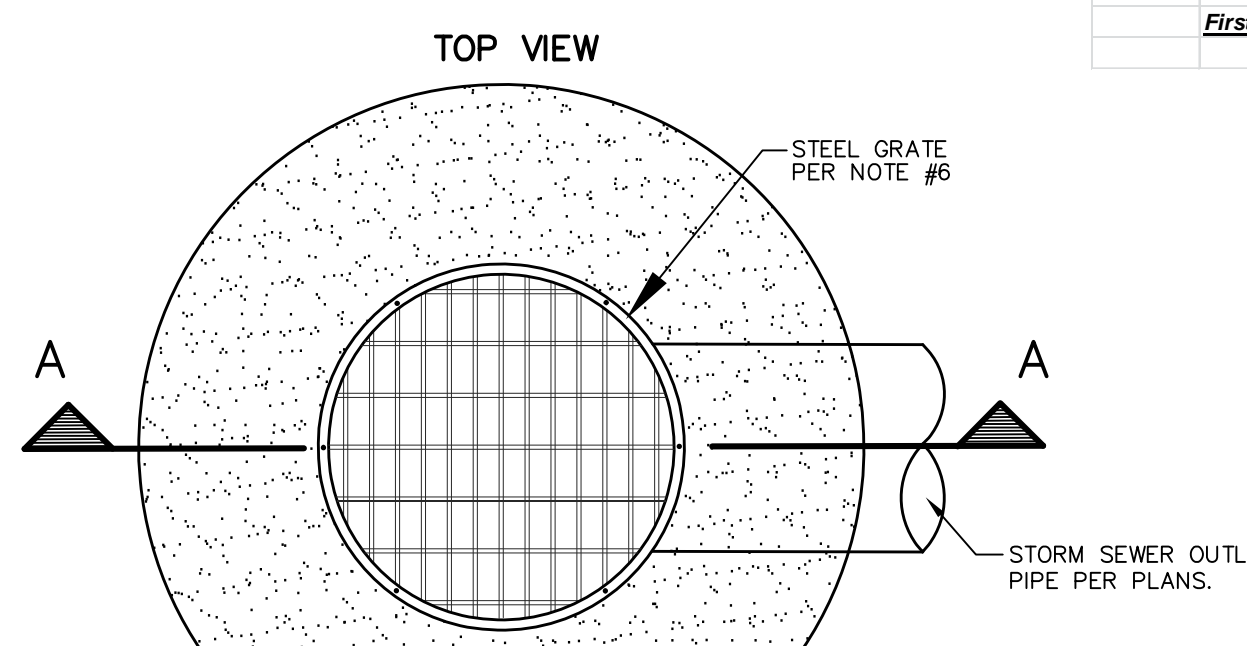
### LEGEND

- MISC. STRUCTURE (AS LABELED)
- BOLLARD
- SIGN
- SOIL BORING / BENCHMARK W/IDENTIFIER
- LIGHT BASE
- STREET LIGHT
- OVERHEAD TRAFFIC SIGNAL
- UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- AIR CONDITIONER UNIT
- UTILITY MANHOLE (AS LABELED)
- UTILITY POLE W/GUY WIRE
- OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- SANITARY SEWER MANHOLE W/IDENTIFIER
- SANITARY SEWER PIPE
- CLEAN OUT
- STORM WATER MANHOLE W/IDENTIFIER
- CATCH BASIN W/IDENTIFIER
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- PROPOSED RECREATIONAL VEHICLE POST
- PROPOSED WATER MAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED EDGE OF PAVEMENT

### BENCHMARKS

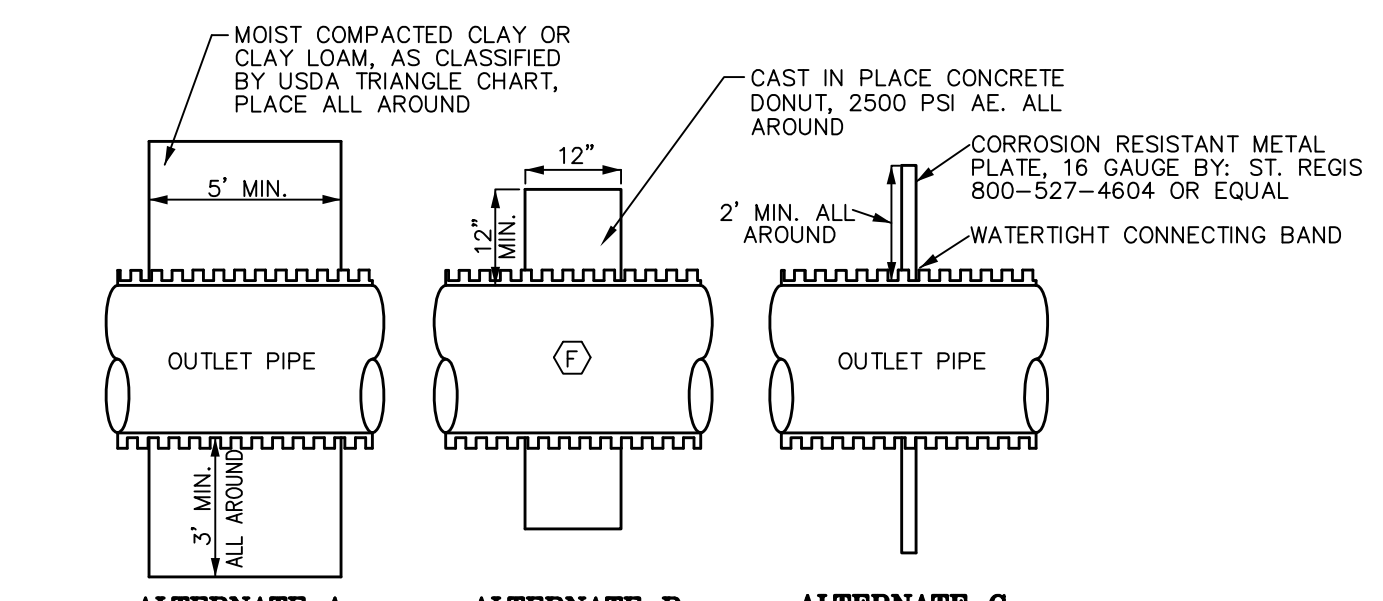
- BENCHMARK #1 (SITE): 2" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
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- BENCHMARK #B: NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET. ELEVATION = 978.25
- BENCHMARK #C: CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING. ELEVATION = 968.03
- BENCHMARK #D: SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55
- BENCHMARK #E: CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17
- BENCHMARK #F: SOUTHWEST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHWEST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74

NOTED: SEE SHEET UT2.4 FOR SANITARY & STORM SEWER CALCULATIONS.



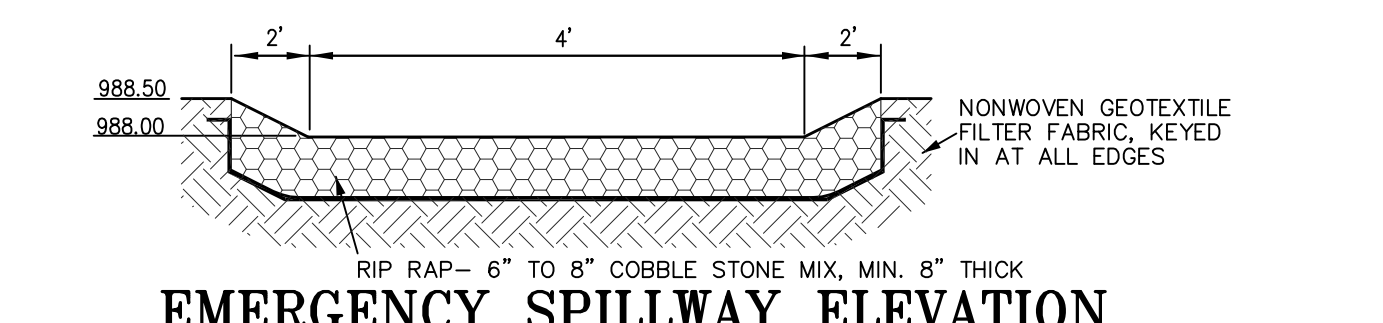
### BASIN CONTROL STRUCTURE DETAIL (CS-201)

NOT TO SCALE



### ANTI SEEP COLLAR

NOTE: LOCATE ONE COLLAR AROUND OUTLET PIPE AT CENTER OF BASIN BERM: INCIDENTAL TO CONTROL STRUCTURE.



DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION
	1	12/04/19	REVISED NOTE SHOWING STORM & SANITARY SEWER CALCS ON UT2.4
	2	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS

REVISION #	DATE	REVISION-DESCRIPTION



UTILITY PLAN (OAK LANE)

CLIENT: WALDENWOODS PROPERTIES  
 C/O BRIAN CROUSE  
 9840 CROUSE ROAD  
 HOWELL, MI. 48855  
 810-632-6135

SCALE: 1"=40'  
 PROJECT No.: 9173156  
 DWG NAME: 3156-UT1.1  
 ISSUED: DEC. 04, 2019

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### CONTROL STRUCTURE CALCULATIONS (CS-103)

CS-103:  
 Tributary Area: A = 4.58 Acres  
 Compound Runoff Coefficient: C = 0.23  
 Orifice Flow Coefficient: c = 0.80  
 Allowable Outflow Rate: Qa = 0.92 CFS

100 Year Flood Volume: V100 = 9,130 CF  
 Bankfull Flood Volume = 8,160 x A x C  
 First Flush Volume = 1,915 x A x C

Low Water Level: LWL = 984.00  
 First Flush Elevation: XF = 985.08  
 Bankfull Flood Elevation: Xbf = 986.50  
 100 Year Flood Elevation: X100 = 986.50  
 High Water Level (Set @ Freeboard Elev.): HWL = 988.50

FIRST FLUSH:  
 Qff = Vff \* (1/24 hrs) \* (1/3600 sec) = 0.0221 CFS  
 Hff = Xff - LWL = 1.08 FT  
 Aff = Qff / (c \* SQRT(2 \* 32.2 \* Hff)) = 0.0044 SF  
 Nff = Aff / 0.0054 = 0.82 1" Holes

Use Nff = 1 1" Holes at Centerline Elevation = 984.04  
 Approx. First Flush Detention Duration = 19.46 hours

BANKFULL FLOOD:  
 H = Xbf - LWL = 2.60 FT  
 Qblw = c \* Nff \* 0.0054 \* SQRT(2 \* 32.2 \* h) = 0.0419 CFS  
 Qblw \* 24 hrs \* (3600 sec / 1 hr) = 3.621 CF  
 Vbneeded = Qblw / Vbprovided = 4.975 CF

Qbf = Vbneeded \* (1/24 hrs) \* (1/3600 sec) = 0.0576 CFS  
 Hbf = Xbf - Xff = 1.52 FT  
 Abf = Qbf / (c \* SQRT(2 \* 32.2 \* Hbf)) = 0.0097 SF  
 Nbf = Abf / 0.0123 = 0.79 1-1/2" Holes

Use Nbf = 1 1-1/2" Holes at Centerline Elevation = 985.14  
 Approx. Bankfull Detention Duration = 38.45 hours

100 YEAR FLOOD:  
 Qff + Qbf = [c \* Nff \* 0.0054 \* SQRT(2 \* 32.2 \* (HWL - LWL))] + [c \* Nbf \* 0.0123 \* SQRT(2 \* 32.2 \* (HWL - Xff))] = 0.1647 CFS  
 Q100needed = Qa - (Qff + Qbf) = 0.7513 CFS  
 H100 = HWL - Xbf = 1.90 FT  
 A100needed = Q100needed / (c \* SQRT(2 \* 32.2 \* H25)) = 0.1131 SF  
 N100needed = A100needed / 0.022 = 5.14 2" Holes

Use N100 = 5 2" Holes at Centerline Elevation = 986.68

### DETENTION BASIN 'A' 100 YR. VOLUME CALCULATION

Tributary Area (A) = 4.58 Acres  
 Run-off Coefficient (C) = 0.23  
 Design Constant (K) = 1.07  
 Allowable Outflow Rate (Qa) = 0.92 cfs

100 YEAR STORM						
Duration (Minutes)	Duration (Seconds)	Intensity (100-yr Storm) (in/hr)	Col #2 x Col #3 (inches)	Col #4 x Col #5 (Cu. Ft.)	Outflow Volume = Col #4 x Qa (Cu. Ft.)	Storage Volume = Col #5 - Col #4 (Cu. Ft.)
5	300	9.17	2.750	2,534	275	2,259
10	600	7.86	4.714	3,020	550	4,481
15	900	6.88	6.358	3,602	824	5,778
20	1,200	6.13	7.333	3,825	1,099	6,725
30	1,800	5.00	9.500	4,603	1,649	7,254
60	3,600	3.24	11.547	12,427	3,238	9,190
90	5,400	2.29	12.913	13,778	4,948	8,830
120	7,200	1.80	13.695	14,570	5,595	7,975
180	10,800	1.34	14.488	15,458	6,893	5,565
240	14,400	1.04	14.943	15,945	7,920	2,754

Note: Figures in Columns (3) are computed by the formula  $I = 275 / (t + 25)$  (i.e. 100-yr Curve)

\* Allowable outflow rate Qa is computed by one of the following cases:  
 Case 1: Qa = capacity of existing discharge conduit or channel. cfs / Acre  
 Case 2: Qa = q \* A, where q = Permissible discharge rate per acre of tributary area = 0.20 cfs / Acre

First Flush Volume: (1,915) (A) (C) = 1,915 cf  
 (1,915) (4.58) (0.23) = 1,912 cf

Bankfull Volume: (8,160) (A) (C) = 8,160 cf  
 (8,160) (4.58) (0.23) = 8,596 cf

Sedimentation Volume Required:  
 A minimum 5% of the total 100 yr. storm shall be provided  
 (8,130) (0.05) = 407 cf

### DETENTION BASIN 'A' 10 YR. VOLUME CALCULATION

Tributary Area (A) = 4.58 Acres  
 Run-off Coefficient (C) = 0.23  
 Design Constant (K) = 1.07  
 Allowable Outflow Rate (Qa) = 0.92 cfs

10 YEAR STORM						
Duration (Minutes)	Duration (Seconds)	Intensity (10-yr Storm) (in/hr)	Col #2 x Col #3 (inches)	Col #4 x Col #5 (Cu. Ft.)	Outflow Volume = Col #4 x Qa (Cu. Ft.)	Storage Volume = Col #5 - Col #4 (Cu. Ft.)
5	300	5.83	1.750	1,887	275	1,612
10	600	5.00	3.500	2,201	550	1,651
15	900	4.38	3.938	4,291	824	3,467
20	1,200	3.86	4.667	4,979	1,099	3,880
30	1,800	3.18	5.727	6,111	1,649	4,462
60	3,600	2.08	7.412	7,908	3,238	4,671
90	5,400	1.50	8.217	8,768	4,948	3,820
120	7,200	1.21	8.595	9,272	5,595	2,977
180	10,800	0.88	9.220	8,837	6,893	-56
240	14,400	0.68	9.599	10,147	7,920	-3,044

Note: Figures in Columns (3) are computed by the formula  $I = 175 / (t + 25)$  (i.e. 10-yr Curve)

\* Allowable outflow rate Qa is computed by one of the following cases:  
 Case 1: Qa = capacity of existing discharge conduit or channel. cfs / Acre  
 Case 2: Qa = q \* A, where q = Permissible discharge rate per acre of tributary area = 0.20 cfs / Acre

### Detention Basin 'A' Emergency Overflow and Forebay Spillway Calculation

Project: Waldenwoods Expansion  
 Project #: 9173156  
 Date: 10/2/2019

Dimensions for the proposed Spillway have been calculated using the following equation:  
 $Q = 3.33 * (L - 0.2H) * H^{1.5}$

Where:  
 C = 0.23  
 A = 4.88 Ac.  
 I = 4.88 in. (100 Yr. Intensity for Zone 10 & 15 Min. To per MDOT Drainage Manual)  
 Q = 4.93 cfs (Computed flow per Rational Method and)  
 H = 0.5 ft. (Depth of flow)  
 L = ft. (Spillway's cross section width)

Therefore:  
 $L = 0.2H + \frac{Q}{3.33H^{1.5}}$   
 L = 4 ft.

### DETENTION BASIN 'A' CALCULATIONS

#### FOREBAY VOLUME CALCULATIONS

POND DEPTH (FT)	ELEV.	CONTOUR AREA (SF)	INCREMENTAL VOLUME (CF)	TOTAL VOLUME (CF)
Bottom	986.00	625	0	0
1.00	987.00	2,390	1,412	1,412
1.50	987.50	3,147	1,380	2,792

Total Designed Detention Volume = 2,792 ft<sup>3</sup>

#### OVERALL VOLUME CALCULATIONS

POND DEPTH (FT)	ELEV.	CONTOUR AREA (SF)	INCREMENTAL VOLUME (CF)	TOTAL VOLUME (CF)
Bottom	984.00	1,108	0	0
1.00	985.00	2,259	1,650	1,650
2.00	986.00	4,429	3,284	4,934
3.00	987.00	8,002	6,128	11,062
4.00	988.00	11,263	9,586	20,648
HWL	988.50	11,996	5,814	26,462

Total Designed Detention Volume = 26,462 ft<sup>3</sup>

#### OVERALL ELEVATION CALCULATIONS

	ELEV.	VOLUME (CF)	ENTER VOLUME	ELEVATION CALC.
Spillway Elevation				
Lower	986.00	625	457	985.90
Higher	987.00	2,390		
First Flush Elevation				
Lower	985.00	1,650	1,912	985.08
Higher	986.00	4,934		
10 Yr. Elevation				
Lower	985.00	1,650	4,611	985.90
Higher	986.00	4,934		
Bankfull Elevation				
Lower	986.00	4,934	8,596	986.60
Higher	987.00	11,062		
100 Yr. Elevation				
Lower	986.00	4,934	9,130	986.68
Higher	987.00	11,062		

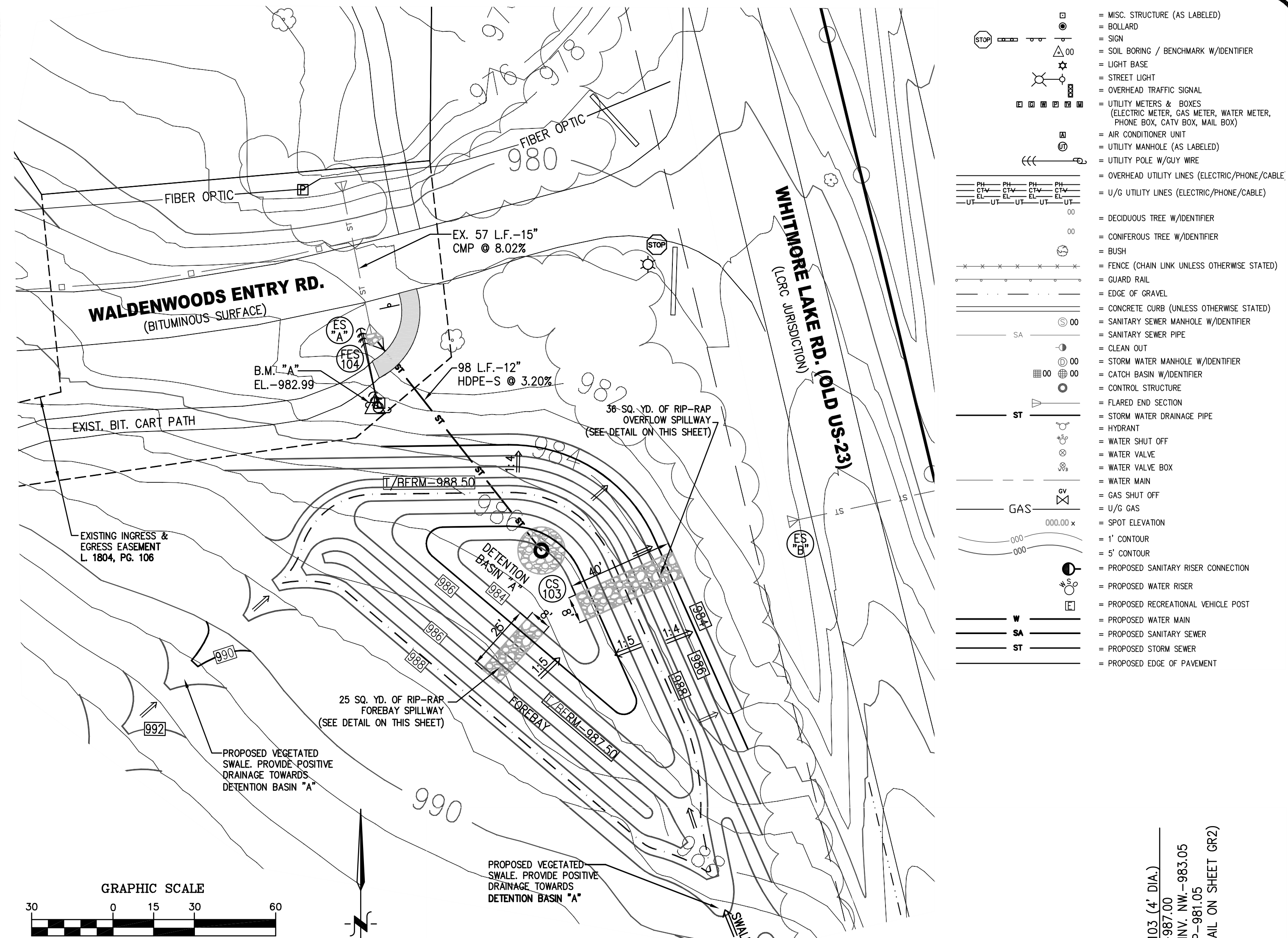
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Higher	986.00	4,934		
Bankfull Elevation				
Lower	986.00	4,934	8,596	986.60
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100 Yr. Elevation				
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Lower	986.00	4,934	8,596	986.60
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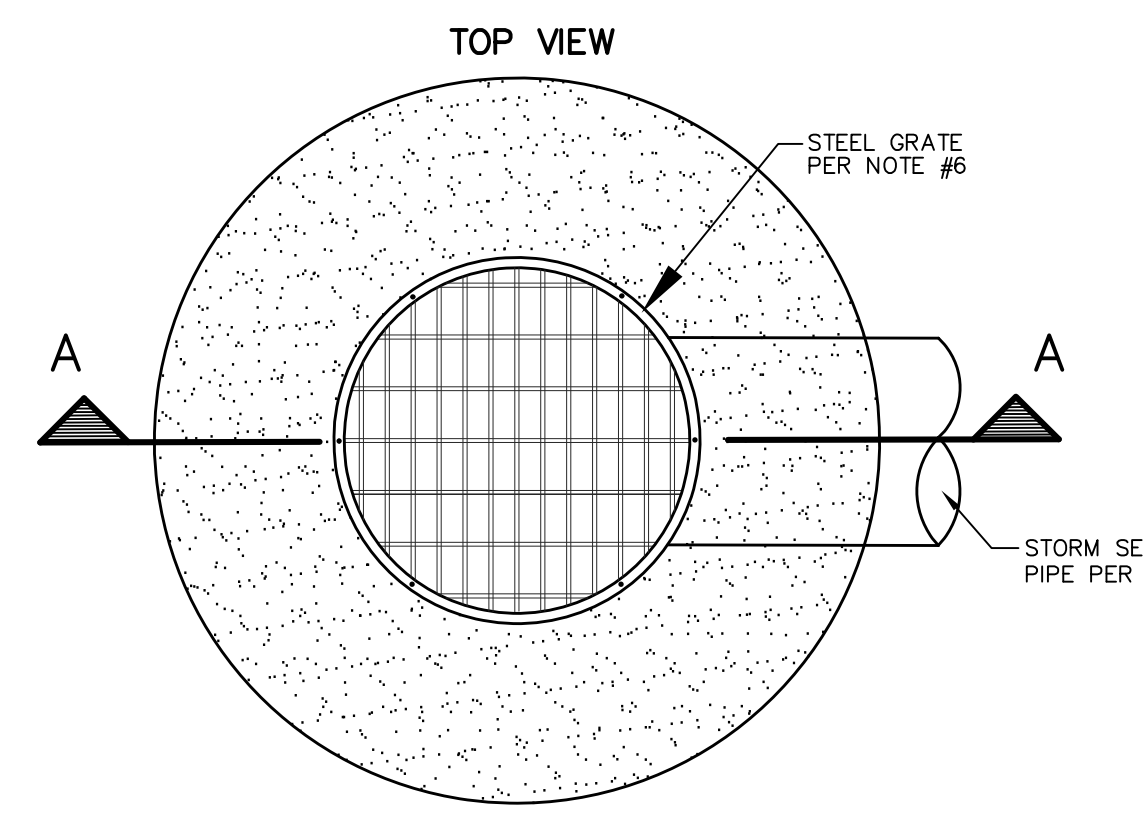
\* A forebay spillway elevation of 987.50 is being proposed.  
 \* An emergency overland overflow spillway is being proposed at an elevation of 988.50



**NOTED:** For proposed Control Structure office locations, see detail on this sheet.

### BENCHMARKS

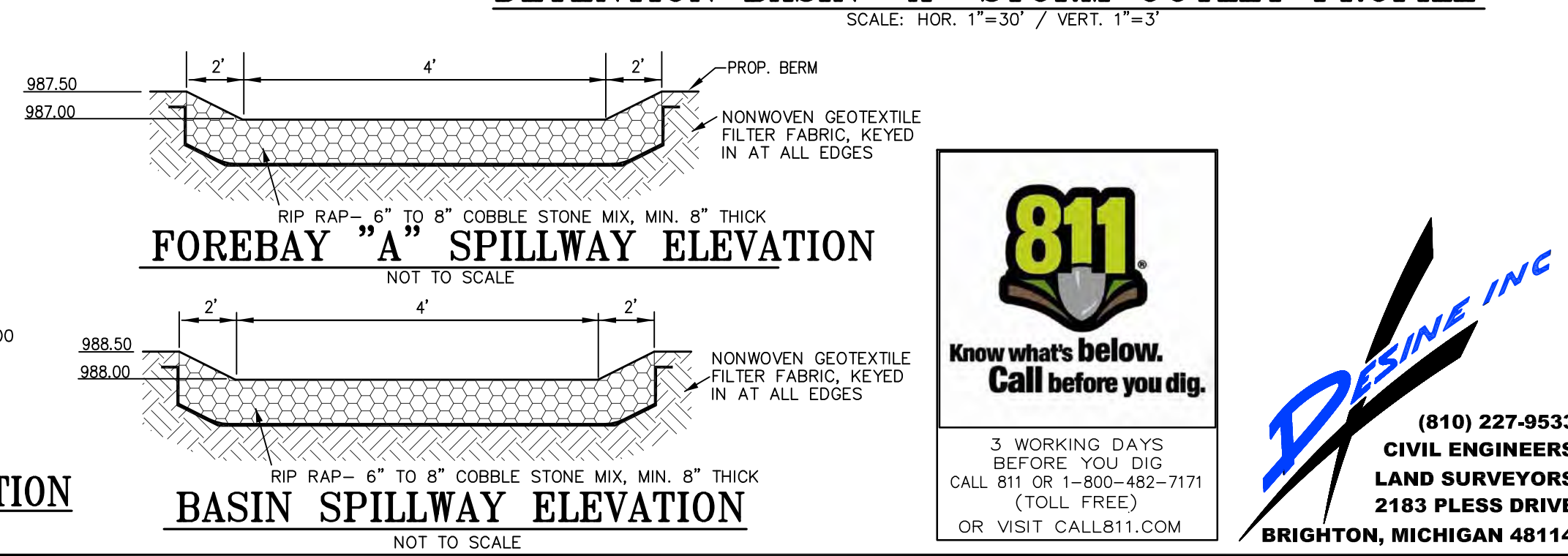
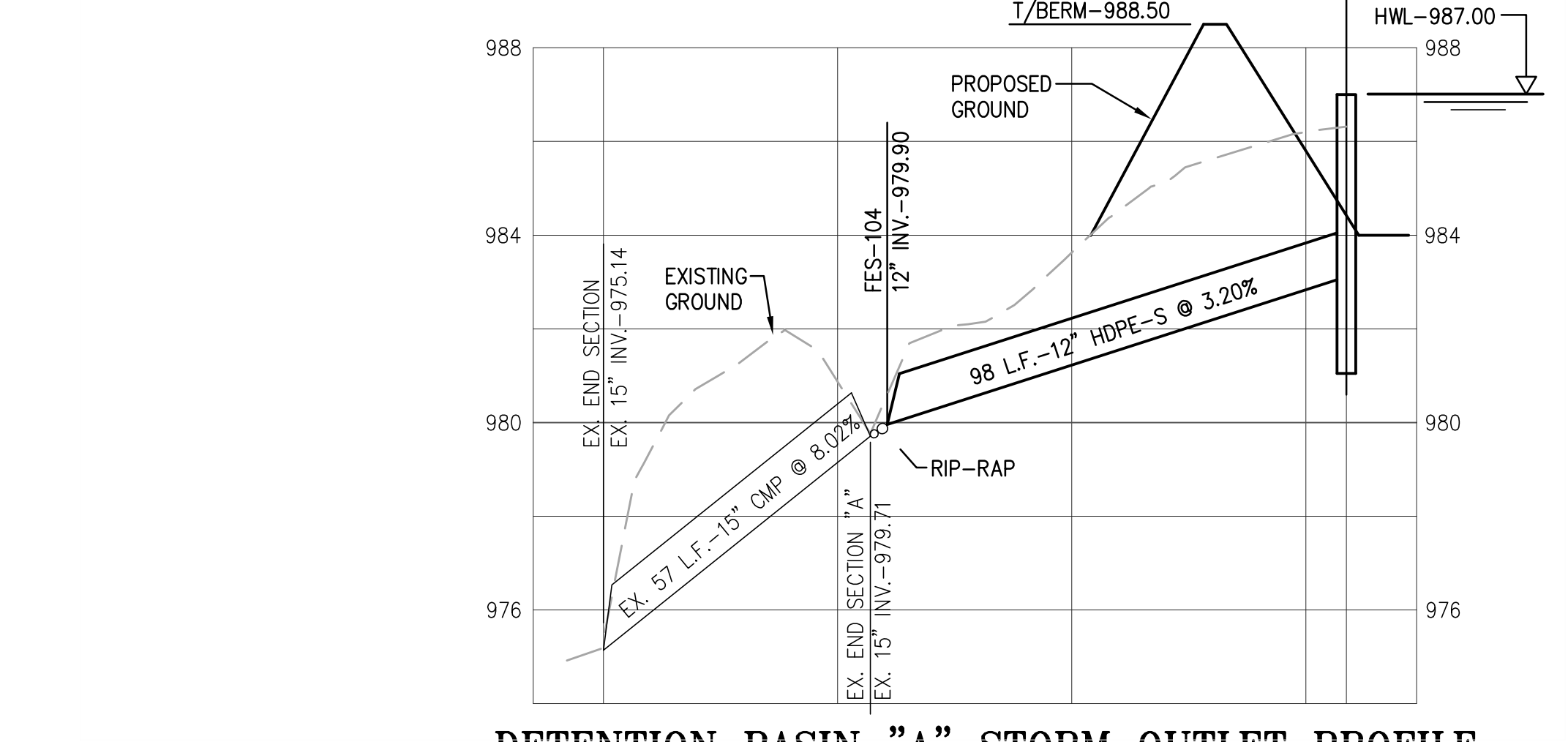
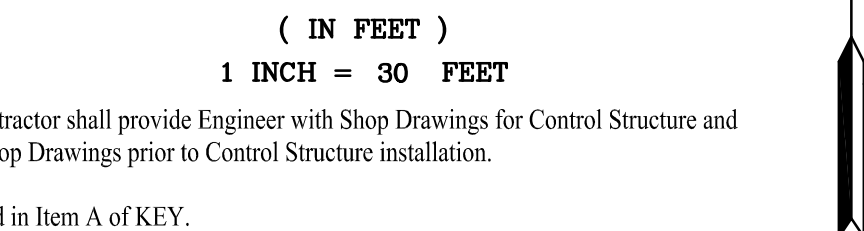
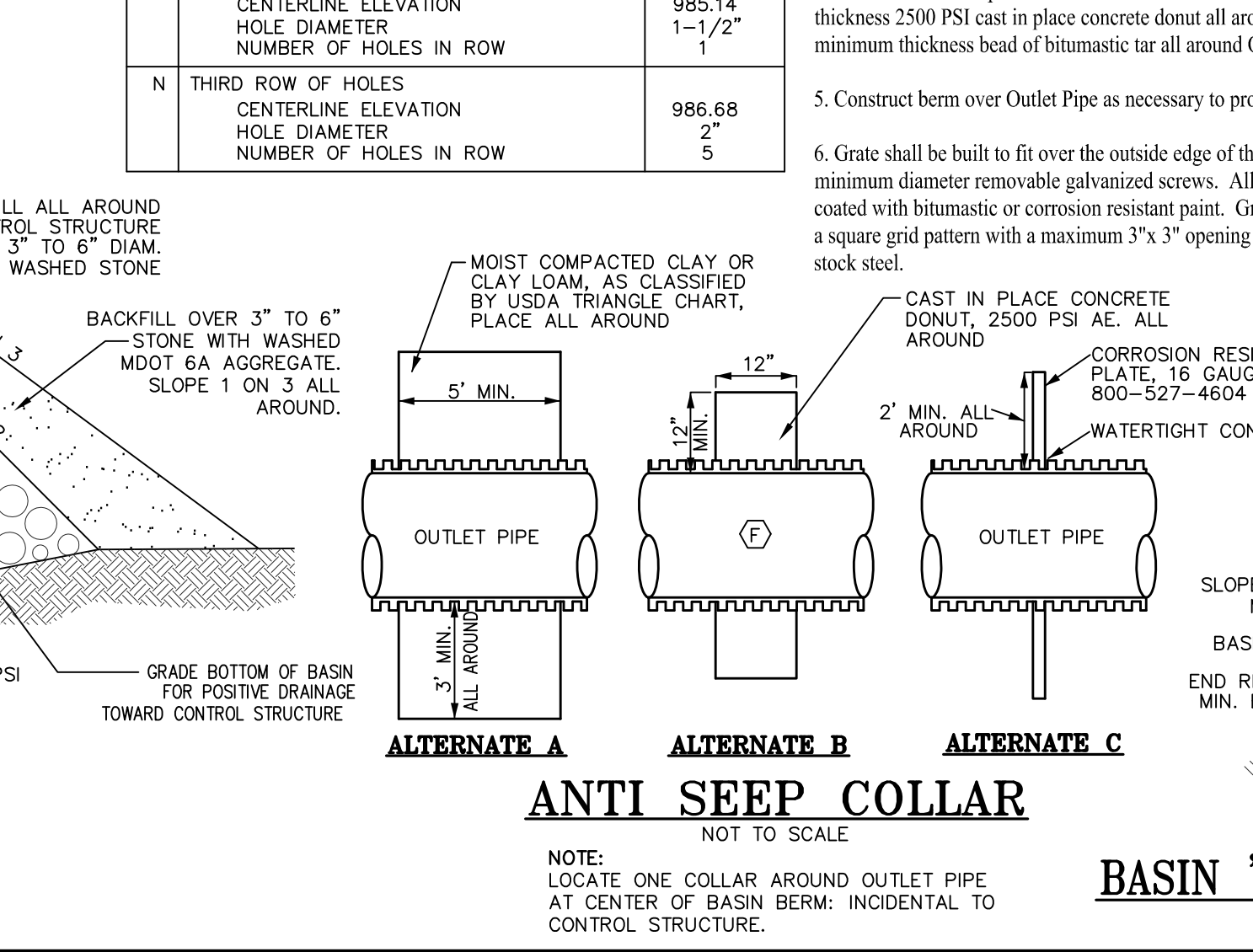
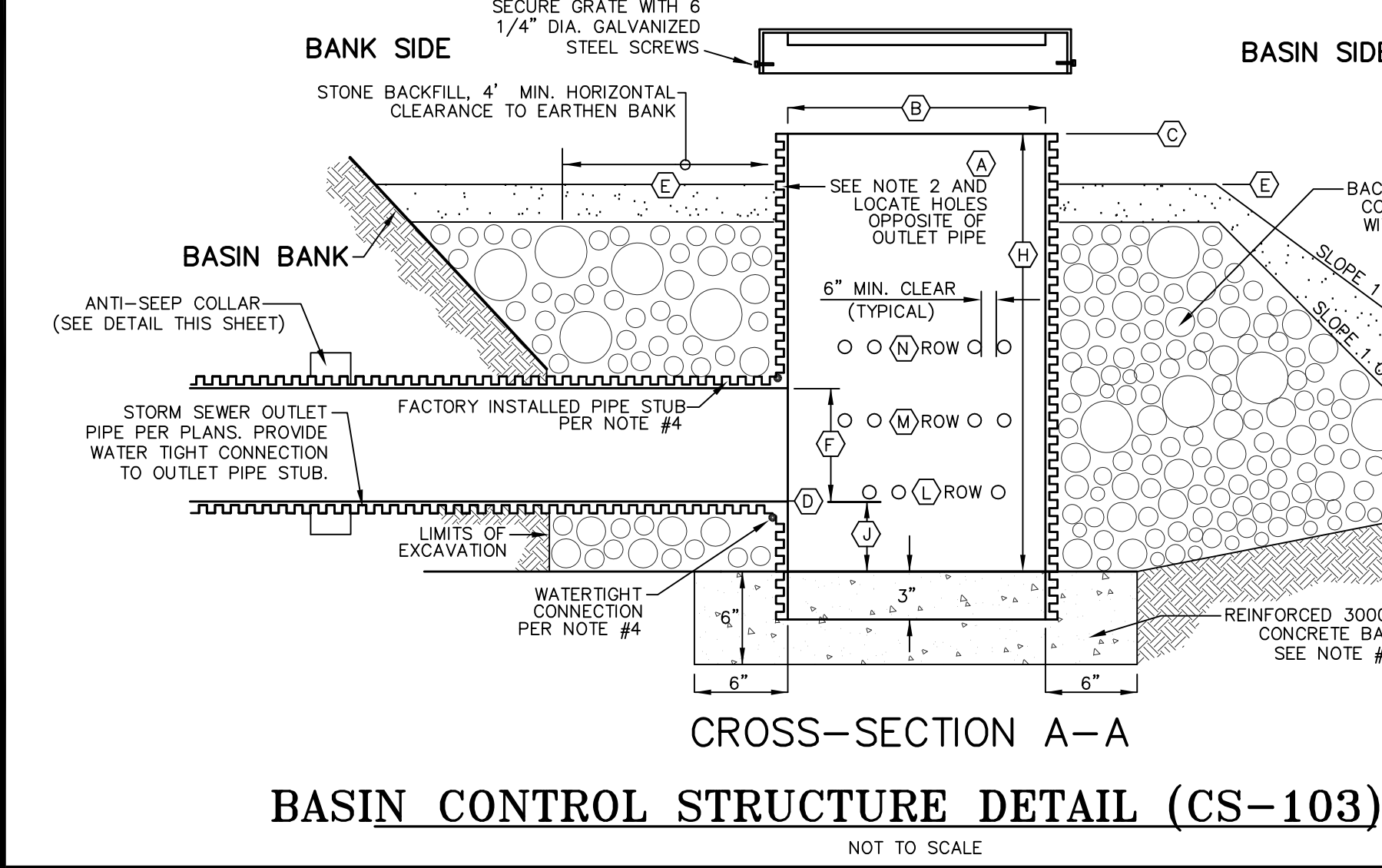
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### KEY

CONTROL STRUCTURE DESIGNATION	CS-103
A MATERIAL TYPE - SEE NOTE 2	CMP
B STRUCTURE INSIDE DIAMETER	4'
C RIM ELEVATION WITHOUT GRATE	987.00
D INVERT ELEVATION OUTLET PIPE	983.05
E TOP OF STONE ELEVATION	986.50
F OUTLET PIPE DIAMETER	12"
G OUTLET PIPE MATERIAL	HDPE-S
H STRUCTURE HEIGHT WITHOUT GRATE	5.10'
J SUMP HEIGHT	2'
K RESTRICTOR OPENING DIA. IN OUTLET PIPE	N/A
L FIRST ROW OF HOLES	
CENTERLINE ELEVATION	984.04
HOLE DIAMETER	1"
NUMBER OF HOLES IN ROW	1
M SECOND ROW OF HOLES	
CENTERLINE ELEVATION	985.14
HOLE DIAMETER	1-1/2"
NUMBER OF HOLES IN ROW	1
N THIRD ROW OF HOLES	
CENTERLINE ELEVATION	986.68
HOLE DIAMETER	2"
NUMBER OF HOLES IN ROW	5

- ### CONTROL STRUCTURE NOTES:
- Control Structure and Grate shall be factory built. Contractor shall provide Engineer with Shop Drawings for Control Structure and Grate. Contractor shall obtain Engineer's Approval of Shop Drawings prior to Control Structure installation.
  - Control Structure shall be constructed of material noted in Item A of KEY. CMP shall be corrugated metal pipe with corrosion resistant coating and shall conform to the specifications for corrugated metal pipe per AASHTO Designation M36. HDPE shall be high density polyethylene pipe with a smooth interior and shall conform to the specifications for high density polyethylene pipe per AASHTO Designation M294 Type S.
  - Control Structure Base shall be a reinforced 3000 PSI air entrained concrete base. Control Structure shall be embedded into the concrete base providing a full strength water tight connection as illustrated in the Basin Control Structure Detail.
  - Provide a watertight connection between the Control Structure and Outlet Pipe as follows:  
 For a CMP Outlet Pipe from a CMP Control Structure: Factory weld a CMP Pipe Stub to the Control Structure with full strength continuous weld all around Pipe Stub. Coat welded area with corrosion resistant paint. OR Provide a bolted CMP saddle with watertight gasket.  
 For an HDPE Outlet Pipe from an HDPE Control Structure: Factory weld an HDPE pipe stub to the Control Structure with full strength PE weld all around pipe both inside and outside of Control Structure. OR Provide a bolted HDPE saddle with watertight gasket.  
 For an RCP Outlet Pipe from a CMP or HDPE Control Structure: Seal Outlet Pipe to outside of Control Structure with an 18" minimum thickness 2500 PSI cast in place concrete donut all around Outlet Pipe. AND Seal Outlet Pipe to inside of Control Structure with a 2" minimum thickness bead of bitumastic tar all around Outlet Pipe.
  - Construct berm over Outlet Pipe as necessary to provide 12" minimum cover.
  - Grate shall be built to fit over the outside edge of the Control Structure and to be secured to the Control Structure with six (6) 1/4" minimum diameter removable galvanized screws. All joints shall be welded full strength per current AWS code. Grate shall be factory coated with bitumastic or corrosion resistant paint. Grate shall be constructed of 1/2" minimum diameter round or square steel bar creating a square grid pattern with a maximum 3" x 3" opening size. Outside of Grate shall be wrapped with a 1/4" minimum x 3" minimum flat stock steel.



DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						



### DETENTION BASIN 'A' PLAN, NOTES & DETAILS

CLIENT: WALDENWOODS PROPERTIES  
 C/O BRIAN CROUSE  
 9840 CROUSE ROAD  
 HOWELL, MI. 48855  
 810-632-6135

PROJECT No.: 9173156  
 DWG NAME: 3156-UT1.3  
 ISSUED: DEC. 11, 2019

SCALE: 1"=30'  
 PROJECT No.: 9173156  
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 BRIGHTON, MICHIGAN 48114

UT1.3

LAKE WALDEN  
WATER ELEV. -950.0±

271 LF. 10" SDR 21 PVC DRY HYDRANT LEAD

SAW CUT, REMOVE & REPLACE EXISTING BITUMINOUS PATH AS REQUIRED FOR WATER LINE CONSTRUCTION. (SEE PAVEMENT X-SECTION ON SHEET DT2)

PROPOSED DRY HYDRANT- INSTALL ONE ADAPTER, 6" NH(f) X 4.5" NH(m) WITH ROCKET LUGS (SEE SCHEMATIC LAYOUT ON THIS SHEET)

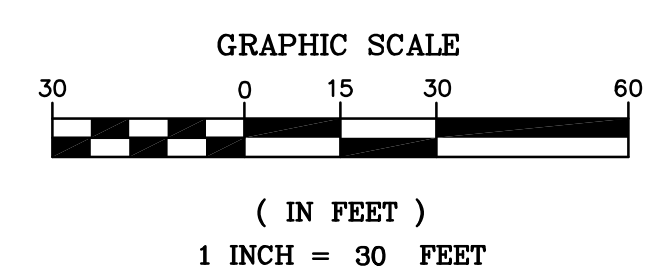
EXISTING BENCH

PROP. CONCRETE BOLLARD (X2) (SEE DETAIL ON SHEET DT2)

PROPOSED BITUMINOUS PAVEMENT (SEE X-SECTION ON SHEET DT2)

EX. 12" END SECTION INV. -948.25

EXISTING IRRIGATION PUMP SYSTEM



**DRY HYDRANT CONSTRUCTION NOTES:**

- PVC BONDING MATERIAL WILL BE TETRAHYDROFURANCE (THF) PRIMER AND BETWEEN AN 800 TO 100 CENTIPOISE VISCOSITY CEMENT.
- AN "AS-BUILT" PRINT WILL BE SUPPLIED TO THE FIRE DEPARTMENT, INDICATING ALL PERTINENT INFORMATION, INCLUDING, BUT NOT LIMITED TO: LOCATION OF ALL JOINTS, SEAMS, AND UNIONS, WITH MEASUREMENTS AS TO THEIR LOCATION; ACTUAL TOTAL LENGTHS OF RISE AND RUN OF THE HYDRANT; DETAIL OF THE STRAINER AND ITS BASE, AS IT WAS INSTALLED IN THE WATER SOURCE.
- AFTER COMPLETION OF THE PROJECT AND AFTER A SUFFICIENT TIME FOR CURING OR DRYING HAS PASSED, THE FIRE DEPARTMENT WILL TEST THE HYDRANT. THE HYDRANT MUST ALLOW AND MAINTAIN THE RATED FLOW LISTED IN THE DNR PUBLICATION FOR DRY FIRE HYDRANTS. EACH HYDRANT, HAVING DIFFERENT LENGTHS AND LIFTS, WILL BE RATED IN THE GUIDE INDIVIDUALLY. FINAL APPROVAL IS GRANTED BY THE FIRE CHIEF AFTER PASSING THIS TEST AND, IN THE OPINION OF THE FIRE CHIEF, SATISFYING 98-1.1e. AT THIS TIME, FINAL PAYMENT WILL BE APPROVED.
- IF ANY OF THE ABOVE CONDITIONS ARE NOT MET, PAYMENT WILL NOT BE APPROVED UNTIL THE SITE AND HYDRANT HAVE BEEN FINISHED TO THE SATISFACTION OF THE FIRE CHIEF.
- ANY AND ALL PERMITS FROM ANY REGULATORY OR GOVERNING BODY WILL BE THE RESPONSIBILITY OF THE INSTALLER. THIS MAY INCLUDE, THOUGH NOT BE LIMITED TO, THE DNR AND DEQ.
- THE INSTALLER WILL PROVIDE A TWO (2) YEAR WARRANTY ON THE ASSEMBLY.
- THE HYDRANT OWNER WILL FILE A DRY HYDRANT SERVICE AGREEMENT WITH THE FIRE DEPARTMENT FOR THE LIFE OF THE HYDRANT.

