

**CITY OF DOVER**

## PLANNING TECHNICAL REVIEW COMMITTEE –AGENDA

Meeting Type: Regular Meeting  
Meeting Location: 1st Floor Conference Room – City Hall, Dover NH  
Meeting Date: **Thursday, March 28, 2019**  
Meeting Time: **10:30 am**

1. 10:30 AM - 11:15 AM: Site Review for 29 Littleworth Road LLC & Northern Pool & Spa, Assessor's Map G, Lot 6 , zoned I-4, and located at 29 Littleworth Road. (Proposal is to construct an 11,728 sq. ft. office and warehouse. Other improvements include access and parking areas, stormwater treatment and an on-site wastewater disposal field). (P19-26)



# ATTAR

ENGINEERING, INC

CIVIL • STRUCTURAL • MARINE

Donna Benton  
City Planner  
City of Dover, N.H.  
288 Central Avenue  
Dover, N.H. 03820-4169

March 4, 2019  
Project No.: C147-19

**RE: Site Plan Review  
29 Littleworth Road ((Map G-6, Lot 0-0))**

Dear Ms. Benton:

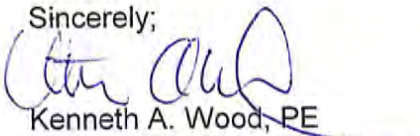
On behalf of 29 Littleworth Rd, LLC and Peter Paul, I have enclosed a Site Plan Review Application, plan set and supporting information for the above referenced project.

The applicant is proposing to develop the 3.99-acre parcel with an 11,728 SF office and warehouse. Other improvements include access and parking areas, stormwater treatment and an on-site wastewater disposal field. The site is served by municipal water.

We look forward to discussing this project at the next available Technical Review Committee and Planning Board meetings. If any additional information is required, please contact me.

Thank you for your assistance.

Sincerely;



Kenneth A. Wood, PE  
President

cc: 29 Littleworth, LLC (Peter Paul)

C147-19\_Dover\_Staff Review-App\_Cover.doc

Encl's:

- 1) Site Plan Review Application
- 2) Site Plan Review Checklist
- 3) Property Deeds
- 4) Google Earth Imagery
- 5) Test Pit Logs
- 6) Traffic Impact Assessment Report
- 7) Stormwater Management Report
- 8) Architectural Drawings
- 9) Street-Scape Rendering



# City of Dover, New Hampshire SITE REVIEW APPLICATION

[Revision Date: April 02, 2018]

|                 |              |       |                |       |
|-----------------|--------------|-------|----------------|-------|
| Office Use Only | Project #:   | _____ | Date Received: | _____ |
|                 | Amount Paid: | _____ | Time Received: | _____ |

## APPLICANT AND OWNER INFORMATION

Name of Applicant: 29 Littleworth Rd, LLC c/o Northern Pool & Spa Telephone # 207-439-6800

Address of Applicant: 291 Harold Dow Highway, Eliot, ME 03903

E-Mail Address: peter@northernpoolandspa.com

Name of Property Owner (*if different from applicant*): Same Telephone # \_\_\_\_\_

Address of Property Owner: \_\_\_\_\_

## PROPERTY INFORMATION

Address of Property: 29 Littleworth Road, Dover, NH 03820

Assessor's Map # G-6 Lot(s) # 0-0

Zoning District(s) I-4, Assembly and Office Overlay District(s) \_\_\_\_\_

Size of Parcel: 173,804 sq. ft. 3.99 ac. Property Deed: Book 4538 Page: 0447

Existing Use of Property: Vacant land, former buildings were demolished.

## SITE PLAN INFORMATION

Describe Proposed Use: Office and Warehouse

Area of Parcel to be Developed: 87,500 SF sq. ft.

If Multi-family Residential, Specify Number of Units & Buildings Proposed: N/A

Number of Parking Spaces: Existing 0 Proposed 22

Highway Access (check where applicable): \_\_\_\_\_ City Street X State Highway

Number of Employees Total: 20 In Maximum Shift: 20

Disposition of Parcel:

Building Setbacks:

Building Footprint 11,728 sq. ft.

Front Yard 75' ft.

Total Building Area 0 sq. ft.

Rear Yard 75' ft.

Paved Area 0 sq. ft.

Side Yard: Right 75 ft. Left 75 ft.

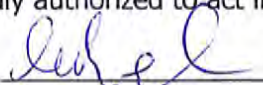


City Water? ☐ Yes ☐ No How far is city water from the property? on-siteCity Sewer? ☐ Yes ☒ No How far is city sewer from the property? \_\_\_\_\_**BUILDING INFORMATION**Type of Building to be Built: Office and WarehouseHeight of Building: 34' Finished Floor Elevation: 107.5'Number of Seats (where applicable) N/AEstimated value of construction: \$420,000 Refuse removal: Public/Private (circle one)**WAIVER REQUESTS**

Site Review Regulations section(s) to be waived: \_\_\_\_\_

Justification for waiver request(s) (*attach additional sheets as needed*): \_\_\_\_\_**SURVEYOR INFORMATION**Name of Surveyor and Company (Licensed in N.H.) Christian WilberAddress River Road, Eliot, ME 03903 Telephone #: (207) 451-3940Professional License #: NH 00847 E-mail address: chriswilberpls@gmail.com**ENGINEER INFORMATION**Name of Engineer and Company (Licensed in N.H.) Kenneth A. Wood, P.E./ Attar Engineering, INCAddress 1284 State Road, Eliot, ME 03903 Telephone #: 207-439-6023Professional License #: 6917 E-mail address: ken@attarengineering.com**SIGNATURES**

I/We hereby submit this application to the City of Dover Planning Board and attest that to the best of my knowledge all of the information on this application form and in the accompanying application materials and documentation is true and accurate. Furthermore, I/we submit that the existing conditions sheet of the plan represents the lot in question, and that no alteration of the site shall take place during Planning Board review up to and including the pre-construction meeting. As applicant or as agent, I attest that I am duly authorized to act in this capacity.

Signature of Property Owner:  Date: 3-4-2019Signature of Applicant (*if different from owner*): GAME Date: \_\_\_\_\_

Signature of Agent: [Signature] PE. Date: 3/4/2019

**AUTHORIZATION TO ENTER SUBJECT PROPERTY**

I, and my successors, hereby authorize members of the Dover Planning Board, Planning Department and other pertinent City Departments and boards to enter my property for the purpose of evaluating this application, including performing inspections during the application phase, post-approval phase, construction phase and occupancy phase. It is understood that these individuals must use all reasonable care, courtesy, and diligence when on the property.

Signature of Property Owner: [Signature] Date: 3-4-2019

**AUTHORIZATION TO COMPLETE THE PROJECT ON SUBJECT PROPERTY**

I, and my successors, hereby the City of Dover or its assigns to enter my property for the purpose of completing the site work as required by the approved plan should the letter or credit or other surety be called. It is understood that these individuals must use all reasonable care, courtesy, and diligence when on the property.

Signature of Property Owner: [Signature] Date: 3-4-2019

Signature of Applicant (if different from owner): SAME Date: \_\_\_\_\_

**CERTIFICATION OF FEES**

I, and my successors, hereby certify that I understand that the City of Dover collects impact fees, utility investment fees and inspection fees for projects developed in Dover. Said fees must be paid before a Certificate of Occupancy can be obtained for a structure, unless a different payment schedule is agreed to by the applicant and the City prior to approvals being issued by the Dover Planning Board. Additionally, should the property be in "Current Use" it will be subject to the Land Use Change Tax.

Signature of Property Owner: [Signature] Date: 3-4-2019

Signature of Applicant (if different from owner): SAME Date: \_\_\_\_\_



## PLANNING BOARD ESTIMATED FEE SCHEDULE

This is only provided to give you an estimate of the application fees. *After you submit an application, staff will invoice you a total.* All fees must be paid two weeks before the Planning Board meeting. **If the Fee has not been paid, the item will not be placed upon the agenda.**

**A. TOTAL FEE** paid by cash or check made payable to "City of Dover"

1. Application fee for the following:

- SUBDIVISION \$150.00 x # \_\_\_\_\_ new lots created = \$ \_\_\_\_\_
- LOT LINE ADJUSTMENT \$200.00 (if more than two lots involved, add \$100.00 per lot) = \_\_\_\_\_
- SITE REVIEW – TRANSFER OF DEVELOPMENT RIGHTS Application fee \$150.00 = \$ \_\_\_\_\_
- SITE REVIEW - RESIDENTIAL \$100.00 x # \_\_\_\_\_ per dwelling unit = \$ \_\_\_\_\_
- SITE REVIEW – NON-RESIDENTIAL (not to exceed \$10,000)  
New construction \$.15 sq. ft. x # 11,728 sq. ft. = \$ 1759.20  
Additions (new floor space) \$.10 per sq. ft. x # \_\_\_\_\_ sq. ft. = \$ \_\_\_\_\_
- IMPERVIOUS PAVED AREA (for new development) OR IMPERVIOUS PARKING LOT ADDITIONS (not to exceed \$10,000) \$.07 sq. ft. x # 52,316 = \$ 3662.12
- MOTEL/HOTEL \$35.00 x # \_\_\_\_\_ per lodging unit = \$ \_\_\_\_\_
- CHANGE OF USE (not to exceed \$5,000)  
Existing floor space \$.10 per sq. ft. x # \_\_\_\_\_ sq. ft. = \$ \_\_\_\_\_
- CONDITIONAL USE PERMIT \$150.00 x # \_\_\_\_\_ per application = \$ \_\_\_\_\_
- GRAVEL PIT/ EXCAVATIONS - Application fee \$50.00 & Permit fee \$75.00 = \$ \_\_\_\_\_
- EXTENSIONS OF/AMENDMENTS TO/WAIVERS FOR AN APPROVED PLAN (\$150.00 minimum) \$50.00 x # \_\_\_\_\_ per hour of review = \$ \_\_\_\_\_
- REQUEST FOR REZONING \$150.00 = \$ \_\_\_\_\_
- DRIVEWAY WAIVER – \$100.00 application fee = \_\_\_\_\_  
Letter of rejection from Engineering Department, diagram & letter from owner \$ \_\_\_\_\_

**B. Abutter Notification/Mailing Labels** - this office will create and print the abutter list and provide labels in triplicate for each abutter. The applicant/owner will need to provide to this office the engineer, architect, land surveyor or soil scientist whose professional seal appears on the plan with names and addresses for notices. You will be notified with the amount due, once this has been completed.

1. Applicant & Owner, engineer, architect, land surveyor or soil scientist  
Certified letters fee # \_\_\_\_\_ of x \$8.00 = \_\_\_\_\_
2. Certified letters fee: # of abutters \_\_\_\_\_ X \$8.00 = \$ \_\_\_\_\_
3. First Class Mail fee (for individual owner of units within a condominium or other collective form of ownership): # of abutters \_\_\_\_\_ X \$1.00 = \$ \_\_\_\_\_
4. Creating/Printing Abutter Labels in triplicate per sheet \_\_\_\_\_ x \$10.00 = \$ \_\_\_\_\_

**C. Foster's newspaper public notice fee** \$ 80.00

*(Revised October 2, 2018)*

**TOTAL FEE** \$ 5421.32

## CITY OF DOVER SITE REVIEW LIST OF ABUTTERS

Pursuant to RSA 676:4, the State Law of New Hampshire, the City of Dover is required to notify the applicant, abutters (including holders of conservation easements), and any professional whose seal is on the plan, of the public hearing by certified mail, return receipt requested. Staff will provide the abutter information, while the applicant must provide accurate contact information for the owner, applicant and professional agents representing the project.

**Owner:**

| TAX MAP | LOT # | PROPERTY OWNER        | MAILING ADDRESS                         |
|---------|-------|-----------------------|-----------------------------------------|
| G-6     | 0-0   | 29 Littleworth Rd LLC | 291 Harold Dow Highway, Eliot, ME 03903 |

**Applicant (if different from owner):**

| APPLICANT NAME | APPLICANT COMPANY | MAILING ADDRESS |
|----------------|-------------------|-----------------|
|                | Same              |                 |

**Surveyor and/or Engineer/Professional Agent:**

| NAME                  | COMPANY                | MAILING ADDRESS                  |
|-----------------------|------------------------|----------------------------------|
| Kenneth A. Wood, P.E. | Attar Engineering, INC | 1284 State Road, Eliot, ME 03903 |
|                       |                        |                                  |
|                       |                        |                                  |

**Conservation Easement Holder:**

| TAX MAP | LOT # | NAME OF EASEMENT HOLDER | MAILING ADDRESS |
|---------|-------|-------------------------|-----------------|
|         |       | None                    |                 |



## List of Abutters

Project: 29 Littleworth Rd.

Location: Dover, NH Map G-6, Lot 0-0

| Map  | Lot | Property Owner                                  | Mailing Address                                      |
|------|-----|-------------------------------------------------|------------------------------------------------------|
| G-4  | 0-0 | 16 Industrial Park, LLC                         | 273 Corporate Drive, Ste 150<br>Portsmouth, NH 03801 |
| G-4  | A-1 | Bearings, INC<br>C/O PT Counselors              | P.O. Box 3075<br>McKinney, TX 75070                  |
| G-4  | G-2 | Littleworth Industrial Park Properties LLC      | PO Box 118<br>Dover, NH 03821-0018                   |
| G-6  | B-0 | Willis E. Hutchings                             | 184 W High Street<br>Somersworth, NH 03878           |
| G-6  | D-0 | Hadley S. & Shane A.                            | 4 Cottage Lane<br>Rollinsford, NH 03869              |
| G-6  | C-0 | Storemaster Funding, LLC<br>C/O Pace Industries | 67 Faulkner Street<br>No. Billerica, MA 01862        |
| H-28 | 0-0 | Richard W. Kay                                  | 45 Littleworth Road<br>Dover, NH 03820               |
| H-28 | 1-0 | Richard W. Kay                                  | 45 Littleworth Road<br>Dover, NH 03820               |
| H-31 | 0-0 | Ruth K Sousane<br>Nancy K Quinian               | 30 Littleworth Road<br>Dover, NH 03820               |
| H-65 | A-0 | Iron Horse Park                                 | High Street<br>N. Billerica, MA 01862                |
|      |     | City of Dover                                   | 288 Central Ave<br>Dover, NH 03820                   |





## City of Dover, New Hampshire

### SITE PLAN REVIEW SUBMISSION CHECKLIST

[Revision Date: June 25, 2018]

This site plan review checklist, as required by Chapter 149-6-B(2), should be completed by the applicant. It is intended to assist the applicant in the planning process of preparing a Site Plan Review application for Planning Board action. The size of the project will determine the types of information required for review, therefore, a **pre-application conference** with the Planning Department to determine the list of items that must be completed is strongly encouraged.

**Fees will be invoiced and are due along with fifteen (15), folded, copies of the plan set and materials, including response to TRC comments, will be due 3 weeks prior to the Planning Board meeting.**

*The applicant is cautioned that this checklist is only a guide and is not intended to be a complete list of all site plan review requirements. Please refer to the Site Plan Review Regulations for full details.*

APPLICANT: 29 Littleworth, LLC File Number: \_\_\_\_\_

PROJECT TITLE: 29 Littleworth Rd Site Plan

PROPERTY LOCATION: 29 Littleworth Rd Tax Map: G-6 Lot: 0-0

|                                                                                                                                                                         | Explain How Provided | Reviewed |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|
| 1. Completed and signed Application form                                                                                                                                | X                    |          |
| 2. Electronic copy of the engineered/surveyed plan layout                                                                                                               | X                    |          |
| 3. Electronic copy of supplementary materials and application                                                                                                           | X                    |          |
| 4. Traffic Impact Assessment and Analysis (Standard or Advanced)                                                                                                        | X                    |          |
| 5. Waiver requests to the Site Plan Review Regulations, with written justification                                                                                      |                      |          |
| 6. Conditional Use Permit applications                                                                                                                                  |                      |          |
| 7. A colored rendering of the streetscape that will be created along the existing public right-of-way                                                                   | X                    |          |
| 8. A colored architectural plan showing all sides of buildings                                                                                                          | X                    |          |
| 9. List of all professional agents to be notified for Planning Board                                                                                                    | X                    |          |
| 10. Letter to Serve from Public and Private Utilities                                                                                                                   | Forthcoming          |          |
| 11. Eight folded copies of site plan w/scale of not less than 1"=50' or 1"=100' for larger site plans, for TRC. Plans shall contain the following items as appropriate: | X                    |          |
| Location map at appropriate scale                                                                                                                                       | X                    |          |
| Proposed Project name and title and Planning File #                                                                                                                     | X                    |          |
| Date, north arrow and scale                                                                                                                                             | X                    |          |
| Names of all abutting property owners                                                                                                                                   | X                    |          |
| Name and address of owners and/or applicants                                                                                                                            | X                    |          |
| Signature & stamp of NH licensed land surveyor and/or engineer                                                                                                          | X                    |          |
| Zoning District boundaries, including any special or overlay districts                                                                                                  | X                    |          |
| Location of Conservation District areas                                                                                                                                 | N/A                  |          |
| Location, names and widths of existing and proposed streets, including pavement widths, grades, curbs and crosswalks                                                    | X                    |          |
| Location and widths of existing & proposed easements & right of ways                                                                                                    | X                    |          |
| Depict pedestrian walkways and accessible access                                                                                                                        | X                    |          |
| Location and width of existing and proposed access/egress ways                                                                                                          | X                    |          |
| Existing and proposed property lines with dimensions and bearings tied into Dover's Geographic Information System coordinate system                                     | N/A                  |          |
|                                                                                                                                                                         | Explain How Provided | Reviewed |



|                                                                                                                          |             |  |
|--------------------------------------------------------------------------------------------------------------------------|-------------|--|
| Existing and proposed topographic information at two foot intervals                                                      | X           |  |
| Existing and proposed buildings and structure locations                                                                  | X           |  |
| Minimum building setbacks or build to lines on all lots                                                                  | X           |  |
| Location and size of existing and proposed electric, telephone, gas cable and other underground utilities                | X           |  |
| Existing and proposed water lines and fire hydrants, including materials and capacity needed                             | X           |  |
| Location and materials of sanitary sewage facilities within project site and projected additional peak hour sewer load   | X           |  |
| Existing and proposed stormwater lines and facilities                                                                    | X           |  |
| Lighting plan depicting all existing and proposed exterior light fixtures and a lighting level analysis for parking lots | X           |  |
| Location of Flood Hazard Zone                                                                                            | N/A         |  |
| Location of all bodies of water and watercourses                                                                         | X           |  |
| Location of wetlands and buffers                                                                                         | X           |  |
| Neighborhood plan with aerial underlay showing how project relates to abutting uses within the plan set                  | X           |  |
| Existing natural features and/or significant vegetation on property                                                      | X           |  |
| Depict existing contours up to 100 ft. beyond project limits                                                             | X           |  |
| Landscape plan depicting existing and proposed landscaping, prepared by a licensed Professional Landscape Architect      | X           |  |
| Location of parking layout delineating spaces and arrangement; note addressing maximum required spaces                   | X           |  |
| Location, material and size of existing and proposed pavement area                                                       | X           |  |
| Location of proposed fire lanes                                                                                          | X           |  |
| Specify finished floor elevations of buildings                                                                           | X           |  |
| Location of solid waste disposal facilities (dumpster, pad and screening, etc.), including required screening            | X           |  |
| Depict all service, storage, loading bays and utility areas                                                              | X           |  |
| All applicable Dover Common Site Plan notes                                                                              | X           |  |
| <b>12. Additional Information if appropriate</b>                                                                         |             |  |
| Stormwater Management Plan depicting the existing & proposed storm drainage system and engineered drainage analysis      | X           |  |
| Stormwater Management System Operation and Maintenance Plan                                                              | X           |  |
| Erosion and Sedimentation Control Plan                                                                                   | X           |  |
| Landscape Operation and Maintenance Plan                                                                                 | X           |  |
| Proposed restrictive covenants or homeowners association documents                                                       | N/A         |  |
| Dates and permit numbers of all required state and federal permits                                                       | Forthcoming |  |
| If wetland buffer, indicate placards locations, as applicable                                                            | X           |  |
| Depict test boring locations, groundwater elevations and soil profiles and/or soils types call-outs                      | X           |  |
| Location of proposed drive-in facilities                                                                                 | N/A         |  |
| Provide additional exhibits/technical data determined appropriate by the Planning Board or its staff as required         | X           |  |

REVIEWED BY: \_\_\_\_\_ DATE \_\_\_\_\_ TRC DATE \_\_\_\_\_

Return to:  
Atlas-Heritage Title, LLC  
903 Central Avenue, #5  
Dover, NH 03820

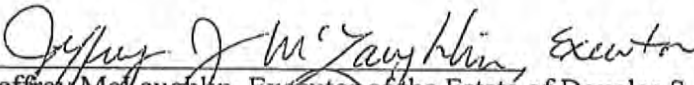
## FIDUCIARY DEED

KNOW ALL MEN BY THESE PRESENTS: That Jeffrey McLaughlin, Executor of Estate of Douglas S. Rogers, of 29 Littleworth Road, Dover, NH 03820, pursuant to the power conferred by the Strafford County Probate Court and every other power, for Two Hundred Forty-Three Thousand and 00/100 (\$243,000.00) paid grant(s) to Peter Paul, with a mailing address of P.O. Box 694, Dover, NH 03820, with Fiduciary Covenants:

The premises described on Exhibit A, attached hereto.

I/We, the grantor(s) herein hereby release all rights of homestead, if any, in the above described premises.

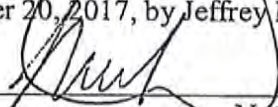
Executed this 20th day of December, 2017.

  
Jeffrey McLaughlin, Executor of the Estate of Douglas S. Rogers

State of New Hampshire  
County of Strafford

December 20, 2017

This instrument was acknowledged before me on December 20, 2017, by Jeffrey McLaughlin, Executor of Estate of Douglas S. Rogers.

  
Notary Public

Commission expiration:





## Exhibit A

A certain tract of land, with the buildings thereon, situate in Dover, County of Strafford and State of New Hampshire on the easterly side of the Littleworth Road, bounded and described as follows:

Beginning at a marker on the easterly side of the Littleworth Road at land of the Boston and Maine Railroad, thence running N 65° 54' E by said Boston and Maine Railroad land, a distance of 400 feet, more or less, to a marker at land of the S.E.N.H. Industrial Park, thence running N 28° 28' W by said Industrial Park a distance of 438.2 feet, to a marker, thence running S 61° 50' W a distance of 400.00 feet to a marker on the Easterly side of said Littleworth Road, thence running S 28° 28' E by said Littleworth Road a distance of 410 feet, more or less, to the point of beginning.

Being shown on an unrecorded plan entitled "S.E.N.H. Industrial Park, Rogers Land, Dover, N.H., dated October 1966, prepared by G.L. Davis and Associates."

Subject, also, to the easement granted to the Public Service Co. of New Hampshire by deed dated August 28, 1968 and recorded in said Registry at Book 850, Page 186.

Meaning and intending to describe and convey the premises conveyed to Grantor(s) by deed dated 06/27/1972 and recorded in the Strafford Registry of Deeds, Volume 986, Page 124.



Return to:

EDoc # 0019217 Dec 27, 2017 10:46 AM  
Book 4538 Page 0447 Page 1 of 2  
Register of Deeds, Strafford County



## WARRANTY DEED

KNOW ALL MEN BY THESE PRESENTS, that I, Peter Paul, with a mailing address of P. O. Box 694, Dover, NH 03820, for consideration paid, grants to 29 Littleworth Road, LLC, with a mailing address of P.O. Box 694, Dover, NH 03820, with Warranty Covenants:

A certain tract of land, with the buildings thereon, situate in Dover, County of Strafford and State of New Hampshire on the easterly side of the Littleworth Road, bounded and described as follows:

Beginning at a marker on the easterly side of the Littleworth Road at land of the Boston and Maine Railroad, thence running N 65° 54' E by said Boston and Maine Railroad land, a distance of 400 feet, more or less, to a marker at land of the S.E.N.H. Industrial Park, thence running N 28° 28' W by said Industrial Park a distance of 438.2 feet, to a marker, thence running S 61° 50' W a distance of 400.00 feet to a marker on the Easterly side of said Littleworth Road, thence running S 28° 28' E by said Littleworth Road a distance of 410 feet, more or less, to the point of beginning.

Being shown on an unrecorded plan entitled "S.E.N.H. Industrial Park, Rogers Land, Dover, N.H., dated October 1966, prepared by G.L. Davis and Associates."

Subject, also, to the easement granted to the Public Service Co. of New Hampshire by deed dated August 28, 1968 and recorded in said Registry at Book 850, Page 186.

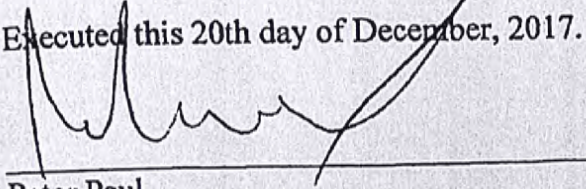
Meaning and intending to describe and convey the premises conveyed to Grantor by deed of near or even date to be recorded herewith.

This is not homestead property.

This is a non-contractual transfer and is not subject to New Hampshire Transfer Tax Stamps. The said Peter Paul is the sole member of the limited liability company.

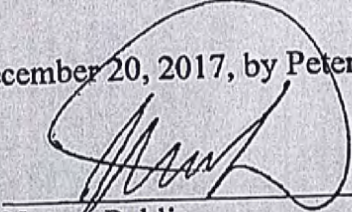


Executed this 20th day of December, 2017.

  
Peter Paul

State of New Hampshire  
County of Strafford

This instrument was acknowledged before me on December 20, 2017, by Peter Paul.

  
Notary Public  
Commission expiration:







29 LITTLEWORTH RD, DOVER N.H.  
ROAD CROSS-SECTION  
APPROX. SCALE: NONE  
PROJECT NO. C147-18



**ATTAR**  
ENGINEERING, INC

CIVIL • STRUCTURAL • MARINE





29 Littleworth Rd



**ATTAR**

ENGINEERING, INC

CIVIL • STRUCTURAL • MARINE

29 LITTLEWORTH RD, DOVER N.H.  
GOOGLE EARTH IMAGERY  
APPROX. SCALE: NONE  
PROJECT NO. C147-18





29 LITTLEWORTH RD, DOVER N.H.  
DRIVEWAY SEPERATION  
APPROX. SCALE: NONE  
PROJECT NO. C147-18



**ATTAR**  
ENGINEERING, INC  
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**Michael Cuomo, Soil Scientist**  
6 York Pond Road, York, Maine 03909  
207 363 4532  
mcuomosoil@gmail.com

TEST PIT DATA

Client: Attar Engineering, Inc.  
Location: 29 Littleworth Road, Dover, NH  
Date: 3 January 2018

Test Pit: ONE

| <u>Depth</u> | <u>Description</u>                                |
|--------------|---------------------------------------------------|
| 0-12"        | 10YR 3/3 very fine sandy loam, granular, friable. |
| 12-22"       | 10YR 5/6 very fine sandy loam, blocky, friable.   |
| 22-31"       | 2.5Y 5/4 silt loam, massive, friable, with redox. |
| 31-51"       | 5Y 4/4 silt loam, massive, firm, with redox.      |

Depth to Seasonal High Water Table: 22"  
Depth to Bedrock: none observed  
Observed Water: none  
Estimated percolation rate: 16 min./inch

Test Pit Number: TWO

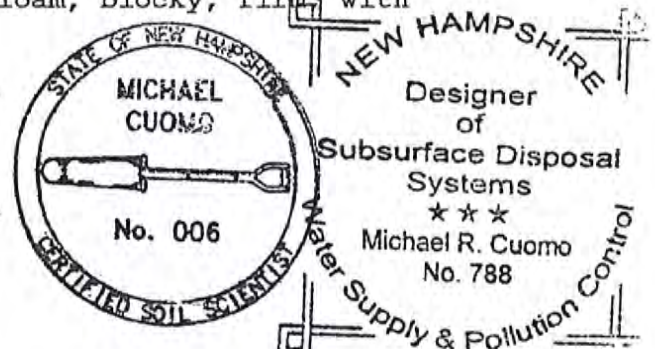
| <u>Depth</u> | <u>Description</u>                                |
|--------------|---------------------------------------------------|
| 0-12"        | 10YR 3/3 very fine sandy loam, granular, friable. |
| 12-22"       | 10YR 5/4 very fine sandy loam, blocky, friable.   |
| 22-30"       | 2.5Y 5/6 silt loam, massive, friable, with redox. |
| 30-58"       | 5Y 6/4 silt loam, massive, firm, with redox.      |

Depth to Seasonal High Water Table: 22"  
Depth to Bedrock: none observed  
Observed Water: none  
Estimated percolation rate: 16 min./inch

Test Pit Number: THREE

| <u>Depth</u> | <u>Description</u>                                        |
|--------------|-----------------------------------------------------------|
| 0-7"         | 10YR 3/3 fine sandy loam, granular, friable.              |
| 7-33"        | 10YR 5/6 fine sandy loam, blocky, friable.                |
| 33-48"       | 2.5Y 6/6 gravelly loamy sand, blocky, firm, with redox.   |
| 48-56"       | 2.5Y 4/4 stony fine sandy loam, blocky, firm, with redox. |

Depth to Seasonal High Water Table: 33"  
Depth to Bedrock: none observed  
Observed Water: none  
Estimated percolation rate: 6 min./inch





Test Pit Number: FOUR

| <u>Depth</u> | <u>Description</u>                                         |
|--------------|------------------------------------------------------------|
| 0-12"        | 10YR 3/2 very fine sandy loam, granular, friable.          |
| 12-15"       | 10YR 5/4 very fine sandy loam, blocky, friable.            |
| 15-21"       | 2.5Y 6/4 silt loam, blocky, friable, with redox.           |
| 21-48"       | 5Y 4/4 silt loam, massive, firm, with redox.               |
| 48-61"       | 2.5Y 4/4 stony fine sandy loam, massive, firm, with redox. |

Depth to Seasonal High Water Table: 15"

Depth to Bedrock: none observed

Observed Water: none

Estimated percolation rate: 16 min./inch

Test Pit Number: FIVE

| <u>Depth</u> | <u>Description</u>                                          |
|--------------|-------------------------------------------------------------|
| 0-8"         | 10YR 2/2 very fine sandy loam, granular, friable.           |
| 8-12"        | 10YR 5/4 very fine sandy loam, blocky, friable.             |
| 12-16"       | 2.5Y 5/4 very fine sandy loam, blocky, friable, with redox. |
| 16-32"       | 2.5Y 6/4 silt loam, blocky, firm, with redox.               |
| 32-60"       | 2.5Y 5/6 stony fine sandy loam, massive, firm, with redox.  |

Depth to Seasonal High Water Table: 12"

Depth to Bedrock: none observed

Observed Water: none

Estimated percolation rate: 16 min./inch

Test Pit Number: SIX

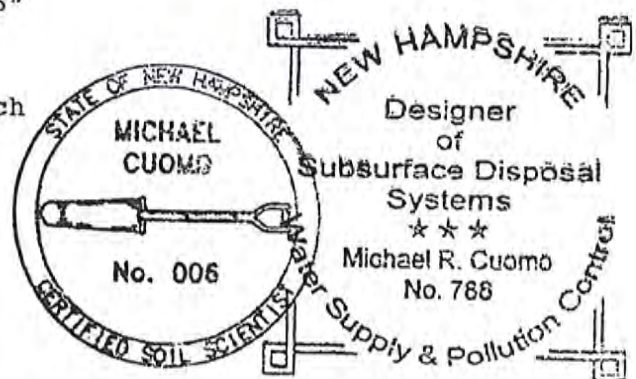
| <u>Depth</u> | <u>Description</u>                                           |
|--------------|--------------------------------------------------------------|
| 0-7"         | 10YR 3/3 gravelly fine sandy loam, granular, friable.        |
| 7-15"        | 10YR 5/4 gravelly fine sandy loam, blocky, friable.          |
| 15-56"       | 2.5Y 5/4 gravelly fine sandy loam, blocky, firm, with redox. |

Depth to Seasonal High Water Table: 15"

Depth to Bedrock: none observed

Observed Water: none

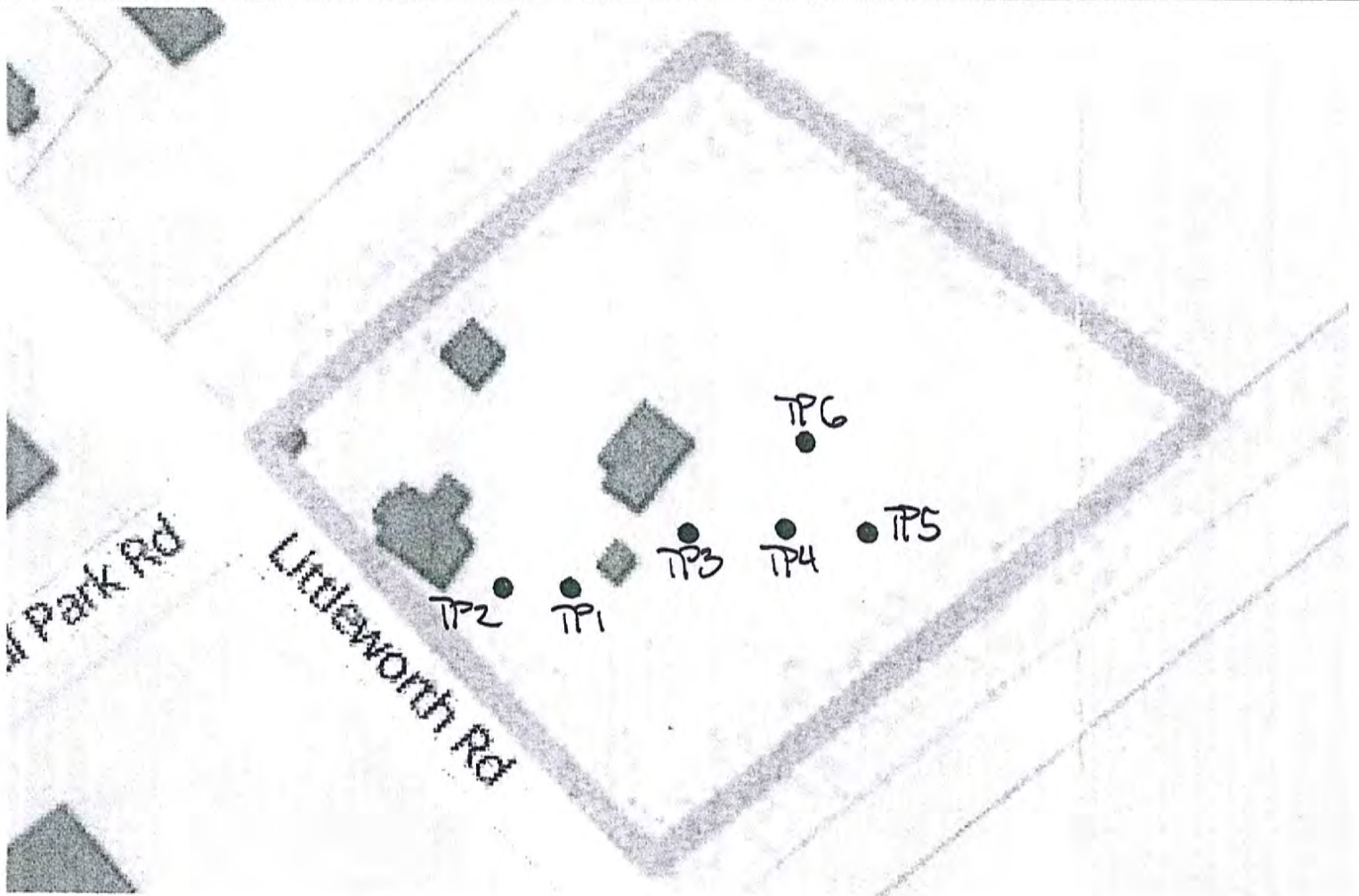
Estimated percolation rate: 6 min./inch





**Michael Cuomo, Soil Scientist**  
6 York Pond Road, York, Maine 03909  
207 363 4532  
mcuomosoil@gmail.com

**29 Littleworth Road, Dover, NH**  
Rough sketch of approximate test pit locations.  
3 January 2018







**TRAFFIC IMPACT ASSESSMENT REPORT**  
**COMMERCIAL DEVELOPMENT – 29 LITTLEWORTH ROAD**  
**DOVER, NEW HAMPSHIRE**  
February 25, 2019

Scope – This report provides a Standard Analysis for the development of 29 Littleworth Road, Dover, New Hampshire. Proposed improvements, consisting of a 11,728 SF building (1,728 SF office and 10,000 SF warehouse area) and a manager's apartment are shown on the "Site Plan, Northern Pool and Spa, Inc., 29 Littleworth Rd, Dover, NH" prepared by Attar Engineering, Inc.

