Drainage Narrative

Calef Highway
Barrington, NH
Tax Map 238, Lot 44-1

Prepared for

TURBOCAM, INC.
607 Calef Highway
Barrington, NH 03825

Land of

NHBBC, LLC
Calef Highway
Barrington, NH 03825

Prepared By

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825
603-332-2863

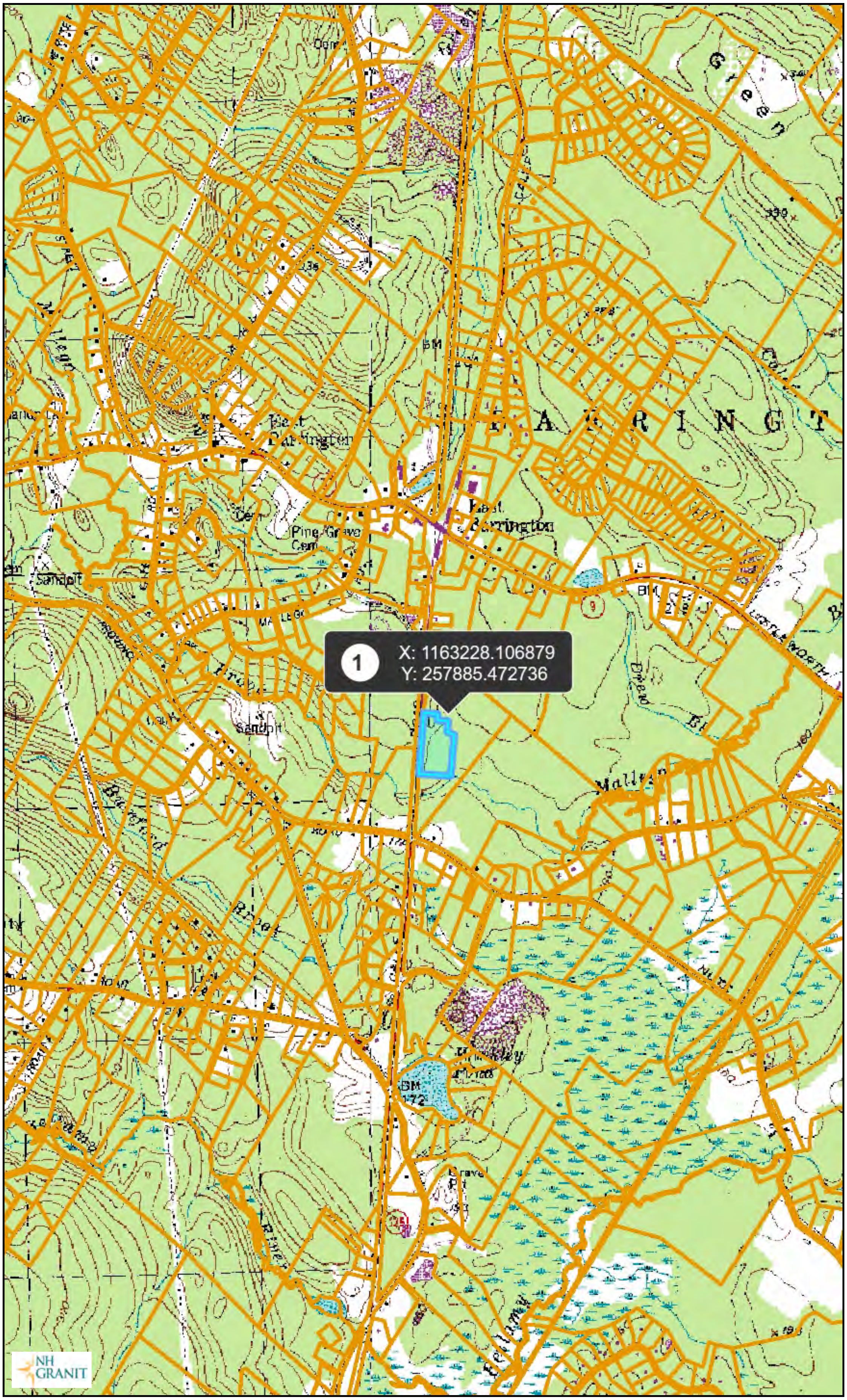
STATE OF NEW HAMPSHIRE – KENNETH A. BERRY No. 14243 LICENSED – PROFESSIONAL ENGINEER

File Number
DB2023-017

February 5, 2024
Revised: April 4, 2024

Table of Contents

Map by NH GRANIT



Legend

- Parcels
- State
- County
- City/Town

Map Scale

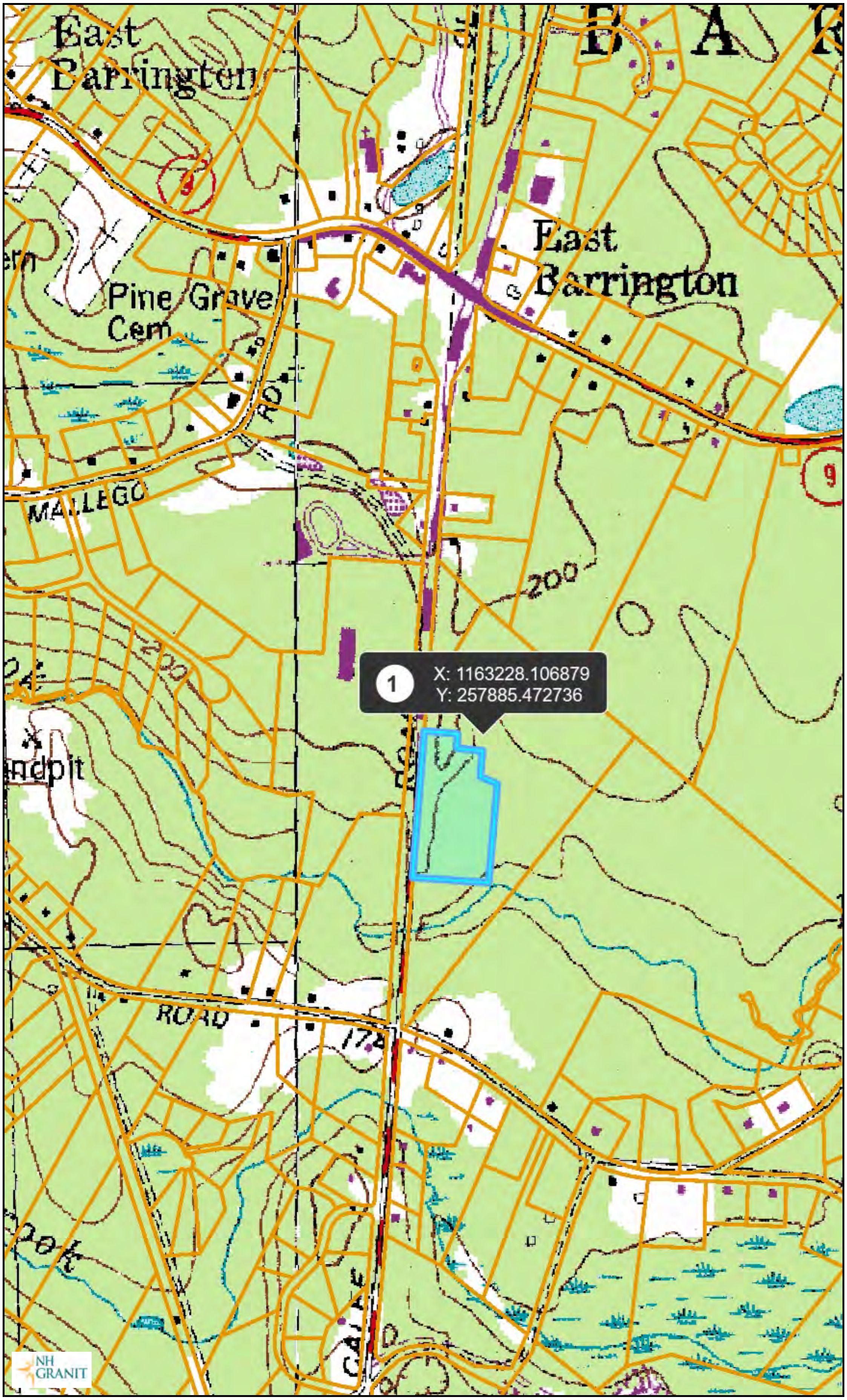
1: 24,000

© NH GRANIT, www.granit.unh.edu

Map Generated: 4/4/2023

Notes

Map by NH GRANIT



Legend

- Parcels
- State
- County
- City/Town

Map Scale

1: 10,000

© NH GRANIT, www.granit.unh.edu

Map Generated: 4/4/2023

Notes

DESIGN METHOD OBJECTIVES

The owner / developer of Tax Map 238, Lots 44 & 44-1, TURBOCAM, INC. is proposing to develop the property at 607 Calef Highway. The site is currently vacant land. TURBOCAM, INC. is proposing an 65,109 square foot Light Manufacturing Facilities with office building.

An on-site topography survey was completed by field crews of Berry Surveying & Engineering in April of 2023 and a Site Specific Soil Survey was completed by John P. Hayes with a report generated on May 5, 2023. Soils on site are included in all four hydrologic soil groups: HSG A, HSG B, HSG C, and HSG D (No HSG D in analysis). (See attached report). A wetland delineation was completed as part of the existing conditions package. The off-site land which drains onto the locus parcel has been delineated by USDA / NRCS soils in Websoil and USGS Equivalent contours from public sources. (Google Tin & NH Lidar)

An Existing and Proposed Conditions analysis was conducted for the purpose of calculating the peak rate of stormwater run-off and to subsequently design adequate mitigation of drainage. There is one existing drainage discharge point which was identified in the existing analysis and duplicated in the proposed conditions analysis. This Discharge Point, or Point of Analysis, is considered the area contributing runoff to the westerly side of the wetlands, south of the existing Turbocam driveway, located on Lot 44-1 and Lot 44. Designing two watershed models we have compared the differences in these rates of peak run-off and surface water volume. Sheet W1, Existing Conditions Watershed Plan, outlines the characteristics of the site in its existing or pre-construction conditions. The second analysis displays the proposed (post-construction) conditions (See Sheet W2). HydroCAD uses a series of node suffixes for numbering purposes (S = Subcatchment, P = Pond Device, R = Reach), to simplify annotation these suffixes are left off the watershed plans and node type is denoted by the symbol shape according to the displayed legend which coincides with HydroCAD graphics. The analysis was conducted using data for; 2 Yr - 24 Hr (3.08”), 10 Yr - 24 Hr (4.65”), 25 Yr - 24 Hr (5.87”), 50 Yr - 24 Hr (7.02”), and 100 YR - 24 Hr (8.39”) storm events. Storm event analysis was accomplished using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. Rainfall quantities are based on the Extreme Precipitation Table for this location from the Northeast Regional Climate Center / Cornell University (http://precip.eas.cornell.edu).

1.0 Existing Conditions Analysis:

Reference: Sheet W1 - Existing Conditions Watershed Plan (Enclosed)
Existing Conditions Plan

The existing parcel is currently vacant, partially wooded land. The analyzed soils within the locus parcel are made up of multiple soil types, containing Hydrologic Soil Group (HSG) A, B, C, & D. See Site Specific Soils Map and report for more information. The land cover types involved are grassed land, woods, and road pavement. Off-site soils are likewise HSG A & B and again based on USDA / NRCS Websoil.

The land area analyzed consists of 6.31 acres of the 7.96 acre parcel as well as 1.58 acres of offsite land. The total area of analysis for the Existing Conditions Analysis is 7.89 acres. The land analyzed is made up of a single subcatchment analyzed at an individual non-point final reach, again being the westerly sideline of the jurisdictional wetland, to the south of the existing Turbocam driveway.

Receiving Waters and Impairments: The Mallego Brook (NHRIV600030903-02) watershed will receive all of the runoff from the site directly. The impairment of the watershed are as follows:

Mercury, NE Regional Mercury TMDL, December 20, 2008, TMDL #33883
pH, Low Priority TMDL
Dissolved Oxygen Saturation, Low Priority TMDL
Oxygen, Dissolved, Low Priority TMDL

Final Reach #100

Subcatchment #1 is land area beginning at the crown of Calef highway extending east to the easement line running through the parcel as well as extending to the delineated wetlands in the south and northeast portions of the property. Runoff flows generally in a southeasterly direction to the delineated wetland being analyzed at **Final Reach #100** which eventually flows offsite.

2.0 Proposed Conditions Analysis:

Reference: Sheet W2 - Proposed Conditions Watershed Plan (Enclosed)
Proposed Grading & Drainage Plan

The applicant is proposing to develop the parcel with a single Light Manufacturing Facility building and attached office space and a road consisting of 1,426 feet of roadway. The proposal is supported by two Bioretention w/ ISR Systems, an Infiltration Basin, a StormTech Infiltration system, and a closed drainage system of catch basins and drain manholes to direct runoff to the practices. The Infiltration Basin and Stormtech infiltration system which helps comply with groundwater recharge volume requirements.

Final Reach #100

Subcatchment #1 is reduced in size due to the proposed development of the parcel and the construction of drainage practices and consists primarily of Route 125 and the Conservation Area. Runoff still flows to the wetland analyzed as **Final Reach #100**.

Subcatchment #11 consists solely of the roof area of the proposed building. Runoff is directed into the main drainage system through **Drain Manhole #6** (**Pond #D06)** flowing to **Bioretention W/ Internal Storage Reservoir (ISR) #101** (**Pond #101**) and subsequently **Infiltration Basin #103** (**Pond #103**) or **StormTech Infiltration Basin #104 (Pond #104)**. The stormwater design included a 22,500 gallon roof runoff collection system. This collection system is supplied via **Drain Manhole #6** (**Pond #D06)** to an Oil & Grit Separator and to the holding tank**.** The stormwater model assumed that the roof runoff collection system is full and all collected roof runoff is discharged to **Bioretention W/ ISR #101** (**Pond #101**).

Subcatchment #21 consists of a primarily paved are to the east of **Bioretention W/ ISR #101** (**Pond #101**)**,** to the northwesterly side of the proposed building. Runoff flows to **Catch Basin #1 (Pond #C01),** routed through **Catch Basin #2 (Pond #C02)**, **Drain Manhole #3 (Pond #D03)**, and **Catch Basin #3 (Pond #C03)**, discharging to **Bioretention W/ ISR #102** (**Pond #102**)**.**

Subcatchment #22 consists of a portion of the paved area west of the proposed building, this is largely the area located over **Stormtech Infiltration System #104**. Runoff flows to **Catch Basin #2** (**Pond #C02**), routed through **Drain Manhole #3 (Pond #D03)**, and **Catch Basin #3 (Pond #C03)**, discharging to **Bioretention W/ ISR #102** (**Pond #102**)**.**

Subcatchment #23 consists of a portion of the paved area south of the proposed building. Runoff flows to **Catch Basin #3** (**Pond #C03**), discharging to **Bioretention W/ ISR #102** (**Pond #102**)**.**

Subcatchments #24-#28, & #30 encompass a majority of the impervious area surrounding the proposed building. Runoff is collected in six catch basins (**Ponds #C04-#C08, C10)** respectively) eventually flowing to **Bioretention W/ ISR #102** (**Pond #102**) through **Drain Manhole #5** (**Pond #D05**) and **Drain Manhole #4** (**Pond #D04**).

Subcatchment #41 is made up of a area of land alongside Calef Highway with runoff flowing east toward the locus parcel and a portion of the proposed parking area. Runoff is directed in a conveyance swale to **Bioretention W/ ISR #101** (**Pond #101**) and subsequently **Infiltration Basin #103** (**Pond #103**) (Secondary & Tertiary) or **StormTech Infiltration Basin #104 (Pond #104)** (Primary).

Subcatchment #42 is comprised of the small land area directly contributing to **Bioretention W/ ISR #102** (**Pond #102**)**.** Runoff is collected in **Pond #102** and outlets to a level spreader directed at **Final Reach #100** through a series of overland reaches (**Reaches #42a & #42b**).

Subcatchment #43 is comprised of land alongside Calef Highway small land area directly contributing to **Infiltration Basin #103 (103P)**. Runoff is collected in **Infiltration Basin #103** with flow received from **Bioretention W/ ISR #101. Infiltration Basin #103** infiltrates the 2YR storm event and with the primary overflow routed to Catch Basin #2 (Pond C02) directed to **Bioretention W/ ISR #102 (Pond 102)** and secondary overflow to **StormTech Infiltration Basin #104 (Pond 104P)**. Flow from the spillway (tertiary) is directed via level spreader to **Final Reach #100** through an overland reach **(Reach #41).**

Stormtech Infiltration Basin #104 (**Pond #104**) receives runoff through the primary outlet of **Bioretention W/ ISR #101 (Pond #101)** and from the secondary outlet of **Infiltration Basin #103 (Pond #103)**. This flow is largely infiltrated, with an overflow outlet routed to **Drain Manhole #3 (Pond D03)** and subsequently to **Bioretention W/ ISR #102 (Pond 102P)**.

3.0a Stormwater Treatment:

Treatment takes place within the two Bioretention W/ ISRs designed to support the development on site. Pre-treatment will be provided in the sediment forebays of Bioretention W/ ISR #101 & #102. The water quality volume is treated within provided treatment area of the practices. Infiltration Basin #103 receives flow from Bioretention W/ ISR above the WQV, with no other discharges entering the BMP. Stormtech Infiltration Basin #104 receives treated discharge from Bioretention W/ ISR #101 and overflow received above the WQV from Infiltration Basin #103. An Isolator Row is provided within the StormTech System.

3.0b Stormwater Infiltration:

Groundwater recharge volume requirements are satisfied by Infiltration Basin #103 (Pond #103)(Sheet P-103) and Stormtech Infiltration System #104 (Pond #104) (Sheet P-104). See Infiltration Feasibility Study also prepared by Berry Surveying & Engineering and published on the same day.

3.1 FULL COMPARATIVE ANALYSIS

ANALYSIS COMPONENT: PEAK RATE DISCHARGE (Cubic Feet / Second)

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #100	Existing	0.87	4.41	8.28	12.46	17.88
	Proposed	0.63	4.34	7.34	10.24	16.89

ANALYSIS COMPONENT: VOLUME (Acre Feet)

		2 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Final Reach #100	Existing	0.195	0.640	1.093	1.581	2.219
	Proposed	0.231	0.621	0.984	1.516	2.226

3.2 SWALE CAPACITY ANALYSIS

ANALYSIS COMPONENT: PEAK RATE DISCHARGE (Cubic Feet / Second)

50YR 24-HR Storm Event Used	Area (Ac.)	Swale Depth (ft.)	Bottom Width (Ft.)	Lt. Slope (X:1)	Rt. Slope (X:1)	Peak Rate (CFS)	50Yr Avg. Depth (Ft.)	Manning's "n"
Reach #43AR	0.959	2	4	2	2	4.92	0.43	0.022

The swale capacity analysis considers the flattest portion of the swale (S = 0.005 '/,) with the steepest side slopes (2:1 Lt. & Rt.). Portions of the swale are steeper than the modeled slope, with 4:1 side slopes.

4.0 EROSION and SEDIMENT CONTROL PLAN & BEST MANAGEMENT PRACTICES (BMP's)

Reference: Proposed Site Plan and Grading Plan
Erosion & Sediment Control Plan
Erosion & Sediment Control Details

The proposed site development is protected from erosion and the abutting easements and properties are protected from sediment by the use of Best Management Practices as outlined in the New Hampshire Stormwater Manual, Volume 2, Post-Construction Best Management Practices Selection & Design (December 2008, NHDES & US EPA). Any area disturbed by construction will be temporarily or permanently re-stabilized within 30 days and abutting easements and properties will not be adversely affected by this development. All swales and drainage structures will be constructed and stabilized prior to having run-off directed to them. Reference is also made to the

Stormwater System Management: Inspection & Maintenance Manual and Stormwater Operations, Inspection & Maintenance Plan which has been developed specifically for this project and available to the owner.

Perimeter Control (Silt Fence / SiltSoxx / Erosion Control Mix Berm)

The plan set demonstrates the location of perimeter sediment control. The Erosion and Sediment Control Details, Sheet E-101, has the specifications for installation and maintenance of the silt fence, Filtrexx mulch filled SiltSoxx (or approved equal), and Erosion Control Mix Berm. There are locations on the site, for example bio-media rain garden protection, where SiltSoxx protection is specified. An area of permanent perimeter control is shown by the well house for wetland buffer protection from steeper slopes.

Catch Basins (Without Sumps) & Drain Manholes

Description: Catch Basins are used throughout the site to capture and, along with culvert pipes and manhole, route surface water runoff to stormwater treatment and detention infrastructure. During construction the catch basins will be protected by inlet protection per the approved construction plans. The practice of street sweeping on a bi-annual basis will help reduce maintenance of these catch basins and culvert pipes.

Note: Deep sump catch basins are not allowed to be used on this proposed development due to wildlife concerns and any manufacturer sump resulting in a catch basin must be filled with washed crushed stone. Sediment should be trapped in the sediment forebays but is also a concern in earlier structures. See construction details for specifications of these conveyance practices.

Maintenance Considerations: Sediment must be removed from Catch Basins and Manholes on a regular basis, at least twice a year and more often if post-winter maintenance and street sweeping is not conducted. Inspections should be conducted periodically. At a minimum they should be cleaned after snow-melt and after leaf-drop. Disposal of all material, sediment, and debris must be done in accordance with state and federal regulations. Culvert pipes will be inspected to ensure that surface water runoff is capable of leaving the structures. Drain manholes will be inspected to make sure there is not sediment build-up or blockages.

Note The generator containment system contains a manual drain w/ gate valve. Close attention must be paid to this drain to ensure ponding doesn't occur within the generator containment system.

Conveyance Swale

Description: Conveyance swales are stabilized channels designed to convey runoff at non-erosive velocities. They may be stabilized using vegetation, riprap, or a combination, or with an alternative lining designed to accommodate design flows while protecting the integrity of the sides and bottom of the channel. Conveyance channels may provide incidental water quality benefits, but are not specifically designed to

provide treatment. Conveyance swales are not considered a Treatment or Pretreatment Practice under the AoT regulations, unless they are also designed to meet the requirements of an acceptable Treatment/Pretreatment Practice as described elsewhere in this Chapter. See SWM Volume 2, 4-6.3 Conveyance Practices, Conveyance Swale, page 166.
Maintenance Considerations: Grassed channels should be inspected periodically (at least annually) for sediment accumulation, erosion, and condition of surface lining (vegetation or riprap). Repairs, including stone or vegetation replacement, should be made based on this inspection. Remove sediment and debris annually, or more frequently as warranted by inspection. Mow vegetated channels based on frequency specified by design. Mowing at least once per year is required to control establishment of woody vegetation. It is recommended to cut grass no shorter than 4 inches.

Sediment Forebay

Description: A sediment forebay is an impoundment, basin, or other storage structure designed to dissipate the energy of incoming runoff and allow for initial settling of coarse sediments. Forebays are used for pretreatment of runoff prior to discharge into the primary water quality treatment BMP. In some cases, forebays may be constructed as separate structures but often, they are integrated into the design of larger stormwater management structures. See SWM Volume 2, 4-4.1 Pre-treatment Practices, Sediment Forebay, page 140.
Maintenance Considerations: Forebays help reduce the sediment load to downstream BMPs, and will therefore require more frequent cleaning. Inspect at least annually; Conduct periodic mowing of embankments (generally two times per year) to control growth of woody vegetation on embankments; Remove debris from outlet structures at least once annually; Remove and dispose of accumulated sediment based on inspection; Install and maintain a staff gage or other measuring device, to indicate depth of sediment accumulation and level at which clean-out is required. Preserving the drainage between the Sediment Forebay and the stormwater BMP by inspecting and maintaining the connecting drainage pipes and perforations should be completed semi annually or as required to ensure the forebay is dry.

In-Ground Infiltration Basin (Basin #103 & StormTech SC-740 P-104)

Description: Infiltration basins are impoundments designed to temporarily store runoff, allowing all or a portion of the water to infiltrate into the ground. An infiltration basin is designed to completely drain between storm events. An infiltration basin is specifically designed to retain and infiltrate the entire Water Quality Volume. Some infiltration basins may infiltrate additional volumes during larger storm events, but many will be designed to release stormwater exceeding the water quality volume from the larger storms. In a properly sited and designed infiltration basin, water quality treatment is provided by runoff pollutants binding to soil particles beneath the basin as water percolates into the subsurface. Biological and chemical processes occurring in the soil also contribute to the breakdown of pollutants. Infiltrated water is used by plants to support growth or it is recharged to the underlying groundwater. As with all impoundment BMPs, surface infiltration basins should be designed with an outlet structure to pass peak flows during a range of storm events, as well as with an emergency spillway to pass peak flows around the embankment during extreme storm events that exceed the combined infiltration capacity and outlet structure capacity of the facility. See SWM Volume 2, 4-3.3b, Treatment Practices, In-Ground Infiltration Basin, page 88.

Maintenance Considerations: Removal of debris from inlet and outlet structures. Removal of accumulated sediment. Inspection and repair of outlet structures and appurtenances. Inspection of infiltration components at least twice annually, and following any rainfall event exceeding 2.5 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection. Inspection of pretreatment measures at least twice annually, and removal of accumulated sediment as warranted by inspection, but no less than once annually. If an infiltration system does not drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore infiltration function, including but not limited to removal of accumulated sediments or reconstruction of the infiltration trench.

Proposed side slopes of 2:1 will be maintained with a weedwhacker, with vegetation being removed from the BMP with each maintenance application.

StormTech Chamber: P-104 Infiltration

Description: The StormTech Chamber System and Isolator Row are trademark products of the Advance Drainage System (ADS) company. The purchase and installation of this system will conform to ADS proprietary rights. The design engineer has specifically used the Isolator Row and StormTech Chamber specifications in the design of this installation. The design is based on the StormTech SC-740 Chambers with an Isolator Row for sediment isolation. The system is designed as an infiltration practice. The volume in the washed crushed stone and in the specified chambers will act as detention in connection with the Outlet Structure discharge stack. Runoff that enters this system does so at the isolator row. P-104 contains 112 chambers in seven rows of sixteen chambers. The top of the outlet structure stack is designed to pass larger storm events. Multiple inspection ports are located throughout the system.

Inspection: Semi-annual and severe rain storm event inspections will be conducted by a trained individual with the capability to observe the condition of the pre-treatment measures and the condition of the Isolator Row especially regarding the depth and extent of sediment buildup. The Isolator Row should initially be inspected semi-annually however this schedule may need to be adjusted based on findings, condition of the pre-treatment measures, and use of the parking facilities. See list of known qualified inspection / maintenance professionals below. The inlet structure and outlet structure must also be inspected. The inspection process requires the removal of Drain Manhole covers.

Maintenance Considerations: Sediment collected in the Isolator Row will be removed with the JetVac process, consisting of high-pressure water scouring and suction retrieval of the captured sediment and pollutants. The orifice cover plate installed to ensure that runoff is routed to the Isolator Row must be in place and if not re-installed to the original specifications. The stack in the outlet structure must be maintained to ensure that there is no buildup that prevents the proper operation of the outlet.

See Infiltration above regarding the annual inspection of infiltration capabilities for P-104. The stormwater practice should be dry within 72 hours of the end of a storm event.

A copy of the ADS StormTech SC-740 Chamber manual and ADS StormTech Isolator Row O&M Manual are attached.

After the system construction and before operation of the site, it is recommended that a long-term agreement for Inspection and Maintenance be established.

As for Isolator Row inspection and maintenance, Catch Basin maintenance, the regional ADS, Inc. representatives recommend using any of the following contacts:

Stormwater Compliance, LLC;
Attn: Nathan Marles, 1-877-271-9055; nmarles@lidtech.com
163 Thadeus Street, Portland, ME 04106
Info@stormwatercomp.com

Ted Berry Company;
Attn: Dave Beauchamp, 207-897-3348; david.beauchamp@tedberrycompany.com
521 Federal Road, Livermore, ME 04253
Info@tedberrycompany.com

Bellemore Septic Sewer & Drain
Attn: Ray Bellemore, 603-641-6640
raymond@bellemore.com
PO Box 10369
Bedford, NH 03110

ADS / StormTech Contact: Aaron Cheever, PE, Advance Drainage Systems, Inc.
aaron.cheever@ads-pipe.com 1-978-302-0650

Bioretention W/ Internal Storage Reservoir (ISR)

Description: A practice that provides temporary storage of runoff for filtering through an engineered soil media, augmented for enhanced phosphorus removal, followed by detention and denitrification in a subsurface internal storage reservoir (ISR) comprised of gravel. Runoff flows are routed through filter media and directed to the underlying ISR via an impermeable membrane for temporary storage. An elevated outlet control at the top of the ISR is designed to provide a retention time of at least 24 hours in the system to allow for sufficient time for denitrification and nitrogen reduction to occur prior to discharge. The design storage capacity for using the cumulative performance curves is comprised of void spaces in the filter media, temporary ponding at the surface of the practice and the void spaces in the gravel ISR. The volume of the ISR will exceed 26% of the Water Quality Volume (WQV). Reference: 2017 NH Small MS4 General Permit, Appendix F Attachment 3, and UNH Stormwater Center, "UNH Stormwater Center Hybrid Bioretention Template" (2020). *UNH Stormwater Center*. 73. https://scholars.unh.edu/stormwater/73

Maintenance Considerations: The outlet to the Internal Storage Reservoir consists of a 1.25" or 1.5" orifice in a threaded end-cap after the goose-neck pipe within the concrete outlet structure. The inlet manifold and threaded pipe outlet manifold system is designed so that the ISR, or anaerobic reservoir can be completely drained and the sump of the outlet structure pumped dry. The orifice requires periodic inspection, initially on a semi-annual basis. This time increment may need to be adjusted based on the experience on the maintenance of the device. The draining of the ISR would only be accomplished if issues developed.
The enhanced bio-media will require additional material rototilled into the top 10-inches to foot of the rain garden after a period of approximately 20 years. The timing of this maintenance period is a factor of the methodology applied during construction and will need to be evaluated as the rain gardens age.
Rain Gardens should be inspected at least twice annually and following any rainfall event exceeding 2.5 inches in a twenty-four hour period. Maintenance rehabilitation will be conducted as warranted by each inspection. Trash and debris will be removed at each inspection.

On an annual basis the infiltration capabilities need to be confirmed by evaluation the drawdown time. If the bioretention system does not drain within 72-hours following a rainfall event, a qualified professional will assess the condition of the rain garden to determine measures required to restore the infiltration function. This is normally the direct result of sediment accumulation which will be removed to restore the filter media ratio.

Proposed side slopes of 2:1 will be maintained with a weedwhacker, with vegetation being removed from the BMP with each maintenance application.

Stone Berm Level Spreader

Description: A stone berm level spreader is an outlet structure constructed at zero percent grade across a slope used to convert concentrated flow to "sheet flow." It disperses or "spreads" flow thinly over a receiving area, usually consisting of undisturbed, vegetated ground. The conversion of concentrated flow to shallow, sheet flow allows runoff to be discharged at non-erosive velocities onto natural ground. To stabilize the spreader outlet, a stone berm is provided to dissipate flow energy, and help disperse flows along the length of the spreader. Level spreaders are not designed to remove pollutants from stormwater; however, some suspended sediment and associated phosphorous, nitrogen, metals and hydrocarbons will settle out of the runoff through settlement, filtration, infiltration, absorption, decomposition and volatilization. See SWM Volume 2, 4-6.6 Conveyance Practices, Stone Berm Level Spreader, page 162.

Maintenance Considerations: Inspect at least once annually for accumulation of sediment and debris and for signs of erosion within approach channel, spreader channel or down-slope of the spreader. Remove debris whenever observed during inspection. Remove sediment when accumulation exceeds 25% of spreader channel depth. Mow as required by landscaping design. At a minimum, mow annually to control woody vegetation within the spreader. Snow should not be stored within or down-slope of the level spreader or its approach channel. Repair any erosion and re-grade or replace stone berm material, as warranted by inspection. Reconstruct the spreader if down-slope channelization indicates that the spreader is not level or that discharge has become concentrated, and corrections cannot be made through minor re-grading.

Stockpiled Sediment or Soil

Stockpiled materials including topsoil, excavated materials, borrow materials imported onto the site, construction aggregates, and sediment removed from temporary sediment traps will be located in designated areas at least 50 feet away form concentrated flows. All stockpiles will have erosion protection in the form of silt fence and diversion swales will be applied to protect the material and surrounding areas. Inactive stockpiles will be seeded for temporary stabilization. Erosion control measures will be inspected in accordance with the schedule for all other activities on site.

At a minimum, you must comply with following (EPA 2012 CGP Part 2.1.2.4d) "Do no hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similar effective control,) storm drain inlet, or surface water."

Dewatering Practices

Dewatering practices are not known to be required on this site. If during construction this becomes required, an addendum will be published specific for the requirements. As a general rule, ground water that needs to be removed from an excavation will be pumped to a sediment basin or a storm drain inlet prior to discharge from the site.