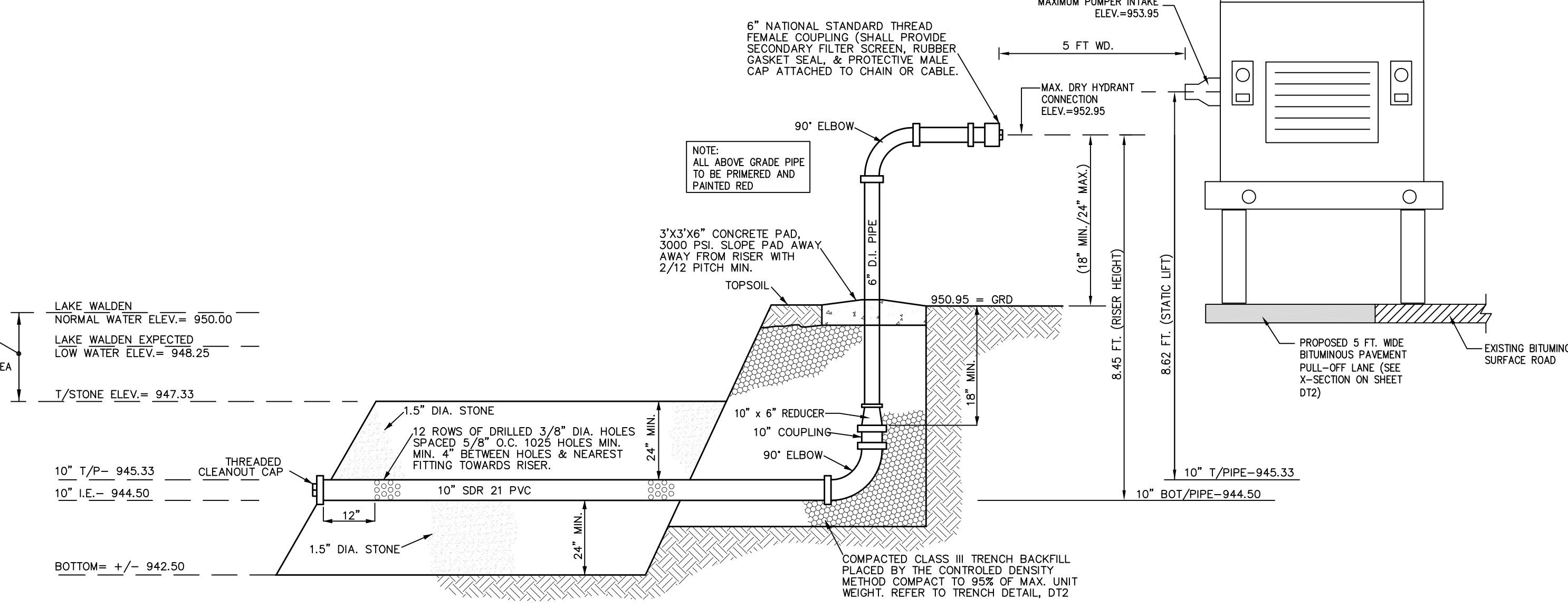
LAKE WALDEN  
NORMAL WATER ELEV. = 950.00  
LAKE WALDEN EXPECTED  
LOW WATER ELEV. = 948.25

± 2.70 FEET  
DROUGHT/ICE  
NON-USABLE AREA

T/STONE ELEV. = 947.33

10" T/P = 945.33  
10" I.E. = 944.50

BOTTOM = +/- 942.50



**DRY HYDRANT SCHEMATIC**  
NOT TO SCALE

- DRY HYDRANT SPECIFICATIONS**
- Piping, elbows, and couplings, reducer(s), and under water strainer shall be schedule 40 or heavier PVC and shall be joined with appropriate PVC-type cement according to the manufacturer's specifications so as to ensure all joints are airtight.
  - Horizontal piping shall have a minimum inside diameter (I.D.) of ten (10) inches. Riser piping shall have an inside diameter (I.D.) of six (6) inches.
  - All elbows associated with the riser assembly shall be ninety (90) degrees. Ninety-degree elbows will not be permitted elsewhere in the suction line.
  - An intake strainer, capable of supporting the flow requirements per Dry-Hydrant worksheet flow requirements shall be provided.
  - The horizontal pipe shall be buried and placed nearly level at a minimum depth of four and one-half (4-1/2) feet below finished grade. It shall penetrate the static water source no less than 10 feet.
  - The riser pipe shall rise at an angle of ninety (90) degrees from the horizontal suction line. The normal water surface elevation in the riser shall a minimum of four and one-half (4-1/2) feet below the finished grade unless alternative frost protection is provided. The riser shall terminate with a six (6) inch PVC ninety (90) degree elbow and fire department connection and cap.
  - The end fitting (i.e., fire department connection) on the dry hydrant shall consist of the following:
    - One 6" PVC 90 degree elbow with 6" NH (NST) male outlet adapter.
    - One adapter, 6" NH(f) X 4.5" NH(m) with rocket lugs.
    - One cap, 4.5" NH with attaching cable.
  - All exposed PVC or metal surfaces and all underground metal surfaces should be primed and painted white to prevent deterioration of the material and enable rapid locating of hydrants.
  - Static lift should be kept as low as possible and shall not exceed twenty five (25) feet (measured from the centerline of the pump intake, assumed to be three (3) feet above the pavement grade, to the top of the underwater intake strainer).
  - Design calculations shall accompany the construction drawings submitted.
  - Design consultants and contractors should check local zoning code requirements for design and construction.
  - A uniform identification sign shall be installed at the dry hydrant location at the developer's expense.

**DRY HYDRANT DESIGN WORKSHEET**

DATE: March 07, 2019

PROJECT/LOCATION: Waldenwoods Campground Dry Hydrant, Livingston County

TOWNSHIP: Hartland Township DESIGN FLOW = 1500 GPM

A. **STATIC LIFT (SL)** (pumper intake to top of strainer)..... 8.62 FEET (SL)

B. **PIPE HEAD LOSSES**

1. **HORIZONTAL PIPE LOSSES (HPL)**  
 Horiz. Pipe Diameter = 10 inches  
 Horiz. Pipe Length (including strainer)..... 271.0 feet  
 Horiz. Pipe Fittings: (see Chart A for straight pipe equivalents)  
 90 degree elbow @ bottom of riser..... 18.0 feet  
 Total Horizontal Length..... 289.0 feet

HPL = Total Horizontal Length x Chart B factor  
 HPL = (289.0) x (1 ft/100 ft) = 2.89 FEET (HPL)

2. **RISER PIPE LOSSES (RPL)**  
 Riser Pipe Diameter = 6.0 inches  
 Riser Pipe Height..... 8.45 feet  
 Riser Pipe Fittings (use Chart A for straight pipe equivalents)  
 1 x 6" reducer..... 5 feet  
 90 degree elbow, std. @ top..... 16.0 feet  
 Total Riser Height..... 29.45 feet

RPL = Total Riser Height x Chart B Factor  
 RPL = (29.45) x (12.3 ft/100 ft) = 3.62 FEET (RPL)

3. **CONNECTION LOSSES (CL)** (Worst Case)  
 6" x 4.5" Adapter/Reducer: 2.5' (Chart A) x 48.7 ft/100ft = 1.2 feet  
 6" Dia. Hard Suction Hose: 10.0' x 14.9 ft/100 ft (Chart C) = 1.5 feet  
 CL = (1.2 ft) + (1.5 ft) = 2.7 FEET (CL)

C. **TOTAL HEAD LOSS (THL)**  
 THL = SL + HPL + RPL + CL = (8.62) + (2.89) + (3.62) + (2.7) = 17.83 FEET (THL)

If the Total Head Loss is greater than 20-25 feet, the pump may not be able to flow its rated GPM. Increase the horizontal pipe diameter and redesign.

**LEGEND**

- SA SA = SANITARY SEWER MANHOLE W/IDENTIFIER
- SA SA = SANITARY SEWER PIPE
- CL = CLEAN OUT
- CL = STORM WATER MANHOLE W/IDENTIFIER
- CB CB = CATCH BASIN W/IDENTIFIER
- CS = CONTROL STRUCTURE
- FL = FLARED END SECTION
- ST ST = STORM WATER DRAINAGE PIPE
- HY = HYDRANT
- WS = WATER SHUT OFF
- WV = WATER VALVE
- WB = WATER MAIN BOX
- WM = WATER MAIN
- GS = GAS SHUT OFF
- UG = U/G GAS
- SE = SPOT ELEVATION
- 1' = 1' CONTOUR
- 5' = 5' CONTOUR
- RS = PROPOSED SANITARY RISER CONNECTION
- WR = PROPOSED WATER RISER
- RV = PROPOSED RECREATIONAL VEHICLE POST
- WM = PROPOSED WATER MAIN
- SS = PROPOSED SANITARY SEWER
- SS = PROPOSED STORM SEWER
- PE = PROPOSED EDGE OF PAVEMENT
- PA = PROPOSED PAVEMENT
- TA = TRAFFIC FLOW ARROWS

STRAIGHT PIPE EQUIVALENT FOR FITTINGS (IN FEET) \*

PVC PIPE DIAMETER	6.0"	8.0"	10.0"
90 ELBOW, STANDARD	16.0	26.0	27.0
90 ELBOW, MEDIUM SWEEP	14.0	18.0	22.0
90 ELBOW, LONG SWEEP	11.0	14.0	18.0
45 ELBOW	7.5	10.0	13.0
HYDRANT CONNECTION (6" X 4.5")	2.5		
REDUCER (6" X 6")	3.5		
REDUCER (10" X 6")	5.0		

\* SOURCE: HANDBOOK OF PVC PIPE

CHART B  
HEAD LOSS IN FEET PER 100 FEET OF PVC PIPE

GPM	PIPE SIZE	6.0"	8.0"	10.0"
750		3.4	0.8	0.3
800		3.8	0.9	0.3
900		4.8	1.2	0.4
1000		5.8	1.4	0.5
1100		6.9	1.7	0.6
1200		8.1	2.0	0.7
1300		9.4	2.3	0.8
1400		10.8	2.7	0.9
1500		12.3	3.0	1.0
1600		13.8	3.4	1.2
1700		15.5	3.8	1.3
1800		17.2	4.2	1.4
1900		19.0	4.7	1.6
2000		20.9	5.2	1.7

\* SOURCE: NFPA 1231, 'STANDARD ON WATER SUPPLIES FOR SUBURBAN AND RURAL FIRE FIGHTING', 1993 EDITION

CHART C  
HEAD LOSS IN FEET PER 100 FEET OF HARD SUCTION HOSE

GPM	PIPE SIZE	4.5"	6.0"
700		14.7	3.6
800		18.9	4.7
900		23.5	5.8
1000		28.5	7.0
1100		34.0	8.4
1200		40.0	9.9
1300		46.4	11.4
1400		53.2	13.1
1500		60.5	14.9
1600		68.1	16.8
1700		76.2	18.8
1800		84.7	20.9
1900		93.7	23.1
2000		103.0	25.4

WATER MAIN (DRY HYDRANT)

ITEM	QTY.
6" NST DRY HYDRANT ADAPTER	1
10" SDR 21 PVC	271
10" COUPLING	1
10"x6" REDUCER	1
10" THREADED CLEANOUT	1
6" CL52 D.I. RISER PIPE	10

**BENCHMARKS**

BENCHMARK #C  
CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING.  
ELEVATION = 968.03

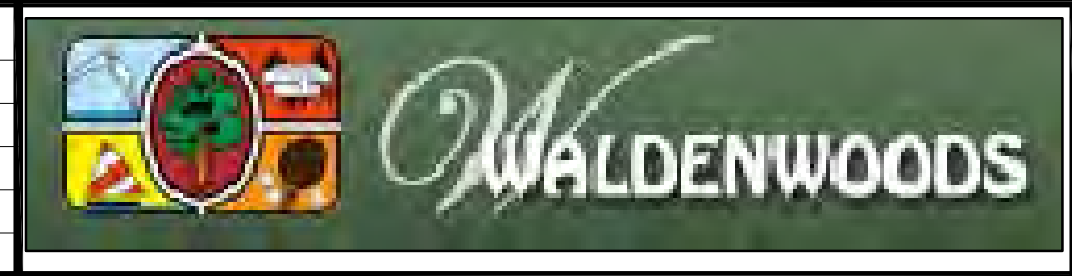
BENCHMARK #D  
SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND.  
ELEVATION = 948.55

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BRIGHTON, MICHIGAN 48114

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						



**DRY HYDRANT SITE PLAN AND DETAILS**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=30'  
PROJECT No.: 9173156  
DWG NAME: 3156-SP2  
ISSUED: DEC. 11, 2019

**SP1.3**

**LEGEND**

- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- = SIGN
- = SOIL BORING / BENCHMARK W/IDENTIFIER
- = LIGHT BASE
- = STREET LIGHT
- = OVERHEAD TRAFFIC SIGNAL
- = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- = AIR CONDITIONER UNIT
- = UTILITY MANHOLE (AS LABELED)
- = UTILITY POLE W/OUT WIRE
- = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = DECIDUOUS TREE W/IDENTIFIER
- = CONIFEROUS TREE W/IDENTIFIER
- = BUSH
- = FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- = GUARD RAIL
- = EDGE OF GRAVEL
- = CONCRETE CURB (UNLESS OTHERWISE STATED)
- = SANITARY SEWER MANHOLE W/IDENTIFIER
- = SANITARY SEWER PIPE
- = CLEAN OUT
- = STORM WATER MANHOLE W/IDENTIFIER
- = CATCH BASIN W/IDENTIFIER
- = CONTROL STRUCTURE
- = FLARED END SECTION
- = STORM WATER DRAINAGE PIPE
- = HYDRANT
- = WATER SHUT OFF
- = WATER VALVE
- = WATER VALVE BOX
- = WATER MAIN
- = GAS SHUT OFF
- = U/G GAS
- = SPOT ELEVATION
- = 1' CONTOUR
- = 5' CONTOUR
- = PROPOSED SANITARY RISER CONNECTION
- = PROPOSED WATER RISER
- = PROPOSED RECREATIONAL VEHICLE POST
- = PROPOSED WATER MAIN
- = PROPOSED SANITARY SEWER
- = PROPOSED STORM SEWER
- = PROPOSED EDGE OF PAVEMENT
- = PROPOSED PAVEMENT
- = PROPOSED GRAVEL DRIVE
- = PROPOSED GRAVEL
- = TRAFFIC FLOW ARROWS

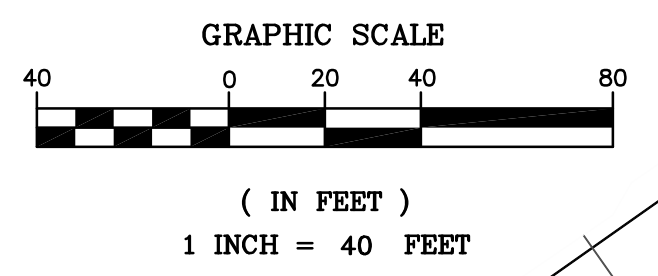
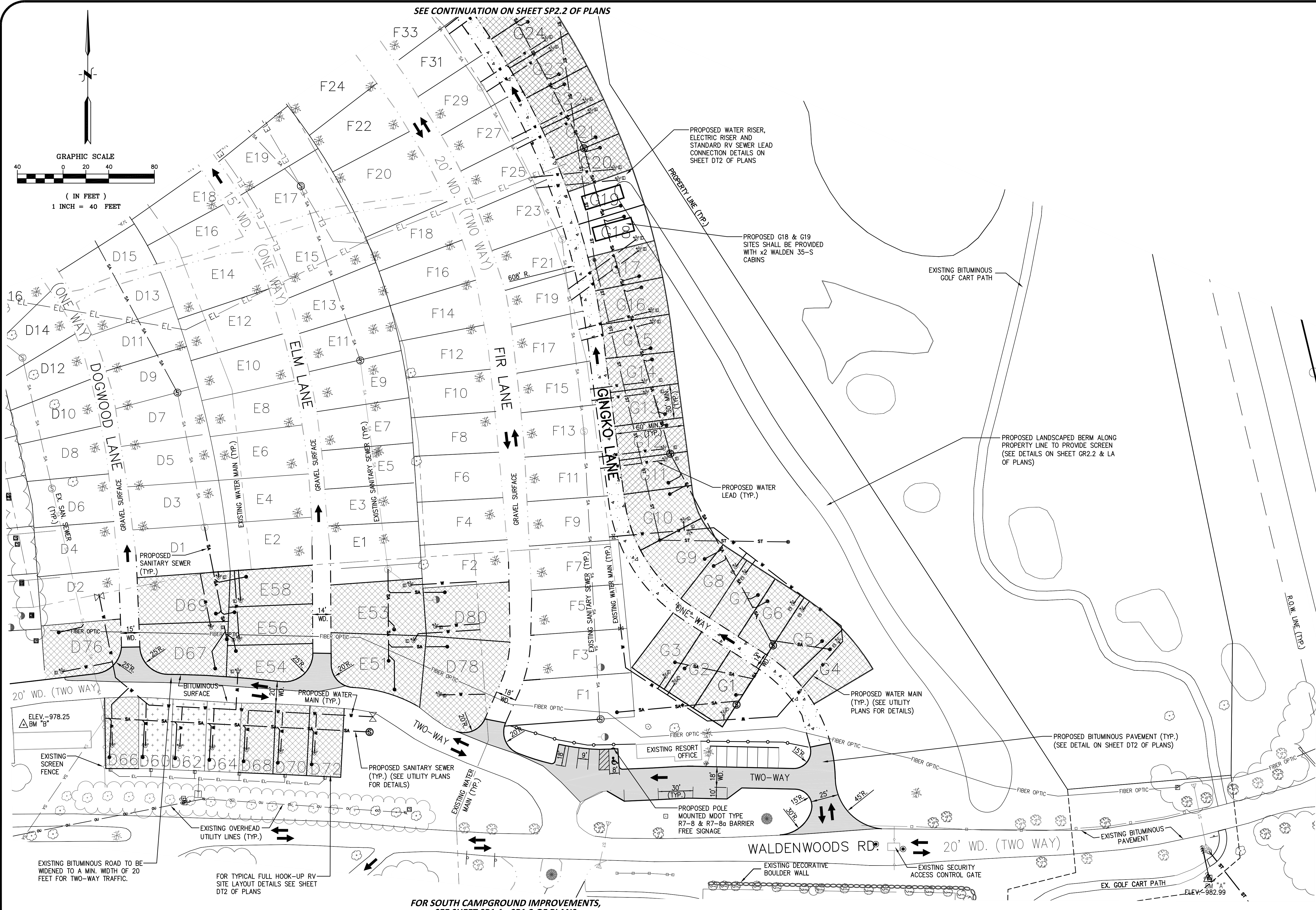
**BENCHMARKS**

- BENCHMARK #1 (SITE): 7" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
- BENCHMARK #A: NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE EAST OF "WALDENWOODS." ELEVATION = 982.99
- BENCHMARK #B: NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET. ELEVATION = 978.25
- BENCHMARK #C: CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING. ELEVATION = 968.03
- BENCHMARK #D: SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55
- BENCHMARK #E: CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17
- BENCHMARK #F: SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74

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BRIGHTON, MICHIGAN 48114



SEE CONTINUATION ON SHEET SP2.2 OF PLANS

PROPOSED WATER RISER, ELECTRIC RISER AND STANDARD RV SEWER LEAD CONNECTION DETAILS ON SHEET DT2 OF PLANS

PROPOSED G18 & G19 SITES SHALL BE PROVIDED WITH x2 WALDEN 35-S CABINS

EXISTING BITUMINOUS GOLF CART PATH

PROPOSED LANDSCAPED BERM ALONG PROPERTY LINE TO PROVIDE SCREEN (SEE DETAILS ON SHEET GR2.2 & LA OF PLANS)

PROPOSED WATER LEAD (TYP.)

PROPOSED WATER MAIN (TYP.) (SEE UTILITY PLANS FOR DETAILS)

PROPOSED BITUMINOUS PAVEMENT (TYP.) (SEE DETAIL ON SHEET DT2 OF PLANS)

PROPOSED SANITARY SEWER (TYP.) (SEE UTILITY PLANS FOR DETAILS)

PROPOSED POLE MOUNTED MDOOT TYPE R7-8 & R7-8a BARRIER FREE SIGNAGE

EXISTING SECURITY ACCESS CONTROL GATE

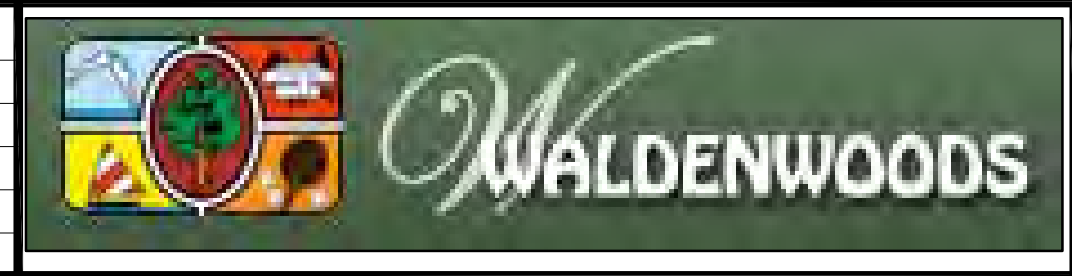
EXISTING BITUMINOUS ROAD TO BE WIDENED TO A MIN. WIDTH OF 20 FEET FOR TWO-WAY TRAFFIC.

FOR TYPICAL FULL HOOK-UP RV SITE LAYOUT DETAILS SEE SHEET DT2 OF PLANS

FOR SOUTH CAMPGROUND IMPROVEMENTS, SEE SHEET SP1.1 - SP1.3 OF PLANS

- ▨ NEW FULL HOOK-UP SITES
- ▨ FULL HOOK-UP UPGRADE SITES

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS			
CHECK: WMP						



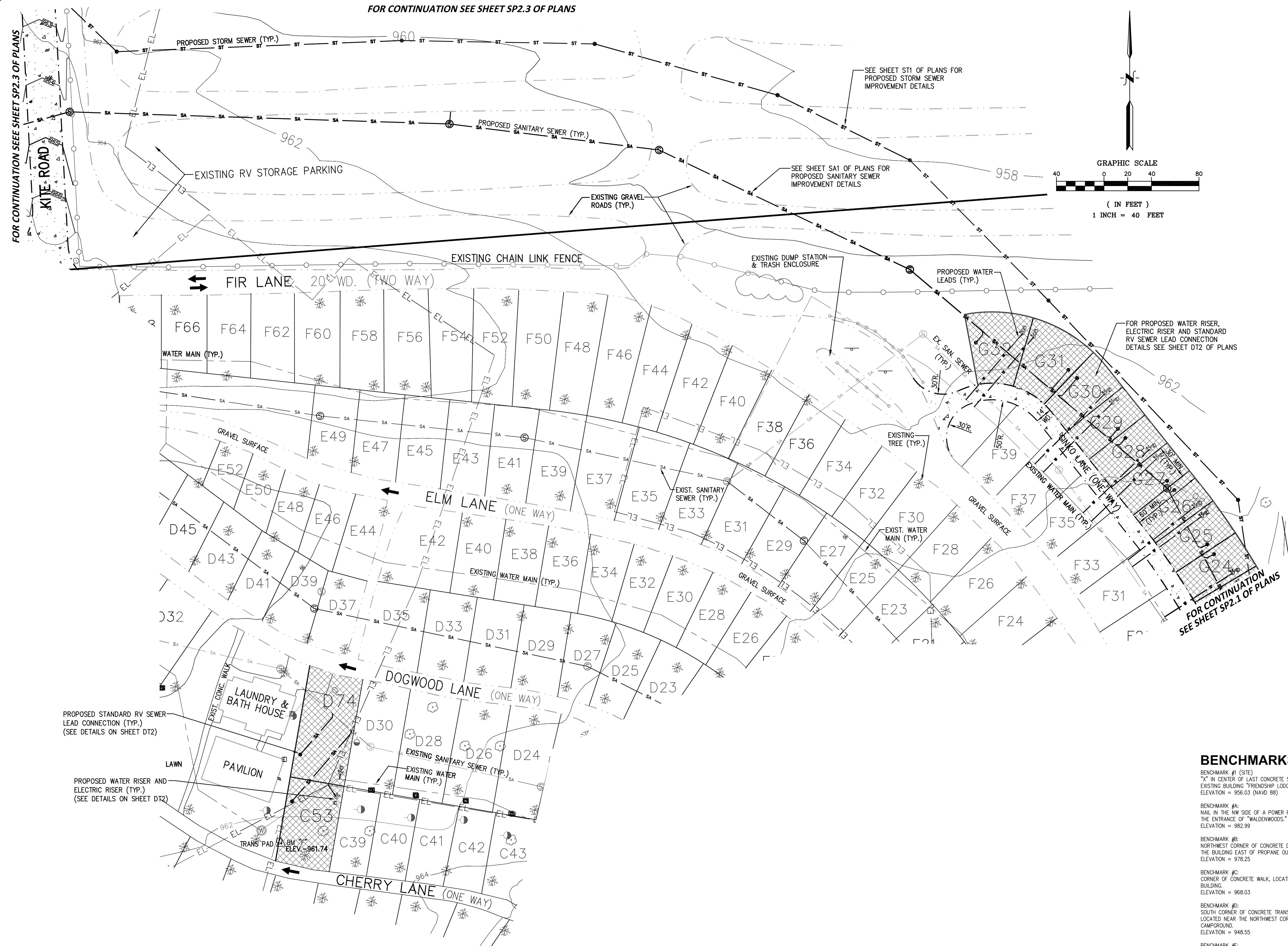
**SITE PLAN (NORTH CAMPGROUND)**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-SP2.1  
ISSUED: DEC. 11, 2019

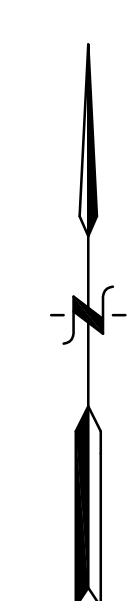
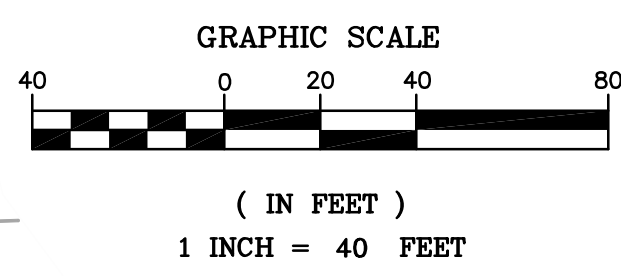
**SP2.1**

FOR CONTINUATION SEE SHEET SP2.3 OF PLANS



**LEGEND**

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- = PROPOSED EDGE OF PAVEMENT
- = PROPOSED PAVEMENT
- = PROPOSED GRAVEL DRIVE
- = PROPOSED GRAVEL
- = TRAFFIC FLOW ARROWS
- = NEW FULL HOOK-UP SITES
- = FULL HOOK-UP UPGRADE SITES



FOR CONTINUATION SEE SHEET SP2.3 OF PLANS

FOR CONTINUATION SEE SHEET SP2.1 OF PLANS

**BENCHMARKS**

- BENCHMARK #1 (SITE): "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
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- BENCHMARK #F: SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILION BUILDING. ELEVATION = 961.74

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS
CHECK: WMP			

REVISION #	DATE	REVISION-DESCRIPTION



**SITE PLAN  
(NORTH CAMPGROUND)**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

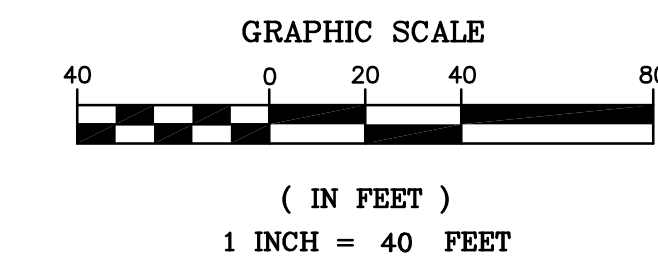
SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-CAMPGRD  
ISSUED: DEC. 11, 2019

SP2.2

# # 4708-17-200-002

## LEGEND

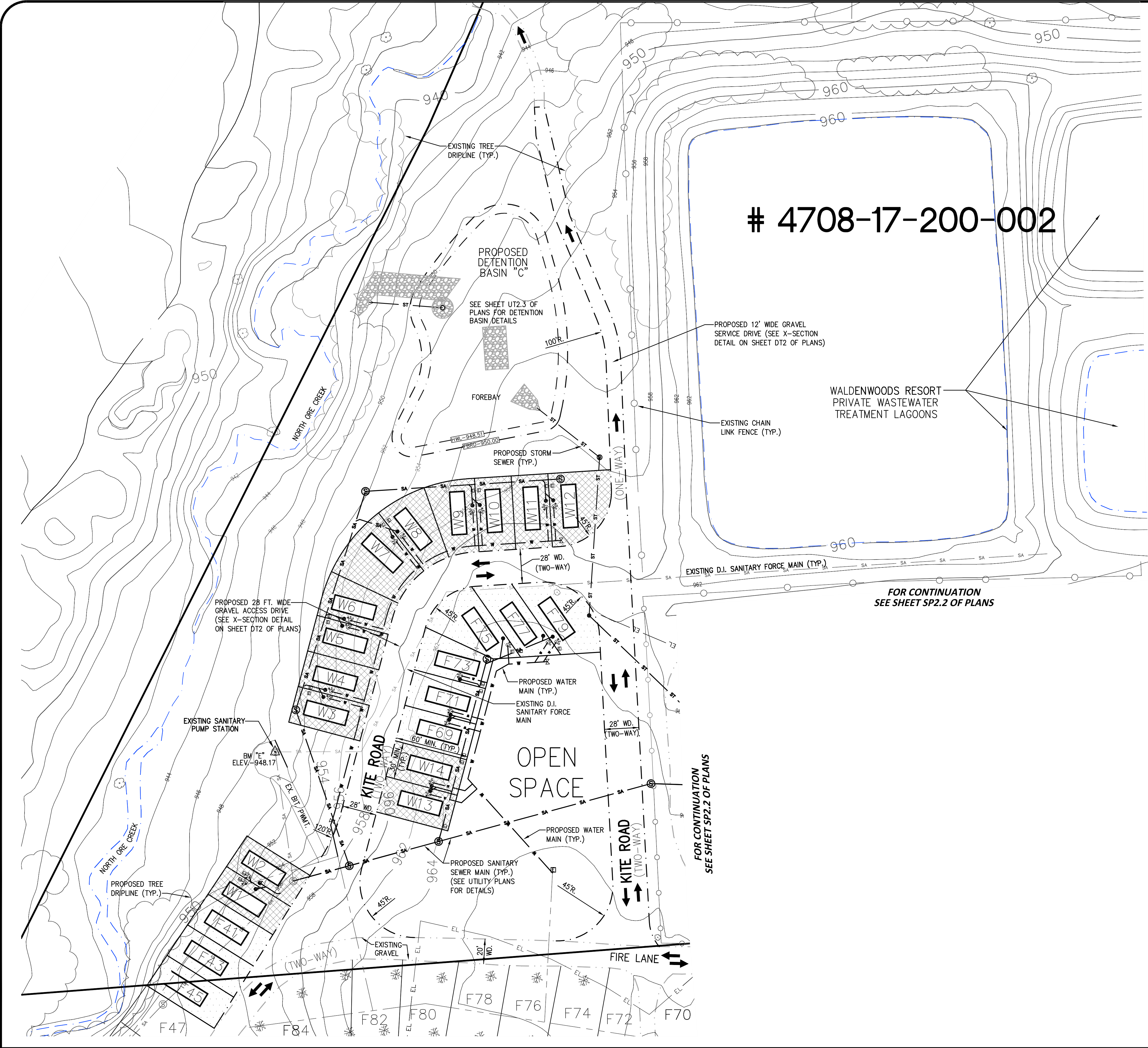
- = MISC. STRUCTURE (AS LABELED)
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- △ = SIGN
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- ⊙ = PROPOSED EDGE OF PAVEMENT
- ⊙ = PROPOSED PAVEMENT
- ⊙ = TRAFFIC FLOW ARROWS



- ▨ NEW FULL HOOK-UP SITES
- ▨ FULL HOOK-UP UPGRADE SITES
- ▨ FULL HOOK-UP UPGRADED AND RELOCATED SITES

## BENCHMARKS

- BENCHMARK #1 (SITE): "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/04/19	REVISED GRAVEL DRIVE X-SEC LABEL PER ENG. REVIEW COMMENTS
CHECK: WMP	2	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS

REVISION #	DATE	REVISION-DESCRIPTION



**SITE PLAN (KITE ROAD)**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-SP2.3  
ISSUED: DEC. 11, 2019

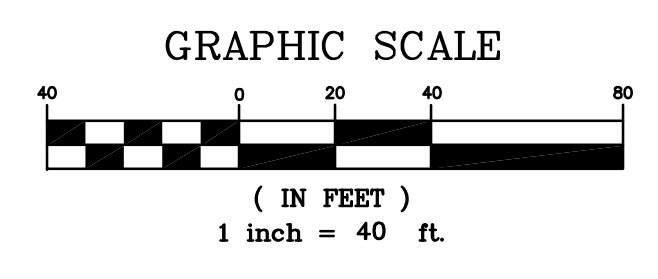
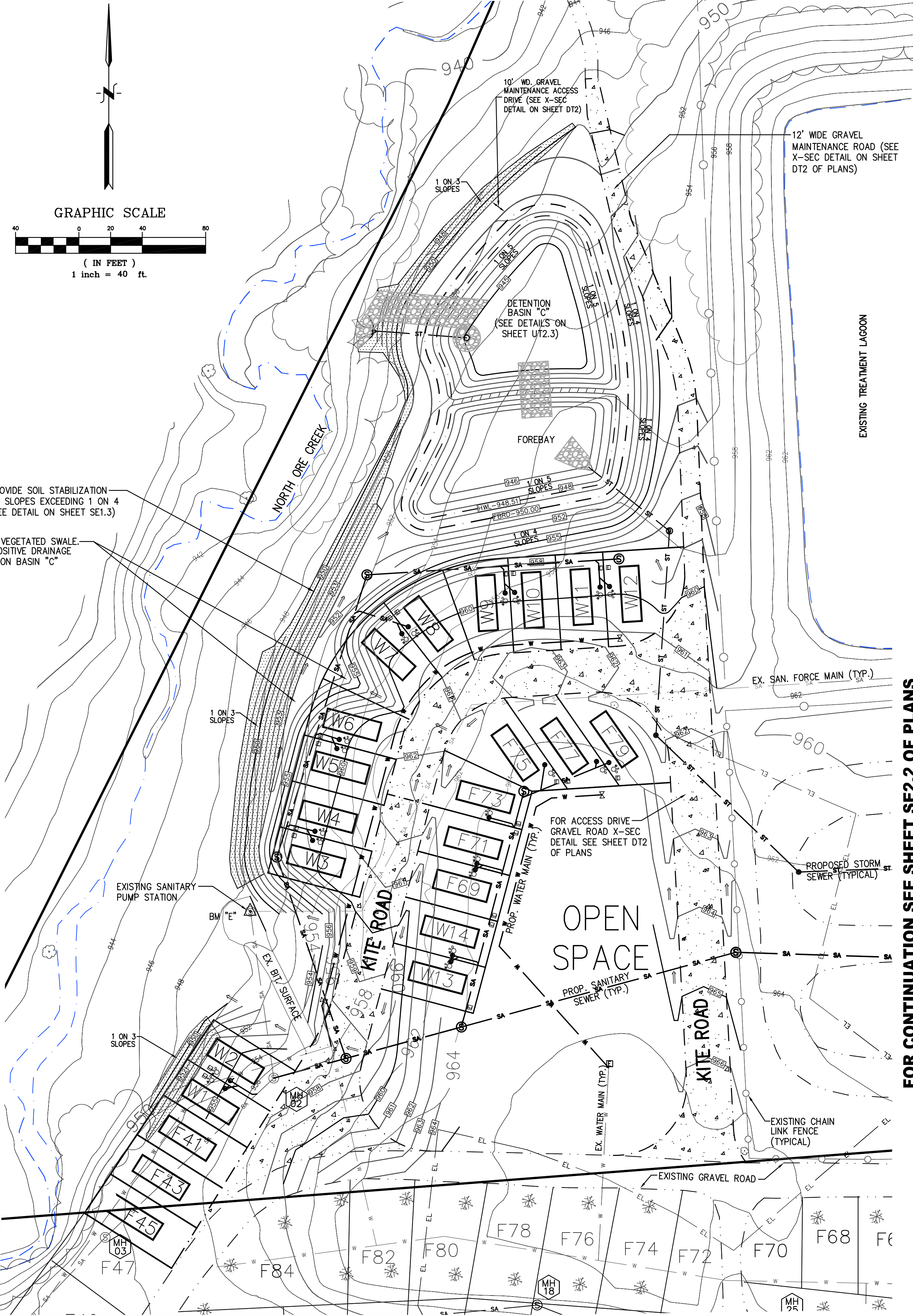
**SP2.3**

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2183 PLESS DRIVE  
BRIGHTON, MICHIGAN 48114

**LEGEND**

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- = PROPOSED STORM SEWER
- = PROPOSED EDGE OF PAVEMENT
- = PROPOSED GRAVEL ACCESS ROAD
- = PROPOSED BITUMINOUS PAVEMENT
- = PROPOSED SPOT ELEVATIONS
- = PROPOSED FLOW ARROW



PROVIDE SOIL STABILIZATION ON SLOPES EXCEEDING 1 ON 4 (SEE DETAIL ON SHEET SE1.3)

PROPOSED VEGETATED SWALE. PROVIDE POSITIVE DRAINAGE TO DETENTION BASIN "C"

FOR CONTINUATION SEE SHEET SE2.2 OF PLANS

**BENCHMARKS**

- BENCHMARK #1 (SITE): "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
- BENCHMARK #A: NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS." ELEVATION = 982.99
- BENCHMARK #B: NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET. ELEVATION = 978.25
- BENCHMARK #C: CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING. ELEVATION = 968.03
- BENCHMARK #D: SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55
- BENCHMARK #E: CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17
- BENCHMARK #F: SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74

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**DESIGN INC**  
(810) 227-9533  
CIVIL ENGINEERS  
LAND SURVEYORS  
2183 PLESS DRIVE  
BRIGHTON, MICHIGAN 48114

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS			
CHECK: WMP						



**GRADING PLAN (KITE ROAD)**

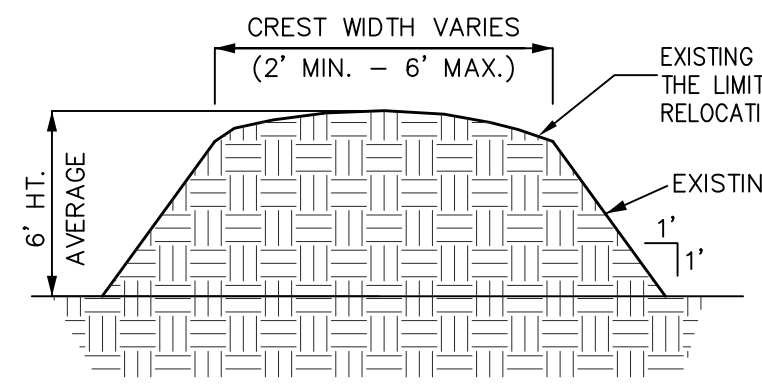
CLIENT: WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-GR2.1  
ISSUED: DEC. 11, 2019

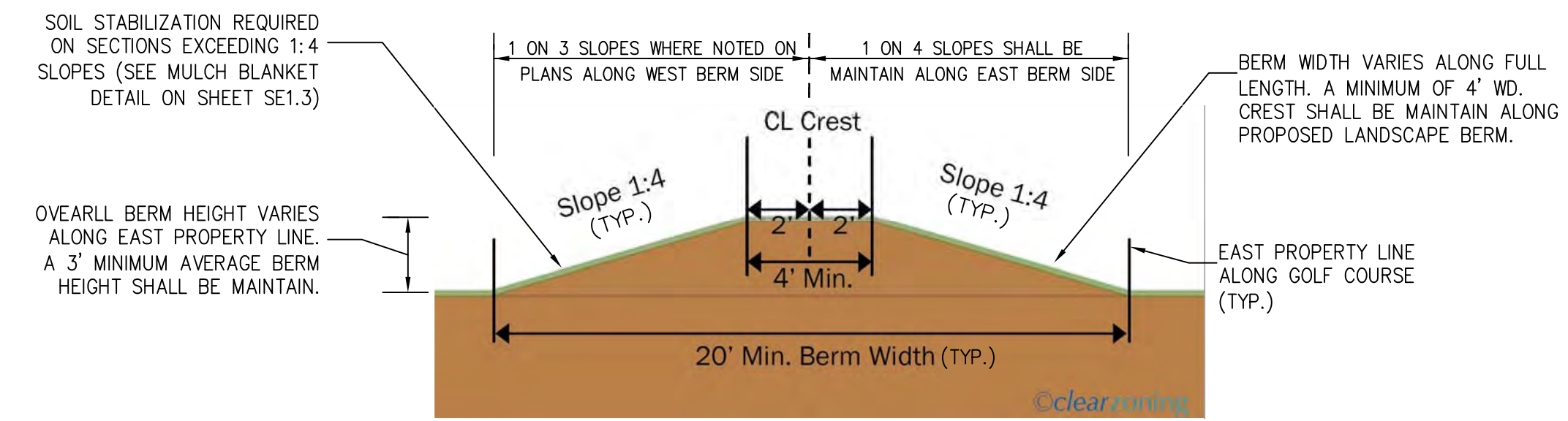
**GR2.1**

**LEGEND**

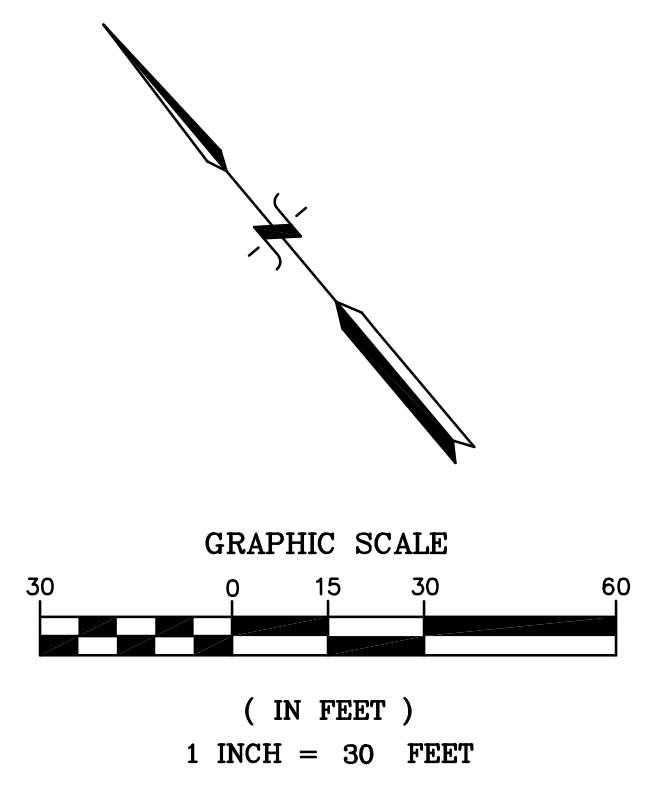
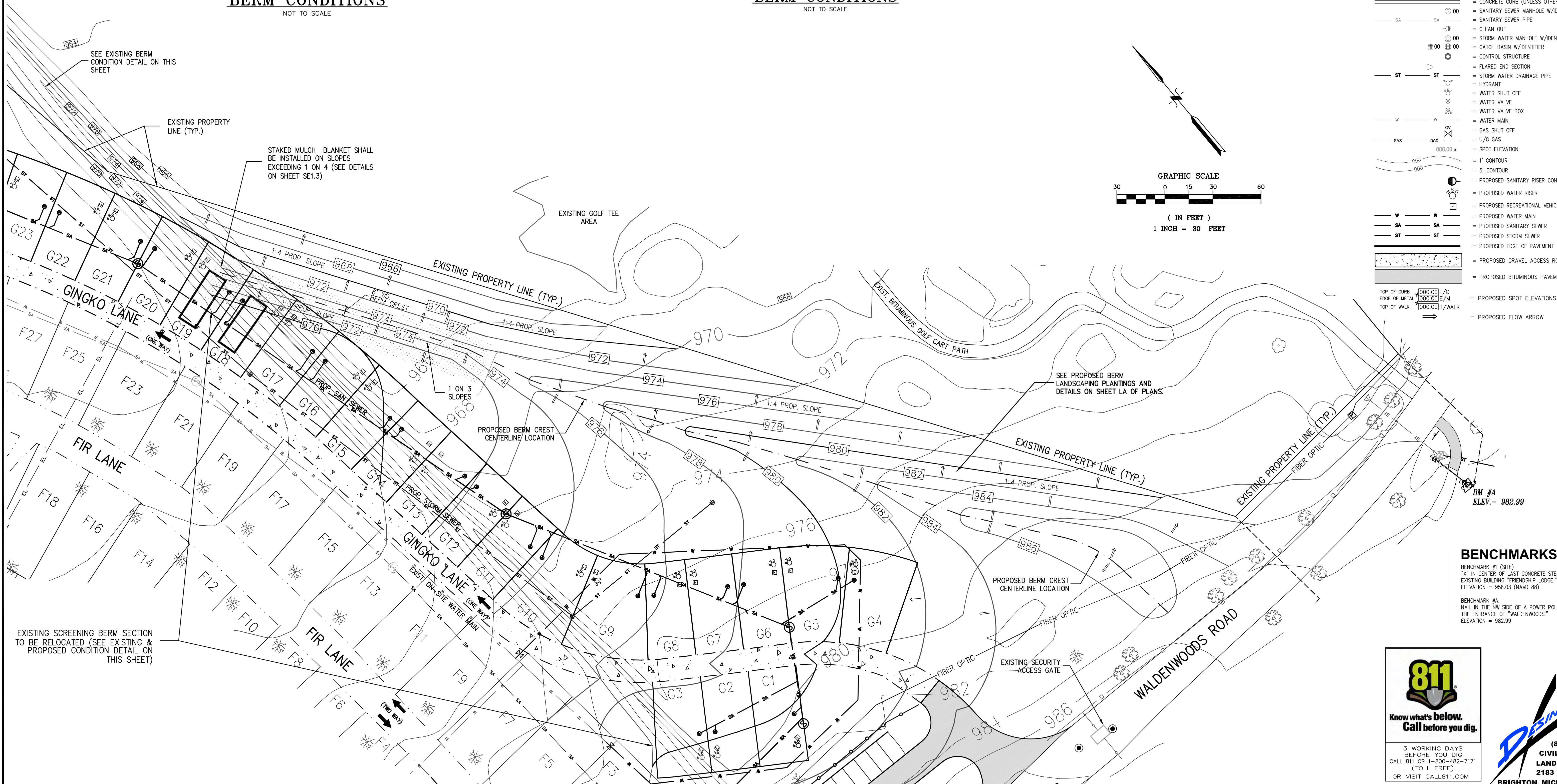
- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- = SIGN
- = SOIL BORING / BENCHMARK W/IDENTIFIER
- = LIGHT BASE
- = STREET LIGHT
- = OVERHEAD TRAFFIC SIGNAL
- = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- = AIR CONDITIONER UNIT
- = UTILITY MANHOLE (AS LABELED)
- = UTILITY POLE W/GUY WIRE
- = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = DECIDUOUS TREE W/IDENTIFIER
- = CONIFEROUS TREE W/IDENTIFIER
- = BUSH
- = FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- = GUARD RAIL
- = EDGE OF GRAVEL
- = CONCRETE CURB (UNLESS OTHERWISE STATED)
- = SANITARY SEWER MANHOLE W/IDENTIFIER
- = SANITARY SEWER PIPE
- = CLEAN OUT
- = STORM WATER MANHOLE W/IDENTIFIER
- = CATCH BASIN W/IDENTIFIER
- = CONTROL STRUCTURE
- = FLARED END SECTION
- = STORM WATER DRAINAGE PIPE
- = HYDRANT
- = WATER SHUT OFF
- = WATER VALVE
- = WATER VALVE BOX
- = WATER MAIN
- = GAS SHUT OFF
- = U/G GAS
- = SPOT ELEVATION
- = 1' CONTOUR
- = 5' CONTOUR
- = PROPOSED SANITARY RISER CONNECTION
- = PROPOSED WATER RISER
- = PROPOSED RECREATIONAL VEHICLE POST
- = PROPOSED WATER MAIN
- = PROPOSED SANITARY SEWER
- = PROPOSED STORM SEWER
- = PROPOSED EDGE OF PAVEMENT
- = PROPOSED GRAVEL ACCESS ROAD
- = PROPOSED BITUMINOUS PAVEMENT
- = PROPOSED SPOT ELEVATIONS
- = PROPOSED FLOW ARROW