- 1) Description of the Site: The 4-acre site is located in the Assembly and Office (I-4 Zoning District. The site is bounded by Littleworth Road, Route 9), to the west, the access drive to Pace Industries to the north, the Pace Industries parcel to the east and B & M Railroad to the south. The proposed entrance is in the same location as a former entrance to a farm and farmstand. Topography is gently sloping towards the rear (east) of the parcel with a difference in elevation of 20' over more than 400'.
- 2) Description of Roadways: Littleworth Road, Route 9 is a two-lane improved state highway, approximately 47 feet wide (two travel lanes, a left-hand (northbound) center turning lane and two breakdown lanes). Additionally there is a 5' wide raised asphalt sidewalk with granite curb located on the east side of Littleworth Road. The existing driveway curb cut also has sidewalk curb ramps on both the northern and southern sides (see photograph attached). Posted speed limit is 35 MPH. the closest intersections are Industrial Park Road, across from the northern sideline and Old Littleworth Road approximately 800' to the south.
- 3) Sight Distance: Sight Distance is 645' looking north and 450' looking south. The proposed driveway is in the same location as the former access drive; Chapter 149-14-H requires a minimum driveway spacing of 310' in the I-4 District from public street intersections in the 35 MPH posted speed limit area but 149-14-H (2) allows "Existing driveways that do not meet the above standards may be retained." Locating the driveway 310' from the intersection with Industrial Park Road is not possible as the driveway would be located adjacent to the railroad bridge and guardrail at the southern sideline (see photograph attached).
- 4) Trip Generation: Trip Generation was estimated using the Institute of Traffic Engineers (ITE) Trip Generation Manual, 10<sup>th</sup> Edition. The "Light Industry" Land Use was used for the Commercial/Industrial Use; this provided a conservative trip generation rate (6.97 daily trips and 0.99 peak hour trips( when compared to warehouse or wholesale uses). The following Selected Land Uses were used in the analysis and, as noted, 95 daily (one-way trip ends) are expected;

**Trip Generation from Development - Average Daily Trips**

| Land Use           | Units    | Gen Rate | No. Units | Daily Trips | Source  |
|--------------------|----------|----------|-----------|-------------|---------|
| Office (Genl)      | 1,000 SF | 11.01    | 1.73      | 19          | ITE 710 |
| Comm/Ind           | 1,000 SF | 6.97     | 10        | 70          | ITE 110 |
| Townhouse          | Dwelling | 5.86     | 1         | 6           | ITE 230 |
| Total Daily Trips: |          |          |           | 95          |         |



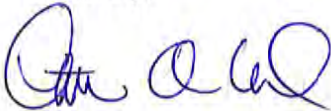
Conversely 15 Peak Hour trips are expected;

Trip Generation from Development - Peak Hourly (AM (7-9 and PM (4-6)

| Land Use     | Units    | Trips | No. of Units | Peak Trips |
|--------------|----------|-------|--------------|------------|
| Office       | 1,000 SF | 1.37  | 1.73         | 4          |
| Comm/Ind     | 1,000 SF | 0.99  | 10           | 10         |
| Townhouse    | Each     | 0.54  | 1            | 1          |
| Total Trips: |          |       |              | 15         |

- 5) Trip Distribution: Average Annual Daily Vehicle Trips (AADT) on Route 9, Littleworth Road have averaged from 8,000 trips (2011) to 10,000 trips (2008), Source; State of New Hampshire, Department of Transportation, Bureau of Traffic. Growth Rate ranges from -7% (2011) to 12% (2017) with the most recent year, 2018, showing a 2% growth rate. Trips are generally split between eastbound and westbound; for 2018 AADT was 10,859 trips with 5444 eastbound and 5415 westbound. Assuming an even split eastbound and westbound for trips generated by the development additional traffic results in an additional 0.14%. No traffic mitigation is anticipated; there are no capacity concerns and adequate sight distance is provided in both directions at the entrance.
- 6) Certifications: Kenneth A. Wood, P.E. (N.H. P.E. # 6917) has been licensed to practice in the State of New Hampshire since 1987; in addition he is licensed to practice engineering in Maine and Massachusetts. He is also licensed as a State of New Hampshire Natural Scientist and he holds a National Council of Engineering Examiners (NCEE) certificate. He formed Attar Engineering, Inc. in April, 1988; the firm practices civil structural and marine engineering and has accomplished many commercial, residential and industrial projects including traffic related items.

Sincerely;



Kenneth A. Wood, P.E.  
President





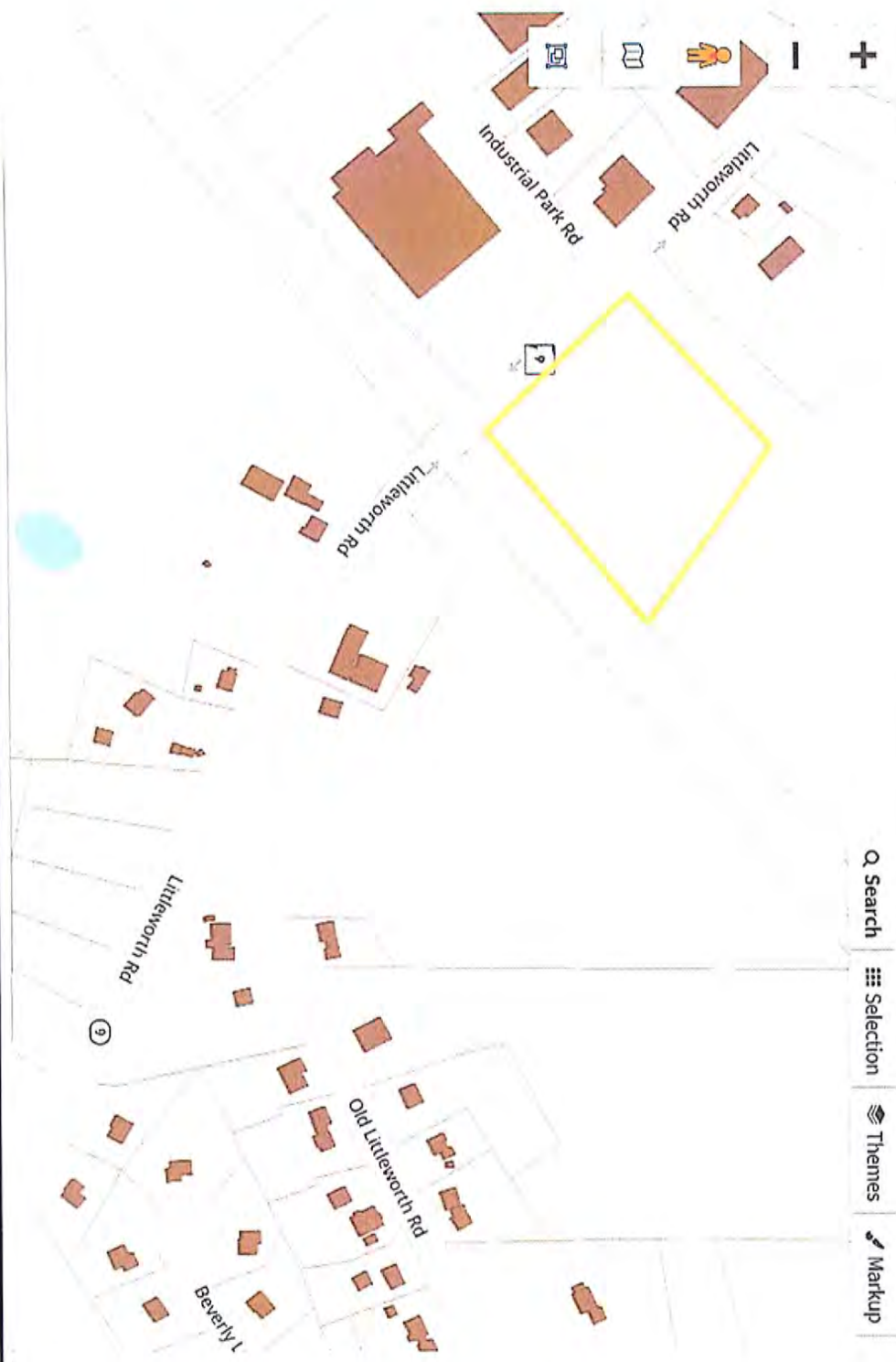
|                      |   |
|----------------------|---|
| 29 LITTLEWORTH RD    |   |
| Property             | < |
| Address              | > |
| ID                   | > |
| Property Information | < |
| City Council         | < |
| Voting Information   | < |
| Ownership            | < |
| Name                 | < |
| Address              | < |
| Valuation            | < |
| Total                | < |
| Buildings            | < |

29 LITTLEWORTH RD  
G0006-000000

29 LITTLEWORTH ROAD  
LLC, C/O NORTHERN POOL  
& SPA  
291 HAROD DOW HIGHWAY  
ELIOT, ME 03903

\$143,300

\$0



Q Search Selection Themes Markup



**ATTAR**  
ENGINEERING, INC

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29 LITTLEWORTH RD, DOVER N.H.  
LOCATION MAP  
APPROX. SCALE: NONE  
PROJECT NO. C147-18





29 LITTLEWORTH RD, DOVER N.H.  
SOUTHERN SIDELINE  
APPROX. SCALE: NONE  
PROJECT NO. C147-18



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☒ TCDs Locations

ALL

Location ID

TMC

Location

Location ID: 82125086

Located On: Littleworth Rd

Direction: 2-WAY

AADT: 10859 (2018)

EB Count: 5444 (2018)

WB Count: 5415 (2018)

[View Detail in a New Search](#)

Industrial Park Dr

Old Littleworth Park Rd

82125086

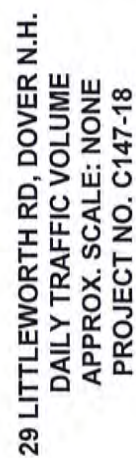
Franklin



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ENGINEERING, INC  
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29 LITTLEWORTH RD, DOVER N.H.  
DAILY TRAFFIC VOLUME  
APPROX. SCALE: NONE  
PROJECT NO. C147-18





29 LITTLEWORTH RD, DOVER N.H.  
DAILY TRAFFIC VOLUME  
APPROX. SCALE: NONE  
PROJECT NO. C147-18





## Transportation Data Management System

List View

All DIRs

|                |                                             |  |    |  |  |             |             |                      |    |
|----------------|---------------------------------------------|--|----|--|--|-------------|-------------|----------------------|----|
| Record         |                                             |  | 1  |  |  | of 1        | Goto Record | <input type="text"/> | go |
| Location ID    | 82125086                                    |  |    |  |  | MPO ID      |             |                      |    |
| Type           | SPOT                                        |  |    |  |  | HPMS ID     |             |                      |    |
| On NHS         | No                                          |  |    |  |  | On HPMS     | No          |                      |    |
| LRS ID         | S0000009                                    |  |    |  |  | LRS Loc Pt. |             |                      |    |
| SF Group       | 04                                          |  |    |  |  | Route Type  |             |                      |    |
| AF Group       | 04                                          |  |    |  |  | Route       | NH 9        |                      |    |
| GF Group       | E                                           |  |    |  |  | Active      | Yes         |                      |    |
| Class Dist Grp | Default                                     |  |    |  |  | Category    | 3           |                      |    |
| Seas Clss Grp  | Default                                     |  |    |  |  |             |             |                      |    |
| WIM Group      | Default                                     |  |    |  |  |             |             |                      |    |
| QC Group       | Default                                     |  |    |  |  |             |             |                      |    |
| Funct'l Class  | Minor Arterial                              |  |    |  |  | Milepost    |             |                      |    |
| Located On     | Littleworth Rd                              |  |    |  |  |             |             |                      |    |
| Loc On Alias   | NH 9 (LITTLEWORTH RD) WEST OF B&M RR BRIDGE |  |    |  |  |             |             |                      |    |
| PR             |                                             |  | MP |  |  | PT          |             |                      |    |
|                |                                             |  |    |  |  |             |             |                      |    |
| More Detail    |                                             |  |    |  |  |             |             |                      |    |
| STATION DATA   |                                             |  |    |  |  |             |             |                      |    |

Directions:   

AADT

| Year | AADT                | DHV-30 | K % | D % | PA           | BC       | Src             |
|------|---------------------|--------|-----|-----|--------------|----------|-----------------|
| 2018 | 10,859 <sup>3</sup> |        | 9   | 55  | 10,012 (92%) | 847 (8%) | Grown from 2017 |
| 2017 | 10,646              | 969    | 9   | 55  | 9,878 (93%)  | 768 (7%) |                 |
| 2016 | 9,486 <sup>3</sup>  |        |     |     | 8,652 (91%)  | 834 (9%) | Grown from 2015 |
| 2015 | 9,300 <sup>2</sup>  |        |     |     |              |          |                 |
| 2011 | 8,000               |        |     |     |              |          |                 |

|&lt;&lt;| &lt;| &gt;| &gt;&gt;| 1-5 of 12

| Travel Demand Model |            |            |        |        |        |        |        |        |        |        |
|---------------------|------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|
|                     | Model Year | Model AADT | AM PHV | AM PPV | MD PHV | MD PPV | PM PHV | PM PPV | NT PHV | NT PPV |

| VOLUME COUNT |               |     |        |
|--------------|---------------|-----|--------|
|              | Date          | Int | Total  |
|              | Thu 7/27/2017 | 60  | 11,812 |
|              | Wed 7/26/2017 | 60  | 12,246 |
|              | Tue 7/25/2017 | 60  | 12,019 |
|              | Mon 7/24/2017 | 60  | 10,893 |
|              | Thu 7/16/2015 | 60  | 10,835 |
|              | Wed 7/15/2015 | 60  | 10,752 |
|              | Tue 7/14/2015 | 60  | 10,691 |

| VOLUME TREND |               |
|--------------|---------------|
| Year         | Annual Growth |
| 2018         | 2%            |
| 2017         | 12%           |
| 2016         | 2%            |
| 2015         | 4%            |
| 2011         | -7%           |
| 2008         | 0%            |



|                                                                                                                                                                                                                                                      |               |    |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----|-------|
|                                                                                                                                                                     | Thu 6/30/2011 | 60 | 9,614 |
|                                                                                                                                                                     | Wed 6/29/2011 | 60 | 9,451 |
|                                                                                                                                                                     | Tue 6/28/2011 | 60 | 9,358 |
| <div> <div> <div>&lt;&lt;</div> <div>&lt;</div> <div>&gt;</div> <div>&gt;&gt;</div> </div> <div>1-10 of 39</div> <div> <div>To Date</div> <div></div> </div> </div> |               |    |       |

|      |     |
|------|-----|
| 2005 | 1%  |
| 2002 | 4%  |
| 1999 | 0%  |
| 1996 | -2% |

<<

<

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1-10 of 11

| SPEED   |      |     |      |       |
|---------|------|-----|------|-------|
|         | Date | Int | Pace | Total |
| No Data |      |     |      |       |

| CLASSIFICATION |      |     |       |
|----------------|------|-----|-------|
|                | Date | Int | Total |
| No Data        |      |     |       |

| WEIGH-IN-MOTION  |      |       |       |
|---------------------------------------------------------------------------------------------------|------|-------|-------|
|                                                                                                   | Date | Axles | Total |
| No Data                                                                                           |      |       |       |

| PER VEHICLE |      |       |      |       |
|-------------|------|-------|------|-------|
|             | Date | Axles | 85th | Total |
| No Data     |      |       |      |       |

| GAP     |      |     |       |
|---------|------|-----|-------|
|         | Date | Int | Total |
| No Data |      |     |       |

## PARTIAL COUNT

Date

Int

24-Hr Total

| NOTES/FILES |      |      |
|-------------|------|------|
|             | Note | Date |
|             |      |      |



STATE OF NEW HAMPSHIRE  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF TRAFFIC

**Bureau of Planning, Traffic Section, Traffic Reports** 18-Feb-16

| STAT.              | TYPE | LOCATION                                                                 | FC | 2008  | 2009 | 2010  | 2011  | 2012 | 2013  | 2014  | 2015 |
|--------------------|------|--------------------------------------------------------------------------|----|-------|------|-------|-------|------|-------|-------|------|
| <b>Town: DOVER</b> |      |                                                                          |    |       |      |       |       |      |       |       |      |
| 125065             | 82   | FOURTH ST OVER COCHECO RIVER (EB-WB)<br>(81125140-81125141)              | 19 | *     | *    | *     | *     | 4400 | *     | *     | 2500 |
| 125066             | 82   | NH 9/NH 108 (CENTRAL AVE) SB AT<br>COCHECO RIVER BRIDGE                  | 16 | 12000 | *    | *     | 12000 | *    | *     | 10000 | *    |
| 125067             | 82   | NH 9/NH 108 (WASHINGTON ST) EB AT<br>COCHECO RIVER BRIDGE                | 16 | 14000 | *    | *     | 13000 | *    | *     | 11000 | *    |
| 125068             | 82   | WASHINGTON ST EAST OF HIGHLAND ST (EB-WB) (81125134-81125135)            | 17 | *     | *    | 6000  | *     | *    | 5600  | *     | *    |
| 125069             | 82   | SIXTH ST WEST OF GLENWOOD AVE                                            | 17 | *     | *    | 8400  | *     | *    | 8500  | *     | *    |
| 125070             | 82   | TOLEND RD BY SPAULDING TPK BRIDGE                                        | 17 | *     | *    | 3800  | *     | *    | 3700  | *     | *    |
| 125071             | 62   | SPAULDING TPK/NH 16 BETWEEN EXITS 8-9<br>(SB-NB) (61125071-61125072)     | 12 | *     | *    | 43300 | *     | *    | 43500 | *     | *    |
| 125075             | 82   | BELLAMY RD BY BELLAMY RIVER BRIDGE                                       | 16 | *     | *    | 4600  | *     | *    | 5000  | *     | *    |
| 125077             | 82   | NH 108 (DURHAM RD) NORTH OF BACK<br>RIVER RD (SB-NB) (81125202-81125203) | 16 | *     | *    | 18000 | *     | *    | 15000 | *     | *    |
| 125078             | 82   | OAK ST EAST OF CENTRAL AVE                                               | 16 | *     | *    | 8200  | *     | *    | 8000  | *     | *    |
| 125079             | 82   | DOVER POINT RD SOUTH OF HOMESTEAD<br>LANE                                | 16 | 12000 | *    | *     | 13000 | *    | *     | 11000 | *    |
| 125083             | 82   | LONG HILL RD WEST OF OLD ROCHESTER<br>RD (EB-WB) (81125144-81125145)     | 19 | 1400  | *    | *     | 1800  | *    | *     | 1900  | *    |
| 125084             | 82   | SIXTH ST WEST OF CHESTNUT ST                                             | 17 | *     | *    | 7100  | *     | *    | 6700  | *     | *    |
| 125085             | 82   | TOLEND RD WEST OF WASHINGTON ST                                          | 17 | 5000  | *    | *     | 2800  | *    | *     | 5600  | *    |
| 125086             | 82   | NH 9 (LITTLEWORTH RD) WEST OF B&M RR<br>BRIDGE                           | 16 | 10000 | *    | *     | 8000  | *    | *     | *     | 9300 |
| 125087             | 82   | NH 155 (KNOX MARSH RD) SOUTH OF NH 9                                     | 16 | 14000 | *    | *     | 13000 | *    | *     | 15000 | *    |



# ATTAR

ENGINEERING, INC

CIVIL • STRUCTURAL • MARINE

## LITTLEWORTH ROAD – OFFICE/WAREHOUSE 29 LITTLEWORTH ROAD, DOVER, NH STORMWATER MANAGEMENT STUDY

Project No.: C147-19

March 5<sup>th</sup>, 2019

### ◆ **Scope**

This stormwater management plan has been prepared for a pool construction and retail/office space development located at 29 Littleworth Road in Dover, NH. The entire parcel contains approximately 3.99 acres; the development will include a single building containing a pool construction area, office space, storefront and a small manager's apartment. The project requires a Site Plan Review and must meet the Stormwater Management requirements for the City of Dover. The project will create approximately 2.1 acres of developed area and approximately 1.2 acres of impervious area.

### ◆ **Site and Watershed Description**

The project site is located in the Lower Cocheco River Subwatershed. A 7½ minute series U.S.G.S. map of the project area is attached.

The current lot contains meadow areas, woodlands and wetlands. The mapped wetlands are on the western portion of the site. There is a buffer area that extends from the wetland boundary 50' westerly into the property. The existing vegetation shall remain in this area and no grading or other disturbance is proposed for this portion of the site.

The site is not located in a flood zone.

### ◆ **Soils/Hydrologic Soil Groups**

Soil types and their respective Hydrologic Soil Groups (HSG) were determined from the USDA NRCS Web Soil Survey. On site soil types consist of Buxton Silt Loam (Bz), Charlton Fine Sandy Loam (Cf), Hollis-Charlton Fine Sandy Loams (Hc), Suffield Silt Loam (Sf) and Sutton Fine Sandy Loam (Sn). Hydrologic Soil Groups (HSG's) range from "B" to "D" for these soil types.

### ◆ **Methodology**

The stormwater quantity analysis will be conducted using the HydroCAD Stormwater Modeling System by Applied Microcomputer Systems. The analysis determines the "Existing Condition" and "Developed Condition" stormwater flows. Both cases are analyzed for the 2, 10, 25 and 50-year, 24-hour frequency storm events. The Existing Condition analyzes the site as it currently exists and the Developed Condition models the site with the proposed improvements described above.

### ◆ **Water Quantity Analysis**

#### Existing Condition

The site itself is divided into two subcatchments for analysis. Runoff flows from the west to the eastern side of the property. The two analysis points are at the eastern property line in the upper and lower portions of the wetlands respectively.

#### Developed Condition

The Developed Condition analysis consists of 6 subcatchments. Other features such as ponds (Bioretention cell) and catch basins were added to account for on-site routing and



detention of stormwater. One Bioretention cell is proposed to provide both stormwater detention and treatment. Calculations are provided to show the required Volume control and treatment required by the City of Dover and the NHDES. All Developed Condition flows were routed to the Analysis Points described above.

#### Changes in Stormwater Flows

Tables showing Existing Condition peak flows, Developed Condition peak flows and the change in peak flow from Existing Condition to Developed Condition are presented on a separate page.

The analysis indicates a decrease in peak flow at all analysis points (AP's 1 & 2) for all storm events (2, 10, 25 and 50-year).

With the exception of the downhill grading located in subcatchment 60, all of the developed area runoff is routed to the Bioretention cell (1P).

Runoff from the Bioretention cell shall be routed through outlet structures, pipes and level spreaders prior to discharge to undisturbed, on-site areas.

The full runoff volume of the 10 year storm does not cause the Bioretention cell to overtop.

#### ◆ **Water Quality**

In accordance with the City of Dover the pre and post development conditions were analyzed for water quality requirements using the "Simple Method" described in the NHDES Stormwater Manual Volume 1. The spreadsheet provided by NHDES was used and the results are provided as part of this report.

Runoff from developed areas on the site will receive treatment in the Bioretention cell prior to being discharged. Approximately 90.0 % of the Total Suspended Solids (TSS), 64.1 % of the Total Nitrogen (TN) and 61.5 % of the Total Phosphorus (TP) are treated. This exceeds the required 80% of TSS, 50% of TN and 50% of TP standard provided by the City of Dover. Treatment calculations and Bioretention cell sizing calculations in accordance with the NHDES Stormwater Manual Volumes 1 and 2 are included in this report.

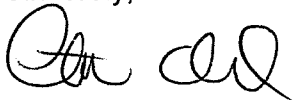
#### ◆ **Erosion and Sedimentation Control**

All of the proposed Erosion and Sedimentation Control Measures and details are noted on Sheet 5.1 of the plan set.

#### ◆ **Summary**

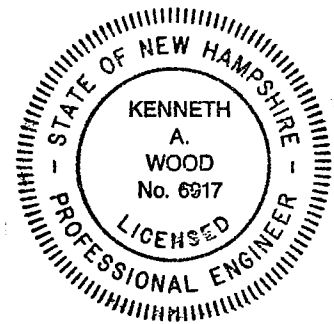
The use of the Bioretention cell to attenuate peak flows will result in no increase in peak runoff quantity from the proposed development. No adverse effects are anticipated on any downstream properties or drainage structures for the analyzed storm events. Runoff quality is also addressed by the use of the Bioretention cell.

Sincerely;



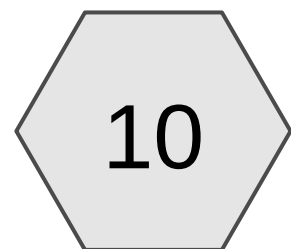
Kenneth A. Wood, P.E.  
President

C147-19 SW Littleworth Road.doc

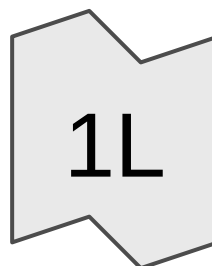
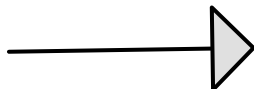


## **EXISTING CONDITION CALCULATIONS**

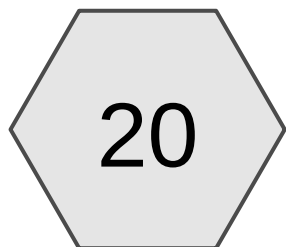




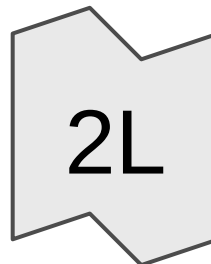
Subcat 10



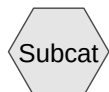
AP1



Subcat 20



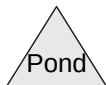
AP2



Subcat



Reach



Pond



Link

**Routing Diagram for Littleworth EXT**

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## Littleworth EXT

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### Area Listing (all nodes)

| Area<br>(sq-ft) | CN        | Description<br>(subcatchment-numbers)        |
|-----------------|-----------|----------------------------------------------|
| 41,208          | 58        | Meadow, non-grazed, HSG B (10, 20)           |
| 15,943          | 71        | Meadow, non-grazed, HSG C (10, 20)           |
| 83,330          | 78        | Meadow, non-grazed, HSG D (10, 20)           |
| 1,350           | 98        | Paved roads w/curbs & sewers, HSG B (10, 20) |
| 915             | 98        | Paved roads w/curbs & sewers, HSG D (10)     |
| 19,254          | 70        | Woods, Good, HSG C (10, 20)                  |
| 22,825          | 77        | Woods, Good, HSG D (10, 20)                  |
| <b>184,825</b>  | <b>72</b> | <b>TOTAL AREA</b>                            |



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### Soil Listing (all nodes)

| Area<br>(sq-ft) | Soil<br>Group | Subcatchment<br>Numbers |
|-----------------|---------------|-------------------------|
| 0               | HSG A         |                         |
| 42,558          | HSG B         | 10, 20                  |
| 35,196          | HSG C         | 10, 20                  |
| 107,070         | HSG D         | 10, 20                  |
| 0               | Other         |                         |
| <b>184,825</b>  |               | <b>TOTAL AREA</b>       |

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**Ground Covers (all nodes)**

| HSG-A<br>(sq-ft) | HSG-B<br>(sq-ft) | HSG-C<br>(sq-ft) | HSG-D<br>(sq-ft) | Other<br>(sq-ft) | Total<br>(sq-ft) | Ground<br>Cover                 |
|------------------|------------------|------------------|------------------|------------------|------------------|---------------------------------|
| 0                | 41,208           | 15,943           | 83,330           | 0                | 140,481          | Meadow,<br>non-grazed           |
| 0                | 1,350            | 0                | 915              | 0                | 2,265            | Paved roads<br>w/curbs & sewers |
| 0                | 0                | 19,254           | 22,825           | 0                | 42,079           | Woods, Good                     |
| <b>0</b>         | <b>42,558</b>    | <b>35,196</b>    | <b>107,070</b>   | <b>0</b>         | <b>184,825</b>   | <b>TOTAL AREA</b>               |



**Littleworth EXT**

NRCC 24-hr D 50-Year Rainfall=7.16"

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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

**Subcatchment10: Subcat 10**

Runoff Area=1.439 ac 3.34% Impervious Runoff Depth>3.65"  
Flow Length=416' Tc=15.7 min CN=73 Runoff=4.60 cfs 19,078 cf

**Subcatchment20: Subcat 20**

Runoff Area=2.804 ac 0.14% Impervious Runoff Depth>3.55"  
Flow Length=409' Tc=17.4 min CN=72 Runoff=8.37 cfs 36,099 cf

**Link 1L: AP1**

Inflow=4.60 cfs 19,078 cf  
Primary=4.60 cfs 19,078 cf

**Link 2L: AP2**

Inflow=8.37 cfs 36,099 cf  
Primary=8.37 cfs 36,099 cf

**Total Runoff Area = 184,825 sf Runoff Volume = 55,177 cf Average Runoff Depth = 3.58"**  
**98.77% Pervious = 182,560 sf 1.23% Impervious = 2,265 sf**

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NRCC 24-hr D 50-Year Rainfall=7.16"

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**Summary for Subcatchment 10: Subcat 10**

Runoff = 4.60 cfs @ 12.24 hrs, Volume= 19,078 cf, Depth&gt; 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 50-Year Rainfall=7.16"

| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| 0.307     | 58 | Meadow, non-grazed, HSG B           |
| 0.143     | 71 | Meadow, non-grazed, HSG C           |
| 0.441     | 78 | Meadow, non-grazed, HSG D           |
| 0.027     | 98 | Paved roads w/curbs & sewers, HSG B |
| 0.021     | 98 | Paved roads w/curbs & sewers, HSG D |
| 0.126     | 70 | Woods, Good, HSG C                  |
| 0.374     | 77 | Woods, Good, HSG D                  |
| 1.439     | 73 | Weighted Average                    |
| 1.391     |    | 96.66% Pervious Area                |
| 0.048     |    | 3.34% Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                            |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------|
| 6.4      | 100           | 0.0628        | 0.26              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.05"                  |
| 1.7      | 179           | 0.0630        | 1.76              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 7.6      | 137           | 0.0145        | 0.30              |                | <b>Shallow Concentrated Flow,</b><br>Forest w/Heavy Litter Kv= 2.5 fps |
| 15.7     | 416           | Total         |                   |                |                                                                        |

**Summary for Subcatchment 20: Subcat 20**

Runoff = 8.37 cfs @ 12.26 hrs, Volume= 36,099 cf, Depth&gt; 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 50-Year Rainfall=7.16"

| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| 0.639     | 58 | Meadow, non-grazed, HSG B           |
| 0.223     | 71 | Meadow, non-grazed, HSG C           |
| 1.472     | 78 | Meadow, non-grazed, HSG D           |
| 0.004     | 98 | Paved roads w/curbs & sewers, HSG B |
| 0.316     | 70 | Woods, Good, HSG C                  |
| 0.150     | 77 | Woods, Good, HSG D                  |
| 2.804     | 72 | Weighted Average                    |
| 2.800     |    | 99.86% Pervious Area                |
| 0.004     |    | 0.14% Impervious Area               |



**Littleworth EXT**

NRCC 24-hr D 50-Year Rainfall=7.16"

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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                            |
|-------------|------------------|------------------|----------------------|-------------------|------------------------------------------------------------------------|
| 11.7        | 100              | 0.0350           | 0.14                 |                   | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.05"                  |
| 1.8         | 183              | 0.0570           | 1.67                 |                   | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 3.9         | 126              | 0.0470           | 0.54                 |                   | <b>Shallow Concentrated Flow,</b><br>Forest w/Heavy Litter Kv= 2.5 fps |
| 17.4        | 409              | Total            |                      |                   |                                                                        |

**Summary for Link 1L: AP1**

Inflow Area = 62,683 sf, 3.34% Impervious, Inflow Depth > 3.65" for 50-Year event  
 Inflow = 4.60 cfs @ 12.24 hrs, Volume= 19,078 cf  
 Primary = 4.60 cfs @ 12.24 hrs, Volume= 19,078 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Link 2L: AP2**

Inflow Area = 122,142 sf, 0.14% Impervious, Inflow Depth > 3.55" for 50-Year event  
 Inflow = 8.37 cfs @ 12.26 hrs, Volume= 36,099 cf  
 Primary = 8.37 cfs @ 12.26 hrs, Volume= 36,099 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Littleworth EXT**

NRCC 24-hr D 2-Year Rainfall=3.14"

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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

**Subcatchment10: Subcat 10**

Runoff Area=1.439 ac 3.34% Impervious Runoff Depth>0.81"  
Flow Length=416' Tc=15.7 min CN=73 Runoff=1.00 cfs 4,240 cf

**Subcatchment20: Subcat 20**

Runoff Area=2.804 ac 0.14% Impervious Runoff Depth>0.76"  
Flow Length=409' Tc=17.4 min CN=72 Runoff=1.74 cfs 7,766 cf

**Link 1L: AP1**

Inflow=1.00 cfs 4,240 cf  
Primary=1.00 cfs 4,240 cf

**Link 2L: AP2**

Inflow=1.74 cfs 7,766 cf  
Primary=1.74 cfs 7,766 cf

**Total Runoff Area = 184,825 sf Runoff Volume = 12,006 cf Average Runoff Depth = 0.78"**  
**98.77% Pervious = 182,560 sf 1.23% Impervious = 2,265 sf**



**Littleworth EXT**

NRCC 24-hr D 10-Year Rainfall=4.74"

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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

**Subcatchment10: Subcat 10**

Runoff Area=1.439 ac 3.34% Impervious Runoff Depth>1.83"  
Flow Length=416' Tc=15.7 min CN=73 Runoff=2.33 cfs 9,571 cf

**Subcatchment20: Subcat 20**

Runoff Area=2.804 ac 0.14% Impervious Runoff Depth>1.76"  
Flow Length=409' Tc=17.4 min CN=72 Runoff=4.17 cfs 17,879 cf

**Link 1L: AP1**

Inflow=2.33 cfs 9,571 cf  
Primary=2.33 cfs 9,571 cf

**Link 2L: AP2**

Inflow=4.17 cfs 17,879 cf  
Primary=4.17 cfs 17,879 cf

**Total Runoff Area = 184,825 sf Runoff Volume = 27,450 cf Average Runoff Depth = 1.78"**  
**98.77% Pervious = 182,560 sf 1.23% Impervious = 2,265 sf**

**Littleworth EXT**

NRCC 24-hr D 25-Year Rainfall=5.99"

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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

**Subcatchment10: Subcat 10**

Runoff Area=1.439 ac 3.34% Impervious Runoff Depth>2.74"  
Flow Length=416' Tc=15.7 min CN=73 Runoff=3.48 cfs 14,332 cf

**Subcatchment20: Subcat 20**

Runoff Area=2.804 ac 0.14% Impervious Runoff Depth>2.65"  
Flow Length=409' Tc=17.4 min CN=72 Runoff=6.29 cfs 26,985 cf

