

ANDERSON

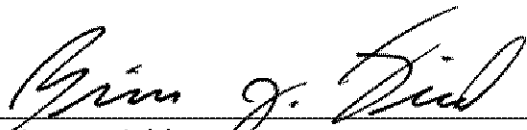
Storm Water Management Plan  
Calculations & Summaries

**Gyropolis Addition / Remodel  
Bloomington, MN**

Project No. 16318

September 28, 2022

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

  
\_\_\_\_\_  
Brian J. Field, P.E.      Reg. No. 57224

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## Project Overview

The construction of two new addition and the redevelopment of two parcels are proposed for the Gyropolis Restaurant located at 2325 W 90<sup>th</sup> ST in Bloomington MN. The Owner on the Gyropolis Restaurant has purchased the Lot to the west and is looking to expand the existing building and reconstruct the parking lot. The west parcel has an area of 0.31 acres and the east parcel with an area of 0.43 acres. These two parcels will be platted into one lot with a total area of 0.74 acres.

The project will include the construction of a 685 SF addition to the west elevation of the existing building and a 1,725 SF addition to the east elevation. An outdoor patio area and drive thru lane to the south is proposed as part of the redevelopment, and as such the Owner will obtain an access easement from the neighbor to the south for the drive thru access. Construction is planned to begin in the Spring of 2023 and completed in Summer of 2023.

## Existing Site Conditions

The property is bounded by Penn Ave S to the east, 90<sup>th</sup> ST W to the North and a Burger King to the South. The entire site surface drains to the north and east towards the intersection of Penn and 90<sup>th</sup> where it is collected in the local storm sewer system at a low point. An existing gas station currently resides on the east parcel and will be demolished as part of the project.

The nearly 31-acre property is bounded by Interstate 94 to the west, CSAH 13 to the east, the FedEx Distribution Building to the north, and the Clam Corporation to the south. Generally, the site surface drains to the north towards the existing wetland onsite with small portions flowing directly to the existing Clam pond and the Brockton Ln N ditch. The existing wetland has an overflow structure near the northeast corner of the site where water exits. Water then follows the Brockton Ln N ditch to the north and eventually discharges into Grass Lake. The existing drainage pattern can be seen in **Exhibit A: Existing Drainage Map** within the appendices of this report.

## Site History

Currently, a gas station/convenience store exists on Parcel 9000 or the east parcel. This gas station has been closed since 2008 and is abandoned. This property identified as Premium Stop is listed as a LUST site and was reported in 1990 during the removal and replacement of three USTs on the property. The site was mitigated, and the LUST was closed by the MPCA in 1990. More recently, the remaining USTs were removed in 2011 with no leaking noted. A full Phase I Environmental Site Assessment was completed in 2013 by Landmark Environmental LLC and has been included as part of this submittal. The following documentation has been included as part of the appendix of this report:

- **Exhibit H: LUST Closure Letter**
- **Exhibit I: Tank Removal Letter**

## Soils

Soil testing for the project is currently pending. Four to six test borings are to be performed on site within the building footprint and within the proposed infiltration BMP. In 1991, EnecoTech Environmental Consultants performed four soil borings near the northeast corner of the site and is in direct proximity to the proposed infiltration BMP. Results indicate that SP sand was found at depths of 5-30+ feet below grade with a water table near 40' in depth. Based off of this information and per the Minnesota Stormwater Manual, a design infiltration rate of 0.80 in/hr is to be used for the SP type soil or Hydraulic soil group 'A'. The four soil boring results can be found within **Exhibit G: Historical Soil Borings** within the appendix of this report.

## Proposed Site Conditions

The proposed construction will consist of two additions to the existing building, reconstruction of the existing parking lot, and a new outdoor dining area. For a full set of Civil plans, refer to **Exhibit F** within the appendix of this report.

The proposed drainage pattern will be relatively unchanged. The entire proposed site drains towards the northeast corner of the site and into the city storm network at the intersection of Penn and West 90<sup>th</sup>. The project is proposing a filtration rock trench (10P) under permeable pavers located in the northeastern corner of the site to meet local rules and regulations. Stormwater will either surface drain to the permeable pavers or will be captured within the local storm sewer system which outlets into the rock filtration trench. Discharge from the filtration rock trench (10P) will be limited by an outlet control structure and concrete weir before leaving the site. The proposed drainage pattern can be seen in **Exhibit B: Proposed Drainage Map** within the appendices of this report.

## Methodology

### Hydrocad

The Hydrologic characteristics of the site were modeled using HydroCAD software. TR55/TR20 methods were utilized. Existing and proposed drainage areas were determined via review of as-built data, current land survey data, and aerial photos.

The 2, 10, & 100-year frequency events were analyzed for peak runoff rate control in the existing and proposed conditions. The MSE-3 24-hr distribution was used in analysis. Depths for the 2, 10, & 100-year storms were found to be 2.86", 4.26", and 7.32" respectively.

Runoff from pervious and impervious surfaces were calculated separately in order to more accurately model the runoff volume from the site surfaces. Time of Concentrations have been calculated using the HydroCAD program individually for each sub-catchment. Results of this analysis are summarized below, and a report can be seen in **Exhibit C: Hydrocad Report**.

### Stormwater Conveyance

The storm sewer network was designed based upon the 10-year storm event. The rational method was employed to determine the flowrate into the storm sewer; pipe diameter, inlet elevations, and slopes were designed to accommodate the ten-year flow through the devices. **Exhibit E: Storm Sewer Sizing Worksheet** attached in the Appendix shows the individual calculations for the storm network.

A Manning's Coefficient of 0.013 was assumed, and overflow routes to drain low points along curb and gutter provide a minimum freeboard of 1 foot. All tributary area was considered for calculations.

## Nine Mile Creek Watershed District Rules

In addition to the rules described below, the proposed design and report will utilize those definitions and procedural requirements as described in Rule 1.0 of the Nine Mile Creek Watershed District Rules. **Table 1** below summarizes the watershed rules that are **not** applicable to this site:

| <b>Table 1: Non-Applicable Watershed Rules</b> |                                        |
|------------------------------------------------|----------------------------------------|
| 2.0                                            | Floodplain Alteration                  |
| 3.0                                            | Wetlands Management                    |
| 6.0                                            | Waterbody Crossing and Structures      |
| 7.0                                            | Shoreline and Streambank Improvements  |
| 8.0                                            | Sediment Removal                       |
| 9.0                                            | Appropriation of Public Surface Waters |

Below is a summary of other applicable watershed rules and regulations have been met for this project:

### **Rule 4.0 – Stormwater Management**

This project will disturbed more than 50 percent of the existing impervious surface on site and therefore, the stormwater criteria of section 4.3 applies.

#### 4.3.4.a – Volume Control

*Regulation: Provide for the retention onsite of 1.1 inches of runoff from the regulated impervious surface of the site.*

Abstraction Req (CF):  $0.574 \text{ Ac} \times 43,560 \text{ CF} / \text{Ac} \times 1.1 \text{ in.} \times 1 \text{ ft} / 12 \text{ in} = \mathbf{2,292 \text{ CF}}$

Proposed:

The underground rock filtration trench (10P) has been sized to treat the entire abstraction for the site. Pretreatment for the filtration trench will be provided via 2' sump manholes at all inlet locations. Parameters for 10P include a surface area of 1994 SF, a depth ranging 4.0' to 5.4', and a void ration of 40% of the storage rock.

The release of stormwater from the rock trench will be controls through a concrete weir within OCS-1, set at an elevation of 830.40. Per **Exhibit C: Hydrocad Report**, the cumulative volume below the concrete weir is **2,313 CF**.

The filtration trench (10P) has been sized to allow a drawdown time of less than 48 hours. By using a design filtration rate of 0.80 in/hr, the trech surface area, and volume below the lowest outlet, the drawdown time has been calculated as follows:

$$\text{Drawdown Time (HR)} = V/vA(1/12) = 2313/(0.8 \times 1994)(1/12) = \mathbf{17.39 \text{ HR}}$$

#### 4.3.1.b – Rate Control

*Regulation: Limit Peak runoff flow rates to that from existing conditions for the 2, 10, and 100-year frequency storm events for all collection points where stormwater discharge leaves the site.*

Proposed:

Rate control was analyzed for the 2, 10, and 100-year storm event. Existing condition rates and proposed rated were compared for the entire property area and at individual discharge points on the site. Runoff rates for the proposed activity shall not exceed existing runoff rates for the 2, 10, and 100-year critical storm.

A full summary of the existing and proposed HydroCAD results can be found within **Exhibit C: Hydrocad Report** in the appendices of this report. Tabulations of the existing and proposed peak runoff rates can be found in **Table 2** shows that post development rates are held below existing conditions:

| <b>Table 2: Rate Control Summary</b> |                     |                |           |
|--------------------------------------|---------------------|----------------|-----------|
| Storm Event                          | 1R – Existing (CFS) | 10R - Proposed | 10P – HWL |
| 2-year                               | 2.77                | 0.38           | 830.48    |
| 10-year                              | 4.35                | 3.31           | 830.74    |
| 100-year                             | 7.73                | 6.08           | 831.12    |

#### 4.3.1.c – Water Quality

*Regulation: Provide for at least 60 percent annual removal efficiency for total phosphorus and at least 90 percent annual removal efficiency for total suspended solids from site runoff.*

Proposed:

The proposed site met the pollution load reduction requirement through the filtration practices provided by the permeable pavement / rock filtration trench. The proposed conditions were modeled using the MIDS Calculator (version 4). A full summer of the results can be found in **Exhibit D: MIDS Results** and a tubulation of proposed pollutant loads can be found in **Table 3** below:

| <b>Table 3: MIDS Calculator Summary</b> |                        |                          |
|-----------------------------------------|------------------------|--------------------------|
| Pollutant                               | Removal Efficiency (%) | Annual Runoff Load (lbs) |
| TSS                                     | 92                     | 16.6                     |
| Total Phosphorus                        | 92                     | 0.0918                   |

#### 4.3.3 – Low-floor Elevation

*Regulation: Reconstructed buildings must be constructed at least two feet above the 100-year high water elevation or one foot above the natural overflow of a waterbody.*

Proposed:

The low floor elevation of the existing building and additions is to be 835.20. The 100-year HWL of 10P is proposed at 831.12.

#### **Rule 5.0 – Erosion and Sediment Control**

Anderson Engineering will obtain a permit from the district that incorporates and approves an erosion and sediment control plan for the project before the start of the project. Disturbance will not be greater than 1.0 acre in area and therefore a Stormwater Pollution Prevention Plan (SWPPP) is **not** required for the project. It is the responsibility of the contractor to implement and modify the erosion and sediment control plan as construction proceeds.

### **Summary**

The site layout and final grading is designed to take advantage of the existing terrain for drainage and will result in a gently rolling topography matching the surrounding landscape. Within the project boundary, some changes to the existing drainage patterns are expected due to the proposed structures and other site improvements. The project design does not propose to make major changes to drainage divides.



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GYROPOLIS

### ADDITION / REMODELING

2325 W 90TH ST  
BLOOMINGTON, MN

## REVISION LOG

[illegible]

CITY SUBMITTAL  
SEPTEMBER 28, 2022

DRAWING TITLE

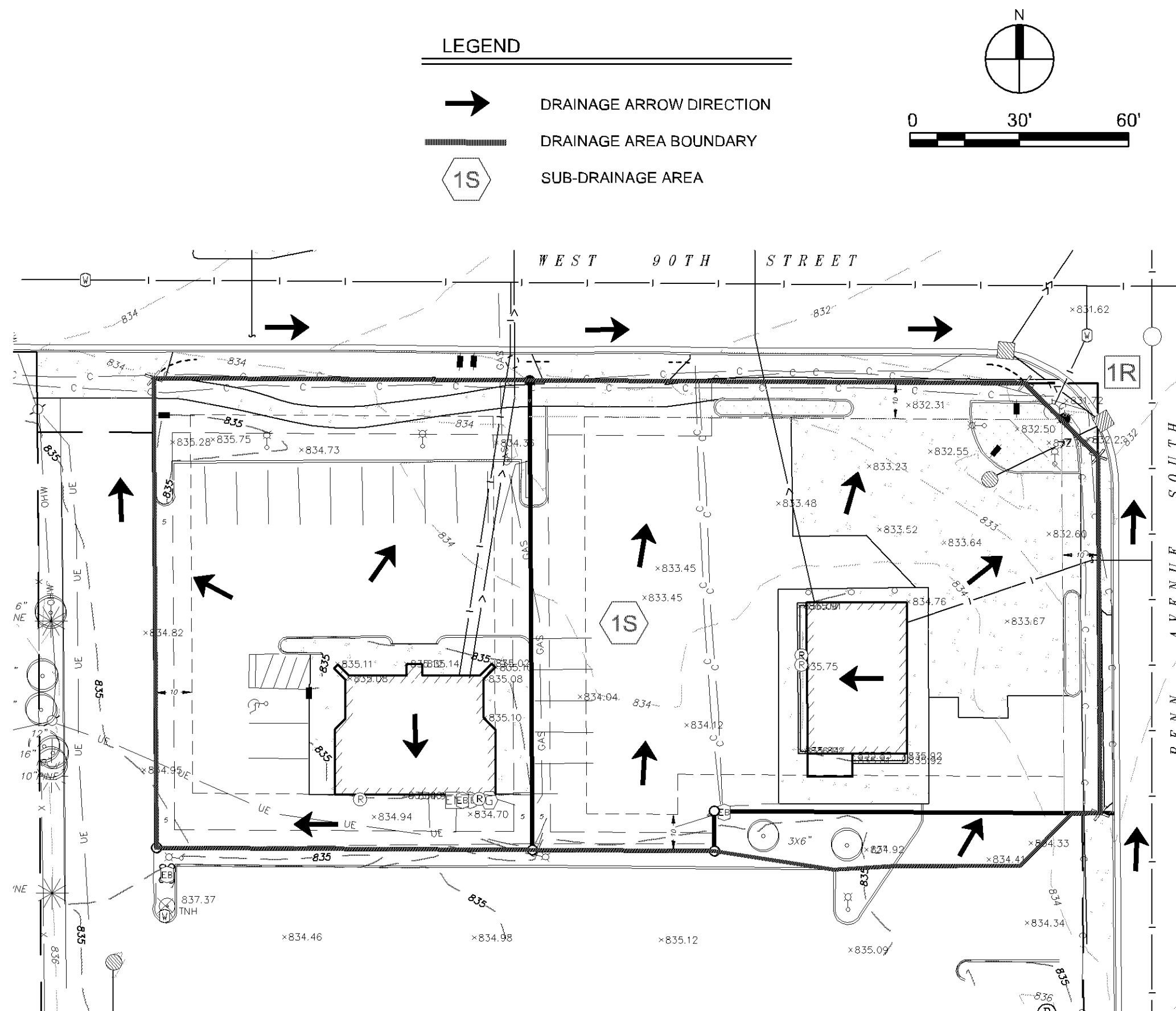
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DRAWING NO.

A

PLOTTED:  
9/27/22

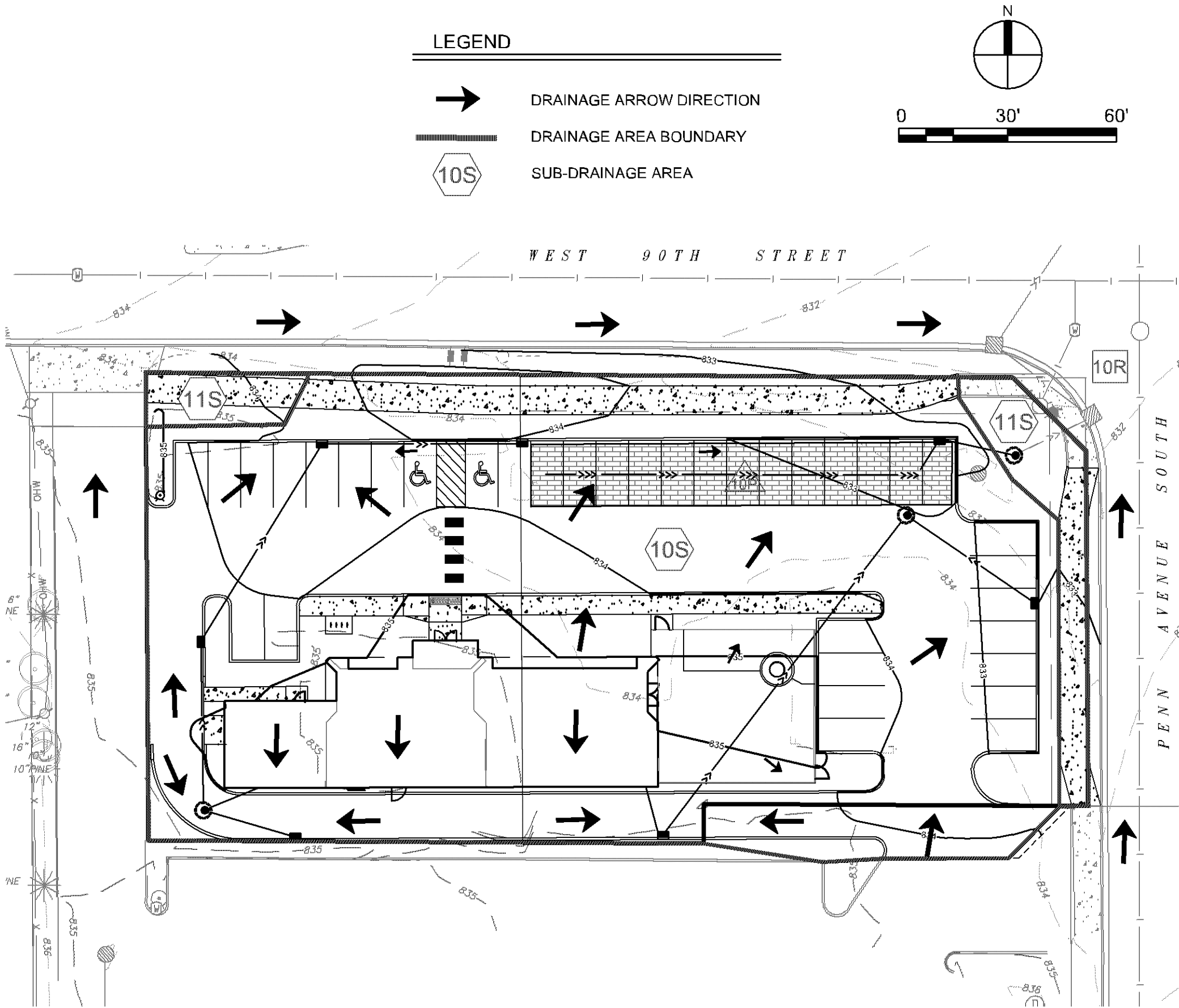
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16318





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**GYROPOLIS**

ADDITION / REMODELING

2325 W 90TH ST  
BLOOMINGTON, MN

**REVISION LOG**

| NO. | DATE | DESCRIPTION |
|-----|------|-------------|
|     |      |             |
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**CITY SUBMITTAL**  
SEPTEMBER 28, 2022

DRAWING TITLE

**PROPOSED  
DRAINAGE MAP**

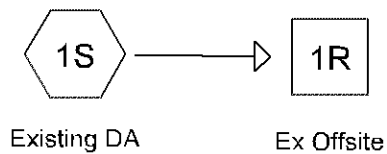
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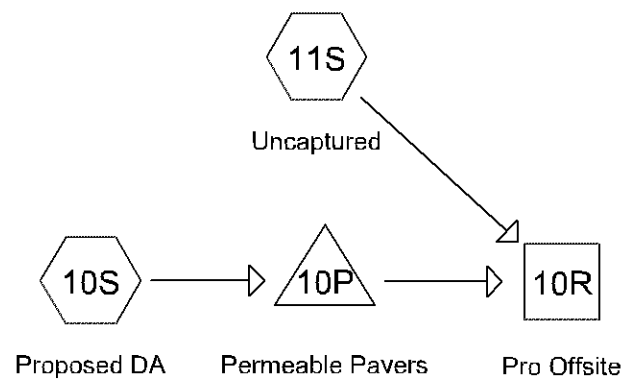
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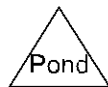
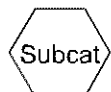
# C - HYDROCAD REPORT



**Existing Conditions**

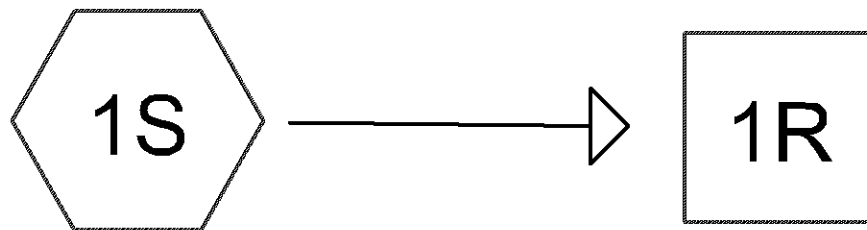


**Proposed Conditions**



**Routing Diagram for 16318\_Hydrocad**

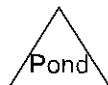
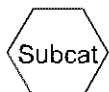
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HydroCAD® 10.10-7a s/n 00837 © 2021 HydroCAD Software Solutions LLC



Existing DA

Ex Offsite

## Existing Conditions



### Routing Diagram for 16318\_Hydrocad

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**16318\_Hydrocad**

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**Project Notes**

Rainfall events imported from "NRCS-Rain.txt" for 5327 MN Hennepin

**16318\_Hydrocad**

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**Rainfall Events Listing**

| Event# | Event<br>Name | Storm Type | Curve | Mode    | Duration<br>(hours) | B/B | Depth<br>(inches) | AMC |
|--------|---------------|------------|-------|---------|---------------------|-----|-------------------|-----|
| 1      | 2-Year        | MSE 24-hr  | 3     | Default | 24.00               | 1   | 2.86              | 2   |
| 2      | 10-Year       | MSE 24-hr  | 3     | Default | 24.00               | 1   | 4.26              | 2   |
| 3      | 100-Year      | MSE 24-hr  | 3     | Default | 24.00               | 1   | 7.32              | 2   |

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**Area Listing (selected nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers) |
|-----------------|-----------|---------------------------------------|
| 0.058           | 39        | >75% Grass cover, Good, HSG A (1S)    |
| 0.708           | 98        | Paved parking, HSG A (1S)             |
| <b>0.766</b>    | <b>94</b> | <b>TOTAL AREA</b>                     |

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**Soil Listing (selected nodes)**

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers |
|-----------------|---------------|-------------------------|
| 0.766           | HSG A         | 1S                      |
| 0.000           | HSG B         |                         |
| 0.000           | HSG C         |                         |
| 0.000           | HSG D         |                         |
| 0.000           | Other         |                         |
| <b>0.766</b>    |               | <b>TOTAL AREA</b>       |

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**Ground Covers (selected nodes)**

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover        | Subcatchment<br>Numbers |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------------|-------------------------|
| 0.058            | 0.000            | 0.000            | 0.000            | 0.000            | 0.058            | >75% Grass cover, Good | 1S                      |
| 0.708            | 0.000            | 0.000            | 0.000            | 0.000            | 0.708            | Paved parking          | 1S                      |
| <b>0.766</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>0.766</b>     | <b>TOTAL AREA</b>      |                         |



**16318\_Hydrocad**

MSE 24-hr 3 2-Year Rainfall=2.86"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: Existing DA**

Runoff Area=0.766 ac 92.43% Impervious Runoff Depth>2.14"  
Tc=7.0 min CN=94 Runoff=2.77 cfs 0.137 af

**Reach 1R: Ex Offsite**

Inflow=2.77 cfs 0.137 af  
Outflow=2.77 cfs 0.137 af

**Total Runoff Area = 0.766 ac Runoff Volume = 0.137 af Average Runoff Depth = 2.14"**  
**7.57% Pervious = 0.058 ac 92.43% Impervious = 0.708 ac**

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MSE 24-hr 3 2-Year Rainfall=2.86"

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**Summary for Subcatchment 1S: Existing DA**

Runoff = 2.77 cfs @ 12.14 hrs, Volume= 0.137 af, Depth> 2.14"  
 Routed to Reach 1R : Ex Offsite

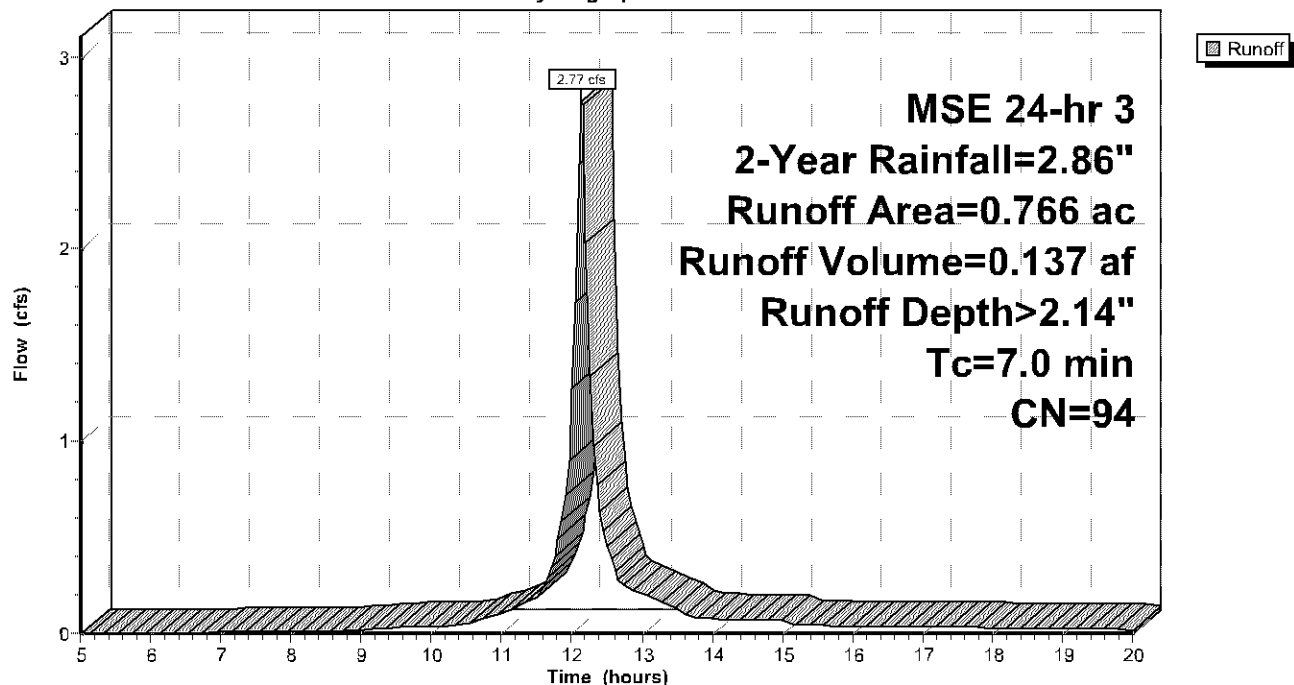
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.708     | 98 | Paved parking, HSG A          |
| 0.058     | 39 | >75% Grass cover, Good, HSG A |
| 0.766     | 94 | Weighted Average              |
| 0.058     |    | 7.57% Pervious Area           |
| 0.708     |    | 92.43% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 1S: Existing DA**

Hydrograph



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MSE 24-hr 3 2-Year Rainfall=2.86"

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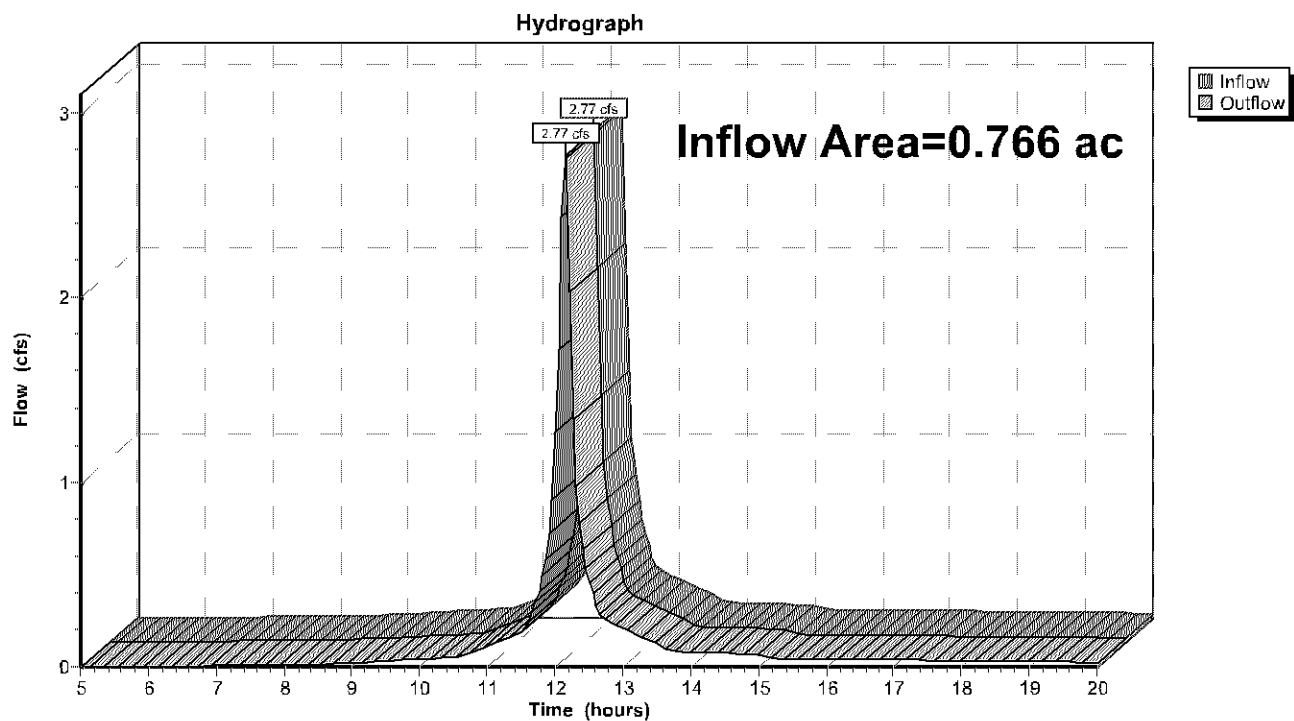
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**Summary for Reach 1R: Ex Offsite**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 92.43% Impervious, Inflow Depth > 2.14" for 2-Year event  
Inflow = 2.77 cfs @ 12.14 hrs, Volume= 0.137 af  
Outflow = 2.77 cfs @ 12.14 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1R: Ex Offsite**

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MSE 24-hr 3 10-Year Rainfall=4.26"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: Existing DA**

Runoff Area=0.766 ac 92.43% Impervious Runoff Depth&gt;3.47"

Tc=7.0 min CN=94 Runoff=4.35 cfs 0.221 af

**Reach 1R: Ex Offsite**

Inflow=4.35 cfs 0.221 af

Outflow=4.35 cfs 0.221 af

**Total Runoff Area = 0.766 ac Runoff Volume = 0.221 af Average Runoff Depth = 3.47"**  
**7.57% Pervious = 0.058 ac 92.43% Impervious = 0.708 ac**

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MSE 24-hr 3 10-Year Rainfall=4.26"

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**Summary for Subcatchment 1S: Existing DA**

Runoff = 4.35 cfs @ 12.14 hrs, Volume= 0.221 af, Depth> 3.47"  
 Routed to Reach 1R : Ex Offsite

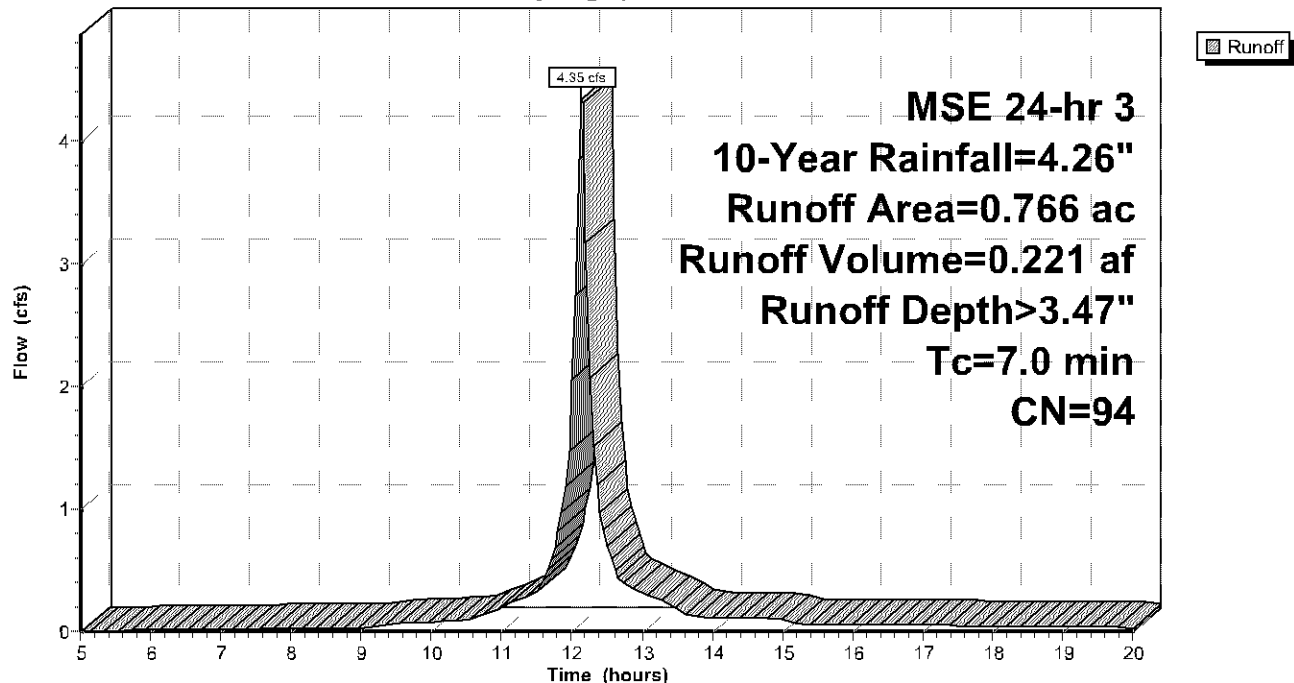
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.708     | 98 | Paved parking, HSG A          |
| 0.058     | 39 | >75% Grass cover, Good, HSG A |
| 0.766     | 94 | Weighted Average              |
| 0.058     |    | 7.57% Pervious Area           |
| 0.708     |    | 92.43% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 1S: Existing DA**

Hydrograph



**16318\_Hydrocad**

MSE 24-hr 3 10-Year Rainfall=4.26"

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**Summary for Reach 1R: Ex Offsite**

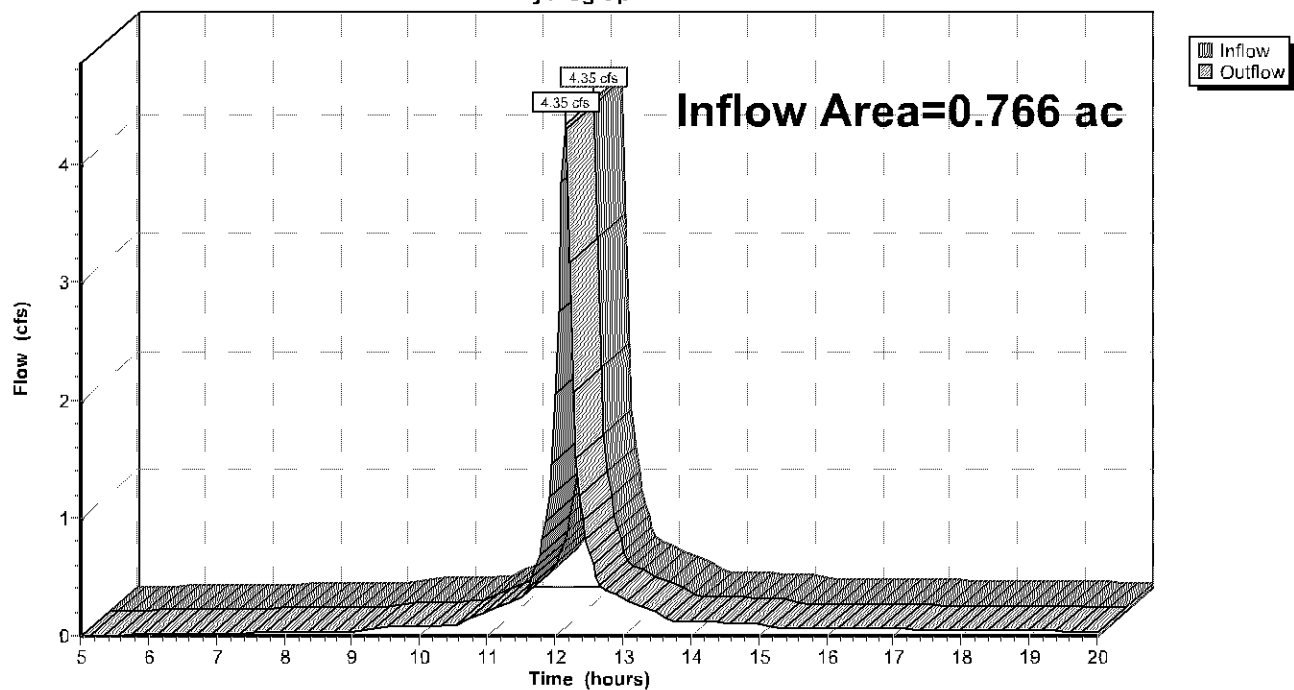
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 92.43% Impervious, Inflow Depth > 3.47" for 10-Year event  
 Inflow = 4.35 cfs @ 12.14 hrs, Volume= 0.221 af  
 Outflow = 4.35 cfs @ 12.14 hrs, Volume= 0.221 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1R: Ex Offsite**