**EXISTING LANDSCAPE BERM CONDITIONS**  
NOT TO SCALE



**PROPOSED LANDSCAPE BERM CONDITIONS**  
NOT TO SCALE



**BENCHMARKS**

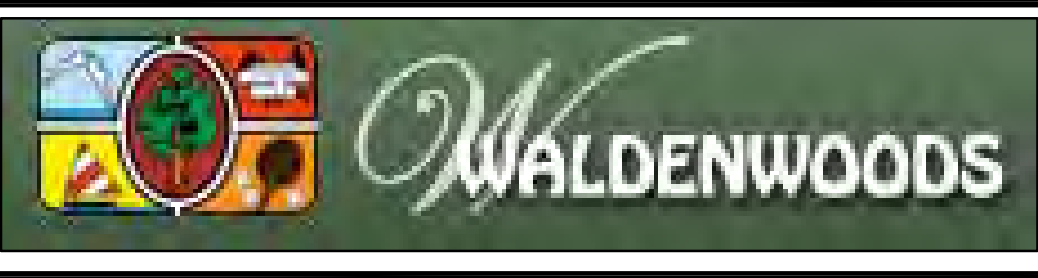
BENCHMARK #1 (SITE)  
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ELEVATION = 956.03 (NAVD 88)

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NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
ELEVATION = 982.99

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BRIGHTON, MICHIGAN 48114

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS			
CHECK: WMP						



**BERM GRADING PLAN AND DETAILS**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-GR2.1  
ISSUED: DEC. 11, 2019

**GR2.2**

FOR CONTINUATION-SEE SHEET UT2.2 OF PLANS

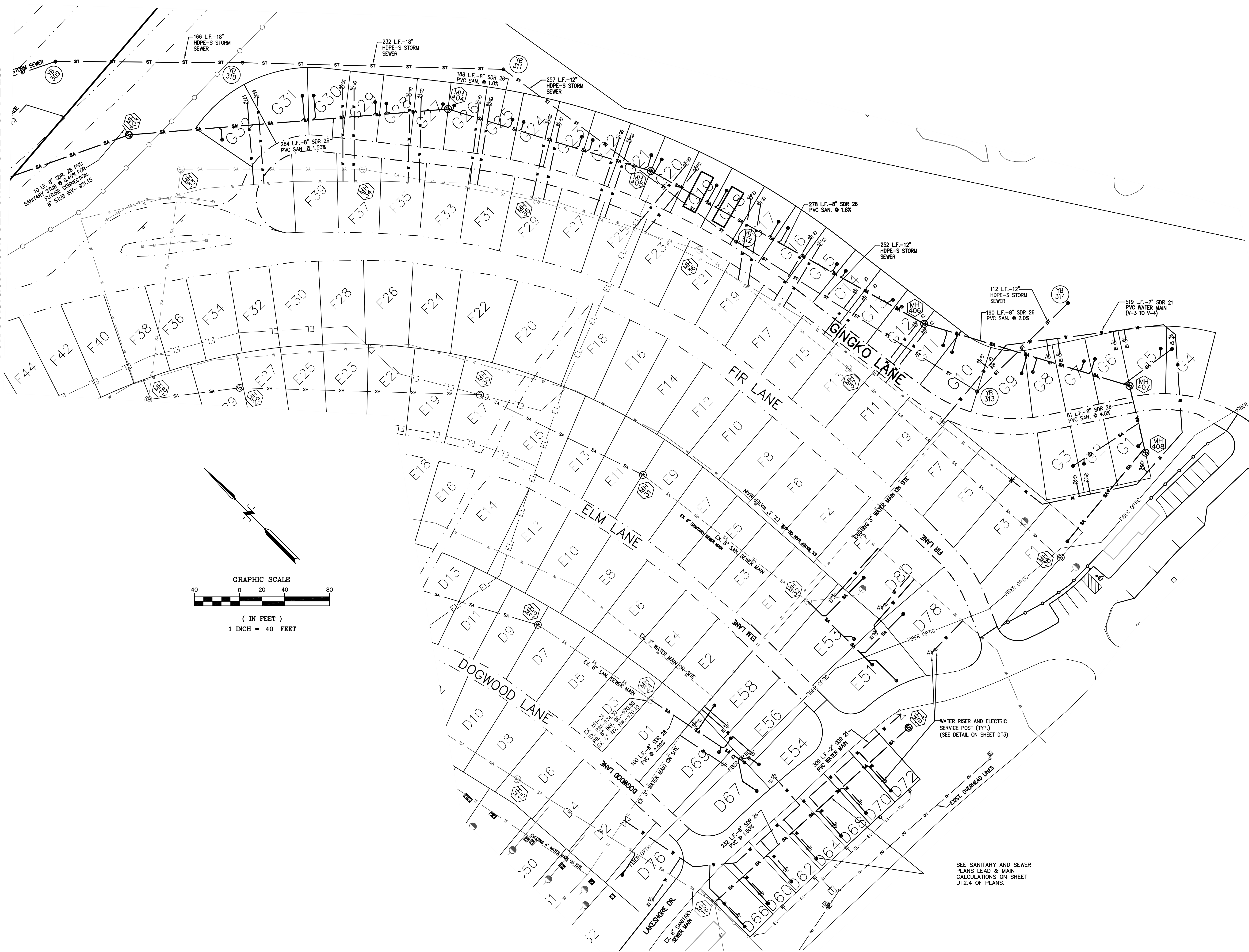
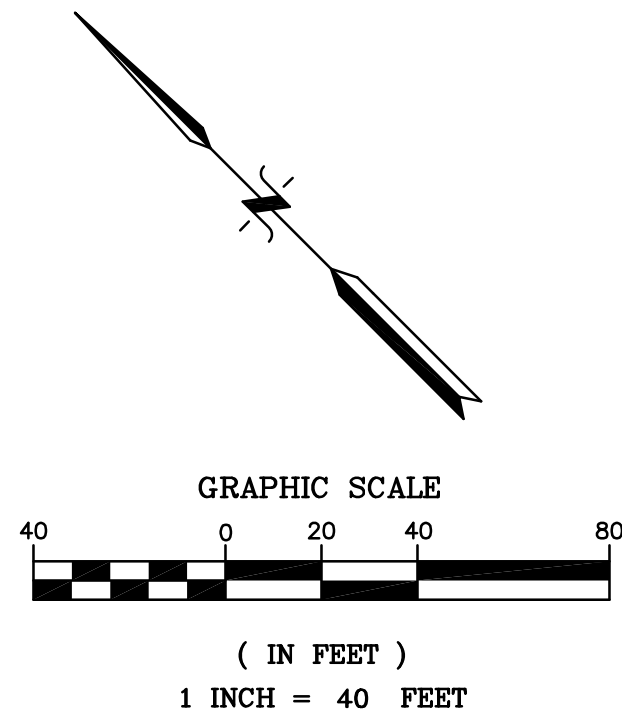
**LEGEND**

- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- △ = SIGN
- △ 00 = SOIL BORING / BENCHMARK W/IDENTIFIER
- = LIGHT BASE
- = STREET LIGHT
- = OVERHEAD TRAFFIC SIGNAL
- = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- = AIR CONDITIONER UNIT
- = UTILITY MANHOLE (AS LABELED)
- = UTILITY POLE W/GUY WIRE
- = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- SA --- ○ 00 = SANITARY SEWER MANHOLE W/IDENTIFIER
- SA --- ○ 00 = SANITARY SEWER PIPE
- SA --- ○ 00 = CLEAN OUT
- SA --- ○ 00 = STORM WATER MANHOLE W/IDENTIFIER
- SA --- ○ 00 = CATCH BASIN W/IDENTIFIER
- SA --- ○ 00 = CONTROL STRUCTURE
- SA --- ○ 00 = FLARED END SECTION
- SA --- ○ 00 = STORM WATER DRAINAGE PIPE
- SA --- ○ 00 = HYDRANT
- SA --- ○ 00 = WATER SHUT OFF
- SA --- ○ 00 = WATER VALVE
- SA --- ○ 00 = WATER VALVE BOX
- SA --- ○ 00 = WATER MAIN
- SA --- ○ 00 = GAS SHUT OFF
- SA --- ○ 00 = U/G GAS
- SA --- ○ 00 = PROPOSED SANITARY RISER CONNECTION
- SA --- ○ 00 = PROPOSED WATER RISER
- SA --- ○ 00 = PROPOSED RECREATIONAL VEHICLE POST
- SA --- ○ 00 = PROPOSED WATER MAIN
- SA --- ○ 00 = PROPOSED SANITARY SEWER
- SA --- ○ 00 = PROPOSED STORM SEWER
- SA --- ○ 00 = PROPOSED EDGE OF PAVEMENT

**BENCHMARKS**

- BENCHMARK #1 (SITE): "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
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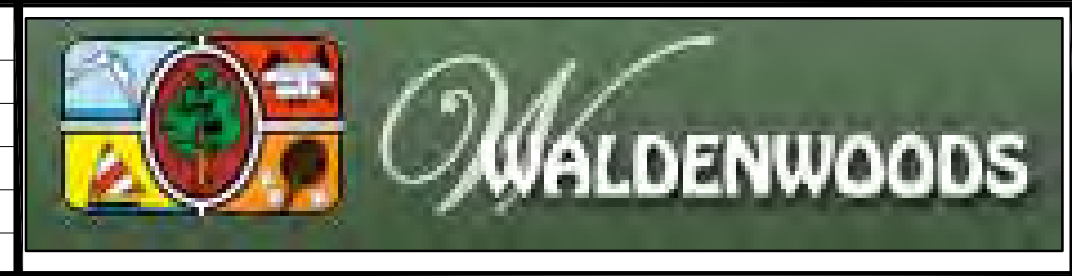
**NOTED:**  
SEE SHEET UT2.4 FOR SANITARY & STORM SEWER CALCULATIONS.



WATER RISER AND ELECTRIC SERVICE POST (TYP.) (SEE DETAIL ON SHEET DT3)

SEE SANITARY AND SEWER PLANS LEAD & MAIN CALCULATIONS ON SHEET UT2.4 OF PLANS.

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/04/19	REVISED NOTE SHOWING STORM & SANITARY SEWER CALCS ON UT2.4			
CHECK: WMP	2	12/11/19	REVISED NOTE PER HARTLAND TWP. REVIEW COMMENTS			



**UTILITY PLAN  
NORTH CAMPGROUND**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-UT2  
ISSUED: DEC. 11, 2019

**UT2.1**





DETENTION BASIN 'C' CALCULATIONS				
FOREBAY VOLUME CALCULATIONS				
POND DEPTH (FT)	ELEV.	CONTOUR AREA (SF)	INCREMENTAL VOLUME (CF)	TOTAL VOLUME (CF)
Bottom	946.00	3,713	0	0
1.00	947.00	4,990	4,336	4,336
2.00	948.00	6,440	5,700	10,035
3.00	949.00	7,997	7,204	17,240
<b>Total Designed Forebay Volume = 17,240 ft<sup>3</sup></b>				

OVERALL VOLUME CALCULATIONS				
POND DEPTH (FT)	ELEV.	CONTOUR AREA (SF)	INCREMENTAL VOLUME (CF)	TOTAL VOLUME (CF)
Bottom	945.00	4,263	0	0
0.00	946.00	9,223	6,585	6,585
1.00	947.00	11,891	10,529	17,114
2.00	948.00	14,877	13,356	30,470
3.00	949.00	18,115	16,469	46,940
4.00	950.00	21,295	19,664	66,623
<b>Total Designed Detention Volume = 66,623 ft<sup>3</sup></b>				

OVERALL ELEVATION CALCULATIONS				
	ELEV.	VOLUME (CF)	ENTER VOLUME	ELEVATION CALC
<b>Forebay Spillway Elevation:</b>				
Lower	946.00	0	1,869	946.43
Higher	947.00	4,336		
<b>First Flush Elevation:</b>				
Lower	946.00	6,585	6,986	946.04
Higher	947.00	17,114		
<b>10 Yr. Elevation:</b>				
Lower	947.00	17,114	20,318	947.24
Higher	948.00	30,470		
<b>Bankfull Elevation:</b>				
Lower	948.00	30,470	31,406	948.06
Higher	949.00	46,940		
<b>100 Yr. Elevation:</b>				
Lower	949.00	46,940	37,373	948.51
Higher	950.00	66,623		

DETENTION BASIN 'C' 100 YR. VOLUME CALCULATION						
Tributary Area (A) = 11.32 Acres						
Run-off Coefficient (C) = 0.34						
Design Constant (K) = 3.84						
Allowable Outflow Rate (Qo) = 2.26 cfs						
LDC REQUIREMENTS						
1	2	3	4	5	6	7
Duration (Minutes)	Duration (Seconds)	Intensity (100-yr Storm) (in/hr)	Col. #2 x Col. #3 (inches)	Inflow Volume = Col. #4 x K (Cu. Ft.)	Outflow Volume = Col. #2 x Qo (Cu. Ft.)	Storage Volume = Col. #5 - Col. #6 (Cu. Ft.)
5	300	9.17	2,750	10,563	679	9,884
10	600	7.86	4,744	18,108	1,358	16,750
15	900	6.88	6,188	23,786	2,038	21,748
20	1,200	6.11	7,350	28,167	2,717	25,450
30	1,800	5.00	9,000	34,560	4,075	30,485
60	3,600	3.24	11,647	44,736	8,150	36,586
90	5,400	2.39	12,913	49,599	12,226	37,373
120	7,200	1.90	13,655	52,450	16,301	36,149
180	10,800	1.34	14,488	55,648	24,451	31,196
240	14,400	0.98	14,943	57,999	32,602	25,396

DETENTION BASIN 'C' 10 YR. VOLUME CALCULATION						
Tributary Area (A) = 11.32 Acres						
Run-off Coefficient (C) = 0.34						
Design Constant (K) = 3.84						
Allowable Outflow Rate (Qo) = 2.26 cfs						
LDC REQUIREMENTS						
1	2	3	4	5	6	7
Duration (Minutes)	Duration (Seconds)	Intensity (10-yr Storm) (in/hr)	Col. #2 x Col. #3 (inches)	Inflow Volume = Col. #4 x K (Cu. Ft.)	Outflow Volume = Col. #2 x Qo (Cu. Ft.)	Storage Volume = Col. #5 - Col. #6 (Cu. Ft.)
5	300	5.83	1,750	6,722	679	6,043
10	600	5.00	3,000	11,523	1,358	10,165
15	900	4.38	3,600	13,524	2,038	11,486
20	1,200	3.89	4,667	17,025	2,717	14,308
30	1,800	3.18	5,727	21,998	4,075	17,923
60	3,600	2.06	7,412	28,469	8,150	20,318
90	5,400	1.52	8,217	31,563	12,226	19,337
120	7,200	1.21	8,660	33,377	16,301	17,076
180	10,800	0.85	9,229	35,412	24,451	10,961
240	14,400	0.66	9,509	36,526	32,602	3,924

CONTROL STRUCTURE CALCULATIONS (CS-301)				
Tributary Area: A = 11.32 Acres				
Compound Runoff Coefficient: C = 0.34				
Orifice Flow Coefficient: c = 0.60				
Allowable Outflow Rate: Qa = 2.26 CFS				
100 Year Flood Volume: V100 = 37,373 CF				
Bankfull Flood Volume = 8,160 x A x C				
First Flush Volume = 1,815 x A x C				
Low Water Level: LWL = 945.00				
First Flush Elevation: Xf = 946.04				
Bankfull Flood Elevation: Xbf = 948.06				
100 Year Flood Elevation: X100 = 948.51				
High Water Level (Set @ Freeboard Elev.): HWL = 950.00				
<b>FIRST FLUSH:</b>				
Qff =	Vff * (1 / 24 hrs) * (1 / 3600 sec) =	0.0809 CFS		
Hff =	Xf - LWL =	1.04 FT		
Aff =	Qff / (c * SQRT(2 * 32.2 * Hff)) =	0.0165 SF		
Nff =	Aff / 0.0054 =	3.05 1/2 Holes		
Use Nff = 3 1" Holes at Centerline Elevation = 944.90				
Approx. First Flush Detention Duration = 24.17 hours				
<b>BANKFULL FLOOD:</b>				
H =	Xbf - LWL =	3.06 FT		
Qbf =	c * Nff * 0.0054 * SQRT(2 * 32.2 * H) =	0.1364 CFS		
Vprovided =	Qbf * 24 hrs * (3600 sec / 1 hr) =	11,783 CF		
Vneeded =	Vff - Vprovided =	19,623 CF		
Qbf =	Vneeded * (1 / 24 hrs) * (1 / 3600 sec) =	0.2271 CFS		
Hbf =	Xbf - Xff =	2.02 FT		
Abf =	Qbf / (c * SQRT(2 * 32.2 * Hbf)) =	0.0332 SF		
Nbf =	Abf / 0.0123 =	2.70 1-1/2 Holes		
Use Nbf = 3 1-1/2 Holes at Centerline Elevation = 946.10				
Approx. Bankfull Detention Duration = 45.82 hours				
<b>100 YEAR FLOOD:</b>				
Qff + Qbf =	[c * Nff * 0.0054 * SQRT(2 * 32.2 * (HWL - LWL))] + [c * Nbf * 0.0123 * SQRT(2 * 32.2 * (HWL - Xff))] =	0.5281 CFS		
H100needed =	Qa - (Qff + Qbf) =	1.7359 CFS		
H100 =	HWL - Xbf =	1.94 FT		
A100needed =	H100needed / (c * SQRT(2 * 32.2 * H100)) =	0.2586 SF		
N100needed =	A100needed / 0.022 =	11.76 2" Holes		
Use N100 = 12 2" Holes at Centerline Elevation = 948.14				

DETENTION BASIN 'C' 10 YR. VOLUME CALCULATION						
Tributary Area (A) = 11.32 Acres						
Runoff Coefficient (C) = 0.34						
Design Constant (K) = 3.84						
Allowable Outflow Rate (Qo) = 2.26 cfs						
LDC REQUIREMENTS						
1	2	3	4	5	6	7
Duration (Minutes)	Duration (Seconds)	Intensity (10-yr Storm) (in/hr)	Col. #2 x Col. #3 (inches)	Inflow Volume = Col. #4 x K (Cu. Ft.)	Outflow Volume = Col. #2 x Qo (Cu. Ft.)	Storage Volume = Col. #5 - Col. #6 (Cu. Ft.)
5	300	5.83	1,750	6,722	679	6,043
10	600	5.00	3,000	11,523	1,358	10,165
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20	1,200	3.89	4,667	17,025	2,717	14,308
30	1,800	3.18	5,727	21,998	4,075	17,923
60	3,600	2.06	7,412	28,469	8,150	20,318
90	5,400	1.52	8,217	31,563	12,226	19,337
120	7,200	1.21	8,660	33,377	16,301	17,076
180	10,800	0.85	9,229	35,412	24,451	10,961
240	14,400	0.66	9,509	36,526	32,602	3,924

CONTROL STRUCTURE CALCULATIONS (CS-301)				
Tributary Area: A = 11.32 Acres				
Compound Runoff Coefficient: C = 0.34				
Orifice Flow Coefficient: c = 0.60				
Allowable Outflow Rate: Qa = 2.26 CFS				
100 Year Flood Volume: V100 = 37,373 CF				
Bankfull Flood Volume = 8,160 x A x C				
First Flush Volume = 1,815 x A x C				
Low Water Level: LWL = 945.00				
First Flush Elevation: Xf = 946.04				
Bankfull Flood Elevation: Xbf = 948.06				
100 Year Flood Elevation: X100 = 948.51				
High Water Level (Set @ Freeboard Elev.): HWL = 950.00				
<b>FIRST FLUSH:</b>				
Qff =	Vff * (1 / 24 hrs) * (1 / 3600 sec) =	0.0809 CFS		
Hff =	Xf - LWL =	1.04 FT		
Aff =	Qff / (c * SQRT(2 * 32.2 * Hff)) =	0.0165 SF		
Nff =	Aff / 0.0054 =	3.05 1/2 Holes		
Use Nff = 3 1" Holes at Centerline Elevation = 944.90				
Approx. First Flush Detention Duration = 24.17 hours				
<b>BANKFULL FLOOD:</b>				
H =	Xbf - LWL =	3.06 FT		
Qbf =	c * Nff * 0.0054 * SQRT(2 * 32.2 * H) =	0.1364 CFS		
Vprovided =	Qbf * 24 hrs * (3600 sec / 1 hr) =	11,783 CF		
Vneeded =	Vff - Vprovided =	19,623 CF		
Qbf =	Vneeded * (1 / 24 hrs) * (1 / 3600 sec) =	0.2271 CFS		
Hbf =	Xbf - Xff =	2.02 FT		
Abf =	Qbf / (c * SQRT(2 * 32.2 * Hbf)) =	0.0332 SF		
Nbf =	Abf / 0.0123 =	2.70 1-1/2 Holes		
Use Nbf = 3 1-1/2 Holes at Centerline Elevation = 946.10				
Approx. Bankfull Detention Duration = 45.82 hours				
<b>100 YEAR FLOOD:</b>				
Qff + Qbf =	[c * Nff * 0.0054 * SQRT(2 * 32.2 * (HWL - LWL))] + [c * Nbf * 0.0123 * SQRT(2 * 32.2 * (HWL - Xff))] =	0.5281 CFS		
H100needed =	Qa - (Qff + Qbf) =	1.7359 CFS		
H100 =	HWL - Xbf =	1.94 FT		
A100needed =	H100needed / (c * SQRT(2 * 32.2 * H100)) =	0.2586 SF		
N100needed =	A100needed / 0.022 =	11.76 2" Holes		
Use N100 = 12 2" Holes at Centerline Elevation = 948.14				

DETENTION BASIN 'C' Emergency Overflow and Forebay Spillway Calculation				
Project: Waldenwoods Expansion				
Project #: 9173156				
Date: 2-Oct-19				
Dimensions for the proposed Spillway have been calculated using the following equation:				
$Q = 3.33 * (L - 0.2H) * H^{1.5}$				
Where:				
C =	0.34			
A =	11.32 Ac.			
I =	4.68 in. (100 Yr. Intensity for Zone 10 & 15 Min. Tc per MDOT Drainage Manual)			
Q =	18.01 cfs (Computed flow per Rational Method)			
H =	0.5 ft. (Depth of flow)			
L =	ft. (Spillway's cross section width)			
Therefore:				
L =	0.2H + $\frac{Q}{3.33H^{1.5}}$			
L =	15 ft.			

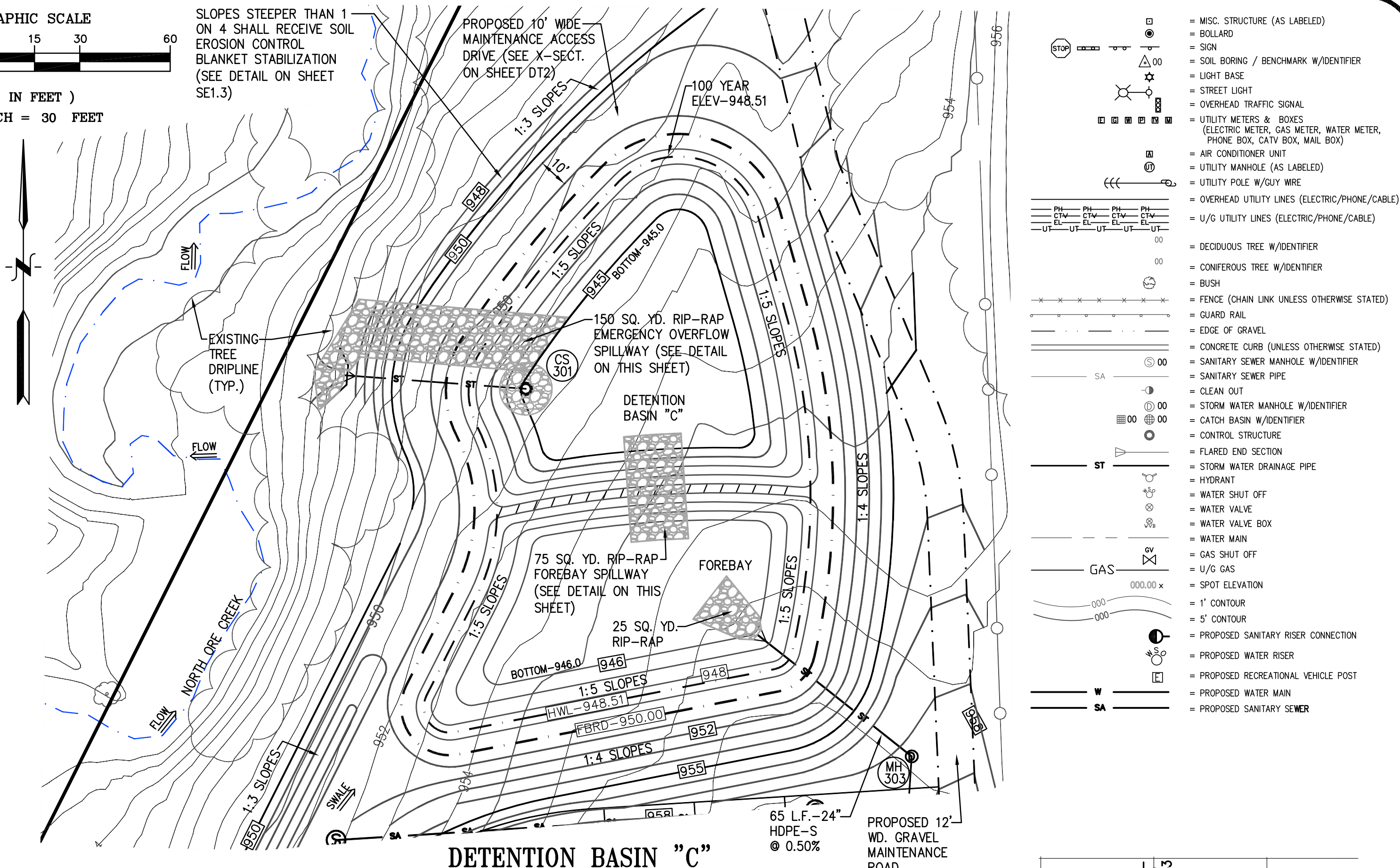
CONTROL STRUCTURE NOTES:				
1. Control Structure and Grate shall be factory built. Contractor shall provide Engineer with Shop Drawings for Control Structure and Grate. Contractor shall obtain Engineer's Approval of Shop Drawings prior to Control Structure installation.				
2. Control Structure shall be constructed of material noted in Item A of KEY. CMP shall be corrugated metal pipe with corrosion resistant coating and shall conform to the specifications for corrugated metal pipe per AASHTO Designation M36. HDPE shall be high density polyethylene pipe with a smooth interior and shall conform to the specifications for high density polyethylene pipe per AASHTO Designation M294 Type S.				
3. Control Structure Base shall be a reinforced 3000 PSI air entrained concrete base. Control Structure shall be embedded into the concrete base providing a full strength water tight connection as illustrated in the Basin Control Structure Detail.				
4. Provide a watertight connection between the Control Structure and Outlet Pipe as follows: For a CMP Outlet Pipe from a CMP Control Structure: Factory weld a CMP Pipe Stub to the Control Structure with full strength continuous weld all around Pipe Stub. Coat welded area with corrosion resistant paint. OR Provide a bolted CMP saddle with watertight gasket. For an HDPE Outlet Pipe from an HDPE Control Structure: Factory weld an HDPE pipe stub to the Control Structure with full strength PE weld all around pipe both inside and outside of Control Structure. OR Provide a bolted HDPE saddle with watertight gasket. For an RCP Outlet Pipe from a CMP or HDPE Control Structure: Seal Outlet Pipe in place concrete donut all around Outlet Pipe. AND Seal Outlet Pipe to inside of Control Structure with a 2" minimum thickness bead of bituminous tar all around Outlet Pipe.				
5. Construct berm over Outlet Pipe as necessary to provide 12" minimum cover.				
6. Grate shall be built to fit over the outside edge of the Control Structure and to be secured to the Control Structure with six (6) 1/4" minimum diameter removable galvanized screws. All joints shall be welded full strength per current AWS code. Grate shall be factory coated with bituminous or corrosion resistant paint. Grate shall be constructed of 1/2" minimum diameter round or square steel bar creating a square grid pattern with a maximum 3"x3" opening size. Outside of Grate shall be wrapped with a 1/4" minimum x 3" minimum flat sock steel.				

BENCHMARKS				
BENCHMARK #1 (SITE): 2" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE". ELEVATION = 956.03 (NAVD 88)				
BENCHMARK #A: NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS". ELEVATION = 982.99				
BENCHMARK #B: NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET. ELEVATION = 978.25				
BENCHMARK #C: CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING. ELEVATION = 968.03				
BENCHMARK #D: SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55				
BENCHMARK #E: CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17				
BENCHMARK #F: SOUTHEAST CORNER OF TRAPSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74				

BENCHMANS				
BENCHMARK #1 (SITE): 2" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE". ELEVATION = 956.03 (NAVD 88)				
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BENCHMARK #F: SOUTHEAST CORNER OF TRAPSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74				



**STORM SEWER CALCULATIONS**

Project: Waldenwoods Campground Expansion      HDPES n = 0.011      Project# 9173156  
 Design Criteria: 10 year event (I = 175/t + 25)      RCP n = 0.013      Date: 4-Dec-19  
    SLCPP n = 0.010

From MH# CB# FES#	To MH# CB# FES#	Pipe Material	Inc. Acres	"A"	"C"	Eqv. Area 1 CA	Total Area 1 CA	T Time Min.	I Inch Per Hour	Q (CIA) c.f.s.	Dia. of pipe inch	Slope pipe %	Slope H.G. %	Length of line ft.	Vel. Flow full ft./sec.	Time of flow min.	Cap of pipe c.f.s.	H.G. Elev. upper end	Ground Elev.		Invert Elev.		COVER		RIM-HGL	% CAP	
																			Upper end	Lower end	Upper end	Lower end	Upper end	Lower end			
314	313	HDPE	0.64	0.28	0.18	0.18	15.0	4.38	0.78	12	2.00	0.03	112	7.58	0.2	5.95	971.27	977.50	975.20	972.47	970.23	4.03	3.97	6.23	0.13		
313	312	HDPE	1.34	0.46	0.62	0.80	15.2	4.35	3.46	12	1.50	0.88	252	6.56	0.6	5.16	967.65	975.20	968.10	968.73	964.95	5.47	2.15	7.55	0.67		
312	311	HDPE	1.13	0.35	0.40	1.19	15.9	4.28	5.10	12	1.50	1.47	257	6.56	0.7	5.16	964.66	968.10	963.75	963.75	959.89	3.35	2.86	3.44	0.99		
311	310	HDPE	0.75	0.37	0.28	1.47	16.5	4.21	6.19	18	1.00	0.25	232	7.02	0.6	12.41	959.25	963.75	961.10	959.49	957.17	2.76	2.43	4.50	0.50		
310	309	HDPE	0.69	0.37	0.26	1.72	17.1	4.16	7.17	18	1.50	0.33	166	8.60	0.3	15.20	956.64	961.10	958.05	957.07	954.58	2.53	1.97	4.46	0.47		
309	308	HDPE	1.12	0.32	0.36	2.08	17.4	4.13	8.59	18	1.50	0.48	124	8.60	0.2	15.20	954.72	958.05	958.15	954.48	952.62	2.07	4.03	3.33	0.57		
308	307	HDPE	0.88	0.34	0.30	2.38	17.7	4.10	9.77	18	1.50	0.62	160	8.60	0.3	15.20	952.83	958.15	958.95	952.52	950.12	4.13	7.33	5.32	0.64		
STUB**	307	HDPE	0.00	0.00	0.00	1.34	18.3	4.04	5.42	18	0.20	0.19	10	3.14	0.1	5.55	951.84	---	958.95	950.14	950.12	---	---	---	---	---	
307	306	HDPE	0.62	0.31	0.19	3.91	18.4	4.04	15.80	24	0.40	0.35	162	5.38	0.5	16.90	951.84	958.95	960.20	949.72	949.08	7.23	9.12	7.11	0.93		
STUB**	306	HDPE	0.00	0.00	0.00	0.23	15.0	4.38	1.01	12	3.00	0.06	10	9.28	0.0	7.29	951.78	---	960.20	951.08	950.78	---	---	---	---	---	
306	305	HDPE	1.03	0.34	0.35	4.49	18.9	3.99	17.93	24	0.45	0.45	240	5.71	0.7	17.93	951.08	960.20	962.45	948.98	947.90	9.22	12.55	9.12	1.00		
305	304	HDPE	0.28	0.47	0.12	4.62	19.6	3.93	18.13	24	0.50	0.46	125	6.02	0.3	18.90	950.00	962.45	961.50	947.80	947.17	12.66	12.33	12.45	0.96		
304	303	HDPE	0.30	0.38	0.11	4.73	19.9	3.90	18.43	24	0.50	0.48	129	6.02	0.4	18.90	949.43	961.50	958.35	947.07	946.43	12.43	9.92	12.07	0.98		
303	302	HDPE	0.00	0.00	0.00	4.73	20.3	3.87	18.29	24	0.50	0.47	65	6.02	0.2	18.90	948.81	958.35	948.00	946.33	946.00	10.03	---	9.54	0.97		
																			<b>948.51 Downstream HWL</b>								

**SANITARY SEWER CALCULATIONS**

Project: Waldenwoods Resort Campground Expansion      Date: 4-Dec-19  
 Job #: 173156

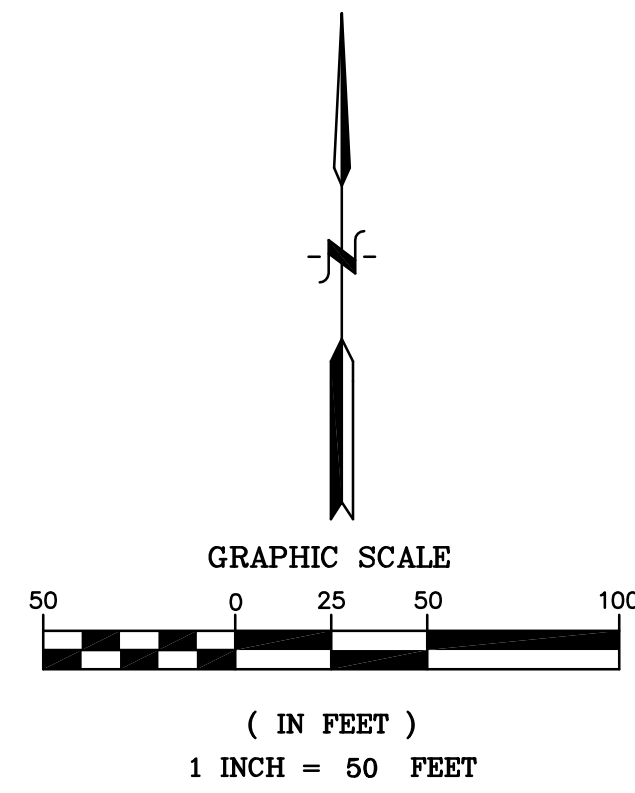
From MH # C/O #	To MH # C/O #	Type of Facility	Unit	# of Units	Average Daily Flow (GPD)	Total Daily Flow (GPD)	Peak Daily Flow (CFS)	Total Peak Daily Flow (CFS)	Pipe Diam. (inch)	Pipe Length (feet)	Slope Pipe %	Pipe Capacity (CFS)	Velocity Flow full (FPS)	Rim Elevation		Invert Elevation		Cover	
														Upper End	Lower End	Upper End	Lower End	Upper End	Lower End
<b>Serving Proposed Units: C53, D60-D76 &amp; W15-W28</b>																			
59	58	Camp	Trailer	9	85	765	0.0012	0.0012	8	313	0.40	0.76	2.19	988.03	986.62	981.32	980.07	6.04	5.88
58	57	Camp	Trailer	7	85	595	0.0010	0.0022	8	250	0.40	0.76	2.19	986.62	985.17	979.97	978.97	5.98	5.53
57	16	---	---	---	---	---	---	0.0031	8	156	3.15	2.14	6.14	985.17	979.65	978.75	973.83	5.75	5.15
16A	16	Camp	Trailer	6	85	510	0.0008	0.0008	8	232	1.50	1.48	4.24	982.65	979.30	977.41	973.93	4.57	4.70
16	15	Camp	Trailer	11	85	935	0.0015	0.0054	8	206	2.38	1.86	5.34	979.65	972.46	973.83	968.92	5.15	2.87
15	14	Camp	Trailer	6	85	510	0.0008	0.0062	8	117	4.20	2.48	7.09	972.46	969.10	968.92	964.01	2.87	4.42
14	13	Camp	Trailer	8	85	680	0.0011	0.0073	8	158	3.20	2.16	6.19	969.10	962.88	964.01	958.95	4.42	3.26
13	12	Camp	Trailer	8	85	680	0.0011	0.0084	8	148	1.05	1.24	3.55	962.88	961.45	958.95	957.40	3.26	3.38
12	11	Camp	Trailer	3	85	255	0.0004	0.0088	8	100	0.70	1.01	2.90	961.45	960.65	957.35	956.65	3.43	3.33
11	10	Bath House	Showers	22	250	5500	0.0088	0.0176	8	117	1.12	1.28	3.66	960.65	959.29	956.65	955.34	3.33	3.28
		Laundry	Washers	5	550	2750	0.0044	0.0220											
		Restrooms	Urinals	7	80	560	0.0039	0.0229											
			Toilets	28	280	7840	0.0125	0.0365											
			Sinks	29	250	7250	0.0116	0.0471											
<b>Serving Proposed Units: F1, F41-F45, F69-F79, G1-G32 &amp; W1-W14</b>																			
408	407	Camp	Trailer	1	85	85	0.0001	0.0001	8	61	4.00	2.42	6.92	981.50	978.20	974.20	971.76	6.61	5.75
407	406	Camp	Trailer	10	85	850	0.0014	0.0015	8	190	2.00	1.71	4.90	978.20	973.00	969.96	966.16	7.55	6.15
406	405	Camp	Trailer	9	85	765	0.0012	0.0027	8	278	1.80	1.62	4.64	973.00	967.75	964.46	959.45	7.85	7.60
405	404	Camp	Trailer	6	85	510	0.0008	0.0035	8	188	1.00	1.21	3.46	967.75	964.10	959.35	957.47	7.70	5.93
404	403	Camp	Trailer	6	85	510	0.0008	0.0044	8	284	1.50	1.48	4.24	964.10	960.40	956.47	952.21	6.93	7.49
STUB	403	Camp	Trailer	13	85	1105	0.0018	0.0018	8	10	0.40	0.76	2.19	957.65	960.40	951.35	951.31	5.60	8.39
403	402	Camp	Trailer	9	85	765	0.0012	0.0073	8	234	0.40	0.76	2.19	960.40	959.40	951.21	950.28	8.49	8.43
402	401	Camp	Trailer	8	85	680	0.0011	0.0084	8	178	0.40	0.76	2.19	959.40	961.35	950.18	949.47	8.53	11.19
STUB	401	Camp	Trailer	17	85	1445	0.0023	0.0023	8	10	2.00	1.71	4.90	958.65	959.40	950.97	950.77	6.99	7.94
401	400	Camp	Trailer	16	85	1360	0.0022	0.0129	8	320	0.40	0.76	2.19	961.35	964.25	949.37	948.09	11.29	15.47
400	504	---	---	---	---	---	---	0.0129	8	180	1.75	1.60	4.58	964.25	964.05	947.99	944.84	15.57	18.52
506	505	Camp	Trailer	3	85	255	0.0004	0.0004	8	59	4.00	2.42	6.92	964.20	964.35	956.56	954.20	6.95	9.46
505	504	Camp	Trailer	5	85	425	0.0007	0.0011	8	154	4.00	2.42	6.92	964.35	964.05	952.70	946.54	10.96	16.82
504	500	---	---	---	---	---	---	0.0140	8	75	1.75	1.60	4.58	964.05	957.50	944.74	943.42	18.62	13.38
503	502	Camp	Trailer	4	85	340	0.0005	0.0005	8	159	3.50	2.26	6.48	959.10	951.80	953.68	948.11	4.73	2.99
502	501	Camp	Trailer	6	85	510	0.0008	0.0014	8	187	0.40	0.76	2.19	951.80	956.20	947.61	946.86	3.49	8.64
501	500	---	---	---	---	---	---	0.0014	8	134	1.00	1.21	3.46	956.20	957.50	945.66	944.32	9.84	12.48
500	2	---	---	---	---	---	---	0.0154	8	47	1.75	1.60	4.58	957.50	957.14	943.32	942.50	13.48	13.94
3	2	Camp	Trailer	5	85	425	0.0007	0.0007	8	146	0.54	0.89	2.54	953.87	957.14	943.13	942.34	10.04	14.10
<b>Serving Proposed Units: D67, D69, D81, D8 &amp; E51-E58</b>																			
32A	32	Camp	Trailer	4	85	340	0.0005	0.0005	6	80	2.00	0.79	4.04	980.15	975.34	973.00	971.39	6.65	3.45
24A	24	Camp	Trailer	5	85	425	0.0007	0.0007	6	100	2.00	0.79	4.04	979.05	974.30	972.50	970.50	6.05	3.30

**SANITARY LEADS TABLE**

Project: Waldenwoods Resort Site Improvements      Date: 4-Dec-19

DIS MH	UNIT NUMBER	WYE SIZE (IN)	LEAD DIAM (IN)	LENGTH D/S MH TO WYE (FT)	SLOPE OF MAIN %	SAN MAIN INV. ELEV.	LEAD LENGTH (to C.O.) (FT)	RISER HEIGHT INV - INV (FT)	LEAD SLOPE (%)	LEAD INVERT at C.O.	PROPOSED R/HOOK-UP ELEVATION	COVER TO TOP (FT)	CONSTRUCTION PLAN SHEET LOCATION
11						956.65							
	C53	8X8X6	6	79	0.70	957.20	44	0.8	1.0	958.44	961.50	3.02	
	D74	8X8X6	6	58	0.70	957.06	79	0.8	1.0	958.65	962.00	3.31	
15						973.83							
	D78	8X8X6	6	122	2.38								

SEE SHEET SE2.1 OF PLANS FOR NORTH CAMPGROUND SOIL EROSION PLAN



**BENCHMARKS**

BENCHMARK #1 (SITE)  
 "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE."  
 ELEVATION = 956.03 (NAVD 88)

BENCHMARK #A:  
 NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
 ELEVATION = 982.99

BENCHMARK #B:  
 NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET.  
 ELEVATION = 978.25

BENCHMARK #C:  
 CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING.  
 ELEVATION = 968.03

BENCHMARK #D:  
 SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND.  
 ELEVATION = 948.55