**Link 1L: AP1**

Inflow=3.48 cfs 14,332 cf  
Primary=3.48 cfs 14,332 cf

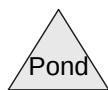
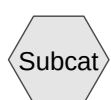
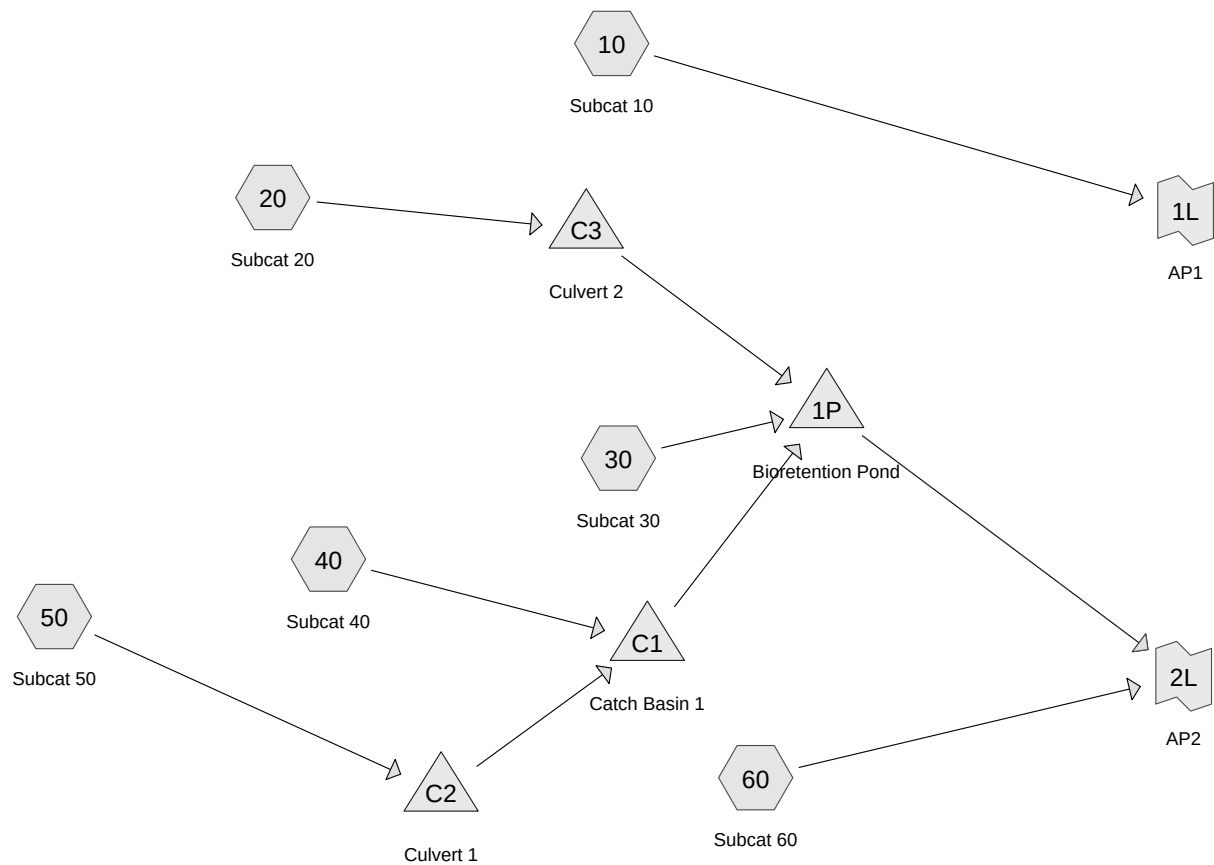
**Link 2L: AP2**

Inflow=6.29 cfs 26,985 cf  
Primary=6.29 cfs 26,985 cf

**Total Runoff Area = 184,825 sf Runoff Volume = 41,317 cf Average Runoff Depth = 2.68"**  
**98.77% Pervious = 182,560 sf 1.23% Impervious = 2,265 sf**



## DEVELOPED CONDITION CALCULATIONS





**Littleworth PRP**

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**Area Listing (all nodes)**

| Area<br>(sq-ft) | CN        | Description<br>(subcatchment-numbers)              |
|-----------------|-----------|----------------------------------------------------|
| 28,310          | 58        | Meadow, non-grazed, HSG B (10, 20, 40, 50, 60)     |
| 15,597          | 71        | Meadow, non-grazed, HSG C (10, 30, 60)             |
| 49,547          | 78        | Meadow, non-grazed, HSG D (10, 20, 30, 40, 50, 60) |
| 8,973           | 98        | Paved parking, HSG B (20, 40)                      |
| 19,994          | 98        | Paved parking, HSG D (20, 30, 40)                  |
| 5,097           | 98        | Paved roads w/curbs & sewers, HSG B (10, 20, 40)   |
| 6,490           | 98        | Paved roads w/curbs & sewers, HSG D (10, 20, 30)   |
| 11,761          | 98        | Roofs, HSG D (30, 40)                              |
| 19,596          | 70        | Woods, Good, HSG C (10, 60)                        |
| 19,312          | 77        | Woods, Good, HSG D (10, 60)                        |
| <b>184,677</b>  | <b>79</b> | <b>TOTAL AREA</b>                                  |

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**Ground Covers (all nodes)**

| HSG-A<br>(sq-ft) | HSG-B<br>(sq-ft) | HSG-C<br>(sq-ft) | HSG-D<br>(sq-ft) | Other<br>(sq-ft) | Total<br>(sq-ft) | Ground<br>Cover                 |
|------------------|------------------|------------------|------------------|------------------|------------------|---------------------------------|
| 0                | 28,310           | 15,597           | 49,547           | 0                | 93,453           | Meadow,<br>non-grazed           |
| 0                | 8,973            | 0                | 19,994           | 0                | 28,967           | Paved parking                   |
| 0                | 5,097            | 0                | 6,490            | 0                | 11,587           | Paved roads<br>w/curbs & sewers |
| 0                | 0                | 0                | 11,761           | 0                | 11,761           | Roofs                           |
| 0                | 0                | 19,596           | 19,312           | 0                | 38,908           | Woods, Good                     |
| <b>0</b>         | <b>42,380</b>    | <b>35,193</b>    | <b>107,105</b>   | <b>0</b>         | <b>184,677</b>   | <b>TOTAL AREA</b>               |



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NRCC 24-hr D 50-Year Rainfall=7.16"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                  |                                                                                                                                                 |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment10: Subcat 10</b> | Runoff Area=1.215 ac 3.95% Impervious Runoff Depth>4.06"<br>Flow Length=395' Tc=10.5 min CN=73 Runoff=4.52 cfs 17,912 cf                        |
| <b>Subcatchment20: Subcat 20</b> | Runoff Area=0.290 ac 73.45% Impervious Runoff Depth>6.10"<br>Flow Length=230' Tc=1.8 min CN=91 Runoff=2.02 cfs 6,417 cf                         |
| <b>Subcatchment30: Subcat 30</b> | Runoff Area=0.496 ac 50.60% Impervious Runoff Depth>5.75"<br>Flow Length=90' Tc=0.7 min CN=88 Runoff=3.29 cfs 10,351 cf                         |
| <b>Subcatchment40: Subcat 40</b> | Runoff Area=0.692 ac 99.57% Impervious Runoff Depth>6.92"<br>Flow Length=367' Tc=2.0 min CN=98 Runoff=5.04 cfs 17,383 cf                        |
| <b>Subcatchment50: Subcat 50</b> | Runoff Area=12,200 sf 0.00% Impervious Runoff Depth>2.52"<br>Flow Length=284' Tc=3.5 min CN=58 Runoff=0.83 cfs 2,558 cf                         |
| <b>Subcatchment60: Subcat 60</b> | Runoff Area=55,170 sf 0.00% Impervious Runoff Depth>4.07"<br>Flow Length=367' Tc=5.1 min CN=73 Runoff=5.66 cfs 18,706 cf                        |
| <b>Pond 1P: (new Pond)</b>       | Peak Elev=99.01' Storage=13,680 cf Inflow=10.65 cfs 35,542 cf<br>Primary=2.19 cfs 26,774 cf Secondary=0.04 cfs 12 cf Outflow=2.23 cfs 26,786 cf |
| <b>Pond C1: Culvert 1</b>        | Peak Elev=100.15' Storage=15 cf Inflow=5.82 cfs 19,914 cf<br>15.0" Round Culvert n=0.013 L=95.3' S=0.0058 '/' Outflow=5.77 cfs 18,798 cf        |
| <b>Pond C2: Culvert 1</b>        | Peak Elev=101.46' Storage=32 cf Inflow=0.83 cfs 2,558 cf<br>12.0" Round Culvert n=0.013 L=135.0' S=0.0198 '/' Outflow=0.83 cfs 2,532 cf         |
| <b>Pond C3: Culvert 1</b>        | Peak Elev=101.79' Storage=36 cf Inflow=2.02 cfs 6,417 cf<br>12.0" Round Culvert n=0.013 L=62.0' S=0.0373 '/' Outflow=2.02 cfs 6,392 cf          |
| <b>Link 1L: AP1</b>              | Inflow=4.52 cfs 17,912 cf<br>Primary=4.52 cfs 17,912 cf                                                                                         |
| <b>Link 2L: AP2</b>              | Inflow=6.49 cfs 45,492 cf<br>Primary=6.49 cfs 45,492 cf                                                                                         |

**Total Runoff Area = 184,677 sf Runoff Volume = 73,326 cf Average Runoff Depth = 4.76"**  
**71.67% Pervious = 132,362 sf 28.33% Impervious = 52,316 sf**

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**Summary for Subcatchment 10: Subcat 10**

Runoff = 4.52 cfs @ 12.18 hrs, Volume= 17,912 cf, Depth&gt; 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 50-Year Rainfall=7.16"

| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| 0.237     | 58 | Meadow, non-grazed, HSG B           |
| 0.140     | 71 | Meadow, non-grazed, HSG C           |
| 0.277     | 78 | Meadow, non-grazed, HSG D           |
| 0.027     | 98 | Paved roads w/curbs & sewers, HSG B |
| 0.021     | 98 | Paved roads w/curbs & sewers, HSG D |
| 0.139     | 70 | Woods, Good, HSG C                  |
| 0.374     | 77 | Woods, Good, HSG D                  |
| 1.215     | 73 | Weighted Average                    |
| 1.167     |    | 96.05% Pervious Area                |
| 0.048     |    | 3.95% Impervious Area               |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                            |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------|
| 0.4      | 24            | 0.0200        | 1.01              |                | <b>Sheet Flow,</b><br>Smooth surfaces n= 0.011 P2= 3.05"               |
| 2.7      | 35            | 0.0625        | 0.21              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.05"                  |
| 2.5      | 259           | 0.0617        | 1.74              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps   |
| 4.9      | 77            | 0.0110        | 0.26              |                | <b>Shallow Concentrated Flow,</b><br>Forest w/Heavy Litter Kv= 2.5 fps |
| 10.5     | 395           | Total         |                   |                |                                                                        |

**Summary for Subcatchment 20: Subcat 20**

Runoff = 2.02 cfs @ 12.08 hrs, Volume= 6,417 cf, Depth&gt; 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 50-Year Rainfall=7.16"

| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| 0.031     | 58 | Meadow, non-grazed, HSG B           |
| 0.046     | 78 | Meadow, non-grazed, HSG D           |
| 0.003     | 98 | Paved parking, HSG B                |
| 0.024     | 98 | Paved parking, HSG D                |
| 0.074     | 98 | Paved roads w/curbs & sewers, HSG B |
| 0.112     | 98 | Paved roads w/curbs & sewers, HSG D |
| 0.290     | 91 | Weighted Average                    |
| 0.077     |    | 26.55% Pervious Area                |
| 0.213     |    | 73.45% Impervious Area              |

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| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------------------------------------------------------|
| 0.6         | 50               | 0.0370           | 1.50                 |                   | <b>Sheet Flow,</b><br>Smooth surfaces n= 0.011 P2= 3.05"             |
| 0.5         | 115              | 0.0349           | 3.79                 |                   | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps              |
| 0.7         | 65               | 0.0520           | 1.60                 |                   | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps |
| 1.8         | 230              | Total            |                      |                   |                                                                      |

**Summary for Subcatchment 30: Subcat 30**

Runoff = 3.29 cfs @ 12.06 hrs, Volume= 10,351 cf, Depth&gt; 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 50-Year Rainfall=7.16"

| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| 0.035     | 71 | Meadow, non-grazed, HSG C           |
| 0.210     | 78 | Meadow, non-grazed, HSG D           |
| 0.107     | 98 | Paved parking, HSG D                |
| 0.016     | 98 | Paved roads w/curbs & sewers, HSG D |
| 0.128     | 98 | Roofs, HSG D                        |
| 0.496     | 88 | Weighted Average                    |
| 0.245     |    | 49.40% Pervious Area                |
| 0.251     |    | 50.60% Impervious Area              |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                              |
|-------------|------------------|------------------|----------------------|-------------------|----------------------------------------------------------|
| 0.5         | 50               | 0.0500           | 1.69                 |                   | <b>Sheet Flow,</b><br>Smooth surfaces n= 0.011 P2= 3.05" |
| 0.2         | 40               | 0.0200           | 2.87                 |                   | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 0.7         | 90               | Total            |                      |                   |                                                          |

**Summary for Subcatchment 40: Subcat 40**

Runoff = 5.04 cfs @ 12.08 hrs, Volume= 17,383 cf, Depth&gt; 6.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
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| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| 0.001     | 58 | Meadow, non-grazed, HSG B           |
| 0.002     | 78 | Meadow, non-grazed, HSG D           |
| 0.203     | 98 | Paved parking, HSG B                |
| 0.328     | 98 | Paved parking, HSG D                |
| 0.016     | 98 | Paved roads w/curbs & sewers, HSG B |
| 0.142     | 98 | Roofs, HSG D                        |
| 0.692     | 98 | Weighted Average                    |
| 0.003     |    | 0.43% Pervious Area                 |
| 0.689     |    | 99.57% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                              |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------|
| 0.5      | 50            | 0.0425        | 1.58              |                | <b>Sheet Flow,</b><br>Smooth surfaces n= 0.011 P2= 3.05" |
| 1.5      | 317           | 0.0315        | 3.60              |                | <b>Shallow Concentrated Flow,</b><br>Paved Kv= 20.3 fps  |
| 2.0      | 367           | Total         |                   |                |                                                          |

**Summary for Subcatchment 50: Subcat 50**

Runoff = 0.83 cfs @ 12.10 hrs, Volume= 2,558 cf, Depth&gt; 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 50-Year Rainfall=7.16"

| Area (sf) | CN | Description               |
|-----------|----|---------------------------|
| 12,132    | 58 | Meadow, non-grazed, HSG B |
| 68        | 78 | Meadow, non-grazed, HSG D |
| 12,200    | 58 | Weighted Average          |
| 12,200    |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                          |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------|
| 0.5      | 50            | 0.0425        | 1.58              |                | <b>Sheet Flow,</b><br>Smooth surfaces n= 0.011 P2= 3.05"             |
| 3.0      | 234           | 0.0341        | 1.29              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps |
| 3.5      | 284           | Total         |                   |                |                                                                      |

**Summary for Subcatchment 60: Subcat 60**

Runoff = 5.66 cfs @ 12.12 hrs, Volume= 18,706 cf, Depth&gt; 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
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| Area (sf) | CN | Description               |
|-----------|----|---------------------------|
| 4,460     | 58 | Meadow, non-grazed, HSG B |
| 7,974     | 71 | Meadow, non-grazed, HSG C |
| 26,174    | 78 | Meadow, non-grazed, HSG D |
| 13,541    | 70 | Woods, Good, HSG C        |
| 3,021     | 77 | Woods, Good, HSG D        |
| 55,170    | 73 | Weighted Average          |
| 55,170    |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                          |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------|
| 1.6      | 29            | 0.4130        | 0.30              |                | <b>Sheet Flow,</b><br>Grass: Dense n= 0.240 P2= 3.05"                |
| 3.5      | 338           | 0.0540        | 1.63              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps |
| 5.1      | 367           | Total         |                   |                |                                                                      |

**Summary for Pond 1P: (new Pond)**

Inflow Area = 76,582 sf, 65.58% Impervious, Inflow Depth > 5.57" for 50-Year event  
 Inflow = 10.65 cfs @ 12.07 hrs, Volume= 35,542 cf  
 Outflow = 2.23 cfs @ 12.32 hrs, Volume= 26,786 cf, Atten= 79%, Lag= 14.6 min  
 Primary = 2.19 cfs @ 12.32 hrs, Volume= 26,774 cf  
 Secondary = 0.04 cfs @ 12.31 hrs, Volume= 12 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 99.01' @ 12.32 hrs Surf.Area= 5,678 sf Storage= 13,680 cf

Plug-Flow detention time= 195.1 min calculated for 26,730 cf (75% of inflow)  
 Center-of-Mass det. time= 88.5 min ( 857.3 - 768.8 )

| Volume | Invert | Avail.Storage | Storage Description                                        |
|--------|--------|---------------|------------------------------------------------------------|
| #1     | 96.00' | 19,684 cf     | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 96.00            | 3,402             | 0                      | 0                      |
| 98.00            | 4,928             | 8,330                  | 8,330                  |
| 99.00            | 5,671             | 5,300                  | 13,630                 |
| 100.00           | 6,438             | 6,055                  | 19,684                 |

| Device | Routing  | Invert | Outlet Devices                                                                                                                                                                                                    |
|--------|----------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 93.53' | <b>12.0" Round Culvert</b><br>L= 52.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 93.53' / 93.03' S= 0.0096 ' / ' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf    |
| #2     | Device 1 | 93.73' | <b>6.0" Round Culvert</b><br>L= 30.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 93.73' / 93.63' S= 0.0033 ' / ' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.20 sf |
| #3     | Device 2 | 96.00' | <b>2.400 in/hr Exfiltration over Surface area</b>                                                                                                                                                                 |

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|    |           |        |                                                                                                                                                                                                                                                                                   |
|----|-----------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #4 | Device 1  | 98.40' | <b>8.0" Vert. Orifice/Grate</b> C= 0.600                                                                                                                                                                                                                                          |
| #5 | Device 1  | 98.80' | <b>12.0" Horiz. Orifice/Grate</b> C= 0.600<br>Limited to weir flow at low heads                                                                                                                                                                                                   |
| #6 | Secondary | 99.00' | <b>10.0' long x 6.0' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00<br>2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65<br>2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83 |

**Primary OutFlow** Max=2.17 cfs @ 12.32 hrs HW=99.01' (Free Discharge)

- 1=Culvert (Passes 2.17 cfs of 7.94 cfs potential flow)  
 2=Culvert (Passes 0.32 cfs of 1.30 cfs potential flow)  
 3=Exfiltration (Exfiltration Controls 0.32 cfs)  
 4=Orifice/Grate (Orifice Controls 0.89 cfs @ 2.65 fps)  
 5=Orifice/Grate (Weir Controls 0.97 cfs @ 1.49 fps)

**Secondary OutFlow** Max=0.02 cfs @ 12.31 hrs HW=99.01' (Free Discharge)

- 6=Broad-Crested Rectangular Weir (Weir Controls 0.02 cfs @ 0.20 fps)

**Summary for Pond C1: Culvert 1**

Inflow Area = 42,344 sf, 70.88% Impervious, Inflow Depth > 5.64" for 50-Year event  
 Inflow = 5.82 cfs @ 12.08 hrs, Volume= 19,914 cf  
 Outflow = 5.77 cfs @ 12.08 hrs, Volume= 18,798 cf, Atten= 1%, Lag= 0.0 min  
 Primary = 5.77 cfs @ 12.08 hrs, Volume= 18,798 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 100.15' @ 12.08 hrs Surf.Area= 13 sf Storage= 15 cf

Plug-Flow detention time= 26.3 min calculated for 18,759 cf (94% of inflow)

Center-of-Mass det. time= (not calculated: outflow precedes inflow)

| Volume | Invert | Avail.Storage | Storage Description                                        |
|--------|--------|---------------|------------------------------------------------------------|
| #1     | 99.00' | 39 cf         | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 99.00               | 13                   | 0                         | 0                         |
| 100.00              | 13                   | 13                        | 13                        |
| 102.00              | 13                   | 26                        | 39                        |

| Device | Routing | Invert | Outlet Devices                                                                                                                                                                                                 |
|--------|---------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary | 98.20' | <b>15.0" Round Culvert</b><br>L= 95.3' CMP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 98.20' / 97.65' S= 0.0058 ' / ' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |

**Primary OutFlow** Max=5.39 cfs @ 12.08 hrs HW=100.02' (Free Discharge)

- 1=Culvert (Barrel Controls 5.39 cfs @ 4.39 fps)



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**Summary for Pond C2: Culvert 1**

Inflow Area = 12,200 sf, 0.00% Impervious, Inflow Depth > 2.52" for 50-Year event  
 Inflow = 0.83 cfs @ 12.10 hrs, Volume= 2,558 cf  
 Outflow = 0.83 cfs @ 12.10 hrs, Volume= 2,532 cf, Atten= 0%, Lag= 0.1 min  
 Primary = 0.83 cfs @ 12.10 hrs, Volume= 2,532 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 101.46' @ 12.10 hrs Surf.Area= 13 sf Storage= 32 cf

Plug-Flow detention time= 8.6 min calculated for 2,526 cf (99% of inflow)  
 Center-of-Mass det. time= 2.9 min ( 888.7 - 885.8 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 99.00'               | 39 cf                     | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 99.00               | 13                   | 0                         | 0                                                          |
| 100.00              | 13                   | 13                        | 13                                                         |
| 102.00              | 13                   | 26                        | 39                                                         |

| Device | Routing | Invert  | Outlet Devices                                                                                                                                                                                                 |
|--------|---------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary | 101.00' | <b>12.0" Round Culvert</b><br>L= 135.0' CMP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 101.00' / 98.33' S= 0.0198 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.82 cfs @ 12.10 hrs HW=101.46' (Free Discharge)  
 ↑**1=Culvert** (Inlet Controls 0.82 cfs @ 2.31 fps)

**Summary for Pond C3: Culvert 1**

Inflow Area = 12,632 sf, 73.45% Impervious, Inflow Depth > 6.10" for 50-Year event  
 Inflow = 2.02 cfs @ 12.08 hrs, Volume= 6,417 cf  
 Outflow = 2.02 cfs @ 12.08 hrs, Volume= 6,392 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 2.02 cfs @ 12.08 hrs, Volume= 6,392 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 101.79' @ 12.08 hrs Surf.Area= 13 sf Storage= 36 cf

Plug-Flow detention time= 5.1 min calculated for 6,379 cf (99% of inflow)  
 Center-of-Mass det. time= 2.7 min ( 783.0 - 780.3 )

| Volume | Invert | Avail.Storage | Storage Description                                        |
|--------|--------|---------------|------------------------------------------------------------|
| #1     | 99.00' | 39 cf         | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

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| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 99.00               | 13                   | 0                         | 0                         |
| 100.00              | 13                   | 13                        | 13                        |
| 102.00              | 13                   | 26                        | 39                        |

| Device | Routing | Invert  | Outlet Devices                                                                                                                                                                                                |
|--------|---------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary | 101.00' | <b>12.0" Round Culvert</b><br>L= 62.0' CMP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 101.00' / 98.69' S= 0.0373 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=1.88 cfs @ 12.08 hrs HW=101.76' (Free Discharge)↑**1=Culvert** (Inlet Controls 1.88 cfs @ 2.96 fps)**Summary for Link 1L: AP1**

Inflow Area = 52,925 sf, 3.95% Impervious, Inflow Depth > 4.06" for 50-Year event  
Inflow = 4.52 cfs @ 12.18 hrs, Volume= 17,912 cf  
Primary = 4.52 cfs @ 12.18 hrs, Volume= 17,912 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Summary for Link 2L: AP2**

Inflow Area = 131,752 sf, 38.12% Impervious, Inflow Depth > 4.14" for 50-Year event  
Inflow = 6.49 cfs @ 12.13 hrs, Volume= 45,492 cf  
Primary = 6.49 cfs @ 12.13 hrs, Volume= 45,492 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                  |                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment10: Subcat 10</b> | Runoff Area=1.215 ac 3.95% Impervious Runoff Depth>0.94"<br>Flow Length=395' Tc=10.5 min CN=73 Runoff=1.00 cfs 4,149 cf                      |
| <b>Subcatchment20: Subcat 20</b> | Runoff Area=0.290 ac 73.45% Impervious Runoff Depth>2.20"<br>Flow Length=230' Tc=1.8 min CN=91 Runoff=0.78 cfs 2,318 cf                      |
| <b>Subcatchment30: Subcat 30</b> | Runoff Area=0.496 ac 50.60% Impervious Runoff Depth>1.94"<br>Flow Length=90' Tc=0.7 min CN=88 Runoff=1.18 cfs 3,499 cf                       |
| <b>Subcatchment40: Subcat 40</b> | Runoff Area=0.692 ac 99.57% Impervious Runoff Depth>2.91"<br>Flow Length=367' Tc=2.0 min CN=98 Runoff=2.19 cfs 7,303 cf                      |
| <b>Subcatchment50: Subcat 50</b> | Runoff Area=12,200 sf 0.00% Impervious Runoff Depth>0.32"<br>Flow Length=284' Tc=3.5 min CN=58 Runoff=0.05 cfs 325 cf                        |
| <b>Subcatchment60: Subcat 60</b> | Runoff Area=55,170 sf 0.00% Impervious Runoff Depth>0.94"<br>Flow Length=367' Tc=5.1 min CN=73 Runoff=1.26 cfs 4,336 cf                      |
| <b>Pond 1P: (new Pond)</b>       | Peak Elev=97.30' Storage=5,079 cf Inflow=4.02 cfs 13,393 cf<br>Primary=0.24 cfs 12,637 cf Secondary=0.00 cfs 0 cf Outflow=0.24 cfs 12,637 cf |
| <b>Pond C1: Culvert 1</b>        | Peak Elev=99.03' Storage=0 cf Inflow=2.19 cfs 7,602 cf<br>15.0" Round Culvert n=0.013 L=95.3' S=0.0058 ' /' Outflow=2.19 cfs 7,602 cf        |
| <b>Pond C2: Culvert 1</b>        | Peak Elev=101.09' Storage=27 cf Inflow=0.05 cfs 325 cf<br>12.0" Round Culvert n=0.013 L=135.0' S=0.0198 ' /' Outflow=0.03 cfs 299 cf         |
| <b>Pond C3: Culvert 1</b>        | Peak Elev=101.45' Storage=32 cf Inflow=0.78 cfs 2,318 cf<br>12.0" Round Culvert n=0.013 L=62.0' S=0.0373 ' /' Outflow=0.78 cfs 2,293 cf      |
| <b>Link 1L: AP1</b>              | Inflow=1.00 cfs 4,149 cf<br>Primary=1.00 cfs 4,149 cf                                                                                        |
| <b>Link 2L: AP2</b>              | Inflow=1.49 cfs 16,973 cf<br>Primary=1.49 cfs 16,973 cf                                                                                      |

**Total Runoff Area = 184,677 sf Runoff Volume = 21,929 cf Average Runoff Depth = 1.42"**  
**71.67% Pervious = 132,362 sf 28.33% Impervious = 52,316 sf**



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                  |                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment10: Subcat 10</b> | Runoff Area=1.215 ac 3.95% Impervious Runoff Depth>2.07"<br>Flow Length=395' Tc=10.5 min CN=73 Runoff=2.30 cfs 9,135 cf                      |
| <b>Subcatchment20: Subcat 20</b> | Runoff Area=0.290 ac 73.45% Impervious Runoff Depth>3.73"<br>Flow Length=230' Tc=1.8 min CN=91 Runoff=1.28 cfs 3,926 cf                      |
| <b>Subcatchment30: Subcat 30</b> | Runoff Area=0.496 ac 50.60% Impervious Runoff Depth>3.42"<br>Flow Length=90' Tc=0.7 min CN=88 Runoff=2.02 cfs 6,162 cf                       |
| <b>Subcatchment40: Subcat 40</b> | Runoff Area=0.692 ac 99.57% Impervious Runoff Depth>4.50"<br>Flow Length=367' Tc=2.0 min CN=98 Runoff=3.33 cfs 11,311 cf                     |
| <b>Subcatchment50: Subcat 50</b> | Runoff Area=12,200 sf 0.00% Impervious Runoff Depth>1.03"<br>Flow Length=284' Tc=3.5 min CN=58 Runoff=0.30 cfs 1,045 cf                      |
| <b>Subcatchment60: Subcat 60</b> | Runoff Area=55,170 sf 0.00% Impervious Runoff Depth>2.08"<br>Flow Length=367' Tc=5.1 min CN=73 Runoff=2.89 cfs 9,543 cf                      |
| <b>Pond 1P: (new Pond)</b>       | Peak Elev=98.32' Storage=9,952 cf Inflow=6.66 cfs 22,040 cf<br>Primary=0.29 cfs 16,118 cf Secondary=0.00 cfs 0 cf Outflow=0.29 cfs 16,118 cf |
| <b>Pond C1: Culvert 1</b>        | Peak Elev=99.32' Storage=4 cf Inflow=3.60 cfs 12,330 cf<br>15.0" Round Culvert n=0.013 L=95.3' S=0.0058 ' Outflow=3.59 cfs 11,975 cf         |
| <b>Pond C2: Culvert 1</b>        | Peak Elev=101.27' Storage=29 cf Inflow=0.30 cfs 1,045 cf<br>12.0" Round Culvert n=0.013 L=135.0' S=0.0198 ' Outflow=0.29 cfs 1,018 cf        |
| <b>Pond C3: Culvert 1</b>        | Peak Elev=101.60' Storage=34 cf Inflow=1.28 cfs 3,926 cf<br>12.0" Round Culvert n=0.013 L=62.0' S=0.0373 ' Outflow=1.28 cfs 3,902 cf         |
| <b>Link 1L: AP1</b>              | Inflow=2.30 cfs 9,135 cf<br>Primary=2.30 cfs 9,135 cf                                                                                        |
| <b>Link 2L: AP2</b>              | Inflow=3.15 cfs 25,660 cf<br>Primary=3.15 cfs 25,660 cf                                                                                      |

**Total Runoff Area = 184,677 sf Runoff Volume = 41,122 cf Average Runoff Depth = 2.67"**  
**71.67% Pervious = 132,362 sf 28.33% Impervious = 52,316 sf**

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                  |                                                                                                                                               |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment10: Subcat 10</b> | Runoff Area=1.215 ac 3.95% Impervious Runoff Depth>3.07"<br>Flow Length=395' Tc=10.5 min CN=73 Runoff=3.43 cfs 13,542 cf                      |
| <b>Subcatchment20: Subcat 20</b> | Runoff Area=0.290 ac 73.45% Impervious Runoff Depth>4.95"<br>Flow Length=230' Tc=1.8 min CN=91 Runoff=1.67 cfs 5,208 cf                       |
| <b>Subcatchment30: Subcat 30</b> | Runoff Area=0.496 ac 50.60% Impervious Runoff Depth>4.62"<br>Flow Length=90' Tc=0.7 min CN=88 Runoff=2.68 cfs 8,311 cf                        |
| <b>Subcatchment40: Subcat 40</b> | Runoff Area=0.692 ac 99.57% Impervious Runoff Depth>5.75"<br>Flow Length=367' Tc=2.0 min CN=98 Runoff=4.21 cfs 14,447 cf                      |
| <b>Subcatchment50: Subcat 50</b> | Runoff Area=12,200 sf 0.00% Impervious Runoff Depth>1.75"<br>Flow Length=284' Tc=3.5 min CN=58 Runoff=0.56 cfs 1,778 cf                       |
| <b>Subcatchment60: Subcat 60</b> | Runoff Area=55,170 sf 0.00% Impervious Runoff Depth>3.08"<br>Flow Length=367' Tc=5.1 min CN=73 Runoff=4.29 cfs 14,144 cf                      |
| <b>Pond 1P: (new Pond)</b>       | Peak Elev=98.80' Storage=12,512 cf Inflow=8.74 cfs 29,588 cf<br>Primary=0.78 cfs 21,574 cf Secondary=0.00 cfs 0 cf Outflow=0.78 cfs 21,574 cf |
| <b>Pond C1: Culvert 1</b>        | Peak Elev=99.60' Storage=8 cf Inflow=4.74 cfs 16,198 cf<br>15.0" Round Culvert n=0.013 L=95.3' S=0.0058 '/' Outflow=4.72 cfs 16,093 cf        |
| <b>Pond C2: Culvert 1</b>        | Peak Elev=101.37' Storage=31 cf Inflow=0.56 cfs 1,778 cf<br>12.0" Round Culvert n=0.013 L=135.0' S=0.0198 '/' Outflow=0.56 cfs 1,751 cf       |
| <b>Pond C3: Culvert 1</b>        | Peak Elev=101.70' Storage=35 cf Inflow=1.67 cfs 5,208 cf<br>12.0" Round Culvert n=0.013 L=62.0' S=0.0373 '/' Outflow=1.66 cfs 5,183 cf        |
| <b>Link 1L: AP1</b>              | Inflow=3.43 cfs 13,542 cf<br>Primary=3.43 cfs 13,542 cf                                                                                       |
| <b>Link 2L: AP2</b>              | Inflow=4.58 cfs 35,718 cf<br>Primary=4.58 cfs 35,718 cf                                                                                       |

**Total Runoff Area = 184,677 sf Runoff Volume = 57,430 cf Average Runoff Depth = 3.73"**  
**71.67% Pervious = 132,362 sf 28.33% Impervious = 52,316 sf**

## **BMP CALCULATIONS**



**TABLE 1 - QUANTITY CALCULATIONS**

**STORM EVENT**

|                 |             | <u>2</u> | <u>10</u> | <u>25</u> | <u>50</u> |
|-----------------|-------------|----------|-----------|-----------|-----------|
| <b>EXISTING</b> | <b>AP 1</b> | 1.00     | 2.33      | 3.48      | 4.6       |
|                 | <b>AP 2</b> | 1.74     | 4.17      | 6.29      | 8.37      |

|                  |             |      |      |      |      |
|------------------|-------------|------|------|------|------|
| <b>DEVELOPED</b> | <b>AP 1</b> | 1    | 2.3  | 3.43 | 4.52 |
|                  | <b>AP 2</b> | 1.49 | 3.15 | 4.58 | 6.49 |

|               |             |       |       |       |       |
|---------------|-------------|-------|-------|-------|-------|
| <b>CHANGE</b> | <b>AP 1</b> | 0.00  | -0.03 | -0.05 | -0.08 |
|               | <b>AP 2</b> | -0.25 | -1.02 | -1.71 | -1.88 |
|               |             |       |       |       |       |
| <b>TOTAL</b>  |             | -0.25 | -1.05 | -1.76 | -1.96 |

2019-03-05 - Littleworth Rd NHDES Simple Method SW Calc Sheet test  
OVERALL SUMMARY

3/5/2019

Date (MM/DD/YYYY): 3/5/2019  
Project Name: Littleworth Road  
Town/City: Dover, NH  
Impacted Surface Waters: N/A  
Applicant: Peter Paul  
DES File #: ?

|                                                                  |       |
|------------------------------------------------------------------|-------|
| TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =                  | 0.00  |
| TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =                | 0.00  |
| TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =                 |       |
| TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =                 | 1.22  |
| TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =               | 0.28  |
| TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =                | 23.0% |
| TOTAL POST-DEV AREA THAT IS FERTILIZED ANNUALLY (ACRES) =        | 0.00  |
| TOTAL POST-DEV PERCENT OF AREA THAT IS FERTILIZED ANNUALLY (%) = | 0.0%  |

|                                                                   | TSS<br>(LBS/YR) | TP<br>(LBS/YR) | TN<br>(LBS/YR) |
|-------------------------------------------------------------------|-----------------|----------------|----------------|
| PRE DEVELOPMENT LOADS (NO BMPS)                                   | 0.0             | 0.0            | 0.0            |
| PRE DEVELOPMENT LOADS (WITH BMPS)                                 | 0.0             | 0.0            | 0.0            |
| PRE DEVELOPMENT LOAD REDUCTION DUE TO BMPS                        | 0.0             | 0.0            | 0.0            |
| PROPOSED PERCENT REDUCTION IN FERTILIZER APPLICATION RATE         | NA              | 0.0%           | 0.0%           |
| POST DEVELOPMENT LOADS (NO BMPS)                                  | 390.1           | 1.3            | 3.9            |
| POST DEVELOPMENT LOADS (WITH BMPS)                                | 39.0            | 0.4            | 1.4            |
| POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS                       | 351.1           | 0.8            | 2.5            |
| POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)      | 39.0            | 0.4            | 1.4            |
| % DIFFERENCE FROM PRE DEVELOPMENT LOADS (SHOULD BE 0 OR NEGATIVE) |                 |                |                |
| TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD      | 100.0%          | 100.0%         | 100.0%         |

## **OPERATION AND MAINTENANCE PROGRAM**





**29 LITTLEWORTH ROAD – OFFICE/WAREHOUSE  
DOVER, NH**

## **OPERATION AND MAINTENANCE PROGRAM STORMWATER MANAGEMENT BMP's**

This project contains specific Best Management Practices (BMP's) for the conveyance, storage, and treatment of stormwater and the prevention of erosion. These BMP's consist of swales, a bioretention cell, catchbasins and culverts. All components should be inspected quarterly, and after every significant rain event of 1" in any 24-hour period. Additional inspection intervals are specified for certain BMP's, specifically, underdrained soil filters.