At a minimum, you must comply with following (EPA CGP Part 2.1.3.4) "With backwash water, either haul it away for disposal or return it to the beginning of the treatment process; and replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications."

Regarding dewatering practices in the State of New Hampshire, specifically see Construction General Permit Section 9.1.2 NHR12000 State of New Hampshire and "Clarification of Section 9.1.2 ... and other New Hampshire specific information for the U.S. EPA 2012 NPDES Construction General Permit (CGP), May 3, 2012"

Please be advised that should dewatering become required, the EPA CGP 2022 requires daily inspections, monitoring, and reporting quarterly to the agency.

Stabilization for Long Term Cover

Vegetated Stabilization – Original Planting

All areas that are disturbed during construction will be stabilized with vegetated material within 30 days of breaking ground. Construction will be managed in such a manner that erosion is prevented and that no abutter's property will be subjected to any siltation, unless otherwise permitted. All areas to be planted with grass for long-term cover will follow the specification and on Sheet E-102 using seeding mixture C, as follows:

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	24	0.55
Creeping Red Fescue	24	0.55
Total	48	1.10

Conservation Mix

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Virginia Wild Rye	Native	FACW-
Little Bluestem	Native	FACU
Big Bluestem	Native	FAC
Red Fescue	Native	FACU
Switch Grass	Native	FAC
Partridge Pea	Native	FACU
Showy Tick Trefoil	Native	FAC
Butterfly Milkweed	Native	NI
Beggar Ticks	Native	FACW
Purple Joe Pye Weed	Native	FAC
Black Eyed Susan	Native	FACU-
Total	**25**	**0.57**

Conservation Mix to be provided by New England Wetland Plants, Inc., Amherst, MA as outline in their New England Conservation / Wildlife Mix or approved equal. Mix to be applied at a rate of 25 lbs. per acre or one-lb. per 1750 square feet. Ratio of seed is proprietary and substitutions are not allowed.

Conservation Mix will used to stabilize all 2:1 slopes and all land area disturbed within the wetland buffer.

Stormwater BMP Mix:
The grass that is planted within a stormwater BMP will be a mix designed for both inundation and dry conditions such as Ernst Seeds, Retention Basin Floor Mix ERNMX-126.

Maintenance Considerations: Permanent seeded areas for long-term cover will be inspected on a periodic basis looking for signs of growth loss or erosion. Any areas found to be damaged will be repaired and replanted to reestablish the growth. The grass should be mowed at least twice per year and any dead material removed. Any woody growth that becomes established will need to be cut and removed.

Long-term maintenance of the land cover is critical and must be maintained at least 85% grass / vegetation coverage, must be inspected for concentrated flow, rills, and channels; and must be repaired as necessary to prevent erosion.

Rolled Erosion Control Blanket

Description: Rolled Erosion Control Blankets, such as American Excelsior Company Curlex III, (or equal), North American Green BioNet series, consist of interlocking fiber mesh which is bio-degradable, used to stabilize sloping earth while vegetation is being established. The product comes in rolls that are laid out over the earth, normally over-lapped, and secured to the soil by the use of anchors or staples. The RECB may be anchored in the earth at the top of the slope to prevent wash-out. Construction specifications are included in the plan set and New Hampshire Stormwater Manual, Volume 3, 4-1 Erosion Control Practices, Temporary Erosion Control Blanket. See the chart on E-102 for compatible products with given slopes.

Construction Considerations: It is recommended that the blanket be installed in the same direction as the water flow or perpendicular to the slope. The manufacturer will recommend the amount of over-lap from one row to the next and on longer slopes between sections. Care must be taken that the RECB is laid directly on the earth / topsoil and that any existing vegetation not cause tenting as this will cause an issue with the blanket not staying in place. The staples or stakes are to be placed according to the manufacturer based on the slope of the receiving soil and forces that may be encountered. Care must be taken to utilize the correct product as specified. The choice of product are all different and in most cases are not interchangeable. NHDES or NH F&G may specify that some RECBs not be used in some applications.

Maintenance Considerations: RECBs will be inspected during the regular inspection schedule and any construction corrections made if the blanket is compromised.

Inlet Protection / Storm Drain Inlets

Storm drain inlet protection will be installed per the Erosion & Sediment Control Details as a sediment barrier installed around a storm drain inlet, catch basin, or curb inlet to reduce sediment intrusion into a system after it has been constructed and existing catch basins. These are to be constructed in accordance with the Erosion & Sediment Control Details, Sheet E-101 and maintained after every rain event.

At a minimum, you must comply with following (EPA CGP Part 2.1.2.9.b) "Clean, or remove and replace, the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, you must remove the deposited sediment by the end of the same work day in which it is found or by the end of the following work day if removal by the same work day is not feasible."

Stabilized Construction Entrance

Description: A temporary gravel construction entrance provides an area where mud can be dislodged from tires before the vehicle leaves the construction site to reduce the amount of mud and sediment transported onto paved municipal and state roads. The stone size for the pad should be 3" angular aggregate, and the pad itself constructed to a minimum length of 75' for the full width of the access road. The aggregate should be placed at least six inches thick applied over a non-woven engineered fabric such as Mirafi 140N. A plan view and profile are shown on Sheet E-101- Erosion & Sediment Control Detail Plan.

Maintenance Considerations: The stone must be refreshed and kept clean in order for the practice to prevent tracking on the abutting roadway. If vehicle traffic by-pass the practice, it should either be channelized or the practice widened to be properly utilized. Tracking on the abutting roadway is not allowed and materials that are deposited on the abutting highway or any internal roadway must be swept daily.

Environmental Dust Control

Dust will be controlled on the site by the use of multiple Best Management Practices. Mulching and temporary seeding will be the first line of protection to be utilized where problems occur. If dust problems are not solved by these applications, the use of water and calcium chloride can be applied. Calcium chloride will be applied at a rate that will keep the surface moist but not cause pollution.

Construction Sequence

1. Cut and remove trees in construction area only as required.

2. Construct and/or install temporary and permanent sediment erosion and detention control facilities as specified. Erosion and sediment control measures shall be installed prior to any soil land disturbance.

3. Erosion, sediment and detention control facility shall be installed & stabilized prior to directing runoff to them, temporary diversions may be required. Post construction storm water management practices must be initiated and stabilized early in the process.

4. Clear, cut and dispose of debris in approved facility. Grubbing and stockpiling shall not occur until after erosion & sediment control measures are installed.

5. Construct temporary water diversions (swales, basins, etc.) as needed until site is stabilized.

6. All swales are to be installed prior to rough grading of the site. Temporary water diversion (swales, etc.) must be used as necessary until areas are stabilized.

7. Construct roadways for access to desired construction areas. All roads shall be stabilized immediately.

8. Install pipe and construction associated appurtenances as required or directed. Install Bioretention W/ ISRs, Infiltration Pond, and stormtech system. All disturbed areas shall stabilized immediately after grading.

9. Begin permanent and temporary seeding and mulching. All cut and fill slopes and disturbed areas shall be seeded or mulched as required, or directed. Any area disturbed by construction will be re-stabilized within 45 days (Env-Wq 1504.16) and abutting properties will not be adversely affected by this development. All swales and drainage structures will be constructed and stabilized prior to having run-off directed to them. IAW EPA 2022 CGP 2.2.14, site stabilization will be initiated immediately in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days. The installation of stabilization will be completed as soon as practicable but no later than 14 calendar days. All roadways and parking areas shall be stabilized within 72 hours of achieving finished grades. All cut and fill slopes shall be stabilized within 72 hours of achieving finished grades.

10. Construct temporary berms, drains ditches, silt fences, sediment traps, etc. Mulch and seed as required.

11. Inspect and maintain all erosion and sediment control measures during construction. All SWPPP inspections must be conducted by a qualified professional such as a professional engineer (PE), a certified professional in erosion and sediment control (CPESC), a certified erosion sediment and storm water inspector (CESSWI), or a certified professional in storm water quality (CPSWQ). Inspection reports shall be submitted to the Planning Department. Inspections shall be conducted weekly and within 24 hours of a 0.25 inch rain event.

12. Complete permanent seeding and landscaping.

13. Remove temporary erosion control measures after seeding areas have established themselves and site improvements are complete.

14. Smooth and revegetate all disturbed areas. Stabilization should occur within 14 days or removing temporary measures.

15. Finish paving all roadways.

Temporary Erosion Control Measures

1. The smallest practical area of land shall be exposed at any one time.

2. Erosion, sediment and detention measures shall be installed as shown on the plans and at locations as required, directed by the engineer.

3. All disturbed areas shall be returned to original grades and elevations. Disturbed areas shall be loamed with a minimum of 4" of loam and seeded with not less than one pound of seed per 50 square yards of area. Apply hay or straw mulch or straw mulch with rye grass seed to temporarily stabilize the area until final grade is achieved.

4. All disturbed areas will be restabilized within 45 days. At any one time, no more than 5 acres, (217,800 sq. Ft.) Will be disturbed.

5. Silt fences and perimeter barriers shall be inspected periodically and after every rain during the life of the project. All damaged areas shall be repaired, sediment deposits shall periodically be removed and disposed of.

6. After all disturbed areas have been stabilized, the temporary erosion and sediment control measures are to be removed and the area disturbed by the removal smoothed and re-vegetated.

7. Per the EPA CGP requirements there will be reports of the erosion control inspections IAW SWPPP prepared by BS&E. All erosion controls shall be inspected weekly and within 24 hours after 0.25" or greater rain event.

8. Ditches, swales, and basins shall be stabilized prior to directing runoff to them.

9. Do not traffic exposed soil surfaces with construction equipment. If feasible, perform excavations with equipment positioned outside the limits of the infiltration system.

10. Roadways, driveways and cut and fill slopes must be stabilized within 72 hours of achieving final grade.

11. Stabilization means:
    - 11.1. A minimum of 85% of vegetative cover has been established.
    - 11.2. A minimum of 3 inches of non-erosive material such as stone or rip rap has been installed, or
    - 11.3. Erosion control blankets have been installed.

12. This project is to be managed in a manner that meets the requirements and intent of RSA 430:53 and chapter AGR 3800 relative to invasive species.

13. The NHDES stormwater manual, in three volumes, dated December 2008, is a part of this plan set and the more restrictive will govern. (NH SWM)

Inspection and Maintenance Schedule

Perimeter control and catch basin inlet protection will be inspected during and after storm events of 0.25" or greater to ensure that the BMP still has integrity and is not allowing sediment to pass. Depending on SWPPP criteria, all BMP controls will be inspected once every 7 days and after storm events. Inspection reports must be submitted to Town of Barrington Planning Department. See also Stormwater System Management: Inspection and Maintenance Manual with accompanying plan published separately also by Berry Surveying & Engineering. See also Storm Water Pollution Prevention Plan (SWPPP) developed in accordance with EPA NPDES requirements & the Town of Barrington Stormwater regulations.

Corrective Action measures will be made in accordance with SWPPP requirements and records maintained on site by the Contractor.

5.0 CONCLUSION

Peak rates of runoff flow are modeled to be reduced in the post-construction analysis, as compared to the pre-construction analysis. This reduction occurs at all storm events due to the installation of the low impact development stormwater devices.

The volume of stormwater discharge from the site at the final reach is minimally increased in all events due to the construction of the proposed building and paved area. The 2Yr.-24Hr. volume increase is less than 0.100 acre feet, allowed by Env-Wq 1507.05(b)(1)(a)&(b) for Channel Protection Volume purposes.

A Site Specific, Terrain Alteration Permit (RSA 485: A-17) is required for this site plan due to the area of disturbance being greater than 100,000 SF (212,000SF).

Respectfully Submitted,
BERRY SURVEYING & ENGINEERING

Kevin R. Poulin, PE
Design Engineer

Kenneth A. Berry PE, LLS,
CPSWQ, CPESC, CESSWI
Principal, VP - Technical Operations

Christopher R. Berry, SIT 567
Principal, President

Appendix I – Existing Conditions Analysis

2 Yr - 24 Hr. Node Listing
10 Yr -24 Hr. Node Listing
25 Yr -24 Hr. Node Listing
50 Yr - 24 Hr. Node Listing
100 Yr -24 Hr. Node Listing
25 Yr - 24 Hr. Full Summary

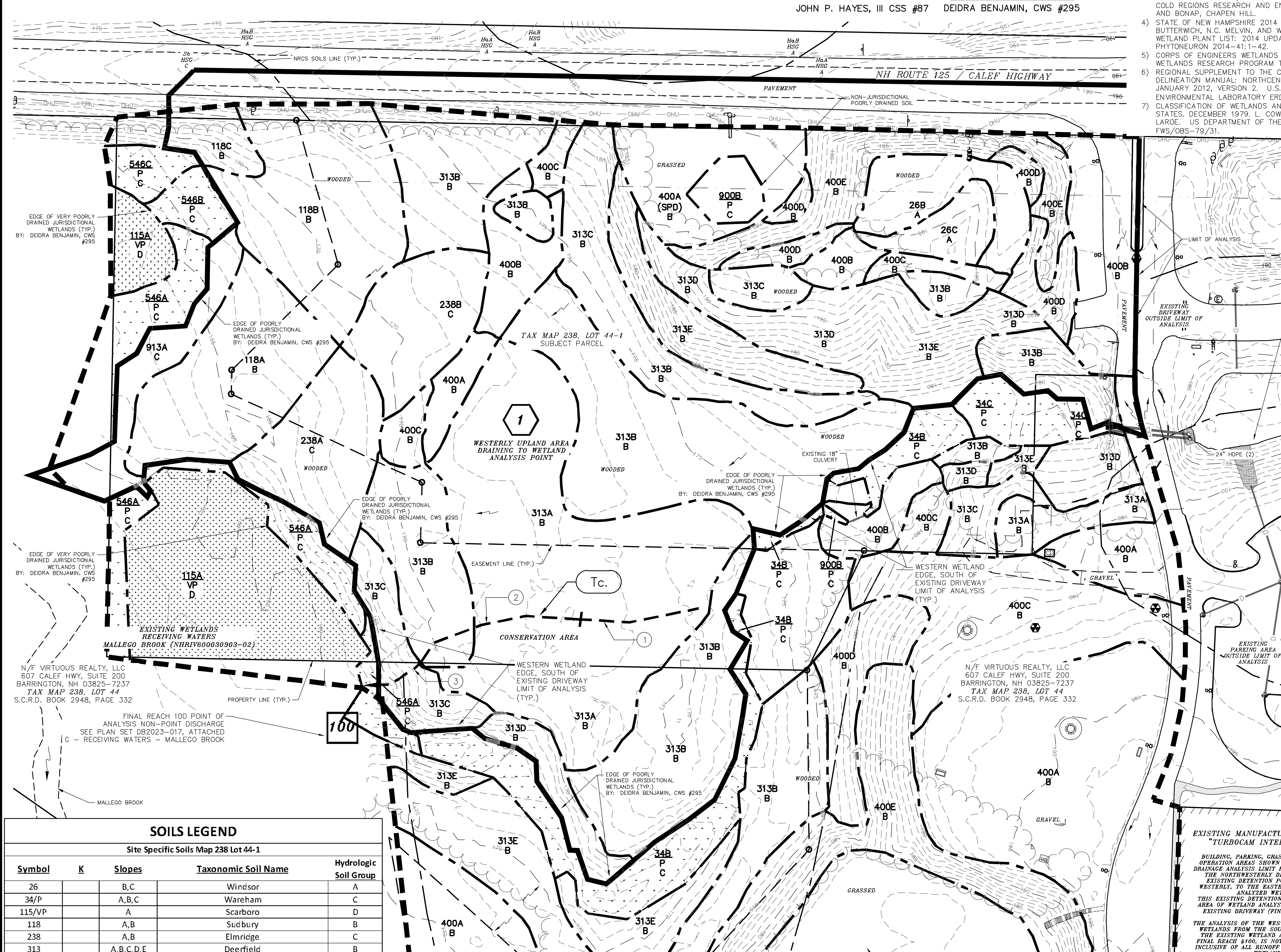
OFF-SITE SOILS:

HaA – HINCKLEY, LOAMY SAND 0 – 3% SLOPES
HaB – HINCKLEY, LOAMY SAND 3 – 8% SLOPES
Sb – SAUGATUCK, LOAMY SAND

SEE: USDA-NRCS WEBSOIL

JOHN P. HAYES, III CSS #87

DEIDRA BENJAMIN, CWS #295



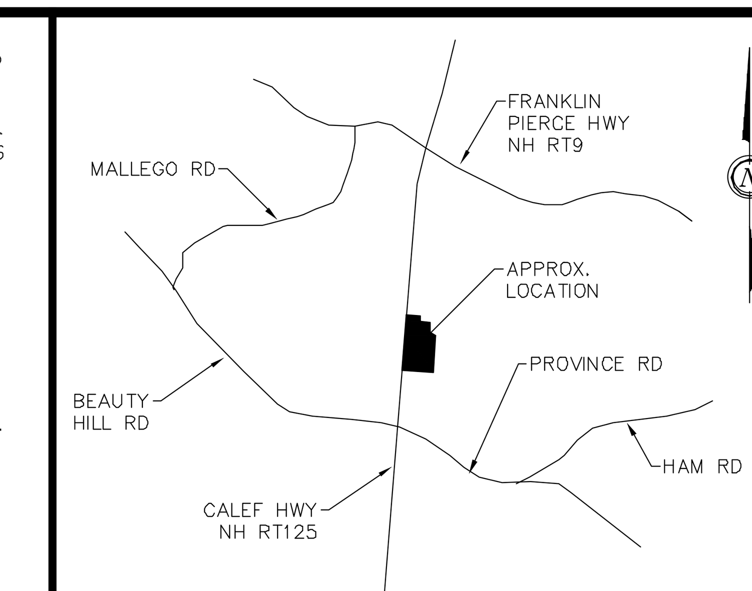
SOILS LEGEND

Site Specific Soils Map 238 Lot 44-1				
Symbol	K	Slopes	Taxonomic Soil Name	Hydrologic Soil Group
26		B,C	Windsor	A
34/P		A,B,C	Wareham	C
115/VP		A	Scarboro	D
118		A,B	Sudbury	B
238		A,B	Elmridge	C
313		A,B,C,D,E	Deerfield	B
400		A,B,C,D,E	Udorthents	B
400(SPD)		A	Udorthents (Somewhat Poorly Drained)	C
546/P		A,B,C	Walpole	C
900/P		A,B	Endoaquents	C
913		A	Sudbury (Somewhat Poorly Drained)	C

Slopes: A = 0-3% B = 3-8% C = 8-15% D = 15-25% E = 25- 50% F = 50%+
Denominators: /P = Poorly Drained /VP = Very Poorly Drained /Rk = Rocky

WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN APRIL OF 2023 AND JANUARY OF 2024 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014–41:1–42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y–87–1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR–12–1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS–79/31.



LOCATION PLAN
BARRINGTON, NH
NOT TO SCALE

NOTES:

1.) OWNER: NHBBC, LLC
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

1A.) APPLICANT: TURBOCAM, INC.
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

2.) TAX MAP 238, LOT 44–1

3.) LOT AREA: 346,738 Sq.Ft., 7.96 Ac.

4.) S.C.R.D. BOOK 3689, PAGE 754

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING CARLSON BRX7 SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING WATERSHED CONDITIONS OF TAX MAP 238, LOT 44–1 AS OF THE DATE OF SURVEY.

7.) HYDROCAD USES A SERIES OF NODE SUFFIXES FOR NUMBERING PURPOSES (S=SUBCATCHMENT, P=POND DEVICE, R=REACH), TO SIMPLIFY ANNOTATION THESE SUFFIXES ARE LEFT OFF THE WATERSHED PLANS AND NODE TYPE IS DENOTED BY THE SYMBOL SHAPE ACCORDING TO THE DISPLAYED LEGEND WHICH COINCIDES WITH HYDROCAD GRAPHICS.

LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY
SOIL LINE
448A SOIL SERIES
NRCS SOIL LINE
HfB NRCS SOIL LABEL
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
TBR TO BE REMOVED

SYMBOLS LEGEND:

SUBCATCHMENT AREA SYMBOL
FLOW REACH SYMBOL
POND DEVICE SYMBOL
TIME OF CONCENTRATION SEGMENT

EXISTING MANUFACTURING FACILITY "TURBOCAM INTERNATIONAL"

BUILDING, PARKING, GRASSED, AND OTHER OPERATION AREAS SHOWN OUTSIDE OF THE DRAINAGE ANALYSIS LIMIT FLOW GENERALLY IN THE NORTHWESTERLY DIRECTION TO AN EXISTING DETENTION POND, OR SOUTH WESTERLY, TO THE EASTERN EDGE OF THE ANALYZED WETLAND. THIS EXISTING DETENTION POND DRAINS TO AREA OF WETLAND ANALYSIS SOUTH OF THE EXISTING DRIVEWAY (FINAL REACH #100).

THE ANALYSIS OF THE WESTERN EDGE OF THE WETLANDS FROM THE SOUTH AND WEST OF THE EXISTING WETLAND AND DRIVEWAY AS FINAL REACH #100, IS NOT INTENDED TO BE INCLUSIVE OF ALL RUNOFF DRAINING TO THIS WETLAND.

THE LIMITS SHOWN ARE INTENDED TO ANALYZE THE RUNOFF DIRECTLY CONTRIBUTING TO THE WESTERN EDGE OF THE WETLAND, FROM SOUTH AND WEST OF THE EXISTING DRIVEWAY FROM THE PROPOSED DEVELOPMENT OF LOT 44–1.

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

SWPPP EPA SITE MAP (EXISTING)

REVISION	DATE	DESCRIPTION
#1A	04–04–24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

W–1 EXISTING WATERSHED PLAN
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44–1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332–2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 – 017

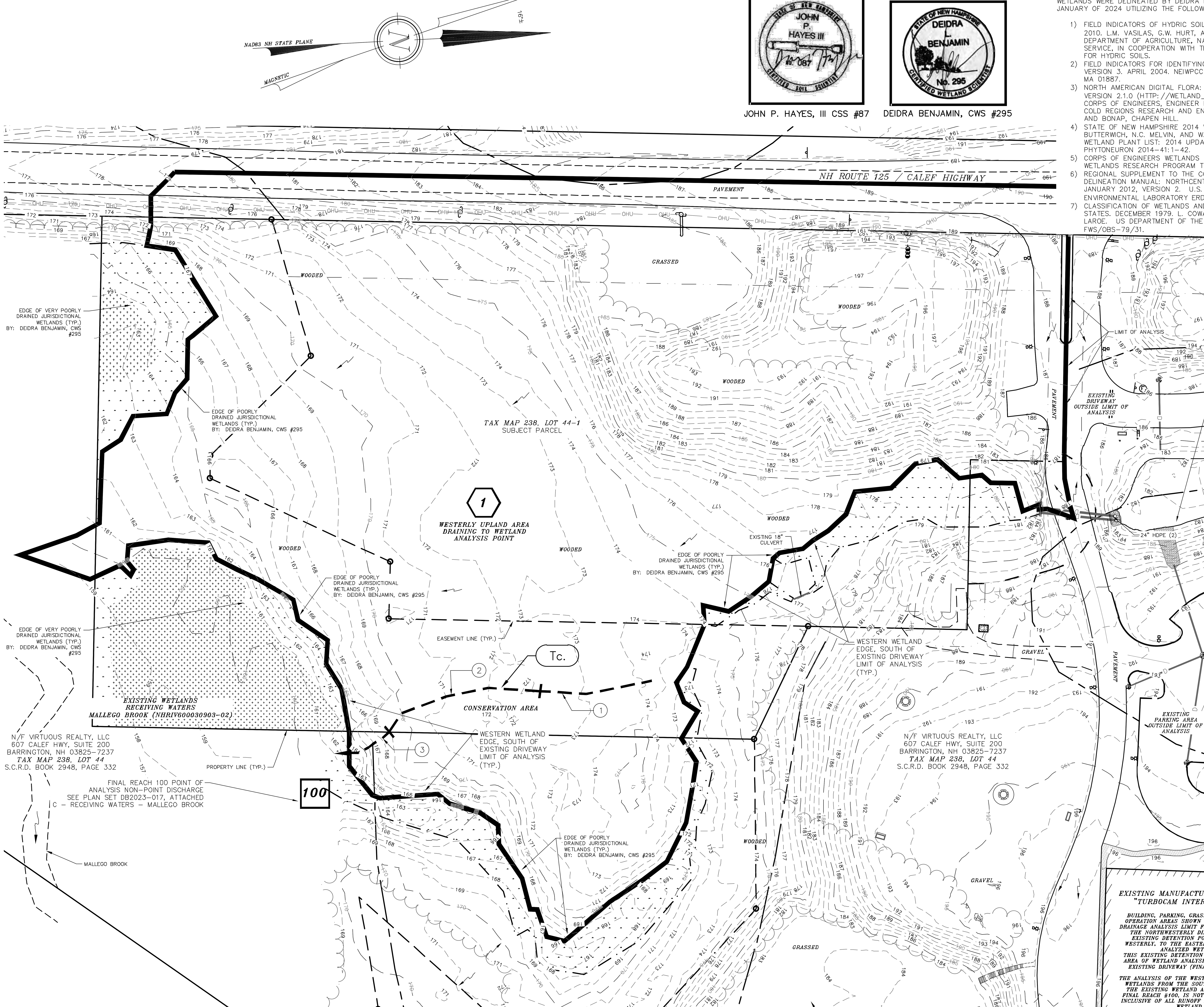
SHEET 1 OF 2

WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN APRIL OF 2023 AND JANUARY OF 2024 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014-41:1-42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y-87-1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR-12-1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS-79/31.

JOHN P. HAYES, III CSS #87

DEIDRA BENJAMIN, CWS #295

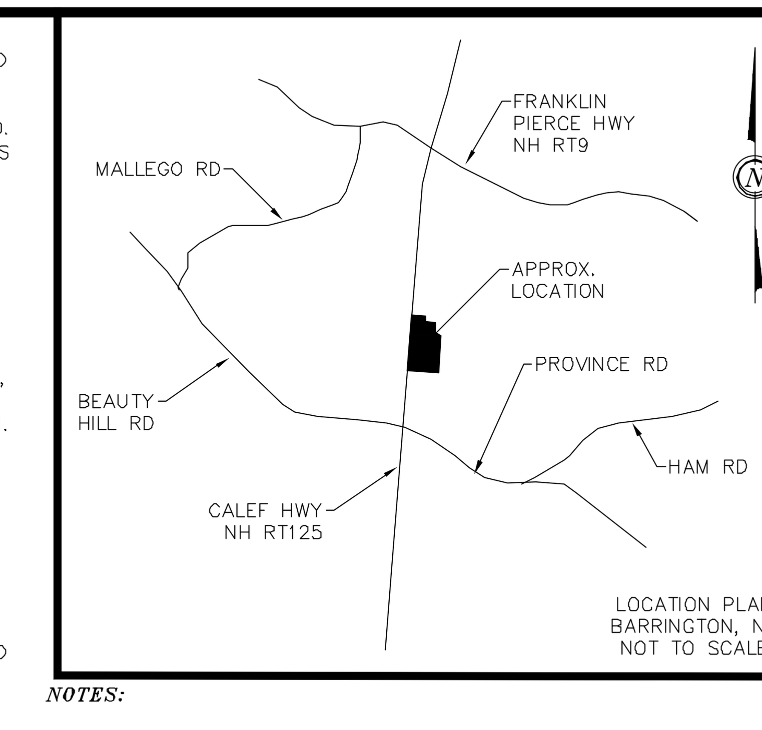


EXISTING MANUFACTURING FACILITY "TURBOCAM INTERNATIONAL"

BUILDING, PARKING, GRASSED, AND OTHER OPERATION AREAS SHOWN OUTSIDE OF THE DRAINAGE ANALYSIS LIMIT FLOW GENERALLY IN THE NORTHWESTERLY DIRECTION TO AN EXISTING DETENTION POND, OR SOUTH WESTERLY, TO THE EASTERN EDGE OF THE ANALYZED WETLAND.
THIS EXISTING DETENTION POND DRAINS TO AREA OF WETLAND ANALYSIS SOUTH OF THE EXISTING DRIVEWAY (FINAL REACH #100).

THE ANALYSIS OF THE WESTERN EDGE OF THE WETLANDS FROM THE SOUTH AND WEST OF THE EXISTING WETLAND AND DRIVEWAY AS FINAL REACH #100, IS NOT INTENDED TO BE INCLUSIVE OF ALL RUNOFF DRAINING TO THIS WETLAND.

THE LIMITS SHOWN ARE INTENDED TO ANALYZE THE RUNOFF DIRECTLY CONTRIBUTING TO THE WESTERN EDGE OF THE WETLAND, FROM SOUTH AND WEST OF THE EXISTING DRIVEWAY FROM THE PROPOSED DEVELOPMENT OF LOT 44-1.



NOTES:

1.) OWNER: NHBBC, LLC
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

1A.) APPLICANT: TURBOCAM, INC.
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

2.) TAX MAP 238, LOT 44-1

3.) LOT AREA: 346,738 Sq.Ft., 7.96 Ac.

4.) S.C.R.D. BOOK 3689, PAGE 754

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING CARLSON BRX7 SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING WATERSHED CONDITIONS OF TAX MAP 238, LOT 44-1 AS OF THE DATE OF SURVEY.

7.) HYDROCAD USES A SERIES OF NODE SUFFIXES FOR NUMBERING PURPOSES (S=SUBCATCHMENT, P=POND DEVICE, R=REACH). TO SIMPLIFY ANNOTATION THESE SUFFIXES ARE LEFT OFF THE WATERSHED PLANS AND NODE TYPE IS DENOTED BY THE SYMBOL SHAPE ACCORDING TO THE DISPLAYED LEGEND WHICH COINCIDES WITH HYDROCAD GRAPHICS.

LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
WETLAND LINE
LIMIT OF WATERSHED
TIME OF CONCENTRATION PATH
FLOW REACH
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
TBR TO BE REMOVED

SYMBOLS LEGEND:

SUBCATCHMENT AREA SYMBOL
FLOW REACH SYMBOL
POND DEVICE SYMBOL
Tc. TIME OF CONCENTRATION SEGMENT

GRAPHIC SCALE

50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

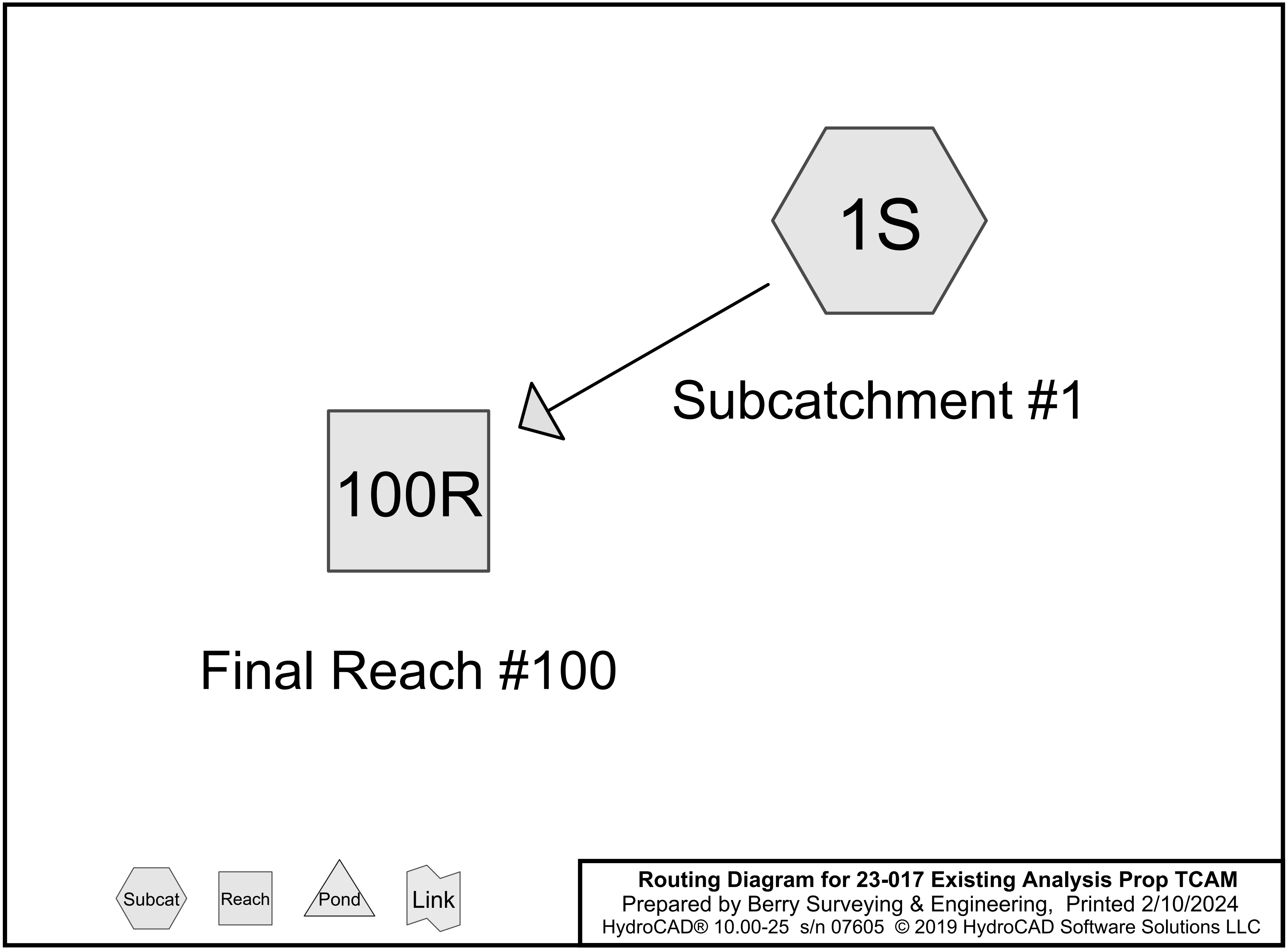
SWPPP EPA SITE MAP (EXISTING)

W-1 EXISTING WATERSHED PLAN (SOILS REMOVED)
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE KENNETH A. BERRY LICENSED PROFESSIONAL ENGINEER



Routing Diagram for 23-017 Existing Analysis Prop TCAM
Prepared by Berry Surveying & Engineering, Printed 2/10/2024

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=343,596 sf 7.61% Impervious Runoff Depth>0.30"
Flow Length=286' Tc=28.1 min UI Adjusted CN=58 Runoff=0.87 cfs 0.195 af

Reach 100R: Final Reach #100 Inflow=0.87 cfs 0.195 af
Outflow=0.87 cfs 0.195 af

Total Runoff Area = 7.888 ac Runoff Volume = 0.195 af Average Runoff Depth = 0.30"
92.39% Pervious = 7.287 ac 7.61% Impervious = 0.601 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=343,596 sf 7.61% Impervious Runoff Depth>0.97"
Flow Length=286' Tc=28.1 min UI Adjusted CN=58 Runoff=4.41 cfs 0.640 af

Reach 100R: Final Reach #100 Inflow=4.41 cfs 0.640 af
Outflow=4.41 cfs 0.640 af

Total Runoff Area = 7.888 ac Runoff Volume = 0.640 af Average Runoff Depth = 0.97"
92.39% Pervious = 7.287 ac 7.61% Impervious = 0.601 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=343,596 sf 7.61% Impervious Runoff Depth>1.66"
Flow Length=286' Tc=28.1 min UI Adjusted CN=58 Runoff=8.28 cfs 1.093 af

Reach 100R: Final Reach #100 Inflow=8.28 cfs 1.093 af
Outflow=8.28 cfs 1.093 af

Total Runoff Area = 7.888 ac Runoff Volume = 1.093 af Average Runoff Depth = 1.66"
92.39% Pervious = 7.287 ac 7.61% Impervious = 0.601 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=343,596 sf 7.61% Impervious Runoff Depth>2.41"
Flow Length=286' Tc=28.1 min UI Adjusted CN=58 Runoff=12.46 cfs 1.581 af

Reach 100R: Final Reach #100 Inflow=12.46 cfs 1.581 af
Outflow=12.46 cfs 1.581 af

Total Runoff Area = 7.888 ac Runoff Volume = 1.581 af Average Runoff Depth = 2.41"
92.39% Pervious = 7.287 ac 7.61% Impervious = 0.601 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=343,596 sf 7.61% Impervious Runoff Depth>3.38"
Flow Length=286' Tc=28.1 min UI Adjusted CN=58 Runoff=17.88 cfs 2.219 af

Reach 100R: Final Reach #100 Inflow=17.88 cfs 2.219 af
Outflow=17.88 cfs 2.219 af

Total Runoff Area = 7.888 ac Runoff Volume = 2.219 af Average Runoff Depth = 3.38"
92.39% Pervious = 7.287 ac 7.61% Impervious = 0.601 ac

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.222	39	>75% Grass cover, Good, HSG A (1S)
0.797	61	>75% Grass cover, Good, HSG B (1S)
0.079	74	>75% Grass cover, Good, HSG C (1S)
0.407	98	Unconnected pavement, HSG A (1S)
0.153	98	Unconnected pavement, HSG B (1S)
0.041	98	Unconnected pavement, HSG C (1S)
0.243	30	Woods, Good, HSG A (1S)
5.285	55	Woods, Good, HSG B (1S)
0.662	70	Woods, Good, HSG C (1S)
7.888	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.872	HSG A	1S
6.234	HSG B	1S
0.781	HSG C	1S
0.000	HSG D	
0.000	Other	
7.888		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.222	0.797	0.079	0.000	0.000	1.098	>75% Grass cover, Good	1S
0.407	0.153	0.041	0.000	0.000	0.601	Unconnected pavement	1S
0.243	5.285	0.662	0.000	0.000	6.190	Woods, Good	1S
0.872	**6.234**	**0.781**	**0.000**	**0.000**	**7.888**	**TOTAL AREA**	

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=343,596 sf 7.61% Impervious Runoff Depth>1.66"
Flow Length=286' Tc=28.1 min UI Adjusted CN=58 Runoff=8.28 cfs 1.093 af

Reach 100R: Final Reach #100 Inflow=8.28 cfs 1.093 af
Outflow=8.28 cfs 1.093 af

Total Runoff Area = 7.888 ac Runoff Volume = 1.093 af Average Runoff Depth = 1.66"
92.39% Pervious = 7.287 ac 7.61% Impervious = 0.601 ac

Summary for Subcatchment 1S: Subcatchment #1

CarlsonPlanXYPos|1163200.9867|257431.8152|

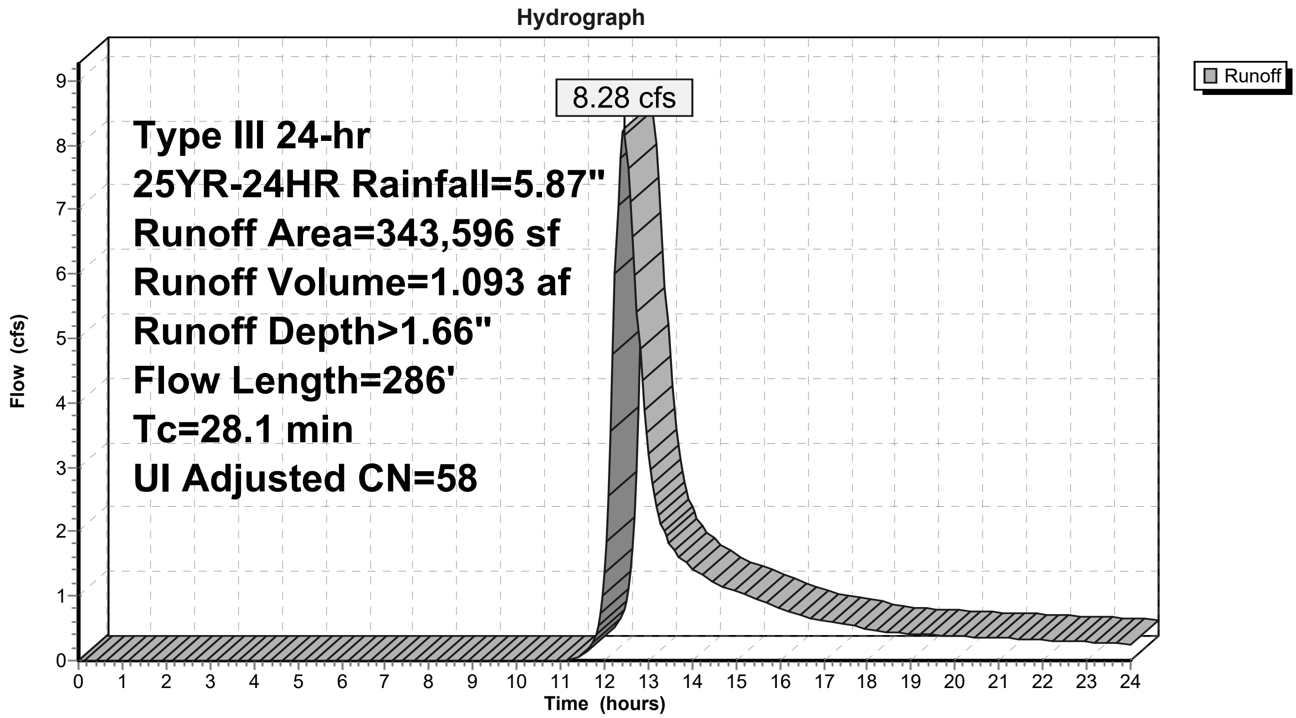
Runoff = 8.28 cfs @ 12.44 hrs, Volume= 1.093 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Adj	Description
9,684	39		>75% Grass cover, Good, HSG A
17,728	98		Unconnected pavement, HSG A
10,594	30		Woods, Good, HSG A
34,699	61		>75% Grass cover, Good, HSG B
6,666	98		Unconnected pavement, HSG B
230,208	55		Woods, Good, HSG B
3,433	74		>75% Grass cover, Good, HSG C
28,818	70		Woods, Good, HSG C
1,766	98		Unconnected pavement, HSG C
343,596	59	58	Weighted Average, UI Adjusted
317,436			92.39% Pervious Area
26,160			7.61% Impervious Area
26,160			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.6	100	0.0150	0.07		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.08"
3.1	145	0.0241	0.78		**Shallow Concentrated Flow, Segment #2** Woodland Kv= 5.0 fps
0.4	41	0.1460	1.91		**Shallow Concentrated Flow, Segment #3** Woodland Kv= 5.0 fps
28.1	286	Total			

Subcatchment 1S: Subcatchment #1



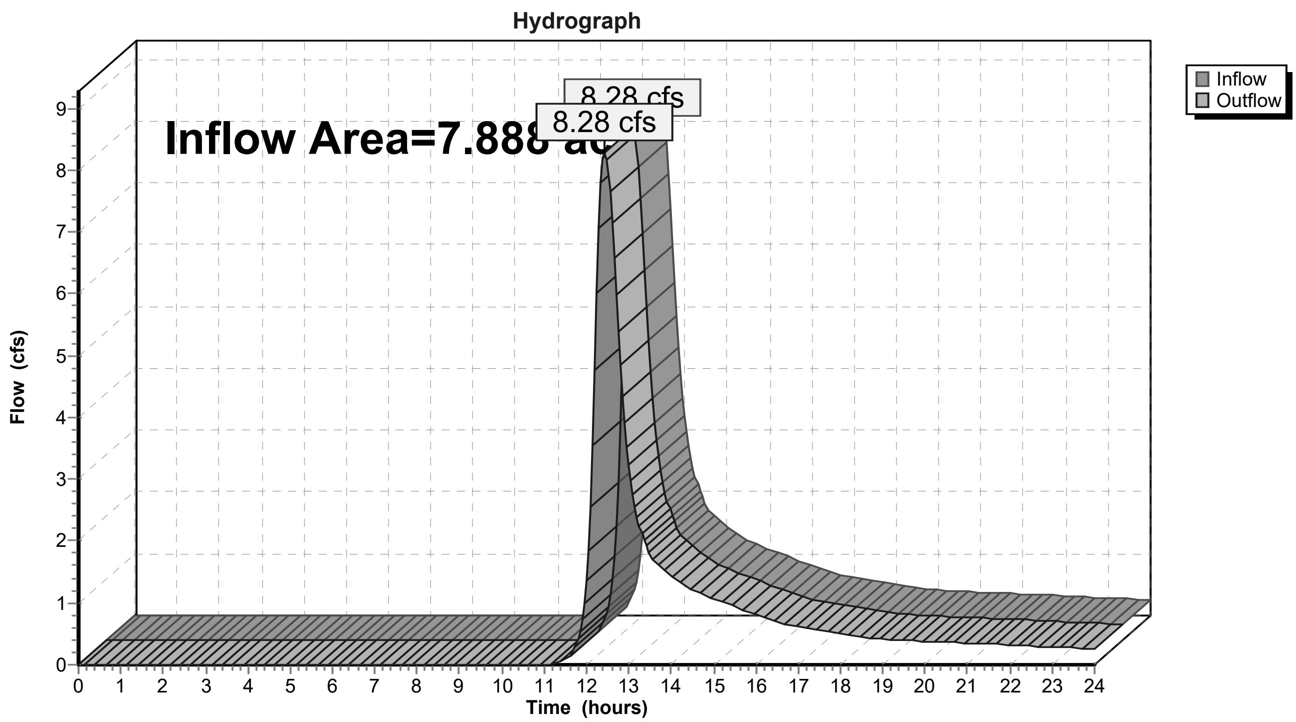
Summary for Reach 100R: Final Reach #100

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

Inflow Area = 7.888 ac, 7.61% Impervious, Inflow Depth > 1.66" for 25YR-24HR event
Inflow = 8.28 cfs @ 12.44 hrs, Volume= 1.093 af
Outflow = 8.28 cfs @ 12.44 hrs, Volume= 1.093 af, Atten= 0%, Lag= 0.0 min

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

Reach 100R: Final Reach #100



Appendix II - Proposed Conditions Analysis

2 Yr - 24 Hr. Node Listing
10 Yr -24 Hr. Node Listing
25 Yr -24 Hr. Node Listing
50 Yr - 24 Hr. Node Listing
100 Yr -24 Hr. Node Listing
25 Yr - 24 Hr. Full Summary
50 YR-24-Hr. Swale Capacity Analysis

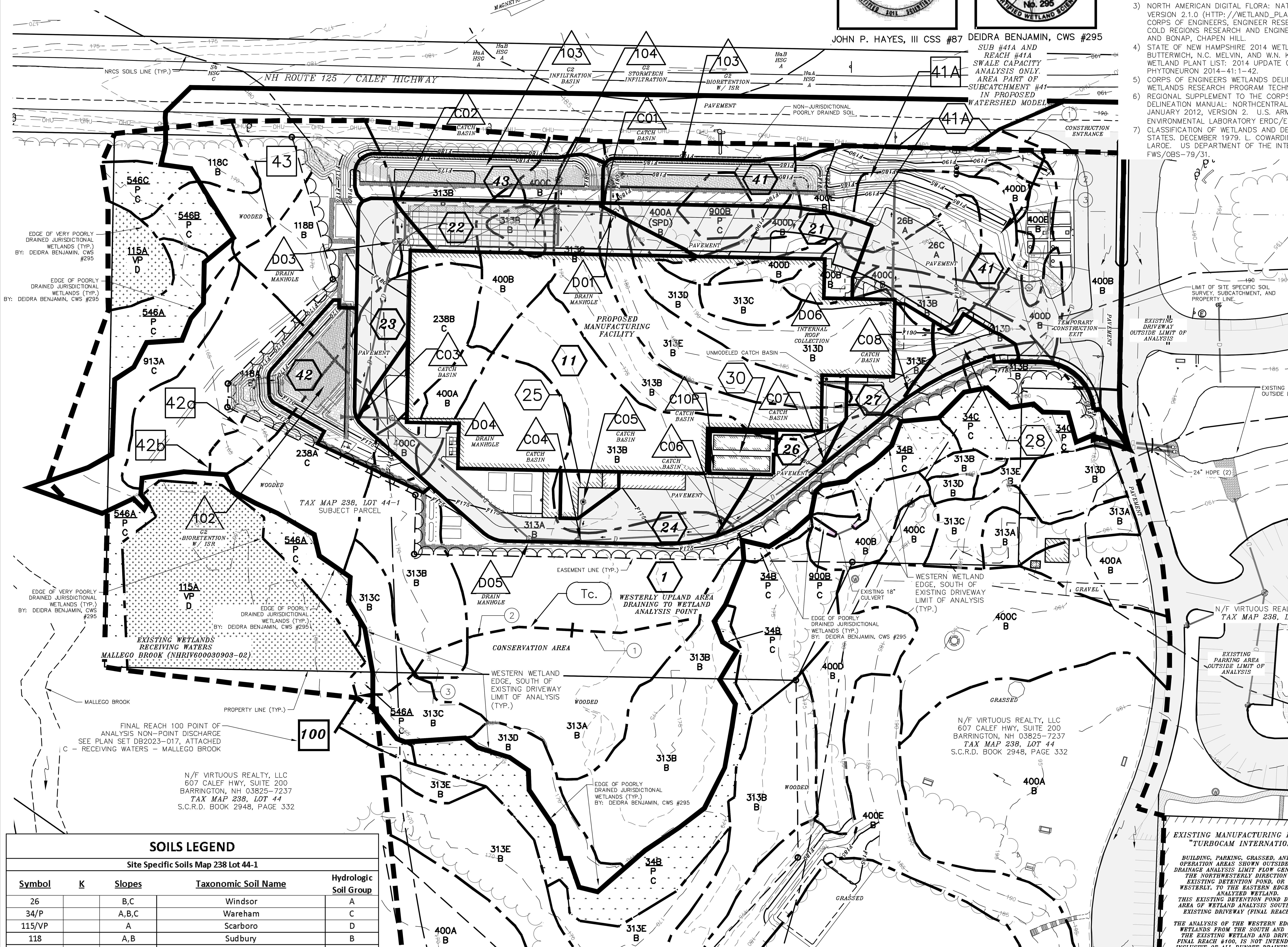
OFF-SITE SOILS:

HaA - HINCKLEY, LOAMY SAND 0 - 3% SLOPES
HaB - HINCKLEY, LOAMY SAND 3 - 8% SLOPES
Sb - SAUGATUCK, LOAMY SAND

SEE: USDA-NRCS WEBSOIL

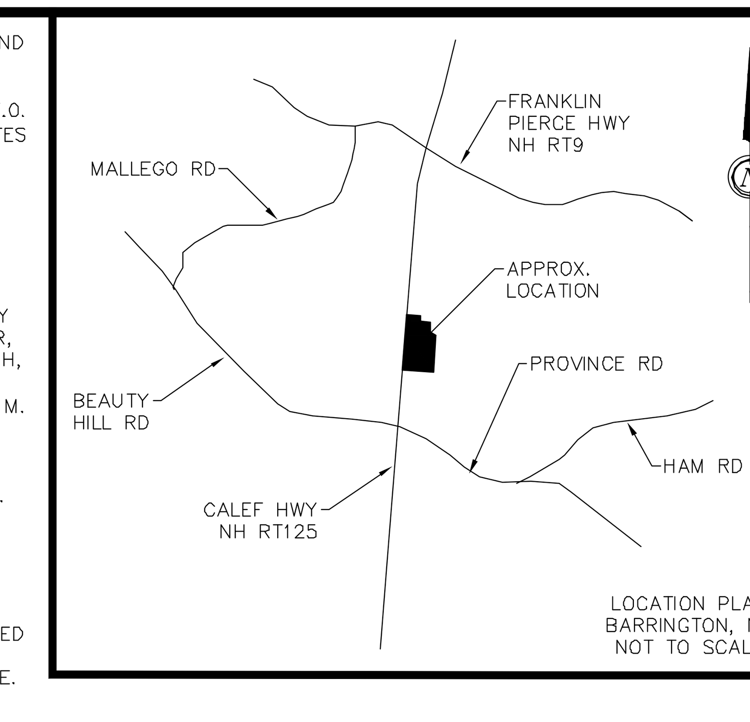
JOHN P. HAYES, III CSS #87

DEIDRA BENJAMIN, CWS #295



WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN APRIL OF 2023 AND JANUARY OF 2024 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014-41:1-42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y-87-1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR-12-1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS-79/31.



NOTES:

1.) OWNER: NHBBC, LLC
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

1A.) APPLICANT: TURBOCAM, INC.
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

2.) TAX MAP 238, LOT 44-1

3.) LOT AREA: 346,738 Sq.Ft., 7.96 Ac.

4.) S.C.R.D. BOOK 3689, PAGE 754

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING CARLSON BRX7 SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE POST CONSTRUCTION DRAINAGE CONDITIONS OF TAX MAP 238, LOT 44-1.

7.) SEE PROPOSED GRADING & DRAINAGE PLAN FOR SLOPES & EROSION & SEDIMENT CONTROL PLAN FOR STOCKPILE AREA AND CONSTRUCTION ENTRANCE.

8.) HYDROCAD USES A SERIES OF NODE SUFFIXES FOR NUMBERING PURPOSES (S=SUBCATCHMENT, P=POND DEVICE, R=REACH), TO SIMPLIFY ANNOTATION THESE SUFFIXES ARE LEFT OFF THE WATERSHED PLANS AND NODE TYPE IS DENOTED BY THE SYMBOL SHAPE ACCORDING TO THE DISPLAYED LEGEND WHICH COINCIDES WITH HYDROCAD GRAPHICS.

SYMBOLS LEGEND:

FLOW REACH SYMBOL

POND DEVICE SYMBOL

LEGEND:

EXISTING CONTOUR MINOR
EXISTING CONTOUR MAJOR
STONE WALL
WETLAND LINE
LIMIT OF SITE SPECIFIC SOIL SURVEY MAPPING
SOIL LINE
SOIL SERIES
NRCS SOIL LINE
NRCS SOIL LABEL
LIMIT OF WATERSHED/SUBCATCHMENT
TIME OF CONCENTRATION PATH
FLOW REACH
MATCH LINE
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS
TYP. TYPICAL
FND FOUND
TBR TO BE REMOVED
DRAIN MANHOLE W/STRUCTURE
CATCH BASIN W/ STRUCTURE
STORMWATER BMP OUTLET STRUCTURE
DRAIN CULVERT W/ FLARED END SECTION (F.E.S.) UNDERDRAIN
RIP RAP
STORMWATER BEST MANAGEMENT PRACTICE (BMP)
BERM
RETAINING WALL
STORMTECH CHAMBERS/ISOLATOR ROW

SOILS LEGEND

Site Specific Soils Map 238 Lot 44-1

Symbol	K	Slopes	Taxonomic Soil Name	Hydrologic Soil Group
26		B,C	Windsor	A
34/P		A,B,C	Wareham	C
115/VP		A	Scarboro	D
118		A,B	Sudbury	B
238		A,B	Elmridge	C
313		A,B,C,D,E	Deerfield	B
400		A,B,C,D,E	Udorthents	B
400(SPD)		A	Udorthents (Somewhat Poorly Drained)	C
546/P		A,B,C	Walpole	C
900/P		A,B	Endoaquents	C
913		A	Sudbury (Somewhat Poorly Drained)	C

Slopes: A = 0-3% B = 3-8% C = 8-15% D = 15-25% E = 25- 50% F = 50%+
Denominators: /P = Poorly Drained /VP = Very Poorly Drained /Rk = Rocky

NOTES (CONT.):

10.) EPA CGP 7.2.4 SITE MAP LEGEND

B5 VEHICLE EXIT
C RECEIVING WATERS
G2 STORMWATER BEST MANAGEMENT PRACTICE

SEE ALSO:

GRADING & DRAINAGE PLAN
EROSION & SEDIMENT CONTROL PLAN
DRAINAGE ANALYSIS & EROSION AND SEDIMENT CONTROL MANUAL
DRAINAGE OPERATION: INSPECTION & MAINTENANCE MANUAL

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

SWPPP EPA SITE MAP (PROPOSED)

DETAIL W-2 PROPOSED WATERSHED PLAN WEST

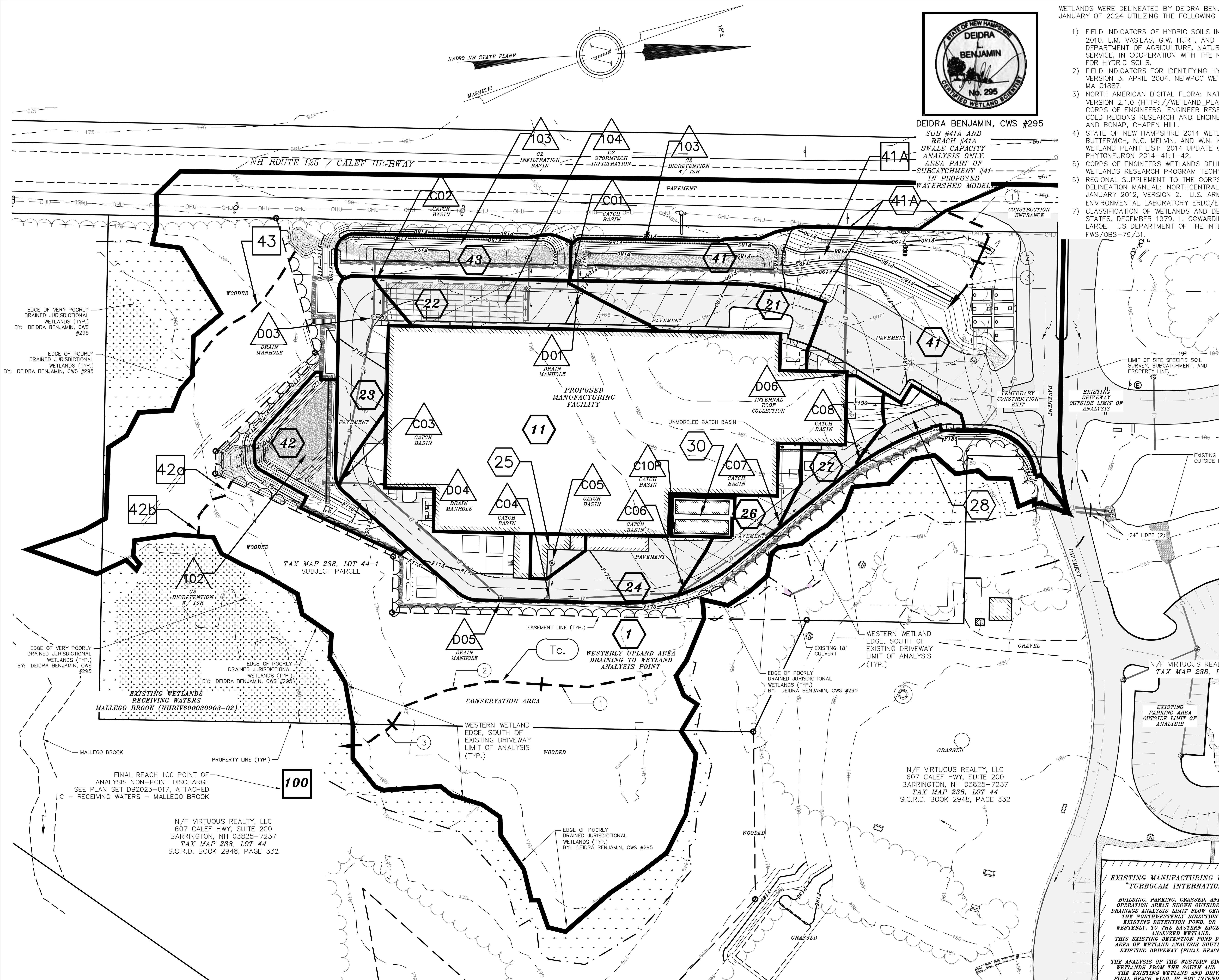
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

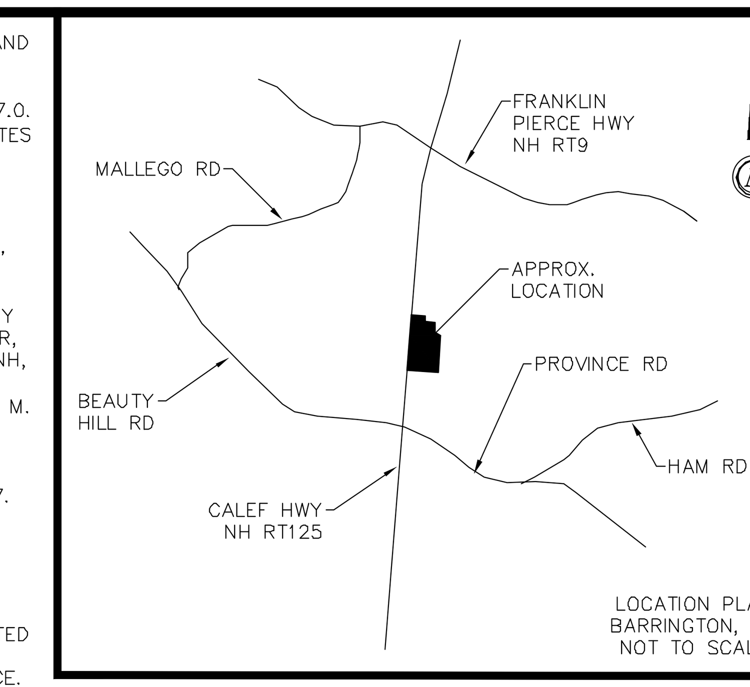
STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14243 LICENSED PROFESSIONAL ENGINEER

SHEET 2 OF 2



WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN APRIL OF 2023 AND JANUARY OF 2024 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014-41:1-42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y-87-1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR-12-1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS-79/31.



LOCATION PLAN
BARRINGTON, NH
NOT TO SCALE

NOTES:

1.) OWNER: NHBBC, LLC
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

1A.) APPLICANT: TURBOCAM, INC.
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

2.) TAX MAP 238, LOT 44-1

3.) LOT AREA: 346,738 Sq.Ft., 7.96 Ac.

4.) S.C.R.D. BOOK 3689, PAGE 754

5.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING CARLSON BRX7 SURVEY GRADE GPS RECEIVERS.

6.) THE INTENT OF THIS PLAN IS TO SHOW THE POST CONSTRUCTION DRAINAGE CONDITIONS OF TAX MAP 238, LOT 44-1.

7.) SEE PROPOSED GRADING & DRAINAGE PLAN FOR SLOPES & EROSION & SEDIMENT CONTROL PLAN FOR STOCKPILE AREA AND CONSTRUCTION ENTRANCE.

8.) HYDROCAD USES A SERIES OF NODE SUFFIXES FOR NUMBERING PURPOSES (S=SUBCATCHMENT, P=POND DEVICE, R=REACH), TO SIMPLIFY ANNOTATION THESE SUFFIXES ARE LEFT OFF THE WATERSHED PLANS AND NODE TYPE IS DENOTED BY THE SYMBOL SHAPE ACCORDING TO THE DISPLAYED LEGEND WHICH COINCIDES WITH HYDROCAD GRAPHICS.

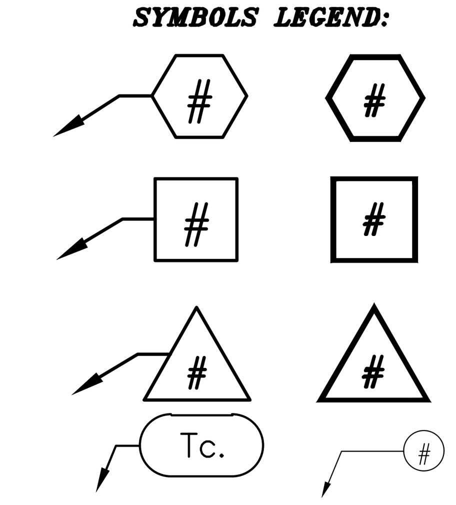
EXISTING MANUFACTURING FACILITY "TURBOCAM INTERNATIONAL"

BUILDING, PARKING, GRASSED, AND OTHER OPERATION AREAS SHOWN OUTSIDE OF THE DRAINAGE ANALYSIS LIMIT FLOW GENERALLY IN THE NORTHWESTERLY DIRECTION TO AN EXISTING DETENTION POND, OR SOUTH WESTERLY, TO THE EASTERN EDGE OF THE ANALYZED WETLAND.
THIS EXISTING DETENTION POND DRAINS TO AREA OF WETLAND ANALYSIS SOUTH OF THE EXISTING DRIVEWAY (FINAL REACH #100).

THE ANALYSIS OF THE WESTERN EDGE OF THE WETLANDS FROM THE SOUTH AND WEST OF THE EXISTING WETLAND AND DRIVEWAY AS FINAL REACH #100, IS NOT INTENDED TO BE INCLUSIVE OF ALL RUNOFF DRAINING TO THIS WETLAND.

THE LIMITS SHOWN ARE INTENDED TO ANALYZE THE RUNOFF DIRECTLY CONTRIBUTING TO THE WESTERN EDGE OF THE WETLAND, FROM SOUTH AND WEST OF THE EXISTING DRIVEWAY FROM THE PROPOSED DEVELOPMENT OF LOT 44-1.