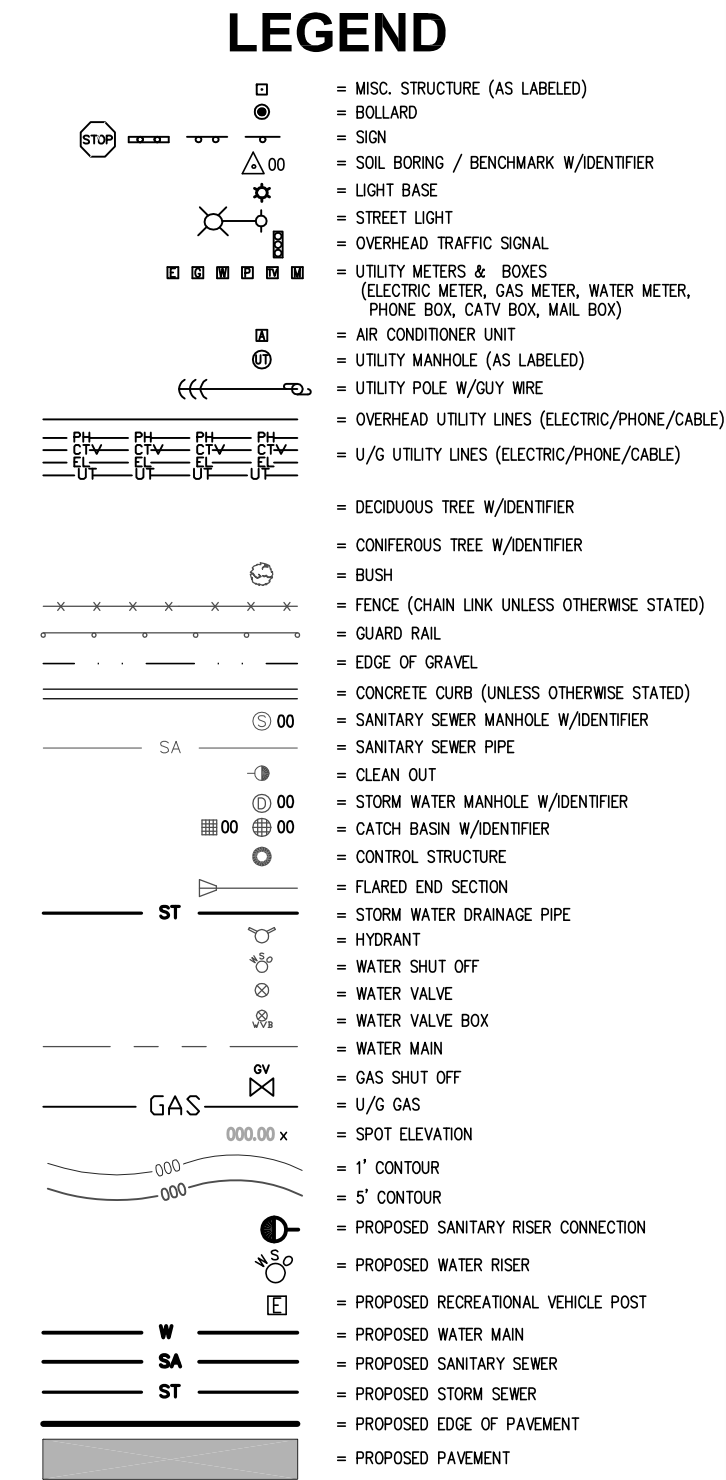
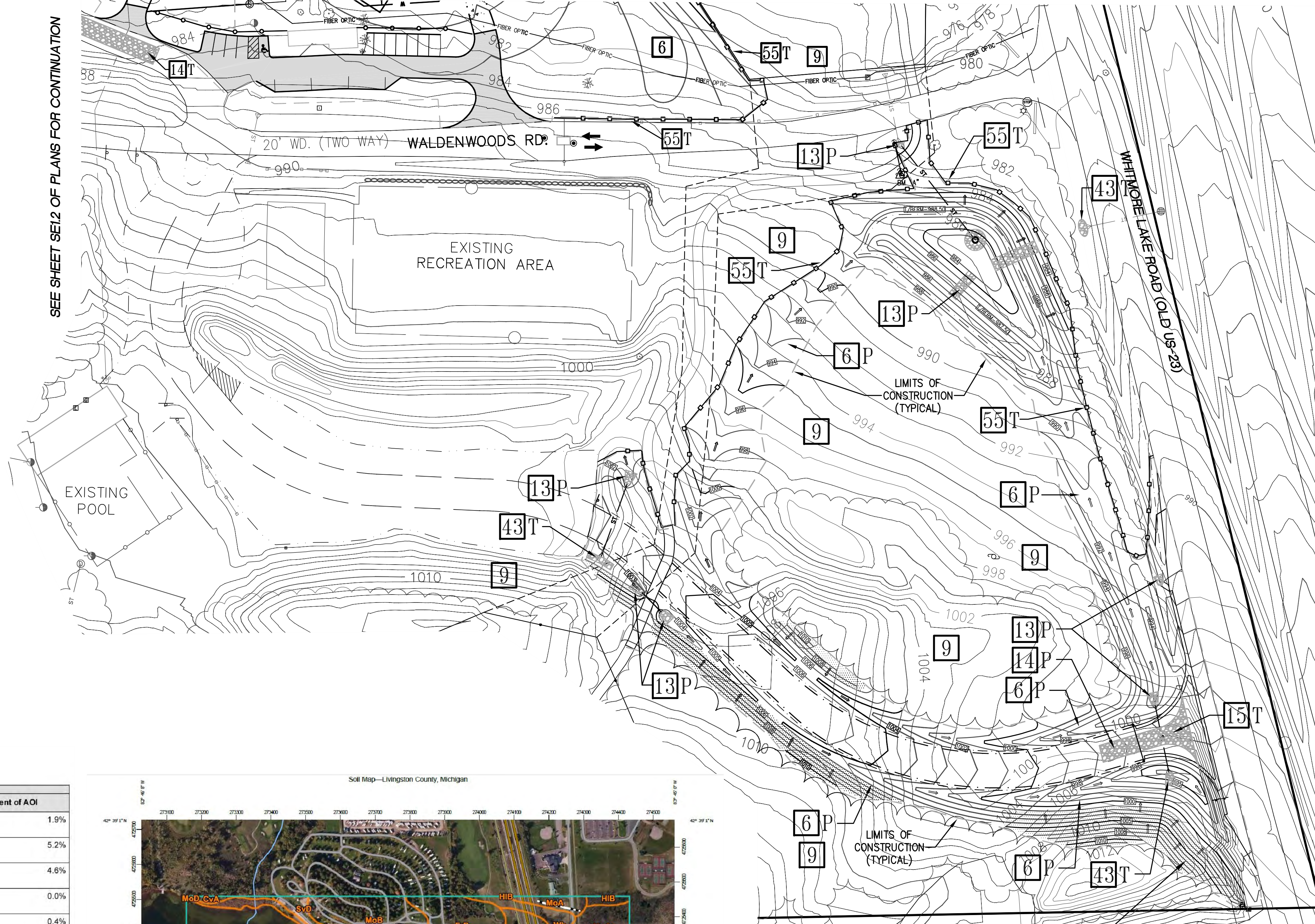
BENCHMARK #E:  
 CENTERLINE OF MANHOLE COVER NEAR LIFT STATION.  
 ELEVATION = 948.17

BENCHMARK #F:  
 SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING.  
 ELEVATION = 961.74

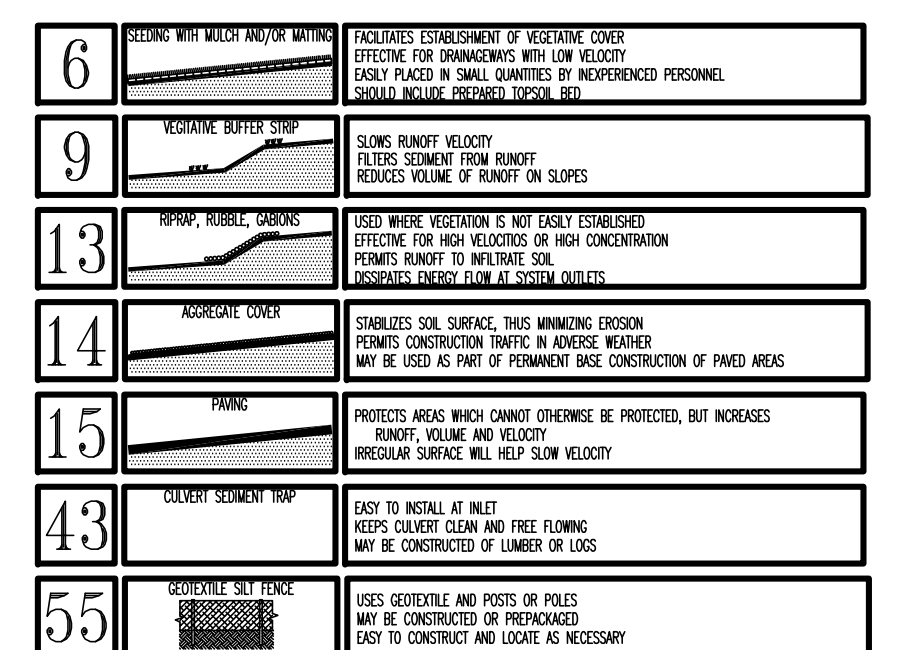
**Map Unit Legend**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
CvA	Conover loam, 0 to 2 percent slopes	3.3	1.9%	
FrB	Fox-Boyer complex, 2 to 6 percent slopes	9.1	5.2%	
FrC	Fox-Boyer complex, 6 to 12 percent slopes	8.1	4.8%	
FrD	Fox-Boyer complex, 12 to 18 percent slopes	0.0	0.0%	
HIB	Hillsdale sandy loam, 2 to 6 percent slopes	0.7	0.4%	
HIE	Hillsdale sandy loam, 18 to 25 percent slopes	18.1	10.3%	
HmB	Hillsdale-Miami loams, 2 to 6 percent slopes	1.4	0.8%	
MoA	Miami loam, 0 to 2 percent slopes	1.8	1.0%	
MoB	Miami loam, 2 to 6 percent slopes	17.4	9.9%	
MoC	Miami loam, 6 to 12 percent slopes	11.9	6.8%	
MoD	Miami loam, 12 to 18 percent slopes	2.7	1.5%	
Pc	Pewamo clay loam	3.1	1.8%	
SvB	Spinks-Oakville loamy sands, 0 to 6 percent slopes	19.1	10.9%	
SvD	Spinks-Oakville loamy sands, 12 to 18 percent slopes	1.6	0.9%	
SvE	Spinks-Oakville loamy sands, 18 to 25 percent slopes	19.1	10.9%	
W	Water	54.5	31.0%	
Wh	Washtenaw silt loam	3.9	2.2%	
<b>Totals for Area of Interest</b>		<b>175.7</b>	<b>100.0%</b>	

SEE SHEET SE1.2 OF PLANS FOR CONTINUATION



**SOIL EROSION LEGEND**



T=TEMPORARY P=PERMANENT  
 - - - - - 36" SILT FENCE

**NOTED:**

>SEE SHEET SE1.3 FOR SOIL EROSION PLAN NOTES AND CONSTRUCTION SEQUENCE SCHEDULE.

>SEE SHEET SE 1.2 FOR NORTH CAMPGROUND AND DRY HYDRANT SOIL EROSION AND SEDIMENTATION CONTROL PLAN.



**SOUTH CAMPGROUND SOILS MAP**  
 NOT TO SCALE

STAKED MULCH BLANKET SHALL BE INSTALLED ON SLOPES EXCEEDING 1 ON 4 (SEE DETAILS ON SHEET SE1.3)

**TOTAL AREA OF DISTURBANCE= 3.13 Ac.**  
 DISTANCE TO NEAREST OPEN WATERCOURSE = 880 FT. (LAKE WALDEN)  
 A COMMERCIAL SESC PERMIT FROM LCDC IS REQUIRED FOR THIS PROJECT  
 AN NPDES PERMIT FROM THE DEQ IS REQUIRED FOR THIS PROJECT.

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.			
CHECK: WMP			

REVISION #	DATE	REVISION-DESCRIPTION

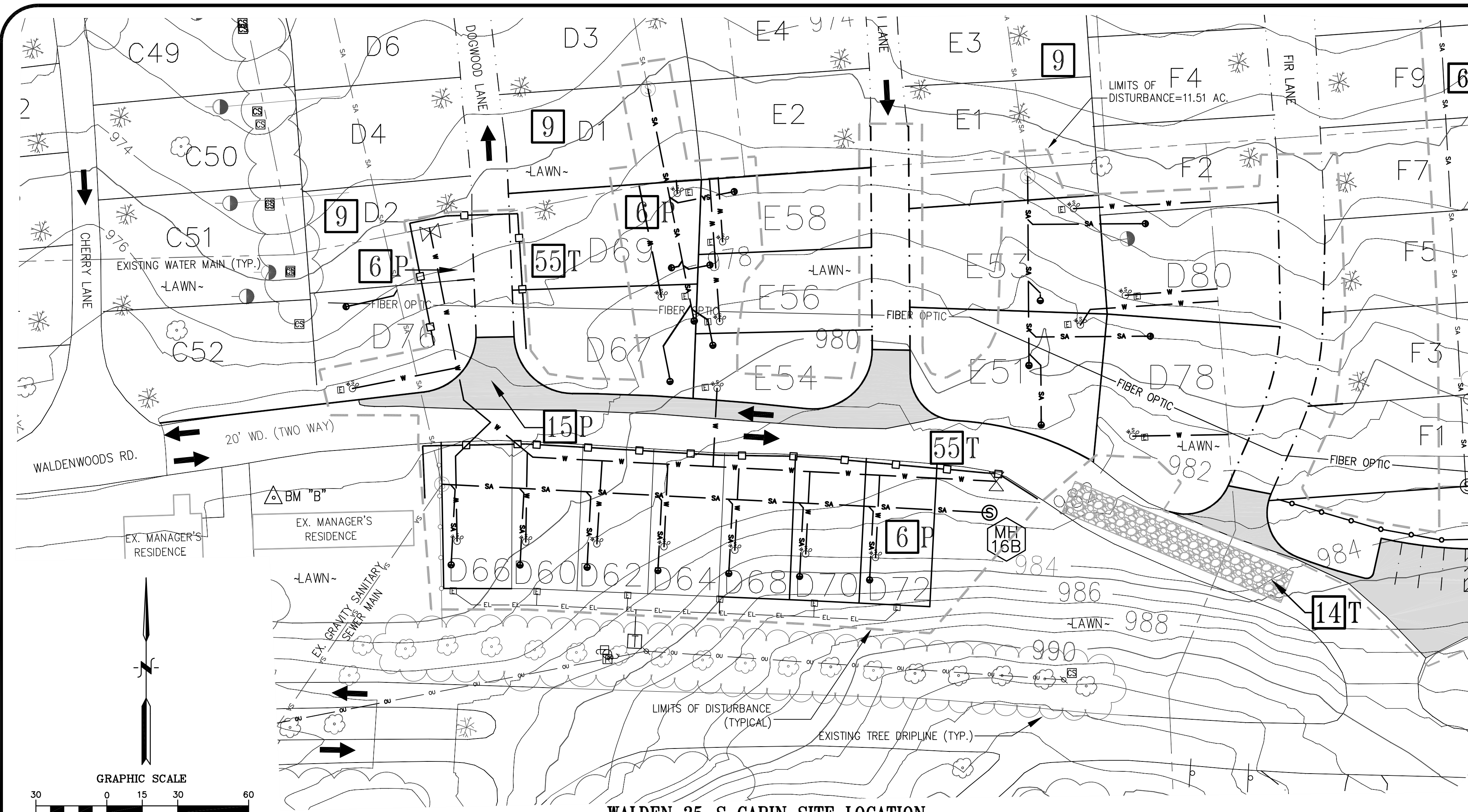


**SOIL EROSION AND SEDIMENTATION CONTROL PLAN (SOUTH)**

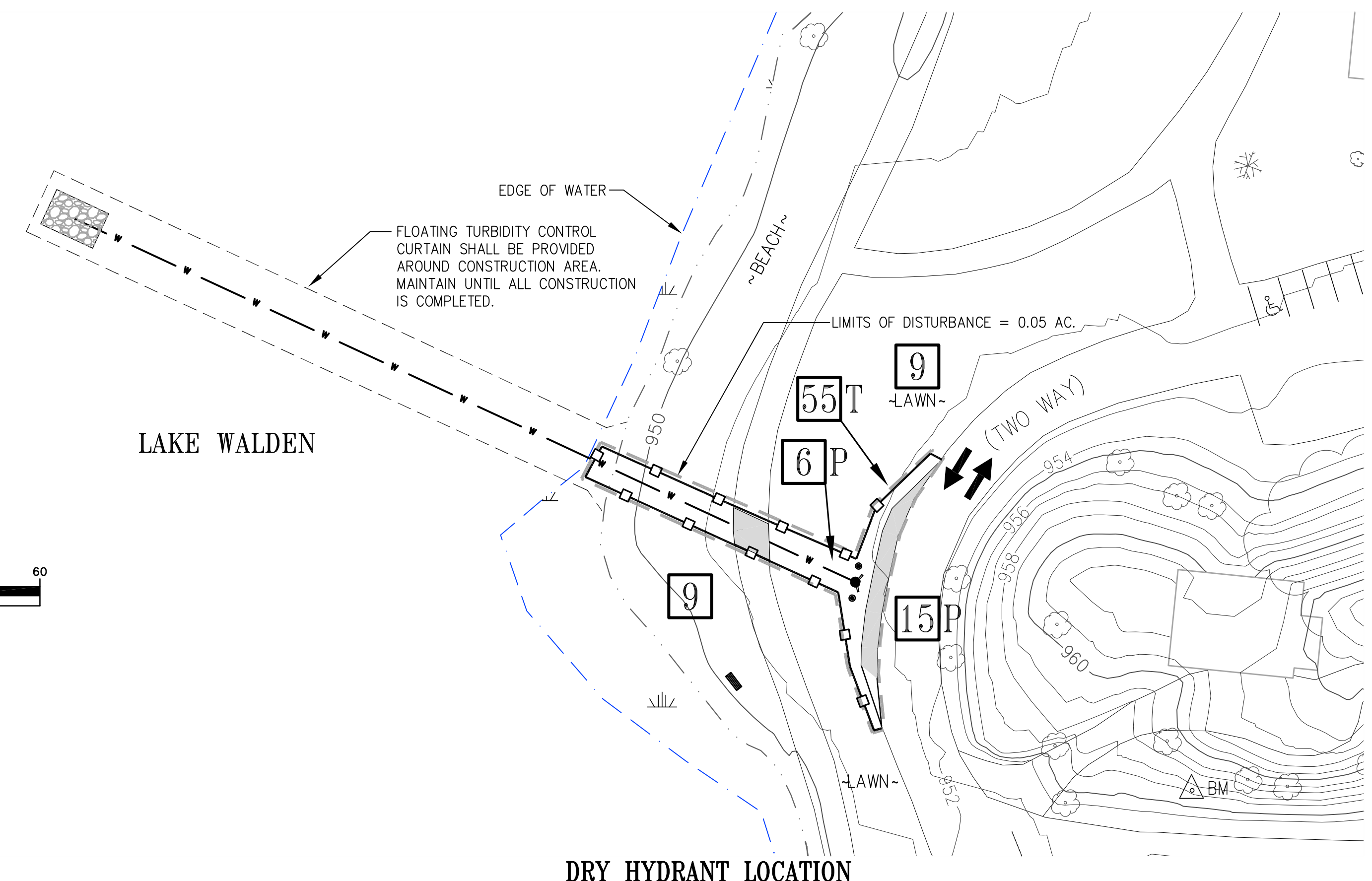
CLIENT:  
 WALDENWOODS PROPERTIES  
 C/O BRIAN CROUSE  
 9840 CROUSE ROAD  
 HOWELL, MI. 48855  
 810-632-6135

SCALE: 1"=50'  
 PROJECT No.: 9173156  
 DWG NAME: 3156-EROSION  
 ISSUED: DEC. 11, 2019

**SE1.1**



**WALDEN 35-S CABIN SITE LOCATION**



**DRY HYDRANT LOCATION**

**PARCEL No. 4708-17-400-002**

**BEGINNING** at the Southeast Corner of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence S85°36'41"W 1100.00 feet along the South line of said Section 17; thence N24°52'10"W 926.39 feet; thence N26°39'20"E 154.69 feet; thence N85°36'41"E 1370.41 feet; thence S02°59'49"E 1000.00 feet along the East line of said Section 17 to the Place of Beginning. Being a part of the Southeast 1/4 of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan. Containing 29.6 acres of land, more or less. Subject to and together with all easements and restrictions affecting title to the above described premises.

**PARCEL No. 4708-17-200-002**

**BEGINNING** at the East Corner of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence S02°59'49"E 177.17 feet along the East line of said Section 17; thence N43°57'30"W 231.58 feet; thence S30°34'23"W 586.56 feet; thence S18°18'56"W 90.08 feet; thence S75°25'29"E 572.11 feet; thence S02°59'49"E 969.72 feet along said East line of Section 17; thence S85°36'41"W 1370.41 feet; thence N26°39'20"E 794.72 feet; thence N23°38'57"E 393.82 feet; thence N31°31'09"E 243.60 feet; thence N48°29'38"W 144.55 feet; thence S71°59'34"W 63.46 feet; thence S72°50'24"W 270.36 feet; thence N04°03'39"W 514.40 feet; thence N89°19'36"W 1521.99 feet; thence N02°53'27"W 985.28 feet along the North-South 1/4 line of said Section 17; thence N89°30'44"E 68.29 feet; thence S07°30'02"E 305.87 feet; thence S31°22'01"E 448.06 feet; thence S03°27'40"E 305.10 feet; thence S89°32'27"E 331.17 feet; thence N02°18'18"W 172.84 feet; thence N10°16'35"W 45.36 feet; thence S75°00'44"W 35.86 feet; thence N13°25'48"W 495.06 feet; thence N16°19'14"W 575.79 feet; thence N38°13'48"W 354.78 feet; thence N01°20'23"E 220.58 feet; thence N11°16'52"E 385.37 feet; thence N02°52'26"W 122.31 feet; thence N10°44'14"E 175.06 feet; thence N85°22'02"E 2067.98 feet along the North line of said Section 17; thence S09°30'23"E 170.78 feet; thence S09°30'23"E 240.03 feet; thence S18°08'28"W 279.07 feet; thence S72°23'07"W 130.59 feet; thence S00°44'11"W 632.84 feet; thence S17°01'38"E 220.11 feet; thence S52°32'30"W 275.89 feet; thence S62°31'47"W 250.09 feet; thence S52°33'48"W 330.05 feet; thence S79°42'38"W 316.70 feet; thence S79°41'39"W 249.73 feet; thence S67°03'38"W 219.64 feet; thence S01°42'54"E 70.08 feet; thence S00°03'15"W 226.37 feet; thence S88°59'10"E 290.18 feet; thence N83°11'26"E 166.71 feet; thence N48°53'03"E 159.83 feet; thence N84°00'33"E 397.43 feet; thence S43°18'13"E 410.56 feet; thence N32°45'28"E 310.41 feet; thence S44°53'41"E 118.78 feet; thence N71°30'54"E 330.04 feet; thence N71°30'54"E 71.45 feet; thence S02°57'52"E 882.64 feet along said East line of Section 17 to the Place of Beginning. Being a part of the Northeast 1/4 and Southeast 1/4 of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan. Containing 144.3 acres of land, more or less. Subject to the rights of the public over that portion thereof taken for Crouse Road and South bound service road of Highway U.S. 23, also subject to and together with all easements and restrictions affecting title to the above described premises.

**PARCEL No. 4708-17-300-009**

**BEGINNING** at the Center Post of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence N85°39'57"E 13.67 feet along the East-West 1/4 of said Section 17; thence S05°24'29"E 173.74 feet; thence S02°34'47"E 950.66 feet; thence S02°50'09"E 48.35 feet; thence S03°04'22"E 289.81 feet; thence N87°35'33"E 53.78 feet; thence S52°24'27"E 201.85 feet; thence N89°05'01"E 133.27 feet; thence N40°03'32"E 244.09 feet; thence N80°30'01"E 86.47 feet; thence S31°36'14"E 373.35 feet; thence S56°19'06"E 73.00 feet; thence N86°22'08"E 62.71 feet; thence N89°28'09"E 254.90 feet; thence N28°39'20"E 18.40 feet; thence S24°55'10"E 926.39 feet; thence S85°36'40"W 1523.28 feet along the South line of said Section 17 to intersection with the North-South 1/4 line of said Section; thence continuing S85°36'40"W 1309.08 feet along the South line of said Section 17; thence N02°55'31"W 451.91 feet; thence N82°04'52"E 109.77 feet; thence N13°01'29"E 95.06 feet; thence N62°23'13"W 157.30 feet; thence N02°55'31"W 2036.26 feet; thence N89°39'57"E 1310.65 feet along the East-West 1/4 line of said Section 17 to the Place of Beginning. **EXCEPTING** therefrom the following described parcel: Commencing at the Center Post of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence S02°53'28"E 1100.70 feet along the North-South 1/4 line of said Section 17; thence S87°06'32"W (S87°06'32"E record) 291.87 feet to the **PLACE OF BEGINNING**; thence S05°42'16"W 59.09 feet; thence S16°14'15"W 1022.59 feet; thence S27°59'04"W 583.06 feet; thence N29°33'57"W 435.16 feet; thence N19°03'17"E 61.21 feet; thence S88°44'57"E 33.40 feet; thence N10°35'15"E 416.52 feet; thence N85°36'41"E 1100.00 feet; thence N41°14'01"E 383.82 feet; thence N48°20'50"E 300.45 feet; thence S71°18'05"E 123.69 feet; thence S02°05'45"E 64.81 feet; thence S02°42'41"E 162.71 feet to the Place of Beginning. Being a part of the Southwest 1/4 and Southeast 1/4 of Section 17, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan. Containing 95.7 acres of land, more or less. Subject to and together with all easements and restrictions affecting title to the above described premises.

**PARCEL No. 4708-16-300-015**

**BEGINNING** at the Southwest Corner of Section 16, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence N02°59'49"W 1969.72 feet along the West line of said Section 16; thence S75°26'29"E 165.45 feet; thence S75°20'11"E 197.84 feet; thence N88°57'47"E 26.01 feet; thence N87°40'40"E 63.85 feet; thence N26°16'22"W 275.23 feet; thence N43°57'30"W 499.35 feet; thence N02°59'49"W 177.17 feet along said West line of Section 16; thence N88°53'44"E 361.88 feet along the East-West 1/4 line of said Section 16; thence S13°31'36"E 279.58 feet along the Westerly Right-of-Way of U.S. 23; thence S89°01'22"W 861.04 feet along the South line of said Section 16 to the Place of Beginning. **EXCEPTING THEREFROM**; Commencing at said Southwest Corner of Section 16; thence S02°56'11"E 0.27 feet along said West line of Section 16; thence 87°03'49"E 699.06 feet to the **PLACE OF BEGINNING**; thence S85°02'00"W 143.72 feet; thence N32°59'00"W 736.37 feet; thence N09°25'29"W 577.73 feet; thence N05°59'45"W 463.81 feet; thence N24°58'23"E 124.56 feet; thence N86°49'08"E 208.20 feet; thence N83°43'48"E 23.64 feet; thence S85°59'10"E 65.39 feet; thence S11°40'12"E 1676.57 feet; thence S00°35'44"W 117.01 feet to the Place of Beginning. Being a part of the Southwest 1/4 of Section 16, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan. Containing 19.1 acres of land, more or less. Subject to and together with all easements and restrictions affecting title to the above described premises.

**PARCEL No. 4708-21-100-037**

**BEGINNING** at the Northwest Corner of Section 21, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan; thence N89°01'22"E 861.04 feet along the North line of said Section 21; thence S13°31'36"E 687.47 feet along the Westerly Right-of-Way line of U.S. 23 (a limited access highway); thence S88°55'52"W 516.10 feet; thence N15°47'03"W 166.14 feet; thence N23°20'55"W 76.91 feet; thence N77°32'26"W 94.52 feet; thence S67°06'04"W 176.20 feet; thence S27°24'54"W 194.88 feet; thence S19°12'31"E 18.25 feet; thence S88°55'52"W 57.30 feet; thence N02°56'18"W 673.02 feet along the West line of said Section 21 to the Place of Beginning. Being a part of the Northwest 1/4 of Section 21, Town 3 North, Range 6 East, Hartland Township, Livingston County, Michigan. Containing 12.5 acres of land, more or less. Subject to the rights of the public over that portion thereof taken for South bound service road of Highway U.S. 23, also subject to and together with all easements and restrictions affecting title to the above described premises.

**LEGEND**

	MISC. STRUCTURE (AS LABELED)
	BOLLARD
	SOIL BORING / BENCHMARK W/IDENTIFIER
	LIGHT BASE
	STREET LIGHT
	OVERHEAD TRAFFIC SIGNAL
	UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
	AIR CONDITIONER UNIT
	UTILITY MANHOLE (AS LABELED)
	UTILITY POLE W/0/2 WIRE
	OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
	U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
	DECIDUOUS TREE W/IDENTIFIER
	CONIFEROUS TREE W/IDENTIFIER
	BUSH
	FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
	GUARD RAIL
	EDGE OF GRAVEL
	CONCRETE CURB (UNLESS OTHERWISE STATED)
	SANITARY SEWER MANHOLE W/IDENTIFIER
	SANITARY SEWER PIPE
	CLEAN OUT
	STORM WATER MANHOLE W/IDENTIFIER
	CATCH BASIN W/IDENTIFIER
	CONTROL STRUCTURE
	FLARED END SECTION
	STORM WATER DRAINAGE PIPE
	HYDRANT
	WATER SHUT OFF
	WATER VALVE
	WATER VALVE BOX
	WATER MAIN
	GAS SHUT OFF
	U/G GAS
	SPOT ELEVATION
	1' CONTOUR
	5' CONTOUR
	PROPOSED SANITARY RISER CONNECTION
	PROPOSED WATER RISER
	PROPOSED RECREATIONAL VEHICLE POST
	PROPOSED WATER MAIN
	PROPOSED SANITARY SEWER
	PROPOSED STORM SEWER
	PROPOSED EDGE OF PAVEMENT
	PROPOSED PAVEMENT

**BENCHMARKS**

**BENCHMARK #1 (SITE)**  
"X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE."  
ELEVATION = 956.03 (NAVD 88)

**BENCHMARK #A:**  
NAL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
ELEVATION = 962.99

**BENCHMARK #B:**  
NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET.  
ELEVATION = 978.25

**BENCHMARK #C:**  
CORNER OF CONCRETE WALK, LOCATED IN CORNER OF BUILDING.  
ELEVATION = 968.03

**BENCHMARK #D:**  
SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND.  
ELEVATION = 948.55

**BENCHMARK #E:**  
CENTERLINE OF MANHOLE COVER NEAR LIFT STATION.  
ELEVATION = 948.17

**BENCHMARK #F:**  
SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING.  
ELEVATION = 961.74

**SOIL EROSION LEGEND**

	6 EROSION CONTROL BLANKETS WITH WOODEN ANCHORS	INCLUDES ESTABLISHMENT OF VEGETATIVE COVER (SEE EROSION CONTROL PLAN) EASILY PLACED IN SMALL QUANTITIES BY UNEXPERIENCED PERSONNEL. SOILS SHOULD BE PROTECTED IMMEDIATELY.
	14 EROSION CONTROL FABRIC	STABILIZES SOIL SURFACE, REDuces WINDING EROSION. FORMS PROTECTIVE MATRICES IN GROSSE MEASURES. MAY BE USED AS PART OF PERMANENT BASE CONSTRUCTION OF PAVED AREAS.
	15 STRAW MULCH	PROTECTS AREAS WHICH SHOULD OTHERWISE BE PROTECTED, BUT INCREASES SEEDING, YIELD AND VELOCITY. IRREGULAR SURFACE WILL HELP SLOW VELOCITY.
	55 GEOTEXTILE MATTING	USES GEOTEXTILE AND POTS OR POLES. MAY BE CONSTRUCTED OR PRECONSTRUCTED. USE TO CONSTRUCT AND LOCATE AS NECESSARY.

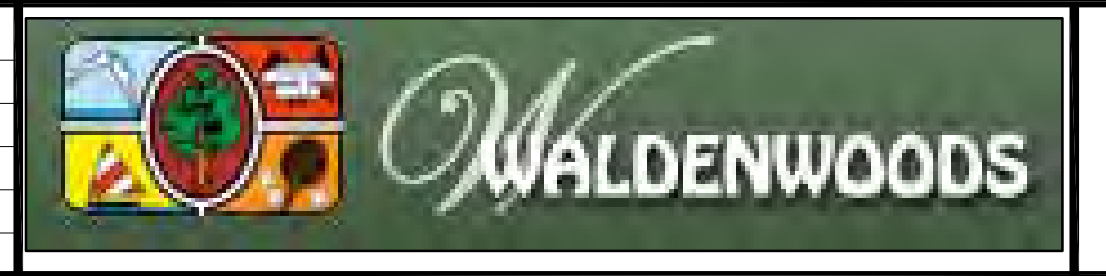
T=TEMPORARY P=PERMANENT  
36" SILT FENCE

DISTANCE TO NEAREST OPEN WATERCOURSE = 0 FT. (LAKE WALDEN)  
WORK WITHIN LAKE WALDEN FOR A DRY HYDRANT IS BEING PROPOSED  
A COMMERCIAL SESC PERMIT FROM LCDC IS REQUIRED FOR THIS PROJECT  
AN MDEQ PART 301 "INLAND LAKES & STREAMS" PERMIT IS REQUIRED FOR THIS PROJECT

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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						



**SOIL EROSION AND SEDIMENTATION CONTROL PLAN**

CLIENT: WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: AS NOTED  
PROJECT No.: 9173156  
DWG NAME: 3156-SE  
ISSUED: DEC. 11, 2019

**SE1.2**



## NORTH CAMPGROUND SOILS MAP

NOT TO SCALE

### Map Unit Legend

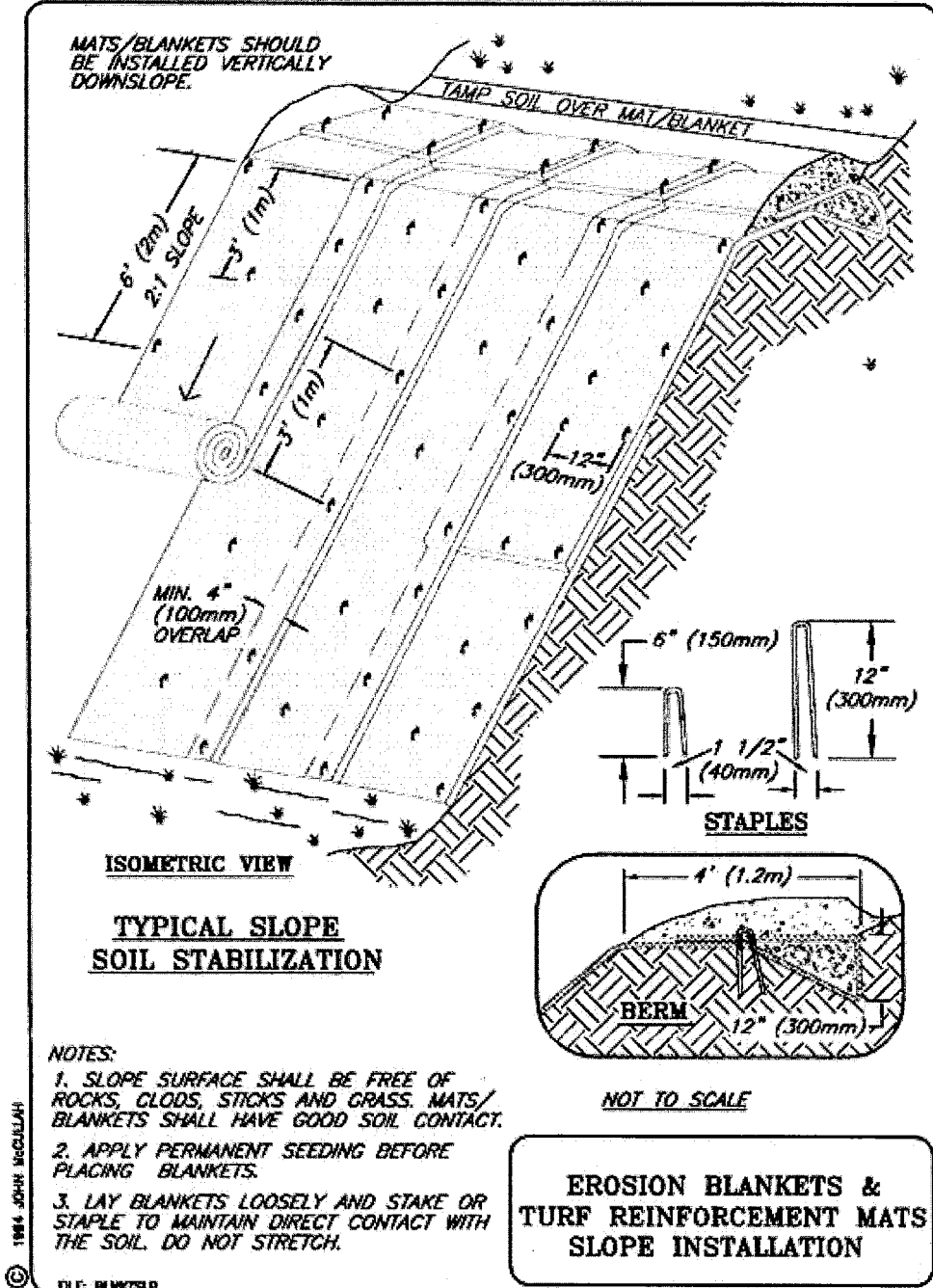
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BIB	Boyer-Orlino loamy sands, 2 to 6 percent slopes	0.2	0.1%
BWA	Brown loamy sand, 0 to 2 percent slopes	3.9	2.3%
CwA	Conover loam, 0 to 2 percent slopes	17.6	10.4%
FwA	Fox sandy loam, 0 to 2 percent slopes	0.6	0.4%
FwB	Fox sandy loam, 2 to 6 percent slopes	3.6	2.1%
FwC	Fox Boyer complex, 2 to 6 percent slopes	8.4	5.0%
Gd	Gifford sandy loam, 0 to 2 percent slopes, gravelly subsoil	10.7	6.3%
HB	Hillsdale sandy loam, 2 to 6 percent slopes	38.7	22.8%
Ho	Houghton muck, 0 to 1 percent slopes	0.0	0.0%
MA	Miami loam, 0 to 2 percent slopes	9.5	5.8%
MoB	Miami loam, 2 to 6 percent slopes	27.8	16.4%
MoC	Miami loam, 12 to 18 percent slopes	15.4	9.1%
MoD	Miami loam, 12 to 18 percent slopes	5.7	3.4%
OsB	Oakville fine sand, 0 to 6 percent slopes	0.1	0.0%
OsB	Oakville fine sand, loamy subsoil, 0 to 6 percent slopes	1.4	0.8%
Pc	Pewarno clay loam	0.1	0.0%
SvB	Sprinks-Oakville loamy sands, 0 to 6 percent slopes	2.5	1.5%
SvC	Sprinks-Oakville loamy sands, 12 to 18 percent slopes	4.2	2.5%
SvE	Sprinks-Oakville loamy sands, 18 to 25 percent slopes	1.2	0.7%
W	Water	13.8	8.1%
Wn	Wheatlaner silt loam	4.1	2.4%
<b>Totals for Area of Interest</b>		<b>169.7</b>	<b>100.0%</b>

TIME LINE OF SOIL EROSION CONTROL AND CONSTRUCTION SEQUENCE					
CONSTRUCTION & WORK CATEGORIES*	2019				
	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5
1 - OBTAIN PERMITS					
2 - SESC MEASURES					
3 - INSPECT / MAINTAIN					
4 - DEMOLITION WORK					
5 - EARTH WORK					
6 - UTILITIES					
7 - BUILDING					
8 - PAVEMENT					
9 - TOPSOIL/VEGETATION					
10 - LANDSCAPING					
11 - RESTORATION					
12 - PERMIT CLOSURE					

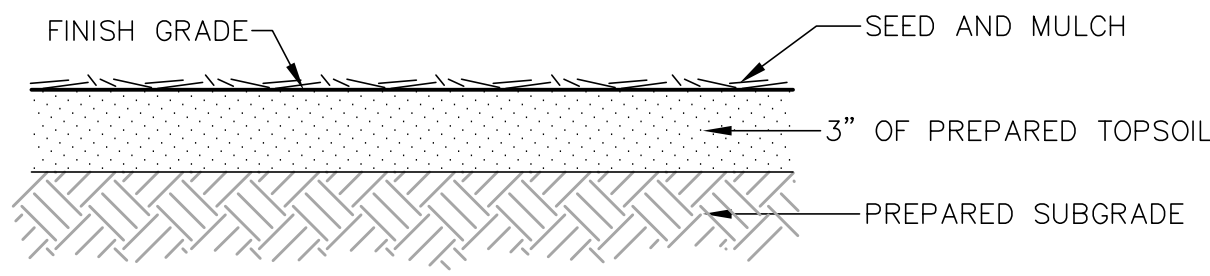
\*REFER TO THE MAJOR WORK ITEMS OUTLINED IN THE SOIL EROSION CONTROL AND CONSTRUCTION SEQUENCE NOTES.

### SOIL EROSION CONTROL AND CONSTRUCTION SEQUENCE:

- Obtain all necessary Soil Erosion and Sedimentation Control related permits from the appropriate Local, County and/or State Agencies. Refer to the General Notes on the project plans for additional requirements.
- Prior to commencement of any earth disruption, install Silt Fence, Mud Tracking Control Devices, and Culvert Sediment Trap at the existing culvert in accordance with the Soil Erosion and Sedimentation Control Plan and the Soil Erosion and Sedimentation Control Permit.
- Inspect and maintain all Soil Erosion Control Measures daily. Maintain all Soil Erosion Control Measures as necessary and as directed by the Engineer and/or the Permitting Agency.
- Perform demolition work. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Strip and stockpile topsoil. Perform mass grading and land balancing. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Construct underground utilities including sanitary sewer, water main, storm sewer, and conduit for underground public utilities. Install appropriate Soil Erosion Control Measures, including inlet sediment filters on new catch basins, in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Install building cabin KOA-355 in accordance with the Site Plan and Architectural Plans. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Install electric risers, fixtures and underground electric. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Construct paved parking roadway areas. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Backfill and finish grade all disturbed areas outside of pavement areas. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Place topsoil and hydroseed within 5 days of finish grade for establishment of vegetative ground cover outside of pavement and mulched landscape bed areas. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Landscape site in accordance with the Project Landscape Plan. Install appropriate Soil Erosion Control Measures in accordance with the Soil Erosion and Sedimentation Control Plan and/or as directed by the Engineer and/or the Permitting Agency.
- Following establishment of sufficient vegetative ground cover and receipt of approval from the Permitting Agency, remove all temporary Soil Erosion Control Measures, and repair any permanent Soil Erosion Control Measures as directed by the Engineer and/or the Permitting Agency.



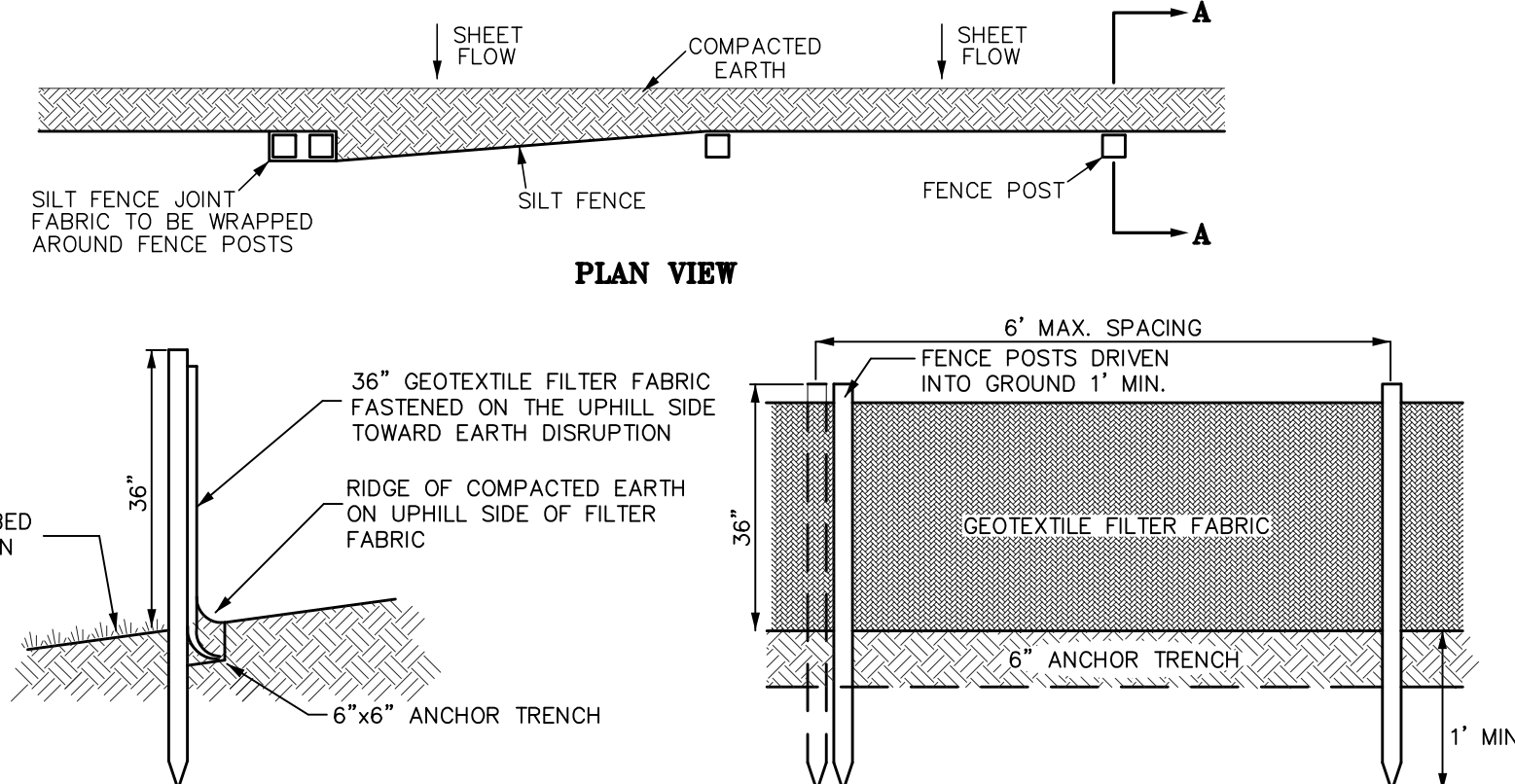
Typical drawing: Erosion Control Blankets for soil slope stabilization  
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 .dgn



### SEEDING DETAIL

NOT TO SCALE

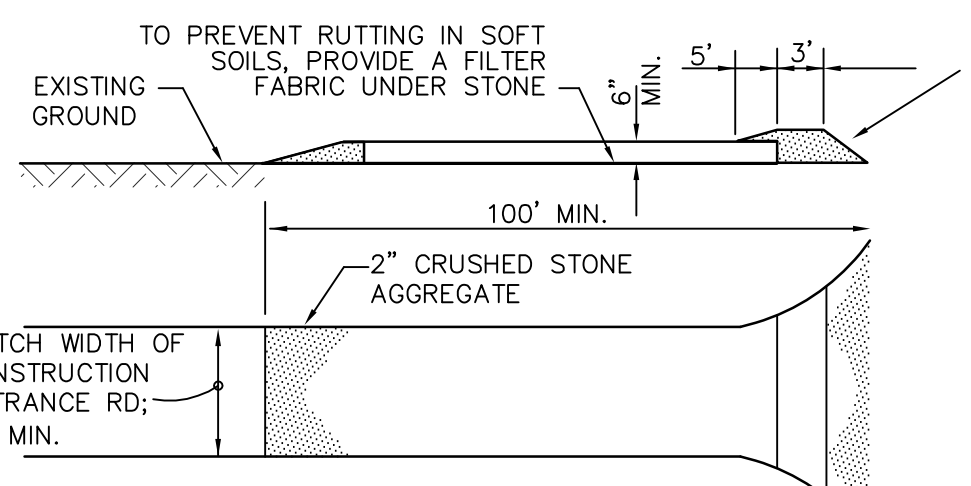
- Seed mixture shall consist of 10% Kentucky Blue Grass, 20% Perennial Ryegrass, 30% Hard Fescue, 40% Creeping Red Fescue. Seed shall be uniformly applied at a rate of 210 pounds per acre.
- Topsoil shall be a dark, organic, natural surface soil free of clay lumps, peat or muck, subsoil, noxious weeds or other foreign matter such as roots, sticks, rocks over 1/2" in diameter and not frozen or muddy. Material shall meet with approval of the Engineer.
- Straw mulching shall be a minimum depth of 3" applied at a rate of 1.5 to 2 tons per acre. All mulching must have a tie down, such as tackifier, net binding, etc.
- Fertilizer shall be evenly applied at a rate which will provide 150 pounds per acre of chemical fertilizer nutrients, in equal portions, (10-10-10), of Nitrogen, Phosphoric Acid and Potash.
- Hydroseeding is not acceptable for slopes exceeding 1%. In such cases, stabilization shall be done with seed and straw mulch with a tackifier.
- The earthen areas to receive topsoil shall be at the required grade and properly trimmed. Topsoil shall be spread on the prepared areas to a depth of 3 inches. After spreading, any large clods and lumps of topsoil shall be broken up and pulverized. Stones and rocks over 1/2" in diameter, roots, litter, and all foreign matter shall be raked up and disposed of by the contractor. Place topsoil only when it can be followed within a reasonable time by seeding operations.