Hydrograph



**16318\_Hydrocad**

MSE 24-hr 3 100-Year Rainfall=7.32"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: Existing DA**

Runoff Area=0.766 ac 92.43% Impervious Runoff Depth>6.39"  
Tc=7.0 min CN=94 Runoff=7.73 cfs 0.408 af

**Reach 1R: Ex Offsite**

Inflow=7.73 cfs 0.408 af  
Outflow=7.73 cfs 0.408 af

**Total Runoff Area = 0.766 ac Runoff Volume = 0.408 af Average Runoff Depth = 6.39"**  
**7.57% Pervious = 0.058 ac 92.43% Impervious = 0.708 ac**

**16318\_Hydrocad**

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MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Subcatchment 1S: Existing DA**

Runoff = 7.73 cfs @ 12.14 hrs, Volume= 0.408 af, Depth> 6.39"  
 Routed to Reach 1R : Ex Offsite

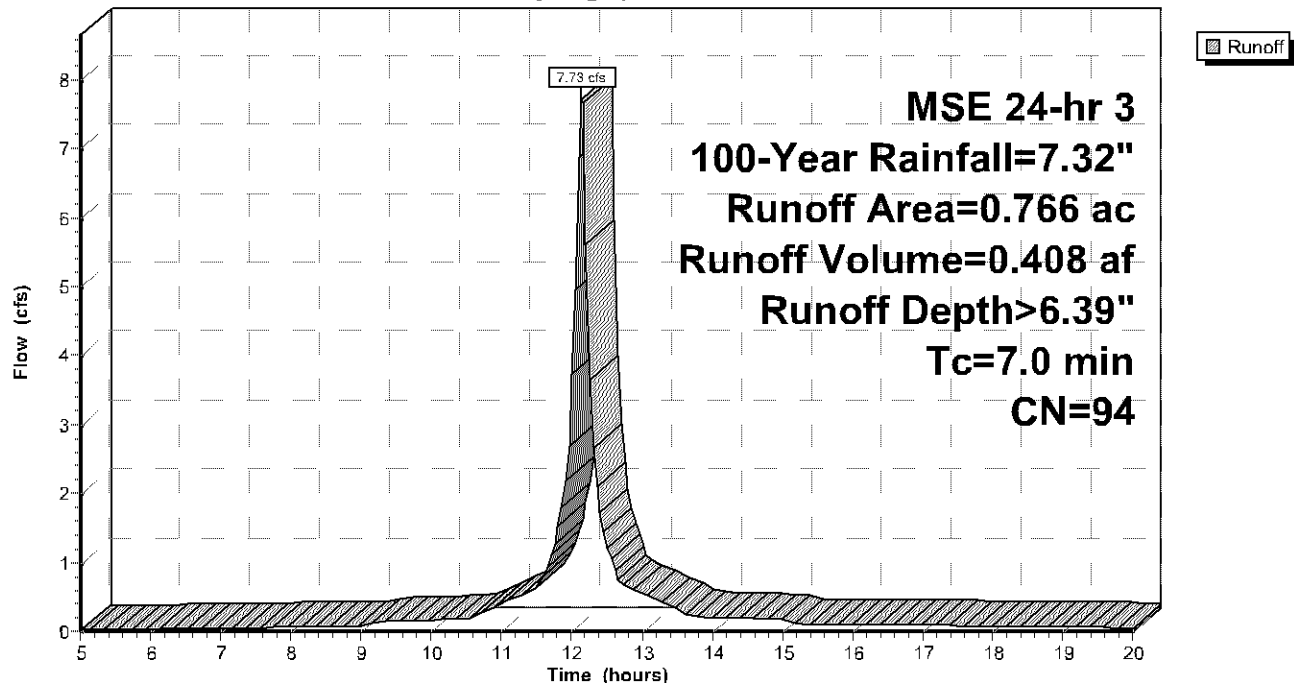
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.708     | 98 | Paved parking, HSG A          |
| 0.058     | 39 | >75% Grass cover, Good, HSG A |
| 0.766     | 94 | Weighted Average              |
| 0.058     |    | 7.57% Pervious Area           |
| 0.708     |    | 92.43% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 1S: Existing DA**

Hydrograph





**16318\_Hydrocad**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Reach 1R: Ex Offsite**

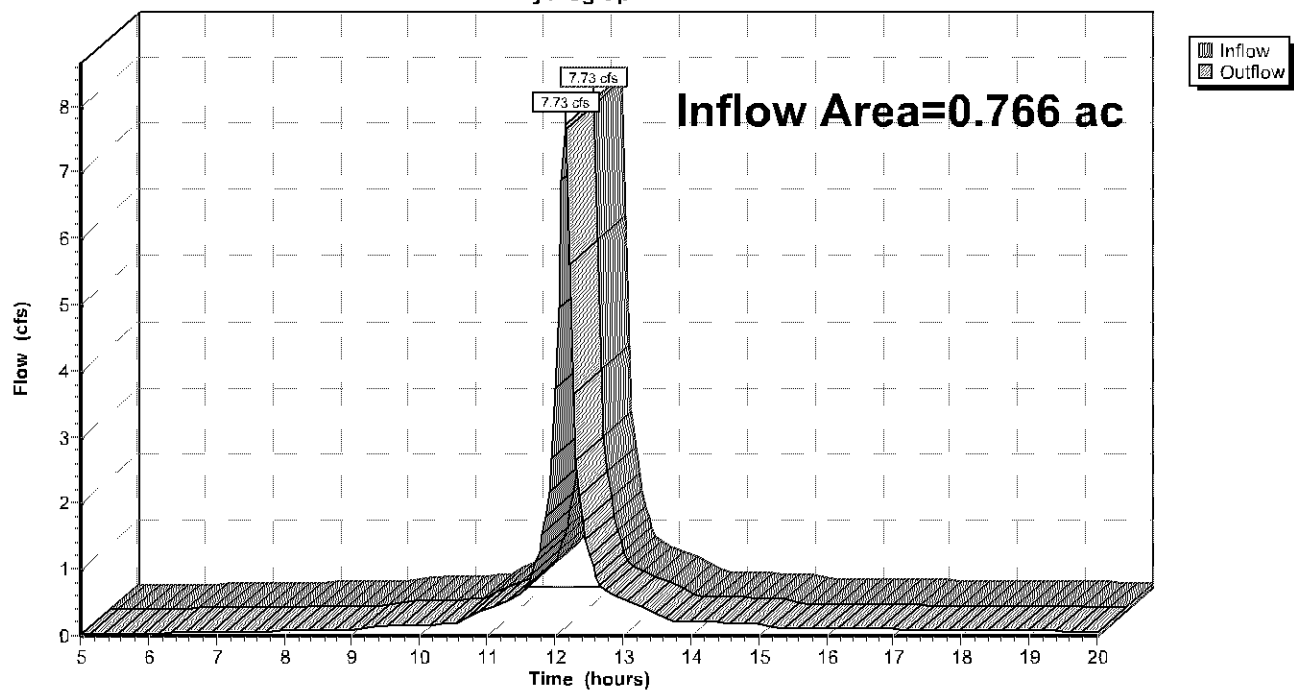
[40] Hint: Not Described (Outflow=Inflow)

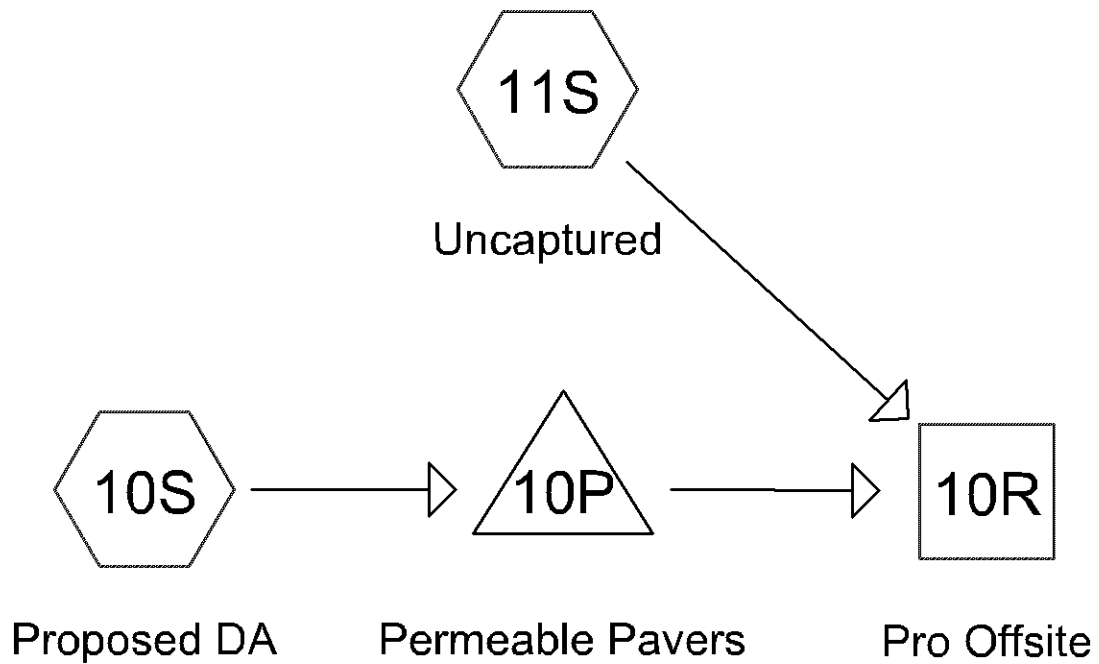
Inflow Area = 0.766 ac, 92.43% Impervious, Inflow Depth > 6.39" for 100-Year event  
 Inflow = 7.73 cfs @ 12.14 hrs, Volume= 0.408 af  
 Outflow = 7.73 cfs @ 12.14 hrs, Volume= 0.408 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

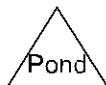
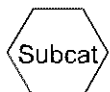
**Reach 1R: Ex Offsite**

Hydrograph





## Proposed Conditions



### Routing Diagram for 16318\_Hydrocad

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**Project Notes**

Rainfall events imported from "NRCS-Rain.txt" for 5327 MN Hennepin

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**Rainfall Events Listing**

| Event# | Event<br>Name | Storm Type | Curve | Mode    | Duration<br>(hours) | B/B | Depth<br>(inches) | AMC |
|--------|---------------|------------|-------|---------|---------------------|-----|-------------------|-----|
| 1      | 2-Year        | MSE 24-hr  | 3     | Default | 24.00               | 1   | 2.86              | 2   |
| 2      | 10-Year       | MSE 24-hr  | 3     | Default | 24.00               | 1   | 4.26              | 2   |
| 3      | 100-Year      | MSE 24-hr  | 3     | Default | 24.00               | 1   | 7.32              | 2   |

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**Area Listing (selected nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)    |
|-----------------|-----------|------------------------------------------|
| 0.146           | 39        | >75% Grass cover, Good, HSG A (10S, 11S) |
| 0.574           | 98        | Paved parking, HSG A (10S, 11S)          |
| 0.046           | 98        | Permeable Pavers (10S)                   |
| <b>0.766</b>    | <b>87</b> | <b>TOTAL AREA</b>                        |

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**Soil Listing (selected nodes)**

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers |
|-----------------|---------------|-------------------------|
| 0.720           | HSG A         | 10S, 11S                |
| 0.000           | HSG B         |                         |
| 0.000           | HSG C         |                         |
| 0.000           | HSG D         |                         |
| 0.046           | Other         | 10S                     |
| <b>0.766</b>    |               | <b>TOTAL AREA</b>       |

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**Ground Covers (selected nodes)**

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover        | Subcatchment<br>Numbers |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------------|-------------------------|
| 0.146            | 0.000            | 0.000            | 0.000            | 0.000            | 0.146            | >75% Grass cover, Good | 10S,<br>11S             |
| 0.574            | 0.000            | 0.000            | 0.000            | 0.000            | 0.574            | Paved parking          | 10S,<br>11S             |
| 0.000            | 0.000            | 0.000            | 0.000            | 0.046            | 0.046            | Permeable Pavers       | 10S                     |
| <b>0.720</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>0.046</b>     | <b>0.766</b>     | <b>TOTAL AREA</b>      |                         |

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**Pipe Listing (selected nodes)**

| Line# | Node<br>Number | In-Invert<br>(feet) | Out-Invert<br>(feet) | Length<br>(feet) | Slope<br>(ft/ft) | n     | Width<br>(inches) | Diam/Height<br>(inches) | Inside-Fill<br>(inches) |
|-------|----------------|---------------------|----------------------|------------------|------------------|-------|-------------------|-------------------------|-------------------------|
| 1     | 10P            | 827.50              | 827.10               | 22.0             | 0.0182           | 0.013 | 0.0               | 12.0                    | 0.0                     |



**16318\_Hydrocad**

MSE 24-hr 3 2-Year Rainfall=2.86"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment10S: Proposed DA**

Runoff Area=0.733 ac 82.54% Impervious Runoff Depth>1.63"  
 Tc=7.0 min CN=88 Runoff=2.14 cfs 0.099 af

**Subcatchment11S: Uncaptured**

Runoff Area=0.033 ac 45.45% Impervious Runoff Depth>0.44"  
 Tc=7.0 min CN=66 Runoff=0.02 cfs 0.001 af

**Reach 10R: Pro Offsite**

Inflow=0.38 cfs 0.022 af  
 Outflow=0.38 cfs 0.022 af

**Pond 10P: Permeable Pavers**

Peak Elev=830.48' Storage=2,377 cf Inflow=2.14 cfs 0.099 af  
 Discarded=0.04 cfs 0.029 af Primary=0.37 cfs 0.020 af Outflow=0.41 cfs 0.050 af

**Total Runoff Area = 0.766 ac Runoff Volume = 0.101 af Average Runoff Depth = 1.58"**  
**19.06% Pervious = 0.146 ac 80.94% Impervious = 0.620 ac**

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MSE 24-hr 3 2-Year Rainfall=2.86"

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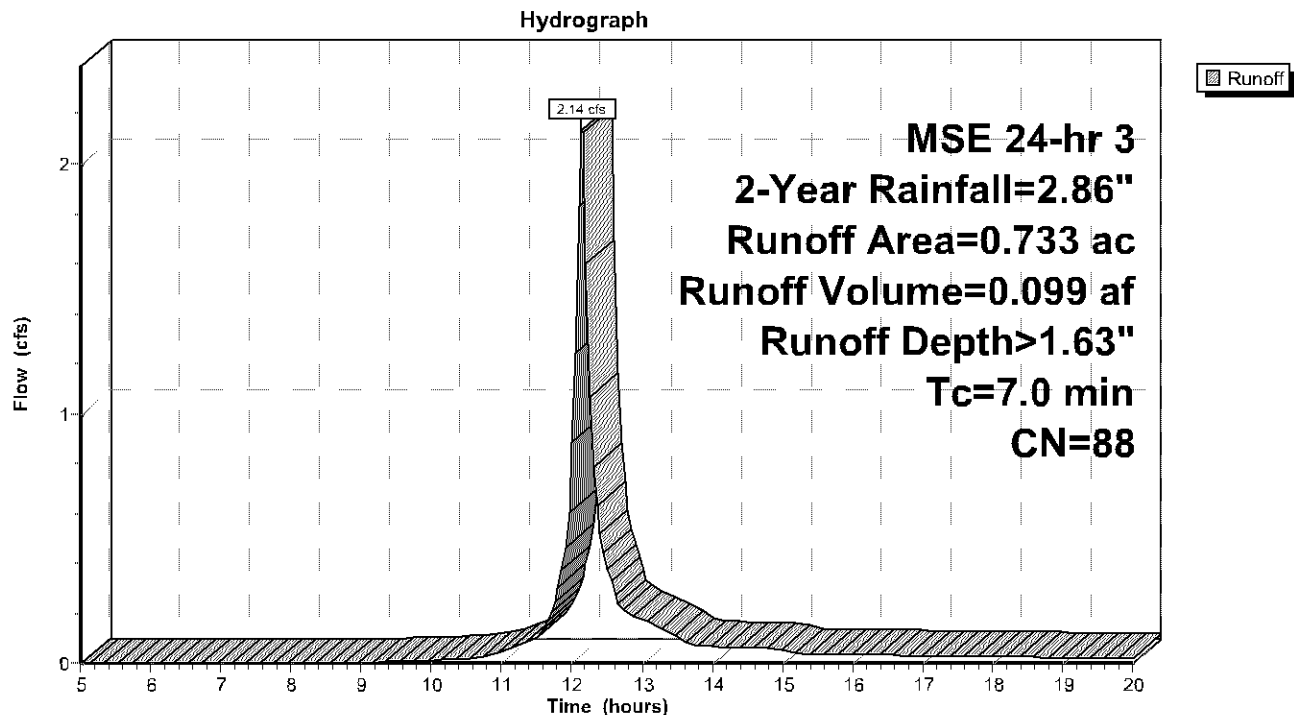
**Summary for Subcatchment 10S: Proposed DA**

Runoff = 2.14 cfs @ 12.14 hrs, Volume= 0.099 af, Depth> 1.63"  
 Routed to Pond 10P : Permeable Pavers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.559     | 98 | Paved parking, HSG A          |
| 0.128     | 39 | >75% Grass cover, Good, HSG A |
| * 0.046   | 98 | Permeable Pavers              |
| 0.733     | 88 | Weighted Average              |
| 0.128     |    | 17.46% Pervious Area          |
| 0.605     |    | 82.54% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 10S: Proposed DA**

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MSE 24-hr 3 2-Year Rainfall=2.86"

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**Summary for Subcatchment 11S: Uncaptured**

Runoff = 0.02 cfs @ 12.16 hrs, Volume= 0.001 af, Depth> 0.44"  
 Routed to Reach 10R : Pro Offsite

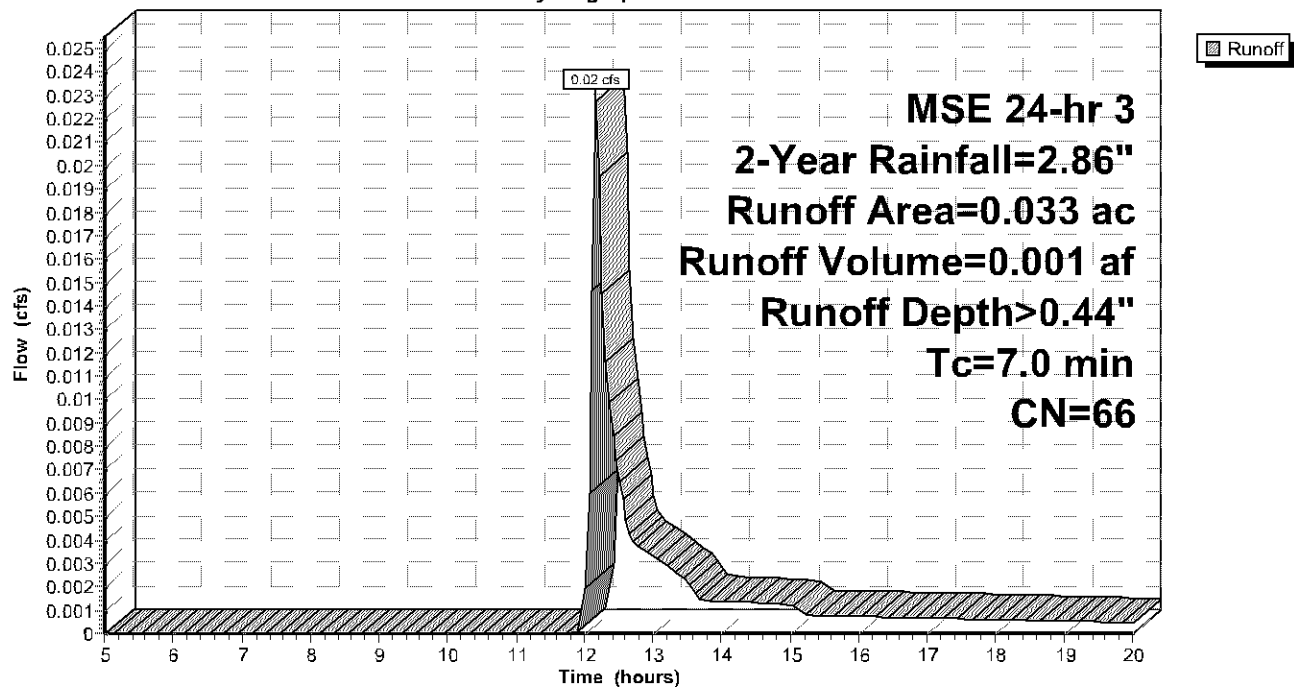
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 2-Year Rainfall=2.86"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.015     | 98 | Paved parking, HSG A          |
| 0.018     | 39 | >75% Grass cover, Good, HSG A |
| 0.033     | 66 | Weighted Average              |
| 0.018     |    | 54.55% Pervious Area          |
| 0.015     |    | 45.45% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 11S: Uncaptured**

Hydrograph



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MSE 24-hr 3 2-Year Rainfall=2.86"

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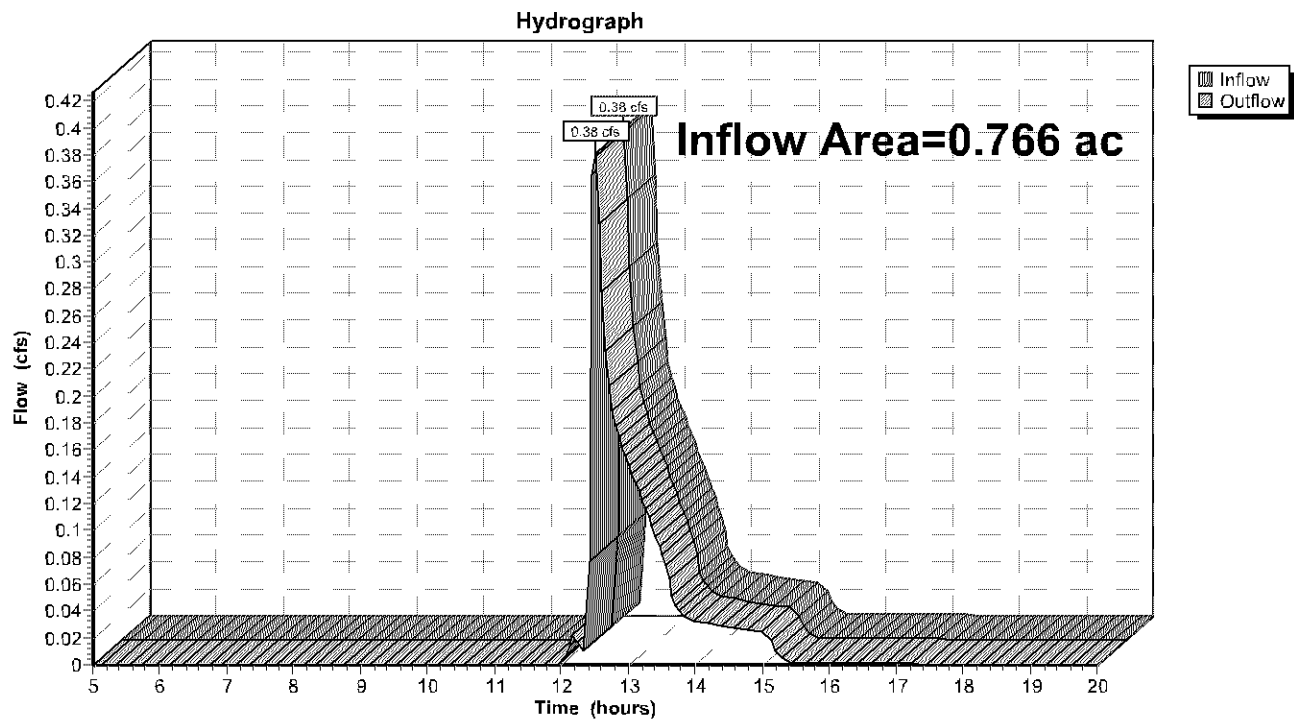
Page 11

**Summary for Reach 10R: Pro Offsite**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 80.94% Impervious, Inflow Depth > 0.34" for 2-Year event  
 Inflow = 0.38 cfs @ 12.49 hrs, Volume= 0.022 af  
 Outflow = 0.38 cfs @ 12.49 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 10R: Pro Offsite**

**16318\_Hydrocad**

MSE 24-hr 3 2-Year Rainfall=2.86"

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**Summary for Pond 10P: Permeable Pavers**

Inflow Area = 0.733 ac, 82.54% Impervious, Inflow Depth > 1.63" for 2-Year event  
 Inflow = 2.14 cfs @ 12.14 hrs, Volume= 0.099 af  
 Outflow = 0.41 cfs @ 12.49 hrs, Volume= 0.050 af, Atten= 81%, Lag= 20.6 min  
 Discarded = 0.04 cfs @ 11.05 hrs, Volume= 0.029 af  
 Primary = 0.37 cfs @ 12.49 hrs, Volume= 0.020 af  
 Routed to Reach 10R : Pro Offsite

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 830.48' @ 12.49 hrs Surf.Area= 1,994 sf Storage= 2,377 cf

Plug-Flow detention time= 145.2 min calculated for 0.050 af (50% of inflow)  
 Center-of-Mass det. time= 83.2 min ( 861.3 - 778.2 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                          |
|--------|---------|---------------|----------------------------------------------------------------------------------------------|
| #1     | 827.50' | 3,190 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)<br>7,976 cf Overall x 40.0% Voids |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 827.50              | 1,994                | 0                         | 0                         |
| 831.50              | 1,994                | 7,976                     | 7,976                     |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                                  |
|--------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 827.50' | <b>12.0" Round Culvert</b><br>L= 22.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 827.50' / 827.10' S= 0.0182 ' S= 0.0182 ' Cc= 0.900<br>n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Device 1  | 830.40' | <b>5.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)                                                                                                                                                            |
| #3     | Discarded | 827.50' | <b>0.800 in/hr Exfiltration over Horizontal area</b>                                                                                                                                                                            |

**Discarded OutFlow** Max=0.04 cfs @ 11.05 hrs HW=827.54' (Free Discharge)  
 ↑ **3=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.36 cfs @ 12.49 hrs HW=830.48' (Free Discharge)  
 ↑ **1=Culvert** (Passes 0.36 cfs of 5.25 cfs potential flow)  
 ↑ **2=Sharp-Crested Rectangular Weir** (Weir Controls 0.36 cfs @ 0.92 fps)

**16318\_Hydrocad**

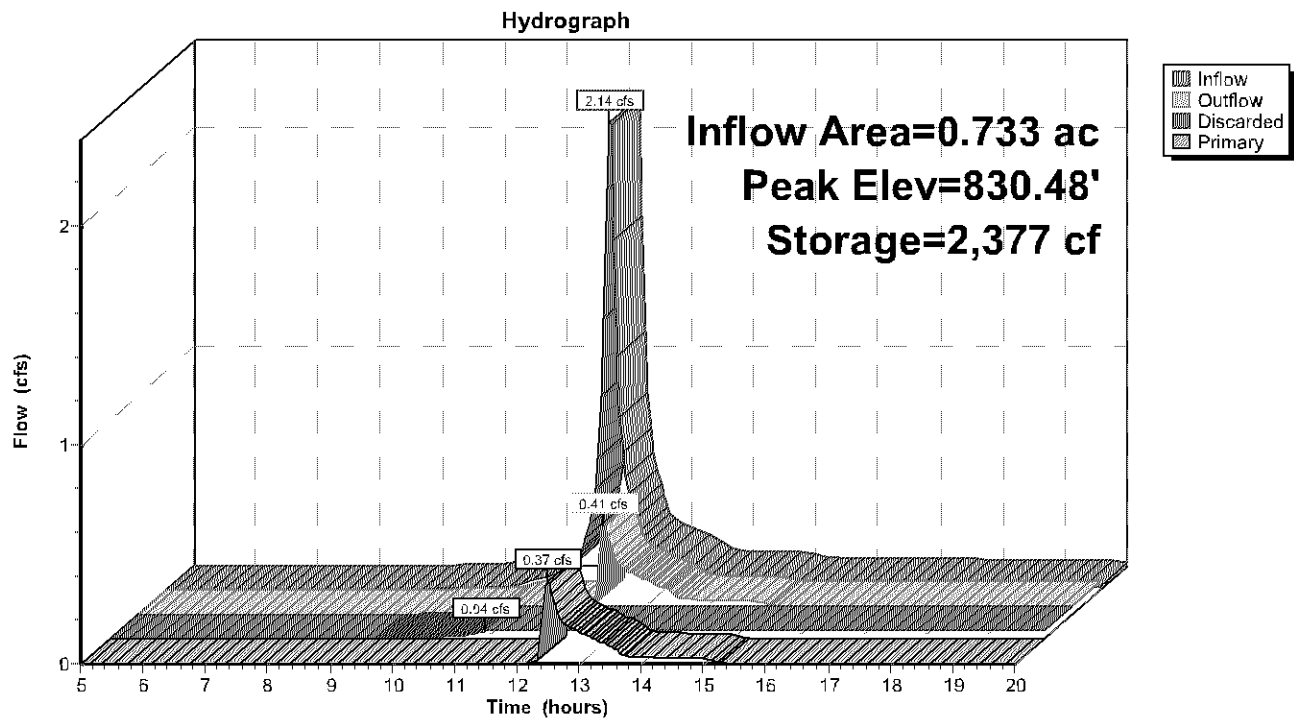
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MSE 24-hr 3 2-Year Rainfall=2.86"

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**Pond 10P: Permeable Pavers**

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MSE 24-hr 3 10-Year Rainfall=4.26"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment10S: Proposed DA**

Runoff Area=0.733 ac 82.54% Impervious Runoff Depth>2.86"  
 Tc=7.0 min CN=88 Runoff=3.66 cfs 0.175 af

**Subcatchment11S: Uncaptured**

Runoff Area=0.033 ac 45.45% Impervious Runoff Depth>1.17"  
 Tc=7.0 min CN=66 Runoff=0.07 cfs 0.003 af

**Reach 10R: Pro Offsite**

Inflow=3.31 cfs 0.092 af  
 Outflow=3.31 cfs 0.092 af

**Pond 10P: Permeable Pavers**

Peak Elev=830.74' Storage=2,588 cf Inflow=3.66 cfs 0.175 af  
 Discarded=0.04 cfs 0.033 af Primary=3.26 cfs 0.089 af Outflow=3.29 cfs 0.122 af

**Total Runoff Area = 0.766 ac Runoff Volume = 0.178 af Average Runoff Depth = 2.79"**  
**19.06% Pervious = 0.146 ac 80.94% Impervious = 0.620 ac**

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MSE 24-hr 3 10-Year Rainfall=4.26"

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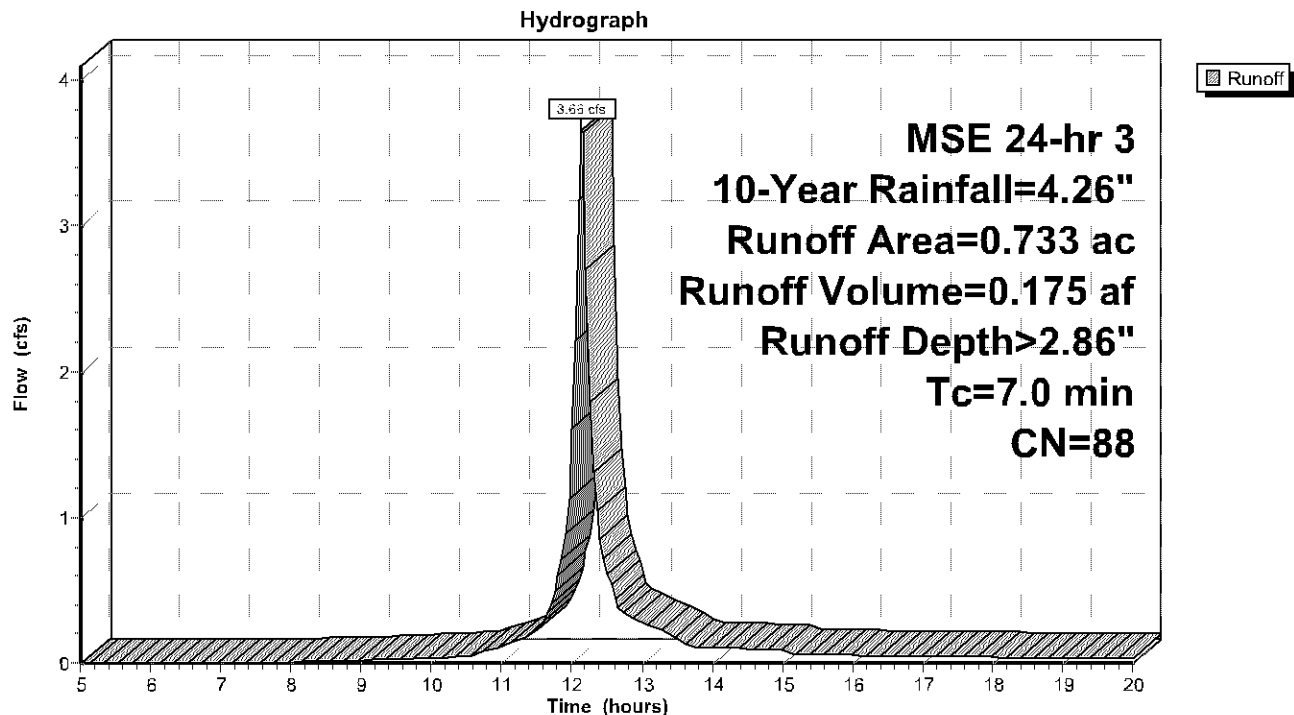
**Summary for Subcatchment 10S: Proposed DA**

Runoff = 3.66 cfs @ 12.14 hrs, Volume= 0.175 af, Depth> 2.86"  
 Routed to Pond 10P : Permeable Pavers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.559     | 98 | Paved parking, HSG A          |
| 0.128     | 39 | >75% Grass cover, Good, HSG A |
| * 0.046   | 98 | Permeable Pavers              |
| 0.733     | 88 | Weighted Average              |
| 0.128     |    | 17.46% Pervious Area          |
| 0.605     |    | 82.54% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 7.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Proposed DA**



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MSE 24-hr 3 10-Year Rainfall=4.26"

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**Summary for Subcatchment 11S: Uncaptured**

Runoff = 0.07 cfs @ 12.15 hrs, Volume= 0.003 af, Depth> 1.17"  
 Routed to Reach 10R : Pro Offsite