SYMBOLS LEGEND:



FLOW REACH SYMBOL

POND DEVICE SYMBOL

LEGEND:

	EXISTING CONTOUR MINOR
	EXISTING CONTOUR MAJOR
	STONE WALL
	WETLAND LINE
	LIMIT OF WATERSHED/SUBCATCHMENT
	TIME OF CONCENTRATION PATH
	FLOW REACH
S.C.R.D.	STRAFFORD COUNTY REGISTRY OF DEEDS
TYP.	TYPICAL
FND	FOUND
TBR	TO BE REMOVED
	DRAIN MANHOLE W/STRUCTURE
	CATCH BASIN W/ STRUCTURE
	STORMWATER BMP OUTLET STRUCTURE
	DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
U.D	UNDERDRAIN
	RIP RAP
	STORMWATER BEST MANAGEMENT PRACTICE (BMP)
	BERM
	RETAINING WALL
	STORMTECH CHAMBERS/ISOLATOR ROW

NOTES (CONT.):

10.) EPA CGP 7.2.4 SITE MAP LEGEND

B5 VEHICLE EXIT
C RECEIVING WATERS
G2 STORMWATER BEST MANAGEMENT PRACTICE

SEE ALSO:

GRADING & DRAINAGE PLAN
EROSION & SEDIMENT CONTROL PLAN
DRAINAGE ANALYSIS & EROSION AND SEDIMENT CONTROL MANUAL
DRAINAGE OPERATION: INSPECTION & MAINTENANCE MANUAL

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

SWPPP EPA SITE MAP (PROPOSED)

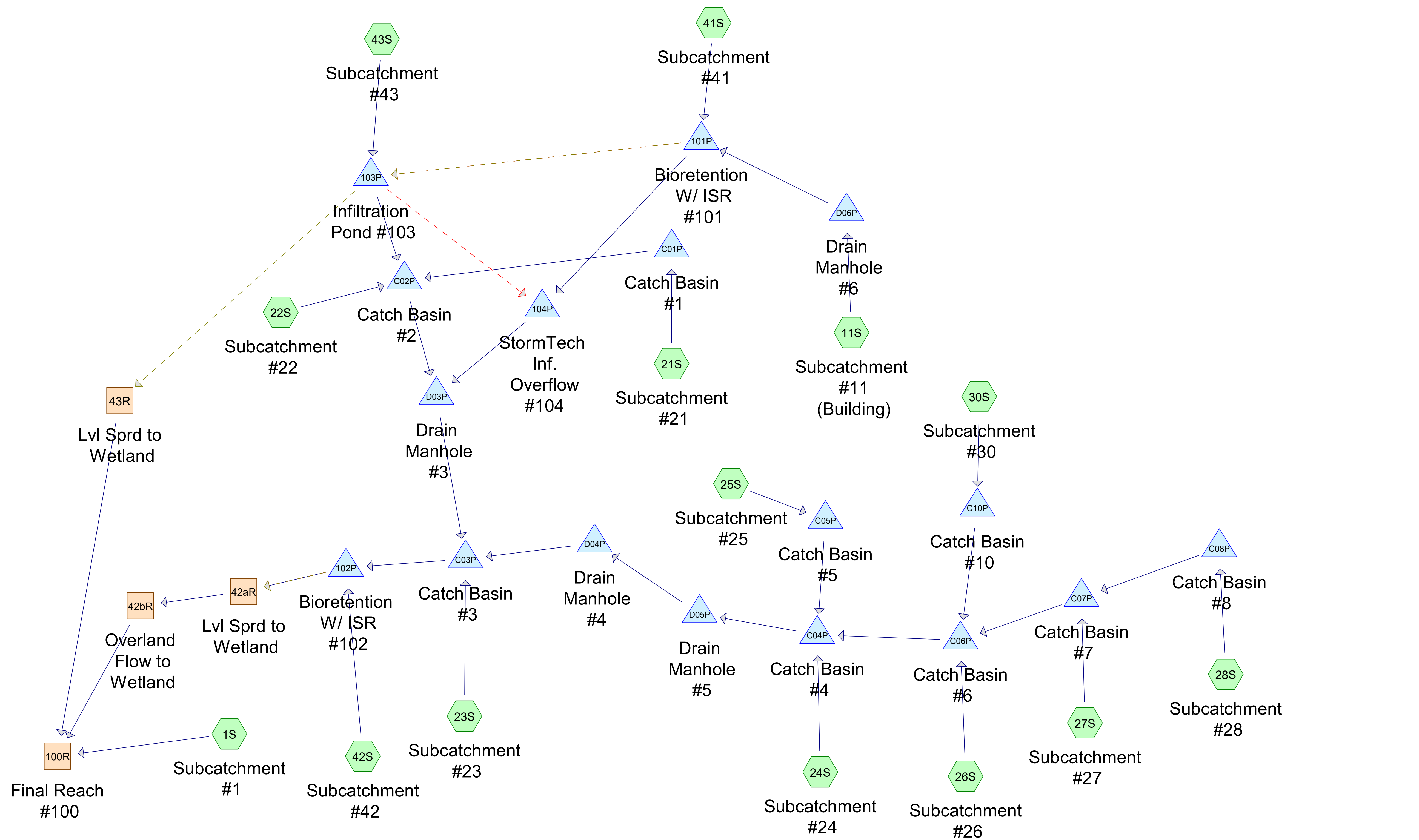
DETAIL W-2 PROPOSED WATERSHED PLAN WEST

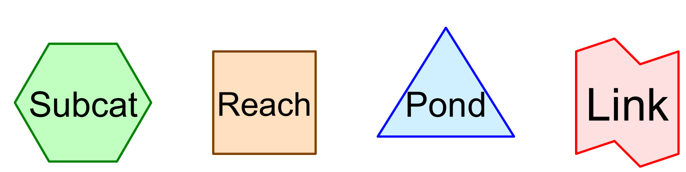
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 50 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14243 LICENSED PROFESSIONAL ENGINEER





Routing Diagram for 23-017 Proposed Analysis Prop TCAM
Prepared by Berry Surveying & Engineering, Printed 4/4/2024
HydroCAD® 10.00-25 s/n 07605 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.354	39	>75% Grass cover, Good, HSG A (1S, 41S)
1.442	61	>75% Grass cover, Good, HSG B (1S, 21S, 22S, 23S, 24S, 26S, 27S, 28S, 41S, 42S, 43S)
0.149	74	>75% Grass cover, Good, HSG C (1S, 23S, 24S, 41S, 42S)
0.010	96	Gravel surface, HSG A (41S)
0.084	96	Gravel surface, HSG B (1S, 41S, 42S, 43S)
0.010	96	Gravel surface, HSG C (41S, 42S)
0.171	98	Paved parking, HSG A (21S, 41S)
1.179	98	Paved parking, HSG B (21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 30S, 41S)
0.133	98	Paved parking, HSG C (21S, 23S, 24S)
1.408	98	Roofs, HSG B (11S, 21S, 24S, 25S, 26S, 27S, 41S)
0.121	98	Roofs, HSG C (11S)
0.338	98	Unconnected pavement, HSG A (1S)
0.006	98	Unconnected pavement, HSG B (1S)
0.041	98	Unconnected pavement, HSG C (1S)
2.115	55	Woods, Good, HSG B (1S)
0.326	70	Woods, Good, HSG C (1S)
7.888	**75**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.872	HSG A	1S, 21S, 41S
6.234	HSG B	1S, 11S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 30S, 41S, 42S, 43S
0.781	HSG C	1S, 11S, 21S, 23S, 24S, 41S, 42S
0.000	HSG D	
0.000	Other	
7.888		**TOTAL AREA**

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=161,060 sf 10.39% Impervious Runoff Depth>0.36"
Flow Length=286' Tc=28.1 min UI Adjusted CN=60 Runoff=0.56 cfs 0.110 af

Subcatchment 11S: Subcatchment #11 Runoff Area=62,630 sf 100.00% Impervious Runoff Depth>2.85"
Tc=6.0 min CN=98 Runoff=4.19 cfs 0.341 af

Subcatchment 21S: Subcatchment #21 Runoff Area=8,602 sf 88.40% Impervious Runoff Depth>2.43"
Tc=6.0 min CN=94 Runoff=0.53 cfs 0.040 af

Subcatchment 22S: Subcatchment #22 Runoff Area=8,537 sf 95.51% Impervious Runoff Depth>2.63"
Tc=6.0 min CN=96 Runoff=0.55 cfs 0.043 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,871 sf 89.89% Impervious Runoff Depth>2.53"
Tc=6.0 min CN=95 Runoff=0.43 cfs 0.033 af

Subcatchment 24S: Subcatchment #24 Runoff Area=16,931 sf 83.07% Impervious Runoff Depth>2.24"
Tc=6.0 min CN=92 Runoff=0.98 cfs 0.072 af

Subcatchment 25S: Subcatchment #25 Runoff Area=1,520 sf 100.00% Impervious Runoff Depth>2.85"
Tc=6.0 min CN=98 Runoff=0.10 cfs 0.008 af

Subcatchment 26S: Subcatchment #26 Runoff Area=4,151 sf 57.19% Impervious Runoff Depth>1.44"
Tc=6.0 min CN=82 Runoff=0.16 cfs 0.011 af

Subcatchment 27S: Subcatchment #27 Runoff Area=4,046 sf 54.00% Impervious Runoff Depth>1.37"
Tc=6.0 min CN=81 Runoff=0.15 cfs 0.011 af

Subcatchment 28S: Subcatchment #28 Runoff Area=2,528 sf 67.56% Impervious Runoff Depth>1.73"
Tc=6.0 min CN=86 Runoff=0.12 cfs 0.008 af

Subcatchment 30S: Subcatchment #30 Runoff Area=1,942 sf 100.00% Impervious Runoff Depth>2.85"
Tc=6.0 min CN=98 Runoff=0.13 cfs 0.011 af

Subcatchment 41S: Subcatchment #41 Runoff Area=49,298 sf 46.37% Impervious Runoff Depth>1.07"
Flow Length=120' Tc=6.0 min CN=76 Runoff=1.34 cfs 0.101 af

Subcatchment 42S: Subcatchment #42 Runoff Area=7,618 sf 0.00% Impervious Runoff Depth>0.71"
Tc=6.0 min CN=69 Runoff=0.12 cfs 0.010 af

Subcatchment 43S: Subcatchment #43 Runoff Area=7,847 sf 0.00% Impervious Runoff Depth>0.50"
Tc=6.0 min CN=64 Runoff=0.08 cfs 0.008 af

Reach 42aR: Lvl Sprd to Wetland Avg. Flow Depth=0.05' Max Vel=0.93 fps Inflow=0.24 cfs 0.121 af
n=0.035 L=38.0' S=0.0395 '/' Capacity=128.49 cfs Outflow=0.24 cfs 0.121 af

Reach 42bR: Overland Flow to Wetland Avg. Flow Depth=0.04' Max Vel=1.39 fps Inflow=0.24 cfs 0.121 af
n=0.035 L=24.0' S=0.1250 '/' Capacity=228.66 cfs Outflow=0.24 cfs 0.121 af

Reach 43R: Lvl Sprd to Wetland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=140.5' S=0.0498 '/' Capacity=96.00 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach #100 Inflow=0.63 cfs 0.231 af
Outflow=0.63 cfs 0.231 af

Pond 101P: Bioretention W/ ISR #101 Peak Elev=183.73' Storage=9,760 cf Inflow=5.53 cfs 0.442 af
Primary=0.14 cfs 0.168 af Secondary=0.50 cfs 0.114 af Tertiary=0.00 cfs 0.000 af Outflow=0.64 cfs 0.282 af

Pond 102P: Bioretention W/ ISR #102 Peak Elev=169.40' Storage=6,388 cf Inflow=3.26 cfs 0.247 af
Primary=0.07 cfs 0.082 af Secondary=0.16 cfs 0.039 af Tertiary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.121 af

Pond 103P: Infiltration Pond #103 Peak Elev=177.13' Storage=3,109 cf Inflow=0.52 cfs 0.122 af
cfs 0.115 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Tertiary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.115 af

Pond 104P: StormTech Inf. Overflow #104 Peak Elev=175.00' Storage=0.014 af Inflow=0.14 cfs 0.168 af
Discarded=0.13 cfs 0.153 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.153 af

Pond C01P: Catch Basin #1 Peak Elev=179.72' Storage=0.000 af Inflow=0.53 cfs 0.040 af
15.0" Round Culvert n=0.012 L=170.0' S=0.0130 '/' Outflow=0.53 cfs 0.040 af

Pond C02P: Catch Basin #2 Peak Elev=177.56' Storage=0.000 af Inflow=1.08 cfs 0.083 af
15.0" Round Culvert n=0.012 L=31.5' S=0.0594 '/' Outflow=1.08 cfs 0.083 af

Pond C03P: Catch Basin #3 Peak Elev=169.41' Storage=0.000 af Inflow=3.13 cfs 0.237 af
24.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=3.14 cfs 0.237 af

Pond C04P: Catch Basin #4 Peak Elev=170.36' Storage=0.000 af Inflow=1.62 cfs 0.122 af
18.0" Round Culvert n=0.012 L=37.0' S=0.0054 '/' Outflow=1.62 cfs 0.122 af

Pond C05P: Catch Basin #5 Peak Elev=170.37' Storage=0.000 af Inflow=0.10 cfs 0.008 af
15.0" Round Culvert n=0.012 L=29.5' S=0.0068 '/' Outflow=0.09 cfs 0.008 af

Pond C06P: Catch Basin #6 Peak Elev=170.86' Storage=0.000 af Inflow=0.55 cfs 0.041 af
15.0" Round Culvert n=0.012 L=116.0' S=0.0056 '/' Outflow=0.55 cfs 0.041 af

Pond C07P: Catch Basin #7 Peak Elev=176.10' Storage=0.000 af Inflow=0.26 cfs 0.019 af
15.0" Round Culvert n=0.012 L=104.0' S=0.0512 '/' Outflow=0.26 cfs 0.019 af

Pond C08P: Catch Basin #8 Peak Elev=180.03' Storage=0.000 af Inflow=0.12 cfs 0.008 af
15.0" Round Culvert n=0.012 L=84.5' S=0.0463 '/' Outflow=0.12 cfs 0.008 af

Pond C10P: Catch Basin #10 Peak Elev=175.47' Storage=0.000 af Inflow=0.13 cfs 0.011 af
6.0" Round Culvert n=0.012 L=53.5' S=0.0439 '/' Outflow=0.13 cfs 0.011 af

Pond D03P: Drain Manhole #3 Peak Elev=175.41' Storage=0.000 af Inflow=1.08 cfs 0.083 af
18.0" Round Culvert n=0.012 L=147.2' S=0.0234 '/' Outflow=1.08 cfs 0.083 af

Pond D04P: Drain Manhole #4 Peak Elev=169.41' Storage=0.000 af Inflow=1.62 cfs 0.122 af
18.0" Round Culvert n=0.012 L=25.0' S=0.0060 '/' Outflow=1.62 cfs 0.121 af

Pond D05P: Drain Manhole #5 Peak Elev=170.03' Storage=0.000 af Inflow=1.62 cfs 0.122 af
18.0" Round Culvert n=0.012 L=150.0' S=0.0053 '/' Outflow=1.62 cfs 0.122 af

Pond D06P: Drain Manhole #6 Peak Elev=186.87' Storage=0.000 af Inflow=4.19 cfs 0.341 af
24.0" Round Culvert n=0.012 L=100.0' S=0.0100 '/' Outflow=4.20 cfs 0.341 af

Total Runoff Area = 7.888 ac Runoff Volume = 0.808 af Average Runoff Depth = 1.23"
56.94% Pervious = 4.491 ac 43.06% Impervious = 3.396 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=161,060 sf 10.39% Impervious Runoff Depth>1.09"
Flow Length=286' Tc=28.1 min UI Adjusted CN=60 Runoff=2.42 cfs 0.337 af

Subcatchment 11S: Subcatchment #11 Runoff Area=62,630 sf 100.00% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=98 Runoff=6.38 cfs 0.529 af

Subcatchment 21S: Subcatchment #21 Runoff Area=8,602 sf 88.40% Impervious Runoff Depth>3.96"
Tc=6.0 min CN=94 Runoff=0.84 cfs 0.065 af

Subcatchment 22S: Subcatchment #22 Runoff Area=8,537 sf 95.51% Impervious Runoff Depth>4.18"
Tc=6.0 min CN=96 Runoff=0.85 cfs 0.068 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,871 sf 89.89% Impervious Runoff Depth>4.07"
Tc=6.0 min CN=95 Runoff=0.68 cfs 0.054 af

Subcatchment 24S: Subcatchment #24 Runoff Area=16,931 sf 83.07% Impervious Runoff Depth>3.75"
Tc=6.0 min CN=92 Runoff=1.59 cfs 0.121 af

Subcatchment 25S: Subcatchment #25 Runoff Area=1,520 sf 100.00% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=98 Runoff=0.15 cfs 0.013 af

Subcatchment 26S: Subcatchment #26 Runoff Area=4,151 sf 57.19% Impervious Runoff Depth>2.77"
Tc=6.0 min CN=82 Runoff=0.30 cfs 0.022 af

Subcatchment 27S: Subcatchment #27 Runoff Area=4,046 sf 54.00% Impervious Runoff Depth>2.68"
Tc=6.0 min CN=81 Runoff=0.29 cfs 0.021 af

Subcatchment 28S: Subcatchment #28 Runoff Area=2,528 sf 67.56% Impervious Runoff Depth>3.14"
Tc=6.0 min CN=86 Runoff=0.21 cfs 0.015 af

Subcatchment 30S: Subcatchment #30 Runoff Area=1,942 sf 100.00% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=98 Runoff=0.20 cfs 0.016 af

Subcatchment 41S: Subcatchment #41 Runoff Area=49,298 sf 46.37% Impervious Runoff Depth>2.25"
Flow Length=120' Tc=6.0 min CN=76 Runoff=2.92 cfs 0.212 af

Subcatchment 42S: Subcatchment #42 Runoff Area=7,618 sf 0.00% Impervious Runoff Depth>1.71"
Tc=6.0 min CN=69 Runoff=0.33 cfs 0.025 af

Subcatchment 43S: Subcatchment #43 Runoff Area=7,847 sf 0.00% Impervious Runoff Depth>1.36"
Tc=6.0 min CN=64 Runoff=0.26 cfs 0.020 af

Reach 42aR: Lvl Sprd to Wetland Avg. Flow Depth=0.15' Max Vel=1.78 fps Inflow=1.97 cfs 0.284 af
n=0.035 L=38.0' S=0.0395 '/' Capacity=128.49 cfs Outflow=1.97 cfs 0.284 af

Reach 42bR: Overland Flow to Wetland Avg. Flow Depth=0.11' Max Vel=2.65 fps Inflow=1.97 cfs 0.284 af
n=0.035 L=24.0' S=0.1250 '/' Capacity=228.66 cfs Outflow=1.97 cfs 0.284 af

Reach 43R: Lvl Sprd to Wetland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=140.5' S=0.0498 '/' Capacity=96.00 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach #100 Inflow=4.34 cfs 0.621 af
Outflow=4.34 cfs 0.621 af

Pond 101P: Bioretention W/ ISR #101 Peak Elev=184.22' Storage=11,470 cf Inflow=9.30 cfs 0.740 af
Primary=0.14 cfs 0.185 af Secondary=4.88 cfs 0.307 af Tertiary=3.71 cfs 0.070 af Outflow=8.74 cfs 0.563 af

Pond 102P: Bioretention W/ ISR #102 Peak Elev=169.89' Storage=8,085 cf Inflow=5.41 cfs 0.419 af
Primary=0.08 cfs 0.091 af Secondary=1.89 cfs 0.193 af Tertiary=0.00 cfs 0.000 af Outflow=1.97 cfs 0.284 af

Pond 103P: Infiltration Pond #103 Peak Elev=178.68' Storage=7,367 cf Inflow=8.81 cfs 0.398 af
cfs 0.204 af Primary=0.00 cfs 0.000 af Secondary=0.94 cfs 0.117 af Tertiary=0.00 cfs 0.000 af Outflow=1.16 cfs 0.321 af

Pond 104P: StormTech Inf. Overflow #104 Peak Elev=175.66' Storage=0.047 af Inflow=1.08 cfs 0.302 af
Discarded=0.40 cfs 0.288 af Primary=0.00 cfs 0.000 af Outflow=0.40 cfs 0.288 af

Pond C01P: Catch Basin #1 Peak Elev=179.81' Storage=0.000 af Inflow=0.84 cfs 0.065 af
15.0" Round Culvert n=0.012 L=170.0' S=0.0130 '/' Outflow=0.84 cfs 0.065 af

Pond C02P: Catch Basin #2 Peak Elev=177.70' Storage=0.000 af Inflow=1.69 cfs 0.133 af
15.0" Round Culvert n=0.012 L=31.5' S=0.0594 '/' Outflow=1.69 cfs 0.133 af

Pond C03P: Catch Basin #3 Peak Elev=169.91' Storage=0.001 af Inflow=5.09 cfs 0.395 af
24.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=5.08 cfs 0.395 af

Pond C04P: Catch Basin #4 Peak Elev=170.60' Storage=0.000 af Inflow=2.73 cfs 0.208 af
18.0" Round Culvert n=0.012 L=37.0' S=0.0054 '/' Outflow=2.73 cfs 0.208 af

Pond C05P: Catch Basin #5 Peak Elev=170.60' Storage=0.000 af Inflow=0.15 cfs 0.013 af
15.0" Round Culvert n=0.012 L=29.5' S=0.0068 '/' Outflow=0.14 cfs 0.013 af

Pond C06P: Catch Basin #6 Peak Elev=171.04' Storage=0.000 af Inflow=0.99 cfs 0.074 af
15.0" Round Culvert n=0.012 L=116.0' S=0.0056 '/' Outflow=0.99 cfs 0.074 af

Pond C07P: Catch Basin #7 Peak Elev=176.20' Storage=0.000 af Inflow=0.49 cfs 0.036 af
15.0" Round Culvert n=0.012 L=104.0' S=0.0512 '/' Outflow=0.49 cfs 0.036 af

Pond C08P: Catch Basin #8 Peak Elev=180.09' Storage=0.000 af Inflow=0.21 cfs 0.015 af
15.0" Round Culvert n=0.012 L=84.5' S=0.0463 '/' Outflow=0.21 cfs 0.015 af

Pond C10P: Catch Basin #10 Peak Elev=175.53' Storage=0.000 af Inflow=0.20 cfs 0.016 af
6.0" Round Culvert n=0.012 L=53.5' S=0.0439 '/' Outflow=0.20 cfs 0.016 af

Pond D03P: Drain Manhole #3 Peak Elev=175.54' Storage=0.000 af Inflow=1.69 cfs 0.133 af
18.0" Round Culvert n=0.012 L=147.2' S=0.0234 '/' Outflow=1.69 cfs 0.133 af

Pond D04P: Drain Manhole #4 Peak Elev=169.92' Storage=0.000 af Inflow=2.73 cfs 0.208 af
18.0" Round Culvert n=0.012 L=25.0' S=0.0060 '/' Outflow=2.72 cfs 0.208 af

Pond D05P: Drain Manhole #5 Peak Elev=170.26' Storage=0.000 af Inflow=2.73 cfs 0.208 af
18.0" Round Culvert n=0.012 L=150.0' S=0.0053 '/' Outflow=2.73 cfs 0.208 af

Pond D06P: Drain Manhole #6 Peak Elev=187.11' Storage=0.000 af Inflow=6.38 cfs 0.529 af
24.0" Round Culvert n=0.012 L=100.0' S=0.0100 '/' Outflow=6.38 cfs 0.528 af

Total Runoff Area = 7.888 ac Runoff Volume = 1.518 af Average Runoff Depth = 2.31"
56.94% Pervious = 4.491 ac 43.06% Impervious = 3.396 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=161,060 sf 10.39% Impervious Runoff Depth>1.82"
Flow Length=286' Tc=28.1 min UI Adjusted CN=60 Runoff=4.34 cfs 0.562 af

Subcatchment 11S: Subcatchment #11 Runoff Area=62,630 sf 100.00% Impervious Runoff Depth>5.63"
Tc=6.0 min CN=98 Runoff=8.08 cfs 0.674 af

Subcatchment 21S: Subcatchment #21 Runoff Area=8,602 sf 88.40% Impervious Runoff Depth>5.16"
Tc=6.0 min CN=94 Runoff=1.08 cfs 0.085 af

Subcatchment 22S: Subcatchment #22 Runoff Area=8,537 sf 95.51% Impervious Runoff Depth>5.39"
Tc=6.0 min CN=96 Runoff=1.09 cfs 0.088 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,871 sf 89.89% Impervious Runoff Depth>5.28"
Tc=6.0 min CN=95 Runoff=0.87 cfs 0.069 af

Subcatchment 24S: Subcatchment #24 Runoff Area=16,931 sf 83.07% Impervious Runoff Depth>4.94"
Tc=6.0 min CN=92 Runoff=2.07 cfs 0.160 af

Subcatchment 25S: Subcatchment #25 Runoff Area=1,520 sf 100.00% Impervious Runoff Depth>5.63"
Tc=6.0 min CN=98 Runoff=0.20 cfs 0.016 af

Subcatchment 26S: Subcatchment #26 Runoff Area=4,151 sf 57.19% Impervious Runoff Depth>3.86"
Tc=6.0 min CN=82 Runoff=0.42 cfs 0.031 af

Subcatchment 27S: Subcatchment #27 Runoff Area=4,046 sf 54.00% Impervious Runoff Depth>3.76"
Tc=6.0 min CN=81 Runoff=0.40 cfs 0.029 af

Subcatchment 28S: Subcatchment #28 Runoff Area=2,528 sf 67.56% Impervious Runoff Depth>4.28"
Tc=6.0 min CN=86 Runoff=0.28 cfs 0.021 af

Subcatchment 30S: Subcatchment #30 Runoff Area=1,942 sf 100.00% Impervious Runoff Depth>5.63"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.021 af

Subcatchment 41S: Subcatchment #41 Runoff Area=49,298 sf 46.37% Impervious Runoff Depth>3.27"
Flow Length=120' Tc=6.0 min CN=76 Runoff=4.25 cfs 0.308 af

Subcatchment 42S: Subcatchment #42 Runoff Area=7,618 sf 0.00% Impervious Runoff Depth>2.61"
Tc=6.0 min CN=69 Runoff=0.52 cfs 0.038 af

Subcatchment 43S: Subcatchment #43 Runoff Area=7,847 sf 0.00% Impervious Runoff Depth>2.17"
Tc=6.0 min CN=64 Runoff=0.44 cfs 0.033 af

Reach 42aR: Lvl Sprd to Wetland Avg. Flow Depth=0.18' Max Vel=2.04 fps Inflow=3.07 cfs 0.422 af
n=0.035 L=38.0' S=0.0395 '/' Capacity=128.49 cfs Outflow=3.07 cfs 0.422 af

Reach 42bR: Overland Flow to Wetland Avg. Flow Depth=0.14' Max Vel=3.04 fps Inflow=3.07 cfs 0.422 af
n=0.035 L=24.0' S=0.1250 '/' Capacity=228.66 cfs Outflow=3.07 cfs 0.422 af

Reach 43R: Lvl Sprd to Wetland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=140.5' S=0.0498 '/' Capacity=96.00 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach #100 Inflow=7.34 cfs 0.984 af
Outflow=7.34 cfs 0.984 af

Pond 101P: Bioretention W/ ISR #101 Peak Elev=184.27' Storage=11,681 cf Inflow=12.32 cfs 0.982 af
Primary=0.14 cfs 0.195 af Secondary=6.63 cfs 0.458 af Tertiary=5.32 cfs 0.147 af Outflow=12.09 cfs 0.800 af

Pond 102P: Bioretention W/ ISR #102 Peak Elev=170.38' Storage=9,846 cf Inflow=7.11 cfs 0.560 af
Primary=0.08 cfs 0.096 af Secondary=2.99 cfs 0.326 af Tertiary=0.00 cfs 0.000 af Outflow=3.07 cfs 0.422 af

Pond 103P: Infiltration Pond #103 Peak Elev=178.90' Storage=8,102 cf Inflow=12.39 cfs 0.637 af
cfs 0.215 af Primary=0.20 cfs 0.002 af Secondary=6.86 cfs 0.324 af Tertiary=0.00 cfs 0.000 af Outflow=7.30 cfs 0.541 af

Pond 104P: StormTech Inf. Overflow #104 Peak Elev=178.48' Storage=0.221 af Inflow=7.00 cfs 0.519 af
Discarded=0.40 cfs 0.456 af Primary=0.00 cfs 0.000 af Outflow=0.40 cfs 0.456 af

Pond C01P: Catch Basin #1 Peak Elev=179.87' Storage=0.000 af Inflow=1.08 cfs 0.085 af
15.0" Round Culvert n=0.012 L=170.0' S=0.0130 '/' Outflow=1.08 cfs 0.085 af

Pond C02P: Catch Basin #2 Peak Elev=177.80' Storage=0.000 af Inflow=2.16 cfs 0.175 af
15.0" Round Culvert n=0.012 L=31.5' S=0.0594 '/' Outflow=2.17 cfs 0.175 af

Pond C03P: Catch Basin #3 Peak Elev=170.40' Storage=0.001 af Inflow=6.61 cfs 0.522 af
24.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=6.59 cfs 0.522 af

Pond C04P: Catch Basin #4 Peak Elev=170.79' Storage=0.000 af Inflow=3.59 cfs 0.278 af
18.0" Round Culvert n=0.012 L=37.0' S=0.0054 '/' Outflow=3.59 cfs 0.278 af

Pond C05P: Catch Basin #5 Peak Elev=170.80' Storage=0.000 af Inflow=0.20 cfs 0.016 af
15.0" Round Culvert n=0.012 L=29.5' S=0.0068 '/' Outflow=0.18 cfs 0.016 af

Pond C06P: Catch Basin #6 Peak Elev=171.16' Storage=0.000 af Inflow=1.35 cfs 0.101 af
15.0" Round Culvert n=0.012 L=116.0' S=0.0056 '/' Outflow=1.35 cfs 0.101 af

Pond C07P: Catch Basin #7 Peak Elev=176.26' Storage=0.000 af Inflow=0.68 cfs 0.050 af
15.0" Round Culvert n=0.012 L=104.0' S=0.0512 '/' Outflow=0.68 cfs 0.050 af

Pond C08P: Catch Basin #8 Peak Elev=180.12' Storage=0.000 af Inflow=0.28 cfs 0.021 af
15.0" Round Culvert n=0.012 L=84.5' S=0.0463 '/' Outflow=0.28 cfs 0.021 af

Pond C10P: Catch Basin #10 Peak Elev=175.57' Storage=0.000 af Inflow=0.25 cfs 0.021 af
6.0" Round Culvert n=0.012 L=53.5' S=0.0439 '/' Outflow=0.25 cfs 0.021 af

Pond D03P: Drain Manhole #3 Peak Elev=175.63' Storage=0.000 af Inflow=2.17 cfs 0.175 af
18.0" Round Culvert n=0.012 L=147.2' S=0.0234 '/' Outflow=2.17 cfs 0.175 af

Pond D04P: Drain Manhole #4 Peak Elev=170.42' Storage=0.001 af Inflow=3.59 cfs 0.278 af
18.0" Round Culvert n=0.012 L=25.0' S=0.0060 '/' Outflow=3.58 cfs 0.277 af

Pond D05P: Drain Manhole #5 Peak Elev=170.50' Storage=0.000 af Inflow=3.59 cfs 0.278 af
18.0" Round Culvert n=0.012 L=150.0' S=0.0053 '/' Outflow=3.59 cfs 0.278 af

Pond D06P: Drain Manhole #6 Peak Elev=187.27' Storage=0.000 af Inflow=8.08 cfs 0.674 af
24.0" Round Culvert n=0.012 L=100.0' S=0.0100 '/' Outflow=8.08 cfs 0.674 af

Total Runoff Area = 7.888 ac Runoff Volume = 2.135 af Average Runoff Depth = 3.25"
56.94% Pervious = 4.491 ac 43.06% Impervious = 3.396 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=161,060 sf 10.39% Impervious Runoff Depth>2.60"
Flow Length=286' Tc=28.1 min UI Adjusted CN=60 Runoff=6.39 cfs 0.801 af

Subcatchment 11S: Subcatchment #11 Runoff Area=62,630 sf 100.00% Impervious Runoff Depth>6.78"
Tc=6.0 min CN=98 Runoff=9.67 cfs 0.812 af

Subcatchment 21S: Subcatchment #21 Runoff Area=8,602 sf 88.40% Impervious Runoff Depth>6.30"
Tc=6.0 min CN=94 Runoff=1.30 cfs 0.104 af

Subcatchment 22S: Subcatchment #22 Runoff Area=8,537 sf 95.51% Impervious Runoff Depth>6.54"
Tc=6.0 min CN=96 Runoff=1.31 cfs 0.107 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,871 sf 89.89% Impervious Runoff Depth>6.42"
Tc=6.0 min CN=95 Runoff=1.04 cfs 0.084 af

Subcatchment 24S: Subcatchment #24 Runoff Area=16,931 sf 83.07% Impervious Runoff Depth>6.07"
Tc=6.0 min CN=92 Runoff=2.51 cfs 0.197 af