### 55 SILT FENCE

NOT TO SCALE

- NOTES:
- REPAIR AND REPLACE SILT FENCE AS NEEDED, INCIDENTAL.
  - FIELD LOCATE SILT FENCE TO FOLLOW CONSTANT CONTOUR ELEVATIONS.
  - INSTALL SED. TRAP AND FILTER AT DRAINAGE LOW POINTS, INCIDENTAL.
  - OVERLAP FENCES AT JOINTS.



### 14 MUD TRACKING CONTROL DIAPER

NO SCALE

NOTE:  
 A. WHEN ACCEPTABLE TO ENGINEER, CONTRACTOR MAY INSTALL STONE BELOW THE SUBGRADE ELEVATION; THUS STONE MAY BE LEFT IN PLACE BELOW PAVEMENT.

### SOIL EROSION AND SEDIMENTATION CONTROL NOTES:

- The Soil Erosion and Sedimentation Control Specifications of the appropriate Local, County and/or State Agencies are a part of this work. Refer to the General Notes on the Project Plans for additional requirements.
- The Soil Erosion and Sedimentation Control (SESC) Permit Holder shall be responsible for compliance with the SESC Permit requirements for the duration of the project and until receipt of final approval from the Permitting Agency. For any site with an earth disturbance area of 1 acre or greater, the SESC Permit Holder shall retain a Certified Storm Water Operator in accordance with the SESC Permit requirements. The Certified Storm Water Operator shall perform routine inspections of the site and the SESC measures and file inspection reports in accordance with the SESC permit requirements. For any site with an earth disturbance area of 5 acres or greater, the SESC Permit Holder shall file a National Pollutant Discharge Elimination System (NPDES) Notice of Coverage Form with the State DEQ prior to any earth disruption.
- The Contractor shall install the appropriate Soil Erosion Control Measures in accordance with the Project Plans prior to massive earth disruption, including but not limited to: silt fence, mud tracking control mats and sediment filters on existing storm sewer structures. Demolition work may be necessary prior to installation of some soil erosion control measures. In such cases, postpone installation of affected soil erosion control measures until immediately following demolition work. Refer to the Project Plans and the Soil Erosion Control and Construction Sequence for additional requirements.
- The Contractor shall schedule work so as to minimize the period of time that an area is exposed and disturbed. The Contractor shall observe the grading limits and limits of disturbance in accordance with the Project Plans. The Contractor shall maintain an undisturbed vegetative buffer around the work when shown on the Project Plans.
- The Contractor shall install and maintain Soil Erosion Control Measures in accordance with the Project Plans during the appropriate phases of construction. The Project Plans show the minimum requirements for Soil Erosion Control Measures. The Contractor shall install additional Soil Erosion Control Measures as necessary due to site conditions and as directed by the Permitting Agency and/or Engineer. The Contractor shall perform routine inspection and maintenance of all Soil Erosion Control Measures to ensure compliance with the permit requirements and proper operation of the Soil Erosion Control Measures.
- The Contractor shall strip and stockpile topsoil from all areas of proposed disturbance. Topsoil stockpiles shall be located in accordance with the Project Plans. Topsoil stockpiles shall be stabilized with vegetative growth (or matted with straw during the non-growing season) to prevent wind and water erosion. A temporary diversion berm and/or silt fence shall encompass all earthen material stockpiles, including but not limited to topsoil, sand and gravel.
- The Contractor shall install Soil Erosion Control Measures associated with the proposed storm sewer system during storm sewer construction. Inlet structure filters shall be installed immediately following completion of each storm inlet structure. Riprap shall be installed immediately following the installation of each flared end section with the following exception: Storm drain outlets that do NOT empty into a Retention, Detention or Sedimentation Basin shall have a temporary 5' wide x 10' long x 3' deep sump installed at the termination of the storm sewer. Upon completion of the stabilization work, the sump area shall be filled and riprap shall be installed in accordance with the Project Plans.
- The Contractor shall install filter stone around the storm basin control structure(s) in accordance with the Project Plans immediately following installation of the control structure(s). The filter stone shall be monitored for sediment build up. The filter stone may need to be cleaned and/or replaced as site conditions require and as directed by the Permitting Agency and/or the Engineer.
- All disturbed areas outside of paved areas shall be restored within 15 days of finish grading. Proposed vegetative areas shall be restored with a minimum of 3-inches of topsoil, then seeded and mulched; unless noted otherwise on the Project Plans. During the non-growing season, temporary stabilization shall be provided using straw matting or as directed by the Permitting Agency and/or the Engineer.

- Seeding, Fertilizer and Mulch Bare Ground Ratio:**  
 This information is provided as minimum guidance for acceptable application rates. Actual amounts depending on soil conditions and site topography shall be detailed on the construction plans.  
**Top-Soil** 3 inches in depth.  
**Grass Seed** 210 lbs. per acre.  
**Fertilizer** 150 lbs. per acre.  
**Straw Mulch** 3" in depth 1.5 to 2 tons per acre  
 (All mulch must have a tie down, such as tackifier, net binding, etc.)  
**Hydro-Seeding:** Hydro-seeding is not acceptable for slopes exceeding 1%, in such cases, stabilization shall be done with seed and straw mulch with a tackifier.
- Following complete site restoration and stabilization; sediment shall be removed from all storm sewer structures, paved areas and storm basins. The SESC Permit Holder shall contact the Permitting Agency to request closure of the SESC Permit. For any site with an earth disturbance area of 5 acres or greater, the SESC Permit Holder shall file a NPDES Notice of Termination Form with the State DEQ.

### MAINTENANCE NOTES FOR SOIL EROSION CONTROL MEASURES:

- The Construction Site and all Soil Erosion Control Measures shall be inspected periodically in accordance with the appropriate local municipality/authority and the DEQ NPDES rules and regulations. At a MINIMUM, inspections shall be performed once a week and within 24 hours following a storm event resulting in 1" of rainfall or greater. Inspections shall be performed throughout the duration of the construction process and until the site is completely stabilized. Following construction, the owner (or it's assignee) shall periodically inspect all permanent soil erosion control measures to ensure proper operation.
- BASIN PERFORATED STANDPIPES / CONTROL STRUCTURES:** Standpipes shall be inspected for soil accumulation, soil caking and mechanical failure/damage. The filter stone around the standpipe shall be removed and replaced each time it becomes clogged with sediment. All mechanical failure/damage shall be repaired immediately.
- CATCH BASINS:** Catch basins shall be inspected for accumulation of solids and sediment. Solids and sediment shall be removed from the catch basins by vacuum or adductor cleaning. Cleaning should be performed before the catch basin sumps are half full.
- MUD TRACKING CONTROL DEVICE / CONSTRUCTION ACCESS:** Mud tracking control devices shall be inspected for significant mud accumulation and to ensure the access is not eroding into public rights of way or drainage features. Add additional layers of stone or remove and replace stone each time the stone becomes covered with mud. All sediment dropped or eroded onto public rights of way shall be removed immediately. Sweeping of the public rights in way and/or paved access route shall be performed as necessary to maintain the access route free of sediment and debris.

- RETENTION BASIN (DRY BOTTOM):** Dry bottom detention basins shall be inspected to ensure erosion is not occurring along the inlet locations, banks and/or bottom of the basin and for sediment accumulation. Regular maintenance of the basin includes routine mowing of the buffer/filter strip, side slopes and basin floor and removal of litter and debris accumulation. Address vegetation and/or erosion concerns as soon as weather permits. Remove sediment from basin every 5 to 10 years or sooner if sediment accumulation adversely affects the operation of the basin. Sediment that is removed shall be disposed of offsite or at an upland area and stabilized so that it does not re-enter the drainage course.
- DETENTION BASIN (WET BOTTOM):** Wet bottom detention basins shall be inspected to ensure erosion is not occurring along the inlet locations, banks and/or bottom of the basin and for sediment and/or algae accumulation. Regular maintenance of the basin includes routine mowing of the buffer/filter strip and side slopes and removal of litter and debris accumulation. Address vegetation and/or erosion concerns as soon as weather permits. Remove sediment from basin every 5 to 10 years or sooner if sediment accumulation adversely affects the operation of the basin. Sediment that is removed shall be disposed of offsite or at an upland area and stabilized so that it does not re-enter the drainage course. Excessive algae shall be removed as necessary to prevent odors and to maintain nutrient removal capacity.

- RETENTION BASIN:** Retention basins shall be inspected to ensure erosion is not occurring along the inlet locations, banks and/or bottom of the basin and for sediment accumulation. Regular maintenance of the basin includes routine mowing of the buffer/filter strip, side slopes and basin floor and removal of litter and debris accumulation. Address vegetation and/or erosion concerns as soon as weather permits. Sediment accumulation shall be removed at least once a year. Sediment shall be removed only when the surface is dry and "mud-cracked". Light equipment must be used to avoid compacting of soils. After removal of sediment, the infiltration area shall be deep tilled to restore infiltration rates. More frequent tilling may be necessary in areas where soils are only marginally permeable. Sediment that is removed shall be disposed of offsite or at an upland area and stabilized so that it does not re-enter the drainage course.
- RIPRAP:** Inspect riprap immediately following the first rainfall event following installation of the riprap. Continue to perform inspections of the riprap at each periodic site inspection. Riprap shall be inspected to ensure erosion is not occurring within and/or around the riprap. The discharge point shall be inspected to ensure that concentrated flows are not causing erosion downstream. Displaced riprap shall be removed from downstream locations and the riprap beds shall be repaired or replaced. Significant sediment buildup shall be removed from riprap beds. Repair or replace failing or displaced riprap immediately. Address vegetation and/or erosion concerns as soon as weather permits.

- SEDIMENTATION BASINS:** Sedimentation basins shall be inspected to ensure erosion is not occurring along the inlet locations, banks and/or bottom of the basin and for piping, seepage, sediment accumulation and/or other mechanical damage. Regular maintenance of the basin includes routine mowing of the buffer/filter strip, side slopes and basin floor and removal of litter and debris accumulation. Address vegetation and/or erosion concerns as soon as weather permits. Sediment shall be removed before it accumulates to 50% of the design depth of the basin. Sediment that is removed shall be disposed of offsite or at an upland area and stabilized so that it does not re-enter the drainage course.
- SEEDING:** Newly seeded areas shall be inspected until substantial vegetative growth is obtained. Seeded areas shall be inspected to ensure erosion is not occurring in the seeded area and vegetative growth is promoted. Eroded areas shall be finish graded as necessary to remove erosion channels or gulleys and new seed placed as soon as weather permits.

- SILT FENCE:** Silt fencing shall be inspected for soil accumulation/erosion, undercutting, overtopping and sagging. Soil accumulation shall be removed from the face of the silt fence each time it reaches half the height of the fence. Removed sediment shall be disposed of in a stable upland site or added to a spoils stockpile. When undercutting occurs, grade out areas of concentrated flow upstream of the silt fence to remove channels and/or gulleys and repair or replace silt fence ensuring proper trenching techniques are utilized. Silt fencing, which sags, falls over or is not staked in shall be repaired or replaced immediately. Silt fencing fabric, which decomposes or becomes ineffective, shall be removed and replaced with new fabric immediately. Silt fencing shall be removed once vegetation is well established and the up-slope area is fully stabilized.

- SOD:** Newly sodded areas shall be inspected to ensure sod is maturing. Sod shall be inspected for failure, erosion or damage. Slipping or eroding sod on steep slopes shall be immediately repaired or replaced and staked in place. Damaged or failed sod shall be immediately replaced.
- SPILLWAYS:** Spillways shall be inspected to ensure that erosion is not occurring within and/or around the spillway. The discharge point shall be inspected to ensure that concentrated flows are not causing erosion downstream. Inspect the spillway for cracked concrete, uneven and/or excessive settling and proper function. Repair or replace failing spillways immediately. Address vegetation and/or erosion concerns as soon as weather permits.

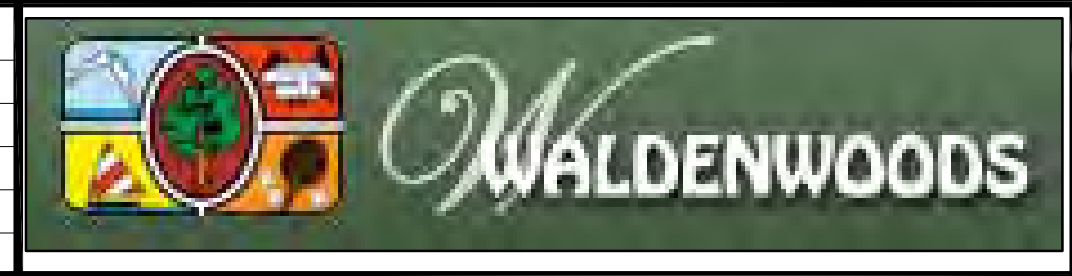
- STOCKPILES:** Temporary and permanent topsoil and spoils stockpiles shall be seeded to promote vegetative growth. Stockpiles shall be inspected to ensure excessive erosion has not occurred. When runoff or wind erosion is evident, reduce the side slopes of the stockpile or stabilize the stockpile with pieces of staked sod laid perpendicular to the slope. When filter fencing is used around a stockpile, the fencing shall be inspected to ensure piping has not occurred under the fencing and to ensure the fencing has not collapsed due to soil slippage or access by construction equipment. Repair or replace damaged fencing immediately. Berms at the base of stockpiles, which become damaged, shall be replaced.
- STORM STRUCTURE INLET FILTER:** Inlet filters shall be inspected for sediment accumulation, clogging and damage. When stone is used in conjunction with inlet filter fabric, replace the stone each time it becomes clogged with sediment. Clean or replace the inlet filter fabric each time it becomes clogged with sediment. Reinstall or replace fallen filter fabrics immediately. Replace damaged filter fabrics immediately.

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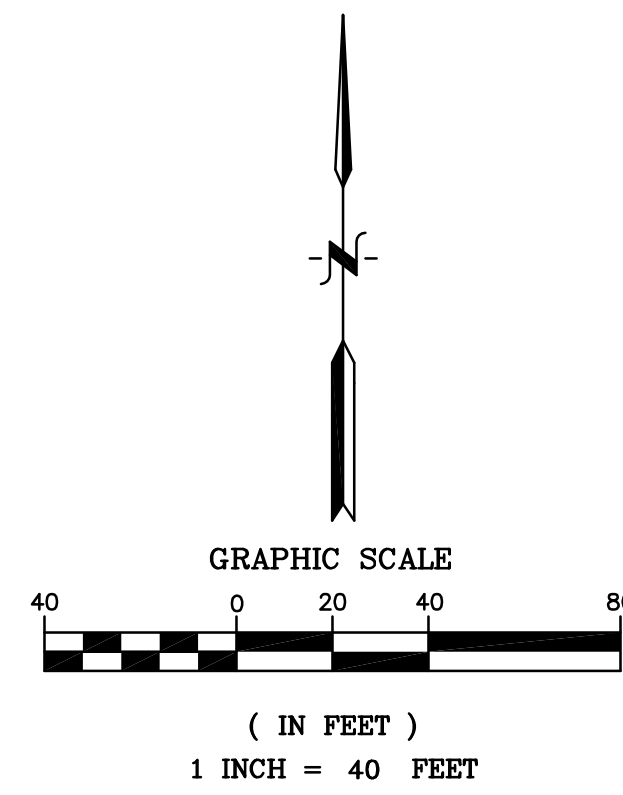
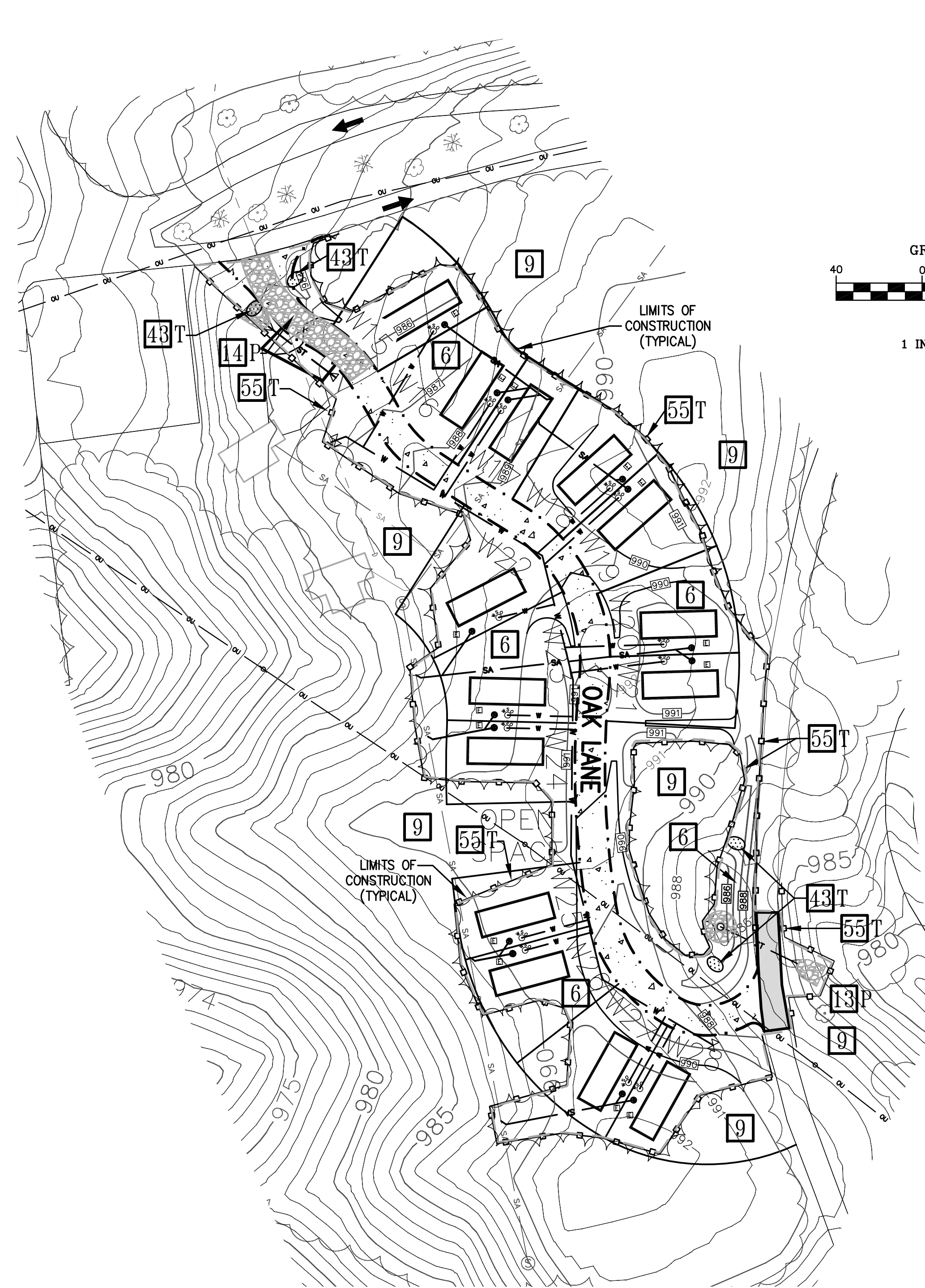
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DRAFT: L.F.						
CHECK: WMP						



**SOIL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS**

CLIENT: WALDENWOODS PROPERTIES C/O BRIAN GROUSE 9840 CROUSE ROAD HOWELL, MI 48855 810-632-6135	SCALE: NOT TO SCALE PROJECT NO.: 9173156 DWG NAME: 3156-SE ISSUED: DEC. 11, 2019	<b>SE1.3</b>
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### LEGEND

- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- = SIGN
- = SOIL BORING / BENCHMARK W/IDENTIFIER
- = LIGHT BASE
- = STREET LIGHT
- = OVERHEAD TRAFFIC SIGNAL
- = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- = AIR CONDITIONER UNIT
- = UTILITY MANHOLE (AS LABELED)
- = UTILITY POLE W/JOINT WIRE
- = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- = DECIDUOUS TREE W/IDENTIFIER
- = CONIFEROUS TREE W/IDENTIFIER
- = BUSH
- = FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- = GUARD RAIL
- = EDGE OF GRAVEL
- = CONCRETE CURB (UNLESS OTHERWISE STATED)
- = SANITARY SEWER MANHOLE W/IDENTIFIER
- = SANITARY SEWER PIPE
- = CLEAN OUT
- = STORM WATER MANHOLE W/IDENTIFIER
- = CATCH BASIN W/IDENTIFIER
- = CONTROL STRUCTURE
- = FLARED END SECTION
- = STORM WATER DRAINAGE PIPE
- = HYDRANT
- = WATER SHUT OFF
- = WATER VALVE
- = WATER VALVE BOX
- = WATER MAIN
- = GAS SHUT OFF
- = U/G GAS
- = SPOT ELEVATION
- = 1' CONTOUR
- = 5' CONTOUR
- = PROPOSED SANITARY RISER CONNECTION
- = PROPOSED WATER RISER
- = PROPOSED RECREATIONAL VEHICLE POST
- = PROPOSED WATER MAIN
- = PROPOSED SANITARY SEWER
- = PROPOSED STORM SEWER

### SOIL EROSION LEGEND

6		EXCESSIVE EROSION OF VEGETATION COVER. EFFECTIVE FOR SLOPES WITH LOW VELOCITY. SHOULD BE PLACED IN SMALL QUANTITIES BY EXPERIENCED PERSONNEL. (SILT FENCE, STRIP CURB, SLOTTED CURB)
9		SLOWS RUNOFF VELOCITY. REDUCES VOLUME OF RUNOFF ON SLOPES.
13		USED WHERE VEGETATION IS NOT GREATLY ESTABLISHED. EFFECTIVE FOR HIGH VELOCITIES OR HIGH CONCENTRATION. STABILIZES RUNOFF TO WAVE SIZE. ABSORBS ENERGY ALONG AT SYSTEM JOINTS.
14		STABILIZES SOIL SURFACE, THIS MINIMIZES EROSION. FIGHTS CONSTRUCTION TRAFFIC IN AREAS WHERE MAY BE USED AS PART OF PERMANENT BASE CONSTRUCTION OF PAVED AREAS.
43		USED TO REGAIN IF MAINT. KEEPS CURB CLEAN AND FREE FLOWING. MAY BE CONSTRUCTED OF CONCRETE OR LOGS.
55		USES GEOTEXTILE AND POSTS OR PILES. MAY BE CONSTRUCTED OF PROPOSED. NOT TO CONSTRUCT AND LOGS IF NECESSARY.

T=TEMPORARY P=PERMANENT  
 36" SILT FENCE

**NOTED:**  
 >SEE SHEET SE1.3 FOR SOIL EROSION PLAN NOTES AND CONSTRUCTION SEQUENCE SCHEDULE.  
 >SEE SHEET SE 1.2 FOR NORTH CAMPGROUND AND DRY HYDRANT SOIL EROSION AND SEDIMENTATION CONTROL PLAN.

### BENCHMARKS

BENCHMARK #1 (SITE)  
 "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE."  
 ELEVATION = 956.03 (NAVD 88)

BENCHMARK #A:  
 NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
 ELEVATION = 982.99

BENCHMARK #B:  
 NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET.  
 ELEVATION = 978.25

BENCHMARK #C:  
 CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING.  
 ELEVATION = 968.03

BENCHMARK #D:  
 SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND.  
 ELEVATION = 948.55

BENCHMARK #E:  
 CENTERLINE OF MANHOLE COVER NEAR LIFT STATION.  
 ELEVATION = 948.17

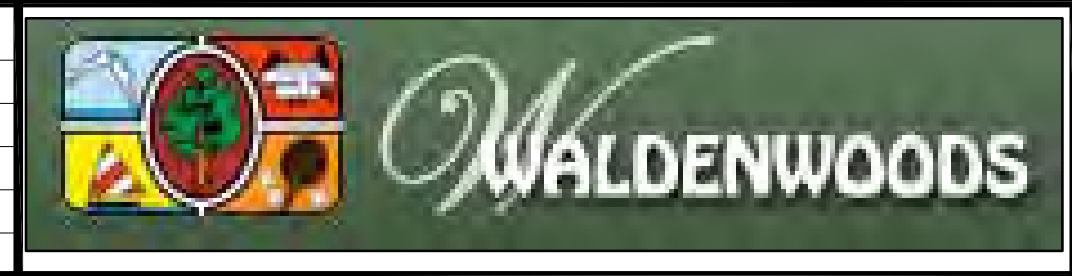
BENCHMARK #F:  
 SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILION BUILDING.  
 ELEVATION = 961.74

**AREA OF DISTURBANCE= 1.09 Ac.**  
 PROJECT IS LOCATED WITHIN THE INFLUENCE OF NORTH ORE CREEK AND LAKE WALDEN.  
 A COMMERCIAL SESC PERMIT FROM LCDC IS REQUIRED FOR THIS PROJECT  
 AN NPDES PERMIT FROM THE DEQ IS REQUIRED FOR THIS PROJECT.

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## SOIL EROSION AND SEDIMENTATION CONTROL PLAN (SOUTH)

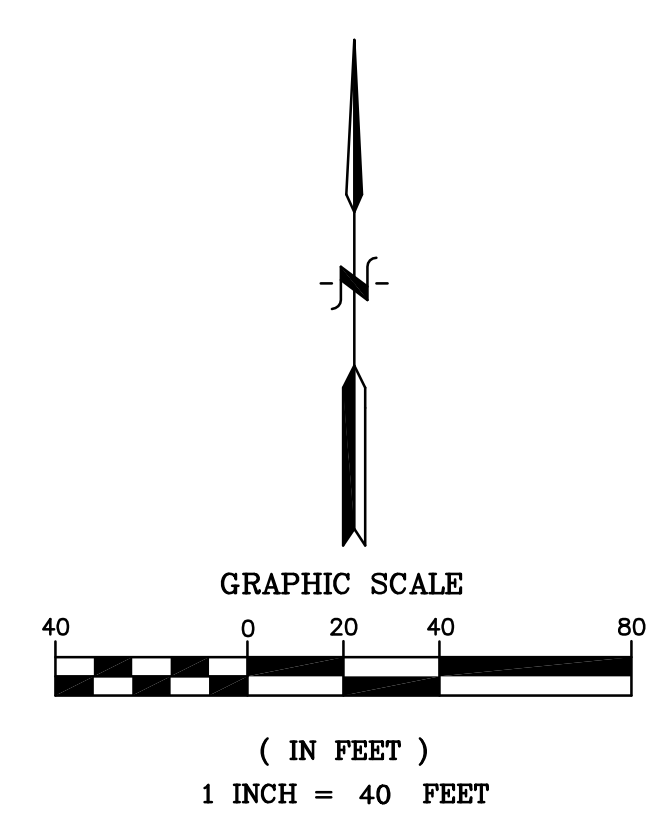
CLIENT:  
 WALDENWOODS PROPERTIES  
 C/O BRIAN CROUSE  
 9840 CROUSE ROAD  
 HOWELL, MI. 48855  
 810-632-6135

SCALE: 1"=40'  
 PROJECT No.: 9173156  
 DWG NAME: 3156-EROSION  
 ISSUED: DEC. 11, 2019

# SE1.4







STAKED MULCH BLANKET SHALL BE INSTALLED ON SLOPES EXCEEDING 1 ON 4

STAKED MULCH BLANKET SHALL BE INSTALLED ON SLOPES EXCEEDING 1 ON 4

PROJECT IS LOCATED WITHIN THE INFLUENCE OF NORTH ORE CREEK AND LAKE WALDEN.  
A COMMERCIAL SESC PERMIT FROM LCDC IS REQUIRED FOR THIS PROJECT.  
AN NPDES PERMIT FROM THE DEQ IS REQUIRED FOR THIS PROJECT.

**BENCHMARKS**

- BENCHMARK #1 (SITE): "X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE." ELEVATION = 956.03 (NAVD 88)
- BENCHMARK #A: NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS." ELEVATION = 982.99
- BENCHMARK #B: NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET. ELEVATION = 978.25
- BENCHMARK #C: CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING. ELEVATION = 968.03
- BENCHMARK #D: SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND. ELEVATION = 948.55
- BENCHMARK #E: CENTERLINE OF MANHOLE COVER NEAR LIFT STATION. ELEVATION = 948.17
- BENCHMARK #F: SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING. ELEVATION = 961.74

**LEGEND**

- MISC. STRUCTURE (AS LABELED)
- BOLLARD
- SOIL
- SOIL BORING / BENCHMARK W/IDENTIFIER
- LIGHT BASE
- STREET LIGHT
- OVERHEAD TRAFFIC SIGNAL
- UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATCH BASIN, MAIL BOX)
- AIR CONDITIONER UNIT
- UTILITY MANHOLE (AS LABELED)
- UTILITY POLE W/JOINT WIRE
- OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- DECIDUOUS TREE W/IDENTIFIER
- CONIFEROUS TREE W/IDENTIFIER
- BUSH
- FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- GUARD RAIL
- EDGE OF GRAVEL
- CONCRETE CURB (UNLESS OTHERWISE STATED)
- SANITARY SEWER MANHOLE W/IDENTIFIER
- SANITARY SEWER PIPE
- CLEAN OUT
- STORM WATER MANHOLE W/IDENTIFIER
- CATCH BASIN W/IDENTIFIER
- CONTROL STRUCTURE
- FLARED END SECTION
- STORM WATER DRAINAGE PIPE
- HYDRANT
- WATER SHUT OFF
- WATER VALVE
- WATER VALVE BOX
- WATER MAIN
- GAS SHUT OFF
- U/G GAS
- SPOT ELEVATION
- 1' CONTOUR
- 5' CONTOUR
- PROPOSED SANITARY RISER CONNECTION
- PROPOSED WATER RISER
- PROPOSED RECREATIONAL VEHICLE POST
- PROPOSED WATER MAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER

**SOIL EROSION LEGEND**

6	GRAVEL TREATMENT OF EXISTING CONTOUR	GRAVEL TREATMENT OF EXISTING CONTOUR
9	EROSION CONTROL MAT	EROSION CONTROL MAT
13	PROV. TREES, CARBONS	PROV. TREES, CARBONS
14	ADHESIVE COVERS	ADHESIVE COVERS
43	STEEL SHEET PILING	STEEL SHEET PILING
55	REVEGETATE SLOPE	REVEGETATE SLOPE
58	SELF-SUPPORTING FENCE	SELF-SUPPORTING FENCE

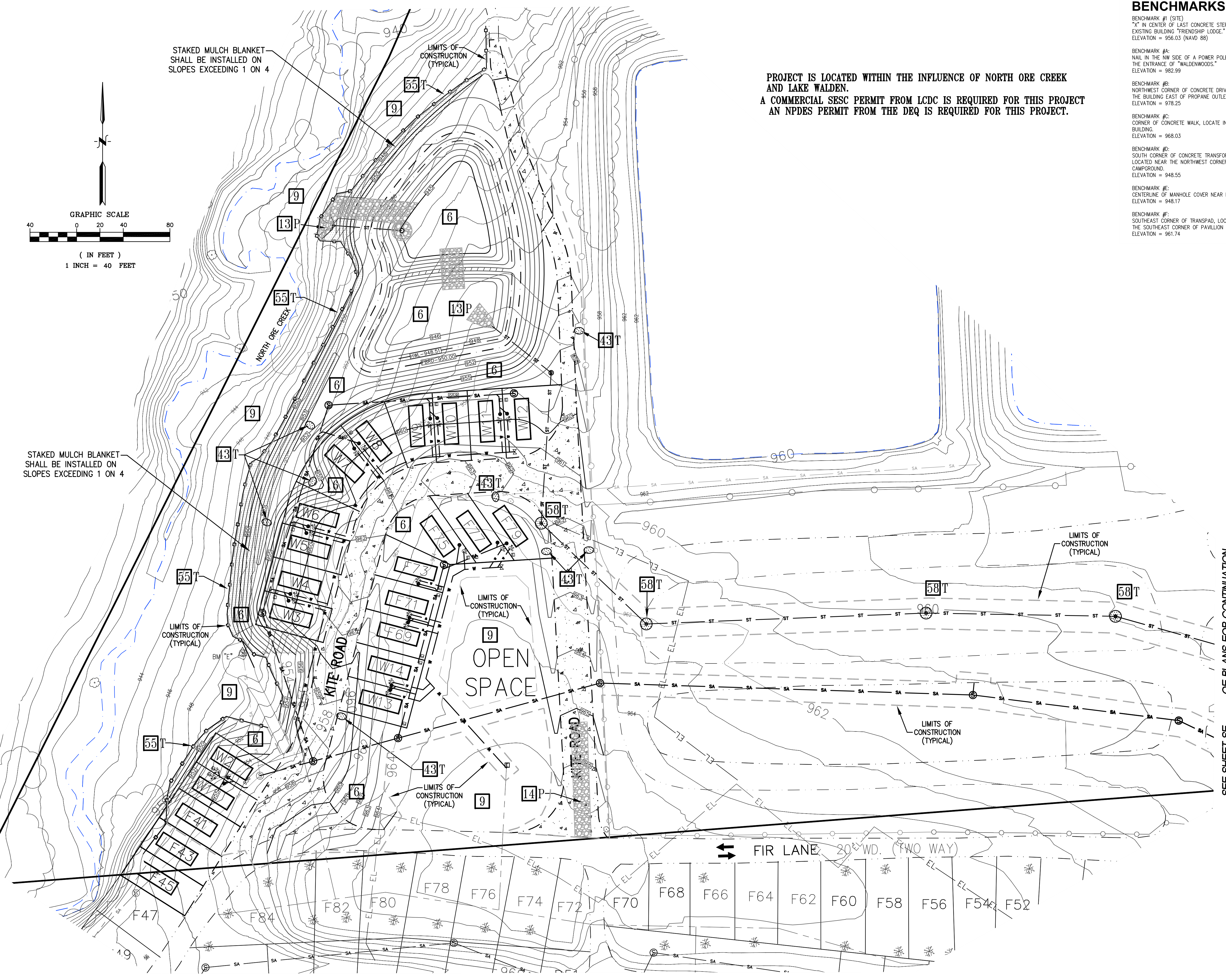
T=TEMPORARY P=PERMANENT  
36" SILT FENCE

**NOTED:**

>SEE SHEET SE1.3 FOR SOIL EROSION PLAN NOTES AND CONSTRUCTION SEQUENCE SCHEDULE.

>SEE SHEET SE 1.2 FOR NORTH CAMPGROUND AND DRY HYDRANT SOIL EROSION AND SEDIMENTATION CONTROL PLAN.

SEE SHEET SE OF PLANS FOR CONTINUATION



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DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TOWNSHIP REVIEW COMMENTS
CHECK: WMP			

REVISION #	DATE	REVISION-DESCRIPTION



**SOIL EROSION AND SEDIMENTATION CONTROL PLAN (KITE ROAD)**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-EROSION  
ISSUED: DEC. 11, 2019

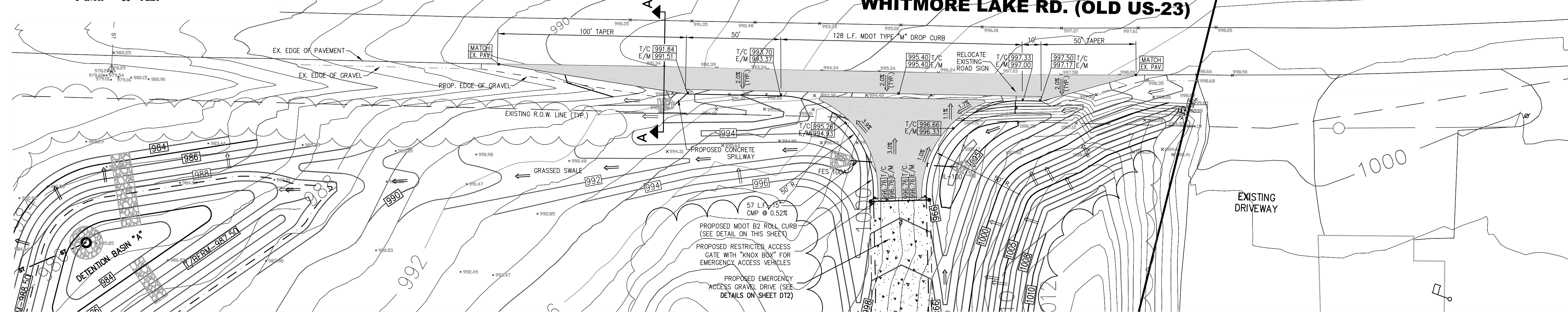
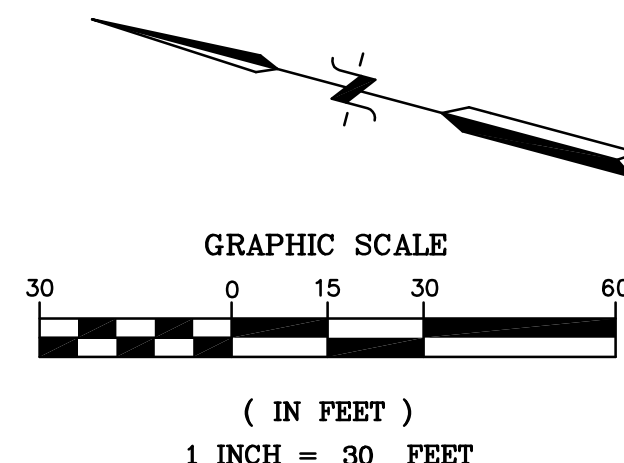
**SE2.2**

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**LEGEND**

- = MISC. STRUCTURE (AS LABELED)
- = BOLLARD
- △ = SIGN
- ⊕ = SOIL BORING / BENCHMARK W/IDENTIFIER
- ⊙ = LIGHT BASE
- ⊙ = STREET LIGHT
- ⊙ = OVERHEAD TRAFFIC SIGNAL
- ⊙ = UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
- ⊙ = AIR CONDITIONER UNIT
- ⊙ = UTILITY MANHOLE (AS LABELED)
- ⊙ = UTILITY POLE W/OUT WIRE
- ⊙ = OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
- ⊙ = U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
- ⊙ = DECIDUOUS TREE W/IDENTIFIER
- ⊙ = CONIFEROUS TREE W/IDENTIFIER
- ⊙ = BUSH
- ⊙ = FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
- ⊙ = GUARD RAIL
- ⊙ = EDGE OF GRAVEL
- ⊙ = CONCRETE CURB (UNLESS OTHERWISE STATED)
- ⊙ = SANITARY SEWER MANHOLE W/IDENTIFIER
- ⊙ = SANITARY SEWER PIPE
- ⊙ = CLEAN OUT
- ⊙ = STORM WATER MANHOLE W/IDENTIFIER
- ⊙ = CATCH BASIN W/IDENTIFIER
- ⊙ = CONTROL STRUCTURE
- ⊙ = FLARED END SECTION
- ⊙ = STORM WATER DRAINAGE PIPE
- ⊙ = HYDRANT
- ⊙ = WATER SHUT OFF
- ⊙ = WATER VALVE
- ⊙ = WATER VALVE BOX
- ⊙ = WATER MAIN
- ⊙ = GAS SHUT OFF
- ⊙ = U/G GAS
- ⊙ = SPOT ELEVATION
- ⊙ = 1" CONTOUR
- ⊙ = 5" CONTOUR
- ⊙ = PROPOSED SANITARY RISER CONNECTION
- ⊙ = PROPOSED WATER RISER
- ⊙ = PROPOSED RECREATIONAL VEHICLE POST
- ⊙ = PROPOSED WATER MAIN
- ⊙ = PROPOSED SANITARY SEWER
- ⊙ = PROPOSED STORM SEWER
- ⊙ = PROPOSED EDGE OF PAVEMENT
- ⊙ = PROPOSED PAVEMENT



**APPROACH PLAN**

- NOTES:**
- CONTRACTOR SHALL NOTIFY THE LIVINGSTON COUNTY ROAD COMMISSION 48 HOURS PRIOR TO START OF ANY CONSTRUCTION WITHIN THE COUNTY RIGHT OF WAY.
  - CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE TRAFFIC CONTROL SIGNAGE AND DEVICES PER THE M.M.U.T.C.D. AS ACCEPTABLE TO THE LIVINGSTON COUNTY ROAD COMMISSION.
  - CONTRACTOR SHALL COORDINATE REMOVAL AND/OR RELOCATION OF COUNTY ROAD SIGNS WITH LIVINGSTON COUNTY ROAD COMMISSION.

**CLEAR VISION AREA**

A CLEAR VISION AREA AS SHOWN IN FIGURE 3, SHALL BE PROVIDED PRIOR TO CONSTRUCTION AND USE OF ANY PUBLIC OR PRIVATE ROAD APPROACH ENTERING ONTO A ROADWAY UNDER THE JURISDICTION OF THE LIVINGSTON COUNTY ROAD COMMISSION. TO PROVIDE FOR ADEQUATE VISION, ALL OBSTRUCTIONS MUST BE REMOVED WITHIN THE CLEAR VISION AREA. THE CLEAR VISION AREA SHALL BE MAINTAINED IN PERPETUITY BY THE PROPERTY OWNER(S).

SIGHT DISTANCE SHALL BE MEASURED ON THE EDGE OF THE ROADWAY AT THE CENTER OF THE APPROACH, USING AN EYE HEIGHT OF 3.5 FEET ABOVE THE ROAD EDGE AND SIGHTING A TARGET 4.25 FEET HIGH ALONG THE CENTER OF EACH LANE ON THE ROAD. A PORTION OF THE TARGET BEING SIGHTED SHALL BE CONTINUOUSLY IN VIEW FOR THE REQUIRED SIGHT DISTANCE VALUES. THE SAME SIGHT DISTANCE REQUIRED AT THE EDGE OF THE ROAD SHALL BE CONTINUOUSLY PROVIDED, ALONG THE CENTER OF THE APPROACH, TO A POINT 15 FEET OFF THE EDGE OF THE ROAD.