The party responsible for implementing this Operation and Maintenance Program (O & M Program) shall be the property owner or owner's representative.

### **Swales**

All swales should be inspected for accumulation of debris, which could adversely affect the function of this BMP. These areas should also be maintained to have gradual slopes, which prevent channeling of stormwater and erosion of the bottom and sides of the swales.

### **Catch Basins**

All catch basin grates, sumps, and inlets/outlets should be inspected for accumulation of debris, which could adversely affect the function of this BMP. Additionally, the basin inverts shall be inspected for clogging and material soundness. Sumps shall always be clear to a depth of 1' below the outlet invert. Inlet structures shall be inspected and cleaned of debris at least twice annually, once in the spring following snow melt and once in the autumn after leaf fall.

### **Culverts**

Culvert inlets and outlets should be inspected for debris, which could clog the BMP. Additionally, the placement of rip-rap should be inspected to ensure that all areas remain smooth and no areas exhibit erosion in the form of rills or gullies.

### **Snow Removal**

Snow shall be stockpiled only in the approved snow storage areas. Plowing of snow into wetland areas, detention ponds, and/or bioretention cells is prohibited. Additionally, a mostly sand mix (reduced salt) shall be applied during winter months to prevent excessive salt from leaching into wetland areas. Excess sand shall be removed from the storage areas, all paved surfaces and adjacent areas each spring.

### **Bioretention Cell**

The bioretention cell filter area is a very effective BMP, however, long term maintenance is essential to its operation. The cell should be inspected after every major storm event during the first year to ensure proper function and at least twice-annually, thereafter. The inspection should ensure that the filter drains within 24 - 48 hours. The top several inches of the filter layer should be replaced with fresh filter material, when water ponds for longer than 72 hours. Debris and sediment that builds up should be removed from

the pre-treatment structure at least annually. Outlet structures shall be inspected and cleaned of debris at least twice annually, once in the spring following snow melt and once in the autumn after leaf fall. The height of grass shall be maintained at a maximum of 12"; mowing shall be limited to no more than two times during the growing season.

### **Seeding, Fertilizing and Mulching**

All exposed soil materials and stockpiles must be either temporarily or permanently seeded, fertilized and mulched in accordance with plan specifications. This is one of the most important features of the Erosion Control Plan, which will provide both temporary and permanent stabilization. Eroded or damaged lawn areas must be repaired until a 75% effective growth of vegetation is established and permanently maintained.

### **Record Keeping (During Construction)**

The construction inspector shall maintain documentation of all inspections as well as maintenance or corrective actions that were taken in response to the inspection. This documentation shall be maintained for at least three years after the site is permanently stabilized.

The scope of construction inspections shall include, but not be limited to, the inspection of the sediment and erosion control measures as well as material storage areas and all points at which vehicles access the site.

### **Record Keeping (Post Construction)**

Routine maintenance and inspections will be accomplished by the future property owners of Lots 1 and 2 or a third party contracted by the respective owner. The inspector shall have knowledge of erosion and stormwater control, including the standards and conditions of the permit. All inspections accomplished in accordance with this program shall be documented on the attached Inspection & Maintenance Log. Copies of the Log shall be kept by the property owner or owner's representative, and be made available to the Department (Maine Department of Environmental Protection) or Town of Kittery, upon request.

All post-construction documentation, such as catch basin inspection and cleaning logs and Bioretention cell inspection and maintenance records, shall be maintained for at least five years.

Additional responsibilities to include, on or by July 1 of each year, providing a completed and signed certification to the Code Enforcement Officer in a form provided by the Town, certifying that the person has inspected the stormwater management facilities and that they are adequately maintained and functioning as intended by the stormwater management plan, or that they require maintenance or repair, describing any required maintenance and any deficiencies found during inspection of the stormwater management facilities and, if the stormwater management facilities require maintenance or repair of deficiencies in order to function as intended by the approved stormwater management plan, the person must provide a record of the required maintenance or deficiency and corrective action(s) taken.

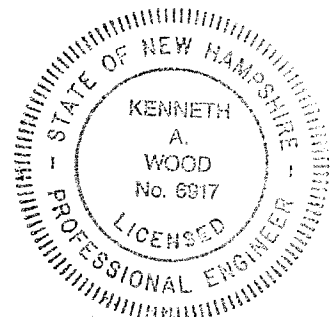
### **Re-certification (as noted in Appendix B. of Chapter 500 Stormwater Management)**

Submit a certification of the following to the Department within three months of the expiration of each five-year interval from the date of issuance of the permit.

- (a) **Identification and repair of erosion problems.** All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.

- (b) **Inspection and repair of stormwater control system.** All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.
- (c) **Maintenance.** The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the Department, and the maintenance log is being maintained.

Municipalities with separate storm sewer systems regulated under the Maine Pollutant Discharge Elimination System (MPDES) Program may report on all regulated systems under their control as part of their required annual reporting in lieu of separate certification of each system. Municipalities not regulated by the MPDES Program, but that are responsible for maintenance of permitted stormwater systems, may report on multiple stormwater systems in one report.

A handwritten signature in black ink, consisting of a stylized 'K' followed by a series of loops and a final 'Q'.



**INSPECTION & MAINTENANCE LOG**  
**29 Littleworth Road – Dover, NH**

| Date | BMP <sup>1</sup> | Purpose <sup>2</sup> | Maintenance Done <sup>3</sup> | By |
|------|------------------|----------------------|-------------------------------|----|
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |
|      |                  |                      |                               |    |

1. "BMP" refers to which site feature is being maintained. For example; Catch Basin, Culvert, Swale, Underdrained Soil Filter (Bioretention cell) etc.
2. "Purpose" is the reason for the inspection. For example; "quarterly" or "after a significant rain event."
3. "Maintenance Done" means any maintenance required as a result of the inspection, such as trash removal or re-seeding of areas.

# **GRASSED UNDERDRAINED SOIL FILTER INSPECTION FORM**

|                                    | For Inspector                              |                                                                                            |              | For Maintenance Crew                                                                                                           |
|------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------|
| Component No.<br>Component<br>Name | Inspection Item and Inspection Item<br>No. |                                                                                            | Result       | Preventative / Corrective<br>Maintenance Actions                                                                               |
| Pretreatment<br>(Forebay)          | 1                                          | Scouring or erosion is present at inlet structure and/or riprap apron                      | Y___<br>N___ | Check the flow diversion device before the inlet pipe and whether the bypass flow channel is clogged<br><br>Work Order # _____ |
|                                    | 2                                          | Clogged pipes or excessive sediment in the forebay                                         | Y___<br>N___ | Remove sediment or debris                                                                                                      |
|                                    | 3                                          | Damaged outlet structure (e.g., cracking, subsidence, spalling, erosion, or deterioration) | Y___<br>N___ | Repair or replace the outlet structure<br><br>Work Order # _____                                                               |
|                                    |                                            |                                                                                            |              |                                                                                                                                |
|                                    |                                            |                                                                                            |              |                                                                                                                                |

|                                    | For Inspector                              |                                                                                                                           | For Maintenance Crew                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component No.<br>Component<br>Name | Inspection Item and Inspection Item<br>No. | Result                                                                                                                    | Preventative / Corrective<br>Maintenance Actions                                                                                                                                                                                                                                                                                                                                                                                        |
| Note:                              |                                            |                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Filter Area                        | 1                                          | <p>Standing water is present after the design drain time</p> <p>The observed drain time is approximately _____ hours.</p> | <p>Y___</p> <p>N___</p> <p>Recheck to determine if there is standing water after 72 hours</p> <p>If standing water is present longer than 5 days, report to mosquito commission.</p> <p>Remove any sediment buildup</p> <p>Replace the sand layer<br/>(<a href="#">volume of replacement sand is specified in the Basin Configuration Targets in the Basic Design Information Section of this Manual</a>)</p> <p>Work Order # _____</p> |
|                                    | 2                                          | Excessive sediment, silt, or trash accumulation on basin bed                                                              | <p>Y___</p> <p>N___</p> <p>Clean pretreatment system</p> <p>Remove silt, sediment, and trash</p>                                                                                                                                                                                                                                                                                                                                        |

|                                    | For Inspector                              |                                                                    |              | For Maintenance Crew                                                                                                                                                |
|------------------------------------|--------------------------------------------|--------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component No.<br>Component<br>Name | Inspection Item and Inspection Item<br>No. |                                                                    | Result       | Preventative / Corrective<br>Maintenance Actions                                                                                                                    |
|                                    | 3                                          | Erosion or channelization is present                               | Y___<br>N___ | Check whether the flow bypass or diversion device is clogged<br><br>Re-grade the infiltration bed<br><br>Work Order # _____                                         |
|                                    | 4                                          | Animal burrows/rodents are present                                 | Y___<br>N___ | Pest control<br><br>Work Order # _____                                                                                                                              |
|                                    | 5                                          | Uneven bed                                                         | Y___<br>N___ | Use light equipment to resurface the bed<br><br>Work Order # _____                                                                                                  |
|                                    | 6                                          | Evidence of sinkholes or subsidence                                | Y___<br>N___ | Monitor for sinkhole development                                                                                                                                    |
| Note:                              |                                            |                                                                    |              |                                                                                                                                                                     |
| Underdrain                         | 1                                          | Standing water is present after the design drain time              | Y___<br>N___ | Check whether the outlet is clogged<br><br>Check whether the underdrain pipes are clogged or damaged<br><br>Ventilate the underdrain pipes<br><br>Work Order# _____ |
|                                    | 2                                          | Gravel present in the discharge pipe or outfall of the sand filter | Y___<br>N___ | Check whether the filter fabric around the pipe is broken and repair if necessary<br><br>Work Order# _____                                                          |



|                                    | For Inspector                              |                                                                                                                              | For Maintenance Crew                                                                                                                                                                                                                   |
|------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component No.<br>Component<br>Name | Inspection Item and Inspection Item<br>No. | Result                                                                                                                       | Preventative / Corrective<br>Maintenance Actions                                                                                                                                                                                       |
|                                    | 3                                          | Continuous discharge of water from the outfall when it has not rained within the past 72 hours and the bed is completely dry | <p>Y___</p> <p>N___</p> <p>Check whether the seasonal high water table is above the bottom of the sand filter</p> <p>A retrofit may be required if the system is intercepting groundwater</p> <p>Work Order# _____</p>                 |
| <p>Note:</p>                       |                                            |                                                                                                                              |                                                                                                                                                                                                                                        |
| Vegetation                         | 1                                          | Large spot(s) showing bare soil                                                                                              | <p>Y___</p> <p>N___</p> <p>Vegetative cover must be maintained at 85%.<br/>Revegetate the entire basin if 50% or more vegetation has been lost</p> <p>Check Landscaping plan for guidance (if available)</p> <p>Work Order # _____</p> |

|                                    | For Inspector                              |                          | For Maintenance Crew                                                                                                                                                                                                         |
|------------------------------------|--------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component No.<br>Component<br>Name | Inspection Item and Inspection Item<br>No. | Result                   | Preventative / Corrective<br>Maintenance Actions                                                                                                                                                                             |
|                                    | 2                                          | Overgrown vegetation     | Y___<br>N___<br>Mow/trim the vegetation<br><br>Work Order # _____                                                                                                                                                            |
|                                    | 3                                          | Tree growth in the basin | Y___<br>N___<br>Clear, trim, or prune the trees<br>according to the original<br>Vegetation or Landscaping<br>Plan<br><br>Inspect to determine if the tree<br>roots caused any structural<br>damage<br><br>Work Order # _____ |
| Note:                              |                                            |                          |                                                                                                                                                                                                                              |

|                                        | For Inspector                              |                                                                                                                |                                                                                                     | For Maintenance Crew                                                                                                                                                                                                                    |                                                                                                                   |
|----------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Component No.<br>Component<br>Name     | Inspection Item and Inspection Item<br>No. |                                                                                                                | Result                                                                                              | Preventative / Corrective<br>Maintenance Actions                                                                                                                                                                                        |                                                                                                                   |
| Basin<br>Embankment<br>and Side Slopes | 1                                          | Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope | Y___<br>N___                                                                                        | Check for excessive overland runoff flow through the embankment.<br><br>Check for any sink hole development<br><br>Direct the overland runoff to the forebay or pretreatment area<br><br>Restabilize the bank<br><br>Work Order # _____ |                                                                                                                   |
|                                        | Outlet                                     | 1                                                                                                              | Trash or debris accumulation more than 20%                                                          | Y___<br>N___                                                                                                                                                                                                                            | Clean and remove<br><br>Determine source of trash and address to reduce future maintenance costs or basin failure |
|                                        |                                            | 2                                                                                                              | Trash rack is damaged or rusted greater than 50%<br><br>Trash rack is bent, loose, or missing parts | Y___<br>N___                                                                                                                                                                                                                            | Repair or replace trash rack<br><br>Work Order # _____                                                            |
|                                        |                                            | 3                                                                                                              | Outlet components (e.g., orifice plates or weir plate) skewed, misaligned, or missing               | Y___<br>N___                                                                                                                                                                                                                            | Repair or replace component<br><br>Work Order # _____                                                             |
|                                        |                                            | 4                                                                                                              | Discharge pipe apron is eroded or scoured                                                           | Y___<br>N___                                                                                                                                                                                                                            | Restabilize the discharge riprap apron<br><br>Work Order # _____                                                  |
| 5                                      |                                            | Standing water is present in the outlet structure longer than 72 hours                                         | Y___<br>N___                                                                                        | Pump out the standing water<br><br>Work Order # _____                                                                                                                                                                                   |                                                                                                                   |

|                                    | For Inspector                              |                                                                      |              | For Maintenance Crew                                                                                               |
|------------------------------------|--------------------------------------------|----------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------|
| Component No.<br>Component<br>Name | Inspection Item and Inspection Item<br>No. |                                                                      | Result       | Preventative / Corrective<br>Maintenance Actions                                                                   |
| Note:                              |                                            |                                                                      |              |                                                                                                                    |
| Emergency<br>Spillway              | 1                                          | Trees or excessive vegetation<br>present                             | Y___<br>N___ | Remove trees and roots, and<br>restore berms if necessary<br><br>Work Order #_____                                 |
|                                    | 2                                          | Damaged structure                                                    | Y___<br>N___ | Repair<br><br>Work Order #_____                                                                                    |
| Miscellaneous<br>(if applicable)   | 1                                          | Fence: broken or eroded parts                                        | Y___<br>N___ | Repair or replace<br><br>Work Order #_____                                                                         |
|                                    | 2                                          | Gate: missing gate or lock                                           | Y___<br>N___ | Repair or replace<br><br>Work Order #_____                                                                         |
|                                    | 3                                          | Sign/plate: tiled, missing, or<br>faded                              | Y___<br>N___ | Repair or replace<br><br>Work Order #_____                                                                         |
|                                    | 4                                          | Excessive or overgrown<br>vegetation blocking access to the<br>basin | Y___<br>N___ | Clear, trim, or prune the<br>vegetation to allow access for<br>inspection and maintenance<br><br>Work Order #_____ |



|                                 |                                         |        |                                               |
|---------------------------------|-----------------------------------------|--------|-----------------------------------------------|
|                                 | For Inspector                           |        | For Maintenance Crew                          |
| Component No.<br>Component Name | Inspection Item and Inspection Item No. | Result | Preventative / Corrective Maintenance Actions |
| Note:                           |                                         |        |                                               |

Follow Up Items (Component No. / Inspection Item No.):

Inspector Name

Signature

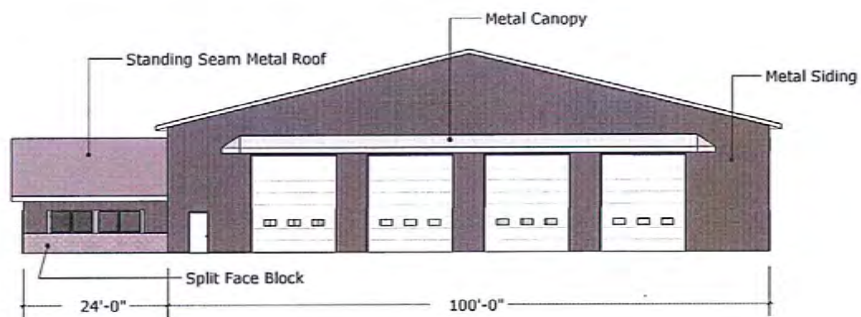
Date

Inspector: \_\_\_\_\_

Date: \_\_\_\_\_

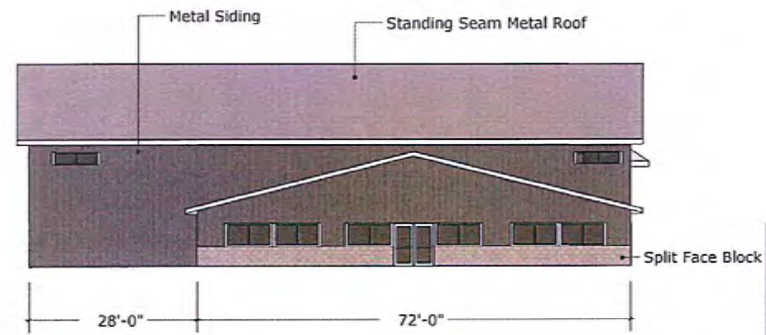
**CATCH BASIN INSPECTION FORM**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                       |                                                                                                                                              |                                                                                                                                              |                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Catch Basin I.D.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                       |                                                                                                                                              | <b>Final Discharge from Structure?</b> Yes <input type="checkbox"/> No <input type="checkbox"/><br><b>If Yes, Discharge to Outfall No: _</b> |                                                                                                                                 |
| <b>Catch Basin Label:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Stencil <input type="checkbox"/> Ground Inset <input type="checkbox"/> Sign <input type="checkbox"/> None <input type="checkbox"/> Other: _                                           |                                                                                                                                              |                                                                                                                                              |                                                                                                                                 |
| <b>Basin Material:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Concrete <input type="checkbox"/><br>Corrugated metal <input type="checkbox"/><br>Stone <input type="checkbox"/><br>Brick <input type="checkbox"/><br>Other: <input type="checkbox"/> | <b>Catch Basin Condition:</b>                                                                                                                |                                                                                                                                              | Good <input type="checkbox"/> Poor <input type="checkbox"/><br>Fair <input type="checkbox"/> Crumbling <input type="checkbox"/> |
| <b>Pipe Material:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Concrete <input type="checkbox"/><br>HDPE <input type="checkbox"/><br>PVC <input type="checkbox"/><br>Clay Tile <input type="checkbox"/><br>Other: _                                  | <b>Pipe Measurements:</b>                                                                                                                    |                                                                                                                                              | Inlet Dia. (in): d= _<br>Outlet Dia. (in): D= _                                                                                 |
| <b>Required Maintenance/ Problems (check all that apply):</b><br><input type="checkbox"/> Tree Work Required<br><input type="checkbox"/> New Grate is Required<br><input type="checkbox"/> Pipe is Blocked<br><input type="checkbox"/> Frame Maintenance is Required<br><input type="checkbox"/> Remove Accumulated Sediment<br><input type="checkbox"/> Pipe Maintenance is Required<br><input type="checkbox"/> Basin Undermined or Bypassed<br><input type="checkbox"/> Cannot Remove Cover<br><input type="checkbox"/> Ditch Work<br><input type="checkbox"/> Corrosion at Structure<br><input type="checkbox"/> Erosion Around Structure<br><input type="checkbox"/> Remove Trash & Debris<br><input type="checkbox"/> Need Cement Around Grate<br><b>Other:</b> _ _ |                                                                                                                                                                                       |                                                                                                                                              |                                                                                                                                              |                                                                                                                                 |
| <b>Catch Basin Grate Type :</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Sediment Buildup Depth :</b>                                                                                                                                                       | <b>Description of Flow:</b>                                                                                                                  | <b>Street Name/ Structure Location:</b>                                                                                                      |                                                                                                                                 |
| Bar: <input type="checkbox"/><br>Cascade: <input type="checkbox"/><br>Other: _<br>Properly Aligned: Yes <input type="checkbox"/><br>No <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0-6 (in): _<br>6-12(in): _<br>12-18 (in): _<br>18-24 (in): _<br>24 + (in): _                                                                                                          | Heavy <input type="checkbox"/><br>Moderate <input type="checkbox"/><br>Slight <input type="checkbox"/><br>Trickling <input type="checkbox"/> |                                                                                                                                              |                                                                                                                                 |
| <b>*If the outlet is submerged check yes and indicate approximate height of water above the outlet invert.</b> h above invert (in): _                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                       |                                                                                                                                              | Yes <input type="checkbox"/>                                                                                                                 | No <input type="checkbox"/>                                                                                                     |
| <input type="checkbox"/> <b>Flow</b><br><input type="checkbox"/> <b>Standing Water</b><br><b>(check one or both)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Observations:</b>                                                                                                                                                                  |                                                                                                                                              | <b>Circle those present:</b>                                                                                                                 |                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Color: _____                                                                                                                                                                          |                                                                                                                                              | Foam                                                                                                                                         | Oil Sheen                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Odor: _____                                                                                                                                                                           |                                                                                                                                              | Sanitary Waste                                                                                                                               | Bacterial Sheen                                                                                                                 |
| <b>Weather Conditions :</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Dry > 24 hours <input type="checkbox"/>                                                                                                                                               | Wet <input type="checkbox"/>                                                                                                                 | Orange Staining                                                                                                                              | Floatables                                                                                                                      |
| <b>Sample of Screenings Collected for Analysis?</b> Yes <input type="checkbox"/> No <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                       |                                                                                                                                              | Excessive sediment                                                                                                                           | Pet Waste                                                                                                                       |
| <b>Comments:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                       |                                                                                                                                              | Other: _                                                                                                                                     | Optical Enhancers                                                                                                               |



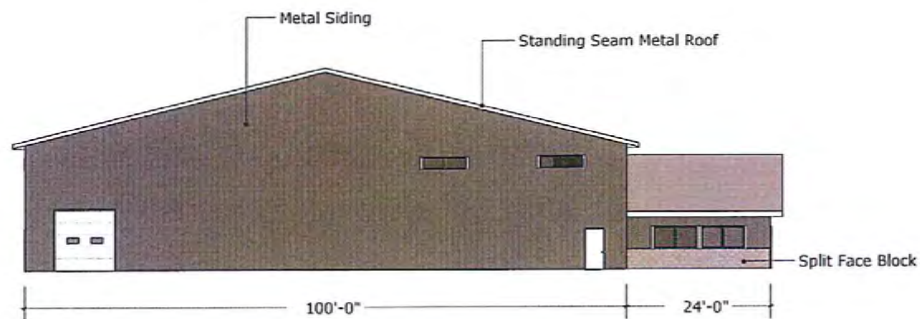
Elevation A

A  
01



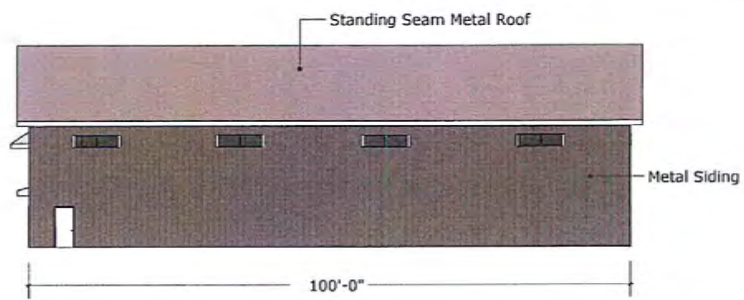
Elevation B

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02



Elevation C

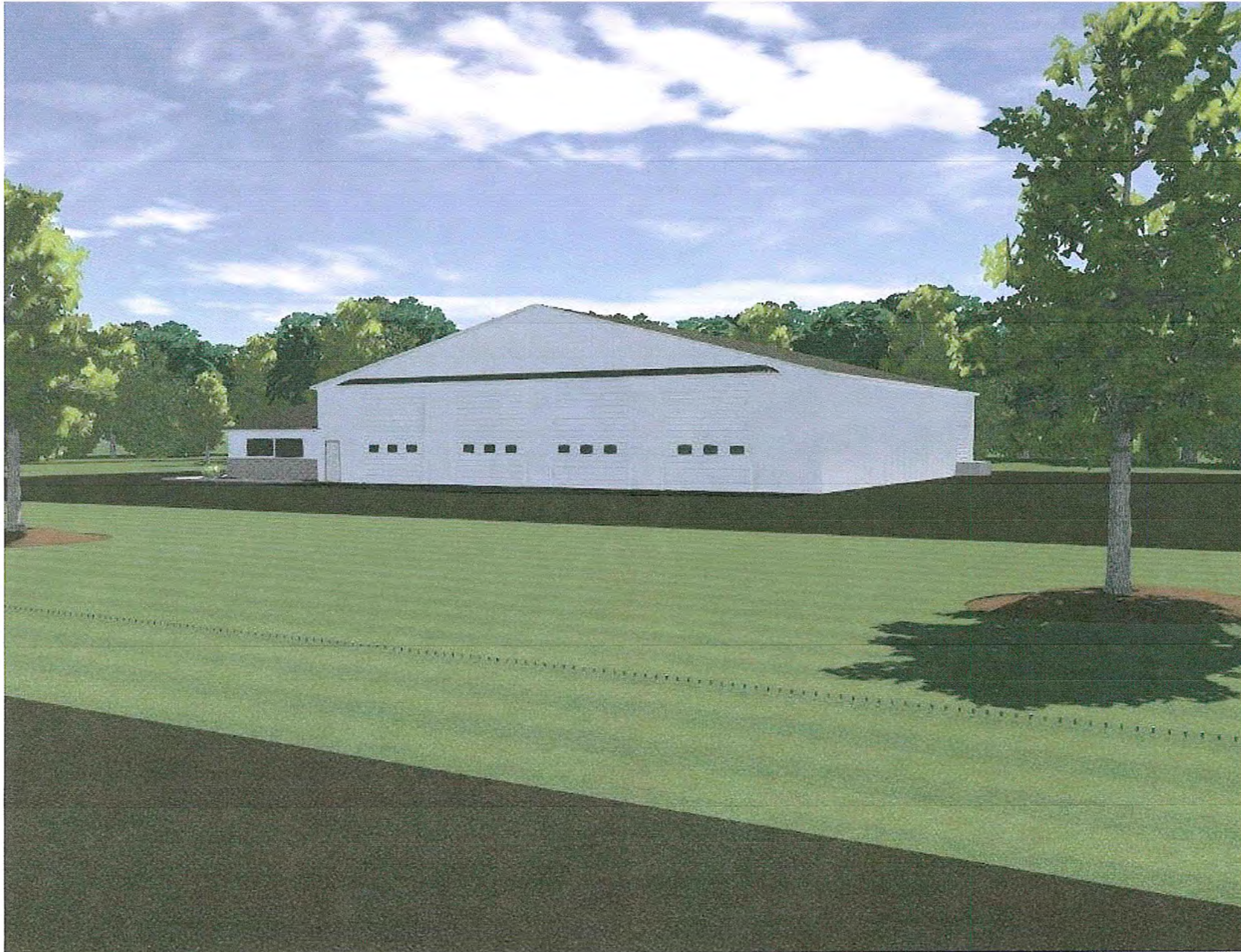
A  
03



Elevation D

A  
04





























### GENERAL NOTES

- GROSS LOT AREA: 3.99- 0.35 (WETLANDS)= 3.63 AC

\*UNSUITABLE SOILS ARE WETLANDS, POORLY DRAINED AND VERY POORLY DRAINED SOILS.

- 5.) ZONING DISTRICT I-4
- |                      |                   |
|----------------------|-------------------|
| MIN. LOT AREA        | 5 AC              |
| MIN. STREET FRONTAGE | 400'              |
| MIN. FRONT SETBACK   | 75'               |
| MIN. SIDE SETBACK    | 75'               |
| MIN. REAR SETBACK    | 75'               |
| MAX. BLDG. HEIGHT    | 40'               |
| MAX. COVERAGE        | 33% = 57,355 S.F. |

- | UNIT TYPE  | REQUIREMENT     | SQUARE FEET | SPACES REQUIRED |
|------------|-----------------|-------------|-----------------|
| APARTMENT  | 1.4 SPACES/UNIT | N/A         | 2               |
| RETAIL     | 1 SPACE/275 SF  | 1,728 SF    | 7               |
| INDUSTRIAL | 1 SPACE/800 SF  | 10,000 SF   | 13              |

TOTAL REQUIRED SPACES = 22 WITH 22 PROVIDED(1 ADA)

- 9.) AS-BUILT PLANS OF THE SITE SHALL BE SUBMITTED ON A REPRODUCIBLE MYLAR MEDIUM AND IN A DIGITAL DXF FORMAT ON DISK TO THE CITY OF DOVER ENGINEER'S OFFICE UPON COMPLETION OF PROJECT. AS-BUILT PLANS SHALL BE PREPARED AND CERTIFIED CORRECT BY A L.L.S. OR P.E.

- 10.) EXTERIOR LIGHTING SHALL BE CUT-OFF TYPE FIXTURES PER CHAPTER 149-14-E AND SHALL PROVIDE LIGHTING DIRECTED ON-SITE ONLY.

- 11.) TOPOGRAPHIC SURVEY PERFORMED BY ATTAR ENGINEERING INC.

- 12.) FIRE DEPARTMENT CONNECTIONS SHALL BE LOCATED ON THE STREET SIDE OF THE BUILDING PER NFPA.

- 13.) ALL ON-SITE UTILITIES SHALL BE INSTALLED UNDERGROUND.

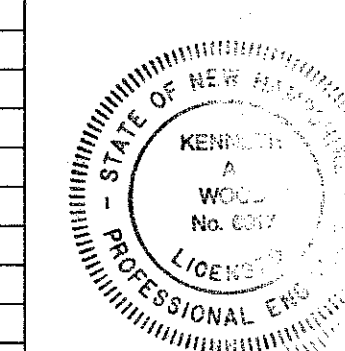
- 14.) THE SUBJECT PARCEL IS SERVED BY MUNICIPAL WATER AND AN ON-SITE WASTEWATER DISPOSAL SYSTEM.

- 15.) ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO APPLICABLE CITY AND STATE CODES.

- 1.1 EXISTING CONDITIONS PLAN
- 1.2 SITE PLAN
- 2.1 GRADING AND UTILITY PLAN
- 3.1 ROAD PLAN AND PROFILE
- 4.1 SITE DETAILS
- 4.2 SITE DETAILS
- 4.3 SITE DETAILS
- 4.4 SITE DETAILS
- 6.1 LANDSCAPING PLAN
- 8.1 LIGHTING PLAN

- 16.) BACKFLOW PREVENTORS SHALL BE PROVIDED FOR DOMESTIC WATER LINES.
- 17.) ALL EROSION CONTROL NOTES SHALL INCLUDE PROVISIONS FOR CONSTRUCTION SEQUENCING, TEMPORARY EROSION CONTROL MEASURES, AND PERMANENT STANDARDS SUCH AS LOAM SPREAD RATE FOR DISTURBED AREAS, RATES OF LIME, TYPE AND RATES FOR FERTILIZER, AND SEED AND MULCH MIXTURE WITH RATES OF APPLICATION.
- 18.) THE LIMITS OF CONSTRUCTION DISTURBANCE THAT ARE LOCATED IN OR WITHIN THE 50 FT. OF CONSERVATION AND WETLAND DISTRICTS SHALL BE STAKED, FLAGGED AND CLEARLY IDENTIFIED PRIOR TO THE COMMENCEMENT OF SITE WORK.
- 19.) ALL TREATMENT SWALES TO BE CONSTRUCTED SHALL HAVE SOD BOTTOMS.
- 20.) A LETTER OF CREDIT FOR THE COST OF REVEGETATING ALL DISTURBED AREAS ON THE SITE SHALL BE SUBMITTED PRIOR TO ANY EARTH DISTURBING ACTIVITY OCCURS.
- 21.) A PRE-CONSTRUCTION CONFERENCE WITH THE DEVELOPER, THE DESIGN ENGINEER, THE EARTHWORK CONTRACTOR AND THE CITY ENGINEER SHALL OCCUR PRIOR TO ANY EARTH DISTURBING ACTIVITY.
- 22.) BUILDING ADDRESSES SHALL BE ASSIGNED BY THE BUILDING INSPECTOR AT THE TIME OF ISSUANCE OF A BUILDING PERMIT.
- 23.) THE PROPOSED USE FOR THE SITE (STRUCTURE) IS OFFICE/WAREHOUSE.
- 24.) THE FOLLOWING FEDERAL AND STATE PERMITS HAVE BEEN ISSUED FOR THE SUBJECT PROPERTY: NHDOT DRIVEWAY PERMIT, NHDES ISDS PERMIT.

1.) "S.E.N.H. INDUSTRIAL PARK 1 ROGERS ROAD GOVER, N.H." DONE OCTOBER 1966,  
PREPARED BY G.L. DAVIS AND ASSOCIATES.

[illegible]

SITE PLAN  
29 LITTLEWORTH RD  
DOVER, NH 03820

|      |                                                          |
|------|----------------------------------------------------------|
| FOR: | 29 LITTLEWORTH ROAD LLC<br>PO BOX 694<br>DOVER, NH 03820 |
|------|----------------------------------------------------------|

ATTAR ENGINEERING, INC.

