



## Eberspaecher Parking Expansion JSP13-60

### **Eberspaecher Parking Expansion, JSP13-60**

Consideration of the request of Eberspaecher North America, for Preliminary Site Plan and Stormwater Management Plan approval. The subject property is located in Section 22 at 43700 Gen Mar in the I-1, Light Industrial District. The subject property is 8.66 acres and the applicant is proposing to add parking to the site to accommodate an additional working shift as well as an outdoor storage tank.

### **REQUIRED ACTION**

Approval/denial of the Preliminary Site Plan and Stormwater Management Plan.

<b>REVIEW</b>	<b>RESULT</b>	<b>DATE</b>	<b>COMMENTS</b>
Planning	Approval recommended	08-13-13	<ul style="list-style-type: none"> <li>• <b>Planning Commission finding that the front yard parking is compatible with surrounding developments is required</b></li> <li>• <b>Variance required for the underage of required parking spaces (staff supported)</b></li> <li>• <b>Variance required to conduct loading and unloading activities outside of permitted times (staff supported)</b></li> <li>• <b>Variance required for oversized outdoor storage tank (staff supported)</b></li> <li>• <b>Variance required for lack of screening around outdoor storage tank (staff supported)</b></li> <li>• <b>Items to address on the Final Site Plan</b></li> </ul>
Engineering	Approval recommended	08-13-13	Items to address on the Final Site Plan
Traffic	Approval recommended	08-12-13	Items to address on the Final Site Plan
Landscaping	Approval recommended	08-14-13	<ul style="list-style-type: none"> <li>• <b>Waiver required for lack of berm along northern frontage (staff supported)</b></li> <li>• <b>Waiver required for lack of berm along right-of-way (staff supported)</b></li> <li>• <b>Items to address on the Final Site Plan</b></li> </ul>
Fire	Approval recommended	07-25-13	Items to address on the Final Site Plan

## **Motion sheet**

### Approval – Preliminary Site Plan

In the matter of Eberspaecher Parking Expansion, JSP13-60, motion to **approve** the Preliminary Site Plan based on and subject to the following:

- a. Planning Commission finding that the proposed front yard parking is compatible with surrounding development, which is hereby made;
- b. Zoning Board of Appeals variance for the underage of required parking spaces;
- c. Zoning Board of Appeals variance for the oversized outdoor storage tank;
- d. Zoning Board of Appeals variance for the lack of screening around the proposed outdoor storage tank;
- e. City Council variance to permit loading and unloading activities to take place outside the permitted hours identified in the City Code;
- f. Planning Commission waiver for the lack of a berm along the northern property frontage and along the right-of-way, which is hereby granted;
- g. The findings of compliance with Ordinance standards in the staff and consultant review letters and the conditions and items listed in those letters being addressed on the Final Site Plan; and
- h. *(additional conditions here if any)*

*(This motion is made because it is otherwise in compliance with Article 19, Article 24 and Article 25 of the Zoning Ordinance and all other applicable provisions of the Ordinance.)*

**-AND -**

### Approval – Stormwater Management Plan

In the matter of Eberspaecher Parking Expansion, JSP13-60, motion to **approve** the Stormwater Management Plan, based on and subject to:

- a. The findings of compliance with Ordinance standards in the staff and consultant review letters and the conditions and items listed in those letters being addressed on the Final Site Plan; and
- b. *(additional conditions here if any)*

*(This motion is made because it otherwise in compliance with Chapter 11 of the Code of Ordinances and all other applicable provisions of the Ordinance.)*

-OR -

Denial

In the matter of Eberspaecher Parking Expansion, JSP13-60 motion to **deny** the Preliminary Site Plan, for the following reasons...(because the plan is not in compliance with Article 19, Article 24 and Article 25 of the Zoning Ordinance.)

-AND -

Denial Storm Water Management Plan

In the matter of Eberspaecher Parking Expansion, JSP13-60, motion to **deny** the Stormwater Management Plan, for the following reasons...( because the plan is not in compliance with Chapter 11 of the Ordinance.)

## PLANNING REVIEW





## PLAN REVIEW CENTER REPORT

August 13, 2013

### Planning Review

Eberspaecher – 43700 Gen Mar

JSP 13-60

---

#### Petitioner

Eberspaecher North America

#### Review Type

Preliminary Site Plan

#### Property Characteristics

- Site Location: 43700 Gen Mar, south side of Gen Mar, west of Novi Rd. (Section 22)
- Site School District: Novi Schools
- Site Zoning: I-1, Light Industrial
- Adjoining Zoning: North and East: I-1; South: OS-1, Office Service; West: R-4, One-Family Residential
- Site Use(s): Existing manufacturing space
- Adjoining Uses: North and East: warehouse/industrial uses; South: vacant land; West: single-family homes
- Site Size: 8.66 acres
- Plan Date: 07-17-13

#### Project Summary

The applicant is proposing to reconfigure and/or add 147 parking spaces at the existing industrial site at 43700 Gen Mar. Eberspaecher would like to add an additional working shift at the site and the new parking is needed to accommodate the extra employees. An outdoor storage tank is also proposed on the south side of the building. The applicant has also proposed the addition of 1,234 square feet of mezzanine storage space.

#### Recommendation

Approval of the **Preliminary Site Plan is recommended**. There are planning related items that need to be addressed at the time of Final Site Plan submittal. Planning Commission approval is required.

#### Ordinance Requirements

This project was reviewed for conformance with the Zoning Ordinance with respect to Article 19 (I-1, Light Industrial District), Article 24 (Schedule of Regulations), Article 25 (General Provisions), and any other applicable provisions of the Zoning Ordinance. Please see the attached charts for information pertaining to ordinance requirements. Applicable sections of the Zoning Ordinance and other regulatory documents are highlighted in gray on the attached chart. Items in **bold** below must be addressed by the applicant or Planning Commission.

1. Front Yard Parking Setback: In order for front yard parking to be permitted in the I-2 District the following requirements must be met: development must be bigger than 2 acres, parking area cannot be more than 50% of the area between the setback line and the building façade; the parking must be screened by a 2.5' berm or wall; and parking must be setback 100'. It appears the parking area occupies less than 50% of the area between the setback line and the building façade. However, calculations have not been provided. **The applicant should provide area calculations for the paved and unpaved area in the front yard on the Final Site Plan submittal. Staff supports a waiver for the required berm or wall. See the landscape review letter. The Planning Commission is required to make a finding that the front yard parking and lighting is compatible with the surrounding area.**
2. Number of Parking Spaces: Manufacturing uses are required to have one parking space for each 700 square feet of useable floor area or one parking space for each 1.5 employees in the largest working shift plus five additional spaces, whichever is greater. Based on the useable area provided by the applicant, 223 parking spaces would be required. **The applicant has provided 185 spaces and has indicated they will seek a variance from the Zoning Board of Appeals.** The applicant has indicated there will sufficient parking spaces to meet the lesser standard regarding the number of employees in the largest working shift. Additionally, the applicant has indicated that they do have the ability to restructure shift start and end times if parking becomes an issue.
3. Loading Activities: Per the City Code, loading and idling is not permitted between the hours of 8PM and 7AM within 400 feet of any residential structure. **The applicant has indicated they will seek a variance from the City Council as they intend to conduct loading and unloading activities outside of the permitted hours.** The applicant should submit a letter to the Community Development Department requesting the aforementioned variance. This letter should include the support information provided in the site plan submittal package, including the noise study, and should identify areas of the site where loading activities will be concentrated.
4. Outdoor Storage Tank: The Zoning Ordinance permits an outdoor storage tank in the I-1 District with a maximum capacity of 600 gallons. **The applicant has proposed a 1,500 gallon tank and has indicated they will seek a variance from the Zoning Board of Appeals regarding the tank size.** A masonry screen wall is also required. **The applicant has proposed no wall and has indicated they will seek a variance from the Zoning Board of Appeals.** The proposed outdoor storage tank is located in the southeast corner of the site as far from the adjacent residential property as is possible and will be screened by the existing building. Staff would not object to the requested variances.
5. Photometric Plan: There are several deficiencies identified for the photometric plan in the lighting review chart. **The applicant must provide the manufacturer's specifications for all proposed lighting fixtures and provide the required information on the photometric plan.**

#### Response Letter

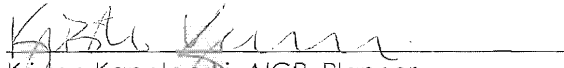
A letter from either the applicant or the applicant's representative addressing comments in this, and in the other review letters, is requested **prior to the Planning Commission meeting and with the Final Site Plan submittal.**

#### Pre-Construction Meeting

Prior to the start of any work on the site, Pre-Construction (Pre-Con) meetings must be held with the applicant's contractor and the City's consulting engineer. Pre-Con meetings are generally held after Stamping Sets have been issued and prior to the start of any work on the site. There are a variety of requirements, fees and permits that must be issued before a Pre-Con can be

scheduled. If you have questions regarding the Pre-Con, please contact Sarah Marchioni [248.347.0430 or smarchioni@cityofnovi.org] in the Community Development Department.

If the applicant has any questions concerning the above review or the process in general, do not hesitate to contact me at 248.347.0586 or kkapelanski@cityofnovi.org.



Kristen Kapelanski, AICP, Planner  
Attachments: Planning Review Chart  
Lighting Review Chart

PLANNING REVIEW SUMMARY CHART

Eberspaecher JSP13-60  
 Preliminary Site Plan Review  
 Plan Date: 07/17/13

Item	Required	Proposed	Meets Requirements?	Comments
Master Plan	Industrial Research Development Technology	No Change Proposed	Yes	
Zoning	I-1 Light Industrial District	No Change Proposed	Yes	
Use (Article 19)	Office, research & development, technology centers, warehousing, manufacturing, laboratories, utility buildings, indoor/outdoor recreation, other similar uses, and accessory structures	156,500 sq. ft. warehouse/office/manufacturing	Yes	The applicant should provide additional information on the use of the building.
Building Height (Sec. 2400 & Sec. 2503.2.E)	40 feet maximum	Elevations not provided	Yes	Elevations will need to be provided if façade changes are proposed.
<b>Building Setback (Sec. 2400)</b>				
Front (south)	40 ft.	83 ft.	Yes	
Interior Side (east)	20 ft.	85 ft.	Yes	
Interior Side (west)	20 ft.	44 ft.	Yes	
Rear (north)	20 ft.	51 ft.	Yes	
<b>Parking Setback (Sec. 2400)</b>				
Front (northeast)	Front yard parking permitted subject to (a) Dev. must be 2 acres (b) Must be setback same as req. bldg. setback (40 ft.) (c) Cannot occupy more than 50% of the area btwn. min. front yard setback and bldg. setback (d) Must be	(a) Parcel is 8.66 acres (b) Setback min. 43 ft. from Genmar Drive (c) Calculations not provided (d) Brick screen wall or landscaped berm not indicated	No	Applicant should provide calculations related to point (c) and must provide brick screen wall or berm for front yard parking.  Planning Commission finding that parking is compatible with surrounding development is required.

Item	Required	Proposed	Meets Requirements?	Comments
	<p>screened by brick wall or landscaped berm</p> <p>(e) Planning Commission must make finding that prkg. area and lighting is compatible w/ surrounding development</p>			
Interior Side (north)	10 ft.	10 ft.	Yes	
interior Side (east)	10 ft.	No changes proposed.	N/A	
Interior Side (south)	10 ft.	No changes to parking proposed.	N/A	
Rear (west)	10 ft.	64 ft.	Yes	
Number of Parking Spaces (Sec. 2505)	<p><u>Manufacturing/ Warehouse</u></p> <p>one space per 700 sq. ft. usable floor area or five spaces plus one space for each one and one-half employees in the largest working shift, whichever is greater</p> <p><math>155,822 / 700 = 223</math> spaces</p> <p><math>120 \text{ employees} \times 1.5 = 180 + 5 = 185</math> spaces</p>	185 spaces	No	<p>The applicant is requesting a Zoning Board of Appeals variance for the deficient number of parking spaces.</p> <p>1,234 square feet of additional mezzanine storage space has been proposed.</p>
Parking Space Dimensions and Maneuvering Lanes (Sec. 2506)	<p>9' x 19' parking space dimensions and 24' wide drives.</p> <p>9' x 17' parking spaces allowed along 7' wide interior sidewalks as long as detail indicates a 4"</p>	<p>9' x 19' spaces provided</p> <p>24' access aisle provided</p> <p>7' sidewalk provided where</p>	Yes	

Item	Required	Proposed	Meets Requirements?	Comments
	curb at these locations and along landscaping.	adjacent to 17' parking spaces		
Barrier Free Spaces (Barrier Free Code)	7 barrier free spaces required (2 van accessible)	7 barrier free spaces (2 van accessible) provided	Yes	
Barrier Free Space Dimensions (Barrier Free Code)	8' wide with a 5' wide access aisle for standard barrier free spaces, and 8' wide with an 8' wide access aisle for van accessible spaces	8' wide with a 5' wide access aisles for standard barrier free spaces, and 8' wide with a shared 8' wide access aisle for van accessible spaces	Yes	
Barrier Free Signs (Barrier Free Design Graphics Manual)	One sign for each accessible parking space.	Barrier free signs shown	Yes	
Loading Spaces (Sec. 2507 and Sec. 22-100 City Code)	Must be in rear yard and screened from right-of-way and neighboring properties - minimum 360 sq. ft.  Loading and idling not permitted between 8:00 p.m. and 7:00 a.m. (the following day), within four hundred feet of any residential structure	Existing loading area to remain  Applicant has indicated loading and unloading activities will take place outside of the hours permitted by the City Code.	No	The applicant has indicated they will seek a <u>City Council variance</u> to permit loading and unloading activities between 8PM and 7AM.
Accessory Structure Setback-Dumpster (Sec. 2503)	Accessory structures should be setback a minimum of 10 feet from any building unless structurally attached and setback the same as parking from all property lines; the structure must be in the rear or interior side yard.	Dumpsters not clearly indicated	Yes	Applicant should confirm no new dumpsters or dumpster locations are proposed.

Item	Required	Proposed	Meets Requirements?	Comments
Dumpster (Chap. 21, Sec. 21-145)	Screening of not less than 5 feet required, interior bumpers or posts required. Enclosure to match building materials and be at least one foot taller than height of refuse bin.	Dumpsters not clearly indicated	Yes?	Applicant should confirm no new dumpsters or dumpster locations are proposed.
Outdoor Storage Tank (Sec. 1905.b(2))	<p>Max. six hundred-gallon capacity per tank and accessory to an otherwise permitted use. Placement and use of the above-ground storage tanks shall be in compliance with the City's adopted fire prevention code and any State of Michigan regulations related to such use.</p> <p>Screening shall consist of a wall one foot higher than the height of the storage tank. Screening materials shall consist of masonry or reinforced concrete. Other materials may be used for the gate or doorway to the enclosure.</p>	<p>1,500 gallon capacity argon tank in rear (southern) yard</p> <p>Screen wall will not be provided</p>	No	The applicant has indicated they will seek a Zoning Board of Appeals variance to permit the over-sized tank and to permit a tank with no screening.
Exterior lighting (Sec. 2511)	Photometric plan and exterior lighting details needed at time of Final Site Plan	Lighting plan submitted		See lighting review chart
Sidewalks (City Code Sec. 11-276(b) and Subdivision Ordinance Sec. 4.05A and Non-Motorized Plan)	No additional sidewalks required	No sidewalk provided	Yes	

Item	Required	Proposed	Meets Requirements?	Comments
Development/ Business Sign	Signage if proposed requires a permit.			Please contact Jeannie Niland (248.347.0438) for information on sign permits

Prepared by Kristen Kapelanski, AICP (248)347-0586



**Lighting Review Summary Chart**

Eberspaecher JSP13-60

Site Plan Review

Plan Date: 07/15/13

Item	Required	Meets Requirements?	Comments
Intent (Section 2511.1)	Establish appropriate minimum levels, prevent unnecessary glare, reduce spillover onto adjacent properties, reduce unnecessary transmission of light into the night sky	Yes	
Lighting plan (Section 2511.2.a.1)	Site plan showing location of all existing and proposed buildings, landscaping, streets, drives, parking areas and exterior lighting fixtures	Yes	
Lighting Plan (Section 2511.2.a.2)	Specifications for all proposed and existing lighting fixtures including: <ul style="list-style-type: none"> <li>▪ Photometric data</li> <li>▪ Fixture height</li> <li>▪ Mounting &amp; design</li> <li>▪ Glare control devices</li> <li>▪ Type and color rendition of lamps</li> <li>▪ Hours of operation</li> <li>▪ Photometric plan</li> </ul>	No	Applicant should provide manufacturer's specifications and hours of operation for all proposed fixtures.
Required conditions (Section 2511.3.a)	Height not to exceed maximum height of zoning district (30 feet) or 25 feet where adjacent to residential districts or uses.	Yes?	Applicant should provide the height of the proposed fixtures.
Required Notes	- Electrical service to	No	Applicant should add

Item	Required	Meets Requirements?	Comments
(Section 2511.3.b)	light fixtures shall be placed underground - No flashing light shall be permitted - Only necessary lighting for security purposes and limited operations shall be permitted after a site's hours of operation.		required notes to the photometric plan.
Required conditions (Section 2511.3.e)	Average light level of the surface being lit to the lowest light of the surface being lit shall not exceed 4:1.	Yes?	Applicant should provide average to minimum calculations or the entire site.
Required conditions (Section 2511.3.f)	Use of true color rendering lamps such as metal halide is preferred over high and low pressure sodium lamps.	Yes	
Minimum Illumination (Section 2511.3.k)	- Parking areas- 0.2 min - Loading and unloading areas- 0.4 min - Walkways- 0.2 min - Building entrances, frequent use- 1.0 min - Building entrances, infrequent use- 0.2 min	Yes	
Maximum Illumination adjacent to Non-Residential (Section 2511.3.k)	When site abuts a residential district, maximum illumination at the property line shall not exceed 0.5 foot candles	Yes?	Light levels at the property line must be provided. The western property line is especially important.
Cut off Angles (Section 2511.3.1(2))	All cut off angles of fixtures must be 90 degrees when adjacent to residential districts	Yes?	Applicant should provide manufacturer's specifications for all proposed fixtures.

Prepared by Kristen Kapelanski, AICP  
kkapelanski@cityofnovi.org

(248) 347-0586

**ENGINEERING REVIEW**



## PLAN REVIEW CENTER REPORT

August 13, 2013

### Engineering Review

Eberspaecher Parking Lot Addition  
JSP13-0060

---

#### Petitioner

Eberspaecher, property owner

#### Review Type

Preliminary Site Plan

#### Property Characteristics

- Site Location: S. of Gen-Mar and W. of Novi Rd.
- Site Size: 8.66 acres
- Plan Date: July 17, 2013

#### Project Summary

- Construction of an approximately 0.21 net acre parking lot addition.
- One existing hydrant would be relocated outside of the proposed parking lot expansion.
- Storm water would be collected by two sewer collection systems; the additional discharge from the parking lot addition is stored in an underground detention system which discharges into the existing storm sewer network before it ultimately outlets into an off-site detention basin east of the property.

#### Recommendation

Approval of the Preliminary Site Plan and Preliminary Storm Water Management Plan is recommended.

#### Comments:

The Preliminary Site Plan meets the general requirements of Chapter 11, the Storm Water Management Ordinance and the Engineering Design Manual with the following items to be addressed at the time of Final Site Plan submittal (further engineering detail will be required at the time of the final site plan submittal):

#### Additional Comments (to be addressed prior to the Final Site Plan submittal):

##### General

1. The City standard detail sheets are not required for the Final Site Plan submittal. They will be required with the Stamping Set submittal.

#### Water Main

2. Provide a note stating that a minimum cover of five and one-half (5 ½) feet shall be maintained to the top of pipe with a minimum cover of six (6) feet maintained within paved areas.
3. Three (3) sealed sets of revised utility plans along with the MDEQ permit application (1/07 rev.) for water main construction and the Streamlined Water Main Permit Checklist should be submitted to the Engineering Department for review, assuming no further design changes are anticipated. Utility plan sets shall include only the cover sheet, any applicable utility sheets and the standard detail sheets.

#### Storm Sewer

4. Revise the plan set to provide under drain for all proposed pervious pavement. Any area that cannot accommodate under drain must be paved with traditional Portland Cement Concrete or Hot-mix Asphalt.
5. Provide a profile for the proposed storm sewer indicating a minimum cover of three (3) feet.
6. Revise the storm sewer material for sections not serving as underground detention to C76 Class IV Reinforced Concrete Pipe or Class 54 Ductile Iron versus corrugated metal pipe as provided.

#### Storm Water Management Plan

7. The Storm Water Management Plan for this development shall be designed in accordance with the Storm Water Ordinance and Chapter 5 of the new Engineering Design Manual.
8. Revise the pre-treatment structure configuration to provide an off-line mechanical pretreatment system prior to discharge into the underground detention basin; in-line pretreatment is not allowed.
9. Remove the mechanical pretreatment structures from catch basins 4 and 6. These structures are not needed because the proposed storm sewer discharges into an existing wet detention basin to the east of the development.
10. The proposed pretreatment device Contech model CDS2015-4 is not approved by the City for use prior to discharge into an underground detention system. The only pretreatment device models accepted are Vortechs and Aquaswirl. Revise the plan to provide a pretreatment structure that has been accepted by the City.
11. Provide manufacture specifications for the proposed underground detention system including material type, size, bedding requirements, and any other applicable information.
12. Revise the storm water detention calculations to demonstrate that bankfull volumes shall be retained in the detention facility for a minimum of 24 hours and no more than 40 hours.

13. Due to maintenance concerns, each restricting orifice in the control structure shall be a minimum of 1 square-inch in size, even though this may result in a flow rate above the calculated discharge.
14. Denote an overland route for storm water that would occur in the event that the underground system cannot accept flow. This route shall be directed to a recognized drainage course or drainage system. Verify that any structures accepting overland flow are capable of handling the 100-year flood capacity.
15. Provide a construction detail for the connection between the proposed underground detention basin and the storm sewer network.
16. Provide critical elevations (bankfull and 100-year storm hydraulic grade lines) on the underground detention system cross-section and storm sewer profile demonstrating that the detention system is 3 feet above ground water and has the required 1 foot of freeboard between the high water elevation and the subgrade below the pavement.

**The following must be submitted at the time of Final Site Plan submittal:**

17. A letter from either the applicant or the applicant's engineer must be submitted with the Final Site Plan highlighting the changes made to the plans addressing each of the comments listed above and indicating the revised sheets involved.
18. An itemized construction cost estimate must be submitted to the Community Development Department at the time of Final Site Plan submittal for the determination of plan review and construction inspection fees. This estimate should only include the civil site work and not any costs associated with construction of the building or any demolition work. **The cost estimate must be itemized** for each utility (water, sanitary, storm sewer), on-site paving, right-of-way paving (including proposed right-of-way), grading, and the storm water basin (basin construction, control structure, pretreatment structure and restoration).

**The following must be submitted at the time of Stamping Set submittal:**

19. A draft copy of the maintenance agreement for the storm water facilities, as outlined in the Storm Water Management Ordinance, must be submitted to the Community Development Department with the Final Site Plan. Once the form of the agreement is approved, this agreement must be approved by City Council and shall be recorded in the office of the Oakland County Register of Deeds.
20. A draft copy of the 20-foot wide easement for the water main to be constructed on the site must be submitted to the Community Development Department.
21. A draft copy of the legal description for the existing water main easement to be vacated by the hydrant relocation must be submitted to the Community Development Department.

The following must be addressed prior to construction:

22. A pre-construction meeting shall be required prior to any site work being started. Please contact Sarah Marchioni in the Community Development Department to setup a meeting (248-347-0430).
23. A City of Novi Grading Permit will be required prior to any grading on the site. This permit will be issued at the pre-construction meeting. Once determined, a grading permit fee must be paid to the City Treasurer's Office.
24. A Soil Erosion Control Permit must be obtained from the City of Novi. Contact Sarah Marchioni in the Community Development Department (248-347-0430) for forms and information.
25. A permit for water main construction must be obtained from the MDEQ. This permit application must be submitted through the City Engineer after the water main plans have been approved.
26. Construction Inspection Fees to be determined once the construction cost estimate is submitted must be paid prior to the pre-construction meeting.
27. A storm water performance guarantee, equal to 1.5 times the amount required to complete storm water management and facilities as specified in the Storm Water Management Ordinance, must be posted at the Treasurer's
28. An incomplete site work performance guarantee for this development will be calculated (equal to 1.5 times the amount required to complete the site improvements, excluding the storm water facilities) as specified in the Performance Guarantee Ordinance. This guarantee will be posted prior to TCO, at which time it may be reduced based on percentage of construction completed.
29. A street sign financial guarantee in an amount to be determined (\$400 per traffic control sign proposed) must be posted at the Treasurer's Office.

Please contact Adam Wayne at (248) 735-5648 with any questions.



cc: Ben Croy, Engineering  
Brian Coburn, Engineering  
Kristen Kapelanski, Community Development Department  
Michael Andrews, Water & Sewer Dept.

TRAFFIC REVIEW



August 12, 2013

Barbara McBeth, AICP  
Deputy Director of Community Development  
City of Novi  
45175 W. Ten Mile Rd.  
Novi, MI 48375

**SUBJECT: Eberspaecher Parking Lot Expansion, JSP13-0060,  
Traffic Review of Preliminary Site Plan, PSP13-0129**

Dear Ms. McBeth:

At your request, we have reviewed the above and offer the following recommendation and supporting comments.

#### **Recommendation**

We recommend approval of the preliminary site plan, subject to the items shown below in **bold** being satisfactorily addressed on the final site plan.

#### **Site Description**

What is the applicant proposing, and what are the surrounding land uses and road network?

1. The applicant is proposing to expand and upgrade the parking lots along the west and north sides of 43700 Gen Mar Drive.
2. The site is bordered on the east by other industrial uses and Novi Road; on the north by the railroad and cemetery; on the west by a single-family residential area; and on the south by currently undeveloped woodlands.
3. Gen Mar Drive is an industrial cul-de-sac with a turnaround bulb at the northeast corner of the site. Gen Mar intersects five-lane Novi Road near the south base of the railroad overpass.

#### **Trip Generation and Traffic Impact Study**

How much new traffic would be generated? Was a traffic study completed and was it acceptable?

4. While the proposed parking lot expansion is intended to serve an increase in employment at this location (to 150 employees in the largest shift), we are unaware of the current employment and therefore have no basis for forecasting the amount of increased traffic.

#### **Vehicular Access Locations**

Do the proposed driveway locations meet City spacing standards?

5. Not applicable. No change in site access is being proposed.

### Vehicular Access Improvements

Will there be any improvements to the abutting road(s) at the proposed access point(s)?

6. Not applicable.

### Access Drive Design and Control

Are the proposed design, pavement markings, and signage satisfactory?

7. Not applicable.

### Pedestrian Access

Are pedestrians *safely and reasonably* accommodated?

8. This industrial park generally lacks off-street pedestrian accommodations.

### Circulation and Parking

Can vehicles *safely and conveniently* maneuver through the site?

9. In the double-banked parking lot in the site's northwest corner, the island on the south side and east end of the parking aisle now features a main corner radius of only 5 ft, contrary to Sec 2506.13 of the Zoning Ordinance and good design practice. **This radius should be increased to at least 10 ft** (the end aisle is slightly wider than normal at 28 ft).
10. To facilitate easier circulation by the City's largest fire truck, **the curb radius on the northwest corner of the building pad should be increased to 20 ft (from 15 ft).**
11. **The final site plan should both dimension (as typical) and include a plan note indicating that all parking space dimensions (width as well as length) shall be referenced to the face of curb or walk.**
12. Detailed specifications are required for all new pavement markings. Per City policy and the MMUTCD, non-barrier-free parking spaces shall be white; barrier-free parking stripes and cross-hatched access aisles shall be blue; and wheelchair symbols to be painted on the pavement shall be white. Adjoining barrier-free and non-barrier-free parking spaces shall be separated by abutting blue and white stripes. We recommend that a plan detail be developed to illustrate these requirements.
13. **The crosshatched turnaround space at the south end of the west lot should be marked in yellow and posted with a NO PARKING ANY TIME (R7-1 with double-headed arrow) sign.**
14. Detailed specifications are also required for the replacement barrier-free signing. The main sign shall be a RESERVED PARKING [wheelchair] ONLY (R7-8) sign and the supplemental sign (when required) shall be a VAN ACCESSIBLE (R7-8P) sign. Any barrier-free space adjacent to an 8-ft-wide access aisle is considered van-accessible and shall be signed accordingly. Where post-mounted, there shall be 7 ft below the R7-8 and at least

6 ft-3 in below the R7-8P. We recommend that a plan detail be developed to illustrate these requirements.

15. A Signing Quantities Table is needed, listing each sign type by description, MMUTCD sign code, and the quantity required.

Sincerely,  
CLEARZONING, INC.

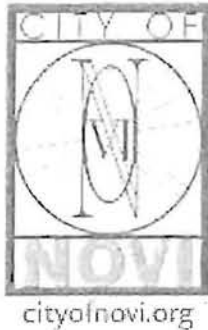


Rodney L. Arroyo, AICP  
President



William A. Stimpson, P.E.  
Director of Traffic Engineering

**LANDSCAPE REVIEW**



## PLAN REVIEW CENTER REPORT

August 14, 2013

### Preliminary Landscape Review

Eberspaecher Parking Expansion

---

#### Petitioner

Eberspaecher North America

#### Review Type

Preliminary Site Plan

#### Property Characteristics

Site Location: Genmar Drive  
Site Zoning: I-1 – Light Industrial District  
Adjoining Zoning: North, east and south: I-1. West: RM-1.  
Site Use(s): Light industrial  
Adjoining Uses: North, east and south: light industrial. West: Multi family residential  
Proposed Use: Light industrial  
Site Size: 8.6 acres  
Plan Date: 7/17/13

#### Recommendation

**Approval of the Preliminary Site Plan for Eberspaecher Parking Expansion JSP13-60 is recommended.** Per Sec. 2509 a landscape plan is required for a new commercial development or an expansion greater than 25% of the original structure. Because there is no actual building expansion, only a parking lot expansion, the landscape plan has been limited in scope to required parking lot landscape, landscape adjacent to the R.O.W. and tree replacement requirements necessary to comply with the Woodlands Preservation Ordinance.

#### Ordinance Considerations

##### Adjacent to Residential – Buffer (Sec. 2509.3.a.)

1. A portion of the proposed parking located to the north is adjacent to residential uses. A landscape berm is required between the uses. However, there is a considerable drop in elevation to a creek between the properties and there is a significant evergreen buffer and native vegetation between the uses. **A waiver would be required for no installation of the berm. As the site is currently well buffered, staff would support a waiver for the berm.**

##### Adjacent to Public Rights-of-Way – Berm (Wall) & Buffer (Sec. 2509.3.b.)

1. A 3' tall berm would typically be required along the street right of way. Installation of this berm would necessitate the removal of existing healthy trees. **A waiver would be required for the berm. Staff would support the waiver.**

2. One canopy tree or large evergreen is required per 40' of road frontage. This requirement has been met.
3. One sub-canopy tree is required per 30' of road frontage. This requirement has been met.

**Street Tree Requirements (Sec. 2509.3.b.)**

1. Six existing trees will be preserved, thereby meeting the intent of the street tree requirement.

**Parking Landscape (Sec. 2509.3.c.)**

1. Calculations have been provided for the required Parking Lot Landscape Area per Ordinance requirement. A total of 3,476 s.f. of interior parking landscape area is required. This requirement has been met.
2. Perimeter Parking Lot Canopy Trees are required at one per 35 LF. Existing healthy trees and trees counted toward interior parking lot landscape may be counted toward this requirement. By virtue of the existing and proposed trees, the Applicant meets the perimeter planting requirement.
3. A total of 47 parking lot canopy tree are required. By virtue of the existing trees to remain and additional proposed trees, this requirement has been met.
4. All existing trees to remain must be sheltered by tree protection fencing during construction.

**Building Foundation Landscape (Sec. 2509.3.d.)**

1. No alterations are proposed to the site building.

**Plant List (LDM)**

1. The Plant List meets the requirements of the Ordinance and Landscape Design Manual.

**Planting Details & Notations (LDM)**

1. Planting Details and Notations meet the requirements of the Ordinance and Landscape Design Manual.

**Irrigation (Sec. 2509 3.f.(6)(b))**

1. All landscape areas are required to be irrigated. A note has been provided stating that the existing irrigation system will be appropriately modified in the area of the addition.

Please follow guidelines of the Zoning Ordinance and Landscape Design Guidelines. This review is a summary and not intended to substitute for any Ordinance. For the landscape requirements, see the Zoning Ordinance landscape section on 2509, Landscape Design Manual and the appropriate items in the applicable zoning classification. Also see the Woodland and Wetland review comments.

Reviewed by: David R. Beschke, RLA



**FIRE REVIEW**



May 9, 2013

July 25, 2013

TO: Barbara McBeth, Deputy Director of Community Development

RE: Ebersbaecher- parking lot expansion

SP#: PSP13-0096  
PSP13-0129

**CITY COUNCIL**

**Mayor**  
Bob Gatt

**Mayor Pro Tem**  
Dave Staudt

Terry K. Margolis

Andrew Mutch

Justin Fischer

Wayne Wrobel

Laura Marie Casey

**City Manager**  
Clay J. Pearson

**Director of Public Safety  
Chief of Police**  
David E. Molloy

**Director of EMS/Fire Operations**  
Jeffery R. Johnson

**Assistant Chief of Police**  
Victor C.M. Lauria

**Assistant Chief of Police**  
Jerrod S. Hart

**Project Description:**

Expansion of existing lot to 225 spaces

**Comments:**

1. **Corrected 7/25/13** - Maintain Emergency access from northwest lot to Marlson. ( Max. grade 8 degrees ).
2. **Corrected 7/25/13** - Addition of 1500 gal. Argon bulk tank requires separate permit and approval. Installation must meet IFC and local building code requirements.

**Recommendation:**

Recommend for Approval, as the above notes have been addressed from previous review.

Sincerely,

Andrew Copeland – FPO/Inspector II - CFPE  
City of Novi – Fire Dept.



**APPLICANT RESPONSE LETTER**



CIVIL ENGINEERS  
LAND SURVEYORS  
LAND PLANNERS

August 20, 2013

Ms. Kristen Kapelanski  
Planner  
City of Novi  
45175 W. Ten Mile Road  
Novi, MI 48375

Re: Eberspaecher North America, Inc.  
Parking Rehabilitation Project  
NFE # H441  
City of Novi Reference No. JSP 13-60

Dear Ms. Kapelanski

On behalf of our client, Eberspaecher North America, Inc. (ENA), we are pleased that the preliminary site plan for the proposed parking lot expansion project at 43700 Gen Mar Drive has been recommended for Planning Commission approval. The following letter serves to address comments per the Planning Review letter dated August 13th, 2013 that will be implemented on the forthcoming Final Site Plan drawings.

**Planning Review Letter and Summary Chart (August 13th, 2013)**

Items that require clarification or will require attention during the final site plan stage are addressed below.

Use (Article 19)

1. The proposed project will not alter the overall use of the building. The current building is used for light automobile part manufacturing, as well as office space for support design and engineering staff.

Building Height (Section 2400 & 2503.2.E)

2. This project does not include any proposed changes to the building facade.

3. Parking Setback (Section 2400)

We have calculated that the existing parking area within the front yard setback is approximately 33% of the total front yard setback area post development. The proposed project involves only minor curb replacement of the existing main drive aisle to the site within the front setback. We will provide these

NOWAK & FRAUS ENGINEERS

calculations on the final site plan drawings. We understand that the staff supports a waiver for the berm or wall requirement since there is no proposed parking additions within the front setback.

Number of Parking Spaces (Section 2505)

4. We have submitted a variance request to the Zoning Board of Appeals (ZBA) to provide the required number of parking spaces based on the number of employees, rather than the useable floor space area. The requested variance would effectively reduce the required spaces from 223 to 185. We note that the final site plan will reflect the inclusion of a 1,234 square foot mezzanine addition. The proposed floor space addition has increased the requested reduction of parking by two stalls from the calculations shown on the preliminary site plan drawings, which show the required stalls as 221 based on useable floor space area. We understand the ZBA has received all necessary documentation, including the changes based on the mezzanine addition, and that the request will be discussed at the September 2013 ZBA meeting.

Loading Spaces (Section 2507 and Sec. 22-100 City Code)

5. A variance has been requested to the ZBA to allow loading and unloading operations to occur between 8 p.m. and 7 a.m. We understand that a City Council variance is also required, and the Owner will be submitting a separate letter requesting the City Council variance to the Community Development Department.

Accessory Structure Setback - Dumpster (Section 2503)

6. The existing trash dumpster/compactor will be maintained. The final site plan drawings will clearly identify that there are not any new dumpsters or dumpster relocations proposed as part of this project.

Outdoor Storage Tank (Section 1905.b(2))

7. A variance to allow for the over-sized gas tank and to allow for modification to the screening requirements is being requested through the ZBA. We understand the ZBA has received all necessary documentation, and that the request will be discussed at the September ZBA meeting.

Exterior Lighting (Section 2511)

8. See the Lighting review Summary Chart response comments below.

**Lighting Review Summary Chart**

Lighting Plan (Section 2511.2.a.2)

1. The manufacturers specifications and hours of operation for all proposed lighting fixtures will be provided on the updated photometric plan that will be submitted with the final site plan drawings.

Required Conditions (Section 2511.2.a)

2. The proposed fixtures will be 25 feet in height. A note stating the fixture height will be included on the updated photometric plan that will be submitted with the final site plan drawings.

Required Notes (Section 2511.3.b)

3. The requested notes will be included on the updated photometric plan that will be submitted with the final site plan drawings.

Required Conditions (Section 2511.3.e)

4. The requested lighting calculations will be included on the updated photometric plan that will be submitted with the final site plan drawings.

Maximum Illumination Adjacent to Non-Residential (Section 2511.3.k)

5. The requested light levels at the property line will be provided on the updated photometric plan that will be submitted with the final site plan drawings.

Cut-Off Angles (Section 2511.3.1(2))

6. The manufacturers specifications showing the required cut-off angles will be provided on the updated photometric plan that will be submitted with the final site plan drawings.

**Engineering Review (August 13th, 2013)**

General

We have read through the comments received from Mr. Adam Wayne, and understand that approval of the preliminary site plan has been recommended. We acknowledge that minor scope of work modifications will be required for the final site plan submittal. Additionally, we understand that the design drawings will require further development and greater detail for the final site plan and subsequent submittals.

Administrative

We will provide a detailed letter to highlight the drawing changes with the final site plan submittal, and will also provide the itemized cost estimate for the civil site work items that has been requested. The Owner acknowledges the additional administrative requirements, following approvals of the final site plan stamping set and prior to construction.

**Preliminary Landscape Review (August 14th, 2013)**

We understand that the project has been recommended for approval based on the preliminary site plan. We acknowledge that the planning staff supports waivers of landscape berm requirements within the front yard setback based on the existing site conditions.

**Fire Marshall Review (July 25th, 2013)**

1. We understand that previous comments received from the Fire Marshall during the pre-application review have been satisfactorily addressed on the preliminary site plan drawings, and that the preliminary site plan has been recommended for approval.

**Clear Zoning, Inc. Traffic Review (August 12th, 2013)**

General

We understand that the project has been recommended for approval based on the preliminary site plan, and we acknowledge that several noted items will have to be addressed on the final site plan drawings.

Trip Generation and Traffic Impact Study

There are 120 employees proposed during the largest shift, not the 150 employees as stated in the review letter. The current maximum number of employees is approximately 60, therefore, the proposed parking expansion would potentially result in an increase of 60 employees.

Circulation and Parking

We acknowledge that several minor geometrical and pavement marking revisions will be required on the final site plan drawings to address comments regarding circulation and parking. Additionally, the requested specifications and/or details for signs and pavement markings will be provided on the final site plan drawings.

Please review the attached documentation, and feel free to contact us if you have questions or require further documentation.

Sincerely,



Paul Tulikangas, P.E.  
Project Engineer



Brett Buchholz, P.E.  
Senior Associate

Ms. Kristen Kapelanski  
City of Novi  
RE: Eberspaecher - 43700 Gen Mar (JSP 13-60)  
8/20/2013  
Page 5

**Attachments:**

**CD containing electronic files of the following:**

Preliminary Site Plan Drawings (Dated 07-17-13)  
Color Site Plan Rendering  
Noise Study (Kolano & Saha Engineers, Inc.)  
Soil Boring Report (CTI & Associates, Inc.)  
Floor Plan w/ mezzanine Addition (Pucci & Vollmar Architect, PC)  
Photometric Plan (MLS East)

SITE PLAN







MAPS  
Location  
Zoning  
Future Land Use  
Natural Features



# Eberspaecher Parking Expansion JSP13-60

Location

Stassen Ave

Durson St

Marlson Ave

S Creek Ct

Thatcher Dr

Cavendish Av

Main St

Trans X Rd

Gen-Mar

Gen-Mar

Novi Rd

Map Author: Kristen Kapelanski  
 Date: 08-20-13  
 Project: Eberspaecher JSP13-60  
 Version #: 1.0

### Map Legend

Subject Property



**City of Novi**

Planning Division  
 Community Development  
 45175 W Ten Mile Rd  
 Novi, MI 48375  
 cityofnovi.org

0 62.5 125 250 375 500  
 Feet

1 inch = 315 feet

#### MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was prepared for use by the City of Novi, Michigan, and is not intended to be used for any other purpose. Boundary lines, easements, and other information are approximate and should not be construed as survey measurements performed by a Licensed Michigan Surveyor as defined as Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager for further details and accuracy information related to this map.



# Eberspaecher Parking Expansion JSP13-60

Zoning



Map Author: Kristen Kapelanski  
 Date: 08-20-13  
 Project: Eberspaecher JSP13-60  
 Version #: 1.0

### Map Legend

- Subject Property
- R-4: One-Family Residential District
  - I-1: Light Industrial District
  - I-2: General Industrial District
  - OS-1: Office Service District
  - TC-1: Town Center -1 District



### City of Novi

Planning Division  
 Community Development  
 45175 W Ten Mile Rd  
 Novi, MI 48375  
 cityofnovi.org



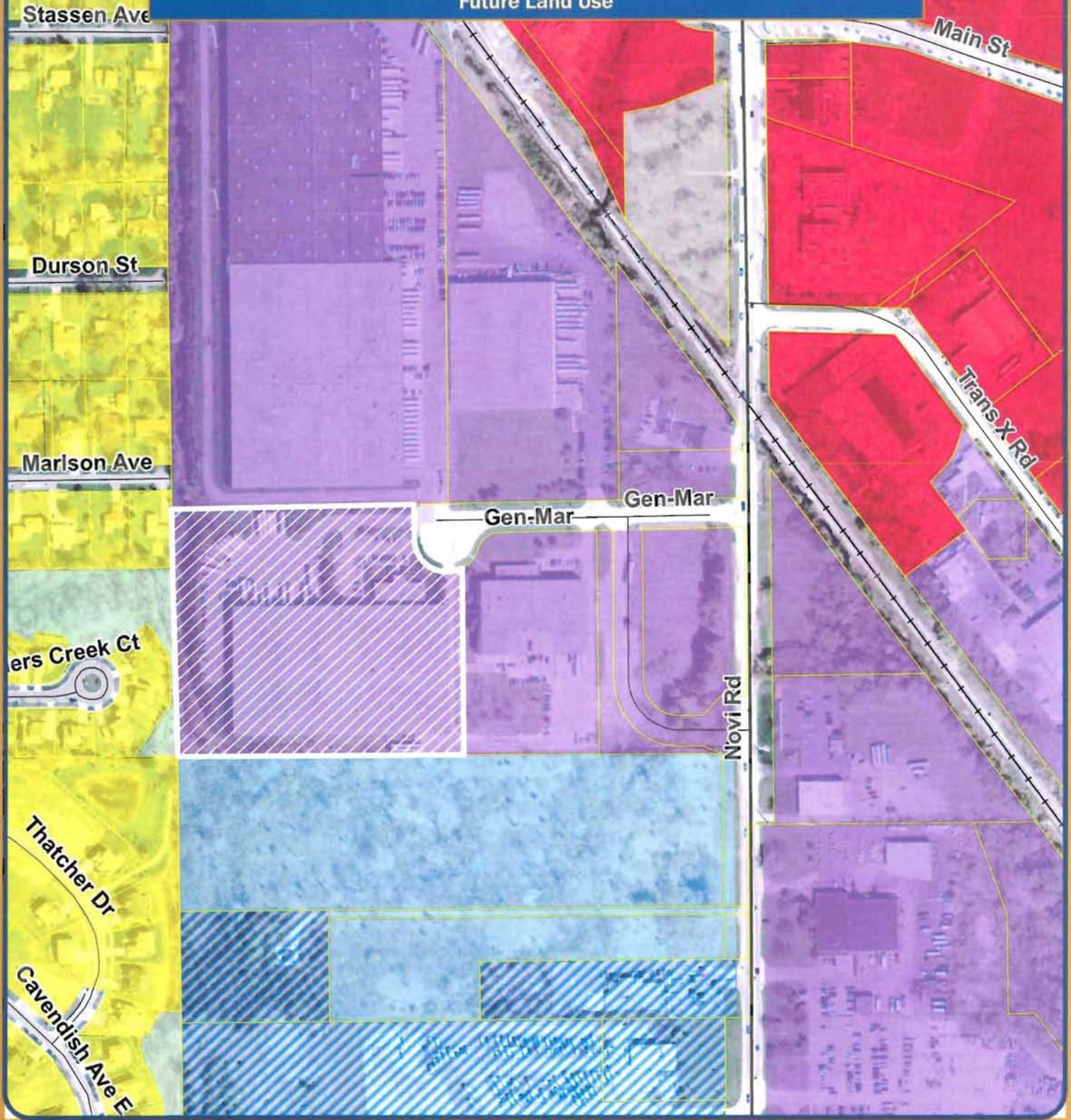
1 inch = 315 feet

**MAP INTERPRETATION NOTICE**  
 Map information depicted is not intended to replace or substitute for any official or advisory zoning. This map was prepared to assist the Planning Division and was prepared from accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.



# Eberspaecher Parking Expansion JSP13-60

Future Land Use



Map Author: Kristen Kapelanski  
 Date: 08-20-13  
 Project: Eberspaecher JSP13-60  
 Version #: 1.0

**MAP INTERPRETATION NOTICE**  
 Map information depicted is not intended to explain or substitute for any official or private survey. This map was intended to provide general information and is not to be used for any legal or financial purposes. The City of Novi is not responsible for any errors or omissions on this map. Boundary determinations and any calculations are approximate and should not be considered as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1978 or amended. Please contact the City GIS Manager for further survey and accuracy information related to this map.

Map Legend	
	TC Commercial
	Single Family
	Public
	Community Office
	Industrial RD Tech
	Private Park
	Cemetery



**City of Novi**

Planning Division  
 Community Development  
 45175 W Ten Mile Rd  
 Novi, MI 48375  
[cityofnovi.org](http://cityofnovi.org)



1 inch = 315 feet



# Eberspaecher Parking Expansion JSP13-60

## Natural Features



Map Author: Kristen Kaplanski  
 Date: 08-20-13  
 Project: Eberspaecher JSP13-60  
 Version #: 1.0

### Map Legend

-  Subject Property
-  Wetlands
-  Woodlands

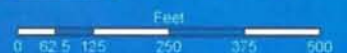
#### MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and was prepared using the most current available information available to the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager for further source and accuracy information related to this map.



### City of Novi

Planning Division  
 Community Development  
 45175 W Ten Mile Rd  
 Novi, MI 48375  
 cityofnovi.org

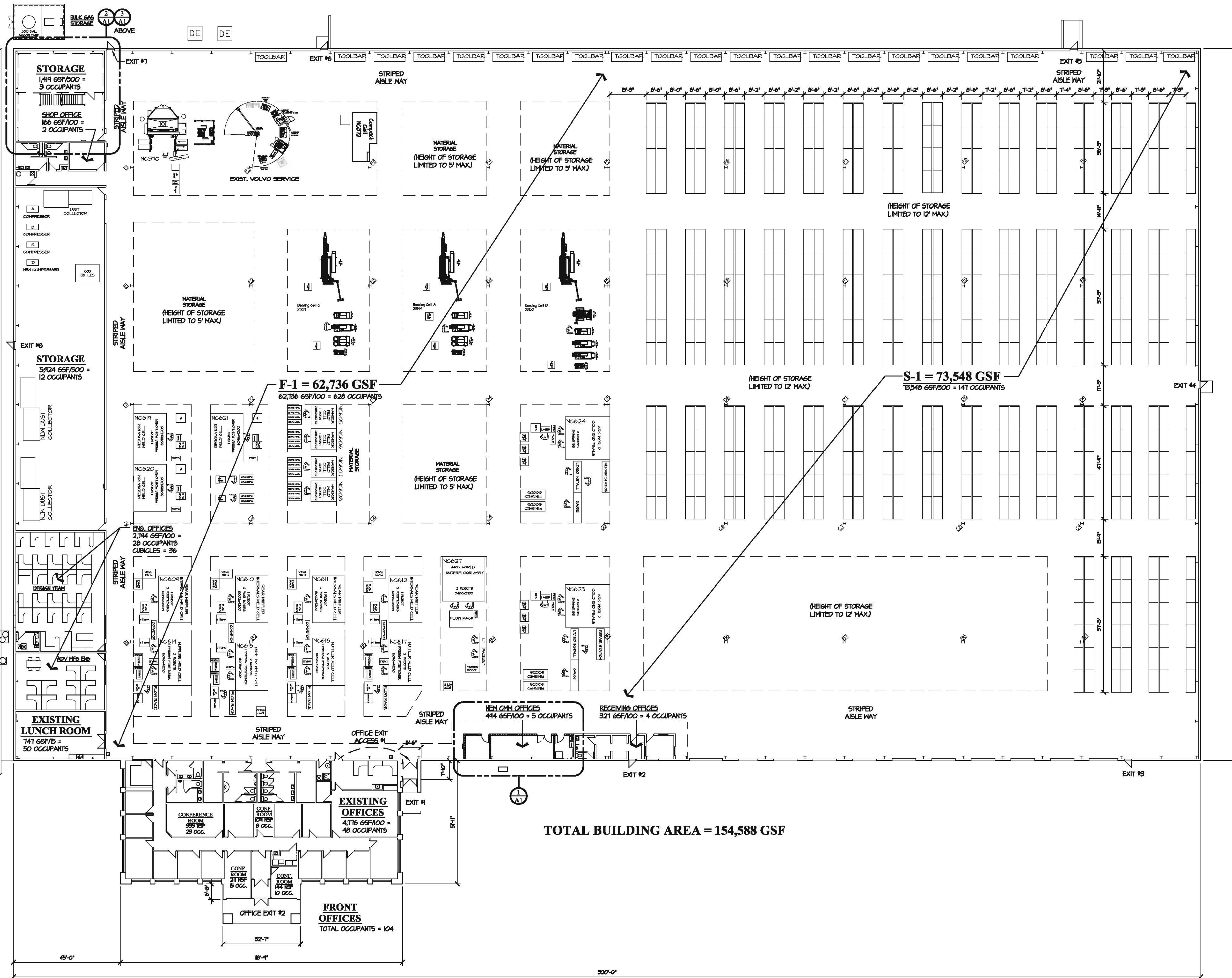


1 inch = 315 feet









**TOTAL BUILDING AREA = 154,588 GSF**

**OVERALL FLOOR PLAN**  
SCALE: 1" = 20'

SHEET INDEX		
SHEET	CURRENT ISSUE	SHEET DESCRIPTION
CS	1-24-2013	FLOOR PLAN AND COVER SHEET
A1	1-24-2013	FLOOR PLANS AND COVER REVIEW
A2	1-24-2013	DOOR SCHEDULE, ROOM FINISH SCHEDULE, INTERIOR ELEVATIONS, AND BARRIER FREE DETAILS
A3	1-24-2013	CMM ROOM WALL SECTIONS AND MEZZANINE SECTIONS
SP1	1-24-2013	ARCHITECTURAL SPECIFICATIONS
P1	1-24-2013	PLUMBING PLAN
H1	1-24-2013	HVAC PLAN
E1	1-24-2013	POWER PLANS
E2	1-24-2013	LIGHTING PLANS
E3	1-24-2013	ELECTRICAL SPECIFICATIONS, PANEL SCHEDULES, AND RISER DIAGRAM

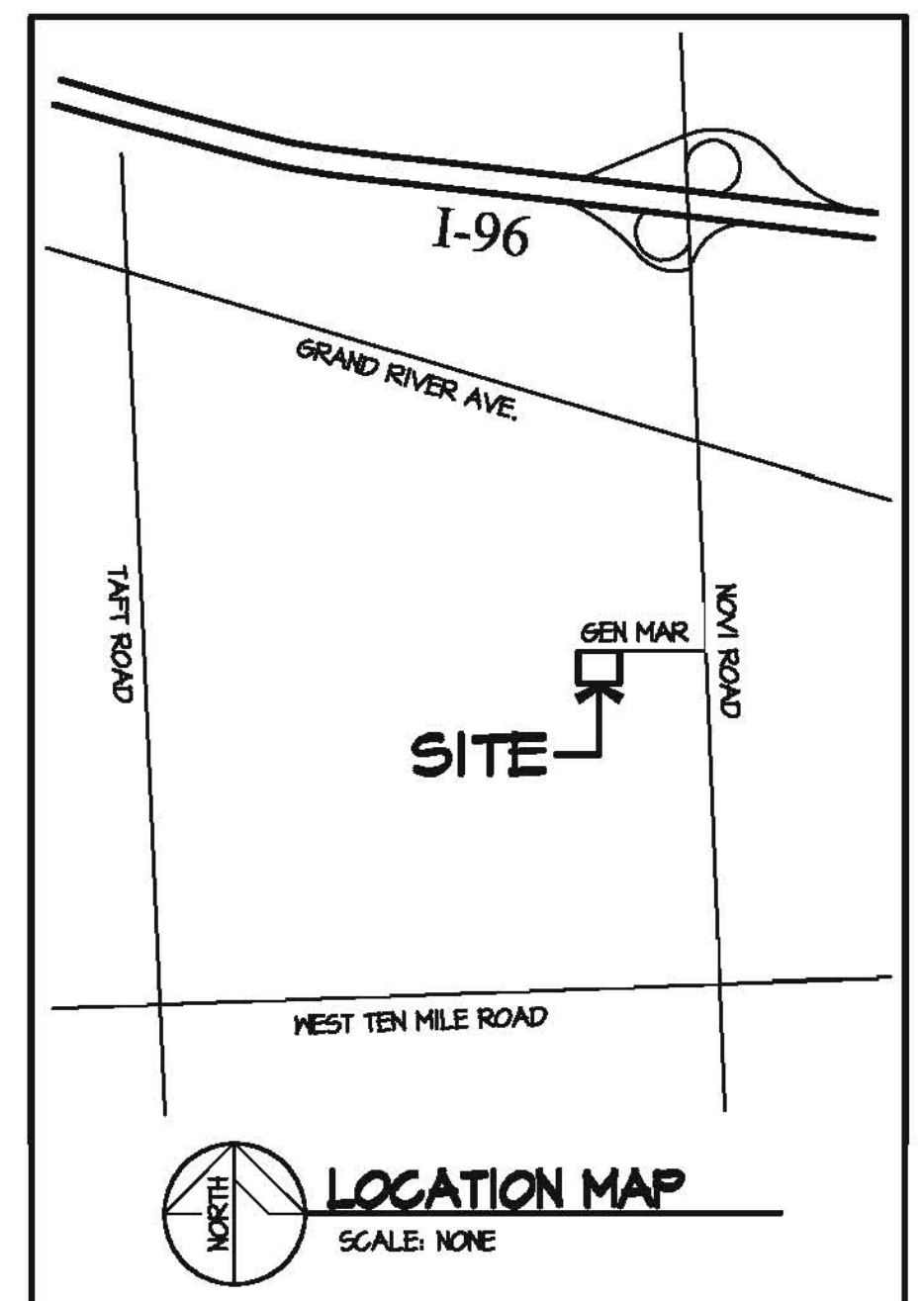
CONTACT INFORMATION:	
<b>BUILDING OWNER:</b> STAS II STERLING HEIGHTS, LLC KATHERINE LOCKARD 34475 M 12 MILE RD. FARMINGTON HILLS, MI 48331 PHONE (248) 840-5626 FAX (248) 284-4128 Katherine.lockard@stas.com	<b>TENANT:</b> EBERSPÄCHER, N.A., INC. CONTACT: CHRIS GOLDMAN FACILITIES SPECIALIST 2035 ORNDORF DRIVE BRIGHTON, MI 48116 PHONE: (248) 628-1161 FAX: (810) 225-4221 chris.goldman@eberspaecher.com

**DEFERRED SUBMITTALS:**  
- FIRE SUPPRESSION SHOP DRAWINGS.  
- PRE-ENG. STEEL PLATFORM AND STAIRS.

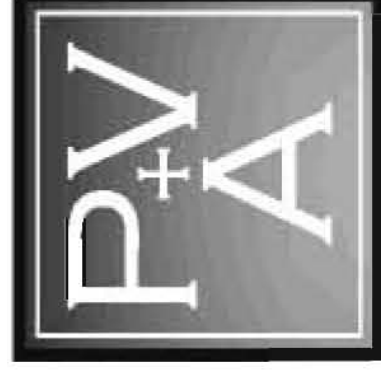
- GENERAL NOTES**
- BUILDING RULES AND REGULATIONS AND CODE AUTHORITY: ALL WORK SHALL BE IN ACCORDANCE WITH THE FOLLOWING CODES:
    - 2001 MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS
    - 2001 MICHIGAN MECHANICAL CODE
    - 2001 MICHIGAN PLUMBING CODE
    - 2008 NATIONAL ELECTRIC CODE
    - 2003 ANSI-A117.1
    - 2010 AMERICANS WITH DISABILITIES ACT (ADA)
    - OAKLAND COUNTY
    - CITY OF NOVI GOVERNING RULES AND REGULATIONS AND CODE AMENDMENTS
  - ARCHITECT IN RESPONSIBLE CHARGE: KARL F. VOLLMAR, LIC.# 1801034372, EXPIRES 10-31-2014.
  - ALL TRADES ARE TO COORDINATE THEIR WORK AND VERIFY DIMENSIONS AND FIELD CONDITIONS OF THE PLANS PRIOR TO THE BEGINNING OF THE WORK. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES, QUESTIONABLE, OR UNCERTAIN CONDITIONS PRIOR TO THE BEGINNING OF THE WORK.
  - NO CUTTING OF THE BUILDING STRUCTURAL SYSTEM SHALL BE DONE WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT, BEING PREVIOUSLY OBTAINED.

THIS PROJECT SHALL COMPLY WITH THE 2001 MICHIGAN REHABILITATION CODE, 2001 MICHIGAN PLUMBING CODE, 2001 MICHIGAN MECHANICAL CODE, 2008 NATIONAL ELECTRIC CODE, MICHIGAN BARRIER FREE DESIGN LAW P.A. 1 OF 1986 AND THE 2003 EDITION OF THE ICC/ANSI A117.1 STANDARD. ADDITIONAL REQUIREMENTS APPLY UNDER THE 2010 AMERICANS WITH DISABILITIES ACT (ADA).

THESE CONSTRUCTION DOCUMENTS WERE PREPARED FOR COMPLIANCE WITH THE MICHIGAN CONSTRUCTION CODES IN EFFECT AT THE TIME OF PERMIT SUBMITTAL. ALL ENGINEERS, CONTRACTORS, AND SUPPLIERS INVOLVED IN THIS PROJECT SHALL COMPLY WITH THE SAME CODES, ISSUED AND APPROVED CODE MODIFICATIONS AND/OR NOVI CONSTRUCTION BOARDS OF APPEALS RULINGS AND INVEIGNER REQUIRED SHALL PROVIDE SHOP DRAWINGS AND SUBMITTALS CLEARLY DESCRIBING COMPLIANCE TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE FOR REVIEW AND APPROVAL.