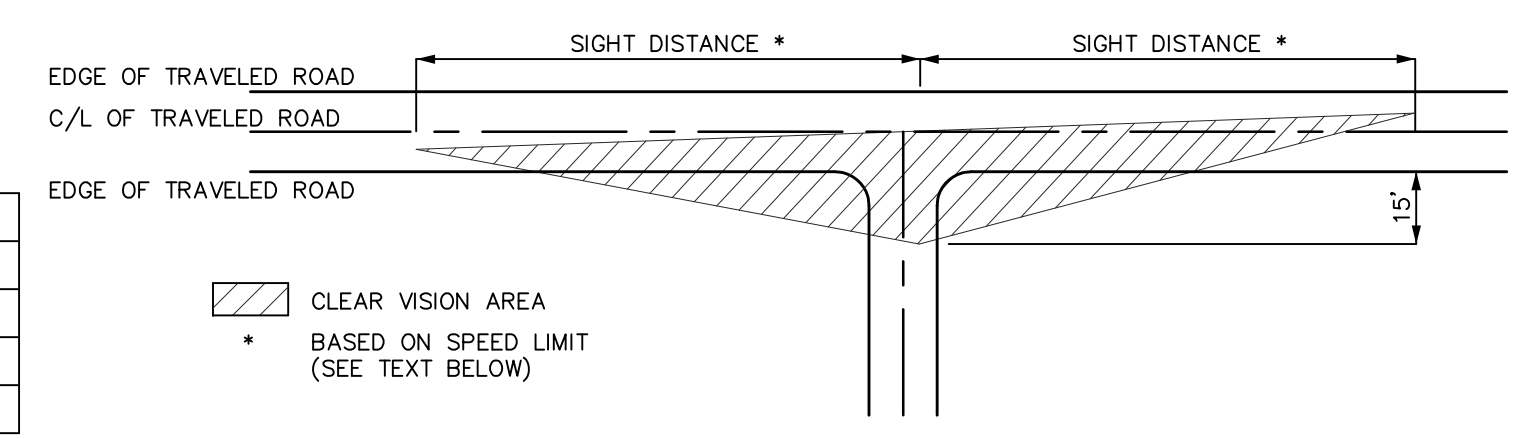
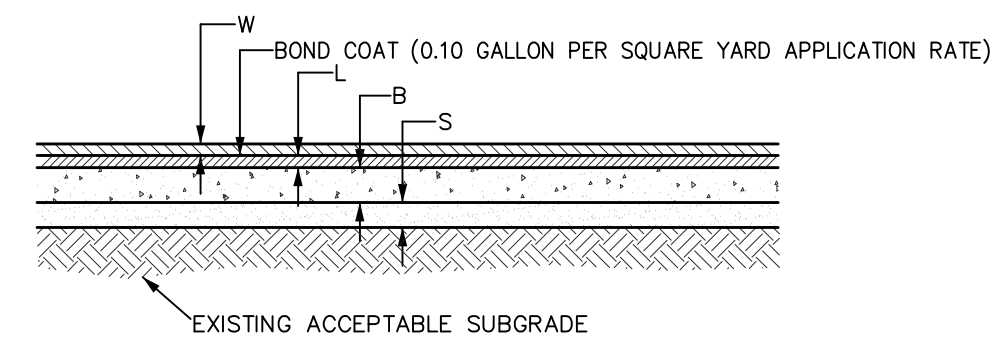


Figure 3. CLEAR VISION REQUIREMENT FOR PUBLIC AND PRIVATE ROAD APPROACHES THE FOLLOWING SIGHT DISTANCE VALUES, ACCORDING TO THE POSTED OR ABSOLUTE REGULATORY SPEED LIMIT, ARE REQUIRED FOR PUBLIC AND PRIVATE ROAD APPROACHES. THOSE VALUES LISTED AS STANDARD REPRESENT THE MINIMUM REQUIREMENTS FOR SIGHT DISTANCE WHERE EXISTING ROADWAY AND SITE CHARACTERISTICS ALLOW.

Speed Limit (mph)	Required Sight Distance (feet)	
	Standard	Minimum Allowable
30 or below	500	350
35	575	400
40	650	450
45	725	500
50	800	550
55	875	600

- NOTES**
- ON MULTILANE HIGHWAYS, CLEAR VISION SHALL BE PROVIDED TO THE CENTER OF EACH LANE IN BOTH DIRECTIONS OF TRAVEL.
  - ON GRAVEL ROADS THAT DO NOT HAVE A POSTED SPEED LIMIT, PUBLIC AND PRIVATE ROAD APPROACHES SHALL MEET THE 45-MPH REQUIREMENTS FOR SIGHT DISTANCE.
  - ON ROADWAYS SERVING THROUGH TRAFFIC THAT HAVE A 25-MPH PRIMA FACIE LIMIT POSTED, PUBLIC AND PRIVATE ROAD APPROACHES SHALL MEET THE VALUE LISTED AS STANDARD FOR SIGHT DISTANCE.

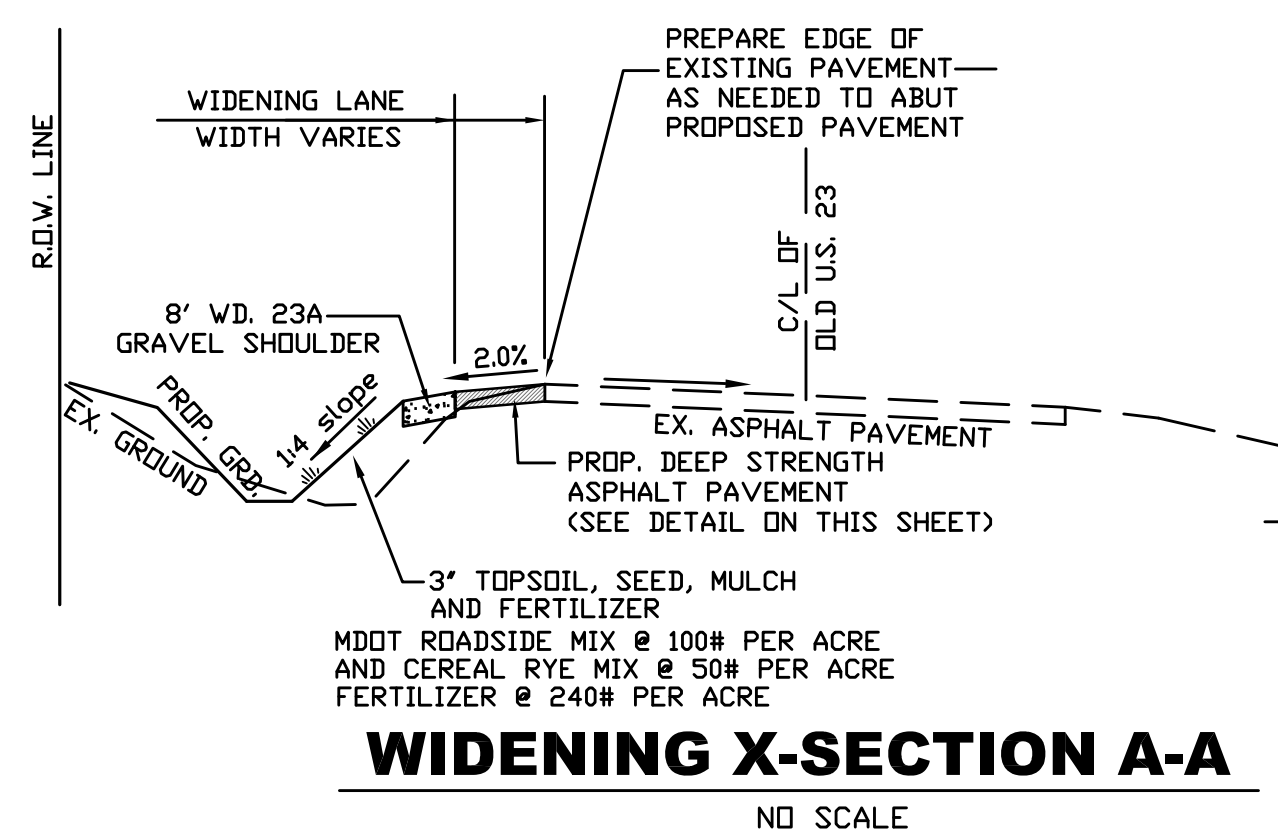


**BITUMINOUS PAVEMENT CROSS-SECTION**  
NO SCALE  
(FOR USE WITHIN OLD US 23 ROAD R.O.W.)

KEY	DESCRIPTION	MATERIAL SPECIFICATION	MIN. COMP. THICKNESS	COMPACTION DENSITY
W	WEARING COURSE	MDOT 36A	1.5"	97% (BULK DENSITY)
L	LEVELING COURSE	MDOT 13A	2.0"	97% (BULK DENSITY)
B	AGGREGATE BASE	MDOT 21AA AGG. BASE	8.0"	98%
S	GRANULAR SUBBASE	MDOT CLASS II	6.0"	95%

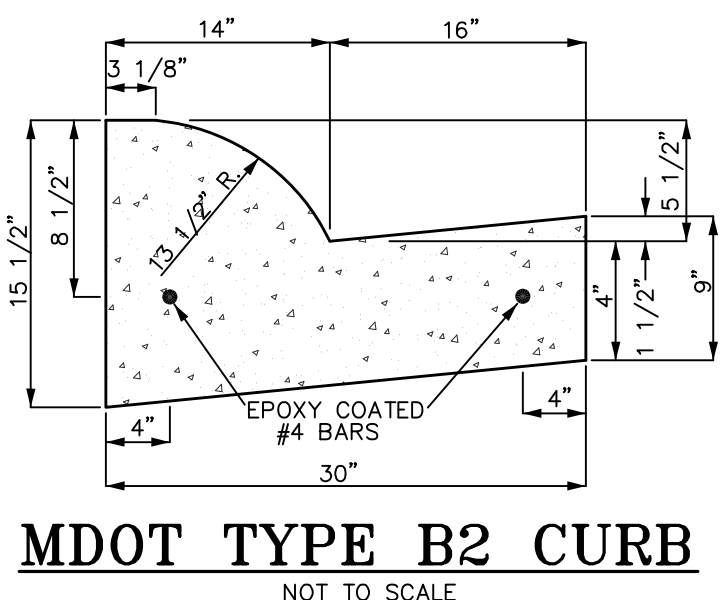
**BITUMINOUS PAVEMENT NOTES:**

- Refer to the General Notes, Road and/or Parking Lot Construction Notes and Typical Road and/or Pavement Cross Section details on the project plans for additional requirements.
- Unsuitable soils found within the 1 on 1 influence zone of the roadway, such as muck, peat, topsoil, marl, silt or other unstable materials shall be excavated and replaced up to the proposed subgrade elevation with MDOT Class III granular material compacted to 95% maximum unit weight, modified proctor.
- Contractor shall proof roll prepared subgrade as directed by Engineer. Unacceptable areas of subgrade shall be undercut and replaced as directed by Engineer.
- Owner/Developer may delay placement of the bituminous wearing course outside of the public road right of way. Repair of the bituminous leveling course may be necessary due to any delay in placement of the bituminous wearing course. Substantial repair to the bituminous leveling course may be necessary if placement of the bituminous wearing course is delayed for more than 12 months after placement of the bituminous leveling course. The bituminous leveling course shall be repaired as directed by Engineer prior to placement of the bituminous wearing course.



**WIDENING X-SECTION A-A**  
NO SCALE

- NOTE:**
- ALL WORK WITHIN ROAD R.O.W. TO COMPLY WITH L.C.R.C. CURRENT SPECIFICATIONS & REQUIREMENTS.
  - ALL SAWCUTTING SHALL BE DONE AS ACCEPTABLE TO L.C.R.C.



**MDOT TYPE B2 CURB**  
NOT TO SCALE

**LIVINGSTON COUNTY PUBLIC ROAD CURB NOTES:**

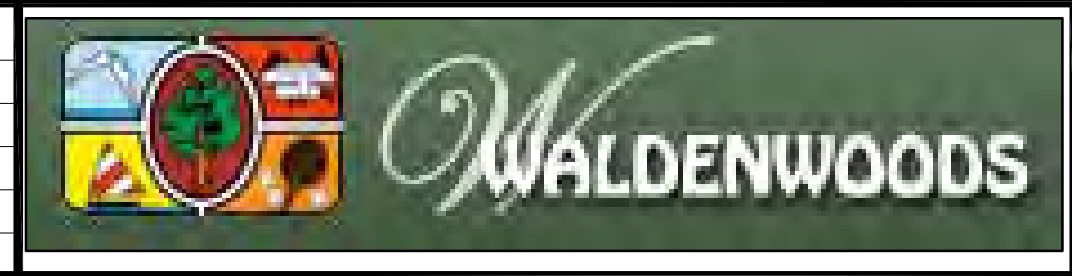
- Refer to the project plans for the proposed locations of specific curb types.
- The construction specifications as found in the Michigan Department of Transportation (MDOT) Standard Specifications for Construction are a part of this work. Refer to the Livingston County Public Road Construction Notes and the General Notes on the project plans for additional requirements.
- Concrete material shall be MDOT Grade P1, air-entrained and shall have a minimum 28-day class design strength of 3500 psi. Contractor shall submit concrete mix design and aggregate mechanical analysis report to the Livingston County Road Commission (LCRC) and Engineer for review and approval prior to use.
- Install transverse contraction control joints in curb with 1" minimum depth at 10' on center. Tool joints in fresh concrete or saw cut within 8 hours.
- Install transverse expansion control joints in curb as follows: 400' maximum on center, at spring points of intersecting streets and within 10' on each side of catch basins. Transverse expansion control joints shall be 1" thick asphalt fiber joint filler matching entire curb cross section.
- Provide 0.5" asphalt fiber control joint between back of curb and all other concrete structures, such as concrete sidewalks and concrete driveways.
- Curb Contractor shall provide final adjustment of catch basin castings in curb line. Castings shall be tucked pointed to structure water tight with concrete or mortar inside and outside of casting.
- Install curb cuts for all existing and proposed sidewalks and pedestrian ramps in accordance with the American Disabilities Act and the Michigan Barrier Free Design requirements. Install curb cuts for all existing and proposed vehicular ramps and drives as noted on the project plans.

**BENCHMARKS**

- BENCHMARK #1 (SITE)**  
"X" IN CENTER OF LAST CONCRETE STEP FROM EXISTING BUILDING "FRIENDSHIP LODGE."  
ELEVATION = 956.03 (NAVD 88)
- BENCHMARK #A:**  
NAIL IN THE NW SIDE OF A POWER POLE, LOCATED AT THE ENTRANCE OF "WALDENWOODS."  
ELEVATION = 982.99
- BENCHMARK #B:**  
NORTHWEST CORNER OF CONCRETE DRIVE, LOCATED AT THE BUILDING EAST OF PROPANE OUTLET.  
ELEVATION = 978.25
- BENCHMARK #C:**  
CORNER OF CONCRETE WALK, LOCATE IN CORNER OF BUILDING.  
ELEVATION = 968.03
- BENCHMARK #D:**  
SOUTH CORNER OF CONCRETE TRANSFORMER PAD, LOCATED NEAR THE NORTHWEST CORNER OF CAMPGROUND.  
ELEVATION = 948.55
- BENCHMARK #E:**  
CENTERLINE OF MANHOLE COVER NEAR LIFT STATION.  
ELEVATION = 948.17
- BENCHMARK #F:**  
SOUTHEAST CORNER OF TRANSPAD, LOCATED NEAR THE SOUTHEAST CORNER OF PAVILLION BUILDING.  
ELEVATION = 961.74

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/04/19	REVISED PER HARTLAND TWP. FIRE MARSHALLS OFFICE COMMENTS
CHECK: WMP	2	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS

REVISION #	DATE	REVISION-DESCRIPTION

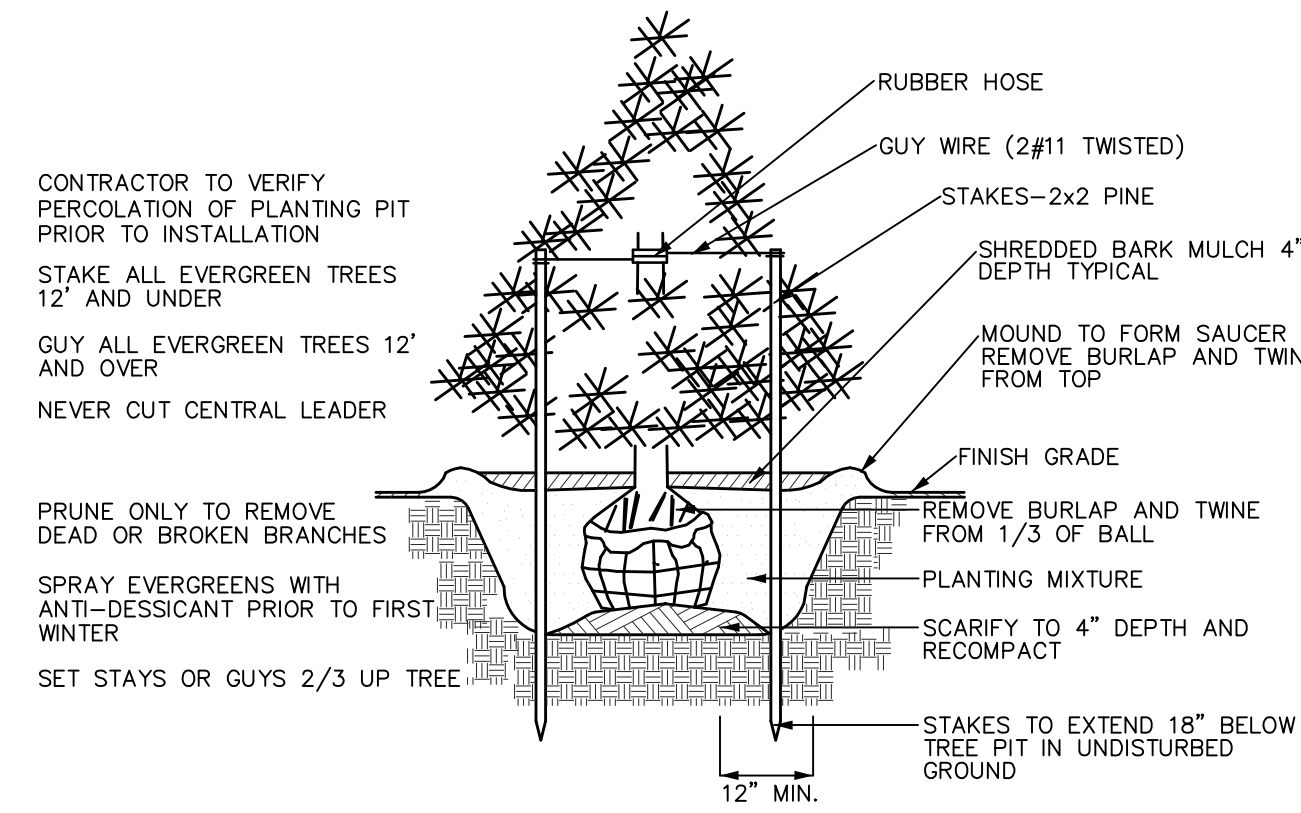


**WHITMORE LAKE ROAD APPROACH PLAN**

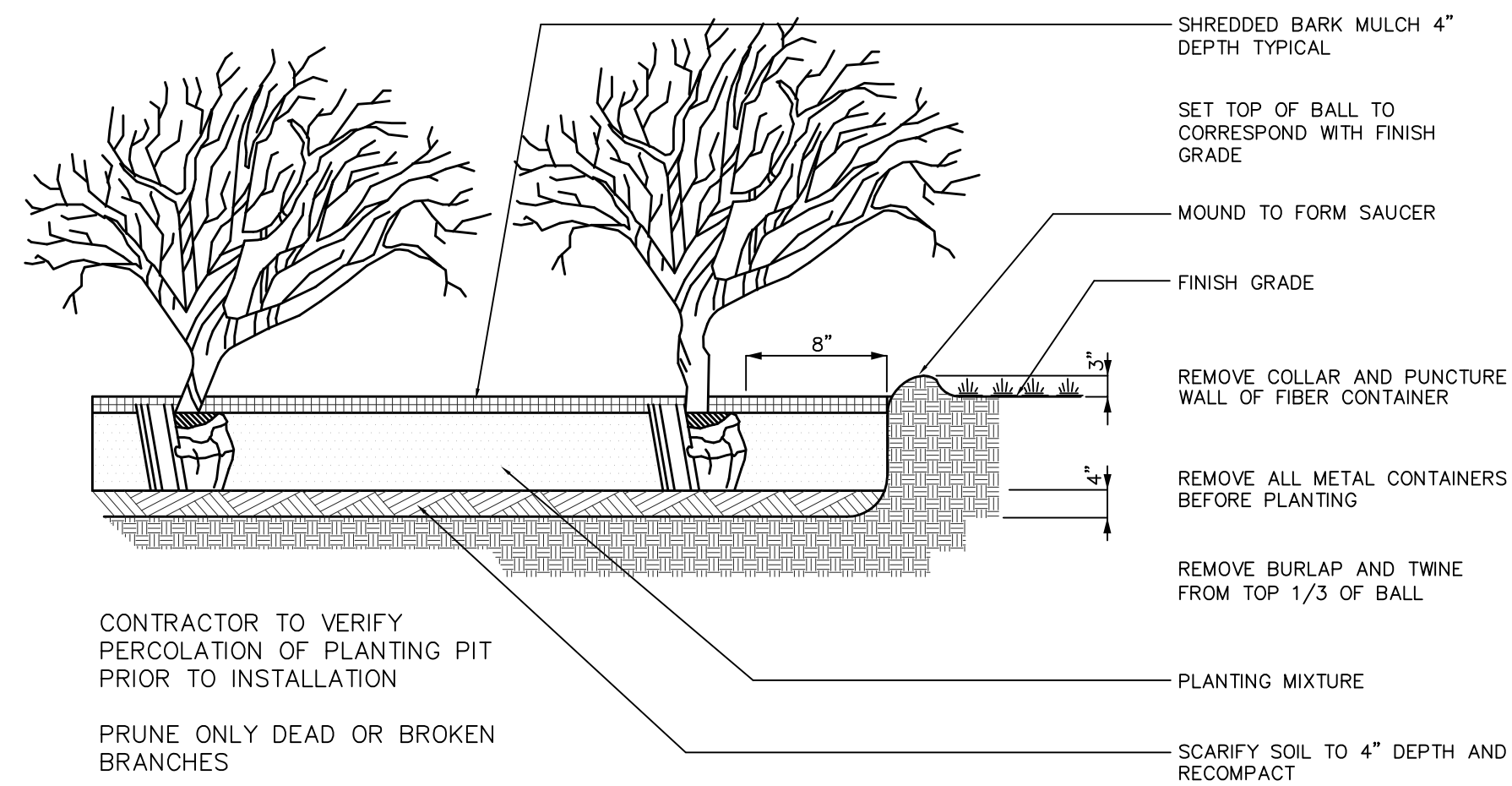
CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=30'  
PROJECT No.: 9173156  
DWG NAME: 3156-APP  
ISSUED: DEC. 11, 2019

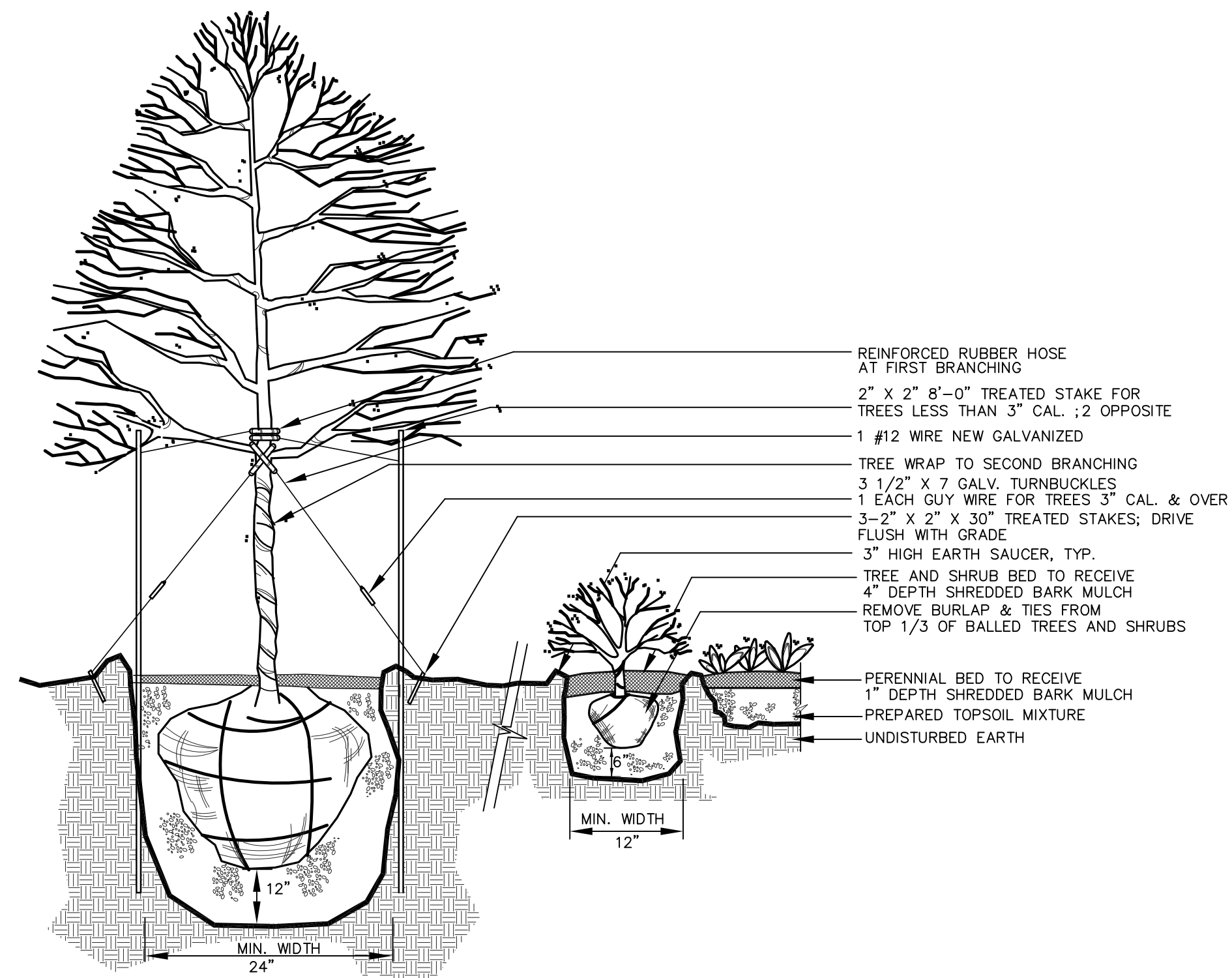
**AP**



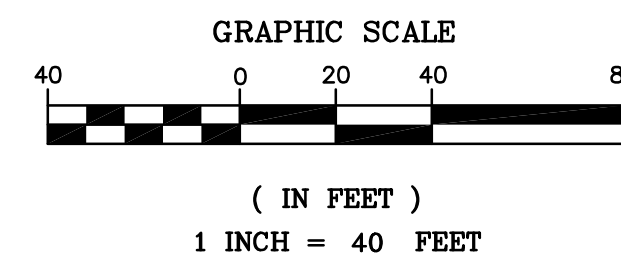
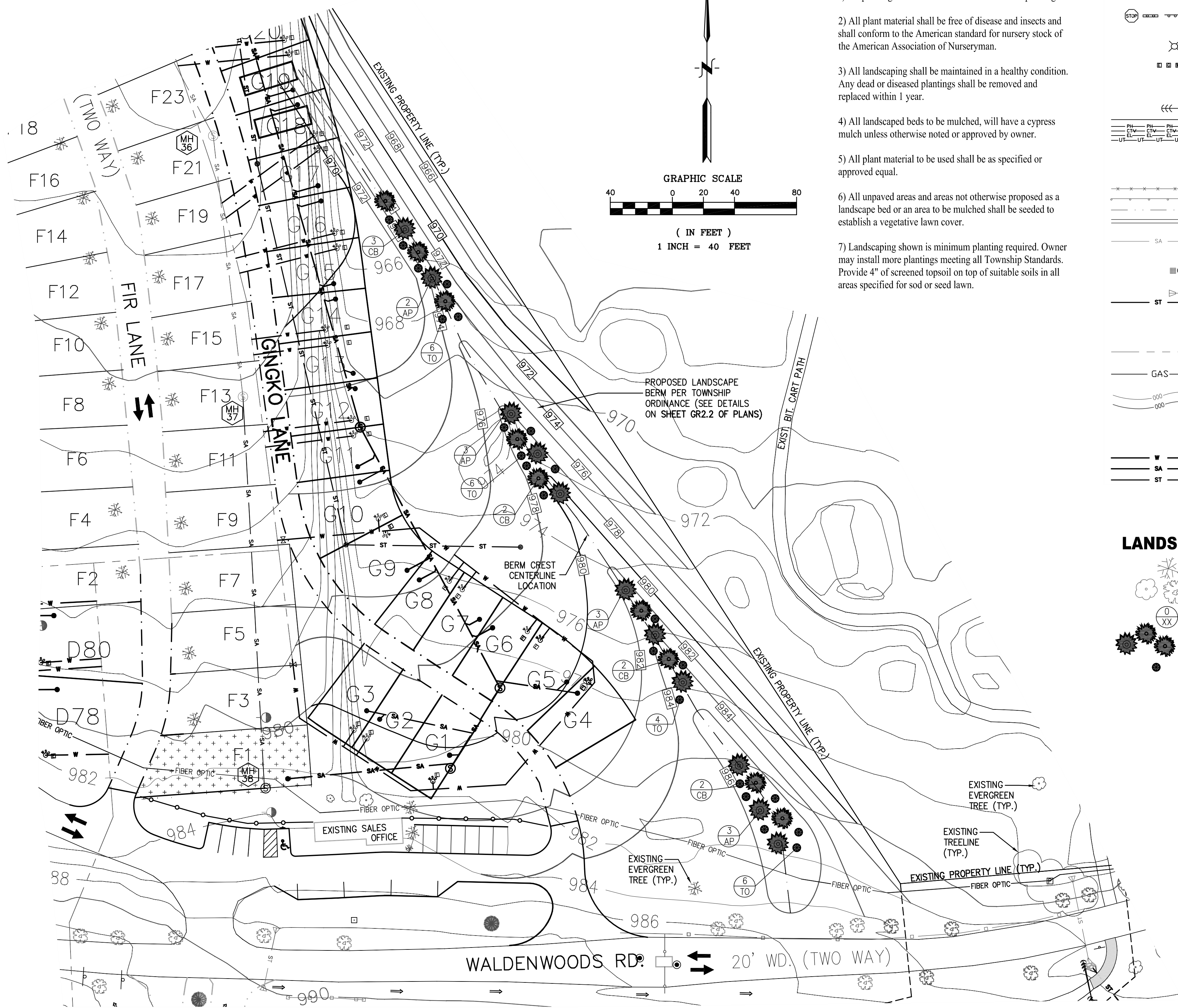
**TYPICAL EVERGREEN TREE PLANTING**  
NOT TO SCALE



**TYPICAL SHRUB PLANTING**  
NOT TO SCALE



**TYPICAL TREE/SHRUB/PERENNIAL PLANTING**  
NOT TO SCALE



- GENREL NOTES:
- 1) All planting sizes shown shall be at the time of planting.
  - 2) All plant material shall be free of disease and insects and shall conform to the American standard for nursery stock of the American Association of Nurseryman.
  - 3) All landscaping shall be maintained in a healthy condition. Any dead or diseased plantings shall be removed and replaced within 1 year.
  - 4) All landscaped beds to be mulched, will have a cypress mulch unless otherwise noted or approved by owner.
  - 5) All plant material to be used shall be as specified or approved equal.
  - 6) All unpaired areas and areas not otherwise proposed as a landscape bed or an area to be mulched shall be seeded to establish a vegetative lawn cover.
  - 7) Landscaping shown is minimum planting required. Owner may install more plantings meeting all Township Standards. Provide 4" of screened topsoil on top of suitable soils in all areas specified for sod or seed lawn.

- LEGEND**
- MISC. STRUCTURE (AS LABELED)
  - BOLLARD
  - SOIL BORING / BENCHMARK W/IDENTIFIER
  - STREET LIGHT
  - OVERHEAD TRAFFIC SIGNAL
  - UTILITY METERS & BOXES (ELECTRIC METER, GAS METER, WATER METER, PHONE BOX, CATV BOX, MAIL BOX)
  - AIR CONDITIONER UNIT
  - UTILITY MANHOLE (AS LABELED)
  - UTILITY POLE W/GUY WIRE
  - OVERHEAD UTILITY LINES (ELECTRIC/PHONE/CABLE)
  - U/G UTILITY LINES (ELECTRIC/PHONE/CABLE)
  - DECIDUOUS TREE W/IDENTIFIER
  - CONIFEROUS TREE W/IDENTIFIER
  - BUSH
  - FENCE (CHAIN LINK UNLESS OTHERWISE STATED)
  - GUARD RAIL
  - EDGE OF GRAVEL
  - CONCRETE CURB (UNLESS OTHERWISE STATED)
  - SANITARY SEWER MANHOLE W/IDENTIFIER
  - SANITARY SEWER PIPE
  - CLEAN OUT
  - STORM WATER MANHOLE W/IDENTIFIER
  - CATCH BASIN W/IDENTIFIER
  - CONTROL STRUCTURE
  - FLARED END SECTION
  - STORM WATER DRAINAGE PIPE
  - HYDRANT
  - WATER SHUT OFF
  - WATER VALVE
  - WATER VALVE BOX
  - WATER MAIN
  - GAS SHUT OFF
  - U/G GAS
  - SPOT ELEVATION
  - 1' CONTOUR
  - 5' CONTOUR
  - PROPOSED SANITARY RISER CONNECTION
  - PROPOSED WATER RISER
  - PROPOSED RECREATIONAL VEHICLE POST
  - PROPOSED WATER MAIN
  - PROPOSED SANITARY SEWER
  - PROPOSED STORM SEWER

- LANDSCAPE LEGEND**
- EXISTING EVERGREEN TREE
  - EXISTING DECIDUOUS TREE
  - PROPOSED SPECIES IDENTIFIER
  - PROPOSED EVERGREEN TREE
  - PROPOSED LANDSCAPE SHRUBS

**PROPOSED LANDSCAPE PLANTING LEGEND**

KEY	QUANTITY	BOTANICAL NAME	COMMON NAME	MINIMUM SIZE	ROOT
<b>EVERGREEN TREES</b>					
AP	11	<i>Pinus Nigra</i>	Austrian Pine	8' Height / 5' Spread	B & B
CB	9	<i>Picea Pungens "Glauca"</i>	Colorado Blue Spruce	8' Height / 5' Spread	B & B
<b>EVERGREEN SHRUBS</b>					
TO	22	<i>Thuja Occidentalis 'Golden Glove'</i>	Golden Glove Arborvitae	24" Height	Container

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**DESIGN INC.**  
(810) 227-9533  
CIVIL ENGINEERS  
LAND SURVEYORS  
2183 PLESS DRIVE  
BRIGHTON, MICHIGAN 48114

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.	1	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS			
CHECK: WMP						



**NORTH CAMPGROUND  
LANDSCAPE PLAN**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI 48855  
810-632-6135

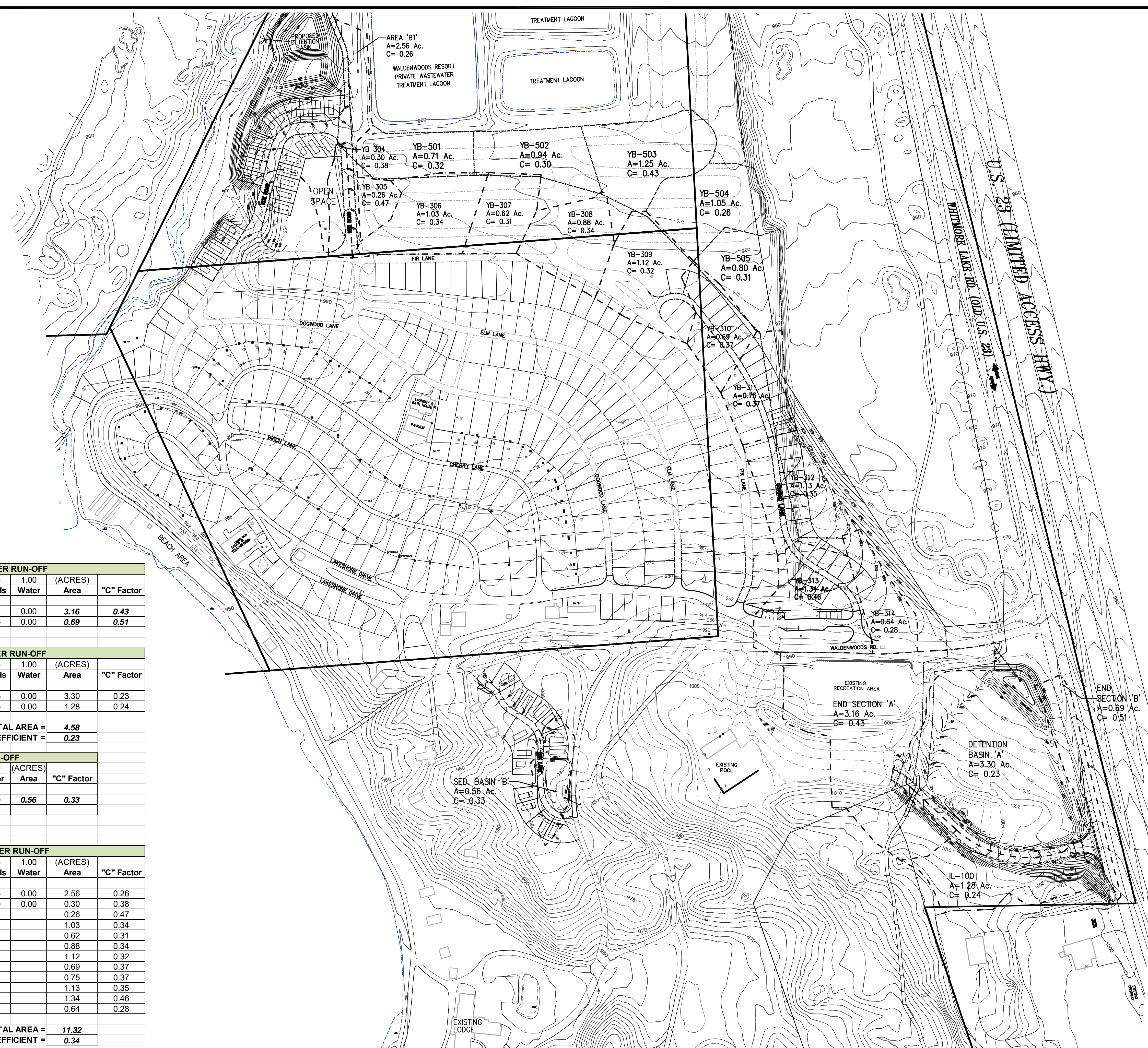
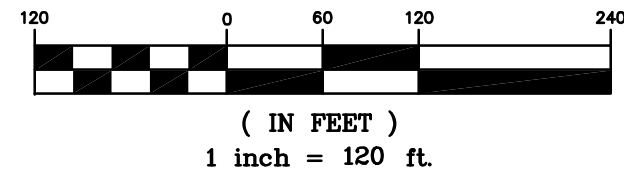
SCALE: 1"=40'  
PROJECT No.: 9173156  
DWG NAME: 3156-LA  
ISSUED: DEC. 11, 2019

**LA**

**LEGEND**

- = STORM WATER MANHOLE IDENTIFIER
- = CATCH BASIN IDENTIFIER
- ▭ = CONTROL STRUCTURE
- ▭ = FLARED END SECTION
- ▭ = STORM WATER DRAINAGE PIPE
- ▭ = WATERSHED BOUNDARY LINE

**GRAPHIC SCALE**



PROP. END SECTIONS STORM WATER RUN-OFF								
"Area"	0.70	0.90	0.80	0.20	0.15	1.00	(ACRES)	"C" Factor
	Gravel	Pavement	Building	Lawn	Woods	Water	Area	
FES "A"	0.30	0.85	0.00	1.60	0.41	0.00	3.16	0.43
FES "B"	0.02	0.30	0.00	0.22	0.15	0.00	0.69	0.51

DETENTION BASIN 'A' STORM WATER RUN-OFF								
"Area"	0.70	0.90	0.80	0.20	0.15	1.00	(ACRES)	"C" Factor
	Gravel	Pavement	Building	Lawn	Woods	Water	Area	
BASIN	0.04	0.18	0.00	2.23	0.85	0.00	3.30	0.23
IL-100	0.03	0.10	0.00	0.40	0.75	0.00	1.28	0.24

TOTAL AREA = 4.58  
RUN-OFF COEFFICIENT = 0.23

SEDIMENT BASIN 'B' STORM WATER RUN-OFF								
"Area"	0.70	0.90	0.80	0.20	0.15	1.00	(ACRES)	"C" Factor
	Gravel	Pavement	Building	Lawn	Woods	Water	Area	
	0.06	0.00	0.08	0.32	0.10	0.00	0.56	0.33

DETENTION BASIN "C" STORM WATER RUN-OFF								
"Area"	0.70	0.90	0.80	0.20	0.15	1.00	(ACRES)	"C" Factor
	Gravel	Pavement	Building	Lawn	Woods	Water	Area	
B1	0.36	0.00	0.14	0.00	2.06	0.00	2.56	0.26
YB 304	0.11	0.00	0.00	0.19	0.00	0.00	0.30	0.38
YB 305	0.14			0.12			0.26	0.47
YB 306	0.29			0.74			1.03	0.34
YB 307	0.14			0.48			0.62	0.31
YB 308	0.24			0.64			0.88	0.34
YB 309	0.27			0.85			1.12	0.32
YB 310	0.24			0.45			0.69	0.37
YB 311	0.26			0.49			0.75	0.37
YB 312	0.33			0.80			1.13	0.35
YB 313	0.17	0.35	0.04	0.78			1.34	0.46
YB 314	0.02	0.06		0.56			0.64	0.28

TOTAL AREA = 11.32  
RUN-OFF COEFFICIENT = 0.34

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2183 PLESS DRIVE  
BRIGHTON, MICHIGAN 48114

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						

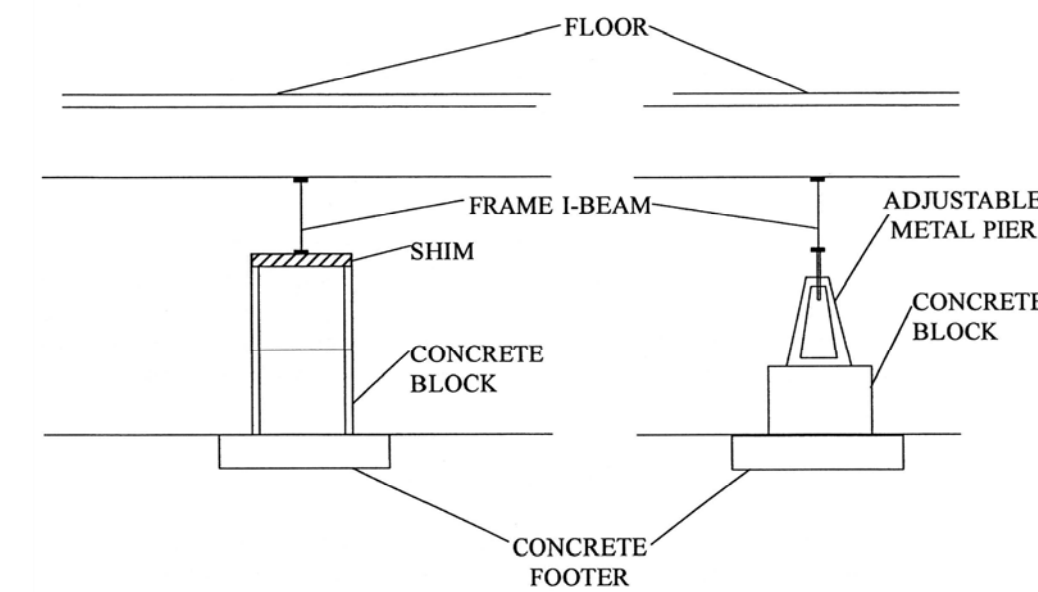
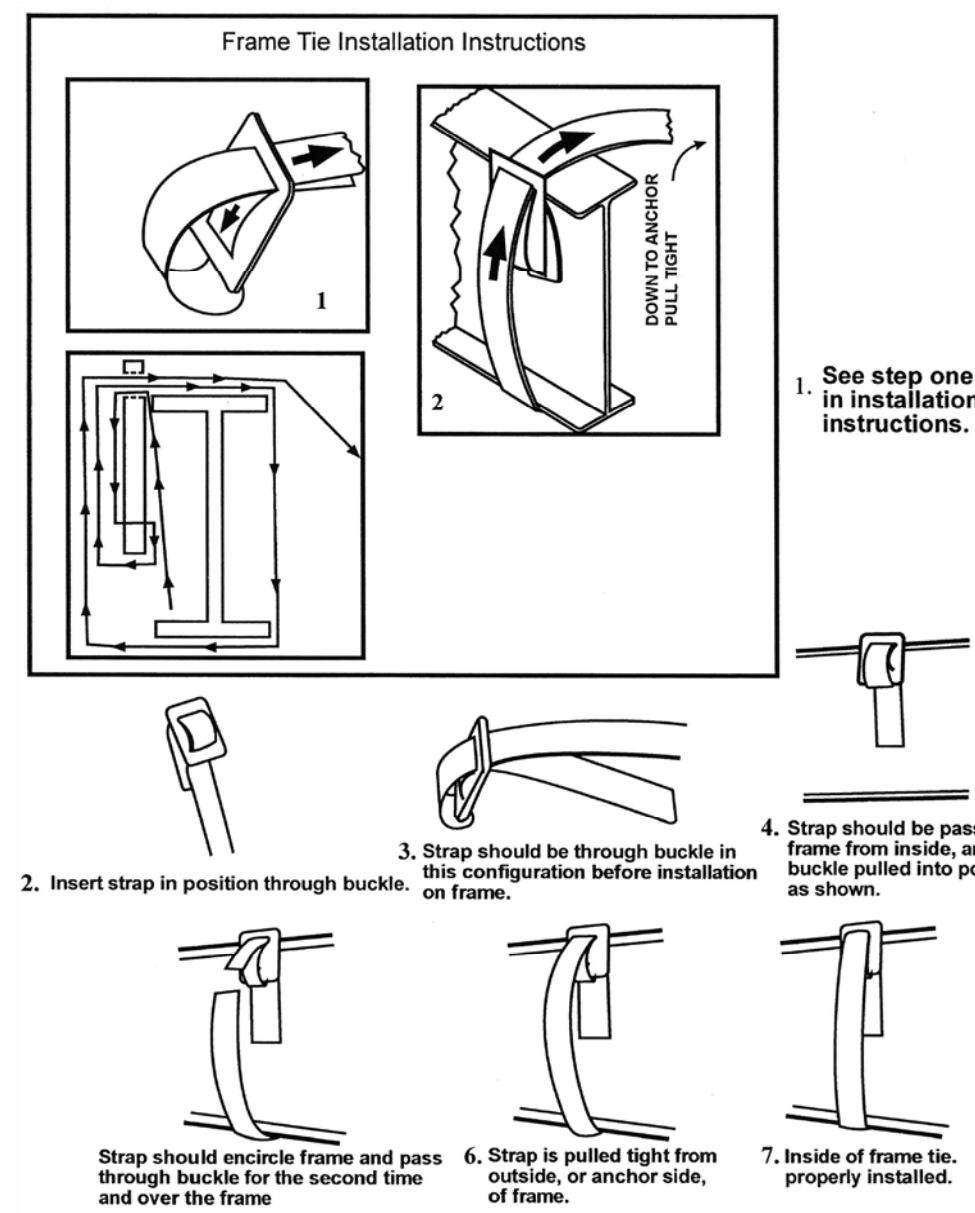
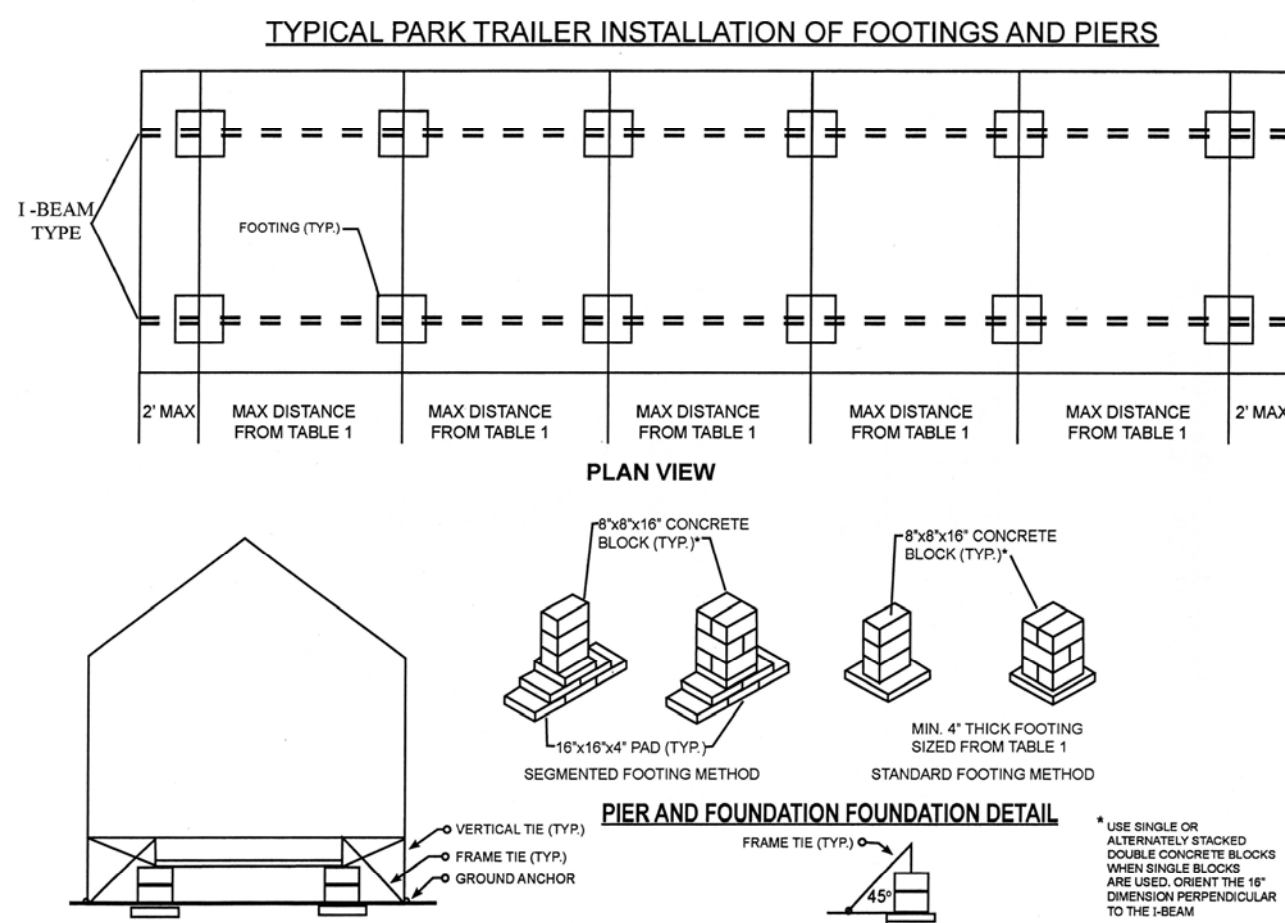


**OVERALL WATERSHED PLAN**

CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: 1"=120'  
PROJECT No.: 9173156  
DWG NAME: 3156-WATERSHED  
ISSUED: DEC. 11, 2019

**WS**



**SUPPORT PIERS**

PIERS MAY BE CONCRETE BLOCKS WITH WOOD SHIMS OR AN ADJUSTABLE METAL PIER SIMILAR TO THAT SHOWN. THE BASE OF THE PIER MUST BE RELATIVELY WIDE WITH RESPECT TO THE HEIGHT WHEN SUPPORTING THE HOME. THE METAL PIER SHOULD BE HIGH ENOUGH SO THAT THE RISER WILL ONLY BE EXTENDED 2.3" WHEN IN PLACE. THIS MAY BE ACCOMPLISHED BY ADDING BLOCKING UNDER THE BASE TO ADJUST THE HEIGHT. THE PIER SHOULD HAVE A PAD (REDWOOD, TREATED LUMBER, OR CONCRETE) PLACED UNDER THE PIER BASE TO MINIMIZE SETTLING OR TIPPING. THESE PADS SHALL BE AT LEAST 12" X 12" OR LARGER IF THE SOIL IS PARTICULARLY SOFT OR UNSTABLE. RECOMMENDED MINIMUM PAD OR FOOTING SIZES ARE SHOWN ON TABLE 6.