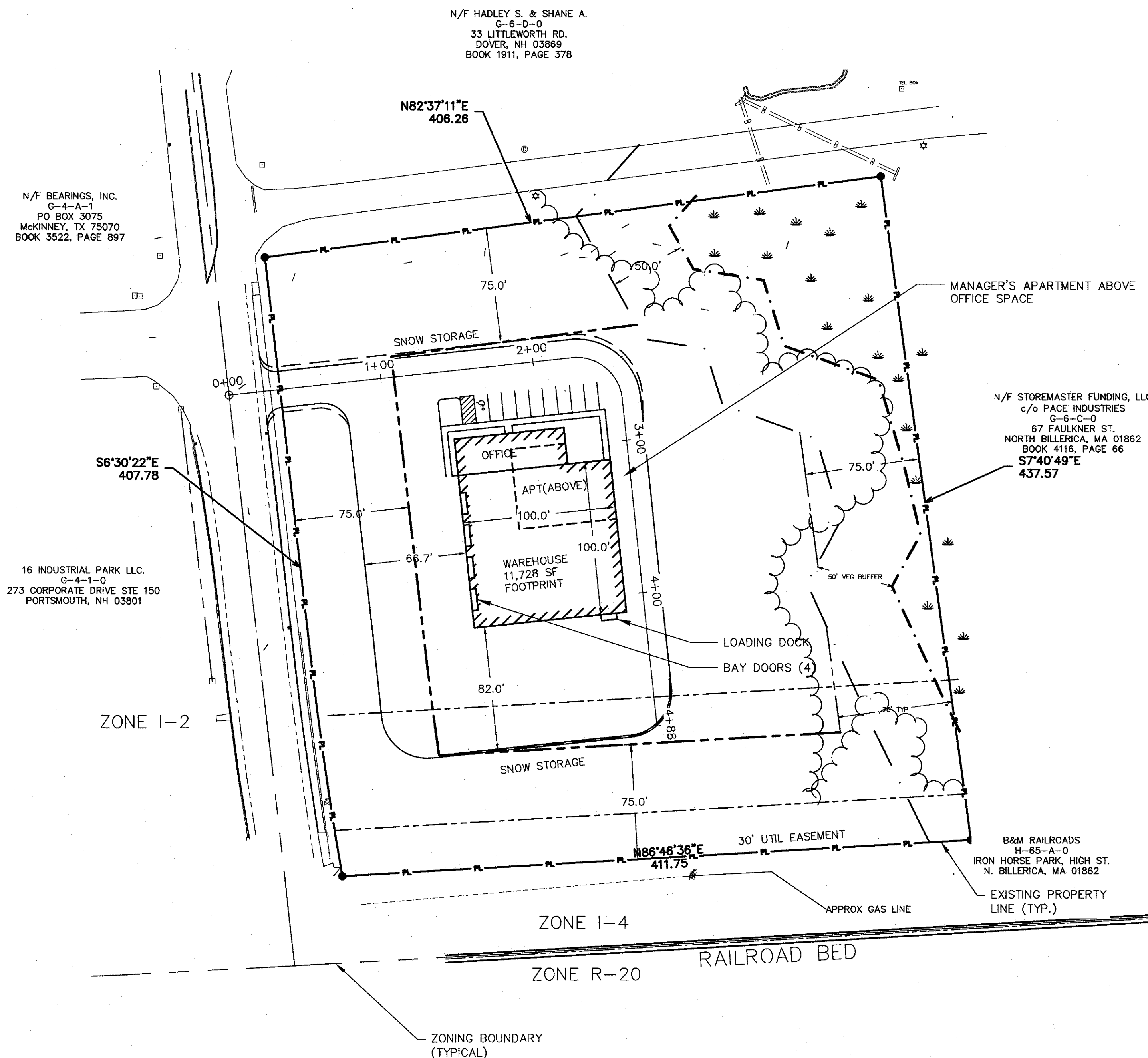
CIVIL ♦ STRUCTURAL ♦ MARINE  
1284 STATE ROAD - ELIOT, MAINE 03903  
PHONE: (207)439-6023 FAX: (207)439-2128

|        |              |     |
|--------|--------------|-----|
| SCALE: | APPROVED BY: | DRA |
|--------|--------------|-----|

|          |                                                                                       |               |
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| 1" = 50' |  | BRN           |
| DATE:    |                                                                                       | REVISION: DAT |

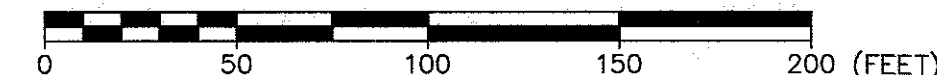
DATE: 3/5/2019

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| JOB NO: C147-19 | FILE: LITTLEWORTH BASE DWG | SHEET: 12 |
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|                     |                                                                                     |
|---------------------|-------------------------------------------------------------------------------------|
| PROPERTY LINE       |  |
| PRP. PAVEMENT       |  |
| EXT. PAVEMENT       |  |
| PRP. GRAVEL         |  |
| ABUTTING PROP. LINE |  |
| SETBACK             |  |
| SOIL TYPE BOUNDARY  |  |
| WETLAND BOUNDARY    |  |
| WETLAND SETBACK     |  |
| PRP. BUILDING       |  |

GRAPHIC SCALE





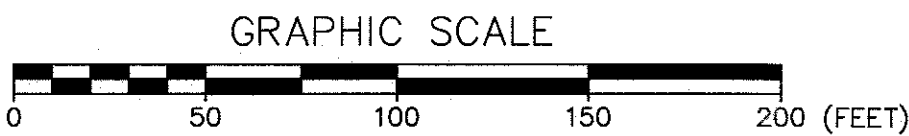
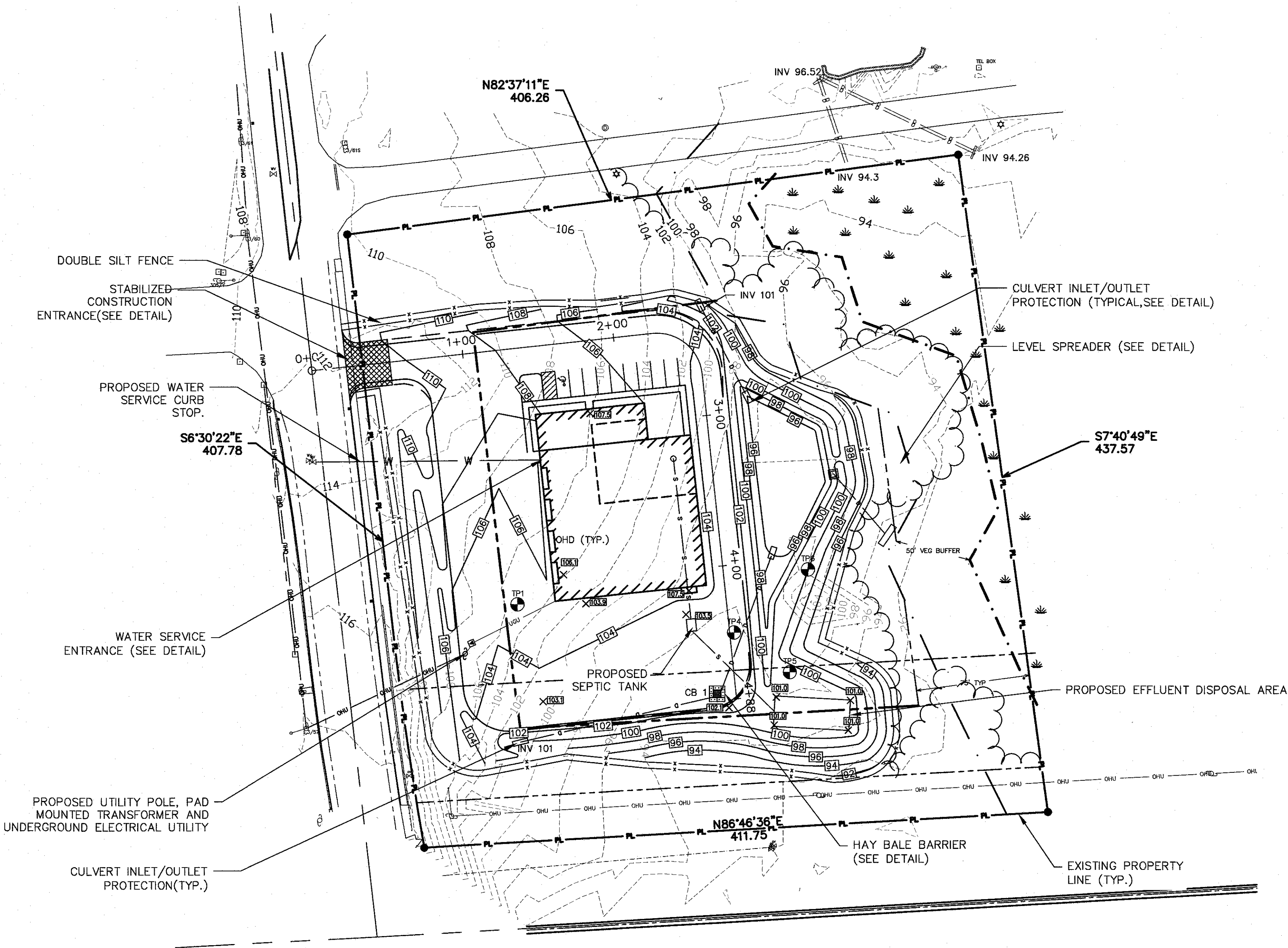
GENERAL NOTES

1. ALL PIPES, VALVES, FITTINGS, AND CONNECTIONS SHALL MEET CURRENT DOVER WATER DEPARTMENT STANDARDS.
2. ALL WATER SERVICES TO BE EQUIPPED WITH CURB STOPS.
3. ALL STORM DRAINS TO BE ADS N-12 (PE) OR APPROVED EQUAL.
4. A MINIMUM OF 5.0' OF COVER SHALL BE MAINTAINED OVER ALL WATER LINES.
5. THE ELECTRICAL POWER COMPANY WILL PREPARE THE ELECTRICAL PLAN FOR CONSTRUCTION. ALL ELECTRICAL, TELEPHONE, AND CABLE SERVICES WILL BE UNDERGROUND.
6. NEW WATER LINES SHALL BE TESTED IN ACCORDANCE WITH DISTRICT REQUIREMENTS.
7. EACH E & S CELL REPRESENTS A LIMITED AREA TO BE CONSTRUCTED WITH ALL EROSION & SEDIMENT CONTROL MEASURES IN PLACE. ALL "CELLS" SHALL BE PROTECTED BY EROSION & SEDIMENT CONTROL BEST MANAGEMENT PRACTICES AS REQUIRED BY THE E & S PLAN. EROSION & SEDIMENT CONTROL SHALL BE MAINTAINED FOR EACH CELL THROUGH-OUT THE COMPLETION OF THE ENTIRE PROJECT. THE CELLS SHALL BE ESTABLISHED IN THERE NUMERICAL ORDER.

DRAINAGE STRUCTURE SCHEDULE

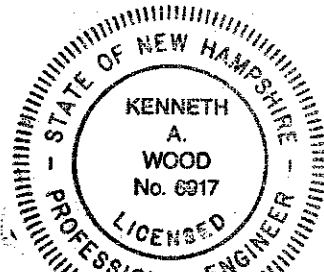
| DESC | RIM ELEV | INV IN | INV OUT | PIPE SIZE(N.) |
|------|----------|--------|---------|---------------|
| CB 1 | 101.9    | 98.3   | 98.2    | 12            |

| LEGEND               |     |
|----------------------|-----|
| PROPERTY LINE        | --- |
| LOT BOUNDARY         | --- |
| PRP. PAVEMENT        | --- |
| ABUTTING PROP. LINE  | --- |
| SETBACK              | --- |
| SOIL TYPE BOUNDARY   | --- |
| WETLAND BOUNDARY     | --- |
| WETLAND SETBACK      | --- |
| EXT. ABUTTER LINE    | --- |
| EXT. PAVEMENT        | --- |
| PRP. GRAVEL          | --- |
| EXT. OVERHEAD ELEC   | OHU |
| EXT. POWER POLE      | OHU |
| PRP. OVERHEAD ELEC   | OHU |
| PRP. CATCH BASIN     | --- |
| PRP. WATER HYDRANT   | --- |
| PRP. SILTATION FENCE | --- |
| PRP. BUILDING        | --- |



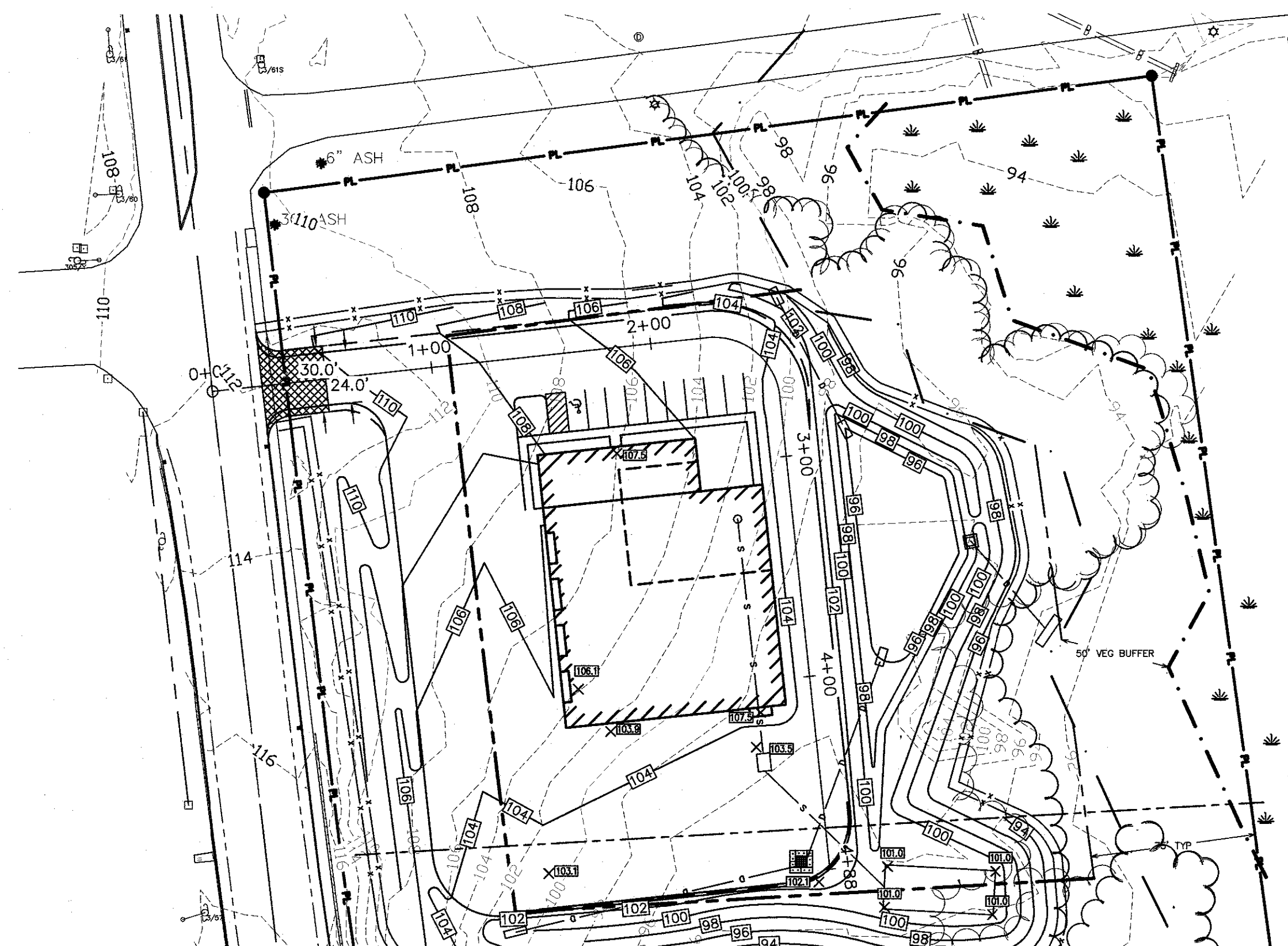
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MAP BLOCK NO. G-6-0-0

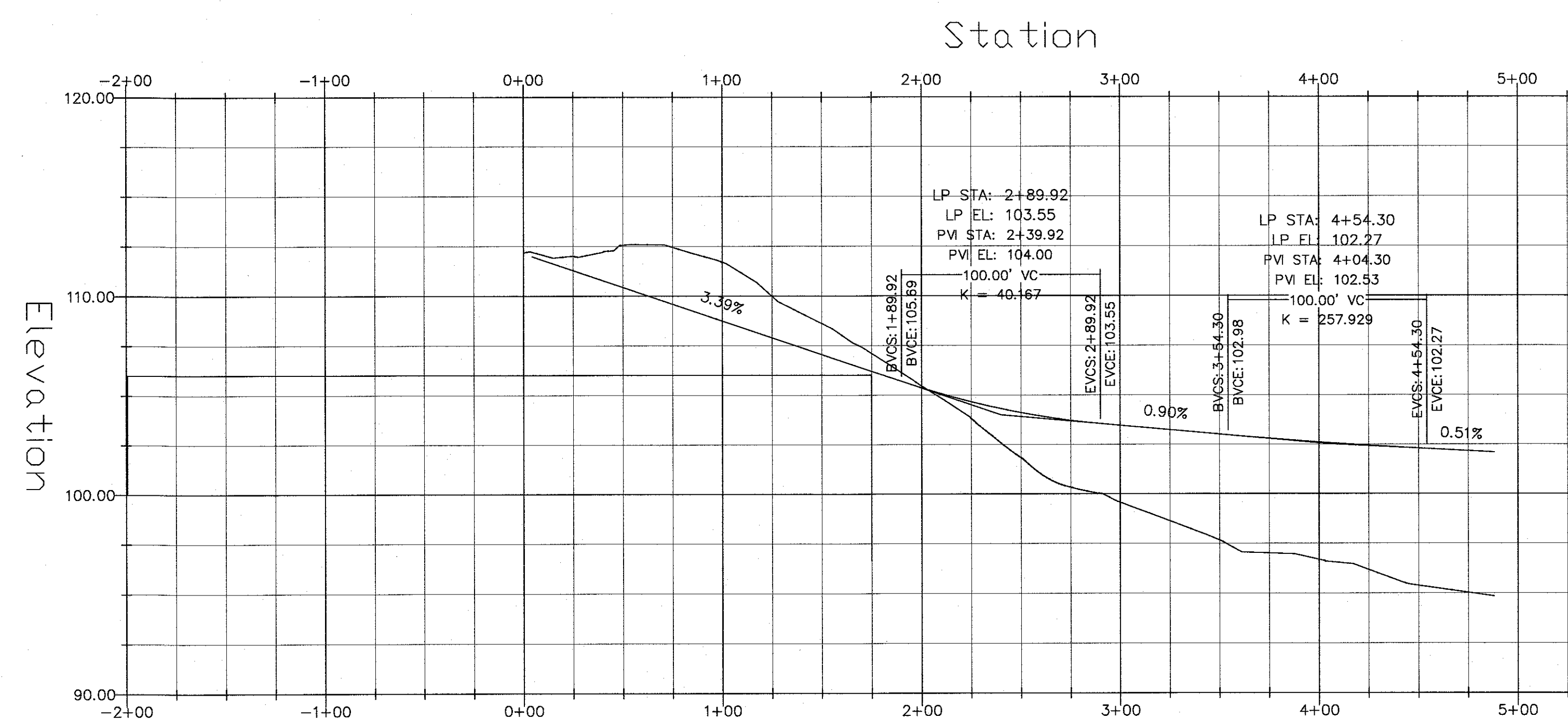


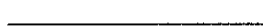
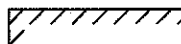
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|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|
| GRADING AND UTILITY PLAN<br>29 LITTLEWORTH RD<br>DOVER, NH 03820                                                                                 |                            |                  |
| FOR: 29 LITTLEWORTH ROAD LLC<br>PO BOX 694<br>DOVER, NH 03820                                                                                    |                            |                  |
| <b>ATTAR ENGINEERING, INC.</b><br>CIVIL ♦ STRUCTURAL ♦ MARINE<br>1284 STATE ROAD - ELIOT, MAINE 03903<br>PHONE: (207)439-6023 FAX: (207)439-2128 |                            |                  |
| SCALE:<br>1" = 50'                                                                                                                               | APPROVED BY:<br>           | DRAWN BY:<br>BRN |
| DATE:<br>3/5/2019                                                                                                                                | REVISION DATE:<br>-- --    |                  |
| JOB NO: C147-19                                                                                                                                  | FILE: LITTLEWORTH BASE.DWG | SHEET: 21        |

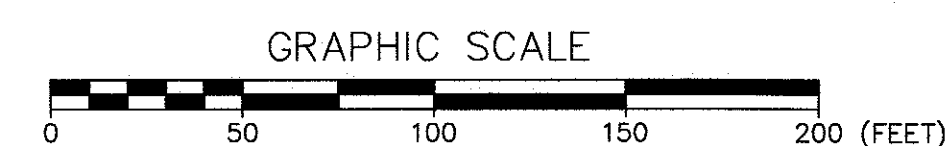
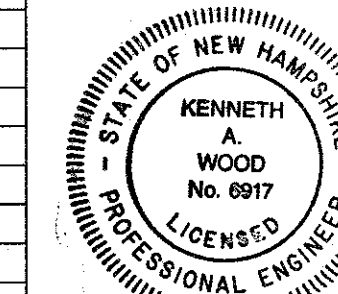




1.) THE TOTAL LENGTH OF THE ENTRANCE IS 488 FEET.



| LEGEND               |                                                                                           |
|----------------------|-------------------------------------------------------------------------------------------|
| PROPERTY LINE        |      |
| LOT BOUNDARY         |      |
| PRP. PAVEMENT        |      |
| ABUTTING PROP. LINE  |      |
| SETBACK              |      |
| SOIL TYPE BOUNDARY   |      |
| WETLAND BOUNDARY     |      |
| WETLAND SETBACK      |      |
| EXT. ABUTTER LINE    |      |
| EXT. PAVEMENT        |      |
| PRP. GRAVEL          |      |
| EXT. OVERHEAD ELEC   |  OHU |
| EXT. POWER POLE      |      |
| PRP. OVERHEAD ELEC   |  OHU |
| PRP. CATCH BASIN     |      |
| PRP. WATER HYDRANT   |      |
| PRP. SILTATION FENCE |      |
| PRP. BUILDING        |      |

[illegible]

ENTRANCE AND PROFILE  
29 LITTLEWORTH RD  
DOVER, NH 03820

|      |                                                          |
|------|----------------------------------------------------------|
| FOR: | 29 LITTLEWORTH ROAD LLC<br>PO BOX 694<br>DOVER, NH 03820 |
|------|----------------------------------------------------------|

ATTAR ENGINEERING, INC.

CIVIL ♦ STRUCTURAL ♦ MARINE

1284 STATE ROAD - ELIOT, MAINE 03903  
PHONE: (207)439-6023 FAX: (207)439-21

|        |              |  |
|--------|--------------|--|
| SCALE: | APPROVED BY: |  |
|--------|--------------|--|

SCALE:  
1" = 50'

DATE:  
3/5/2019

APPROVED BY:

APPROVED BY:  
  
 3/15/2008

DRAWN BY:

BRN

REVISION DATE  
- : -

|                 |                            |           |
|-----------------|----------------------------|-----------|
| JOB NO: C147-19 | FILE: LITTLEWORTH BASE.DWG | SHEET: 31 |
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EROSION & SEDIMENTATION CONTROL NOTES

- SILTATION FENCE OR HAY BALE BARRIERS WILL BE INSTALLED DOWNSLOPE OF ALL STRIPPING OR CONSTRUCTION OPERATIONS. A DOUBLE SILT FENCE BARRIER SHALL BE INSTALLED DOWNSLOPE OF ANY SOIL MATERIAL STOCKPILES. SILT FENCES SHALL BE INSPECTED AFTER EACH RAIN EVENT AND DAILY DURING PROLONGED RAIN. SILT AND SOIL PARTICLES ACCUMULATING BEHIND THE FENCE SHALL BE REMOVED AFTER EACH SIGNIFICANT RAIN EVENT AND IN NO INSTANCE SHOULD ACCUMULATION EXCEED 1/2 THE HEIGHT OF THE FENCE. TORN OR DAMAGED AREAS SHALL BE REPAIRED.
- TEMPORARY AND PERMANENT VEGETATION AND MULCHING IS AN INTEGRAL COMPONENT OF THE EROSION AND SEDIMENTATION CONTROL PLAN. ALL AREAS SHALL BE INSPECTED AND MAINTAINED UNTIL THE DESIRED VEGETATIVE COVER IS ESTABLISHED. THESE CONTROL MEASURES ARE ESSENTIAL TO EROSION PREVENTION AND ALSO REDUCE COSTLY REWORK OF GRADED AND SHAPED AREAS.
- SEEDING, FERTILIZER AND LIME RATES AND TIME OF APPLICATION WILL BE DEPENDENT ON SOIL REQUIREMENTS. TEMPORARY VEGETATION SHALL BE MAINTAINED IN THESE AREAS UNTIL PERMANENT SEEDING IS APPLIED. ADDITIONALLY, EROSION AND SEDIMENTATION MEASURES SHALL BE MAINTAINED UNTIL PERMANENT VEGETATION IS ESTABLISHED.
- ALL LAWN AREA, OUTER POND SIDE SLOPES AND SWALES SHALL BE PERMANENTLY SEEDDED WITH THE FOLLOWING MIXTURE: 20 LB/ACRE CREEPING RED FESCUE, 2 LB/ACRE REDTOP AND 20 LB/ACRE TALL FESCUE FOR A TOTAL OF 42 LB/ACRE. FERTILIZER AND LIME RATES SHALL BE DEPENDENT ON SOIL TESTING. IN THE ABSENCE OF SOIL TESTS, FERTILIZE WITH 10-20-20 (N-P205-K201) AT 800 LB/ACRE AND LIME AT 3 TONS/ACRE. MULCH WITH HAY AT 70-90 LB/1000 S.F. 4" OF LOAM SHALL BE APPLIED PRIOR TO SEEDING.
- POND BOTTOMS AND INNER POND SIDESLOPES SHALL BE PERMANENTLY SEEDDED WITH THE FOLLOWING MIXTURE: 20 LB/ACRE CREEPING RED FESCUE, 8 LB/ACRE BIRDSFOOT TREFOIL AND 20 LB/ACRE TALL FESCUE FOR A TOTAL OF 48 LB/ACRE. SEE THE ABOVE NOTE FOR FERTILIZER, LIME AND MULCHING RATES.
- TEMPORARY VEGETATION OF ALL DISTURBED AREAS, MATERIAL STOCKPILES AND OTHER SUCH AREAS SHALL BE ESTABLISHED BY SEEDING WITH EITHER WINTER RYE AT A RATE OF 112 LB/ACRE OR ANNUAL RYEGRASS AT A RATE OF 40 LB/ACRE. WINTER RYE SHALL BE USED FOR FALL SEEDING AND ANNUAL RYEGRASS FOR SHORT DURATION SEEDING. SEEDING SHALL BE ACCOMPLISHED BEFORE OCTOBER 1.
- TEMPORARY SEEDING OF DISTURBED AREAS SHALL BE ACCOMPLISHED BEFORE OCTOBER 1. PERMANENT SEEDING SHALL BE ACCOMPLISHED BEFORE SEPTEMBER 15.
- ALL SEEDED AREAS SHALL BE MULCHED WITH HAY AT A RATE OF 2 BALES (70-90 LB) PER 1000 S.F. OF SEEDED AREA.
- SLOPES 2:1 OR STEEPER SHALL BE TREATED WITH POLYJUTE OPEN WEAVE GEOTEXTILE (OR EQUIVALENT) AFTER SEEDING. JUTE MATS SHALL BE ANCHORED PER MANUFACTURER'S SPECIFICATIONS.
- EXCESSIVE DUST CAUSED BY CONSTRUCTION OPERATIONS SHALL BE CONTROLLED BY APPLICATION OF WATER OR CALCIUM CHLORIDE.
- THE CONTRACTOR MAY OPT TO USE EROSION CONTROL MIX BERM AS A SEDIMENT BARRIER IN LIEU OF SILTATION FENCE OR HAY BALE BARRIERS WITH APPROVAL FROM THE INSPECTING ENGINEER.
- MINIMIZE DISTURBED AREAS AND PROTECT NATURAL DOWNGRADIENT BUFFER AREAS TO THE EXTENT PRACTICABLE. CONTROL STORMWATER VOLUME AND VELOCITY WITHIN THE SITE TO MINIMIZE SOIL EROSION. MINIMIZE THE DISTURBANCE OF STEEP SLOPES. CONTROL STORMWATER DISCHARGES, INCLUDING BOTH PEAK FLOW RATES AND VOLUME, TO MINIMIZE EROSION AT OUTLETS. THE DISCHARGE MAY NOT RESULT IN EROSION OF ANY OPEN DRAINAGE CHANNELS, SWALES, STREAM CHANNELS OR STREAM BANKS, UPLAND, OR COASTAL OR FRESHWATER WETLANDS OFF THE PROJECT SITE.

EROSION & SED. CONTROL NOTES (CONT.)