Subcatchment 25S: Subcatchment #25 Runoff Area=1,520 sf 100.00% Impervious Runoff Depth>6.78"
Tc=6.0 min CN=98 Runoff=0.23 cfs 0.020 af

Subcatchment 26S: Subcatchment #26 Runoff Area=4,151 sf 57.19% Impervious Runoff Depth>4.93"
Tc=6.0 min CN=82 Runoff=0.53 cfs 0.039 af

Subcatchment 27S: Subcatchment #27 Runoff Area=4,046 sf 54.00% Impervious Runoff Depth>4.82"
Tc=6.0 min CN=81 Runoff=0.51 cfs 0.037 af

Subcatchment 28S: Subcatchment #28 Runoff Area=2,528 sf 67.56% Impervious Runoff Depth>5.38"
Tc=6.0 min CN=86 Runoff=0.35 cfs 0.026 af

Subcatchment 30S: Subcatchment #30 Runoff Area=1,942 sf 100.00% Impervious Runoff Depth>6.78"
Tc=6.0 min CN=98 Runoff=0.30 cfs 0.025 af

Subcatchment 41S: Subcatchment #41 Runoff Area=49,298 sf 46.37% Impervious Runoff Depth>4.27"
Flow Length=120' Tc=6.0 min CN=76 Runoff=5.54 cfs 0.403 af

Subcatchment 42S: Subcatchment #42 Runoff Area=7,618 sf 0.00% Impervious Runoff Depth>3.53"
Tc=6.0 min CN=69 Runoff=0.71 cfs 0.051 af

Subcatchment 43S: Subcatchment #43 Runoff Area=7,847 sf 0.00% Impervious Runoff Depth>3.01"
Tc=6.0 min CN=64 Runoff=0.62 cfs 0.045 af

Reach 42aR: Lvl Sprd to Wetland Avg. Flow Depth=0.20' Max Vel=2.20 fps Inflow=3.93 cfs 0.685 af
n=0.035 L=38.0' S=0.0395 '/' Capacity=128.49 cfs Outflow=3.93 cfs 0.685 af

Reach 42bR: Overland Flow to Wetland Avg. Flow Depth=0.15' Max Vel=3.28 fps Inflow=3.93 cfs 0.685 af
n=0.035 L=24.0' S=0.1250 '/' Capacity=228.66 cfs Outflow=3.93 cfs 0.685 af

Reach 43R: Lvl Sprd to Wetland Avg. Flow Depth=0.14' Max Vel=1.98 fps Inflow=1.52 cfs 0.030 af
n=0.035 L=140.5' S=0.0498 '/' Capacity=96.00 cfs Outflow=1.44 cfs 0.030 af

Reach 100R: Final Reach #100 Inflow=10.24 cfs 1.516 af
Outflow=10.24 cfs 1.516 af

Pond 101P: Bioretention W/ ISR #101 Peak Elev=184.32' Storage=11,854 cf Inflow=15.21 cfs 1.215 af
Primary=0.14 cfs 0.199 af Secondary=8.13 cfs 0.605 af Tertiary=6.73 cfs 0.225 af Outflow=15.00 cfs 1.030 af

Pond 102P: Bioretention W/ ISR #102 Peak Elev=170.89' Storage=11,818 cf Inflow=8.79 cfs 0.824 af
Primary=0.09 cfs 0.101 af Secondary=3.84 cfs 0.584 af Tertiary=0.00 cfs 0.000 af Outflow=3.93 cfs 0.685 af

Pond 103P: Infiltration Pond #103 Peak Elev=179.18' Storage=9,032 cf Inflow=15.47 cfs 0.876 af
s 0.226 af Primary=1.01 cfs 0.125 af Secondary=9.84 cfs 0.379 af Tertiary=1.52 cfs 0.030 af Outflow=13.10 cfs 0.761 af

Pond 104P: StormTech Inf. Overflow #104 Peak Elev=179.09' Storage=0.245 af Inflow=9.98 cfs 0.578 af
Discarded=0.40 cfs 0.465 af Primary=0.34 cfs 0.010 af Outflow=0.75 cfs 0.475 af

Pond C01P: Catch Basin #1 Peak Elev=179.93' Storage=0.000 af Inflow=1.30 cfs 0.104 af
15.0" Round Culvert n=0.012 L=170.0' S=0.0130 '/' Outflow=1.30 cfs 0.104 af

Pond C02P: Catch Basin #2 Peak Elev=177.96' Storage=0.000 af Inflow=2.99 cfs 0.335 af
15.0" Round Culvert n=0.012 L=31.5' S=0.0594 '/' Outflow=2.98 cfs 0.335 af

Pond C03P: Catch Basin #3 Peak Elev=170.93' Storage=0.001 af Inflow=8.10 cfs 0.773 af
24.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=8.09 cfs 0.773 af

Pond C04P: Catch Basin #4 Peak Elev=171.03' Storage=0.000 af Inflow=4.41 cfs 0.344 af
18.0" Round Culvert n=0.012 L=37.0' S=0.0054 '/' Outflow=4.40 cfs 0.344 af

Pond C05P: Catch Basin #5 Peak Elev=171.03' Storage=0.000 af Inflow=0.23 cfs 0.020 af
15.0" Round Culvert n=0.012 L=29.5' S=0.0068 '/' Outflow=0.22 cfs 0.020 af

Pond C06P: Catch Basin #6 Peak Elev=171.29' Storage=0.000 af Inflow=1.69 cfs 0.128 af
15.0" Round Culvert n=0.012 L=116.0' S=0.0056 '/' Outflow=1.68 cfs 0.128 af

Pond C07P: Catch Basin #7 Peak Elev=176.31' Storage=0.000 af Inflow=0.85 cfs 0.063 af
15.0" Round Culvert n=0.012 L=104.0' S=0.0512 '/' Outflow=0.86 cfs 0.063 af

Pond C08P: Catch Basin #8 Peak Elev=180.15' Storage=0.000 af Inflow=0.35 cfs 0.026 af
15.0" Round Culvert n=0.012 L=84.5' S=0.0463 '/' Outflow=0.35 cfs 0.026 af

Pond C10P: Catch Basin #10 Peak Elev=175.60' Storage=0.000 af Inflow=0.30 cfs 0.025 af
6.0" Round Culvert n=0.012 L=53.5' S=0.0439 '/' Outflow=0.30 cfs 0.025 af

Pond D03P: Drain Manhole #3 Peak Elev=175.76' Storage=0.000 af Inflow=2.98 cfs 0.345 af
18.0" Round Culvert n=0.012 L=147.2' S=0.0234 '/' Outflow=2.97 cfs 0.345 af

Pond D04P: Drain Manhole #4 Peak Elev=170.97' Storage=0.001 af Inflow=4.39 cfs 0.344 af
18.0" Round Culvert n=0.012 L=25.0' S=0.0060 '/' Outflow=4.37 cfs 0.344 af

Pond D05P: Drain Manhole #5 Peak Elev=171.01' Storage=0.000 af Inflow=4.40 cfs 0.344 af
18.0" Round Culvert n=0.012 L=150.0' S=0.0053 '/' Outflow=4.39 cfs 0.344 af

Pond D06P: Drain Manhole #6 Peak Elev=187.42' Storage=0.000 af Inflow=9.67 cfs 0.812 af
24.0" Round Culvert n=0.012 L=100.0' S=0.0100 '/' Outflow=9.67 cfs 0.812 af

Total Runoff Area = 7.888 ac Runoff Volume = 2.751 af Average Runoff Depth = 4.19"
56.94% Pervious = 4.491 ac 43.06% Impervious = 3.396 ac

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=161,060 sf 10.39% Impervious Runoff Depth>3.61"
Flow Length=286' Tc=28.1 min UI Adjusted CN=60 Runoff=9.02 cfs 1.111 af

Subcatchment 11S: Subcatchment #11 Runoff Area=62,630 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=11.57 cfs 0.976 af

Subcatchment 21S: Subcatchment #21 Runoff Area=8,602 sf 88.40% Impervious Runoff Depth>7.66"
Tc=6.0 min CN=94 Runoff=1.56 cfs 0.126 af

Subcatchment 22S: Subcatchment #22 Runoff Area=8,537 sf 95.51% Impervious Runoff Depth>7.91"
Tc=6.0 min CN=96 Runoff=1.57 cfs 0.129 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,871 sf 89.89% Impervious Runoff Depth>7.79"
Tc=6.0 min CN=95 Runoff=1.26 cfs 0.102 af

Subcatchment 24S: Subcatchment #24 Runoff Area=16,931 sf 83.07% Impervious Runoff Depth>7.42"
Tc=6.0 min CN=92 Runoff=3.03 cfs 0.240 af

Subcatchment 25S: Subcatchment #25 Runoff Area=1,520 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=0.28 cfs 0.024 af

Subcatchment 26S: Subcatchment #26 Runoff Area=4,151 sf 57.19% Impervious Runoff Depth>6.23"
Tc=6.0 min CN=82 Runoff=0.66 cfs 0.049 af

Subcatchment 27S: Subcatchment #27 Runoff Area=4,046 sf 54.00% Impervious Runoff Depth>6.11"
Tc=6.0 min CN=81 Runoff=0.64 cfs 0.047 af

Subcatchment 28S: Subcatchment #28 Runoff Area=2,528 sf 67.56% Impervious Runoff Depth>6.71"
Tc=6.0 min CN=86 Runoff=0.43 cfs 0.032 af

Subcatchment 30S: Subcatchment #30 Runoff Area=1,942 sf 100.00% Impervious Runoff Depth>8.15"
Tc=6.0 min CN=98 Runoff=0.36 cfs 0.030 af

Subcatchment 41S: Subcatchment #41 Runoff Area=49,298 sf 46.37% Impervious Runoff Depth>5.51"
Flow Length=120' Tc=6.0 min CN=76 Runoff=7.11 cfs 0.520 af

Subcatchment 42S: Subcatchment #42 Runoff Area=7,618 sf 0.00% Impervious Runoff Depth>4.68"
Tc=6.0 min CN=69 Runoff=0.94 cfs 0.068 af

Subcatchment 43S: Subcatchment #43 Runoff Area=7,847 sf 0.00% Impervious Runoff Depth>4.09"
Tc=6.0 min CN=64 Runoff=0.85 cfs 0.061 af

Reach 42aR: Lvl Sprd to Wetland Avg. Flow Depth=0.22' Max Vel=2.35 fps Inflow=4.89 cfs 0.948 af
n=0.035 L=38.0' S=0.0395 '/' Capacity=128.49 cfs Outflow=4.89 cfs 0.948 af

Reach 42bR: Overland Flow to Wetland Avg. Flow Depth=0.17' Max Vel=3.51 fps Inflow=4.89 cfs 0.948 af
n=0.035 L=24.0' S=0.1250 '/' Capacity=228.66 cfs Outflow=4.89 cfs 0.948 af

Reach 43R: Lvl Sprd to Wetland Avg. Flow Depth=0.27' Max Vel=2.99 fps Inflow=5.40 cfs 0.167 af
n=0.035 L=140.5' S=0.0498 '/' Capacity=96.00 cfs Outflow=5.49 cfs 0.167 af

Reach 100R: Final Reach #100 Inflow=16.89 cfs 2.226 af
Outflow=16.89 cfs 2.226 af

Pond 101P: Bioretention W/ ISR #101 Peak Elev=184.37' Storage=12,047 cf Inflow=18.67 cfs 1.495 af
Primary=0.15 cfs 0.206 af Secondary=9.90 cfs 0.781 af Tertiary=8.42 cfs 0.321 af Outflow=18.46 cfs 1.309 af

Pond 102P: Bioretention W/ ISR #102 Peak Elev=171.62' Storage=14,785 cf Inflow=12.06 cfs 1.088 af
Primary=0.09 cfs 0.107 af Secondary=4.80 cfs 0.841 af Tertiary=0.00 cfs 0.000 af Outflow=4.89 cfs 0.948 af

Pond 103P: Infiltration Pond #103 Peak Elev=179.36' Storage=9,663 cf Inflow=19.16 cfs 1.164 af
0.236 af Primary=1.78 cfs 0.200 af Secondary=10.26 cfs 0.427 af Tertiary=5.40 cfs 0.167 af Outflow=17.66 cfs 1.030 af

Pond 104P: StormTech Inf. Overflow #104 Peak Elev=179.27' Storage=0.252 af Inflow=10.40 cfs 0.633 af
Discarded=0.40 cfs 0.473 af Primary=1.81 cfs 0.040 af Outflow=2.21 cfs 0.512 af

Pond C01P: Catch Basin #1 Peak Elev=179.99' Storage=0.000 af Inflow=1.56 cfs 0.126 af
15.0" Round Culvert n=0.012 L=170.0' S=0.0130 '/' Outflow=1.56 cfs 0.126 af

Pond C02P: Catch Basin #2 Peak Elev=178.31' Storage=0.000 af Inflow=4.66 cfs 0.456 af
15.0" Round Culvert n=0.012 L=31.5' S=0.0594 '/' Outflow=4.66 cfs 0.456 af

Pond C03P: Catch Basin #3 Peak Elev=171.70' Storage=0.001 af Inflow=11.15 cfs 1.021 af
24.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=11.12 cfs 1.020 af

Pond C04P: Catch Basin #4 Peak Elev=171.76' Storage=0.001 af Inflow=5.37 cfs 0.423 af
18.0" Round Culvert n=0.012 L=37.0' S=0.0054 '/' Outflow=5.36 cfs 0.423 af

Pond C05P: Catch Basin #5 Peak Elev=171.76' Storage=0.001 af Inflow=0.28 cfs 0.024 af
15.0" Round Culvert n=0.012 L=29.5' S=0.0068 '/' Outflow=0.26 cfs 0.024 af

Pond C06P: Catch Basin #6 Peak Elev=171.76' Storage=0.000 af Inflow=2.09 cfs 0.159 af
15.0" Round Culvert n=0.012 L=116.0' S=0.0056 '/' Outflow=2.08 cfs 0.159 af

Pond C07P: Catch Basin #7 Peak Elev=176.36' Storage=0.000 af Inflow=1.06 cfs 0.080 af
15.0" Round Culvert n=0.012 L=104.0' S=0.0512 '/' Outflow=1.06 cfs 0.080 af

Pond C08P: Catch Basin #8 Peak Elev=180.18' Storage=0.000 af Inflow=0.43 cfs 0.032 af
15.0" Round Culvert n=0.012 L=84.5' S=0.0463 '/' Outflow=0.43 cfs 0.032 af

Pond C10P: Catch Basin #10 Peak Elev=175.65' Storage=0.000 af Inflow=0.36 cfs 0.030 af
6.0" Round Culvert n=0.012 L=53.5' S=0.0439 '/' Outflow=0.36 cfs 0.030 af

Pond D03P: Drain Manhole #3 Peak Elev=176.01' Storage=0.000 af Inflow=4.66 cfs 0.495 af
18.0" Round Culvert n=0.012 L=147.2' S=0.0234 '/' Outflow=4.66 cfs 0.495 af

Pond D04P: Drain Manhole #4 Peak Elev=171.73' Storage=0.001 af Inflow=5.35 cfs 0.423 af
18.0" Round Culvert n=0.012 L=25.0' S=0.0060 '/' Outflow=5.31 cfs 0.423 af

Pond D05P: Drain Manhole #5 Peak Elev=171.75' Storage=0.001 af Inflow=5.36 cfs 0.423 af
18.0" Round Culvert n=0.012 L=150.0' S=0.0053 '/' Outflow=5.35 cfs 0.423 af

Pond D06P: Drain Manhole #6 Peak Elev=187.60' Storage=0.000 af Inflow=11.57 cfs 0.976 af
24.0" Round Culvert n=0.012 L=100.0' S=0.0100 '/' Outflow=11.57 cfs 0.976 af

Total Runoff Area = 7.888 ac Runoff Volume = 3.517 af Average Runoff Depth = 5.35"
56.94% Pervious = 4.491 ac 43.06% Impervious = 3.396 ac

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.354	39	>75% Grass cover, Good, HSG A (1S, 41S)
1.442	61	>75% Grass cover, Good, HSG B (1S, 21S, 22S, 23S, 24S, 26S, 27S, 28S, 41S, 42S, 43S)
0.149	74	>75% Grass cover, Good, HSG C (1S, 23S, 24S, 41S, 42S)
0.010	96	Gravel surface, HSG A (41S)
0.084	96	Gravel surface, HSG B (1S, 41S, 42S, 43S)
0.010	96	Gravel surface, HSG C (41S, 42S)
0.171	98	Paved parking, HSG A (21S, 41S)
1.179	98	Paved parking, HSG B (21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 30S, 41S)
0.133	98	Paved parking, HSG C (21S, 23S, 24S)
1.408	98	Roofs, HSG B (11S, 21S, 24S, 25S, 26S, 27S, 41S)
0.121	98	Roofs, HSG C (11S)
0.338	98	Unconnected pavement, HSG A (1S)
0.006	98	Unconnected pavement, HSG B (1S)
0.041	98	Unconnected pavement, HSG C (1S)
2.115	55	Woods, Good, HSG B (1S)
0.326	70	Woods, Good, HSG C (1S)
7.888	**75**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.872	HSG A	1S, 21S, 41S
6.234	HSG B	1S, 11S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 30S, 41S, 42S, 43S
0.781	HSG C	1S, 11S, 21S, 23S, 24S, 41S, 42S
0.000	HSG D	
0.000	Other	
7.888		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.354	1.442	0.149	0.000	0.000	1.945	>75% Grass cover, Good	1S, 21S, 22S, 23S, 24S, 26S, 27S, 28S, 41S, 42S, 43S
0.010	0.084	0.010	0.000	0.000	0.105	Gravel surface	1S, 41S, 42S, 43S
0.171	1.179	0.133	0.000	0.000	1.483	Paved parking	21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 30S, 41S
0.000	1.408	0.121	0.000	0.000	1.530	Roofs	11S, 21S, 24S, 25S, 26S, 27S, 41S
0.338	0.006	0.041	0.000	0.000	0.384	Unconnected pavement	1S
0.000	2.115	0.326	0.000	0.000	2.442	Woods, Good	1S
0.872	**6.234**	**0.781**	**0.000**	**0.000**	**7.888**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	101P	178.25	177.90	22.0	0.0159	0.012	15.0	0.0	0.0
2	101P	178.25	178.00	25.0	0.0100	0.012	18.0	0.0	0.0
3	102P	165.75	165.50	44.0	0.0057	0.012	6.0	0.0	0.0
4	102P	165.75	165.50	20.0	0.0125	0.012	15.0	0.0	0.0
5	103P	178.50	177.00	15.5	0.0968	0.012	15.0	0.0	3.0
6	103P	175.75	175.50	22.5	0.0111	0.012	15.0	0.0	0.0
7	104P	175.40	175.20	4.0	0.0500	0.012	15.0	0.0	0.0
8	C01P	179.38	177.17	170.0	0.0130	0.012	15.0	0.0	0.0
9	C02P	177.07	175.20	31.5	0.0594	0.012	15.0	0.0	0.0
10	C03P	167.85	167.75	10.0	0.0100	0.012	24.0	0.0	0.0
11	C04P	169.70	169.50	37.0	0.0054	0.012	18.0	0.0	0.0
12	C05P	170.00	169.80	29.5	0.0068	0.012	15.0	0.0	0.0
13	C06P	170.45	169.80	116.0	0.0056	0.012	15.0	0.0	0.0
14	C07P	175.87	170.55	104.0	0.0512	0.012	15.0	0.0	0.0
15	C08P	179.88	175.97	84.5	0.0463	0.012	15.0	0.0	0.0
16	C10P	175.25	172.90	53.5	0.0439	0.012	6.0	0.0	0.0
17	D03P	174.95	171.50	147.2	0.0234	0.012	18.0	0.0	0.0
18	D04P	168.50	168.35	25.0	0.0060	0.012	18.0	0.0	0.0
19	D05P	169.40	168.60	150.0	0.0053	0.012	18.0	0.0	0.0
20	D06P	186.00	185.00	100.0	0.0100	0.012	24.0	0.0	0.0

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Subcatchment #1 Runoff Area=161,060 sf 10.39% Impervious Runoff Depth>1.82"
Flow Length=286' Tc=28.1 min UI Adjusted CN=60 Runoff=4.34 cfs 0.562 af

Subcatchment 11S: Subcatchment #11 Runoff Area=62,630 sf 100.00% Impervious Runoff Depth>5.63"
Tc=6.0 min CN=98 Runoff=8.08 cfs 0.674 af

Subcatchment 21S: Subcatchment #21 Runoff Area=8,602 sf 88.40% Impervious Runoff Depth>5.16"
Tc=6.0 min CN=94 Runoff=1.08 cfs 0.085 af

Subcatchment 22S: Subcatchment #22 Runoff Area=8,537 sf 95.51% Impervious Runoff Depth>5.39"
Tc=6.0 min CN=96 Runoff=1.09 cfs 0.088 af

Subcatchment 23S: Subcatchment #23 Runoff Area=6,871 sf 89.89% Impervious Runoff Depth>5.28"
Tc=6.0 min CN=95 Runoff=0.87 cfs 0.069 af

Subcatchment 24S: Subcatchment #24 Runoff Area=16,931 sf 83.07% Impervious Runoff Depth>4.94"
Tc=6.0 min CN=92 Runoff=2.07 cfs 0.160 af

Subcatchment 25S: Subcatchment #25 Runoff Area=1,520 sf 100.00% Impervious Runoff Depth>5.63"
Tc=6.0 min CN=98 Runoff=0.20 cfs 0.016 af

Subcatchment 26S: Subcatchment #26 Runoff Area=4,151 sf 57.19% Impervious Runoff Depth>3.86"
Tc=6.0 min CN=82 Runoff=0.42 cfs 0.031 af

Subcatchment 27S: Subcatchment #27 Runoff Area=4,046 sf 54.00% Impervious Runoff Depth>3.76"
Tc=6.0 min CN=81 Runoff=0.40 cfs 0.029 af

Subcatchment 28S: Subcatchment #28 Runoff Area=2,528 sf 67.56% Impervious Runoff Depth>4.28"
Tc=6.0 min CN=86 Runoff=0.28 cfs 0.021 af

Subcatchment 30S: Subcatchment #30 Runoff Area=1,942 sf 100.00% Impervious Runoff Depth>5.63"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.021 af

Subcatchment 41S: Subcatchment #41 Runoff Area=49,298 sf 46.37% Impervious Runoff Depth>3.27"
Flow Length=120' Tc=6.0 min CN=76 Runoff=4.25 cfs 0.308 af

Subcatchment 42S: Subcatchment #42 Runoff Area=7,618 sf 0.00% Impervious Runoff Depth>2.61"
Tc=6.0 min CN=69 Runoff=0.52 cfs 0.038 af

Subcatchment 43S: Subcatchment #43 Runoff Area=7,847 sf 0.00% Impervious Runoff Depth>2.17"
Tc=6.0 min CN=64 Runoff=0.44 cfs 0.033 af

Reach 42aR: Lvl Sprd to Wetland Avg. Flow Depth=0.18' Max Vel=2.04 fps Inflow=3.07 cfs 0.422 af
n=0.035 L=38.0' S=0.0395 '/' Capacity=128.49 cfs Outflow=3.07 cfs 0.422 af

Reach 42bR: Overland Flow to Wetland Avg. Flow Depth=0.14' Max Vel=3.04 fps Inflow=3.07 cfs 0.422 af
n=0.035 L=24.0' S=0.1250 '/' Capacity=228.66 cfs Outflow=3.07 cfs 0.422 af

Reach 43R: Lvl Sprd to Wetland Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.035 L=140.5' S=0.0498 '/' Capacity=96.00 cfs Outflow=0.00 cfs 0.000 af

Reach 100R: Final Reach #100 Inflow=7.34 cfs 0.984 af
Outflow=7.34 cfs 0.984 af

Pond 101P: Bioretention W/ ISR #101 Peak Elev=184.27' Storage=11,681 cf Inflow=12.32 cfs 0.982 af
Primary=0.14 cfs 0.195 af Secondary=6.63 cfs 0.458 af Tertiary=5.32 cfs 0.147 af Outflow=12.09 cfs 0.800 af

Pond 102P: Bioretention W/ ISR #102 Peak Elev=170.38' Storage=9,846 cf Inflow=7.11 cfs 0.560 af
Primary=0.08 cfs 0.096 af Secondary=2.99 cfs 0.326 af Tertiary=0.00 cfs 0.000 af Outflow=3.07 cfs 0.422 af

Pond 103P: Infiltration Pond #103 Peak Elev=178.90' Storage=8,102 cf Inflow=12.39 cfs 0.637 af
cfs 0.215 af Primary=0.20 cfs 0.002 af Secondary=6.86 cfs 0.324 af Tertiary=0.00 cfs 0.000 af Outflow=7.30 cfs 0.541 af

Pond 104P: StormTech Inf. Overflow #104 Peak Elev=178.48' Storage=0.221 af Inflow=7.00 cfs 0.519 af
Discarded=0.40 cfs 0.456 af Primary=0.00 cfs 0.000 af Outflow=0.40 cfs 0.456 af

Pond C01P: Catch Basin #1 Peak Elev=179.87' Storage=0.000 af Inflow=1.08 cfs 0.085 af
15.0" Round Culvert n=0.012 L=170.0' S=0.0130 '/' Outflow=1.08 cfs 0.085 af

Pond C02P: Catch Basin #2 Peak Elev=177.80' Storage=0.000 af Inflow=2.16 cfs 0.175 af
15.0" Round Culvert n=0.012 L=31.5' S=0.0594 '/' Outflow=2.17 cfs 0.175 af

Pond C03P: Catch Basin #3 Peak Elev=170.40' Storage=0.001 af Inflow=6.61 cfs 0.522 af
24.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=6.59 cfs 0.522 af

Pond C04P: Catch Basin #4 Peak Elev=170.79' Storage=0.000 af Inflow=3.59 cfs 0.278 af
18.0" Round Culvert n=0.012 L=37.0' S=0.0054 '/' Outflow=3.59 cfs 0.278 af

Pond C05P: Catch Basin #5 Peak Elev=170.80' Storage=0.000 af Inflow=0.20 cfs 0.016 af
15.0" Round Culvert n=0.012 L=29.5' S=0.0068 '/' Outflow=0.18 cfs 0.016 af

Pond C06P: Catch Basin #6 Peak Elev=171.16' Storage=0.000 af Inflow=1.35 cfs 0.101 af
15.0" Round Culvert n=0.012 L=116.0' S=0.0056 '/' Outflow=1.35 cfs 0.101 af

Pond C07P: Catch Basin #7 Peak Elev=176.26' Storage=0.000 af Inflow=0.68 cfs 0.050 af
15.0" Round Culvert n=0.012 L=104.0' S=0.0512 '/' Outflow=0.68 cfs 0.050 af

Pond C08P: Catch Basin #8 Peak Elev=180.12' Storage=0.000 af Inflow=0.28 cfs 0.021 af
15.0" Round Culvert n=0.012 L=84.5' S=0.0463 '/' Outflow=0.28 cfs 0.021 af

Pond C10P: Catch Basin #10 Peak Elev=175.57' Storage=0.000 af Inflow=0.25 cfs 0.021 af
6.0" Round Culvert n=0.012 L=53.5' S=0.0439 '/' Outflow=0.25 cfs 0.021 af

Pond D03P: Drain Manhole #3 Peak Elev=175.63' Storage=0.000 af Inflow=2.17 cfs 0.175 af
18.0" Round Culvert n=0.012 L=147.2' S=0.0234 '/' Outflow=2.17 cfs 0.175 af

Pond D04P: Drain Manhole #4 Peak Elev=170.42' Storage=0.001 af Inflow=3.59 cfs 0.278 af
18.0" Round Culvert n=0.012 L=25.0' S=0.0060 '/' Outflow=3.58 cfs 0.277 af

Pond D05P: Drain Manhole #5 Peak Elev=170.50' Storage=0.000 af Inflow=3.59 cfs 0.278 af
18.0" Round Culvert n=0.012 L=150.0' S=0.0053 '/' Outflow=3.59 cfs 0.278 af

Pond D06P: Drain Manhole #6 Peak Elev=187.27' Storage=0.000 af Inflow=8.08 cfs 0.674 af
24.0" Round Culvert n=0.012 L=100.0' S=0.0100 '/' Outflow=8.08 cfs 0.674 af

Total Runoff Area = 7.888 ac Runoff Volume = 2.135 af Average Runoff Depth = 3.25"
56.94% Pervious = 4.491 ac 43.06% Impervious = 3.396 ac

Summary for Subcatchment 1S: Subcatchment #1

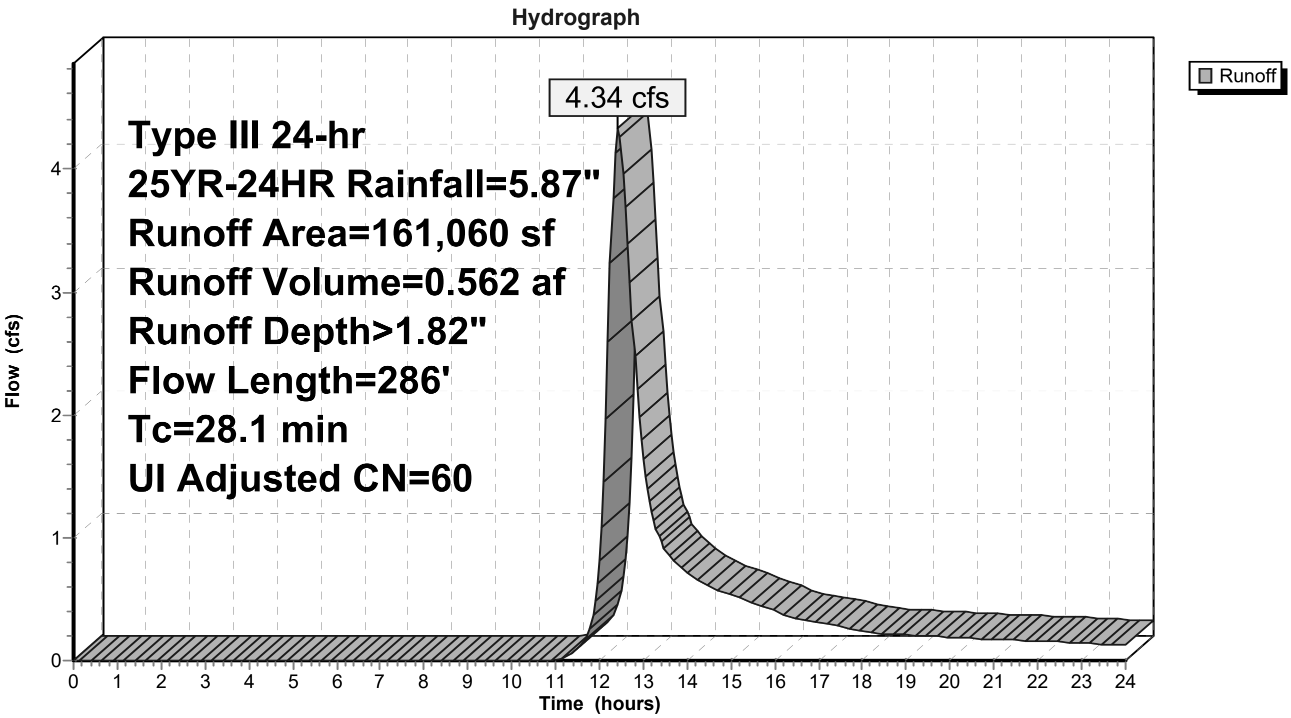
Runoff = 4.34 cfs @ 12.43 hrs, Volume= 0.562 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Adj	Description
7,819	39		>75% Grass cover, Good, HSG A
14,715	98		Unconnected pavement, HSG A
26,686	61		>75% Grass cover, Good, HSG B
1,909	96		Gravel surface, HSG B
92,141	55		Woods, Good, HSG B
1,557	74		>75% Grass cover, Good, HSG C
14,220	70		Woods, Good, HSG C
247	98		Unconnected pavement, HSG B
1,766	98		Unconnected pavement, HSG C
161,060	62	60	Weighted Average, UI Adjusted
144,332			89.61% Pervious Area
16,728			10.39% Impervious Area
16,728			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.6	100	0.0150	0.07		**Sheet Flow, Segment #1** Woods: Light underbrush n= 0.400 P2= 3.08"
3.1	145	0.0241	0.78		**Shallow Concentrated Flow, Segement #2** Woodland Kv= 5.0 fps
0.4	41	0.1460	1.91		**Shallow Concentrated Flow, Segement #3** Woodland Kv= 5.0 fps
28.1	286	Total			

Subcatchment 1S: Subcatchment #1



Summary for Subcatchment 11S: Subcatchment #11 (Building)