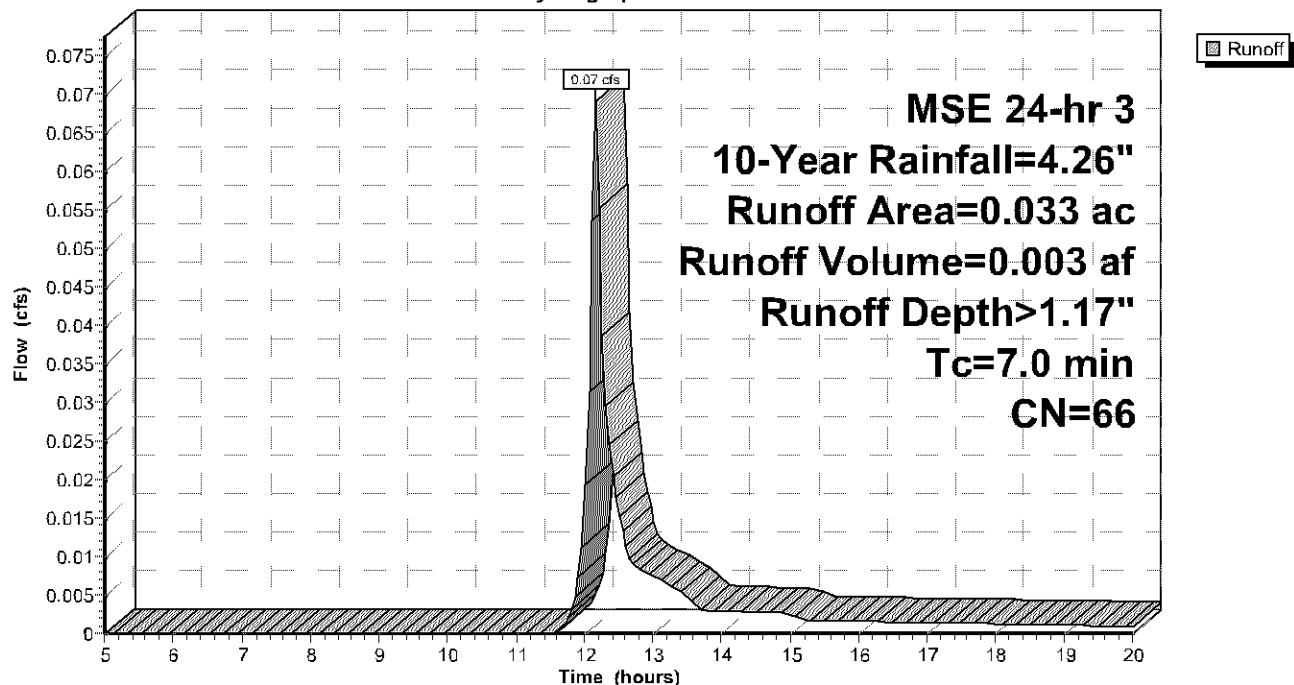
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 10-Year Rainfall=4.26"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.015     | 98 | Paved parking, HSG A          |
| 0.018     | 39 | >75% Grass cover, Good, HSG A |
| 0.033     | 66 | Weighted Average              |
| 0.018     |    | 54.55% Pervious Area          |
| 0.015     |    | 45.45% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 11S: Uncaptured**

Hydrograph



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MSE 24-hr 3 10-Year Rainfall=4.26"

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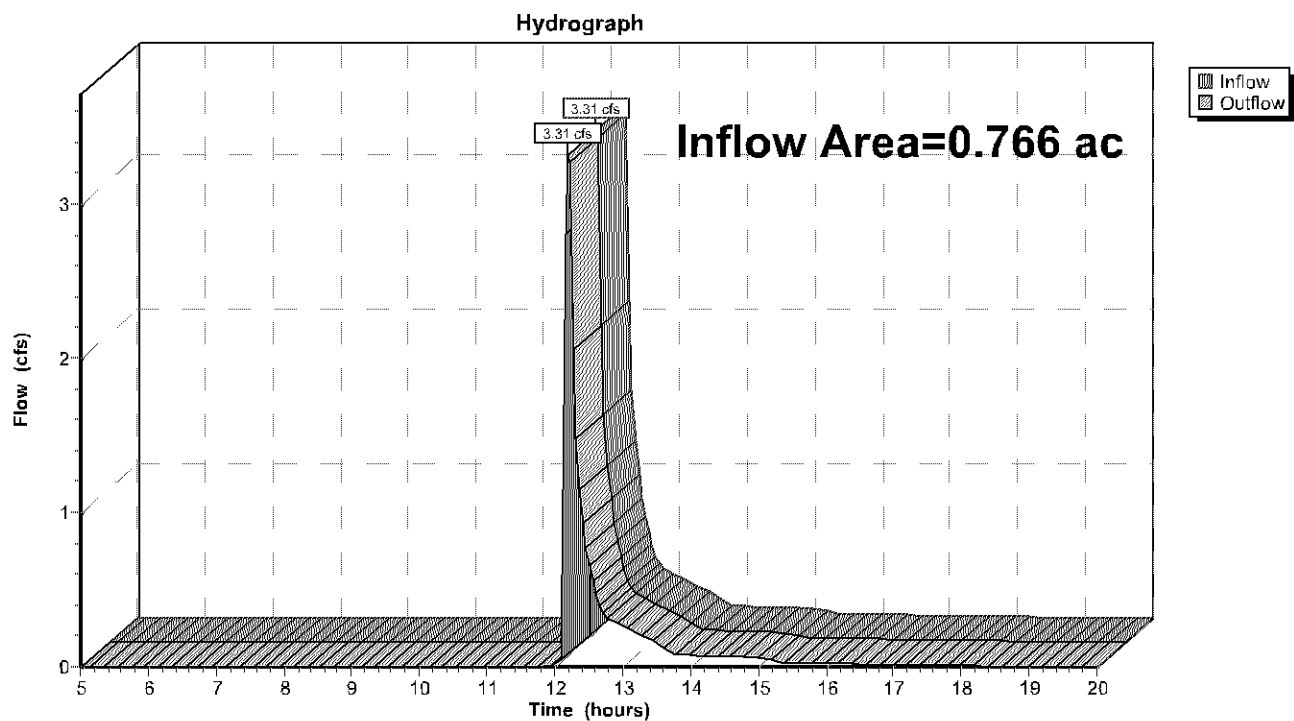
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**Summary for Reach 10R: Pro Offsite**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 80.94% Impervious, Inflow Depth > 1.44" for 10-Year event  
 Inflow = 3.31 cfs @ 12.19 hrs, Volume= 0.092 af  
 Outflow = 3.31 cfs @ 12.19 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 10R: Pro Offsite**

**16318\_Hydrocad**

MSE 24-hr 3 10-Year Rainfall=4.26"

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**Summary for Pond 10P: Permeable Pavers**

Inflow Area = 0.733 ac, 82.54% Impervious, Inflow Depth > 2.86" for 10-Year event  
 Inflow = 3.66 cfs @ 12.14 hrs, Volume= 0.175 af  
 Outflow = 3.29 cfs @ 12.19 hrs, Volume= 0.122 af, Atten= 10%, Lag= 2.9 min  
 Discarded = 0.04 cfs @ 10.25 hrs, Volume= 0.033 af  
 Primary = 3.26 cfs @ 12.19 hrs, Volume= 0.089 af  
 Routed to Reach 10R : Pro Offsite

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 830.74' @ 12.19 hrs Surf.Area= 1,994 sf Storage= 2,588 cf

Plug-Flow detention time= 82.0 min calculated for 0.122 af (70% of inflow)  
 Center-of-Mass det. time= 29.3 min ( 797.9 - 768.6 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                          |
|--------|---------|---------------|----------------------------------------------------------------------------------------------|
| #1     | 827.50' | 3,190 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)<br>7,976 cf Overall x 40.0% Voids |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 827.50              | 1,994                | 0                         | 0                         |
| 831.50              | 1,994                | 7,976                     | 7,976                     |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                        |
|--------|-----------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 827.50' | <b>12.0" Round Culvert</b><br>L= 22.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 827.50' / 827.10' S= 0.0182 ' / Cc= 0.900<br>n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Device 1  | 830.40' | <b>5.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)                                                                                                                                                  |
| #3     | Discarded | 827.50' | <b>0.800 in/hr Exfiltration over Horizontal area</b>                                                                                                                                                                  |

**Discarded OutFlow** Max=0.04 cfs @ 10.25 hrs HW=827.54' (Free Discharge)  
 ↑ **3=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=3.11 cfs @ 12.19 hrs HW=830.73' (Free Discharge)  
 ↑ **1=Culvert** (Passes 3.11 cfs of 5.52 cfs potential flow)  
 ↑ **2=Sharp-Crested Rectangular Weir** (Weir Controls 3.11 cfs @ 1.89 fps)

16318\_Hydrocad

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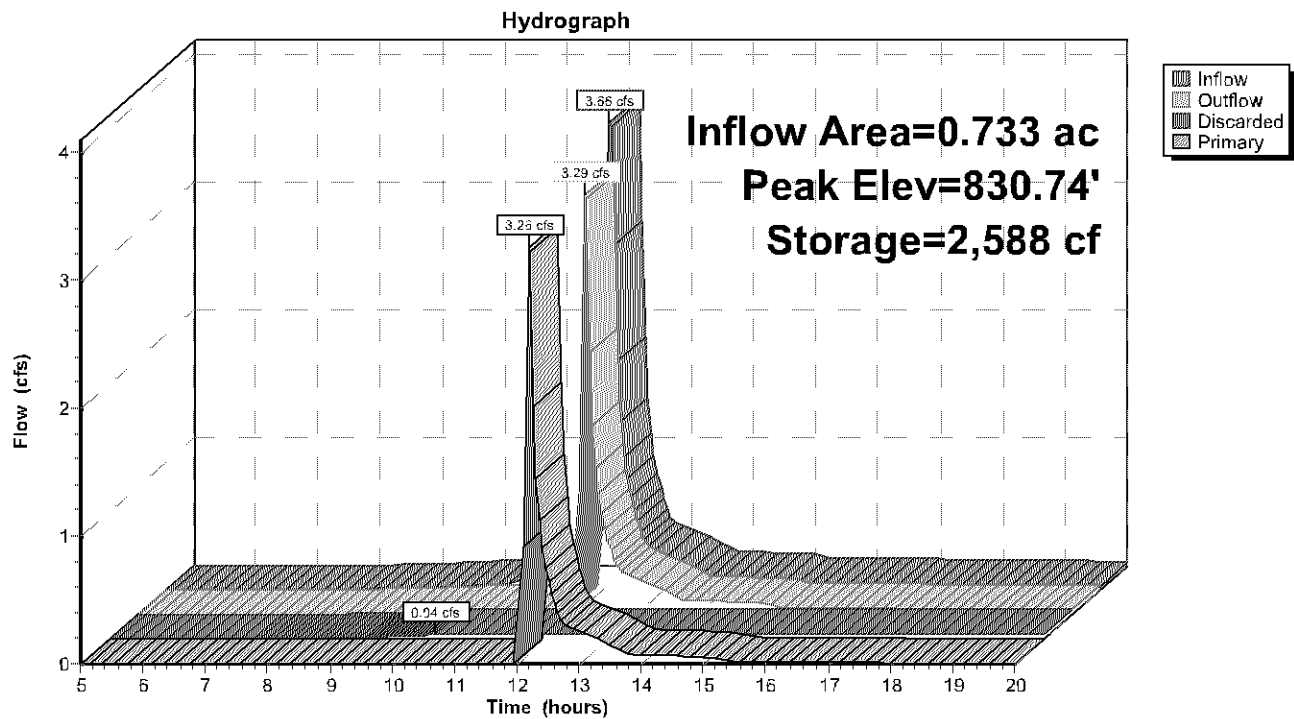
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MSE 24-hr 3 10-Year Rainfall=4.26"

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Pond 10P: Permeable Pavers



**16318\_Hydrocad**

MSE 24-hr 3 100-Year Rainfall=7.32"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment10S: Proposed DA**

Runoff Area=0.733 ac 82.54% Impervious Runoff Depth>5.71"  
 Tc=7.0 min CN=88 Runoff=6.98 cfs 0.349 af

**Subcatchment11S: Uncaptured**

Runoff Area=0.033 ac 45.45% Impervious Runoff Depth>3.30"  
 Tc=7.0 min CN=66 Runoff=0.20 cfs 0.009 af

**Reach 10R: Pro Offsite**

Inflow=6.08 cfs 0.265 af  
 Outflow=6.08 cfs 0.265 af

**Pond 10P: Permeable Pavers**

Peak Elev=831.12' Storage=2,889 cf Inflow=6.98 cfs 0.349 af  
 Discarded=0.04 cfs 0.040 af Primary=6.00 cfs 0.256 af Outflow=6.04 cfs 0.296 af

**Total Runoff Area = 0.766 ac Runoff Volume = 0.358 af Average Runoff Depth = 5.61"**  
**19.06% Pervious = 0.146 ac 80.94% Impervious = 0.620 ac**

**16318\_Hydrocad**

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MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Subcatchment 10S: Proposed DA**

Runoff = 6.98 cfs @ 12.14 hrs, Volume= 0.349 af, Depth> 5.71"  
 Routed to Pond 10P : Permeable Pavers

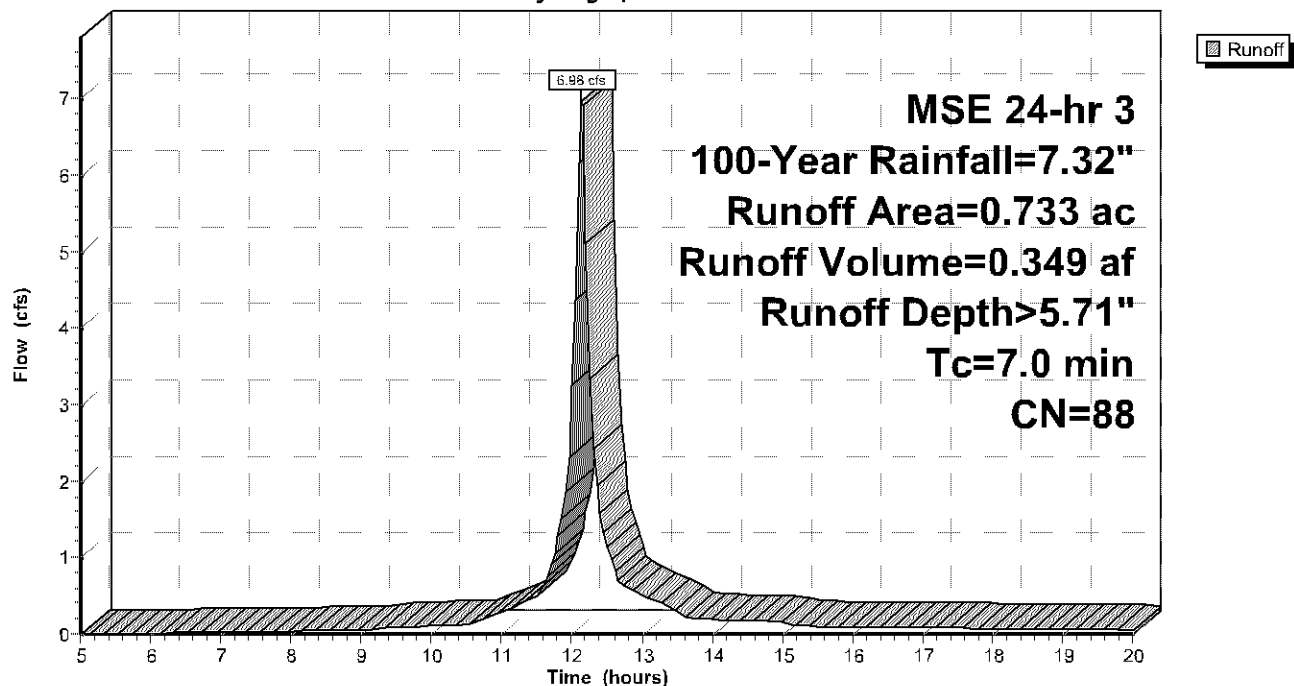
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.559     | 98 | Paved parking, HSG A          |
| 0.128     | 39 | >75% Grass cover, Good, HSG A |
| * 0.046   | 98 | Permeable Pavers              |
| 0.733     | 88 | Weighted Average              |
| 0.128     |    | 17.46% Pervious Area          |
| 0.605     |    | 82.54% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 10S: Proposed DA**

Hydrograph



**16318\_Hydrocad**

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MSE 24-hr 3 100-Year Rainfall=7.32"

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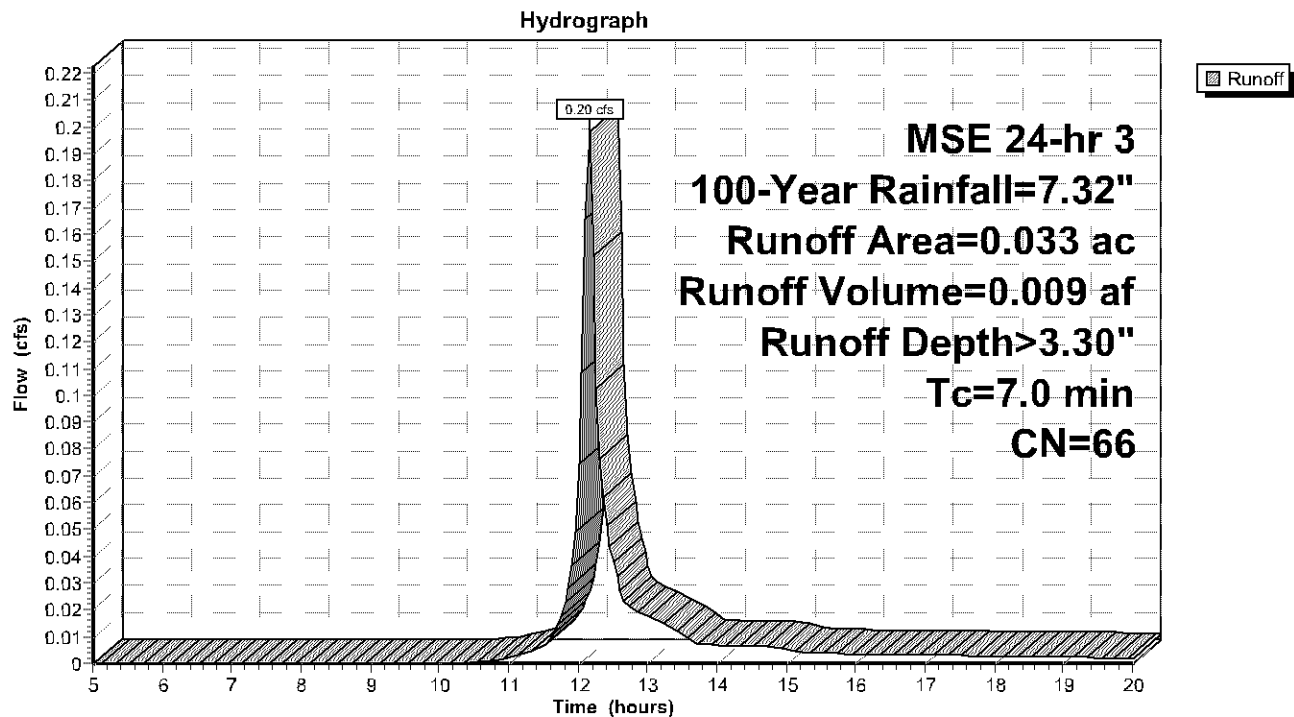
**Summary for Subcatchment 11S: Uncaptured**

Runoff = 0.20 cfs @ 12.15 hrs, Volume= 0.009 af, Depth> 3.30"  
 Routed to Reach 10R : Pro Offsite

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 MSE 24-hr 3 100-Year Rainfall=7.32"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.015     | 98 | Paved parking, HSG A          |
| 0.018     | 39 | >75% Grass cover, Good, HSG A |
| 0.033     | 66 | Weighted Average              |
| 0.018     |    | 54.55% Pervious Area          |
| 0.015     |    | 45.45% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 7.0         |                  |                  |                      |                   | Direct Entry, |

**Subcatchment 11S: Uncaptured**

**16318\_Hydrocad**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Reach 10R: Pro Offsite**

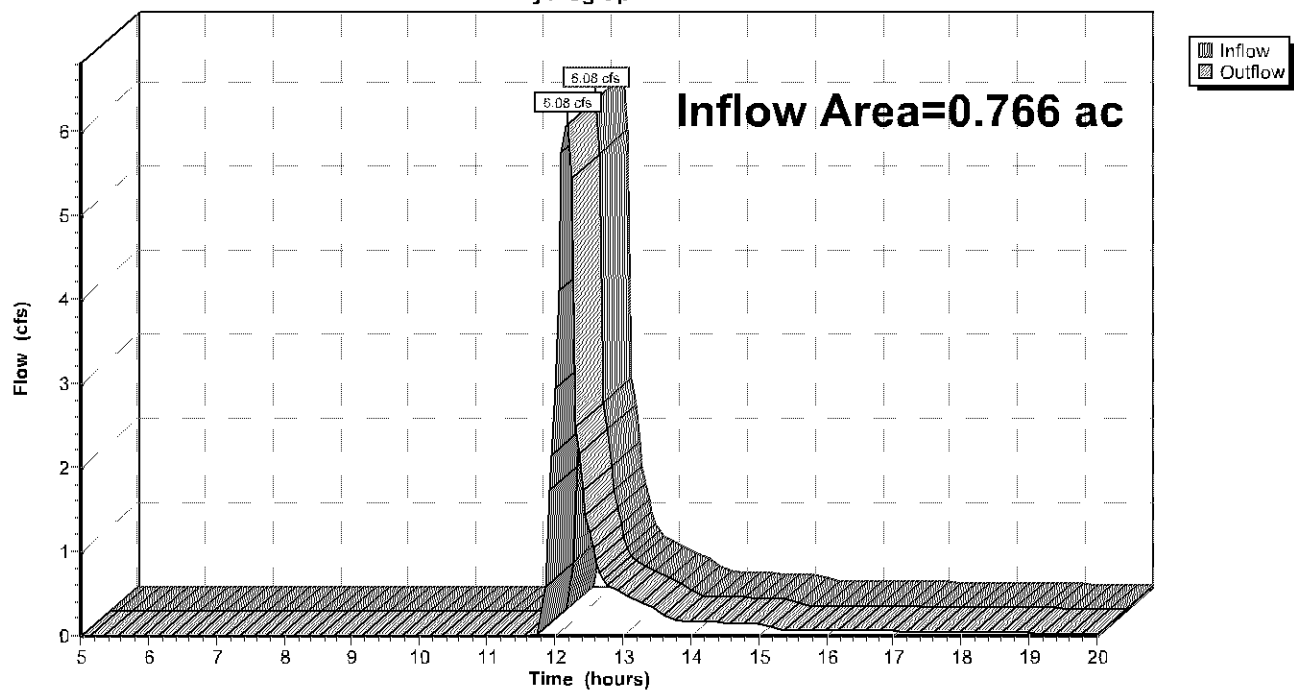
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 80.94% Impervious, Inflow Depth > 4.15" for 100-Year event  
 Inflow = 6.08 cfs @ 12.17 hrs, Volume= 0.265 af  
 Outflow = 6.08 cfs @ 12.17 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 10R: Pro Offsite**

Hydrograph





**16318\_Hydrocad**

MSE 24-hr 3 100-Year Rainfall=7.32"

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**Summary for Pond 10P: Permeable Pavers**

Inflow Area = 0.733 ac, 82.54% Impervious, Inflow Depth > 5.71" for 100-Year event  
 Inflow = 6.98 cfs @ 12.14 hrs, Volume= 0.349 af  
 Outflow = 6.04 cfs @ 12.18 hrs, Volume= 0.296 af, Atten= 13%, Lag= 2.2 min  
 Discarded = 0.04 cfs @ 8.45 hrs, Volume= 0.040 af  
 Primary = 6.00 cfs @ 12.18 hrs, Volume= 0.256 af  
 Routed to Reach 10R : Pro Offsite

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 831.12' @ 12.18 hrs Surf.Area= 1,994 sf Storage= 2,889 cf

Plug-Flow detention time= 56.9 min calculated for 0.296 af (85% of inflow)  
 Center-of-Mass det. time= 17.9 min ( 774.5 - 756.6 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                          |
|--------|---------|---------------|----------------------------------------------------------------------------------------------|
| #1     | 827.50' | 3,190 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)<br>7,976 cf Overall x 40.0% Voids |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 827.50              | 1,994                | 0                         | 0                         |
| 831.50              | 1,994                | 7,976                     | 7,976                     |

| Device | Routing   | Invert  | Outlet Devices                                                                                                                                                                                                                  |
|--------|-----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary   | 827.50' | <b>12.0" Round Culvert</b><br>L= 22.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 827.50' / 827.10' S= 0.0182 ' S= 0.0182 ' Cc= 0.900<br>n= 0.013 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Device 1  | 830.40' | <b>5.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)                                                                                                                                                            |
| #3     | Discarded | 827.50' | <b>0.800 in/hr Exfiltration over Horizontal area</b>                                                                                                                                                                            |

**Discarded OutFlow** Max=0.04 cfs @ 8.45 hrs HW=827.54' (Free Discharge)

↑ **3=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=5.86 cfs @ 12.18 hrs HW=831.09' (Free Discharge)

↑ **1=Culvert** (Inlet Controls 5.86 cfs @ 7.46 fps)

↑ **2=Sharp-Crested Rectangular Weir** (Passes 5.86 cfs of 9.04 cfs potential flow)

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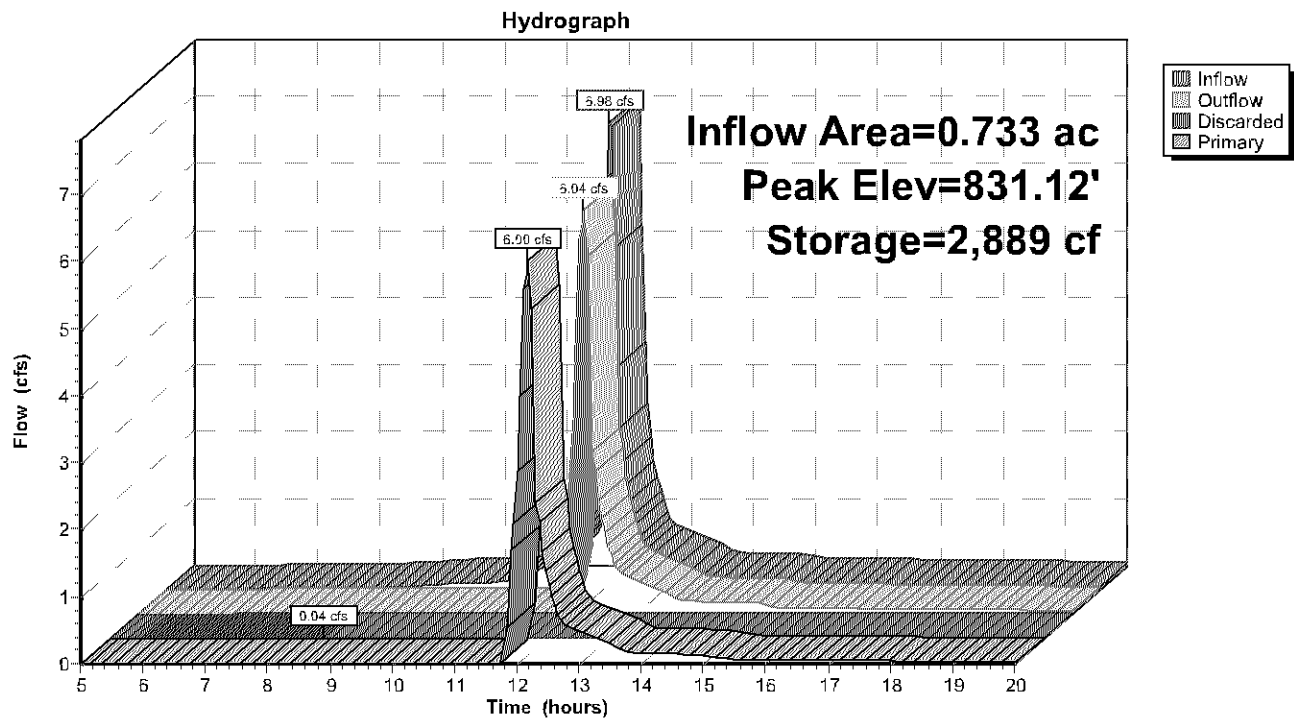
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MSE 24-hr 3 100-Year Rainfall=7.32"

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Pond 10P: Permeable Pavers



**16318\_Hydrocad**

MSE 24-hr 3 100-Year Rainfall=7.32"

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Page 1

**Stage-Area-Storage for Pond 10P: Permeable Pavers**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Horizontal<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-----------------------|-------------------------|
| 827.50              | 1,994              | 1,994                 | 0                       |
| 827.60              | 1,994              | 1,994                 | 80                      |
| 827.70              | 1,994              | 1,994                 | 160                     |
| 827.80              | 1,994              | 1,994                 | 239                     |
| 827.90              | 1,994              | 1,994                 | 319                     |
| 828.00              | 1,994              | 1,994                 | 399                     |
| 828.10              | 1,994              | 1,994                 | 479                     |
| 828.20              | 1,994              | 1,994                 | 558                     |
| 828.30              | 1,994              | 1,994                 | 638                     |
| 828.40              | 1,994              | 1,994                 | 718                     |
| 828.50              | 1,994              | 1,994                 | 798                     |
| 828.60              | 1,994              | 1,994                 | 877                     |
| 828.70              | 1,994              | 1,994                 | 957                     |
| 828.80              | 1,994              | 1,994                 | 1,037                   |
| 828.90              | 1,994              | 1,994                 | 1,117                   |
| 829.00              | 1,994              | 1,994                 | 1,196                   |
| 829.10              | 1,994              | 1,994                 | 1,276                   |
| 829.20              | 1,994              | 1,994                 | 1,356                   |
| 829.30              | 1,994              | 1,994                 | 1,436                   |
| 829.40              | 1,994              | 1,994                 | 1,515                   |
| 829.50              | 1,994              | 1,994                 | 1,595                   |
| 829.60              | 1,994              | 1,994                 | 1,675                   |
| 829.70              | 1,994              | 1,994                 | 1,755                   |
| 829.80              | 1,994              | 1,994                 | 1,834                   |
| 829.90              | 1,994              | 1,994                 | 1,914                   |
| 830.00              | 1,994              | 1,994                 | 1,994                   |
| 830.10              | 1,994              | 1,994                 | 2,074                   |
| 830.20              | 1,994              | 1,994                 | 2,154                   |
| 830.30              | 1,994              | 1,994                 | 2,233                   |
| 830.40              | 1,994              | 1,994                 | 2,313                   |
| 830.50              | 1,994              | 1,994                 | 2,393                   |
| 830.60              | 1,994              | 1,994                 | 2,473                   |
| 830.70              | 1,994              | 1,994                 | 2,552                   |
| 830.80              | 1,994              | 1,994                 | 2,632                   |
| 830.90              | 1,994              | 1,994                 | 2,712                   |
| 831.00              | 1,994              | 1,994                 | 2,792                   |
| 831.10              | 1,994              | 1,994                 | 2,871                   |
| 831.20              | 1,994              | 1,994                 | 2,951                   |
| 831.30              | 1,994              | 1,994                 | 3,031                   |
| 831.40              | 1,994              | 1,994                 | 3,111                   |
| 831.50              | 1,994              | 1,994                 | 3,190                   |

# D - MIDS RESULTS

## Project Information

|                           |                      |
|---------------------------|----------------------|
| Calculator Version:       | Version 4: July 2020 |
| Project Name:             | Gyropolis            |
| User Name / Company Name: | Anderson Engineering |
| Date:                     | 9-27-2022            |
| Project Description:      |                      |
| Construction Permit?:     | Yes                  |

## Site Information

|                                 |       |
|---------------------------------|-------|
| Retention Requirement (inches): | 1.1   |
| Site's Zip Code:                | 55431 |
| Annual Rainfall (inches):       | 31.3  |
| Phosphorus EMC (mg/l):          | 0.3   |
| TSS EMC (mg/l):                 | 54.5  |

## Total Site Area

| Land Cover                                                                      | A Soils<br>(acres) | B Soils<br>(acres) | C Soils<br>(acres)      | D Soils<br>(acres) | Total<br>(acres) |
|---------------------------------------------------------------------------------|--------------------|--------------------|-------------------------|--------------------|------------------|
| Forest/Open Space - Undisturbed, protected forest/open space or reforested land |                    |                    |                         |                    | 0                |
| Managed Turf - disturbed, graded for yards or other turf to be mowed/managed    | 0.192              |                    |                         |                    | 0.192            |
|                                                                                 |                    |                    | Impervious Area (acres) |                    | 0.574            |
|                                                                                 |                    |                    | Total Area (acres)      |                    | 0.766            |

## Site Areas Routed to BMPs

| Land Cover                                                                      | A Soils<br>(acres) | B Soils<br>(acres) | C Soils<br>(acres)      | D Soils<br>(acres) | Total<br>(acres) |
|---------------------------------------------------------------------------------|--------------------|--------------------|-------------------------|--------------------|------------------|
| Forest/Open Space - Undisturbed, protected forest/open space or reforested land |                    |                    |                         |                    | 0                |
| Managed Turf - disturbed, graded for yards or other turf to be mowed/managed    | 0.174              |                    |                         |                    | 0.174            |
|                                                                                 |                    |                    | Impervious Area (acres) |                    | 0.559            |
|                                                                                 |                    |                    | Total Area (acres)      |                    | 0.733            |

## Summary Information

### Performance Goal Requirement

|                                                        |           |                 |
|--------------------------------------------------------|-----------|-----------------|
| Performance goal volume retention requirement:         | 2292      | ft <sup>3</sup> |
| Volume removed by BMPs towards performance goal:       | 2232      | ft <sup>3</sup> |
| <b>Percent volume removed towards performance goal</b> | <b>97</b> | <b>%</b>        |

### Annual Volume and Pollutant Load Reductions

|                                              |           |          |
|----------------------------------------------|-----------|----------|
| Post development annual runoff volume        | 1.3477    | acre-ft  |
| Annual runoff volume removed by BMPs:        | 1.2355    | acre-ft  |
| <b>Percent annual runoff volume removed:</b> | <b>92</b> | <b>%</b> |

|                                                 |           |          |
|-------------------------------------------------|-----------|----------|
| Post development annual particulate P load:     | 0.6048    | lbs      |
| Annual particulate P removed by BMPs:           | 0.554     | lbs      |
| Post development annual dissolved P load:       | 0.495     | lbs      |
| Annual dissolved P removed by BMPs:             | 0.454     | lbs      |
| Total P removed by BMPs                         | 1.008     | lbs      |
| <b>Percent annual total phosphorus removed:</b> | <b>92</b> | <b>%</b> |

|                                    |           |          |
|------------------------------------|-----------|----------|
| Post development annual TSS load:  | 199.8     | lbs      |
| Annual TSS removed by BMPs:        | 183.2     | lbs      |
| <b>Percent annual TSS removed:</b> | <b>92</b> | <b>%</b> |

## BMP Summary

### Performance Goal Summary

| BMP Name         | BMP Volume Capacity (ft <sup>3</sup> ) | Volume Recieved (ft <sup>3</sup> ) | Volume Retained (ft <sup>3</sup> ) | Volume Outflow (ft <sup>3</sup> ) | Percent Retained (%) |
|------------------|----------------------------------------|------------------------------------|------------------------------------|-----------------------------------|----------------------|
| Permeable Pavers | 2313                                   | 2232                               | 2232                               | 0                                 | 100                  |

### Annual Volume Summary

| BMP Name         | Volume From Direct Watershed (acre-ft) | Volume From Upstream BMPs (acre-ft) | Volume Retained (acre-ft) | Volume outflow (acre-ft) | Percent Retained (%) |
|------------------|----------------------------------------|-------------------------------------|---------------------------|--------------------------|----------------------|
| Permeable Pavers | 1.3079                                 | 0                                   | 1.2355                    | 0.0724                   | 94                   |

### Particulate Phosphorus Summary

| BMP Name         | Load From Direct Watershed (lbs) | Load From Upstream BMPs (lbs) | Load Retained (lbs) | Outflow Load (lbs) | Percent Retained (%) |
|------------------|----------------------------------|-------------------------------|---------------------|--------------------|----------------------|
| Permeable Pavers | 0.587                            | 0                             | 0.5545              | 0.0325             | 94                   |

#### Dissolved Phosphorus Summary

| BMP Name         | Load From Direct Watershed (lbs) | Load From Upstream BMPs (lbs) | Load Retained (lbs) | Outflow Load (lbs) | Percent Retained (%) |
|------------------|----------------------------------|-------------------------------|---------------------|--------------------|----------------------|
| Permeable Pavers | 0.4803                           | 0                             | 0.4537              | 0.0266             | 94                   |