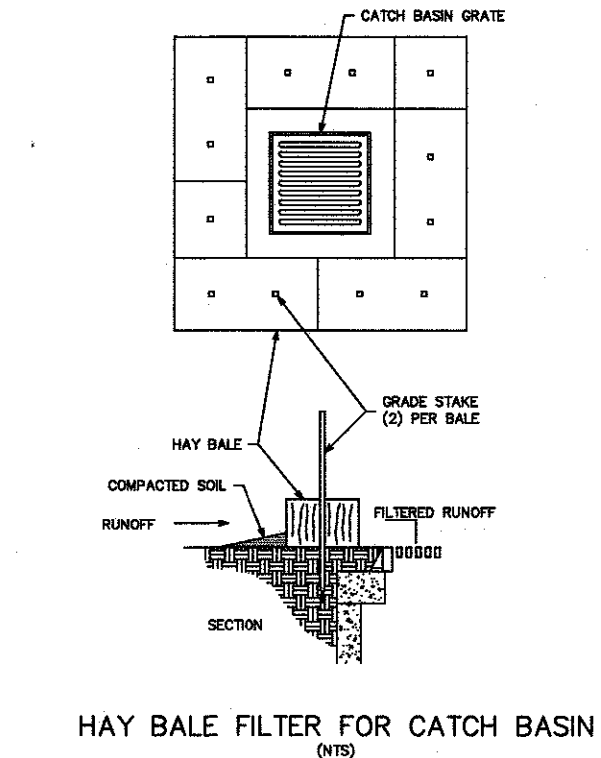
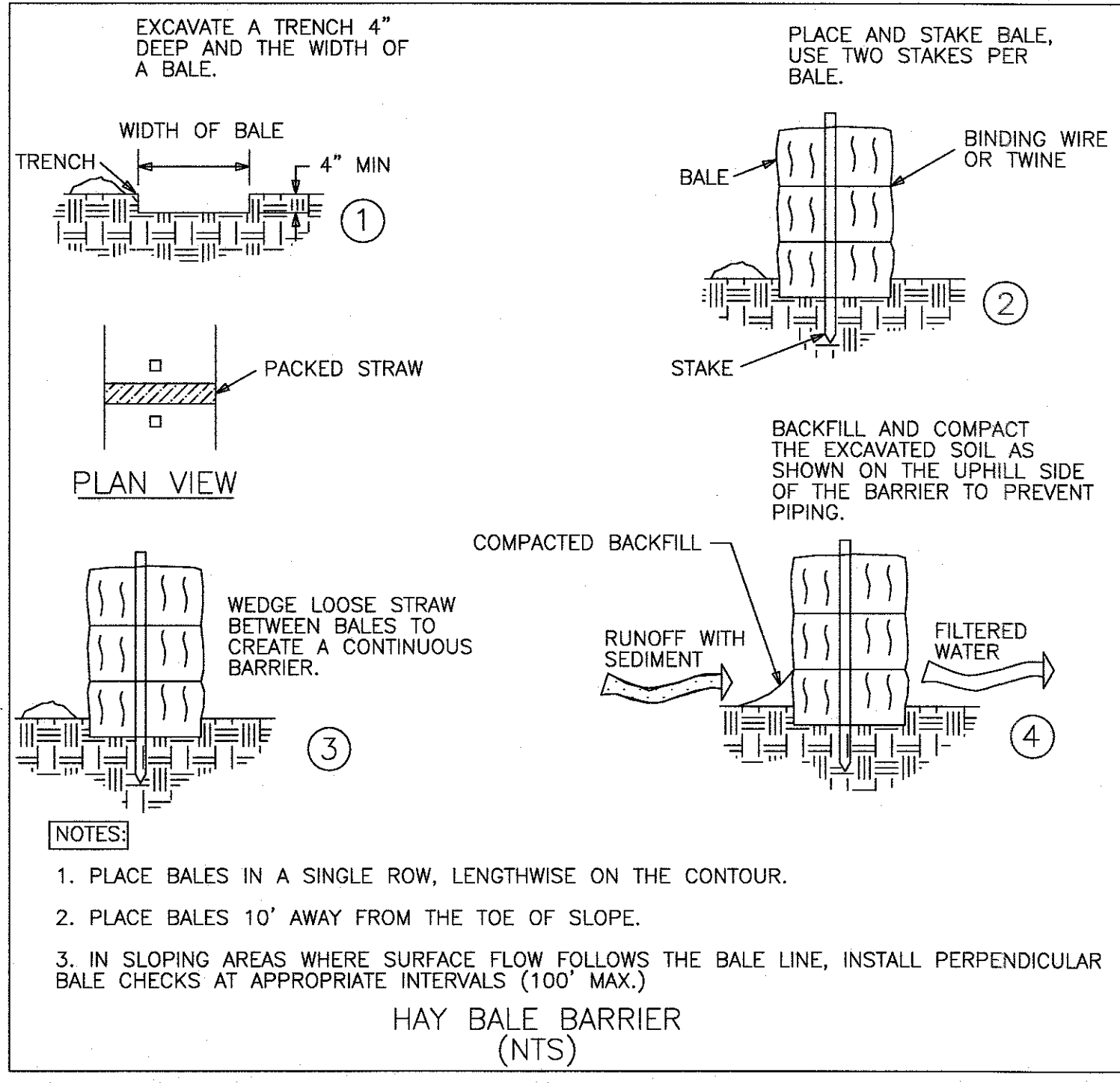
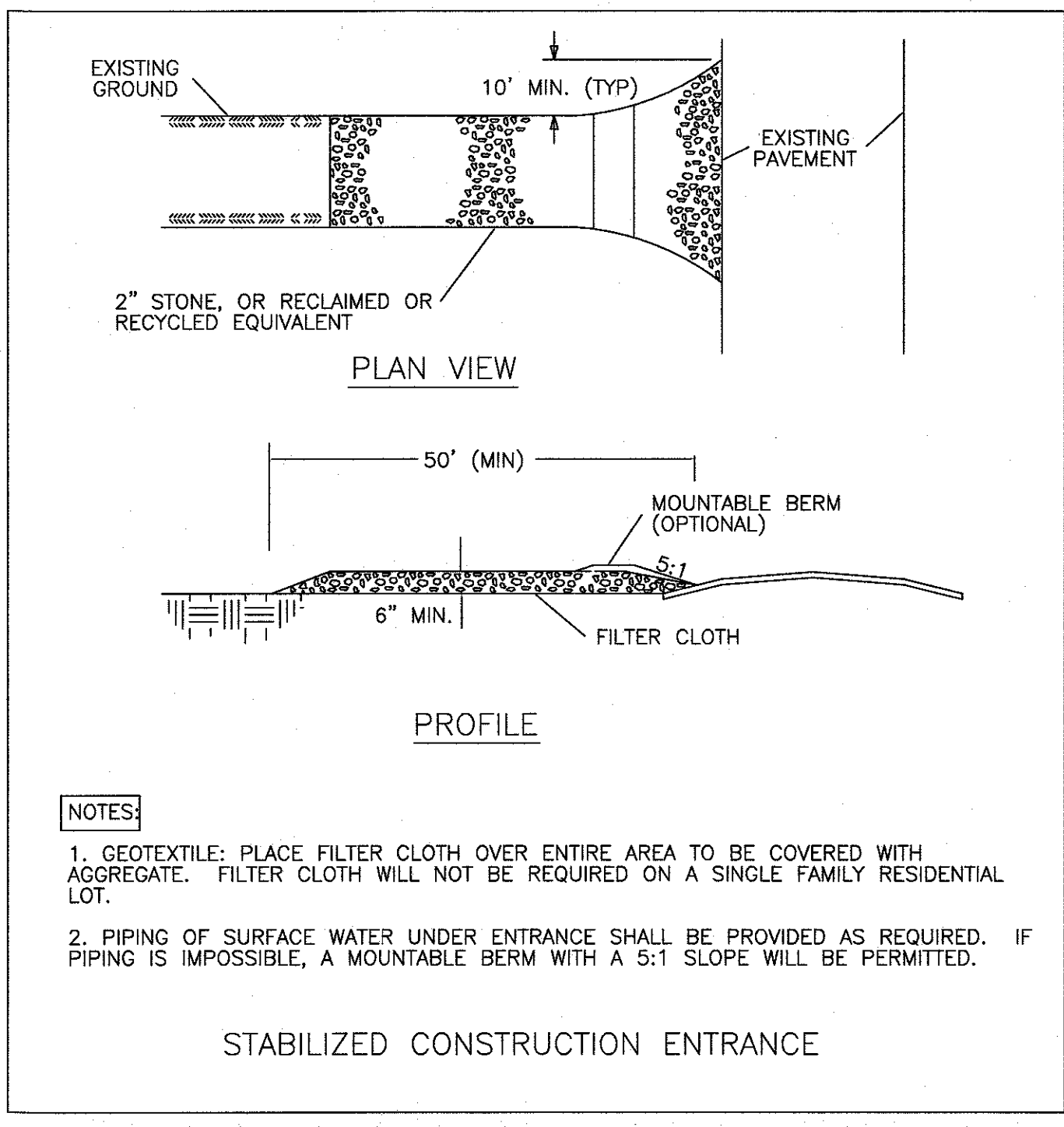
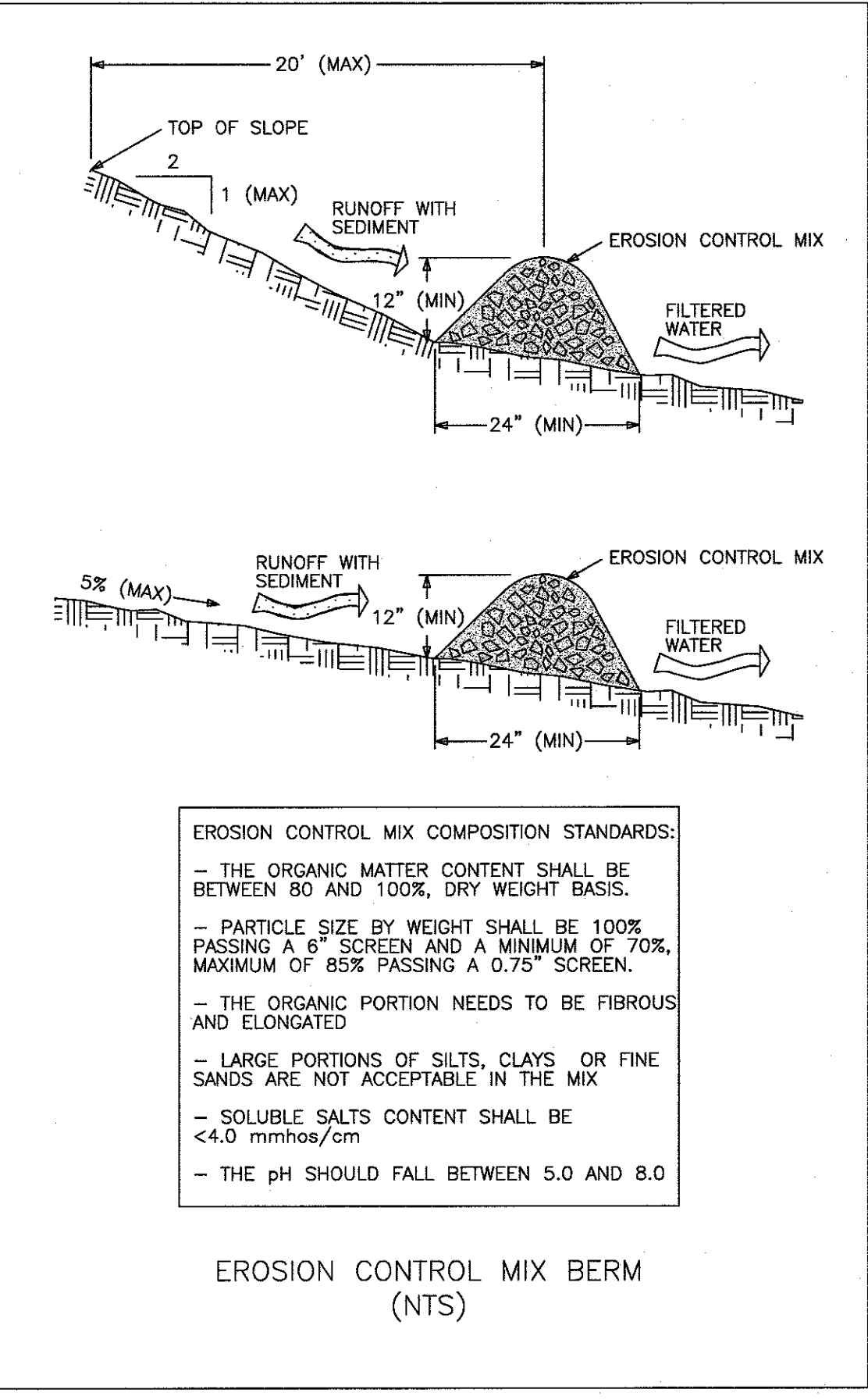
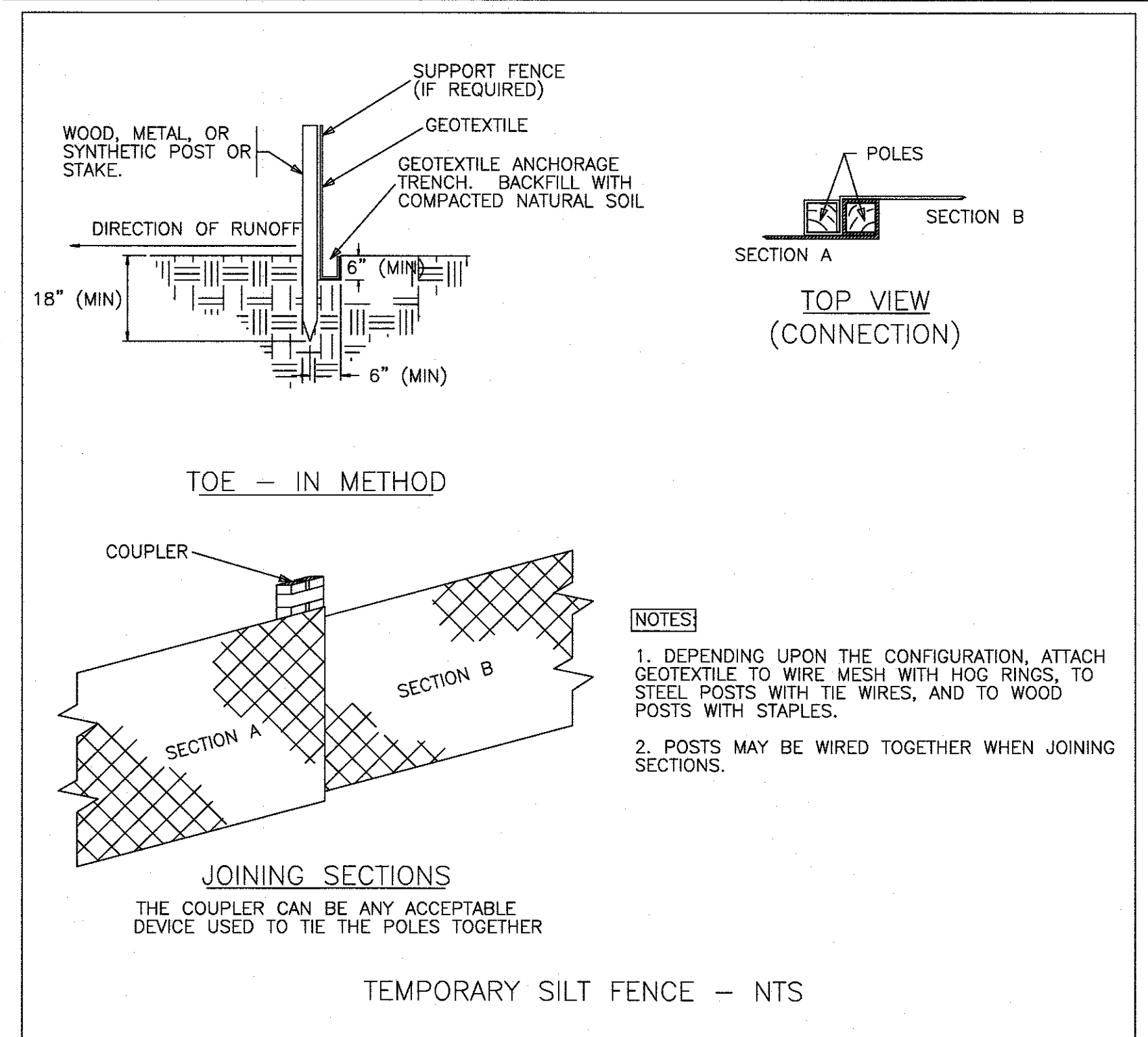
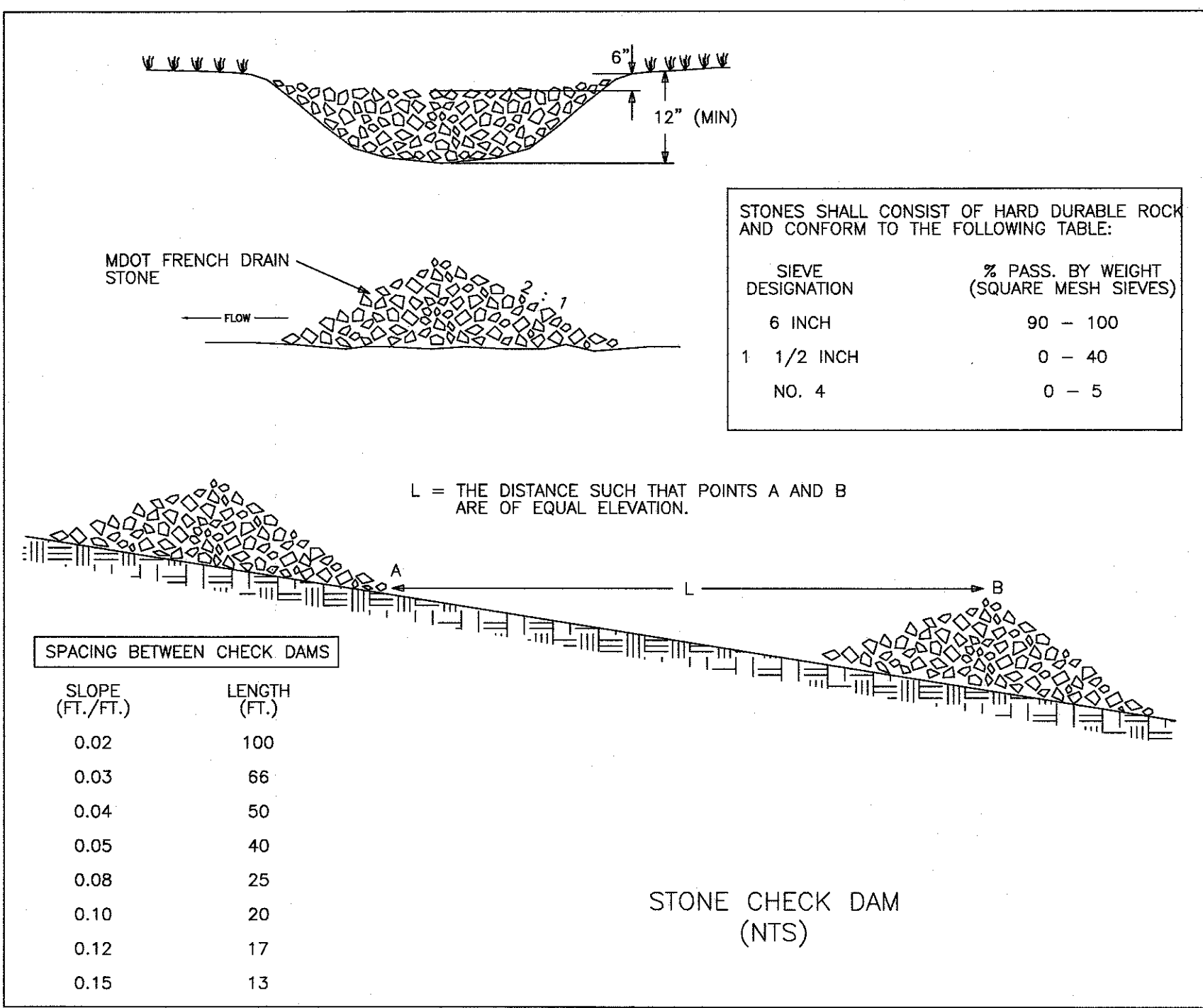
- WHENEVER PRACTICABLE, NO DISTURBANCE ACTIVITIES SHOULD TAKE PLACE WITHIN 50 FEET OF ANY PROTECTED NATURAL RESOURCE. IF DISTURBANCE ACTIVITIES TAKE PLACE BETWEEN 30 FEET AND 50 FEET OF ANY PROTECTED NATURAL RESOURCE, AND STORMWATER DISCHARGES THROUGH THE DISTURBED AREAS TOWARD THE PROTECTED NATURAL RESOURCE, PERIMETER EROSION CONTROLS MUST BE DOUBLED. IF DISTURBANCE ACTIVITIES TAKE PLACE LESS THAN 30 FEET FROM ANY PROTECTED NATURAL RESOURCE, AND STORMWATER DISCHARGES THROUGH THE DISTURBED AREAS TOWARD THE PROTECTED NATURAL RESOURCE, PERIMETER EROSION CONTROLS MUST BE DOUBLED AND DISTURBED AREAS MUST BE TEMPORARILY OR PERMANENTLY STABILIZED WITHIN 7 DAYS.
- PRIOR TO CONSTRUCTION, PROPERLY INSTALL SEDIMENT BARRIERS AT THE DOWNGRADIENT EDGE OF ANY AREA TO BE DISTURBED AND ADJACENT TO ANY DRAINAGE CHANNELS WITHIN THE DISTURBED AREA. SEDIMENT BARRIERS SHOULD BE INSTALLED DOWNGRADIENT OF SOIL OR SEDIMENT STOCKPILES AND STORMWATER PREVENTED FROM RUNNING ONTO THE STOCKPILE. MAINTAIN THE SEDIMENT BARRIERS BY REMOVING ACCUMULATED SEDIMENT, OR REMOVING AND REPLACING THE BARRIER, UNTIL THE DISTURBED AREA IS PERMANENTLY STABILIZED. WHERE A DISCHARGE TO A STORM DRAIN INLET OCCURS, IF THE STORM DRAIN CARRIES WATER DIRECTLY TO A SURFACE WATER AND YOU HAVE AUTHORITY TO ACCESS THE STORM DRAIN INLET, YOU MUST INSTALL AND MAINTAIN PROTECTION MEASURES THAT REMOVE SEDIMENT FROM THE DISCHARGE.
- PRIOR TO CONSTRUCTION, PROPERLY INSTALL A STABILIZED CONSTRUCTION ENTRANCE (SCE) AT ALL POINTS OF EGRESS FROM THE SITE. THE SCE IS A STABILIZED PAD OF AGGREGATE, UNDERLAIN BY A GEOTEXTILE FILTER FABRIC, USED TO PREVENT TRAFFIC FROM TRACKING MATERIAL AWAY FROM THE SITE ONTO PUBLIC ROWS. MAINTAIN THE SCE UNTIL ALL DISTURBED AREAS ARE STABILIZED.
- WITHIN 7 DAYS OF THE CESSATION OF CONSTRUCTION ACTIVITIES IN AN AREA THAT WILL NOT BE WORKED FOR MORE THAN 7 DAYS, STABILIZE ANY EXPOSED SOIL WITH MULCH, OR OTHER NON-ERODIBLE COVER. STABILIZE AREAS WITHIN 75 FEET OF A WETLAND OR WATERBODY WITHIN 48 HOURS OF THE INITIAL DISTURBANCE OF THE SOIL OR PRIOR TO ANY STORM EVENT, WHICHEVER COMES FIRST.
- REMOVE ANY TEMPORARY CONTROL MEASURES, SUCH AS SILTATION FENCE, WITHIN 30 DAYS AFTER PERMANENT STABILIZATION IS ATTAINED. REMOVE ANY ACCUMULATED SEDIMENTS AND STABILIZE.
- IF THE AREA WILL NOT BE WORKED FOR MORE THAN ONE YEAR OR HAS BEEN BROUGHT TO FINAL GRADE, THEN PERMANENTLY STABILIZE THE AREA WITHIN 7 DAYS BY PLANTING VEGETATION, SEEDING, SOD, OR THROUGH THE USE OF PERMANENT MULCH, OR RIPRAP, OR ROAD SUB-BASE. IF USING VEGETATION FOR STABILIZATION, SELECT THE PROPER VEGETATION FOR THE LIGHT, MOISTURE, AND SOIL CONDITIONS; AMEND AREAS OF DISTURBED SUBSOILS WITH TOPSOIL, COMPOST, OR FERTILIZERS; PROTECT SEEDED AREAS WITH MULCH OR, IF NECESSARY, EROSION CONTROL BLANKETS; AND SCHEDULE SODDING, PLANTING, AND SEEDING SO TO AVOID DIE-OFF FROM SUMMER DROUGHT AND FALL FROSTS. NEWLY SEEDED OR SODDED AREAS MUST BE PROTECTED FROM VEHICLE TRAFFIC, EXCESSIVE PEDESTRIAN TRAFFIC, AND CONCENTRATED RUNOFF UNTIL THE VEGETATION IS WELL-ESTABLISHED WITH 90% COVER BY HEALTHY VEGETATION. IF NECESSARY, AREAS MUST BE REWORKED AND RESTABILIZED IF GERMINATION IS SPARSE, PLANT COVERAGE IS SPOTTY, OR TOPSOIL EROSION IS EVIDENT. ONE OR MORE OF THE FOLLOWING MAY APPLY TO A PARTICULAR SITE.
- FOR SEEDED AREAS, PERMANENT STABILIZATION MEANS A 90% COVER OF THE DISTURBED AREA WITH MATURE, HEALTHY PLANTS WITH NO EVIDENCE OF WASHING OR RILLING OF THE TOPSOIL.
- FOR SODDED AREAS, PERMANENT STABILIZATION MEANS THE COMPLETE BINDING OF THE SOD ROOTS INTO THE UNDERLYING SOIL WITH NO SLUMPING OF THE SOD OR DIE-OFF.
- FOR MULCHED AREAS, PERMANENT MULCHING MEANS TOTAL COVERAGE OF THE EXPOSED AREA WITH AN APPROVED MULCH MATERIAL. EROSION CONTROL MIX MAY BE USED AS MULCH FOR PERMANENT STABILIZATION ACCORDING TO THE APPROVED APPLICATION RATES AND LIMITATIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE HOUSEKEEPING PRACTICES DURING THE CONSTRUCTION OF THE PROJECT. THESE STANDARDS CAN BE FOUND IN THE FOLLOWING DOCUMENT: MDEP CHAPTER 500 (STORMWATER MANAGEMENT), APPENDIX C. HOUSEKEEPING. HOUSEKEEPING PRACTICES INCLUDE, BUT ARE NOT LIMITED TO, SPILL PREVENTION, GROUNDWATER PROTECTION, FUGITIVE SEDIMENT AND DUST, DEBRIS AND OTHER MATERIALS, EXCAVATION DEWATERING, AUTHORIZED NON-STORMWATER DISCHARGES AND UNAUTHORIZED NON-STORMWATER DISCHARGES.

WINTER CONSTRUCTION NOTES

- NOVEMBER 1 - APRIL 15
- AN AREA SHALL BE CONSIDERED STABILIZED WHEN EXPOSED SURFACES HAVE BEEN EITHER MULCHED WITH HAY AT A RATE OF 100 LB/1000 S.F. OR DORMANT SEEDED, MULCHED AND ADEQUATELY ANCHORED BY AN APPROVED ANCHORING TECHNIQUE. IN ALL CASES, MULCH SHALL BE APPLIED SO THAT THE SOIL SURFACE IS NOT VISIBLE THROUGH THE MULCH.
  - FROM OCTOBER 15 TO APRIL 1, LOAM AND SEED WILL NOT BE REQUIRED. DURING PERIODS OF TEMPERATURES ABOVE FREEZING, DISTURBED AREAS SHALL BE FINE GRADED AND PROTECTED WITH MULCH OR TEMPORARILY SEEDED AND MULCHED UNTIL PERMANENT SEEDING CAN BE APPLIED. AFTER NOVEMBER 1, DISTURBED AREAS MAY BE LOAMED, FINE GRADED AND DORMANT SEEDED AT A RATE 200-300% HIGHER THAN THE SPECIFIED PERMANENT SEEDING RATE. IF CONSTRUCTION CONTINUES DURING FREEZING WEATHER, DISTURBED AREAS SHALL BE GRADED BEFORE FREEZING AND TEMPORARILY STABILIZED WITH MULCH. DISTURBED AREAS SHALL NOT BE LEFT OVER THE WINTER OR FOR ANY OTHER EXTENDED PERIOD OF TIME UNLESS STABILIZED WITH MULCH.
  - FROM NOVEMBER 1 TO APRIL 15 ALL MULCH SHALL BE ANCHORED BY EITHER PEG LINE, MULCH NETTING, ASPHALT EMULSION CHEMICAL, TRACK OR WOOD CELLULOSE FIBER. MULCH NETTING SHALL BE USED TO ANCHOR MULCH IN ALL DRAINAGE WAYS WITH SLOPES GREATER THAN 3%. SLOPES EXPOSED TO DIRECT WINDS AND FOR SLOPES GREATER THAN 8%. MULCH NETTING SHALL BE USED TO ANCHOR MULCH IN ALL AREAS WITH SLOPES GREATER THAN 15%. AFTER OCTOBER 1, THE SAME APPLIES TO ALL SLOPES GREATER THAN 8%.
  - SNOW SHALL BE REMOVED FROM AREAS OF SEEDING AND MULCHING PRIOR TO PLACEMENT.
  - FOR WINTER STABILIZATION, HAY MULCH SHALL BE APPLIED AT TWICE THE STANDARD TEMPORARY STABILIZATION RATE. AT THE END OF EACH CONSTRUCTION DAY, AREAS THAT HAVE BEEN BROUGHT TO FINAL GRADE SHALL BE STABILIZED. MULCH SHALL NOT BE SPREAD ON TOP OF SNOW.
  - ALL AREAS WITHIN 75 FEET OF A PROTECTED NATURAL RESOURCE SHALL BE PROTECTED WITH A DOUBLE ROW OF SEDIMENT BARRIERS.
  - ALL VEGETATED DITCH LINES THAT HAVE NOT BEEN STABILIZED BY NOVEMBER 1, OR WILL BE WORKED DURING THE WINTER CONSTRUCTION PERIOD, SHALL BE STABILIZED WITH AN APPROPRIATE STONE LINING BACKED BY AN APPROPRIATE GRAVEL BED OR GEOTEXTILE UNLESS SPECIFICALLY RELEASED FROM THIS STANDARD BY THE MDEP.
  - MULCH NETTING SHALL BE USED TO ANCHOR MULCH ON ALL SLOPES GREATER THAN 8% UNLESS EROSION CONTROL BLANKETS OR EROSION CONTROL MIX IS BEING USED ON SUCH SLOPES.

E&S INSPECTION/MAINTENANCE DURING CONSTRUCTION

- INSPECTION AND CORRECTIVE ACTION.** INSPECT DISTURBED AND IMPERVIOUS AREAS, EROSION CONTROL MEASURES, MATERIALS STORAGE AREAS THAT ARE EXPOSED TO PRECIPITATION, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE. INSPECT THESE AREAS AT LEAST ONCE A WEEK AS WELL AS BEFORE AND WITHIN 24 HOURS AFTER A STORM EVENT (RAINFALL), AND PRIOR TO COMPLETING PERMANENT STABILIZATION MEASURES. A PERSON WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROL, INCLUDING THE STANDARDS AND CONDITIONS IN THE PERMIT, SHALL CONDUCT THE INSPECTIONS.
- MAINTENANCE.** IF BEST MANAGEMENT PRACTICES (BMPs) NEED TO BE REPAIRED, THE REPAIR WORK SHOULD BE INITIATED UPON DISCOVERY OF THE PROBLEM BUT NO LATER THAN THE END OF THE NEXT WORKDAY. IF ADDITIONAL BMPs OR SIGNIFICANT REPAIR OF BMPs ARE NECESSARY, IMPLEMENTATION MUST BE COMPLETED WITHIN 7 CALENDAR DAYS AND PRIOR TO ANY STORM EVENT (RAINFALL). ALL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION UNTIL AREAS ARE PERMANENTLY STABILIZED.
- DOCUMENTATION.** KEEP A LOG (REPORT) SUMMARIZING THE INSPECTIONS AND ANY CORRECTIVE ACTION TAKEN. THE LOG MUST INCLUDE THE NAME(S) AND QUALIFICATIONS OF THE PERSON MAKING THE INSPECTIONS, THE DATE(S) OF THE INSPECTIONS, AND MAJOR OBSERVATIONS ABOUT THE OPERATION AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROLS, MATERIALS STORAGE AREAS, AND VEHICLES ACCESS POINTS TO THE PARCEL. MAJOR OBSERVATIONS MUST INCLUDE BMPs THAT NEED MAINTENANCE, BMPs THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION, AND LOCATION(S) WHERE ADDITIONAL BMPs ARE NEEDED. FOR EACH BMP REQUIRING MAINTENANCE, BMP NEEDING REPLACEMENT, AND LOCATION NEEDING ADDITIONAL BMPs, NOTE IN THE LOG THE CORRECTIVE ACTION TAKEN AND WHEN IT WAS TAKEN. THE LOG MUST BE MADE ACCESSIBLE TO DEPARTMENT STAFF AND A COPY MUST BE PROVIDED UPON REQUEST. THE PERMITTEE SHALL RETAIN A COPY OF THE LOG FOR A PERIOD OF AT LEAST THREE YEARS FROM THE COMPLETION OF PERMANENT STABILIZATION.

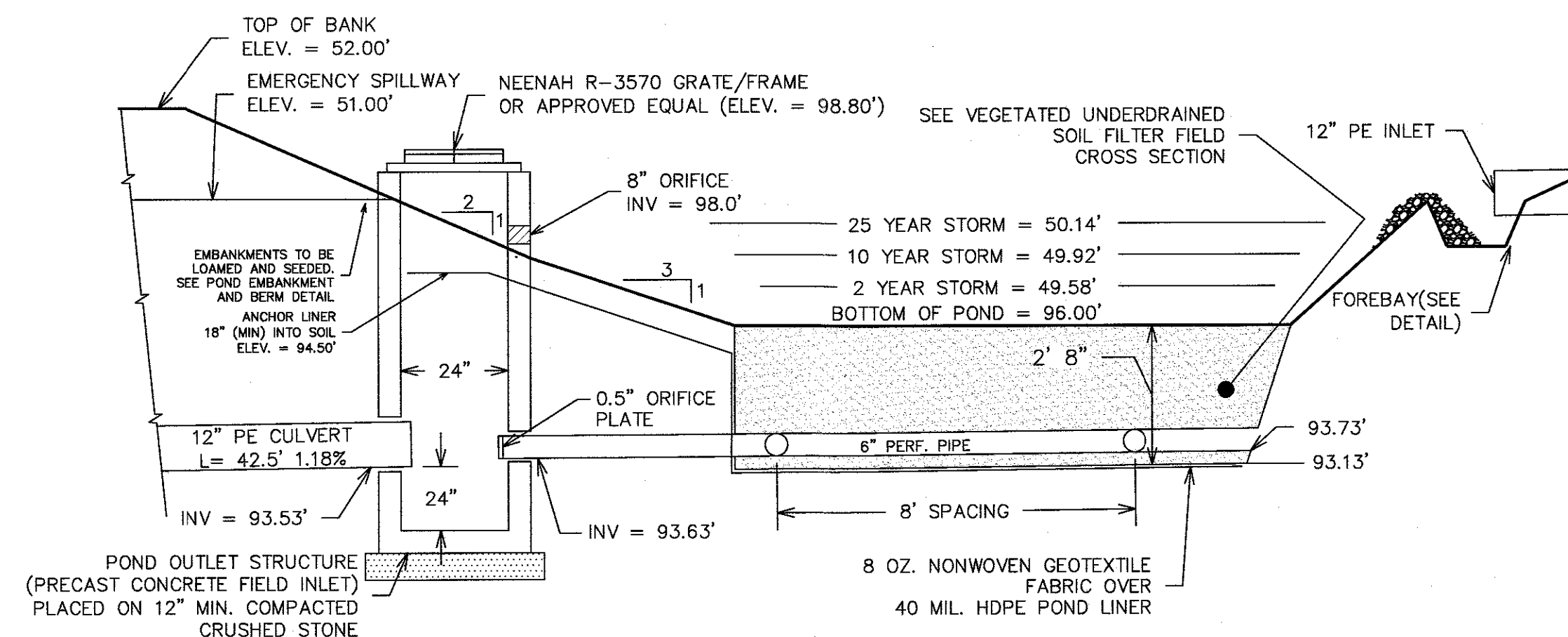


|                    |  |                                              |                                                                                                                                                  |                                             |  |
|--------------------|--|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--|
|                    |  |                                              | SITE DETAILS<br>29 LITTLEWORTH RD<br>DOVER, NH 03820                                                                                             |                                             |  |
|                    |  |                                              | FOR: 29 LITTLEWORTH ROAD LLC<br>PO BOX 694<br>DOVER, NH 03820                                                                                    |                                             |  |
|                    |  |                                              | <b>ATTAR ENGINEERING, INC.</b><br>CIVIL ♦ STRUCTURAL ♦ MARINE<br>1284 STATE ROAD - ELIOT, MAINE 03903<br>PHONE: (207)439-6023 FAX: (207)439-2128 |                                             |  |
| SCALE:<br>1" = 50' |  | APPROVED BY:<br><i>Att. Eng.</i><br>3/5/2019 |                                                                                                                                                  | DRAWN BY:<br>BRN<br>REVISION DATE:<br>- : - |  |
| JOB NO: C147-19    |  | FILE: LITTLEWORTH DET.DWG                    |                                                                                                                                                  | SHEET: 4-1                                  |  |

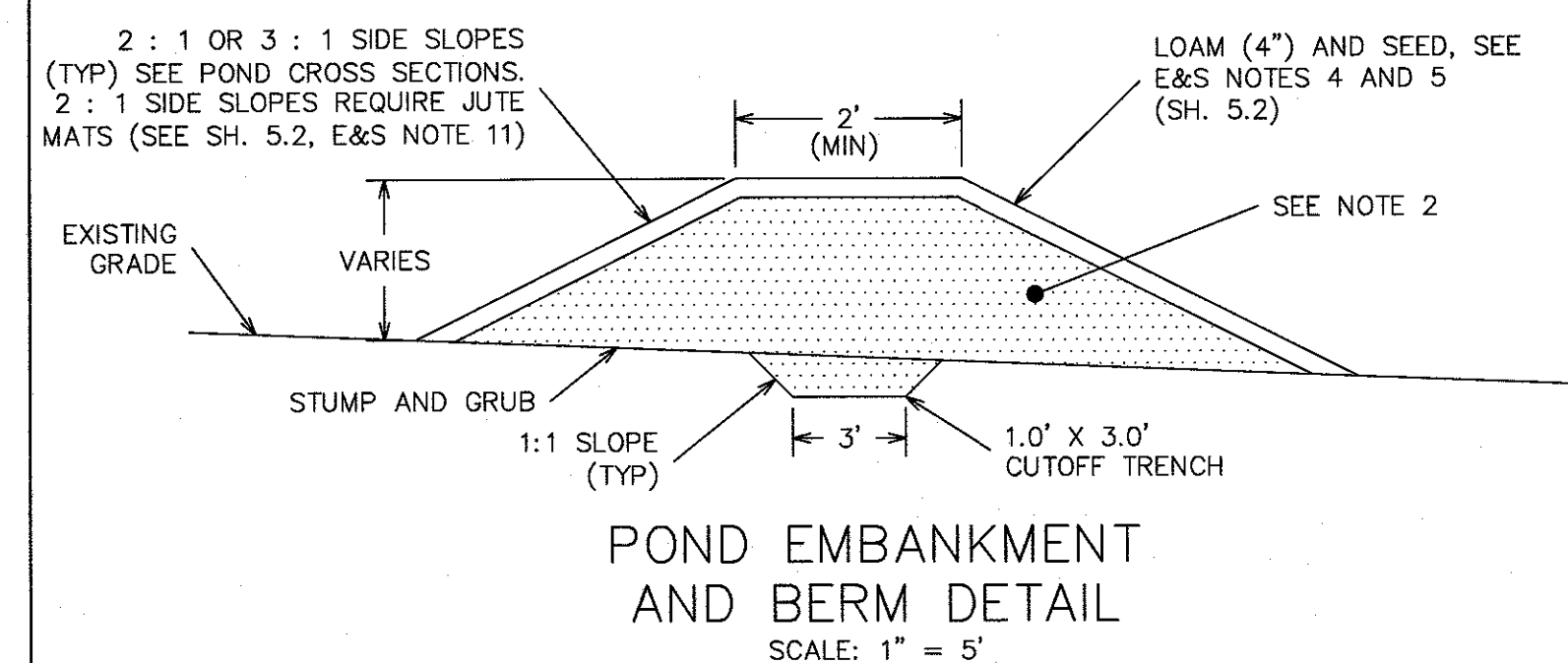


|                                                                                                                                                         |                                                                                       |                                                          |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------|------------|
| <div style="text-align: center;">             SITE DETAILS<br/>             29 LITTLEWORTH RD<br/>             DOVER, NH 03820           </div>         |                                                                                       |                                                          |            |
| FOR:                                                                                                                                                    |                                                                                       | 29 LITTLEWORTH ROAD LLC<br>PO BOX 694<br>DOVER, NH 03820 |            |
| <b><u>ATTAR ENGINEERING, INC.</u></b><br>CIVIL ♦ STRUCTURAL ♦ MARINE<br>1284 STATE ROAD – ELIOT, MAINE 03903<br>PHONE: (207)439-6023 FAX: (207)439-2128 |                                                                                       |                                                          |            |
| SCALE:                                                                                                                                                  | APPROVED BY:                                                                          | DRAWN BY:                                                |            |
| 1" = 50'                                                                                                                                                |  | BRN                                                      |            |
| DATE:                                                                                                                                                   |                                                                                       | REVISION DATE:                                           |            |
| 3/5/2019                                                                                                                                                |                                                                                       | - - -                                                    |            |
| JOB NO: 2471-19                                                                                                                                         | FILE: LITTLEWORTH DET.DWG                                                             |                                                          | SHEET: 4/2 |