**Pucci + Vollmar**  
ARCHITECTS, PC  
ARCHITECTURE + DESIGN + PLANNING  
506 E. GRAND RIVER AVE., SUITE 100B, BRIGHTON, MI 48116-1566  
PHONE (810) 225-2950 • FAX (810) 225-2950 • www.pv-a.com



**Eberspächer North America, SPP**  
45700 GEN MAR  
NOVI, MICHIGAN

**OVERALL FLOOR PLAN AND COVER SHEET**

NO.	DATE	BY	NOTES
1	5-27-2013	KV	BULLETIN #11 REVISION STORAGE TRACKS

DO NOT SCALE THIS PRINT, USE DIMENSIONS SHOWN ONLY

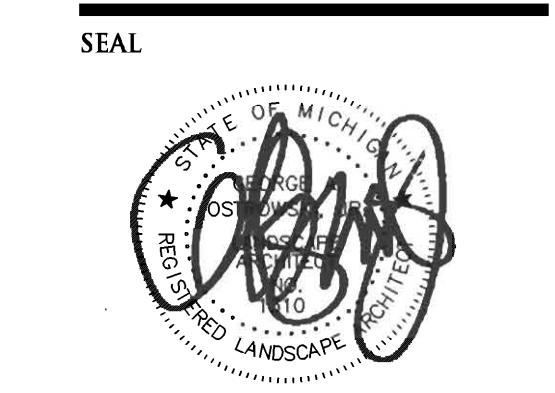
DRAWN BY: KV  
CHECKED: KV  
APPROVED: KV  
DATE: JULY 24, 2013  
PROJECT: 1320

SHEET:  
**CS**









PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspacher North America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of Section 22  
T. 1 N., R. 8 E.  
City of Novi, Oakland County, Michigan

SHEET  
Tree Preservation Plan



REVISIONS  
7/17/13 PRELIMINARY SITE PLAN REVIEW

DRAWN BY:  
G. Ostrowski

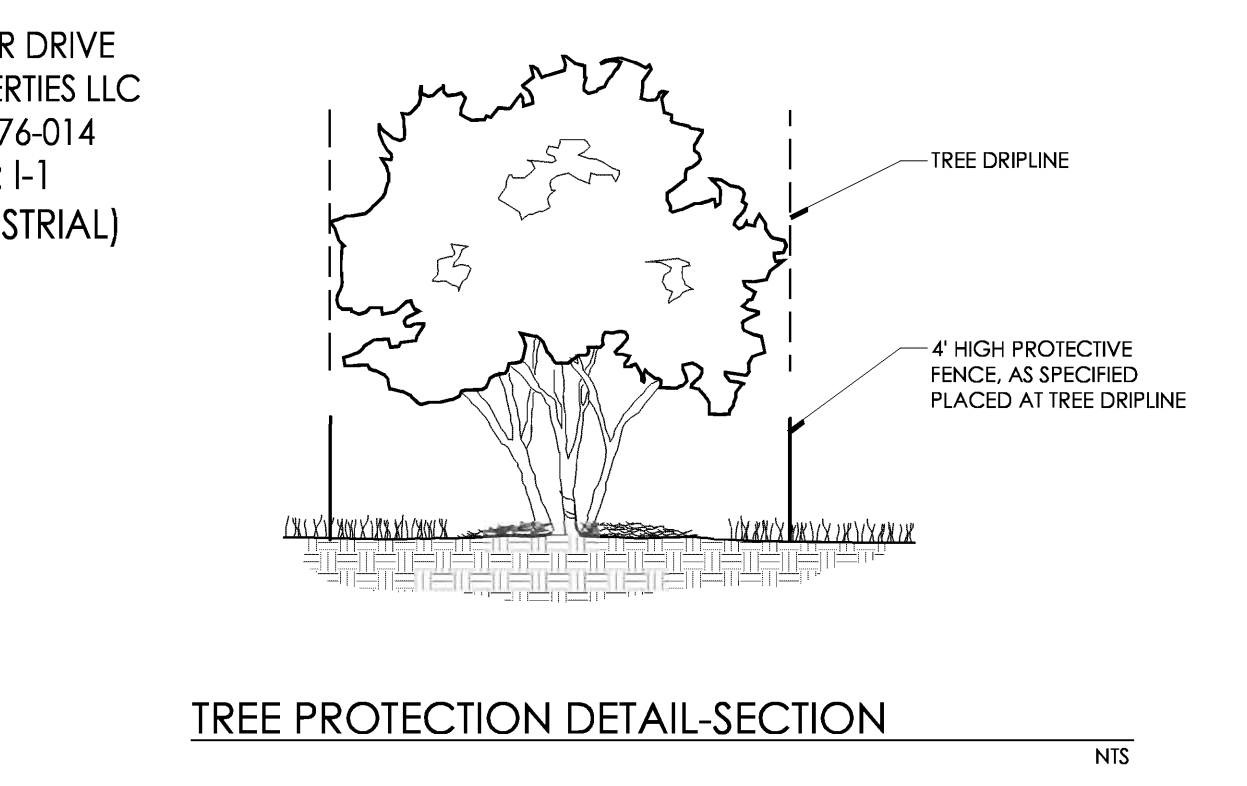
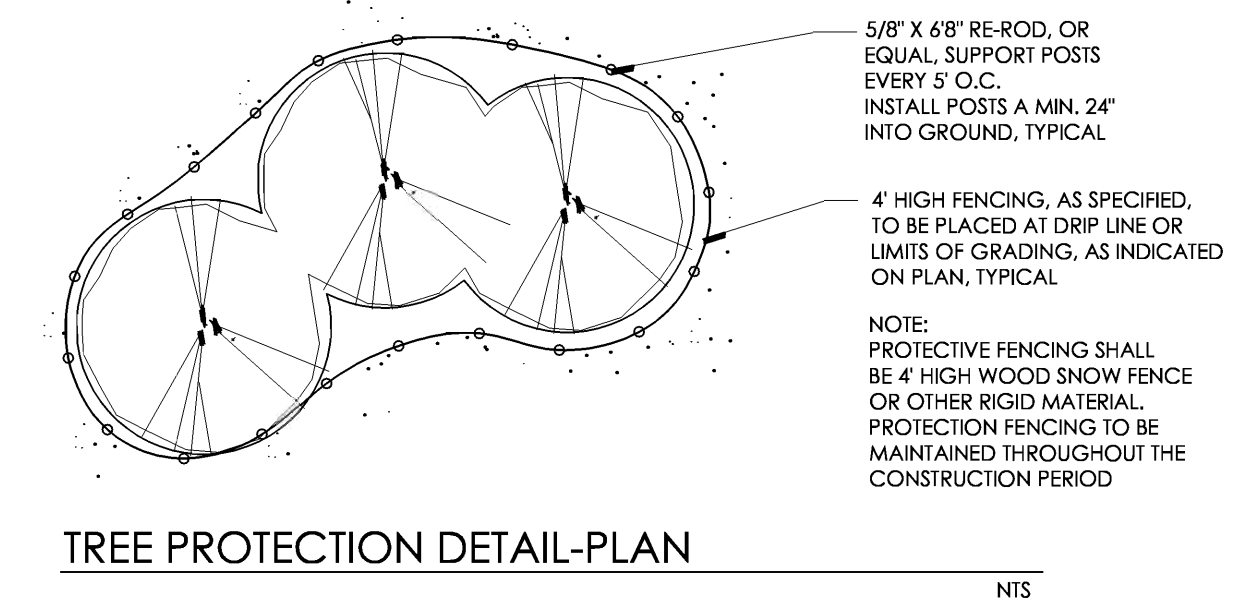
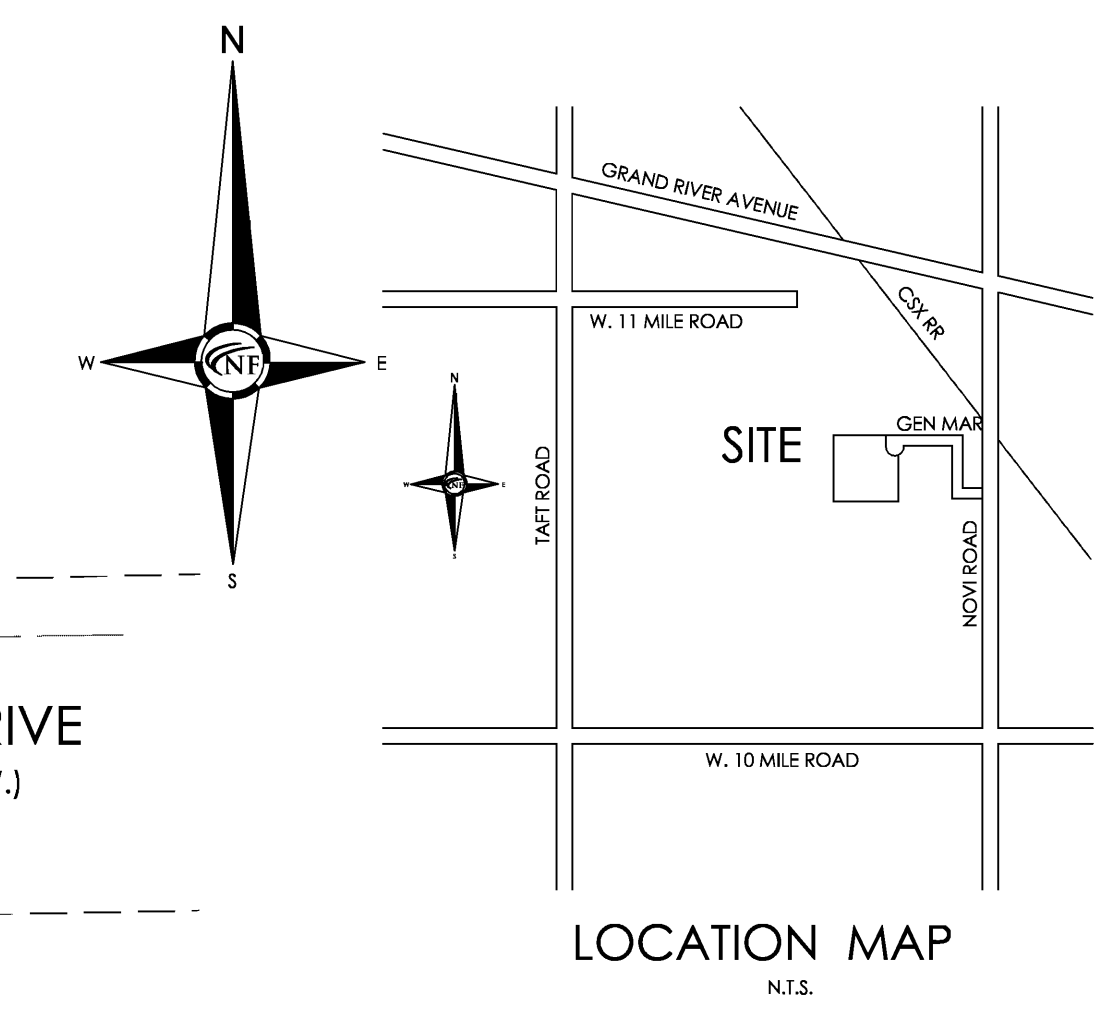
DESIGNED BY:  
G. Ostrowski

APPROVED BY:  
G. Ostrowski

DATE:  
May 3, 2013

SCALE: 1" = 40'

NFE JOB NO. SHEET NO.  
H441 L1



### CITY OF NOVI TREE PROTECTION NOTES

1. EITHER PLASTIC, WOOD SNOW FENCING SHALL BE INSTALLED AT OR BEYOND THE DRIPLINE, UNLESS MORE SUBSTANTIAL FENCING IS REQUIRED.
2. STAKES SHALL BE METAL "T" POLES SPACED NO FARTHER THAN 5' ON CENTER.
3. FENCING SHALL NOT BE INSTALLED CLOSER TO THE TREE THAN THE DRIPLINE OF THOSE TREES TO BE SAVED. SPECIAL CIRCUMSTANCES SHALL BE REVIEWED BY THE CITY.
4. FENCING SHALL BE ERRECTED PRIOR TO CONSTRUCTION. THE CITY SHALL BE NOTIFIED ONCE THE FENCING IS INSTALLED FOR INSPECTION.
5. UNDER NO CIRCUMSTANCE SHALL THE PROTECTIVE FENCING BE REMOVED WITHOUT PROPER APPROVAL FROM THE CITY.
6. NO PERSON SHALL CONDUCT ANY ACTIVITY WITHIN THE AREAS PROPOSED TO REMAIN. THIS SHALL INCLUDE, BUT NOT LIMITED TO:
  - A. NO SOLVENTS OR CHEMICALS WITHIN THE PROTECTED AREAS.
  - B. NO BUILDING MATERIALS OR CONSTRUCTION EQUIPMENT WITHIN THE PROTECTED AREAS.
  - C. NO GRADE CHANGES, INCLUDING FILL WITHIN THE PROTECTED AREAS.
7. NO REMOVAL OF VEGETATION FROM THE GROUND UP WITHOUT THE PERMISSION FROM THE PROPER REVIEWING AUTHORITY, INCLUDING THE WOODLANDS REVIEW BOARD.
8. REGULATED WOODLANDS AND REGULATED TREES ADJACENT TO THE PROPERTY ARE ALSO REQUIRED TO BE PROTECTED, WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.

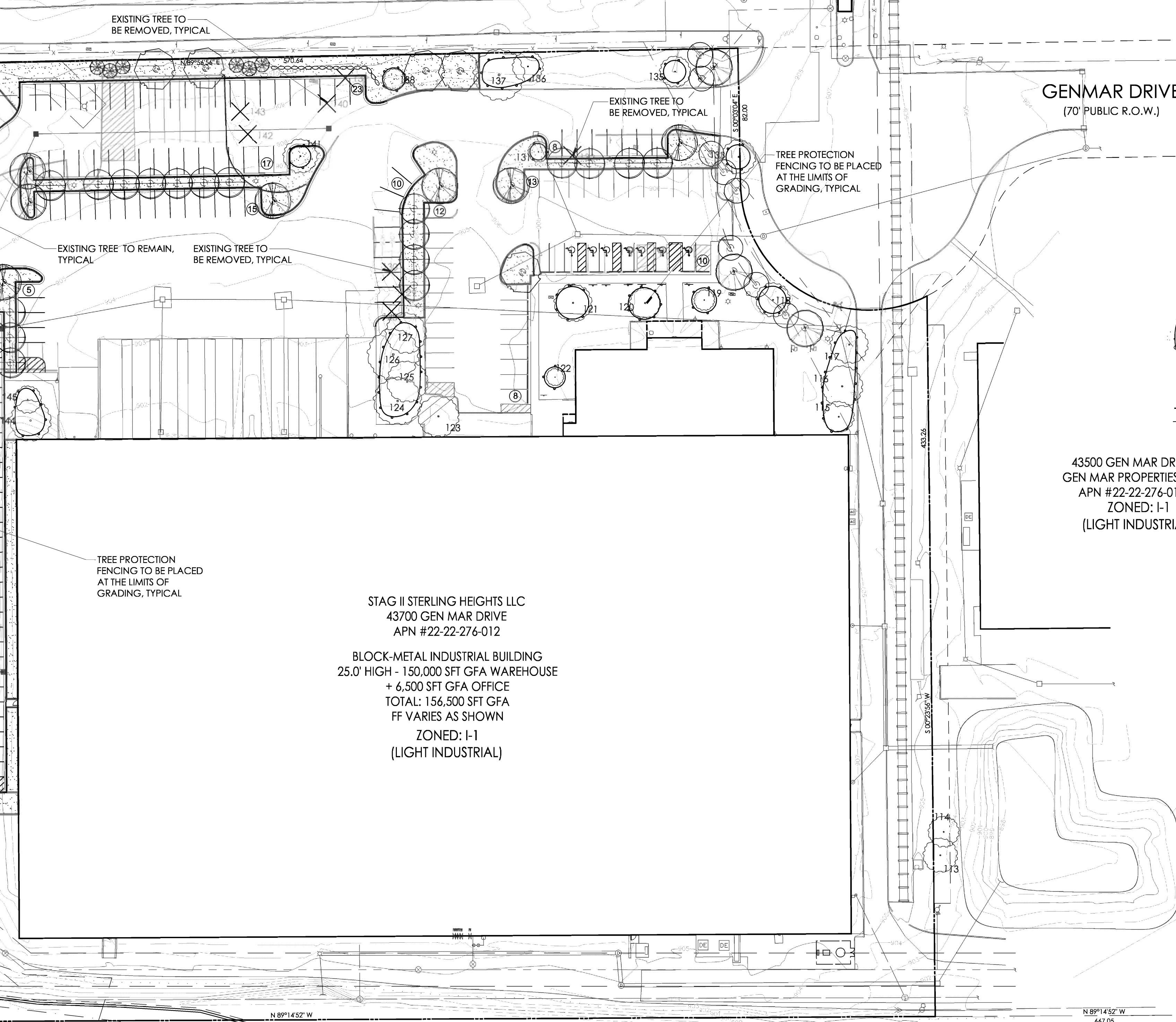
43800 GEN MAR DRIVE  
WEC 2001 A-DC-2 LLC  
APN #22-22-276-008  
ZONED: I-1  
(LIGHT INDUSTRIAL)

MARLSON AVE.  
(60' PUBLIC R.O.W.)

NOVI HEIGHTS SUB. NO. 3  
44057 MARLSON AVE.  
KRAUSE DARNEL SR  
APN #22-22-252-010

ZONED: R-4  
(ONE FAMILY RESIDENTIAL DISTRICT)

SETTLER'S CREEK SUBDIVISION  
MUNROE PARK (PRIVATE)  
APN #22-22-252-018



### TREE PRESERVATION LEGEND

- 234 EXISTING TREES TO REMAIN
- ✕ 128 EXISTING TREES TO BE REMOVED
- PROPOSED TREE PROTECTION FENCING

Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments	Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments	Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments	Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments	Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments									
113	Pinus nigra	Austrian Pine	10			Good	Being grinded by support cable	134	Acer platanoides	Norway Maple	10			Poor	Lg trunk injury, wood exposed, some decay	179	Picea glauca	White Spruce	7			Fair	Being choked by vines	202	Pinus nigra	Austrian Pine	11		Fair	Dipodia needle blight	233	Picea glauca	White Spruce	9		Good		245	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight				
114	Pinus nigra	Austrian Pine	9			Poor	Being grinded by support cable, dipodia needle blight	135	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight	180	Picea glauca	White Spruce	6			Good		203	Quercus velutina	Black Oak	8		Good		224	Pinus nigra	Austrian Pine	16		Fair	Dipodia needle blight	246	Pinus nigra	Austrian Pine	10		Fair	Dipodia needle blight				
115	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight	136	Pinus nigra	Austrian Pine	9			Good		181	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight	204	Picea glauca	White Spruce	5		Good		225	Pinus nigra	Austrian Pine	11	Twain	10	Fair	Dipodia needle blight	247	Pinus nigra	Austrian Pine	10		Fair	Dipodia needle blight			
116	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight	137	Pinus nigra	Austrian Pine	15			Good		182	Pinus nigra	Austrian Pine	12			Good		205	Picea glauca	White Spruce	9		Good		226	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight	248	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight				
117	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight	138	Malus spp.	Crabapple spp.	8			Good		183	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight	206	Picea glauca	White Spruce	7		Good		227	Picea glauca	White Spruce	15		Good		249	Pinus nigra	Austrian Pine	13		Fair	Dipodia needle blight				
118	Acer platanoides	Norway Maple	10			Poor	Lg basal trunk injury W side of tree, some decay	139	Malus spp.	Crabapple spp.	8			Good		184	Picea glauca	White Spruce	8			Good		207	Picea glauca	White Spruce	10		Good		228	Picea glauca	White Spruce	11		Good		250	Pinus nigra	Austrian Pine	9		Good					
119	Malus spp.	Crabapple spp.	6			Good		140	Malus spp.	Crabapple spp.	3			Fair	Small trunk injury, wood exposed	185	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight	208	Picea glauca	White Spruce	7		Fair	Suspected needle blight	230	Picea glauca	White Spruce	7		Good		251	Pinus nigra	Austrian Pine	13		Good					
120	Malus spp.	Crabapple spp.	9			Good		141	Acer platanoides	Norway Maple	10			Good		186	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight	209	Picea glauca	White Spruce	5		Poor	Suspected needle blight, very sparse crown	231	Pinus nigra	Austrian Pine	16		Fair	Dipodia needle blight	252	Pinus nigra	Austrian Pine	11		Good					
121	Acer platanoides	Norway Maple	11			Good	Some gridding roots beg.	142	Picea glauca	White Spruce	9			Good	Slight trunk lean	187	Pinus nigra	Austrian Pine	13			Fair	Dipodia needle blight	210	Picea glauca	White Spruce	6		Good		232	Pinus nigra	Austrian Pine	15		Fair	Dipodia needle blight	253	Pinus nigra	Austrian Pine	13		Good					
122	Malus spp.	Crabapple spp.	6			Good		143	Picea glauca	White Spruce	9			Good		188	Pinus nigra	Austrian Pine	10			Good		211	Picea glauca	White Spruce	7		Good		233	Picea glauca	White Spruce	8		Good		254	Pinus nigra	Austrian Pine	12		Fair	Dipodia needle blight				
123	Picea glauca	White Spruce	12			Good		144	Picea glauca	White Spruce	6			Good		189	Pinus nigra	Austrian Pine	7			Good		212	Pinus nigra	Austrian Pine	7		Good	Dipodia needle blight	234	Picea glauca	White Spruce	7		Good		255	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight				
124	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight	145	Picea glauca	White Spruce	5			Good		190	Pinus nigra	Austrian Pine	12			Good		213	Pinus nigra	Austrian Pine	11		Good	Dipodia needle blight	235	Picea glauca	White Spruce	8		Good	Suspected needle blight	256	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight				
125	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight	146	Quercus velutina	Black Oak	9			Good		191	Pinus nigra	Austrian Pine	9			Good		214	Pinus nigra	Austrian Pine	11		Good	Dipodia needle blight	236	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight	257	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight				
126	Pinus nigra	Austrian Pine	15			Fair	Dipodia needle blight	147	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight	192	Pinus nigra	Austrian Pine	8			Good		215	Pinus nigra	Austrian Pine	12		Fair	Dipodia needle blight	237	Pinus nigra	Austrian Pine	15		Fair	Dipodia needle blight	258	Picea glauca	White Spruce	8		Good	Lg bow in trunk, unbalanced crown				
127	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight	148	Pinus nigra	Austrian Pine	10			Fair	Dipodia needle blight	193	Pinus nigra	Austrian Pine	10			Good		216	Picea glauca	White Spruce	5		Fair	Suspected needle blight	238	Picea glauca	White Spruce	6		Fair	Suspected needle blight	259	Tilia americana	Basewood	10		Fair					
128	Pinus nigra	Austrian Pine	16			Good	Dipodia needle blight	149	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight	194	Picea glauca	White Spruce	7			Good		217	Pinus nigra	Austrian Pine	8		Poor	Dipodia, low live crown ratio	239	Pinus nigra	Austrian Pine	15		Fair	Dipodia needle blight	260	Tilia americana	Basewood	17	Multiple	14, 13	Good				
129	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight	150	Pinus nigra	Austrian Pine	7			Poor		195	Pinus nigra	Austrian Pine	9			Good		218	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight	240	Picea glauca	White Spruce	7		Fair	Suspected needle blight											
130	Pinus nigra	Austrian Pine	12			Good	Dipodia needle blight	151	Acer platanoides	Norway Maple	10			Good		196	Pinus nigra	Austrian Pine	10			Good		219	Pinus nigra	Austrian Pine	9		Fair	Dipodia needle blight	241	Picea glauca	White Spruce	8		Fair	Suspected needle blight											
131	Malus spp.	Crabapple spp.	6	Multiple	6, 5	Good		152	Picea glauca	White Spruce	8			Good		197	Pinus nigra	Austrian Pine	9			Good		220	Pinus nigra	Austrian Pine	11		Fair	Dipodia needle blight	242	Pinus nigra	Austrian Pine	12		Fair	Dipodia needle blight											
132	Malus spp.	Crabapple spp.	9			Good		153	Picea glauca	White Spruce	9			Good		198	Picea glauca	White Spruce	6			Good		221	Picea glauca	White Spruce	8		Good	Dipodia needle blight, very sparse crown	243	Pinus nigra	Austrian Pine	14		Fair	Dipodia needle blight											
133	Acer platanoides	Norway Maple	10			Good		154	Picea glauca	White Spruce	5			Poor	Terminal leader failure	199	Picea glauca	White Spruce	6			Good		222	Picea glauca	White Spruce	6		Good		244	Pinus nigra	Austrian Pine	13		Fair	Dipodia needle blight											
								155	Pinus nigra	Austrian Pine	11			Good		200	Picea glauca	White Spruce	5			Fair	Suspected needle blight																									
								156	Pinus nigra	Austrian Pine	11			Good		201	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight																									

### REPLACEMENT SUMMARY

TOTAL REGULATED TREES TO BE REMOVED: 7 TREES  
8-11" TREES TO BE REMOVED: 4 X 1 TREE = 4 TREES  
11-20" TREES TO BE REMOVED: 3 X 2 TREES = 6 TREES  
20"+ TREES TO BE REMOVED: 0 X 3 TREES = 0 TREES  
TOTAL REPLACEMENT TREES REQUIRED: 10 TREES



SEAL



PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspaecher North America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of Section 22  
T. 1 N., R. 8 E.  
City of Novi, Oakland County, Michigan

SHEET  
Landscape Plan



Know what's below  
Call before you dig.

REVISIONS  
7/11/13 PRELIMINARY SITE PLAN REVIEW

DRAWN BY:  
G. Ostrowski

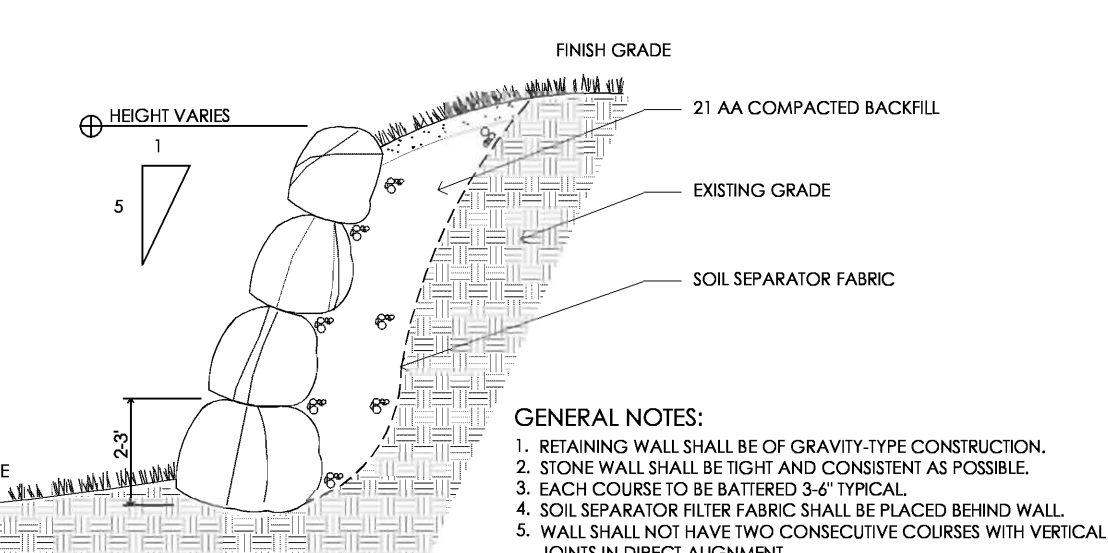
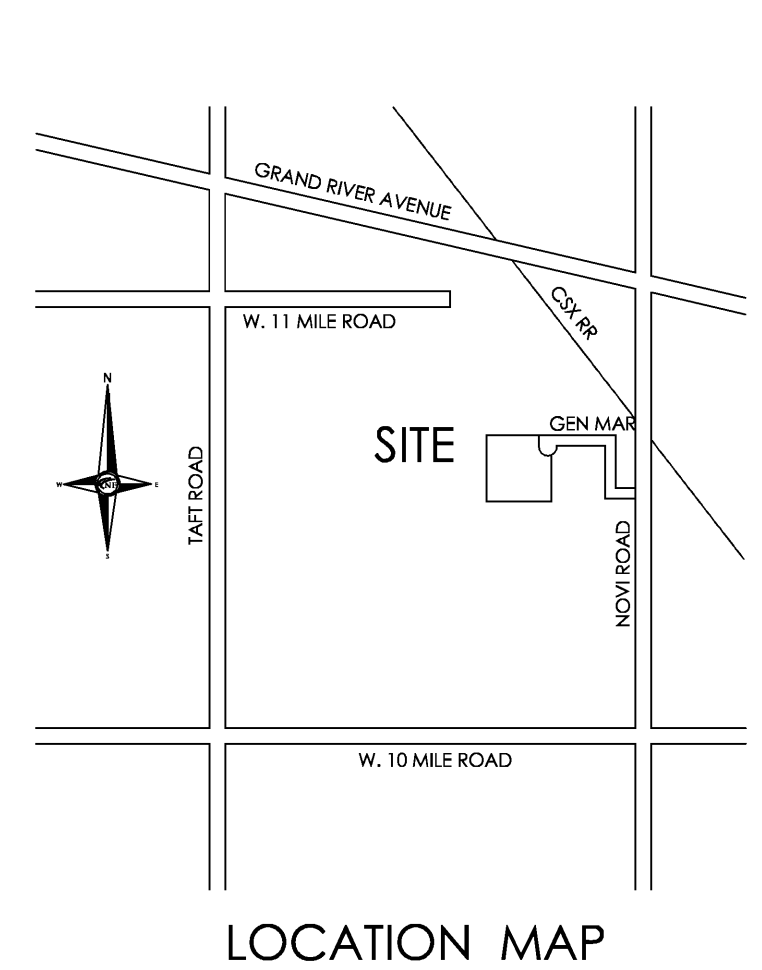
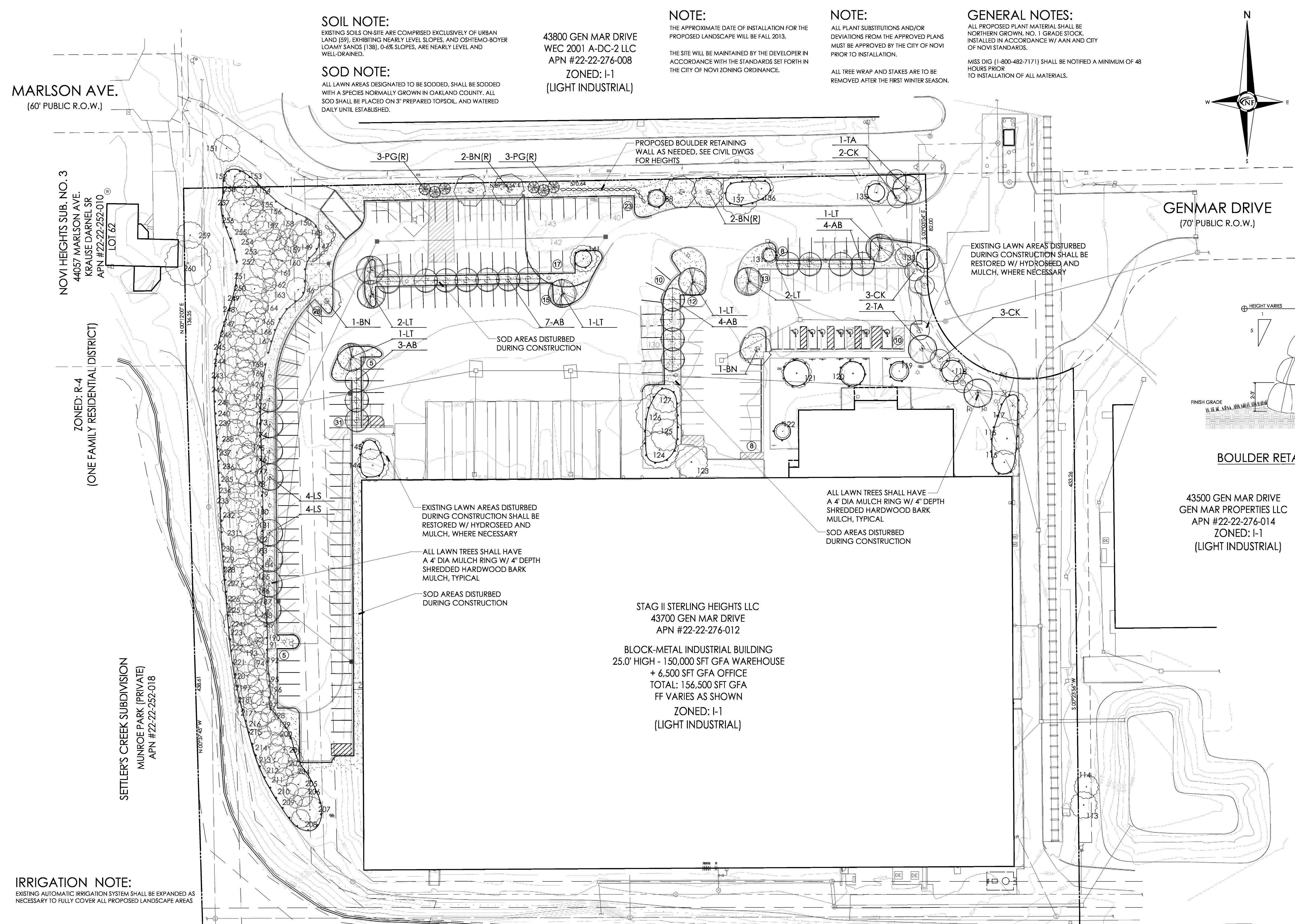
DESIGNED BY:  
G. Ostrowski

APPROVED BY:  
G. Ostrowski

DATE:  
May 3, 2013

SCALE: 1" = 40'

NFE JOB NO. SHEET NO.  
H441 L2



**LANDSCAPE REQUIREMENTS**  
EXISTING SITE ZONING: I-1, LIGHT INDUSTRIAL DISTRICT  
EXISTING SITE AREA: 8.66 ACRES

**LANDSCAPE ABUTTING A R.O.W.**  
1 DECIDUOUS OR EVERGREEN TREE PER 40 L.F.  
1 ORNAMENTAL TREE PER 30 L.F.  
REQUIRED: 237.95 OF FRONTAGE  
CANOPY TREES: 237.95 / 40 = 5.9 OR 6 TREES REQUIRED  
SUB-CANOPY TREES: 237.95 / 30 = 7.9 OR 8 TREES REQUIRED  
PROVIDED: 3 EXISTING CANOPY TREE, 3 PROPOSED CANOPY TREES, 8 SUB-CANOPY TREES

**PARKING LOT LANDSCAPE REQUIREMENTS**  
PARKING SPACE AREA  
34,780 S.F.  
34,780 S.F. X 7% = 2,435 S.F. OF AREA

**VEHICLE USE AREA**  
58,168 S.F. (CALCULATED)  
50,000 S.F. X 2% = 1,000 S.F.  
8,168 S.F. X 0.5% = 41 S.F.

**REQUIRED PARKING LOT LANDSCAPE AREA**  
REQUIRED: 2,435 S.F. + 1,000 S.F. + 41 S.F. = 3,476 S.F. REQUIRED  
FOR PARKING LOT ISLANDS  
PROVIDED: 7,566.94 S.F.

**PARKING LOT DECIDUOUS SHADE TREES**  
1 CANOPY TREE PER 75 S.F. REQUIRED LANDSCAPE AREA  
REQUIRED: 3,476 S.F. / 75 S.F. = 46.34 OR 47 TREES REQUIRED  
PROVIDED: 12 EXISTING TREES, 35 PROPOSED TREES

**GENERAL LANDSCAPE NOTES**

- LANDSCAPE CONTRACTOR SHALL VISIT SITE, INSPECT EXISTING CONDITIONS AND REVIEW PROPOSED PLANTING AND RELATED WORK. IN CASE OF DISCREPANCY BETWEEN PLAN AND PLANT LIST, THE PLANT LIST SHALL GOVERN QUANTITIES. CONTACT THE LANDSCAPE ARCHITECT WITH ANY CONCERNS.
- THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL ON-SITE UTILITIES PRIOR TO BEGINNING CONSTRUCTION ON THESE AREAS OF WORK. ANY DAMAGE OR INTERFERENCE OF SERVICES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- THE CONTRACTOR SHALL COORDINATE ALL RELATED ACTIVITIES WITH OTHER TRADES AND SHALL PROTECT ANY UNCONTRACTED SERVICES TO THE OWNER'S REPRESENTATIVE PRIOR TO COMMENCEMENT.
- PLANTS SHALL BE FULLY BRANCHED AND IN HEALTHY VIGOROUS GROWING CONDITION.
- PLANTS SHALL BE WATERED BEFORE AND AFTER PLANTING IS COMPLETE.
- ALL TREES MUST BE STAKED, FERTILIZED AND MULCHED AND SHALL BE GUARANTEED TO REACH A NORMAL GROWTH CYCLE FOR 1 YEAR OR (1) YEAR FOLLOWING PLANTING.
- ALL MATERIAL SHALL CONFORM TO THE SPECIFICATIONS ESTABLISHED IN THE MOST RECENT EDITION OF THE "AMERICAN STANDARDS FOR NURSERY STOCK".
- CONTRACTOR WILL SUPPLY FINISH GRADE AND DECORATE AS NECESSARY TO SUPPLY PLANT MIX DEPTH IN ALL PLANTING BEDS AS INDICATED IN PLANT DETAILS AND A DEPTH OF 1" IN ALL PLANTING BEDS.
- PROVIDE CLEAN BACKFILL SOIL, USING MATERIAL STOCKPILED ON-SITE. SOIL SHALL BE SCREENED AND FREE OF COBBLES, GRASS, TWIGS, AND STONE.
- SLOW RELEASE FERTILIZER SHALL BE ADDED TO THE PLANT MIX BEFORE BEING DISCLOSED. APPLICATION SHALL BE IN ACCORDANCE WITH RECOMMENDED RATES.
- PREPARED PLANT MIX (PREPARED TOPSOIL) SHALL CONSIST OF 1/3 SCREENED TOPSOIL, 1/3 SAND, AND 1/2 PEAT MIXED WELL AND SPREAD TO A DEPTH AS INDICATED.
- ALL PLANTINGS SHALL BE MULCHED WITH SHREDDED HARDWOOD BARK, SPREAD TO A DEPTH OF 1" FOR TREES AND SHRUBS, AND 2" ON ANNUALS, PERENNIALS, AND GROUNDCOVER PLANTINGS. MULCH SHALL BE FREE FROM DIRBS AND FOREIGN MATERIAL, AND FREE FROM ON-SITE DEBRIS.
- NO SUBSTITUTIONS OR CHANGES OF LOCATION, OR PLANT TYPE SHALL BE MADE WITHOUT THE APPROVAL OF THE ARCHITECT OR OWNER'S REPRESENTATIVE.
- THE LANDSCAPE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCIES BETWEEN THE PLANS AND FIELD CONDITIONS PRIOR TO COMMENCEMENT OF WORK.
- THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL PLANT MATERIAL IN A VERTICAL CONDITION THROUGHOUT THE GUARANTEED PERIOD.
- TO BE PLANTED AND WATERED FOR 1 YEAR AS INDICATED ON PLANS. ALL AREAS DESIGNATED AS SUCH ON THE PLANS THROUGHOUT THE CONTRACT DATES. THEREAFTER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING AREAS DISTURBED DURING CONSTRUCTION. NOT IN THE CONTRACT LIMITS TO EQUAL OR GREATER CONDITIONS.
- ALL LANDSCAPE AREAS SHALL HAVE PROPER DRAINAGE THAT PREVENTS EXCESSIVE WATER FROM PONDING ON LAWN AREAS OR AROUND TREES AND SHRUBS.
- ALL LANDSCAPE AREAS SHALL BE BROADCAST WITH AN AUTOMATIC UNDERGROUND SYSTEM.

- CITY OF NOVI NOTES**
- ALL LANDSCAPE ISLANDS SHALL BE BACKFILLED WITH A SAND MIXTURE TO FACILITATE DRAINAGE.
  - ALL PROPOSED LANDSCAPE ISLANDS SHALL BE CURBED.
  - ALL LANDSCAPE AREAS SHALL BE BERMADED.
  - OVERHEAD UTILITY LINES AND POLES TO BE RELOCATED, AS DIRECTED BY THE UTILITY COMPANY OF RECORD.
  - EVERGREEN AND CANOPY TREES SHALL BE PLANTED A MINIMUM OF 10' FROM A FIRE HYDRANT AND MANHOLE AND 12' FROM OVERHEAD WIRES.
  - ALL PLANT MATERIAL SHALL BE NORTHERN GROWN NURSERY STOCK, GUARANTEED FOR TWO (2) YEARS AFTER PLANTING AND SHALL BE REPAIRED AND MAINTAINED ACCORDING TO CITY OF NOVI STANDARDS. THE TWO-YEAR WARRANTY PERIOD SHALL INCLUDE A MINIMUM OF ONE CULTIVATION IN JUNE, JULY AND AUGUST FOR EACH OF THE TWO YEAR GUARANTEE.
  - ALL PROPOSED STREET TREES SHALL BE PLANTED A MINIMUM OF 4' FROM THE BACK OF CURB AND PROPOSED WALKS.
  - ALL TREE AND SHRUB PLANTING BEDS SHALL BE MULCHED WITH SHREDDED HARDWOOD BARK, SPREAD TO A MINIMUM DEPTH OF 4". ALL LAWN AREA TREES SHALL HAVE A 4" DIAMETER CIRCLE OF SHREDDED HARDWOOD MULCH, 3" AWAY FROM TRUNK. ALL PERENNIAL, ANNUAL, AND GROUNDCOVER BEDS SHALL RECEIVE 2" OF DARK COLORED BARK MULCH. MULCH IS TO BE FREE FROM DIRBS AND FOREIGN MATERIAL, AND SHALL CONTAIN NO PEECES OF INCONSIDERABLE.
  - THE CITY OF NOVI LANDSCAPE ARCHITECT SHALL APPROVE ANY SUBSTITUTIONS IN WRITING PRIOR TO INSTALLATION.

**PLANT SCHEDULE**

KEY	QTY	BOTANICAL/Common NAME	SIZE	SPACING	ROOT	COMMENT	UNIT/TOTAL COSTS
AB	18	Acer rubrum 'Bowhall' Bowhall Maple	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$7,200
BN	6	Betula nigra 'Heritage' Heritage River Birch	1 1/2" HT	SEE PLAN	B&B	CLUMP FORM, 3 CANES	\$350/\$2,100
CK	8	Cornus kousa chinensis Kousa Dogwood	2 1/2" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$250/\$2,000
LS	8	Liquidambar styraciflua 'Worpelodori' Worpelodori Sweet Gum	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$3,200
LT	7	Liquidambar styraciflua Lump Tree	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$2,800
PG	6	Picea glauca 'Denata' Black Hills Spruce	8' HT	SEE PLAN	B&B	FULL MATCHED HEADS	\$325/\$1,950
TA	3	Tilia americana 'Redmond' Redmond Linden	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$1,200

(R) INDICATES TREE REPLACEMENT

**SOIL NOTE:**  
EXISTING SOILS ON-SITE ARE COMPRISED EXCLUSIVELY OF URBAN LAND (S9), EXHIBITING NEARLY LEVEL SLOPES, AND OSTIEMO-BOYER LOAMY SANDS (138), 0-6% SLOPES, ARE NEARLY LEVEL AND WELL-DRAINED.

**SOD NOTE:**  
ALL LAWN AREAS DESIGNATED TO BE SODDED, SHALL BE SODDED WITH A SPECIES NORMALLY GROWN IN OAKLAND COUNTY. ALL SOD SHALL BE PLACED ON 3" PREPARED TOPSOIL, AND WATERED DAILY UNTIL ESTABLISHED.

43800 GEN MAR DRIVE  
WEC 2001 A-DC-2 LLC  
APN #22-22-276-008  
ZONED: I-1  
(LIGHT INDUSTRIAL)

**NOTE:**  
THE APPROXIMATE DATE OF INSTALLATION FOR THE PROPOSED LANDSCAPE WILL BE FALL 2013.

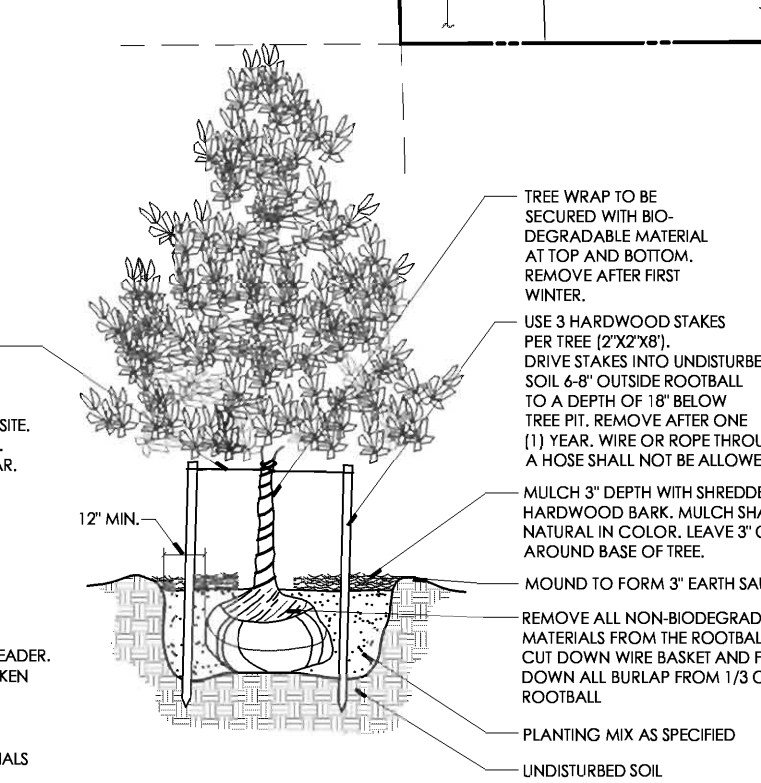
THE SITE WILL BE MAINTAINED BY THE DEVELOPER IN ACCORDANCE WITH THE STANDARDS SET FORTH IN THE CITY OF NOVI ZONING ORDINANCE.

ALL TREE WRAP AND STAKES ARE TO BE REMOVED AFTER THE FIRST WINTER SEASON.

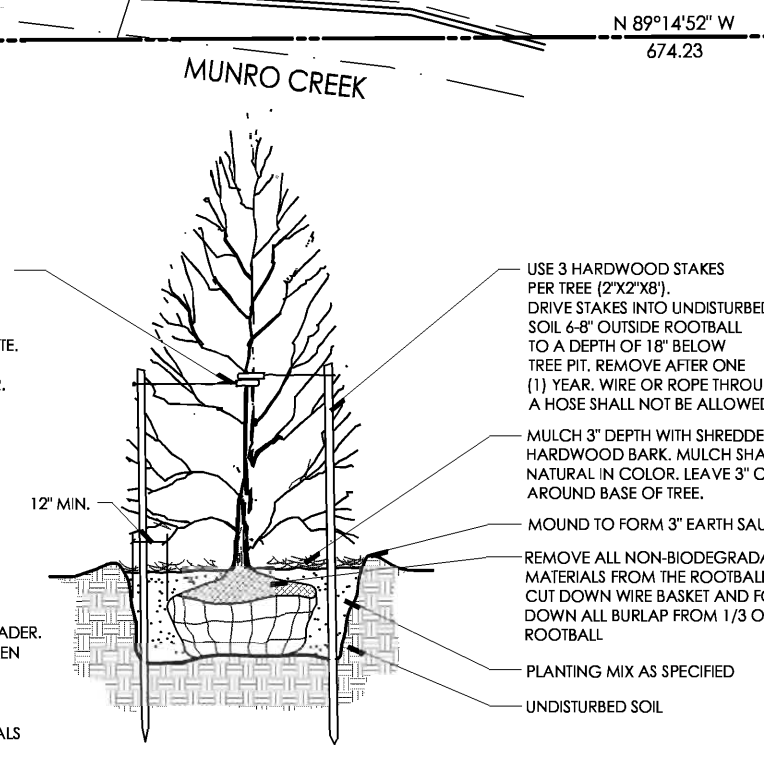
**GENERAL NOTES:**  
ALL PROPOSED PLANT MATERIAL SHALL BE NORTHERN GROWN, NO. 1 GRADE STOCK, INSTALLED IN ACCORDANCE WITH AAN AND CITY OF NOVI STANDARDS.

MISS DIG (1-800-482-7171) SHALL BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO INSTALLATION OF ALL MATERIALS.

**IRRIGATION NOTE:**  
EXISTING AUTOMATIC IRRIGATION SYSTEM SHALL BE EXPANDED AS NECESSARY TO FULLY COVER ALL PROPOSED LANDSCAPE AREAS



DECIDUOUS TREE PLANTING DETAIL



EVERGREEN TREE PLANTING DETAIL

MARLSON AVE.  
(60' PUBLIC R.O.W.)

NOVI HEIGHTS SUB. NO. 3  
44057 MARLSON AVE.  
KRAUSE DARNEL SR  
APN #22-22-252-010

ZONED: R-4  
(ONE FAMILY RESIDENTIAL DISTRICT)

SETTLERS CREEK SUBDIVISION  
MUNROE PARK (PRIVATE)  
APN #22-22-252-018

STAG II STERLING HEIGHTS LLC  
43700 GEN MAR DRIVE  
APN #22-22-276-012

BLOCK-METAL INDUSTRIAL BUILDING  
25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
+ 6,500 SFT GFA OFFICE  
TOTAL: 156,500 SFT GFA  
FF VARIES AS SHOWN  
ZONED: I-1  
(LIGHT INDUSTRIAL)

GENMAR DRIVE  
(70' PUBLIC R.O.W.)

43500 GEN MAR DRIVE  
GEN MAR PROPERTIES LLC  
APN #22-22-276-014  
ZONED: I-1  
(LIGHT INDUSTRIAL)

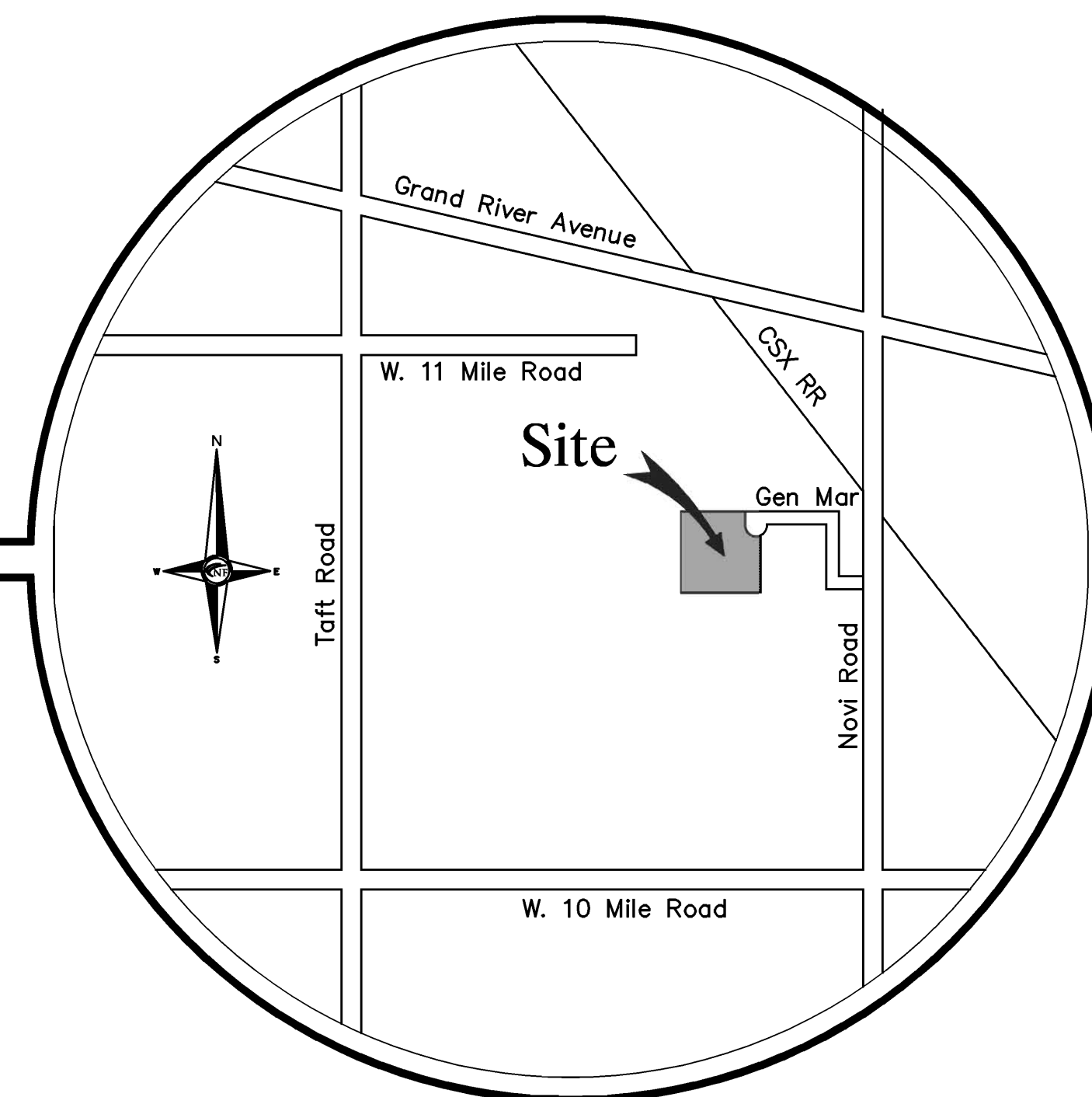
CITY OF NOVI  
APN #22-22-400-027

ZONED: OS-1  
(OFFICE SERVICE)

**CITY OF NOVI NOTES**

# 43700 GEN MAR DRIVE, NOVI, MI PARKING REHABILITATION PRELIMINARY SITE PLAN

PREPARED FOR  
**EBERSPAECHER NORTH AMERICA, INC.**



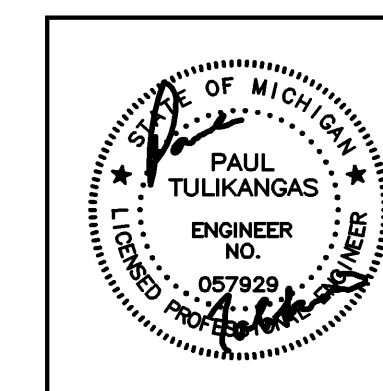
LOCATION MAP

SHEET INDEX	
	COVER SHEET
T1	TOPOGRAPHIC-TREE SURVEY
PSP1	OVERALL SITE PLAN
PSP2	DEMOLITION PLAN
PSP3	PAVING & GRADING PLAN
PSP4	UTILITY PLAN
PSP5	SOIL EROSION & SEDIMENTATION CONTROL PLAN
PSP6	STORM WATER MAINAGEMENT PLAN
L1	TREE PRESERVATION PLAN
L2	LANDSCAPE PLAN

PART OF THE NE 1/4 OF SECTION 22, T.1N., R.8E.  
CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

**CLIENT**  
EBERSPAECHER NORTH AMERICA, INC.  
33533 W. TWELVE MILE ROAD  
FARMINGTON HILLS, MI 48331  
CONTACT: CHRIS COLEMAN  
PHONE: (248) 994-7010

**CIVIL ENGINEER**  
NOWAK & FRAUS ENGINEERS  
46777 WOODWARD AVENUE  
PONTIAC, MI 48342  
CONTACT: BRETT BUCHHOLZ, P.E.  
PHONE: (248) 332-7931  
FAX: (248) 332-8257



N/F JOB H441

**PREPARED BY:**

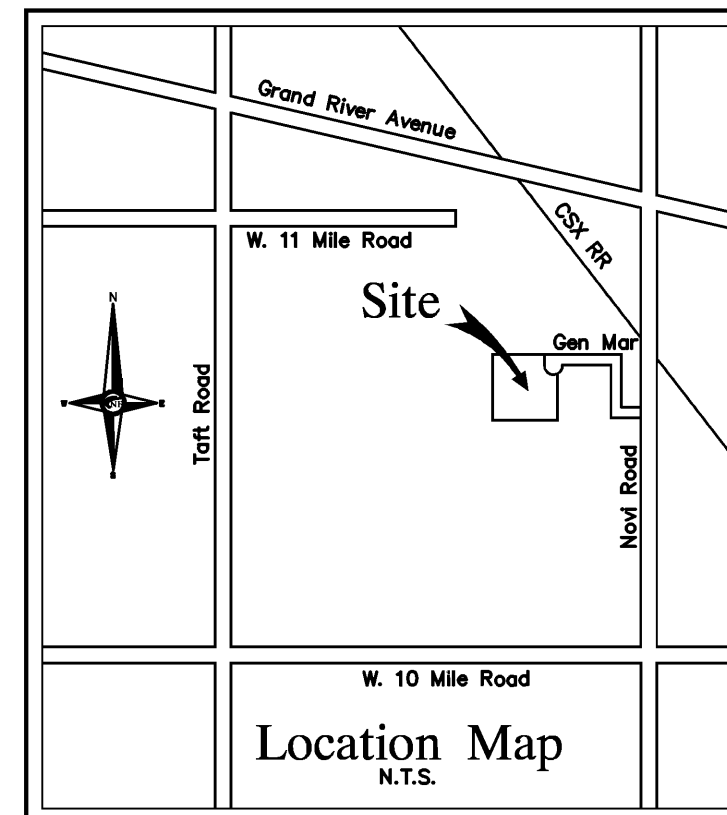
**NF ENGINEERS**  
CIVIL ENGINEERS  
LAND SURVEYORS  
LAND PLANNERS  
NOWAK & FRAUS ENGINEERS  
46777 WOODWARD AVE.  
PONTIAC, MI 48342-5032  
TEL. (248) 332-7931  
FAX. (248) 332-8257

**ISSUE DATE: JULY 17, 2013**



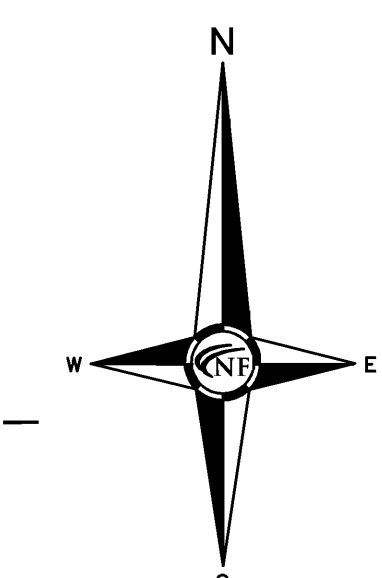
MARLSON AVE.  
(60' PUBLIC R.O.W.)

43800 GEN MAR DRIVE  
WEC 2001 A-DC-2 LLC  
APN #22-22-276-008  
ZONED: I-1  
(LIGHT INDUSTRIAL)



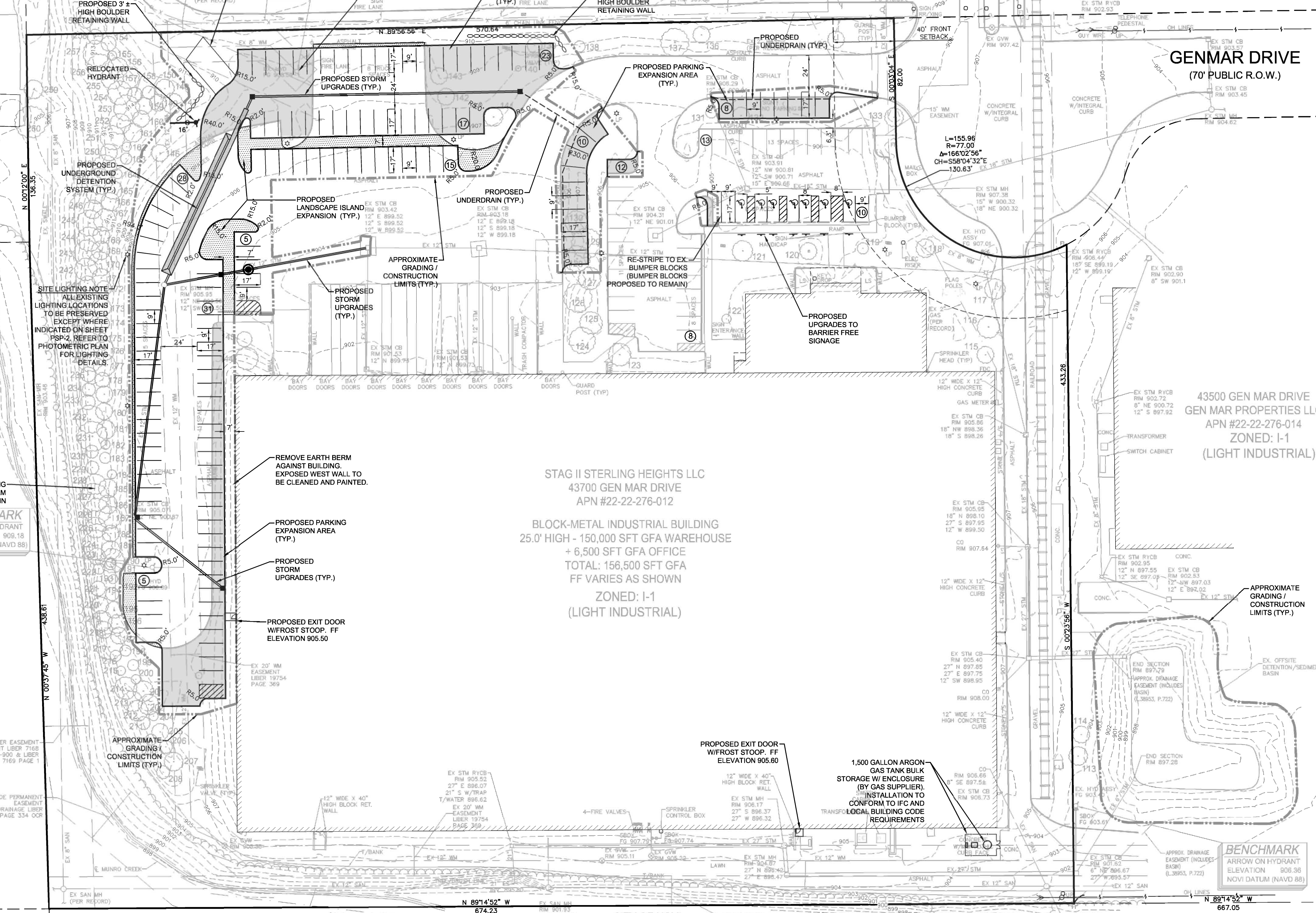
**NF**  
**ENGINEERS**  
CIVIL ENGINEERS  
LAND SURVEYORS  
LAND PLANNERS

NOWAK & FRAUS ENGINEERS  
46777 WOODWARD AVE.  
PONTIAC, MI 48342-5032  
TEL. (248) 332-7931  
FAX. (248) 332-8257



NOVI HEIGHTS SUB. NO. 3  
44057 MARLSON AVE.  
KRAUSE DARNEL SR  
APN #22-22-252-010  
ZONED: R-4  
(ONE FAMILY RESIDENTIAL DISTRICT)

SETTLERS CREEK SUBDIVISION  
MUNRO PARK (PRIVATE)  
APN #22-22-252-018



GENMAR DRIVE  
(70' PUBLIC R.O.W.)

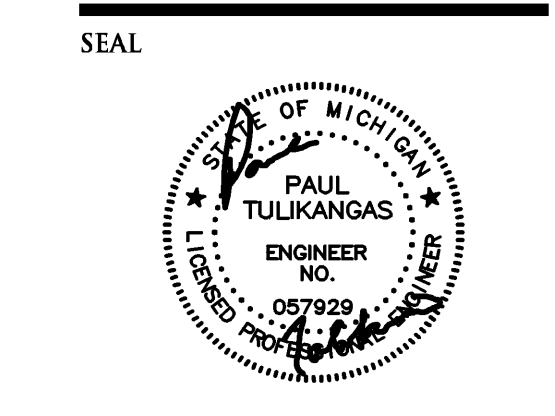
43500 GEN MAR DRIVE  
GEN MAR PROPERTIES LLC  
APN #22-22-276-014  
ZONED: I-1  
(LIGHT INDUSTRIAL)

STAG II STERLING HEIGHTS LLC  
43700 GEN MAR DRIVE  
APN #22-22-276-012  
BLOCK-METAL INDUSTRIAL BUILDING  
25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
+ 6,500 SFT GFA OFFICE  
TOTAL: 156,500 SFT GFA  
FF VARIES AS SHOWN  
ZONED: I-1  
(LIGHT INDUSTRIAL)

**SITE SUMMARY**  
SITE ZONING (PER CURRENT ZONING MAP): I-1 LIGHT INDUSTRIAL  
PROPERTY ACREAGE: 8.662 ACRES  
EXISTING BUILDING FOOTPRINT: 5,523 SFT  
EXISTING OFFICES: 149,065 SFT  
EXISTING WAREHOUSE: 154,588 SFT  
TOTAL BUILDING: 154,588 SFT  
BUILDING HEIGHT: 1-STORY, 25' FROM FINISH FLOOR  
REQUIRED BUILDING SETBACKS:  
FRONT: 40 FEET  
EACH SIDE: 20 FEET  
REAR: 20 FEET  
REQUIRED PARKING SETBACKS:  
FRONT: 40 FEET  
EACH SIDE: 10 FEET  
REAR: 10 FEET

**PARKING CALCULATIONS**  
**PARKING REQUIREMENTS**  
I-1 LIGHT INDUSTRIAL DISTRICT:  
BASED ON TOTAL NUMBER OF EMPLOYEES:  
5 PLUS 1 SPACE PER EACH 1.5 EMPLOYEES IN LARGEST WORKING SHIFT:  
= 5 + 120 EMPLOYEES (LARGEST SHIFT) X 1.5 = 185 SPACES  
BASED ON TOTAL BUILDING AREA:  
1 SPACE FOR EVERY 700 S.F. OF GROSS BUILDING AREA  
= (154,588 S.F. / (700 S.F. PER SPACE)) = 221 SPACES  
(REFER TO FLOOR PLAN AND COVER SHEET DATED 5-7-13 PREPARED BY PUCCI & VOLLMAR ARCHITECTS, PC)  
B.F. PARKING REQUIRED: 7 SPACES, INCLUDING 1 SPACE VAN-ACCESSIBLE

**PROPOSED PARKING PROVIDED:** 185 SPACES AS SHOWN, INCLUDING 7 B.F. SPACES.  
**REQUESTED VARIANCES**  
THE FOLLOWING CODE VARIANCES ARE REQUESTED AS PART OF PRELIMINARY SITE PLAN SUBMITTAL:  
1. PARKING VARIANCE TO ALLOW FOR PROVIDED PARKING TO COMPLY WITH CODE BASED ON TOTAL NUMBER OF EMPLOYEES.  
2. ALLOWANCE OF A 1,500 GALLON ARGON GAS TANK TO BE LOCATED NEAR THE SOUTHWEST BUILDING CORNER. VARIANCES ARE REQUESTED TO EXCEED THE MAXIMUM TANK CAPACITY LIMIT, AND ALSO TO FORGO USE OF SCREEN WALL SURROUNDING THE PROPOSED TANK.  
3. A VARIANCE TO ALLOW LOADING AND UNLOADING OPERATIONS OUTSIDE OF THE NORMAL REQUIREMENTS.  
**PROJECT NARRATIVE**  
EBERSPACHER NORTH AMERICA, INC. (ENA) IS IN THE PROCESS OF EXPANDING ITS OPERATIONS AND WORKFORCE AT ITS FACILITY LOCATED AT 43700 GEN MAR DRIVE.  
ENA CURRENTLY LEASES THIS PROPERTY.  
ENA REQUESTS TO EXPAND THE PARKING LOT FROM ITS CURRENT CONDITIONS TO ACCOMMODATE ITS EXPANDING WORKFORCE THAT WILL INCLUDE APPROXIMATELY 150 WORKERS ON THE LARGEST SHIFT.  
THE PROPOSED PARKING LOT EXPANSION AS INDICATED HEREON INCLUDES APPROXIMATELY 0.55 ACRES OF PAVEMENT ADDITION TO REPLACE EXISTING LAWN AREAS. STORM/DRAINAGE UPGRADES ARE ALSO ANTICIPATED TO CONSIST OF OVERSIZED PIPING TO ACCOMMODATE THE INCREASE IN RUNOFF COEFFICIENT.  
THE EXISTING PARKING LOT AREAS CONSIST MAINLY OF ASPHALT PAVEMENT AND ASPHALT CURBING. PROPOSED GRADING MAY DICTATE THAT SOME EXISTING PARKING LOT AREAS MAY NEED TO BE PULVERIZED, REGRADED AND REPAVED. OTHER AREAS OF THE EXISTING PARKING LOT WILL NOT BE RECONFIGURED, BUT MAY BE RESURFACED AND RE-STRIPPED. PROPOSED PAVEMENT MATERIALS FOR THE EXPANSION AREAS ARE PLANNED TO MATCH THE EXISTING ASPHALT PAVEMENT/CURBS.  
THE RAILROAD SPUR EASEMENT LOCATED ON THE EASTERLY PORTION OF THE PROPERTY IS PLANNED TO BE VACATED AND TRACKS TO BE REMOVED. THE PARKING LOT EXPANSION SHOWN ON THE EAST SIDE OF THE BUILDING DOES NOT MEET THE CURRENT ZONING SETBACK REQUIREMENT OF 10 FEET (0.5 FEET SETBACK PROVIDED). ALSO, A TEMPORARY GRADING EASEMENT (10 FEET SHOWN) WILL BE REQUIRED ON THE ADJACENT PROPERTY. THE EAST SIDE PARKING EXPANSION WILL REQUIRE A PARKING SETBACK VARIANCE FROM THE CITY AND WRITTEN APPROVAL/EASEMENT FROM THE ADJACENT PROPERTY OWNER.  
SOME LANDSCAPE TREES WILL NEED TO BE REMOVED TO ACCOMMODATE THE EXPANSION. LAWN/LANDSCAPE AREAS TO BE RECONFIGURED ACCORDINGLY, SUBJECT TO DESIGN BY A LANDSCAPE ARCHITECT.  
THE EXISTING SCREENING BERM ON THE WEST SIDE OF THE PROPERTY WILL NOT BE ALTERED.  
THE FINISHED GRADE ALONG THE WEST SIDE OF THE BUILDING WILL BE LOWERED TO ACCOMMODATE THE PARKING EXPANSION. THE EXISTING WEST WALL OF THE BUILDING WILL BE EXPANDED, WHICH IS PLANNED TO BE CLEANED AND PAINTED AS PART OF THE PROJECT.  
THERE ARE TWO (2) EXIT DOORS PLANNED TO BE CUT INTO THE BUILDING ON ITS WEST AND SOUTH FACES INDICATED HEREON FOR REFERENCE PURPOSES (DESIGN BY ARCHITECT), AS PART OF THE INTERIOR BUILDING PERMIT.  
A 1,500 GALLON ARGON GAS BULK STORAGE TANK AND ITS ASSOCIATED ENCLOSURE IS PROPOSED EXTERIOR OF THE BUILDING, AT ITS SOUTHWEST CORNER (LOCATION INDICATED HEREON FOR REFERENCE PURPOSES, DESIGN BY ARCHITECT), ALSO AS PART OF THE INTERIOR BUILDING PERMIT.  
NO WORK IS PROPOSED WITHIN A FLOOD PLAIN OR WETLAND.  
THE EXISTING EMERGENCY ACCESS/EASEMENT LOCATED AT THE NORTHWEST CORNER OF THE PROPERTY IS PROPOSED TO BE RE-ALIGNED WITH THE PARKING EXPANSION. AN EXISTING FIRE HYDRANT WILL NEED TO BE RELOCATED, PROPOSED AS INDICATED HEREON.