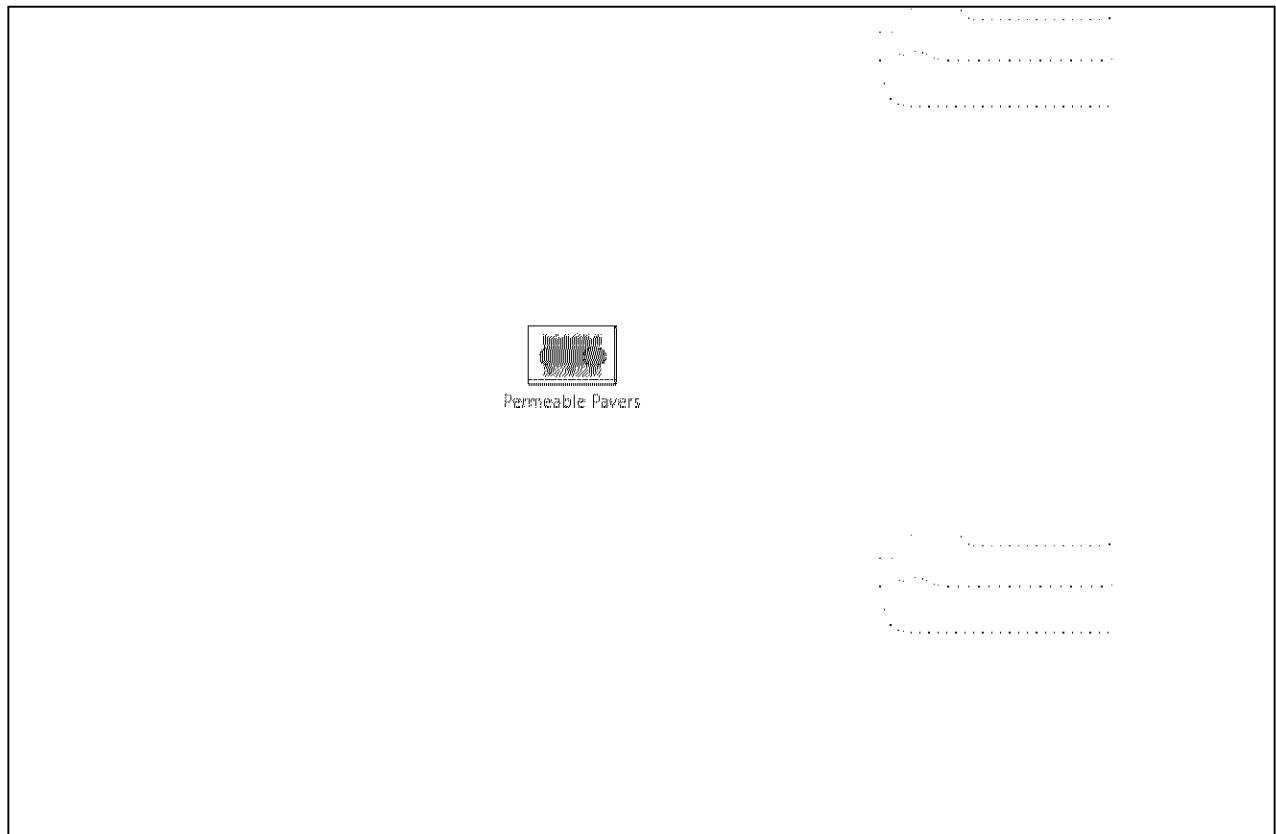
#### Total Phosphorus Summary

| BMP Name         | Load From Direct Watershed (lbs) | Load From Upstream BMPs (lbs) | Load Retained (lbs) | Outflow Load (lbs) | Percent Retained (%) |
|------------------|----------------------------------|-------------------------------|---------------------|--------------------|----------------------|
| Permeable Pavers | 1.0673                           | 0                             | 1.0082              | 0.0591             | 94                   |

#### TSS Summary

| BMP Name         | Load From Direct Watershed (lbs) | Load From Upstream BMPs (lbs) | Load Retained (lbs) | Outflow Load (lbs) | Percent Retained (%) |
|------------------|----------------------------------|-------------------------------|---------------------|--------------------|----------------------|
| Permeable Pavers | 193.88                           | 0                             | 183.15              | 10.73              | 94                   |

#### BMP Schematic





E - STORM SEWER SIZING WORKSHEET

GYROPOLIS

STORM SIZING WORK SHEET

AE PROJ #16318

DATE: 9/27/2022

"C" Values

Imp.0.9

Per.0.3

Project Location

Possible Regions

Minnesota3,4

Designed For

Region3

Storm (yr)10

DESIGN CHECKS

| Pipe Run |     |        |      | Flow Calculation |           |            |         |            |                                |              |         |            |           | Pipe Sizing   |           |           |                |                |               | Pipe Properties |                   | Cover          |                |                  |                                        |                          |                 | Pipe Capacity    |      | Pipe Cover |      |
|----------|-----|--------|------|------------------|-----------|------------|---------|------------|--------------------------------|--------------|---------|------------|-----------|---------------|-----------|-----------|----------------|----------------|---------------|-----------------|-------------------|----------------|----------------|------------------|----------------------------------------|--------------------------|-----------------|------------------|------|------------|------|
|          |     |        |      | Per. Area        | Imp. Area | Total Area | Area    | Cumm. Area | Time of Conc (T <sub>c</sub> ) | Intensity    | Q = cIA | Q cumm Q10 | Pipe size | Pipe Material | slope     | k         | Pipe           |                | Length of     | Invert Upstream | Invert Downstream | Minimu m Cover | Depth Upstream | Depth Downstream | Pipe inc Flow as Perc. of Capacity (%) | Flow Capacity Condition? | Pipe Cover (ft) | Cover Condition? |      |            |      |
|          |     |        |      |                  |           |            |         |            |                                |              |         |            |           |               |           |           |                |                |               |                 |                   |                |                |                  |                                        |                          |                 |                  |      |            |      |
| Struc.   | Rim | Struc. | Rim  | (sf)             | (sf)      | (sf)       | (acres) | "c" value  | (min.)                         | I (in/24 hr) | (cfs)   | (cfs)      | (in.)     | (material)    | Slope (%) | Manning's | Capacity (cfs) | Velocity (fps) | Pipe Run (ft) | Upstream        | (ft)              | (ft)           | (ft)           | (ft)             |                                        |                          |                 |                  |      |            |      |
| CBMH     | 3   | 833.00 | CB   | 2                | 833.80    | 543        | 4,891   | 5,434      | 0.12                           | 0.84         | 5.00    | 6.07       | 0.64      | 1.04          | 12        | HDPE      | 2.10           | 42.1           | 6.10          | 4.98            | 52                | 827.50         | 826.41         | 4.40             | 5.50                                   | 7.39                     | 17.0%           | GOOD             | 4.40 | GOOD       |      |
| CBMH     | 4   | 834.10 | CBMH | 3                | 833.00    | 136        | 773     | 909        | 0.02                           | 0.81         | 5.00    | 6.07       | 0.10      | 0.40          | 12        | HDPE      | 1.10           | 42.1           | 4.42          | 2.97            | 65                | 828.60         | 827.89         | 4.02             | 5.50                                   | 5.12                     | 9.1%            | GOOD             | 4.02 | GOOD       |      |
| CBMH     | 5   | 834.40 | CBMH | 4                | 834.10    | 0          | 685     | 685        | 0.02                           | 0.90         | 5.00    | 6.07       | 0.09      | 0.30          | 12        | HDPE      | 0.90           | 42.1           | 3.99          | 2.50            | 45                | 829.30         | 828.90         | 4.00             | 5.10                                   | 5.21                     | 7.5%            | GOOD             | 4.00 | GOOD       |      |
| CB       | 6   | 834.00 | CBMH | 5                | 834.40    | 88         | 1,673   | 1,761      | 0.04                           | 0.87         | 5.00    | 6.07       | 0.21      | 0.21          | 12        | HDPE      | 1.00           | 42.1           | 4.21          | 2.23            | 27                | 829.70         | 829.43         | 3.20             | 4.30                                   | 4.97                     | 5.1%            | GOOD             | 3.20 | GOOD       |      |
| CBMH     | 8   | 834.00 | CBMH | 7                | 833.10    | 261        | 4,959   | 5,220      | 0.12                           | 0.87         | 5.00    | 6.07       | 0.63      | 0.63          | 12        | HDPE      | 2.30           | 42.1           | 6.39          | 4.44            | 107               | 827.50         | 825.04         | 5.40             | 6.50                                   | 8.06                     | 9.9%            | GOOD             | 5.40 | GOOD       |      |
| CB       | 9   | 832.50 | CBMH | 7                | 833.10    | 532        | 4,789   | 5,321      | 0.12                           | 0.84         | 5.00    | 6.07       | 0.62      | 0.62          | 12        | HDPE      | 3.00           | 42.1           | 7.29          | 4.80            | 40                | 827.50         | 826.30         | 3.90             | 5.00                                   | 6.80                     | 8.5%            | GOOD             | 3.90 | GOOD       |      |
|          |     |        |      |                  |           |            |         | 0          | 0.00                           | -            | 5.00    | 6.07       | 0         | 0.00          |           |           | #DIV/0!        |                |               |                 |                   | 0.00           | -              | 0.00             | 0.00                                   |                          |                 |                  |      | #N/A       | #N/A |
|          |     |        |      |                  |           |            |         | 0          | 0.00                           | -            | 5.00    | 6.07       | 0         | 0.00          |           |           | #DIV/0!        |                |               |                 |                   | 0.00           | -              | 0.00             | 0.00                                   |                          |                 |                  |      | #N/A       | #N/A |



F - CIVIL PLANS

EXISTING CONDITIONS SURVEY  
FOR: HTG ARCHITECTS

SITE ADDRESSES:

2325 90th Street West, (Lot 1)  
AND  
9000 Penn Avenue South, (Lot 2)  
Bloomington, Minnesota.

LEGAL DESCRIPTION:

Lot 1 Block 1, WINCHELL'S ADDITION, Hennepin County County, Minnesota.  
AND  
Lot 2 Block 1, WINCHELL'S ADDITION, Except Road, Hennepin County County, Minnesota.

SURVEY NOTES:

- The horizontal datum and bearings are based on the Hennepin County Coordinate System NAD83(2011).
- The vertical datum is NAVD 88. The site benchmark is the top nut of the hydrant located near the southwest corner of Lot 1 (depicted hereon). Elevation = 837.37 feet.
- The area of Lot 1 is 13,304 square feet or 0.3054 acres.  
The area of Lot 2 is 18,958 square feet or 0.4352 acres. The area of Lot 2, less the lands per HENNEPIN COUNTY HIGHWAY RIGHT-OF-WAY PLAT NO. 69, is 18,758 square feet or 0.4306 acres.
- The location and extent of underground utilities, if shown, are based upon existing drawings provided by the utility companies, above ground evidence and Gopher State One Call markings per ticket number 220060272 and 220060275. Exclusive of excavation, there is no guarantee as to the accuracy or the completeness of this information. The size and location should be considered approximate. Additional underground utilities may be present. Verification of the existence and location of all utilities should be obtained from the utility owners prior to any planning or design. In accordance with State Statute, the location of utilities shall be confirmed prior to any demolition or construction.
- The tree information shown hereon was collected during the field survey by non-forestry trained Anderson Engineering of Minnesota survey personnel. Tree sizes are estimates and locations are accurate to plus or minus three feet.
- No title work was provided for the preparation of this survey to verify the legal description or the existence of any easements or encumbrances.
- At the time of this survey, portions of the subject property were covered in significant amounts of snowfall, snow piles and ice. Some catch basins were observed to be full of ice and snow. Some improvements may not be depicted.
- According to the City of Bloomington, the subject property is zoned B-4 (Neighborhood Commercial Center) and has the building setback requirements listed below. It is recommended that the property owner obtain a zoning letter from the City to verify all conditions that affect the property through the city zoning ordinance. This survey does not purport to describe all conditions contained in said ordinance.

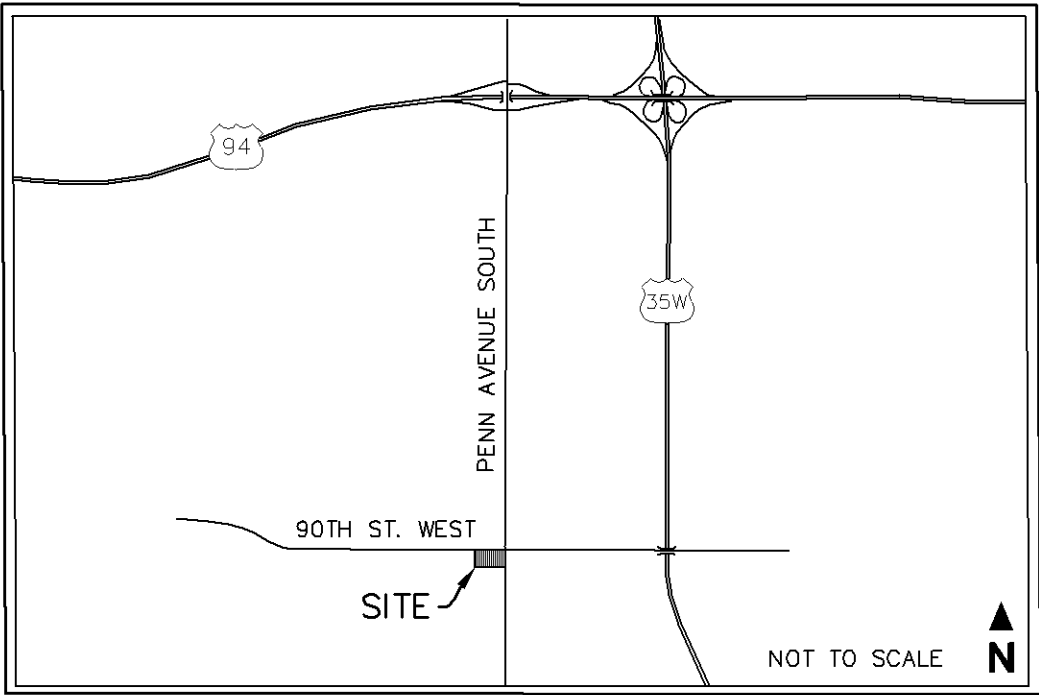
BUILDING SETBACKS

Front = 10 feet  
Side = 10 feet  
Rear = 15 feet

LEGEND

|  |                                              |  |                      |
|--|----------------------------------------------|--|----------------------|
|  | CATCH BASIN                                  |  | CONIFEROUS TREE      |
|  | ELECTRIC BOX                                 |  | DECIDUOUS TREE       |
|  | ELECTRIC METER                               |  | COMMUNICATION        |
|  | GAS METER                                    |  | FENCE                |
|  | GUARD POST                                   |  | GAS MAIN             |
|  | HANDICAP PARKING                             |  | OVERHEAD WIRES       |
|  | HYDRANT                                      |  | SANITARY SEWER       |
|  | LIGHT POLE                                   |  | STORM SEWER          |
|  | MANHOLE                                      |  | UNDERGROUND ELECTRIC |
|  | MANHOLE NOT FIELD VERIFIED                   |  | WATER MAIN           |
|  | POWER POLE                                   |  | BITUMINOUS SURFACE   |
|  | POWER POLE ANCHOR                            |  | CONCRETE SURFACE     |
|  | ROOF DRAIN                                   |  | LANDSCAPE ROCK       |
|  | SANITARY MANHOLE                             |  | LANDSCAPE WOODCHIPS  |
|  | SEMAPHORE                                    |  | DEPRESSION CONTOUR   |
|  | SIGN                                         |  | CAST IRON PIPE       |
|  | WATER VALVE                                  |  | VITRIFIED CLAY PIPE  |
|  | FOUND IRON MONUMENT                          |  |                      |
|  | SET 1/2"X14" IRON PIPE MARKED L.S. NO. 43501 |  |                      |
|  | SCRIBED "X" IN SURFACE                       |  |                      |

VICINITY MAP



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Minneapolis, MN 55347  
Tel: 952.278.8880  
Fax: 952.278.8822

PROJECT

GYROPOLIS

ADDITION/REMODELING

2325 W 90TH ST  
BLOOMINGTON, MINNESOTA

ISSUED SET

REVISIONS

| DATE    | NO. |                |
|---------|-----|----------------|
| 9/27/22 | 1   | CITY SUBMITTAL |
|         |     |                |
|         |     |                |
|         |     |                |
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|         |     |                |
|         |     |                |

I HEREBY CERTIFY THAT THIS SURVEY WAS  
PREPARED BY ME OR UNDER MY DIRECT  
SUPERVISION, AND THAT I AM A DULY LICENSED  
LAND SURVEYOR UNDER THE LAWS OF THE  
STATE OF MINNESOTA.

David Anderson, LS

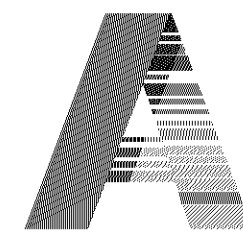
DAVID ANDERSON, LS

43501

MN. REG. NO.

1/28/22

DATE



ANDERSON

13605 1st Avenue N., #100  
Plymouth, MN 55441 | ae-mn.com  
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Anderson Engineering of Minnesota, LLC

EXISTING  
CONDITIONS  
SURVEY

DRAWN BY: BF CHECKED BY: BF

C1





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PROJECT

GYROPOLIS

ADDITION/REMODELING

2325 W 90TH ST  
BLOOMINGTON, MINNESOTA

ISSUED SET

REVISIONS

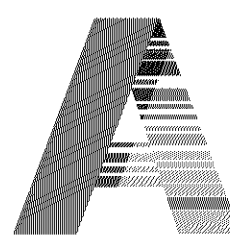
DATE NO. CITY SUBMITTAL  
9/27/22 1

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION  
OR REPORT WAS PREPARED BY ME OR UNDER MY  
DIRECT SUPERVISION, AND THAT I AM A DULY  
LICENSED CIVIL ENGINEER UNDER THE  
LAWS OF THE STATE OF MINNESOTA

NOT FOR CONSTRUCTION

Brian Field, PE

56013 09/27/2022  
REG. NO. DATE



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P 763.412.4000 | F 763.412.4090  
Anderson Engineering of Minnesota, LLC

DEMOLITION  
PLAN

DRAWN BY: BF CHECKED BY: BF

C2

KEY NOTES

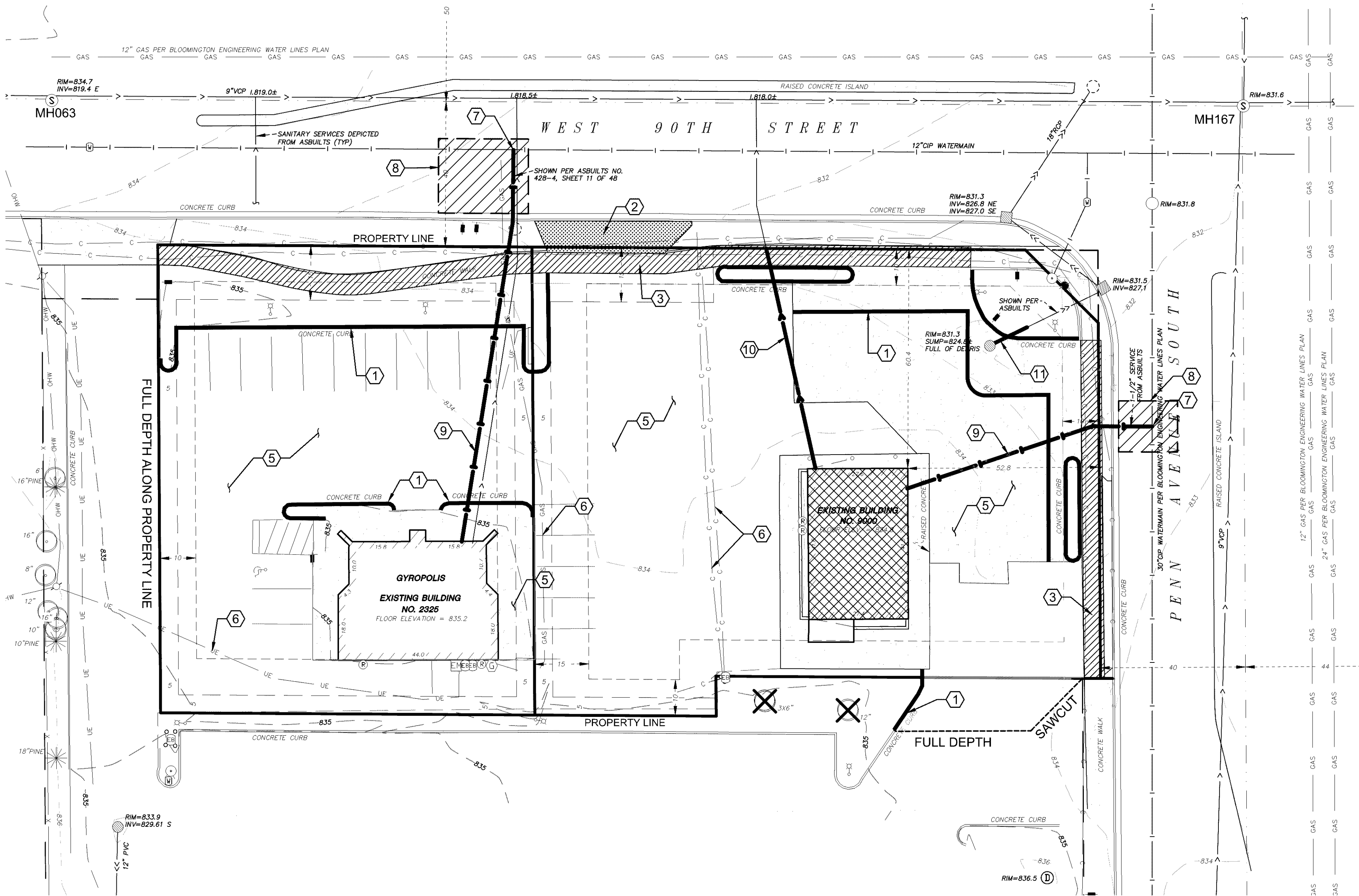
- 1 REMOVE EXISTING CONCRETE CURB AND GUTTER (TYP.).
- 2 REMOVE EXISTING CONCRETE APRON. RESTORE WEST 90TH ST PAVEMENT, CONCRETE CURB AND GUTTER, AND BOULEVARD PER CITY OF BLOOMINGTON STANDARDS.
- 3 REMOVE EXISTING CONCRETE WALK PER LIMITS SHOWN.
- 4 REMOVE EXISTING GAS STATION STRUCTURE IN ITS ENTIRETY.
- 5 REMOVE EXISTING PAVEMENT WITHIN CONSTRUCTION LIMITS.
- 6 CONTRACTOR TO COORDINATE RELOCATION OF EXISTING UNDERGROUND SERVICE WITH RESPECTIVE UTILITY COMPANY
- 7 ABANDON WATER SERVICE AT MAIN PER CITY STANDARDS
- 8 REMOVE & REPLACE IN-KIND FOR UTILITY CONNECTIONS. PROVIDE STAGE APPROPRIATE TRAFFIC CONTROL MEASURES PER MUTCD
- 9 REMOVE EXISTING WATER SERVICE
- 10 REMOVE EXISTING SANITARY SEWER SERVICE TO ROW LINE
- 11 REMOVE EXISTING STORM SEWER AND MANHOLE AS SHOWN

GENERAL NOTES

1. UTILITIES SHOWN HERE ARE FOR INFORMATIONAL USE ONLY AND ARE NOT GUARANTEED IN THEIR ACCURACY. VERIFY WORK. NOTIFY ENGINEER OF ANY/ALL DISCREPANCIES IMMEDIATELY.
2. CONTRACTOR SHALL HIRE PRIVATE UTILITY LOCATOR AS NECESSARY TO VERIFY UNDERGROUND UTILITIES. UTILITIES SHOWN ON PLANS MAY VARY FROM EXISTING CONDITIONS, AND CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED TO UTILITY LINES SHOWN, NOT SHOWN, OR SHOWN INCORRECTLY.
3. UTILITIES MUST BE LOCATED PRIOR TO EXCAVATION OR GRADING ON ANY SITE. CALL GOPHER SATE ONE CALL AT 1-800-252-1166 AS SOON AS POSSIBLE TO SCHEDULE UTILITY LOCATIONS FOR THIS SITE.
4. A MINIMUM OF 24-HOUR NOTICE IS REQUIRED WHEN SCHEDULING INSPECTIONS. PLEASE FORWARD THIS INFORMATION TO ANY AND ALL AFFECTED SUB-CONTRACTORS FOR THIS PROJECT.

LEGEND

- |   |                               |   |                                    |
|---|-------------------------------|---|------------------------------------|
| — | PROPERTY LIMITS               | ⊗ | EXISTING SANITARY MANHOLE          |
| — | EXISTING WATERMAIN            | ⊗ | EXISTING STORM SEWER INLET         |
| — | EXISTING SANITARY SEWER       | ⊗ | REMOVE EXISTING BUILDING STRUCTURE |
| — | EXISTING STORM SEWER          | ⊗ | REMOVE EXISTING APRON              |
| — | EXISTING FENCE                | ⊗ | REMOVE EXISTING CONCRETE WALK      |
| — | EXISTING GAS MAIN             | ⊗ | REMOVE EXISTING CONCRETE C&G       |
| — | EXISTING OVERHEAD WIRES       | ⊗ | REMOVE TREE                        |
| — | EXISTING TELEPHONE            | ⊗ |                                    |
| — | EXISTING UNDERGROUND ELECTRIC | ⊗ |                                    |
| — | EXISTING HYDRANT AND GV       | ⊗ |                                    |

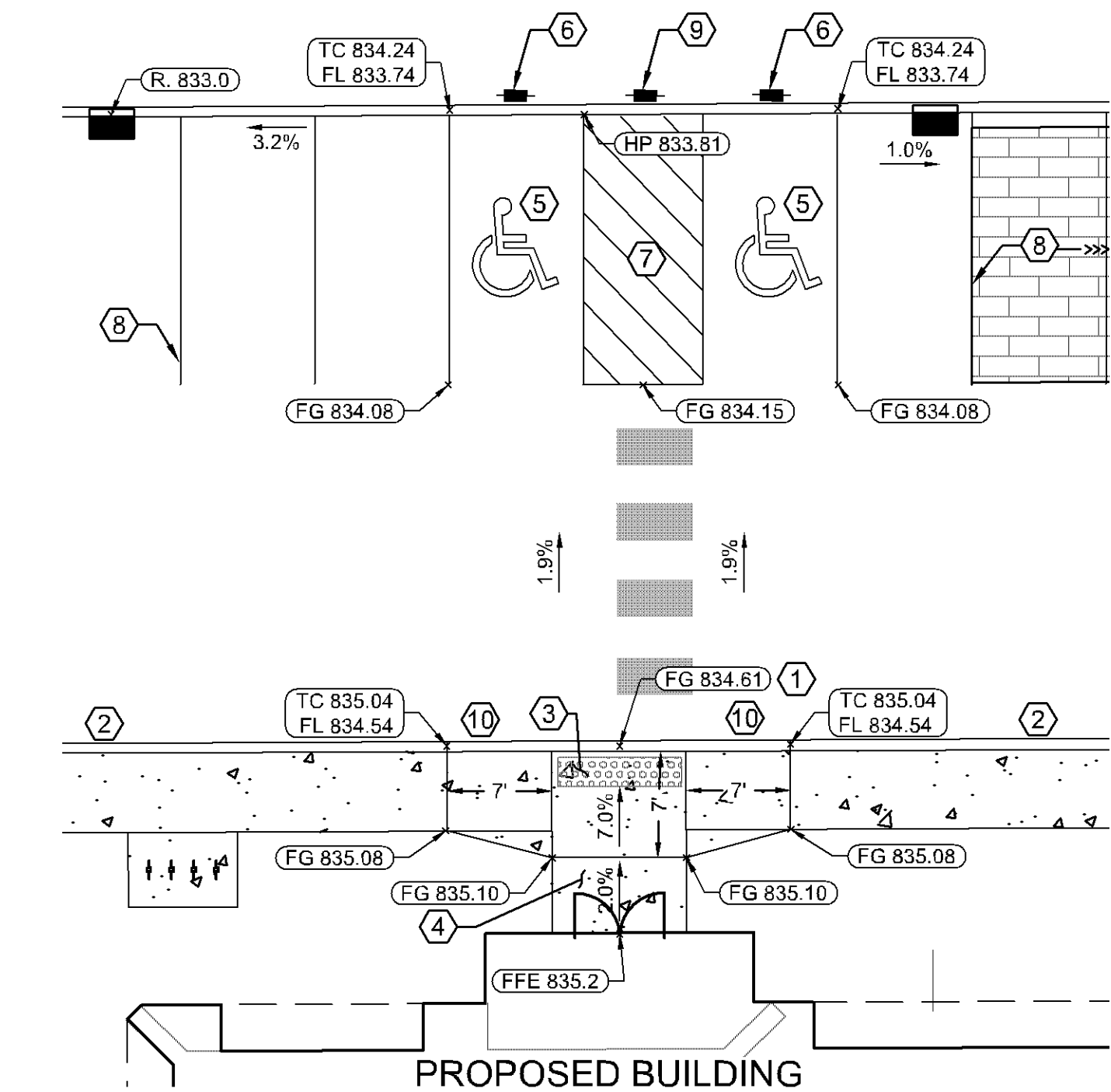


CALL 48 HOURS BEFORE DIGGING  
Utilities Underground Location Center  
DIAL 811

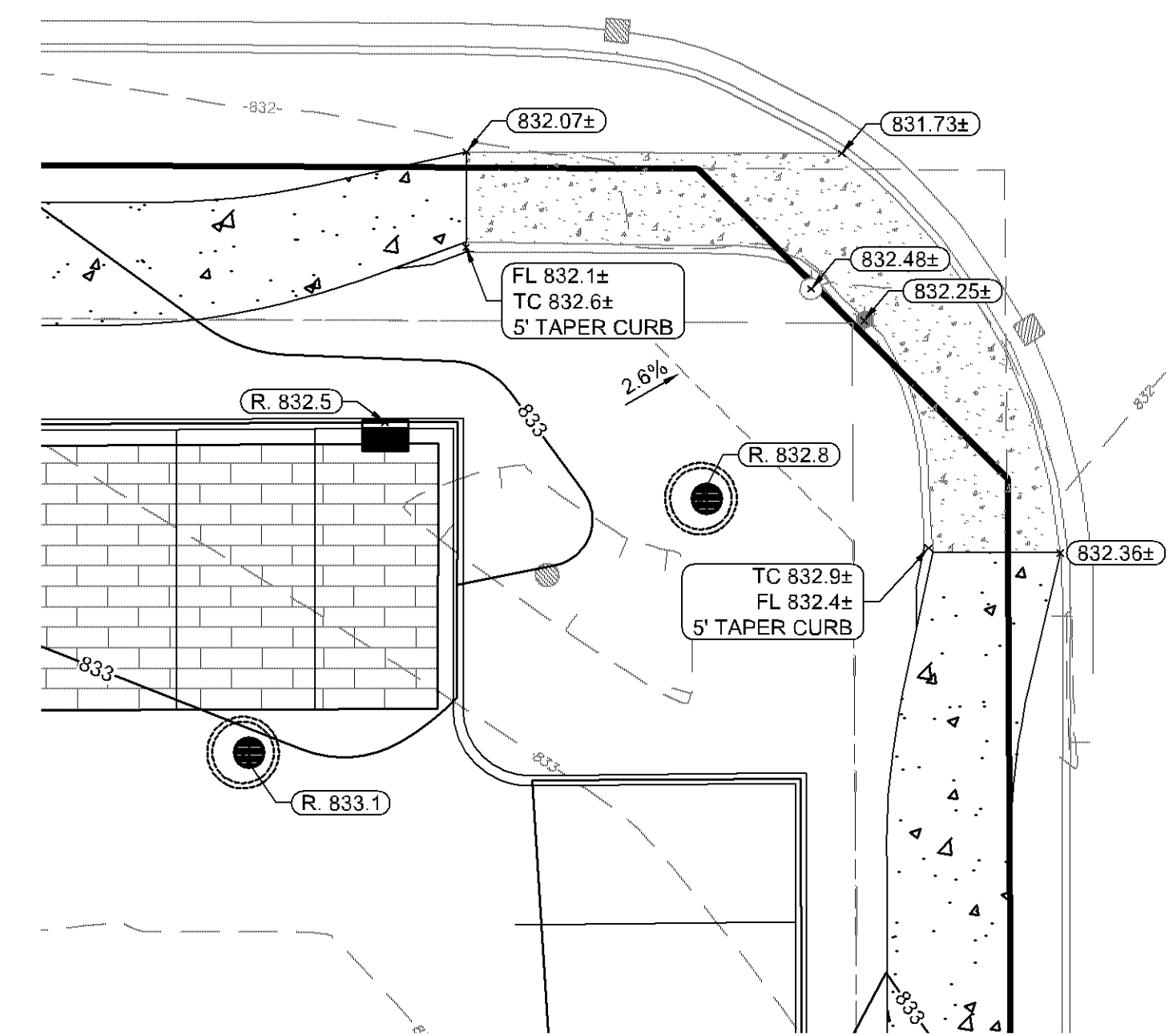


Know what's below,  
Call before you dig.





1 PEDESTRIAN CURB RAMP ENLARGEMENT  
SCALE: 1"=10'



2 NE CORNER ENLARGEMENT  
SCALE: 1"=10'

CALL 48 HOURS BEFORE DIGGING  
Utilities Underground Location Center  
DIAL 811

**811**

Know what's below,  
Call before you dig.

## KEY NOTES

- 0" CURB HEIGHT FOR FULL LENGTH OF CONCRETE WALK.
- FULL CURB HEIGHT
- DETECTABLE WARNING MAY BE PART OF 4'X4' LANDING AREA IF IT IS NOT FEASIBLE TO CONSTRUCT THE LANDING OUTSIDE OF THE DETECTABLE WARNING AREA.
- 4' BY 4' MIN. LANDING WITH MAX. 2.0% SLOPE IN ALL DIRECTIONS
- WHITE REFLECTIVE PAINT RECTANGLE CENTERED AROUND ACCESSIBILITY PARKING SYMBOL. LINE TO BE 3 INCHES WIDE, OVER A WIDTH OF 36 INCHES AND HEIGHT OF 41 INCHES PER 2009 MUTCD CODE FIGURE 3B.20.
- HANDICAP STALL SIGN TO COMPLY WITH 2020 MN ACCESSIBILITY CODE 502.7
- 4" PAINTED DIAGONAL LINES 45° - 3" CENTER TO CENTER.
- 4" PAINTED PARKING STALL LINES.
- NO PARKING SIGN. MUTCD R8-3. INSTALL MIN. OF 60" TO MAX. OF 66" HIGH MEASURED FROM HEAD OF ACCESS AISLE PAVEMENT ELEVATION TO BOTTOM OF SIGN PER 2020 MN ACCESSIBILITY CODE 502.4.4.
- VARIABLE HEIGHT CURB

## CONTRACTOR NOTES

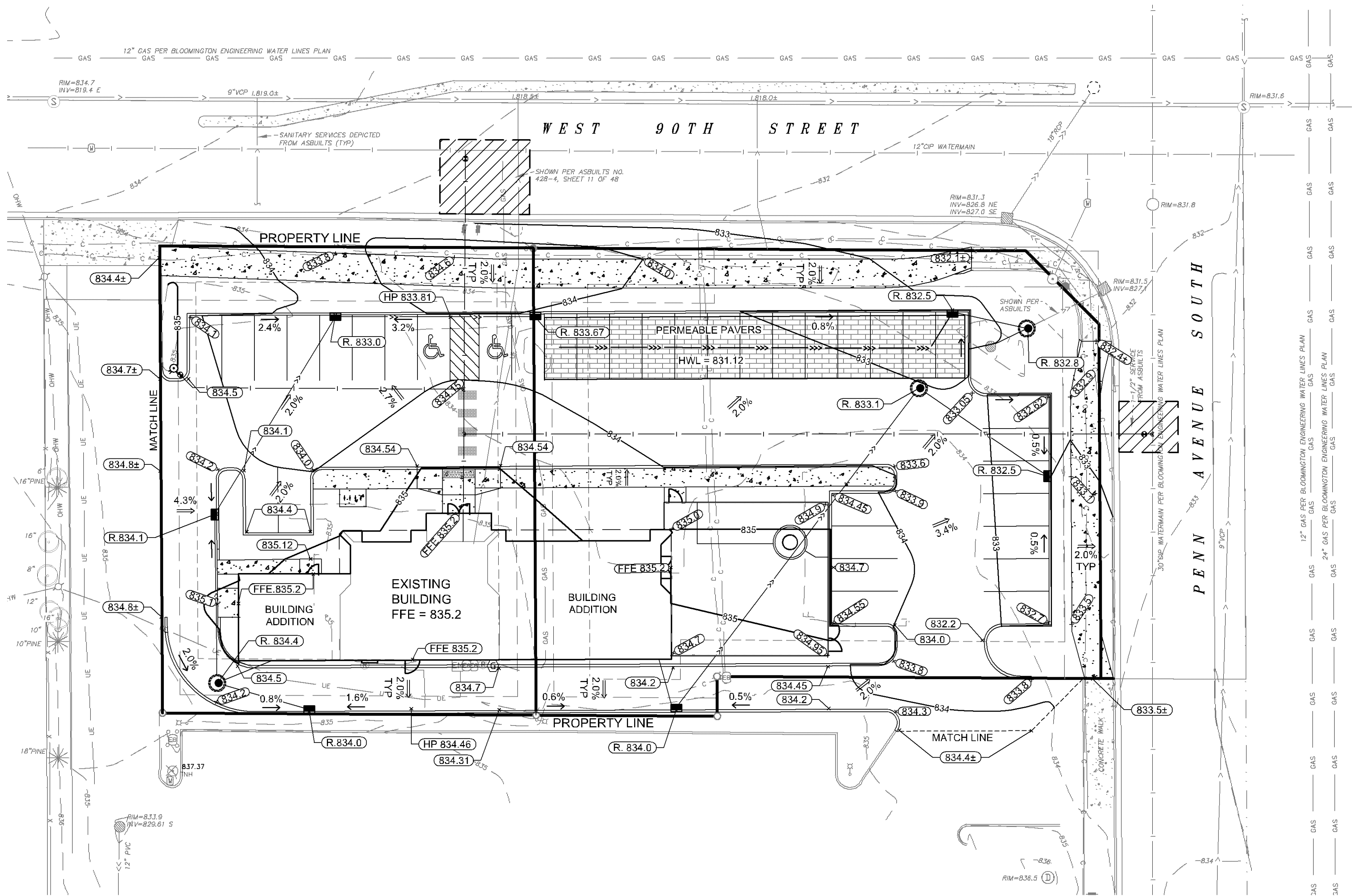
- PROPOSED SPOT ELEVATIONS ARE TO TOP OF FINISHED SURFACE UNLESS OTHERWISE NOTED IN LEGEND.
- ALL CONSTRUCTION OF HANDICAP STALLS, ROUTES, & CURB RAMPS TO COMPLY WITH THE 2020 MN ACCESSIBILITY CODE.
- CONTRACTION JOINTS SHALL BE CONSTRUCTION ALONG ALL GRADE BREAKS. ALL GRADE BREAKS SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL.
- TO ENSURE RAMPS & LANDINGS ARE PROPERLY CONSTRUCTED, LANDINGS MAY BE CAST SEPARATELY.
- ALL SLOPES ARE ABSOLUTE, RATHER THAN RELATIVE TO SIDEWALK/ROADWAY GRADES.
- TOP OF CURB SHALL MATCH PROPOSED ADJACENT WALK GRADE. FOUR FOOT MIN WIDTH OF DETECTABLE WARNING IS REQUIRED FOR ALL RAMPS. DETECTABLE WARNINGS SHALL CONTINUOUSLY EXTEND FOR A MIN. OF 24" IN THE PATH OF TRAVEL.