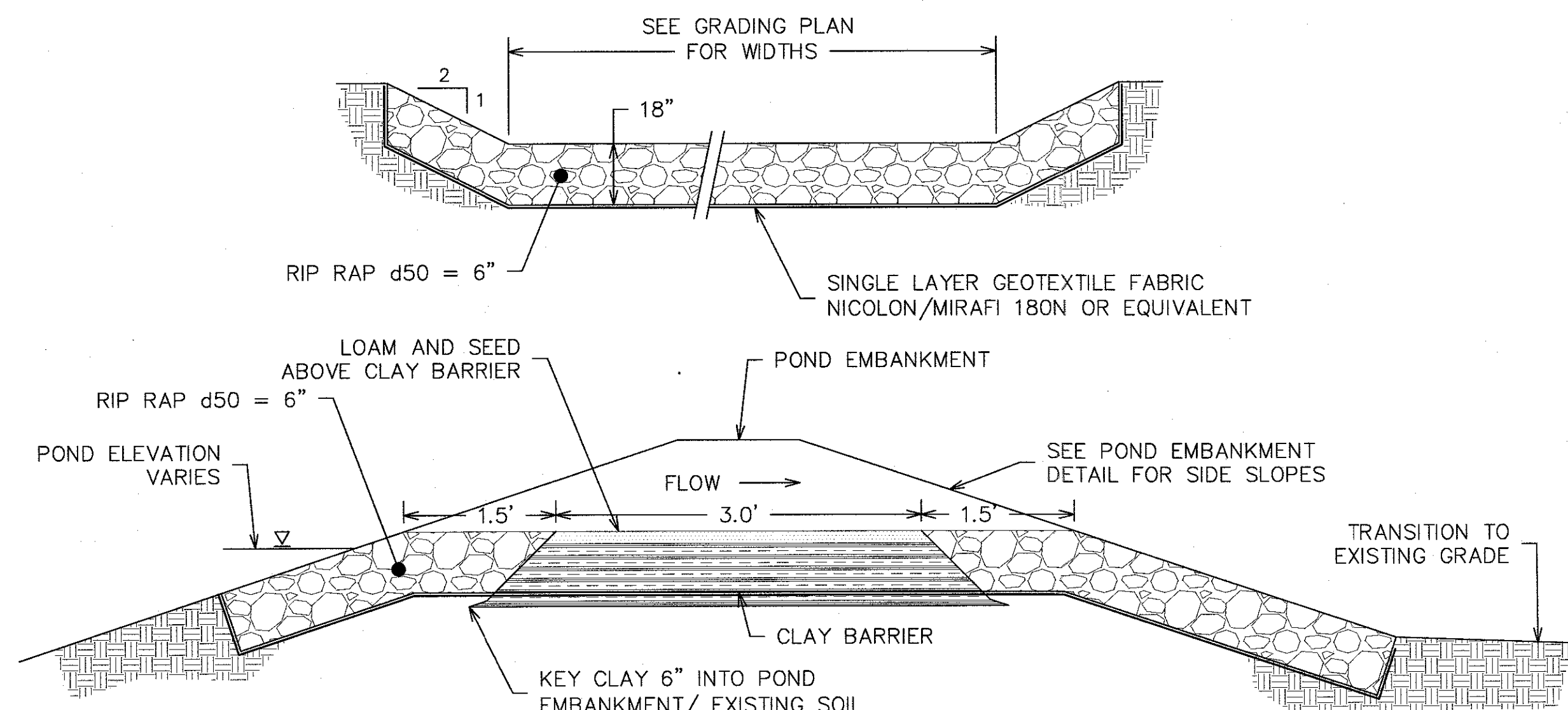


BIORETENTION(RAIN GARDEN) POND 1P

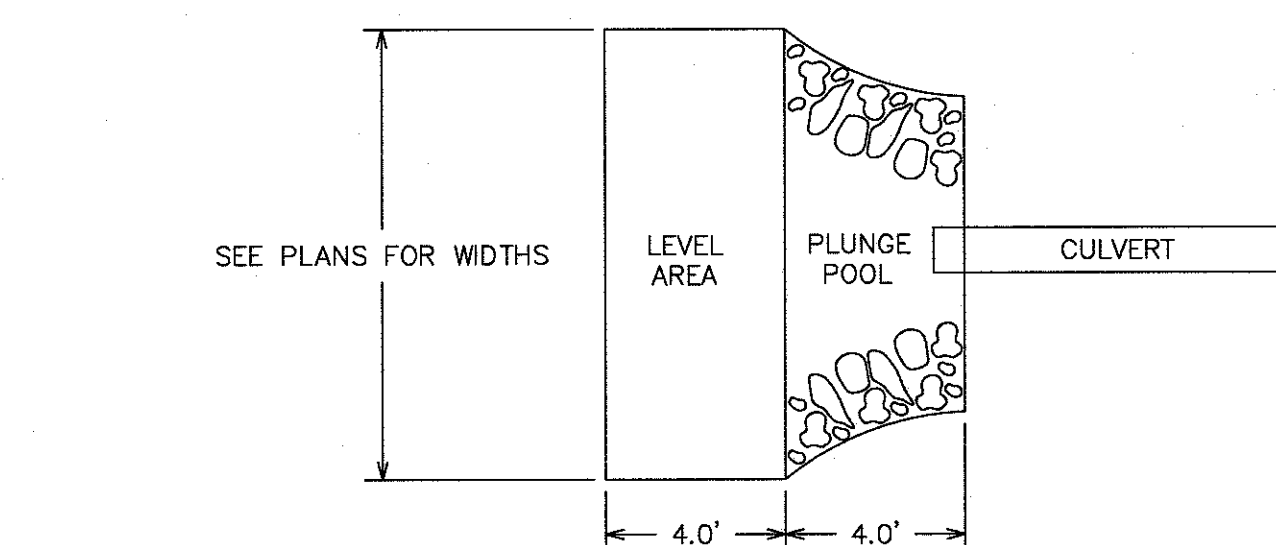


### EMBANKMENT CONSTRUCTION NOTES

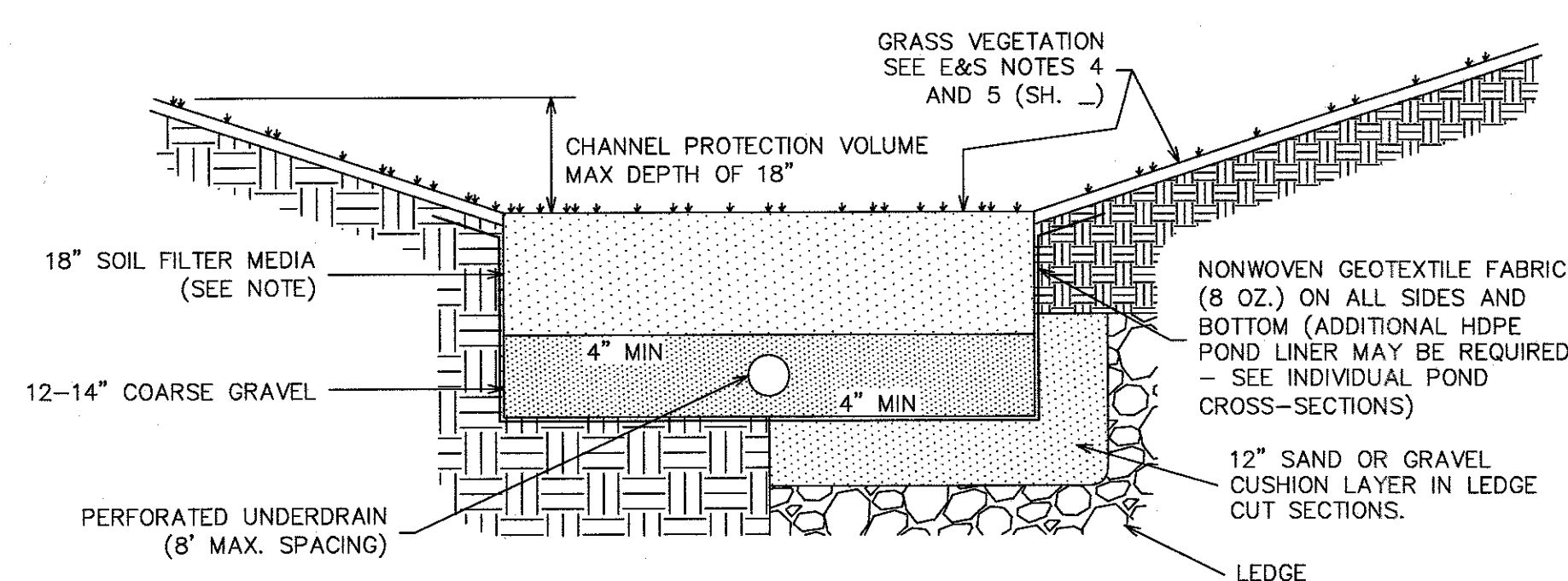
1. ALL ORGANIC MATERIAL, STUMPS, ROCKS AND BOULDERS SHALL BE REMOVED TO A MINIMUM DEPTH OF 24" BELOW SUBGRADE OF THE BASIN EMBANKMENT. ALL EXCAVATIONS BELOW THE BASIN EMBANKMENT SHALL HAVE A MINIMUM SLOPE OF 1H : 1V.
2. ALL BASIN EMBANKMENT FILL MATERIAL SHALL BE WELL GRADED BORROW WITH A MINIMUM OF 20% FINES CONTENT. EMBANKMENT FILL SHALL BE PLACED IN 12" (MAX.) LIFTS AND BE COMPACTED TO 95% MODIFIED PROCTOR. A CUTOFF TRENCH SHALL BE EXCAVATED AS SHOWN PRIOR TO CONSTRUCTION OF EMBANKMENT.
3. DETENTION BASIN AND ALL EXCAVATIONS SHALL BE KEPT FREE OF WATER DURING CONSTRUCTION.



EMERGENCY SPILLWAY DETAIL



LEVEL SPREADER (NTS)



BIORETENTION CELL (RAIN GARDEN) CROSS SECTION

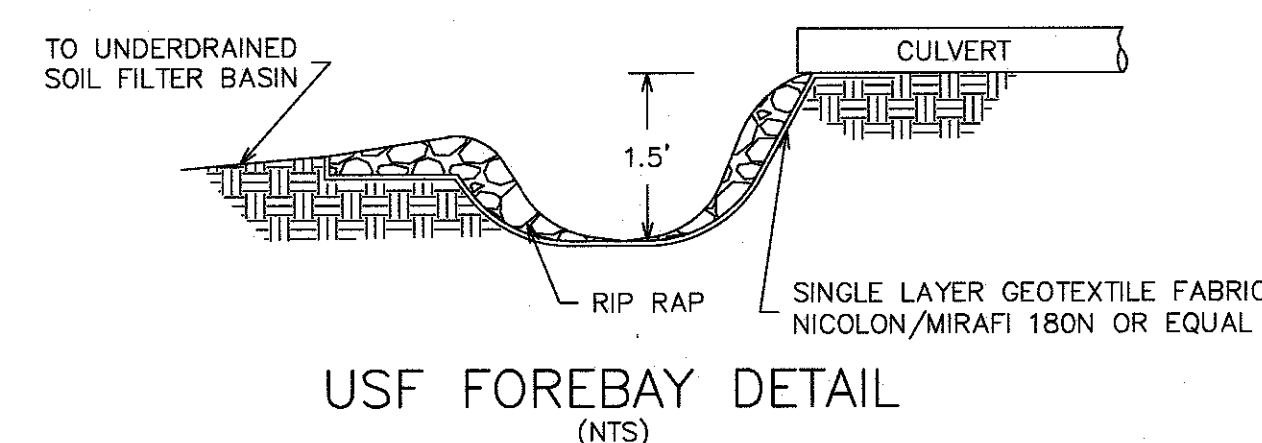
(NTS)

### SOIL FILTER MEDIA NOTE:

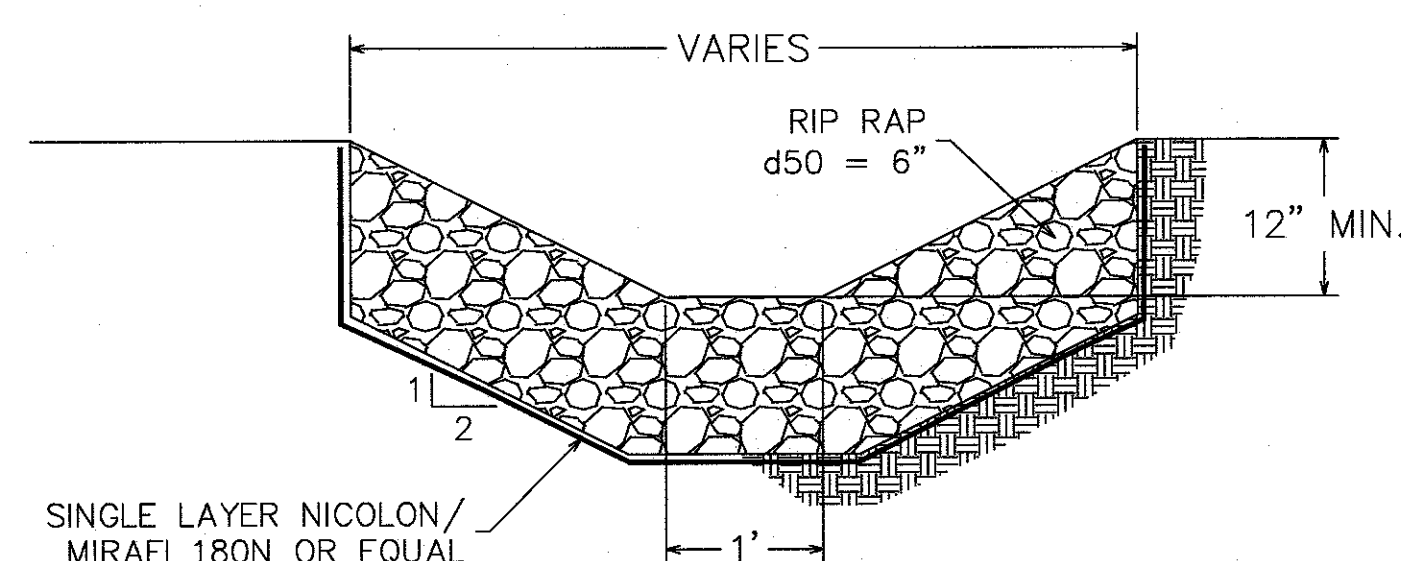
THE SOIL FILTER MEDIA SHALL CONSIST OF A SILTY SAND OR SOIL MIXTURE COMBINED WITH 20% - 25% FINE SHREDDED BARK OR WOOD FIBER MULCH. THE MIXTURE MUST HAVE NO LESS THAN 8% PASSING THE 200 SIEVE, AND A CLAY CONTENT OF LESS THAN 2%. PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST CHECK WITH THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES FOR UPDATED SOIL FILTER MEDIA SPECIFICATIONS.

### CONSTRUCTION OVERSIGHT REQUIRED:

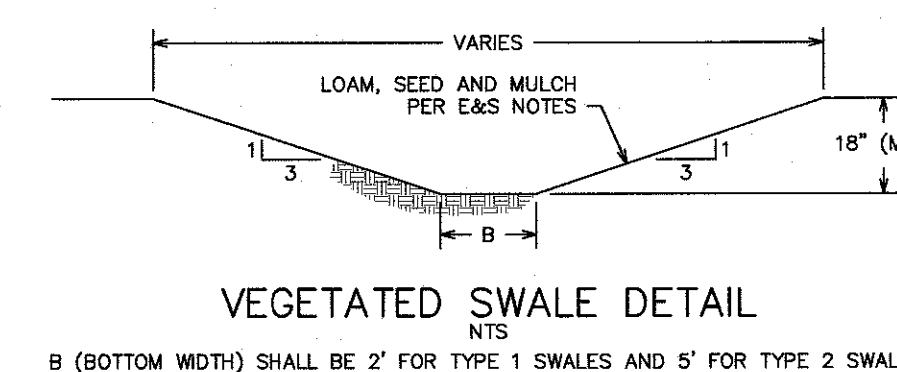
- INSPECTION OF THE FILTER BASIN SHALL BE PROVIDED FOR EACH PHASE OF CONSTRUCTION BY THE DESIGN ENGINEER WITH REQUIRED REPORTING TO THE DEP. AT A MINIMUM, INSPECTIONS WILL OCCUR:
- AFTER PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED;
  - AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO THE INSTALLATION OF THE FILTER MEDIA;
  - AFTER THE FILTER MEDIA HAS BEEN INSTALLED AND SEEDED;
  - AFTER ONE YEAR TO INSPECT HEALTH OF THE VEGETATION AND MAKE CORRECTIONS; AND
  - ALL MATERIAL USED FOR THE CONSTRUCTION OF THE FILTER BASIN WILL BE APPROVED BY THE DESIGN ENGINEER AFTER TESTS BY A CERTIFIED LABORATORY SHOW THAT THEY ARE PASSING DEP SPECIFICATIONS.
  - CONTRACTOR SHALL COORDINATE INSPECTION SCHEDULE WITH INSPECTING ENGINEER PRIOR TO CONSTRUCTION.
  - HEAVY VEHICLES AND EQUIPMENT ARE PROHIBITED FROM DRIVING OVER ANY INFILTRATION BASIN.
  - NO SNOW SHALL BE STORED WITHIN THE AREA OF ANY UNDERDRAINED SOIL FILTER.



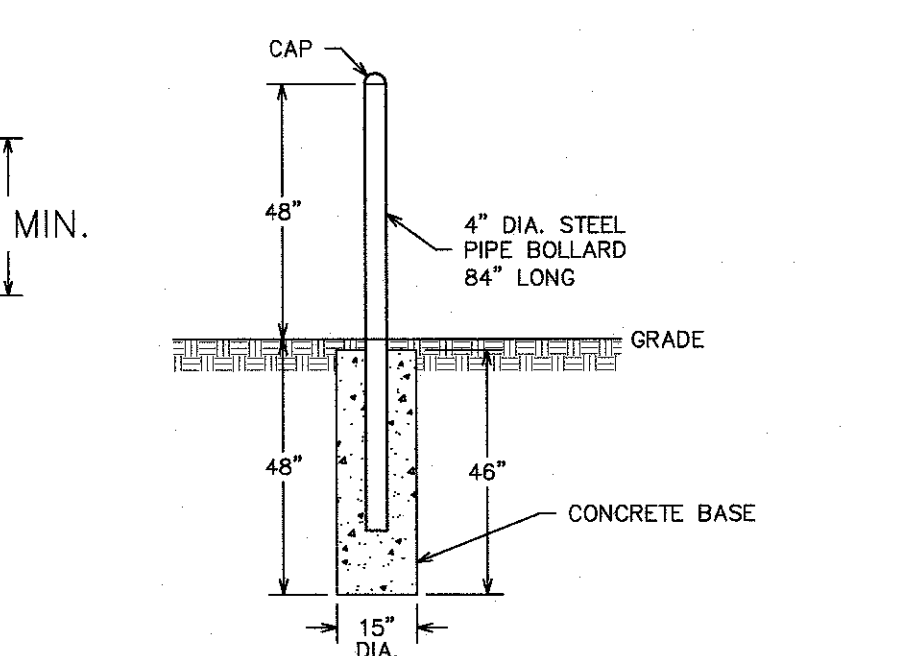
USF FOREBAY DETAIL (NTS)



RIP RAP SWALE DETAIL (NTS)



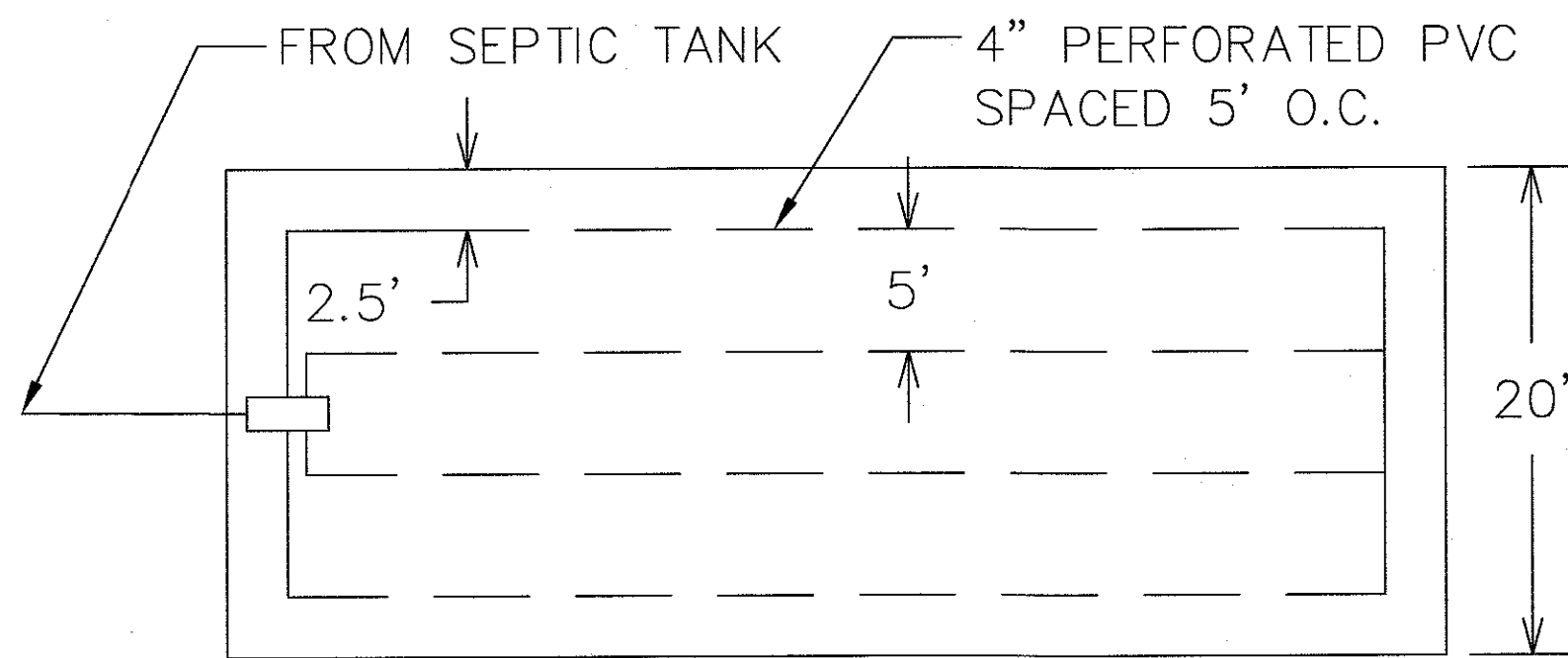
VEGETATED SWALE DETAIL (NTS)



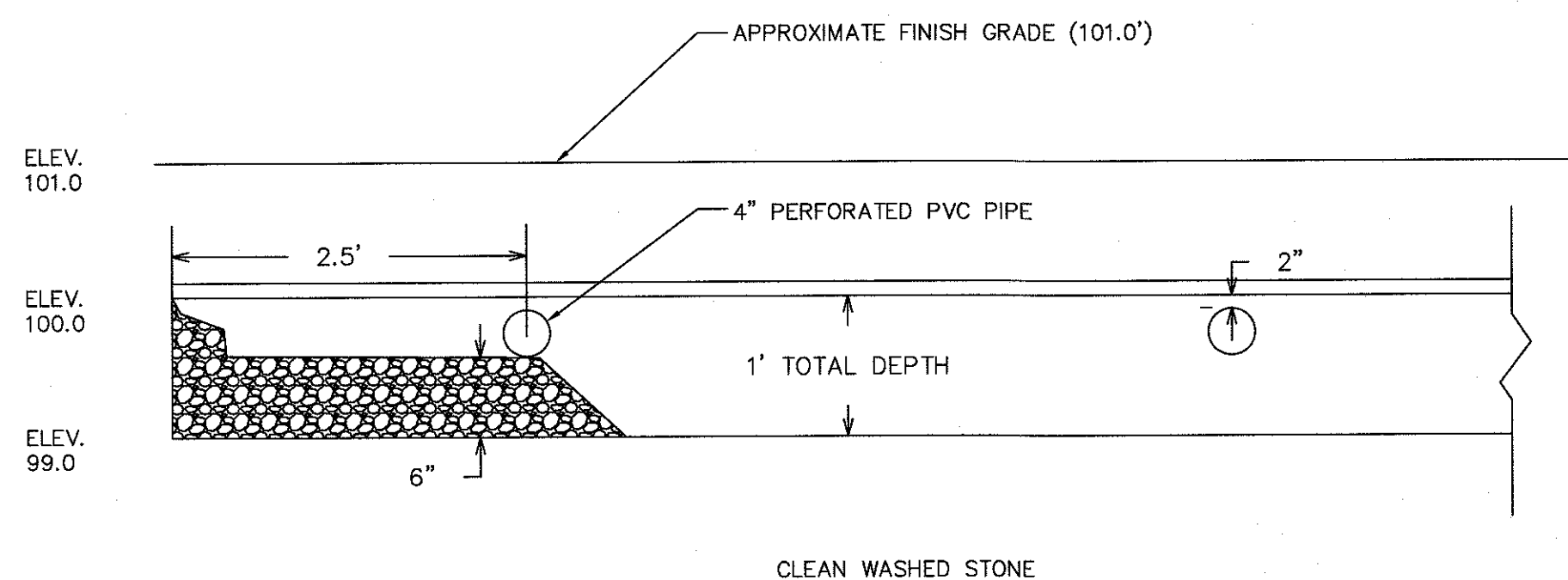
PROTECTIVE BOLLARD DETAIL (NTS)

|  |  |  |                                                                                                                                                  |                           |                                          |
|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------|
|  |  |  | SITE DETAILS<br>29 LITTLEWORTH RD<br>DOVER, NH 03820                                                                                             |                           |                                          |
|  |  |  | FOR: 29 LITTLEWORTH ROAD<br>PO BOX 694<br>DOVER, NH 03820                                                                                        |                           |                                          |
|  |  |  | <b>ATTAR ENGINEERING, INC.</b><br>CIVIL • STRUCTURAL • MARINE<br>1284 STATE ROAD - ELIOT, MAINE 03903<br>PHONE: (207)439-6023 FAX: (207)439-2128 |                           |                                          |
|  |  |  | SCALE: 1" = 50'<br>DATE: 3/5/2019                                                                                                                | APPROVED BY:<br>          | DRAWN BY:<br>BRN<br>REVISION DATE: - : - |
|  |  |  | JOB NO: C147-19                                                                                                                                  | FILE: LITTLEWORTH DET.DWG | SHEET: 4-5                               |

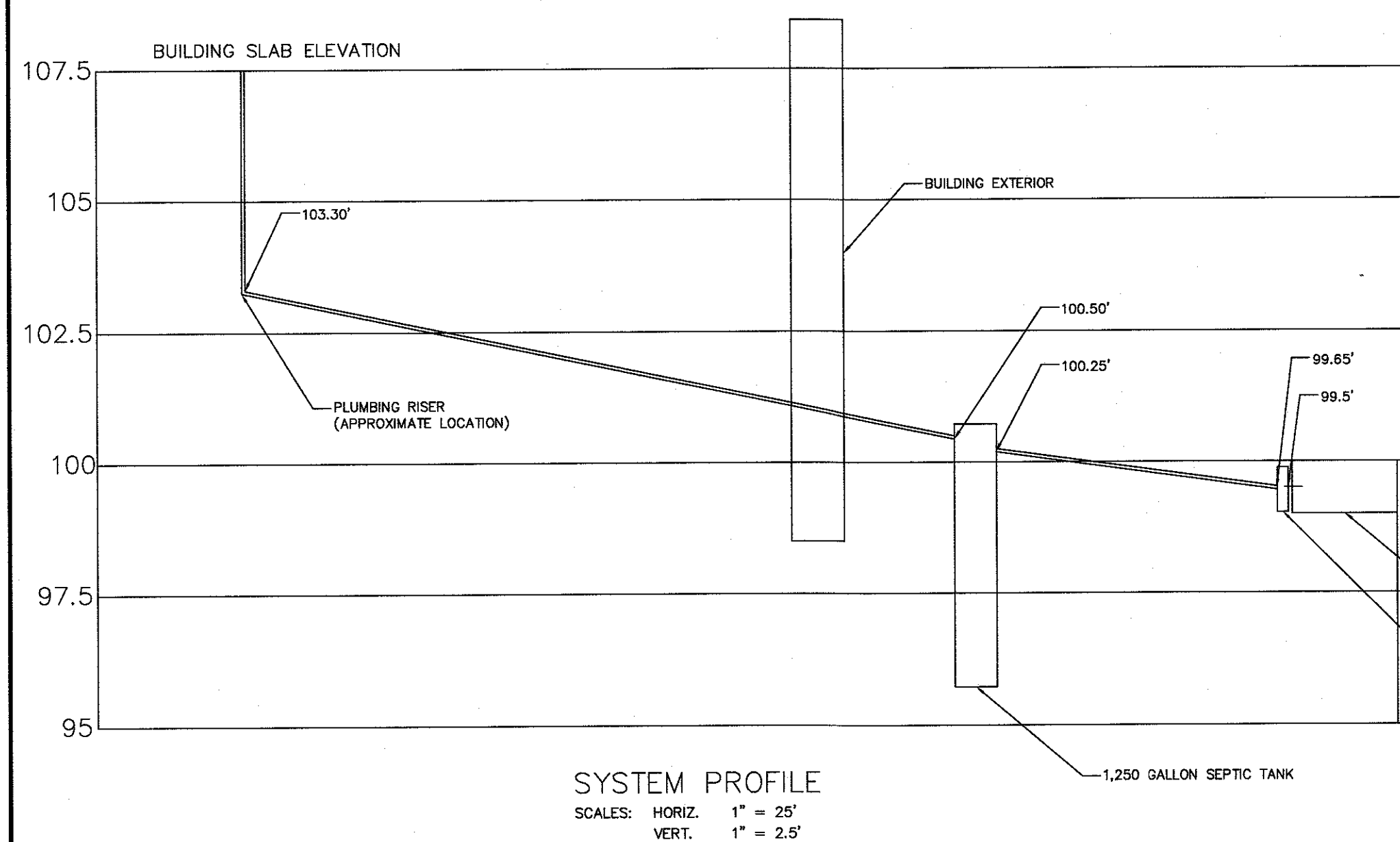




20' X 50' EFFLUENT DISPOSAL AREA DETAIL  
(NTS)



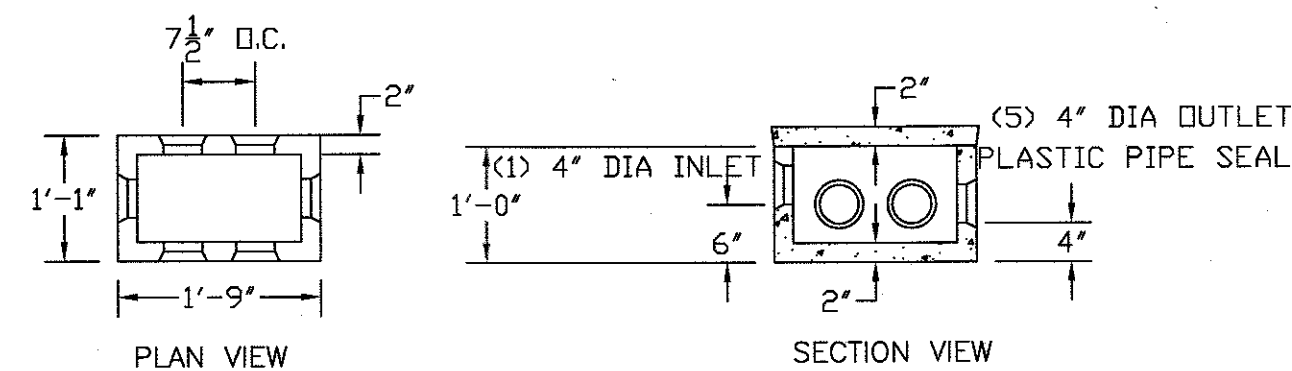
SEPTIC FIELD CROSS SECTION DETAIL  
(NTS)



SYSTEM PROFILE  
SCALES: HORIZ. 1" = 25'  
VERT. 1" = 2.5'

## GENERAL NOTES

- THE GENERAL CONTRACTOR IS TO BE RESPONSIBLE FOR HORIZONTAL AND VERTICAL CONTROL OF ALL SYSTEM COMPONENTS.
- THIS PLAN IS TO SHOW THE DESIGN OF THE SUBSURFACE SEWAGE DISPOSAL SYSTEM ONLY. THE SYSTEM IS DESIGNED.
- SYSTEM IS DESIGNED ONLY TO ACCOMMODATE SANITARY SEWAGE ASSOCIATED WITH NORMAL COMMERCIAL/DOMESTIC USAGE AND CONSISTING OF WATER-CARRIED PUTRESCIBLE WASTE.
- THE SYSTEM IS NOT DESIGNED FOR GARBAGE GRINDERS / DISPOSALS.
- THE SYSTEM SHALL BE VENTED THROUGH BUILDING PLUMBING AS REQUIRED BY BUILDING CODE AND AS SHOWN HEREON.
- PROPERTY LINES AND BUILDING LOCATION ARE GRAPHIC ONLY, PROPERTY LINES HAVE NOT BEEN VERIFIED, AND NO REPRESENTATION OR CERTIFICATION AS TO THE ACCURACY OF THOSE SHOWN IS IMPLIED OR INTENDED.
- APPLICABLE ZONING REGULATIONS SHALL BE CONFIRMED BY THE OWNER PRIOR TO CONSTRUCTION.
- THE PLANS SHOWS ONLY THOSE FEATURES THAT WERE VISUALLY APPARENT ON DATE OF TOPOGRAPHY AND THE ABSENCE OF SUBSURFACE STRUCTURES, UTILITIES, ETC. IS NOT INTENDED ARE IMPLIED.
- THE INSTALLER OF THIS SYSTEM MUST BE LICENSED BY THE STATE OF NEW HAMPSHIRE.
- THERE ARE NO KNOWN EXISTING WELLS WITHIN 75 FEET OF THE PROPOSED SEWAGE DISPOSAL SYSTEM.
- THESE PLANS AND SPECIFICATIONS ARE INTENDED TO BE EXPLANATORY OF THE WORK TO BE DONE AND OF EACH OTHER, BUT SHOULD ANY OMISSION, ERRORS OR DISCREPANCIES APPEAR, THEY SHALL BE SUBJECT TO CORRECTION AND INTERPRETATION BY THE DESIGN ENGINEER THEREBY DEFINING AND FULFILLING THE INTENT OF THE PLANS.
- FINISHED SURFACE OF THE LEACHING AREA SHALL BE GRADED TO ASSURE WATER RUNOFF (2% MINIMUM SLOPE), SPREAD LOAM TO 6" MINIMUM THICKNESS.
- ALL DISTURBED AREAS TO BE LOAMED, SEEDED, AND MAINTAINED TO PREVENT EROSION. SPREAD LOAM TO A 6" THICKNESS, MINIMUM.
- THIS DISPOSAL SYSTEM MUST BE INSTALLED IN COMPLIANCE WITH CURRENT NHDES RULES, MOST CURRENT NHDES APPROVED VERSION OF MANUFACTURE'S DESIGN MANUAL, AS APPLICABLE, AND SPECIFICATIONS OF THIS PLAN. IT IS THE RESPONSIBILITY OF THE INSTALLER TO BE FAMILIAR WITH THE RULES, AS THEY CAN NOT BE REPRODUCED IN THEIR ENTIRETY ON THIS PLAN.
- INSTALLER IS RESPONSIBLE FOR CLEARING EXCAVATION WITH DIG-SAFE BEFORE CONSTRUCTION. CALL 811 OF 1-800-DIGSAFE.
- AMENDED PLANS FROM THE DESIGNER WILL BE REQUIRED PRIOR TO NHDES INSPECTION IF CHANGES HAVE BEEN MADE TO THE LOCATION OF SYSTEM COMPONENTS (EXCLUDING THE BED) OR PROPOSED STRUCTURE. IF THE BED IS NOT INSTALLED AT THE LOCATION SHOWN AND ELEVATION SHOWN, A NEW APPROVAL WILL BE REQUIRED.
- TANK, D-BOX AND ALL PIPE CONNECTIONS MUST BE SEALED AND WATER TIGHT. TANK TO BE SEALED WITH JOINT SEALANT MEETING ASTM C990-09. CONNECTIONS BETWEEN TANK AND PIPES TO BE SEALED WITH A WATERTIGHT, FLEXIBLE JOINT CONNECTOR.
- SEPTIC TANK MUST HAVE ACCESSIBLE BAFFLES ON INLET, OUTLET, AND BETWEEN COMPARTMENTS IF MULTI-COMPARTMENT TANK IS SPECIFIED. ACCESS TO ALL COMPARTMENTS REQUIRED. RISERS TO BE PROVIDED WHEN COVER EXCEEDS 12". SECURE COVER AND RISER TO FINISH GRADE IS REQUIRED OVER ACCESS TO EFFLUENT FILTER, IF SPECIFIED. ACCESS TO THE INTERIOR OF THE TANK SHALL CONFORM TO ENV-WQ 1010.05.
- 4 INCH GRAVITY SEWER TO BE SDR 35 OR SCHEDULE 40 PVC, UNLESS OTHERWISE NOTED. WHERE GRAVITY SEWER IS LESS THAN 75' TO WELL, 4" GRAVITY SEWER TO BE SDR 26. FORCE MAINS TO BE SDR 26, SCHEDULE 40 PVC, OR POLYETHYLENE PIPE (POLY PIPE), 100-150 RATING.
- DISTRIBUTION BOX MUST BE SET ON LEVEL STABLE SOIL BASE OR CONCRETE PAD. DISTRIBUTION BOX SHALL HAVE FLOW EQUALIZER OUTLET FITTINGS, UNLESS SYSTEM UTILIZES A PUMP. IF EFFLUENT IS PUMPED, THE DISTRIBUTION BOX MUST HAVE VELOCITY REDUCING BAFFLE OR T. T SHALL NOT RESTRICT AIR FLOW.
- ALL TOPSOIL, ROOTS AND ORGANIC MATTER SHALL BE REMOVED FROM THE AREA TO BE FILLED, INCLUDING THE AREA UNDER THE 3: 1 SLOPE. DO NOT COMPACT OR SMEAR SUBSOIL WITH MACHINERY. SCARIFY WITH TEETH OF EXCAVATOR BEFORE PLACING FILL. SCARIFY PARALLEL WITH CONTOURS, WORKING FROM THE CENTER OUTWARD. SOIL MUST BE DRY PRIOR TO PREPARATION.
- IF DISPOSAL AREA IS RAISED, SEPTIC SAND FILL TO BE PUSHED ONTO PREPARED SURFACE FROM THE SIDE. DO NOT ALLOW EQUIPMENT ON THE SCARIFIED SOIL SURFACE. CONTINUOUS GRADING AND SHAPING SHALL BE CARRIED OUT TO ASSURE UNIFORM DENSITY.
- MATERIAL SPECIFICATIONS:
  - TOPSOIL: 6 INCH MINIMUM LOAM, SEEDED AND MULCHED TO PREVENT EROSION.
  - BACKFILL: CLEAN, PERMEABLE SAND FILL WITH NO STONES GREATER THAN 3 INCHES OR IN ACCORDANCE WITH CURRENT NHDES APPROVED VERSION OR MANUFACTURER'S DESIGN MANUAL, AS APPLICABLE.
  - CLEAN, WASHED SAND.
  - FILL TO RAISE EDA: CLEAN BANK RUN SAND, FREE OF HUMUS, DREDGING OR STONES GREATER THAN 6 INCHES.
- LEACH LINES AND BED BOTTOM SHALL BE LEVEL PER NHDES ENV-WQ 1017.05(G) AND LEACH LINES SHALL BE INSTALLED PER ENV-WQ 1017.01.
- DISPOSAL SYSTEMS MUST BE INSPECTED BY NHDES PRIOR TO BACKFILL. CITIES AND TOWNS HAVE INDEPENDENT INSPECTION REQUIREMENTS.
- DO NOT ALLOW HEAVY WHEELED MACHINERY, VEHICULAR TRAFFIC, LIVESTOCK OR OTHER HEAVY OBJECTS ON ANY COMPONENT OF SYSTEM UNLESS THAT STRUCTURE IS DESIGNED TO WITHSTAND AN H-20 WHEEL LOAD.
- IT IS THE OWNERS RESPONSIBILITY TO PROPERLY MAINTAIN THIS SYSTEM THROUGH REGULAR PUMPING OF THE SEPTIC TANK. THE OWNER MUST NOT EXCEED DESIGN CAPACITY AND MUST NOT DISPOSE OF INAPPROPRIATE OR PROHIBITED LIQUIDS OR SOLIDS IN THE SYSTEM. KEEP A COPY OF THIS PLAN AND RECORD THE LOCATION OF THE SEPTIC TANK AND PUMP CHAMBER (IF ANY) CLEAN OUT COVERS.
- EFFLUENT DISPOSAL AREA MAY BE REBUILT IN PLACE, WITH REGULATORY APPROVAL, SHOULD FAILURE OCCUR.