**PROJECT**  
43700 Gen Mar Drive  
**CLIENT**  
Eberspacher North America, Inc.  
**PROJECT LOCATION**  
Part of the NE 1/4 of Section 22  
T. 1 N., R. 8 E.  
City of Novi, Oakland County, Michigan

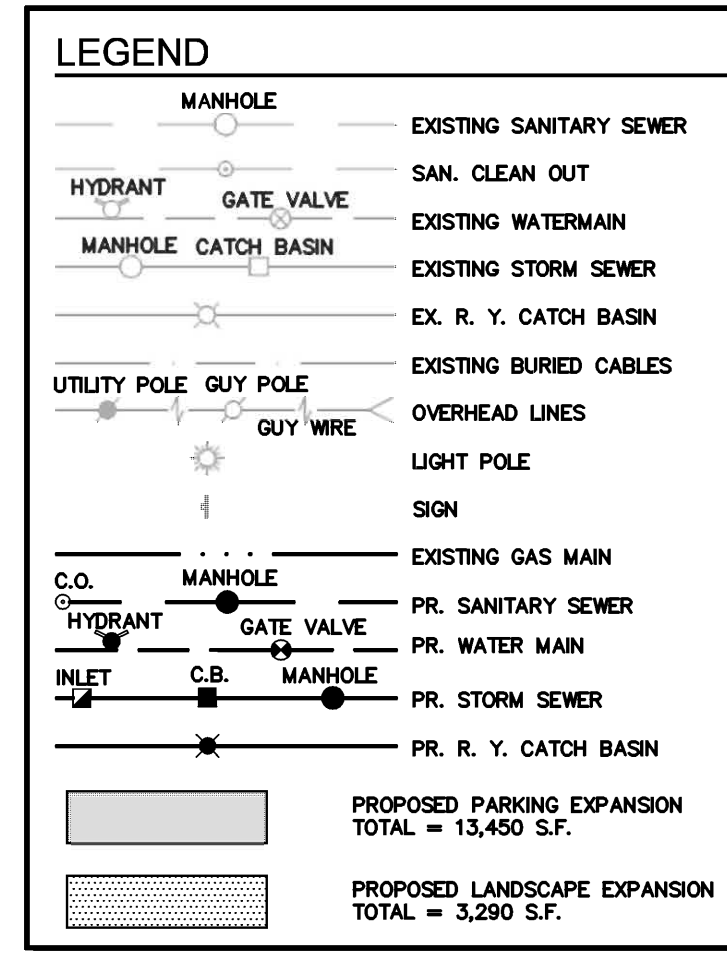
**SHEET**  
Overall Site Plan  
**811**  
Know what's below  
Call before you dig.  
**REVISIONS**  
05-03-13 Pre-Application Meeting Submittal  
07-17-13 Preliminary Site Plan

- GENERAL NOTES**
- THE IMPROVEMENTS COVERED BY THESE PLANS SHALL BE DONE IN ACCORDANCE WITH THE CITY OF NOVI STANDARD DETAILS, SPECIFICATIONS, AND ORDINANCE, THE CURRENT MICHIGAN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION (ENGLISH), OAKLAND COUNTY, MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY, AND THE 2005 MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, EXCEPT WHERE OTHERWISE INDICATED ON THESE PLANS OR IN THE PROPOSAL, SUPPLEMENTAL SPECIFICATIONS AND SPECIAL PROVISIONS.
  - THE LOCATION OF ALL UTILITIES SHOWN ON THESE PLANS IS TAKEN FROM THE BEST AVAILABLE DATA. NOWAK AND FRAUS WILL NOT BE RESPONSIBLE FOR ANY OMISSION OR VARIATIONS FROM THE LOCATIONS SHOWN OR IN THE CASE OF UNFORESEEN EVENTS. AS A CONDITION OF THIS CONTRACT, NOTICE SHALL BE GIVEN TO MISS DIG FOR ANY UNDERGROUND WORK TO BE PERFORMED IN ACCORDANCE WITH THIS CONTRACT. THE CONTRACTOR SHALL NOTIFY MISS DIG AT 1-800-482-7171 A MINIMUM OF THREE WORKING DAYS PRIOR TO ANY EXCAVATION OR GRADING. THE CONTRACTOR SHALL VERIFY THE LOCATION & DEPTHS OF ALL UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL ANTICIPATE TO LOCATE UTILITY CROSSINGS BY HAND EXCAVATION, WHILE INSTALLING NEW UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO SAID EXISTING UTILITIES CAUSED BY HIS AND/OR HIS SUBCONTRACTOR'S OPERATIONS.
  - PUBLIC RIGHT OF WAYS SHALL NOT BE CLOSED WITHOUT THE WRITTEN APPROVAL OF THE CITY. APPLICABLE PERMITS MUST BE OBTAINED FROM THE CITY OF NOVI AND OAKLAND COUNTY PRIOR TO THE COMMENCEMENT OF WORK. PROPER TEMPORARY SIGNING AND BARRICADING MUST BE ERRECTED AND MAINTAINED TO INSURE SAFE TRAFFIC CONDITIONS ADJACENT TO WORK WITHIN PUBLIC RIGHTS OF WAY.
  - DUST CONTROL SHALL BE PROVIDED BY THE CONTRACTOR AT SUCH TIMES AS THE CITY/COUNTY INSPECTORS SHALL DIRECT. WATER AND/OR CHLORIDE USED AS A DUST CONTROL PALLIATIVE WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE CONSIDERED TO BE INCLUDED IN THE WORK OF THE ENTIRE PROJECT.
  - THE CONTRACTOR SHALL VERIFY WITH THE CITY OR APPROPRIATE OWNER(S)/OWNER'S REPRESENTATIVE. ALL SALVAGED OR REMOVED MATERIAL, DEBRIS OR ITEMS ORIGINATING FROM PRIVATE PROPERTY OR PUBLIC RIGHT OF WAYS, NOT TO BE REUSED AS PART OF THIS PROJECT AND NOT TO BE CLAIMED BY THE APPROPRIATE OWNER(S). SAID ITEMS SHALL INCLUDE BUT ARE NOT LIMITED TO DRAINAGE STRUCTURE COVERS, SIGNS, SIGN POLES, DIRT, ETC., SHALL BECOME THE PROPERTY OF THE CONTRACTOR, SHALL BE IMMEDIATELY HAULED OFFSITE AND LEGALLY DISPOSED OF AND SHALL NOT BE STORED WITHIN MUNICIPAL RIGHTS OF WAY.
  - IN CONJUNCTION WITH THE PROPOSED SITE WORK, THE UTILITY COMPANIES AND/OR PUBLIC AGENCIES MAY BE RELOCATING OR REPLACING FACILITIES WHICH MAY OR MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR WILL BE REQUIRED TO COORDINATE HIS OPERATION WITH THESE AND/OR OTHER UTILITIES, IF NECESSARY, TO NOT INCUR FURTHER COSTS TO THE OWNER.
  - THE CONTRACTOR AND/OR SUBCONTRACTOR IS REQUIRED TO COOPERATE AND COORDINATE THEIR WORK WITH ALL WORK, IF ANY, BEING PERFORMED BY OTHERS.
  - SAWCUTTING IS REQUIRED FOR THE REMOVAL OF PAVEMENT, SIDEWALK, CURB AND GUTTER, DRIVE APPROACHES, ETC. THE FIELD ENGINEER SHALL DETERMINE AND MARK IN THE FIELD THE APPROPRIATE REMOVAL OR SAWCUT LIMITS PRIOR TO CONSTRUCTION.
  - IT IS THE INTENT THAT ALL GOVERNMENT CORNERS BE PRESERVED AND THAT, WHERE NECESSARY, MONUMENT BOXES BE SURVEYED AND WITNESSED, WHETHER SHOWN OR NOT, PRIOR TO REMOVAL OF SAID MONUMENTS. APPROPRIATELY RESET ALL MONUMENT CORNERS AND RESPECTIVE BOXES IN CONJUNCTION WITH CONSTRUCTION OPERATIONS.
  - IN THE SPIRIT OF PROVIDING QUALITY PROJECT ASSURANCE, ALL RECOMMENDATIONS AND SUGGESTIONS POSED BY OTHER PROFESSIONAL DESIGN AND TESTING FIRMS INVOLVED WITH THIS PROJECT AND NOT TO BE FOUND IN THESE PLANS SHALL BE CONSIDERED AND DECIDED UPON BY THE OWNER AND CONTRACTOR.
  - ADJUSTING EXISTING STORM DRAIN, SANITARY SEWER AND GATE VALVE STRUCTURE COVERS AS INDICATED IN THE PLANS SHALL INCLUDE REMOVING AND REPLACING THE CASTING/COVER, BLOCK, BRICK AND IF NEEDED, PRECAST SECTIONS TO OBTAIN THE DESIRED PROPOSED RIM ELEVATIONS. SET ALL RIM ELEVATIONS TO THE PROPOSED FINISHED GRADES AS INDICATED IN THE PLANS.

**SANITARY WASTE DISPOSAL AND WATER SUPPLY**  
THE EXISTING BUILDING IS CURRENTLY SERVICED BY SANITARY WASTE DISPOSAL AND WATER SUPPLY SYSTEMS.

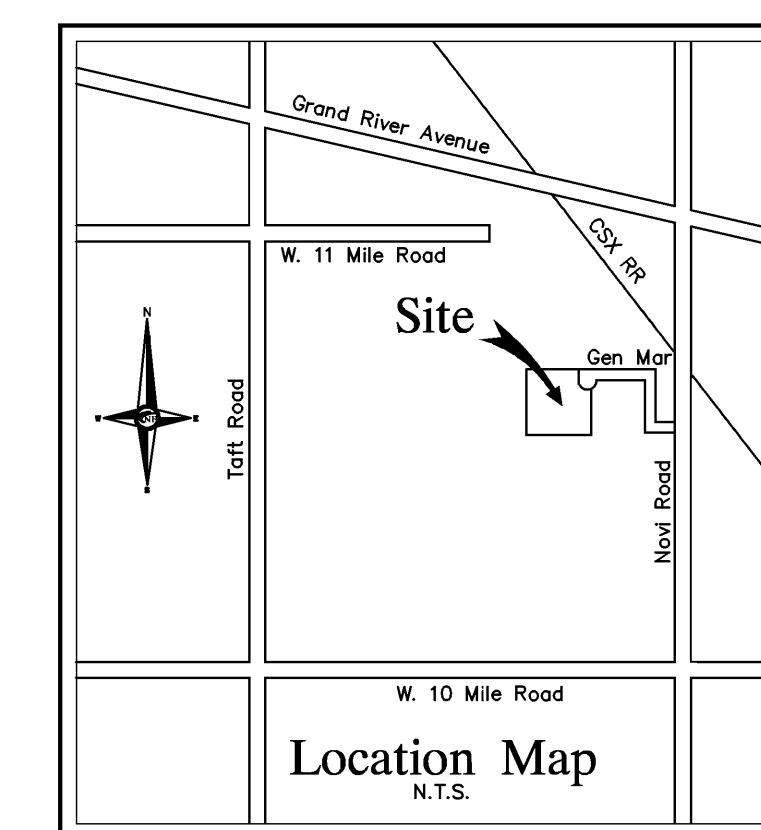
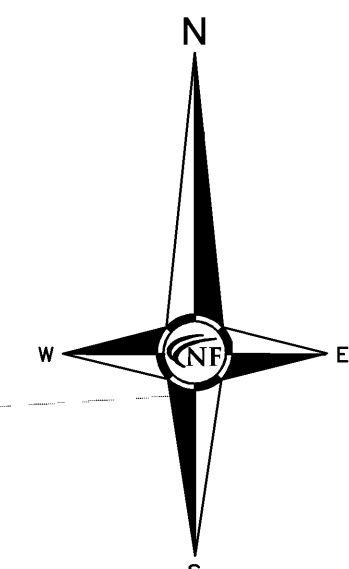
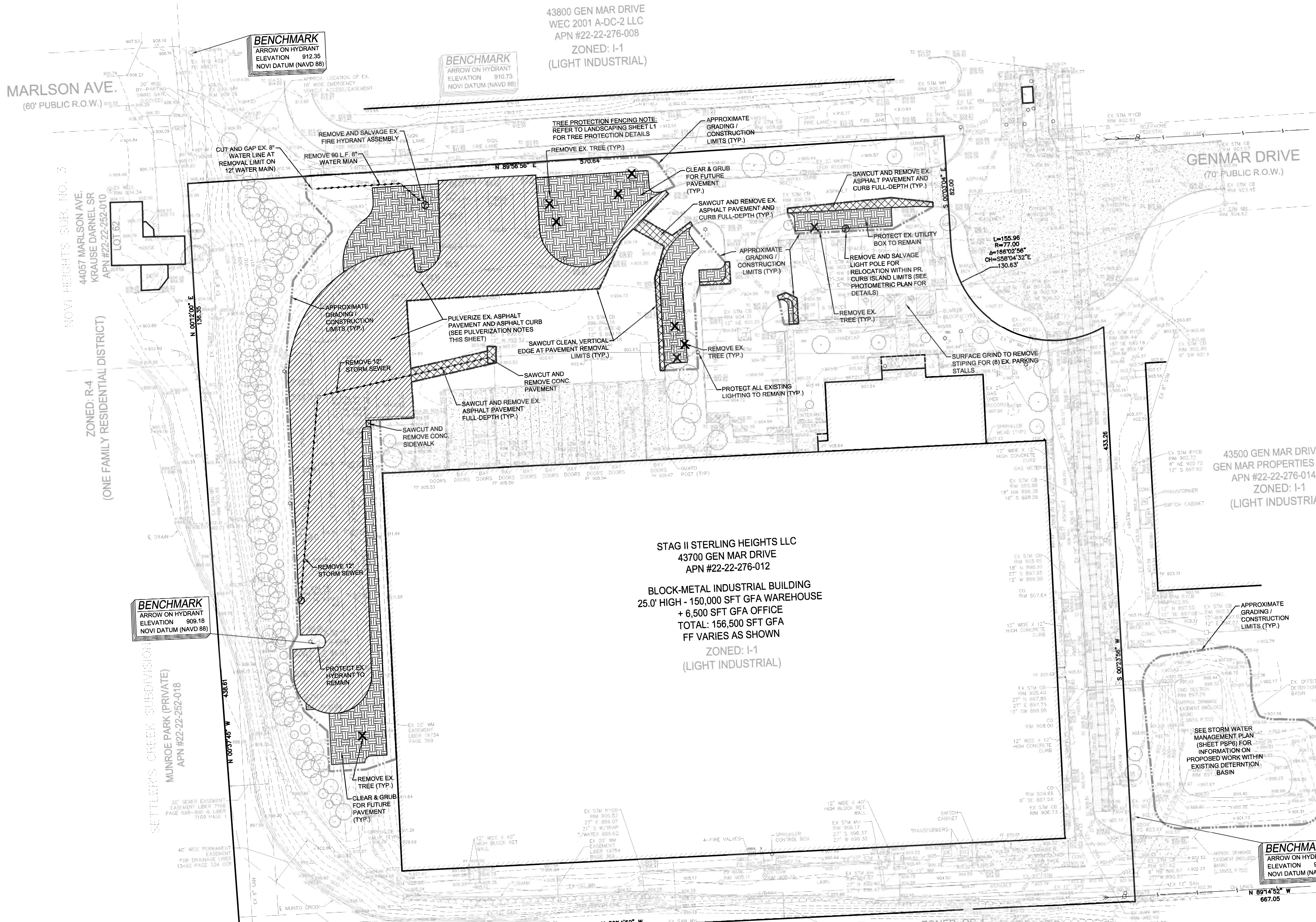
**REGULATED WETLANDS AND WOODLANDS NOTE**  
PER MR. PETER HILL, P.E., THIS SITE CONTAINS BOTH CITY REGULATED WETLANDS AND WOODLANDS. AN AREA OF CITY REGULATED WETLANDS EXISTS NEAR THE SOUTHWEST CORNER OF THE SITE (ASSOCIATED WITH AN EXISTING DRAIN), AN AREA OF CITY REGULATED WOODLANDS IS LOCATED ALONG THE WESTERN PERIMETER OF THE SITE.  
THE PROPOSED PROJECT WILL NOT IMPACT THE REGULATED WETLANDS OR WOODLANDS ON THIS SITE.

**DIMENSION NOTES**  
1. ALL RADIUS DIMENSIONS SHOWN ARE TO BACK OF CURB UNLESS OTHERWISE SPECIFIED.  
2. PARKING STALL & DRIVE AISLES ARE DIMENSIONED TO FACE OF CURB.



**DRAWN BY:**  
RP  
**DESIGNED BY:**  
BB/PT  
**APPROVED BY:**  
BB  
**DATE:**  
May 3, 2013  
**SCALE:** 1" = 40'  
40 20 0 20 40 60  
NFE JOB NO. SHEET NO.  
**H441 PSP1**





**NF ENGINEERS**  
 CIVIL ENGINEERS  
 LAND SURVEYORS  
 LAND PLANNERS

NOVAK & FRAUS ENGINEERS  
 46777 WOODWARD AVE.  
 PONTIAC, MI 48342-5032  
 TEL. (248) 332-7931  
 FAX. (248) 332-8257

**DEMOLITION NOTES**  
 DEMOLITION OF SITE IMPROVEMENTS SHALL BE ALLOWED ONLY AFTER AN APPROVED PERMIT HAS BEEN SECURED FROM THE PUBLIC AGENCY HAVING JURISDICTION OVER SAID DEMOLITION.

FOR ANY DEMOLITION WITHIN PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL PAY FOR, AND SECURE, ALL NECESSARY PERMITS AND LICENSES AND SHALL ARRANGE FOR ALL SITE INSPECTIONS.

SITE DEMOLITION INCLUDES THE COMPLETE REMOVAL OF SITE IMPROVEMENTS AND OFF-SITE DISPOSAL. DEBRIS SHALL BE TRANSPORTED TO AN APPROPRIATE DISPOSAL FACILITY THAT IS LICENSED FOR THAT TYPE OF DEBRIS.

THE CONTRACTOR SHALL COORDINATE TRUCK ROUTES WITH THE MUNICIPALITY PRIOR TO COMMENCEMENT OF SITE DEMOLITION. ALL TRUCKS SHALL BE TARPED OR PROPERLY SECURED TO CONTAIN DEMOLITION DEBRIS PRIOR TO LEAVING SITE.

EXISTING ON-SITE UNDERGROUND UTILITIES AND BUILDING SERVICES HAVE BEEN INDICATED BASED UPON THE BEST AVAILABLE UTILITY RECORDS AND/OR ON-SITE INSPECTION. NO GUARANTEE IS MADE BY THE DESIGN ENGINEER, AS TO THE COMPLETENESS OR ACCURACY OF UTILITY DATA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF UTILITY INFORMATION (THE DESIGN ENGINEER MAKES NO GUARANTEE NOR ASSUMES ANY LIABILITY AS TO THE COMPLETENESS AND/OR ACCURACY OF UTILITY DATA).

PRIOR TO THE REMOVAL OR ABANDONMENT OF ANY EXISTING UNDERGROUND UTILITY OR BUILDING SERVICE LINES CALLED FOR IN THE PLANS OR DISCOVERED DURING EXCAVATION, THE CONTRACTOR MUST DETERMINE IF THE UTILITY LINE OR BUILDING SERVICE IS STILL IN USE. IF THE UTILITY LINE OR BUILDING SERVICE IS STILL IN USE/ACTIVE THE CONTRACTOR MUST TAKE ALL THE NECESSARY STEPS TO GUARANTEE THAT THE UTILITY LINE OR BUILDING SERVICE IS RECONNECTED WITHOUT AN INTERRUPTION IN SERVICE. THE RECONNECTION OF THE UTILITY LINE OR BUILDING SERVICE MUST BE IN ACCORDANCE WITH THE STANDARDS AND REQUIREMENTS OF THE APPROPRIATE GOVERNMENTAL AGENCY OR PRIVATE UTILITY COMPANY.

SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO SITE DEMOLITION.

\* THE CONTRACTOR SHALL NOTIFY MISS DIG (1-800-482-7171) A MINIMUM OF THREE (3) WORKING DAYS PRIOR TO THE START OF THE SITE DEMOLITION.

THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH THE DETROIT EDISON COMPANY. REMOVAL OF DETROIT EDISON ELECTRICAL SERVICES SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND REQUIREMENTS OF DETROIT EDISON.

THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH CONSUMERS ENERGY/MICHIGAN. REMOVAL OF CONSUMERS ENERGY/MICHIGAN GAS SERVICES SHALL BE IN ACCORDANCE WITH THE STANDARDS AND REQUIREMENTS OF CONSUMERS ENERGY/MICHIGAN.

THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH AMERITECH. REMOVAL OF AMERITECH COMMUNICATION SERVICES SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND REQUIREMENTS OF AMERITECH.

THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH THE APPROPRIATE CABLE COMPANY. REMOVAL OF CABLE SERVICES SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND REQUIREMENTS OF THE CABLE COMPANY.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFICATION OF PRIVATE UTILITY COMPANIES AND COORDINATE UTILITY SERVICE SHUT OFF/DISCONNECT, PRIOR TO DEMOLITION OF EXISTING STRUCTURES OR PROPERTIES.

ALL UTILITY METERS SHALL BE REMOVED BY THE APPROPRIATE UTILITY COMPANY.

ANY ON-SITE STORM SEWER FACILITIES LOCATED DURING DEMOLITION SHALL BE REMOVED AND BULK HEADED AT THE PROPERTY LINE IF INDICATED FOR REMOVAL ON THE PLANS.

PRIOR TO BUILDING DEMOLITION, ALL HAZARDOUS MATERIAL SHALL BE REMOVED BY OTHERS. THE DEMOLITION CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER SHOULD ANY SUSPICIOUS MATERIAL BE FOUND.

WATER SERVICES AND/OR STOP-BOX SHALL BE PRESERVED AND BULK HEADED AT THE PROPERTY LINE OR AS DIRECTED BY THE OWNER'S REPRESENTATION.

WHERE EXISTING BUILDINGS PLANNED FOR DEMOLITION FALL WITHIN PROPOSED BUILDING FOOT PRINTS, BASEMENT FLOOR SLABS, FOUNDATION WALLS AND FOOTINGS SHALL BE COMPLETELY REMOVED AND BACK FILLED WITH MDOT CLASS II GRANULAR MATERIAL AND BE MACHINE COMPACTED TO A MINIMUM OF 98% OF MATERIALS MAXIMUM DENSITY.

**UTILITY DISCLAIMER**  
 THE LOCATIONS AND ELEVATIONS OF SOME OF THE EXISTING UNDERGROUND UTILITIES AS SHOWN ON THE SURVEY DRAWING WERE OBTAINED FROM MUNICIPAL AND UTILITY COMPANY RECORDS AND MAPS. THEREFORE, NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT UTILITY LOCATIONS AND ELEVATIONS PRIOR TO THE START OF CONSTRUCTION.

**LEGEND**

MANHOLE	EXISTING SANITARY SEWER
HYDRANT	EXISTING SAN. CLEAN OUT
MANHOLE CATCH BASIN	EXISTING WATER MAIN
	EXISTING STORM SEWER
	EX. R. Y. CATCH BASIN
UTILITY POLE	EXISTING BURIED CABLES
GUY POLE	OVERHEAD LINES
GUY WIRE	LIGHT POLE
	SIGN

**DEMOLITION LEGEND**

	PULVERIZE EX. ASPHALT PAVEMENT AND CURB FULL-DEPTH (SEE PULVERIZATION NOTES THIS SHEET)
	SAWCUT AND REMOVE EX. PAVEMENT FULL-DEPTH
	CLEAR & GRUB FOR FUTURE PAVEMENT
	EX. UTILITY LINE TO BE REMOVED
	EX. UTILITY STRUCTURE TO BE REMOVED
	EX. TREE TO BE REMOVED

**PULVERIZATION NOTES**

- PULVERIZATION OF EXISTING PAVEMENT SHALL BE IN ACCORDANCE WITH M.D.O.T. STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2012, SECTION 302.
- IN AREAS THAT WILL RECEIVE NEW PAVEMENT, THE CONTRACTOR SHALL PULVERIZE EXISTING ASPHALT PAVEMENT IN PLACE, RE-SHAPE TO COORDINATE WITH PROPOSED PAVEMENT ELEVATIONS, AND RE-COMPACT.
- IN AREAS THAT WILL BE CONVERTED TO GREENBELT, THE CONTRACTOR SHALL REMOVE PULVERIZED MATERIAL.
- EXCESS PULVERIZED MATERIAL SHALL BE STOCKPILED ON SITE IN A LOCATION THAT WILL BE DETERMINED WITH THE OWNER TO BE USED AS BASE MATERIAL IN PROPOSED PARKING ADDITIONS.
- FOR PROPOSED PARKING ADDITIONS, THE PULVERIZED MATERIAL SHALL BE MIXED WITH M.D.O.T. 21AA LIMESTONE TO CREATE A HOMOGENEOUS BASE MATERIAL. PULVERIZED MATERIAL SHALL NOT CONSTITUTE GREATER THAN 50% OF THE TOTAL MIXTURE.
- CONTRACTOR SHALL COMPACT FINAL BASE MATERIAL IN ALL WORK AREAS IN MAXIMUM 4 INCH LIFTS AS REQUIRED TO ACHIEVE A MINIMUM OF 95% DENSITY IN ACCORDANCE WITH ASTM D-1557.
- CONTRACTOR IS RESPONSIBLE FOR CALCULATING AMOUNT OF PULVERIZED MATERIAL THAT WILL BE REQUIRED. EXCESS PULVERIZED MATERIAL THAT IS NOT UTILIZED SHALL BE REMOVED FROM THE SITE IN ACCORDANCE WITH DEMOLITION NOTES ON THIS SHEET.
- SAWCUTTING SHALL BE PERFORMED AT ALL REPAIR LIMITS TO PROVIDE CLEAN REPAIR EDGE.

**ESTIMATED QUANTITIES**

NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

**DEMOLITION**

DESCRIPTION	QUANTITY	UNITS
PULVERIZE EX. ASPH. PAVT. FULL-DEPTH	3,330	S.Y.
REMOVE EX. ASPH. PAVT. FULL-DEPTH	231	S.Y.
REMOVE EX. CONC. PAVEMENT FULL-DEPTH	9	S.Y.
REMOVE EX. CONC. SIDEWALK FULL-DEPTH	2	S.Y.
CLEAR & GRUB FOR FUTURE PAVT.	1,430	S.Y.
REMOVE & SALVAGE HYDRANT	1	E.A.
REMOVE 8" WATER MAIN	90	L.F.
REMOVE CATCH BASIN	1	E.A.
REMOVE 12" STORM SEWER	284	L.F.
REMOVE & SALVAGE LIGHT POLE	1	E.A.
REMOVE EX. TREE	9	E.A.
REMOVE EX. PARKING STALL MARKINGS	8	E.A.

MARLSON AVE.  
 (60' PUBLIC R.O.W.)

43800 GEN MAR DRIVE  
 WEC 2001 A-DC-2 LLC  
 APN #22-22-276-008  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

GENMAR DRIVE  
 (70' PUBLIC R.O.W.)

43500 GEN MAR DRIVE  
 GEN MAR PROPERTIES LLC  
 APN #22-22-276-014  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

STAG II STERLING HEIGHTS LLC  
 43700 GEN MAR DRIVE  
 APN #22-22-276-012  
 BLOCK-METAL INDUSTRIAL BUILDING  
 25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
 + 6,500 SFT GFA OFFICE  
 TOTAL: 156,500 SFT GFA  
 FF VARIES AS SHOWN  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

CITY OF NOVI  
 APN #22-22-400-027  
 ZONED: OS-1  
 (OFFICE SERVICE)

BENCHMARK  
 ARROW ON HYDRANT  
 ELEVATION 908.38  
 NOVI DATUM (NAVD 88)

BENCHMARK  
 ARROW ON HYDRANT  
 ELEVATION 912.35  
 NOVI DATUM (NAVD 88)

BENCHMARK  
 ARROW ON HYDRANT  
 ELEVATION 910.73  
 NOVI DATUM (NAVD 88)

BENCHMARK  
 ARROW ON HYDRANT  
 ELEVATION 906.38  
 NOVI DATUM (NAVD 88)

SEAL



PROJECT  
 43700 Gen Mar Drive

CLIENT  
 Eberspacher North America, Inc.

PROJECT LOCATION  
 Part of the NE 1/4 of Section 22  
 T. 1 N., R. 8 E.  
 City of Novi, Oakland County, Michigan

SHEET  
 Demolition Plan



REVISIONS  
 07-17-13 Preliminary Site Plan

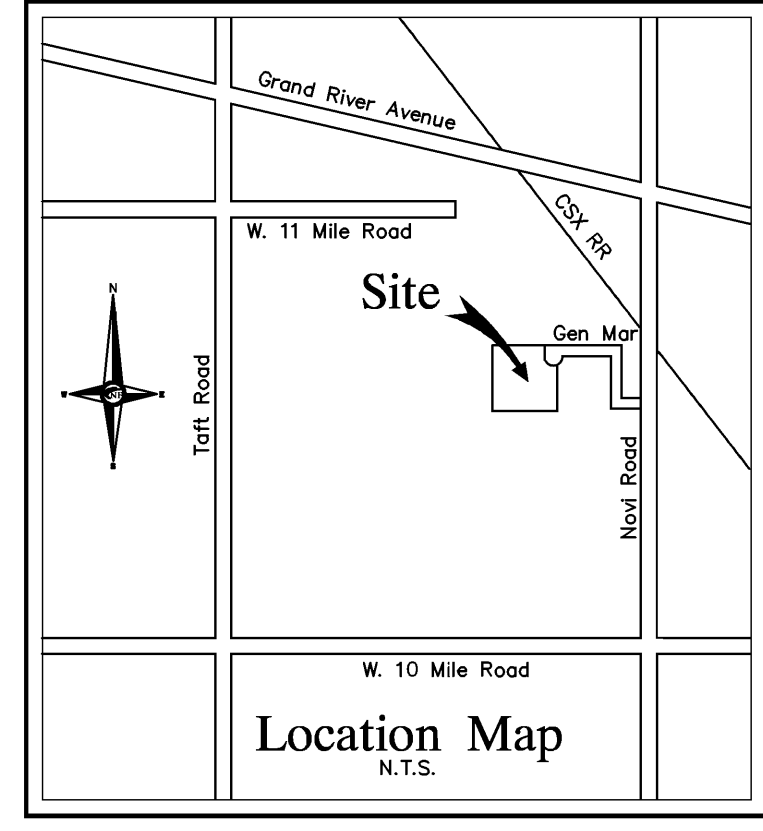
DRAWN BY:  
 PT  
 DESIGNED BY:  
 BB/PT  
 APPROVED BY:  
 BB  
 DATE:  
 04/30/2013

SCALE: 1"=30'

NFE JOB NO. SHEET NO.  
 H441 PSP2

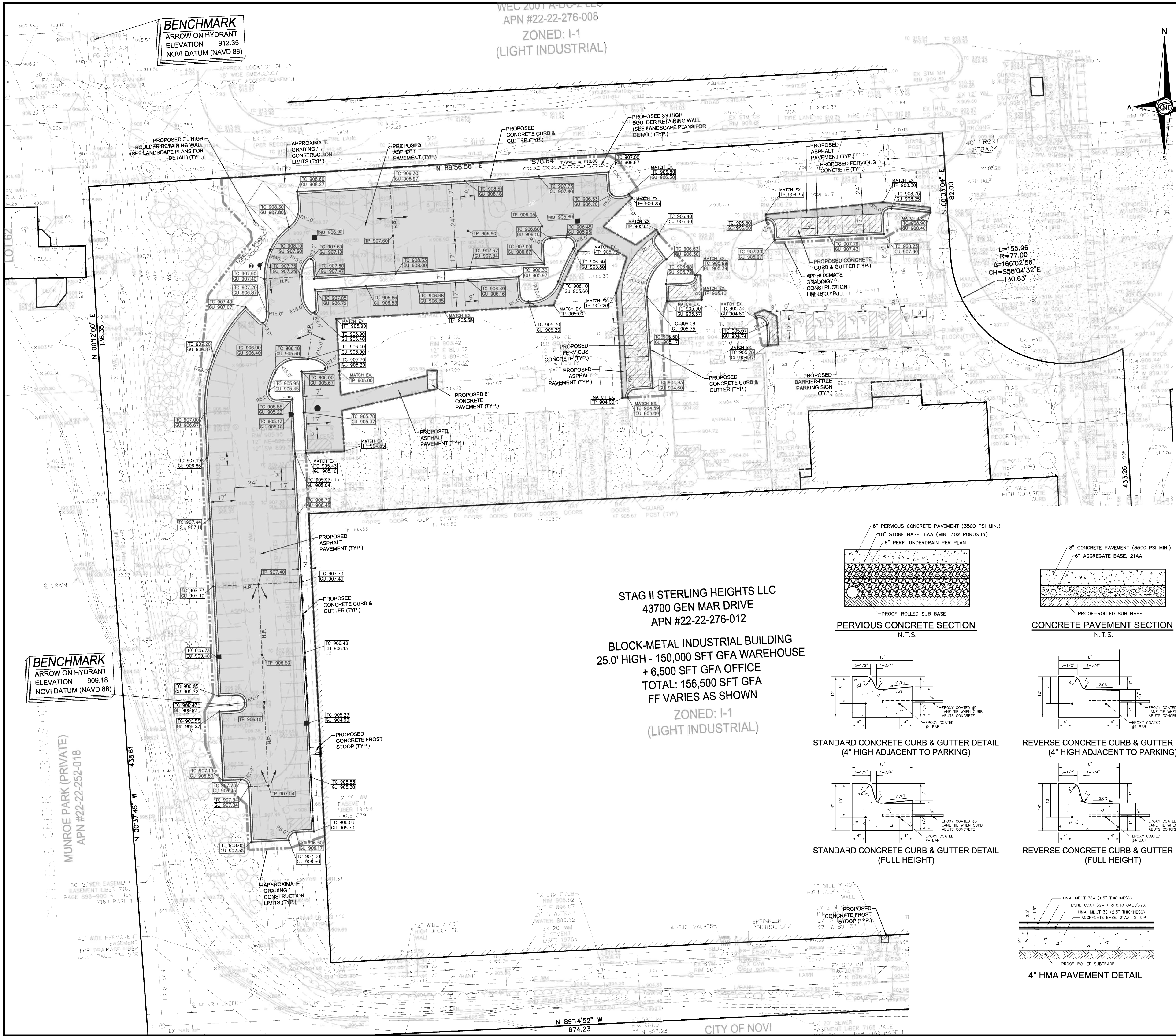
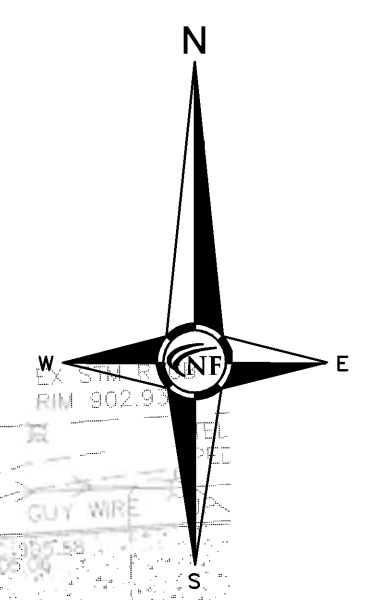


WEC 2001-A-D-02-ELC  
 APN #22-22-276-008  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)



**NF ENGINEERS**  
 CIVIL ENGINEERS  
 LAND SURVEYORS  
 LAND PLANNERS

NOVAK & FRAUS ENGINEERS  
 46777 WOODWARD AVE.  
 PONTIAC, MI 48342-5032  
 TEL. (248) 332-7931  
 FAX. (248) 332-8257



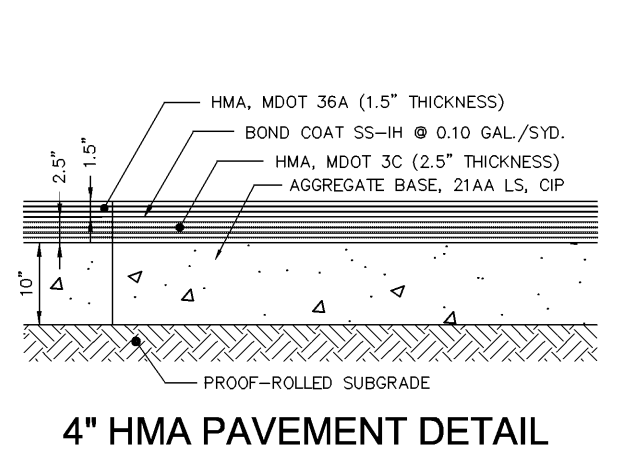
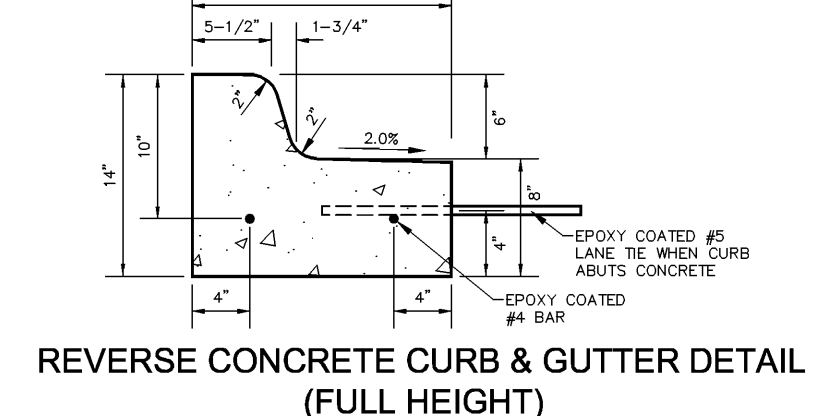
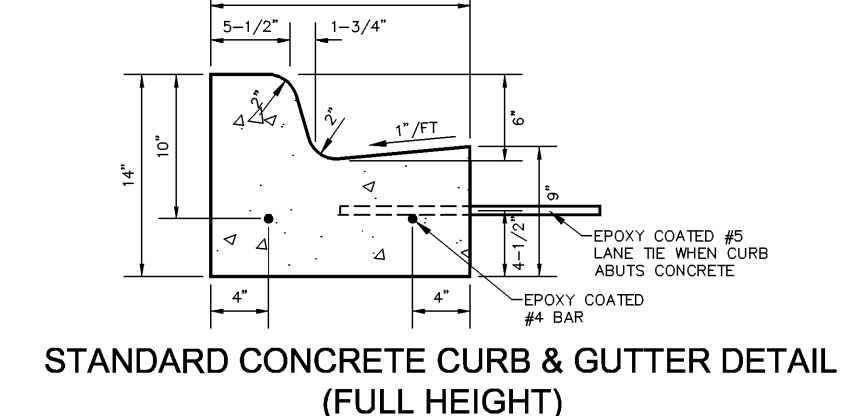
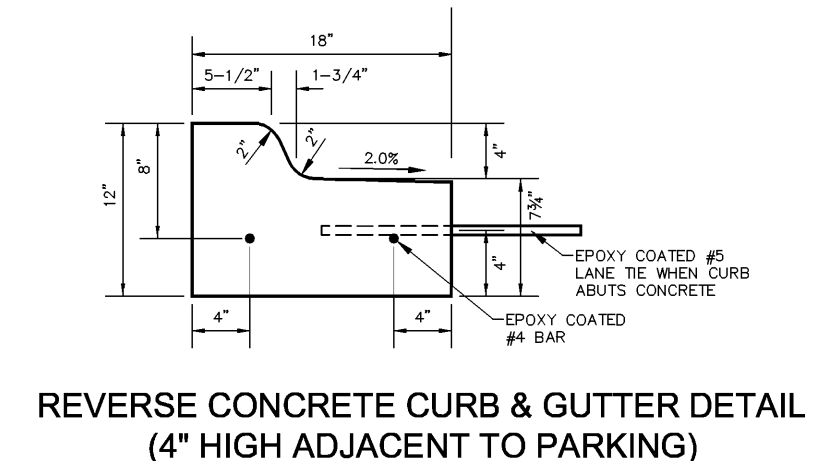
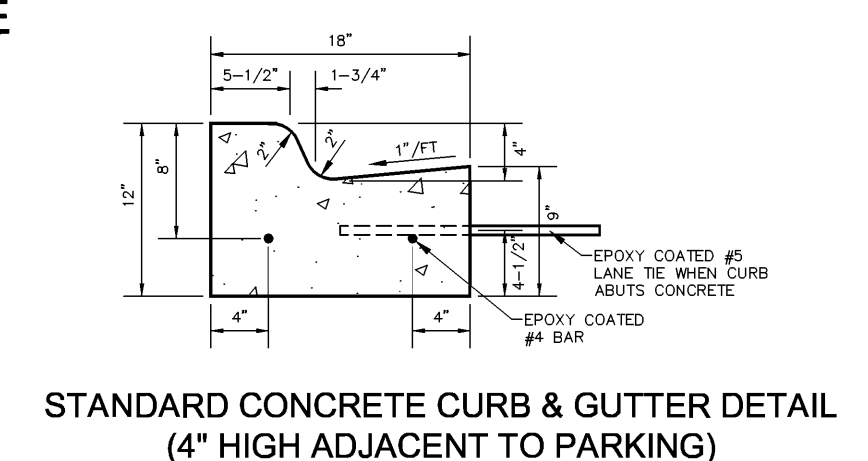
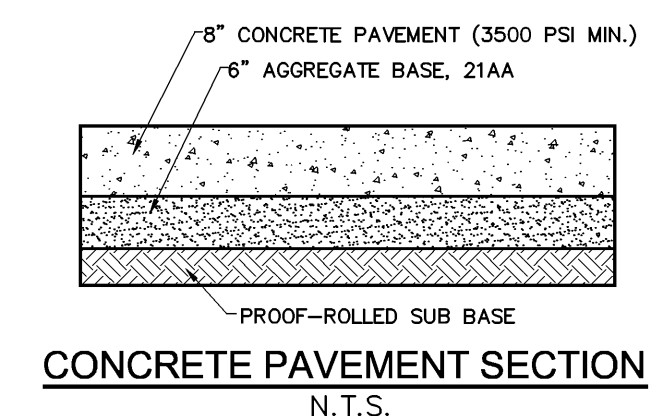
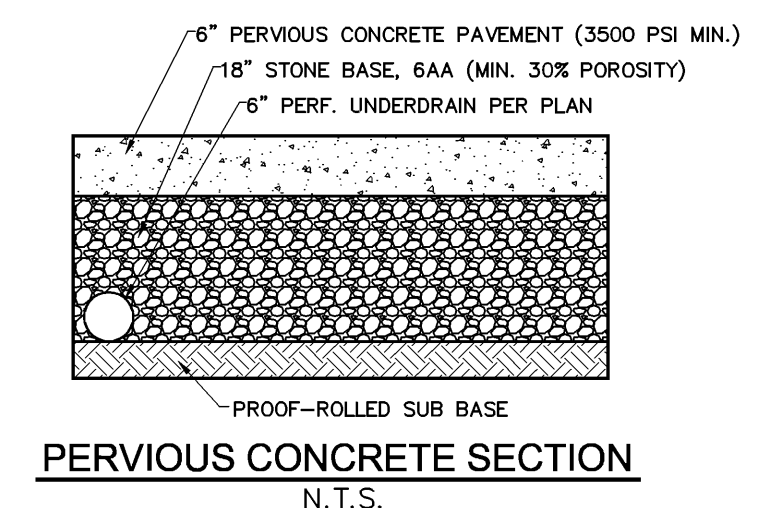
**BENCHMARK**  
 ARROW ON HYDRANT  
 ELEVATION 912.35  
 NOVI DATUM (NAVD 88)

**BENCHMARK**  
 ARROW ON HYDRANT  
 ELEVATION 909.18  
 NOVI DATUM (NAVD 88)

**STAG II STERLING HEIGHTS LLC**  
 43700 GEN MAR DRIVE  
 APN #22-22-276-012

**BLOCK-METAL INDUSTRIAL BUILDING**  
 25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
 + 6,500 SFT GFA OFFICE  
 TOTAL: 156,500 SFT GFA  
 FF VARIES AS SHOWN

ZONED: I-1  
 (LIGHT INDUSTRIAL)



**GENERAL PAVING NOTES:**  
 1. PAVEMENT SHALL BE OF THE TYPE, THICKNESS AND CROSS SECTION AS INDICATED ON THE PLANS AND AS FOLLOWS:

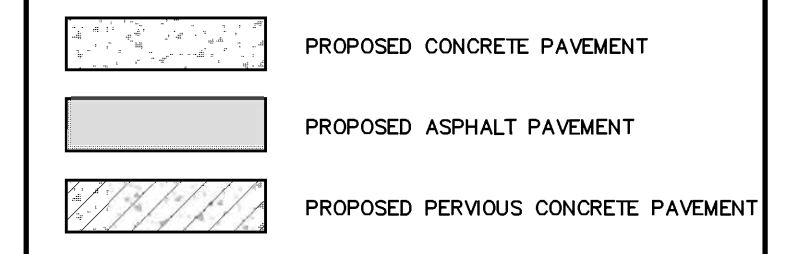
- CONCRETE: PORTLAND CEMENT TYPE IA (AIR-ENTRAINED) WITH A MINIMUM CEMENT CONTENT OF SIX SACKS PER CUBIC YARD, MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3,500 PSI AND A SLUMP OF 1 1/2 TO 3 INCHES. CONCRETE CURB AND GUTTER SHALL MEET MDOT P1 MATERIAL SPECIFICATIONS. 7-SACK HIGH-EARLY NOT ALLOWED.
- HOT MIX ASPHALT (HMA): LEVELING COURSE - AS NOTED; SURFACE COURSE - AS NOTED; ASPHALT BOND COAT SHALL MEET SS-1H EMULSION, AND SHALL BE INSTALLED BETWEEN THE LEVELING AND TOP COURSES. ASPHALT BINDER SHALL MEET PG64-22 SPECIFICATIONS. COMPACT ALL ASPHALT COURSES TO 97% MAXIMUM DENSITY.
- 2. RECLAIMED ASPHALT PAVEMENT (RAP) IS PROHIBITED IN ALL TOP COURSE PAVEMENTS. THE USE OF RAP IN BASE AND LEVELING COURSES SHALL BE IN ACCORDANCE WITH CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. THE CONTRACTOR AND TESTING ENGINEER ARE RESPONSIBLE FOR QUALITY CONTROL OF ALL PAVING OPERATIONS AND MATERIALS.
- 3. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT. SAND SUB-BASE SHALL MEET MDOT CLASS II SPECIFICATIONS, AND SHALL BE COMPACTED TO 95% MAX. DENSITY.
- 4. ALL CONCRETE PAVEMENT, DRIVEWAYS, CURB & GUTTER, ETC. SHALL BE SPRAY CURED WITH WHITE MEMBRANE CURING COMPOUND IMMEDIATELY FOLLOWING FINISHING OPERATION.
- 5. ALL CONCRETE PAVEMENT JOINTS SHALL BE FILLED WITH HOT Poured RUBBERIZED ASPHALT JOINT SEALING COMPOUND IMMEDIATELY AFTER SAWCUT OPERATION. FEDERAL SPECIFICATION SS-5164.
- 6. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF CITY OF NOVI AND THE MICHIGAN DEPARTMENT OF TRANSPORTATION.
- 7. ALL TOP OF CURB ELEVATIONS, AS SHOWN ON THE PLANS, ARE CALCULATED FOR A 6" CONCRETE CURB UNLESS OTHERWISE NOTED.
- 8. ALL SIDEWALK RAMPS, CONFORMING TO PUBLIC ACT NO. 8, 1973 AND ICANSI A117.1-1996, SECTION 406, SHALL BE INSTALLED AS INDICATED ON THE PLANS. FOR ANY WORK WITHIN THE PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL PAY FOR AND SECURE ALL NECESSARY PERMITS AND LIKEWISE ARRANGE FOR ALL INSPECTION.
- 10. EXISTING TOPSOIL, VEGETATION AND ORGANIC MATERIALS SHALL BE STRIPPED AND REMOVED FROM PROPOSED PAVEMENT AREA PRIOR TO PLACEMENT OF BASE MATERIALS.
- 11. EXPANSION & CONTRACTION JOINTS SHALL BE PLACED IN ACCORDANCE WITH CITY OF NOVI STANDARDS, AND THE INDUSTRY QUALITY STANDARDS.
- 12. ALL PAVEMENT AREAS SHALL BE PROOF-ROLLED UNDER THE SUPERVISION OF A GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF BASE MATERIALS AND PAVING MATERIALS.
- 13. FILL AREAS SHALL BE MACHINE COMPACTED IN UNIFORM LIFTS NOT EXCEEDING 9 INCHES THICK TO 95% OF THE MAXIMUM DENSITY (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT.
- 14. ALL STRUCTURES (MANHOLES, GATEWELLS, HYDRANTS, ETC.) SHALL BE ADJUSTED TO THE FINISH GRADE.
- 16. THE CONTRACTOR SHALL REQUEST WRITTEN CLARIFICATION FROM THE ENGINEER WELL IN ADVANCE OF CONSTRUCTION, SHOULD THERE BE ANY QUESTIONS.

**ESTIMATED QUANTITIES**

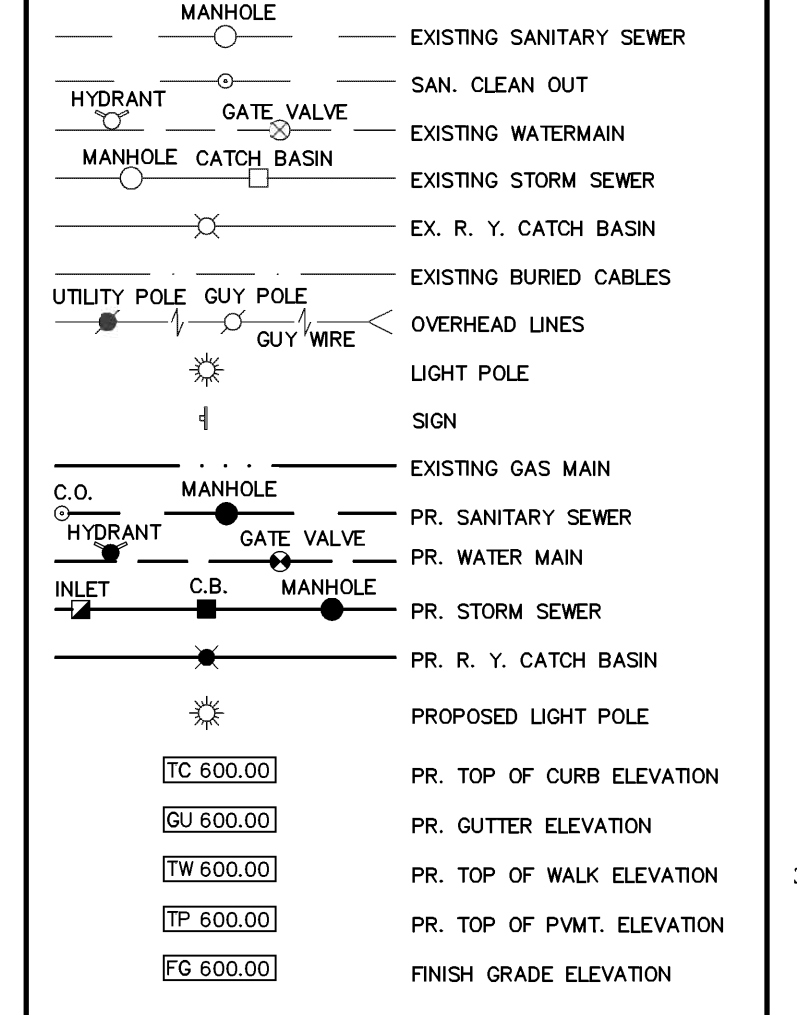
NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

PAVING	DESCRIPTION	QUANTITY	UNITS
4"	ASPHALT ON 10" 21AA BASE	4,048	S.Y.
6"	PERVIOUS CONC. ON 18" STONE BASE	307	S.Y.
8"	CONCRETE PAVT. ON 6" 21AA BASE	9	S.Y.
6"	CONCRETE CURB & GUTTER	475	L.F.
4"	CONCRETE CURB & GUTTER	1,547	L.F.
	CONCRETE FROST STOOP	7	S.Y.
	BARRIER-FREE PARKING SIGN & POST	7	E.A.

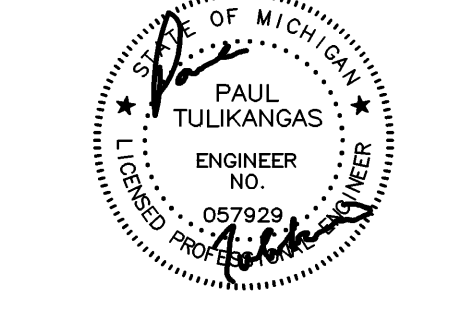
**PAVING LEGEND**



**LEGEND**



SEAL



PROJECT  
 43700 Gen Mar Drive

CLIENT  
 Eberspaecher North America, Inc.

PROJECT LOCATION  
 Part of the NE 1/4 of Section 22  
 T. 1 N., R. 8 E.  
 City of Novi, Oakland County, Michigan

SHEET  
 Paving & Grading Plan



REVISIONS  
 07-17-13 Preliminary Site Plan

DRAWN BY:  
 PT

DESIGNED BY:  
 BB/PT

APPROVED BY:  
 BB

DATE:  
 04/30/2013

SCALE: 1"=30'

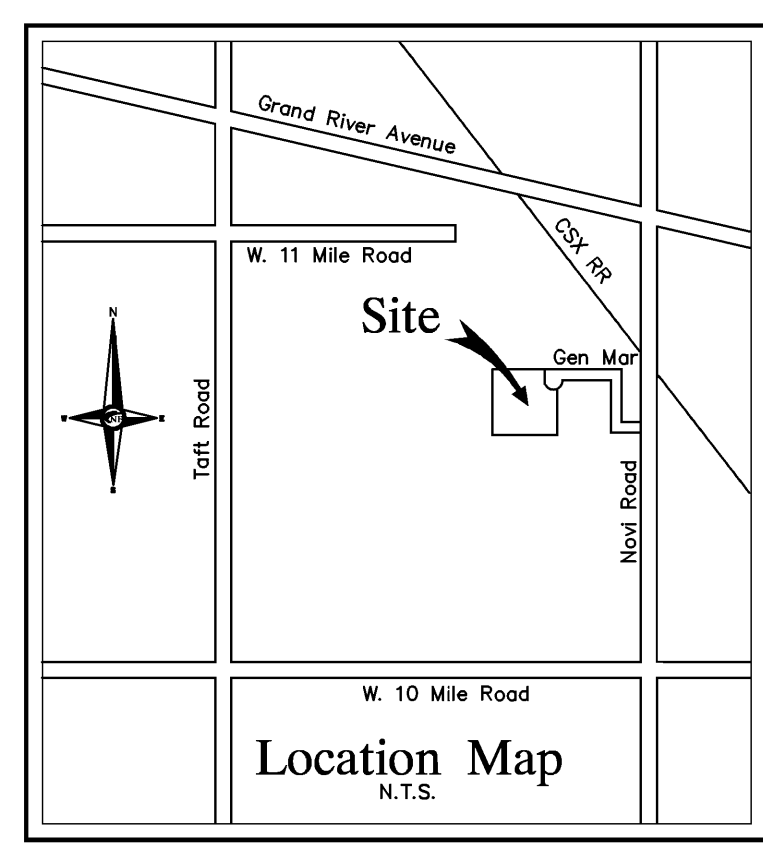
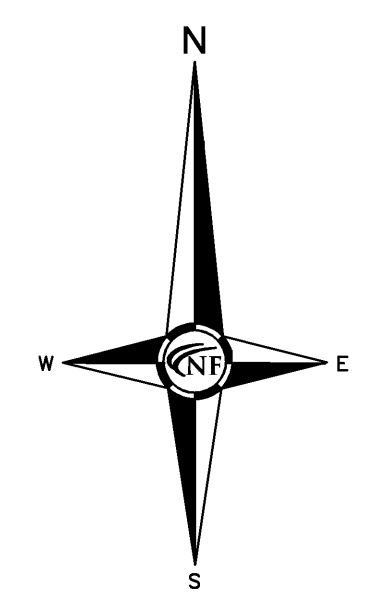
NFE JOB NO. SHEET NO.  
**H441 PSP3**



ARROW ON HYDRANT  
ELEVATION 912.35  
NOVI DATUM (NAVD 88)

BENCHMARK  
ARROW ON HYDRANT  
ELEVATION 910.73  
NOVI DATUM (NAVD 88)

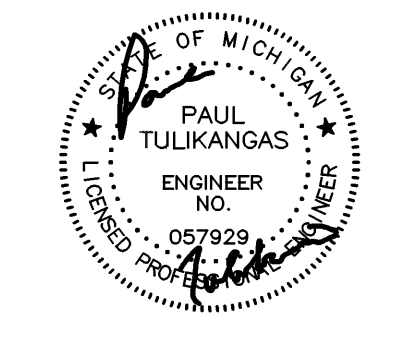
ZONED: I-1  
(LIGHT INDUSTRIAL)



**NF**  
ENGINEERS  
CIVIL ENGINEERS  
LAND SURVEYORS  
LAND PLANNERS

NOWAK & FRAUS ENGINEERS  
46777 WOODWARD AVE.  
PONTIAC, MI 48342-5032  
TEL. (248) 332-7931  
FAX. (248) 332-8257

SEAL



PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspaecher North  
America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of  
Section 22  
T. 1 N., R. 8 E.  
City of Novi,  
Oakland County, Michigan

SHEET  
Utility Plan



REVISIONS  
07-17-13 Preliminary Site Plan

DRAWN BY:  
PT

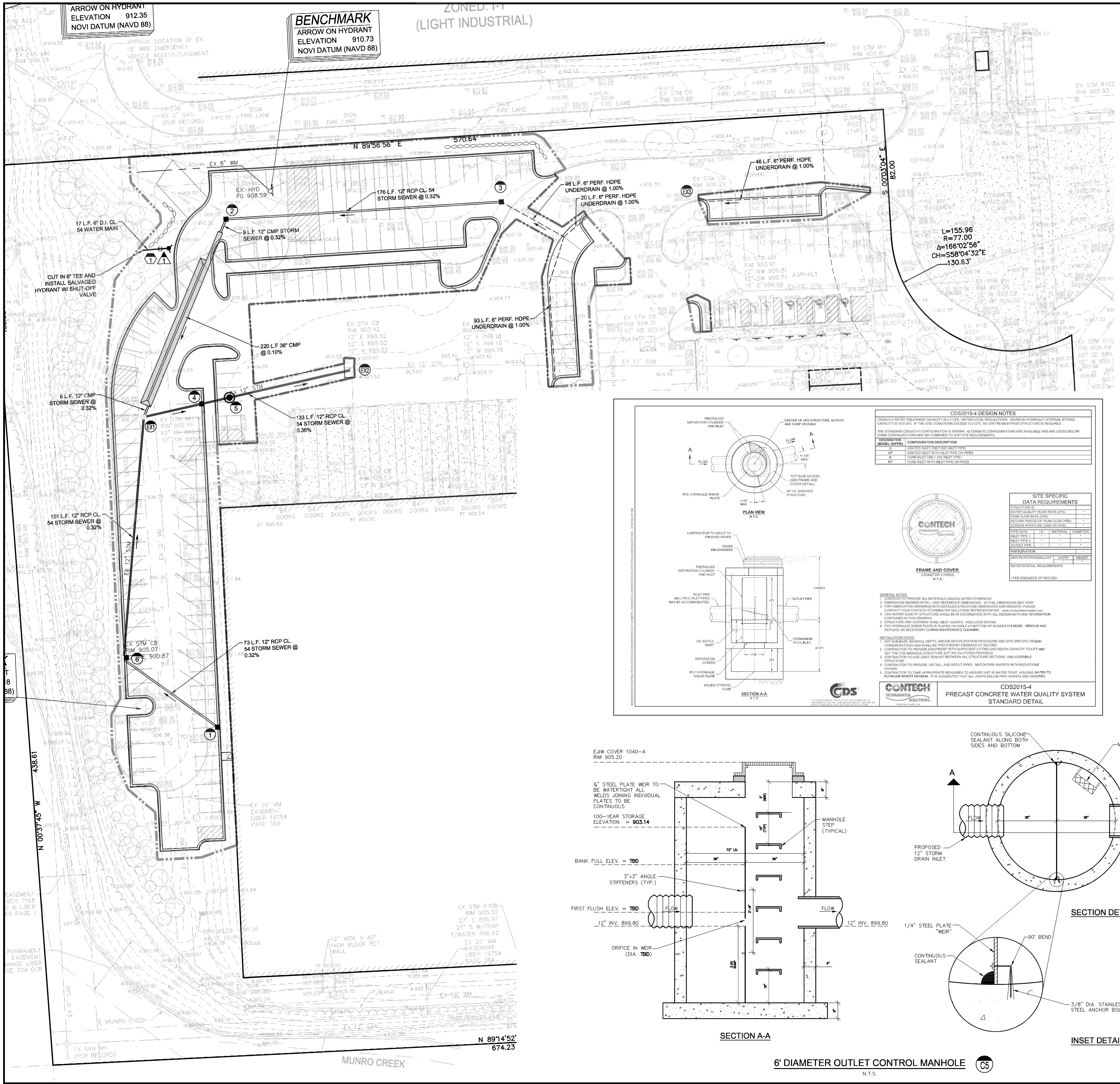
DESIGNED BY:  
BB/PT

APPROVED BY:  
BB

DATE:  
04/30/2013

SCALE: 1" = 30'

NFE JOB NO. SHEET NO.  
H441 PSP4



**PROPOSED STORM SEWER SCHEDULE**

<p>EX1 TAP EX. MANHOLE AND RE-SET RIM ELEVATION EX. RIM 905.35 PR. RM 906.25 EX. 12" INV NE 899.50 (REMOVE) EX. 12" INV SW 900.00 (REMOVE) PR. 12" INV SW 900.00 PR. 12" INV N 900.00</p>	<p>2 PR. PRE-TREATMENT CATCH BASIN W/ 2' SUMP (CONTECH CDS 2015 OR EQUAL) E/W COVER 5105 RIM 906.90 PR. 12" INV SW 900.15 PR. 12" INV E 900.15</p>
<p>EX2 TAP EX. CATCH BASIN EX. RIM 903.42 EX. 12" INV N 899.52 EX. 12" INV S 899.50 (REMOVE) PR. RM 906.29 PR. 12" INV S 899.52</p>	<p>3 PR. 4' DIA. CATCH BASIN W/ 2' SUMP E/W COVER 5105 RIM 905.80 PR. 12" INV 900.71 PR. 6" INV E 900.15</p>
<p>EX3 TAP EX. CATCH BASIN EX. RIM 906.29 PR. RM 906.29 EX. 12" INV SE 900.94 PR. 6" INV E 903.00</p>	<p>4 PR. PRE-TREATMENT CATCH BASIN W/ 2' SUMP (CONTECH CDS 2015 OR EQUAL) E/W COVER 5105 RIM 905.10 PR. 12" INV SW 899.87 PR. 12" INV NE 899.87</p>
<p>T1 PR. 4' DIA. CATCH BASIN W/ 2' SUMP E/W COVER 5105 RIM 904.90 PR. 12" INV NE 900.72</p>	<p>5 PR. OUTLET CONTROL MANHOLE RIM 905.20 PR. 12" INV SW 899.80 PR. 12" INV NE 899.80</p>
	<p>6 PR. PRE-TREATMENT CATCH BASIN W/ 2' SUMP (CONTECH CDS 2015 OR EQUAL) RIM 905.40 PR. 12" INV SE 900.48 PR. 12" INV NE 900.48</p>