## SPOT ELEVATION KEY

|    |                       |
|----|-----------------------|
| ±  | EXISTING GRADE        |
| HP | HIGH POINT ELEVATION  |
| TC | TOP OF CURB ELEVATION |
| R  | RIM ELEVATION         |
| I  | INVERT ELEVATION      |

## LEGEND

|     |                         |
|-----|-------------------------|
| --- | PROPERTY LIMITS         |
| --- | EXISTING MINOR CONTOUR  |
| --- | EXISTING MAJOR CONTOUR  |
| --- | PROPOSED MINOR CONTOUR  |
| --- | PROPOSED MAJOR CONTOUR  |
| ×   | EXISTING SPOT ELEVATION |
| →   | DRAINAGE ARROW          |
| --- | PROPOSED CONCRETE C&G   |

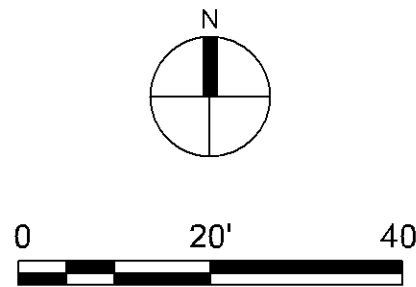




| STRUCTURE SCHEDULE |           |         |               |
|--------------------|-----------|---------|---------------|
| STRUCTURE NUMBER   | SIZE      | CASTING | NOTES         |
| OSC-1              | 60"—DIA   | R-1642  | SOLID "STORM" |
| CB-2               | 48"—DIA   | R-3067  | —             |
| CBMH-3             | 48"—DIA   | R-3067  | —             |
| CBMH-4             | 48"—DIA   | R-3067  | —             |
| STMH-5             | 48"—DIA   | R-1642  | SOLID "STORM" |
| CB-6               | 2'X3' REC | R-3067  | —             |
| STMH-7             | 48" DIA   | R-1642  | SOLID "STORM" |
| CB-8               | 2'X3' REC | R-3067  | —             |
| CB-9               | 2'X3' REC | R-3067  | —             |
| CB-10              | 2'X3' REC | R-3067  | —             |

- ① WET TAP EXISTING 12" WATER MAIN WITH SADDLE AND 6" GATE VALVE. REMOVE EXISTING SERVICE PER CITY OF BLOOMINGTON STANDARDS.
- ② INSTALL 6" GATE VALVE AND RISER BOX.
- ③ INSTALL 6" - HDPE INTERNAL ROOF DRAIN FOR BUILDING ADDITION. COORDINATE FINAL LOCATION AND TYPE WITH MASTER PLUMBER.
- ④ REMOVE AND REPLACE IN- KIND FOR UTILITY CONNECTION PROVIDE STAGE APPROPRIATE VEHICLE AND PEDESTRIAN TRAFFIC CONTROL MEASURES PER MUTCD.
- ⑤ PROTECT EXISTING SANITARY SERVICE IN PLACE.
- ⑥ ABANDONED WATER SERVICE AT MAIN PER CITY STANDARDS.
- ⑦ INSTALL 6" HYDRANT LEAD WITH GATE VALVE (10 C6)
- ⑧ WET TAP EXISTING 30" WATER MAIN WITH SADDLE AND 6" GATE VALVE.
- ⑨ INSTALL 6X6 TEE

|                                                                                     |                             |
|-------------------------------------------------------------------------------------|-----------------------------|
|  | PROPERTY LIMITS             |
|  | EXISTING WATERMAIN          |
|  | EXISTING SANITARY SEWER     |
|  | EXISTING STORM SEWER        |
|  | PROPOSED WATERMAIN          |
|  | PROPOSED STORM SEWER        |
|  | PROPOSED STORM INLETS       |
|  | PROPOSED CONCRETE WALK      |
|  | PROPOSED BITUMINOUS ASPHALT |



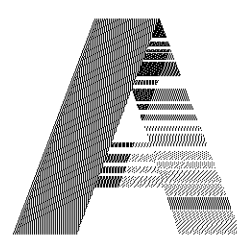
9300 Hennepin Town Road  
Minneapolis, MN 55347  
Tel: 952.278.8880  
Fax: 952.278.8822

# GYROPOLIS

2325 W 90TH ST  
BLOOMINGTON, MINNESOTA

DATE NO. CITY SUBMITTAL  
9/27/22 1

56013 09/27/2022  
REG. NO. DATE



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Plymouth, MN 55441 | [ae-mn.com](mailto:ae-mn.com)  
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Anderson Engineering of Minnesota, LLC

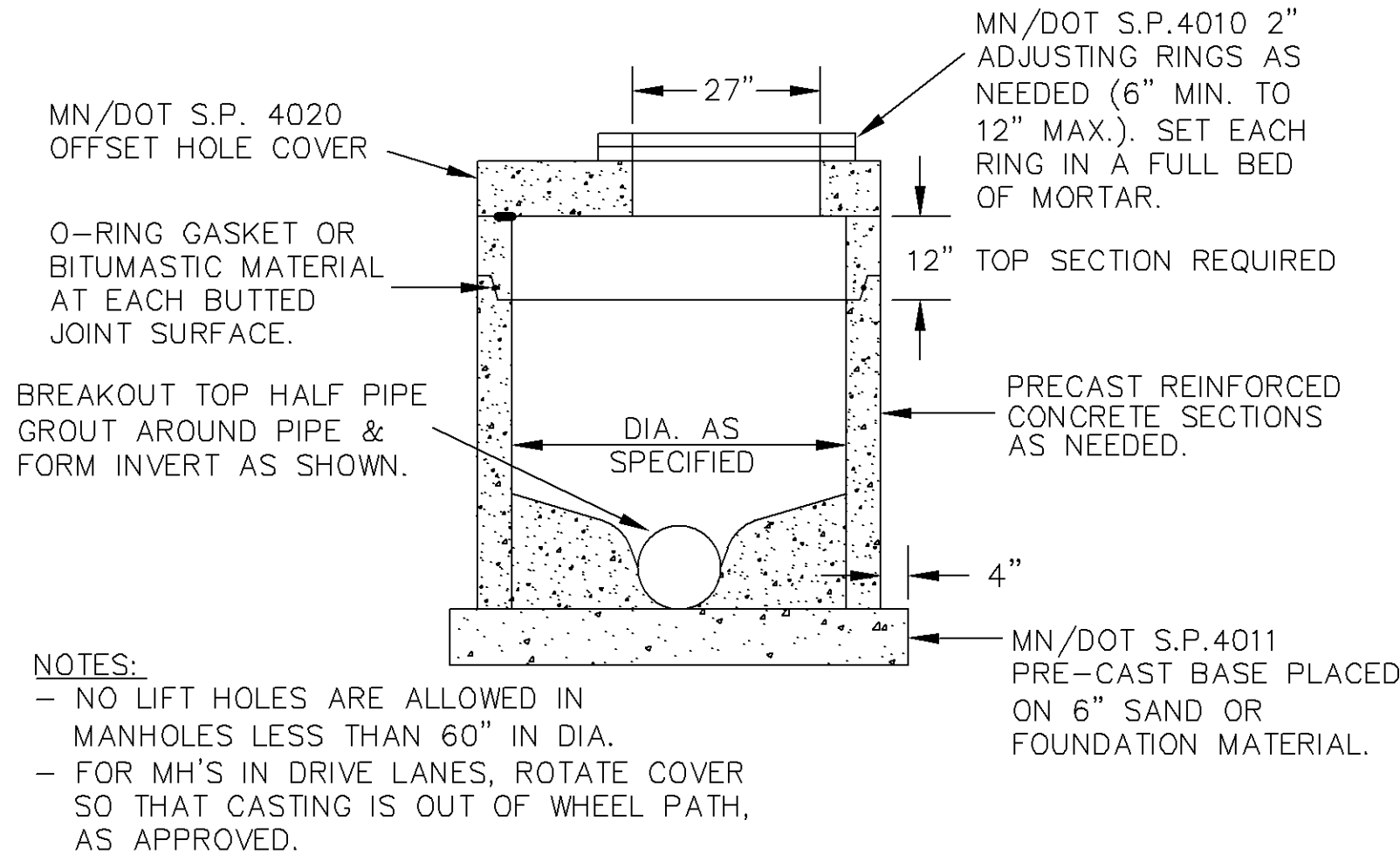
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# C4



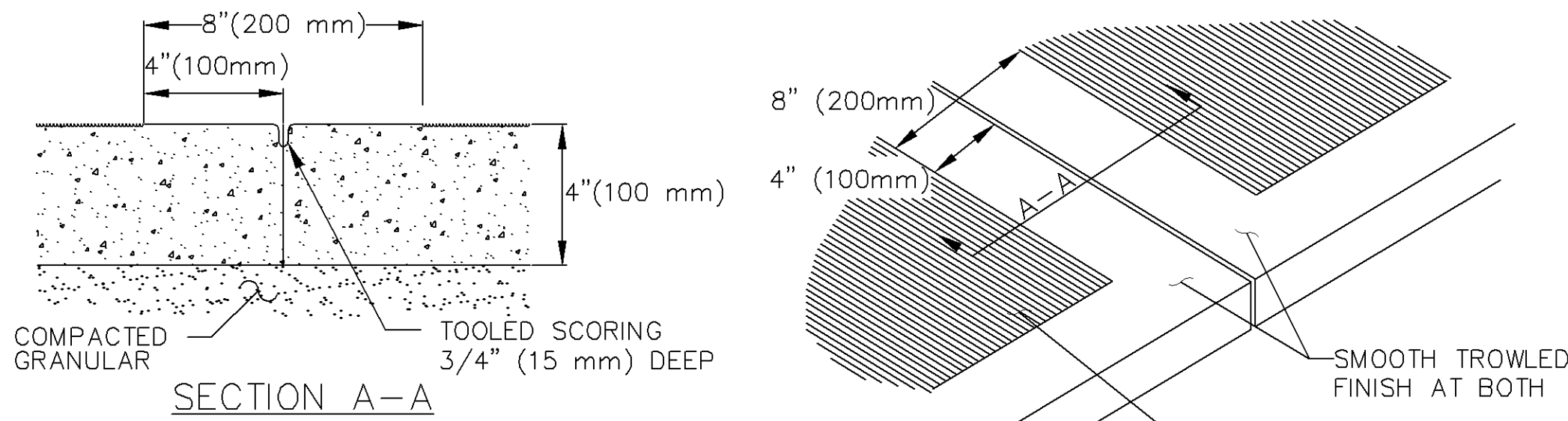






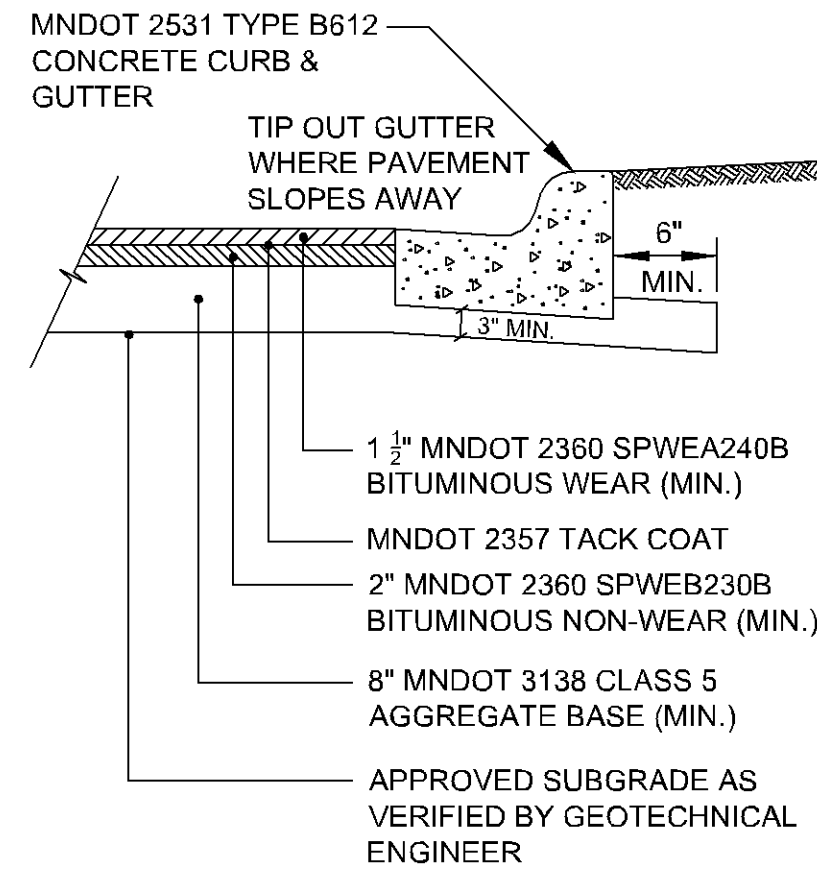
1 STANDARD MANHOLE DETAIL

SCALE: N.T.S.



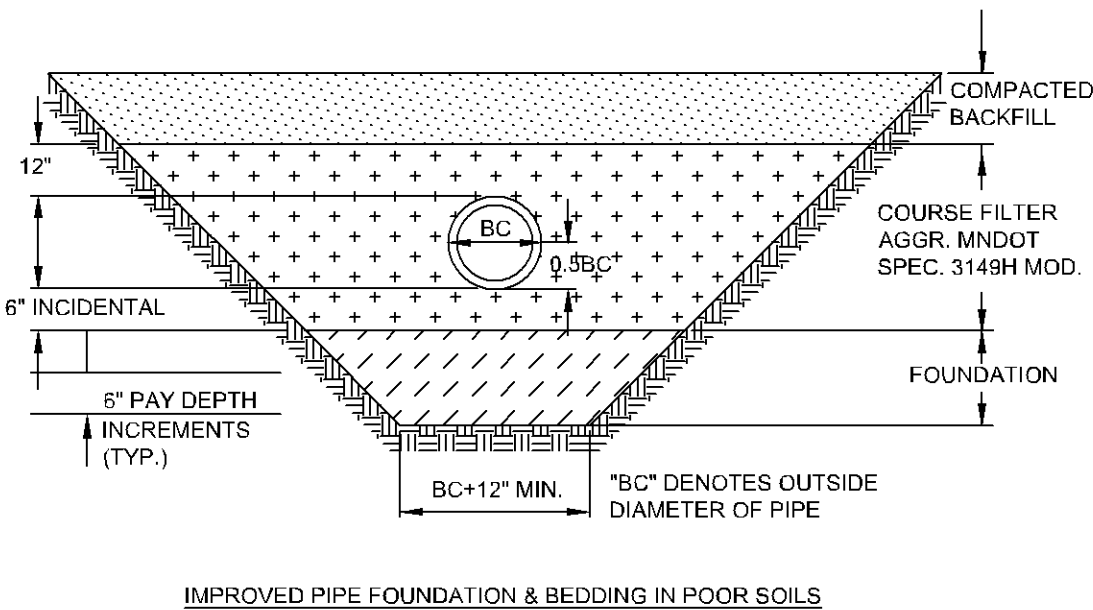
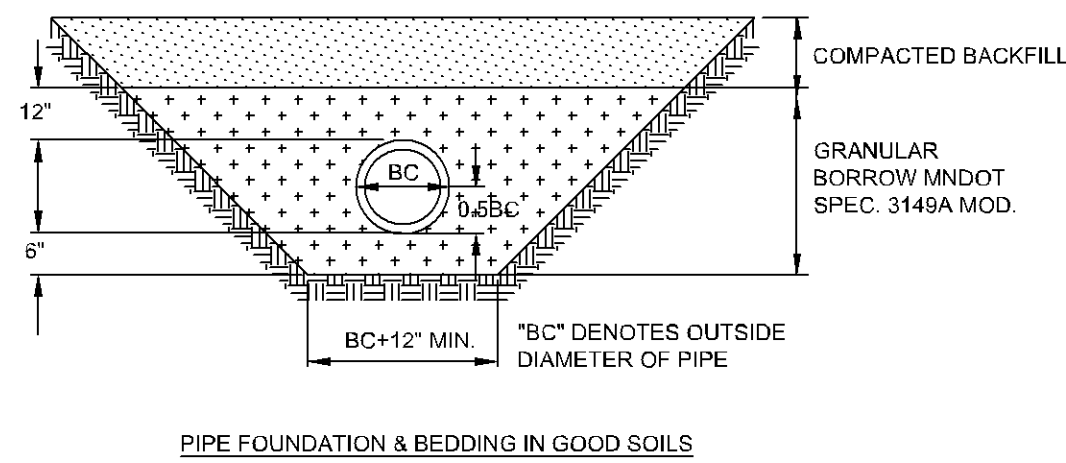
2 CONCRETE WALK SECTION DETAIL

SCALE: N.T.S.



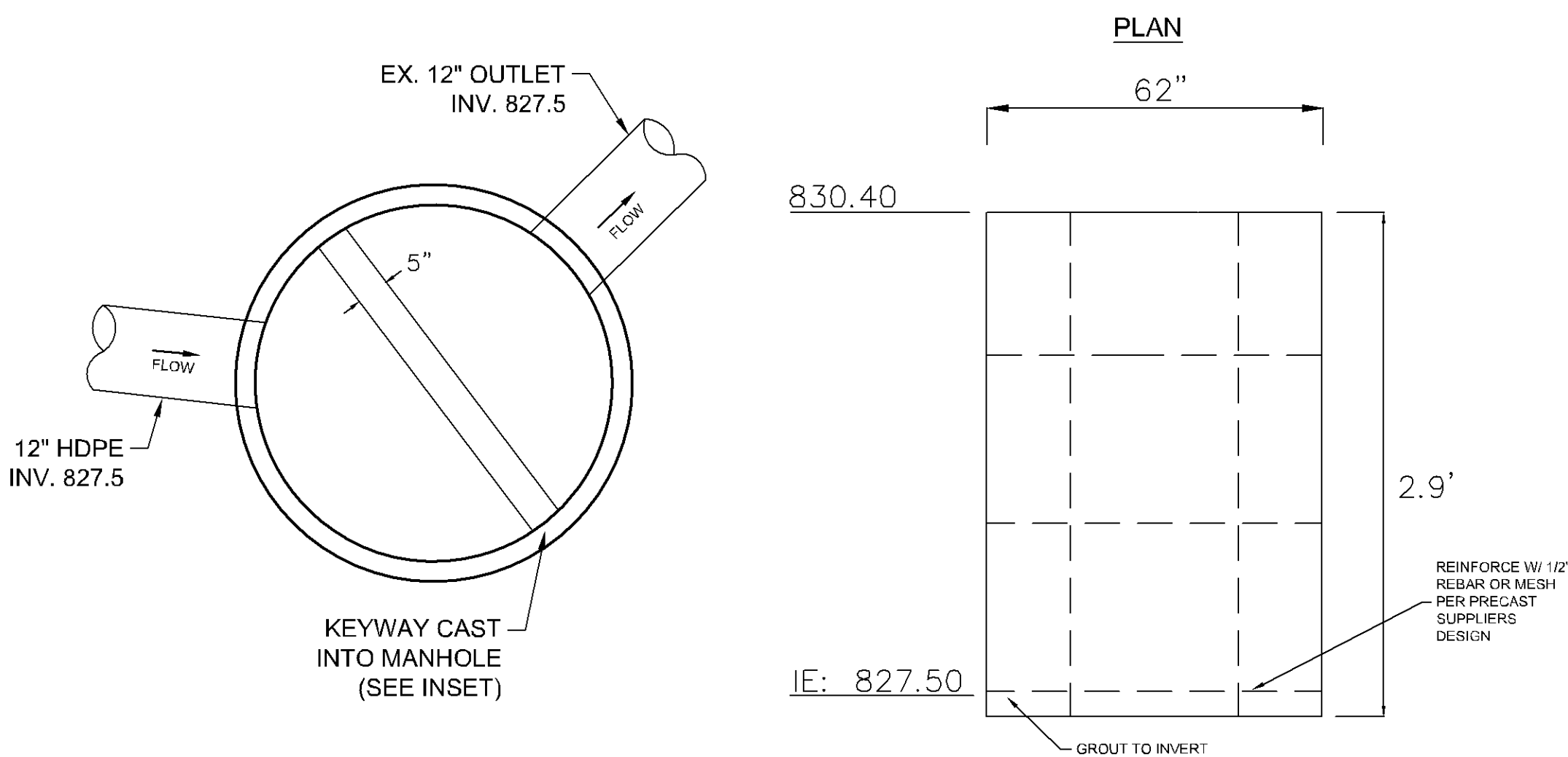
3 BITUMINOUS PAVEMENT SECTION

SCALE: N.T.S.



4 PVC OR HDPE PIPE BEDDING

SCALE: N.T.S.

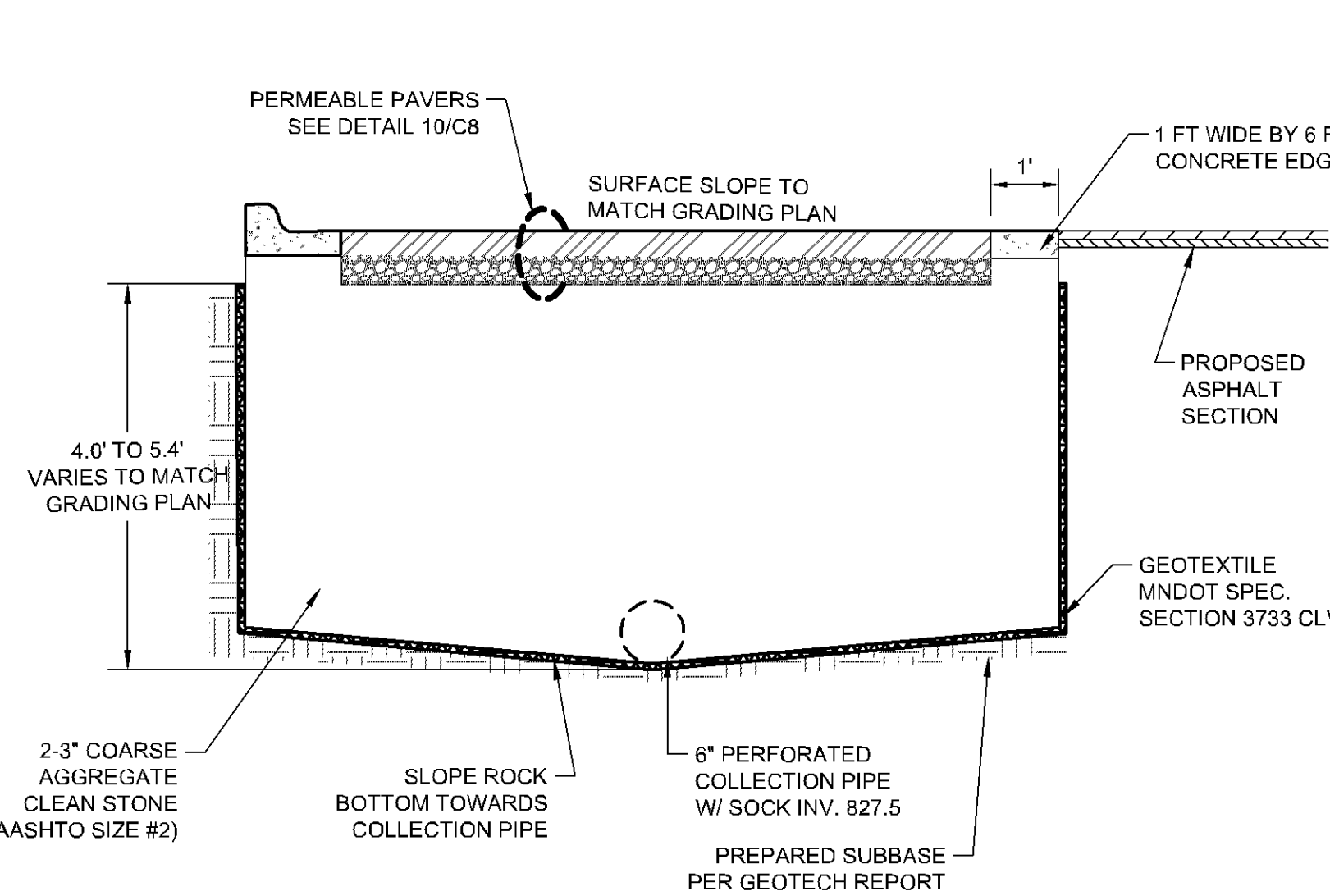


5 OUTLET CONTROL STRUCTER - 1 DETAIL

SCALE: N.T.S.

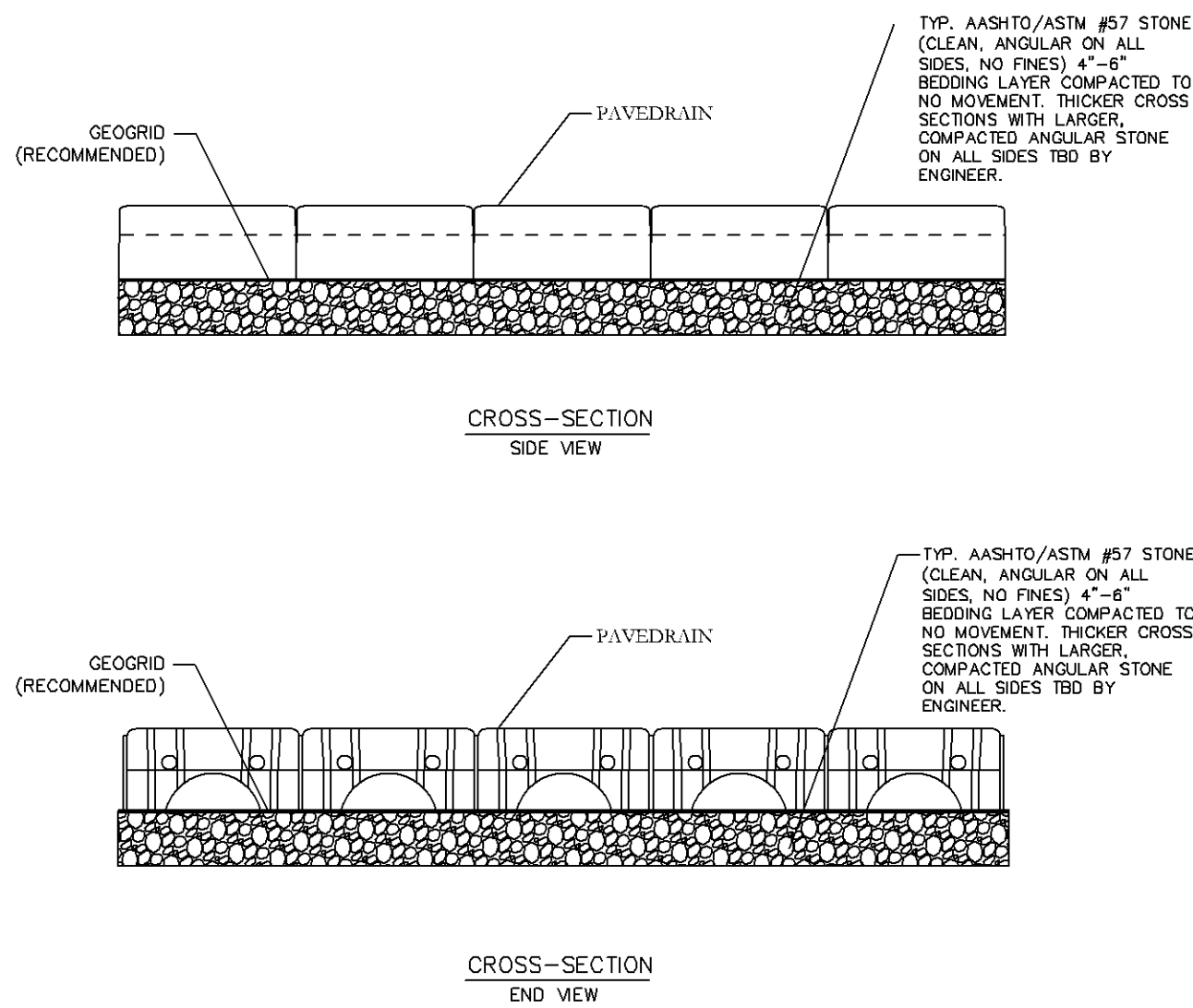
INSTALLATION NOTES

- EXISTING SUBGRADE UNDER BED AREAS SHALL NOT BE SUBJECT TO EXCESSIVE CONSTRUCTION EQUIPMENT TRAFFIC PRIOR TO GEOTEXTILE AND STONE BED PLACEMENT.
- BRING SUBGRADE OF STONE INFILTRATION BED TO LINE, GRADE, AND ELEVATION INDICATED. FILL AND LIGHTLY REGRADE ANY AREAS DAMAGED BY EROSION, PONDING, OR TRAFFIC COMPACTION BEFORE PLACING OF STONE. TRANSVERSE SUBGRADE SLOPE TO BE 1.0% MIN, SEE GRADING PLAN FOR LONGITUDINAL SUBGRADE SLOPE.
- PLACE GEOTEXTILE IN ACCORDANCE WITH MANUFACTURER'S STANDARDS AND RECOMMENDATIONS. ADJACENT TRIPS OF GEOTEXTILE SHALL OVERLAP A MINIMUM OF 16-INCHES. SECURE GEOTEXTILE AT LEAST FOUR (4) FEET OUTSIDE OF BED AND TAKE ANY STEPS NECESSARY TO PREVENT ANY RUNOFF OR SEDIMENT FROM ENTERING THE STORAGE BED.
- INSTALL COURSE AGGREGATE IN 8-INCH MAXIMUM LIFTS. LIFTS OF 12-INCHES ARE ALLOWED OVER PIPE TO PREVENT DAMAGE. LIGHTLY COMPACT EACH LAYER WITH EQUIPMENT, KEEPING EQUIPMENT MOVEMENT OVER STORAGE BED SUBGRADES TO A MINIMUM. INSTALL AGGREGATE TO GRADES INDICATED ON DRAWINGS.
- INSTALL STABILIZER BASE COURSE AGGREGATE EVENLY OVER SURFACE OF STONE BED, SUFFICIENT TO ALLOW PLACEMENT OF PAVEMENT, AND NOTIFY ENGINEER FOR APPROVAL.
- FOLLOWING PLACEMENT OF BED AGGREGATE, THE GEOTEXTILE SHALL BE FOLDED BACK ALONG ALL BED EDGES TO PROTECT FROM SEDIMENT WASHOUT ALONG BED EDGES. AT LEAST A FOUR (4) FOOT EDGE STRIP SHALL BE USED TO PROTECT BEDS FROM ADJACENT BARE SOIL. THIS EDGE STRIP SHALL REMAIN IN PLACE UNTIL ALL BARE SOILS CONTIGUOUS TO BEDS ARE STABILIZED AND VEGETATED. IN ADDITION, TAKE ANY OTHER NECESSARY STEPS TO PREVENT SEDIMENT FROM WASHING INTO BEDS DURING SITE DEVELOPMENT. WHEN THE SITE IS FULLY STABILIZED, TEMPORARY SEDIMENT CONTROL DEVICES SHALL BE REMOVED.



7 PERMEABLE INFILTRATION SECTION

SCALE: N.T.S.

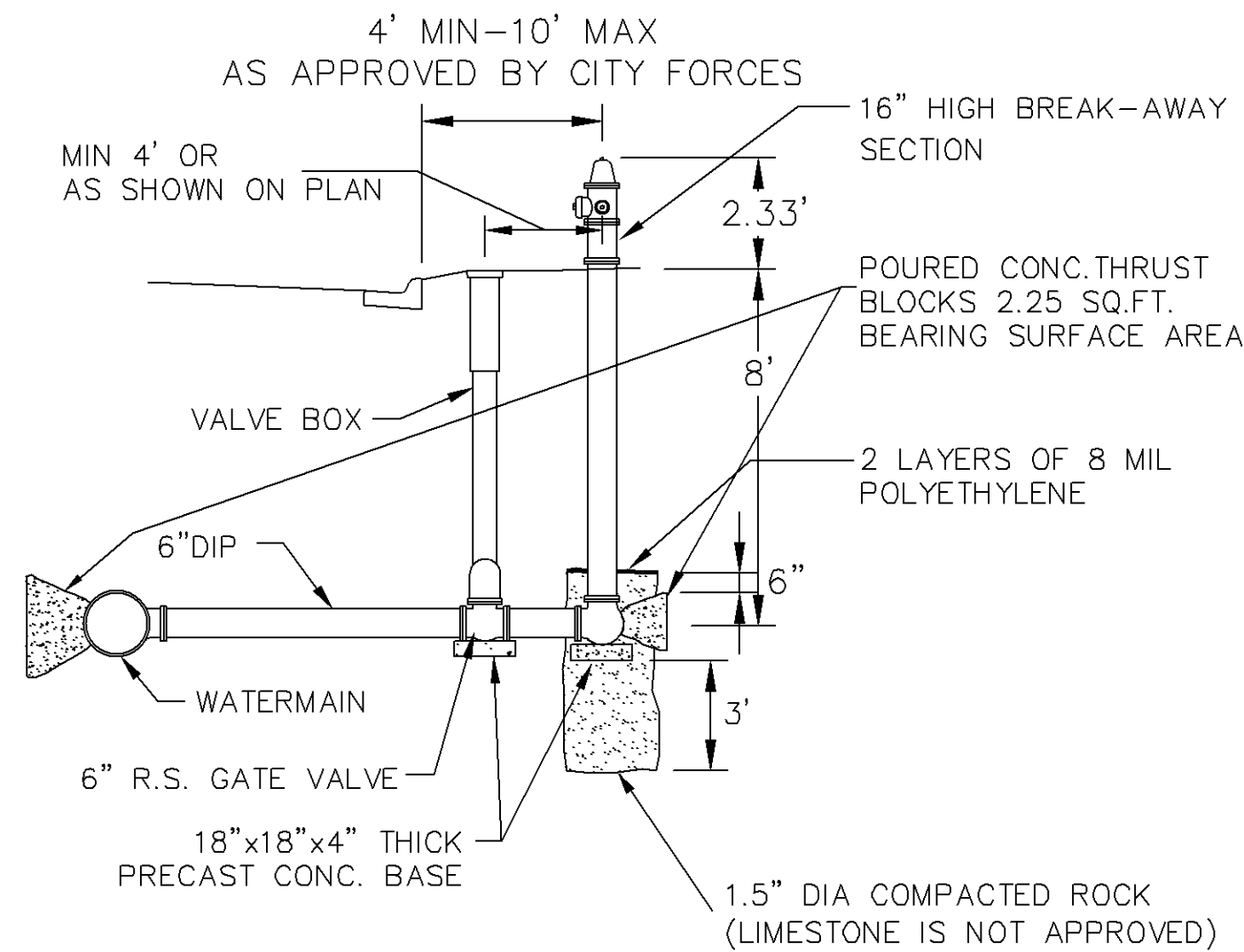


8 PERMEABLE PAVER SECTION

SCALE: N.T.S.