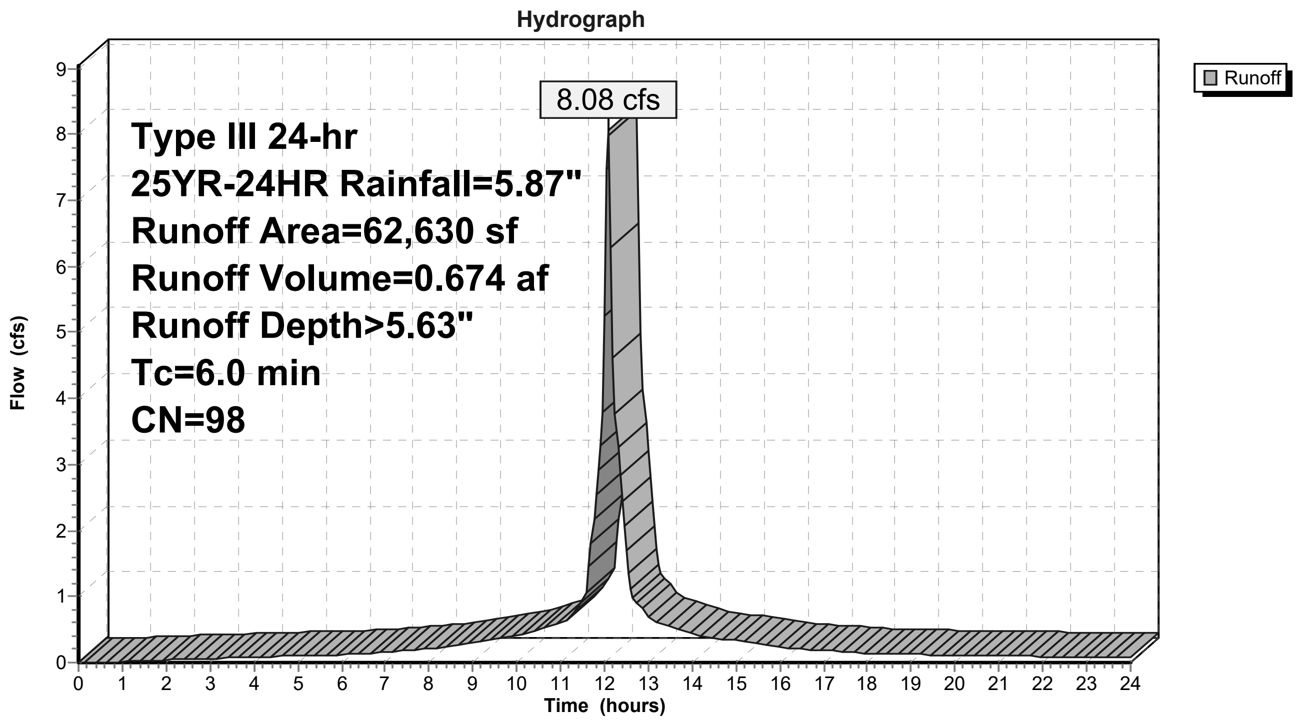
Runoff = 8.08 cfs @ 12.09 hrs, Volume= 0.674 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

	Area (sf)	CN	Description
*	57,338	98	Roofs, HSG B
*	5,292	98	Roofs, HSG C
	62,630	98	Weighted Average
	62,630		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 11S: Subcatchment #11 (Building)



Summary for Subcatchment 21S: Subcatchment #21

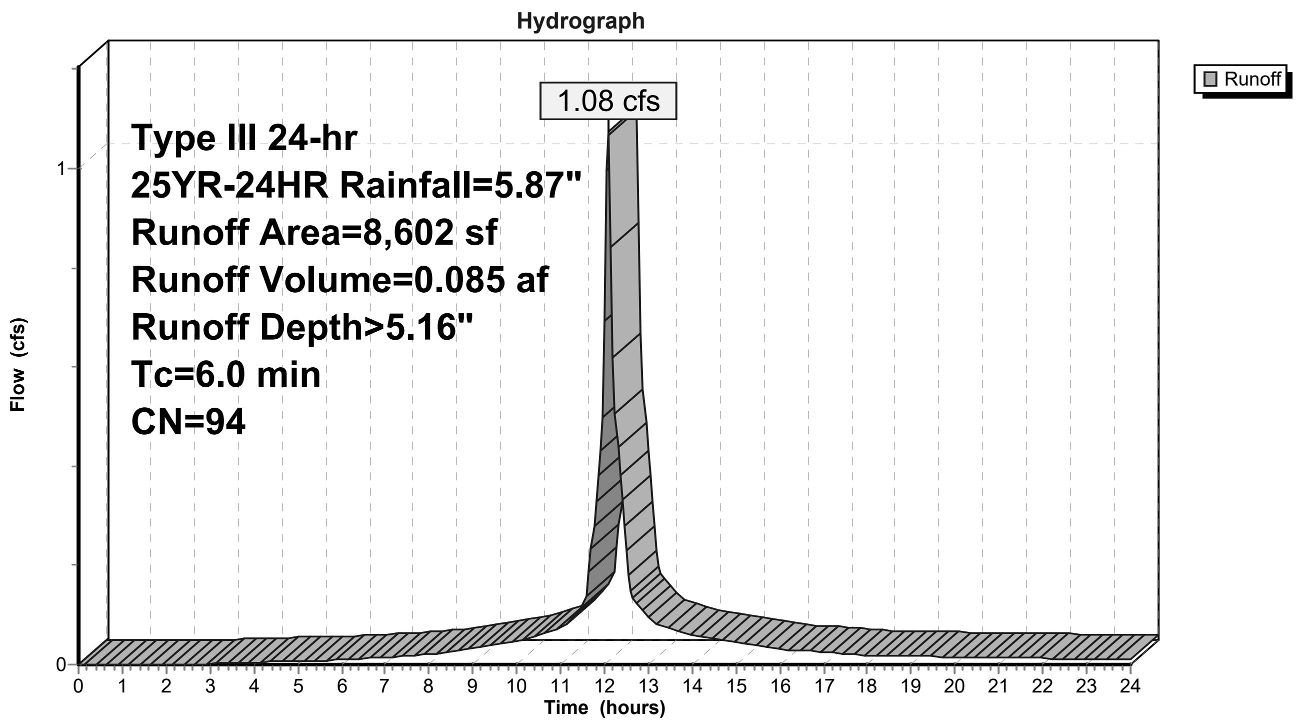
Runoff = 1.08 cfs @ 12.09 hrs, Volume= 0.085 af, Depth> 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
554	98	Paved parking, HSG A
5,190	98	Paved parking, HSG B
409	98	Roofs, HSG B
998	61	>75% Grass cover, Good, HSG B
1,451	98	Paved parking, HSG C
8,602	94	Weighted Average
998		11.60% Pervious Area
7,604		88.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 21S: Subcatchment #21



Summary for Subcatchment 22S: Subcatchment #22

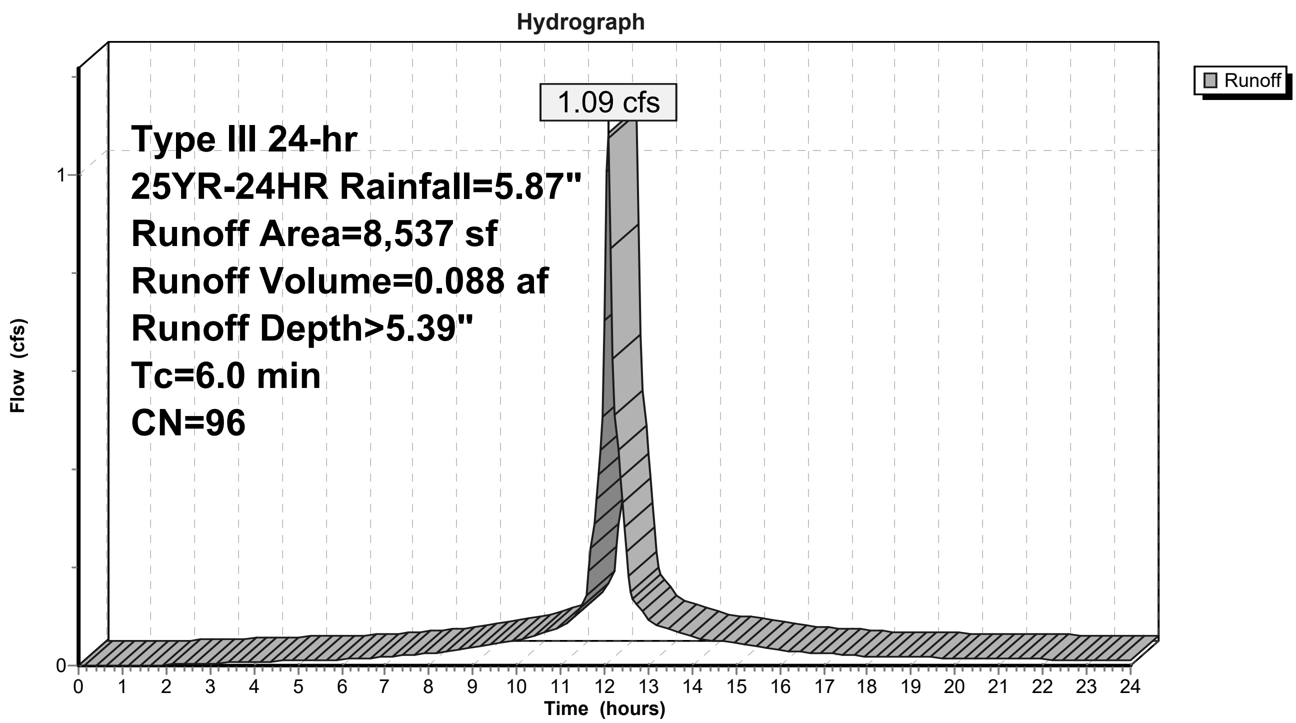
Runoff = 1.09 cfs @ 12.09 hrs, Volume= 0.088 af, Depth> 5.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
383	61	>75% Grass cover, Good, HSG B
8,154	98	Paved parking, HSG B
8,537	96	Weighted Average
383		4.49% Pervious Area
8,154		95.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 22S: Subcatchment #22



Summary for Subcatchment 23S: Subcatchment #23

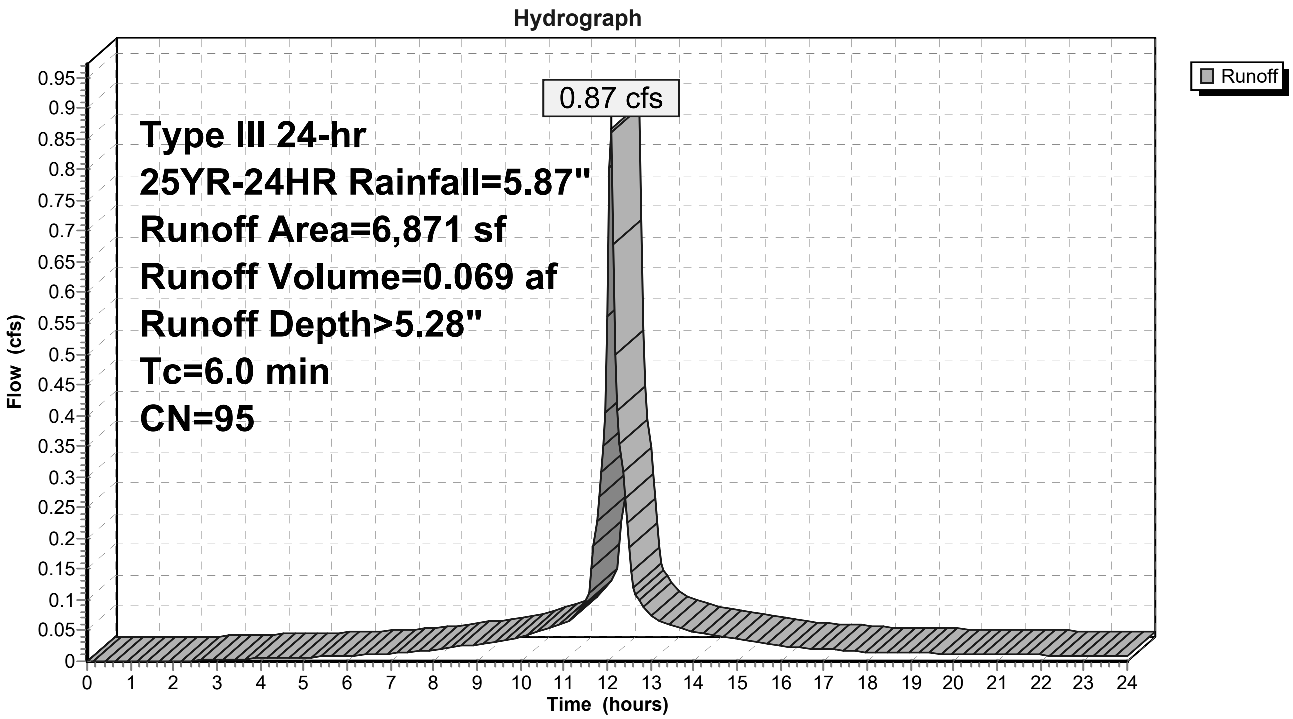
Runoff = 0.87 cfs @ 12.09 hrs, Volume= 0.069 af, Depth> 5.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
539	61	>75% Grass cover, Good, HSG B
2,938	98	Paved parking, HSG B
156	74	>75% Grass cover, Good, HSG C
3,238	98	Paved parking, HSG C
6,871	95	Weighted Average
695		10.11% Pervious Area
6,176		89.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 23S: Subcatchment #23



Summary for Subcatchment 24S: Subcatchment #24

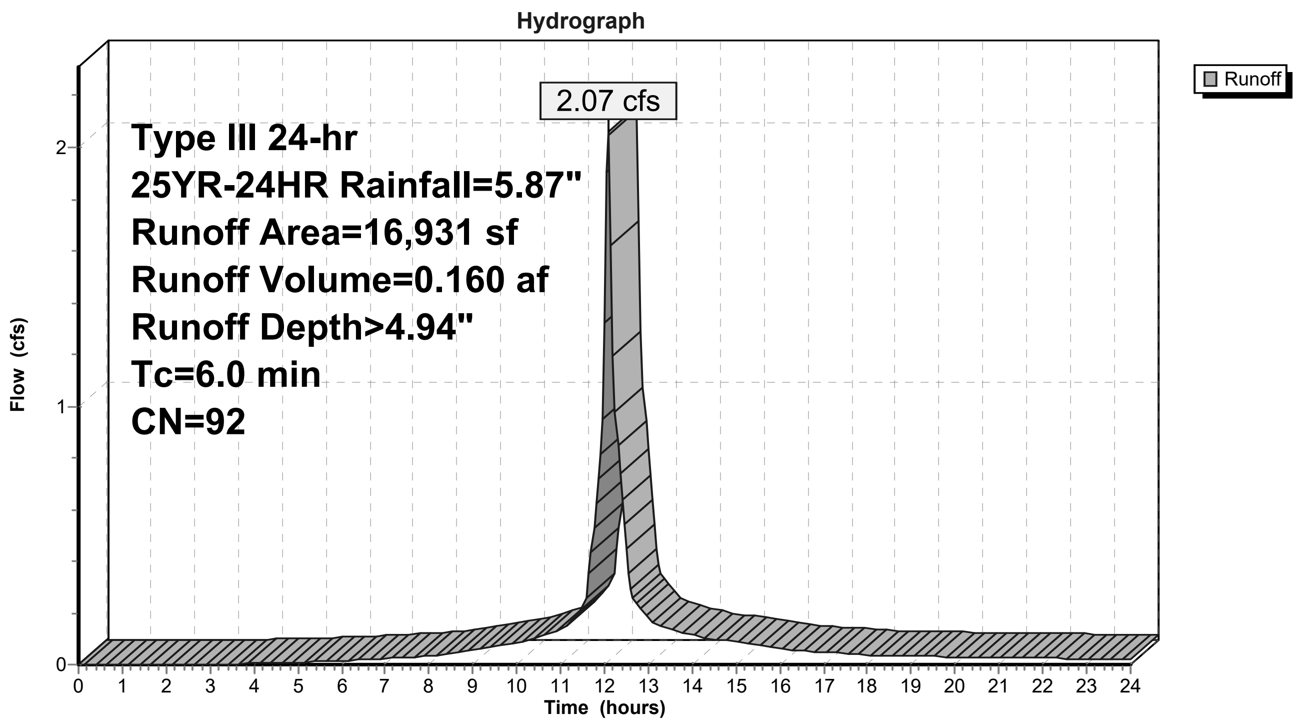
Runoff = 2.07 cfs @ 12.09 hrs, Volume= 0.160 af, Depth> 4.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
2,245	61	>75% Grass cover, Good, HSG B
11,486	98	Paved parking, HSG B
1,461	98	Roofs, HSG B
621	74	>75% Grass cover, Good, HSG C
1,118	98	Paved parking, HSG C
16,931	92	Weighted Average
2,866		16.93% Pervious Area
14,065		83.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 24S: Subcatchment #24



Summary for Subcatchment 25S: Subcatchment #25

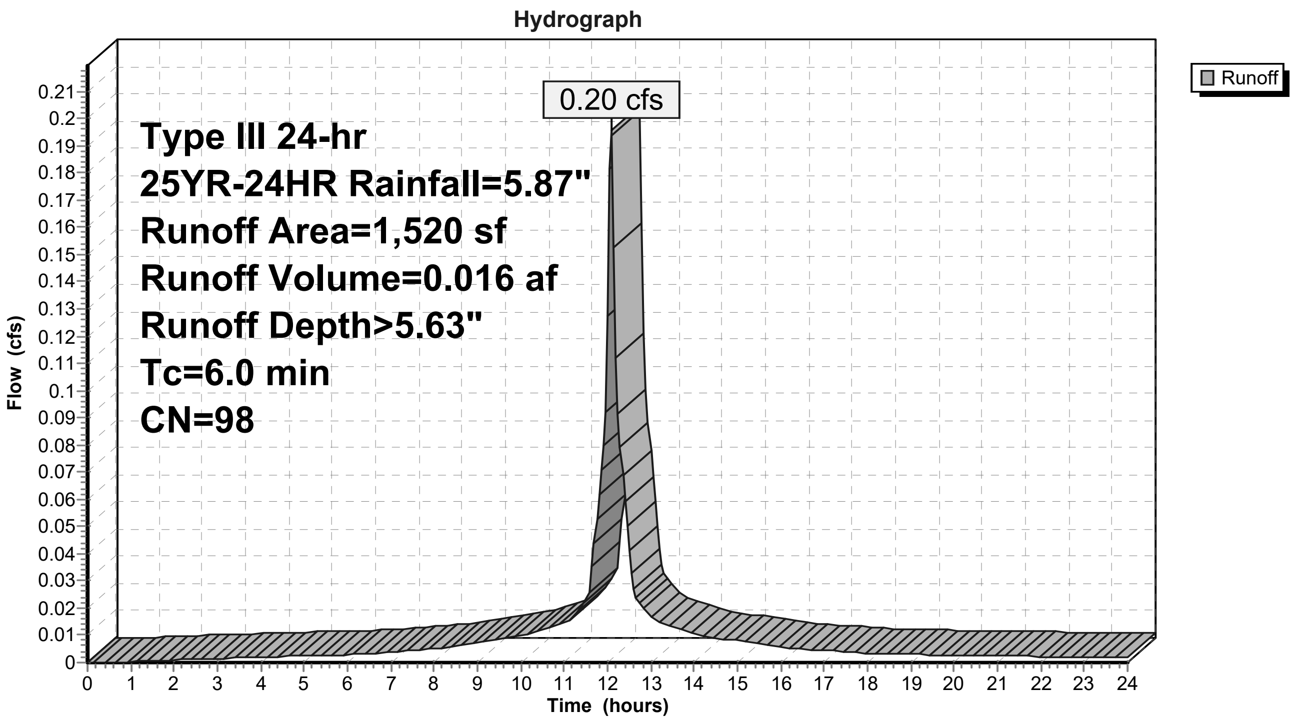
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.016 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
443	98	Paved parking, HSG B
1,077	98	Roofs, HSG B
1,520	98	Weighted Average
1,520		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 25S: Subcatchment #25



Summary for Subcatchment 26S: Subcatchment #26

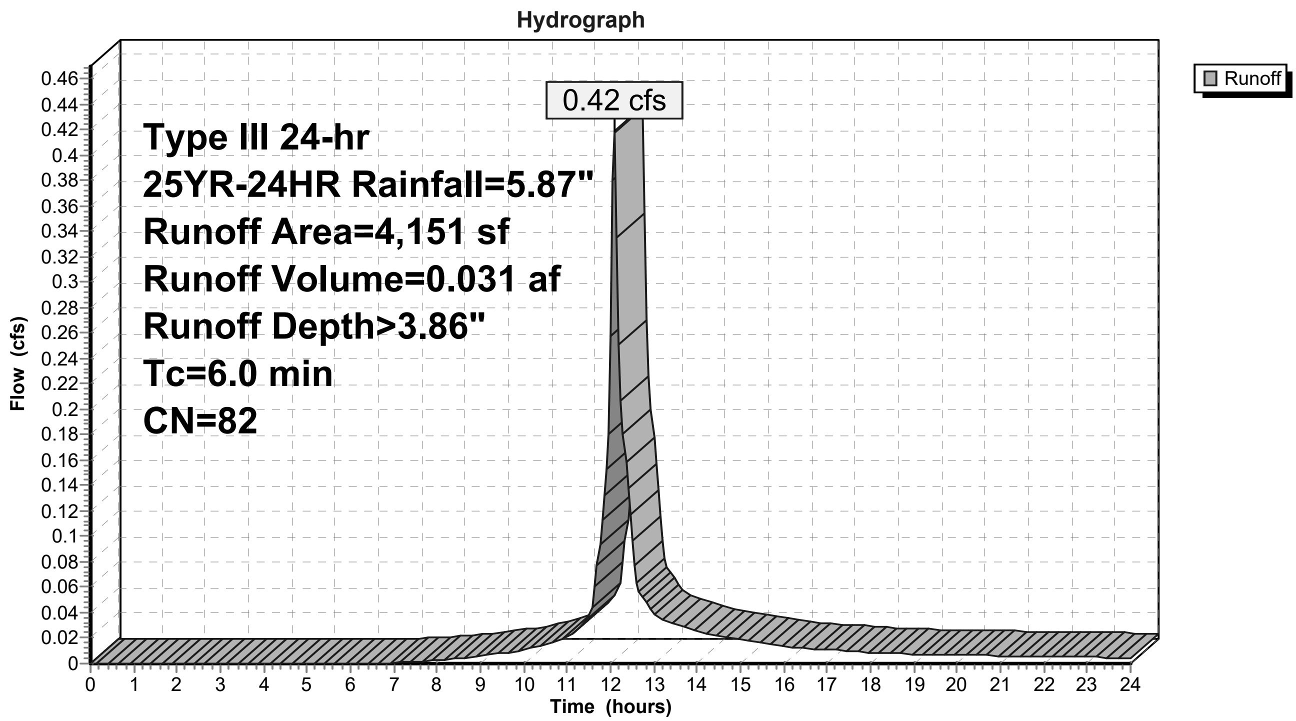
Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af, Depth> 3.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
1,777	61	>75% Grass cover, Good, HSG B
2,270	98	Paved parking, HSG B
104	98	Roofs, HSG B
4,151	82	Weighted Average
1,777		42.81% Pervious Area
2,374		57.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 26S: Subcatchment #26



Summary for Subcatchment 27S: Subcatchment #27

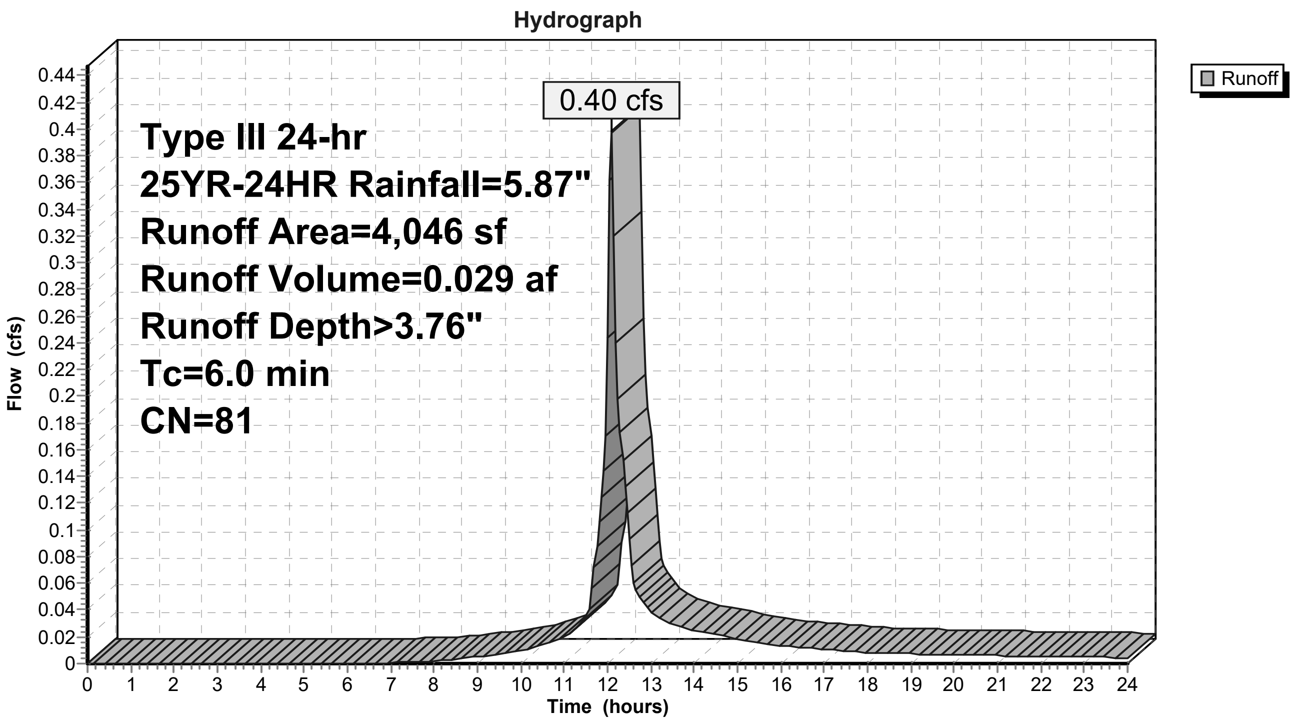
Runoff = 0.40 cfs @ 12.09 hrs, Volume= 0.029 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
1,861	61	>75% Grass cover, Good, HSG B
1,786	98	Paved parking, HSG B
399	98	Roofs, HSG B
4,046	81	Weighted Average
1,861		46.00% Pervious Area
2,185		54.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 27S: Subcatchment #27



Summary for Subcatchment 28S: Subcatchment #28

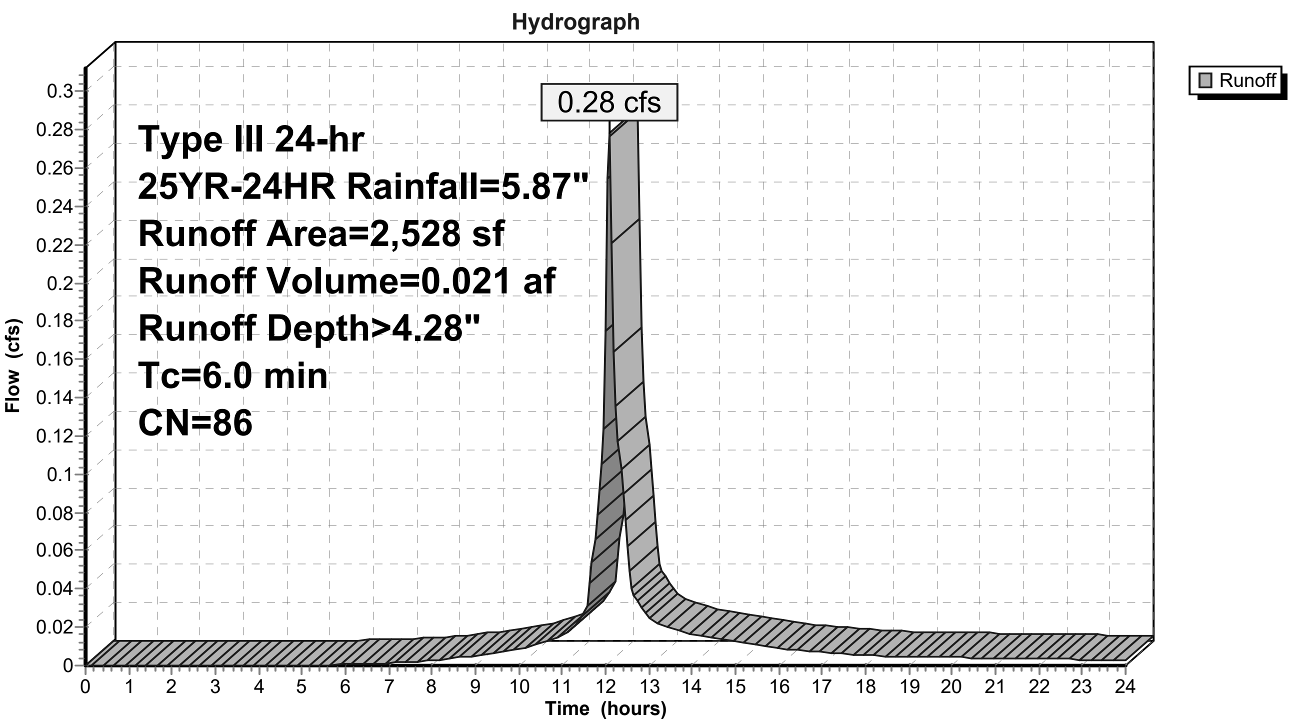
Runoff = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af, Depth> 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
820	61	>75% Grass cover, Good, HSG B
1,708	98	Paved parking, HSG B
2,528	86	Weighted Average
820		32.44% Pervious Area
1,708		67.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 28S: Subcatchment #28



Summary for Subcatchment 30S: Subcatchment #30

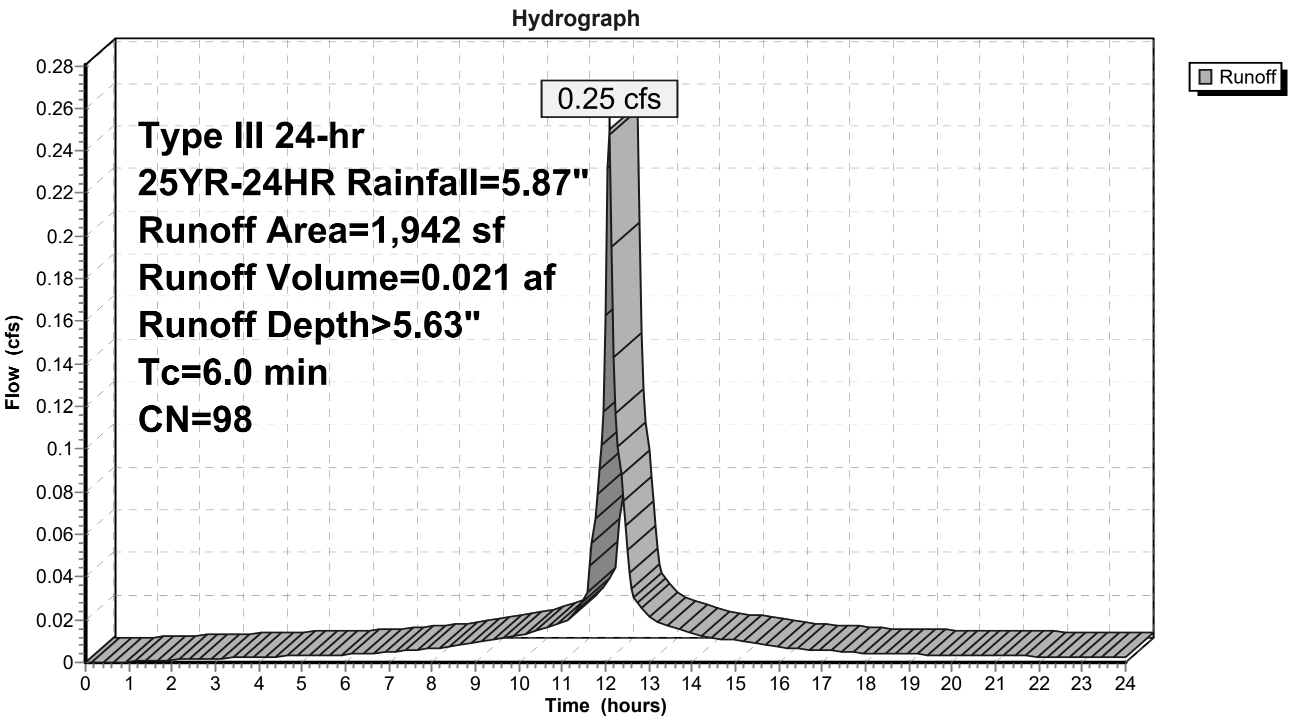
Runoff = 0.25 cfs @ 12.09 hrs, Volume= 0.021 af, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
1,942	98	Paved parking, HSG B
1,942		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 30S: Subcatchment #30