**PROPOSED WATER MAIN SCHEDULE**

<p>T1 PR. 6" STANDARD FIRE HYDRANT W/ VALVE &amp; BOX PR. F.G. 908.25 PR. T/P 902.75</p>	<p>T2 PR. 6" SHUT-OFF VALVE IN BOX PR. F.G. 908.50</p>
--	--

**ESTIMATED QUANTITIES**

NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

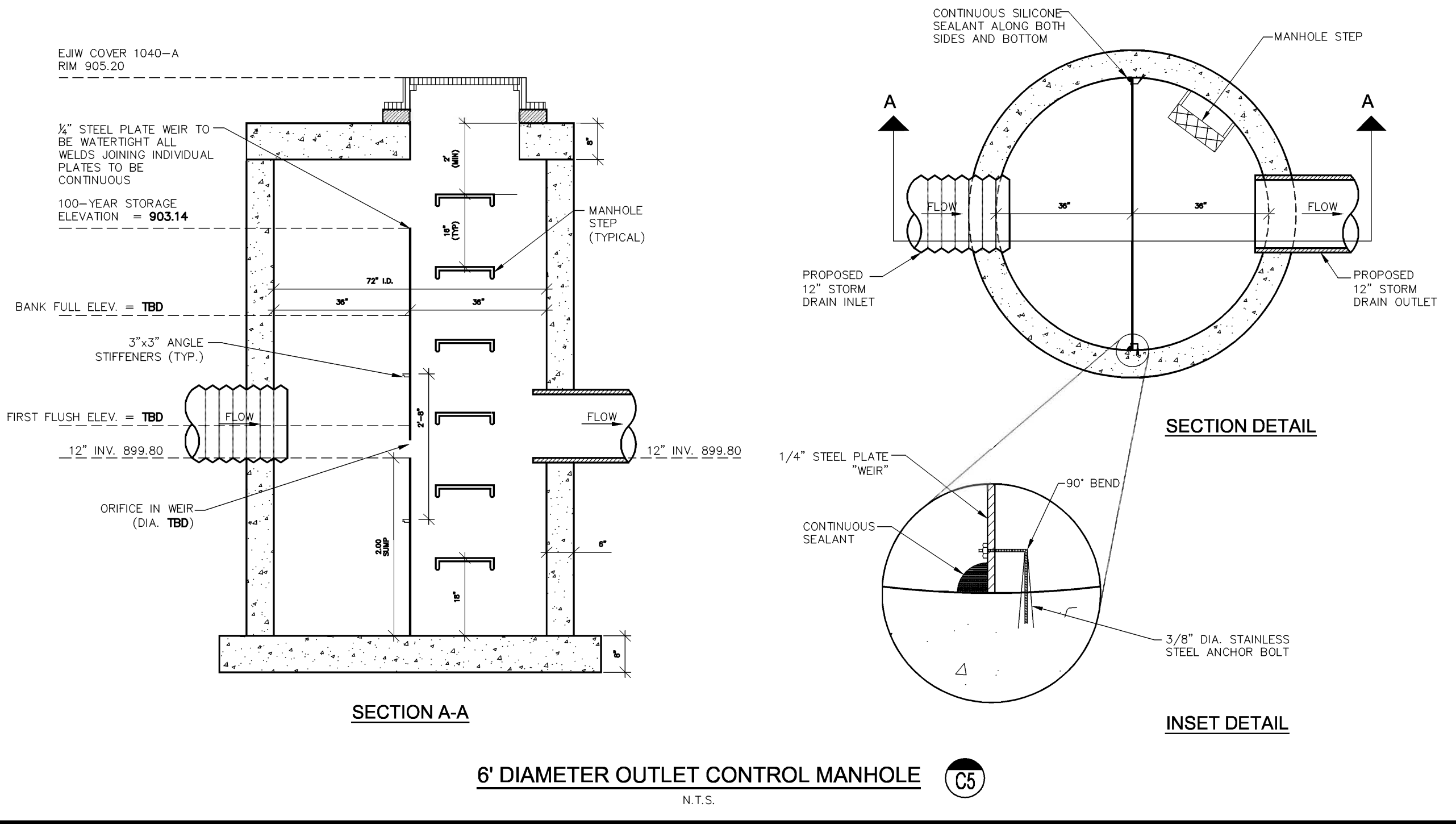
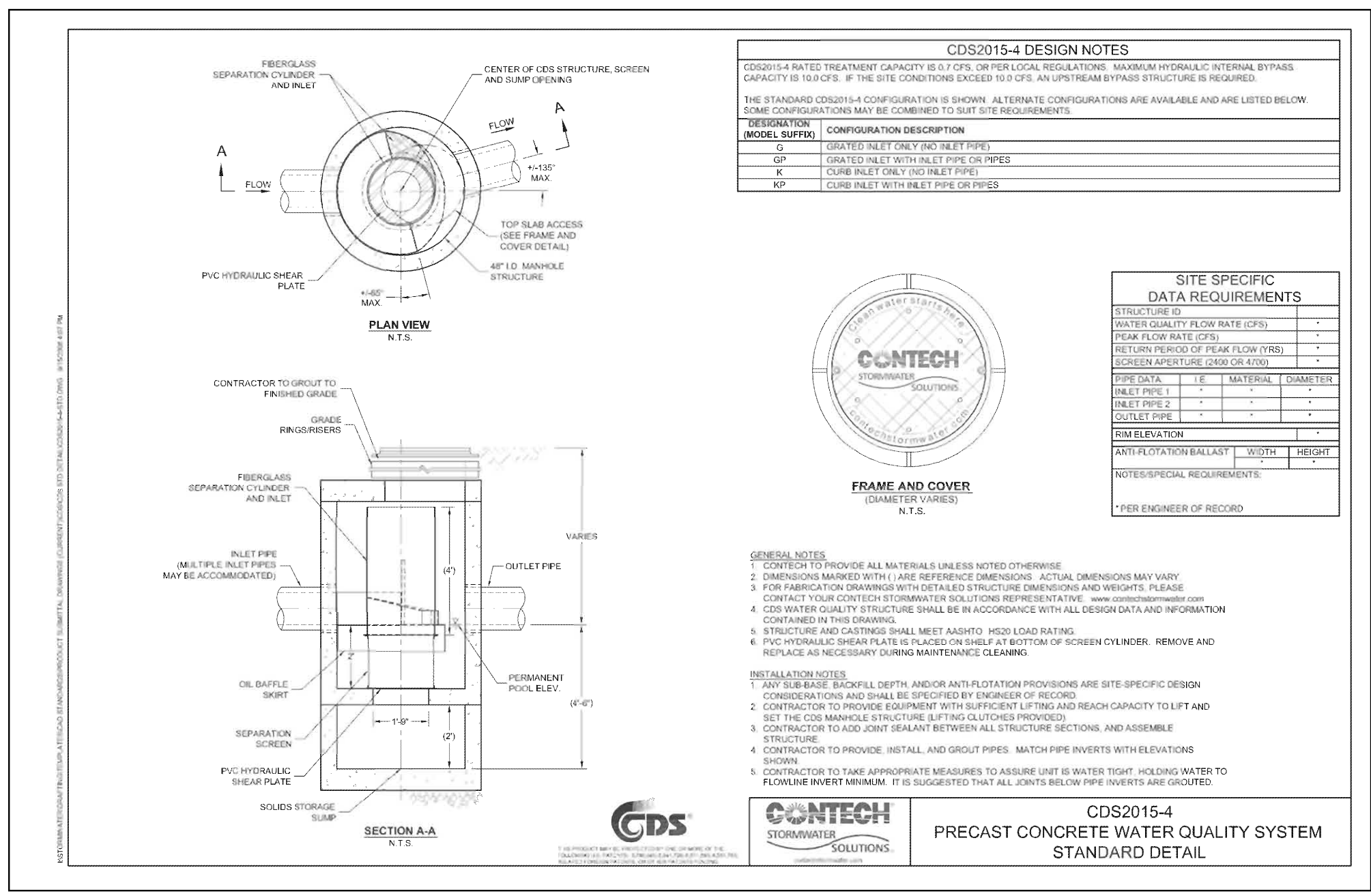
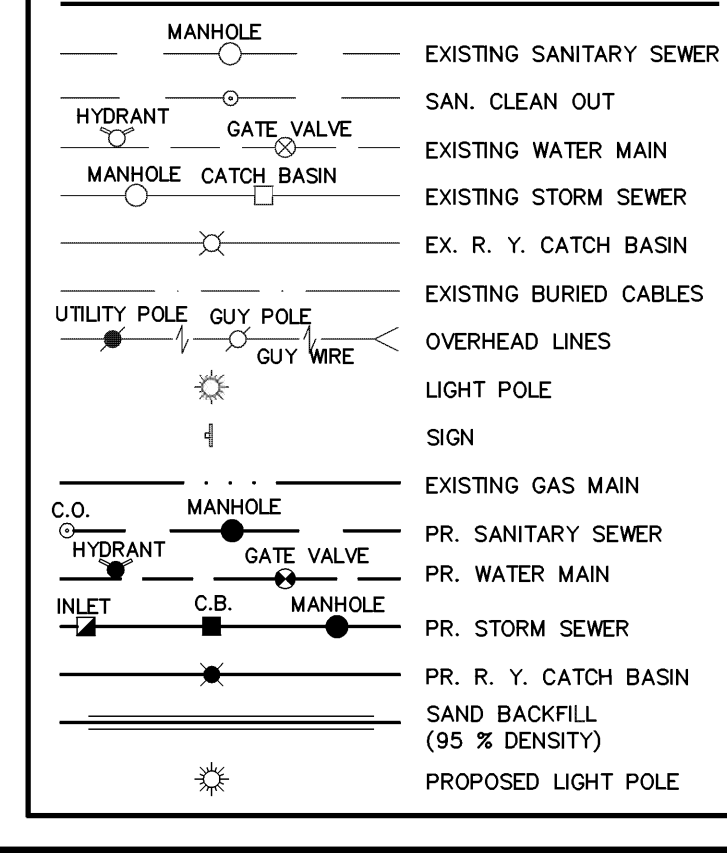
**STORM SEWER**

DESCRIPTION	QUANTITY	UNITS
36" CMP	220	L.F.
12" C-76, CLASS IV, SEWER PIPE	548	L.F.
6" PERFORATED HDPE UNDERDRAIN	205	L.F.
PRE-TREATMENT CATCH BASIN W/ 2' SUMP	3	EA.
4' DIA. CATCH BASIN W/ 2' SUMP	2	EA.
OUTLET CONTROL MANHOLE	1	EA.
12" SEWER TAP/CONNECTION	4	EA.
6" SEWER TAP/CONNECTION	1	EA.

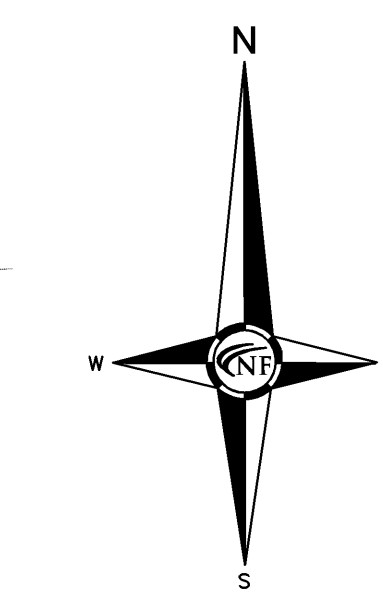
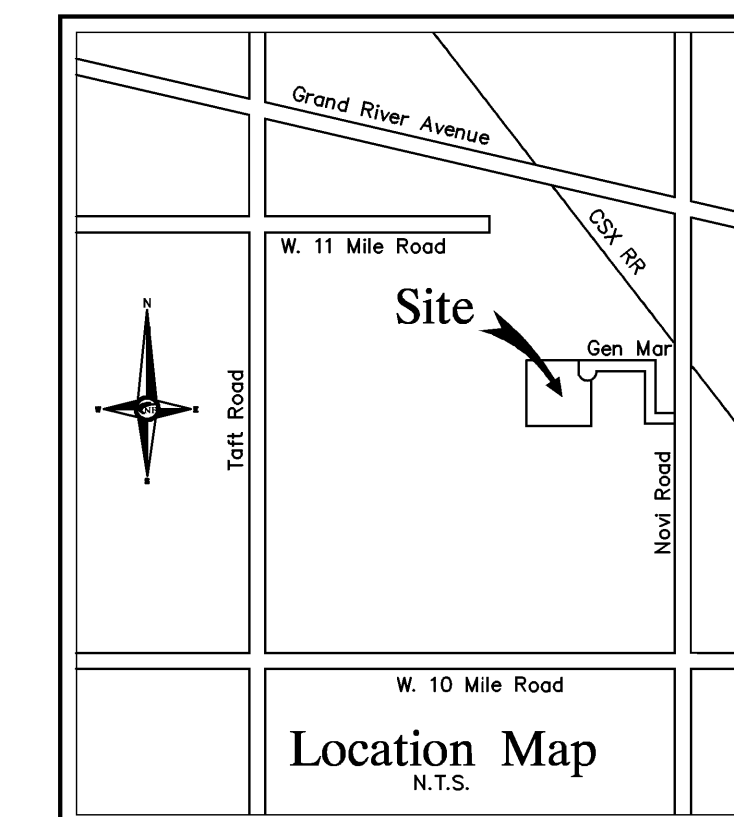
**WATER MAIN**

DESCRIPTION	QUANTITY	UNITS
6" D.I., CLASS 54, WATER MAIN	17	L.F.
6" SHUT-OFF VALVE	1	EA.
SALVAGE & RE-INSTALL HYDRANT	1	EA.
WATER MAIN CONNECTION	1	EA.

**LEGEND**







WEC 2001 A-DC-2 LLC  
 APN #22-22-276-008  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

SOIL TYPE  
 59

GENMAR DRIVE  
 (70' PUBLIC R.O.W.)

MARLSON AVE.  
 60' PUBLIC R.O.W.)

SOIL TYPE  
 60B

SOIL TYPE  
 13B

43500 GEN MAR DRIVE  
 GEN MAR PROPERTIES LLC  
 APN #22-22-276-014  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

STAG II STERLING HEIGHTS LLC  
 43700 GEN MAR DRIVE  
 APN #22-22-276-012  
 BLOCK-METAL INDUSTRIAL BUILDING  
 + 6,500 SFT GFA OFFICE  
 TOTAL: 156,500 SFT GFA  
 FF VARIES AS SHOWN  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

SOIL TYPE  
 12

CITY OF NOVI  
 APN #22-22-400-027  
 ZONED: OS-1  
 (OFFICE SERVICE)

SOIL TYPE  
 12

**SUPPLEMENTAL EARTHWORK NOTES**

- EARTHWORK AND PAVEMENT CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
- REMOVE EXISTING TOPSOIL, ORGANICS, VEGETATION, TREES, UNSUITABLE FILL, AND DELETERIOUS MATERIALS TO EXPOSE THE SUBGRADE SOIL. TREE ROOTS AND ASSOCIATED ROOT SYSTEMS SHALL BE COMPLETELY REMOVED.
- PRIOR TO PLACING ENGINEERED FILL, THE TOP 12 INCHES OF EXPOSED SUBGRADE, INCLUDING INDIVIDUAL FILL LAYERS, SHALL BE COMPACTED TO A MINIMUM 95% OF THE MAXIMUM MODIFIED PROCTOR DRY DENSITY.
- THE FINAL SUBGRADE SHALL BE PROOF ROLLED USING A FULLY LOADED TANDUM AXLE TRUCK UNDER THE OBSERVATIONS OF THE GEOTECHNICAL ENGINEER. LOOSE OR YIELDING AREA THAT CANNOT BE MECHANICALLY STABILIZED SHOULD BE REMOVED AND REPLACED WITH ENGINEERED FILL OR AS DICTATED BY FIELD CONDITIONS.
- COMMENCE WITH EARTHWORK OPERATIONS BY EXCAVATION, EARTH BALANCE, AND/OR IMPORTING AND PLACING ENGINEERED FILL TO ACHIEVE FINAL SUBGRADE ELEVATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING HIS OWN EARTHWORK BALANCE/FILL/CUT/IMPORT/EXPORT VOLUMES TO COMPLETE THE PROJECT.
- SUITABLE ON-SITE FILL CAN BE USED, IF TESTED, APPROVED, AND PLACED UNDER THE SUPERVISION OF THE GEOTECHNICAL ENGINEER.
- ALL ENGINEERED FILL MATERIALS USED FOR THE PROJECT SHALL BE CLEAN AND FREE OF FROZEN SOIL, ORGANICS, OR OTHER DELETERIOUS MATERIALS.
- ENGINEERED FILL SHALL BE PLACED IN 8" LOOSE LIFTS COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH MODIFIED PROCTOR. APPROVED ENGINEERED FILL MATERIAL SHALL CONSIST OF MDOT CLASS II, CLASS IIA, OR CLASS III SAND, UTILITY TRENCHES AND EXCAVATED AREAS (DUE TO OLD FOUNDATION REMOVALS) SHALL BE BACKFILLED AND COMPACTED USING CLASS II SAND, OR OTHER SUITABLE BACKFILL MATERIALS APPROVED BY THE GEOTECHNICAL ENGINEER.

**SOIL EROSION MAINTENANCE NOTE**

THE OWNER SHALL BE RESPONSIBLE FOR MAINTAINING ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES WEEKLY AND AFTER EVERY STORM EVENT.

**SOIL DATA**

THIS SITE CONSISTS OF SOIL TYPES 12, 13B, AND 60B BASED ON CURRENT INFORMATION OBTAINED FROM THE USDA NRCS SOIL SURVEY FOR OAKLAND COUNTY.

**ESTIMATED QUANTITIES**

NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

DESCRIPTION	QUANTITY	UNITS
SILT FABRIC FENCING	165	LF.
INLET FILTER	10	EA.
1' x 3' STONE FILTER DAM	7	C.Y.

**CONSTRUCTION SEQUENCE / TIMING SCHEDULE**

1. INSTALL PERIMETER FILTER FABRIC FENCING AND INLET FILTERS IN EX. STORM STRUCTURES	SEPTEMBER 2013
2. MASS GRADE SITE.	SEPTEMBER 2013
3. COMMENCE UNDERGROUND UTILITY WORK.	OCTOBER 2013
4. INSTALL INLET FILTERS ON PROPOSED DRAINAGE STRUCTURES.	NOVEMBER 2013
5. FINAL GRADE AND PAVE SITE.	APRIL 2014
6. COMPLETE ALL LANDSCAPE ACTIVITY.	MAY 2014
7. JET VAC NEW STORM SEWER SYSTEM AS REQUIRED.	MAY 2014
8. REMOVE ALL TEMPORARY SOIL EROSION MEASURES.	JULY 2014

**LEGEND**

- INDICATES LIMITS OF SILT FABRIC FENCE.
- INDICATES LIMITS OF DRAINAGE DISTRICT AREA.
- INDICATES LIMITS OF SOIL DISRUPTION.
- INDICATES SOIL TYPE DELINEATION.
- INDICATES LOW POINT INLET FILTER.
- INDICATES DRAINAGE DISTRICT AREA.

**EROSION CONTROL NOTES**

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ANY NECESSARY PERMITS REQUIRED, PRIOR TO CONSTRUCTION.

PROPERTY DESCRIPTION: EBERSPACHER NORTH AMERICA, 43700 GEN MAR DRIVE, NOVI, MICHIGAN  
 PROPERTY SIZE: 8.862 ACRES

AREA OF EARTH DISRUPTION: 1.641 ACRES

CONTRACTOR SHALL OBEY THE MDEQ "NOTICE OF COVERAGE" LAW (A FORMAL PERMIT IS REQUIRED FOR EARTH DISRUPTION OF MORE THAN 5 ACRES).

THE EARTH CHANGE WILL INCLUDE UNDERGROUND UTILITY WORK, EARTHWORK TO ESTABLISH PROPOSED PAVEMENT SUBGRADES AND EARTH BALANCE.

ALL NON-PAVED AREAS ARE TO BE LANDSCAPED, SODDED AND/OR SEEDED AND MULCHED.

THE CONTRACTOR SHALL STORE ALL TOPSOIL ON-SITE IN AN AREA AGREED UPON BY THE OWNER OR OWNER'S REPRESENTATIVE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING AND MAINTAINING SOIL EROSION AND SEDIMENTATION CONTROL DEVICES, AND FOR PROVIDING DUST CONTROL.

THE FOLLOWING SHALL APPLY UNDER INSTALLATION OF SOIL EROSION AND SEDIMENTATION CONTROL DEVICES:

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING MUD MATS MADE OF LARGE COURSE AGGREGATE, AS NEEDED TO PROHIBIT CONSTRUCTION TRAFFIC FROM TRACKING DEBRIS AND SOILS ONTO ADJACENT ROADWAYS. ALL HAULING OPERATIONS MUST CONFORM TO LOCAL AND STATE LAW.
- THE CONTRACTOR SHALL PROVIDE PERMANENT STABILIZATION OF ALL DENUDEED AREAS WITHIN 5 DAYS OF FINAL GRADE.
- IF SO DEEMED BY THE SITE INSPECTOR, THE CONTRACTOR SHALL IMMEDIATELY CEASE SITE WORK OPERATIONS, AND INSTALL EMERGENCY TEMPORARY EROSION CONTROL DEVICES (INCLUDING MUD MATS).
- TOPSOIL SHALL NOT BE STORED WITHIN PUBLIC RIGHT OF WAY. STOCKPILED SOILS SHALL BE PROPERLY COMPACTED AND/OR COVERED, WITH SILT FENCE SURROUNDING THE PILE.

ALL SESC MEASURES SHALL BE INSPECTED & REPAIRED AS NECESSARY AT A MINIMUM ONCE A WEEK AND AFTER EVERY STORM EVENT.

BURLAP IS NOT ALLOWED AND STRAW BALES CAN ONLY BE USED TO BACKUP SILT FENCES.

FINISHED GRADE STABILIZATION SHALL BE ACHIEVED WITHIN 5 DAYS OF FINAL GRADE.

ALL SESC MATERIALS AND INSTALLATION PROCEDURES SHALL BE IN COMPLIANCE WITH APPLICABLE CITY OF NOVI REQUIREMENTS.

**MAINTENANCE OF SOIL EROSION & SEDIMENTATION CONTROL & DUST CONTROL NOTES:**

- THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING WEEKLY AND POST RAINFALL INSPECTION & MAINTENANCE OF ALL SOIL EROSION & SEDIMENTATION CONTROL MEASURES.
- REMOVE ACCUMULATION OF SEDIMENT & DEBRIS IN CONSTRUCTION ENTRANCE, SILT FENCE, LOW POINT INLET FILTERS AND MANHOLE SUMPS. ALSO, ACCUMULATED SEDIMENT AND DEBRIS ON ROADWAYS SHALL BE REMOVED.
- SOIL EROSION & SEDIMENTATION CONTROL MEASURES FOUND IMPROPERLY INSTALLED SHALL BE RE-INSTALLED TO MEET THE DESIRED FUNCTION.
- DUST SHALL BE CONTROLLED DAILY, OR AS NEEDED, TO A MINIMUM BY USE OF A WATER TRUCK AND/OR DUST CONTROL MATERIALS.

**SEQUENCE OF CONSTRUCTION**

- INSTALL SOIL EROSION & SEDIMENTATION CONTROL MEASURES.
- REMOVE TREES/SHRUBS/VEGETATION.
- REMOVE EXISTING BITUMINOUS PAVEMENT, CONCRETE CURB & GUTTER AND SIDEWALK.
- IN CONJUNCTION WITH MASS GRADING, STRIP EXISTING VEGETATION & TOPSOIL, STABILIZE GROUND WITH SUBGRADE UNDERCUTTING TYPE II PER MDOT STANDARDS AT EXISTING SOFT SUBGRADE AREAS, AND PERFORM UNDERGROUND UTILITY WORK. INSTALL LOW POINT FILTERS ON NEW CATCH BASINS, AS CONSTRUCTED.
- PERFORM PAVEMENT SUBGRADE PREPARATION AND FILLING OPERATIONS FOR PROPOSED PAVEMENT. PERFORM PROOF ROLLING.
- INSTALL PAVEMENT SUBBASE, CONCRETE PAVEMENT, AND CURBING.
- INSTALL ASPHALT LEVELING COURSE.
- MAINTAIN ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES IN ACCORDANCE WITH THE CITY'S REQUIREMENTS (ALL TIMES).
- INSTALL SIDEWALKS.
- COMPLETE INSTALLATION OF FINAL WEARING COURSE.
- RESTORE DENUDEED EARTH AREAS WITH TOPSOIL, SEED AND/OR SOD, PER THE LANDSCAPE PLAN.
- PUNCH LIST ITEMS. CLEAN PAVEMENT AND STRUCTURES OF ACCUMULATED DEBRIS IN CONJUNCTION WITH REMOVAL OF SOIL EROSION AND SEDIMENTATION CONTROL MEASURES.

SEAL



PROJECT

43700 Gen Mar Drive

CLIENT

Eberspacher North America, Inc.

PROJECT LOCATION

Part of the NE 1/4 of Section 22  
 T. 1 N., R. 8 E.  
 City of Novi,  
 Oakland County, Michigan

SHEET

Soil Erosion & Sedimentation Control Plan



REVISIONS

07-17-13 Preliminary Site Plan

DRAWN BY:

PT

DESIGNED BY:

BB/PT

APPROVED BY:

BB

DATE:

04/30/2013

SCALE: 1" = 40'

40 0 20 40 60

NFE JOB NO.

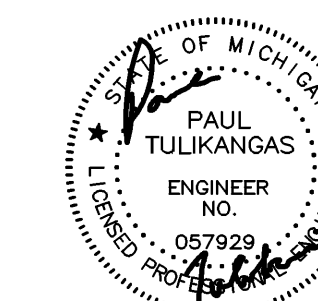
H441

SHEET NO.

PSP5



SEAL



PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspaecher North America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of Section 22  
T. 1 N., R. 8 E.  
City of Novi, Oakland County, Michigan

SHEET  
Storm Water Management Plan



REVISIONS  
07-17-13 Preliminary Site Plan

DRAWN BY:  
PT

DESIGNED BY:  
BB/PT

APPROVED BY:  
BB

DATE:  
04/30/2013

SCALE: 1" = 40'

N/E JOB NO. SHEET NO.  
H441 PSP6

**EXISTING (PRE-DEVELOPMENT) SITE RUN-OFF CALCULATIONS**

THERE ARE TWO STORM SEWER SYSTEMS THAT SERVICE THIS SITE. ONE SYSTEM RECEIVES DRAINAGE FROM A PORTION OF THE SITE LOCATED AT THE NORTHEAST CORNER. THIS SYSTEM CONVEYS THE STORM WATER DIRECTLY OFF-SITE TO THE STORM SYSTEM LOCATED WITHIN GENMAR DRIVE. THE SECOND SYSTEM RECEIVES THE MAJORITY OF SITE DRAINAGE, AND CONVEYS THE STORM WATER TO A DETENTION BASIN LOCATED NEAR THE SOUTH EAST CORNER OF THE SITE, BEFORE EVENTUALLY DISCHARGING INTO MUNRO CREEK. THE DRAINAGE AREA THAT CONTRIBUTES TO THE DETENTION BASIN IS CONSIDERED IN THE FOLLOWING CALCULATIONS:

**EXISTING RUNOFF COEFFICIENT - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN**  
TOTAL AREA (A) = 5.90 ACRES  
IMPERVIOUS SURFACE AREA (A<sub>i</sub>) = 5.08 ACRES  
PERMEABLE SURFACE AREA (A<sub>p</sub>) = 0.82 ACRES  
RUNOFF COEFFICIENT (c) = (0.95A<sub>i</sub> + 0.35A<sub>p</sub>)/A = 0.87

**EXISTING (PRE-DEVELOPMENT) DETENTION BASIN VOLUME CALCULATIONS**

BASED ON ORIGINAL DESIGN PLANS COMPLETED BY ORCHARD, HILTZ, AND MCCLIMENT, INC. DATED 2-8-86, THE DETENTION BASIN WAS DESIGNED TO PROVIDE THE VOLUME AS SHOWN BELOW (NOTE THAT A DATUM DIFFERENCE OF 2.57 FEET EXISTS BETWEEN THE ORIGINAL DESIGN AND RECENT TOPOGRAPHIC SURVEY ELEVATIONS):

**POUND DETENTION PROVIDED (DESIGN):**

ELEVATION	AREA, SF	DEPTH, FT	VOLUME, CF	Σ VOLUME, CF
904.30	11,514	0.30		
904.00	10,800	1.00	3,347.10	3,347.10
903.00	8,550	1.00	9,675.00	13,022.10
902.00	6,550	1.00	7,525.00	20,547.10
901.00	4,650	0.50	5,575.00	26,122.10
900.50	3,800	0.65	2,112.50	28,234.60
899.85			1,235.00	29,469.60
<b>TOTAL VOLUME (DESIGN)</b>				<b>29,469.60</b>

BASED ON THE TOPOGRAPHIC SURVEY INCLUDED IN THE PROPOSED PLANS, THE EXISTING DETENTION BASIN PROVIDES THE VOLUME AS SHOWN BELOW:

**POUND DETENTION PROVIDED (EXISTING):**

ELEVATION	AREA, SF	DEPTH, FT	VOLUME, CF	Σ VOLUME, CF
901.73	10,815	0.73		
901.00	9,149	1.00	7,286.86	7,286.86
900.00	7,296	1.00	8,222.50	15,509.36
899.00	5,671	1.00	6,483.50	21,992.86
898.00	2,996	0.72	4,333.50	26,326.36
897.28			1,076.56	27,402.92
<b>TOTAL VOLUME (EXISTING)</b>				<b>27,402.92</b>

**CITY OF NOVI REQUIREMENTS FOR NEW DEVELOPMENTS**

FOR COMPARISON PURPOSES, THE STORAGE REQUIREMENTS FOR 10, 5, AND 1 YEAR STORM EVENTS FOR NEW DEVELOPMENTS IN THE CITY OF NOVI ARE PROVIDED BELOW. THESE ARE CALCULATIONS ARE BASED ON CURRENT CITY OF NOVI EQUATIONS FOR THE AFOREMENTIONED DRAINAGE AREA CONTRIBUTING TO THE DETENTION SYSTEM, AS PORTRAYED IN THE CALCULATIONS BELOW. THE EXISTING BASIN WAS DESIGNED AND CURRENTLY STORES A VOLUME BETWEEN THE REQUIREMENTS FOR A 1-YEAR AND 5-YEAR STORM BASED ON THE CURRENT REQUIREMENTS:

**DETENTION REQUIRED - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN (CURRENT 10-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.885 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.1731 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(8,562.5/Q<sub>i</sub>) = 189.72 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [10,500/T(1+25)] - 40Q<sub>a</sub>T = 7,976.85CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 41,785.63 CF

**DETENTION REQUIRED - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN (CURRENT 5-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.885 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.1731 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(8,562.5/Q<sub>i</sub>) = 152.24 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [10,500/T(1+25)] - 40Q<sub>a</sub>T = 6,418.81 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 32,616.39 CF

**DETENTION REQUIRED - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN (CURRENT 1-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.885 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.1731 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(8,562.5/Q<sub>i</sub>) = 99.91 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [10,500/T(1+25)] - 40Q<sub>a</sub>T = 2,763.79 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 14,134.16 CF

**STORM WATER MANAGEMENT PROPOSAL (POST DEVELOPMENT):**

THE FOLLOWING DETAILS THE PROPOSED STORM WATER MANAGEMENT APPROACH TO THIS PROJECT:

- THE ABOVE CALCULATIONS INDICATE THAT THE CURRENT DETENTION BASIN VOLUME HAS DECREASED ABOUT 2,065 C.F., OR BY APPROXIMATELY 7% OF THE ORIGINAL DESIGN VOLUME. IT IS PROPOSED TO REMOVE TREE AND SHRUB OVER-GROWTH, CLEAN, EXCAVATE, AND RE-STABILIZE THE EXISTING DETENTION BASIN TO PROVIDE AN ADDITIONAL 2,065 C.F. OF STORAGE, EFFECTIVELY RESTORING THE ORIGINAL DESIGN VOLUME.
- THREE OF THE PROPOSED PARKING LOT ADDITIONS, TOTALING 1,250 S.F. (0.30 AC) ARE LOCATED OUTSIDE OF THE DRAINAGE AREA THAT CONTRIBUTES TO THE DETENTION BASIN. IT IS PROPOSED TO CONSTRUCT THESE PARKING ADDITIONS WITH PERVIOUS PAVEMENT IN AN EFFORT TO MINIMIZE THE ADDITIONAL RUN-OFF TO THE GENMAR DRIVE STORM SEWER SYSTEM. THE EFFECTIVE RUNOFF COEFFICIENT FOR THESE ADDITIONS IS THE DIFFERENCE BETWEEN THE RUNOFF COEFFICIENT FOR PERVIOUS PAVEMENT (0.45) AND THE RUN-OFF COEFFICIENT FROM THE EXISTING GREENBELT (0.35), OR 0.10. THE REQUIRED STORAGE VOLUME BASED ON A 100-YEAR STORM EVENT WILL BE STORED WITHIN THE STONE BASE BENEATH THE PERVIOUS PAVEMENT.

**PROPOSED RUNOFF COEFFICIENT - PERVIOUS PAVEMENT ADDITIONS (OFF-SITE)**

TOTAL AREA (A) = 0.03 ACRES  
EFFECTIVE RUN-OFF COEFFICIENT FOR PARKING ADDITIONS = 0.10

**DETENTION REQUIRED - PERVIOUS PAVEMENT ADDITIONS (OFF-SITE) (CURRENT 100-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.0044 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 1.5 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(10,312.5/Q<sub>i</sub>) = 57.92 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [16,500/T(1+25)] - 40Q<sub>a</sub>T = 8,050.13 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 23.35 CF

**PROPOSED STORAGE TO BE PROVIDED - PERVIOUS PAVEMENT ADDITIONS (OFF-SITE)**

TOTAL AREA PERVIOUS PAVEMENT = 1,250 SF  
VOLUME OF 6AA STONE BASE (18" DEPTH) = (1,250 SF x (18"/12")) = 1,875.00 CF  
POROSITY OF 6AA STONE BASE = 0.30  
TOTAL = (1,875.00 CF x 0.30) = 562.50 CF

- THE REMAINING PROPOSED PARKING LOT ADDITIONS WILL INCREASE RUN-OFF TO THE DRAINAGE AREA THAT CONTRIBUTES TO THE EXISTING DETENTION BASIN. THE INCREASES ARE QUANTIFIED IN THE CALCULATIONS BELOW:

TOTAL PARKING ADDITIONS (AS SHOWN ON SHEET PSP1) = 13,520 S.F.  
THREE PARKING ADDITIONS THAT DRAIN TO GENMAR STORM SYSTEM (TO BE CONSTRUCTED OF PERVIOUS PAVEMENT AS DISCUSSED IN ITEM No. 2 ABOVE) = 1,250 S.F.  
NET PARKING ADDITIONS WITHIN DRAINAGE AREA THAT CONTRIBUTES TO EXISTING DETENTION BASIN = 13,520 - 1,250 = 12,270 S.F.  
TOTAL PROPOSED LANDSCAPE AREAS AND ADDITIONS = 3,290 S.F.  
NET PARKING ADDITIONS = 12,270 - 3,290 = **8,980 S.F. (0.21 AC)**

OF THE 8,980 S.F. (0.21 AC) NET PARKING ADDITIONS, 1,837 S.F. (0.038 AC) CONSISTS OF THE ADDITION LOCATED AT THE SOUTHWEST CORNER OF THE SITE, WHICH DOES NOT CURRENTLY CONTRIBUTE TO THE DETENTION BASIN. THE EFFECTIVE RUNOFF COEFFICIENT FOR THIS AREA IS THEREFORE 0.95. THE EASTERMOST PARKING ADDITION TOTALS 1,510 S.F. (0.035 AC), AND IS PROPOSED TO BE CONSTRUCTED OF PERVIOUS PAVEMENT TO ENSURE THAT RUN-OFF FROM THIS AREA CAN BE FEASIBLY ROUTED THROUGH THE PROPOSED UNDERGROUND DETENTION SYSTEM. THE EFFECTIVE RUNOFF COEFFICIENT FOR THIS ADDITION IS THE DIFFERENCE BETWEEN THE RUNOFF COEFFICIENT FOR PERVIOUS PAVEMENT (0.45) AND THE RUN-OFF COEFFICIENT FROM THE EXISTING GREENBELT (0.35), OR 0.10. THE REMAINING AREA OF 5,833 S.F. (0.14 AC) WILL CONSIST OF IMPERVIOUS PARKING ADDITIONS WITHIN EXISTING GREENBELT AREAS THAT CURRENTLY CONTRIBUTE TO THE DETENTION BASIN. THEREFORE, THE NET RUN-OFF COEFFICIENT FOR THESE AREAS IS THE DIFFERENCE BETWEEN 0.95 AND 0.35, OR 0.60.

**PROPOSED RUNOFF COEFFICIENT - NET PARKING ADDITIONS**

TOTAL AREA (A) = 0.21 ACRES  
IMPERVIOUS SURFACE AREA (NEW DRAINAGE AREA) (A<sub>i</sub>) = 0.038 ACRES  
PERVIOUS PAVEMENT AREA (A<sub>p</sub>) = 0.035 ACRES  
IMPERVIOUS SURFACE AREA (EXISTING DRAINAGE AREA) (A<sub>b</sub>) = 0.14 ACRES  
RUNOFF COEFFICIENT (c) = (0.95A<sub>i</sub> + 0.10A<sub>p</sub> + 0.60A<sub>b</sub>)/A = 0.59

**DETENTION REQUIRED - NET PARKING ADDITIONS (CURRENT 100-YR EVENT)**

ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.0315 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.2549 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(10,312.5/Q<sub>i</sub>) = 171.16 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [16,500/T(1+25)] - 40Q<sub>a</sub>T = 12,853.59 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 1,563.98 CF

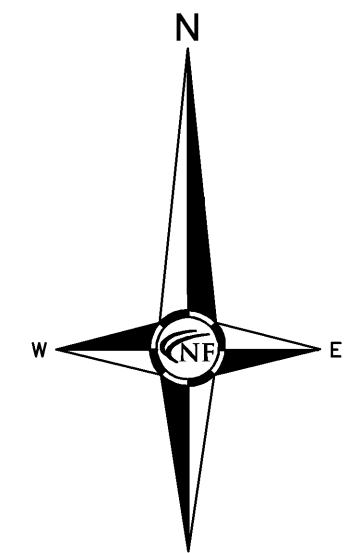
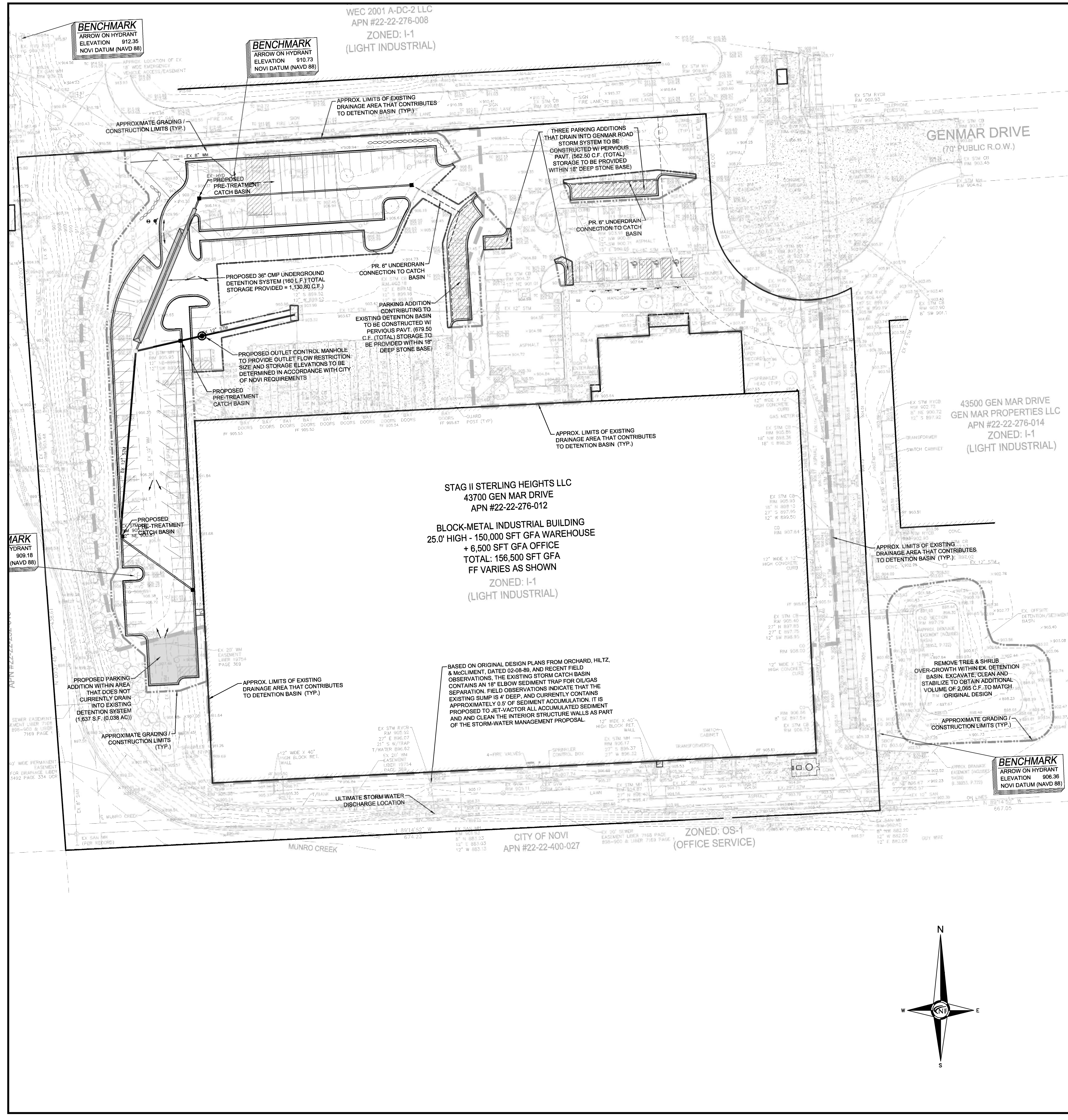
OF THE 1,563.98 C.F. STORAGE REQUIRED, A MINIMUM STORAGE OF 21.18 C.F. OS REQUIRED TO BE STORED IN THE PERVIOUS PAVEMENT ADDITION. AS SHOWN BELOW, THE PROPOSED 18" DEEP STONE BASE IN THE PERVIOUS PAVEMENT ADDITION GREATLY EXCEEDS THIS MINIMUM REQUIREMENT.

**PROPOSED STORAGE TO BE PROVIDED - PERVIOUS PAVEMENT ADDITION**  
TOTAL AREA PERVIOUS PAVEMENT = 1,510 SF  
VOLUME OF 6AA STONE BASE (18" DEPTH) = (1,510 SF x (18"/12")) = 2,265 CF  
POROSITY OF 6AA STONE BASE = 0.30  
TOTAL STORAGE PROVIDED = (2,265 CF x 0.30) = 679.5 CF  
MINIMUM STORAGE REQUIRED = 21.18 CF

**PROPOSED STORAGE TO BE PROVIDED - UNDERGROUND DETENTION SYSTEM**  
220 FEET OF 36" C.M.P. = 1,555.08 CF  
TOTAL = 1,555.08 CF

**TOTAL PROPOSED STORAGE = 28,18 C.F. + 1,555.08 C.F. = 1,583.26 C.F.**

IN ADDITION TO STORING THE 100-YEAR VOLUME ASSOCIATED WITH THE PROPOSED PARKING ADDITIONS, IT IS PROPOSED TO PROVIDE PRE-TREATMENT VIA INSTALLATION OF THREE MECHANICAL FOREBAY STRUCTURES. THE DETENTION VOLUME OF WATER RESULTING FROM THE RUN-OFF ADDITIONS WILL HAVE ITS FLOW RESTRICTED TO THE REQUIRED DISCHARGE RATE VIA INSTALLATION OF THE REQUIRED OUTLET CONTROL MANHOLE (STORM STRUCTURE #5 SHOWN ON THE PLANS), SIZING AND STORAGE ELEVATIONS CONFORMING TO CITY OF NOVI REQUIREMENTS WILL BE PROVIDED WITH THE FINAL DESIGN.



WEC 2001 A-DC-2 LLC  
APN #22-22-276-008  
ZONED: I-1  
(LIGHT INDUSTRIAL)

GENMAR DRIVE  
(70' PUBLIC R.O.W.)

43500 GEN MAR DRIVE  
GEN MAR PROPERTIES LLC  
APN #22-22-276-014  
ZONED: I-1  
(LIGHT INDUSTRIAL)

STAG II STERLING HEIGHTS LLC  
43700 GEN MAR DRIVE  
APN #22-22-276-012  
BLOCK-METAL INDUSTRIAL BUILDING  
25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
+ 6,500 SFT GFA OFFICE  
TOTAL: 156,500 SFT GFA  
FF VARIES AS SHOWN  
ZONED: I-1  
(LIGHT INDUSTRIAL)

BASED ON ORIGINAL DESIGN PLANS FROM ORCHARD, HILTZ, & MCCLIMENT, DATED 02-08-86, AND RECENT FIELD OBSERVATIONS, THE EXISTING STORM CATCH BASIN CONTAINS AN 18" ELBOW SEDIMENT TRAP FOR OIL/GAS SEPARATION. FIELD OBSERVATIONS INDICATE THAT THE SEPARATION FIELD OBSERVATIONS INDICATE THAT THE EXISTING TRAP IS 4' DEEP, AND CURRENTLY CONTAINS APPROXIMATELY 0.5' OF SEDIMENT ACCUMULATION. IT IS PROPOSED TO JET-VACUUM ALL ACCUMULATED SEDIMENT AND CLEAN THE INTERIOR STRUCTURE WALLS AS PART OF THE STORM-WATER MANAGEMENT PROPOSAL.

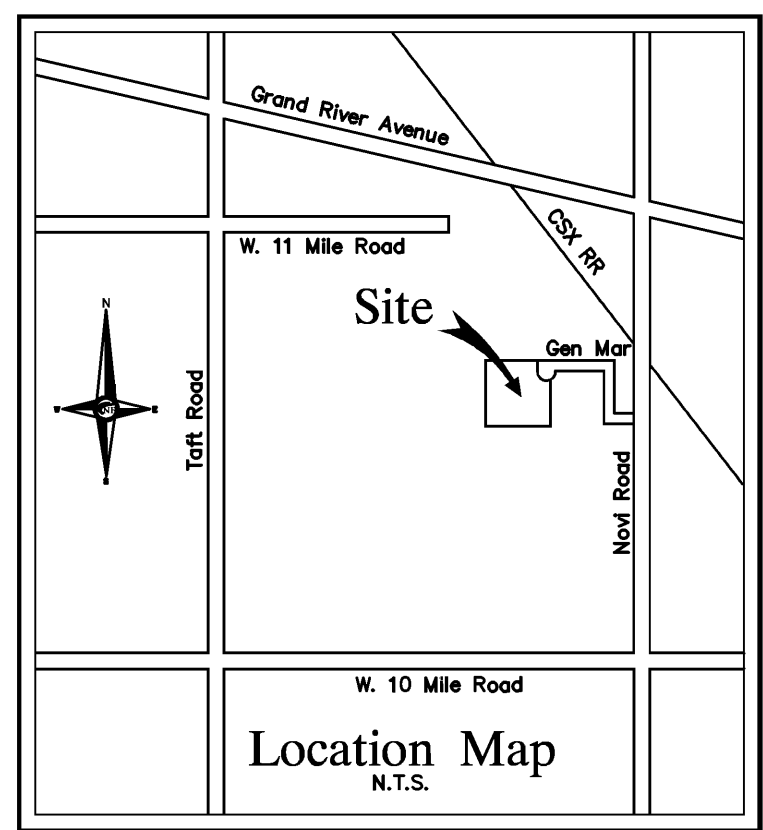
CITY OF NOVI  
APN #22-22-400-027  
ZONED: OS-1  
(OFFICE SERVICE)

BENCHMARK  
ARROW ON HYDRANT  
ELEVATION 912.35  
NOVI DATUM (NAVD 88)

BENCHMARK  
ARROW ON HYDRANT  
ELEVATION 910.73  
NOVI DATUM (NAVD 88)

BENCHMARK  
ARROW ON HYDRANT  
ELEVATION 906.36  
NOVI DATUM (NAVD 88)





**LEGAL DESCRIPTION**

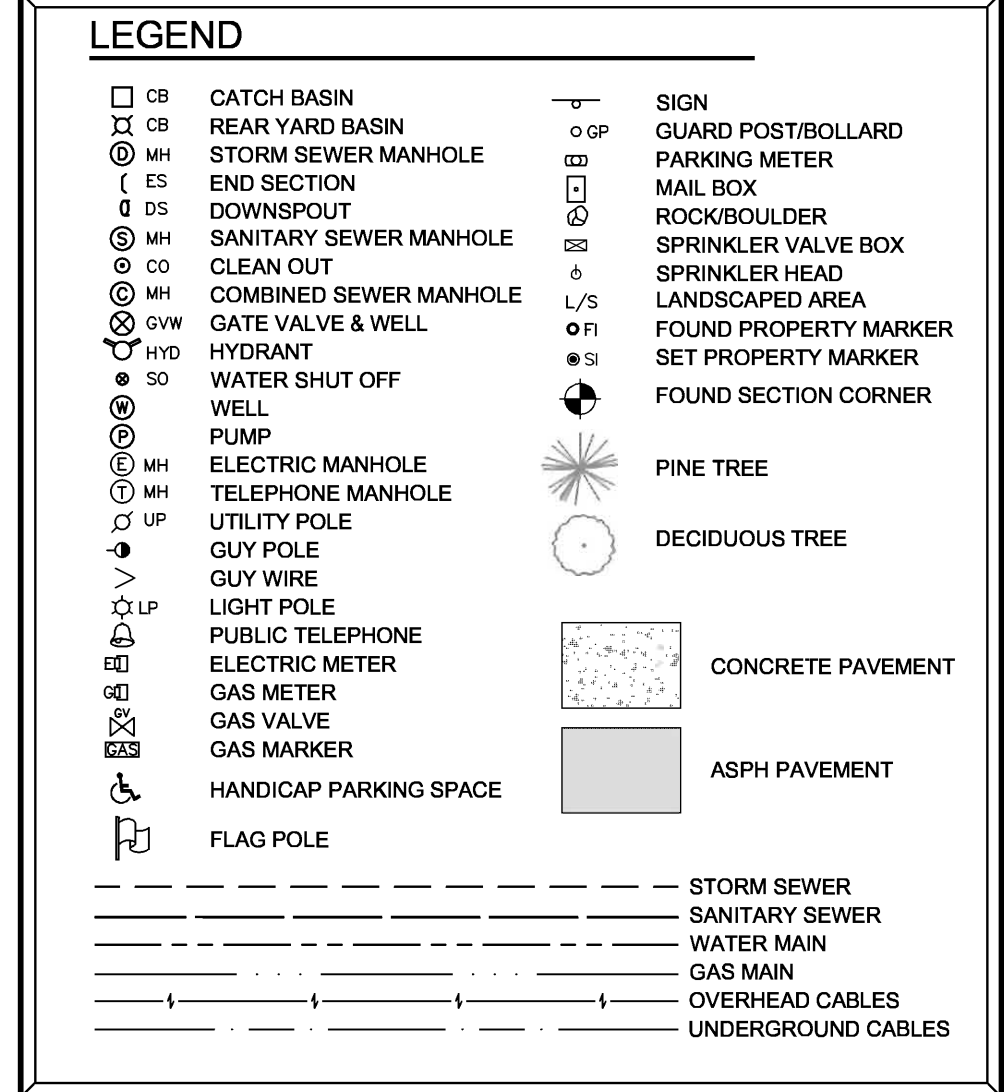
(PER LEHNER ASSOCIATES, INC. ALTA SURVEY DATED 02-05-07)  
 NFE HAS NOT PERFORMED A BOUNDARY SURVEY TO CONFIRM THIS LEGAL DESCRIPTION.

**PARCEL 1:**  
 A PARCEL OF LAND LOCATED IN THE NORTHEAST 1/4 OF SECTION 22, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN. THENCE N 89°14'52" W, 667.05 FEET ALONG THE EAST AND WEST 1/4 LINE OF SECTION 22 TO THE POINT OF BEGINNING, PROCEEDING ALONG THE EAST AND WEST 1/4 LINE OF SECTION 22, N 89°14'52" W, 674.23 FEET; THENCE N 00°37'45" W, 438.61 FEET TO A POINT ON THE EAST LINE OF NOVI HEIGHTS SUBDIVISION NO.3; THENCE ALONG THE EAST LINE OF NOVI HEIGHTS SUBDIVISION NO.3, N 00°12'00" E, 136.35 FEET; THENCE N 89°56'56" E, 470.64 FEET TO A POINT OF THE WEST RIGHT-OF-WAY LINE OF GENMAR DRIVE; THENCE ALONG THE WEST AND SOUTH LINE OF GENMAR DRIVE THE FOLLOWING TWO (2) COURSES: (1) S 00°03'04" E, 82.00 FEET AND (2) 155.96 FEET ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 77.00 FEET, CENTRAL ANGLE OF 116°02'56". THE LONG CHORD BEARS S 88°04'32" E, 130.63 FEET; THENCE S 00°23'56" W, 433.26 FEET TO THE POINT OF BEGINNING.

**TOGETHER WITH**

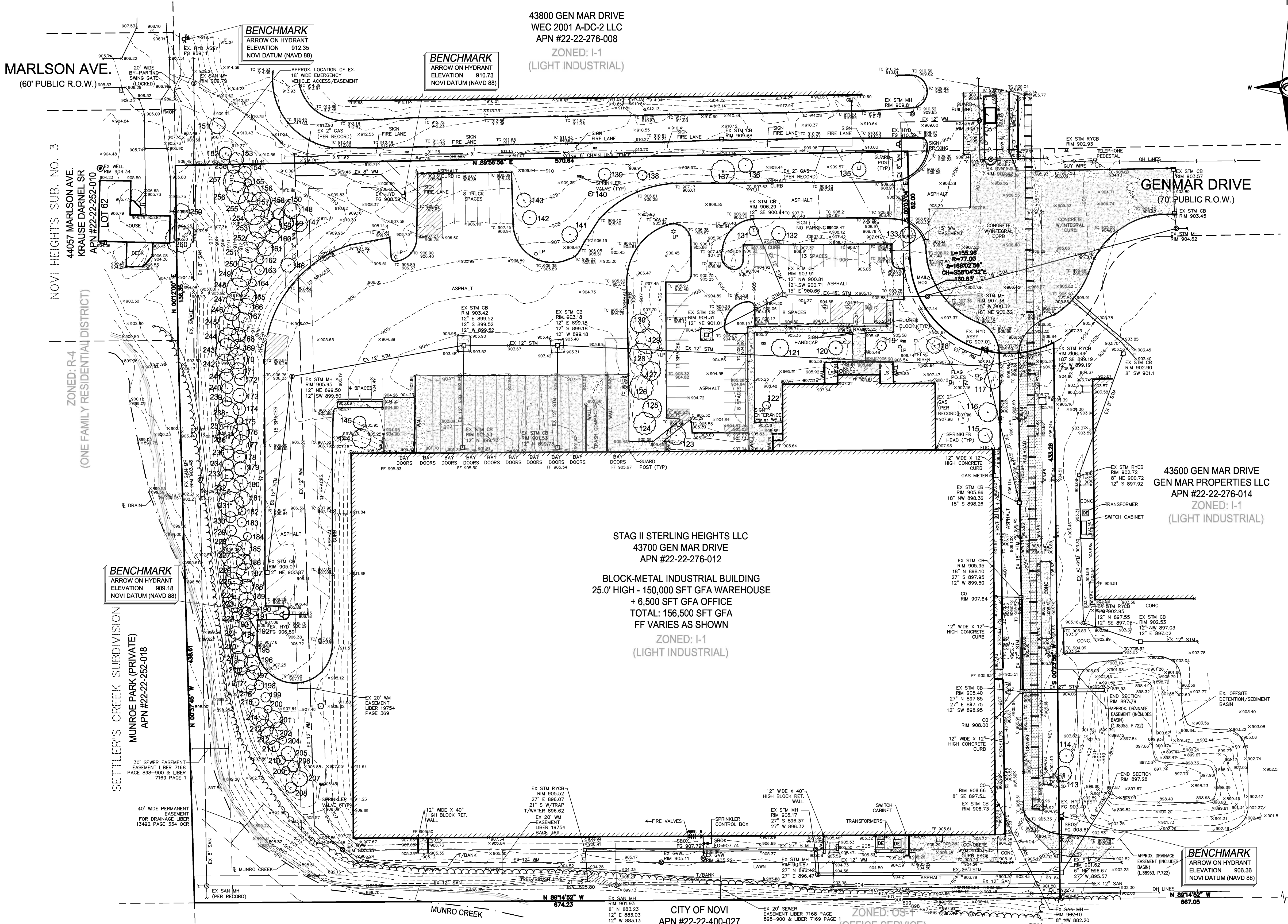
**PARCEL 1-A:**  
 AN EASEMENT FOR THE CONSTRUCTION, ALTERATION, MAINTENANCE, AND USE OF A RAILROAD SPUR, TWENTY (20) FEET IN WIDTH, TEN (10) FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTER LINE: A STRIP OF LAND BEING A PART OF THE NORTHEAST 1/4 OF SECTION 22, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN. DESCRIBED AS: COMMENCING AT THE EAST 1/4 CORNER OF SECTION 22, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN; THENCE N 00°23'56" E, 593.76 FEET ALONG THE EAST LINE OF SECTION 22; THENCE S 89°56'56" W, 885.62 FEET ALONG THE NORTH LINE OF GENMAR DRIVE; 70 FEET WIDE TO THE POINT OF BEGINNING, PROCEEDING THENCE S 00°23'56" W, 157.48 FEET TO THE POINT OF ENDING.

COMMONLY KNOWN AS: 43700 GENMAR, NOVI, MICHIGAN  
 PARCEL IDENTIFICATION NO. 22-22-276-012



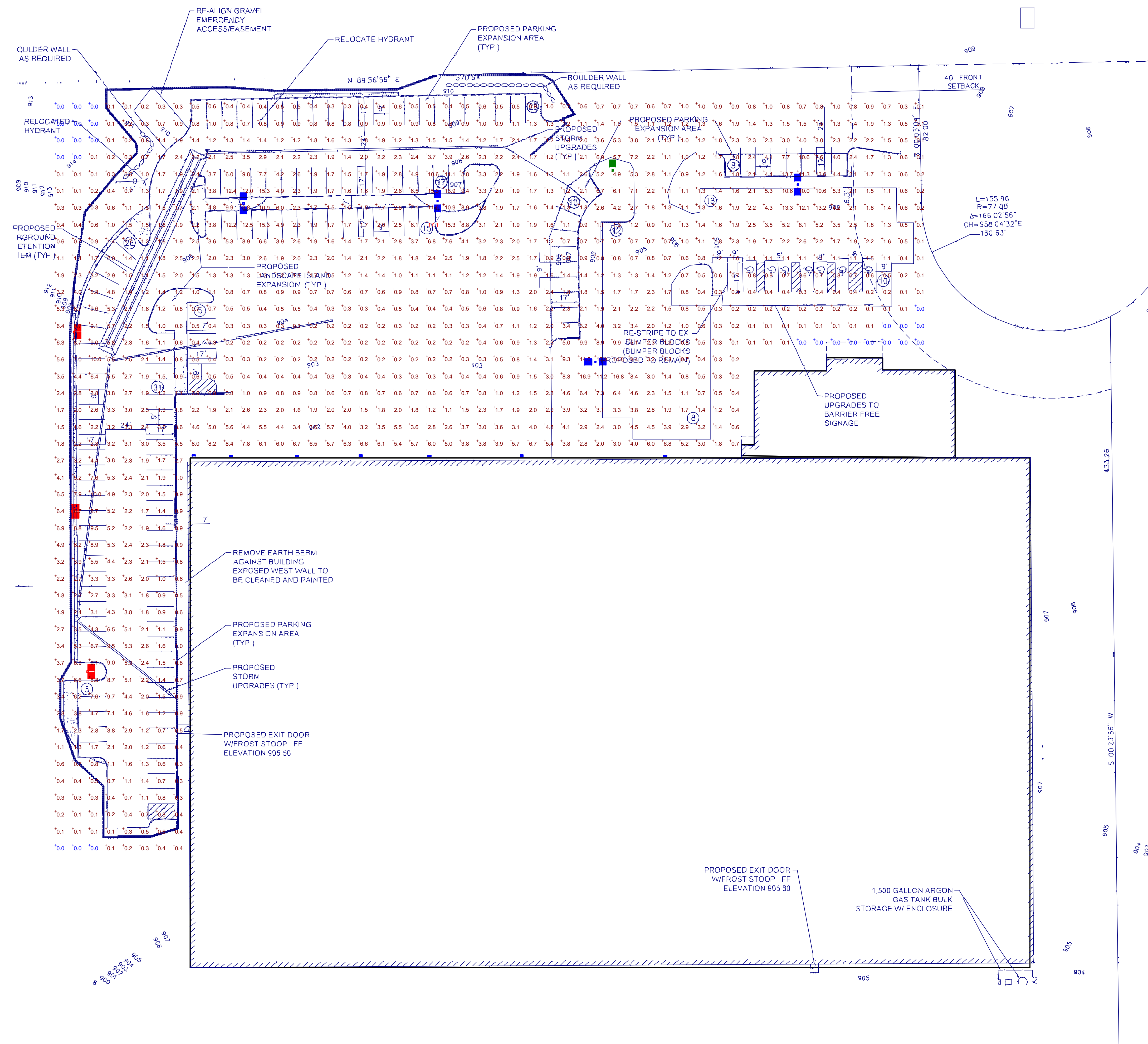
**TOPOGRAPHIC SURVEY NOTES**

ALL ELEVATIONS ARE EXISTING ELEVATIONS, UNLESS OTHERWISE NOTED.  
 UTILITY LOCATIONS WERE OBTAINED FROM MUNICIPAL OFFICIALS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.  
 WHERE POSSIBLE THIS SURVEY REFLECTS EASEMENTS OF INDICATED ON THE LEHNER ASSOCIATES, INC. ALTA SURVEY DATED 02-05-07 PROVIDED BY OTHERS. AN UPDATED TITLE POLICY MUST BE FURNISHED TO THE SURVEYOR BY THE OWNER TO CONFIRM EASEMENT LOCATIONS SHOWN HEREON.



Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments	Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments	Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments	Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments		
113	Pinus nigra	Australian Pine	10			Good	Being pruned by support cable, dipodia needle blight	134	Acer platanoides	Norway Maple	10			Poor	Lg trunk injury, wood exposed, some decay	202	Pinus nigra	Australian Pine	11				Fair	Dipodia needle blight	223	Pinus glauca	White Spruce	9			Good		
114	Pinus nigra	Australian Pine	9			Poor	Being pruned by support cable, dipodia needle blight	135	Pinus nigra	Australian Pine	9			Fair	Dipodia needle blight	180	Pinus nigra	Australian Pine	8				Good		203	Quercus velutina	Black Oak	8			Good		
115	Pinus nigra	Australian Pine	9			Fair	Dipodia needle blight	136	Pinus nigra	Australian Pine	9			Good		181	Pinus nigra	Australian Pine	9				Good	Dipodia needle blight	204	Pinus glauca	White Spruce	5			Good		
116	Pinus nigra	Australian Pine	12			Fair	Dipodia needle blight	137	Pinus nigra	Australian Pine	15			Good		182	Pinus nigra	Australian Pine	12				Good	Dipodia needle blight	205	Pinus glauca	White Spruce	9			Good		
117	Pinus nigra	Australian Pine	11			Fair	Dipodia needle blight	138	Morus spp.	Crapeapple spp.	8			Good		183	Pinus nigra	Australian Pine	12				Good	Dipodia needle blight	206	Pinus glauca	White Spruce	10			Good		
118	Acer platanoides	Norway Maple	10			Poor	Lg basal trunk injury W side of tree, some decay	139	Morus spp.	Crapeapple spp.	8			Good		184	Pinus glauca	White Spruce	8				Good		207	Pinus glauca	White Spruce	10			Good		
119	Morus spp.	Crapeapple spp.	8			Good		140	Morus spp.	Crapeapple spp.	3			Good		185	Pinus glauca	White Spruce	6				Good		208	Pinus glauca	White Spruce	7			Fair	Suspected needle blight	
120	Morus spp.	Crapeapple spp.	9			Good		141	Acer platanoides	Norway Maple	10			Good		186	Pinus nigra	Australian Pine	12				Fair	Dipodia needle blight	209	Pinus glauca	White Spruce	5			Poor	Dipodia	
121	Acer platanoides	Norway Maple	11			Good	Some grinding rods on top	142	Pinus glauca	White Spruce	9			Good		187	Pinus nigra	Australian Pine	10				Poor	Dipodia, terminal leader failure	210	Pinus glauca	White Spruce	8			Good		
122	Morus spp.	Crapeapple spp.	5			Good		143	Pinus glauca	White Spruce	9			Good		188	Pinus nigra	Australian Pine	13				Fair	Dipodia needle blight	211	Pinus glauca	White Spruce	7			Good		
123	Pinus glauca	White Spruce	12			Good		144	Pinus glauca	White Spruce	6			Good		189	Pinus nigra	Australian Pine	10				Fair	Dipodia needle blight	212	Pinus nigra	Australian Pine	11			Fair	Dipodia needle blight	
124	Pinus nigra	Australian Pine	14			Fair	Dipodia needle blight	145	Pinus glauca	White Spruce	5			Good		190	Pinus nigra	Australian Pine	13				Good		213	Pinus nigra	Australian Pine	11			Fair	Dipodia needle blight	
125	Pinus nigra	Australian Pine	12			Fair	Dipodia needle blight	146	Quercus velutina	Black Oak	9			Good		191	Pinus nigra	Australian Pine	10				Fair	Dipodia needle blight	214	Pinus nigra	Australian Pine	12			Fair	Dipodia needle blight	
126	Pinus nigra	Australian Pine	15			Fair	Dipodia needle blight	147	Pinus nigra	Australian Pine	11			Fair	Dipodia needle blight	192	Pinus nigra	Australian Pine	7				Poor	Dipodia, low live crown ratio	215	Pinus glauca	White Spruce	5			Fair	Suspected needle blight	
127	Pinus nigra	Australian Pine	12			Fair	Dipodia needle blight	148	Pinus nigra	Australian Pine	9			Good		193	Pinus glauca	White Spruce	6				Good		216	Pinus glauca	White Spruce	6			Fair	Suspected needle blight	
128	Pinus nigra	Australian Pine	14			Fair	dipodia needle blight	149	Pinus nigra	Australian Pine	7			Poor	Dipodia, very low live crown ratio	194	Pinus glauca	White Spruce	5				Good		217	Pinus nigra	Australian Pine	14			Fair	Dipodia needle blight	
129	Pinus nigra	Australian Pine	14			Fair	dipodia needle blight	150	Pinus nigra	Australian Pine	7			Poor	Dipodia, very low live crown ratio	195	Pinus nigra	Australian Pine	9				Good		218	Pinus nigra	Australian Pine	12			Fair	Dipodia needle blight	
130	Pinus nigra	Australian Pine	16			Good	Dipodia needle blight	151	Acer platanoides	Norway Maple	10			Good		196	Pinus nigra	Australian Pine	10				Good		219	Pinus nigra	Australian Pine	11			Fair	Dipodia needle blight	
131	Pinus nigra	Australian Pine	12			Good		152	Pinus glauca	White Spruce	8			Good		197	Pinus nigra	Australian Pine	9				Poor	Dipodia	220	Pinus nigra	Australian Pine	9			Poor	Dipodia needle blight, very sparse crown	
132	Morus spp.	Crapeapple spp.	6		Multiple	6.5	Good		153	Pinus glauca	White Spruce	9			Good		198	Pinus glauca	White Spruce	8				Good		221	Pinus glauca	White Spruce	8			Good	
133	Acer platanoides	Norway Maple	10			Good		154	Pinus glauca	White Spruce	8			Good		199	Pinus glauca	White Spruce	5				Good		222	Pinus glauca	White Spruce	8			Good		
								155	Pinus glauca	White Spruce	5			Poor	Low live crown ratio, suspected needle blight	200	Pinus glauca	White Spruce	5				Fair	Suspected needle blight									
								156	Pinus glauca	White Spruce	5			Poor	Terminal leader failure	201	Pinus nigra	Australian Pine	11				Fair	Dipodia needle blight									
								157	Pinus nigra	Australian Pine	12			Good		202	Pinus nigra	Australian Pine	12				Fair	Being choked by vines									
								158	Pinus nigra	Australian Pine	8			Fair	Dipodia, very low live crown ratio	203	Pinus nigra	Australian Pine	11				Fair	Dipodia needle blight									
								159	Pinus nigra	Australian Pine	9			Fair	Dipodia needle blight	204	Pinus nigra	Australian Pine	9				Good										
								160	Pinus nigra	Australian Pine	9			Fair	Dipodia needle blight	205	Pinus glauca	White Spruce	9				Good										
								161	Pinus nigra	Australian Pine	10			Good		206	Pinus glauca	White Spruce	10				Good										
								162	Pinus glauca	White Spruce	5			Good		207	Pinus glauca	White Spruce	10				Good										
								163	Pinus glauca	White Spruce	6			Good		208	Pinus glauca	White Spruce	7				Good										
								164	Pinus glauca	White Spruce	5			Good		209	Pinus glauca	White Spruce	5				Good										
								165	Pinus nigra	Australian Pine	10			Good		210	Pinus glauca	White Spruce	8				Good										
								166	Pinus nigra	Australian Pine	10			Good		211	Pinus glauca	White Spruce	7				Good										
								167	Pinus nigra	Australian Pine	12			Good		212	Pinus nigra	Australian Pine	11				Fair	Dipodia needle blight									
								168	Pinus nigra	Australian Pine	9			Good		213	Pinus nigra	Australian Pine	11				Fair	Dipodia needle blight									
								169	Pinus nigra	Australian Pine	10			Fair	Dipodia needle blight	214	Pinus nigra	Australian Pine	12				Fair	Dipodia needle blight									
								170	Pinus nigra	Australian Pine	13			Good		215	Pinus glauca	White Spruce	5				Fair	Suspected needle blight									
								171	Pinus glauca	White Spruce	4			Good		216	Pinus glauca	White Spruce	6				Fair	Dipodia needle blight									
								172	Pinus glauca	White Spruce	6			Good		217	Pinus nigra	Australian Pine	14				Fair	Dipodia needle blight									
								173	Pinus glauca	White Spruce	7			Good		218	Pinus nigra	Australian Pine	9				Fair	Dipodia needle blight									
								174	Pinus glauca	White Spruce	5			Good		219	Pinus nigra	Australian Pine	11				Fair	Dipodia needle blight									
								175	Pinus nigra	Australian Pine	12			Good		220	Pinus nigra	Australian Pine	9				Poor	Dipodia needle blight, very sparse crown									
								176	Pinus nigra	Australian Pine	12			Good		221	Pinus glauca	White Spruce	8				Good										
								177</																									





Plan View  
Scale 1" = 30'

LUMINAIRE SCHEDULE									
Symbol	Label	Qty	Catalog Number	Description	Lamp	File	Lumens	LLF	Watts
■	A	4	CR1-H40-H5	CIMARRON RECTANGULAR AREA LIGHT TYPE V REFLECTOR CLEAR FLAT LENS	400W CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION	cr1-h40-h5.ies	32400	0.72	920
■	B	3	CR1-H40-H3	CIMARRON RECTANGULAR AREA LIGHT TYPE III REFLECTOR CLEAR FLAT LENS	400W CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION	cr1-h40-h3.ies	32400	0.72	920
■	C	1	CR1-H40-H5	CIMARRON RECTANGULAR AREA LIGHT TYPE V REFLECTOR CLEAR FLAT LENS	400W CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION	cr1-h40-h5.ies	32400	0.72	460
■	D	7	PGL400Hx2xxPVL V	WALLPACK - PERIMALITER II GLASS REF. SPECULAR ALUMINUM ENCL. PRISMATIC BOROSIL. GLASS	400 W MET. HAL. ED 37	HP09115.ies	36000	0.72	460

STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone #2	+	2.3 fc	17.1 fc	0.0 fc	N/A	N/A

LUMINAIRE LOCATIONS											
No.	Label	X	Y	Z	MH	Orientation	Tilt	X	Aim Y	Z	
1	A	-289.1	402.7	30.0	30.0	0.0	0.0				
2	A	-174.0	404.1	30.0	30.0	0.0	0.0				
3	B	-389.5	326.4	30.0	30.0	0.0	0.0				
4	B	-390.8	220.2	30.0	30.0	0.0	0.0				
5	B	-381.4	124.9	30.0	30.0	0.0	0.0				
6	A	-80.3	308.7	30.0	30.0	90.0	0.0				
7	C	-70.1	422.2	30.0	30.0	0.0	0.0	-70.1	423.6	0.0	
8	A	39.5	413.9	30.0	30.0	0.0	0.0				
9	D	-296.4	252.8	16.0	16.0	0.0	0.0	-296.4	252.8	0.0	
10	D	-257.5	252.9	16.0	16.0	0.0	0.0	-257.5	252.9	0.0	
11	D	-219.7	253.1	16.0	16.0	0.0	0.0	-219.7	253.1	0.0	
12	D	-178.9	252.8	16.0	16.0	0.0	0.0	-178.9	252.8	0.0	
13	D	-124.0	253.0	16.0	16.0	0.0	0.0	-124.0	253.0	0.0	
14	D	-39.0	253.0	16.0	16.0	0.0	0.0	-39.0	253.0	0.0	
15	D	-318.6	253.2	16.0	16.0	0.0	0.0	-318.6	253.2	0.0	

Designer  
Brian Mendez

Date  
Jul 15 2013

Scale

Drawing No.



June 26, 2013

Mr. Brett Buchholz, P.E., Senior Associate  
Nowak & Fraus Engineers  
46777 Woodward Avenue  
Pontiac, Michigan 48342

**RE: Geotechnical Investigation  
Eberspaecher North America  
Parking Lot Improvements  
Novi, Michigan  
CTI Project No. 3132040026**

Dear Mr. Buchholz:

CTI and Associates, Inc. (CTI) has completed the geotechnical investigation services for the proposed parking lot improvement project at the Eberspaecher North America facility in Novi, Michigan. Our services were performed in general accordance with CTI Proposal No. 113PRO2040-118 dated May 22, 2012 as authorized by Mr. Brett Buchholz, P.E., Senior Associate of Nowak & Fraus Engineers on May 31, 2012.

The purpose of our investigation was to determine the general subsurface conditions at the site by performing a series of soil borings within the new proposed pavement and utility areas, and pavement cores in the existing pavement areas. The boring logs, which detail the general subsurface conditions encountered at each boring location, are attached to this report.

Our investigation determined that the site is generally underlain by clay fill material containing trace amounts of organics. In addition, it appears that coarse gravel was used in an effort to stabilize the subgrade soils during construction of the existing parking lot. Due to the presence of organics in the existing fill, care should be taken to construct the new pavement subgrade and base courses as detailed in this report. Recommendations regarding support of the proposed storm sewer are also presented in this report.

### **SITE AND PROJECT DESCRIPTION**

The project is located at 43700 Gen Mar Drive in Novi, Michigan. At the time of our field investigation, the existing pavement surface consisted of asphalt pavement, with the exception of the truck well area which was covered with concrete pavement. No information was provided regarding the age of the existing asphalt pavement or the existing storm sewer.

The proposed project includes an expansion of the existing parking areas and storm water improvements. The proposed storm water improvements include the installation of approximately 500 lineal feet of 24- to 48-inch concrete storm sewer pipe and new catch basins to accommodate the additional runoff associated with the new pavement areas. In addition, the existing asphalt pavement will be improved through a partial depth milling and repaving. The depth of the storm sewer has not yet been finalized. We anticipate that the storm sewer invert will be at a depth of 5 to 8 feet below the existing grade.

## INVESTIGATION PROCEDURES

Our field investigation consisted of performing four soil borings in the vicinity of the pavement expansion areas and three pavement cores through the existing asphalt pavement. The soil borings are designated as Borings B-1 through B-4 and the pavement cores are designated as C-5 through C-7. The boring and core locations were approved by Nowak & Fraus Engineers and marked in the field by CTI personnel. For reference purposes, the approximate locations of the soil borings and pavement cores are shown on the Boring Location Plan, included with this report. As requested, the borings were extended to depths of 7½ to 10 feet below the existing ground surface at each location. Determining the surface elevations at the soil boring locations was not included in our scope of work for this investigation.

The drilling operations were performed on June 12, 2013. The soil borings were drilled using a rotary drill rig with continuous flight 3¼-inch hollow-stem augers. Within each test boring, soil samples were obtained at 2½-foot intervals by the Standard Penetration Test Method (ASTM D1586), whereby a 2-inch outside diameter split barrel sampler is driven into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler is generally driven three successive 6-inch increments, with the number of blows for each increment being recorded. The number of blows required to advance the sampler the second and third 6-inch increment is termed the Standard Penetration Resistance, N. The soil samples recovered from the borings were sealed in glass jar containers and then transported to our laboratory for further classification, examination and testing.

At the core locations, pavement cores were obtained using a diamond tipped core barrel. A hand auger was used to determine the aggregate base thickness and subgrade soils present immediately below the aggregate base material. After completion of the drilling and coring operations, the boreholes were backfilled with excavated soil. Borings and cores performed through pavement were also patched with a cold asphalt patching material.

Soil and groundwater conditions observed in the test borings have been evaluated and are presented on the boring logs included with this report. To aid in understanding the data presented on the boring logs, "General Notes for Soil Classification," describing nomenclature used in soil descriptions, are also included with this report. The soil descriptions reported on the boring logs are based upon field logs prepared by experienced drillers, modified based on the results of laboratory testing and engineering review.

The laboratory testing program determined the general soil classification and physical properties. All laboratory testing was performed in general accordance with applicable ASTM test method standards. The laboratory testing consisted of visual soil classification of each collected sample, as well as natural moisture content determination and Loss-on-Ignition (organic) analysis of selected samples. The unconfined compressive strength of several cohesive samples was also estimated based on the resistance to a calibrated spring-loaded hand penetrometer.

The soil samples were visually classified in general accordance with the Unified Soil Classification System (USCS). The estimated USCS group symbol is shown in parentheses following the written description of the various natural soil strata on the boring logs. The results of all laboratory tests are indicated on the boring logs at the depths the samples were obtained and/or on the "Summary of Laboratory Test Results" included with this report.



## EXISTING PAVEMENT CONDITIONS

On June 12, 2013, Ms. Theresa Marsik, P.E., of CTI visited the site for the purpose of visually assessing the quality of the existing pavement. While no ponded water was observed at the time of the site visit, some areas of water staining were observed along the western edge of the western portion of the parking lot. Additionally, water staining was observed in an area of pavement distress located north of the existing truck well concrete pavement.

Slight raveling of the asphalt surface was observed across portions of the parking lot. Transverse and longitudinal cracking was present across portions of the entire parking lot, with cracks in the northern portion of the parking lot typically ranging from approximately ¼- to ¾-inch in width; most of the remaining cracks were less than ½-inch wide. Areas of alligator cracking were observed across the north and northwestern pavement areas.

Overall, the pavement appeared in fair condition. It should be noted that crack sealant had been applied to many of the observed pavement cracks.

## SUBSURFACE CONDITIONS

### Soil Conditions

At the location of Borings B-1 through B-3, approximately 2 to 6 inches of topsoil fill was encountered. At the location of Boring B-4, approximately 3 inches of asphalt pavement was encountered, underlain by coarse gravel fill to a depth of about 2 feet. Below the coarse gravel fill in B-4 and the surficial topsoil fill at the remaining boring locations, clay fill with varying amounts of organics was encountered to depths of about 2¼ to 6 feet below the existing ground surface. Laboratory testing indicated that the clay fill material encountered within B-1 and B-4 had an organic content in the range of approximately 2.7 to 3.5 percent. The clay fill encountered within B-3 was underlain by fine to coarse gravel fill to a depth of 3½ feet. Below the encountered fill materials, the subgrade soils typically consisted of clay with occasional sand seams and layers. Trace amounts of organics were observed within the clay encountered in B-2 below a depth of about 6 feet. The clay encountered below a depth of 6 feet within B-1 was identified as "possible fill." In the absence of foreign debris, it is difficult to distinguish between natural soils and clean fill soil within a relatively small diameter boring.

At the location of Cores C-5 through C-7, pavement sections consisting of approximately 3.2 to 4 inches of asphalt pavement with 7 to 8½ inches of aggregate base materials were encountered. The pavement sections were underlain by coarse gravel fill to the final explored depths of 1¼ to 1½ feet.

Standard Penetration Test (SPT) resistance (N) values recorded within the encountered native clay soils ranged from 3 to 25 blows per foot. The unconfined compressive strength of the tested clay samples ranged from approximately 1,000 pounds per square foot (psf) to more than 9,000 psf, indicating very stiff to hard consistencies. The samples generally appeared moist when examined in the laboratory. The moisture contents of the tested native clay samples ranged from approximately 16 to 22 percent.

An N-value of 10 blows per foot was recorded within a silty, clayey fine sand layer encountered

within B-3, indicating a medium dense relative density. The collected sample appeared moist when examined in the laboratory.

### **Groundwater Conditions**

The drillers looked for indications of groundwater seepage both during and upon completion of the drilling operations. Groundwater seepage was observed within Boring B-3 at a depth of 6¾ feet during drilling. Collapse of Boring B-3 upon removal of the augers precluded accurate measurement of the groundwater level following completion of the drilling operations. The remaining borings were reported as dry both during and after drilling.

Due to the inherent low permeability of the native clay soils, a long time would be required for the water level in an open borehole to stabilize with the long-term, hydrostatic groundwater level. It would be necessary to install and monitor a series of observation wells (piezometers) over an extended period of time to accurately determine the position of the long-term hydrostatic groundwater level in these soil conditions. The installation of groundwater monitoring wells was beyond the scope of our services for this project.

The groundwater conditions discussed herein and indicated on the soil boring logs represent those encountered at the time of the field investigation. The groundwater levels, including perched groundwater accumulations, should be expected to fluctuate seasonally, based on variations in precipitation, evaporation, surface run-off and other factors not evident at the time of our investigation. The actual groundwater levels at the time of construction may vary from those provided herein.

The above subsurface description is of a generalized nature intended to highlight the major stratification features and material characteristics. The individual boring logs should be reviewed for specific information at each location. The stratification depths shown on the test boring logs represent the soil conditions at the actual boring locations only.

Variations may occur between and/or beyond the boring locations. The presence and depth of fill or other organic soils is expected to be random and may extend to greater depths in some areas than reported herein. If significant variations in the soil conditions are discovered during construction, it should be immediately brought to the attention of CTI, before removal. An evaluation should then be made in the field by a CTI representative to determine if it is classified as topsoil, fill or highly organic and requires removal.

## **ANALYSIS AND RECOMMENDATIONS**

At the time this report was prepared, the overall project was in the planning and design stage. The following recommendations have been developed based on the previously assumed/described project characteristics and subsurface conditions. If there is any significant change in the project characteristics from those presented earlier, a review should be made by CTI to determine if any modifications in the evaluations and recommendations included in this report will be required.

As stated previously, the proposed project includes the installation of approximately 500 lineal feet of 24- to 48-inch diameter concrete storm sewer pipe and new catch basins to accommodate the additional runoff associated with the new pavement areas. In addition, the existing asphalt pavement will be improved through a partial depth milling and repaving. The

depth of the storm sewer has not yet been finalized. We anticipate that the storm sewer invert will be at a depth of 5 to 8 feet below the existing grade. Based on the available soil and project information, the encountered subgrade soils appear to be suitable for installation of the proposed utilities using open-cut excavation methods.

### **Utility Installation Recommendations**

In general, the placement of utility lines within the soil profile does not greatly increase the load on the underlying soil. However, it is important that the utility pipe be placed on a firm and stable subgrade, along the design alignment and at the proper grade to prevent the pipe from becoming over-stressed in hoop compression or bending.

Based on the soil conditions encountered at the boring locations, the soil at the anticipated storm sewer invert elevation is anticipated to be medium stiff to hard clay and/or clay fill, with isolated areas of medium dense silty, clayey fine sand. Based on the test borings, the soils encountered at the proposed invert elevation should generally provide adequate support for the proposed storm sewer, provided the soils are free of unsuitable soils and stable at the time of construction.

All excavations should comply with MIOSHA guidelines, as described in this report. After excavating to the proposed utility invert elevation, the exposed soils should be thoroughly inspected to verify that they are in a stable condition. We recommend that the contractor verify the actual groundwater conditions at the time of construction. Depending on the condition of the exposed subgrade soils, it may be necessary to stabilize the soils with a layer of crushed stone prior to placing pipe bedding material.

In general, sufficient bedding material should be placed and compacted below the utility pipes. Unless the design requirements are otherwise, we recommend a minimum of 6 inches of bedding material be placed below the utility pipe invert elevation. The bedding materials shall be placed in the trench bottom over stable subgrade soils and extend up and around the utility lines, and be compacted in accordance with the project specifications. Granular backfill around the utility pipes should be tamped in place evenly to avoid imparting excessive and/or unequal pressure on the pipe and to avoid disturbance of the pipe and joints.

Trenches and excavations shall be backfilled as soon as practical after the utility lines have been properly installed. The engineered backfill soils should be placed as described in this report. Since the proposed utilities will be located within the influence of the existing parking lot, CTI recommends that the excavations be backfilled with MDOT Class II material. In landscaped areas, natural backfill materials meeting the requirements of engineered fill may be used as backfill.

### **Utility Excavations**

In general, all excavations should be safely sheeted, shored, sloped or braced in accordance with OSHA guidelines. Construction traffic, stockpiles of soil and construction materials should be kept away from the edges of the excavations a lateral distance at least 1.5 times the depth of the excavation.

Utility excavations are generally expected to consist of open-cut methods. In this regard, the utility trench sidewalls should be adequately braced or sloped back to prevent sloughing and caving. In any case, appropriate measures will be required to maintain the stability of excavation sidewalls. The required measures will depend on the depth and width of excavations and groundwater conditions at specific locations. The excavation support system



for utilities could consist of internally braced sheeting, trench boxes or sliding trench shields. If material is stored or equipment is operated near an excavation, stronger shoring must be used to resist the extra pressure due to the superimposed loads.

The angle of the excavation side slopes should be decided based on the soil type and unconfined compressive strength of the excavated soil per MIOSHA requirements. For excavations greater than 5 feet and less than 20 feet in depth, MIOSHA has different sloping requirements for a variety of soil types. The table presented below provides a summary of the requirements for informational purposes only. Prior to designing or constructing a stable and safe excavation, the contractor must refer to MIOSHA standards.

<b>Table 1: Maximum Allowable Angle of Repose for the Side of an Excavation</b>			
<b>Soil Type</b>	<b>Maximum Allowable Excavation Side Slope</b>		<b>Maximum Angle of Repose (Degrees)</b>
	<b>Horizontal</b>	<b>Vertical</b>	
Clay with minimum unconfined compressive strength of 2.5 tsf	1	2	63
Clay with minimum unconfined compressive strength of 1.5 tsf	2	3	56
Clay with minimum unconfined compressive strength of 1.0 tsf; Dry granular soils; Dry sand and clay mixtures	1	1	45
Granular soil with wet clay or silt seams; Clay with a minimum unconfined compressive strength of 1.0 tsf that contains running sand seams	1½	1	34
Saturated granular soil; Clay with an unconfined compressive strength less than 1.0 tsf	2	1	26
Running/sloughing soil (sand or clay)	3	1	18

The contractor is solely responsible for designing and constructing stable and safe temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor should be aware that slope height, slope inclination and excavation depth should not exceed the specified local, state and federal regulations.

**Backfill and Engineered Fill Placement**

Any fill placed below the proposed pavement area should be an approved material that is free of topsoil, organics, frozen soil or any other unsuitable material. If granular soils containing greater than 12 percent fines (i.e., silt or clay) are used as fill, close moisture content control will be required to achieve the recommended degree of compaction. Any fill materials encountered at locations other than the boring locations can be further evaluated during site preparation to determine if some of the soils can be reused as engineered fill.

The engineered fill should be placed in uniform horizontal layers not exceeding 8 to 12 inches in loose thickness for clean granular soils and 4 to 6 inches in loose thickness for clay soils (or clayey granular soils exhibiting cohesive characteristics), depending on the type and size of compaction equipment used. The lift thickness for sands that have an appreciable amount of fines should be decreased accordingly. The engineered fill should be compacted to achieve a density of not less than 95 percent of the maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D1557). Also, the upper 12 inches of the subgrade soils should be compacted, prior to any fill placement, to achieve a density of not less than 95 percent of the maximum dry density as determined by the Modified Proctor test. The as-compacted moisture content of the engineered fill should be within 2 to 3 percent of the optimum moisture content for the soil. The placement and testing of engineered fill should be observed and properly documented in the field by CTI.

We recommend that the contract specifications include provisions for moisture conditioning of any on-site soils that are to be used as engineered fill. Some of the natural soils may require moisture conditioning to allow for proper compaction. The success of aeration and drying of clay soils will be dependent on the time of year, the prevailing weather conditions and the contractor's effort. During cold and/or wet periods of the year, the saturated or disturbed clay soils will be more difficult to dry. In this case, the contractor may have to use drier on-site soils or imported sand.

If site grading or other construction activity is planned during cold weather, it is recommended that proper winter construction practices are followed. All snow and ice should be removed from cut and fill areas prior to grading. Frozen materials should not be used as engineered fill and no fill or pavement should be placed on soils that are frozen or contain frozen material.

### **Site Preparation for Pavement Support – Existing Unpaved Areas**

At the start of earthwork operations, topsoil and any other deleterious materials are to be stripped from the new pavement areas. The thickness of the existing topsoil and near surface fill layer (where present) should be expected to vary across the site. The depth of unsuitable soil removal should be determined by a representative of CTI at the time of stripping and rough grading.

Proper evaluation and conditioning (if necessary) of the subgrade should be performed prior to any engineered fill placement. After stripping and excavating to the design subgrade level (i.e. the bottom of the proposed aggregate base course), and after removing any unsuitable materials and underground objects, the rough graded pavement area should be proofrolled with a loaded tandem-axle dump truck or similar rubber-tired vehicle. The purpose of proofrolling operations is to locate areas of excessively loose, soft or weak subgrade soils which may be present at the time of construction. Soils that are observed to rut or deflect excessively during proofrolling should be stabilized by conventional methods such as disking, drying and re-compacting.

If it is not feasible to dry and re-compact the unsuitable subgrade soils due to unfavorable weather conditions, scheduling, etc., it may be necessary to remove such soils and replace them with engineered fill. The thickness of the undercut will depend on the severity of the unstable soils encountered at specific locations. A layer of crushed aggregate may be necessary to stabilize the subgrade before placement of the selected engineered fill material. The use of a geotextile separator below the crushed aggregate layer should also be considered to provide additional subgrade stability and pavement durability.

It should be noted that the actual locations and depths of any undercutting and/or stabilization should be established in the field at the time of construction. The extent to which yielding subgrades may be a problem is difficult to predict beforehand since it is dependent upon several factors including seasonal conditions, precipitation, construction practices, etc.

Once the site has been evaluated, proofrolled and/or stabilized, the inspected area should not be allowed to remain exposed to wet conditions more than one day or subjected to construction traffic, otherwise a re-evaluation should be made. The site earthwork operations should be carried out during a period of dry weather, if possible. This should minimize potential subgrade problems, although they may not be eliminated. The severity of subgrade instability will depend to a high degree on the weather conditions prevailing during construction.

### **Site Preparation for Pavement Support – Existing Pavement Areas**

The pavement areas, in general, were observed to be in fair condition. Isolated areas of significant pavement distress were observed in the north and northwest portions of the existing pavement area. In addition, the remaining portions of the parking lot appear to be exhibiting initial signs of pavement fatigue and cracking.

The pavement displays random cracking, slightly raveled aggregate, and localized alligator cracking (north and northwest portions of the parking lot, as discussed via telephone on June 25, 2013). In the areas of the observed alligator cracking, full-depth pavement reconstruction is required.

The recommended full-depth asphalt pavement reconstruction would consist of removing the asphaltic pavement and existing aggregate base materials, then scarifying and re-compacting the resulting subgrade material to a firm and unyielding condition. Areas that pump or exhibit unstable conditions shall be removed and replaced or reworked until a firm and unyielding condition exists. Following reworking of the subgrade material, the design thickness of aggregate base material should be placed and compacted, and the edges of the remaining pavement shall be saw cut in a straight line. The edges of the cut pavement should be “battered” with liquid asphalt and a new minimum 4 inch thick asphaltic surface course constructed. The new asphalt shall match the grades of the remaining asphalt and shall provide “positive” site drainage to the stormwater outlets.

Where full-depth pavement reconstruction is not recommended, we anticipate the upper 1 to 2 inches of the existing pavement will be milled and removed. Following the milling procedures, the remaining pavement surface must be thoroughly swept and cleaned. A pavement survey should then be performed to identify the presence of any remaining pavement cracks. All longitudinal, transverse and random cracks should be professionally cleaned, with all soil and vegetation removed. Cracks greater than 1 inch in width should be patched with hot-mix asphalt for the full length of the crack. Cracks wider than ½ inch but less than 1 inch should be sealed with a hot applied elastomeric-type crack sealant. Cracks that are less than ½ inch wide should be repaired by the application of a seal coat.

Following the repairs as outlined, an asphalt overlay should be applied to the entire pavement area. We recommend a minimum overlay thickness of 1½ inches consisting of MDOT Type 36A asphaltic mix to improve the serviceability of the pavement structure. It should be noted that, even with the repair measures outlined herein, reflective cracking may occur.

## **Pavement Design Considerations**

The subgrade soils for support of the pavement sections should be prepared in accordance with the recommendations of this report. As discussed previously, we recommend the subgrade be subjected to a comprehensive proofrolling and evaluation program to determine the overall suitability at the time of construction. The areas requiring subgrade improvement should be determined in the field by CTI by proper inspection and evaluation at the time of construction. Provisions should be established in the construction documents for this purpose.

The long-term performance of the pavement will typically be a function of the quality of the subgrade soil at the time of construction along with the quality, thickness and strength of the overall pavement section. The most critical portion of the subgrade is the 3 feet immediately beneath the pavement section, which provides the primary strength needed for pavement section support. Uncontrolled fill materials present within the upper 2 to 3 feet of the pavement subgrade can be detrimental if the design does not account for this substandard soil condition, especially during the spring freeze-thaw cycles.

The pavement system should be properly drained to reduce the potential for weakening the subgrade. Provisions should be made to prevent surface run-off water from accumulating within the aggregate base course of the pavement. The pavement and underlying subgrade should be suitably crowned or sloped to promote effective surface drainage and prevent water ponding. We anticipate that the pavement surface will drain via a storm sewer system. Due to the presence of silt and clay in the granular subgrade soils, a system of finger drains or stub drains should be placed around all catch basins within the pavement areas to minimize the accumulation of water in the frost susceptible subgrade soils. These under drains should be installed below the aggregate base layer of the pavement system and be properly protected with free-draining coarse aggregate material and filter fabric.

All pavements require regular maintenance and occasional repairs to keep them in a serviceable condition. Of particular value is timely sealing of joints and cracks, which if left unrepaired, can serve to permit water to enter the pavement section and cause rapid deterioration of the pavement during freeze-thaw cycles. The need for such routine maintenance and repair is not necessarily indicative of premature pavement failure. However, if appropriate maintenance and repairs are not performed on a timely basis, the serviceable life of the pavement can be reduced significantly.

## **Preliminary Pavement Design Analysis**

A detailed pavement design was beyond the scope of our study. However, we have developed preliminary pavement designs based on the assumption that the subgrade will be prepared as recommended in this report. No information regarding anticipated traffic loading was provided to CTI.

Our analysis is based on the 1993 American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures. Based on estimated traffic loading and a 20-year design period, we have projected a design parameter of 150,000 Equivalent 18-kip Single Axle Loads (ESALs) for medium duty pavement. Other design parameters assumed for our pavement analysis include a terminal serviceability of 2.5, an initial serviceability of 4.5, reliability (R) of 95% and a standard deviation ( $S_0$ ) of 0.49. Should any of

these traffic assumptions be found incorrect, CTI should be contacted and requested to re-evaluate the pavement design recommendations based on the revised traffic data.

Based on the anticipated pavement subgrade soils, we have assigned a subgrade CBR of 3, a resilient modulus, ( $M_r$ ), of 5,000 pounds per square inch (psi) and a modulus of subgrade reaction, ( $k$ ), of 100 pounds per cubic inch (pci) for this site. A minimum Structural Number (SN) value of 3.11 was determined for the medium duty pavement using the criteria listed above.

The following table summarizes the minimum flexible pavement cross sections recommended for the proposed site:

<b>Table 2: Medium Duty Flexible Pavement Section</b>				
<b>Layer</b>	<b>Material</b>	<b>Thickness (inches)</b>	<b>Structural Layer Coefficient</b>	<b>Structural Number (SN)</b>
Bituminous Surface	MDOT 36A	1.5	0.44	0.66
Bituminous Leveling	MDOT 3C	2.5	0.42	1.05
Aggregate Base	MDOT 21AA crushed limestone	10.0	0.14	1.40
			<b>Total SN =</b>	<b>3.11</b>

We have formulated our flexible pavement design recommendations with the assumption that “staged” construction is not planned. It should be recognized that if the leveling course of the pavement section will be used as a construction platform, the design of the pavement should account for the additional loading of construction traffic. If staged construction is planned for the project, the design thickness of the asphalt leveling course should be increased by 0.5 inch (at a minimum) to reflect the damage which occurs during construction. Furthermore, distress caused by construction traffic should be repaired prior to placement of the wearing course.

Other pavement design sections, from those presented herein, which provide equivalent structural capacity can also be considered. Crushed concrete, recycled asphalt millings or MDOT 22A should not be substituted for the recommended aggregate base material without at least a 25 percent increase of the thickness of the aggregate base to account for the structural differences of the materials.

Actual pavement section thickness should be provided by the design civil engineer based on traffic loads and volume and the owners design life requirements. All pavement materials and procedures should conform to standard MDOT, Oakland County Road Commission or appropriate local municipal agency requirements.

### **GENERAL COMMENTS**

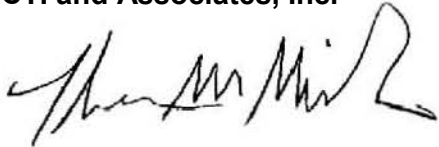
This limited geotechnical investigation report has been prepared to assist in the planning, design and construction of the proposed parking lot improvements at the Eberspaecher North America facility in Novi, Michigan. The evaluations and recommendations discussed in this report are based on the soil conditions encountered in the test borings performed at the

approximate locations indicated on the attached Boring Location Plan and on the date indicated on the boring logs.

In order to permit correlation between the soil boring data and the actual soil conditions encountered during construction, it is recommended that a continuous inspection and review of soil related phases of construction work be carried out. We recommend the subgrade preparation activities, engineered fill placement, and pavement construction be observed by a CTI representative.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report or if we can be of further assistance, such as providing field monitoring and quality control inspection services during construction, please contact our office.

Sincerely,  
**CTI and Associates, Inc.**



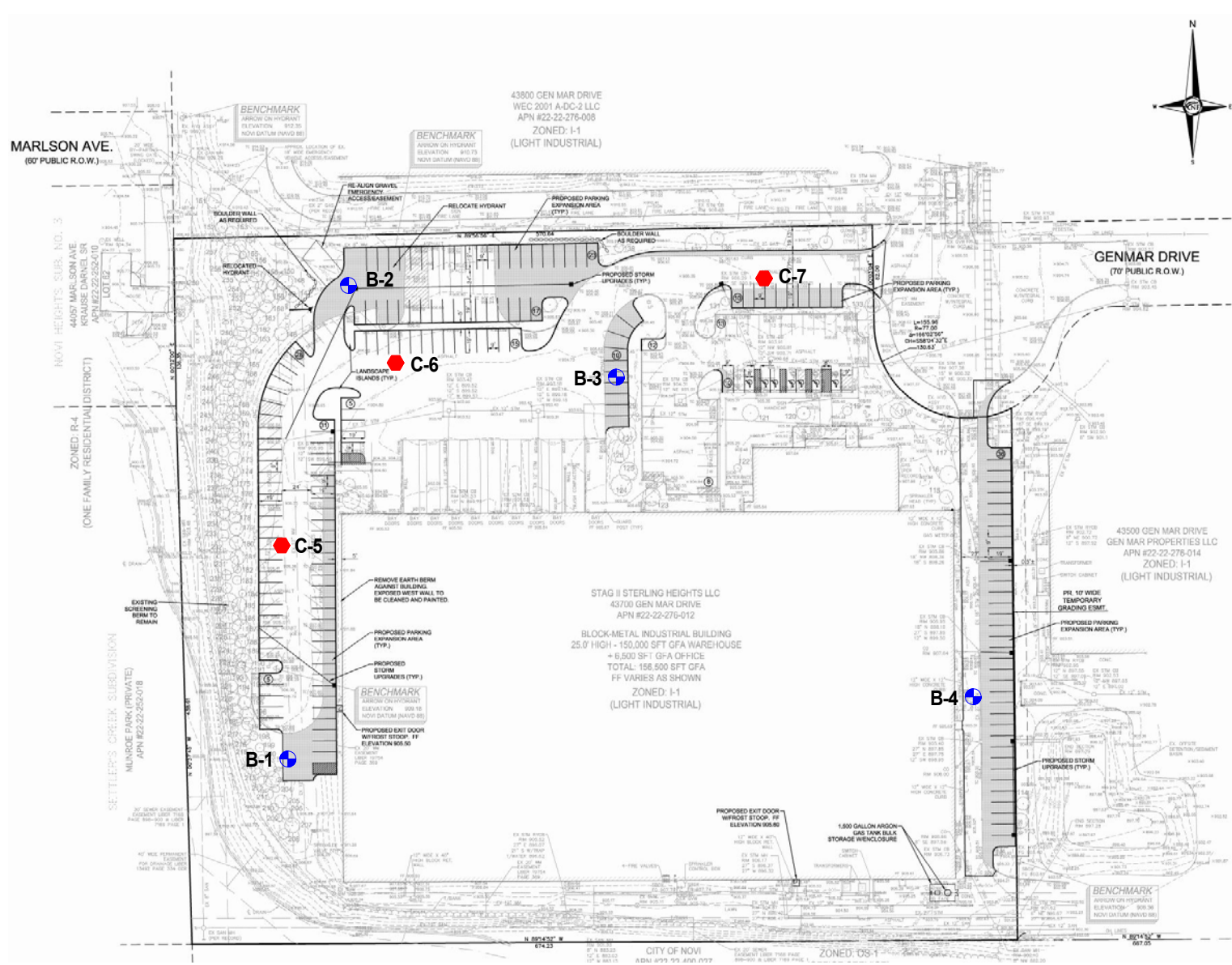
Theresa M. Marsik, P.E., LEED AP  
Senior Project Engineer



Kevin Foye, Ph.D., P.E.  
Project Engineer

Attachments: Boring Location Plan  
Boring Logs (B-1 through B-4 and C-5 through C-7)  
Summary of Laboratory Test Results  
General Notes for Soil Classification





SCALE:	As Shown
PROJECT NUMBER:	31520-4026
FILE NAME:	BORINGPLAN.CAD
DATE:	6-12-13

**BORING LOCATION PLAN**

EBERSPAECHER NORTH AMERICA PARKING LOT IMPROVEMENTS  
43700 GEN MAR DRIVE  
NOVI, MICHIGAN

PLATE:  
I



NOTE: Image reproduced from "Conceptual Site Plan" prepared by Nowak & Fraus Engineers.

**LEGEND:**

- - PROPOSED BORING LOCATION
- - PROPOSED CORE LOCATION



**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		2 inches of dark brown moist TOPSOIL FILL												
2.5		Brown moist CLAY with silt; traces of gravel, sand and organics; and occasional silt partings - (FILL)	SS 1	100	3-5-6 (11)									
5.0		Grayish-brown moist CLAY with traces of gravel, sand and organics - (FILL) Loss-on-Ignition (Organic Content) = 2.7%	SS 2	100	3-6-7 (13)									
7.5		Grayish-brown moist medium stiff CLAY with traces of gravel and sand and occasional tree roots - (CL/Possible FILL)	SS 3	100	2-2-1 (3)	1.0								
10.0			SS 4	100	0-0-3 (3)	0.5								

Bottom of borehole at 10.0 feet.





**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲				
								15	30	45	60	
0.0		6 inches of dark brown moist TOPSOIL FILL										
2.5		Brown slightly moist hard CLAY with silt, some sand, trace of gravel, and frequent silt partings - (FILL)	SS 1	100	10-14-19 (33)							
5.0		Brown moist medium stiff CLAY with silt and trace of gravel and sand - (CL)	SS 2	100	3-4-3 (7)	0.75						
7.5		Mottled brown and gray moist stiff CLAY with silt and traces of gravel, sand and organics - (CL)	SS 3	100	4-4-7 (11)	1.0						

Bottom of borehole at 7.5 feet.



**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** 6' 9"  
**AFTER DRILLING** 6' 9"  
**COLLAPSE DEPTH** 6' 9"

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		3 inches of dark brown moist TOPSOIL FILL												
		Brown slightly moist CLAY with silt, some sand and trace of gravel - (FILL)												
2.5		Gray moist fine to coarse crushed limestone GRAVEL - (FILL)	SS 1	100	5-9-13 (22)									
5.0		Brown moist medium dense silty, clayey fine SAND - (SC-SM)	SS 2	100	3-4-6 (10)		18							
		Brown moist stiff CLAY with silt, some sand and trace of gravel - (CL)												
		Brown wet medium dense silty fine SAND with occasional gravel seams - (SM)	SS 3	100	6-14-11 (25)	4.5+	14							
7.5		Brown moist hard CLAY with silt and trace of sand - (CL)												

Bottom of borehole at 7.5 feet.



**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		3 inches of ASPHALT PAVEMENT												
		Gray moist coarse 1" x 3" GRAVEL - (FILL)												
2.5		Dark brown moist CLAY with silt, some sand and traces of gravel and organics - (FILL)	SS 1	100	4-7-5 (12)									
		Loss-on-Ignition (Organic Content) = 3.5%	SS 2	100	4-3-4 (7)		18							
5.0		Mottled brown and gray moist hard CLAY with silt, traces of gravel and sand and occasional silt partings - (CL)	SS 3	100	3-4-6 (10)	4.5+	15							

Bottom of borehole at 7.5 feet.



CTI and Associates Inc

**CORE NUMBER C-5**

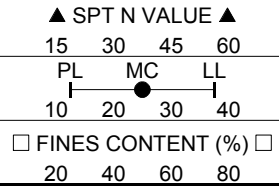
PAGE 1 OF 1

**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** CTI and Associates, Inc.  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** D. Cook **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		4 inches of ASPHALT PAVEMENT												
		7 inches of fine to coarse crushed limestone GRAVEL - (FILL)												
		6.5 inches of coarse 1" x 3" GRAVEL - (FILL)												

Bottom of borehole at 1.5 feet.





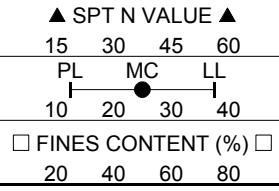
CTI and Associates Inc

**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** CTI and Associates, Inc.  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** D. Cook **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		3.5 inches of ASPHALT PAVEMENT												
		8 inches of fine to coarse crushed limestone GRAVEL - (FILL)												
		3.5 inches of coarse 1" x 3" GRAVEL - (FILL)												

Bottom of borehole at 1.3 feet.





CTI and Associates Inc

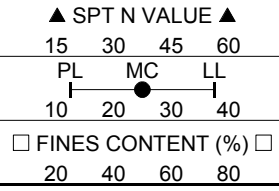
**CORE NUMBER C-7**

PAGE 1 OF 1

**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** CTI and Associates, Inc.  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** D. Cook **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲					
								15	30	45	60		
0.0		3.2 inches of ASPHALT PAVEMENT											
		8.5 inches of fine to coarse crushed limestone GRAVEL - (FILL)											
		6.3 inches of coarse 1" x 3" GRAVEL - (FILL)											



Bottom of borehole at 1.5 feet.







SEAL



PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspaecher North America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of Section 22  
T. 1 N., R. 8 E.  
City of Novi, Oakland County, Michigan

SHEET  
Landscape Plan



Know what's below  
Call before you dig.

REVISIONS  
7/11/13 PRELIMINARY SITE PLAN REVIEW

DRAWN BY:  
G. Ostrowski

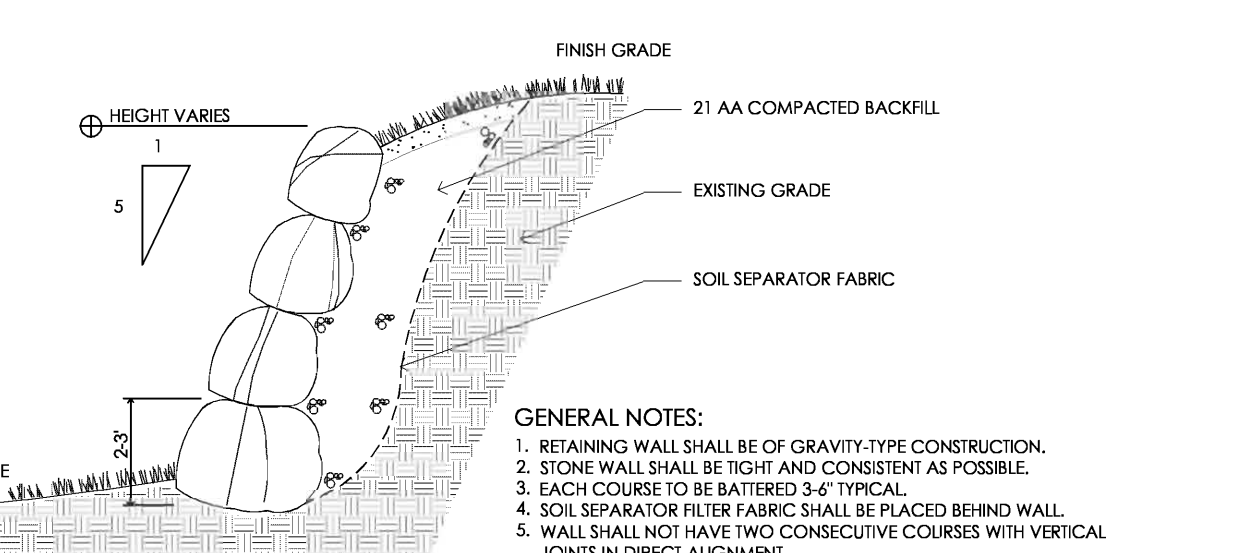
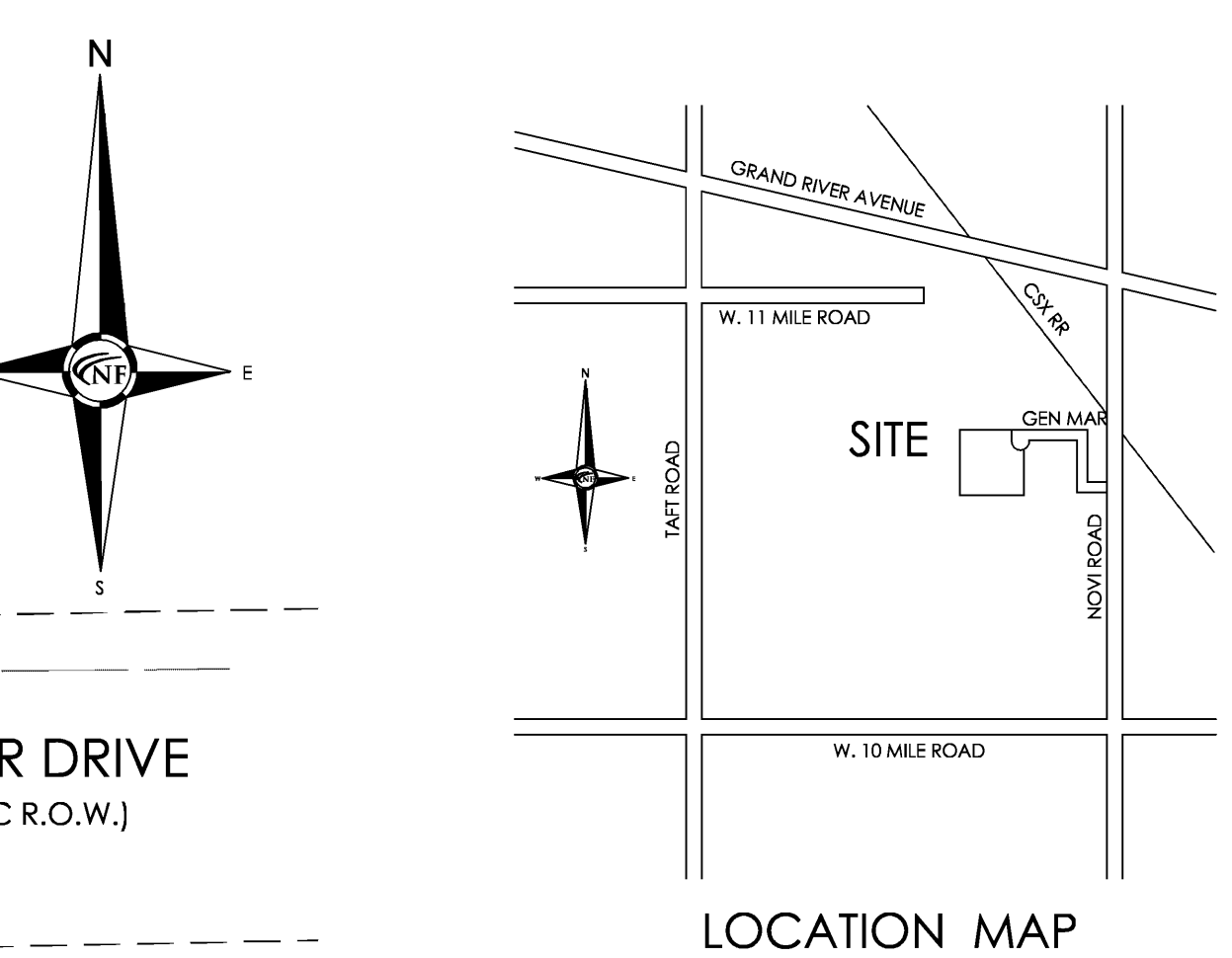
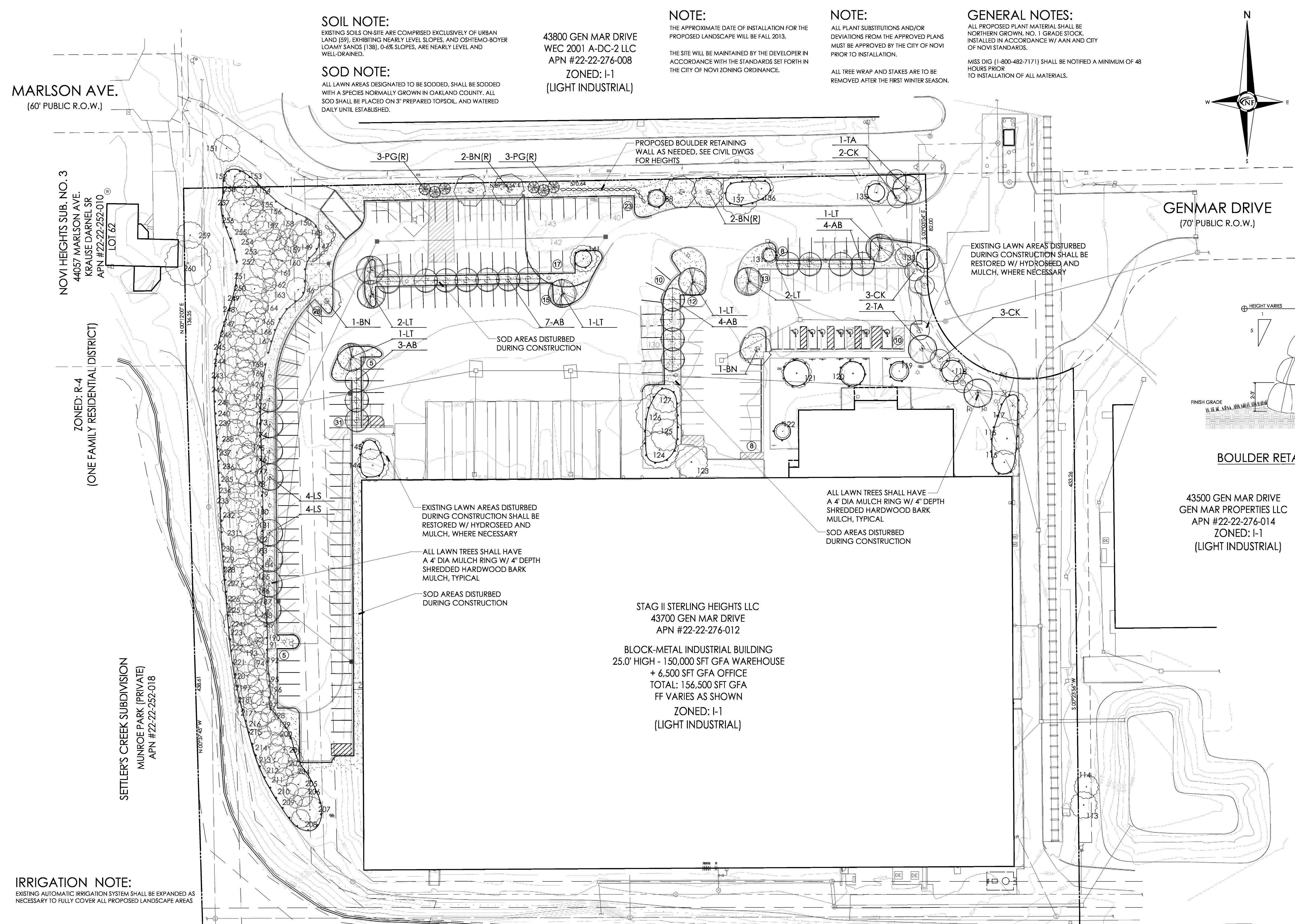
DESIGNED BY:  
G. Ostrowski

APPROVED BY:  
G. Ostrowski

DATE:  
May 3, 2013

SCALE: 1" = 40'

NFE JOB NO. SHEET NO.  
H441 L2



LANDSCAPE REQUIREMENTS  
EXISTING SITE ZONING: I-1, LIGHT INDUSTRIAL DISTRICT  
EXISTING SITE AREA: 8.66 ACRES

LANDSCAPE ABUTTING A R.O.W.  
1 DECIDUOUS OR EVERGREEN TREE PER 40 L.F.  
1 ORNAMENTAL TREE PER 30 L.F.  
REQUIRED: 237.95 OF FRONTAGE  
CANOPY TREES: 237.95 / 40 = 5.9 OR 6 TREES REQUIRED  
SUB-CANOPY TREES: 237.95 / 30 = 7.9 OR 8 TREES REQUIRED  
PROVIDED: 3 EXISTING CANOPY TREE, 3 PROPOSED CANOPY TREES, 8 SUB-CANOPY TREES

PARKING LOT LANDSCAPE REQUIREMENTS  
PARKING SPACE AREA  
34,780 S.F.  
34,780 S.F. X 7% = 2,435 S.F. OF AREA

VEHICLE USE AREA  
58,168 S.F. (CALCULATED)  
50,000 S.F. X 2% = 1,000 S.F.  
8,168 S.F. X 0.5% = 41 S.F.

REQUIRED PARKING LOT LANDSCAPE AREA  
REQUIRED: 2,435 S.F. + 1,000 S.F. + 41 S.F. = 3,476 S.F. REQUIRED  
FOR PARKING LOT ISLANDS  
PROVIDED: 7,566.94 S.F.

PARKING LOT DECIDUOUS SHADE TREES  
1 CANOPY TREE PER 75 S.F. REQUIRED LANDSCAPE AREA  
REQUIRED: 3,476 S.F. / 75 S.F. = 46.34 OR 47 TREES REQUIRED  
PROVIDED: 12 EXISTING TREES, 35 PROPOSED TREES

GENERAL LANDSCAPE NOTES

- LANDSCAPE CONTRACTOR SHALL VISIT SITE, INSPECT EXISTING CONDITIONS AND REVIEW PROPOSED PLANTING AND RELATED WORK. IN CASE OF DISCREPANCY BETWEEN PLAN AND PLANT LIST, THE PLANT SHALL GOVERN QUANTITIES. CONTACT THE LANDSCAPE ARCHITECT WITH ANY CONCERNS.
- THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL ON-SITE UTILITIES PRIOR TO BEGINNING CONSTRUCTION ON THESE AREAS OF WORK. ANY DAMAGE OR INTERFERENCE OF UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- THE CONTRACTOR SHALL COORDINATE ALL RELATED ACTIVITIES WITH OTHER TRADES AND SHALL PROTECT ANY UNCONTRACTED WORK. CONDITIONS TO THE OWNER'S REPRESENTATIVE PRIOR TO COMMENCEMENT.
- PLANTS SHALL BE FULLY BRANCHED AND IN HEALTHY VIGOROUS GROWING CONDITION.
- PLANTS SHALL BE WATERED BEFORE AND AFTER PLANTING IS COMPLETE.
- ALL TREES MUST BE STAKED, FERTILIZED AND MULCHED AND SHALL BE GUARANTEED TO REMAIN A NORMAL GROWTH CYCLE FOR A PERIOD OF (1) YEAR FOLLOWING PLANTING.
- ALL MATERIAL SHALL CONFORM TO THE SPECIFICATIONS ESTABLISHED IN THE MOST RECENT EDITION OF THE "AMERICAN STANDARDS FOR NURSERY STOCK".
- CONTRACTOR WILL SUPPLY FINISH GRADE AND DISCHARGE AS NECESSARY TO SUPPLY PLANT MIX DEPTH IN ALL PLANTING BEDS AS INDICATED IN PLANT DETAILS AND A DEPTH OF 1" IN ALL PLANTING BEDS.
- PROVIDE CLEAN BACKFILL SOIL, USING MATERIAL STOCKPILED ON-SITE. SOIL SHALL BE SCREENED AND FREE OF COBBLES, GRASSHAY, OR LANDSTONE.
- SLOW RELEASE FERTILIZER SHALL BE ADDED TO THE PLANT MIX BEFORE BEING DISCLOSED. APPLICATION SHALL BE IN ACCORDANCE WITH RECOMMENDED RATES.
- PREPARED PLANT MIX (PREPARED TOPSOIL) SHALL CONSIST OF 1/3 SCREENED TOPSOIL, 1/3 SAND, AND 1/2 PEAT MIXED WELL AND SPREAD TO A DEPTH AS INDICATED.
- ALL PLANTINGS SHALL BE MULCHED WITH SHREDDED HARDWOOD BARK, SPREAD TO A DEPTH OF 1" FOR TREES AND SHRUBS, AND 2" ON ANNUALS, PERENNIALS, AND GROUNDCOVER PLANTINGS. MULCH SHALL BE FREE FROM DIRBS AND FOREIGN MATERIAL, AND FREE FROM ON-SITE WEEDS.
- NO SUBSTITUTIONS OR CHANGES OF LOCATION, OR PLANT TYPE SHALL BE MADE WITHOUT THE APPROVAL OF THE LANDSCAPE ARCHITECT.
- THE LANDSCAPE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCIES BETWEEN THE PLANS AND FIELD CONDITIONS PRIOR TO COMMENCEMENT OF WORK.
- THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL PLANT MATERIAL IN A VERTICAL CONDITION THROUGHOUT THE GUARANTEED PERIOD.
- TO BE PLANTED AND WATERED FOR 90 DAYS AFTER PLANTING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL PLANT MATERIAL AS SPECIFIED AS SUCH ON THE PLANS THROUGHOUT THE CONTRACT DATES. THEREAFTER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL PLANT MATERIAL AS SPECIFIED AS SUCH ON THE PLANS THROUGHOUT THE CONTRACT DATES. THEREAFTER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL PLANT MATERIAL AS SPECIFIED AS SUCH ON THE PLANS THROUGHOUT THE CONTRACT DATES.
- THE CITY OF NOVI LANDSCAPE ARCHITECT SHALL APPROVE ANY SUBSTITUTIONS IN WRITING PRIOR TO INSTALLATION.

- CITY OF NOVI NOTES
- ALL LANDSCAPE ISLANDS SHALL BE BACKFILLED WITH A SAND MIXTURE TO FACILITATE DRAINAGE.
  - ALL PROPOSED LANDSCAPE ISLANDS SHALL BE CURBED.
  - ALL LANDSCAPE AREAS SHALL BE BERMADED.
  - OVERHEAD UTILITY LINES AND POLES TO BE RELOCATED, AS DIRECTED BY THE UTILITY COMPANY OF RECORD.
  - EVERGREEN AND CANOPY TREES SHALL BE PLANTED A MINIMUM OF 10' FROM A FIRE HYDRANT AND MANHOLE AND 12' FROM OVERHEAD WIRES.
  - ALL PLANT MATERIAL SHALL BE NORTHERN GROWN NURSERY STOCK, GUARANTEED FOR TWO (2) YEARS AFTER PLANTING AND SHALL BE REPAIRED AND MAINTAINED ACCORDING TO CITY OF NOVI STANDARDS. THE TWO-YEAR WARRANTY PERIOD SHALL INCLUDE A MINIMUM OF ONE CULTIVATION IN JUNE, JULY AND AUGUST FOR EACH OF THE TWO YEAR GUARANTEE.
  - ALL PROPOSED STREET TREES SHALL BE PLANTED A MINIMUM OF 4' FROM THE BACK OF CURB AND PROPOSED WALKS.
  - ALL TREE AND SHRUB PLANTING BEDS SHALL BE MULCHED WITH SHREDDED HARDWOOD BARK, SPREAD TO A MINIMUM DEPTH OF 4". ALL LAWN AREA TREES SHALL HAVE A 4" DIAMETER CIRCLE OF SHREDDED HARDWOOD MULCH, 3" AWAY FROM TRUNK. ALL PERENNIAL, ANNUAL, AND GROUNDCOVER BEDS SHALL RECEIVE 2" OF DARK COLORED BARK MULCH. MULCH IS TO BE FREE FROM DIRBS AND FOREIGN MATERIAL, AND SHALL CONTAIN NO WEEDS OF INCONSPICUOUS WEEDS.
  - THE CITY OF NOVI LANDSCAPE ARCHITECT SHALL APPROVE ANY SUBSTITUTIONS IN WRITING PRIOR TO INSTALLATION.

NOTE:  
THE APPROXIMATE DATE OF INSTALLATION FOR THE PROPOSED LANDSCAPE WILL BE FALL 2013.  
THE SITE WILL BE MAINTAINED BY THE DEVELOPER IN ACCORDANCE WITH THE STANDARDS SET FORTH IN THE CITY OF NOVI ZONING ORDINANCE.  
ALL TREE WRAP AND STAKES ARE TO BE REMOVED AFTER THE FIRST WINTER SEASON.

GENERAL NOTES:  
ALL PROPOSED PLANT MATERIAL SHALL BE NORTHERN GROWN, NO. 1 GRADE STOCK, INSTALLED IN ACCORDANCE WITH AAN AND CITY OF NOVI STANDARDS.  
MISS DIG (1-800-482-7171) SHALL BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO INSTALLATION OF ALL MATERIALS.

SOIL NOTE:  
EXISTING SOILS ON-SITE ARE COMPRISED EXCLUSIVELY OF URBAN LAND (S9), EXHIBITING NEARLY LEVEL SLOPES, AND OSTIEMO-BOYER LOAMY SANDS (I38), 0-6% SLOPES, ARE NEARLY LEVEL AND WELL-DRAINED.  
SOD NOTE:  
ALL LAWN AREAS DESIGNATED TO BE SODDED, SHALL BE SODDED WITH A SPECIES NORMALLY GROWN IN OAKLAND COUNTY. ALL SOD SHALL BE PLACED ON 3" PREPARED TOPSOIL, AND WATERED DAILY UNTIL ESTABLISHED.