9 PERMEABLE PAVER NOTES

SCALE: N.T.S.



10 HYDRANT INSTALLATION DETAIL

SCALE: N.T.S.



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Fax: 952.278.8822

PROJECT

GYROPOLIS

ADDITION/REMODELING

2325 W 90TH ST  
BLOOMINGTON, MINNESOTA

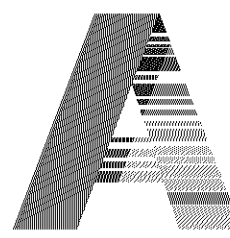
| ISSUED SET |     |                |
|------------|-----|----------------|
| REVISIONS  |     |                |
| DATE       | NO. | CITY SUBMITTAL |
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|            |     |                |
|            |     |                |
|            |     |                |

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION, AND THAT I AM A DULY LICENSED CIVIL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA

NOT FOR CONSTRUCTION

Brian Field, PE

56013 09/27/2022  
REG. NO. DATE



ANDERSON

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P 763.412.4000 | F 763.412.4090  
Anderson Engineering of Minnesota, LLC

CIVIL DETAILS

DRAWN BY: BF CHECKED BY: BF

C6

# G - HISTORICAL BORINGS

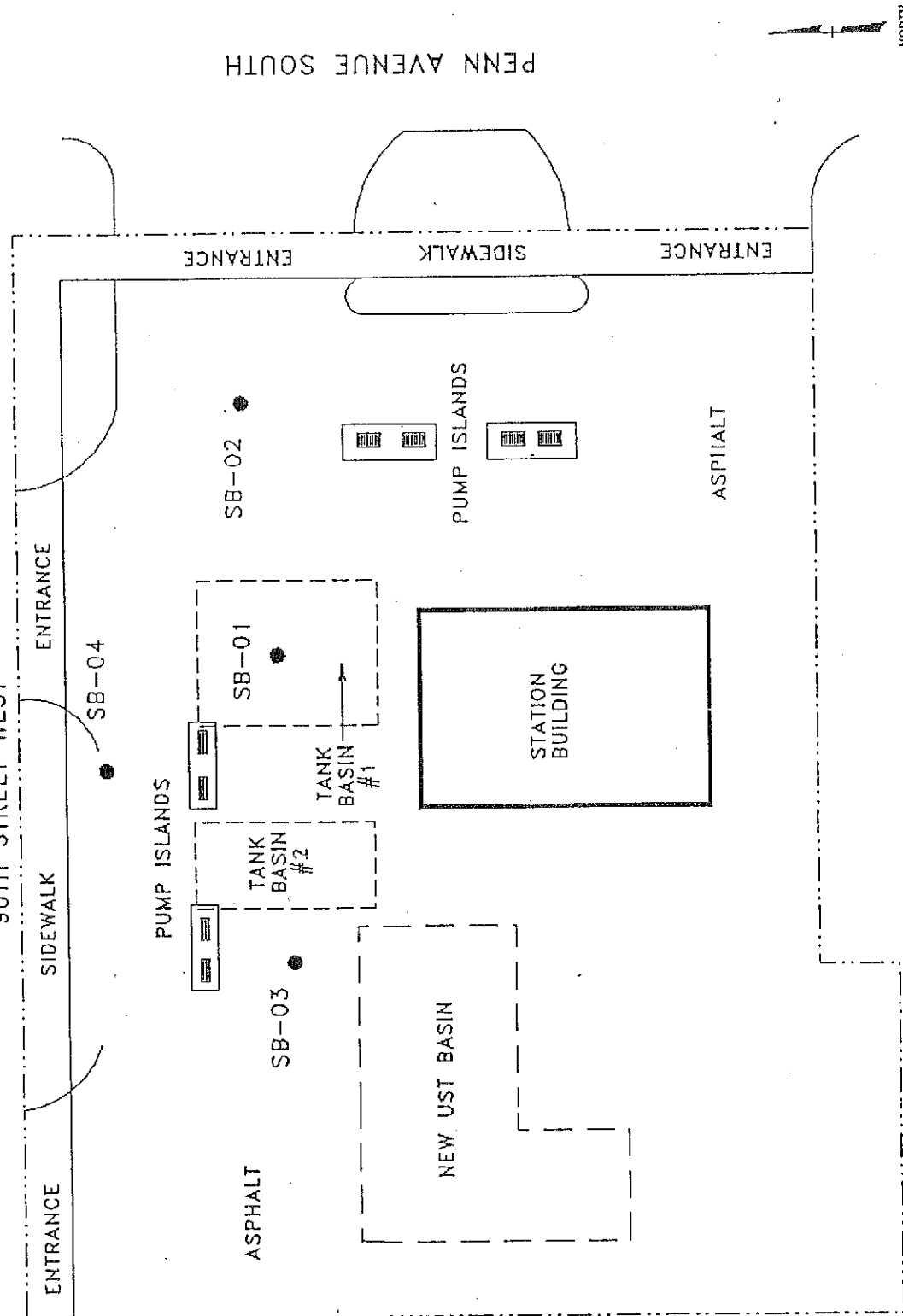
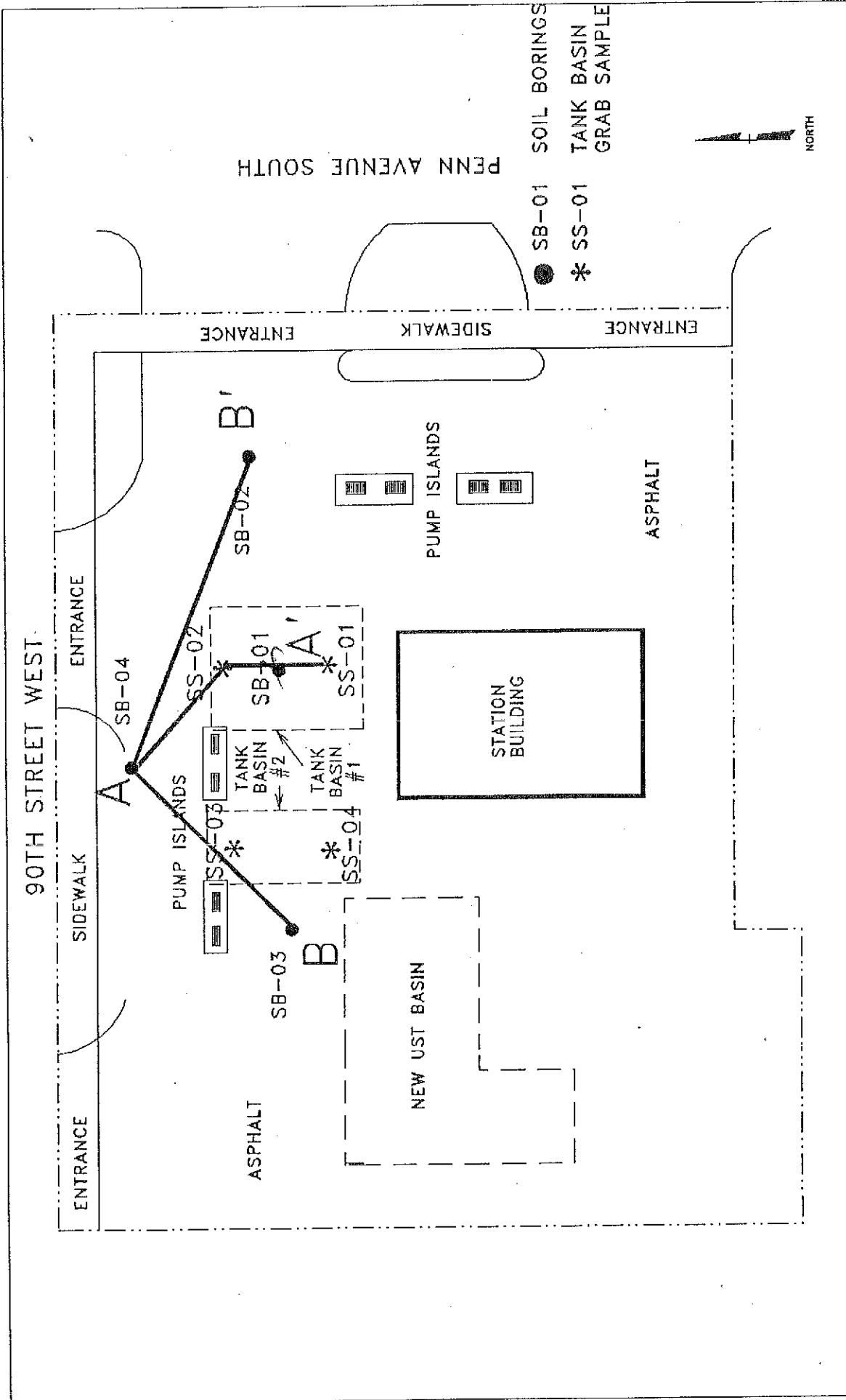


FIGURE 4  
SOIL BORING LOCATIONS  
TOTAL SERVICE STATION  
9000 PENN AVE. SO., BLOOMINGTON, MN

EnecoTech®  
ENVIRONMENTAL CONSULTANTS  
BLOOMINGTON, MINNESOTA

| PROJECT NO.<br>719-012 | DATE<br>5/91 | SCALE<br>1" = 20' | PREPARED BY<br>EFW | REVIEWED BY | DATE | REVISION<br>ORIGINAL | SB |
|------------------------|--------------|-------------------|--------------------|-------------|------|----------------------|----|
|                        |              |                   |                    | JFS         | 6/91 |                      |    |



|                                                                          |              |                                                                                                                 |                    |
|--------------------------------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------|--------------------|
| <b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA |              | FIGURE 5<br>GEOLOGIC CROSS SECTIONS A-A' & B-B'<br>TOTAL SERVICE STATION<br>9000 PENN AVE. SO., BLOOMINGTON, MN |                    |
| PROJECT NO.<br>719-012                                                   | DATE<br>5/91 | SCALE<br>1" = 20'                                                                                               | PREPARED BY<br>EFW |
|                                                                          |              | REVIEWED BY<br>JFS                                                                                              | DATE<br>6/91       |
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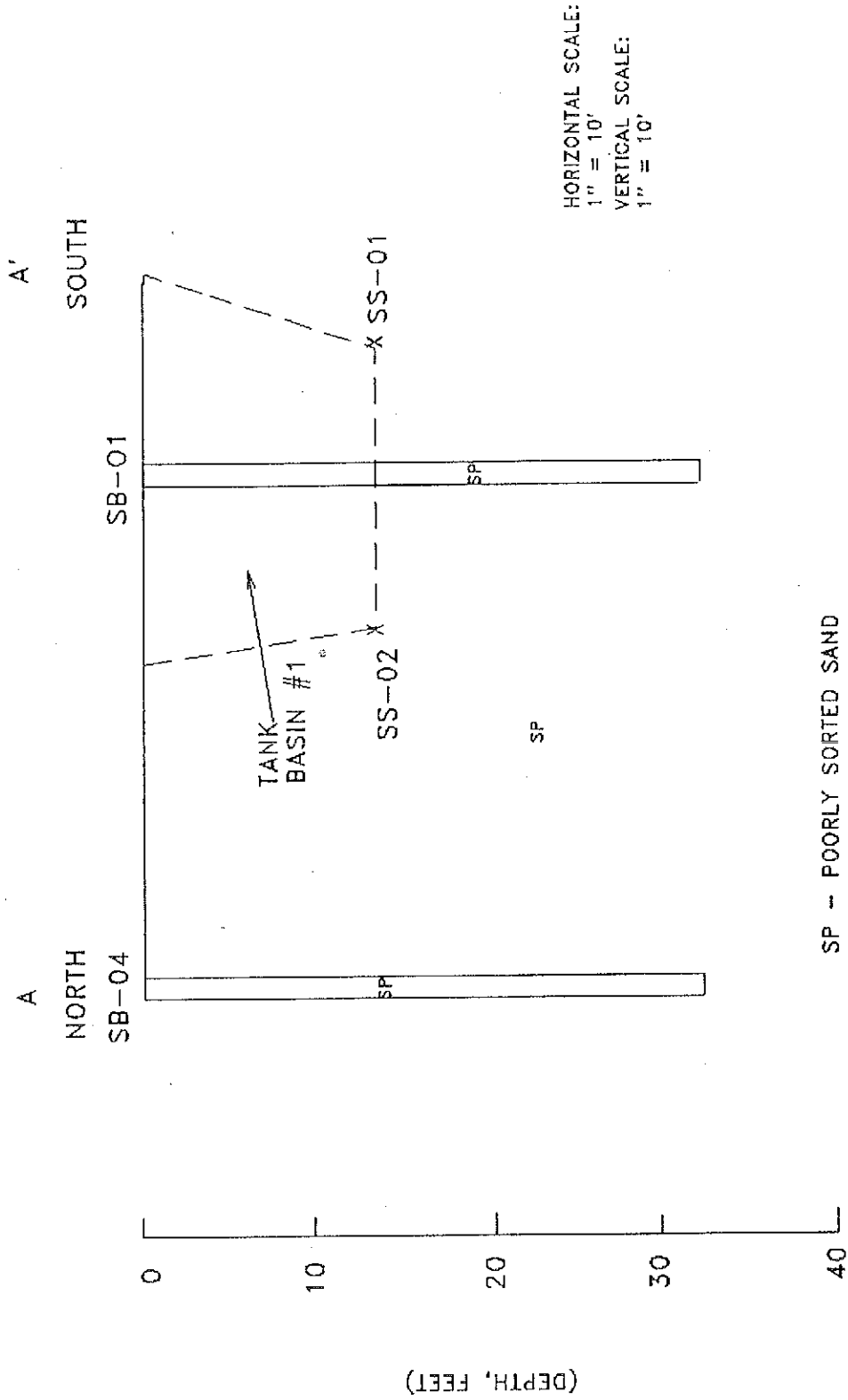
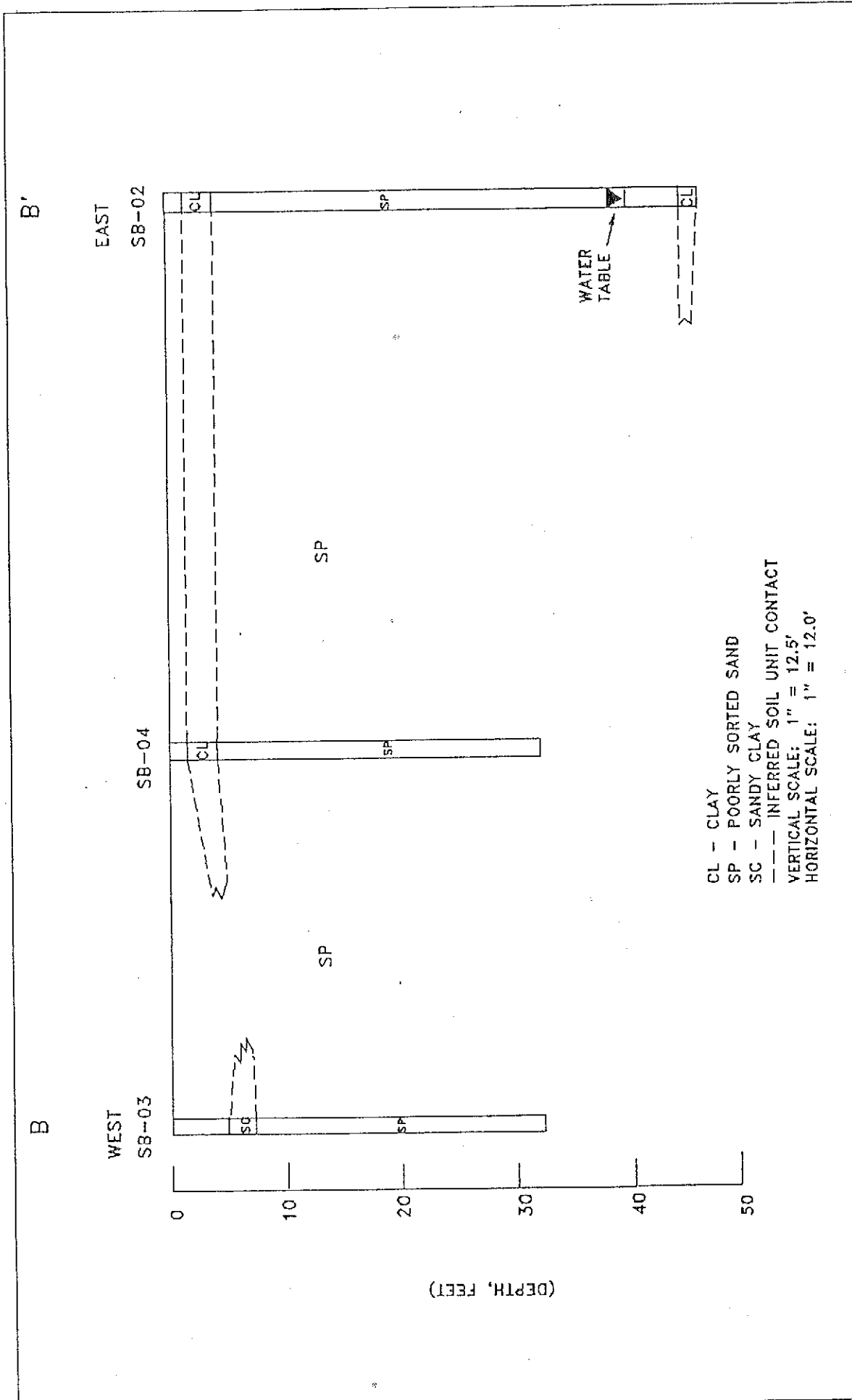


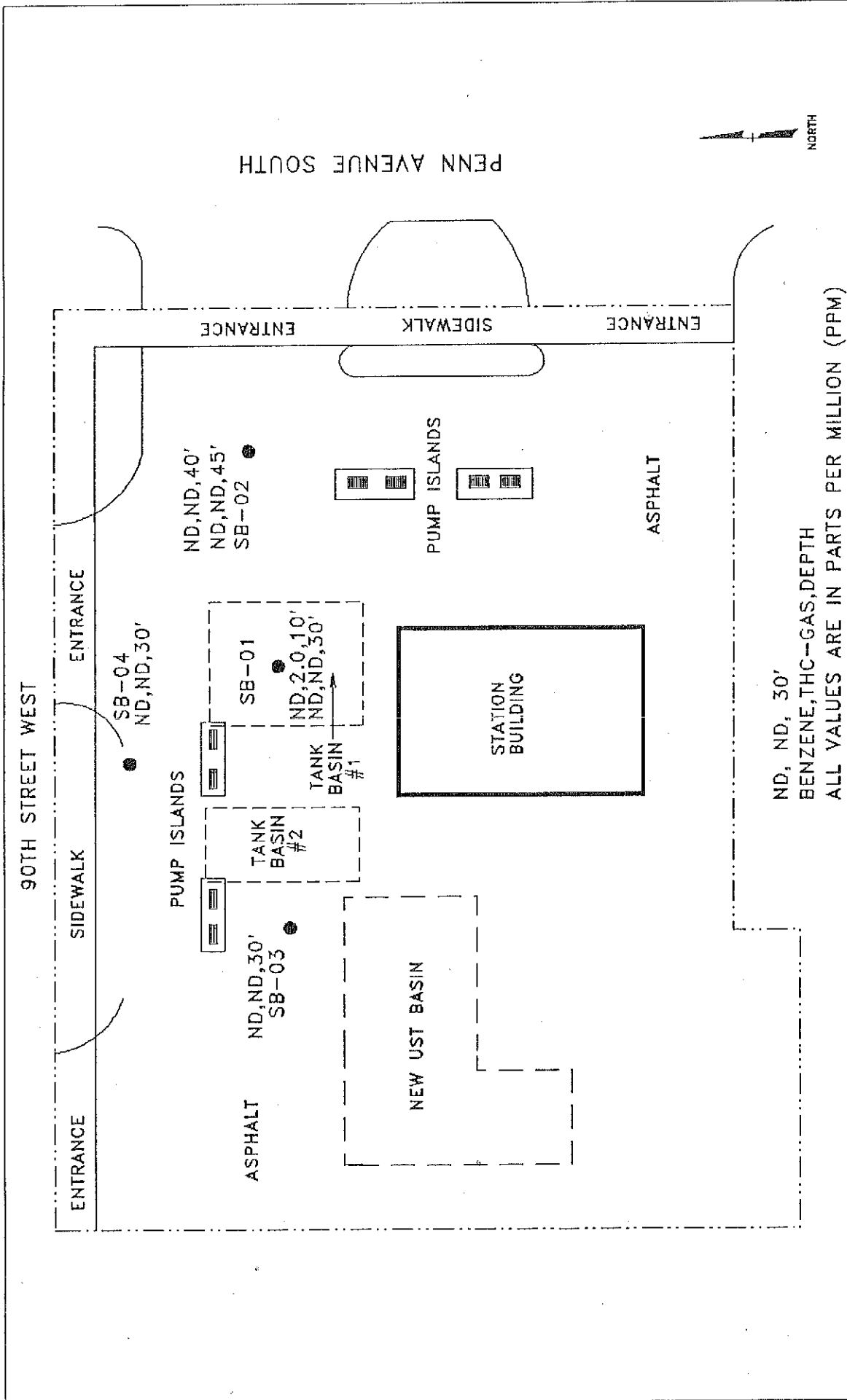
FIGURE 6  
GEOLOGIC CROSS SECTION A-A'  
TOTAL SERVICE STATION  
9000 PENN AVENUE SOUTH, BLOOMINGTON, MINNESOTA

**EnecoTech®**  
ENVIRONMENTAL CONSULTANTS  
BLOOMINGTON, MINNESOTA

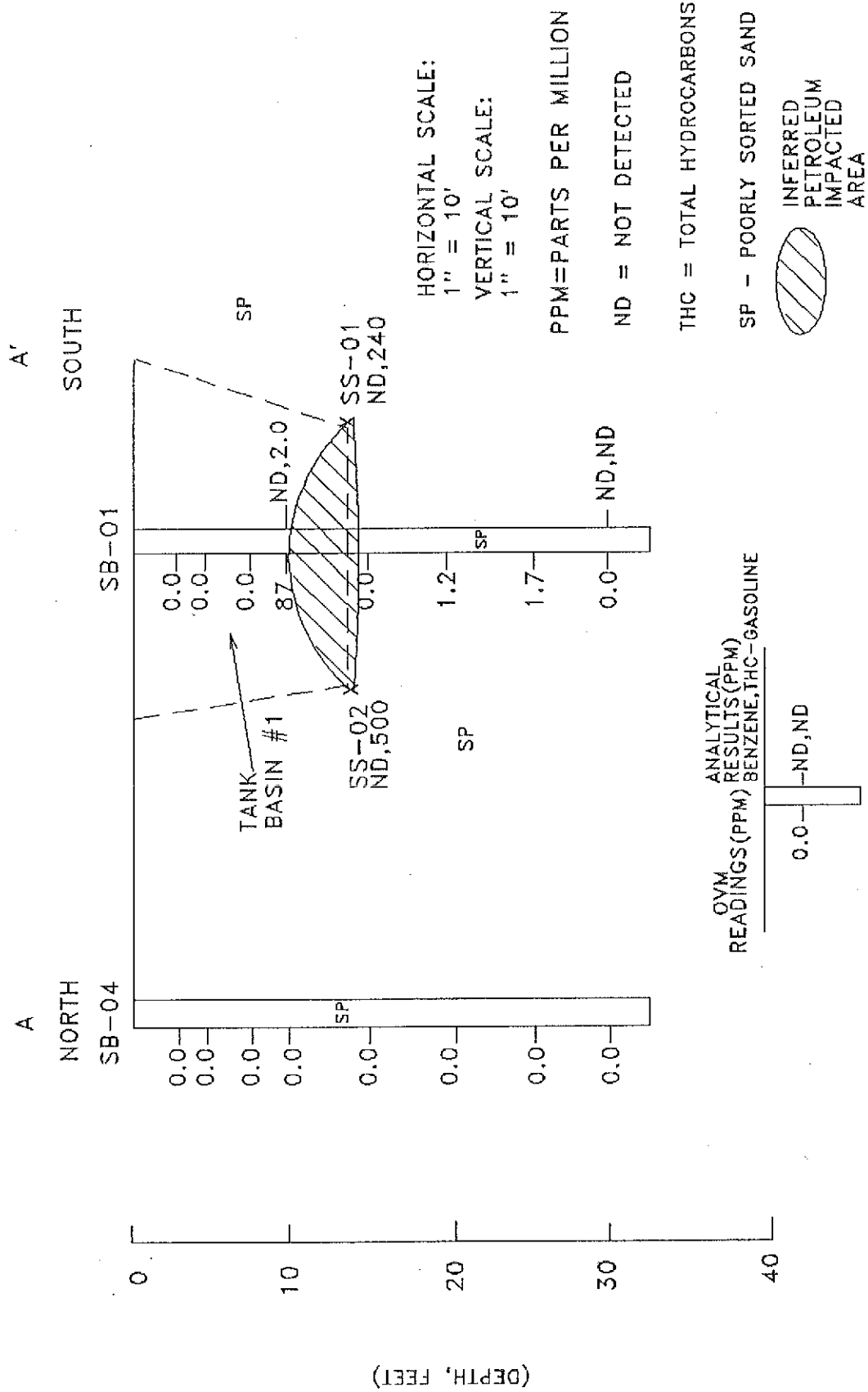
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| <br><b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA |              |                      | <b>FIGURE 7</b><br><br>GEOLOGIC CROSS SECTION B-B'<br>TOTAL SERVICE STATION<br><br>9000 PENN AVENUE SOUTH, BLOOMINGTON, MN |          |             |      |          |
| PROJECT NO.<br>719-012                                                                                                                                            | DATE<br>6/91 | SCALE<br>SEE DRAWING | PREPARED BY                                                                                                                |          | REVIEWED BY | DATE | REVISION |
|                                                                                                                                                                   |              |                      | SHW                                                                                                                        | REV: EFW |             |      |          |
|                                                                                                                                                                   |              |                      | JFS                                                                                                                        |          | 7/51        | C4   |          |



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|--------------------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------|----------------------|
| <b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA |                                   | FIGURE 8<br>SOIL ANALYTICAL DATA<br>TOTAL SERVICE STATION<br>9000 PENN AVE. SO., BLOOMINGTON, MN |                      |
| PROJECT NO.<br>719-012                                                   | DATE<br>5/91                      | SCALE<br>1" = 20'                                                                                | PREPARED BY<br>EFW   |
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| <b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA |              | <b>FIGURE 9</b><br>GEOLOGIC CROSS SECTION A-A' AND SOIL ANALYTICAL RESULTS<br>TOTAL SERVICE STATION<br>9000 PENN AVENUE SOUTH, BLOOMINGTON, MINNESOTA |                                            |
| PROJECT NO.<br>719-012                                                   | DATE<br>5/91 | SCALE<br>SEE DRAWING                                                                                                                                  | PREPARED BY<br>EFW                         |
|                                                                          |              | REVIEWED BY<br>JFS                                                                                                                                    | DATE<br>7/91<br>REVISION<br>ORIGINAL<br>C3 |



REMEDIAL INVESTIGATION  
REPORT  
TOTAL PETROLEUM INC  
JULY 12, 1991

*Kim  
Holand*

HENNEPIN COUNTY LEAK 3106  
BLOOMINGTON  
TOTAL PETROLEUM  
9000 PENN AVENUE S.

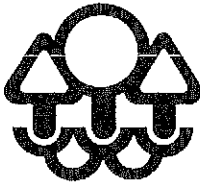
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THIS FILE HAS BEEN CHECKED FOR  
NOT PUBLIC INFORMATION  
ON 8-14-92 BY STH  
(DATED) (INITIALS)

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File  
LEAK  
Regul

# H - LUST CLOSURE LETTER



## Minnesota Pollution Control Agency

520 Lafayette Road, Saint Paul, Minnesota 55155-3898

Telephone (612) 296-6300

September 9, 1991

Mr. Mike Brown  
1 Denver Place  
999 18th Street  
Suite 2201  
P.O. Box 500  
Denver, Colorado 80201

Dear Mr. Brown:

RE: Petroleum Tank Release Site Closure  
Site: Total Petroleum Station, 9000 Penn Avenue South, Bloomington  
Site ID#: LEAK00003106

The Minnesota Pollution Control Agency (MPCA) staff has determined that the cleanup performed in response to the petroleum tank release at the site referenced above has adequately addressed the petroleum contamination, and therefore the file regarding this release will be closed.

On August 22, 1990, a petroleum tank release was reported to the MPCA. Since then you have taken the following corrective actions in response to the release:

1. Three petroleum underground storage tanks (USTs) were removed from the site.
  - one 10,000 gallon unleaded gasoline UST.
  - one 6,000 gallon unleaded gasoline UST.
  - one 6,000 gallon regular leaded gasoline UST.
2. Approximately 228 cubic yards of petroleum contaminated soil was removed from the site. Soils were treated by CleanSoils, Incorporated and used as road base. Contamination remains on-site at low levels.
3. Four soil borings were completed to further define the extent and magnitude of soil and/or ground water contamination. Laboratory analysis of a soil sample taken from a boring, completed through the former tank basin, detected low levels of contamination (87 parts per million) at 10 to 12 feet. A sample from the base of the borehole did not detect hydrocarbon contamination.

Mr. Mike Brown

Page 2

September 9, 1991

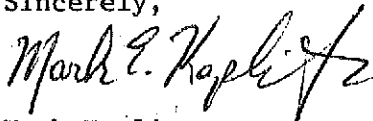
4. Laboratory analysis of soil samples taken at the water table (40 feet) did not detect hydrocarbon contamination above the method detection limit of 1.2 parts per million, total hydrocarbons as gasoline.

Based on the currently available information, we believe these actions have adequately addressed the petroleum tank release. Therefore, MPCA staff does not intend to require any more investigation or cleanup work in response to this release. However, the MPCA reserves the right to reopen this file and require additional work if in the future more work is determined to be necessary, and this letter does not release any party from liability for this contamination.

Because you performed the requested work, the state may reimburse you for a major portion of your costs. The Petroleum Tank Release Cleanup Act establishes a fund which in certain circumstances provides partial reimbursement for petroleum tank release cleanup costs. This fund is administered by the Petroleum Tank Release Compensation Board (Petro Board). More specific eligibility rules are available from the Petro Board (612/297-4017).

Thank you for your cooperation with the MPCA in responding to this petroleum tank release to protect the public health and the environment of the state of Minnesota. If you have any questions regarding this correspondence, please call me at 612/297-8611.

Sincerely,



Mark Kopplitz  
Pollution Control Specialist  
Tanks and Spills Section  
Hazardous Waste Division

MK:np

cc: Ulyssus Seal, Fire Chief, Bloomington  
E.L. Woulfe, City Clerk, Bloomington  
Greg Lie, Hennepin County Solid Waste Officer, Minneapolis  
Jim Simonet, EnecoTech Environmental Consultants, Inc., Bloomington



**CleanSoils**

PL202200183  
MEK  
9-13

CleanSoils Inc. 84 2nd Avenue S.E., New Brighton, MN 55112 • (612) 639-8811 • FAX (612) 639-8813

October 24, 1990

Mr. Mike Brown  
1 Denver Place  
999 18th Street  
Suite 2201  
P.O. Box 500  
Denver, Colorado 80201

Dear Mr. Brown:

RE: Final Report on Soil Treatment and Notification of Post-Burn Sampling Results

Site: 9000 Penn Avenue South, Bloomington, MN  
MPCA Leak ID#: LEAK00003106  
CleanSoils Project #: 90.143

CleanSoils has successfully completed the thermal treatment of petroleum contaminated soil from the above referenced site. The treated soil meets all MPCA requirements. Attached please find a copy of independent post-burn soil analyses for BTEX and TPH. Below is other information regarding the soil treated.

Quantity of Soil: 276.24 tons  
Completion Date: October 15, 1990  
Post-Burn Samples: 90.143-1  
Final Disposition of Soil: Roadbase

386.764

If you should have any questions regarding this project, please contact me at (612) 639-8811.

Sincerely,

*David H. Kress*

David H. Kress  
Project Manager

attachments

pc: File  
Bob Dullinger, MPCA  
Consultant

RECEIVED

JUL 29 1991

MPCA, HAZARDOUS  
WASTE DIVISION

REMEDIAL INVESTIGATION REPORT  
TOTAL PETROLEUM INC.  
9000 PENN AVENUE SOUTH  
BLOOMINGTON, MINNESOTA

Prepared For:

TOTAL PETROLEUM INC.  
999 18th Street  
Suite 2201  
Denver, Colorado 80202

Prepared By:

ENECOTECH MIDWEST, INC.  
3050 Metro Drive, Suite 115  
Bloomington, Minnesota 55425

July 12, 1991

PROJECT NO: 719-012

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## 1.0 INTRODUCTION

### 1.1 Purpose

EnecoTech Midwest, Inc. (EnecoTech) was retained by Total Petroleum, Inc. (Total) to perform a remedial investigation at the Total retail service station located at 9000 Penn Avenue South, Bloomington, Minnesota. The investigation was in response to data collected by EnecoTech during underground storage tank (UST) removal activities conducted on October 3, 1990. The data indicated that site soils had been impacted by a petroleum hydrocarbon release. The purpose of the investigation was to:

- o Determine the nature, extent and magnitude of hydrocarbon release(s) to site soils; and
- o Provide options and recommendations for remediation of hydrocarbon impacts, if necessary.

### 1.2 Scope-of-Work

An investigation scope-of-work for the site was developed and implemented by EnecoTech with the approval of Total. The scope-of-work involved the characterization of site geology, hydrogeology, soil quality, and potential hydrocarbon sources. Characterization of these items was accomplished by:

- o Drilling four (4) soil borings,
- o Logging geologic materials encountered in the borings,
- o Monitoring soil gas vapors with an OVM Systems photo-ionizer (OVM),
- o Collecting soil samples for laboratory analyses,

### 1.3 Previous Reports

A Minnesota Pollution Control Agency (MPCA) "Excavation Report for Petroleum Release Sites" for the subject location (Appendix A) summarized tank excavation activities performed at the site on October 3, 1990. A summary of this report is provided below:

- o One (1) 6,000 gallon regular gasoline UST and one (1) 6,000 gallon unleaded gasoline UST were excavated and removed from Tank Basin #1 at the subject location. In addition, one (1) 10,000 gallon unleaded gasoline UST was excavated and removed from Tank Basin #2.
- o Some corrosion was noted but no holes in the tanks were visible.
- o Soils in the tank pit consisted of sandy clay.
- o Ground water was not encountered during the UST excavations
- o Bedrock was not encountered during the UST excavations.

- o Elevated OVM readings were measured in soils from beneath and adjacent to the USTs in both Tank Basin #1 and Tank Basin #2 (Figure 2 and 3, Appendix A). OVM readings ranged from 5.3 to 965 parts per million (ppm) in Tank Basin #1 and from 0 to 827 ppm in Tank Basin #2.
- o Four (4) soil samples were collected from beneath the former UST locations. Total hydrocarbons (THC) as gasoline were detected in two (2) of the four (4) samples at concentration levels of 240 ppm and 500 ppm. Concentration levels of lead ranged from 2 to 23 ppm. However, none of the four (4) samples contained detectable concentration levels of benzene.
- o A complete excavation of the petroleum impacted soil was not considered feasible due to the geotechnical instability of the unconsolidated sand and the potential for structural damage to existing above ground structures. Approximately, 228 cubic yards of gasoline impacted soil was removed and sent to a local soil incinerator with MPCA approval. All necessary information pertaining to the contaminated soil removal and disposal may be found in Appendix B.

## 2.0 BACKGROUND INFORMATION

### 2.1 Site Setting

The site is located at 9000 Penn Avenue South, Bloomington, Minnesota (Figure 1). At the time of the investigation, above ground structures included the station building and two pump islands located to the north and east of the station building (Figure 2). The below ground structures included one (1) 6,000 gallon regular gasoline steel UST, one (1) 6,000 gallon unleaded gasoline steel UST, and one (1) 10,000 gallon unleaded gasoline steel UST. These three USTs were located in the north central portion of the property. The area surrounding the site is occupied by an Amoco Service Station to the north; Wallys Restaurant to the east; a Burger King Restaurant to the south; and a Dunkin' Donut Store to the west. *WALLY'S RESTAURANT* *AMOCO STATION*

### 2.2 Site History

No information was available regarding the site history at the time of this report preparation.