Summary for Subcatchment 41S: Subcatchment #41

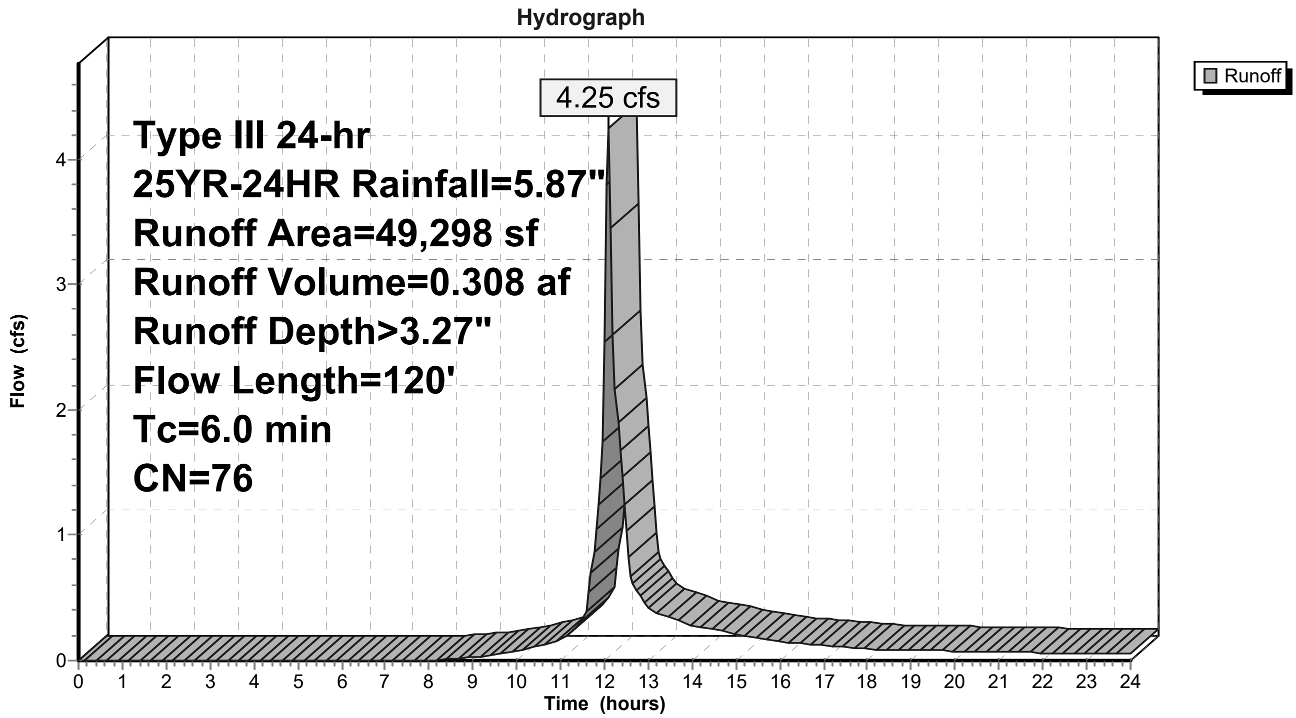
Runoff = 4.25 cfs @ 12.09 hrs, Volume= 0.308 af, Depth> 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
7,583	39	>75% Grass cover, Good, HSG A
6,875	98	Paved parking, HSG A
456	96	Gravel surface, HSG A
16,368	61	>75% Grass cover, Good, HSG B
15,427	98	Paved parking, HSG B
558	98	Roofs, HSG B
901	96	Gravel surface, HSG B
984	74	>75% Grass cover, Good, HSG C
146	96	Gravel surface, HSG C
49,298	76	Weighted Average
26,438		53.63% Pervious Area
22,860		46.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	53	0.0374	0.19		**Sheet Flow, Segement #1** Grass: Short n= 0.150 P2= 3.08"
0.1	14	0.0699	1.85		**Shallow Concentrated Flow, Segment #2** Short Grass Pasture Kv= 7.0 fps
0.9	53	0.0190	0.96		**Shallow Concentrated Flow, Segment #3** Short Grass Pasture Kv= 7.0 fps
5.7	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 41S: Subcatchment #41



Summary for Subcatchment 42S: Subcatchment #42

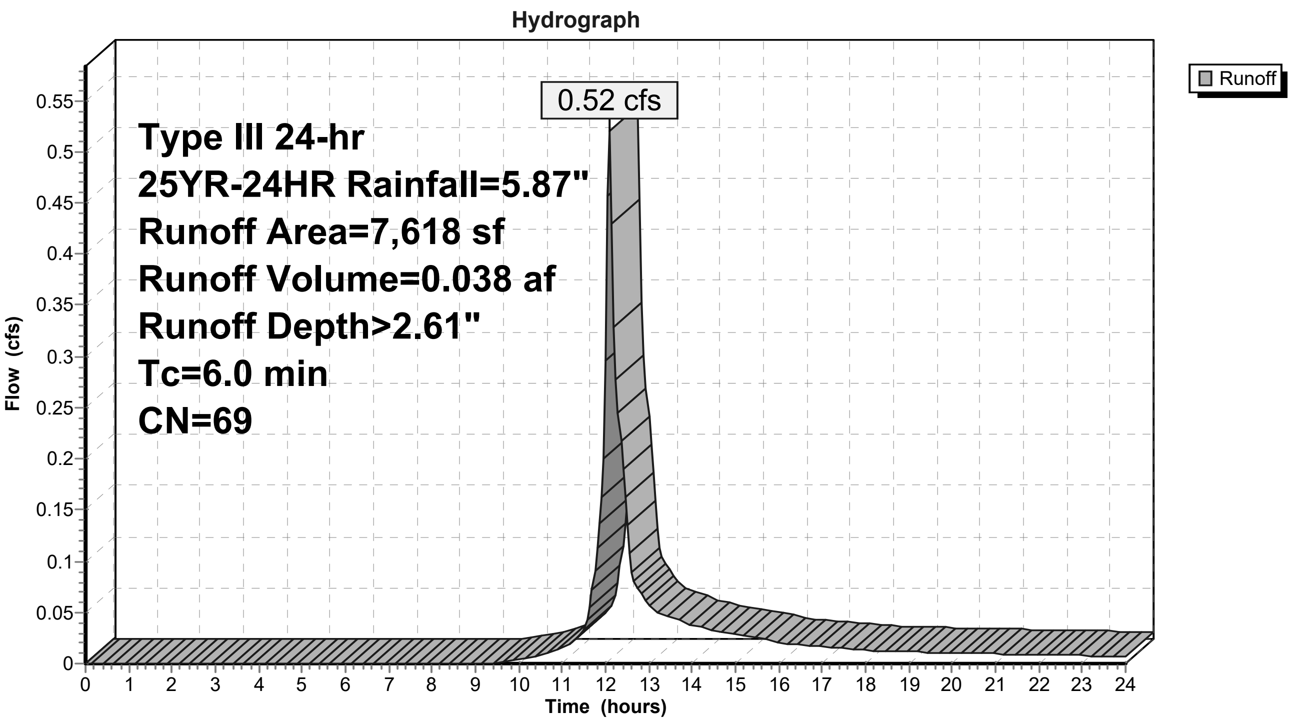
Runoff = 0.52 cfs @ 12.10 hrs, Volume= 0.038 af, Depth> 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
3,915	61	>75% Grass cover, Good, HSG B
235	96	Gravel surface, HSG B
3,165	74	>75% Grass cover, Good, HSG C
303	96	Gravel surface, HSG C
7,618	69	Weighted Average
7,618		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 42S: Subcatchment #42



Summary for Subcatchment 43S: Subcatchment #43

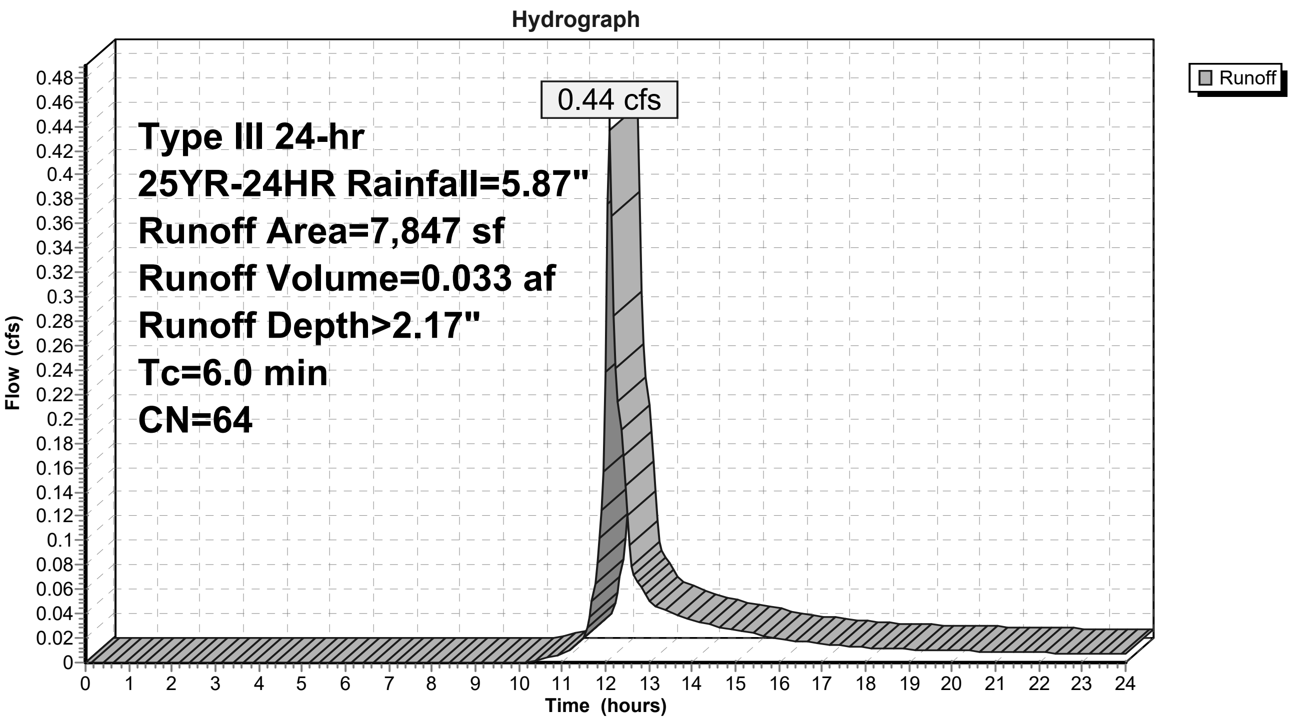
Runoff = 0.44 cfs @ 12.10 hrs, Volume= 0.033 af, Depth> 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR-24HR Rainfall=5.87"

Area (sf)	CN	Description
7,233	61	>75% Grass cover, Good, HSG B
614	96	Gravel surface, HSG B
7,847	64	Weighted Average
7,847		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 43S: Subcatchment #43



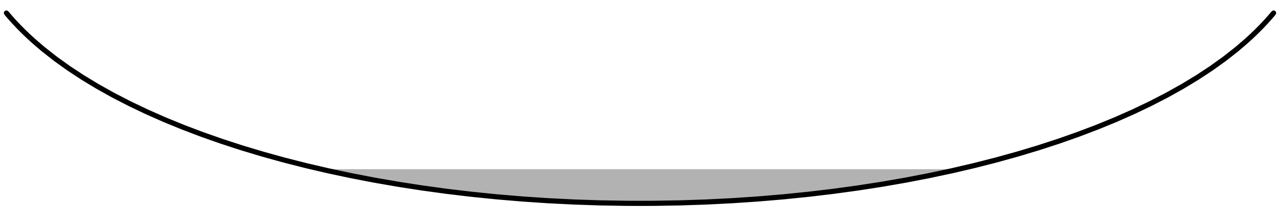
Summary for Reach 42aR: Lvl Sprd to Wetland

Inflow Area = 4.190 ac, 71.89% Impervious, Inflow Depth > 1.21" for 25YR-24HR event
Inflow = 3.07 cfs @ 12.31 hrs, Volume= 0.422 af
Outflow = 3.07 cfs @ 12.31 hrs, Volume= 0.422 af, Atten= 0%, Lag= 0.1 min

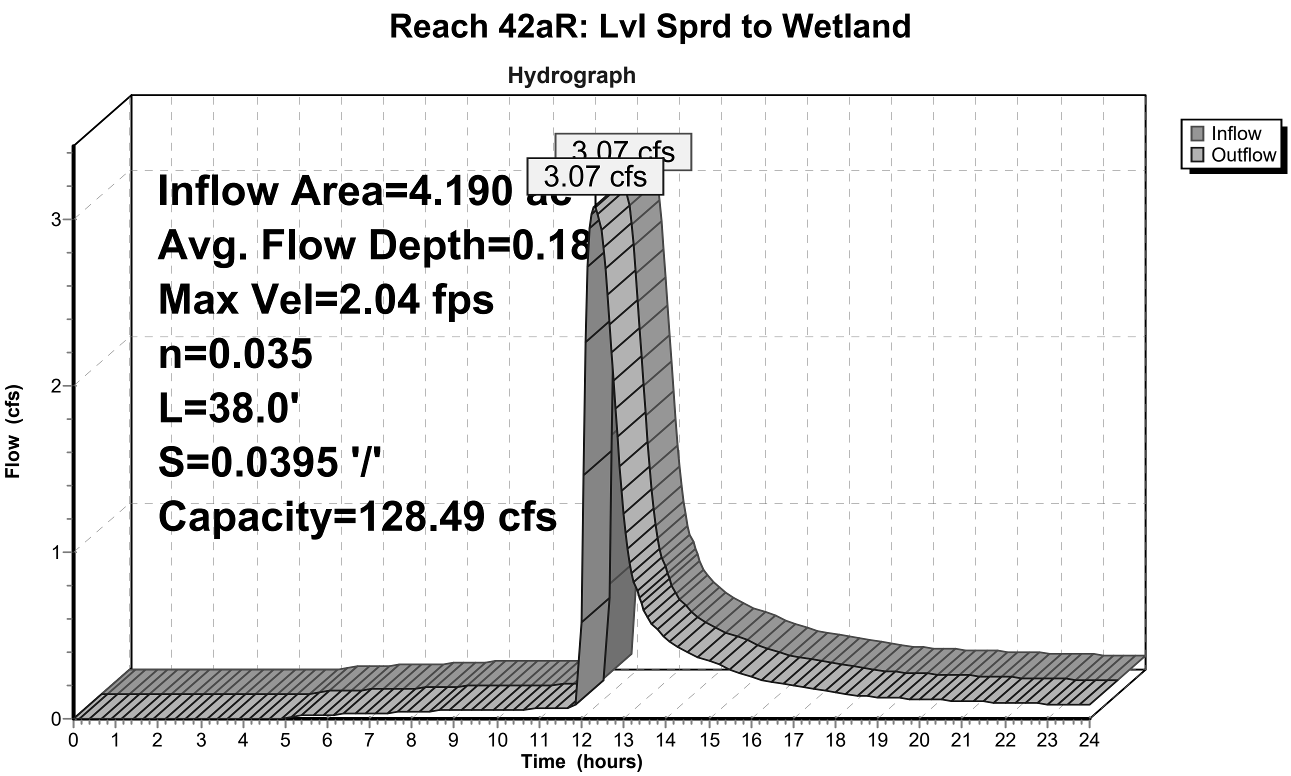
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.04 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 0.8 min

Peak Storage= 57 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 128.49 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 38.0' Slope= 0.0395 '/'
Inlet Invert= 165.50', Outlet Invert= 164.00'



‡



Summary for Reach 42bR: Overland Flow to Wetland

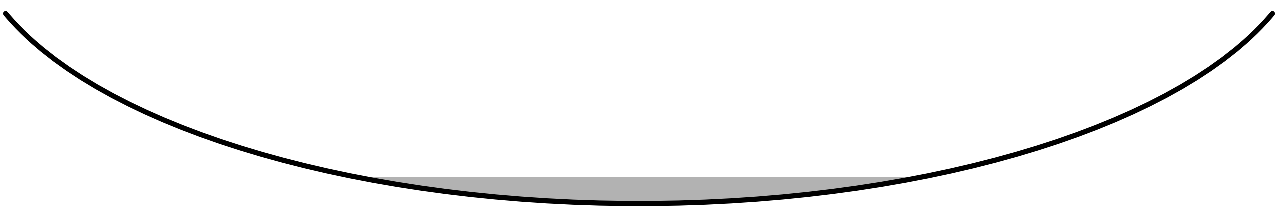
[61] Hint: Exceeded Reach 42aR outlet invert by 0.14' @ 12.30 hrs

Inflow Area = 4.190 ac, 71.89% Impervious, Inflow Depth > 1.21" for 25YR-24HR event
Inflow = 3.07 cfs @ 12.31 hrs, Volume= 0.422 af
Outflow = 3.07 cfs @ 12.31 hrs, Volume= 0.422 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.04 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 0.3 min

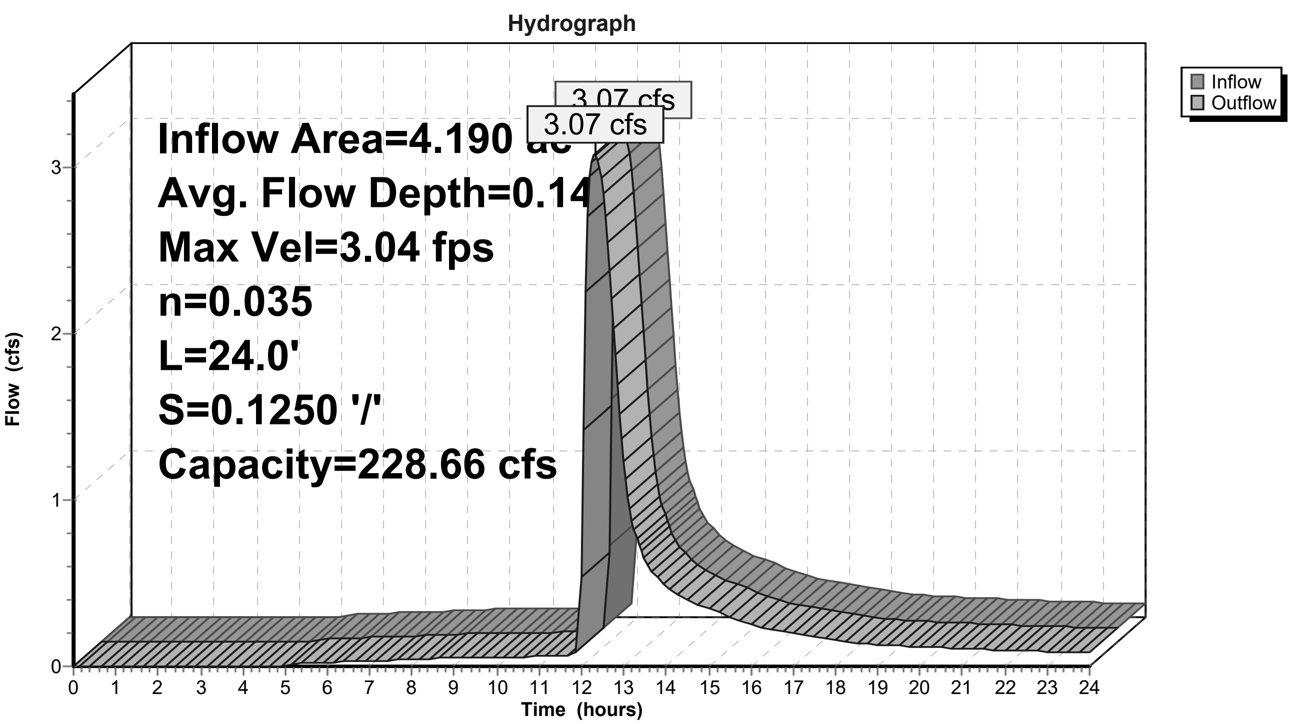
Peak Storage= 24 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 228.66 cfs

30.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 24.0' Slope= 0.1250 '/'
Inlet Invert= 164.00', Outlet Invert= 161.00'



‡

Reach 42bR: Overland Flow to Wetland



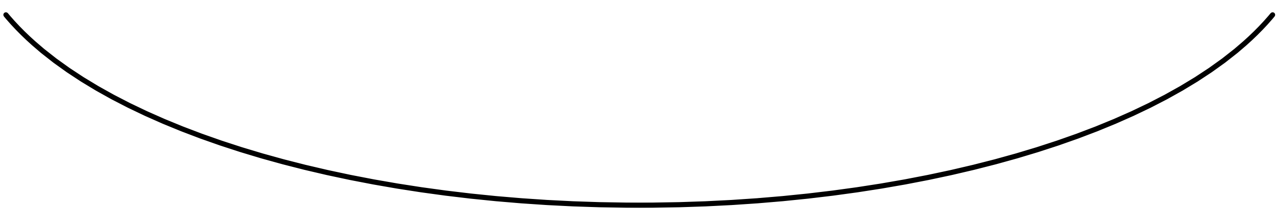
Summary for Reach 43R: Lvl Sprd to Wetland

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

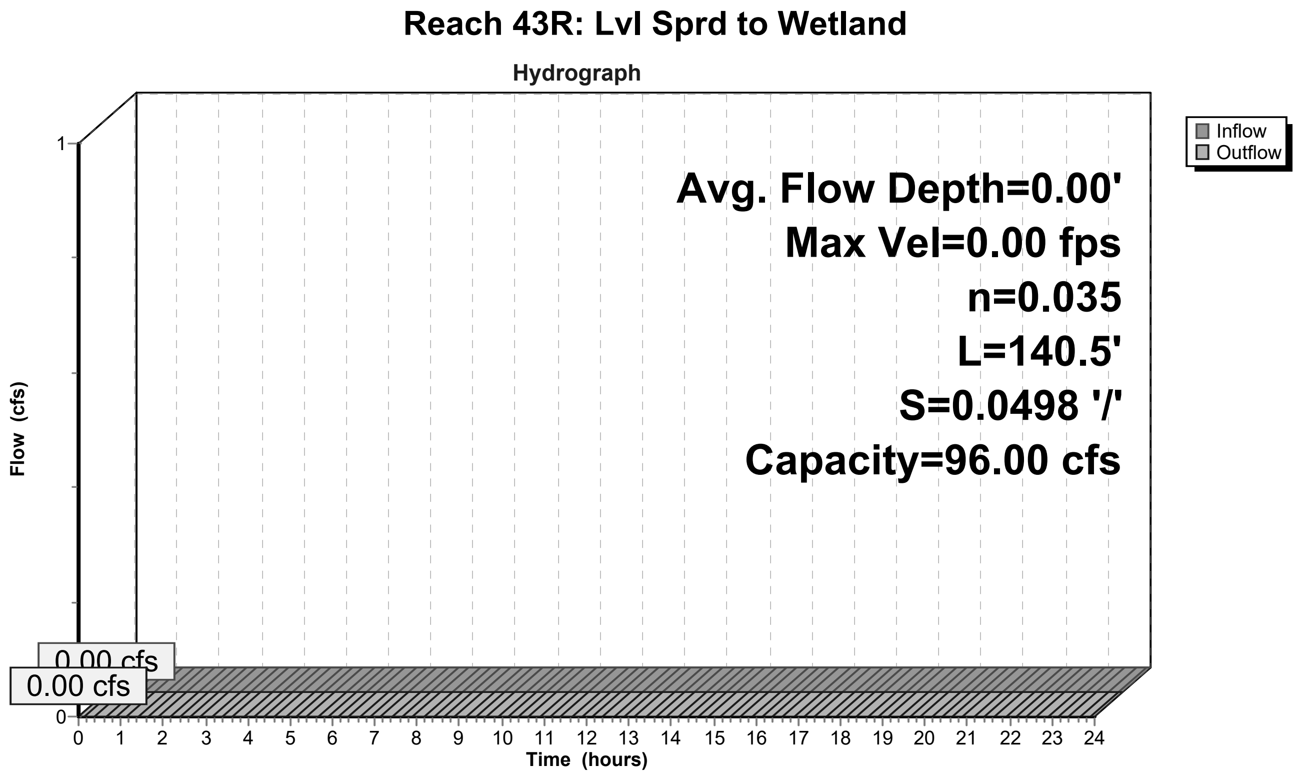
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 13.3 sf, Capacity= 96.00 cfs

20.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds
Length= 140.5' Slope= 0.0498 '/'
Inlet Invert= 172.00', Outlet Invert= 165.00'



‡



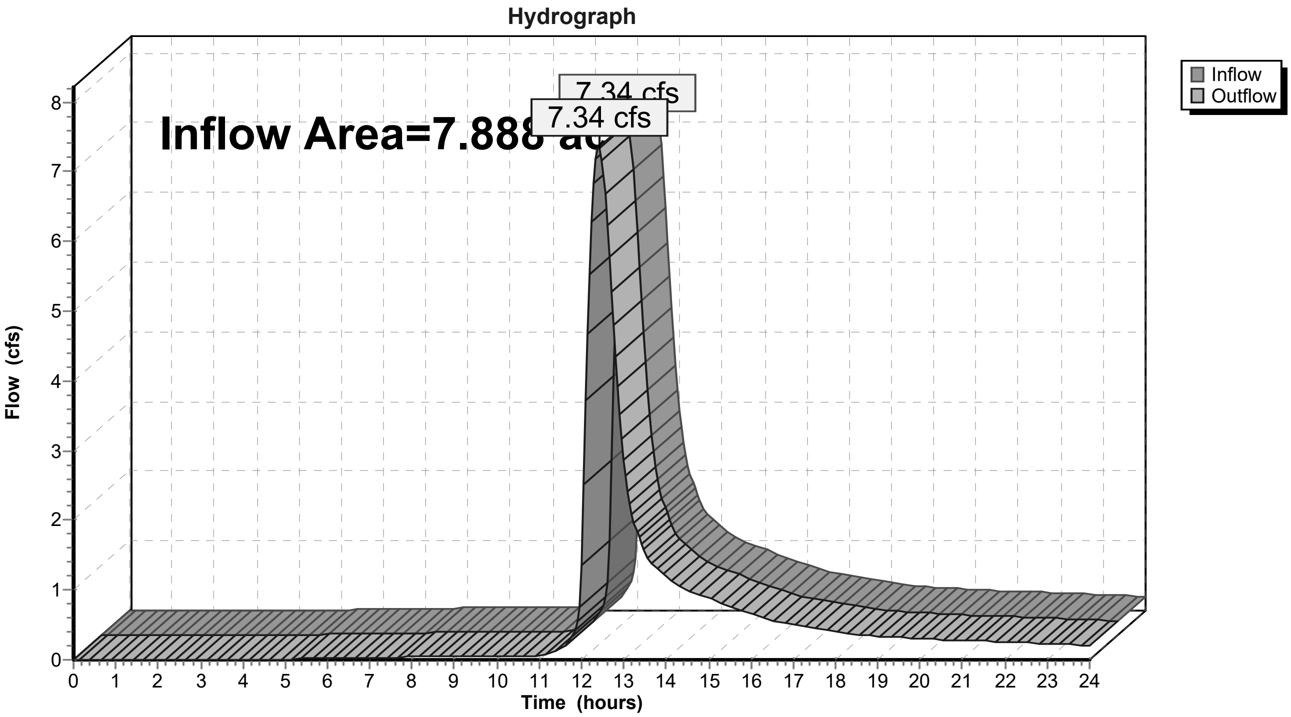
Summary for Reach 100R: Final Reach #100

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

Inflow Area =	7.888 ac, 43.06% Impervious, Inflow Depth > 1.50"	for 25YR-24HR event	
Inflow =	7.34 cfs @ 12.41 hrs, Volume=	0.984 af	
Outflow =	7.34 cfs @ 12.41 hrs, Volume=	0.984 af, Atten= 0%, Lag= 0.0 min	

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

Reach 100R: Final Reach #100



Summary for Pond 101P: Bioretention W/ ISR #101

Inflow Area = 2.570 ac, 76.38% Impervious, Inflow Depth > 4.59" for 25YR-24HR event
Inflow = 12.32 cfs @ 12.09 hrs, Volume= 0.982 af
Outflow = 12.09 cfs @ 12.11 hrs, Volume= 0.800 af, Atten= 2%, Lag= 1.0 min
Primary = 0.14 cfs @ 12.11 hrs, Volume= 0.195 af
Secondary = 6.63 cfs @ 12.11 hrs, Volume= 0.458 af
Tertiary = 5.32 cfs @ 12.11 hrs, Volume= 0.147 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 184.27' @ 12.11 hrs Surf.Area= 1,705 sf Storage= 11,681 cf
Flood Elev= 185.00' Surf.Area= 1,705 sf Storage= 14,868 cf

Plug-Flow detention time= 139.1 min calculated for 0.800 af (81% of inflow)
Center-of-Mass det. time= 64.4 min (834.4 - 770.0)

Volume	Invert	Avail.Storage	Storage Description
#1	178.25'	171 cf	**Peastone (Irregular)** Listed below (Recalc) -Impervious 426 cf Overall x 40.0% Voids
#2	178.50'	512 cf	**Biomedia (Irregular)** Listed below (Recalc) 2,558 cf Overall x 20.0% Voids
#3	180.00'	13,577 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
#4	184.00'	2,435 cf	**Sediment Forebay (Irregular)** Listed below (Recalc) -Impervious
		16,693 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.25	1,705	338.9	0	0	1,705
178.50	1,705	338.9	426	426	1,790

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.50	1,705	338.9	0	0	1,705
180.00	1,705	338.9	2,558	2,558	2,213

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
180.00	1,705	338.9	0	0	1,705
181.00	2,086	349.8	1,892	1,892	2,395
182.00	2,483	360.8	2,282	4,174	3,111
183.00	2,893	371.7	2,685	6,859	3,844
184.00	3,357	386.1	3,122	9,981	4,792
185.00	3,839	399.8	3,595	13,577	5,734

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	204	76.7	0	0	204
185.00	1,141	337.2	609	609	8,787
186.00	2,610	503.6	1,826	2,435	19,928

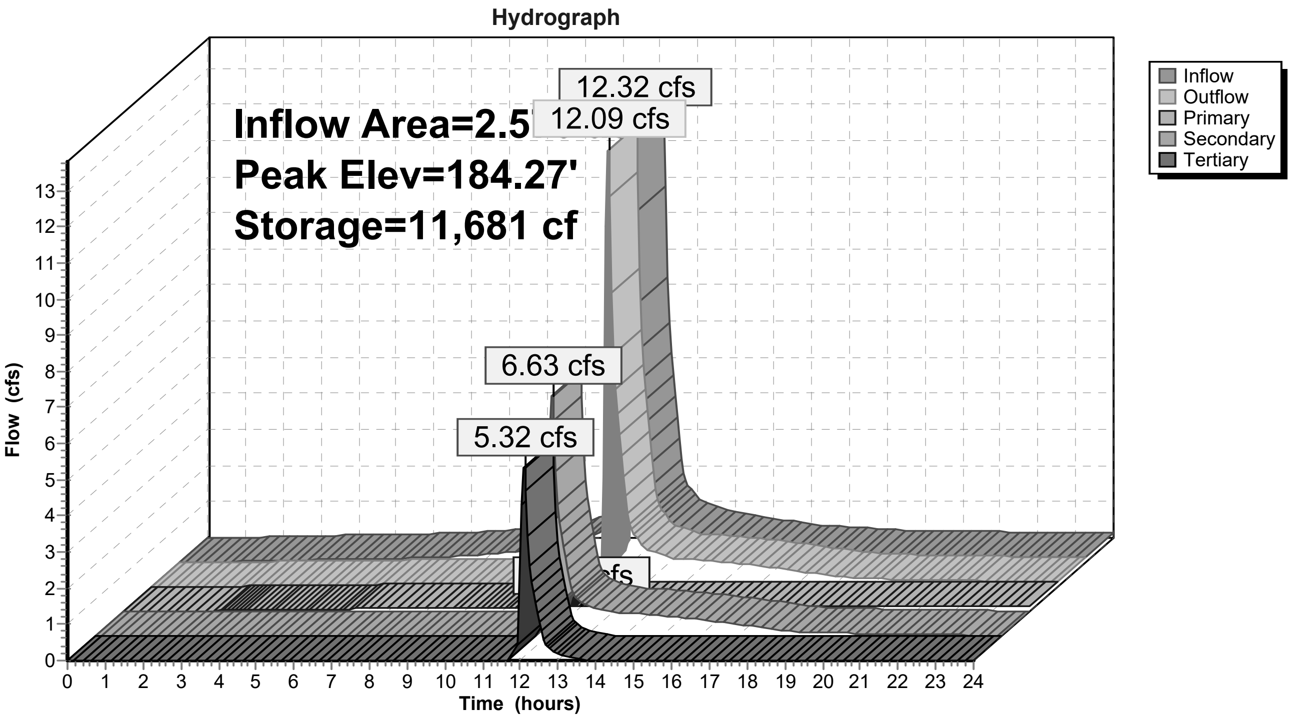
Device	Routing	Invert	Outlet Devices
#1	Primary	178.25'	**15.0" Round 15" HDPE N-12** L= 22.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 178.25' / 177.90' S= 0.0159 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	178.25'	**18.0" Round 18" HDPE N-12** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 178.25' / 178.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 1	178.25'	**1.5" Vert. 1.50" Orifice** C= 0.600
#4	Device 3	178.50'	**10.000 in/hr BioMedia over Surface area**
#5	Device 2	183.10'	**3.0" Vert. 3" Orifice (3) STR B X 3.00** C= 0.600
#6	Device 2	184.00'	**48.0" Horiz. 48" Outlet Structure** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	184.00'	**15.0' long x 8.0' breadth 15' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.14 cfs @ 12.11 hrs HW=184.27' TW=174.11' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 0.14 cfs of 13.73 cfs potential flow)
  └─**3=1.50" Orifice** (Orifice Controls 0.14 cfs @ 11.75 fps)
    └─**4=BioMedia** (Passes 0.14 cfs of 0.39 cfs potential flow)