RECOMMENDED PIER SPACING IS 2 FEET MAXIMUM FROM EITHER END AND NOT OVER 10 FEET CENTERS THEREAFTER. PIERS SHALL BE LOCATED UNDER THE MAIN I-BEAM.

**REQUIRED FOOTING SIZES FOR PIERS UNDER EACH I-BEAM**

Table 1

Max. Pier Spacing Feet	Roof Live Load (PSF)	Pier Load (pounds)	Footing Area (Sq. ft.)	Footing Size (in./side)	Soil Pressure (PSF)	
					1000	2000
3	20	1,697	1.77	16.00	1.77	16.00
3	30	1,909	1.91	16.58	1.77	16.00
4	20	2,334	2.33	18.33	1.77	16.00
4	30	2,625	2.63	19.44	1.77	16.00
5	20	2,667	2.67	19.60	1.77	16.00
5	30	3,000	3.00	20.78	1.77	16.00
6	20	3,111	3.11	21.17	1.77	16.00
6	30	3,500	3.50	22.45	1.77	16.00
8	20	3,734	3.73	23.19	1.86	16.38
8	30	4,200	4.20	24.59	2.10	17.41
10	20	4,667	4.67	25.92	2.33	18.33
10	30	5,250	5.25	27.50	2.63	19.44

Note: 16" x 16" x 4" minimum footing for concrete piers

**Segmented Footing Method**  
 It is possible to create larger footing sizes using 16" x 16" x 4" minimum pads with the segmented footing method as shown in figure 1. To implement the method use the following example:  
 Required footing size (from Table 1) - 25.92' x 4"  
 Area of footing - 672 sq. in.  
 Area of 16" x 16" pad - 256 sq. in.  
 Divide 672 by 256 for a result of 2.62  
 This indicates (3) 16" x 16" x 4" pads are required at the base of the footing. Orient the pads as indicated in Figure 1.

PAGE 06  
Figure 1

**WALDEN 35S CABIN UNIT SET UP**

**Blocking** - many of the specific rules affecting the way in which your unit is blocked are rules created by local or state governments or by the park in which your unit is sited. The unit should be blocked in such a manner that the unit is level end to end and side to side, and that the unit does not flex on its frame when you walk through the unit. Normal blocking locations are along the I-beams of the frame at most 4' from each end and at 6' - 8' intervals. Some customers will request extra blocking under entry doors. (On Sentinel the slide outs must be blocked.) If the blocking of the unit is set on soil, there may be some settling and reblocking and releveling may be required.

**Hooking up electric** - seems easy, the cord that comes with the unit just plugs into the receptacle on the site. However, prior to plugging in the unit, you should make sure that all the breakers in the breaker box are in the off position. **Make sure that the breaker for the Water Heater is in the off position and remains in the off position until the water heater is filled with water.** Individually check the circuits covered by each breaker to see that they are working. In cases where the unit is to be hardwired to the electric source at the site, this should only be done by a locally licensed electrician.

**Hooking up water** - to the unit is accomplished by hooking a portable water hose from the site hook up spigot to the hose hookup normally located on the belly of the unit under the water heater. You may wish to have a pressure regulator on your city water line. Check all finger tight fittings at faucets and stools. Walk the unit and listen for any pressure release. Do not check faucets until the sewer lines are hooked up or hosing yanks are checked.

**Hooking up sewer** - to the unit can be done with standard RV sewer hose though it is often hard plumbed. If using RV sewer hose, it must be supported to ensure that it constantly angles down and no low points allow for stagnation. If your unit has optional holding tanks, there are valves on the tanks. The black valve (the larger one in line) should never be left open even if you are hooked up to a park sewer; it should be kept closed until the black water tank is at least half full so that the chemicals in the tank have a chance to dissolve the solids. Holding tanks can be emptied about once a week in most households. Most parks without sewer systems will have "honey wagon" pickup weekly. If you are emptying your holding tanks into a sewer system or into your own "honey wagon" open your Black valve first, the main valve and then the gray valve. Depending on space when dumping yourself, you may wish to run fresh water through the tanks while dumping. There are also tank washout systems you can add to your sewer outlet. Check with your dealer regarding these.

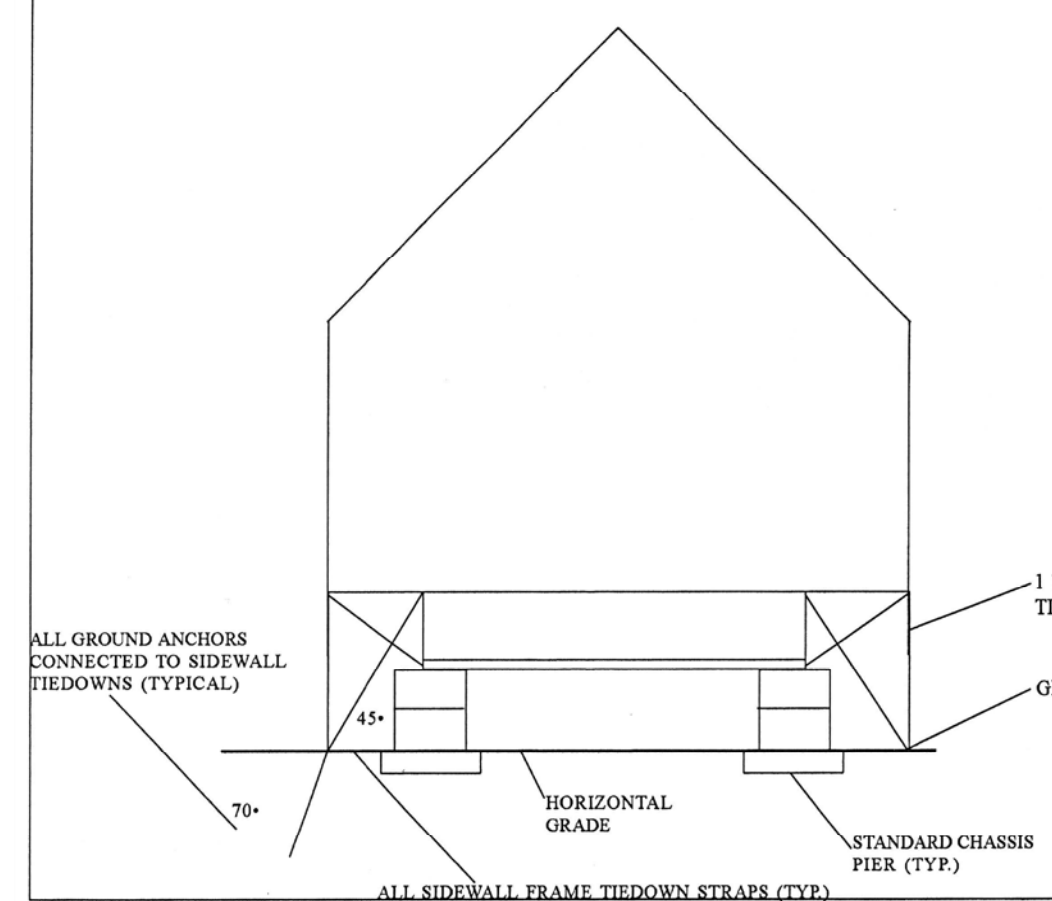
Once your sewer line is hooked up, you can check the water faucets and sewer lines again checking finger tight fittings under the sinks. Check that the water heater bypass is not in the bypass position and make sure to run faucets to the hot water side as well as the cold. When the hot side runs smoothly the water heater is filled with water and you can switch on the water heater breaker and test that it is working. Electric water heaters may take substantial time to heat a freshly filled tank.

**Hooking up gas** - to the unit with certified LP lines at the inlet located on the rear of the unit should always be done the first time by a certified LP technician. **The gas appliances used in these park models are factory set for LP Gas. Do not hook up to Natural Gas.** (Occasionally, a unit will be built for Natural Gas hookup - these are built to special order and should never be hooked up to LP.) After the LP gas is connected to the unit each appliance should be tested individually. Note: each appliance has a separate shut off valve. **If you smell gas at any point after the gas valve has been turned to the on position, immediately vacate the unit and turn the valve on the tank to the off position, then call the gas company to check it out.**

**GENERAL NOTES:**

- Contractor shall perform the work in accordance with the requirements of the appropriate Local, County and State Agencies and all other Government and Regulatory Agencies with jurisdiction over the project. Contractor shall notify the appropriate Agencies in advance of each stage of work in accordance with each Agency's requirements.
- Contractor shall comply with all permit, insurance, licensing and inspection requirements associated with the work. Prior to construction, Contractor and Owner/Developer shall determine who is responsible for obtaining each required permit. Contractor shall verify that the each required permit has been obtained prior to commencement of the stage of work associated with the required permit(s).
- Contractor shall furnish liability insurance and property damage insurance to save harmless the Owner, Developer, Architect, Engineer, Surveyor and Government Agencies for any accident occurring during the construction period. Refer to the appropriate Local, County and State Agencies for additional requirements. Copies of insurance certifications shall be made available to the Owner/Developer.
- Contractor shall conduct and perform work in a safe and competent manner. Contractor shall perform all necessary measures to provide for traffic and pedestrian safety from the start of work and through substantial completion. Contractor shall determine procedures and provide safety equipment such as traffic controls, warning devices, temporary pavement markings and signs as needed. Contractor shall comply with the safety standards of the State Department of Labor, the occupational health standards of the State Department of Health and safety regulations of the appropriate Local, County, State and Federal Agencies. Refer to the safety specifications of the appropriate Regulatory Agencies. The Contractor shall designate a qualified employee with complete job site authority over the work and safety precautions; said designated employee shall be on site at all times during the work.
- Contractor shall coordinate scheduling of all work in the proper sequence, including work by Subcontractors. Additional costs due to improper planning by Contractor or work done out of sequence as determined by standard acceptable construction practices, shall be Contractor's responsibility.
- Contractor shall contact the 811 Underground Public Utility Locating System or other appropriate local underground utility locating Agency, a minimum of three (3) working days prior to construction. Existing utility information on the project plans may be from information disclosed to this firm by the Utility Companies, Local, County or State Agencies, and/or various other sources. No guarantee is given as to the completeness or accuracy thereof. Prior to construction, locations and depths of all existing utilities (in possible conflict with the proposed improvements) shall be verified in the field.
- Contractor shall coordinate scheduling a Pre-Construction Meeting with Engineer prior to commencement of work.
- The Local Municipality, County and/or State in which the project is located may require an Engineer's Certification of construction of the proposed site improvements. Contractor shall verify the certification requirements with Engineer prior to commencement of work. Contractor shall coordinate construction staking, testing, documentation and observation with the appropriate Agency, Surveyor and/or Engineer as required for Engineer's Certification and Government Agency Acceptance. All materials used and work done shall meet or exceed the requirements of certification and acceptance, the contract documents and the material specifications noted on the project plans. Any materials used or work done that does not meet said requirements, contract documents and/or specifications shall be replaced and/or redone at Contractor's expense. The Owner/Developer may wait for test results, certifications and/or Agency reviews prior to accepting work.
- Engineer may provide subsurface soil evaluation results, if available, to Contractor upon request. Subsurface soil evaluation results, soils maps and/or any other documentation does NOT guarantee existing soil conditions or that sufficient, acceptable on-site granular material is available for use as structural fill, pipe bedding, pipe backfill, road subbase or use as any other granular material specified on the project plans. On-site granular material that meets or exceeds the material specifications noted on the project plans may be used as structural fill, pipe bedding, pipe backfill and/or road subbase material. On-site granular material shall be stockpiled and tested as acceptable to the appropriate Agency and/or Engineer prior to use.
- During the performance of their work, Contractor shall be solely responsible for determining soil conditions and appropriate construction methods based on the actual field conditions. Contractor shall furnish, install and maintain sheeting, shoring, bracing and/or other tools and equipment and/or construction techniques as needed for the safety and protection of the workers, pedestrians and vehicular traffic and for protection of adjacent structures and site improvements.
- Contractor shall install temporary and permanent soil erosion and sedimentation control devices at the appropriate stages of construction in accordance with the appropriate regulatory Agencies. Refer to Soil Erosion and Sedimentation Control Plans and Notes on the project plans.
- Structural fill shall be placed as specified on the project plans and within the 1 on 1 influence zone of all structures, paved areas and other areas subject to vehicular traffic. Structural fill shall be placed using the controlled density method (12" maximum lifts, compacted to 95% maximum unit weight, modified proctor). Fill material shall meet or exceed the specifications noted on the project plans or as directed by Engineer when not specified on the project plans.
- All existing monuments, property corners, ground control and benchmarks shall be protected and preserved; and if disturbed by Contractor, shall be restored at Contractor's expense. Contractor shall notify Surveyor of any conflicts between existing monuments, property corners, ground control and/or benchmarks and the proposed site improvements.
- Contractor shall notify Owner/Developer and Engineer immediately upon encountering any field conditions, which are inconsistent with the project plans and/or specifications.
- When noted on the project plans for demolition and/or removal, Contractor shall remove existing structures, building and debris and recycle and/or dispose of in accordance with Local, County, State and Federal regulations.
- Contractor shall remove excess construction materials and debris from site and perform restoration in accordance with the project plans and specifications. Disposing of excess materials and debris shall be performed in accordance with Local, County, State and Federal regulations.
- Construction access to the site shall be located as acceptable to the Owner/Developer and to the appropriate Local, County and/or State Agency with jurisdiction over the road(s) providing access to the site. Construction access shall be maintained and cleaned in accordance with the appropriate Local, County and/or State Agencies and as directed by Owner/Developer and/or Engineer.
- Contractor shall take necessary precautions to protect all site improvements from heavy equipment and construction procedures. Damage resulting from Contractor actions shall be repaired at Contractor's expense.

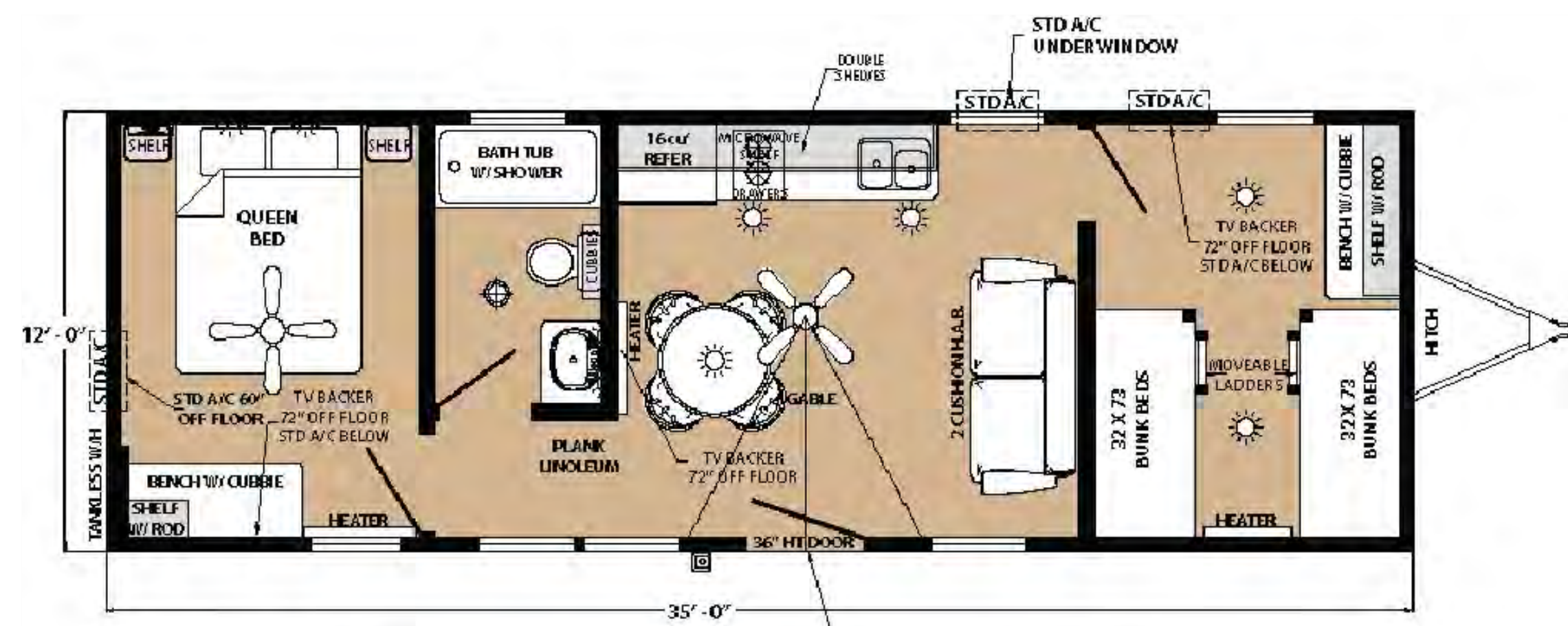
**ON SITE-PARK TRAILER TIEDOWN INSTALLATION**



ALL TIEDOWN STRAPS, SEALS, TIEDOWN ANCHORS AND CONNECTING HARDWARE MUST BE CERTIFIED BY A PROFESSIONAL ENGINEER OR A RECOGNIZED TESTING LABORATORY TO ADEQUATELY SUPPORT A 3150 POUND ALLOWABLE LOAD MIN. (ULTIMATE LOAD 4725 POUNDS MIN.) AND/OR TO COMPLY WITH ASTM D3953-91. ALL GROUND ANCHORS MUST BE CERTIFIED BY A PROFESSIONAL ENGINEER OR A RECOGNIZED TESTING LABORATORY TO ADEQUATELY SUPPORT A 4000 POUND ALLOWABLE LOAD MIN. (ULTIMATE LOAD 6000 POUNDS MIN.) WHEN LOADED BOTH PARALLEL WITH THE ANCHOR SHAFT AND THE ANCHORS MUST BE IN THEIR FULL DEPTH IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS (AS APPROVED FOR INSTALLATION IN SOIL TYPE WHICH EXISTS AT THE SITE ETC.) AND MUST EXTEND BELOW THE FROST LINE AND BE AT LEAST 12 INCHES ABOVE THE WATER TABLE. ALL GROUND ANCHORS CONNECTED TO THE SIDEWALL FRAME TIEDOWNS MUST BE PROVIDED WITH STABILIZER PLATES TO MINIMIZE HORIZONTAL MOVEMENT.

**WALDEN 35S CABIN FEATURES**

UTILITIES / INSULATION	CONSTRUCTION FEATURES
R-14 Batten Insulation In Floor	Solid Steel Dual I-Beam Chassis
R-11 Batten Insulation In Walls	Detachable Hitch
R-28 Batten Insulation In Roof	Poly-Woven Simplex Underbelly Material
OSB Ext. Sheathing W/Housewrap Wind Barrier	2" X 6" Double Perimeter Floor Joists
Radiant Heat W/Individual Thermostats	2" X 6" Floor Joists - 16" O.C.
50 Amp Electrical Service W/Power Cord	T & G Floor Decking
"Rinnai" Tankless LP Gas Water Heater	Rafters - 16" O.C.
Thru-Wall A/C Unit(S) - Per Plan	Integrated Steel Strapping Construction
Illuminated Light Switches - Per Location	KOA Approved
Rocker Style Light Switches - Throughout	ANSI 119.5 Approved
Black Iron Gas Piping	RVIA Approved
Pex Water Lines W/Low Point Drain	
In-Line Water: Shut Off Valves at Toilet & Sinks	



Size: 12' x 35' Description: Sleeps 6 or 8, Full Bath

**WALDEN 35S CABIN FLOOR PLAN**

NOT TO SCALE

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						



**SITE IMPROVEMENT NOTES & DETAILS**

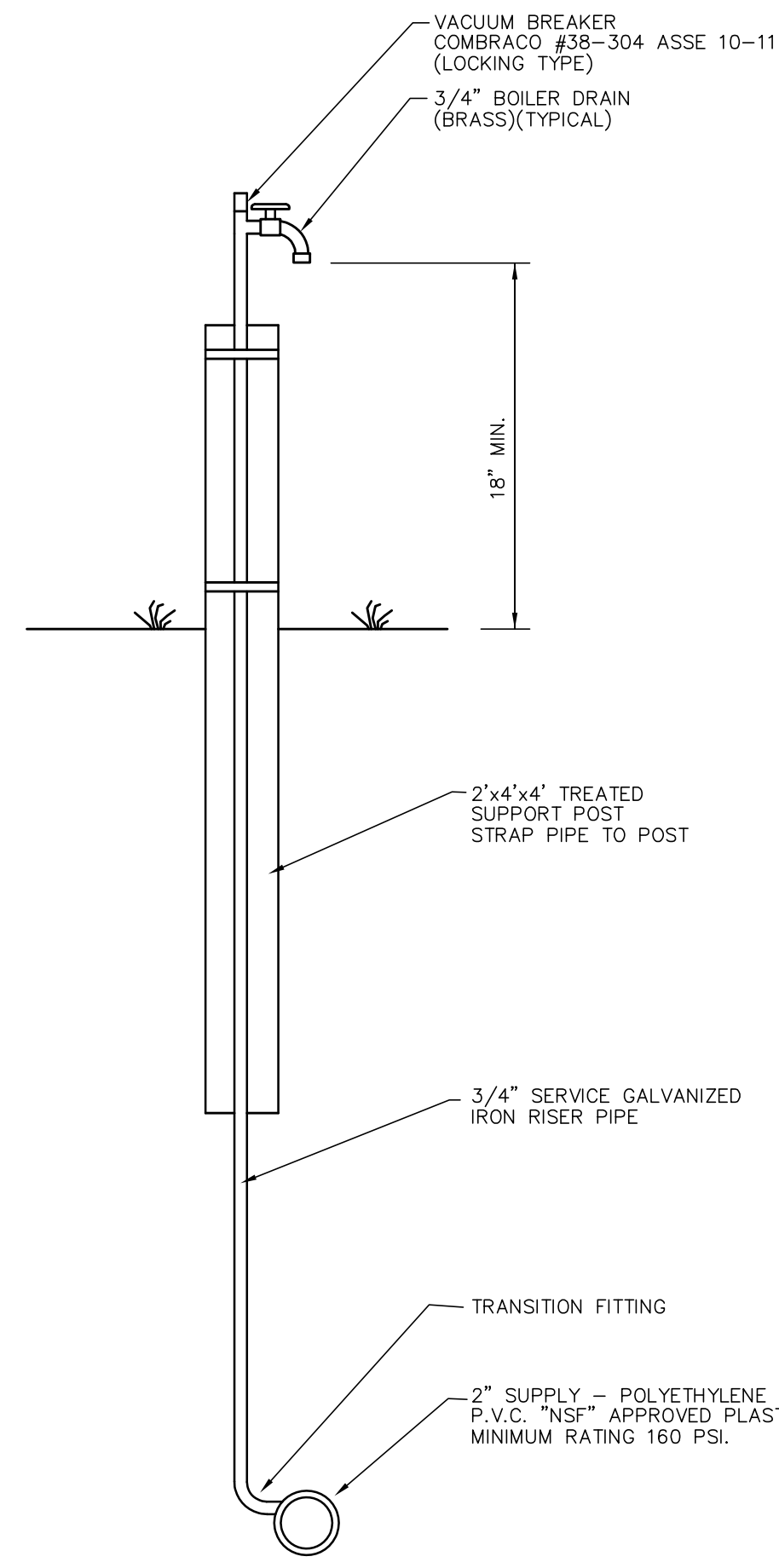
CLIENT: WALDENWOODS PROPERTIES  
 C/O BRIAN CROUSE  
 9840 CROUSE ROAD  
 HOWELL, MI. 48855  
 810-632-6135

SCALE: AS SHOWN  
 PROJECT No.: 9173156  
 DWG NAME: 3156-DTLS  
 ISSUED: DEC. 11, 2019

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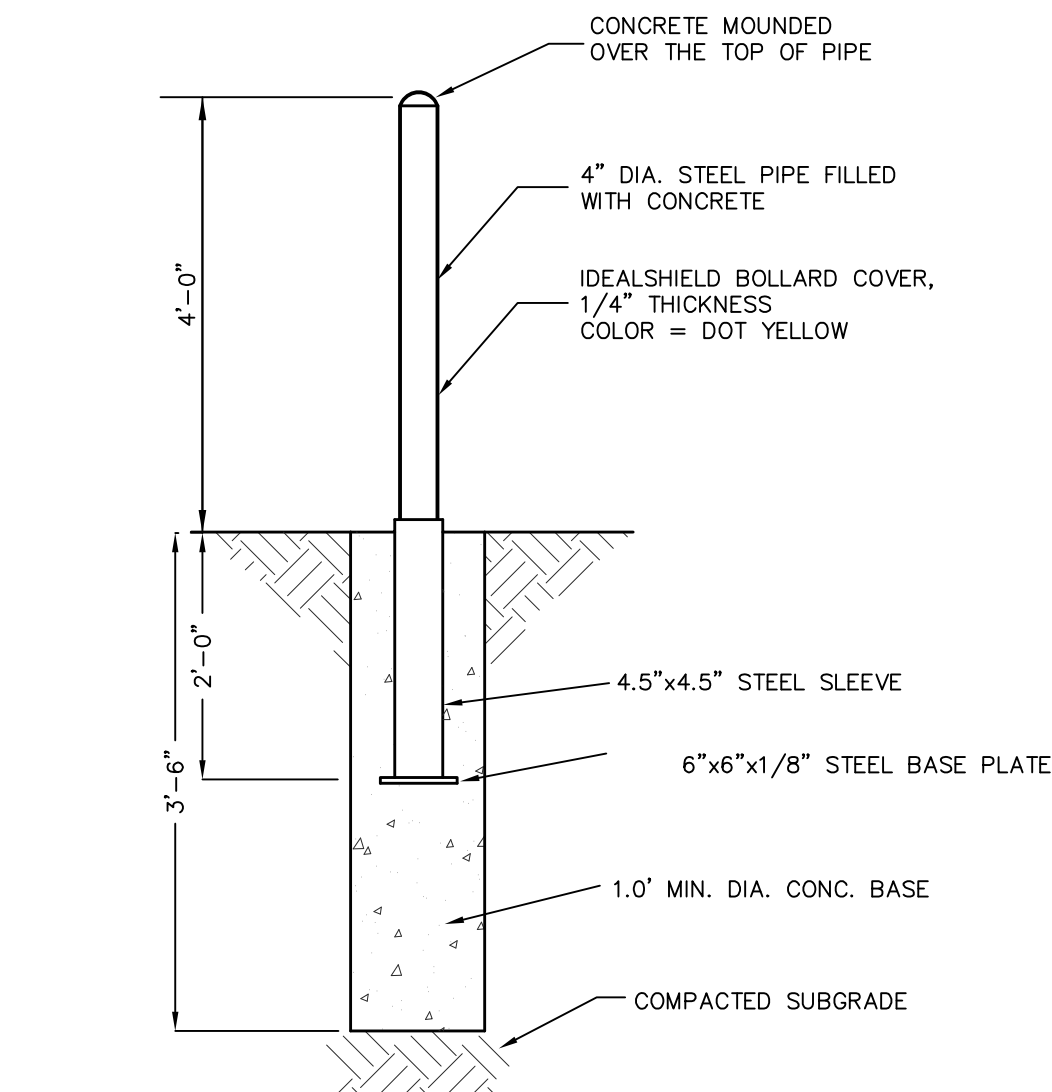
**DT1**



**WATER RISER DETAIL**  
NOT TO SCALE

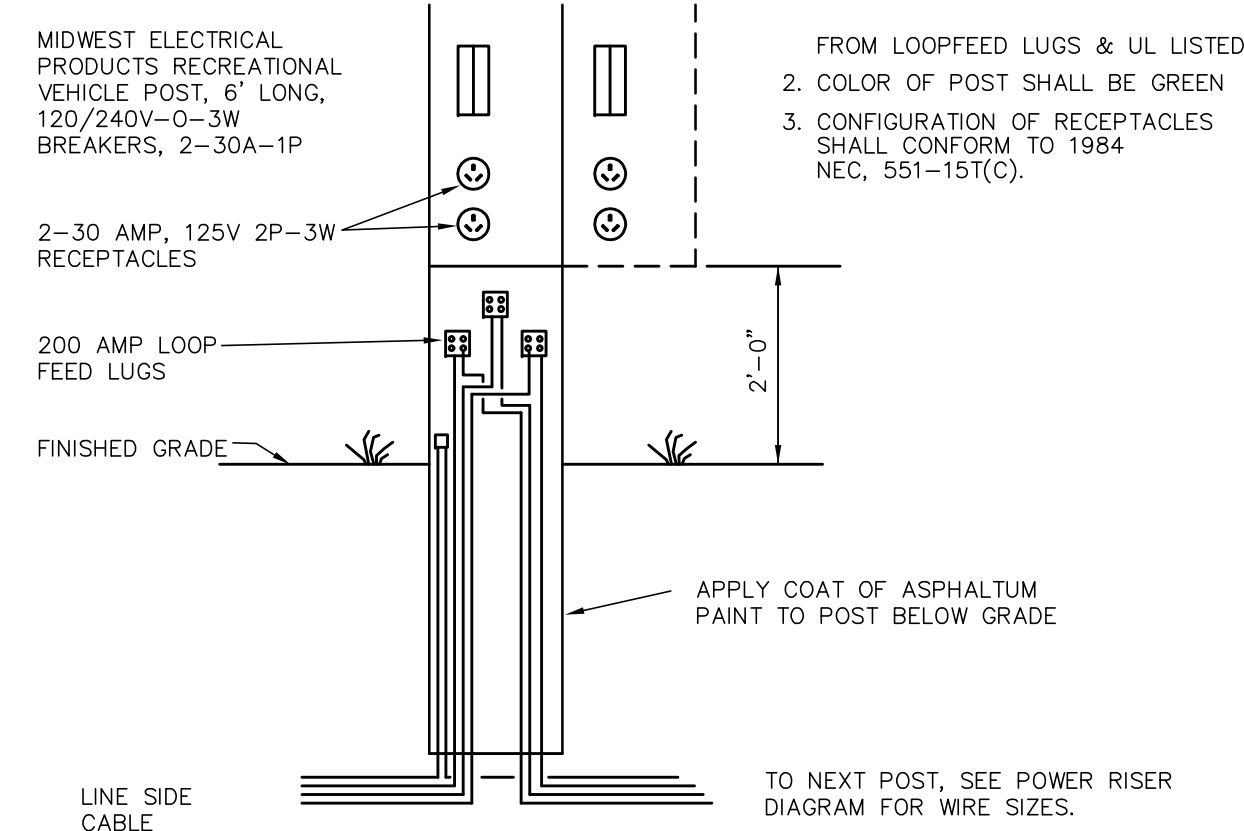
**WATER SUPPLY NOTES**

1. ALL PROPOSED SITES ARE TO BE SERVED WITH WATER FROM EXISTING WELLS.
2. WATER AND ELECTRICAL SERVICE SHALL BE INSTALLED IN THE SAME TRENCH AT DIFFERENT LEVELS.
3. WATERMANS SHALL BE 2 INCHES DIA. SDR 21, WITH APPROPRIATE FITTINGS AND VALVES AS SHOWN ON THE PLANS.
4. RISERS SHALL BE GALVANIZED PIPE WITH NORMALLY 2 3/4" BOILER DRAINS SERVING AS OUTLETS, RISERS SHALL BE SUPPORTED WITH TREATED TIMBER POST AS SHOWN ON THE DETAILS.
5. ALL WORK SHALL BE IN CONFORMANCE WITH THE STATE AND LIVINGSTON COUNTY PLUMBING CODES. THE WATERMAIN SHALL BE TESTED, FLUSHED AND CHLORINATED IN COMPLIANCE WITH THE AWWA STANDARDS AND MEET THE REQUIREMENTS OF THE MICHIGAN DEPARTMENT OF PUBLIC HEALTH.

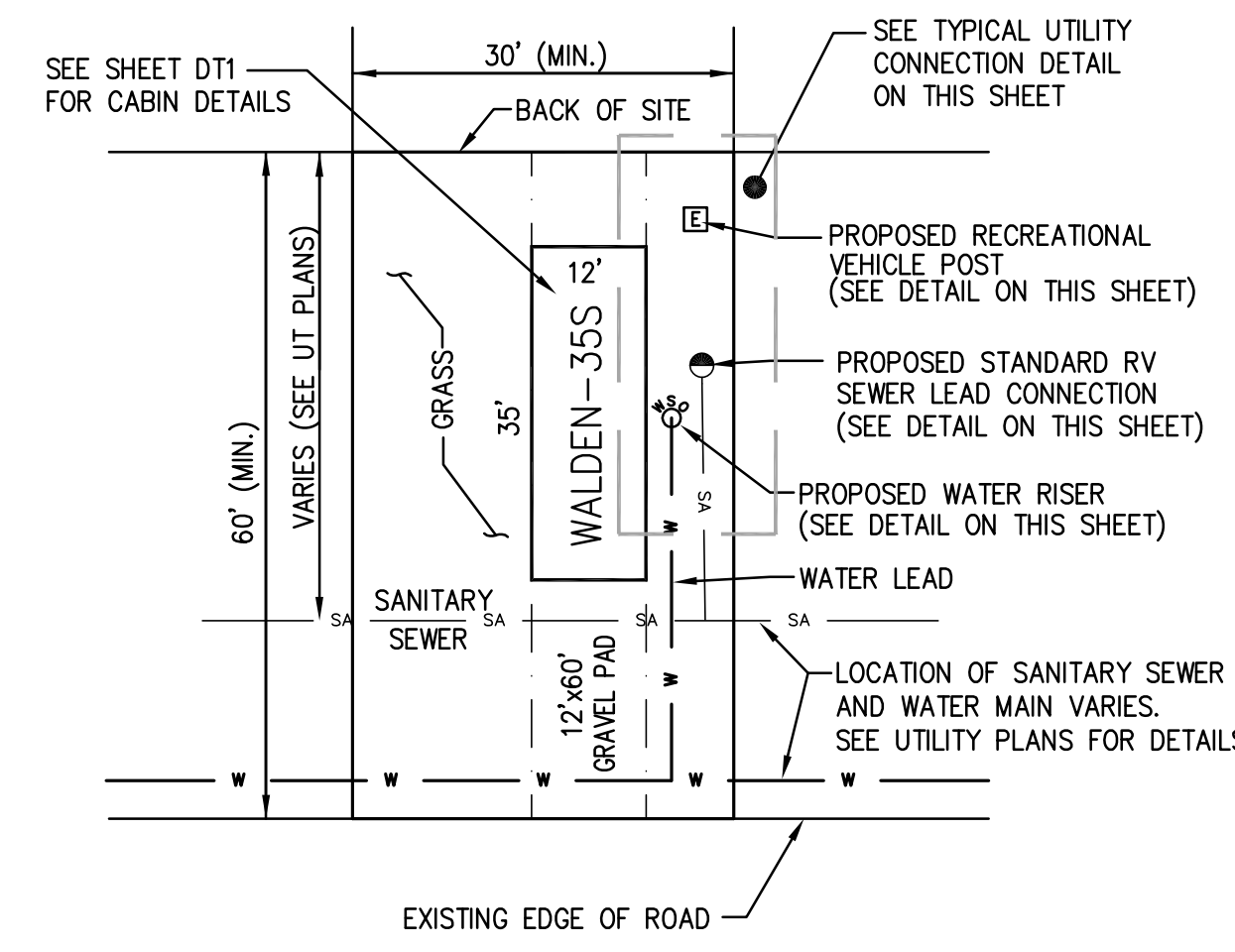


**CONCRETE BOLLARD DETAIL**  
NOT TO SCALE

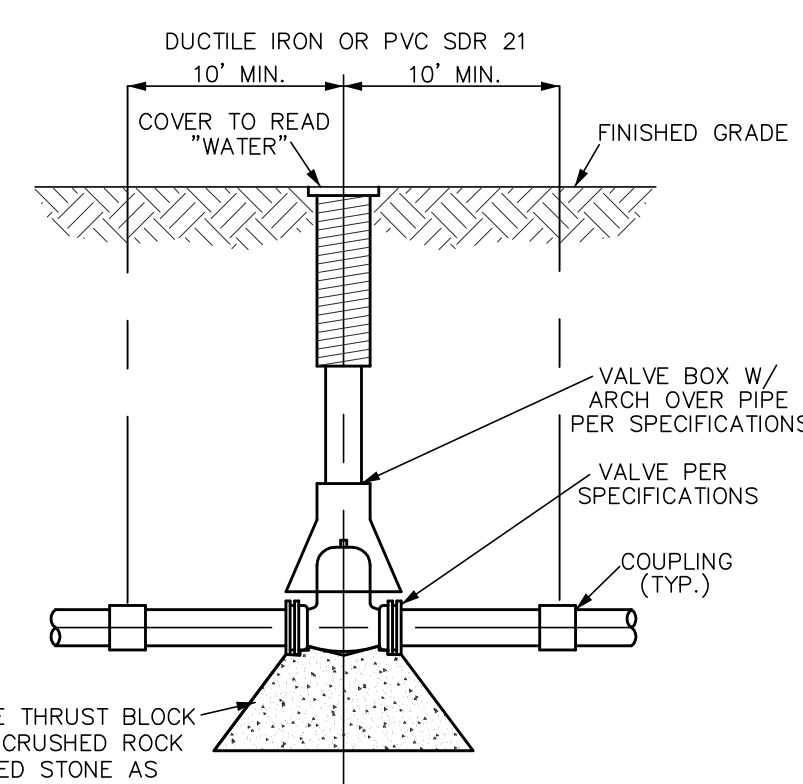
NOTE:  
PAINT ALL EXTERIOR SURFACES WITH ONE COAT METAL PRIMER AND ONE COAT EXT. PAINT



**RECREATIONAL VEHICLE POST**  
NOT TO SCALE

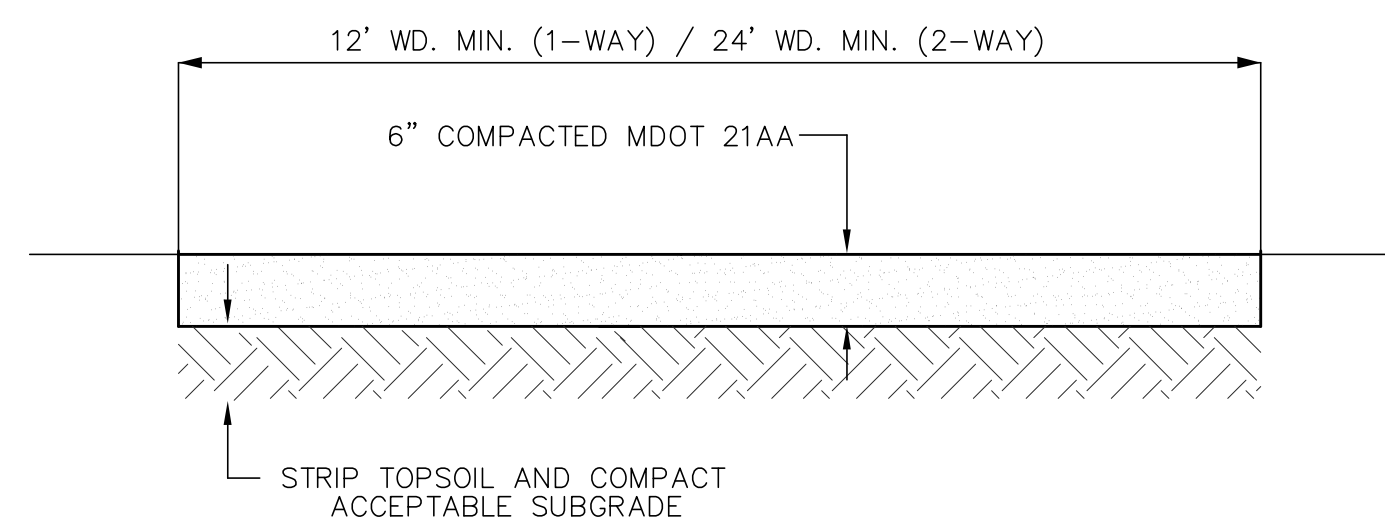


**TYPICAL WALDEN-35S CABIN SITE LAYOUT DETAIL**  
SCALE: 1"=20'



**VALVE AND BOX DETAIL**  
NOT TO SCALE

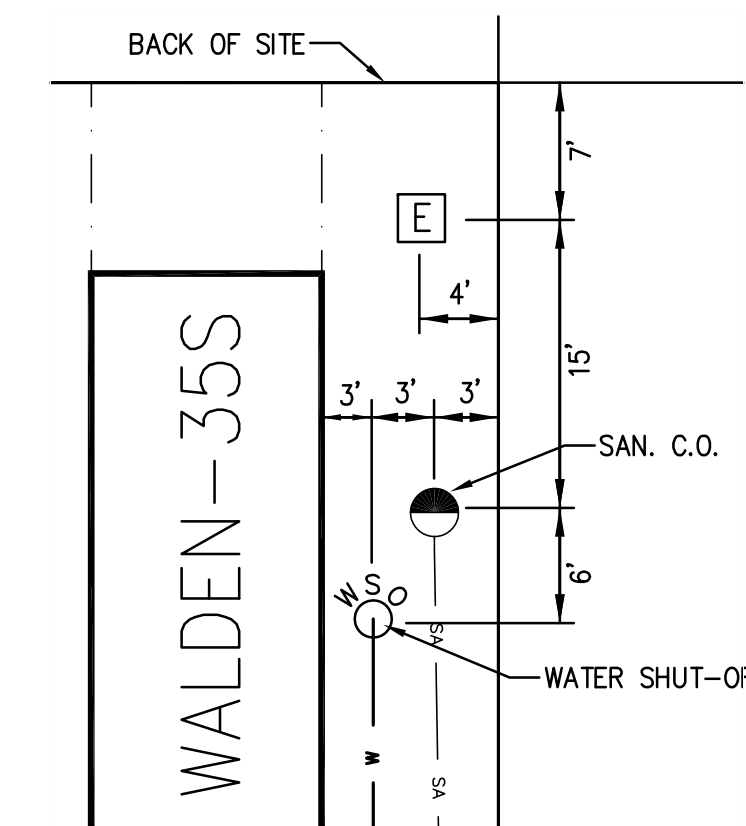
NOTE:  
1. INSTALL COUPLINGS/FITTINGS AS NEEDED.  
2. PROVIDE MECHANICAL JOINT RESTRAINTS FOR ALL GATE VALVES.  
3. VALVE BOX SHALL NOT REST ON VALVE OR MAIN LINE PIPE.