43800 GEN MAR DRIVE  
WEC 2001 A-DC-2 LLC  
APN #22-22-276-008  
ZONED: I-1  
(LIGHT INDUSTRIAL)

35000 GEN MAR DRIVE  
GEN MAR PROPERTIES LLC  
APN #22-22-276-014  
ZONED: I-1  
(LIGHT INDUSTRIAL)

43700 GEN MAR DRIVE  
STAG II STERLING HEIGHTS LLC  
APN #22-22-276-012

BLOCK-METAL INDUSTRIAL BUILDING  
25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
+ 6,500 SFT GFA OFFICE  
TOTAL: 156,500 SFT GFA  
FF VARIES AS SHOWN  
ZONED: I-1  
(LIGHT INDUSTRIAL)

CITY OF NOVI  
APN #22-22-400-027  
ZONED: OS-1  
(OFFICE SERVICE)

PROPOSED BOULDER RETAINING WALL AS NEEDED, SEE CIVIL DWGS FOR HEIGHTS

EXISTING LAWN AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED W/ HYDROSEED AND MULCH, WHERE NECESSARY

ALL LAWN TREES SHALL HAVE A 4" DIA MULCH RING W/ 4" DEPTH SHREDDED HARDWOOD BARK MULCH, TYPICAL

SOD AREAS DISTURBED DURING CONSTRUCTION

EXISTING LAWN AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED W/ HYDROSEED AND MULCH, WHERE NECESSARY

ALL LAWN TREES SHALL HAVE A 4" DIA MULCH RING W/ 4" DEPTH SHREDDED HARDWOOD BARK MULCH, TYPICAL

SOD AREAS DISTURBED DURING CONSTRUCTION

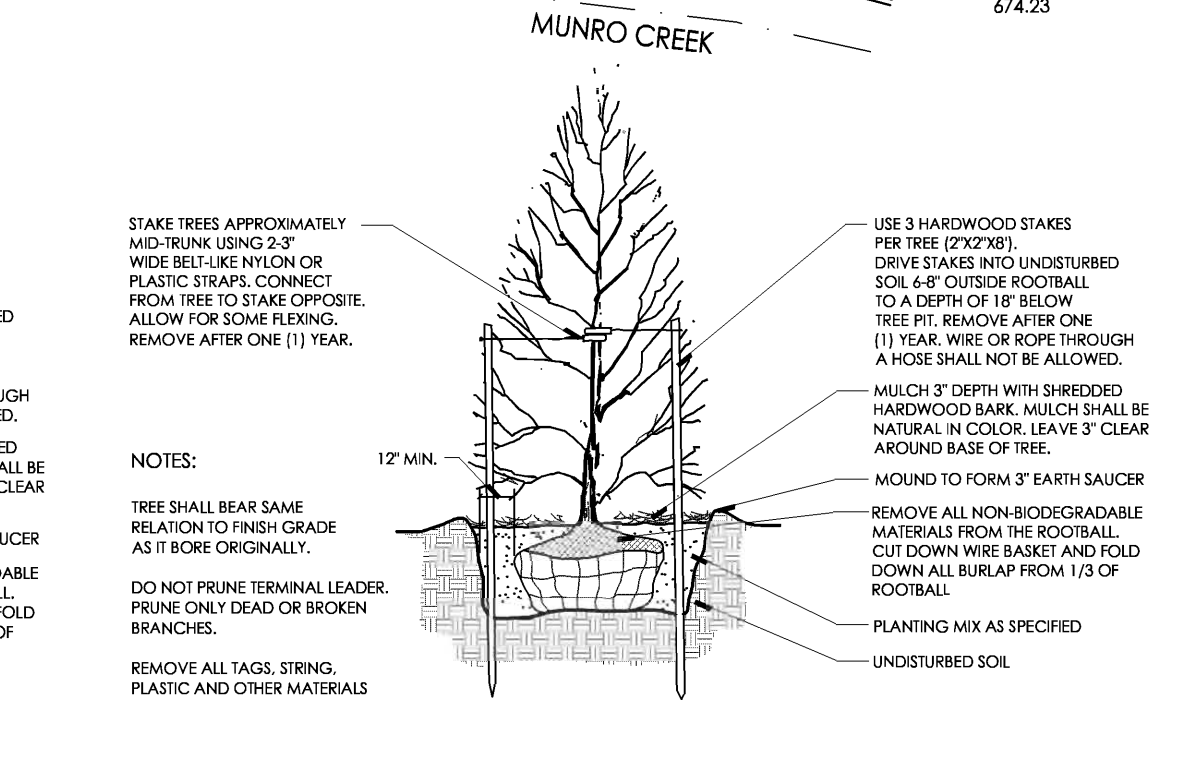
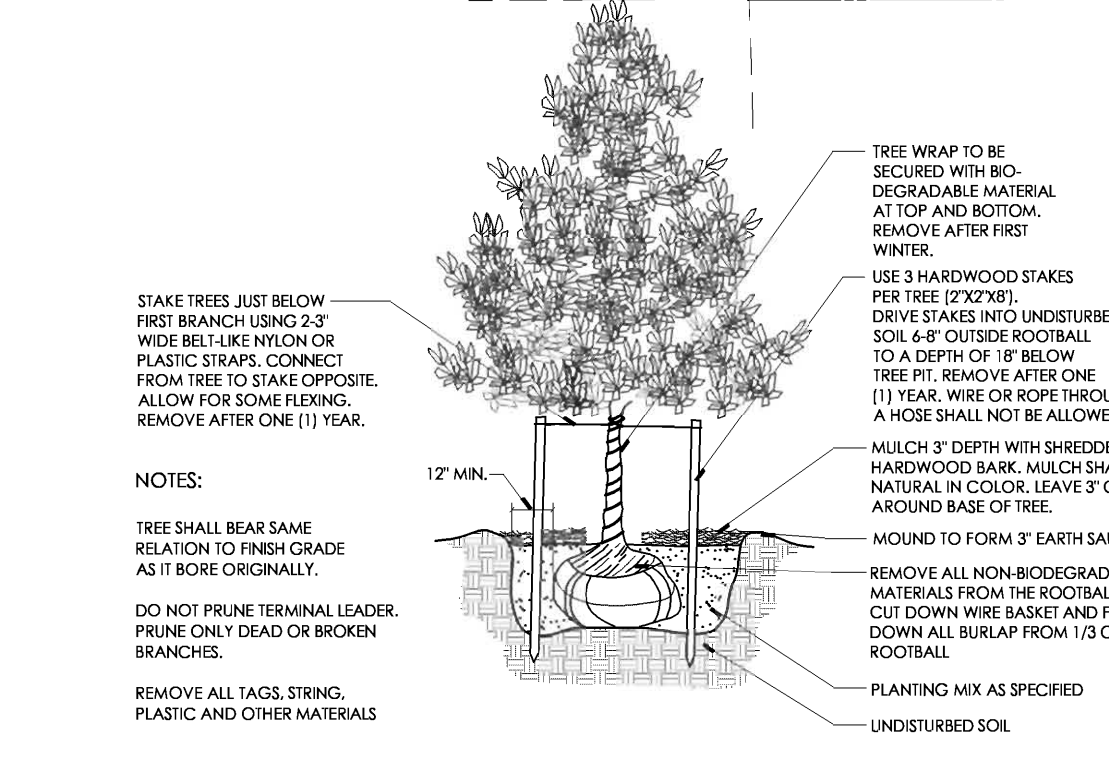
IRRIGATION NOTE:  
EXISTING AUTOMATIC IRRIGATION SYSTEM SHALL BE EXPANDED AS NECESSARY TO FULLY COVER ALL PROPOSED LANDSCAPE AREAS

IRRIGATION NOTE:  
EXISTING AUTOMATIC IRRIGATION SYSTEM SHALL BE EXPANDED AS NECESSARY TO FULLY COVER ALL PROPOSED LANDSCAPE AREAS

PLANT SCHEDULE

KEY	QTY	BOTANICAL/Common NAME	SIZE	SPACING	ROOT	COMMENT	UNIT/TOTAL COSTS
AB	18	Acer rubrum 'Bowhall' Bowhall Maple	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$7,200
BN	6	Betula nigra 'Heritage' Heritage River Birch	1 1/2" HT	SEE PLAN	B&B	CLUMP FORM, 3 CANES	\$350/\$2,100
CK	8	Cornus kousa chinensis Kousa Dogwood	2 1/2" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$250/\$2,000
LS	8	Liquidambar styraciflua 'Worpelodori' Worpelodori Sweet Gum	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$2,800
LT	7	Liquidambar styraciflua Lump Tree	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$2,800
PG	6	Picea glauca 'Denata' Black Hills Spruce	8' HT	SEE PLAN	B&B	FULL MATCHED HEADS	\$325/\$1,950
TA	3	Tilia americana 'Redmond' Redmond Linden	3" CAL	SEE PLAN	B&B	FULL MATCHED HEADS	\$400/\$1,200

(R) INDICATES TREE REPLACEMENT



DECIDUOUS TREE PLANTING DETAIL NTS

EVERGREEN TREE PLANTING DETAIL NTS

MARLSON AVE.  
(60' PUBLIC R.O.W.)

NOVI HEIGHTS SUB. NO. 3  
44057 MARLSON AVE.  
KRAUSE DARNEL SR  
APN #22-22-252-010

ZONED: R-4  
(ONE FAMILY RESIDENTIAL DISTRICT)

SETTLERS CREEK SUBDIVISION  
MUNROE PARK (PRIVATE)  
APN #22-22-252-018

IRRIGATION NOTE:  
EXISTING AUTOMATIC IRRIGATION SYSTEM SHALL BE EXPANDED AS NECESSARY TO FULLY COVER ALL PROPOSED LANDSCAPE AREAS

IRRIGATION NOTE:  
EXISTING AUTOMATIC IRRIGATION SYSTEM SHALL BE EXPANDED AS NECESSARY TO FULLY COVER ALL PROPOSED LANDSCAPE AREAS

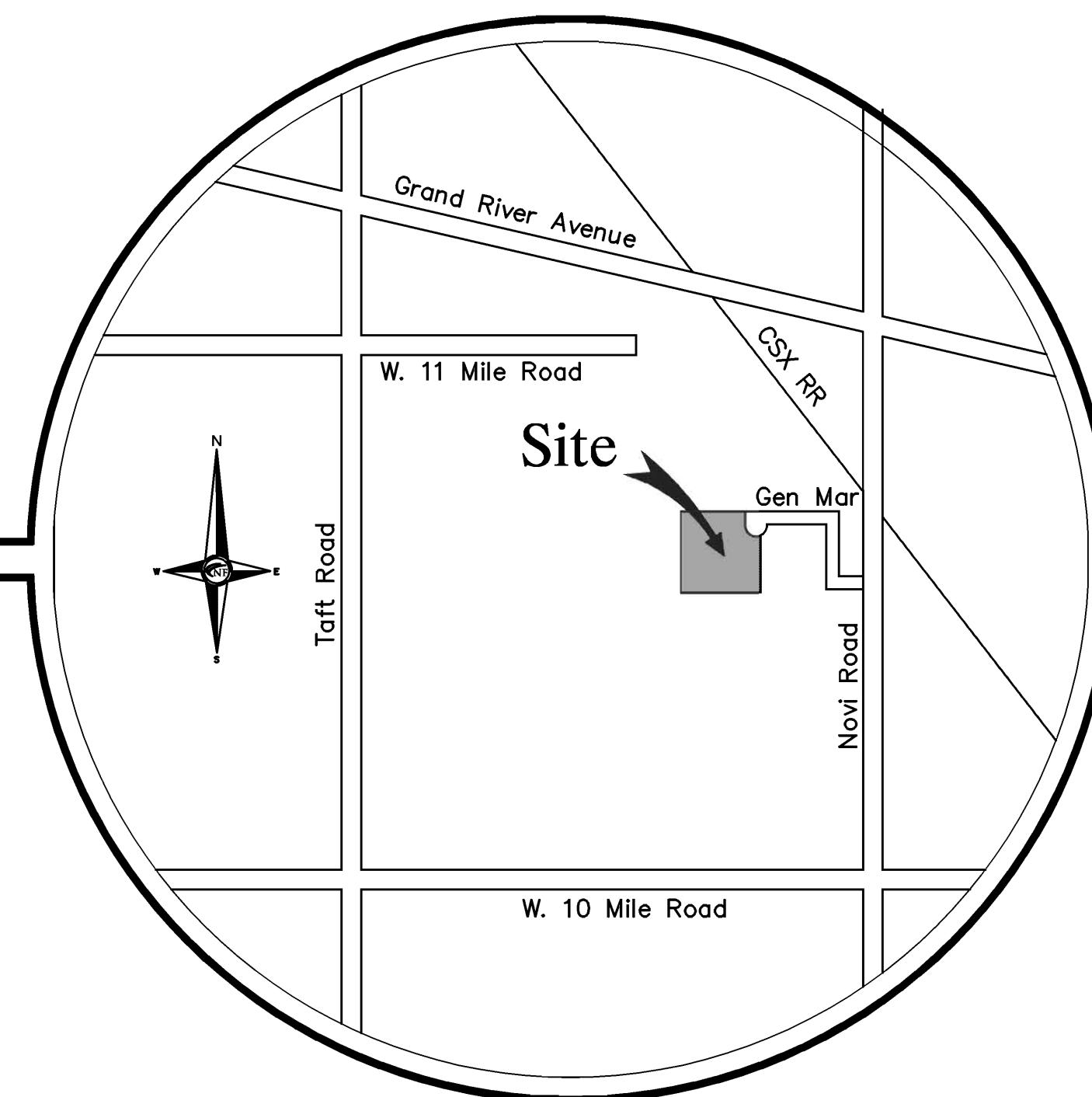
NOTE:  
TREE WRAP TO BE SECURED WITH BIODEGRADABLE MATERIAL AT TOP AND BOTTOM. REMOVE AFTER FIRST WINTER.  
USE 3 HARDWOOD STAKES PER TREE (2X2X8). DRIVE STAKES INTO UNDISTURBED SOIL 6" OUTSIDE ROOTBALL TO A DEPTH OF 18" BELOW TREE FT. REMOVE AFTER ONE (1) YEAR. WIRE OR ROPE THROUGH A HOSE SHALL NOT BE ALLOWED.  
MULCH 3" DEPTH WITH SHREDDED HARDWOOD BARK. MULCH SHALL BE NATURAL IN COLOR. LEAVE 3" CLEAR AROUND BASE OF TREE.  
MOUND TO FORM 3" EARTH SAUCER.  
REMOVE ALL NON-BIODEGRADABLE MATERIALS FROM THE ROOTBALL. CUT DOWN WIRE BASKET AND FOLD DOWN WIRE BASKET FROM 1/3 OF ROOTBALL.  
PLANTING MIX AS SPECIFIED.  
UNDISTURBED SOIL.

NOTE:  
TREE WRAP TO BE SECURED WITH BIODEGRADABLE MATERIAL AT TOP AND BOTTOM. REMOVE AFTER FIRST WINTER.  
USE 3 HARDWOOD STAKES PER TREE (2X2X8). DRIVE STAKES INTO UNDISTURBED SOIL 6" OUTSIDE ROOTBALL TO A DEPTH OF 18" BELOW TREE FT. REMOVE AFTER ONE (1) YEAR. WIRE OR ROPE THROUGH A HOSE SHALL NOT BE ALLOWED.  
MULCH 3" DEPTH WITH SHREDDED HARDWOOD BARK. MULCH SHALL BE NATURAL IN COLOR. LEAVE 3" CLEAR AROUND BASE OF TREE.  
MOUND TO FORM 3" EARTH SAUCER.  
REMOVE ALL NON-BIODEGRADABLE MATERIALS FROM THE ROOTBALL. CUT DOWN WIRE BASKET AND FOLD DOWN WIRE BASKET FROM 1/3 OF ROOTBALL.  
PLANTING MIX AS SPECIFIED.  
UNDISTURBED SOIL.



# 43700 GEN MAR DRIVE, NOVI, MI PARKING REHABILITATION PRELIMINARY SITE PLAN

PREPARED FOR  
**EBERSPAECHER NORTH AMERICA, INC.**



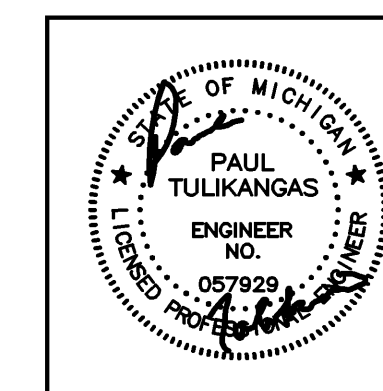
LOCATION MAP

SHEET INDEX	
	COVER SHEET
T1	TOPOGRAPHIC-TREE SURVEY
PSP1	OVERALL SITE PLAN
PSP2	DEMOLITION PLAN
PSP3	PAVING & GRADING PLAN
PSP4	UTILITY PLAN
PSP5	SOIL EROSION & SEDIMENTATION CONTROL PLAN
PSP6	STORM WATER MAINAGEMENT PLAN
L1	TREE PRESERVATION PLAN
L2	LANDSCAPE PLAN

PART OF THE NE 1/4 OF SECTION 22, T.1N., R.8E.  
CITY OF NOVI, OAKLAND COUNTY, MICHIGAN

**CLIENT**  
EBERSPAECHER NORTH AMERICA, INC.  
33533 W. TWELVE MILE ROAD  
FARMINGTON HILLS, MI 48331  
CONTACT: CHRIS COLEMAN  
PHONE: (248) 994-7010

**CIVIL ENGINEER**  
NOWAK & FRAUS ENGINEERS  
46777 WOODWARD AVENUE  
PONTIAC, MI 48342  
CONTACT: BRETT BUCHHOLZ, P.E.  
PHONE: (248) 332-7931  
FAX: (248) 332-8257



N/F JOB H441

**PREPARED BY:**

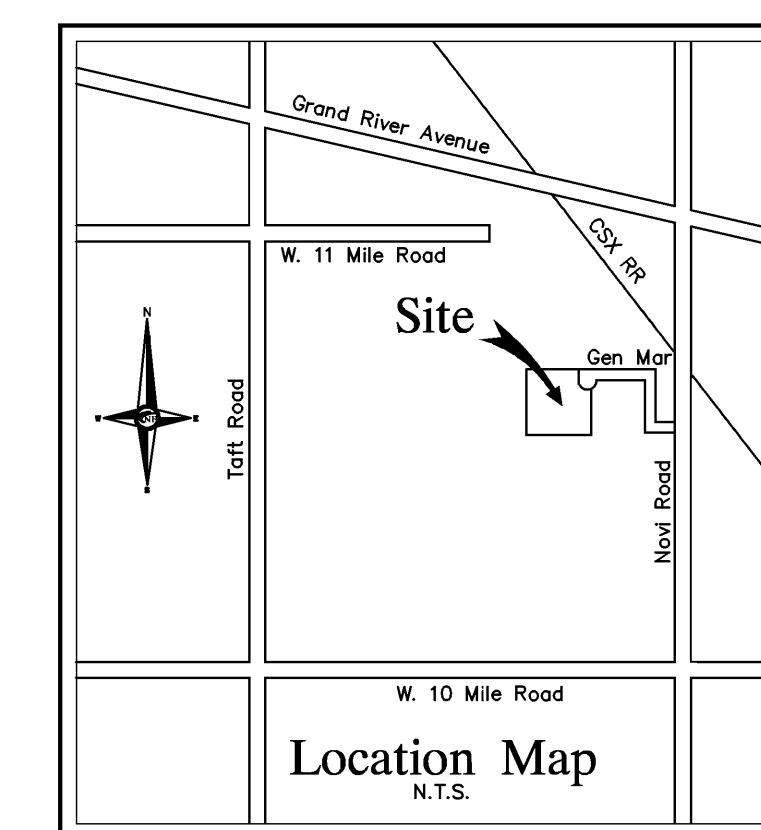
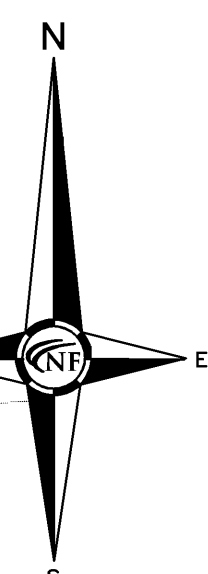
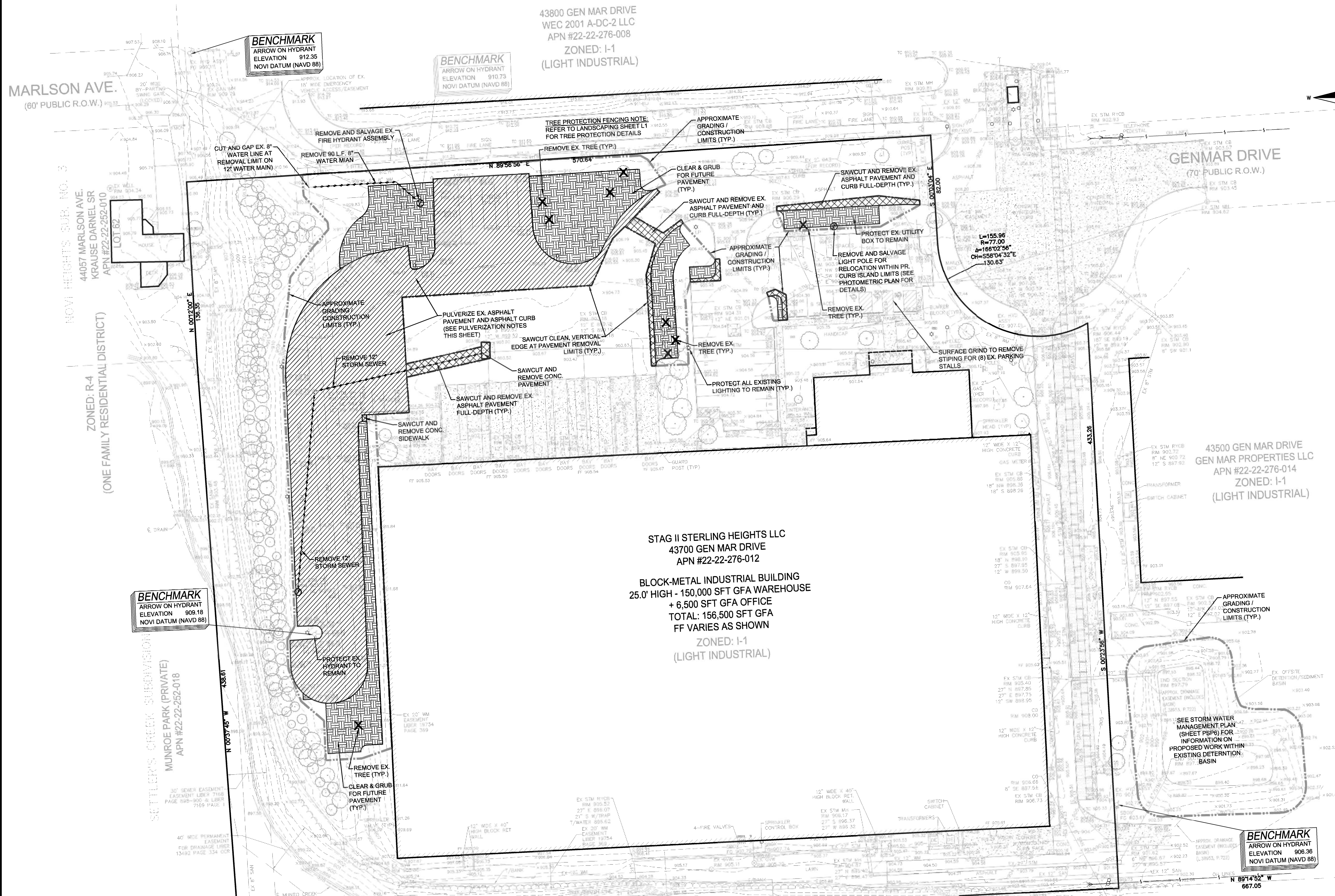
**NF ENGINEERS**  
CIVIL ENGINEERS  
LAND SURVEYORS  
LAND PLANNERS  
NOWAK & FRAUS ENGINEERS  
46777 WOODWARD AVE.  
PONTIAC, MI 48342-5032  
TEL. (248) 332-7931  
FAX. (248) 332-8257

**ISSUE DATE: JULY 17, 2013**









**NF ENGINEERS**  
 CIVIL ENGINEERS  
 LAND SURVEYORS  
 LAND PLANNERS

NOVAK & FRAUS ENGINEERS  
 46777 WOODWARD AVE.  
 PONTIAC, MI 48342-5032  
 TEL. (248) 332-7931  
 FAX. (248) 332-8257

**DEMOLITION NOTES**

DEMOLITION OF SITE IMPROVEMENTS SHALL BE ALLOWED ONLY AFTER AN APPROVED PERMIT HAS BEEN SECURED FROM THE PUBLIC AGENCY HAVING JURISDICTION OVER SAID DEMOLITION.

FOR ANY DEMOLITION WITHIN PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL PAY FOR, AND SECURE, ALL NECESSARY PERMITS AND LICENSES AND SHALL ARRANGE FOR ALL SITE INSPECTIONS.

SITE DEMOLITION INCLUDES THE COMPLETE REMOVAL OF SITE IMPROVEMENTS AND OFF-SITE DISPOSAL. DEBRIS SHALL BE TRANSPORTED TO AN APPROPRIATE DISPOSAL FACILITY THAT IS LICENSED FOR THAT TYPE OF DEBRIS.

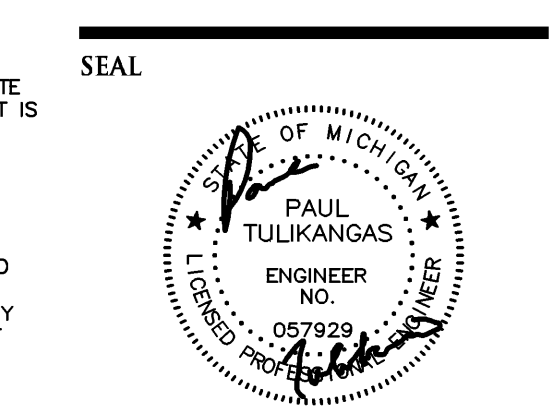
THE CONTRACTOR SHALL COORDINATE TRUCK ROUTES WITH THE MUNICIPALITY PRIOR TO COMMENCEMENT OF SITE DEMOLITION. ALL TRUCKS SHALL BE TARPED OR PROPERLY SECURED TO CONTAIN DEMOLITION DEBRIS PRIOR TO LEAVING SITE.

EXISTING ON-SITE UNDERGROUND UTILITIES AND BUILDING SERVICES HAVE BEEN INDICATED BASED UPON THE BEST AVAILABLE UTILITY RECORDS AND/OR ON-SITE INSPECTION. NO GUARANTEE IS MADE BY THE DESIGN ENGINEER, AS TO THE COMPLETENESS OR ACCURACY OF UTILITY DATA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF UTILITY INFORMATION (THE DESIGN ENGINEER MAKES NO GUARANTEE NOR ASSUMES ANY LIABILITY AS TO THE COMPLETENESS AND/OR ACCURACY OF UTILITY DATA).

PRIOR TO THE REMOVAL OR ABANDONMENT OF ANY EXISTING UNDERGROUND UTILITY OR BUILDING SERVICE LINES CALLED FOR IN THE PLANS OR DISCOVERED DURING EXCAVATION, THE CONTRACTOR MUST DETERMINE IF THE UTILITY LINE OR BUILDING SERVICE IS STILL IN USE. IF THE UTILITY LINE OR BUILDING SERVICE IS STILL IN USE/ACTIVE THE CONTRACTOR MUST TAKE ALL THE NECESSARY STEPS TO GUARANTEE THAT THE UTILITY LINE OR BUILDING SERVICE IS RECONNECTED WITHOUT AN INTERRUPTION IN SERVICE. THE RECONNECTION OF THE UTILITY LINE OR BUILDING SERVICE MUST BE IN ACCORDANCE WITH THE STANDARDS AND REQUIREMENTS OF THE APPROPRIATE GOVERNMENTAL AGENCY OR PRIVATE UTILITY COMPANY.

SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO SITE DEMOLITION.

\* THE CONTRACTOR SHALL NOTIFY MISS DIG (1-800-482-7171) A MINIMUM OF THREE (3) WORKING DAYS PRIOR TO THE START OF THE SITE DEMOLITION.



THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH THE DETROIT EDISON COMPANY. REMOVAL OF DETROIT EDISON ELECTRICAL SERVICES SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND REQUIREMENTS OF DETROIT EDISON.

THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH CONSUMERS ENERGY/MICHIGAN. REMOVAL OF CONSUMERS ENERGY/MICHIGAN GAS SERVICES SHALL BE IN ACCORDANCE WITH THE STANDARDS AND REQUIREMENTS OF CONSUMERS ENERGY/MICHIGAN.

THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH AMERITECH. REMOVAL OF AMERITECH COMMUNICATION SERVICES SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND REQUIREMENTS OF AMERITECH.

THE CONTRACTOR SHALL COORDINATE THE REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES AND BUILDING SERVICES WITH THE APPROPRIATE CABLE MEDIA COMPANY. REMOVAL OF CABLE SERVICES SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND REQUIREMENTS OF THE CABLE COMPANY.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFICATION OF PRIVATE UTILITY COMPANIES AND COORDINATE UTILITY SERVICE SHUT-OFF/DISCONNECT, PRIOR TO DEMOLITION OF EXISTING STRUCTURES OR PROPERTIES.

ALL UTILITY METERS SHALL BE REMOVED BY THE APPROPRIATE UTILITY COMPANY.

ANY ON-SITE STORM SEWER FACILITIES LOCATED DURING DEMOLITION SHALL BE REMOVED AND BULK HEADED AT THE PROPERTY LINE IF INDICATED FOR REMOVAL ON THE PLANS.

PRIOR TO BUILDING DEMOLITION, ALL HAZARDOUS MATERIAL SHALL BE REMOVED BY OTHERS. THE DEMOLITION CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER SHOULD ANY SUSPICIOUS MATERIAL BE FOUND.

WATER SERVICES AND/OR STOP-BOX SHALL BE PRESERVED AND BULK HEADED AT THE PROPERTY LINE OR AS DIRECTED BY THE OWNER'S REPRESENTATION.

WHERE EXISTING BUILDINGS PLANNED FOR DEMOLITION FALL WITHIN PROPOSED BUILDING FOOT PRINTS, BASEMENT FLOOR SLABS, FOUNDATION WALLS AND FOOTINGS SHALL BE COMPLETELY REMOVED AND BACK FILLED WITH MDOT CLASS II GRANULAR MATERIAL AND BE MACHINE COMPACTED TO A MINIMUM OF 98% OF MATERIALS MAXIMUM DENSITY.

PROJECT  
 43700 Gen Mar Drive

CLIENT  
 Eberspacher North America, Inc.

PROJECT LOCATION  
 Part of the NE 1/4 of Section 22  
 T. 1 N., R. 8 E.  
 City of Novi, Oakland County, Michigan

SHEET  
 Demolition Plan



REVISIONS  
 07-17-13 Preliminary Site Plan

DRAWN BY:  
 PT

DESIGNED BY:  
 BB/PT

APPROVED BY:  
 BB

DATE:  
 04/30/2013

SCALE: 1"=30'

NFE JOB NO. SHEET NO.  
 H441 PSP2

STAG II STERLING HEIGHTS LLC  
 43700 GEN MAR DRIVE  
 APN #22-22-276-012

BLOCK-METAL INDUSTRIAL BUILDING  
 25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
 + 6,500 SFT GFA OFFICE  
 TOTAL: 156,500 SFT GFA  
 FF VARIES AS SHOWN

ZONED: I-1  
 (LIGHT INDUSTRIAL)

43500 GEN MAR DRIVE  
 GEN MAR PROPERTIES LLC  
 APN #22-22-276-014  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

**PULVERIZATION NOTES**

- PULVERIZATION OF EXISTING PAVEMENT SHALL BE IN ACCORDANCE WITH M.D.O.T. STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2012, SECTION 302.
- IN AREAS THAT WILL RECEIVE NEW PAVEMENT, THE CONTRACTOR SHALL PULVERIZE EXISTING ASPHALT PAVEMENT IN PLACE, RE-SHAPE TO COORDINATE WITH PROPOSED PAVEMENT ELEVATIONS, AND RE-COMPACT.
- IN AREAS THAT WILL BE CONVERTED TO GREENBELT, THE CONTRACTOR SHALL REMOVE PULVERIZED MATERIAL.
- EXCESS PULVERIZED MATERIAL SHALL BE STOCKPILED ON SITE IN A LOCATION THAT WILL BE DETERMINED WITH THE OWNER TO BE USED AS BASE MATERIAL IN PROPOSED PARKING ADDITIONS.
- FOR PROPOSED PARKING ADDITIONS, THE PULVERIZED MATERIAL SHALL BE MIXED WITH M.D.O.T. 21AA LIMESTONE TO CREATE A HOMOGENEOUS BASE MATERIAL. PULVERIZED MATERIAL SHALL NOT CONSTITUTE GREATER THAN 50% OF THE TOTAL MIXTURE.
- CONTRACTOR SHALL COMPACT FINAL BASE MATERIAL IN ALL WORK AREAS IN MAXIMUM 4 INCH LIFTS AS REQUIRED TO ACHIEVE A MINIMUM OF 95% DENSITY IN ACCORDANCE WITH ASTM D-1557.
- CONTRACTOR IS RESPONSIBLE FOR CALCULATING AMOUNT OF PULVERIZED MATERIAL THAT WILL BE REQUIRED. EXCESS PULVERIZED MATERIAL THAT IS NOT UTILIZED SHALL BE REMOVED FROM THE SITE IN ACCORDANCE WITH DEMOLITION NOTES ON THIS SHEET.
- SAWCUTTING SHALL BE PERFORMED AT ALL REPAIR LIMITS TO PROVIDE CLEAN REPAIR EDGE.

**ESTIMATED QUANTITIES**

NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

DESCRIPTION	QUANTITY	UNITS
PULVERIZE EX. ASPH. PAVT. FULL-DEPTH	3,330	S.Y.
REMOVE EX. ASPH. PAVT. FULL-DEPTH	231	S.Y.
REMOVE EX. CONC. PAVEMENT FULL-DEPTH	9	S.Y.
REMOVE EX. CONC. SIDEWALK FULL-DEPTH	2	S.Y.
CLEAR & GRUB FOR FUTURE PAVT.	1,430	S.Y.
REMOVE & SALVAGE HYDRANT	1	EA.
REMOVE 8" WATER MAIN	90	L.F.
REMOVE CATCH BASIN	1	EA.
REMOVE 12" STORM SEWER	284	L.F.
REMOVE & SALVAGE LIGHT POLE	1	EA.
REMOVE EX. TREE	9	EA.
REMOVE EX. PARKING STALL MARKINGS	8	EA.

**LEGEND**

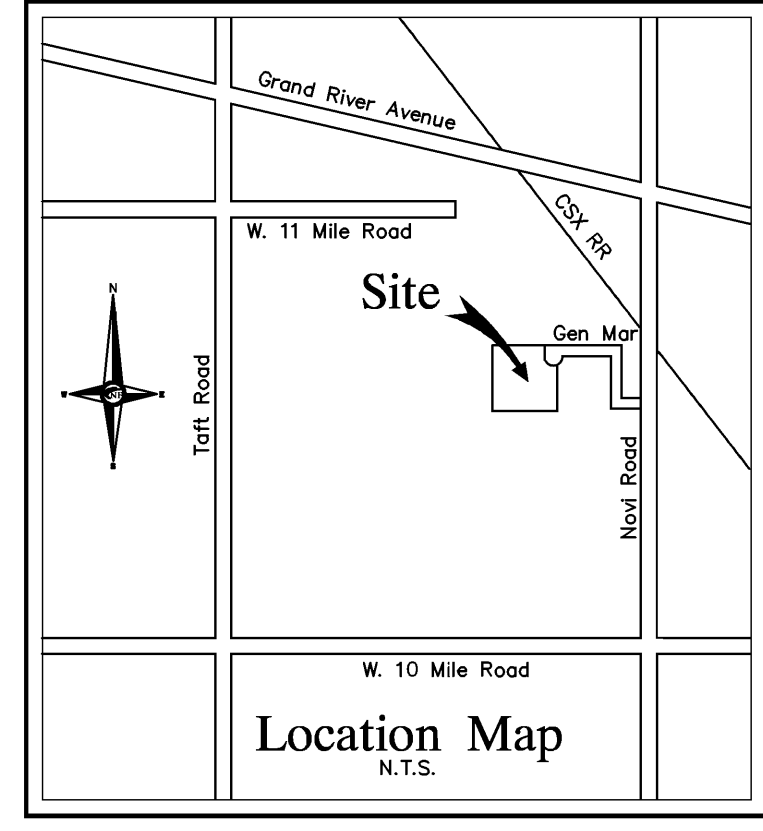
- |                     |                         |
|---------------------|-------------------------|
| MANHOLE             | EXISTING SANITARY SEWER |
| HYDRANT             | EXISTING SAN. CLEAN OUT |
| MANHOLE CATCH BASIN | EXISTING WATER MAIN     |
|                     | EXISTING STORM SEWER    |
|                     | EX. R. Y. CATCH BASIN   |
| UTILITY POLE        | EXISTING BURIED CABLES  |
| GUY POLE            | OVERHEAD LINES          |
| GUY WIRE            | LIGHT POLE              |
|                     | SIGN                    |

**DEMOLITION LEGEND**

- |  |   |
|--|---|
|  | PULVERIZE EX. ASPHALT PAVEMENT AND CURB FULL-DEPTH (SEE PULVERIZATION NOTES THIS SHEET) |
|  | SAWCUT AND REMOVE EX. PAVEMENT FULL-DEPTH   |
|  | CLEAR & GRUB FOR FUTURE PAVEMENT  |
|  | EX. UTILITY LINE TO BE REMOVED  |
|  | EX. UTILITY STRUCTURE TO BE REMOVED   |
|  | EX. TREE TO BE REMOVED  |



WEC 2001-A-D-02-ELC  
 APN #22-22-276-008  
 ZONED: I-1  
 (LIGHT INDUSTRIAL)

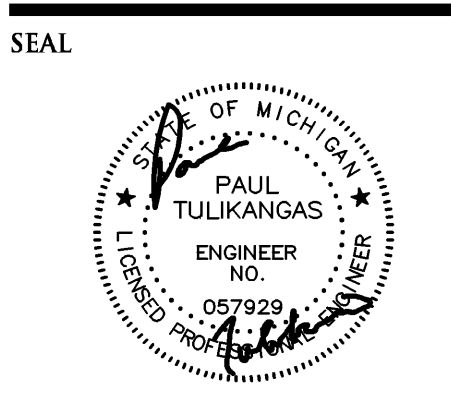


**NF ENGINEERS**  
 CIVIL ENGINEERS  
 LAND SURVEYORS  
 LAND PLANNERS

NOVAK & FRAUS ENGINEERS  
 46777 WOODWARD AVE.  
 PONTIAC, MI 48342-5032  
 TEL. (248) 332-7931  
 FAX. (248) 332-8257

**GENERAL PAVING NOTES:**  
 1. PAVEMENT SHALL BE OF THE TYPE, THICKNESS AND CROSS SECTION AS INDICATED ON THE PLANS AND AS FOLLOWS:

- CONCRETE: PORTLAND CEMENT TYPE IA (AIR-ENTRAINED) WITH A MINIMUM CEMENT CONTENT OF SIX SACKS PER CUBIC YARD, MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3,500 PSI AND A SLUMP OF 1 1/2 TO 3 INCHES. CONCRETE CURB AND GUTTER SHALL MEET MDOT P1 MATERIAL SPECIFICATIONS. 7-SACK HIGH-EARLY NOT ALLOWED.
- HOT MIX ASPHALT (HMA): LEVELING COURSE - AS NOTED; SURFACE COURSE - AS NOTED; ASPHALT BOND COAT SHALL MEET SS-1H EMULSION, AND SHALL BE INSTALLED BETWEEN THE LEVELING AND TOP COURSES. ASPHALT BINDER SHALL MEET PG64-22 SPECIFICATIONS. COMPACT ALL ASPHALT COURSES TO 97% MAXIMUM DENSITY.
- 2. RECLAIMED ASPHALT PAVEMENT (RAP) IS PROHIBITED IN ALL TOP COURSE PAVEMENTS. THE USE OF RAP IN BASE AND LEVELING COURSES SHALL BE IN ACCORDANCE WITH CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. THE CONTRACTOR AND TESTING ENGINEER ARE RESPONSIBLE FOR QUALITY CONTROL OF ALL PAVING OPERATIONS AND MATERIALS.
- 3. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT. SAND SUB-BASE SHALL MEET MDOT CLASS II SPECIFICATIONS, AND SHALL BE COMPACTED TO 95% MAX. DENSITY.
- 4. ALL CONCRETE PAVEMENT, DRIVEWAYS, CURB & GUTTER, ETC. SHALL BE SPRAY CURED WITH WHITE MEMBRANE CURING COMPOUND IMMEDIATELY FOLLOWING FINISHING OPERATION.
- 5. ALL CONCRETE PAVEMENT JOINTS SHALL BE FILLED WITH HOT Poured RUBBERIZED ASPHALT JOINT SEALING COMPOUND IMMEDIATELY AFTER SAWCUT OPERATION.
- 6. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF CITY OF NOVI AND THE MICHIGAN DEPARTMENT OF TRANSPORTATION.
- 7. ALL TOP OF CURB ELEVATIONS, AS SHOWN ON THE PLANS, ARE CALCULATED FOR A 6" CONCRETE CURB UNLESS OTHERWISE NOTED.
- 8. ALL SIDEWALK RAMPS, CONFORMING TO PUBLIC ACT NO. 8, 1973 AND ICANSI A117.1-1996, SECTION 406, SHALL BE INSTALLED AS INDICATED ON THE PLANS.
- 9. FOR ANY WORK WITHIN THE PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL PAY FOR AND SECURE ALL NECESSARY PERMITS AND LIKEWISE ARRANGE FOR ALL INSPECTION.
- 10. EXISTING TOPSOIL, VEGETATION AND ORGANIC MATERIALS SHALL BE STRIPPED AND REMOVED FROM PROPOSED PAVEMENT AREA PRIOR TO PLACEMENT OF BASE MATERIALS.
- 11. EXPANSION & CONTRACTION JOINTS SHALL BE PLACED IN ACCORDANCE WITH CITY OF NOVI STANDARDS, AND THE INDUSTRY QUALITY STANDARDS.
- 12. ALL PAVEMENT AREAS SHALL BE PROOF-ROLLED UNDER THE SUPERVISION OF A GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF BASE MATERIALS AND PAVING MATERIALS.
- 13. FILL AREAS SHALL BE MACHINE COMPACTED IN UNIFORM LIFTS NOT EXCEEDING 9 INCHES THICK TO 95% OF THE MAXIMUM DENSITY (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT.
- 14. ALL STRUCTURES (MANHOLES, GATEWELLS, HYDRANTS, ETC.) SHALL BE ADJUSTED TO THE FINISH GRADE.
- 15. THE CONTRACTOR SHALL REQUEST WRITTEN CLARIFICATION FROM THE ENGINEER WELL IN ADVANCE OF CONSTRUCTION, SHOULD THERE BE ANY QUESTIONS.



PROJECT  
 43700 Gen Mar Drive

CLIENT  
 Eberspaecher North America, Inc.

PROJECT LOCATION  
 Part of the NE 1/4 of Section 22  
 T. 1 N., R. 8 E.  
 City of Novi, Oakland County, Michigan

SHEET  
 Paving & Grading Plan



REVISIONS  
 07-17-13 Preliminary Site Plan

DRAWN BY:  
 PT

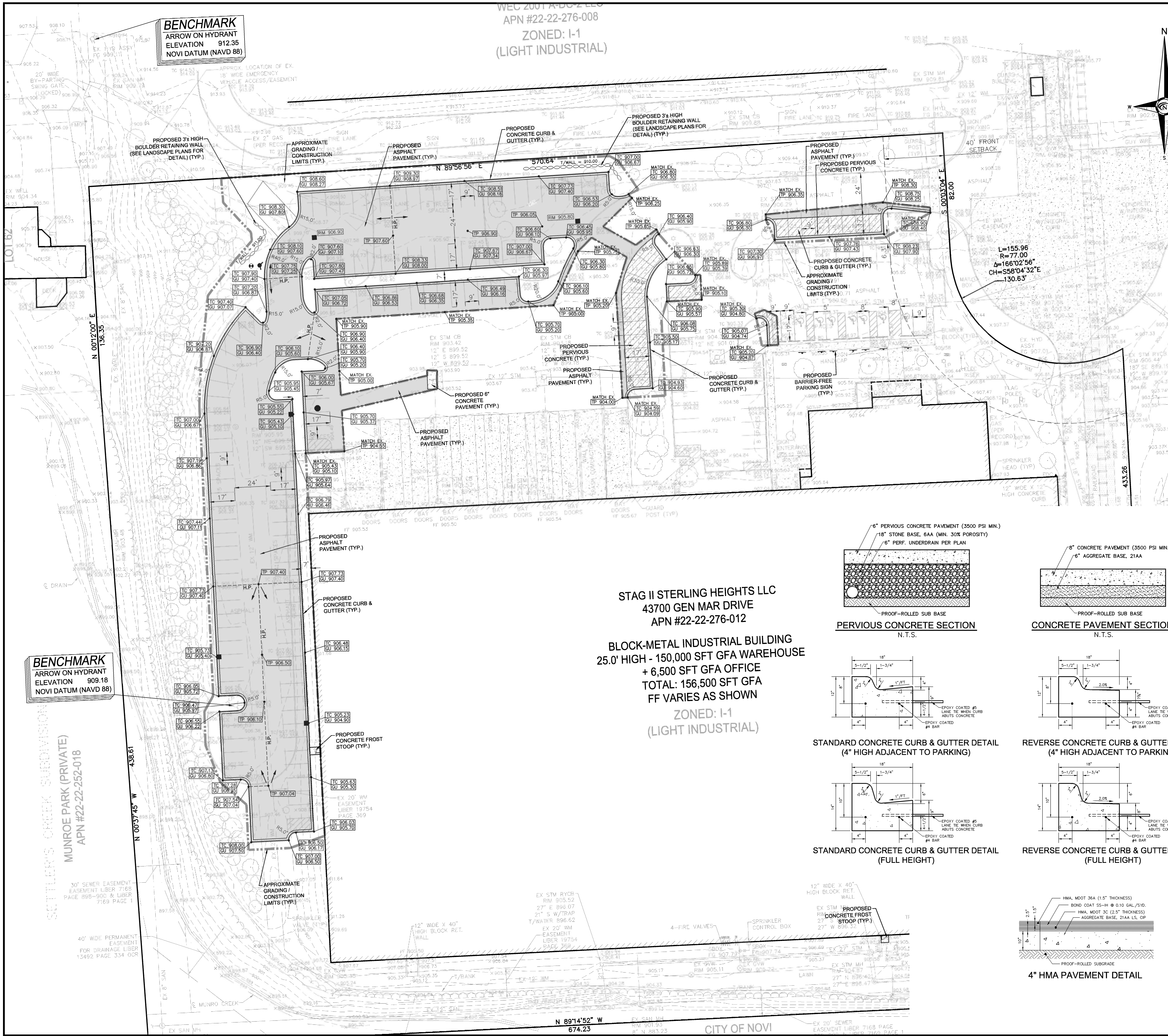
DESIGNED BY:  
 BB/PT

APPROVED BY:  
 BB

DATE:  
 04/30/2013

SCALE: 1"=30'

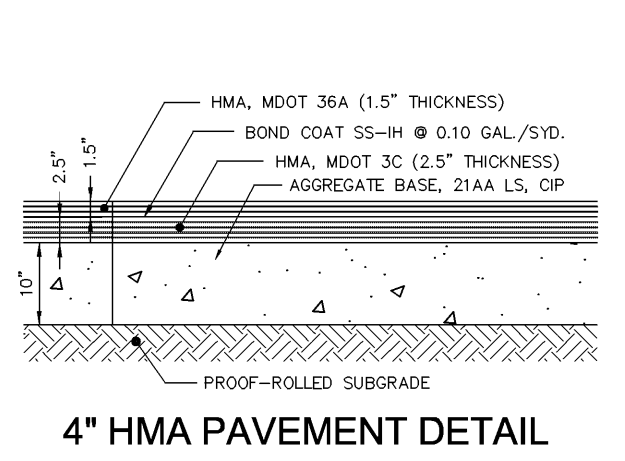
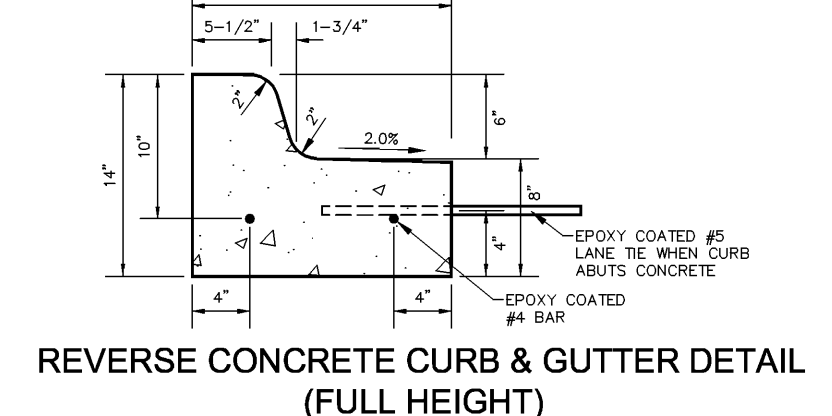
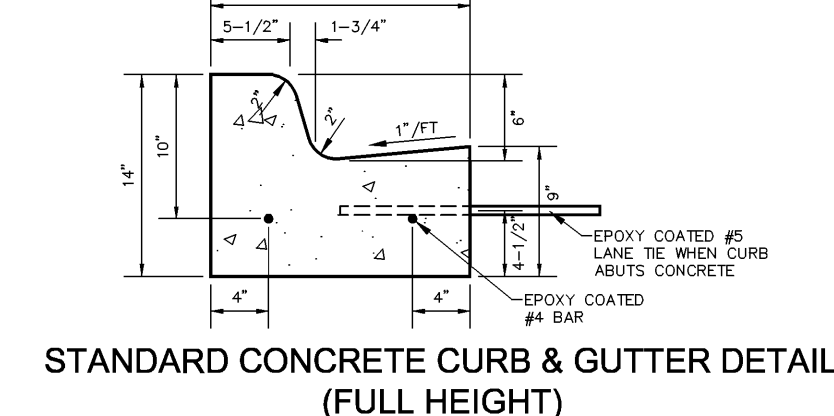
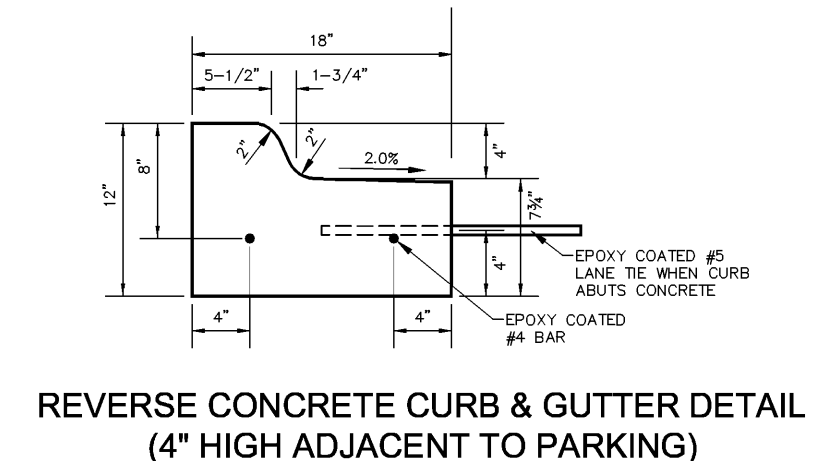
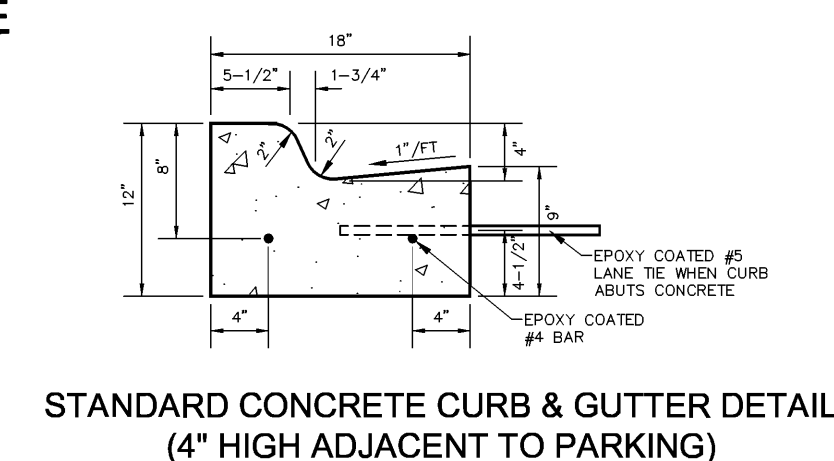
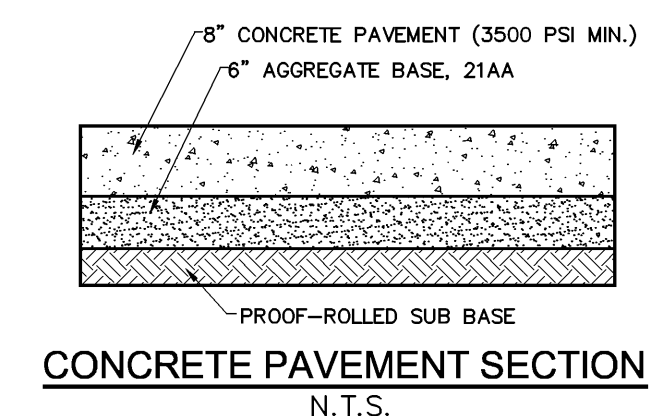
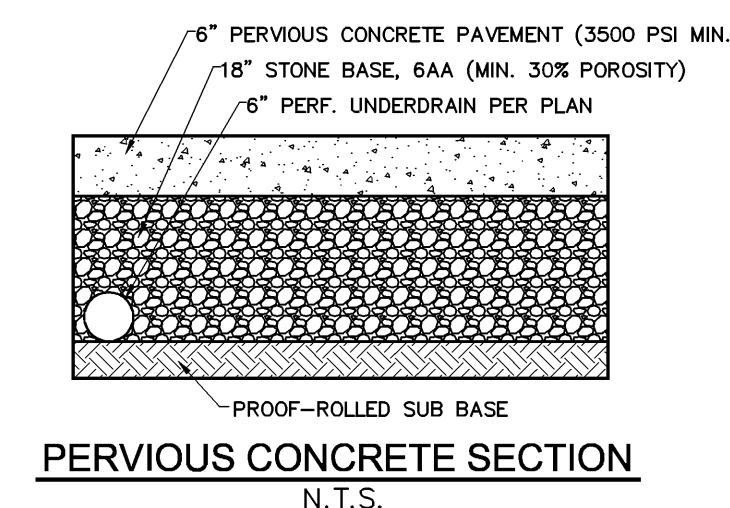
NFE JOB NO. SHEET NO.  
 H441 PSP3



STAG II STERLING HEIGHTS LLC  
 43700 GEN MAR DRIVE  
 APN #22-22-276-012

BLOCK-METAL INDUSTRIAL BUILDING  
 25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
 + 6,500 SFT GFA OFFICE  
 TOTAL: 156,500 SFT GFA  
 FF VARIES AS SHOWN

ZONED: I-1  
 (LIGHT INDUSTRIAL)

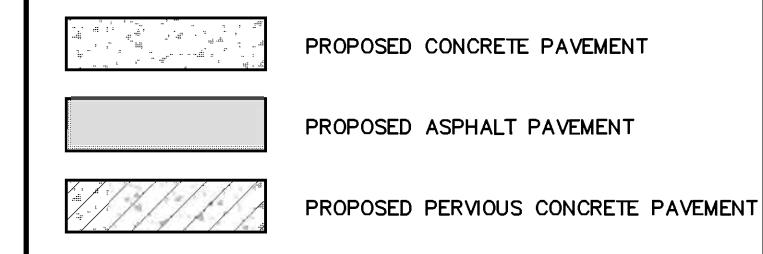


**ESTIMATED QUANTITIES**

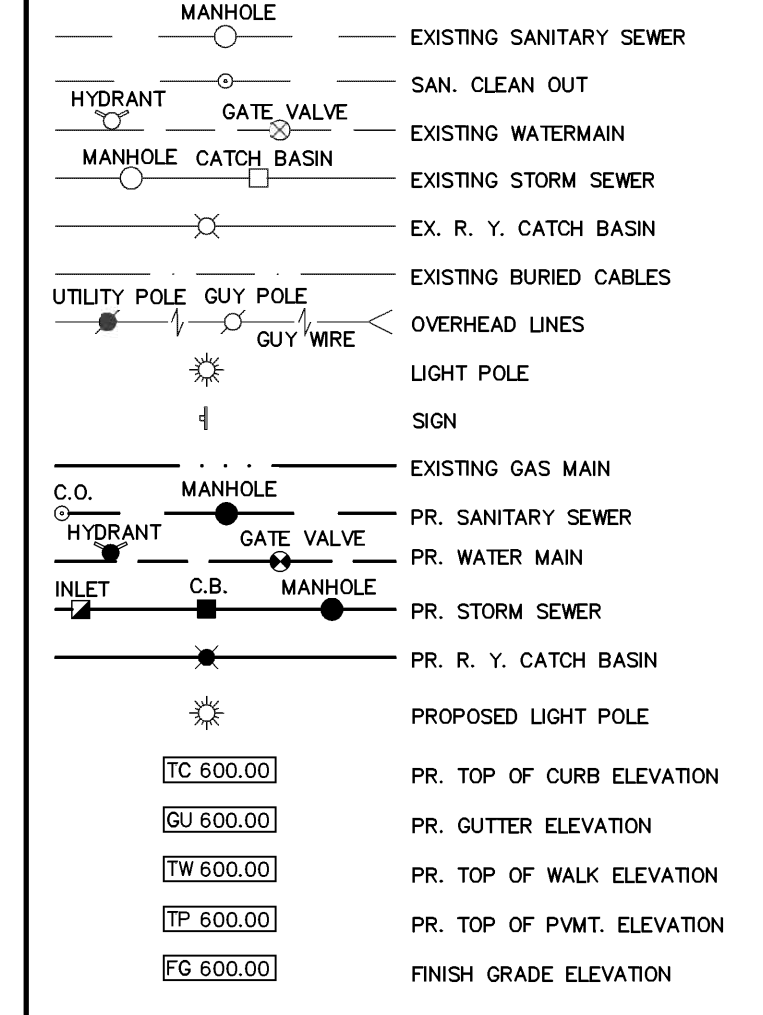
NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

PAVING	DESCRIPTION	QUANTITY	UNITS
4"	ASPHALT ON 10" 21AA BASE	4,048	S.Y.
6"	PERVIOUS CONC. ON 18" STONE BASE	307	S.Y.
8"	CONCRETE PAVT. ON 6" 21AA BASE	9	S.Y.
6"	CONCRETE CURB & GUTTER	475	L.F.
4"	CONCRETE CURB & GUTTER	1,547	L.F.
	CONCRETE FROST STOOP	7	S.Y.
	BARRIER-FREE PARKING SIGN & POST	7	E.A.