### 2.3 Regional Geology

The geology of the region has been characterized from published Minnesota Geological Survey (MGS) information. Available information indicates that the region is underlain by Pleistocene age fluvial terrace deposits consisting of sand, gravelly sand and silty sand. These glacial deposits range in thickness from approximately 100 to 200 feet (Bloomgren, 1979) and overlie bedrock composed of the Prairie du Chien group.

### 2.4 Regional Hydrogeology

The glacial deposits form an unconfined buried glacial aquifer. Regional groundwater flow direction for the unconfined buried glacial aquifer is to the southeast (Figure 3). Glacial deposits that underlie this portion of Bloomington yield moderate amounts of water to wells. The major bedrock aquifers in the region are the St. Peter, Prairie du Chien – Jordan and Mt. Simon–Hinkley Aquifers. These aquifers are approximately 100 to 800 feet below ground surface (bgs).

The St. Peter Sandstone yields 9 to 100 gallons per minute (gpm) and is primarily used for private domestic wells. The Prairie du Chien–Jordan and Mt. Simon Hinkley aquifer supply the majority of groundwater to the region. Yields range from 85 to 2,765 gpm (Norvitch, et.al., 1973).

### 3.0 SITE INVESTIGATION PROCEDURES

#### 3.1 Soil Boring Placement

The locations of soil borings were based on data obtained from the original tank pit excavations and were positioned to delineate the stratigraphic and areal extent of potential hydrocarbon soil impacts (Figure 4).

#### 3.2 Soil Boring Procedures

Soil boring activities were initiated on February 28, 1991. Thein Well Company of Shakopee, Minnesota performed drilling activities under EnecoTech supervision using a Mobile drill rig and hollow stem augers. Drilling equipment was cleaned by field personnel prior to the drilling of the first soil boring and after each soil boring completion. Cleaning was performed with a high pressure washer and potable water. An EnecoTech geologist monitored cleaning activities and inspected the augers to ensure decontamination had been achieved.

A total of four (4) soil borings were completed to depths of 32 to 47 feet below ground surface (bgs). The soil borings were drilled using a 6 3/4 inch O.D. hollow stem auger. The EnecoTech geologist logged each borehole by describing the geologic materials encountered in the subsurface (Appendix C).

#### 3.3 Soil Sampling Procedures

Soil samples were collected with a split spoon sampler. Split spoons were decontaminated prior to sampling, using a detergent-distilled water-methanol-distilled water rinse cycle. Samples were collected at 5 feet intervals to the final bottom hole depth. Soil samples were screened with an OVM using the MPCA jar headspace analysis technique. The soil sample that contained the highest concentration levels of organic vapors, and the deepest soil sample, were placed in laboratory prepared containers. All samples were labeled, stored on ice, and shipped with a chain of custody form to the analytical laboratory (Appendix D). The soil samples were analyzed for benzene, toluene, ethyl benzene and xylene (BTEX), methyl tertiary butyl ether (MTBE), and total hydrocarbons (THC) as gasoline. Analyses were completed using Environmental Protection Agency (EPA) Method 8020 for BTEX, and MTBE, EPA Method 6010 for lead, and EPA Method 8015 for THC-gasoline.



## 4.0 RESULTS AND DISCUSSION

### 4.1 Site Geology

The soil underlying the site has been characterized to a depth of 47 feet bgs by logging soil samples obtained from soil borings SB-01 through SB-04 (Appendix C). Geologic cross sections developed from these borings are shown in Figures 5, 6 and 7. The site is generally underlain by a medium grained sand which was logged to a depth of 32 feet bgs in soil borings SB-01, SB-03, SB-04, and to 46 feet bgs in soil boring SB-02. Soil borings SB-02 and SB-04 indicate a clay unit from 2.5 to 4.5 feet bgs. A stiff silty to sandy clay was encountered in soil borings SB-02 at 46 to 47.5 feet bgs (end of boring).

### 4.2 Site Hydrogeology

Ground water was encountered in only one soil boring, SB-02, at approximately 40 feet bgs. Saturated conditions in this boring were logged from 40 to 46 feet bgs. The saturated conditions were encountered in the sand unit. At 46 feet bgs a clay unit, which was at least 1.5 feet thick, was encountered. These conditions indicate that the clay unit, if continuous, may be acting as an aquitard.

### 4.3 Soil Quality

#### 4.3.1 Soil Sample Organic Vapor Data

Organic vapor readings recorded during soil boring advancements may be found in Table 1. No significant organic vapors were detected in soil samples from soil borings SB-02, SB-03 and SB-04. A sample from soil boring SB-01 had an organic vapor reading of 87 ppm at 10 to 12 feet bgs. This sample corresponds to the bottom elevation of Tank Basin #1. Subsequent samples collected beneath the 10 to 12 feet bgs interval in soil boring SB-01, indicated either non-detectable or very minor (<2.0 ppm) organic vapor concentrations.

#### 4.3.2 Soil Sample Laboratory Analytical Data

Soil samples were collected from the soil borings for laboratory analysis at depths ranging from 10 to 45 feet bgs (Table 2). Detectable concentrations of THC-gasoline at 2.0 ppm was found in soil sample SS-01-10. This concentration remains well below the MPCA regulatory action level of 50 ppm. Benzene was not detected in any of the soil samples analyzed. In addition, lead concentrations all remained within normal limits (1.3 to 9 ppm).

### 4.4 Hydrocarbon Distribution

The following discussion of the soil petroleum hydrocarbon distribution incorporates the data that was collected during the UST excavations as well as data collected during the soil boring investigation. The distribution of petroleum hydrocarbons in soil are shown in Figures 8, 9 and 10.

Limited soil impacts were encountered in the area of Tank Basins #1 and #2. The soil impacts associated with Tank Basin #1 are restricted to a thin layer of soil directly beneath the former UST location within that basin. These impacts were encountered in soil samples SS-1 and SS-2 collected from the base of the excavation after UST removal (Figure 9). Although both samples contained detectable concentration levels of THC-gasoline at 500 ppm and 240 ppm, respectively, they did not contain detectable concentration levels of benzene.

The soil impacts associated with Tank Basin #2 were restricted to the soil excavated during UST excavation activities. Soil samples SS-3 and SS-4, collected from the base of Tank Basin #2, did not display detectable concentration levels of soil organic vapors, BTEX or THC-gasoline (Appendix A).

Soil boring SB-01 was completed in the center of Tank Basin #1, to assess the vertical extent of impacts beneath Tank Basin #1. A soil sample collected from this boring at 10 to 12 feet bgs, displayed an organic vapor reading of 87 ppm and a laboratory concentration of 2.0 ppm THC-gasoline. However, from 12 to 32 feet bgs (bottom of boring) OVM readings ranged from non-detectable to 1.7 ppm. In addition, soil sample SB-01-30 had non-detectable concentrations for all hydrocarbon constituents analyzed. This data indicates that vertical migration of petroleum hydrocarbons below 12 feet bgs in soil boring SB-01 is extremely limited (Figure 9).

The western, northern, and eastern boundaries of Tank Basins #1 and #2 are defined by soil borings SB-03, SB-04, and SB-02. Generally, no detectable concentration levels of soil organic vapors, BTEX or THC-gasoline were detected in these borings to their bottom hole depths of 32, 32, and 47 feet bgs, respectively (Figure 8 and 10). An OVM reading of 3.4 ppm was recorded in soil boring SB-02 at a depth of 45-47 feet bgs. The cause for this reading is unknown given the non-detectable laboratory results discussed below.

Ground water was encountered at a depth of approximately 40 feet bgs in soil boring SB-02. Soil samples were collected immediately above the water table (SB-02-40) and within the saturated zone (SB-02-45). Both samples revealed non-detectable concentrations for all petroleum hydrocarbon constituents analyzed.

Interpretation of both the UST excavation data and soil boring data indicates that petroleum impacted soil is limited to a thin layer of sand at the base of former Tank Basin #1 (Figure 9).

## 5.0 SUMMARY

- o On October 3, 1990, one (1) 6,000 gallon regular gasoline UST, one (1) 6,000 gallon unleaded gasoline UST, and one (1) 10,000 gallon unleaded gasoline UST were excavated at the subject location. Some corrosion was noted but no holes in the tanks were visible. Soil encountered in the two (2) tank basins consisted of sandy clay.
- o Elevated OVM readings were recorded in the soil encountered during the UST's removal activities. OVM readings ranged from 0 to 965 ppm in the two (2) tank basins at depths of 4.5 to 13.5 feet bgs. THC-gasoline was detected in two (2) of the four (4) soil samples collected from the two (2) tank basins. Soil samples SS-01 and SS-02 had THC-gasoline concentration levels of 500 ppm and 240 ppm, respectively. These two (2) samples were collected from the base of Tank Basin #1. However, none of the four (4) soil samples contained detectable concentration levels of benzene.
- o A complete excavation of the petroleum impacted soil was not considered feasible due to the geotechnical instability of the unconsolidated sand and the potential for structural damage to existing above ground structures. Approximately 228 cubic yards of hydrocarbon impacted soil was removed and sent to a local soil incinerator with MPCA approval (Appendix B).
- o Soil boring activities were initiated and completed on February 28, 1991. A total of four (4) boreholes were completed to depths of 32 to 47 feet bgs. The soil borings were drilled using a 6 3/4 inch O.D. hollow stem auger. Sample collection was completed using split spoon samplers.
- o No significant organic vapors were detected in soil boring samples collected from SB-02, SB-03 and SB-04. Soil boring SB-01 was the only soil boring which contained a significant vapor reading (87 ppm) at 10 to 12 feet bgs. From 12 to 32 feet bgs, organic vapors in soil samples from SB-01 ranged from non-detectable to 1.7 ppm (Table 1).
- o Soil sample SB-1-10, collected at 10 feet bgs from soil boring SB-01, had a concentration of THC-gasoline of 2.0 ppm. However, all other soil boring samples analyzed from soil borings SB-01, SB-02, SB-03 and SB-04 contained non-detectable concentrations of benzene and THC-gasoline (Table 2).
- o Groundwater was encountered at a depth of approximately 40 feet bgs in soil boring SB-02. Non-detectable laboratory results from soil samples SB-02-40 and SB-02-45, collected from the water table interface and in the saturated zone, respectively, indicate that ground water has not been impacted by petroleum hydrocarbons (Figure 10).
- o All the available UST excavation and soil boring data indicates petroleum hydrocarbon impacted soil is limited to a thin layer of sand at the base of Tank Basin #1 (Figure 9).

## 6.0 CONCLUSIONS

The following conclusions are based upon field data generated during the UST excavation and subsequent RI.

- o Excavation of impacted soils in Tank Basin #2 has remediated the Tank Basin #2 area. No hydrocarbon impacts were found in the soil samples analyzed from the base of Tank Basin #2.
- o The data collected from the soil borings has determined the lateral and vertical extent of impacts. This data indicates that a limited gasoline release occurred in the area of Tank Basin #1. Only a residual layer of impacted soil remains near the bottom of Tank Basin #1 at 10 to 12 feet bgs. By advancing soil borings SB-01, SB-02, SB-03 and SB-04, it was determined that extremely limited lateral and vertical migration of hydrocarbons occurred in the vicinity of Tank Basin #1.
- o The analytical data collected from the soil boring samples indicates that hydrocarbon impacts are minimal and remain well below MPCA regulatory action levels.
- o Soil organic vapor readings and soil analytical data collected from soil boring SB-02 indicate that ground water was not impacted by hydrocarbons.
- o The data indicates that excavation activities have sufficiently remediated the Tank Basin #1 area.

## 7.0 RECOMMENDATIONS

EnecoTech's recommendations are based on conditions at the site at the time of field investigations. These recommendations have been determined from the data that has been generated by tasks outlined in the scope-of-work.

The data indicates that no additional investigation or remediation is warranted. We therefore recommend site closure. This recommendation is based on the following specific data:

- o Petroleum hydrocarbon impacts are limited to a very small area both horizontally and vertically.
- o Soil boring data indicates soil excavation completed during UST removal has sufficiently remediated hydrocarbon impacts.
- o The soil impacts detected during the RI are below MPCA regulatory action levels for soil remediation.
- o Soil sample data indicates that the underlying surficial aquifer has not been impacted by the investigated release.

## 8.0 REFERENCES

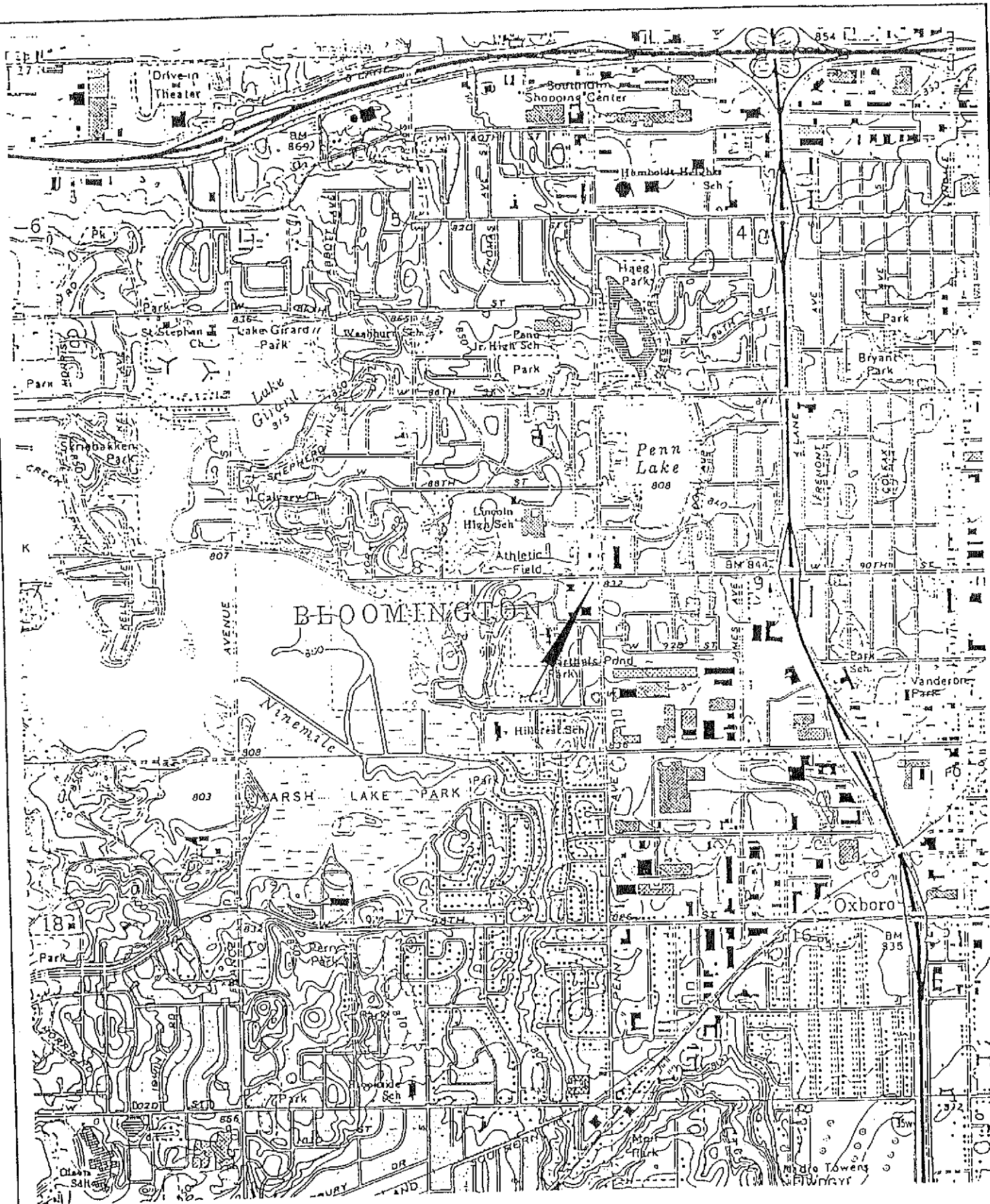
Balabon, N.H., 1989; Geologic Atlas, Hennepin County, Minnesota; County Atlas Series, Atlas C-4; Minnesota Geological Survey.

Bloomgren, B.A., Poppe, J.R., 1979 Geologic and Hydrologic Aspects of Tunneling in the Twin Cities Area, Minnesota: Minnesota Geological Survey.

Norvitch, R.F., Ross, T.G., and Brietkrietz, Alex, 1973 Water Resources Outlook for the Minneapolis-St. Paul Metropolitan Area, Minnesota: USGS

Minnesota Pollution Control Agency Guidelines, 1986. "Procedures for Groundwater Monitoring" MPCA Solid and Hazardous Waste Division Program Development Section.

## FIGURES



ENECOTECH

BLOOMINGTON, MINNESOTA

PROJECT

TOTAL-PENN AVE. SOUTH

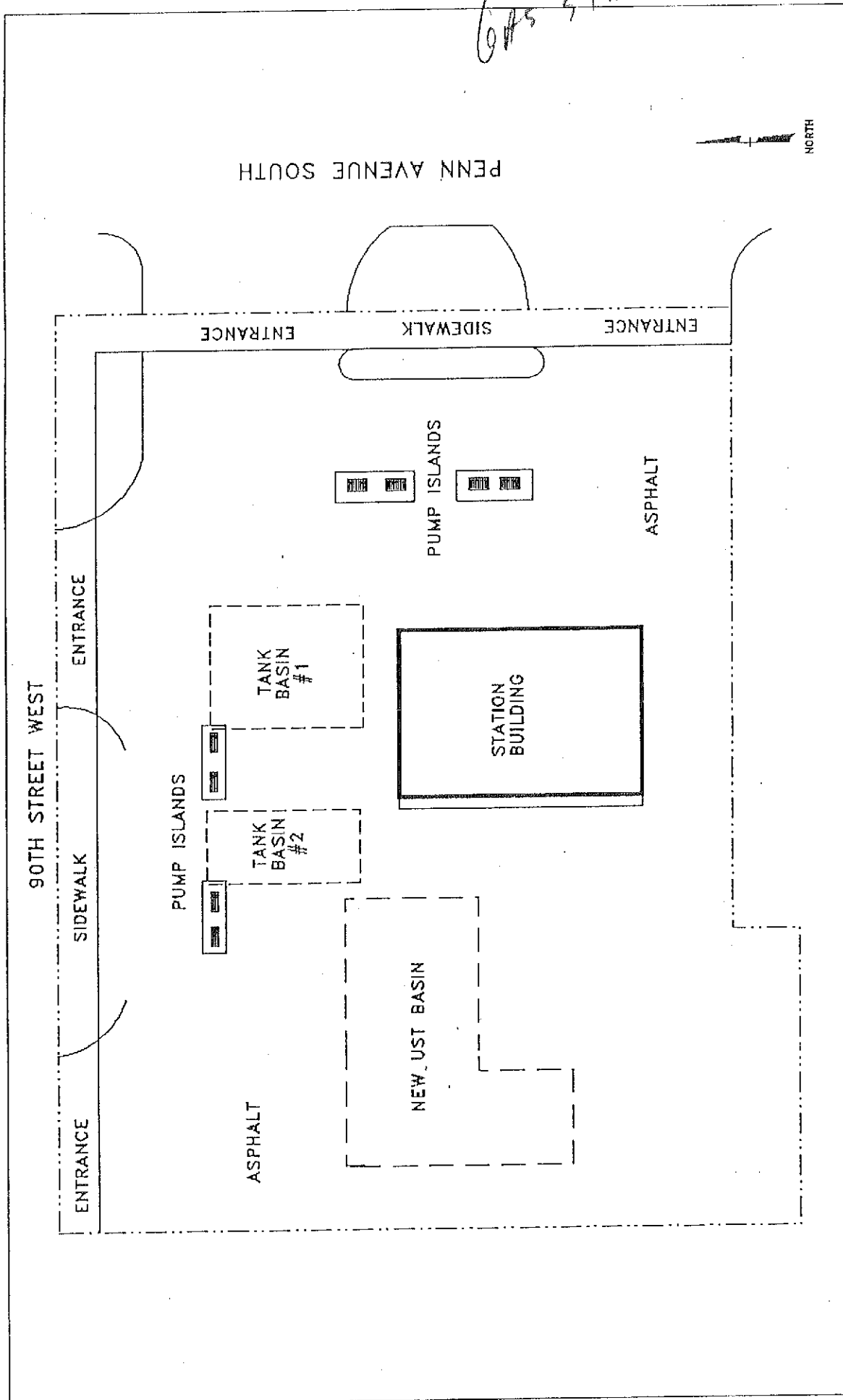
SITE LOCATION MAP

9000 PENN AVE. SOUTH  
BLOOMINGTON, MINNESOTA



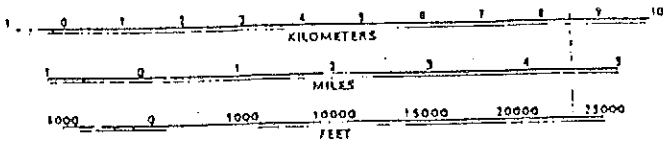
Gas Station

Amoco



|                                                                          |              |                                                                                      |                    |                      |
|--------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------|--------------------|----------------------|
| <b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA |              | FIGURE 2<br>SITE MAP<br>TOTAL SERVICE STATION<br>9000 PENN AVE. SO., BLOOMINGTON, MN |                    |                      |
| PROJECT NO.<br>719-012                                                   | DATE<br>5/91 | SCALE<br>1" = 20'                                                                    | PREPARED BY<br>EFW | REVIEWED BY<br>JFS.  |
|                                                                          |              |                                                                                      | DATE<br>5/91       | REVISION<br>ORIGINAL |
|                                                                          |              |                                                                                      |                    | S1                   |

SCALE 1:133,333



# GEOLOGIC ATLAS OF HENNEPIN COUNTY, MINNESOTA

AFTER BALABON, 1989



**EnecoTech<sup>®</sup>**  
ENVIRONMENTAL CONSULTANTS  
BLOOMINGTON, MINNESOTA

FIGURE 3  
WATER TABLE/BURIED GLACIAL AQUIFER  
TOTAL PETROLEUM SERVICE STATION  
9000 PENN AVENUE SOUTH, BLOOMINGTON, MN

| PROJECT NO. | DATE | SCALE     | PREPARED BY | REVIEWED BY | DATE | REVISION |
|-------------|------|-----------|-------------|-------------|------|----------|
| 708-007     | 5/91 | 1:133,000 | GVA         | J.T.S.      | 5/91 | ORIGINAL |

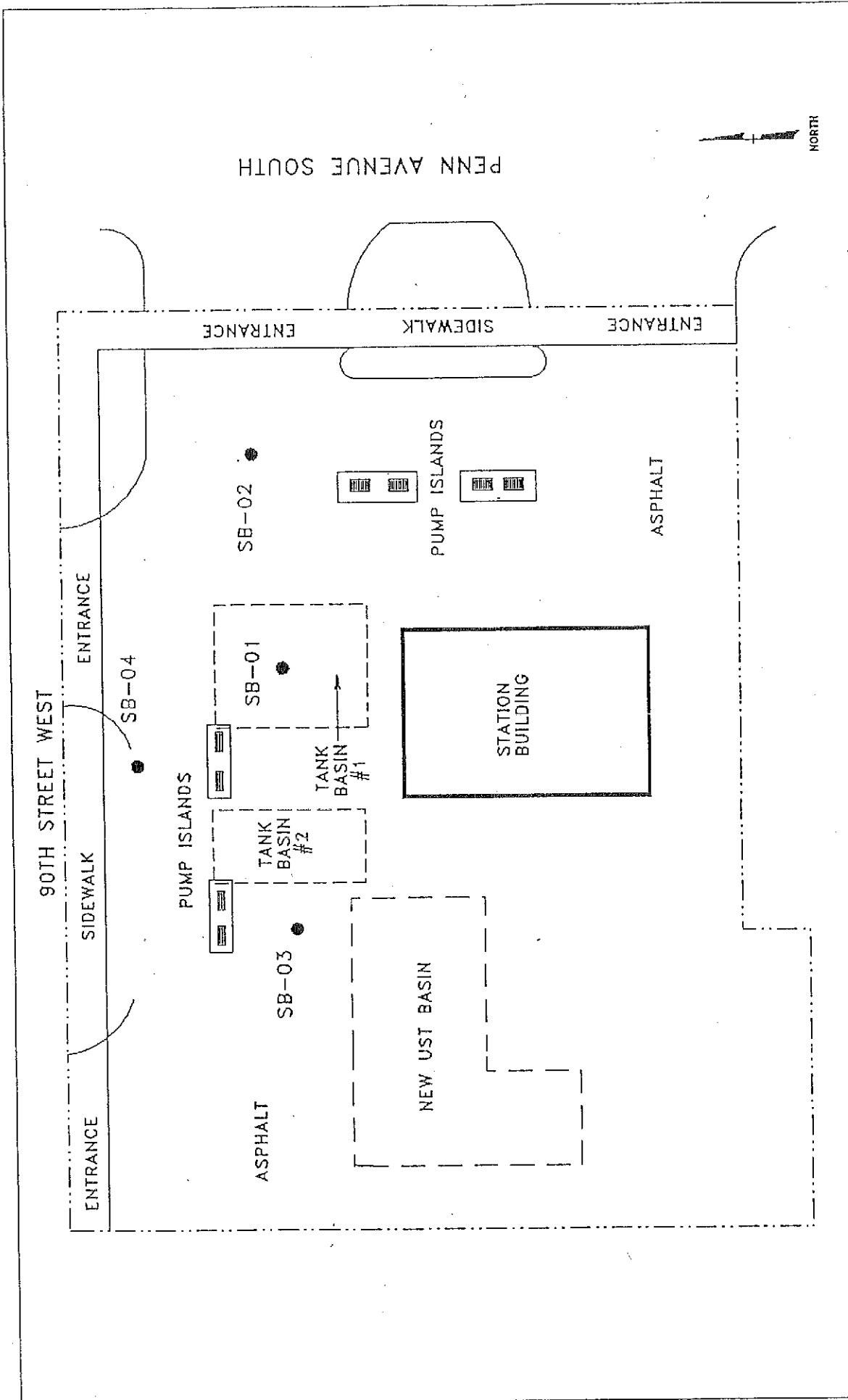
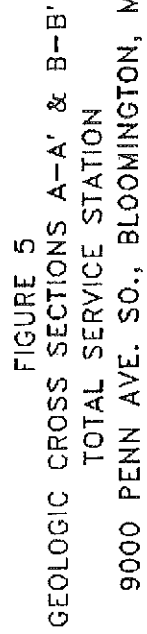


FIGURE 4  
SOIL BORING LOCATIONS  
TOTAL SERVICE STATION  
9000 PENN AVE. SO., BLOOMINGTON, MN

**EnecoTech®**  
ENVIRONMENTAL CONSULTANTS  
BLOOMINGTON, MINNESOTA

| PROJECT NO.<br>719-012 | DATE<br>5/91 | SCALE<br>1" = 20' | PREPARED BY<br>EFW | REVIEWED BY | DATE | REVISION<br>ORIGINAL | SB |
|------------------------|--------------|-------------------|--------------------|-------------|------|----------------------|----|
|                        |              |                   |                    | <i>JS</i>   | 6/91 |                      |    |



|                        |              |                   |                    |                    |              |                      |    |
|------------------------|--------------|-------------------|--------------------|--------------------|--------------|----------------------|----|
| PROJECT NO.<br>719-012 | DATE<br>5/91 | SCALE<br>1" = 20' | PREPARED BY<br>EFW | REVIEWED BY<br>JFS | DATE<br>6/91 | REVISION<br>ORIGINAL | CS |
|------------------------|--------------|-------------------|--------------------|--------------------|--------------|----------------------|----|

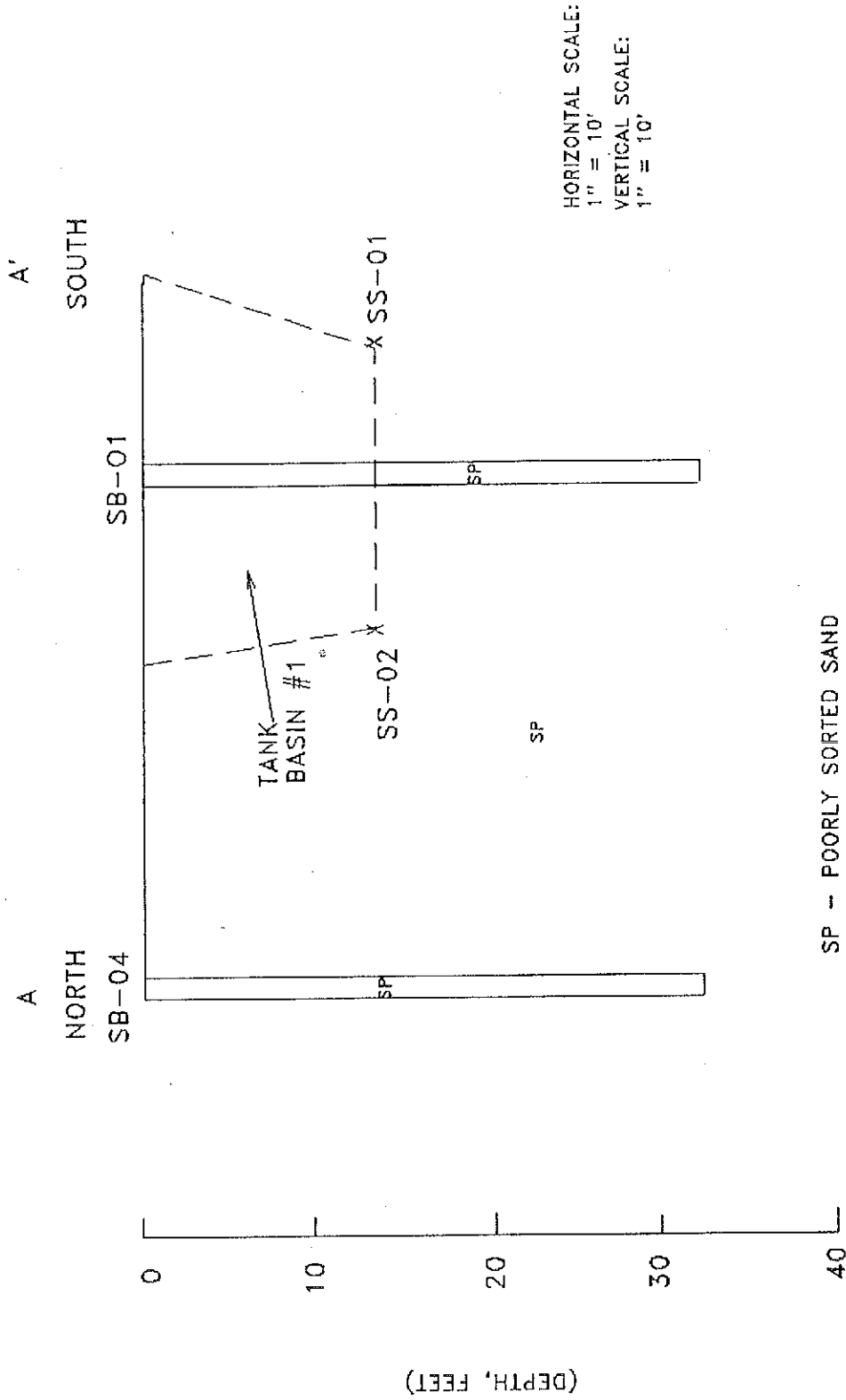
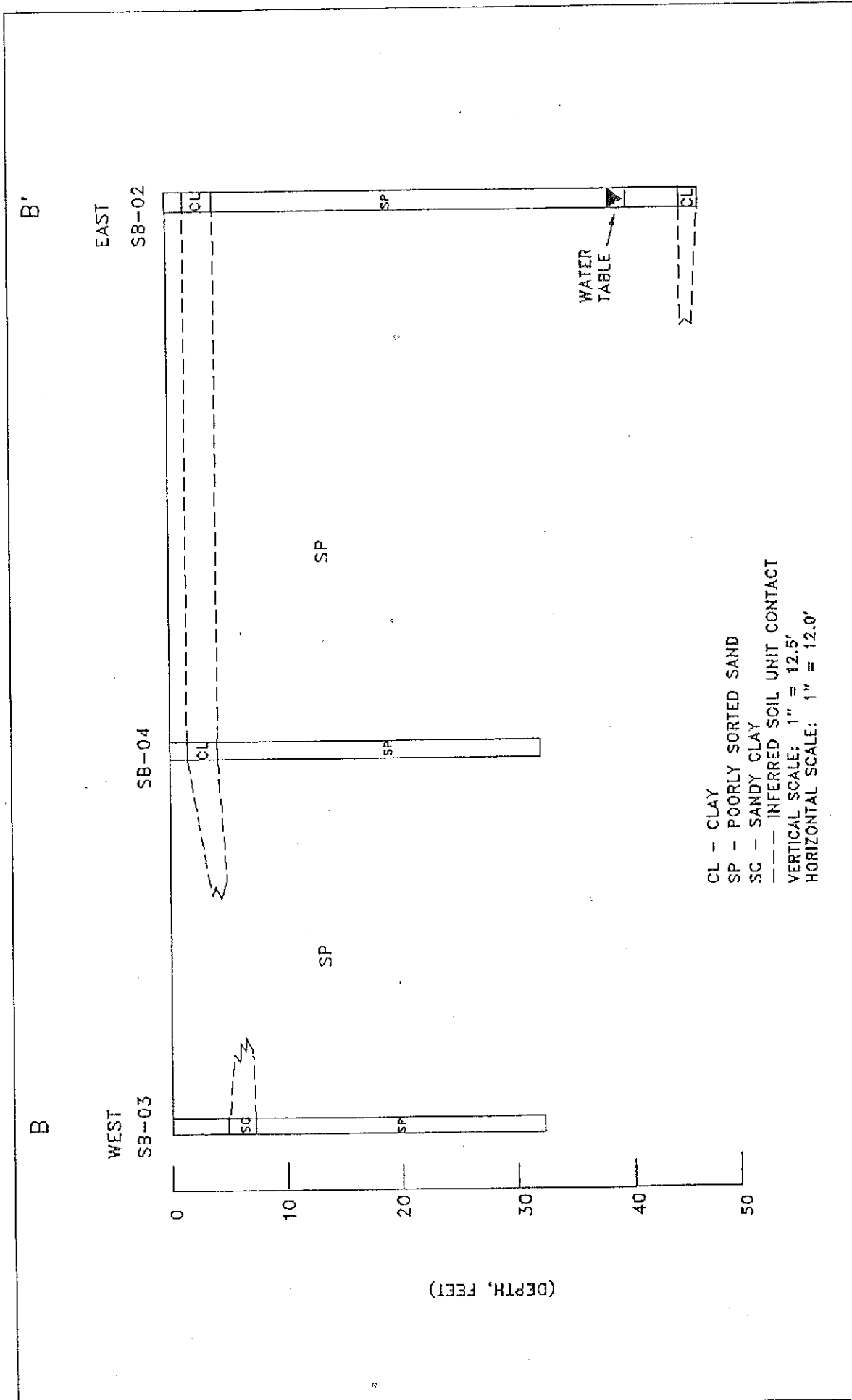