DISTRIBUTION BOX DETAIL  
(NTS)

## SEPTIC TANK NOTES:

- CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
- CONSTRUCTION OF SEPTIC TANK CONFORMS WITH NHDES ENV-WQ1000.
- ALL REINFORCEMENT PER ASTM C1227.
- TEES AND GAS BAFFLE SOLD SEPARATELY.
- TONGUE & GROOVE JOINT SEALED WITH BUTYL RESIN.
- IF COVER EXCEEDS 4 FEET, HEAVY DUTY TANK IS REQUIRED. ALSO AVAILABLE IN AASHTO HS-20 LOADING.

## INVERT DATA

|                              |           |
|------------------------------|-----------|
| BUILDING SLAB                | = 107.5'  |
| SEPTIC TANK IN               | = 100.5'  |
| SEPTIC TANK OUT              | = 100.25' |
| D-BOX IN                     | = 99.65'  |
| D-BOX OUT                    | = 99.5'   |
| STONE AND PIPE               | = 99.5'   |
| BOTTOM OF STONE AND PIPE EDA | = 99.0'   |
| FINISH GRADE                 | = 101.0'  |

## DESIGN DATA

LOT AREA = 173,805 S.F. (3.99 AC)

|                     |                                    |
|---------------------|------------------------------------|
| NOT TO SCALE        |                                    |
| EMPLOYEES/BEDROOMS  | = 20 EMPLOYEES/ 1 BEDROOM          |
| DESIGN FLOW:        | = 10 GPD/EMPLOYEE + 225GPD/BEDROOM |
| DAILY FLOW:         | = 425 GPD                          |
| SEPTIC TANK REQ'D   | = 1,250 GAL.                       |
| SEPTIC TANK USED    | = 1,250 GAL.                       |
| EFFLUENT AREA REQ'D | = (SEE                             |
| EFFLUENT AREA USED  | = DESIGN CALCS)                    |

## SOIL LOGS

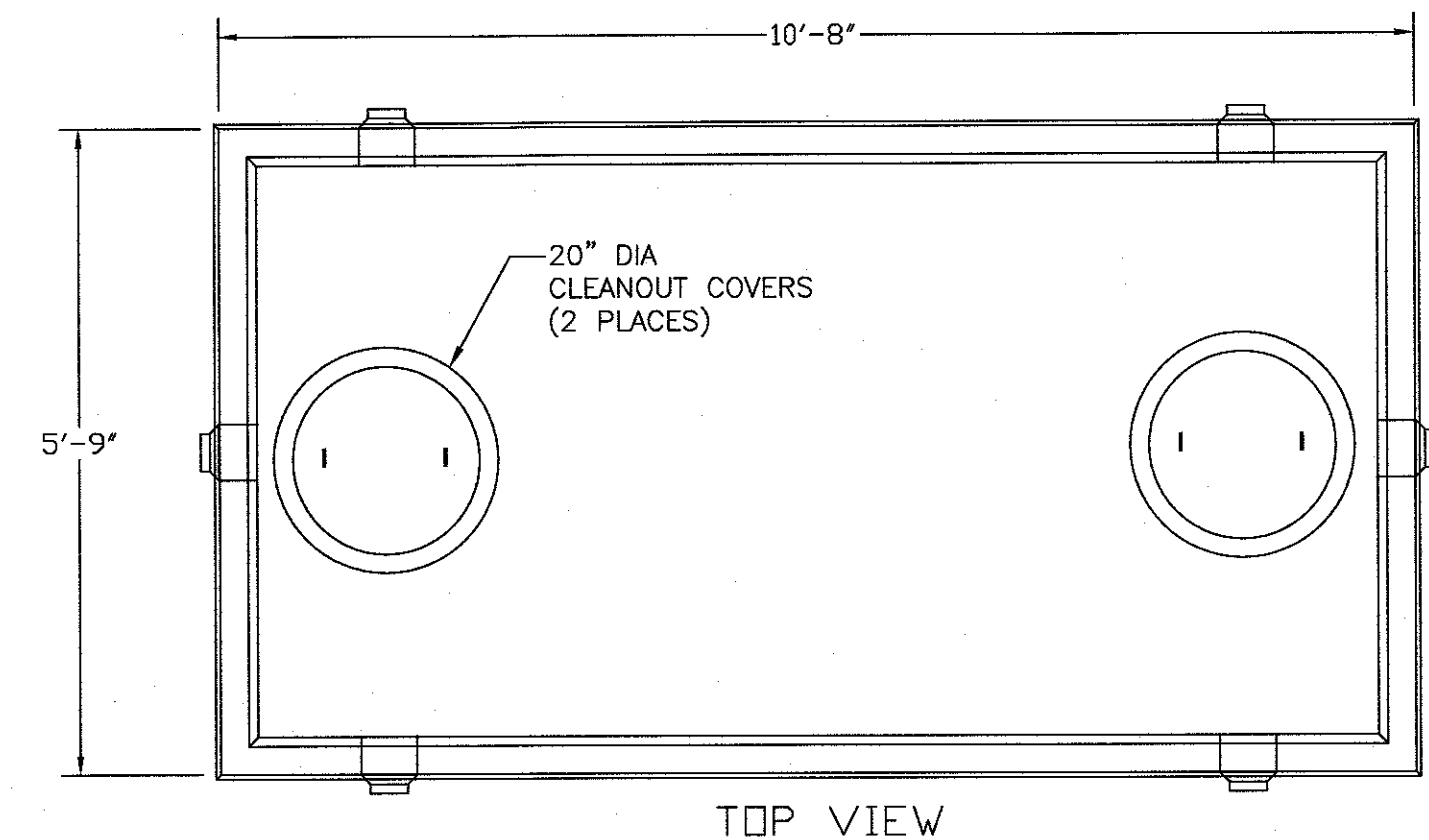
|                          |                         |
|--------------------------|-------------------------|
| DATE OF TESTS            | = 1/3/2018              |
| PRESENT AT TESTS:        | = MICHAEL CUOMO, C.S.S. |
| DESIGN PERCOLATION RATE: | = 2 MINUTES PER INCH    |
| SOIL TYPE                | = ELMWOOD               |

## DESIGN CALCS

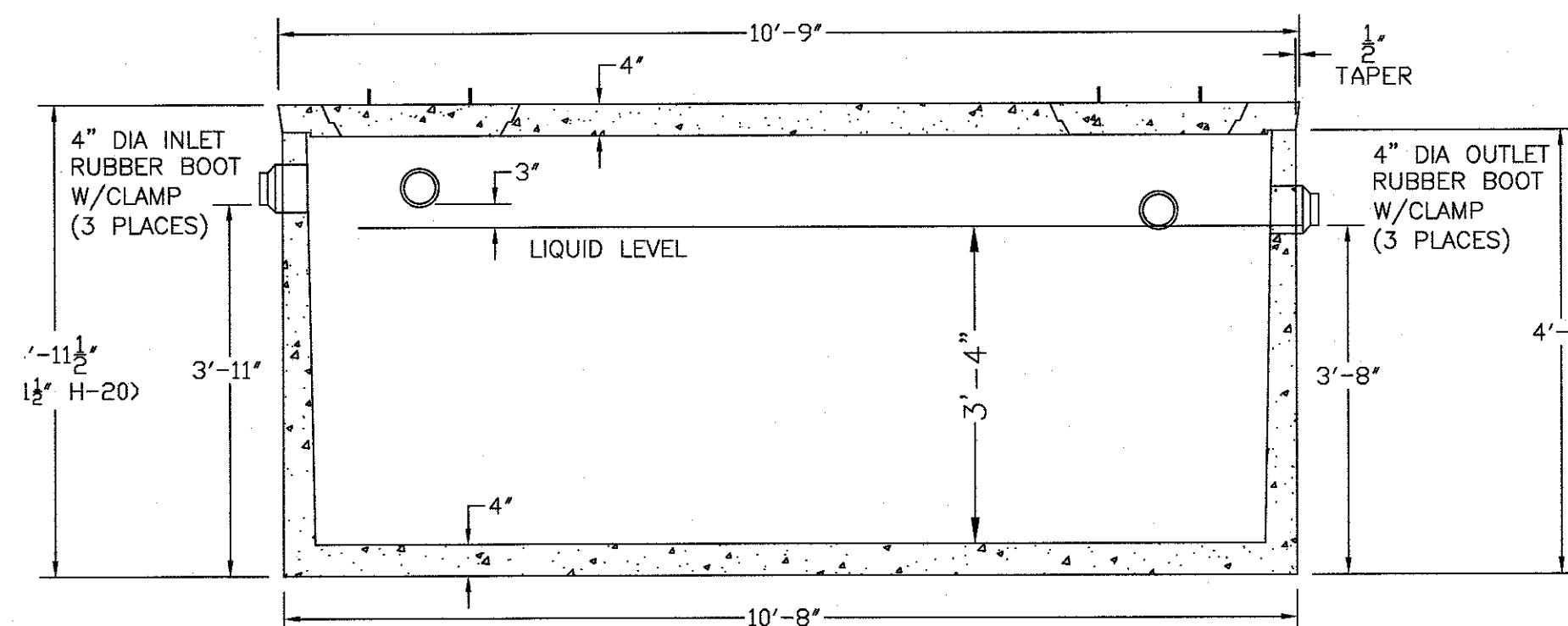
PER NHDES ENV-WQ-1000.(FOR NH),REQUIRED EFFLUENT DISPOSAL AREA (EDA) = 225SF/100 GPD = 956.20 SF WITH 1,000 SF PROVIDED, FIELD SIZE EQUAL TO 20' X 50'

## DESIGN INTENT

BOTTOM OF EFFLUENT DISPOSAL AREA (EDA) SHALL BE AT ELEV 99.0' ALONG THE BACK SIDE. THIS PROVIDES A MINIMUM SEPARATION TO SHWT (EL = 95.0' ) OF 4'.

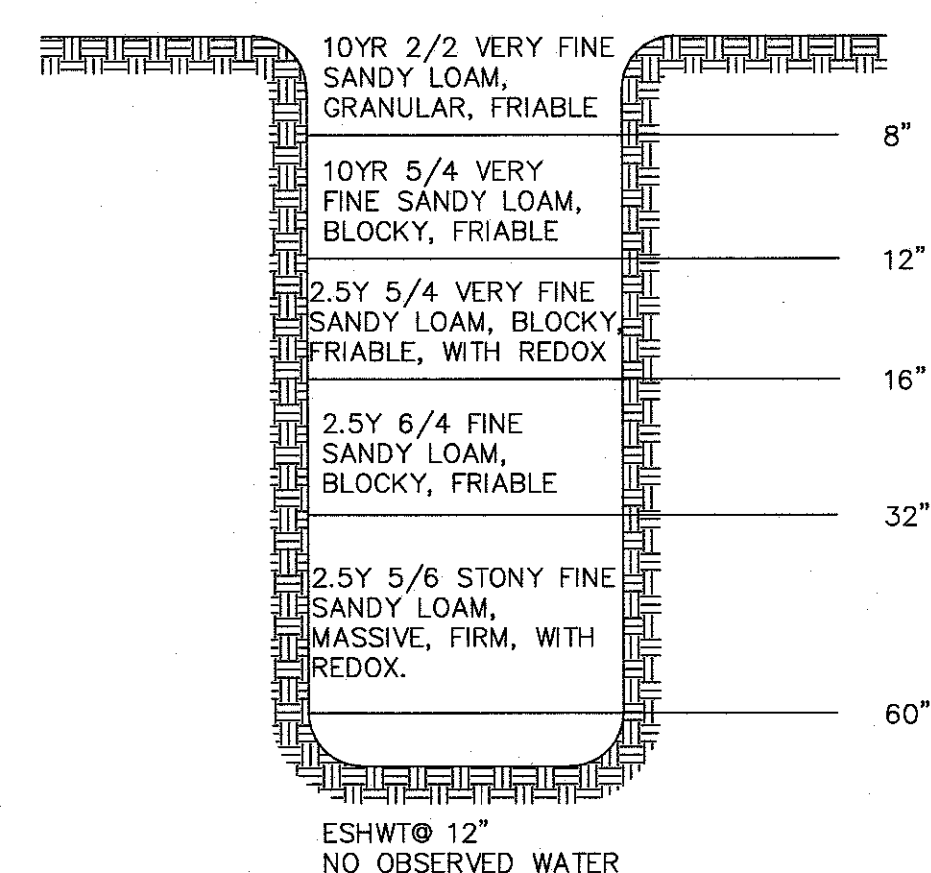


TOP VIEW

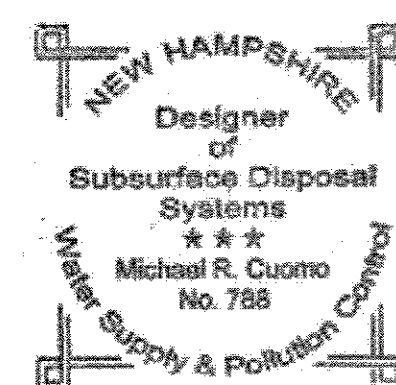


SECTION VIEW  
SEPTIC TANK DETAIL  
(NTS)

## TEST PIT #5 (EL = 96.0')



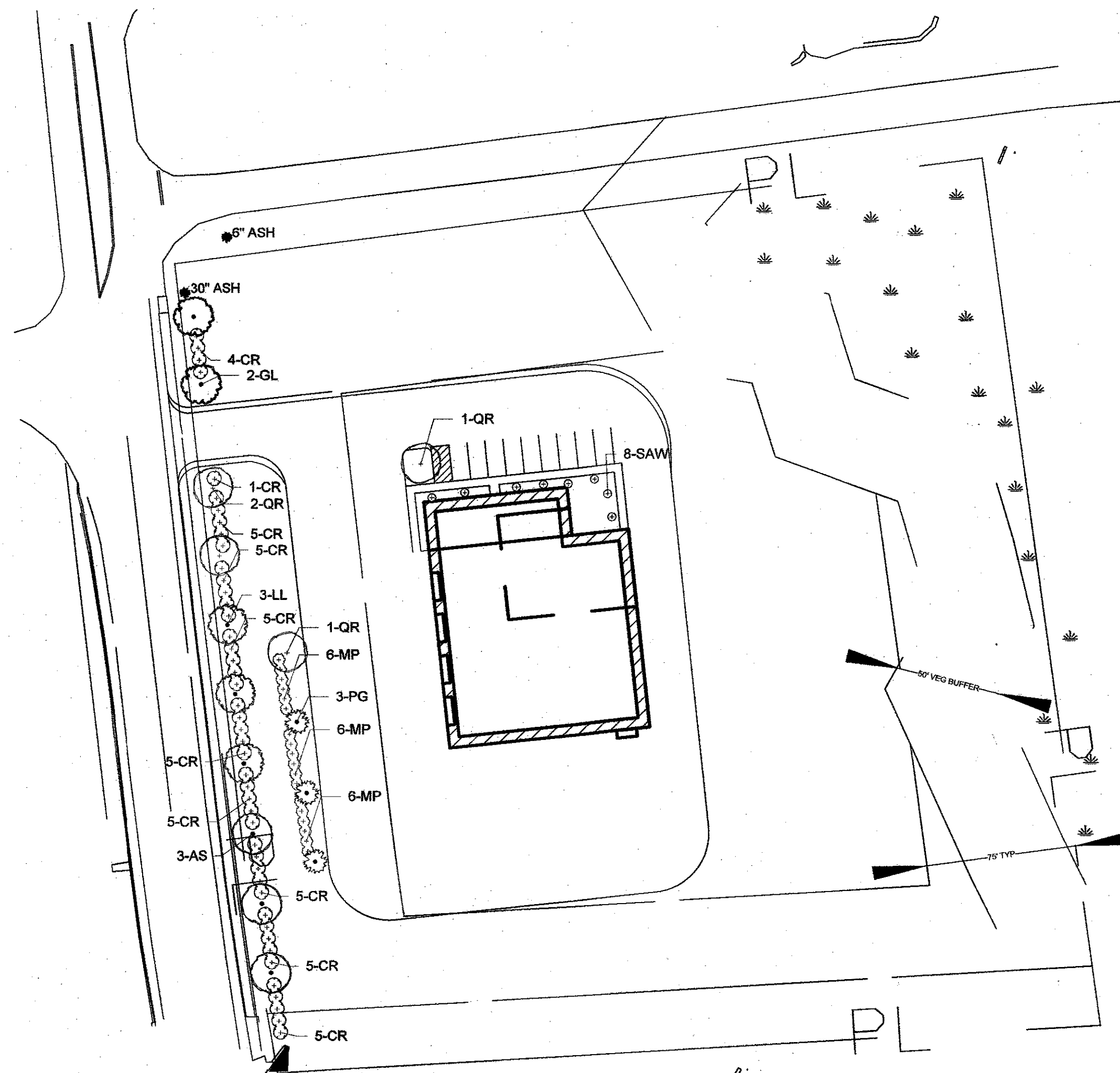
SOIL TEST PIT PROFILE  
(NTS)



Michael Cuomo

|                                                                                                                                           |  |  |                                                                |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------|--|--|----------------------------------------------------------------|--|--|
| SEPTIC DESIGN DETAILS<br>29 LITTLEWORTH RD<br>DOVER, NH 03820                                                                             |  |  | FOR: 29 LITTLEWORTH ROAD LLC,<br>PO BOX 694<br>DOVER, NH 03820 |  |  |
| ATTAR ENGINEERING, INC.<br>CIVIL • STRUCTURAL • MARINE<br>1284 STATE ROAD - ELIOT, MAINE 03903<br>PHONE: (207)439-6023 FAX: (207)439-2128 |  |  | SCALE: 1" = 50'<br>DATE: 3/5/2019<br>JOB NO: C147-19           |  |  |
| APPROVED BY: <i>[Signature]</i><br>3/8/2019                                                                                               |  |  | DRAWN BY: BRN<br>REVISION DATE: - : -<br>SHEET: 4/4            |  |  |
| NO. DESCRIPTION DATE                                                                                                                      |  |  | REVISIONS                                                      |  |  |

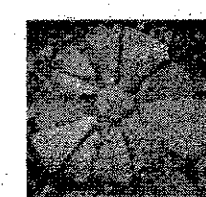
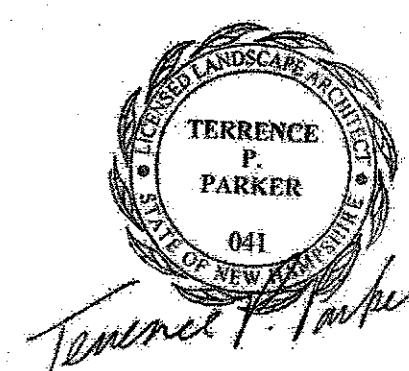




- 1) THE CONTRACTOR SHALL FOLLOW BEST MANAGEMENT PRACTICES DURING CONSTRUCTION AND SHALL TAKE ALL MEANS NECESSARY TO STABILIZE AND PROTECT THE SITE FROM EROSION.
- 2) EROSION CONTROL SHALL BE IN PLACE PRIOR TO CONSTRUCTION.
- 3) EROSION CONTROL TO CONSIST OF HAY BALES AND EROSION CONTROL FABRIC SHALL BE STAKED IN PLACE BETWEEN THE WORK AND WATER BODIES, WETLANDS AND/OR DRAINAGEWAYS PRIOR TO ANY CONSTRUCTION.
- 4) THE CONTRACTOR SHALL VERIFY LAYOUT AND GRADES AND INFORM THE LANDSCAPE ARCHITECT OR CLIENT'S REPRESENTATIVE OF ANY DISCREPANCIES OR CHANGES IN LAYOUT AND/OR GRADE RELATIONSHIPS PRIOR TO CONSTRUCTION.
- 5) THE CONTRACTOR SHALL VERIFY EXACT LOCATION AND ELEVATION OF ALL UTILITIES WITH RESPECTIVE UTILITY OWNERS PRIOR TO CONSTRUCTION. CALL DIGSAFE AT 1-888-344-7233.
- 6) THE CONTRACTOR SHALL GUARANTEE ALL PLANTS FOR NOT LESS THAN TWO YEARS FROM THE TIME OF ACCEPTANCE.
- 7) ALL LANDSCAPING SHALL BE PROVIDED WITH EITHER OF THE FOLLOWING:
- 1) AN UNDERGROUND SPRINKLER SYSTEM
- 2) AN OUTSIDE HOSE ATTACHMENT WITH 150 FEET
- 8) TREES, GRASS COVER, AND SHRUB BEDS SHALL BE MULCHED TO A DEPTH OF 2" WITH ONE-YEAR-OLD, WELL-COMPOSTED, SHREDDED NATURAL BARK NOT LONGER THAN 4" IN LENGTH AND 1/2" IN WIDTH, FREE OF WOODCHIPS AND SAW DUST. MULCH FOR FERNS AND HERACACEOUS PERENNIALS SHALL BE NO LONGER THAN 1" IN LENGTH. TREES IN LAWN AREAS SHALL BE MULCHED IN A 5" DIAMETER MIN. SAUCER.
- 9) ALL DISTURBED AREAS WILL BE DRESSED WITH 4" OF TOPSOIL, PLANTED AS NOTED ON THE PLANS OR SEEDED EXCEPT PLANT BEDS. PLANT BEDS SHALL BE PREPARED TO A DEPTH OF 12" WITH 75% LOAM AND 25% COMPOST.
- 10) SHRUBS AND HEDGES SHALL BE A MINIMUM OF 24" IN HEIGHT WHEN MEASURED IMMEDIATELY AFTER PLANTING. GROUND COVERS AND PERENNIALS MAY BE LESS.
- 11) NUMBER OF TREES AND PLANTS REQUIRED AT FRONTAGE(1 TREE PER 35 FEET):407 LF/ 35 = 12 TREES TREES  
PLANTS REQUIRED - PROPOSED -
- 12) NUMBER OF TREES AND PLANTS REQUIRED AT PARKING: TREES REQUIRED - PROPOSED -

| <b>Plant List</b> |            |                                       |                             |
|-------------------|------------|---------------------------------------|-----------------------------|
| <b>ID</b>         | <b>Qty</b> | <b>Latin Name</b>                     | <b>Common Name</b>          |
| <b>AS</b>         | 3          | Acer saccharum 'Bonfire'              | Bonfire Sugar Maple         |
| <b>CR</b>         | 45         | Cornus racemosa                       | Gray Dogwood                |
| <b>GL</b>         | 2          | Gleditsia triacanthos inermis 'Halka' | Halka Thornless Honeylocust |
| <b>LL</b>         | 3          | Larix laricina                        | American Larch              |
| <b>MP</b>         | 18         | Myrica pensylvanica                   | Northern Bayberry           |
| <b>PG</b>         | 3          | Picea glauca                          | White Spruce                |
| <b>QR</b>         | 4          | Quercus rubra                         | Red Oak                     |
| <b>SAW</b>        | 8          | Spiraea 'Anthony Waterer'             | Anthony Waterer Spiraea     |

| LEGEND              |       |
|---------------------|-------|
| PROPERTY LINE       | _____ |
| LOT BOUNDARY        | _____ |
| PRP. PAVEMENT       | _____ |
| ABUTTING PROP. LINE | _____ |
| SETBACK             | _____ |
| SOIL TYPE BOUNDARY  | _____ |
| WETLAND BOUNDARY    | _____ |
| WETLAND SETBACK     | _____ |



**terra firma**  
landscape architecture  
163-a court street • portsmouth, nh 03801  
office 603.430.8788 | [terrence@terrafirmalandarch.com](mailto:terrence@terrafirmalandarch.com)

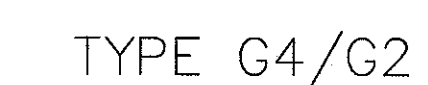
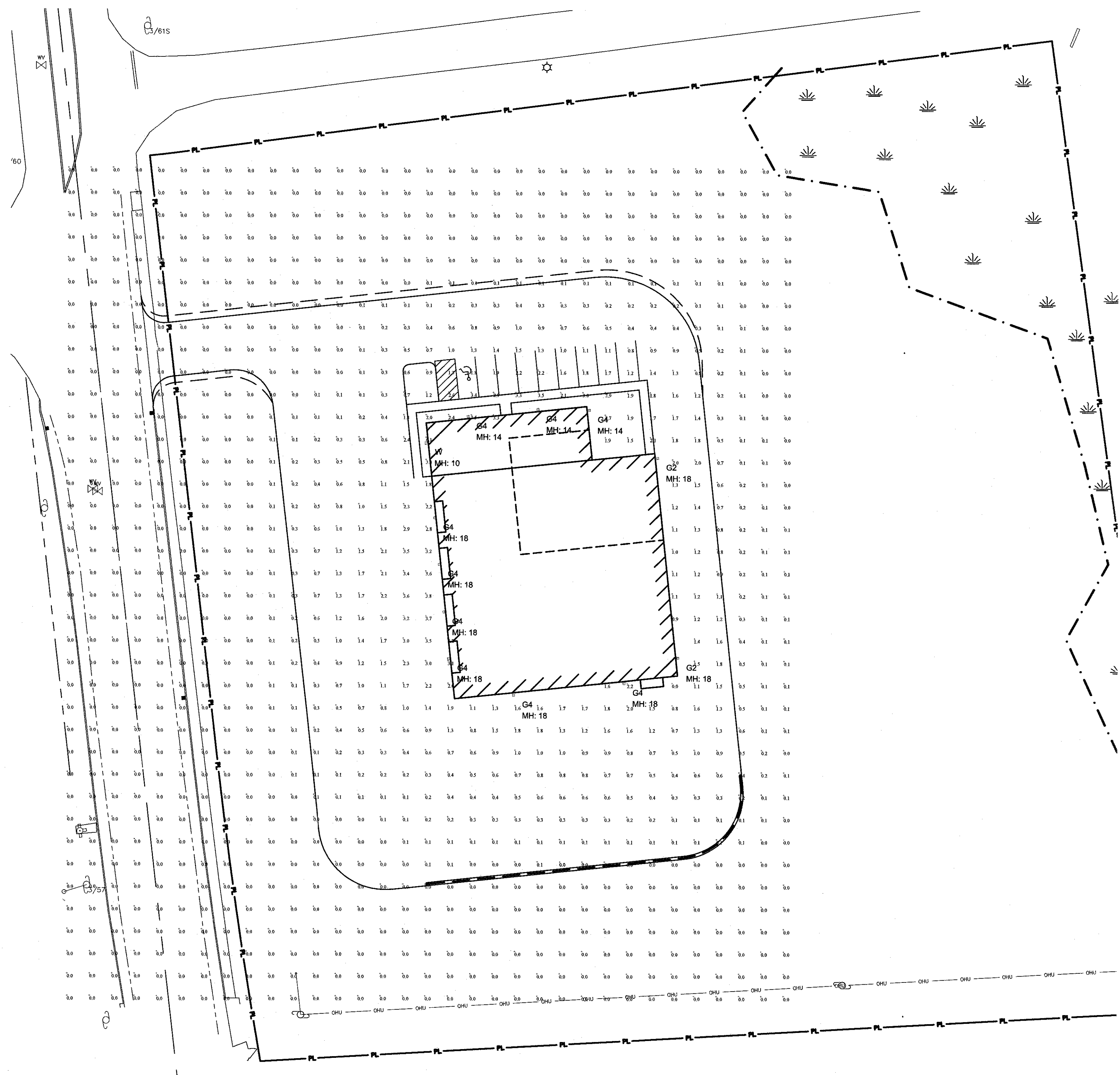
0 50 100 150 200 (FEET)

[illegible]

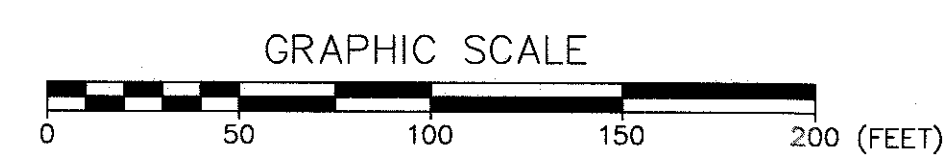
SHEET: 6.1

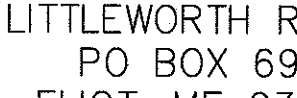
FILE: LITTLEWORTH BASE.DWG





| Luminaire Schedule |                                                                                       |       |                                                |                              |
|--------------------|---------------------------------------------------------------------------------------|-------|------------------------------------------------|------------------------------|
| Qty                | Symbol                                                                                | Label | Manufacturer                                   | Description                  |
| 2                  |  | G2    | EATON - McGRAW-EDISON (FORMER COOPER LIGHTING) | GWCAFP-01-LED-E1-SL2-BZ-600  |
| 9                  |  | G4    | EATON - McGRAW-EDISON (FORMER COOPER LIGHTING) | GWCAFP-01-LED-E1-T4F1-BZ-600 |
| 1                  |  | W     | EATON - LUMARK (FORMER COOPER LIGHTING)        | XTOR1B-W                     |



|                       |             |                                                                                                                                                                                                                                        |                                                                                                                   |
|-----------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| MAP BLOCK NO. G-6-U-0 |             | DOVER, NH 03820                                                                                                                                                                                                                        |                                                                                                                   |
|                       |             | FOR: 29 LITTLEWORTH ROAD LLC<br>PO BOX 694<br>ELIOT, ME 03903                                                                                                                                                                          |                                                                                                                   |
|                       |             |                                                                                                                                                   |                                                                                                                   |
|                       |             |  <b>ATTAR ENGINEERING, INC.</b><br>CIVIL ♦ STRUCTURAL ♦ MARINE<br>1284 STATE ROAD - ELIOT, MAINE 03903<br>PHONE: (207)439-6023 FAX: (207)439-2128 |                                                                                                                   |
|                       |             | SCALE:<br>1" = 30'<br>DATE:<br>3/5/2019                                                                                                                                                                                                | APPROVED BY:<br><br>3/5/2019 |
|                       |             | JOB NO: C147-19                                                                                                                                                                                                                        | DRAWN BY:<br>BRN<br>REVISION DATE:<br>- : -<br>FILE: LITTLEWORTH_BASE.DWG<br>SHEET: 8.1                           |
| NO.                   | DESCRIPTION | DATE                                                                                                                                                                                                                                   |                                                                                                                   |
|                       | REVISIONS   |                                                                                                                                                                                                                                        |                                                                                                                   |

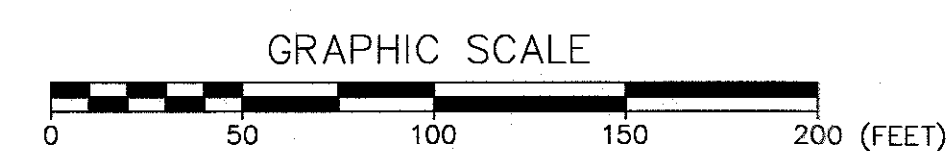
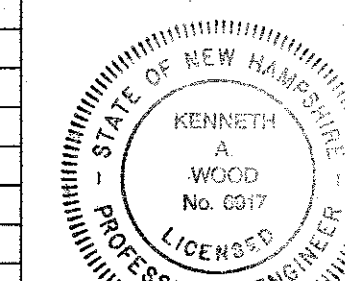




1.) ACCORDING TO THE TEST PITS(SHOWN ON PLAN) SOILS WITHIN THE DEVELOPED AREAS CONSISTS OF ELMWOOD, PAXTON AND WOODBRIDGE - ALL ARE HYDROLOGIC SOIL GROUP "C".

- 1.) SOIL DATA APPROXIMATED FROM THE USDA NRCS WEB SOIL SURVEY.
- 2.) TEST PIT DATA PREPARED BY MICHAEL CUOMO FOR ATTAR ENGINEERING, INC. ON JANUARY 3, 2018.

| <u>SYMBOL</u> | <u>SOIL SERIES</u>                                | <u>HYDROLOGIC SOIL GROUP</u> |
|---------------|---------------------------------------------------|------------------------------|
| BzB           | BUXTON SILT LOAM, 3% TO 8% SLOPE                  | C/D                          |
| CfB           | CHARLTON FINE SANDY LOAM, 3% TO 8% SLOPE          | B                            |
| CfC           | CHARLTON FINE SANDY LOAM, 8% TO 15% SLOPE         | B                            |
| HcC           | HOLLIS-CHARLTON FINE SANDY LOAMS, 8% TO 15% SLOPE | D                            |
| SfC           | SUFFIELD SILT LOAM, 8% TO 15% SLOPE               | C                            |
| SnB           | SUTTON FINE SANDY LOAM, 3% TO 8% SLOPE            | B/D                          |

[illegible]

STORMWATER RUNOFF PLAN  
29 LITTLEWORTH RD  
DOVER, NH 03820

|      |                                                          |
|------|----------------------------------------------------------|
| FOR: | 29 LITTLEWORTH ROAD LLC<br>PO BOX 694<br>ELIOT, ME 03903 |
|------|----------------------------------------------------------|

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|                                           |                                                                                                       |                         |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------|
| PHONE: (207) 439-6023 FAX: (207) 439-2128 |                                                                                                       |                         |
| SCALE:<br>1" = 50'                        | APPROVED BY:<br> | DRAWN BY:<br>BRN        |
| DATE:<br>3/5/2019                         | REVISION DATE:<br>3/5/2019                                                                            | REVISION DATE:<br>- : - |
| JOB NO: C147-19                           | FILE: LITTLEWORTH BASE.DWG                                                                            | SHEET: 1 OF 1           |