**PAVING LEGEND**



**LEGEND**



BENCHMARK  
 ARROW ON HYDRANT  
 ELEVATION 909.18  
 NOVI DATUM (NAVD 88)

BENCHMARK  
 ARROW ON HYDRANT  
 ELEVATION 912.35  
 NOVI DATUM (NAVD 88)

MUNROE PARK (PRIVATE)  
 APN #22-22-252-018

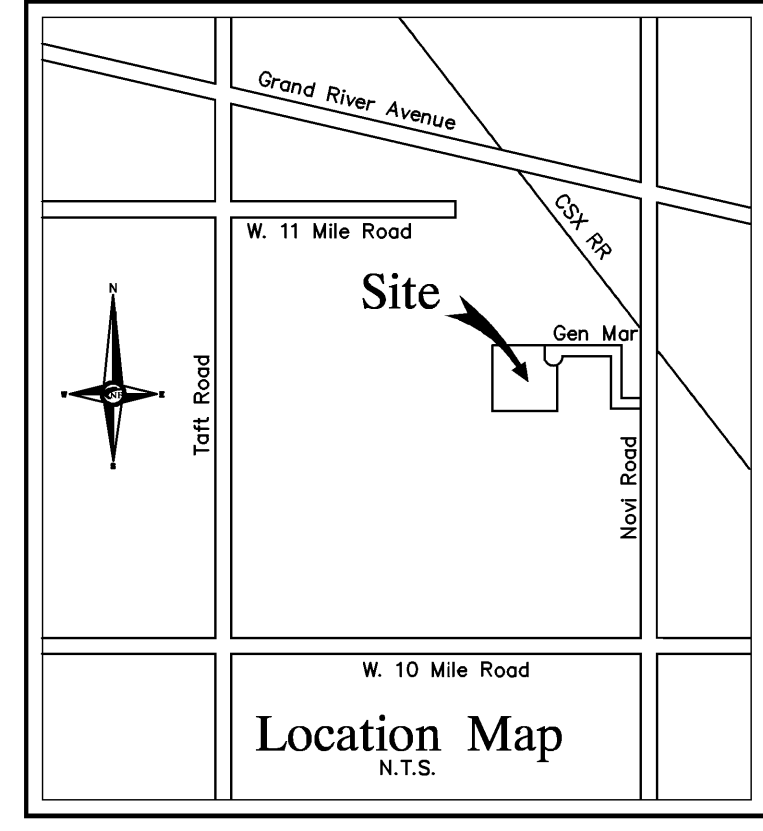
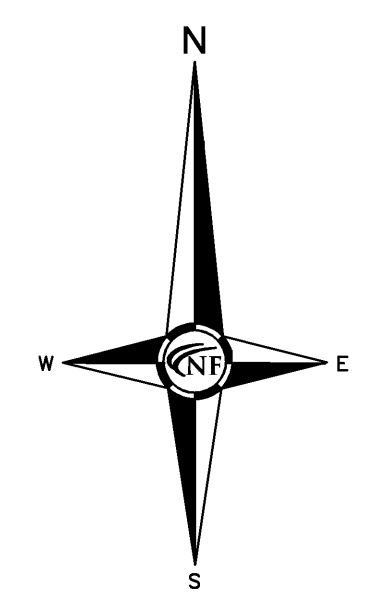
CITY OF NOVI



ARROW ON HYDRANT  
ELEVATION 912.35  
NOVI DATUM (NAVD 88)

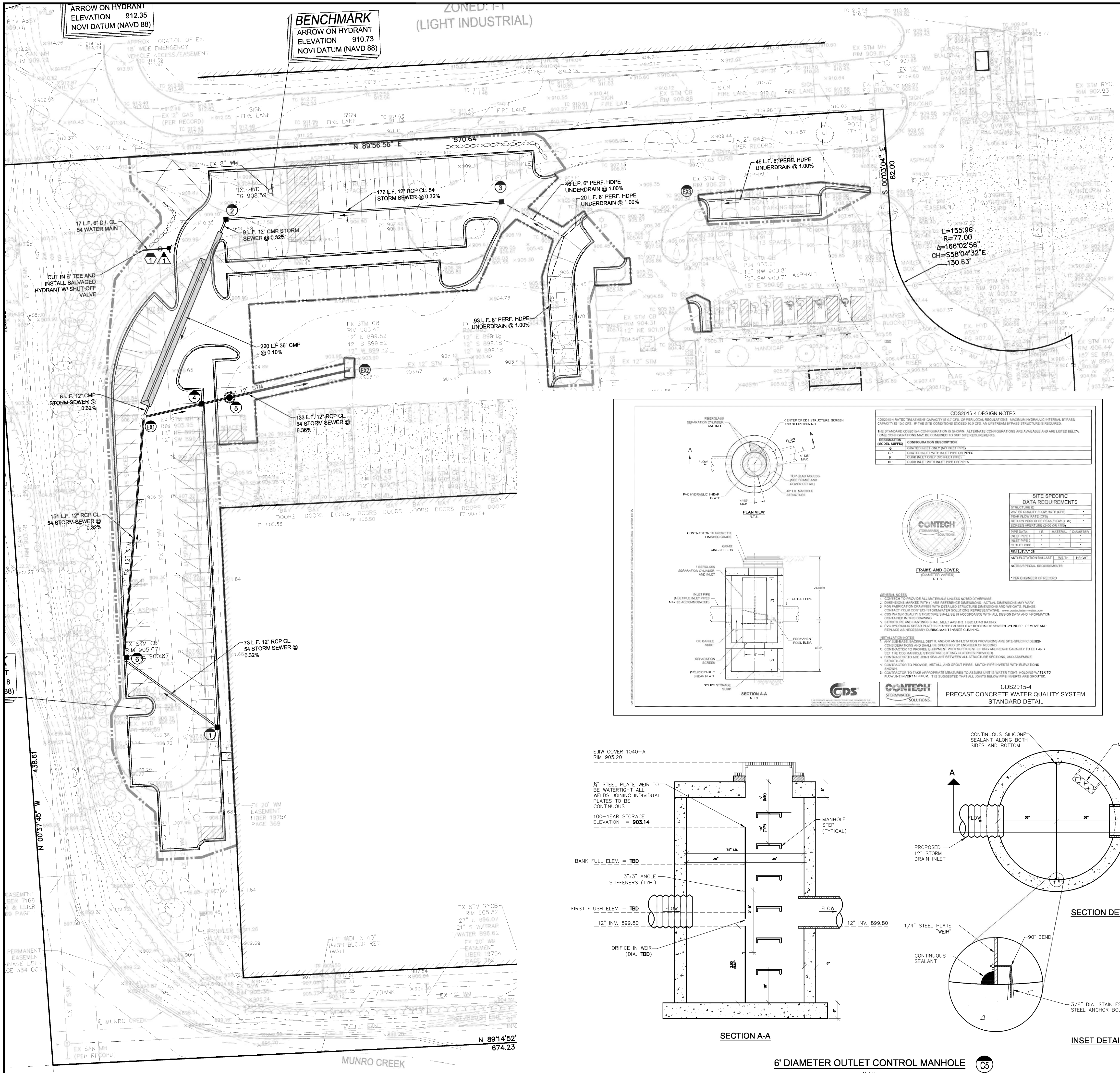
BENCHMARK  
ARROW ON HYDRANT  
ELEVATION 910.73  
NOVI DATUM (NAVD 88)

ZONED: I-1  
(LIGHT INDUSTRIAL)



**NF**  
ENGINEERS  
CIVIL ENGINEERS  
LAND SURVEYORS  
LAND PLANNERS

NOWAK & FRAUS ENGINEERS  
46777 WOODWARD AVE.  
PONTIAC, MI 48342-5032  
TEL. (248) 332-7931  
FAX. (248) 332-8257



**PROPOSED STORM SEWER SCHEDULE**

- |   |   |
|---|---|
| <p>1. TAP EX. MANHOLE AND RE-SET RIM ELEVATION<br/>EX. RIM 905.35<br/>PR. RIM 906.25<br/>EX. 12" INV NE 899.50 (REMOVE)<br/>EX. 12" INV SW 900.00 (REMOVE)<br/>PR. 12" INV SW 900.00<br/>PR. 12" INV N 900.00</p> | <p>2. PR. PRE-TREATMENT CATCH BASIN W/ 2' SUMP (CONTECH CDS 2015 OR EQUAL)<br/>E.W. COVER 5105<br/>RIM 906.90<br/>PR. 12" INV SW 900.15<br/>PR. 12" INV E 900.15<br/>PR. 12" INV N 900.00</p> |
| <p>2. TAP EX. CATCH BASIN<br/>EX. RIM 903.42<br/>EX. 12" INV N 899.52<br/>EX. 12" INV S 899.50 (REMOVE)<br/>PR. RIM 906.29<br/>PR. 12" INV SE 900.94<br/>PR. 6" INV E 903.00</p>                                  | <p>3. PR. 4' DIA. CATCH BASIN W/ 2' SUMP<br/>E.W. COVER 5105<br/>RIM 905.80<br/>PR. 12" INV 900.71<br/>PR. 6" INV E 900.15<br/>PR. 12" INV N 900.71</p>                                       |
| <p>3. TAP EX. CATCH BASIN<br/>EX. RIM 906.29<br/>EX. 12" INV SE 900.94<br/>PR. 6" INV E 903.00</p>  | <p>4. PR. PRE-TREATMENT CATCH BASIN W/ 2' SUMP (CONTECH CDS 2015 OR EQUAL)<br/>E.W. COVER 5105<br/>RIM 905.10<br/>PR. 12" INV SW 899.87<br/>PR. 12" INV NE 899.87</p>                         |
| <p>4. PR. 4' DIA. CATCH BASIN W/ 2' SUMP<br/>E.W. COVER 5105<br/>RIM 904.90<br/>PR. 12" INV NE 900.72</p>   | <p>5. PR. OUTLET CONTROL MANHOLE RIM 905.20<br/>PR. 12" INV SW 899.80<br/>PR. 12" INV NE 899.80</p>   |
| <p>5. PR. PRE-TREATMENT CATCH BASIN W/ 2' SUMP (CONTECH CDS 2015 OR EQUAL)<br/>RIM 905.40<br/>PR. 12" INV SE 900.48<br/>PR. 12" INV NE 900.48</p>   |   |

**PROPOSED WATER MAIN SCHEDULE**

- |  |  |
|--|--|
| <p>1. PR. 6" STANDARD FIRE HYDRANT W/ VALVE &amp; BOX<br/>PR. F.G. 908.25<br/>PR. T/P 902.75</p> | <p>2. PR. 6" SHUT-OFF VALVE IN BOX<br/>PR. F.G. 908.50</p> |
|--|--|

**ESTIMATED QUANTITIES**

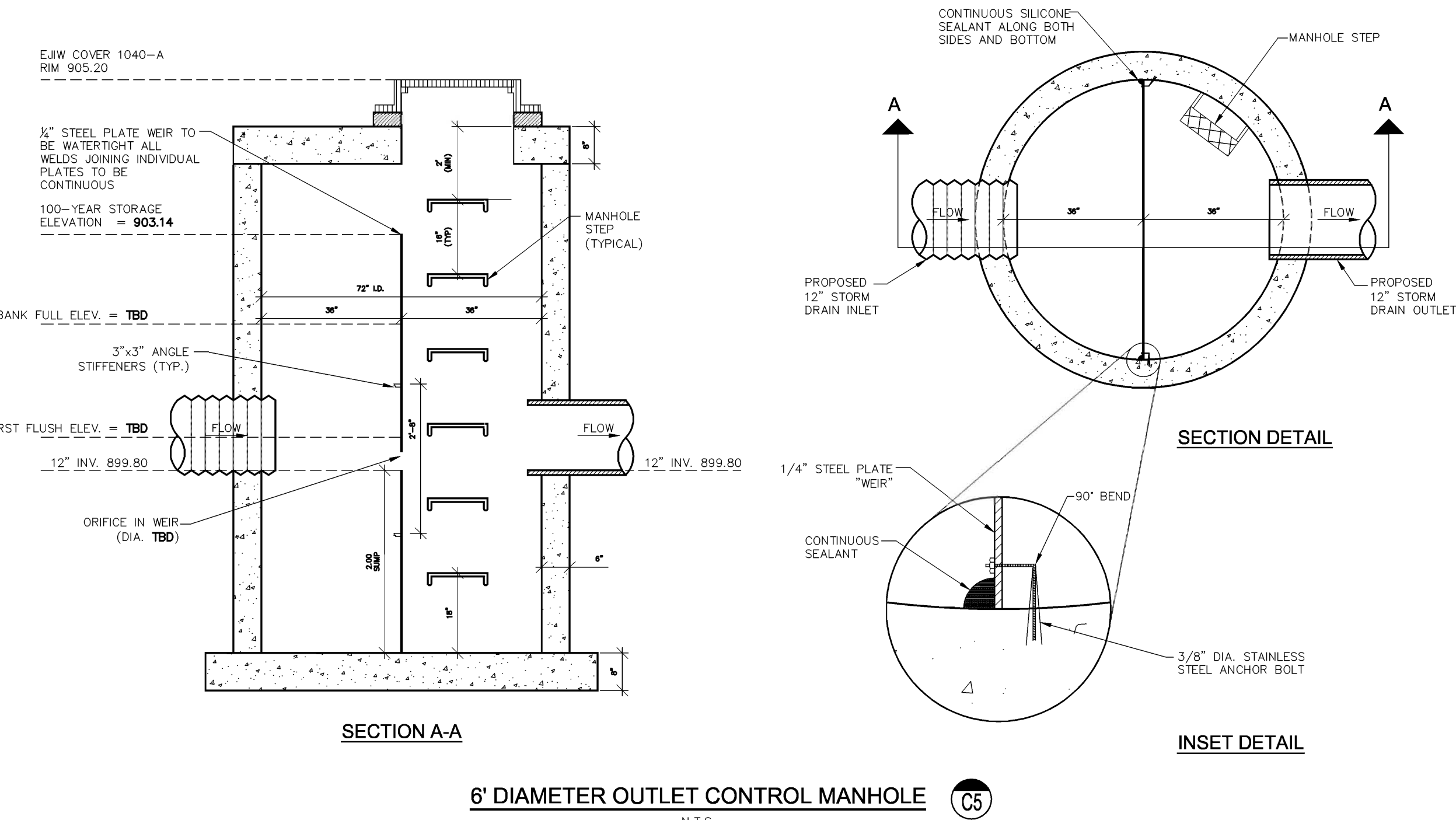
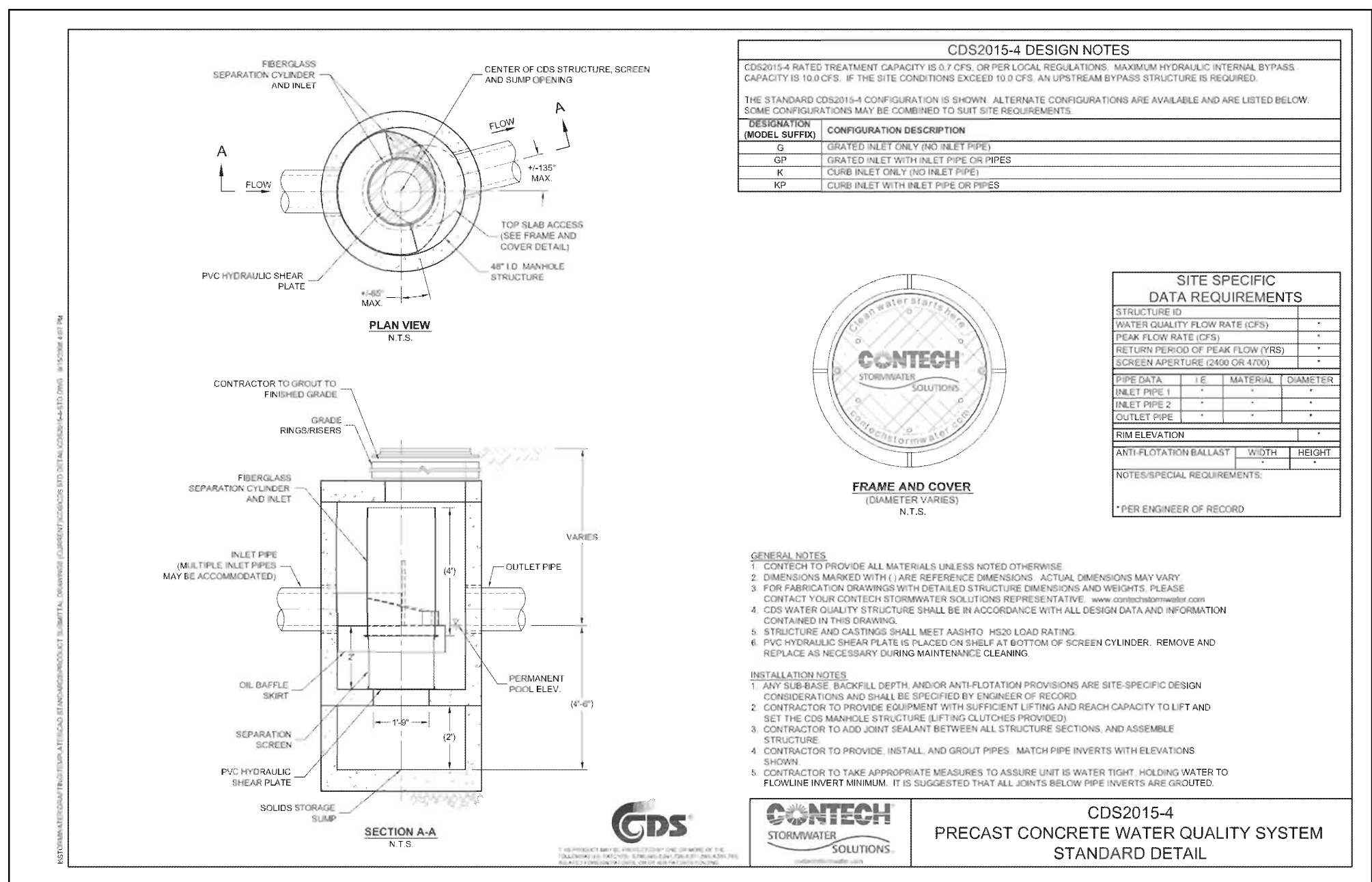
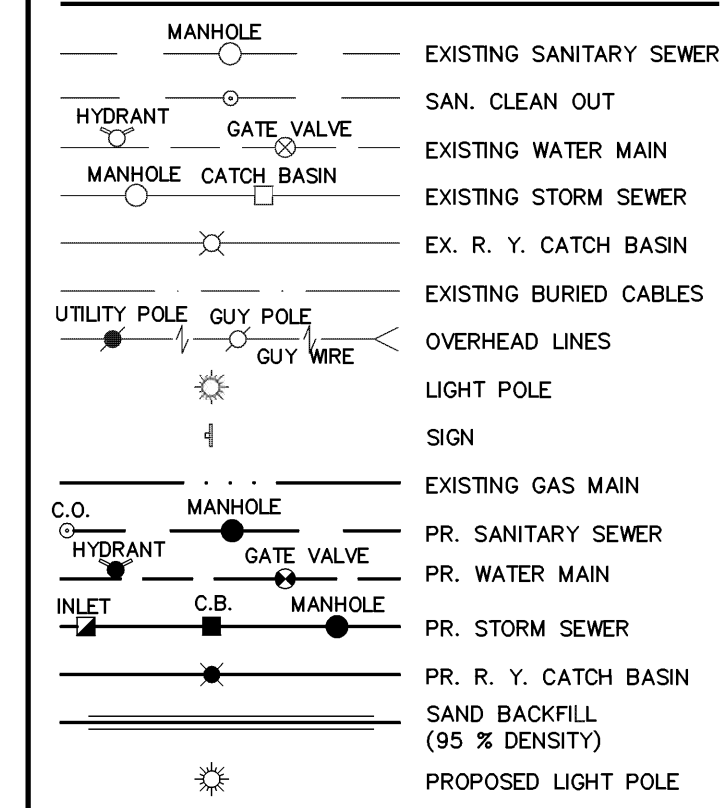
NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

DESCRIPTION	QUANTITY	UNITS
36" CMP	220	L.F.
12" C-76, CLASS IV, SEWER PIPE	548	L.F.
6" PERFORATED HDPE UNDERDRAIN	205	L.F.
PRE-TREATMENT CATCH BASIN W/ 2' SUMP	3	EA.
4' DIA. CATCH BASIN W/ 2' SUMP	2	EA.
OUTLET CONTROL MANHOLE	1	EA.
12" SEWER TAP/CONNECTION	4	EA.
6" SEWER TAP/CONNECTION	1	EA.

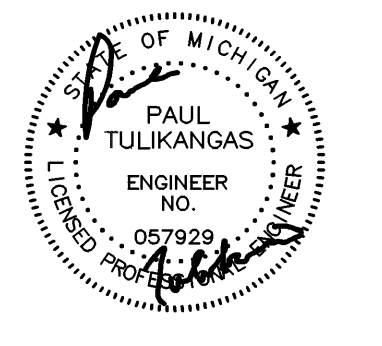
**WATER MAIN**

DESCRIPTION	QUANTITY	UNITS
6" D.I., CLASS 54, WATER MAIN	17	L.F.
6" SHUT-OFF VALVE	1	EA.
SALVAGE & RE-INSTALL HYDRANT	1	EA.
WATER MAIN CONNECTION	1	EA.

**LEGEND**



SEAL



PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspacher North America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of Section 22  
T. 1 N., R. 8 E.  
City of Novi, Oakland County, Michigan

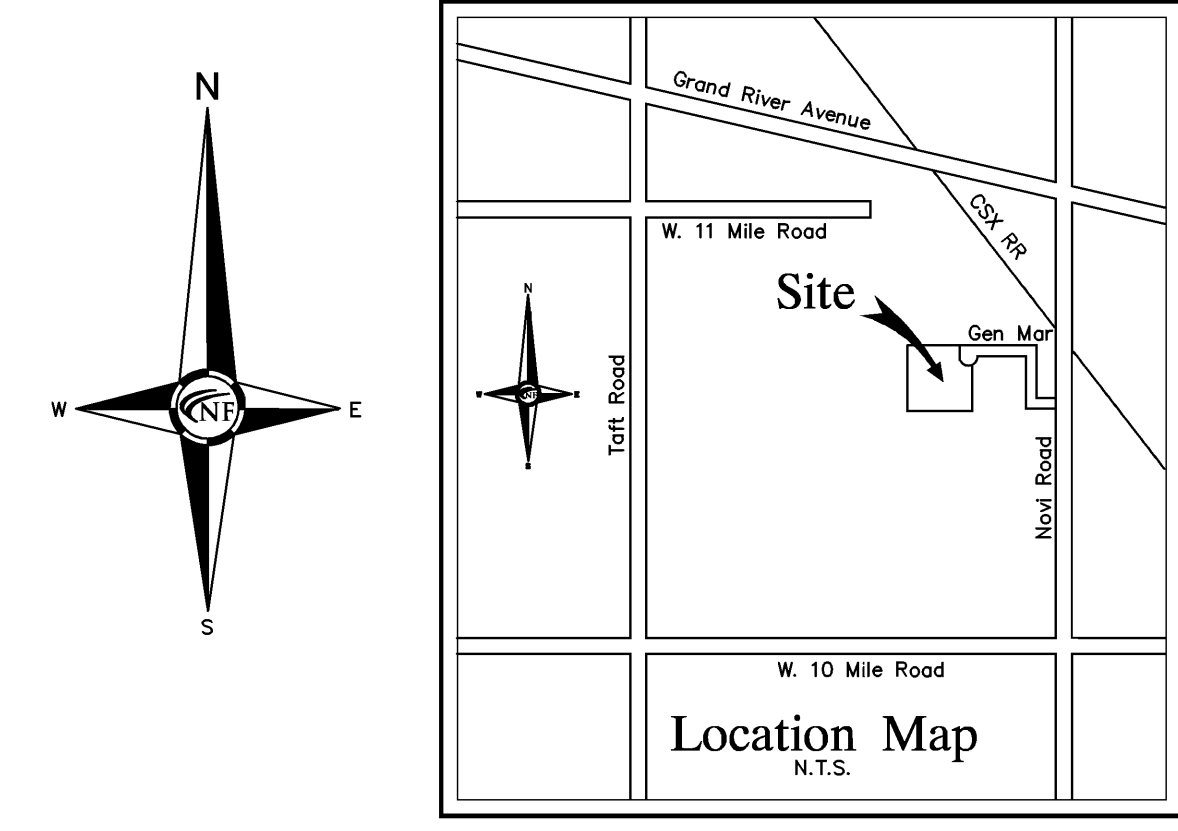
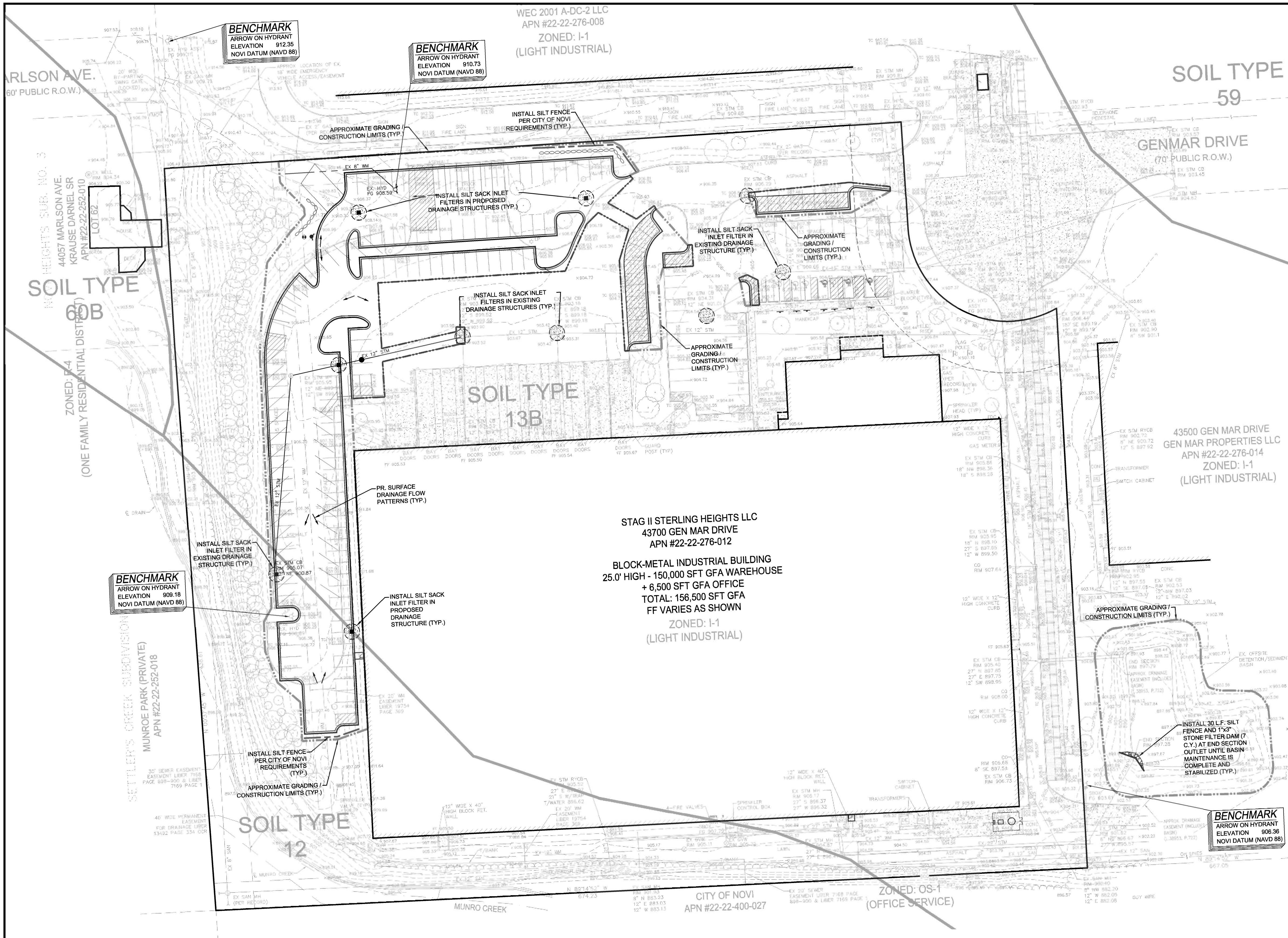
SHEET  
Utility Plan



REVISIONS  
07-17-13 Preliminary Site Plan

DRAWN BY:  
PT  
DESIGNED BY:  
BB/PT  
APPROVED BY:  
BB  
DATE:  
04/30/2013  
SCALE: 1" = 30'  
30 15 0 15 30 45  
NFE JOB NO. SHEET NO.  
H441 PSP4





**NF ENGINEERS**  
 CIVIL ENGINEERS  
 LAND SURVEYORS  
 LAND PLANNERS

NOWAK & FRAUS ENGINEERS  
 46777 WOODWARD AVE.  
 PONTIAC, MI 48342-5032  
 TEL. (248) 332-7931  
 FAX. (248) 332-8257

**EROSION CONTROL NOTES**  
 THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ANY NECESSARY PERMITS REQUIRED, PRIOR TO CONSTRUCTION.

PROPERTY DESCRIPTION: EBERSPACHER NORTH AMERICA, 43700 GEN MAR DRIVE, NOVI, MICHIGAN  
 PROPERTY SIZE: 8.862 ACRES  
 AREA OF EARTH DISRUPTION: 1.641 ACRES

CONTRACTOR SHALL OBEY THE MDEQ "NOTICE OF COVERAGE" LAW (A FORMAL PERMIT IS REQUIRED FOR EARTH DISRUPTION OF MORE THAN 5 ACRES).

THE EARTH CHANGE WILL INCLUDE UNDERGROUND UTILITY WORK, EARTHWORK TO ESTABLISH PROPOSED PAVEMENT SUBGRADES AND EARTH BALANCE.

ALL NON-PAVED AREAS ARE TO BE LANDSCAPED, SODDED AND/OR SEEDED AND MULCHED.

THE CONTRACTOR SHALL STORE ALL TOPSOIL ON-SITE IN AN AREA AGREED UPON BY THE OWNER OR OWNER'S REPRESENTATIVE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING AND MAINTAINING SOIL EROSION AND SEDIMENTATION CONTROL DEVICES, AND FOR PROVIDING DUST CONTROL.

THE FOLLOWING SHALL APPLY UNDER INSTALLATION OF SOIL EROSION AND SEDIMENTATION CONTROL DEVICES:

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING MUD MATS MADE OF LARGE COURSE AGGREGATE, AS NEEDED TO PROHIBIT CONSTRUCTION TRAFFIC FROM TRACKING DEBRIS AND SOILS ONTO ADJACENT ROADWAYS. ALL HAULING OPERATIONS MUST CONFORM TO LOCAL AND STATE LAW.
  - THE CONTRACTOR SHALL PROVIDE PERMANENT STABILIZATION OF ALL DENUDED AREAS WITHIN 5 DAYS OF FINAL GRADE.
  - IF SO DEEMED BY THE SITE INSPECTOR, THE CONTRACTOR SHALL IMMEDIATELY CEASE SITE WORK OPERATIONS, AND INSTALL EMERGENCY TEMPORARY EROSION CONTROL DEVICES (INCLUDING MUD MATS).
  - TOPSOIL SHALL NOT BE STORED WITHIN PUBLIC RIGHT OF WAY. STOCKPILED SOILS SHALL BE PROPERLY COMPACTED AND/OR COVERED, WITH SILT FENCE SURROUNDING THE PILE.
- ALL SESC MEASURES SHALL BE INSPECTED & REPAIRED AS NECESSARY AT A MINIMUM ONCE A WEEK AND AFTER EVERY STORM EVENT.
- BURLAP IS NOT ALLOWED AND STRAW BALES CAN ONLY BE USED TO BACKUP SILT FENCES.
- FINISHED GRADE STABILIZATION SHALL BE ACHIEVED WITHIN 5 DAYS OF FINAL GRADE.
- ALL SESC MATERIALS AND INSTALLATION PROCEDURES SHALL BE IN COMPLIANCE WITH APPLICABLE CITY OF NOVI REQUIREMENTS.

**MAINTENANCE OF SOIL EROSION & SEDIMENTATION CONTROL & DUST CONTROL NOTES:**

- THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING WEEKLY AND POST RAINFALL INSPECTION & MAINTENANCE OF ALL SOIL EROSION & SEDIMENTATION CONTROL MEASURES.
- REMOVE ACCUMULATION OF SEDIMENT & DEBRIS IN CONSTRUCTION ENTRANCE, SILT FENCE, LOW POINT INLET FILTERS AND MANHOLE SUMPS. ALSO, ACCUMULATED SEDIMENT AND DEBRIS ON ROADWAYS SHALL BE REMOVED.
- SOIL EROSION & SEDIMENTATION CONTROL MEASURES FOUND IMPROPERLY INSTALLED SHALL BE RE-INSTALLED TO MEET THE DESIRED FUNCTION.
- DUST SHALL BE CONTROLLED DAILY, OR AS NEEDED, TO A MINIMUM BY USE OF A WATER TRUCK AND/OR DUST CONTROL MATERIALS.

- SEQUENCE OF CONSTRUCTION**
- INSTALL SOIL EROSION & SEDIMENTATION CONTROL MEASURES.
  - REMOVE TREES/SHRUBS/VEGETATION.
  - REMOVE EXISTING BITUMINOUS PAVEMENT, CONCRETE CURB & GUTTER AND SIDEWALK.
  - IN CONJUNCTION WITH MASS GRADING, STRIP EXISTING VEGETATION & TOPSOIL, STABILIZE GROUND WITH SUBGRADE UNDERCUTTING TYPE II PER MDOT STANDARDS AT EXISTING SOFT SUBGRADE AREAS, AND PERFORM UNDERGROUND UTILITY WORK. INSTALL LOW POINT FILTERS ON NEW CATCH BASINS, AS CONSTRUCTED.
  - PERFORM PAVEMENT SUBGRADE PREPARATION AND FILLING OPERATIONS FOR PROPOSED PAVEMENT. PERFORM PROOF ROLLING.
  - INSTALL PAVEMENT SUBBASE, CONCRETE PAVEMENT, AND CURBING.
  - INSTALL ASPHALT LEVELING COURSE.
  - MAINTAIN ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES IN ACCORDANCE WITH THE CITY'S REQUIREMENTS (ALL TIMES).
  - INSTALL SIDEWALKS.
  - COMPLETE INSTALLATION OF FINAL WEARING COURSE.
  - RESTORE DENUDED EARTH AREAS WITH TOPSOIL, SEED AND/OR SOD, PER THE LANDSCAPE PLAN.
  - PUNCH LIST ITEMS. CLEAN PAVEMENT AND STRUCTURES OF ACCUMULATED DEBRIS IN CONJUNCTION WITH REMOVAL OF SOIL EROSION AND SEDIMENTATION CONTROL MEASURES.

**SUPPLEMENTAL EARTHWORK NOTES**

- EARTHWORK AND PAVEMENT CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
- REMOVE EXISTING TOPSOIL, ORGANICS, VEGETATION, TREES, UNSUITABLE FILL, AND DELETERIOUS MATERIALS TO EXPOSE THE SUBGRADE SOIL. TREE ROOTS AND ASSOCIATED ROOT SYSTEMS SHALL BE COMPLETELY REMOVED.
- PRIOR TO PLACING ENGINEERED FILL, THE TOP 12 INCHES OF EXPOSED SUBGRADE, INCLUDING INDIVIDUAL FILL LAYERS, SHALL BE COMPACTED TO A MINIMUM 95% OF THE MAXIMUM MODIFIED PROCTOR DRY DENSITY.
- THE FINAL SUBGRADE SHALL BE PROOF ROLLED USING A FULLY LOADED TANDEN AXLE TRUCK UNDER THE OBSERVATIONS OF THE GEOTECHNICAL ENGINEER. LOOSE OR YIELDING AREA THAT CANNOT BE MECHANICALLY STABILIZED SHOULD BE REMOVED AND REPLACED WITH ENGINEERED FILL OR AS DICTATED BY FIELD CONDITIONS.
- COMMENCE WITH EARTHWORK OPERATIONS BY EXCAVATION, EARTH BALANCE, AND/OR IMPORTING AND PLACING ENGINEERED FILL TO ACHIEVE FINAL SUBGRADE ELEVATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING HIS OWN EARTHWORK BALANCE/FILL/CUT/IMPORT/EXPORT VOLUMES TO COMPLETE THE PROJECT.
- SUITABLE ON-SITE FILL CAN BE USED, IF TESTED, APPROVED, AND PLACED UNDER THE SUPERVISION OF THE GEOTECHNICAL ENGINEER.
- ALL ENGINEERED FILL MATERIALS USED FOR THE PROJECT SHALL BE CLEAN AND FREE OF FROZEN SOIL, ORGANICS, OR OTHER DELETERIOUS MATERIALS.
- ENGINEERED FILL SHALL BE PLACED IN 8" LOOSE LIFTS COMPACTED TO A MINIMUM OF 95% OF MAXIMUM DRY DENSITY IN ACCORDANCE WITH MODIFIED PROCTOR. APPROVED ENGINEERED FILL MATERIAL SHALL CONSIST OF MDOT CLASS II, CLASS IIA, OR CLASS III SAND, UTILITY TRENCHES AND EXCAVATED AREAS (DUE TO OLD FOUNDATION REMOVALS) SHALL BE BACKFILLED AND COMPACTED USING CLASS II SAND, OR OTHER SUITABLE BACKFILL MATERIALS APPROVED BY THE GEOTECHNICAL ENGINEER.

**SOIL EROSION MAINTENANCE NOTE**  
 THE OWNER SHALL BE RESPONSIBLE FOR MAINTAINING ALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES WEEKLY AND AFTER EVERY STORM EVENT.

**SOIL DATA**  
 THIS SITE CONSISTS OF SOIL TYPES 12, 13B, AND 60B BASED ON CURRENT INFORMATION OBTAINED FROM THE USDA NRCS SOIL SURVEY FOR OAKLAND COUNTY.

**ESTIMATED QUANTITIES**  
 NOTE: THE BELOW QUANTITIES ARE FOR REFERENCE PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM HIS OWN QUANTITY TAKEOFFS & EARTHWORK CALCULATIONS PRIOR TO BIDDING.

DESCRIPTION	QUANTITY	UNITS
SILT FABRIC FENCING	165	LF.
INLET FILTER	10	EA.
1" x 3" STONE FILTER DAM	7	C.Y.

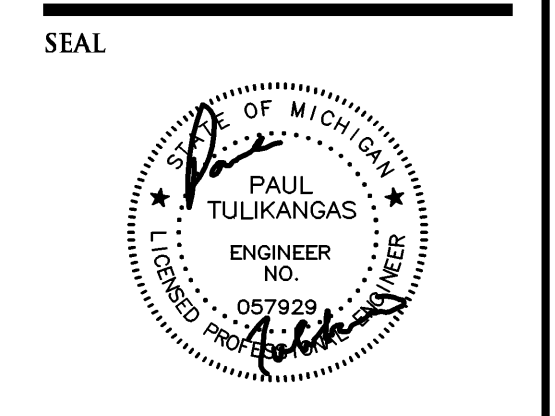
**CONSTRUCTION SEQUENCE / TIMING SCHEDULE**

1. INSTALL PERIMETER FILTER FABRIC FENCING AND INLET FILTERS IN EX. STORM STRUCTURES	SEPTEMBER 2013
2. MASS GRADE SITE.	SEPTEMBER 2013
3. COMMENCE UNDERGROUND UTILITY WORK.	OCTOBER 2013
4. INSTALL INLET FILTERS ON PROPOSED DRAINAGE STRUCTURES.	NOVEMBER 2013
5. FINAL GRADE AND PAVE SITE.	APRIL 2014
6. COMPLETE ALL LANDSCAPE ACTIVITY.	MAY 2014
7. JET VAC NEW STORM SEWER SYSTEM AS REQUIRED.	MAY 2014
8. REMOVE ALL TEMPORARY SOIL EROSION MEASURES.	JULY 2014

**LEGEND**

- INDICATES LIMITS OF SILT FABRIC FENCE.
- INDICATES LIMITS OF DRAINAGE DISTRICT AREA.
- INDICATES LIMITS OF SOIL DISRUPTION.
- INDICATES SOIL TYPE DELINEATION.
- INDICATES LOW POINT INLET FILTER.
- INDICATES DRAINAGE DISTRICT AREA.

AREA A  
0.00 ACRE



PROJECT  
 43700 Gen Mar Drive

CLIENT  
 Eberspacher North America, Inc.

PROJECT LOCATION  
 Part of the NE 1/4 of Section 22  
 T. 1 N., R. 8 E.  
 City of Novi,  
 Oakland County, Michigan

SHEET  
 Soil Erosion &  
 Sedimentation Control  
 Plan



REVISIONS  
 07-17-13 Preliminary Site Plan

DRAWN BY:  
 PT

DESIGNED BY:  
 BB/PT

APPROVED BY:  
 BB

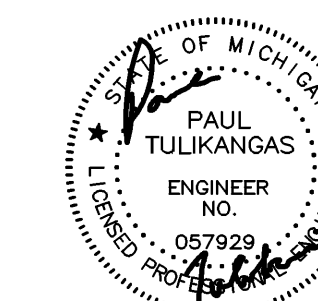
DATE:  
 04/30/2013

SCALE: 1" = 40'

NFE JOB NO. SHEET NO.  
 H441 PSP5



SEAL



PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspaecher North America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of Section 22  
T. 1 N., R. 8 E.  
City of Novi,  
Oakland County, Michigan

SHEET  
Storm Water Management Plan



REVISIONS  
07-17-13 Preliminary Site Plan

DRAWN BY:  
PT

DESIGNED BY:  
BB/PT

APPROVED BY:  
BB

DATE:  
04/30/2013

SCALE: 1" = 40'

N/E JOB NO. SHEET NO.  
H441 PSP6

**EXISTING (PRE-DEVELOPMENT) SITE RUN-OFF CALCULATIONS**

THERE ARE TWO STORM SEWER SYSTEMS THAT SERVICE THIS SITE. ONE SYSTEM RECEIVES DRAINAGE FROM A PORTION OF THE SITE LOCATED AT THE NORTHEAST CORNER. THIS SYSTEM CONVEYS THE STORM WATER DIRECTLY OFF-SITE TO THE STORM SYSTEM LOCATED WITHIN GENMAR DRIVE. THE SECOND SYSTEM RECEIVES THE MAJORITY OF SITE DRAINAGE, AND CONVEYS THE STORM WATER TO A DETENTION BASIN LOCATED NEAR THE SOUTH EAST CORNER OF THE SITE, BEFORE EVENTUALLY DISCHARGING INTO MUNRO CREEK. THE DRAINAGE AREA THAT CONTRIBUTES TO THE DETENTION BASIN IS CONSIDERED IN THE FOLLOWING CALCULATIONS:

**EXISTING RUNOFF COEFFICIENT - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN**  
TOTAL AREA (A) = 5.90 ACRES  
IMPERVIOUS SURFACE AREA (A<sub>i</sub>) = 5.08 ACRES  
PERVIOUS SURFACE AREA (A<sub>p</sub>) = 0.82 ACRES  
RUNOFF COEFFICIENT (c) = (0.95A<sub>i</sub> + 0.35A<sub>p</sub>)/A = 0.87

**EXISTING (PRE-DEVELOPMENT) DETENTION BASIN VOLUME CALCULATIONS**

BASED ON ORIGINAL DESIGN PLANS COMPLETED BY ORCHARD, HILTZ, AND MCCLIMENT, INC. DATED 2-8-86, THE DETENTION BASIN WAS DESIGNED TO PROVIDE THE VOLUME AS SHOWN BELOW (NOTE THAT A DATUM DIFFERENCE OF 2.57 FEET EXISTS BETWEEN THE ORIGINAL DESIGN AND RECENT TOPOGRAPHIC SURVEY ELEVATIONS):

**POUND DETENTION PROVIDED (DESIGN):**

ELEVATION	AREA, SF	DEPTH, FT	VOLUME, CF	Σ VOLUME, CF
904.30	11,514	0.30		
904.00	10,800	1.00	3,347.10	3,347.10
903.00	8,550	1.00	9,675.00	13,022.10
902.00	6,550	1.00	7,525.00	20,547.10
901.00	4,650	0.50	5,575.00	26,122.10
900.50	3,800	0.65	2,112.50	28,234.60
899.85			1,235.00	29,469.60
<b>TOTAL VOLUME (DESIGN)</b>				<b>29,469.60</b>

BASED ON THE TOPOGRAPHIC SURVEY INCLUDED IN THE PROPOSED PLANS, THE EXISTING DETENTION BASIN PROVIDES THE VOLUME AS SHOWN BELOW:

**POUND DETENTION PROVIDED (EXISTING):**

ELEVATION	AREA, SF	DEPTH, FT	VOLUME, CF	Σ VOLUME, CF
901.73	10,815	0.73		
901.00	9,149	1.00	7,286.86	7,286.86
900.00	7,296	1.00	8,222.50	15,509.36
899.00	5,671	1.00	6,483.50	21,992.86
898.00	2,996	0.72	4,333.50	26,326.36
897.28			1,076.56	27,402.92
<b>TOTAL VOLUME (EXISTING)</b>				<b>27,402.92</b>

**CITY OF NOVI REQUIREMENTS FOR NEW DEVELOPMENTS**

FOR COMPARISON PURPOSES, THE STORAGE REQUIREMENTS FOR 10, 5, AND 1 YEAR STORM EVENTS FOR NEW DEVELOPMENTS IN THE CITY OF NOVI ARE PROVIDED BELOW. THESE ARE CALCULATIONS ARE BASED ON CURRENT CITY OF NOVI EQUATIONS FOR THE AFOREMENTIONED DRAINAGE AREA CONTRIBUTING TO THE DETENTION SYSTEM, AS PORTRAYED IN THE CALCULATIONS BELOW. THE EXISTING BASIN WAS DESIGNED AND CURRENTLY STORES A VOLUME BETWEEN THE REQUIREMENTS FOR A 1-YEAR AND 5-YEAR STORM BASED ON THE CURRENT REQUIREMENTS:

**DETENTION REQUIRED - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN (CURRENT 10-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.885 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.1731 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(6,562.5/Q<sub>i</sub>) = 189.72 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [10,500/T(1+25)] - 40Q<sub>a</sub>T = 7,976.85CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 41,785.63 CF

**DETENTION REQUIRED - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN (CURRENT 5-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.885 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.1731 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(6,562.5/Q<sub>i</sub>) = 152.24 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [10,500/T(1+25)] - 40Q<sub>a</sub>T = 6,418.81 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 32,616.39 CF

**DETENTION REQUIRED - DRAINAGE AREA CONTRIBUTING TO DETENTION BASIN (CURRENT 1-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.885 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.1731 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(6,562.5/Q<sub>i</sub>) = 99.91 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [10,500/T(1+25)] - 40Q<sub>a</sub>T = 2,763.79 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 14,134.16 CF

**STORM WATER MANAGEMENT PROPOSAL (POST DEVELOPMENT):**

THE FOLLOWING DETAILS THE PROPOSED STORM WATER MANAGEMENT APPROACH TO THIS PROJECT:

- THE ABOVE CALCULATIONS INDICATE THAT THE CURRENT DETENTION BASIN VOLUME HAS DECREASED ABOUT 2,065 C.F., OR BY APPROXIMATELY 7% OF THE ORIGINAL DESIGN VOLUME. IT IS PROPOSED TO REMOVE TREE AND SHRUB OVER-GROWTH, CLEAN, EXCAVATE, AND RE-STABILIZE THE EXISTING DETENTION BASIN TO PROVIDE AN ADDITIONAL 2,065 C.F. OF STORAGE, EFFECTIVELY RESTORING THE ORIGINAL DESIGN VOLUME.
- THREE OF THE PROPOSED PARKING LOT ADDITIONS, TOTALING 1,250 S.F. (0.30 AC) ARE LOCATED OUTSIDE OF THE DRAINAGE AREA THAT CONTRIBUTES TO THE DETENTION BASIN. IT IS PROPOSED TO CONSTRUCT THESE PARKING ADDITIONS WITH PERVIOUS PAVEMENT IN AN EFFORT TO MINIMIZE THE ADDITIONAL RUN-OFF TO THE GENMAR DRIVE STORM SEWER SYSTEM. THE EFFECTIVE RUNOFF COEFFICIENT FOR THESE ADDITIONS IS THE DIFFERENCE BETWEEN THE RUNOFF COEFFICIENT FOR PERVIOUS PAVEMENT (0.45) AND THE RUN-OFF COEFFICIENT FROM THE EXISTING GREENBELT (0.35), OR 0.10. THE REQUIRED STORAGE VOLUME BASED ON A 100-YEAR STORM EVENT WILL BE STORED WITHIN THE STONE BASE BENEATH THE PERVIOUS PAVEMENT.

**PROPOSED RUNOFF COEFFICIENT - PERVIOUS PAVEMENT ADDITIONS (OFF-SITE)**  
TOTAL AREA (A) = 0.03 ACRES  
EFFECTIVE RUN-OFF COEFFICIENT FOR PARKING ADDITIONS = 0.10

**DETENTION REQUIRED - PERVIOUS PAVEMENT ADDITIONS (OFF-SITE) (CURRENT 100-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.0044 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 1.5 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(10,312.5/Q<sub>i</sub>) = 57.92 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [16,500/T(1+25)] - 40Q<sub>a</sub>T = 8,050.13 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 23.35 CF

**PROPOSED STORAGE TO BE PROVIDED - PERVIOUS PAVEMENT ADDITIONS (OFF-SITE)**  
TOTAL AREA PERVIOUS PAVEMENT = 1,250 SF  
VOLUME OF 6AA STONE BASE (18" DEPTH) = (1,250 SF x (18"/12")) = 1,875.00 CF  
POROSITY OF 6AA STONE BASE = 0.30  
TOTAL = (1,875.00 CF x 0.30) = 562.50 CF

- THE REMAINING PROPOSED PARKING LOT ADDITIONS WILL INCREASE RUN-OFF TO THE DRAINAGE AREA THAT CONTRIBUTES TO THE EXISTING DETENTION BASIN. THE INCREASES ARE QUANTIFIED IN THE CALCULATIONS BELOW:

TOTAL PARKING ADDITIONS (AS SHOWN ON SHEET PSP1) = 13,520 S.F.  
THREE PARKING ADDITIONS THAT DRAIN TO GENMAR STORM SYSTEM (TO BE CONSTRUCTED OF PERVIOUS PAVEMENT AS DISCUSSED IN ITEM No. 2 ABOVE) = 1,250 S.F.  
NET PARKING ADDITIONS WITHIN DRAINAGE AREA THAT CONTRIBUTES TO EXISTING DETENTION BASIN = 13,520 - 1,250 = 12,270 S.F.  
TOTAL PROPOSED LAND AREA AND ADDITIONS = 3,290 S.F.  
NET PARKING ADDITIONS = 12,270 - 3,290 = **8,980 S.F. (0.21 AC)**

OF THE 8,980 S.F. (0.21 AC) NET PARKING ADDITIONS, 1,837 S.F. (0.038 AC) CONSISTS OF THE ADDITION LOCATED AT THE SOUTHWEST CORNER OF THE SITE, WHICH DOES NOT CURRENTLY CONTRIBUTE TO THE DETENTION BASIN. THE EFFECTIVE RUNOFF COEFFICIENT FOR THIS AREA IS THEREFORE 0.95. THE EASTERMOST PARKING ADDITION TOTALS 1,510 S.F. (0.035 AC), AND IS PROPOSED TO BE CONSTRUCTED OF PERVIOUS PAVEMENT TO ENSURE THAT RUN-OFF FROM THIS AREA CAN BE FEASIBLY ROUTED THROUGH THE PROPOSED UNDERGROUND DETENTION SYSTEM. THE EFFECTIVE RUNOFF COEFFICIENT FOR THIS ADDITION IS THE DIFFERENCE BETWEEN THE RUNOFF COEFFICIENT FOR PERVIOUS PAVEMENT (0.45) AND THE RUN-OFF COEFFICIENT FROM THE EXISTING GREENBELT (0.35), OR 0.10. THE REMAINING AREA OF 5,833 S.F. (0.14 AC) WILL CONSIST OF IMPERVIOUS PARKING ADDITIONS WITHIN EXISTING GREENBELT AREAS THAT CURRENTLY CONTRIBUTE TO THE DETENTION BASIN. THEREFORE, THE NET RUN-OFF COEFFICIENT FOR THESE AREAS IS THE DIFFERENCE BETWEEN 0.95 AND 0.35, OR 0.60.

**PROPOSED RUNOFF COEFFICIENT - NET PARKING ADDITIONS**  
TOTAL AREA (A) = 0.21 ACRES  
IMPERVIOUS SURFACE AREA (NEW DRAINAGE AREA) (A<sub>in</sub>) = 0.038 ACRES  
PERVIOUS PAVEMENT AREA (A<sub>p</sub>) = 0.035 ACRES  
IMPERVIOUS SURFACE AREA (EXISTING DRAINAGE AREA) (A<sub>ie</sub>) = 0.14 ACRES  
RUNOFF COEFFICIENT (c) = (0.95A<sub>in</sub> + 0.10A<sub>p</sub> + 0.60A<sub>ie</sub>)/A = 0.59

**DETENTION REQUIRED - NET PARKING ADDITIONS (CURRENT 100-YR EVENT)**  
ALLOWABLE DISCHARGE (Q<sub>a</sub>) = 0.15 CFS/ACRE x A<sub>i</sub> = 0.0315 CFS  
DISCHARGE/IMPERVIOUS ACRE (Q<sub>i</sub>) = Q<sub>a</sub>/(c x A<sub>i</sub>) = 0.2549 CFS/ACRE  
STORAGE TIME (T) = -25 + SQRT(10,312.5/Q<sub>i</sub>) = 171.16 MIN  
STORAGE VOLUME/IMPERVIOUS ACRE (V<sub>a</sub>) = [16,500/T(1+25)] - 40Q<sub>a</sub>T = 12,853.59 CF/ACRE  
STORAGE VOLUME REQUIRED (V<sub>r</sub>) = c x A<sub>i</sub> x V<sub>a</sub> = 1,563.98 CF

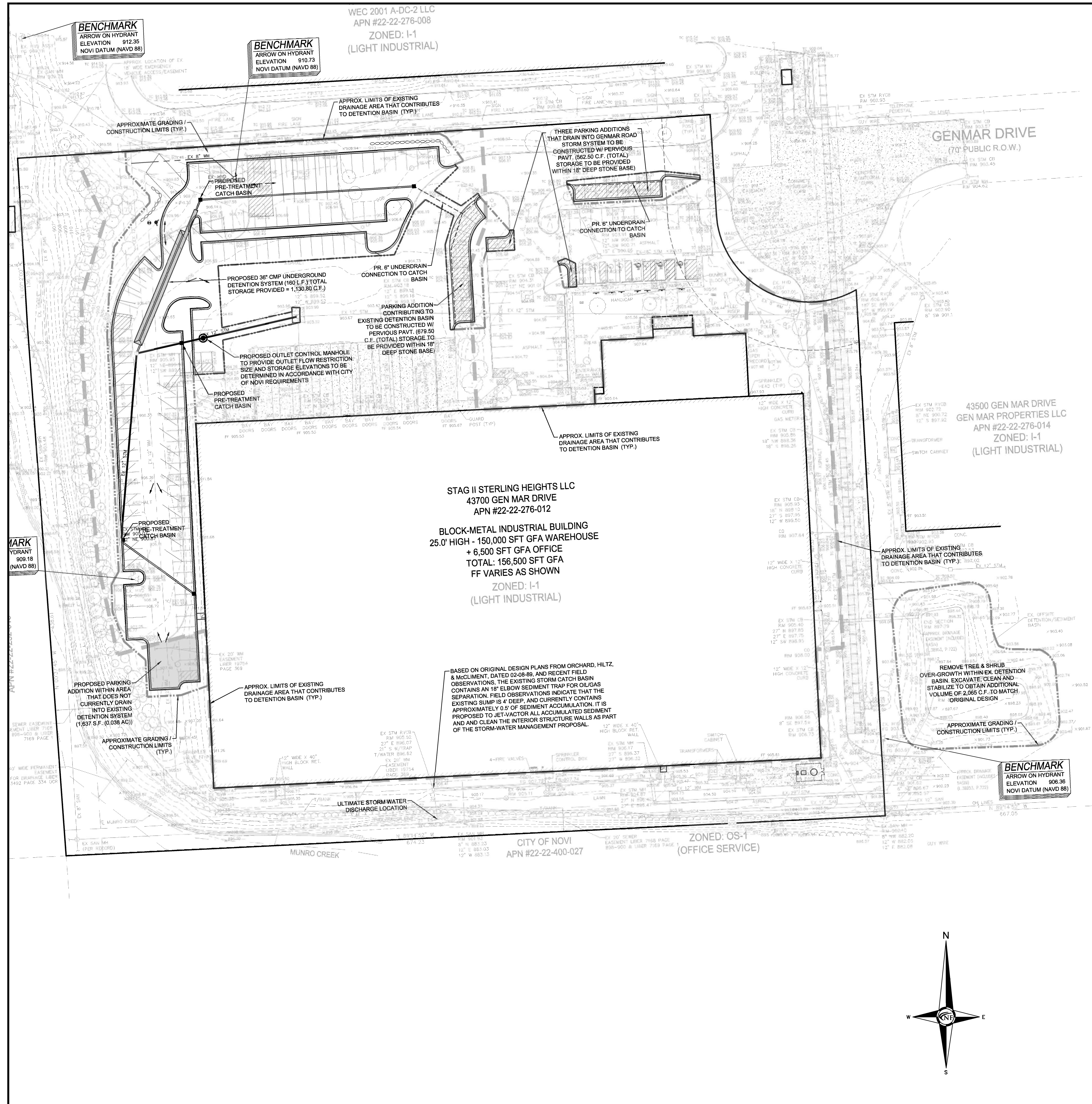
OF THE 1,563.98 C.F. STORAGE REQUIRED, A MINIMUM STORAGE OF 21.18 C.F. OS REQUIRED TO BE STORED IN THE PERVIOUS PAVEMENT ADDITION. AS SHOWN BELOW, THE PROPOSED 18" DEEP STONE BASE IN THE PERVIOUS PAVEMENT ADDITION GREATLY EXCEEDS THIS MINIMUM REQUIREMENT.

**PROPOSED STORAGE TO BE PROVIDED - PERVIOUS PAVEMENT ADDITION**  
TOTAL AREA PERVIOUS PAVEMENT = 1,510 SF  
VOLUME OF 6AA STONE BASE (18" DEPTH) = (1,510 SF x (18"/12")) = 2,265 CF  
POROSITY OF 6AA STONE BASE = 0.30  
TOTAL STORAGE PROVIDED = (2,265 CF x 0.30) = 679.5 CF  
MINIMUM STORAGE REQUIRED = 21.18 CF

**PROPOSED STORAGE TO BE PROVIDED - UNDERGROUND DETENTION SYSTEM**  
220 FEET OF 36" C.M.P. = 1,555.08 CF  
TOTAL = 1,555.08 CF

**TOTAL PROPOSED STORAGE = 28,18 C.F. + 1,555.08 C.F. = 1,583.26 C.F.**

IN ADDITION TO STORING THE 100-YEAR VOLUME ASSOCIATED WITH THE PROPOSED PARKING ADDITIONS, IT IS PROPOSED TO PROVIDE PRE-TREATMENT VIA INSTALLATION OF THREE MECHANICAL FOREBAY STRUCTURES. THE DETENTION VOLUME OF WATER RESULTING FROM THE RUN-OFF ADDITIONS WILL HAVE ITS FLOW RESTRICTED TO THE REQUIRED DISCHARGE RATE VIA INSTALLATION OF THE REQUIRED OUTLET CONTROL MANHOLE (STORM STRUCTURE #5 SHOWN ON THE PLANS), SIZING AND STORAGE ELEVATIONS CONFORMING TO CITY OF NOVI REQUIREMENTS WILL BE PROVIDED WITH THE FINAL DESIGN.



WEC 2001 A-DC-2 LLC  
APN #22-22-276-008  
ZONED: I-1  
(LIGHT INDUSTRIAL)

GENMAR DRIVE  
(70' PUBLIC R.O.W.)

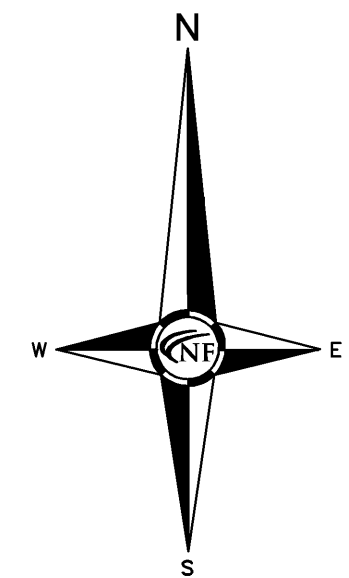
43500 GEN MAR DRIVE  
GEN MAR PROPERTIES LLC  
APN #22-22-276-014  
ZONED: I-1  
(LIGHT INDUSTRIAL)

STAG II STERLING HEIGHTS LLC  
43700 GEN MAR DRIVE  
APN #22-22-276-012  
BLOCK-METAL INDUSTRIAL BUILDING  
25.0' HIGH - 150,000 SFT GFA WAREHOUSE  
+ 6,500 SFT GFA OFFICE  
TOTAL: 156,500 SFT GFA  
FF VARIES AS SHOWN  
ZONED: I-1  
(LIGHT INDUSTRIAL)

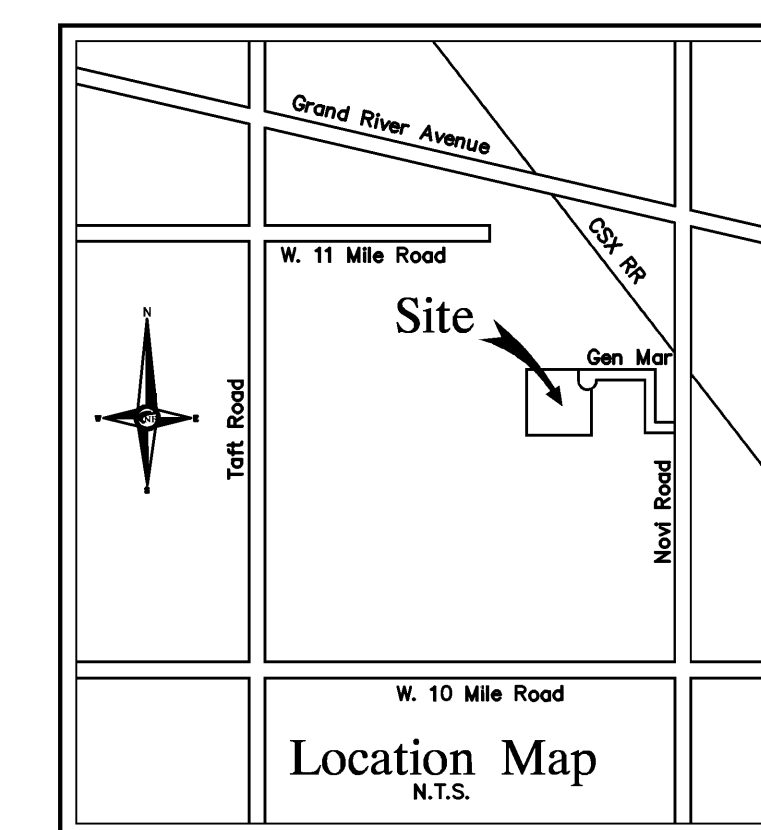
BASED ON ORIGINAL DESIGN PLANS FROM ORCHARD, HILTZ, & MCCLIMENT, DATED 02-08-86, AND RECENT FIELD OBSERVATIONS, THE EXISTING STORM CATCH BASIN CONTAINS AN 18" ELBOW SEDIMENT TRAP FOR OIL/GAS SEPARATION. FIELD OBSERVATIONS INDICATE THAT THE SEPARATION FIELD OBSERVATIONS INDICATE THAT THE EXISTING SUMP IS 4' DEEP, AND CURRENTLY CONTAINS APPROXIMATELY 0.5' OF SEDIMENT ACCUMULATION. IT IS PROPOSED TO JET-VACUUM ALL ACCUMULATED SEDIMENT AND CLEAN THE INTERIOR STRUCTURE WALLS AS PART OF THE STORM-WATER MANAGEMENT PROPOSAL.

BENCHMARK  
ARROW ON HYDRANT  
ELEVATION 906.36  
NOVI DATUM (NAVD 88)

CITY OF NOVI  
APN #22-22-400-027  
ZONED: OS-1  
(OFFICE SERVICE)





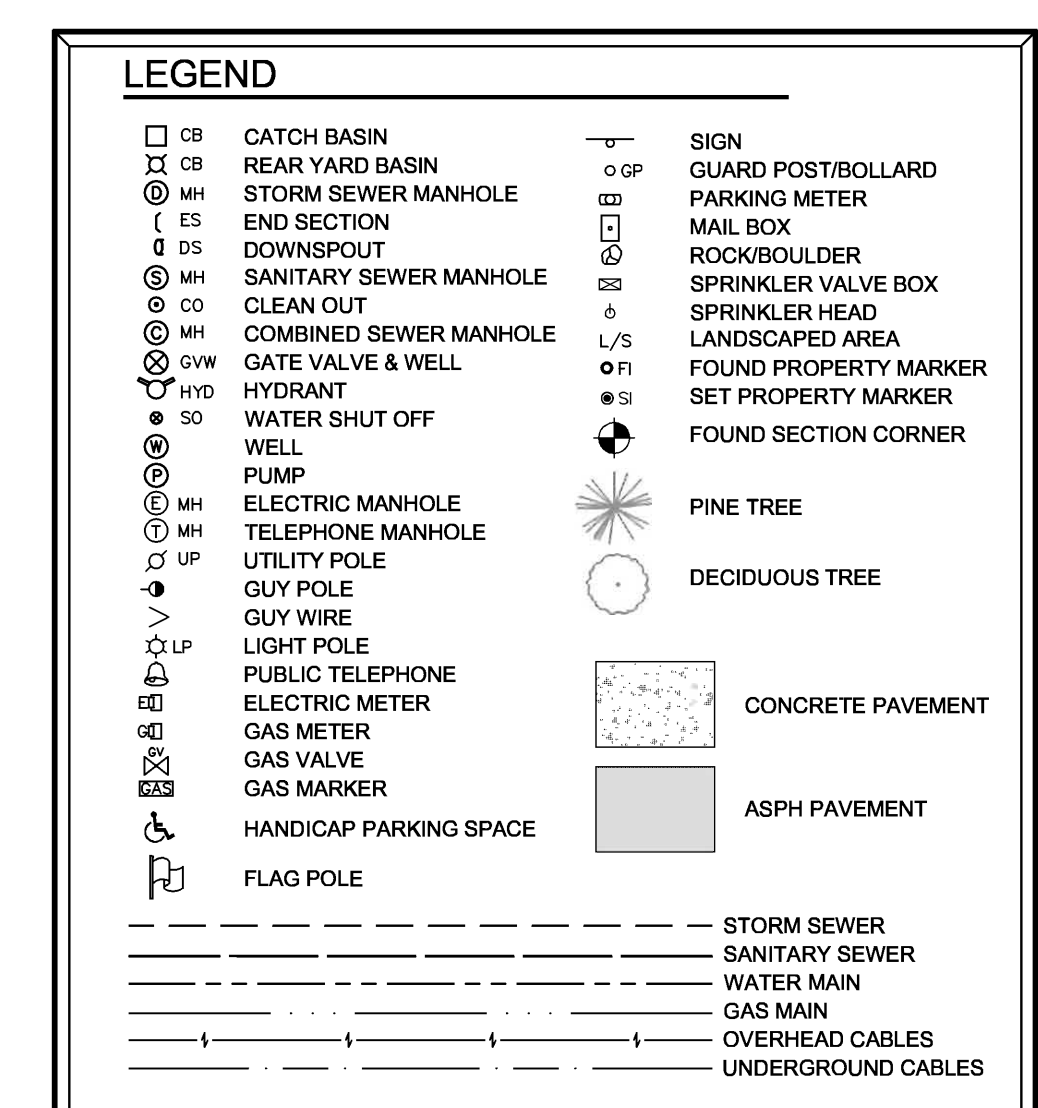


**LEGAL DESCRIPTION**  
(PER LEHNER ASSOCIATES, INC. ALTA SURVEY DATED 02-05-07)  
NFE HAS NOT PERFORMED A BOUNDARY SURVEY TO CONFIRM THIS LEGAL DESCRIPTION.