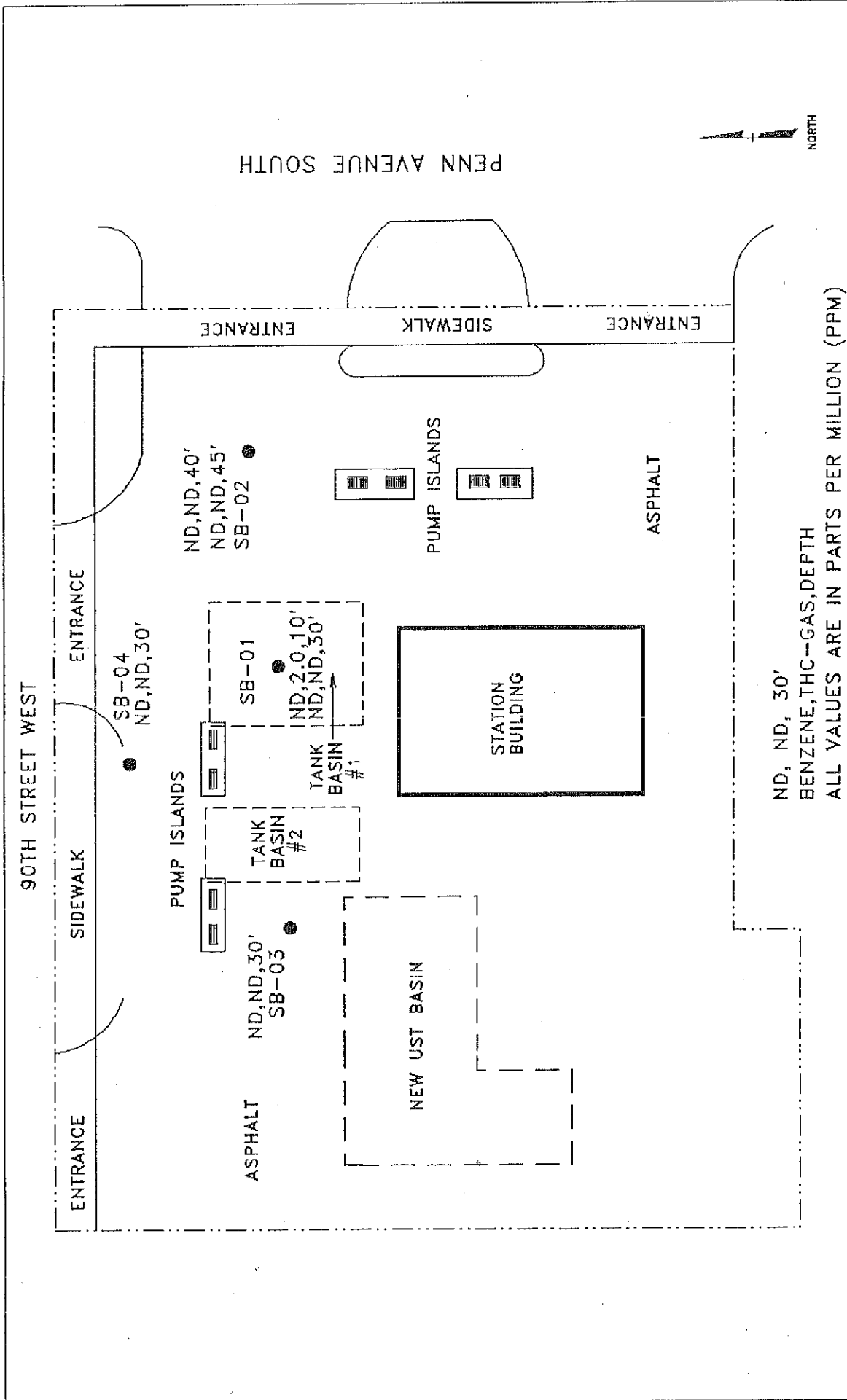
FIGURE 6  
GEOLOGIC CROSS SECTION A-A'  
TOTAL SERVICE STATION  
9000 PENN AVENUE SOUTH, BLOOMINGTON, MINNESOTA

**EnecoTech®**  
ENVIRONMENTAL CONSULTANTS  
BLOOMINGTON, MINNESOTA

| PROJECT NO. | DATE | SCALE       | PREPARED BY | REVIEWED BY | DATE | REVISION    |
|-------------|------|-------------|-------------|-------------|------|-------------|
|             |      |             |             |             |      |             |
| 719-012     | 5/91 | SEE DRAWING | EFW         | JFS         | 7/51 | C1 ORIGINAL |



|                                                                                                                                                                   |              |                      |                                                                                                                             |          |          |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------|----------|----------|----|
| <br><b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA |              |                      | <b>FIGURE 7</b><br><br>GEOLOGIC CROSS SECTION B--B'<br>TOTAL SERVICE STATION<br><br>9000 PENN AVENUE SOUTH, BLOOMINGTON, MN |          |          |    |
| PROJECT NO.<br>719-012                                                                                                                                            | DATE<br>6/91 | SCALE<br>SEE DRAWING | PREPARED BY                                                                                                                 |          | REVISION | C4 |
|                                                                                                                                                                   |              |                      | SHW                                                                                                                         | REV: EFW |          |    |
|                                                                                                                                                                   |              |                      | REVIEWED BY                                                                                                                 | DATE     | ORIGINAL |    |
|                                                                                                                                                                   |              |                      | JFS                                                                                                                         | 7/51     |          |    |

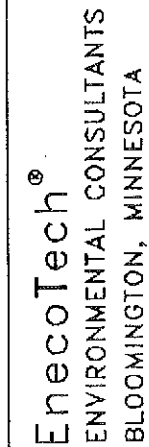


|                                                                          |                           |                                                                                                  |                      |
|--------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------|----------------------|
| <b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA |                           | FIGURE 8<br>SOIL ANALYTICAL DATA<br>TOTAL SERVICE STATION<br>9000 PENN AVE. SO., BLOOMINGTON, MN |                      |
| PROJECT NO.<br>719-012                                                   | DATE<br>5/91              | SCALE<br>1" = 20'                                                                                | PREPARED BY<br>EFW   |
|                                                                          | REVIEWED BY<br><i>JFS</i> | DATE<br>7/91                                                                                     | REVISION<br>ORIGINAL |
|                                                                          |                           |                                                                                                  | J1                   |

GEOLOGIC CROSS SECTION A-A' AND SOIL ANALYTICAL RESULTS  
 TOTAL SERVICE STATION  
 9000 PENN AVENUE SOUTH, BLOOMINGTON, MINNESOTA

|                                                                                       |                                                                          |              |                      |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------|----------------------|
|  | <b>EnecoTech®</b><br>ENVIRONMENTAL CONSULTANTS<br>BLOOMINGTON, MINNESOTA | DATE<br>5/91 | SCALE<br>SEE DRAWING |
| PROJECT NO.<br>719-012                                                                |                                                                          |              |                      |





|                        |              |                      |                             |             |      |                      |    |
|------------------------|--------------|----------------------|-----------------------------|-------------|------|----------------------|----|
| PROJECT NO.<br>719-012 | DATE<br>6/91 | SCALE<br>SEE DRAWING | PREPARED BY<br>SHW REV: EFW | REVIEWED BY | DATE | REVISION<br>ORIGINAL | CZ |
|                        |              |                      |                             | <i>JS</i>   | 7/91 |                      |    |

## TABLES

TABLE 1  
 SOIL SAMPLE VAPOR ORGANIC DATA  
 TOTAL PETROLEUM SERVICE STATION  
 9000 PENN AVENUE SOUTH  
 BLOOMINGTON, MN

| BORING # | DEPTH (FEET) |     |         |       |       |       |       |       |       |       |       |
|----------|--------------|-----|---------|-------|-------|-------|-------|-------|-------|-------|-------|
|          | 2.5-4.5      | 5-7 | 7.5-9.5 | 10-12 | 15-17 | 20-22 | 25-27 | 30-32 | 35-37 | 40-42 | 45-47 |
| SB-01    | 0            | 0   | 0       | 87    | 0     | 1.2   | 1.7   | 0     | ---   | ---   | ---   |
| SB-02    | 0            | 0   | 0       | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 3.4   |
| SB-03    | 3.8          | 1.7 | 0       | 0     | 0     | 0     | 0     | 0     | ---   | ---   | ---   |
| SB-04    | 0            | 0   | 0       | 0     | 0     | 0     | 0     | 0     | ---   | ---   | ---   |

ALL DATA SHOWN IN PARTS PER MILLION (PPM).

---- NO READINGS RECORDED. END OF BORING AT 32 FEET BELOW GROUND SURFACE (BGS)

TABLE 2  
 SOIL ANALYTICAL DATA  
 TOTAL PETROLEUM SERVICE STATION  
 9000 PENN AVENUE SOUTH  
 BLOOMINGTON, MN

| HOLE<br>SAMPLE # | SAMPLE<br>DATE | BENZENE | TOLUENE | ETHYL<br>BENZENE | XYLENE | THC<br>GASOLINE | LEAD | MTBE  |
|------------------|----------------|---------|---------|------------------|--------|-----------------|------|-------|
| SB-01-10         | 2/28/91        | <0.06   | <0.11   | <0.05            | 0.35   | 2.0             | 9    | <0.06 |
| SB-01-30         | 2/28/91        | <0.06   | <0.11   | <0.05            | <0.28  | <1.2            | 1.3  | <0.06 |
| SB-02-40         | 2/28/91        | <0.06   | <0.11   | <0.05            | <0.28  | <1.2            | <1.3 | <0.06 |
| SB-02-45         | 2/28/91        | <0.06   | <0.11   | <0.05            | <0.28  | <1.2            | 3    | <0.06 |
| SB-03-30         | 2/28/91        | <0.06   | <0.11   | <0.05            | <0.28  | <1.2            | 2    | <0.06 |
| SB-04-30         | 2/28/91        | <0.06   | <0.11   | <0.05            | <0.28  | <1.2            | 1.3  | <0.06 |

LABORATORY REPORT SHOWS SPECIFIC DETECTION LIMITS USED IN EACH ANALYSIS.  
 ALL VALUES ARE IN PARTS PER MILLION (PPM.)  
 SAMPLE DEPTHS ARE IN FEET BELOW GROUND SURFACE (BGS.)  
 THC - TOTAL HYDROCARBONS. MTBE - METHYL TERTIARY BUTYL ETHERS.

APPENDIX C  
SOIL BORING LOGS

# SOIL BORING LOG

FILING CODE - 19012S1A

ENECOTECH, INC.

|                      |   |         |
|----------------------|---|---------|
| HOLE DESIGNATION     | - | SB-01   |
| DATE STARTED         | - | 2/28/91 |
| DATE COMPLETED       | - | 2/28/91 |
| ENECOTECH SUPERVISOR | - | SPY     |

|                     |   |       |
|---------------------|---|-------|
| DRILLING CONTRACTOR | - | THEIN |
| DRILLER             | - | MIKE  |
| SURFACE ELEVATION   | - |       |
| DRILLING METHOD     | - | HSA   |

|                |   |                      |
|----------------|---|----------------------|
| PROJECT NAME   | - | TOTAL-PENN           |
| PROJECT NUMBER | - | 719-012              |
| CLIENT         | - | TOTAL                |
| LOCATION       | - | 9000 PENN AVENUE SO. |

| DEPTH            |        | S<br>A<br>M<br>P<br>L<br>E | S<br>A<br>M<br>P<br>L<br>E | S<br>A<br>M<br>P<br>L<br>E | PENETRATION<br>RECORD<br>SPLIT SPOON BLOWS |    |    |     | D<br>R<br>C<br>O<br>V<br>A<br>L<br>U<br>E | O<br>S<br>T<br>O<br>R<br>Y | S<br>A<br>M<br>B<br>L                 | SAMPLE DESCRIPTION<br><br>(COMPONENTS, COLOR, MOISTURE, NATIVE/FILL) | NOTES<br>(STRUCTURES,<br>DRILLER'S COMMENTS,<br>GEOLOGIC CLASSIFICATION) |
|------------------|--------|----------------------------|----------------------------|----------------------------|--------------------------------------------|----|----|-----|-------------------------------------------|----------------------------|---------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------|
| F<br>R<br>O<br>M | T<br>O |                            |                            |                            | 6"                                         | 6" | 6" | 6"  |                                           |                            |                                       |                                                                      |                                                                          |
|                  |        |                            |                            |                            |                                            |    |    |     |                                           |                            |                                       |                                                                      |                                                                          |
| 0                | 2.5    |                            |                            | AF                         |                                            |    |    |     |                                           | SP                         | MEDIUM SAND, MIXED WITH GRAVEL, BROWN |                                                                      |                                                                          |
| 2.5              | 4.5    |                            |                            | SS                         |                                            |    | 32 | 30  | 0                                         |                            | SP                                    | SAA, FROZEN                                                          | HAMMERING THROUGH FROST                                                  |
| 4.5              | 5.0    |                            |                            | AF                         |                                            |    |    |     |                                           |                            | SP                                    | SAA                                                                  |                                                                          |
| 5.0              | 7.0    |                            |                            | SS                         |                                            |    | 8  | 90  | 0                                         |                            | SP                                    | MEDIUM SAND, LIGHT BROWN                                             |                                                                          |
| 7.0              | 7.5    |                            |                            | AF                         |                                            |    |    |     |                                           |                            | SP                                    | SAA                                                                  |                                                                          |
| 7.5              | 9.5    |                            |                            | SS                         |                                            |    | 7  | 90  | 0                                         |                            | SP                                    | SAA                                                                  |                                                                          |
| 9.5              | 10.0   |                            |                            | AF                         |                                            |    |    |     |                                           |                            | SP                                    | SAA                                                                  |                                                                          |
| 10.0             | 12.0   | SB-01-10                   |                            | SS                         |                                            |    | 7  | 90  | 87                                        |                            | SP                                    | SAA                                                                  | MODERATE HYDROCARBON ODOR                                                |
| 12.0             | 15.0   |                            |                            | AF                         |                                            |    |    |     |                                           |                            | SP                                    | SAA                                                                  |                                                                          |
| 15.0             | 17.0   |                            |                            | SS                         |                                            |    | 20 | 100 | 0                                         |                            | SP                                    | MEDIUM SAND, BROWN TO BLACK                                          | NO HYDROCARBON ODOR                                                      |
| 17.0             | 20.0   |                            |                            | AF                         |                                            |    |    |     |                                           |                            | SP                                    | MEDIUM SAND, BROWN                                                   |                                                                          |
| 20.0             | 22.0   |                            |                            | SS                         |                                            |    | 40 | 100 | 1.2                                       |                            | SP                                    | MEDIUM SAND WITH 1/8" BEDS OF PEAT THROUGHOUT SPOON                  |                                                                          |
| 22.0             | 25.0   |                            |                            | AF                         |                                            |    |    |     |                                           |                            | SP                                    | SAA                                                                  |                                                                          |

## SOIL BORING LOG

FILING CODE - 19012S1B

FILING CODE

FILING CODE -

FILING CODE - 1901

FILING CODE - 19012S1B

FILING CODE - 19012S18

FILING CODE - 19012S18

FILING CODE - 19012S1B

FILING CODE - 19012S1B

FILING CODE - 19012S1B

FILING CODE - 19012S1B

FILING CODE - 19012S1B

FILING CODE - 19012S1B SOIL

| FILING CODE | - 19012S1B | SOIL BORI |
|-------------|------------|-----------|
|-------------|------------|-----------|

|             |            |  |                 |
|-------------|------------|--|-----------------|
| FILING CODE | - 19012S1B |  | SOIL BORING LOG |
|-------------|------------|--|-----------------|

| FILING CODE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | - 19012S1B | SOIL BORING LOG |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|
| <p>           1. 19012S1B<br/>           2. 19012S1B<br/>           3. 19012S1B<br/>           4. 19012S1B<br/>           5. 19012S1B<br/>           6. 19012S1B<br/>           7. 19012S1B<br/>           8. 19012S1B<br/>           9. 19012S1B<br/>           10. 19012S1B<br/>           11. 19012S1B<br/>           12. 19012S1B<br/>           13. 19012S1B<br/>           14. 19012S1B<br/>           15. 19012S1B<br/>           16. 19012S1B<br/>           17. 19012S1B<br/>           18. 19012S1B<br/>           19. 19012S1B<br/>           20. 19012S1B<br/>           21. 19012S1B<br/>           22. 19012S1B<br/>           23. 19012S1B<br/>           24. 19012S1B<br/>           25. 19012S1B<br/>           26. 19012S1B<br/>           27. 19012S1B<br/>           28. 19012S1B<br/>           29. 19012S1B<br/>           30. 19012S1B<br/>           31. 19012S1B<br/>           32. 19012S1B<br/>           33. 19012S1B<br/>           34. 19012S1B<br/>           35. 19012S1B<br/>           36. 19012S1B<br/>           37. 19012S1B<br/>           38. 19012S1B<br/>           39. 19012S1B<br/>           40. 19012S1B<br/>           41. 19012S1B<br/>           42. 19012S1B<br/>           43. 19012S1B<br/>           44. 19012S1B<br/>           45. 19012S1B<br/>           46. 19012S1B<br/>           47. 19012S1B<br/>           48. 19012S1B<br/>           49. 19012S1B<br/>           50. 19012S1B<br/>           51. 19012S1B<br/>           52. 19012S1B<br/>           53. 19012S1B<br/>           54. 19012S1B<br/>           55. 19012S1B<br/>           56. 19012S1B<br/>           57. 19012S1B<br/>           58. 19012S1B<br/>           59. 19012S1B<br/>           60. 19012S1B<br/>           61. 19012S1B<br/>           62. 19012S1B<br/>           63. 19012S1B<br/>           64. 19012S1B<br/>           65. 19012S1B<br/>           66. 19012S1B<br/>           67. 19012S1B<br/>           68. 19012S1B<br/>           69. 19012S1B<br/>           70. 19012S1B<br/>           71. 19012S1B<br/>           72. 19012S1B<br/>           73. 19012S1B<br/>           74. 19012S1B<br/>           75. 19012S1B<br/>           76. 19012S1B<br/>           77. 19012S1B<br/>           78. 19012S1B<br/>           79. 19012S1B<br/>           80. 19012S1B<br/>           81. 19012S1B<br/>           82. 19012S1B<br/>           83. 19012S1B<br/>           84. 19012S1B<br/>           85. 19012S1B<br/>           86. 19012S1B<br/>           87. 19012S1B<br/>           88. 19012S1B<br/>           89. 19012S1B<br/>           90. 19012S1B<br/>           91. 19012S1B<br/>           92. 19012S1B<br/>           93. 19012S1B<br/>           94. 19012S1B<br/>           95. 19012S1B<br/>           96. 19012S1B<br/>           97. 19012S1B<br/>           98. 19012S1B<br/>           99. 19012S1B<br/>           100. 19012S1B<br/>           101. 19012S1B<br/>           102. 19012S1B<br/>           103. 19012S1B<br/>           104. 19012S1B<br/>           105. 19012S1B<br/>           106. 19012S1B<br/>           107. 19012S1B<br/>           108. 19012S1B<br/>           109. 19012S1B<br/>           110. 19012S1B<br/>           111. 19012S1B<br/>           112. 19012S1B<br/>           113. 19012S1B<br/>           114. 19012S1B<br/>           115. 19012S1B<br/>           116. 19012S1B<br/>           117. 19012S1B<br/>           118. 19012S1B<br/>           119. 19012S1B<br/>           120. 19012S1B<br/>           121. 19012S1B<br/>           122. 19012S1B<br/>           123. 19012S1B<br/>           124. 19012S1B<br/>           125. 19012S1B<br/>           126. 19012S1B<br/>           127. 19012S1B<br/>           128. 19012S1B<br/>           129. 19012S1B<br/>           130. 19012S1B<br/>           131. 19012S1B<br/>           132. 19012S1B<br/>           133. 19012S1B<br/>           134. 19012S1B<br/>           135. 19012S1B<br/>           136. 19012S1B<br/>           137. 19012S1B<br/>           138. 19012S1B<br/>           139. 19012S1B<br/>           140. 19012S1B<br/>           141. 19012S1B<br/>           142. 19012S1B<br/>           143. 19012S1B<br/>           144. 19012S1B<br/>           145. 19012S1B<br/>           146. 19012S1B<br/>           147. 19012S1B<br/>           148. 19012S1B<br/>           149. 19012S1B<br/>           150. 19012S1B<br/>           151. 19012S1B<br/>           152. 19012S1B<br/>           153. 19012S1B<br/>           154. 19012S1B<br/>           155. 19012S1B<br/>           156. 19012S1B<br/>           157. 19012S1B<br/>           158. 19012S1B<br/>           159. 19012S1B<br/>           160. 19012S1B<br/>           161. 19012S1B<br/>           162. 19012S1B<br/>           163. 19012S1B<br/>           164. 19012S1B<br/>           165. 19012S1B<br/>           166. 19012S1B<br/>           167. 19012S1B<br/>           168. 19012S1B<br/>           169. 19012S1B<br/>           170. 19012S1B<br/>           171. 19012S1B<br/>           172. 19012S1B<br/>           173. 19012S1B<br/>           174. 19012S1B<br/>           175. 19012S1B<br/>           176. 19012S1B<br/>           177. 19012S1B<br/>           178. 19012S1B<br/>           179. 19012S1B<br/>           180. 19012S1B<br/>           181. 19012S1B<br/>           182. 19012S1B<br/>           183. 19012S1B<br/>           184. 19012S1B<br/>           185. 19012S1B<br/>           186. 19012S1B<br/>           187. 19012S1B<br/>           188. 19012S1B<br/>           189. 19012S1B<br/>           190. 19012S1B<br/>           191. 19012S1B<br/>           192. 19012S1B<br/>           193. 19012S1B<br/>           194. 19012S1B<br/>           195. 19012S1B<br/>           196. 19012S1B<br/>           197. 19012S1B<br/>           198. 19012S1B<br/>           199. 19012S1B<br/>           200. 19012S1B<br/>           201. 19012S1B<br/>           202. 19012S1B<br/>           203. 19012S1B<br/>           204. 19012S1B<br/>           205. 19012S1B<br/>           206. 19012S1B<br/>           207. 19012S1B<br/>           208. 19012S1B<br/>           209. 19012S1B<br/>           210. 19012S1B<br/>           211. 19012S1B<br/>           212. 19012S1B<br/>           213. 19012S1B<br/>           214. 19012S1B<br/>           215. 19012S1B<br/>           216. 19012S1B<br/>           217. 19012S1B<br/>           218. 19012S1B<br/>           219. 19012S1B<br/>           220. 19012S1B<br/>           221. 19012S1B<br/>           222. 19012S1B<br/>           223. 19012S1B<br/>           224. 19012S1B<br/>           225. 19012S1B<br/>           226. 19012S1B<br/>           227. 19012S1B<br/>           228. 19012S1B<br/>           229. 19012S1B<br/>           230. 19012S</p> |            |                 |

| FILING CODE | - 19012S1B | SOIL BORING LOG | E |
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| FILING CODE | - 19012S1B | SOIL BORING LOG | ENECOT |
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| FILING CODE | - 19012S1B | SOIL BORING LOG | ENECOTECH, |
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FILING CODE - 19012S1B

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| FILING CODE | - 19012S1B | SOIL BORING LOG | ENECOTECH, INC. | SHE |
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FILING CODE - 19012S1B SOIL BORING LOG ENECOTECH, INC. SHEET NO.

FILING CODE - 19012S1B

FILING CODE - 19012S1B SOIL BORING LOG ENECOTECH, INC. SHEET NO. 2 OF 2

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SHEET NO. 1 OF 2

ENEOTECH, INC.

SOIL BORING LOG

FILING CODE - 19012S2A

PROJECT NAME - TOTAL-PENN  
 PROJECT NUMBER - 719-012  
 CLIENT - TOTAL  
 LOCATION - 9000 PENN AVENUE SQ.

DRILLING CONTRACTOR - THEIN  
 DRILLER - MIKE  
 SURFACE ELEVATION -  
 DRILLING METHOD - HSA

HOLE DESIGNATION - SB-02  
 DATE STARTED - 2/28/91  
 DATE COMPLETED - 2/28/91  
 ENECOTECH SUPERVISOR - SPY

| DEPTH   | S A M P L E |   |   |   | PENETRATION RECORD SPLIT SPOON BLOWS |    |    |    | P R E C O R D E V A L U E | O S D T O R E N G T H | A S S Y M B O L | SAMPLE DESCRIPTION<br>(COMPONENTS, COLOR, MOISTURE, NATIVE/FILL) | NOTES<br>(STRUCTURES, DRILLER'S COMMENTS, GEOLOGIC CLASSIFICATION) |
|---------|-------------|---|---|---|--------------------------------------|----|----|----|---------------------------|-----------------------|-----------------|------------------------------------------------------------------|--------------------------------------------------------------------|
|         | F           | R | Q | M | 6"                                   | 6" | 6" | 6" |                           |                       |                 |                                                                  |                                                                    |
| D 2.5   |             |   |   |   |                                      |    |    |    |                           |                       | SP              | MEDIUM SAND, LIGHT BROWN                                         |                                                                    |
| 2.5 4.5 |             |   |   |   |                                      |    |    |    | 100 D                     |                       | CL              | SANDY CLAY, LIGHT GREEN BROWN                                    | POUNDING THROUGH FROST                                             |
| 4.5 5   |             |   |   |   |                                      |    |    |    |                           |                       | SC              | SAA                                                              |                                                                    |
| 5 7     |             |   |   |   |                                      |    |    | 7  | 60 D                      |                       | SP              | MEDIUM SAND, LIGHT BROWN                                         |                                                                    |
| 7 7.5   |             |   |   |   |                                      |    |    |    |                           |                       | SP              | SAA                                                              |                                                                    |
| 7.5 9.5 |             |   |   |   |                                      |    |    | 9  | 100 D                     |                       | SP              | SAA                                                              |                                                                    |
| 9.5 10  |             |   |   |   |                                      |    |    |    |                           |                       | SP              | SAA                                                              |                                                                    |
| 10 12   |             |   |   |   |                                      |    |    | 10 | 100 D                     |                       | SP              | SAA                                                              |                                                                    |
| 12 15   |             |   |   |   |                                      |    |    |    |                           |                       | SP              | SAA                                                              |                                                                    |
| 15 17   |             |   |   |   |                                      |    |    | 15 | 100 D                     |                       | SP              | MEDIUM SAND, LT BROWN TO BLACK                                   |                                                                    |
| 17 20   |             |   |   |   |                                      |    |    |    |                           |                       | SP              | MEDIUM SAND, DARK BROWN                                          |                                                                    |
| 20 22   |             |   |   |   |                                      |    |    | 11 | 100 D                     |                       | SP              | MED SAND, LIGHT BROWN TO BLACK                                   |                                                                    |
| 22 25   |             |   |   |   |                                      |    |    |    |                           |                       | SP              | MEDIUM SAND, DARK BROWN                                          |                                                                    |



SHEET NO. 2 OF 2

ENECOTECH, INC.

## SOIL BORING LOG

FILING CODE - 19012528

PROJECT NAME - TOTAL-PENN  
 PROJECT NUMBER - 719-012  
 CLIENT - TOTAL  
 LOCATION - 9000 PENN AVENUE SO.  
 DRILLING CONTRACTOR - THEIN  
 DRILLER - MIKE  
 SURFACE ELEVATION -  
 DRILLING METHOD - HSA  
 HOLE DESIGNATION - SB-02  
 DATE STARTED - 2/28/91  
 DATE COMPLETED - 2/28/91  
 ENECOTECH SUPERVISOR - SPY

| DEPTH | F<br>R<br>O<br>M | S<br>A<br>M<br>P<br>L<br>E<br>N<br>O<br>B<br>D | P<br>E<br>N<br>E<br>T<br>R<br>A<br>T<br>I<br>O<br>N<br>R<br>E<br>C<br>O<br>R<br>D<br>S<br>P<br>L<br>I<br>T<br>S<br>P<br>O<br>O<br>N<br>B<br>L<br>O<br>W<br>S | P<br>R<br>E<br>C<br>O<br>U<br>N<br>T<br>E<br>R<br>Y | D<br>I<br>V<br>A<br>L<br>U<br>E | O<br>S<br>T<br>R<br>E<br>N<br>G<br>T<br>H | A<br>S<br>T<br>M<br>B<br>O<br>L | S<br>A<br>M<br>P<br>L<br>E<br>D<br>E<br>S<br>C<br>R<br>I<br>P<br>T<br>I<br>O<br>N<br>(COMPONENTS, COLOR, MOISTURE, NATIVE/FILL) | N<br>O<br>T<br>E<br>S<br>(STRUCTURES,<br>DRILLER'S COMMENTS,<br>GEOLOGIC CLASSIFICATION) |
|-------|------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------|-------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
|       |                  |                                                | 6"                                                                                                                                                           | 6"                                                  | 6"                              | 6"                                        |                                 |                                                                                                                                 |                                                                                          |
| 25    | 27               |                                                |                                                                                                                                                              |                                                     | 52                              | 100                                       | 0                               | MEDIUM SAND, LIGHT BROWN TO ORANGE/BROWN                                                                                        |                                                                                          |
| 27    | 30               |                                                |                                                                                                                                                              |                                                     |                                 |                                           |                                 | SAA, DARK BROWN                                                                                                                 |                                                                                          |
| 30    | 32               |                                                |                                                                                                                                                              |                                                     | 80                              | 30                                        | 0                               | MEDIUM TO COARSE SAND, DARK BROWN TO ORANGE/BROWN                                                                               |                                                                                          |
| 32    | 35               |                                                |                                                                                                                                                              |                                                     |                                 |                                           |                                 | SAA                                                                                                                             |                                                                                          |
| 35    | 37               |                                                |                                                                                                                                                              |                                                     | 34                              | 100                                       | 0                               | MEDIUM TO FINE SAND, LIGHT BROWN                                                                                                |                                                                                          |
| 37    | 40               |                                                |                                                                                                                                                              |                                                     |                                 |                                           |                                 | SAA                                                                                                                             |                                                                                          |
| 40    | 42               | SB-02-40                                       |                                                                                                                                                              |                                                     | 40                              | 50                                        | 0                               | FINE SAND, GREEN, SATURATED                                                                                                     | WATER @ ~ 40'                                                                            |
| 42    | 45               |                                                |                                                                                                                                                              |                                                     |                                 |                                           |                                 | SAA                                                                                                                             | ENCOUNTERED ~ 6" ROCK LAYER @ 43'                                                        |
| 45    | 47               | SB-02-45                                       |                                                                                                                                                              |                                                     | 50                              | 100                                       | 3.4                             | 45-46' - MEDIUM SAND, GRAY, SATURATED                                                                                           |                                                                                          |
|       |                  |                                                |                                                                                                                                                              |                                                     |                                 |                                           |                                 | 46-46.5' - STIFF SILTY CLAY, GRAY                                                                                               |                                                                                          |
|       |                  |                                                |                                                                                                                                                              |                                                     |                                 |                                           |                                 | 46.5-47.5' - SANDY CLAY, GRAY                                                                                                   |                                                                                          |
|       |                  |                                                |                                                                                                                                                              |                                                     |                                 |                                           |                                 | TERMINATED BORING @ 47.0'                                                                                                       |                                                                                          |

SHEET NO. 1 OF 2

ENECOTECH, INC.

## SOIL BORING LOG

FILING CODE - 19012S3A

PROJECT NAME - TOTAL-PENN  
 PROJECT NUMBER - 719-012  
 CLIENT - TOTAL  
 LOCATION - 9000 PENN AVENUE SO.  
 DRILLING CONTRACTOR - THEIN  
 DRILLER - MIKE  
 SURFACE ELEVATION -  
 DRILLING METHOD - HSA  
 HOLE DESIGNATION - SB-03  
 DATE STARTED - 2/28/91  
 DATE COMPLETED - 2/28/91  
 ENECOTECH SUPERVISOR - SPY

| DEPTH | F<br>R<br>O<br>M | T<br>O | S<br>A<br>M<br>P<br>L<br>E<br>N<br>U<br>M<br>B<br>E<br>R | S<br>A<br>M<br>P<br>L<br>E<br>T<br>H<br>I<br>N<br>G<br>D | PENETRATION<br>RECORD<br>SPLIT SPOON BLOWS |    |    |    | P<br>R<br>E<br>C<br>O<br>V<br>E<br>R<br>Y | D<br>I<br>V<br>A<br>L<br>U<br>E | O<br>S<br>D<br>T<br>O<br>R<br>E<br>N<br>G<br>T<br>H | A<br>S<br>F<br>S<br>M<br>B<br>O<br>L | S<br>A<br>M<br>P<br>L<br>E<br>D<br>E<br>S<br>C<br>R<br>I<br>P<br>T<br>I<br>O<br>N<br>(COMPONENTS, COLOR, MOISTURE, NATIVE/FILL) | N<br>O<br>T<br>E<br>S<br>(STRUCTURES,<br>DRILLER'S COMMENTS,<br>GEOLOGIC CLASSIFICATION) |
|-------|------------------|--------|----------------------------------------------------------|----------------------------------------------------------|--------------------------------------------|----|----|----|-------------------------------------------|---------------------------------|-----------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
|       |                  |        |                                                          |                                                          | 6"                                         | 6" | 6" | 6" |                                           |                                 |                                                     |                                      |                                                                                                                                 |                                                                                          |
| 0     | 0                | 2.5    |                                                          | AF                                                       |                                            |    |    |    |                                           |                                 |                                                     | SP                                   | MEDIUM SAND, LIGHT BROWN                                                                                                        |                                                                                          |
| 2.5   | 2.5              | 4.5    |                                                          | SS                                                       |                                            |    |    |    |                                           | 3.8                             |                                                     | SP                                   | SAA                                                                                                                             | POUNDING THROUGH FROST                                                                   |
| 4.5   | 4.5              | 5      |                                                          | AF                                                       |                                            |    |    |    |                                           |                                 |                                                     | SP                                   | SAA                                                                                                                             |                                                                                          |
| 5     | 5                | 7      |                                                          | SS                                                       |                                            |    |    | 8  | 50                                        | 1.7                             |                                                     | SC                                   | MEDIUM SAND W/ CLAY, LIGHT BROWN                                                                                                |                                                                                          |
| 7     | 7                | 7.5    |                                                          | AF                                                       |                                            |    |    |    |                                           |                                 |                                                     | SC                                   | SAA                                                                                                                             |                                                                                          |
| 7.5   | 7.5              | 9.5    |                                                          | SS                                                       |                                            |    |    | 14 | 75                                        | 0                               |                                                     | SP                                   | MEDIUM SAND W/GRAVEL, LIGHT BROWN                                                                                               |                                                                                          |
| 9.5   | 9.5              | 10     |                                                          | AF                                                       |                                            |    |    |    |                                           |                                 |                                                     | SP                                   | SAA                                                                                                                             |                                                                                          |
| 10    | 10               | 12     |                                                          | SS                                                       |                                            |    |    | 7  | 90                                        | 0                               |                                                     | SP                                   | MEDIUM SAND W/GRAVEL, LIGHT BROWN                                                                                               |                                                                                          |
| 12    | 12               | 15     |                                                          | AF                                                       |                                            |    |    |    |                                           |                                 |                                                     | SP                                   | SAA                                                                                                                             |                                                                                          |
| 15    | 15               | 17     |                                                          | SS                                                       |                                            |    |    | 18 | 90                                        | 0                               |                                                     | SP                                   | MED SAND, LT BROWN TO BLACK                                                                                                     |                                                                                          |
| 17    | 17               | 20     |                                                          | AF                                                       |                                            |    |    |    |                                           |                                 |                                                     | SP                                   | MEDIUM SAND, LIGHT BROWN                                                                                                        |                                                                                          |
| 20    | 20               | 22     |                                                          | SS                                                       |                                            |    |    | 18 | 60                                        | 0                               |                                                     | SP                                   | SAA - BOTTOM 1/2" ON SPOON CONTAINED PEAT                                                                                       |                                                                                          |
| 22    | 22               | 25     |                                                          | AF                                                       |                                            |    |    |    |                                           |                                 |                                                     | SP                                   | MEDIUM SAND, LIGHT BROWN                                                                                                        |                                                                                          |

## SOIL BORING LOG

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| FILING CODE | - 19012S38 | SOIL BORING LOG | ENECOT |
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| FILING CODE | - 19012S38 | SOIL BORING LOG | ENECOTECH, INC. | SHEET NO. 2 |
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## Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

800-657-3864 | 651-282-5332 TTY | [www.mPCA.state.mn.us](http://www.mPCA.state.mn.us) | Equal Opportunity Employer

December 16, 2011

# I - TANK REMOVAL LETTER

Mr. Ned Abdul  
Bloomington Investments, LLC  
510 1<sup>st</sup> Avenue North, Suite 200  
Minneapolis, MN 55403

RE: August 4, 2011, Underground Storage Tank Field Citation - Completion of Corrective Action for Minnesota Pollution Control Agency Tank Site No. 2635 – 9000 Penn Avenue South, Bloomington, Minnesota

Dear Mr. Abdul:

This letter acknowledges that Bloomington Investments, LLC (Regulated Party) has completed the corrective action described in the Minnesota Pollution Control Agency's (MPCA) August 4, 2011, Underground Storage Tank Field Citation by removing the tanks from the ground. The MPCA also acknowledges receipt of the Regulated Party's check in the amount of \$750 received on September 22, 2011.

On December 8, 2011, the Regulated Party's MPCA certified tank contractor removed the three underground storage tanks from the ground at 9000 Penn Avenue South, Bloomington, Minnesota. MPCA staff was present during the removal of the tanks. Based upon this information, the MPCA staff has determined that the corrective action contained in the Field Citation has been completed.

If you have any questions, please contact me at 651-285-8666.

Thank you for your attention to this matter and your cooperation in fulfillment of the requirements.

Sincerely,

Shirley Smith  
Pollution Control Specialist Senior  
Compliance and Enforcement Section  
Industrial Division

SJS:map

cc: Michael Wilson, Hennepin County Department of Environmental Services  
Carmen Netten, Attorney General's Office  
Bob Dullinger, MPCA  
Nate Blasing, MPCA  
MPCA Enforcement Data Coordinator-Enforcement Database Tracking Number #13134  
Shirley Smith, MPCA  
MPCA Tank Site No. 2635 File