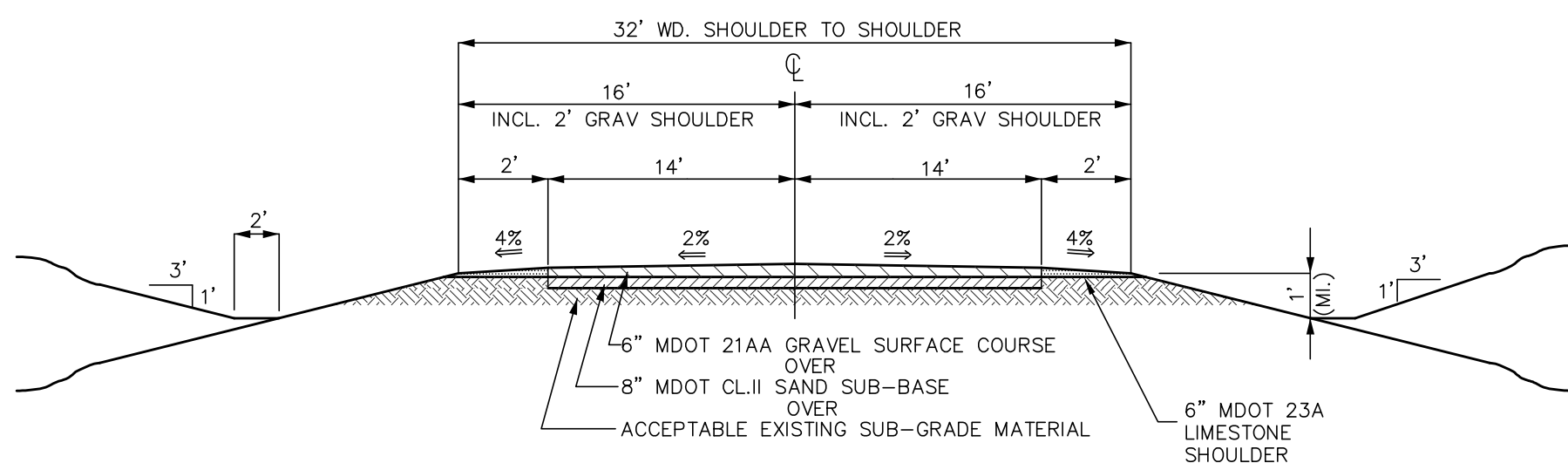
**CAMPSITE GRAVEL DRIVE CROSS SECTION**  
NOT TO SCALE

**GRAVEL ROAD CROSS SECTION NOTES:**

1. Unsuitable soils found within the 1 on 1 influence zone of the roadway, such as muck, peat, topsoil, marl, silt or other unstable materials shall be excavated and replaced up to the proposed subgrade elevation with MDOT Class III granular material using 12" lifts & compacted to 95% maximum unit weight, modified proctor.
2. Contractor shall proof roll prepared subgrade as directed by Engineer. Unacceptable areas of subgrade shall be undercut and replaced as directed by Engineer.

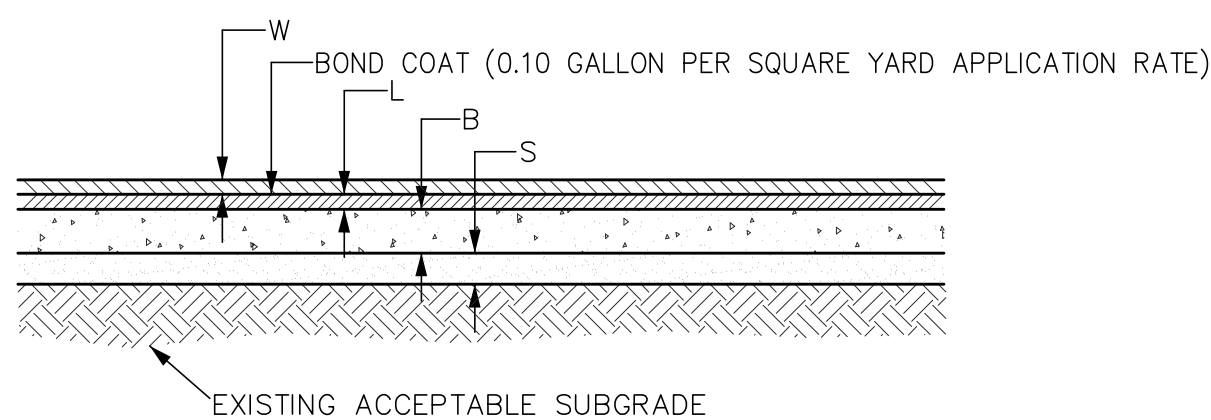


**TYPICAL WALDEN-35S CABIN UTILITY CONNECTIONS**  
SCALE: 1"=10'



**EMERGENCY ACCESS DRIVE TYPICAL CROSS SECTION**  
NOT TO SCALE

- NOTES:
1. UNSUITABLE SOILS, SUCH AS MUCK, PEAT, TOPSOIL, MARL, SILT OR OTHER UNSTABLE MATERIALS, SHALL BE UNDERCUT AND REPLACED WITH COMPACTED SAND SUBGRADE FILL.
  2. AREAS OF SUBGRADE FILL SHALL BE CONSTRUCTED USING 12" THICK LIFTS OF COMPACTED SAND, MDOT CLASS III OR EQUIVALENT ON-SITE MATERIAL; WHEN INSIDE ROAD INFLUENCE ZONE.



**CAMPSITE BITUMINOUS PAVEMENT CROSS SECTION**  
NOT TO SCALE

**BITUMINOUS PAVEMENT NOTES:**

1. Refer to the General Notes, Road and/or Parking Lot Construction Notes and Typical Road and/or Pavement Cross Section details on the project plans for additional requirements.
2. Unsuitable soils found within the 1 on 1 influence zone of the roadway, such as muck, peat, topsoil, marl, silt or other unstable materials shall be excavated and replaced up to the proposed subgrade elevation with MDOT Class III granular material compacted to 95% maximum unit weight, modified proctor.
3. Contractor shall proof roll prepared subgrade as directed by Engineer. Unacceptable areas of subgrade shall be undercut and replaced as directed by Engineer.
4. Owner/Developer may delay placement of the bituminous wearing course outside of the public road right of way. Repair of the bituminous leveling course may be necessary due to any delay in placement of the bituminous wearing course. Substantial repair to the bituminous leveling course may be necessary if placement of the bituminous wearing course is delayed for more than 12 months after placement of the bituminous leveling course. The bituminous leveling course shall be repaired as directed by Engineer prior to placement of the bituminous wearing course.

**CART PATH & INTERNAL PRIVATE ROADS X-SECTION**

KEY	DESCRIPTION	MATERIAL SPECIFICATION	MIN. COMP. THICKNESS	COMPACTION DENSITY
L	LEVELING COURSE	MDOT 13A	3" MIN.	97% (BULK DENSITY)
S	GRANULAR SUBBASE	MDOT 21AA	6" MIN.	95%

DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F. CHECK: WMP	1	12/04/19	REVISED PER HARTLAND TWP. ENG. REVIEW COMMENTS DATED 11-22-19			
	2	12/11/19	REVISED PER HARTLAND TWP. REVIEW COMMENTS			



**SITE IMPROVEMENT NOTES & DETAILS**

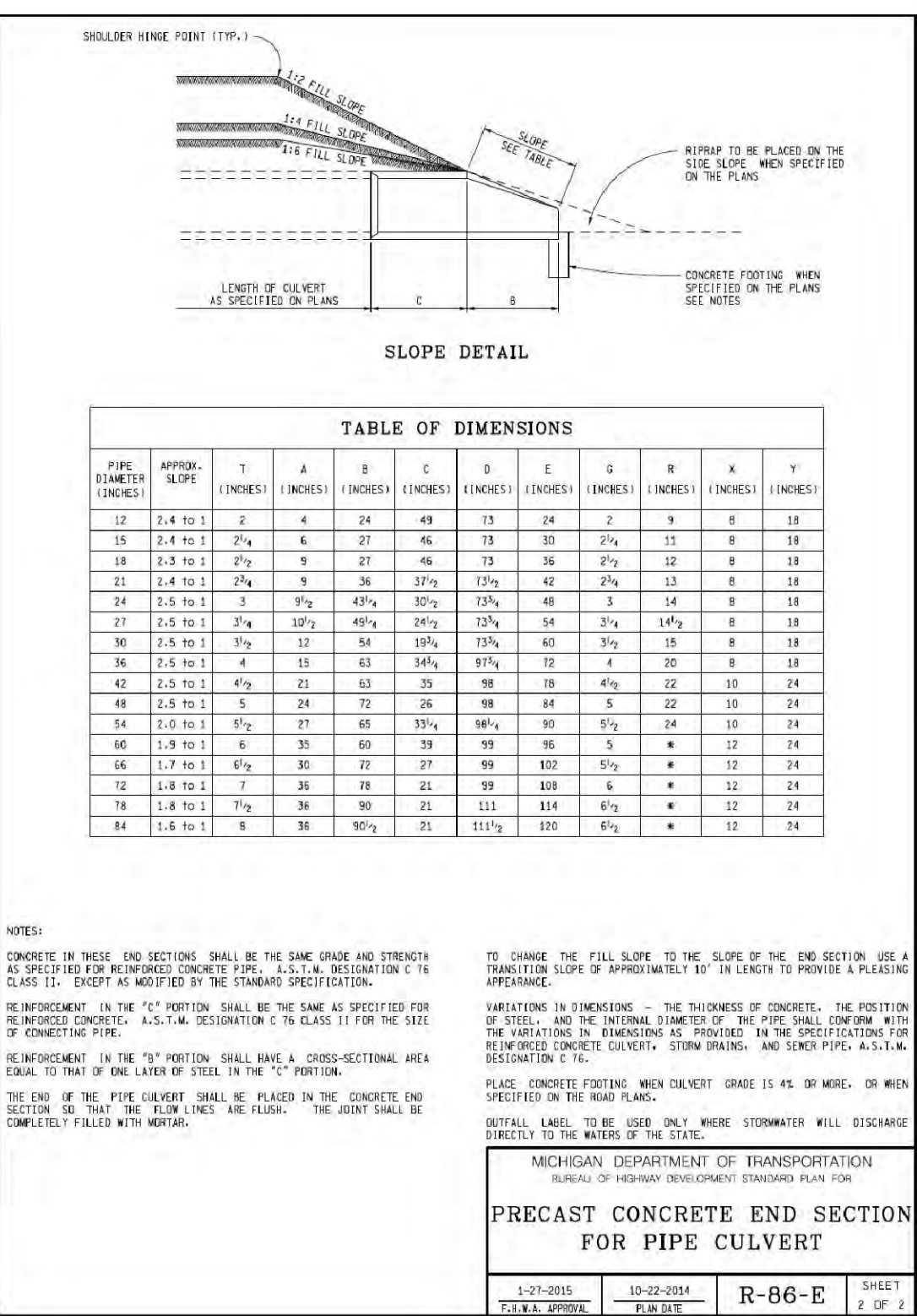
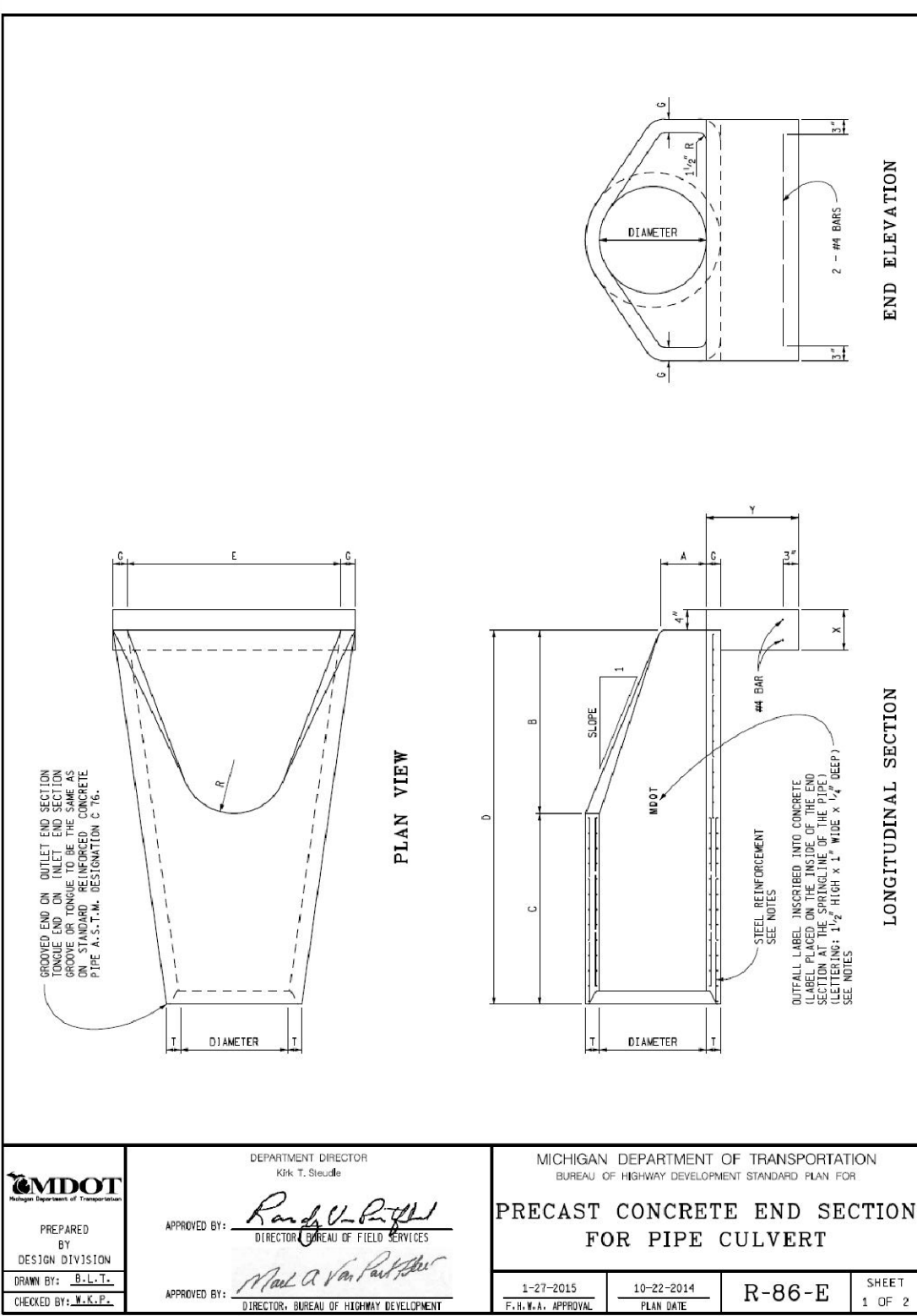
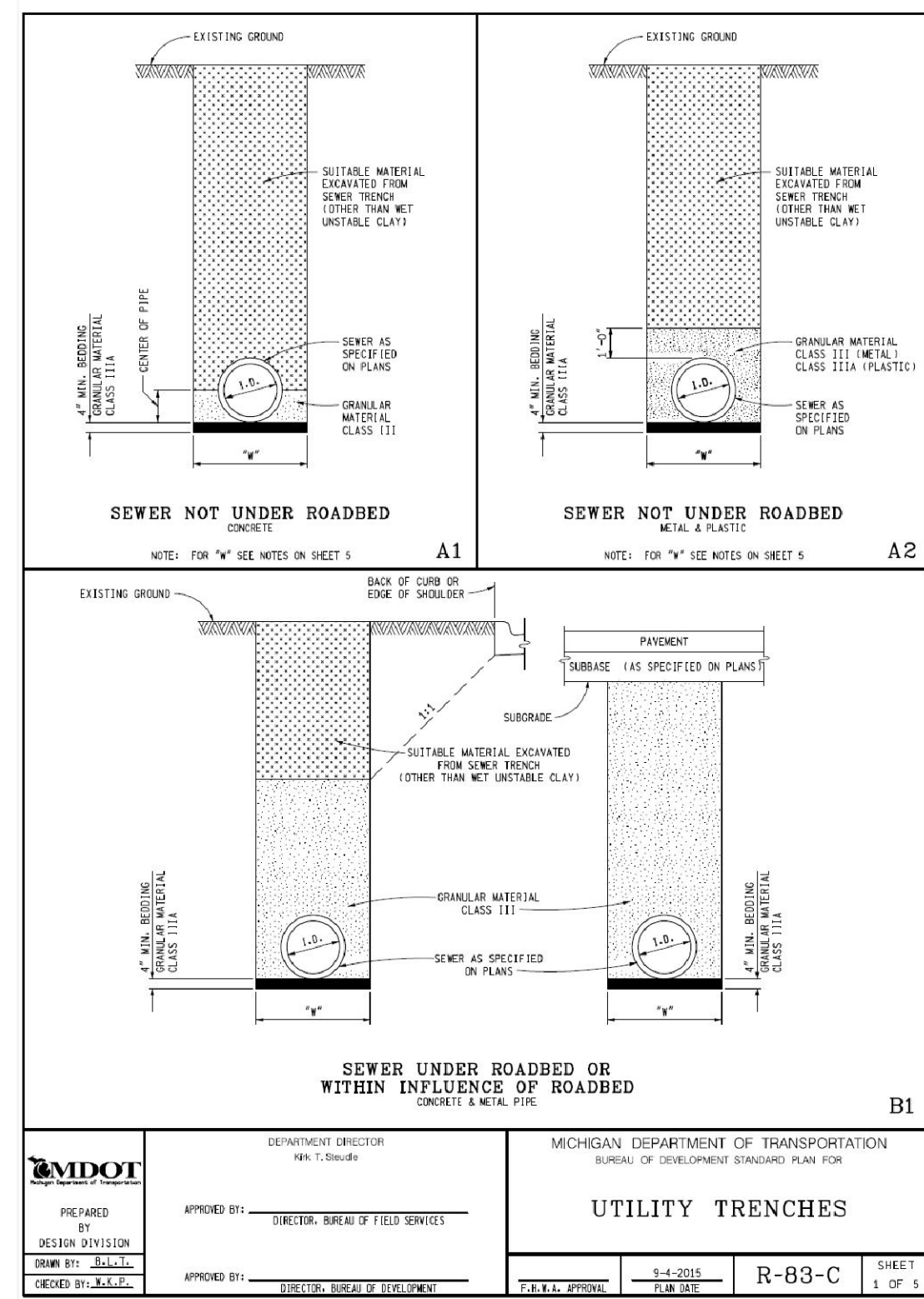
CLIENT:  
WALDENWOODS PROPERTIES  
C/O BRIAN CROUSE  
9840 CROUSE ROAD  
HOWELL, MI. 48855  
810-632-6135

SCALE: AS NOTED  
PROJECT No.: 9173156  
DWG NAME: 3156-DT2  
ISSUED: DEC. 11, 2019

**DT2**

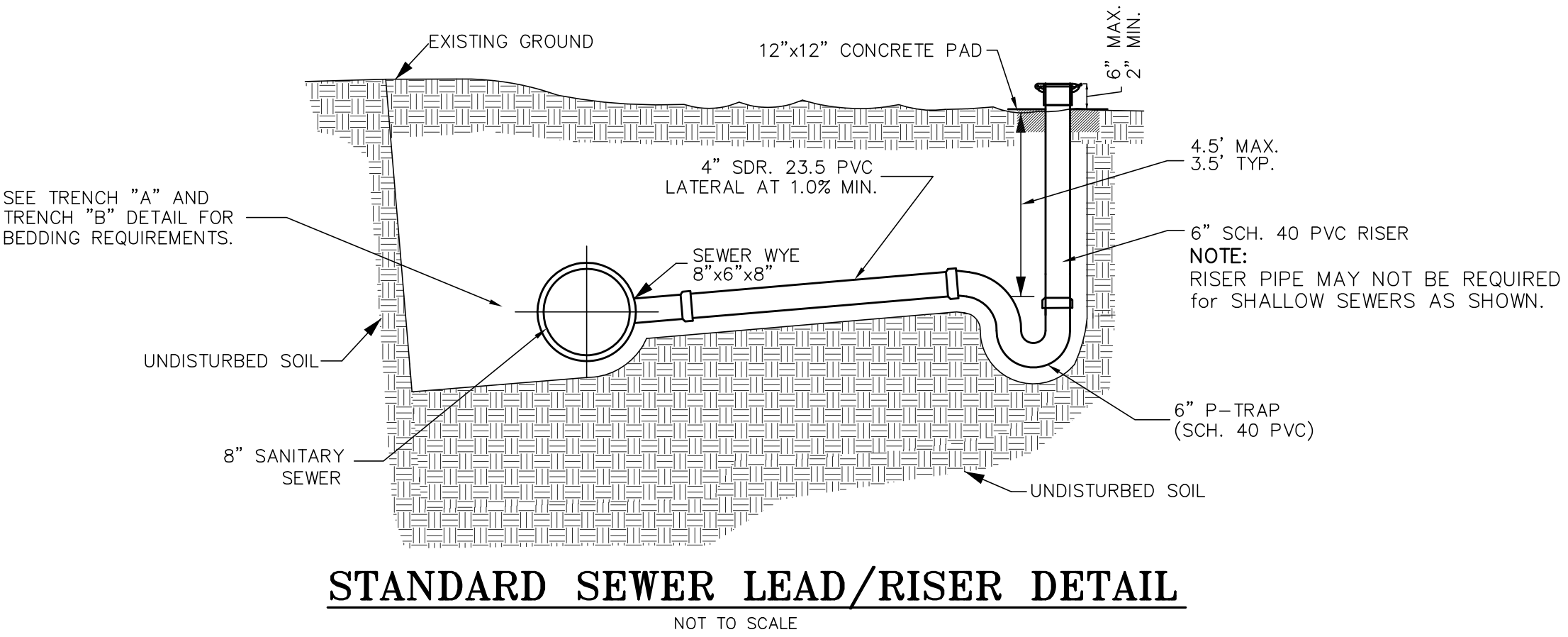
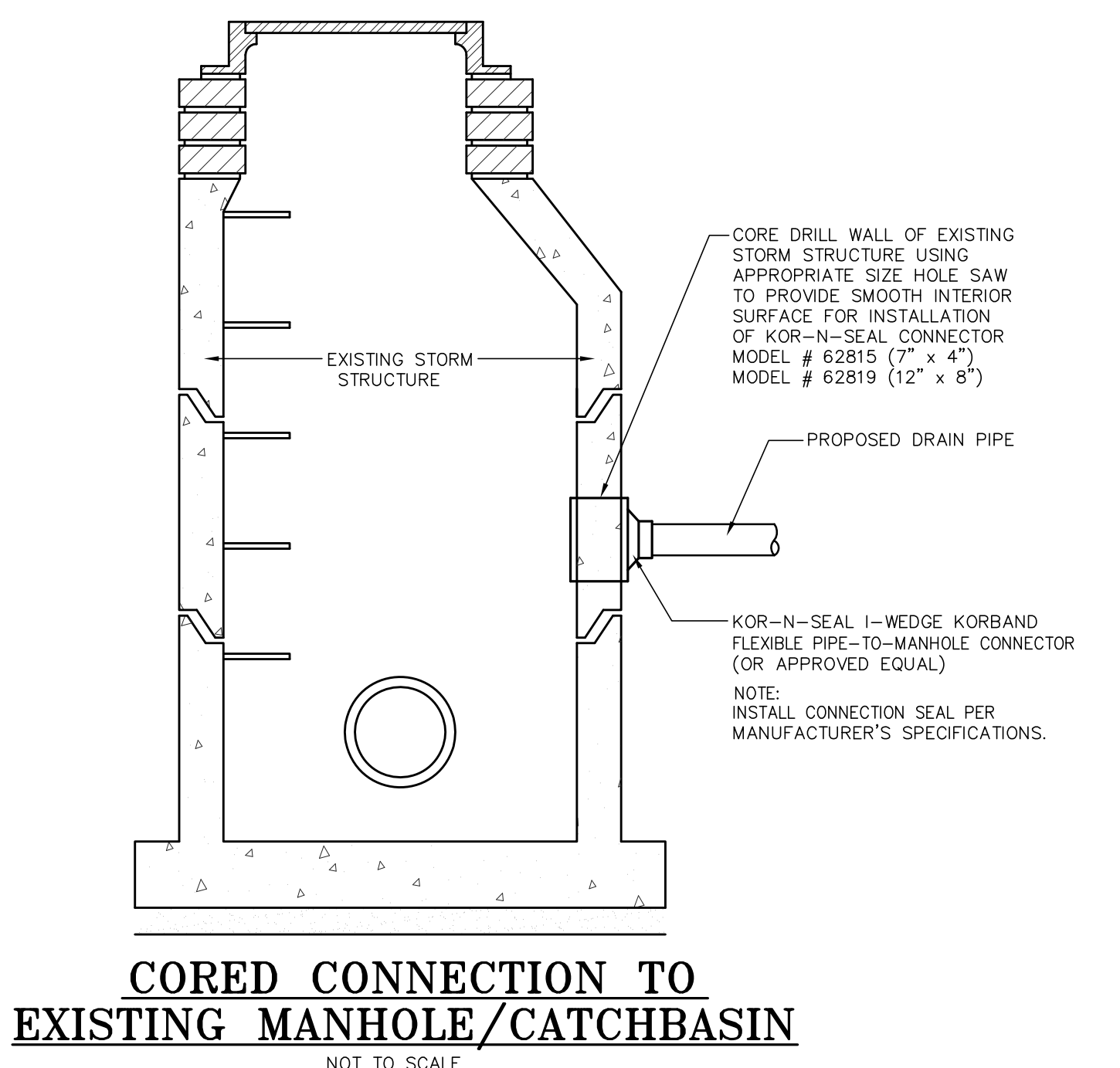
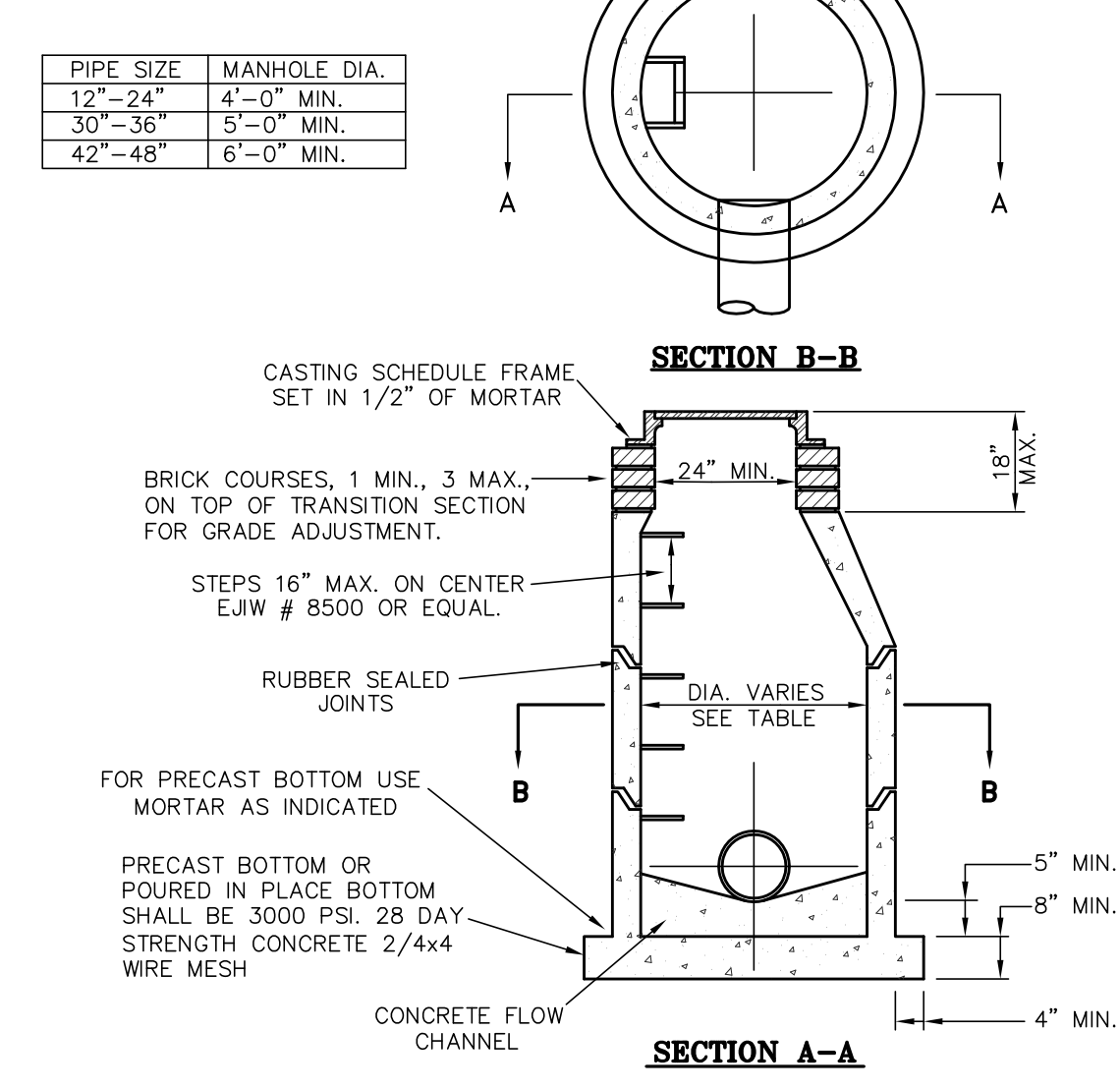
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- GRAVITY SANITARY SEWER NOTES:**
- The sanitary sewer specifications of the Local Municipality with authority over the sanitary sewer are a part of this work. Refer to the General Notes on the project plans for additional requirements.
  - Sanitary sewer work shall include clearing of vegetation and tree stumps, stripping and stockpiling of topsoil for reuse, excavation of pipe trench, placement of pipe bedding, placement of pipe and structures including castings, connection to existing structures, tuck pointing of structures, backfill of pipe trench, compaction of backfill, finish grading, adjustment of castings to match finish grade, testing of sanitary sewer, topsoil placement, seed & mulch, site cleanup and restoration, and other work as shown on the project plans and specifications.
  - Existing and proposed grades shown in profile view on the project plans may be in relation to the centerline of road or item other than the centerline of pipe. The pipe lengths and grades shown in profile view on the project plans may not be to scale.
  - PVC when shown on the project plans shall be polyvinyl chloride gravity pipe and shall conform to the specifications for polyvinyl chloride gravity pipe per ASTM D3034, maximum SDR of 26. PVC pipe joints shall be push on bell-and-spigot type joints conforming to ASTM D3212 with factory installed flexible elastomeric gaskets conforming to ASTM F477. Solvent cemented joints shall only be used when noted on the project plans for specific applications and shall conform to ASTM D2855. Trench backfill at the spring line of PVC pipe. Saw cut pipes to length for connection to structures and fittings as needed.
  - Sanitary structures shall be pre-cast reinforced concrete and shall conform to the specifications for pre-cast reinforced concrete structures per ASTM C478. Sanitary structure joints shall be Modified Groove Tongue (MGT) type joints with a compression type rubber gasket snapped into a groove cast into the tongue. Rubber gaskets shall conform to ASTM C433. Pipe openings in pre-cast structures shall be water tight factory installed rubber boot connectors. Sewer pipe shall be clamped to the rubber boot with stainless steel clamps and hardware in accordance with the manufacturer's specifications. All temporary openings in sanitary structures shall be pointed up watertight with cement mortar.
  - Provide sanitary structure castings as noted on the project plans. When casting type is not noted on the project plans, provide East Jordan 1040 or Neenah R-1916 F1 with solid self sealing cover or equivalent OR as directed by the Municipality. Sanitary structure castings shall be coated with water based asphaltic paint by the manufacturer. Final casting grade adjustments shall be made with pre-cast reinforced concrete grade rings sealed with rubber "O" ring gaskets or brick and mortar pointed up and sealed water tight with cement mortar. Castings shall be secured to the pre-cast structure with a minimum of four (4) 5/8" diameter cadmium coated bolts or threaded studs with neoprene flat washers and cadmium coated nuts.
  - Connections to existing manholes shall be performed by core drilling the manhole wall and installing a resilient boot. Star drilling the opening shall ONLY be performed when core drilling is not possible. Provide a smooth hand-troweled mortared finish in the star drilled opening for installation of a resilient boot.
  - Backfill all sanitary sewer in accordance with the Pipe Trench details provided on the project plans. Provide pipe bedding that meets or exceeds both the specifications of the Pipe Trench details on the project plans and the recommendation of the pipe manufacturer, incidental to work.
  - Install removable plugs in sanitary sewer stubs as acceptable to Engineer and Municipality, incidental to work. Mark the end of all sanitary sewer stubs with a 2" x 4" wooden stake extending a minimum of 12" above finish grade, incidental to work.
  - Install sanitary sewer service leads in accordance with the project plans. Detailed graphic representation of the sanitary lead connection to the sanitary main may not be shown in the plan and/or profile views. Contractor shall provide the necessary fittings for connection of the sanitary lead to the sanitary main in accordance with the Municipality and the Project Plans, incidental to work. See the Gravity Sanitary Sewer Service Lead Notes and Details on the project plans for additional requirements.
  - Contractor shall provide testing of the sanitary sewer in accordance with the Local Municipality requirements.

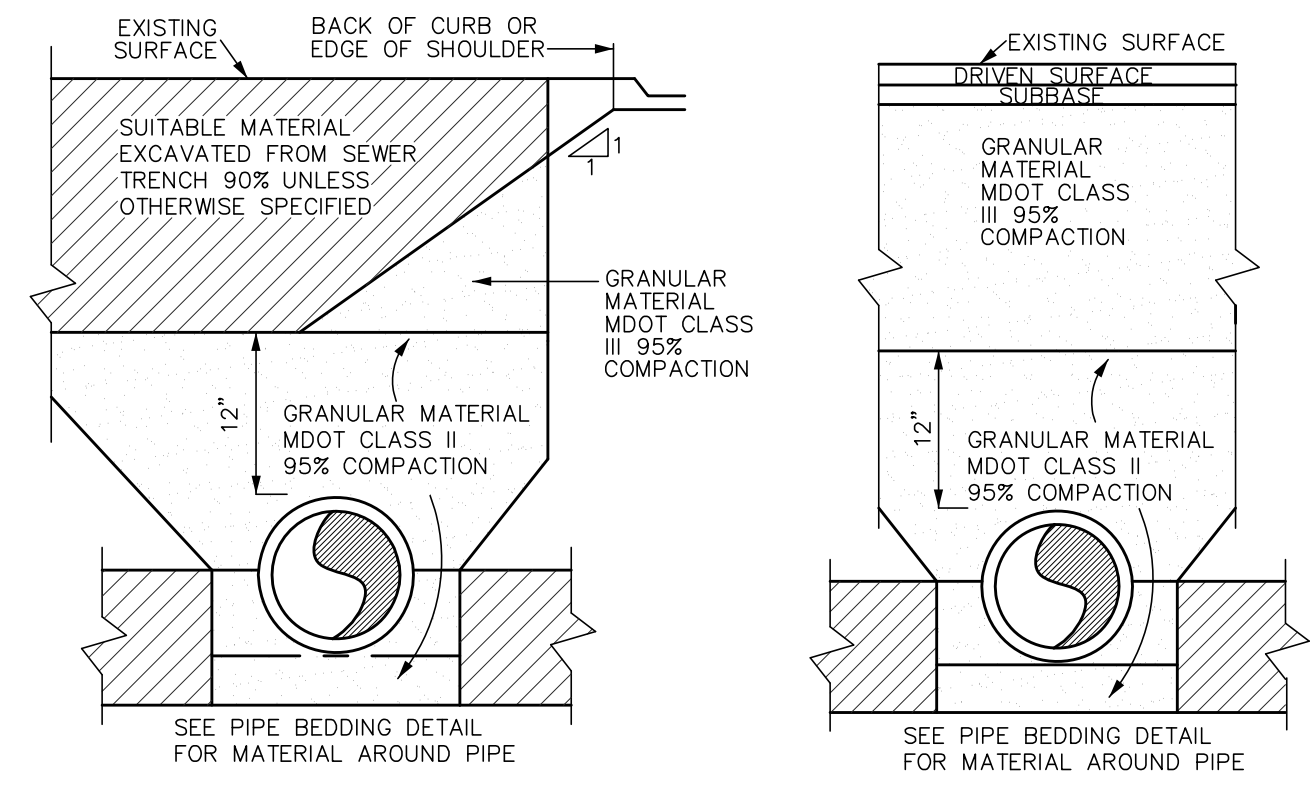
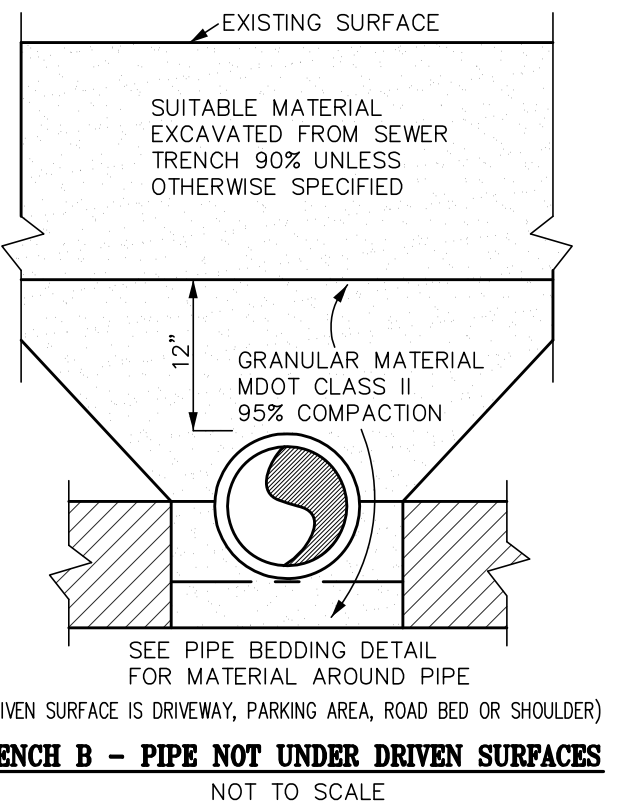
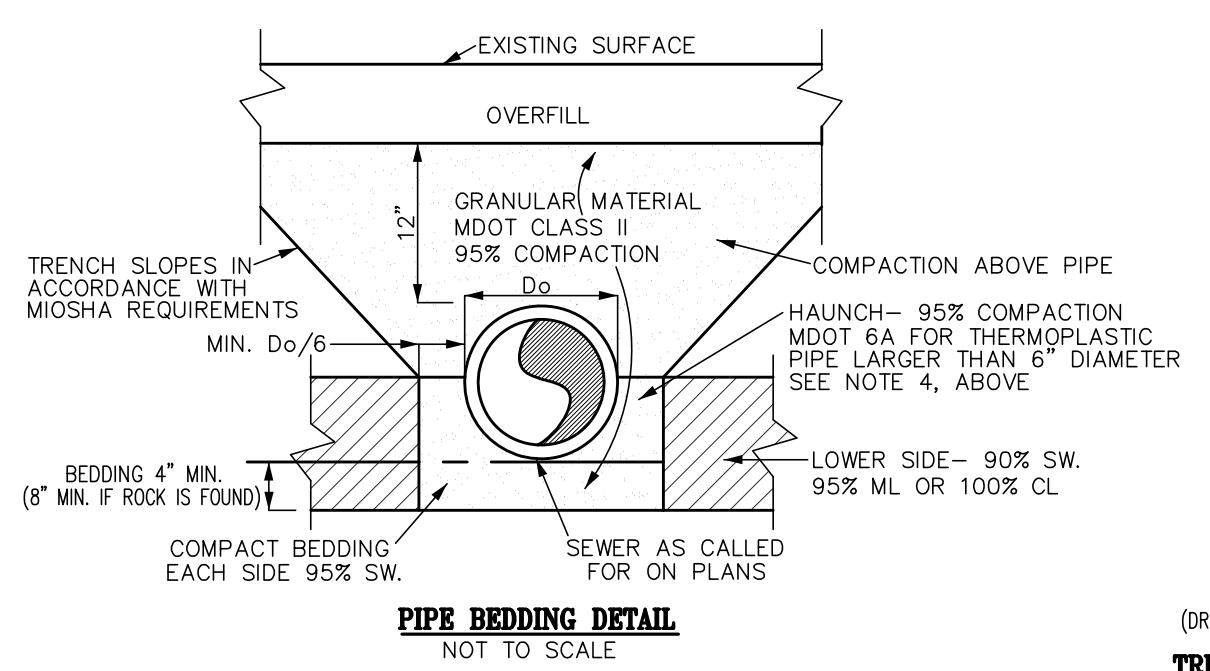
- PRE-CAST CONCRETE MANHOLE**
- SECTIONS SHALL MEET ASTM C478.
  - ALL JOINTS MADE WATER TIGHT WITH RUBBER GASKET JOINTS.
  - CONCRETE TO BE ECCENTRIC TYPE.



- NOTES for WATER LINE:**
- When installing pipe under existing asphalt or concrete, keep trench width to a minimum. Sawcut the edge of the existing pavement prior to removal, or other method that will provide a clean, straight and uncracked edge for restoration. See Trench A, detail for backfill requirements. As acceptable to Owner, Contractor shall replace turf, pavement, curbs and/or sidewalks to an equal or improved condition; shall remove to a safe location all landscape fixtures, such as mailboxes, signs and plants; and shall reinstall these landscape fixtures. Owner and Contractor shall agree in advance on procedure to get repairs to damaged private underground improvements owned by the Owner, such as irrigation pipes and private underground electric cables (invisible dog fence). Prior to breaking ground, the Contractor shall coordinate scheduling the Owner's representative to field locate these private underground improvements.
  - Contractor shall connect to existing water mains where shown on the plans. All materials and labor required for a complete, watertight connection shall be incidental to the work.
  - All water mains shall be 1 1/2" supply polyethylene or PVC "NSF" approved plastic with a minimum pressure rating of 160 PSI.

- The depth of cover shall at least match cover over existing water main; when possible, provide 5.5' cover over top of pipe.
- All water main valves shall be resilient seated gate valves with box, rated 160 PSI. Gate valves shall conform to AWWA C-500 as manufactured by Mueller Co. (313-478-1224) or equal. All valves shall open counter-clockwise (Left).
  - The Contractor shall take precautions to minimize disruption of water service in both service area to be shut off and the length of time of shut off, including providing additional labor and equipment, incidental. Coordinate closing appropriate valves with the Water Authority. Schedule work in phases to create service loops that can remain in service during later shut offs. Schedule each phase of the work when acceptable to Water Authority.

**SEWER MANHOLE**  
 NOT TO SCALE



**TYPICAL TRENCH DETAILS**  
 NOT TO SCALE

**TYPICAL TRENCH DETAILS**  
 NOT TO SCALE

- NOTES:**
- COMPACTION PRESENTED AS STANDARD PROCTOR VALUES.
  - SOIL TYPES  
 GRAVEL SANDY (SW)  
 SANDY SILTY (ML)  
 SILTY CLAY (CL)  
 AASHTO DESIG.
  - SOIL IN HAUNCH AND LOWER SLOPE ZONES OUTSIDE OF Do/6 FROM SPRING LINE SHALL BE COMPACTED TO AT LEAST THE SAME COMPACTION AS THE SOIL IN THE OVERFILL ZONE.
  - MATERIALS AROUND THERMOPLASTIC PIPE WITH DIAMETER 6 INCHES SHALL PASS 0.5 INCH SIEVE. MATERIALS AROUND OTHER PIPES SHALL PASS 1.5 INCH SIEVE.

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DESIGN: FA	REVISION #	DATE	REVISION-DESCRIPTION	REVISION #	DATE	REVISION-DESCRIPTION
DRAFT: L.F.						
CHECK: WMP						



**SITE IMPROVEMENT DETAILS**

CLIENT:  
 WALDENWOODS PROPERTIES  
 C/O BRIAN CROUSE  
 9840 CROUSE ROAD  
 HOWELL, MI. 48855  
 810-632-6135

SCALE: AS SHOWN  
 PROJECT NO.: 9173156  
 DWG NAME: 3156-DTLS  
 ISSUED: DEC. 11, 2019

**DT3**



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 Larry N. Ciofu, Clerk  
 Kathleen A. Horning, Treasurer

Joseph W. Colaianne, Trustee  
 Matthew J. Germane, Trustee  
 Glenn E. Harper, Trustee  
 Joseph M. Petrucci, Trustee

**2020  
 HARTLAND TOWNSHIP PLANNING COMMISSION MEETINGS  
 HARTLAND TOWNSHIP HALL  
 7:00 P.M.**

*The regular meetings of the Hartland Township Planning Commission for the year 2020 will be held on the following dates. All meetings are open to the public.*

January 9, 2020	January 23, 2020
February 13, 2020	February 27, 2020
March 12, 2020	March 26, 2020
April 9, 2020	April 23, 2020
May 14, 2020	May 28, 2020
June 11, 2020	June 25, 2020
July 9, 2020	July 23, 2020
August 13, 2020	August 27, 2020
September 10, 2020	September 24, 2020
October 8, 2020	October 22, 2020
November 5, 2020	November 19, 2020
December 3, 2020	December 17, 2020

*Keith Voight  
 Hartland Township Planning Commission Secretary*