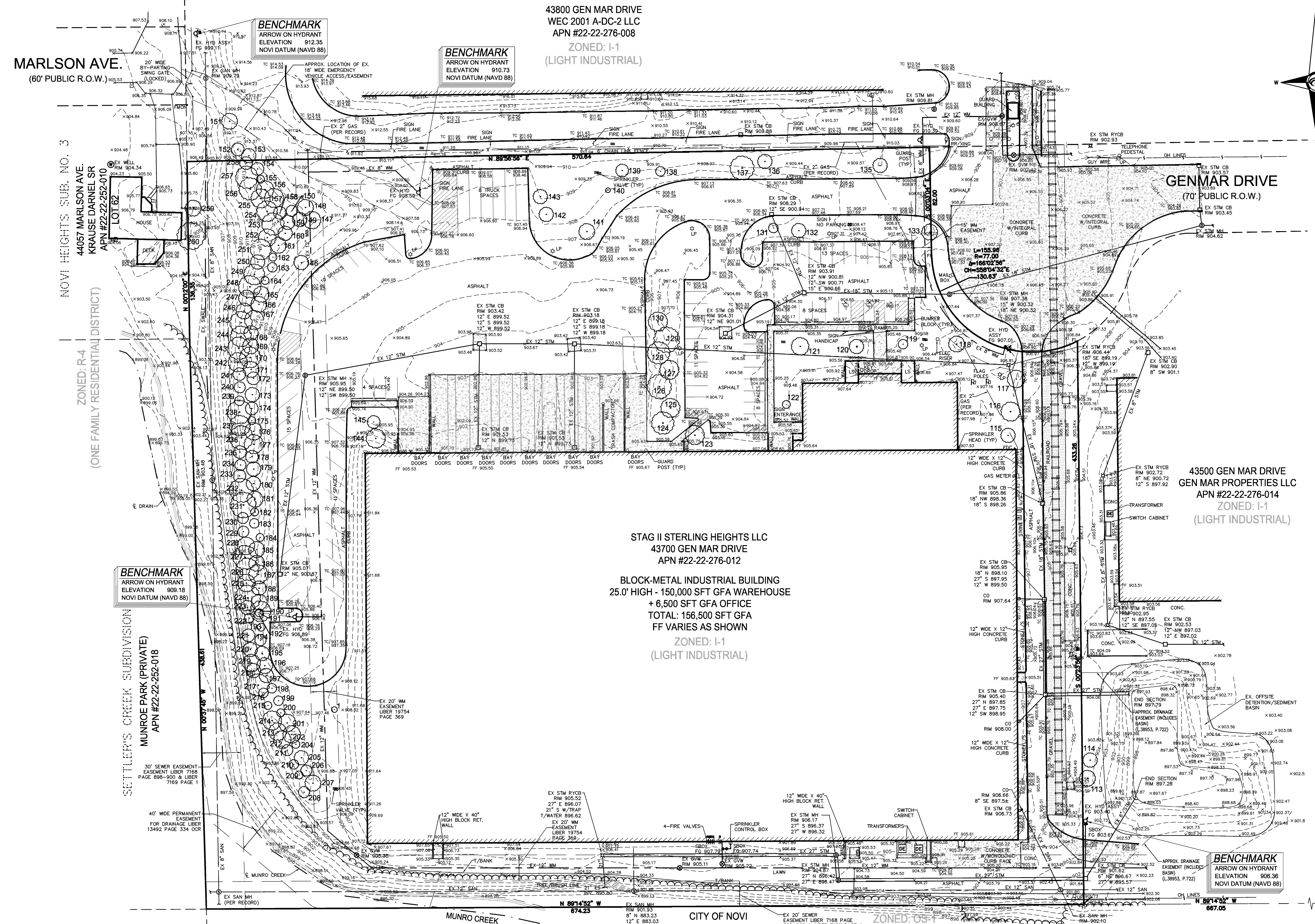
**PARCEL 1:**  
A PARCEL OF LAND LOCATED IN THE NORTHEAST 1/4 OF SECTION 22, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN. THENCE N 89°14'52" W, 667.05 FEET ALONG THE EAST AND WEST 1/4 LINE OF SECTION 22 TO THE POINT OF BEGINNING, PROCEEDING ALONG THE EAST AND WEST 1/4 LINE SECTION 22, N 89°14'52" W, 674.23 FEET; THENCE N 00°37'45" W, 438.61 FEET TO A POINT ON THE EAST LINE OF NOVI HEIGHTS SUBDIVISION NO.3, THENCE ALONG THE EAST LINE OF NOVI HEIGHTS SUBDIVISION NO.3, N 00°12'00" E, 136.35 FEET; THENCE N 89°56'56" E, 470.64 FEET TO A POINT OF THE WEST RIGHT-OF-WAY LINE OF GENMAR DRIVE; THENCE ALONG THE WEST AND SOUTH LINE OF GENMAR DRIVE THE FOLLOWING TWO (2) COURSES: (1) S 00°03'04" E, 82.00 FEET AND (2) 155.96 FEET ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 77.00 FEET, CENTRAL ANGLE OF 116°02'56". THE LONG CHORD BEARS S 89°04'32" E, 130.63 FEET; THENCE S 00°23'56" W, 433.26 FEET TO THE POINT OF BEGINNING.

**TOGETHER WITH**  
**PARCEL 1-A:**  
AN EASEMENT FOR THE CONSTRUCTION, ALTERATION, MAINTENANCE, AND USE OF A RAILROAD SPUR, TWENTY (20) FEET IN WIDTH, TEN (10) FEET ON EACH SIDE OF THE FOLLOWING DESCRIBED CENTER LINE: A STRIP OF LAND BEING A PART OF THE NORTHEAST 1/4 OF SECTION 22, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN. DESCRIBED AS: COMMENCING AT THE EAST 1/4 CORNER OF SECTION 22, TOWN 1 NORTH, RANGE 8 EAST, CITY OF NOVI, OAKLAND COUNTY, MICHIGAN; THENCE N 00°23'56" E, 593.76 FEET ALONG THE EAST LINE OF SECTION 22; THENCE S 89°56'56" W, 886.62 FEET ALONG THE NORTH LINE OF GENMAR DRIVE; 70 FEET WIDE TO THE POINT OF BEGINNING, PROCEEDING THENCE S 00°23'56" W, 157.48 FEET TO THE POINT OF ENDING.

COMMONLY KNOWN AS: 43700 GENMAR, NOVI, MICHIGAN  
PARCEL IDENTIFICATION NO. 22-22-276-012



**TOPOGRAPHIC SURVEY NOTES**  
ALL ELEVATIONS ARE EXISTING ELEVATIONS, UNLESS OTHERWISE NOTED.  
UTILITY LOCATIONS WERE OBTAINED FROM MUNICIPAL OFFICIALS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.  
WHERE POSSIBLE THIS SURVEY REFLECTS EASEMENTS OF INDICATED ON THE LEHNER ASSOCIATES, INC. ALTA SURVEY DATED 02-05-07 PROVIDED BY OTHERS. AN UPDATED TITLE POLICY MUST BE FURNISHED TO THE SURVEYOR BY THE OWNER TO CONFIRM EASEMENT LOCATIONS SHOWN HEREON.



Tree #	Botanical Name	Common Name	Dia.	Type	Other Dia.	Condition	Comments
113	Pinus nigra	Austrian Pine	10			Good	Being pruned by support cable, dipodia needle blight
114	Pinus nigra	Austrian Pine	9			Poor	Being pruned by support cable, dipodia needle blight
115	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight
116	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
117	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
118	Acer platanoides	Norway Maple	10			Poor	Lg basal trunk injury W side of tree, some decay
119	Morus spp.	Crapeapple spp.	8			Good	
120	Morus spp.	Crapeapple spp.	9			Good	
121	Acer platanoides	Norway Maple	11			Good	Some grinding rods on
122	Morus spp.	Crapeapple spp.	5			Good	
123	Picea glauca	White Spruce	12			Good	
124	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight
125	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
126	Pinus nigra	Austrian Pine	15			Fair	Dipodia needle blight
127	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
128	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight
129	Pinus nigra	Austrian Pine	16			Good	Dipodia needle blight
130	Pinus nigra	Austrian Pine	12			Good	
131	Morus spp.	Crapeapple spp.	6	Multiple	6.5	Good	
132	Morus spp.	Crapeapple spp.	9			Good	
133	Acer platanoides	Norway Maple	10			Good	
134	Acer platanoides	Norway Maple	10			Poor	Lg trunk injury, wood exposed, some decay
135	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight
136	Pinus nigra	Austrian Pine	9			Good	
137	Pinus nigra	Austrian Pine	15			Good	
138	Pinus nigra	Austrian Pine	8			Good	
139	Morus spp.	Crapeapple spp.	8			Good	
140	Morus spp.	Crapeapple spp.	3			Good	Lg basal trunk injury W side of tree, some decay
141	Acer platanoides	Norway Maple	10			Good	
142	Picea glauca	White Spruce	9			Good	Slight trunk lean
143	Pinus nigra	Austrian Pine	9			Good	
144	Picea glauca	White Spruce	6			Good	
145	Picea glauca	White Spruce	5			Good	
146	Quercus velutina	Black Oak	9			Good	
147	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
148	Pinus nigra	Austrian Pine	10			Fair	Dipodia needle blight
149	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight
150	Pinus nigra	Austrian Pine	7			Poor	Dipodia, very low live crown ratio
151	Picea glauca	White Spruce	6			Good	
152	Pinus nigra	Austrian Pine	7			Poor	Dipodia, very low live crown ratio
153	Picea glauca	White Spruce	5			Good	
154	Picea glauca	White Spruce	8			Good	
155	Picea glauca	White Spruce	5			Poor	Terminal leader failure
156	Pinus nigra	Austrian Pine	11			Good	
157	Pinus nigra	Austrian Pine	12			Good	
158	Pinus nigra	Austrian Pine	8			Fair	Dipodia, very low live crown ratio
159	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight
160	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
161	Pinus nigra	Austrian Pine	10			Good	
162	Picea glauca	White Spruce	5			Good	
163	Picea glauca	White Spruce	6			Good	
164	Picea glauca	White Spruce	5			Good	
165	Pinus nigra	Austrian Pine	10			Poor	Dipodia, terminal leader failure
166	Pinus nigra	Austrian Pine	10			Poor	Dipodia, terminal leader failure
167	Pinus nigra	Austrian Pine	12			Good	
168	Pinus nigra	Austrian Pine	9			Good	
169	Pinus nigra	Austrian Pine	10			Fair	Dipodia needle blight
170	Pinus nigra	Austrian Pine	13			Good	
171	Picea glauca	White Spruce	4			Good	
172	Picea glauca	White Spruce	6			Good	
173	Picea glauca	White Spruce	7			Good	
174	Picea glauca	White Spruce	5			Good	
175	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
176	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
177	Pinus nigra	Austrian Pine	5			Good	
178	Picea glauca	White Spruce	6			Poor	Low live crown ratio, suspected needle blight
179	Picea glauca	White Spruce	7			Fair	
180	Picea glauca	White Spruce	6			Fair	Being choked by vines
181	Pinus nigra	Austrian Pine	9			Good	
182	Pinus nigra	Austrian Pine	12			Good	
183	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
184	Picea glauca	White Spruce	8			Good	
185	Pinus nigra	Austrian Pine	8			Good	
186	Picea abies	Norway Spruce	9			Good	
187	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
188	Pinus nigra	Austrian Pine	13			Fair	Dipodia needle blight
189	Pinus nigra	Austrian Pine	7			Good	
190	Morus alba	White Mulberry	8			Good	
191	Picea glauca	White Spruce	5			Fair	
192	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
193	Picea glauca	White Spruce	5			Good	
194	Picea glauca	White Spruce	7			Good	
195	Pinus nigra	Austrian Pine	9			Poor	Dipodia, low live crown ratio
196	Pinus nigra	Austrian Pine	10			Fair	
197	Pinus nigra	Austrian Pine	9			Poor	Dipodia
198	Picea glauca	White Spruce	8			Good	
199	Picea glauca	White Spruce	5			Good	
200	Picea glauca	White Spruce	5			Fair	Suspected needle blight
201	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
202	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
203	Quercus velutina	Black Oak	8			Good	
204	Pinus nigra	Austrian Pine	5			Good	
205	Picea glauca	White Spruce	9			Good	
206	Picea glauca	White Spruce	12			Good	
207	Picea glauca	White Spruce	10			Good	
208	Picea glauca	White Spruce	7			Good	
209	Picea glauca	White Spruce	5			Good	
210	Picea glauca	White Spruce	8			Good	
211	Picea glauca	White Spruce	7			Good	
212	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
213	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
214	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
215	Picea glauca	White Spruce	5			Fair	Suspected needle blight
216	Picea glauca	White Spruce	6			Fair	Suspected needle blight
217	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight
218	Pinus nigra	Austrian Pine	9			Fair	Dipodia needle blight
219	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight
220	Pinus nigra	Austrian Pine	9			Poor	Dipodia needle blight, very sparse crown
221	Picea glauca	White Spruce	8			Good	
222	Picea glauca	White Spruce	8			Good	
223	Picea glauca	White Spruce	9			Good	
224	Pinus nigra	Austrian Pine	10			Fair	Dipodia needle blight
225	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight
226	Pinus nigra	Austrian Pine	11	Twin	10	Fair	Dipodia needle blight
227	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight
228	Picea glauca	White Spruce	10			Good	
229	Picea glauca	White Spruce	11			Good	
230	Picea glauca	White Spruce	7			Good	
231	Pinus nigra	Austrian Pine	16			Fair	Dipodia needle blight
232	Pinus nigra	Austrian Pine	15			Fair	Dipodia needle blight
233	Pinus nigra	Austrian Pine	12			Good	
234	Picea glauca	White Spruce	7			Good	
235	Picea glauca	White Spruce	8			Good	Suspected needle blight
236	Pinus nigra	Austrian Pine	15			Fair	Dipodia needle blight
237	Pinus nigra	Austrian Pine	13			Fair	Dipodia needle blight
238	Pinus nigra	Austrian Pine	15			Fair	Dipodia needle blight
239	Picea glauca	White Spruce	8			Fair	Suspected needle blight
240	Picea glauca	White Spruce	7			Fair	Suspected needle blight
241	Picea glauca	White Spruce	8			Fair	Suspected needle blight
242	Pinus nigra	Austrian Pine	12			Fair	Dipodia needle blight
243	Pinus nigra	Austrian Pine	14			Fair	Dipodia needle blight
244	Pinus nigra	Austrian Pine	11			Fair	Dipodia needle blight

SEAL

PROJECT  
43700 Gen Mar Drive

CLIENT  
Eberspacher North America, Inc.

PROJECT LOCATION  
Part of the NE 1/4 of Section 22, T. 1 N., R. 8 E. City of Novi, Oakland County, Michigan

SHEET  
Topographic / Tree Survey



REVISIONS  
05-06-13 Pre-Application Meeting Submitted  
07-17-13 Preliminary Site Plan

DRAWN BY:  
R. Peery

DESIGNED BY:  
B. Buchholz

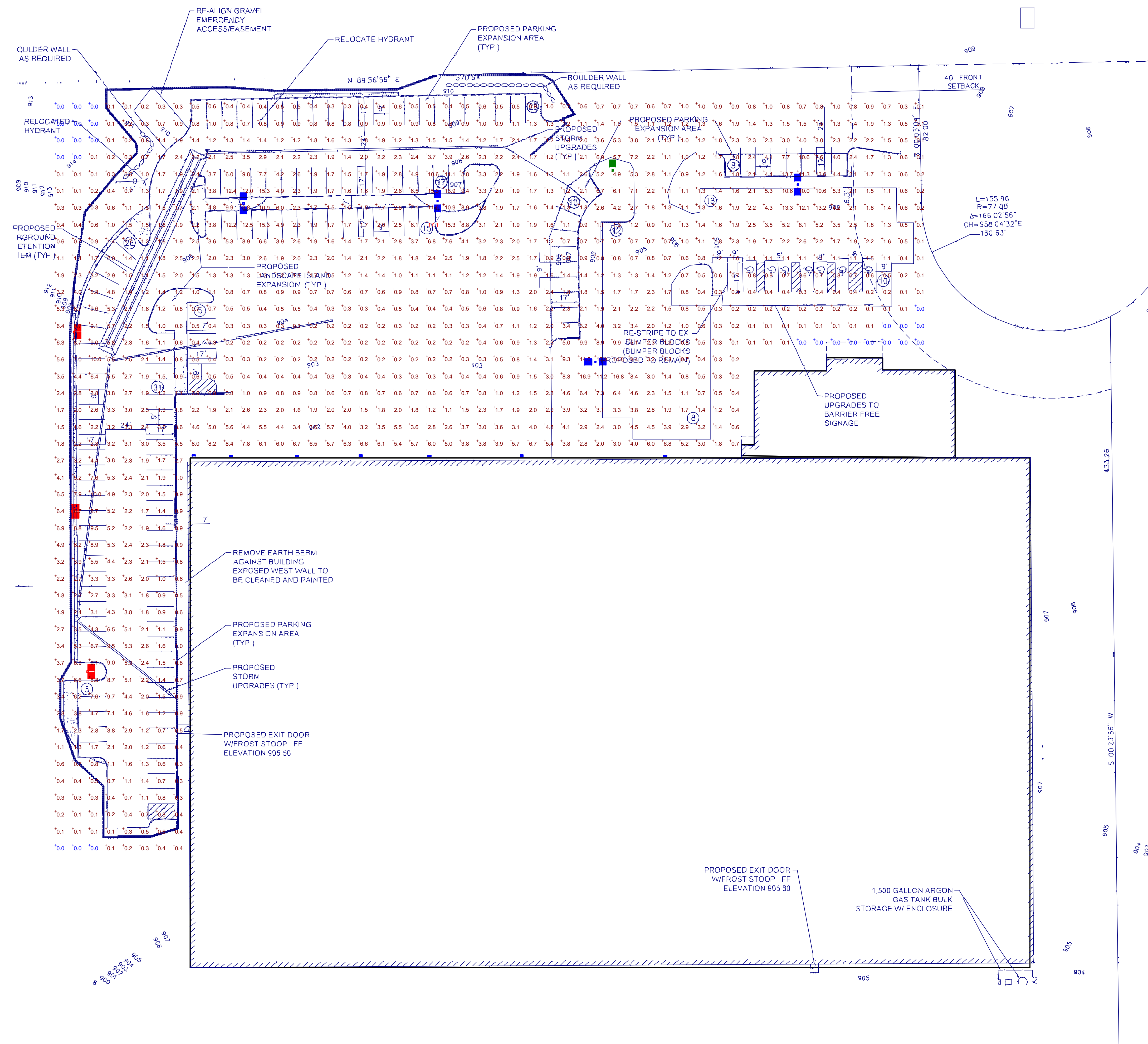
APPROVED BY:  
B. Buchholz

DATE:  
04/30/2013

SCALE: 1" = 40'  
40 0 20 40 60

NFE JOB NO. SHEET NO.  
H441 T1





Plan View  
Scale 1" = 30'

LUMINAIRE SCHEDULE									
Symbol	Label	Qty	Catalog Number	Description	Lamp	File	Lumens	LLF	Watts
■	A	4	CR1-H40-H5	CIMARRON RECTANGULAR AREA LIGHT TYPE V REFLECTOR CLEAR FLAT LENS	400W CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION	cr1-h40-h5.ies	32400	0.72	920
■	B	3	CR1-H40-H3	CIMARRON RECTANGULAR AREA LIGHT TYPE III REFLECTOR CLEAR FLAT LENS	400W CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION	cr1-h40-h3.ies	32400	0.72	920
■	C	1	CR1-H40-H5	CIMARRON RECTANGULAR AREA LIGHT TYPE V REFLECTOR CLEAR FLAT LENS	400W CLEAR ED-28 METAL HALIDE, HORIZONTAL POSITION	cr1-h40-h5.ies	32400	0.72	460
■	D	7	PGL400Hx2xxPVL V	WALLPACK - PERIMALITER II GLASS REFLECTOR ALUMINUM ENCL. PRISMATIC BOROSIL. GLASS	400 W MET. HAL. ED 37	HP09115.ies	36000	0.72	460

STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone #2	+	2.3 fc	17.1 fc	0.0 fc	N / A	N / A

LUMINAIRE LOCATIONS											
No.	Label	X	Y	Z	MH	Orientation	Tilt	X	Aim Y	Z	
1	A	-289.1	402.7	30.0	30.0	0.0	0.0				
2	A	-174.0	404.1	30.0	30.0	0.0	0.0				
3	B	-389.5	326.4	30.0	30.0	0.0	0.0				
4	B	-390.8	220.2	30.0	30.0	0.0	0.0				
5	B	-381.4	124.9	30.0	30.0	0.0	0.0				
6	A	-80.3	308.7	30.0	30.0	90.0	0.0				
7	C	-70.1	422.2	30.0	30.0	0.0	0.0	-70.1	423.6	0.0	
8	A	39.5	413.9	30.0	30.0	0.0	0.0				
9	D	-296.4	252.8	16.0	16.0	0.0	0.0	-296.4	252.8	0.0	
10	D	-257.5	252.9	16.0	16.0	0.0	0.0	-257.5	252.9	0.0	
11	D	-219.7	253.1	16.0	16.0	0.0	0.0	-219.7	253.1	0.0	
12	D	-178.9	252.8	16.0	16.0	0.0	0.0	-178.9	252.8	0.0	
13	D	-124.0	253.0	16.0	16.0	0.0	0.0	-124.0	253.0	0.0	
14	D	-39.0	253.0	16.0	16.0	0.0	0.0	-39.0	253.0	0.0	
15	D	-318.6	253.2	16.0	16.0	0.0	0.0	-318.6	253.2	0.0	

Designer  
Brian Mendez

Date  
Jul 15 2013

Scale

Drawing No.





June 26, 2013

Mr. Brett Buchholz, P.E., Senior Associate  
Nowak & Fraus Engineers  
46777 Woodward Avenue  
Pontiac, Michigan 48342

**RE: Geotechnical Investigation  
Eberspaecher North America  
Parking Lot Improvements  
Novi, Michigan  
CTI Project No. 3132040026**

Dear Mr. Buchholz:

CTI and Associates, Inc. (CTI) has completed the geotechnical investigation services for the proposed parking lot improvement project at the Eberspaecher North America facility in Novi, Michigan. Our services were performed in general accordance with CTI Proposal No. 113PRO2040-118 dated May 22, 2012 as authorized by Mr. Brett Buchholz, P.E., Senior Associate of Nowak & Fraus Engineers on May 31, 2012.

The purpose of our investigation was to determine the general subsurface conditions at the site by performing a series of soil borings within the new proposed pavement and utility areas, and pavement cores in the existing pavement areas. The boring logs, which detail the general subsurface conditions encountered at each boring location, are attached to this report.

Our investigation determined that the site is generally underlain by clay fill material containing trace amounts of organics. In addition, it appears that coarse gravel was used in an effort to stabilize the subgrade soils during construction of the existing parking lot. Due to the presence of organics in the existing fill, care should be taken to construct the new pavement subgrade and base courses as detailed in this report. Recommendations regarding support of the proposed storm sewer are also presented in this report.

### **SITE AND PROJECT DESCRIPTION**

The project is located at 43700 Gen Mar Drive in Novi, Michigan. At the time of our field investigation, the existing pavement surface consisted of asphalt pavement, with the exception of the truck well area which was covered with concrete pavement. No information was provided regarding the age of the existing asphalt pavement or the existing storm sewer.

The proposed project includes an expansion of the existing parking areas and storm water improvements. The proposed storm water improvements include the installation of approximately 500 lineal feet of 24- to 48-inch concrete storm sewer pipe and new catch basins to accommodate the additional runoff associated with the new pavement areas. In addition, the existing asphalt pavement will be improved through a partial depth milling and repaving. The depth of the storm sewer has not yet been finalized. We anticipate that the storm sewer invert will be at a depth of 5 to 8 feet below the existing grade.

## INVESTIGATION PROCEDURES

Our field investigation consisted of performing four soil borings in the vicinity of the pavement expansion areas and three pavement cores through the existing asphalt pavement. The soil borings are designated as Borings B-1 through B-4 and the pavement cores are designated as C-5 through C-7. The boring and core locations were approved by Nowak & Fraus Engineers and marked in the field by CTI personnel. For reference purposes, the approximate locations of the soil borings and pavement cores are shown on the Boring Location Plan, included with this report. As requested, the borings were extended to depths of 7½ to 10 feet below the existing ground surface at each location. Determining the surface elevations at the soil boring locations was not included in our scope of work for this investigation.

The drilling operations were performed on June 12, 2013. The soil borings were drilled using a rotary drill rig with continuous flight 3¼-inch hollow-stem augers. Within each test boring, soil samples were obtained at 2½-foot intervals by the Standard Penetration Test Method (ASTM D1586), whereby a 2-inch outside diameter split barrel sampler is driven into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler is generally driven three successive 6-inch increments, with the number of blows for each increment being recorded. The number of blows required to advance the sampler the second and third 6-inch increment is termed the Standard Penetration Resistance, N. The soil samples recovered from the borings were sealed in glass jar containers and then transported to our laboratory for further classification, examination and testing.

At the core locations, pavement cores were obtained using a diamond tipped core barrel. A hand auger was used to determine the aggregate base thickness and subgrade soils present immediately below the aggregate base material. After completion of the drilling and coring operations, the boreholes were backfilled with excavated soil. Borings and cores performed through pavement were also patched with a cold asphalt patching material.

Soil and groundwater conditions observed in the test borings have been evaluated and are presented on the boring logs included with this report. To aid in understanding the data presented on the boring logs, "General Notes for Soil Classification," describing nomenclature used in soil descriptions, are also included with this report. The soil descriptions reported on the boring logs are based upon field logs prepared by experienced drillers, modified based on the results of laboratory testing and engineering review.

The laboratory testing program determined the general soil classification and physical properties. All laboratory testing was performed in general accordance with applicable ASTM test method standards. The laboratory testing consisted of visual soil classification of each collected sample, as well as natural moisture content determination and Loss-on-Ignition (organic) analysis of selected samples. The unconfined compressive strength of several cohesive samples was also estimated based on the resistance to a calibrated spring-loaded hand penetrometer.

The soil samples were visually classified in general accordance with the Unified Soil Classification System (USCS). The estimated USCS group symbol is shown in parentheses following the written description of the various natural soil strata on the boring logs. The results of all laboratory tests are indicated on the boring logs at the depths the samples were obtained and/or on the "Summary of Laboratory Test Results" included with this report.



## EXISTING PAVEMENT CONDITIONS

On June 12, 2013, Ms. Theresa Marsik, P.E., of CTI visited the site for the purpose of visually assessing the quality of the existing pavement. While no ponded water was observed at the time of the site visit, some areas of water staining were observed along the western edge of the western portion of the parking lot. Additionally, water staining was observed in an area of pavement distress located north of the existing truck well concrete pavement.

Slight raveling of the asphalt surface was observed across portions of the parking lot. Transverse and longitudinal cracking was present across portions of the entire parking lot, with cracks in the northern portion of the parking lot typically ranging from approximately ¼- to ¾-inch in width; most of the remaining cracks were less than ½-inch wide. Areas of alligator cracking were observed across the north and northwestern pavement areas.

Overall, the pavement appeared in fair condition. It should be noted that crack sealant had been applied to many of the observed pavement cracks.

## SUBSURFACE CONDITIONS

### Soil Conditions

At the location of Borings B-1 through B-3, approximately 2 to 6 inches of topsoil fill was encountered. At the location of Boring B-4, approximately 3 inches of asphalt pavement was encountered, underlain by coarse gravel fill to a depth of about 2 feet. Below the coarse gravel fill in B-4 and the surficial topsoil fill at the remaining boring locations, clay fill with varying amounts of organics was encountered to depths of about 2¼ to 6 feet below the existing ground surface. Laboratory testing indicated that the clay fill material encountered within B-1 and B-4 had an organic content in the range of approximately 2.7 to 3.5 percent. The clay fill encountered within B-3 was underlain by fine to coarse gravel fill to a depth of 3½ feet. Below the encountered fill materials, the subgrade soils typically consisted of clay with occasional sand seams and layers. Trace amounts of organics were observed within the clay encountered in B-2 below a depth of about 6 feet. The clay encountered below a depth of 6 feet within B-1 was identified as "possible fill." In the absence of foreign debris, it is difficult to distinguish between natural soils and clean fill soil within a relatively small diameter boring.

At the location of Cores C-5 through C-7, pavement sections consisting of approximately 3.2 to 4 inches of asphalt pavement with 7 to 8½ inches of aggregate base materials were encountered. The pavement sections were underlain by coarse gravel fill to the final explored depths of 1¼ to 1½ feet.

Standard Penetration Test (SPT) resistance (N) values recorded within the encountered native clay soils ranged from 3 to 25 blows per foot. The unconfined compressive strength of the tested clay samples ranged from approximately 1,000 pounds per square foot (psf) to more than 9,000 psf, indicating very stiff to hard consistencies. The samples generally appeared moist when examined in the laboratory. The moisture contents of the tested native clay samples ranged from approximately 16 to 22 percent.

An N-value of 10 blows per foot was recorded within a silty, clayey fine sand layer encountered

within B-3, indicating a medium dense relative density. The collected sample appeared moist when examined in the laboratory.

### **Groundwater Conditions**

The drillers looked for indications of groundwater seepage both during and upon completion of the drilling operations. Groundwater seepage was observed within Boring B-3 at a depth of 6¾ feet during drilling. Collapse of Boring B-3 upon removal of the augers precluded accurate measurement of the groundwater level following completion of the drilling operations. The remaining borings were reported as dry both during and after drilling.

Due to the inherent low permeability of the native clay soils, a long time would be required for the water level in an open borehole to stabilize with the long-term, hydrostatic groundwater level. It would be necessary to install and monitor a series of observation wells (piezometers) over an extended period of time to accurately determine the position of the long-term hydrostatic groundwater level in these soil conditions. The installation of groundwater monitoring wells was beyond the scope of our services for this project.

The groundwater conditions discussed herein and indicated on the soil boring logs represent those encountered at the time of the field investigation. The groundwater levels, including perched groundwater accumulations, should be expected to fluctuate seasonally, based on variations in precipitation, evaporation, surface run-off and other factors not evident at the time of our investigation. The actual groundwater levels at the time of construction may vary from those provided herein.

The above subsurface description is of a generalized nature intended to highlight the major stratification features and material characteristics. The individual boring logs should be reviewed for specific information at each location. The stratification depths shown on the test boring logs represent the soil conditions at the actual boring locations only.

Variations may occur between and/or beyond the boring locations. The presence and depth of fill or other organic soils is expected to be random and may extend to greater depths in some areas than reported herein. If significant variations in the soil conditions are discovered during construction, it should be immediately brought to the attention of CTI, before removal. An evaluation should then be made in the field by a CTI representative to determine if it is classified as topsoil, fill or highly organic and requires removal.

## **ANALYSIS AND RECOMMENDATIONS**

At the time this report was prepared, the overall project was in the planning and design stage. The following recommendations have been developed based on the previously assumed/described project characteristics and subsurface conditions. If there is any significant change in the project characteristics from those presented earlier, a review should be made by CTI to determine if any modifications in the evaluations and recommendations included in this report will be required.

As stated previously, the proposed project includes the installation of approximately 500 lineal feet of 24- to 48-inch diameter concrete storm sewer pipe and new catch basins to accommodate the additional runoff associated with the new pavement areas. In addition, the existing asphalt pavement will be improved through a partial depth milling and repaving. The



depth of the storm sewer has not yet been finalized. We anticipate that the storm sewer invert will be at a depth of 5 to 8 feet below the existing grade. Based on the available soil and project information, the encountered subgrade soils appear to be suitable for installation of the proposed utilities using open-cut excavation methods.

### **Utility Installation Recommendations**

In general, the placement of utility lines within the soil profile does not greatly increase the load on the underlying soil. However, it is important that the utility pipe be placed on a firm and stable subgrade, along the design alignment and at the proper grade to prevent the pipe from becoming over-stressed in hoop compression or bending.

Based on the soil conditions encountered at the boring locations, the soil at the anticipated storm sewer invert elevation is anticipated to be medium stiff to hard clay and/or clay fill, with isolated areas of medium dense silty, clayey fine sand. Based on the test borings, the soils encountered at the proposed invert elevation should generally provide adequate support for the proposed storm sewer, provided the soils are free of unsuitable soils and stable at the time of construction.

All excavations should comply with MIOSHA guidelines, as described in this report. After excavating to the proposed utility invert elevation, the exposed soils should be thoroughly inspected to verify that they are in a stable condition. We recommend that the contractor verify the actual groundwater conditions at the time of construction. Depending on the condition of the exposed subgrade soils, it may be necessary to stabilize the soils with a layer of crushed stone prior to placing pipe bedding material.

In general, sufficient bedding material should be placed and compacted below the utility pipes. Unless the design requirements are otherwise, we recommend a minimum of 6 inches of bedding material be placed below the utility pipe invert elevation. The bedding materials shall be placed in the trench bottom over stable subgrade soils and extend up and around the utility lines, and be compacted in accordance with the project specifications. Granular backfill around the utility pipes should be tamped in place evenly to avoid imparting excessive and/or unequal pressure on the pipe and to avoid disturbance of the pipe and joints.

Trenches and excavations shall be backfilled as soon as practical after the utility lines have been properly installed. The engineered backfill soils should be placed as described in this report. Since the proposed utilities will be located within the influence of the existing parking lot, CTI recommends that the excavations be backfilled with MDOT Class II material. In landscaped areas, natural backfill materials meeting the requirements of engineered fill may be used as backfill.

### **Utility Excavations**

In general, all excavations should be safely sheeted, shored, sloped or braced in accordance with OSHA guidelines. Construction traffic, stockpiles of soil and construction materials should be kept away from the edges of the excavations a lateral distance at least 1.5 times the depth of the excavation.

Utility excavations are generally expected to consist of open-cut methods. In this regard, the utility trench sidewalls should be adequately braced or sloped back to prevent sloughing and caving. In any case, appropriate measures will be required to maintain the stability of excavation sidewalls. The required measures will depend on the depth and width of excavations and groundwater conditions at specific locations. The excavation support system

for utilities could consist of internally braced sheeting, trench boxes or sliding trench shields. If material is stored or equipment is operated near an excavation, stronger shoring must be used to resist the extra pressure due to the superimposed loads.

The angle of the excavation side slopes should be decided based on the soil type and unconfined compressive strength of the excavated soil per MIOSHA requirements. For excavations greater than 5 feet and less than 20 feet in depth, MIOSHA has different sloping requirements for a variety of soil types. The table presented below provides a summary of the requirements for informational purposes only. Prior to designing or constructing a stable and safe excavation, the contractor must refer to MIOSHA standards.

<b>Table 1: Maximum Allowable Angle of Repose for the Side of an Excavation</b>			
<b>Soil Type</b>	<b>Maximum Allowable Excavation Side Slope</b>		<b>Maximum Angle of Repose (Degrees)</b>
	<b>Horizontal</b>	<b>Vertical</b>	
Clay with minimum unconfined compressive strength of 2.5 tsf	1	2	63
Clay with minimum unconfined compressive strength of 1.5 tsf	2	3	56
Clay with minimum unconfined compressive strength of 1.0 tsf; Dry granular soils; Dry sand and clay mixtures	1	1	45
Granular soil with wet clay or silt seams; Clay with a minimum unconfined compressive strength of 1.0 tsf that contains running sand seams	1½	1	34
Saturated granular soil; Clay with an unconfined compressive strength less than 1.0 tsf	2	1	26
Running/sloughing soil (sand or clay)	3	1	18

The contractor is solely responsible for designing and constructing stable and safe temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor should be aware that slope height, slope inclination and excavation depth should not exceed the specified local, state and federal regulations.

**Backfill and Engineered Fill Placement**

Any fill placed below the proposed pavement area should be an approved material that is free of topsoil, organics, frozen soil or any other unsuitable material. If granular soils containing greater than 12 percent fines (i.e., silt or clay) are used as fill, close moisture content control will be required to achieve the recommended degree of compaction. Any fill materials encountered at locations other than the boring locations can be further evaluated during site preparation to determine if some of the soils can be reused as engineered fill.



The engineered fill should be placed in uniform horizontal layers not exceeding 8 to 12 inches in loose thickness for clean granular soils and 4 to 6 inches in loose thickness for clay soils (or clayey granular soils exhibiting cohesive characteristics), depending on the type and size of compaction equipment used. The lift thickness for sands that have an appreciable amount of fines should be decreased accordingly. The engineered fill should be compacted to achieve a density of not less than 95 percent of the maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D1557). Also, the upper 12 inches of the subgrade soils should be compacted, prior to any fill placement, to achieve a density of not less than 95 percent of the maximum dry density as determined by the Modified Proctor test. The as-compacted moisture content of the engineered fill should be within 2 to 3 percent of the optimum moisture content for the soil. The placement and testing of engineered fill should be observed and properly documented in the field by CTI.

We recommend that the contract specifications include provisions for moisture conditioning of any on-site soils that are to be used as engineered fill. Some of the natural soils may require moisture conditioning to allow for proper compaction. The success of aeration and drying of clay soils will be dependent on the time of year, the prevailing weather conditions and the contractor's effort. During cold and/or wet periods of the year, the saturated or disturbed clay soils will be more difficult to dry. In this case, the contractor may have to use drier on-site soils or imported sand.

If site grading or other construction activity is planned during cold weather, it is recommended that proper winter construction practices are followed. All snow and ice should be removed from cut and fill areas prior to grading. Frozen materials should not be used as engineered fill and no fill or pavement should be placed on soils that are frozen or contain frozen material.

### **Site Preparation for Pavement Support – Existing Unpaved Areas**

At the start of earthwork operations, topsoil and any other deleterious materials are to be stripped from the new pavement areas. The thickness of the existing topsoil and near surface fill layer (where present) should be expected to vary across the site. The depth of unsuitable soil removal should be determined by a representative of CTI at the time of stripping and rough grading.

Proper evaluation and conditioning (if necessary) of the subgrade should be performed prior to any engineered fill placement. After stripping and excavating to the design subgrade level (i.e. the bottom of the proposed aggregate base course), and after removing any unsuitable materials and underground objects, the rough graded pavement area should be proofrolled with a loaded tandem-axle dump truck or similar rubber-tired vehicle. The purpose of proofrolling operations is to locate areas of excessively loose, soft or weak subgrade soils which may be present at the time of construction. Soils that are observed to rut or deflect excessively during proofrolling should be stabilized by conventional methods such as disking, drying and re-compacting.

If it is not feasible to dry and re-compact the unsuitable subgrade soils due to unfavorable weather conditions, scheduling, etc., it may be necessary to remove such soils and replace them with engineered fill. The thickness of the undercut will depend on the severity of the unstable soils encountered at specific locations. A layer of crushed aggregate may be necessary to stabilize the subgrade before placement of the selected engineered fill material. The use of a geotextile separator below the crushed aggregate layer should also be considered to provide additional subgrade stability and pavement durability.

It should be noted that the actual locations and depths of any undercutting and/or stabilization should be established in the field at the time of construction. The extent to which yielding subgrades may be a problem is difficult to predict beforehand since it is dependent upon several factors including seasonal conditions, precipitation, construction practices, etc.

Once the site has been evaluated, proofrolled and/or stabilized, the inspected area should not be allowed to remain exposed to wet conditions more than one day or subjected to construction traffic, otherwise a re-evaluation should be made. The site earthwork operations should be carried out during a period of dry weather, if possible. This should minimize potential subgrade problems, although they may not be eliminated. The severity of subgrade instability will depend to a high degree on the weather conditions prevailing during construction.

### **Site Preparation for Pavement Support – Existing Pavement Areas**

The pavement areas, in general, were observed to be in fair condition. Isolated areas of significant pavement distress were observed in the north and northwest portions of the existing pavement area. In addition, the remaining portions of the parking lot appear to be exhibiting initial signs of pavement fatigue and cracking.

The pavement displays random cracking, slightly raveled aggregate, and localized alligator cracking (north and northwest portions of the parking lot, as discussed via telephone on June 25, 2013). In the areas of the observed alligator cracking, full-depth pavement reconstruction is required.

The recommended full-depth asphalt pavement reconstruction would consist of removing the asphaltic pavement and existing aggregate base materials, then scarifying and re-compacting the resulting subgrade material to a firm and unyielding condition. Areas that pump or exhibit unstable conditions shall be removed and replaced or reworked until a firm and unyielding condition exists. Following reworking of the subgrade material, the design thickness of aggregate base material should be placed and compacted, and the edges of the remaining pavement shall be saw cut in a straight line. The edges of the cut pavement should be “battered” with liquid asphalt and a new minimum 4 inch thick asphaltic surface course constructed. The new asphalt shall match the grades of the remaining asphalt and shall provide “positive” site drainage to the stormwater outlets.

Where full-depth pavement reconstruction is not recommended, we anticipate the upper 1 to 2 inches of the existing pavement will be milled and removed. Following the milling procedures, the remaining pavement surface must be thoroughly swept and cleaned. A pavement survey should then be performed to identify the presence of any remaining pavement cracks. All longitudinal, transverse and random cracks should be professionally cleaned, with all soil and vegetation removed. Cracks greater than 1 inch in width should be patched with hot-mix asphalt for the full length of the crack. Cracks wider than ½ inch but less than 1 inch should be sealed with a hot applied elastomeric-type crack sealant. Cracks that are less than ½ inch wide should be repaired by the application of a seal coat.

Following the repairs as outlined, an asphalt overlay should be applied to the entire pavement area. We recommend a minimum overlay thickness of 1½ inches consisting of MDOT Type 36A asphaltic mix to improve the serviceability of the pavement structure. It should be noted that, even with the repair measures outlined herein, reflective cracking may occur.



## **Pavement Design Considerations**

The subgrade soils for support of the pavement sections should be prepared in accordance with the recommendations of this report. As discussed previously, we recommend the subgrade be subjected to a comprehensive proofrolling and evaluation program to determine the overall suitability at the time of construction. The areas requiring subgrade improvement should be determined in the field by CTI by proper inspection and evaluation at the time of construction. Provisions should be established in the construction documents for this purpose.

The long-term performance of the pavement will typically be a function of the quality of the subgrade soil at the time of construction along with the quality, thickness and strength of the overall pavement section. The most critical portion of the subgrade is the 3 feet immediately beneath the pavement section, which provides the primary strength needed for pavement section support. Uncontrolled fill materials present within the upper 2 to 3 feet of the pavement subgrade can be detrimental if the design does not account for this substandard soil condition, especially during the spring freeze-thaw cycles.

The pavement system should be properly drained to reduce the potential for weakening the subgrade. Provisions should be made to prevent surface run-off water from accumulating within the aggregate base course of the pavement. The pavement and underlying subgrade should be suitably crowned or sloped to promote effective surface drainage and prevent water ponding. We anticipate that the pavement surface will drain via a storm sewer system. Due to the presence of silt and clay in the granular subgrade soils, a system of finger drains or stub drains should be placed around all catch basins within the pavement areas to minimize the accumulation of water in the frost susceptible subgrade soils. These under drains should be installed below the aggregate base layer of the pavement system and be properly protected with free-draining coarse aggregate material and filter fabric.

All pavements require regular maintenance and occasional repairs to keep them in a serviceable condition. Of particular value is timely sealing of joints and cracks, which if left unrepaired, can serve to permit water to enter the pavement section and cause rapid deterioration of the pavement during freeze-thaw cycles. The need for such routine maintenance and repair is not necessarily indicative of premature pavement failure. However, if appropriate maintenance and repairs are not performed on a timely basis, the serviceable life of the pavement can be reduced significantly.

## **Preliminary Pavement Design Analysis**

A detailed pavement design was beyond the scope of our study. However, we have developed preliminary pavement designs based on the assumption that the subgrade will be prepared as recommended in this report. No information regarding anticipated traffic loading was provided to CTI.

Our analysis is based on the 1993 American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures. Based on estimated traffic loading and a 20-year design period, we have projected a design parameter of 150,000 Equivalent 18-kip Single Axle Loads (ESALs) for medium duty pavement. Other design parameters assumed for our pavement analysis include a terminal serviceability of 2.5, an initial serviceability of 4.5, reliability (R) of 95% and a standard deviation ( $S_0$ ) of 0.49. Should any of

these traffic assumptions be found incorrect, CTI should be contacted and requested to re-evaluate the pavement design recommendations based on the revised traffic data.

Based on the anticipated pavement subgrade soils, we have assigned a subgrade CBR of 3, a resilient modulus, ( $M_r$ ), of 5,000 pounds per square inch (psi) and a modulus of subgrade reaction, ( $k$ ), of 100 pounds per cubic inch (pci) for this site. A minimum Structural Number (SN) value of 3.11 was determined for the medium duty pavement using the criteria listed above.

The following table summarizes the minimum flexible pavement cross sections recommended for the proposed site:

<b>Table 2: Medium Duty Flexible Pavement Section</b>				
<b>Layer</b>	<b>Material</b>	<b>Thickness (inches)</b>	<b>Structural Layer Coefficient</b>	<b>Structural Number (SN)</b>
Bituminous Surface	MDOT 36A	1.5	0.44	0.66
Bituminous Leveling	MDOT 3C	2.5	0.42	1.05
Aggregate Base	MDOT 21AA crushed limestone	10.0	0.14	1.40
			<b>Total SN =</b>	<b>3.11</b>

We have formulated our flexible pavement design recommendations with the assumption that “staged” construction is not planned. It should be recognized that if the leveling course of the pavement section will be used as a construction platform, the design of the pavement should account for the additional loading of construction traffic. If staged construction is planned for the project, the design thickness of the asphalt leveling course should be increased by 0.5 inch (at a minimum) to reflect the damage which occurs during construction. Furthermore, distress caused by construction traffic should be repaired prior to placement of the wearing course.

Other pavement design sections, from those presented herein, which provide equivalent structural capacity can also be considered. Crushed concrete, recycled asphalt millings or MDOT 22A should not be substituted for the recommended aggregate base material without at least a 25 percent increase of the thickness of the aggregate base to account for the structural differences of the materials.

Actual pavement section thickness should be provided by the design civil engineer based on traffic loads and volume and the owners design life requirements. All pavement materials and procedures should conform to standard MDOT, Oakland County Road Commission or appropriate local municipal agency requirements.

### **GENERAL COMMENTS**

This limited geotechnical investigation report has been prepared to assist in the planning, design and construction of the proposed parking lot improvements at the Eberspaecher North America facility in Novi, Michigan. The evaluations and recommendations discussed in this report are based on the soil conditions encountered in the test borings performed at the

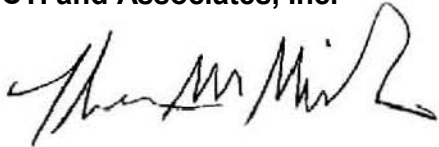


approximate locations indicated on the attached Boring Location Plan and on the date indicated on the boring logs.

In order to permit correlation between the soil boring data and the actual soil conditions encountered during construction, it is recommended that a continuous inspection and review of soil related phases of construction work be carried out. We recommend the subgrade preparation activities, engineered fill placement, and pavement construction be observed by a CTI representative.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report or if we can be of further assistance, such as providing field monitoring and quality control inspection services during construction, please contact our office.

Sincerely,  
**CTI and Associates, Inc.**

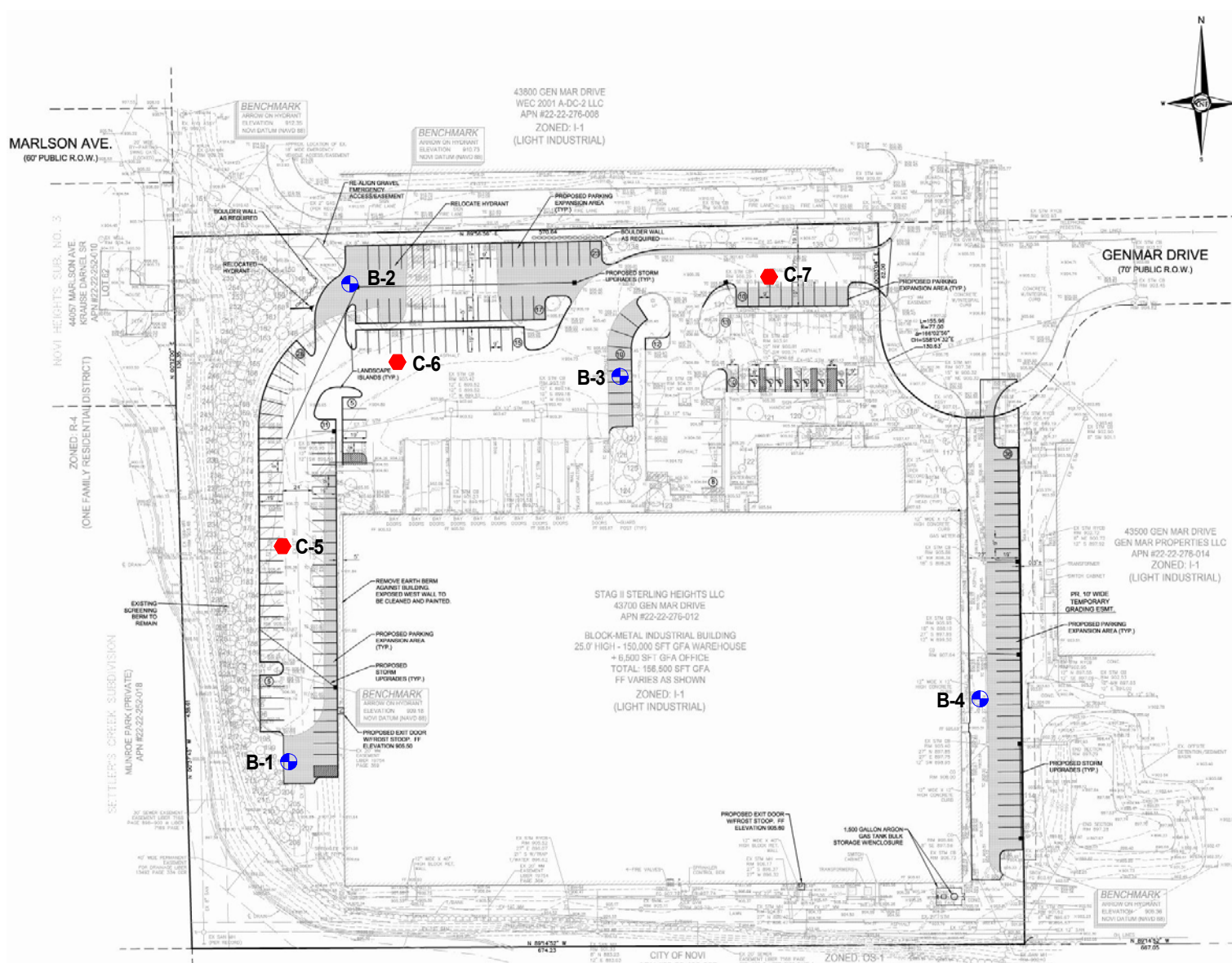


Theresa M. Marsik, P.E., LEED AP  
Senior Project Engineer



Kevin Foye, Ph.D., P.E.  
Project Engineer

Attachments: Boring Location Plan  
Boring Logs (B-1 through B-4 and C-5 through C-7)  
Summary of Laboratory Test Results  
General Notes for Soil Classification



SCALE:	As Shown
PROJECT NUMBER:	31520-4026
FILE NAME:	BORINGPLAN.CAD
DATE:	6-12-13

**BORING LOCATION PLAN**

EBERSPAECHER NORTH AMERICA PARKING LOT IMPROVEMENTS  
43700 GEN MAR DRIVE  
NOVI, MICHIGAN

PLATE:  
I



NOTE: Image reproduced from "Conceptual Site Plan" prepared by Nowak & Fraus Engineers.

**LEGEND:**

- ⊕ - PROPOSED BORING LOCATION
- - PROPOSED CORE LOCATION





**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		2 inches of dark brown moist TOPSOIL FILL												
2.5		Brown moist CLAY with silt; traces of gravel, sand and organics; and occasional silt partings - (FILL)	SS 1	100	3-5-6 (11)									
5.0		Grayish-brown moist CLAY with traces of gravel, sand and organics - (FILL) Loss-on-Ignition (Organic Content) = 2.7%	SS 2	100	3-6-7 (13)									
7.5		Grayish-brown moist medium stiff CLAY with traces of gravel and sand and occasional tree roots - (CL/Possible FILL)	SS 3	100	2-2-1 (3)	1.0								
10.0			SS 4	100	0-0-3 (3)	0.5								

Bottom of borehole at 10.0 feet.



CTI and Associates Inc

**BORING NUMBER B-2**

PAGE 1 OF 1

**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲					
								15	30	45	60		
0.0		6 inches of dark brown moist TOPSOIL FILL											
2.5		Brown slightly moist hard CLAY with silt, some sand, trace of gravel, and frequent silt partings - (FILL)	SS 1	100	10-14-19 (33)			8					
5.0		Brown moist medium stiff CLAY with silt and trace of gravel and sand - (CL)	SS 2	100	3-4-3 (7)	0.75		22					
7.5		Mottled brown and gray moist stiff CLAY with silt and traces of gravel, sand and organics - (CL)	SS 3	100	4-4-7 (11)	1.0		16					

Bottom of borehole at 7.5 feet.





**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** 6' 9"  
**AFTER DRILLING** 6' 9"  
**COLLAPSE DEPTH** 6' 9"

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		3 inches of dark brown moist TOPSOIL FILL												
		Brown slightly moist CLAY with silt, some sand and trace of gravel - (FILL)												
2.5		Gray moist fine to coarse crushed limestone GRAVEL - (FILL)	SS 1	100	5-9-13 (22)									
5.0		Brown moist medium dense silty, clayey fine SAND - (SC-SM)	SS 2	100	3-4-6 (10)		18							
		Brown moist stiff CLAY with silt, some sand and trace of gravel - (CL)												
		Brown wet medium dense silty fine SAND with occasional gravel seams - (SM)	SS 3	100	6-14-11 (25)	4.5+	14							
7.5		Brown moist hard CLAY with silt and trace of sand - (CL)												

Bottom of borehole at 7.5 feet.



**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** Rau Drilling  
**DRILLING METHOD** 3-1/4 inch Hollow Stem Auger  
**LOGGED BY** A. Rau **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		3 inches of ASPHALT PAVEMENT												
		Gray moist coarse 1" x 3" GRAVEL - (FILL)												
2.5		Dark brown moist CLAY with silt, some sand and traces of gravel and organics - (FILL)	SS 1	100	4-7-5 (12)									
		Loss-on-Ignition (Organic Content) = 3.5%	SS 2	100	4-3-4 (7)		18							
5.0		Mottled brown and gray moist hard CLAY with silt, traces of gravel and sand and occasional silt partings - (CL)	SS 3	100	3-4-6 (10)	4.5+	15							

Bottom of borehole at 7.5 feet.





CTI and Associates Inc

**CORE NUMBER C-5**

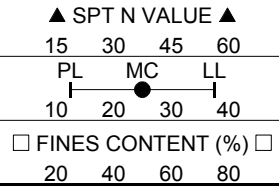
PAGE 1 OF 1

**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** CTI and Associates, Inc.  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** D. Cook **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		4 inches of ASPHALT PAVEMENT												
		7 inches of fine to coarse crushed limestone GRAVEL - (FILL)												
		6.5 inches of coarse 1" x 3" GRAVEL - (FILL)												

Bottom of borehole at 1.5 feet.





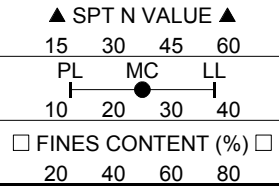
CTI and Associates Inc

**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** CTI and Associates, Inc.  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** D. Cook **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0		3.5 inches of ASPHALT PAVEMENT												
		8 inches of fine to coarse crushed limestone GRAVEL - (FILL)												
		3.5 inches of coarse 1" x 3" GRAVEL - (FILL)												

Bottom of borehole at 1.3 feet.







CTI and Associates Inc

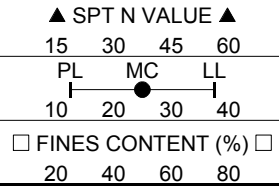
**CORE NUMBER C-7**

PAGE 1 OF 1

**CLIENT** Nowak & Fraus Engineers  
**PROJECT NUMBER** 3132040026  
**DATE STARTED** 6/12/13 **COMPLETED** 6/12/13  
**DRILLING CONTRACTOR** CTI and Associates, Inc.  
**DRILLING METHOD** Hand Auger  
**LOGGED BY** D. Cook **CHECKED BY** T. Marsik  
**NOTES** Boring backfilled with auger cuttings and patched with cold patch

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements  
**PROJECT LOCATION** Novi, Michigan  
**GROUND ELEVATION** N/A  
**GROUND WATER LEVELS:**  
**DURING DRILLING** None  
**AFTER DRILLING** None  
**COLLAPSE DEPTH** None

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲						
								15	30	45	60			
0.0														
		3.2 inches of ASPHALT PAVEMENT												
		8.5 inches of fine to coarse crushed limestone GRAVEL - (FILL)												
		6.3 inches of coarse 1" x 3" GRAVEL - (FILL)												



Bottom of borehole at 1.5 feet.



CTI and Associates Inc

# SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 1

**CLIENT** Nowak & Fraus Engineers

**PROJECT NAME** Eberspaecher North America Parking Lot Improvements

**PROJECT NUMBER** 3132040026

**PROJECT LOCATION** Novi, Michigan

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Unc. Strength (tsf)	Loss-on-Ignition (%)
B-1	2.5						FILL	12			
B-1	5.0						FILL	15			2.7
B-1	7.5						CL	17		1.0	
B-1	10.0						CL	21		0.5	
B-2	2.5						FILL	8			
B-2	5.0						CL	22		0.75	
B-2	7.5						CL	16		1.0	
B-3	5.0						SC-SM	18			
B-3	7.5						CL	14		4.5+	
B-4	5.0						FILL	18			3.5
B-4	7.5						CL	15		4.5+	





GENERAL NOTES FOR SOIL CLASSIFICATION

**STANDARD PENETRATION TEST:** Driving a 2” outside diameter, 1-3/8” inside diameter sampler a distance of 18 inches into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. The sampler is driven three successive 6-inch increments. The number of blows required for the last 12 inches of penetration is termed the Standard Penetration Resistance (N).

**GROUNDWATER:** Observations are made at the times indicated on logs. Porosity of soil strata, weather conditions and site topography may cause changes in the water levels.

**SOIL CLASSIFICATION PROCEDURE:** Classification on the logs is generally made by visual inspection. For fine-grained soils (silt, clay and combinations thereof), the classification is primarily based upon plasticity. For coarse-grained soils (sand and gravel), the classification is based upon particle size distribution. Minor soil constituents are reported as “trace” (0-5%), “some” (5-12%) and “with” (12-29%). Where the minor constituents are in excess of 29%, an adjective is used preceding the major constituent name (i.e. for sands containing 35% silt, the soil is classified as silty sand).

PARTICLE SIZE DISTRIBUTION

- Boulders - Greater than 12 inches average diameter
- Cobbles - 3 inches to 12 inches
- Gravel –
  - Coarse - ¾ inches to 3 inches
  - Fine - No. 4 (4.75mm) to ¾ inches
- Sand –
  - Coarse - No. 10 (2.00mm) to No. 4 (4.75mm)
  - Medium - No. 40 (0.425mm) to No. 10 (2.00mm)
  - Fine - No. 200 (0.075mm) to No. 40 (0.425mm)
- Silt and Clay - Less than 0.075mm, Classification based upon plasticity. Generally silt particles size ranges from 0.005mm to 0.075mm and clay particle size is less than 0.005mm.

CONSISTENCY OF FINE GRAINED SOILS IN TERMS OF UNCONFINED COMPRESSIVE STRENGTH AND N-VALUES

<u>Consistency</u>	<u>Unconfined Compressive Strength (Tons per square foot)</u>	<u>Approximate range of N</u>
Very Soft	Less than 0.25	0 - 2
Soft	0.25 to 0.5	3 - 4
Medium Stiff	0.5 to 1.0	5 - 8
Stiff	1.0 to 2.0	9 - 15
Very Stiff	2.0 to 4.0	16 - 30
Hard	over 4.0	over 31

RELATIVE DENSITY OF COARSE GRAINED SOILS ACCORDING TO N-VALUES

<u>Density Classification</u>	<u>Relative Density, %</u>	<u>Approximate Range of N</u>
Very Loose	0 – 15	0 – 4
Loose	16 – 35	5 – 10
Medium Dense	36 - 65	11 - 30
Dense	66 - 85	31 – 50
Very Dense	86 – 100	over 50

Relative density of cohesionless soils is based upon an evaluation of the Standard Penetration Resistance (N), modified as required for overburden pressure.



CIVIL ENGINEERS

LAND SURVEYORS

LAND PLANNERS

August 20, 2013

Ms. Kristen Kapelanski  
Planner  
City of Novi  
45175 W. Ten Mile Road  
Novi, MI 48375

Re: Eberspaecher North America, Inc.  
Parking Rehabilitation Project  
NFE # H441  
City of Novi Reference No. JSP 13-60

Dear Ms. Kapelanski

On behalf of our client, Eberspaecher North America, Inc. (ENA), we are pleased that the preliminary site plan for the proposed parking lot expansion project at 43700 Gen Mar Drive has been recommended for Planning Commission approval. The following letter serves to address comments per the Planning Review letter dated August 13th, 2013 that will be implemented on the forthcoming Final Site Plan drawings.

**Planning Review Letter and Summary Chart (August 13th, 2013)**

Items that require clarification or will require attention during the final site plan stage are addressed below.

Use (Article 19)

1. The proposed project will not alter the overall use of the building. The current building is used for light automobile part manufacturing, as well as office space for support design and engineering staff.

Building Height (Section 2400 & 2503.2.E)

2. This project does not include any proposed changes to the building facade.

3. Parking Setback (Section 2400)

We have calculated that the existing parking area within the front yard setback is approximately 33% of the total front yard setback area post development. The proposed project involves only minor curb replacement of the existing main drive aisle to the site within the front setback. We will provide these

NOWAK & FRAUS ENGINEERS



calculations on the final site plan drawings. We understand that the staff supports a waiver for the berm or wall requirement since there is no proposed parking additions within the front setback.

Number of Parking Spaces (Section 2505)

4. We have submitted a variance request to the Zoning Board of Appeals (ZBA) to provide the required number of parking spaces based on the number of employees, rather than the useable floor space area. The requested variance would effectively reduce the required spaces from 223 to 185. We note that the final site plan will reflect the inclusion of a 1,234 square foot mezzanine addition. The proposed floor space addition has increased the requested reduction of parking by two stalls from the calculations shown on the preliminary site plan drawings, which show the required stalls as 221 based on useable floor space area. We understand the ZBA has received all necessary documentation, including the changes based on the mezzanine addition, and that the request will be discussed at the September 2013 ZBA meeting.

Loading Spaces (Section 2507 and Sec. 22-100 City Code)

5. A variance has been requested to the ZBA to allow loading and unloading operations to occur between 8 p.m. and 7 a.m. We understand that a City Council variance is also required, and the Owner will be submitting a separate letter requesting the City Council variance to the Community Development Department.

Accessory Structure Setback - Dumpster (Section 2503)

6. The existing trash dumpster/compactor will be maintained. The final site plan drawings will clearly identify that there are not any new dumpsters or dumpster relocations proposed as part of this project.

Outdoor Storage Tank (Section 1905.b(2))

7. A variance to allow for the over-sized gas tank and to allow for modification to the screening requirements is being requested through the ZBA. We understand the ZBA has received all necessary documentation, and that the request will be discussed at the September ZBA meeting.

Exterior Lighting (Section 2511)

8. See the Lighting review Summary Chart response comments below.

**Lighting Review Summary Chart**

Lighting Plan (Section 2511.2.a.2)

1. The manufacturers specifications and hours of operation for all proposed lighting fixtures will be provided on the updated photometric plan that will be submitted with the final site plan drawings.

Required Conditions (Section 2511.2.a)

2. The proposed fixtures will be 25 feet in height. A note stating the fixture height will be included on the updated photometric plan that will be submitted with the final site plan drawings.

Required Notes (Section 2511.3.b)

3. The requested notes will be included on the updated photometric plan that will be submitted with the final site plan drawings.

Required Conditions (Section 2511.3.e)

4. The requested lighting calculations will be included on the updated photometric plan that will be submitted with the final site plan drawings.

Maximum Illumination Adjacent to Non-Residential (Section 2511.3.k)

5. The requested light levels at the property line will be provided on the updated photometric plan that will be submitted with the final site plan drawings.

Cut-Off Angles (Section 2511.3.1(2))

6. The manufacturers specifications showing the required cut-off angles will be provided on the updated photometric plan that will be submitted with the final site plan drawings.

**Engineering Review (August 13th, 2013)**

General

We have read through the comments received from Mr. Adam Wayne, and understand that approval of the preliminary site plan has been recommended. We acknowledge that minor scope of work modifications will be required for the final site plan submittal. Additionally, we understand that the design drawings will require further development and greater detail for the final site plan and subsequent submittals.

Administrative

We will provide a detailed letter to highlight the drawing changes with the final site plan submittal, and will also provide the itemized cost estimate for the civil site work items that has been requested. The Owner acknowledges the additional administrative requirements, following approvals of the final site plan stamping set and prior to construction.

**Preliminary Landscape Review (August 14th, 2013)**

We understand that the project has been recommended for approval based on the preliminary site plan. We acknowledge that the planning staff supports waivers of landscape berm requirements within the front yard setback based on the existing site conditions.

**Fire Marshall Review (July 25th, 2013)**

1. We understand that previous comments received from the Fire Marshall during the pre-application review have been satisfactorily addressed on the preliminary site plan drawings, and that the preliminary site plan has been recommended for approval.

**Clear Zoning, Inc. Traffic Review (August 12th, 2013)**

General

We understand that the project has been recommended for approval based on the preliminary site plan, and we acknowledge that several noted items will have to be addressed on the final site plan drawings.

Trip Generation and Traffic Impact Study

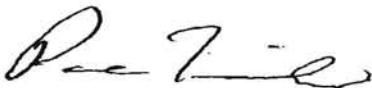
There are 120 employees proposed during the largest shift, not the 150 employees as stated in the review letter. The current maximum number of employees is approximately 60, therefore, the proposed parking expansion would potentially result in an increase of 60 employees.

Circulation and Parking

We acknowledge that several minor geometrical and pavement marking revisions will be required on the final site plan drawings to address comments regarding circulation and parking. Additionally, the requested specifications and/or details for signs and pavement markings will be provided on the final site plan drawings.

Please review the attached documentation, and feel free to contact us if you have questions or require further documentation.

Sincerely,



Paul Tulikangas, P.E.  
Project Engineer



Brett Buchholz, P.E.  
Senior Associate



Ms. Kristen Kapelanski  
City of Novi  
RE: Eberspaecher - 43700 Gen Mar (JSP 13-60)  
8/20/2013  
Page 5

**Attachments:**

**CD containing electronic files of the following:**

Preliminary Site Plan Drawings (Dated 07-17-13)  
Color Site Plan Rendering  
Noise Study (Kolano & Saha Engineers, Inc.)  
Soil Boring Report (CTI & Associates, Inc.)  
Floor Plan w/ mezzanine Addition (Pucci & Vollmar Architect, PC)  
Photometric Plan (MLS East)