Secondary OutFlow Max=6.53 cfs @ 12.11 hrs HW=184.27' TW=177.70' (Dynamic Tailwater)
└─**2=18" HDPE N-12** (Passes 6.53 cfs of 19.54 cfs potential flow)
  ├─**5=3" Orifice (3) STR B** (Orifice Controls 0.73 cfs @ 4.93 fps)
  └─**6=48" Outlet Structure** (Weir Controls 5.81 cfs @ 1.70 fps)

Tertiary OutFlow Max=5.23 cfs @ 12.11 hrs HW=184.27' TW=177.70' (Dynamic Tailwater)
└─**7=15' Emergency Spillway** (Weir Controls 5.23 cfs @ 1.29 fps)

Pond 101P: Bioretention W/ ISR #101



Summary for Pond 102P: Bioretention W/ ISR #102

[80] Warning: Exceeded Pond C03P by 0.08' @ 11.95 hrs (3.38 cfs 0.129 af)

Inflow Area = 4.190 ac, 71.89% Impervious, Inflow Depth > 1.60" for 25YR-24HR event
Inflow = 7.11 cfs @ 12.09 hrs, Volume= 0.560 af
Outflow = 3.07 cfs @ 12.31 hrs, Volume= 0.422 af, Atten= 57%, Lag= 13.1 min
Primary = 0.08 cfs @ 12.31 hrs, Volume= 0.096 af
Secondary = 2.99 cfs @ 12.31 hrs, Volume= 0.326 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 170.38' @ 12.31 hrs Surf.Area= 2,141 sf Storage= 9,846 cf
Flood Elev= 172.50' Surf.Area= 2,141 sf Storage= 18,568 cf

Plug-Flow detention time= 155.1 min calculated for 0.422 af (75% of inflow)
Center-of-Mass det. time= 70.3 min (848.6 - 778.4)

Volume	Invert	Avail.Storage	Storage Description
#1	165.75'	214 cf	**Peastone (Irregular)** Listed below (Recalc) -Impervious 535 cf Overall x 40.0% Voids
#2	166.00'	642 cf	**Biomedia (Irregular)** Listed below (Recalc) 3,212 cf Overall x 20.0% Voids
#3	167.50'	570 cf	**Forebay (Irregular)** Listed below (Recalc) -Impervious
#4	167.50'	5,235 cf	**Cell (Irregular)** Listed below (Recalc) -Impervious
#5	169.50'	11,825 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
#6	165.75'	82 cf	**4.00'D x 6.50'H Outlet Structure** -Impervious
		18,568 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
165.75	2,141	208.5	0	0	2,141
166.00	2,141	208.5	535	535	2,193

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
166.00	2,141	208.5	0	0	2,141
167.50	2,141	208.5	3,212	3,212	2,454

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
167.50	190	64.7	0	0	190
168.00	233	71.4	106	106	270
169.00	336	85.2	283	389	459
169.50	390	91.6	181	570	559

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
167.50	2,141	208.5	0	0	2,141
168.00	2,474	221.0	1,153	1,153	2,582
169.00	2,804	229.3	2,637	3,790	2,955
169.50	2,977	233.6	1,445	5,235	3,151

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
169.50	3,387	262.2	0	0	3,387
170.00	3,608	269.4	1,748	1,748	3,719
171.00	3,942	278.4	3,774	5,522	4,198
172.00	4,288	287.6	4,114	9,636	4,700
172.50	4,470	292.4	2,189	11,825	4,964

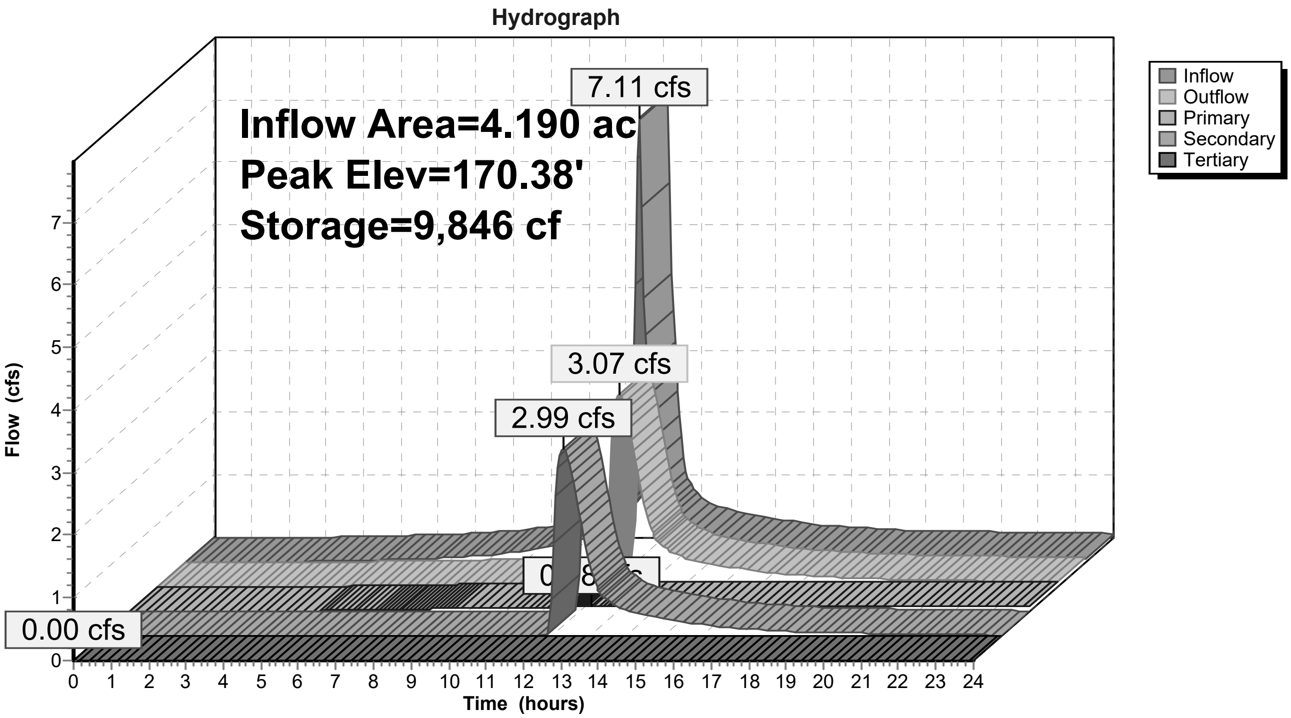
Device	Routing	Invert	Outlet Devices
#1	Primary	165.75'	**6.0" Round 6" HDPE N-12 (Str A)** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.75' / 165.50' S= 0.0057 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	165.75'	**1.2" Vert. 1.25" Orifice (Str A)** C= 0.600
#3	Secondary	165.75'	**15.0" Round 15" HDPE N-12 (Str B)** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.75' / 165.50' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#4	Device 2	166.00'	**10.000 in/hr BioMedia over Surface area**
#5	Device 3	169.25'	**8.0" Vert. 8" Orifice (Str B) (2) X 2.00** C= 0.600
#6	Device 3	171.75'	**48.0" Horiz. 48" Outlet Structure (Str B)** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	172.00'	**10.0' long x 10.0' breadth 10' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.08 cfs @ 12.31 hrs HW=170.37' TW=165.68' (Dynamic Tailwater)
└─**1=6" HDPE N-12 (Str A)** (Passes 0.08 cfs of 1.56 cfs potential flow)
  └─**2=1.25" Orifice (Str A)** (Orifice Controls 0.08 cfs @ 10.30 fps)
    └─**4=BioMedia** (Passes 0.08 cfs of 0.50 cfs potential flow)

Secondary OutFlow Max=2.99 cfs @ 12.31 hrs HW=170.37' TW=165.68' (Dynamic Tailwater)
└─**3=15" HDPE N-12 (Str B)** (Passes 2.99 cfs of 11.82 cfs potential flow)
  ├─**5=8" Orifice (Str B) (2)** (Orifice Controls 2.99 cfs @ 4.28 fps)
  └─**6=48" Outlet Structure (Str B)** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.75' TW=165.50' (Dynamic Tailwater)
└─**7=10' Emergency Spillway** (Controls 0.00 cfs)

Pond 102P: Bioretention W/ ISR #102



Summary for Pond 103P: Infiltration Pond #103

Inflow Area =	0.180 ac,	0.00% Impervious,	Inflow Depth > 42.46"	for 25YR-24HR event
Inflow =	12.39 cfs @	12.11 hrs, Volume=	0.637 af	
Outflow =	7.30 cfs @	12.26 hrs, Volume=	0.541 af, Atten= 41%, Lag= 9.5 min	
Discarded =	0.23 cfs @	12.26 hrs, Volume=	0.215 af	
Primary =	0.20 cfs @	12.26 hrs, Volume=	0.002 af	
Secondary =	6.86 cfs @	12.26 hrs, Volume=	0.324 af	
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 178.90' @ 12.26 hrs Surf.Area= 3,344 sf Storage= 8,102 cf
Flood Elev= 180.00' Surf.Area= 3,897 sf Storage= 12,067 cf

Plug-Flow detention time= 133.8 min calculated for 0.539 af (85% of inflow)
Center-of-Mass det. time= 88.0 min (906.5 - 818.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	12,067 cf	**Open Water Storage (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
175.00	689	156.4	0	0	689
176.00	1,523	271.2	1,079	1,079	4,601
177.00	2,020	308.3	1,766	2,844	6,336
178.00	2,889	381.1	2,442	5,286	10,345
179.00	3,394	399.3	3,138	8,424	11,541
180.00	3,897	414.2	3,643	12,067	12,588

Device	Routing	Invert	Outlet Devices
#1	Primary	178.75'	**15.0" Round 15" HDPE N-12 (W/ Wier Lip) w/ 3.0" inside fill** L= 15.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 177.00' S= 0.0968 '/' Cc= 0.900 n= 0.012, Flow Area= 1.05 sf
#2	Secondary	175.75'	**15.0" Round 15" HDPE N-12 (Str B)** L= 22.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.75' / 175.50' S= 0.0111 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	178.60'	**48.0" Horiz. 48" Orifice (Str B)** C= 0.600 Limited to weir flow at low heads
#4	Tertiary	179.00'	**10.0' long x 10.0' breadth 10' E. Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	175.00'	**3.000 in/hr Infiltration over Surface area**

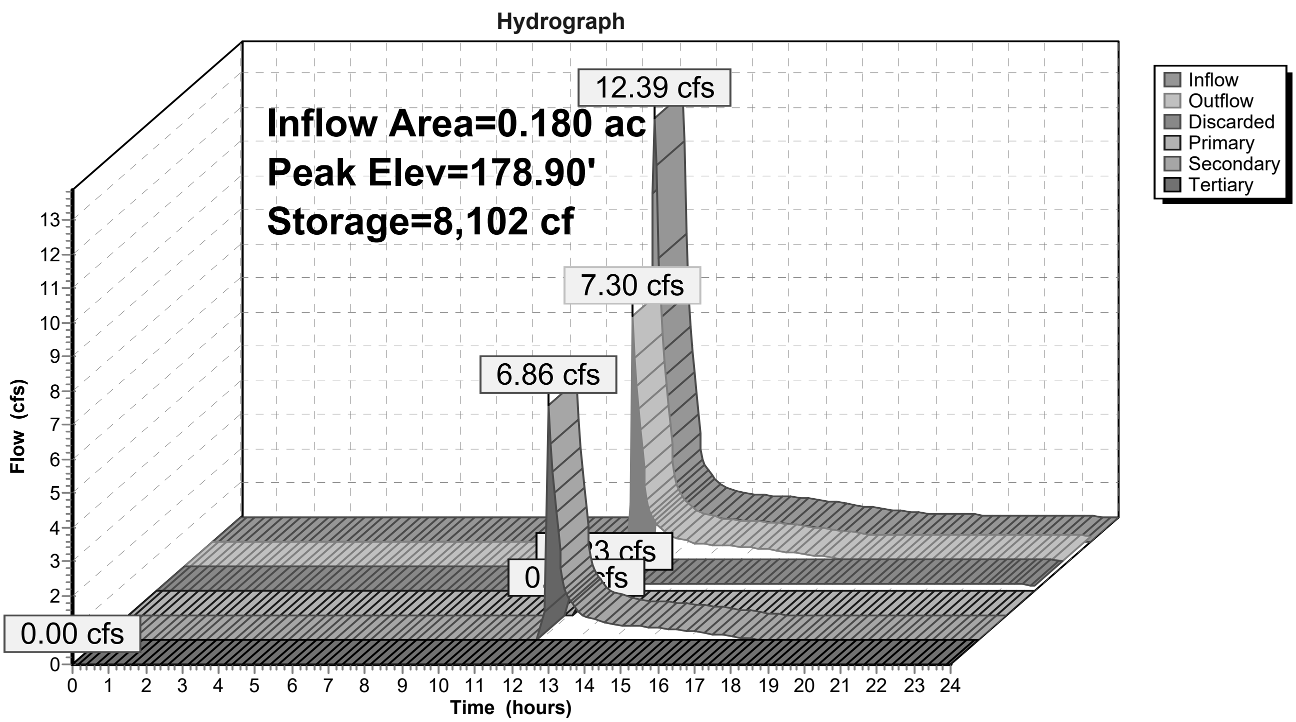
Discarded OutFlow Max=0.23 cfs @ 12.26 hrs HW=178.89' (Free Discharge)
└─**5=Infiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.18 cfs @ 12.26 hrs HW=178.89' TW=177.58' (Dynamic Tailwater)
└─**1=15" HDPE N-12 (W/ Wier Lip)** (Inlet Controls 0.18 cfs @ 1.19 fps)

Secondary OutFlow Max=6.41 cfs @ 12.26 hrs HW=178.89' TW=175.47' (Dynamic Tailwater)
└─**2=15" HDPE N-12 (Str B)** (Passes 6.41 cfs of 9.37 cfs potential flow)
  └─**3=48" Orifice (Str B)** (Weir Controls 6.41 cfs @ 1.76 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' TW=172.00' (Dynamic Tailwater)
└─**4=10' E. Spillway** (Controls 0.00 cfs)

Pond 103P: Infiltration Pond #103



Summary for Pond 104P: StormTech Inf. Overflow #104

Inflow Area = 2.570 ac, 76.38% Impervious, Inflow Depth > 2.42" for 25YR-24HR event
Inflow = 7.00 cfs @ 12.26 hrs, Volume= 0.519 af
Outflow = 0.40 cfs @ 12.25 hrs, Volume= 0.456 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.40 cfs @ 12.25 hrs, Volume= 0.456 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 178.48' @ 16.00 hrs Surf.Area= 0.134 ac Storage= 0.221 af
Flood Elev= 179.75' Surf.Area= 0.134 ac Storage= 0.271 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 171.6 min (1,006.3 - 834.7)

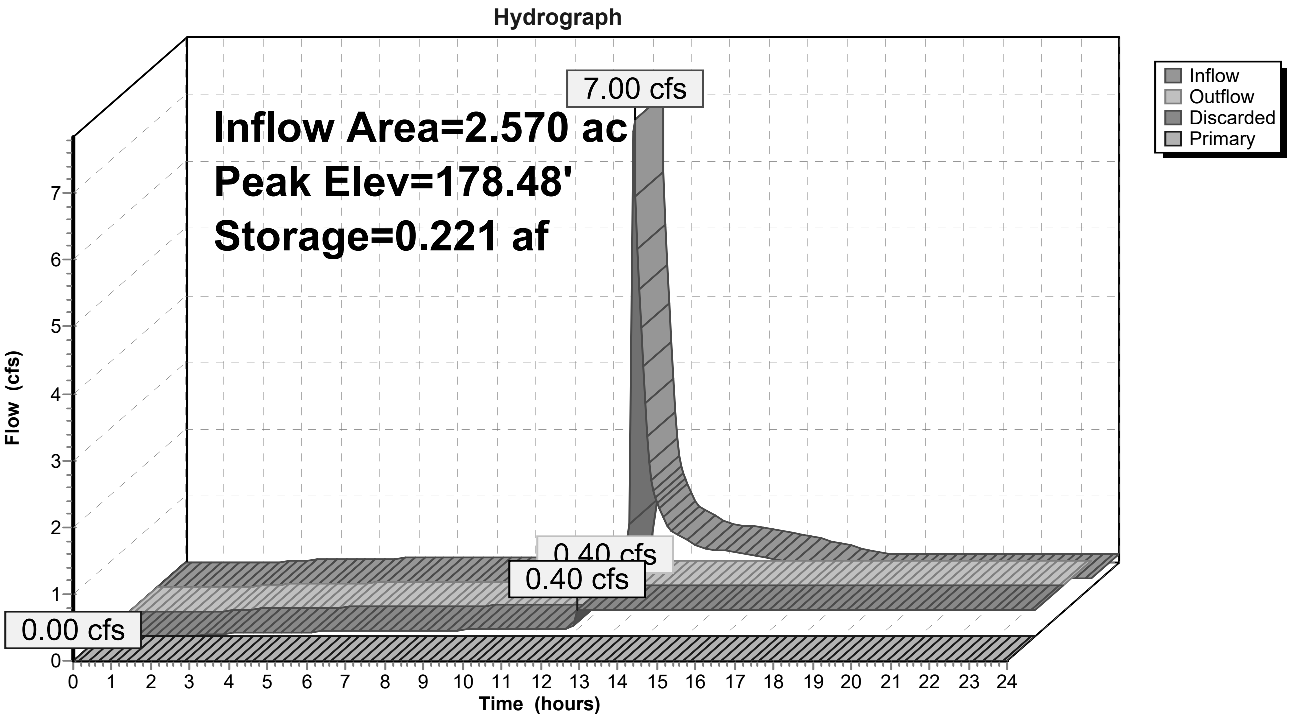
Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	0.014 af	**34.75'W x 45.00'L x 1.00'H Lower Stone** 0.036 af Overall x 40.0% Voids
#2	175.00'	0.138 af	**34.75'W x 122.50'L x 4.75'H Upper Stone** 0.464 af Overall - 0.118 af Embedded = 0.346 af x 40.0% Voids
#3	175.50'	0.118 af	**ADS_StormTech SC-740 +Cap** x 112 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		0.271 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Primary	175.40'	**15.0" Round 15" HDPE Overflow** L= 4.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.40' / 175.20' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	179.00'	**15.0" Horiz. 15" Internal Stack** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.40 cfs @ 12.25 hrs HW=175.36' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.00' TW=174.94' (Dynamic Tailwater)
└─**2=15" HDPE Overflow** (Controls 0.00 cfs)
  └─**3=15" Internal Stack** (Controls 0.00 cfs)

Pond 104P: StormTech Inf. Overflow #104



Summary for Pond C01P: Catch Basin #1

Inflow Area = 0.197 ac, 88.40% Impervious, Inflow Depth > 5.16" for 25YR-24HR event
Inflow = 1.08 cfs @ 12.09 hrs, Volume= 0.085 af
Outflow = 1.08 cfs @ 12.09 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.1 min
Primary = 1.08 cfs @ 12.09 hrs, Volume= 0.085 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 179.87' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 184.38' Surf.Area= 0.000 ac Storage= 0.001 af

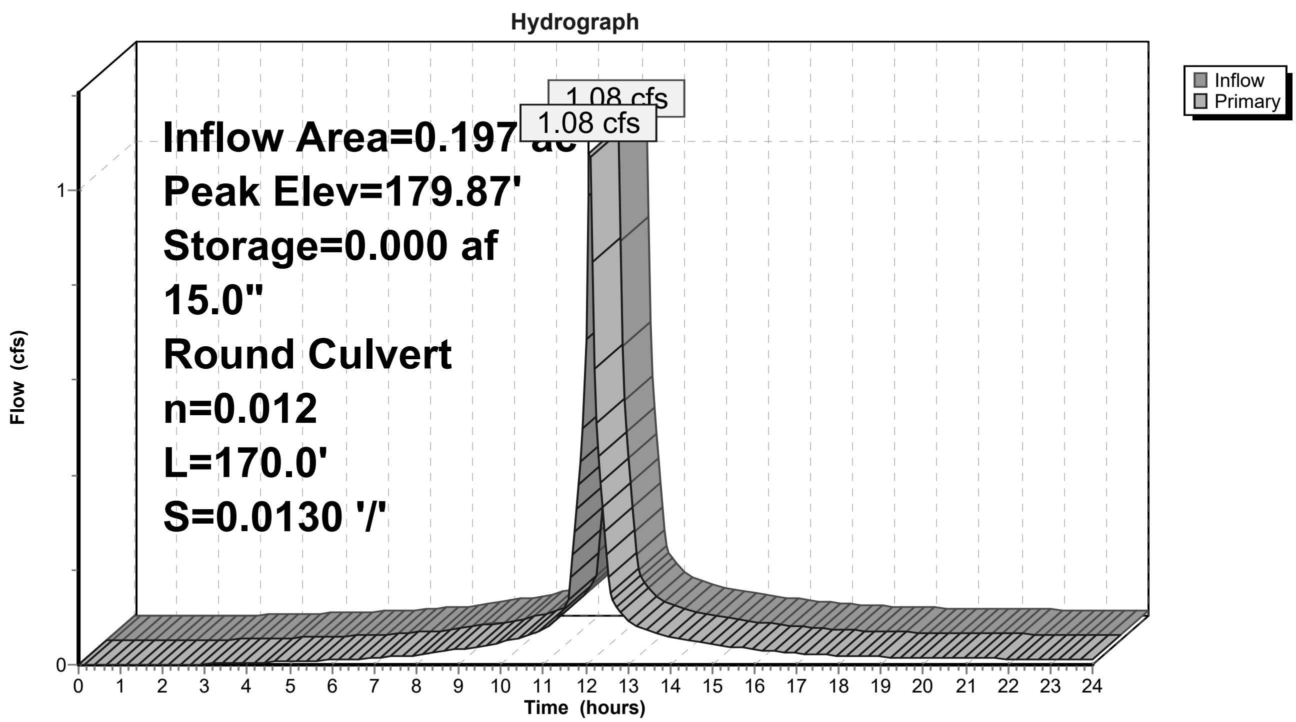
Plug-Flow detention time= 0.3 min calculated for 0.085 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (768.9 - 768.6)

Volume	Invert	Avail.Storage	Storage Description
#1	179.38'	0.001 af	**4.00'D x 5.00'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	179.38'	**15.0" Round 15" HDPE N-12** L= 170.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.38' / 177.17' S= 0.0130 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.05 cfs @ 12.09 hrs HW=179.87' TW=177.79' (Dynamic Tailwater)
↑—**1=15" HDPE N-12** (Inlet Controls 1.05 cfs @ 2.37 fps)

Pond C01P: Catch Basin #1



Summary for Pond C02P: Catch Basin #2

Inflow Area = 0.574 ac, 63.07% Impervious, Inflow Depth > 3.67" for 25YR-24HR event
Inflow = 2.16 cfs @ 12.09 hrs, Volume= 0.175 af
Outflow = 2.17 cfs @ 12.09 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.1 min
Primary = 2.17 cfs @ 12.09 hrs, Volume= 0.175 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 177.80' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 181.57' Surf.Area= 0.000 ac Storage= 0.001 af

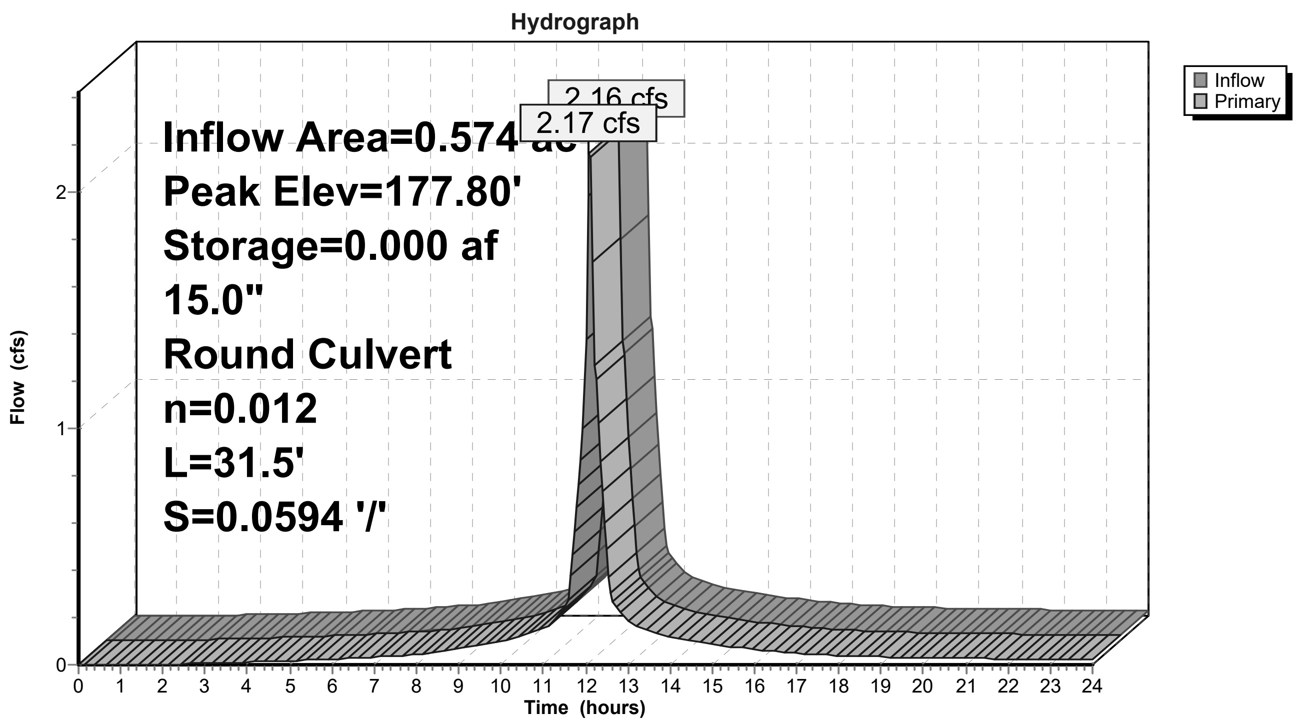
Plug-Flow detention time= 0.2 min calculated for 0.175 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (763.3 - 763.2)

Volume	Invert	Avail.Storage	Storage Description
#1	177.07'	0.001 af	**4.00'D x 4.50'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	177.07'	**15.0" Round 15" HDPE N-12** L= 31.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 177.07' / 175.20' S= 0.0594 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.11 cfs @ 12.09 hrs HW=177.79' TW=175.62' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Inlet Controls 2.11 cfs @ 2.89 fps)

Pond C02P: Catch Basin #2



Summary for Pond C03P: Catch Basin #3

[80] Warning: Exceeded Pond D04P by 0.07' @ 12.20 hrs (2.30 cfs 0.036 af)

Inflow Area = 4.015 ac, 75.02% Impervious, Inflow Depth > 1.56" for 25YR-24HR event
Inflow = 6.61 cfs @ 12.09 hrs, Volume= 0.522 af
Outflow = 6.59 cfs @ 12.09 hrs, Volume= 0.522 af, Atten= 0%, Lag= 0.0 min
Primary = 6.59 cfs @ 12.09 hrs, Volume= 0.522 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 170.40' @ 12.34 hrs Surf.Area= 0.000 ac Storage= 0.001 af
Flood Elev= 176.25' Surf.Area= 0.000 ac Storage= 0.002 af

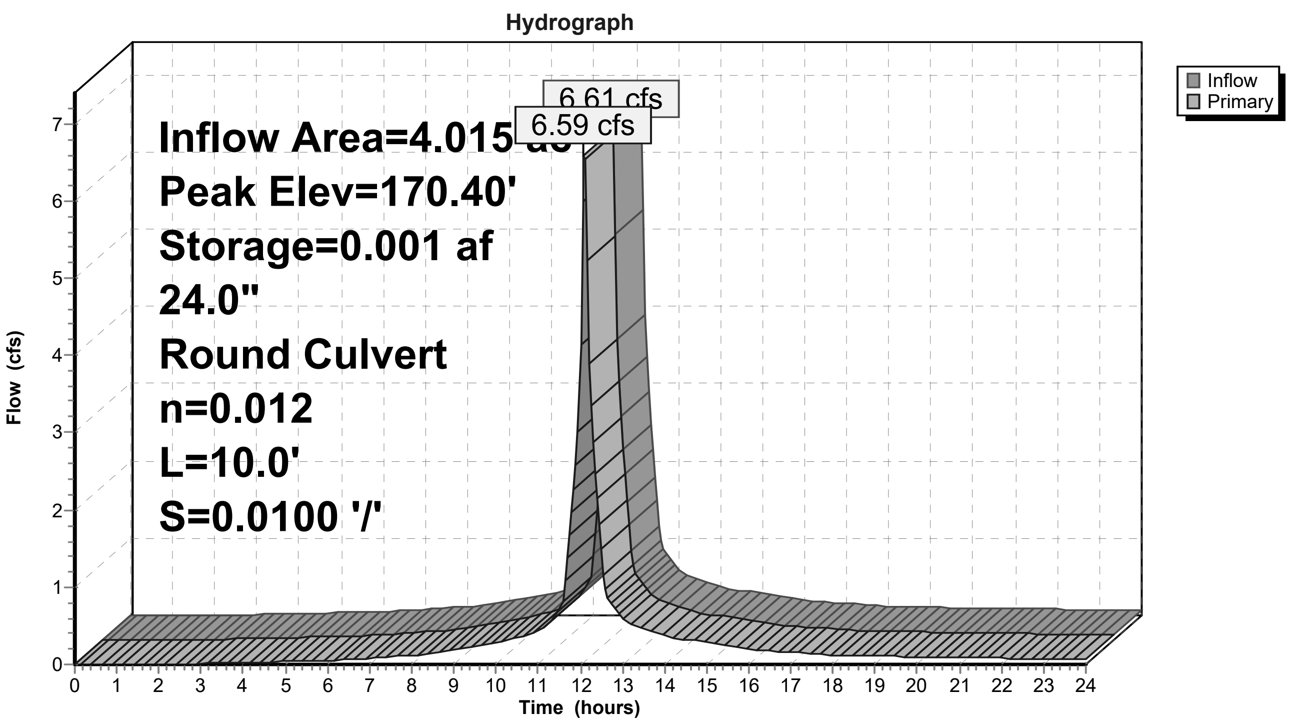
Plug-Flow detention time= 0.7 min calculated for 0.522 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (773.8 - 773.7)

Volume	Invert	Avail.Storage	Storage Description
#1	167.85'	0.002 af	**4.00'D x 8.40'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	167.85'	**24.0" Round 24" HDPE N-12** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.85' / 167.75' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=169.92' TW=169.97' (Dynamic Tailwater)
└─**1=24" HDPE N-12** (Controls 0.00 cfs)

Pond C03P: Catch Basin #3



Summary for Pond C04P: Catch Basin #4

[80] Warning: Exceeded Pond C05P by 0.18' @ 12.05 hrs (1.13 cfs 0.014 af)

Inflow Area = 0.714 ac, 76.46% Impervious, Inflow Depth > 4.66" for 25YR-24HR event
Inflow = 3.59 cfs @ 12.09 hrs, Volume= 0.278 af
Outflow = 3.59 cfs @ 12.09 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min
Primary = 3.59 cfs @ 12.09 hrs, Volume= 0.278 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 170.79' @ 12.12 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 173.99' Surf.Area= 0.000 ac Storage= 0.001 af

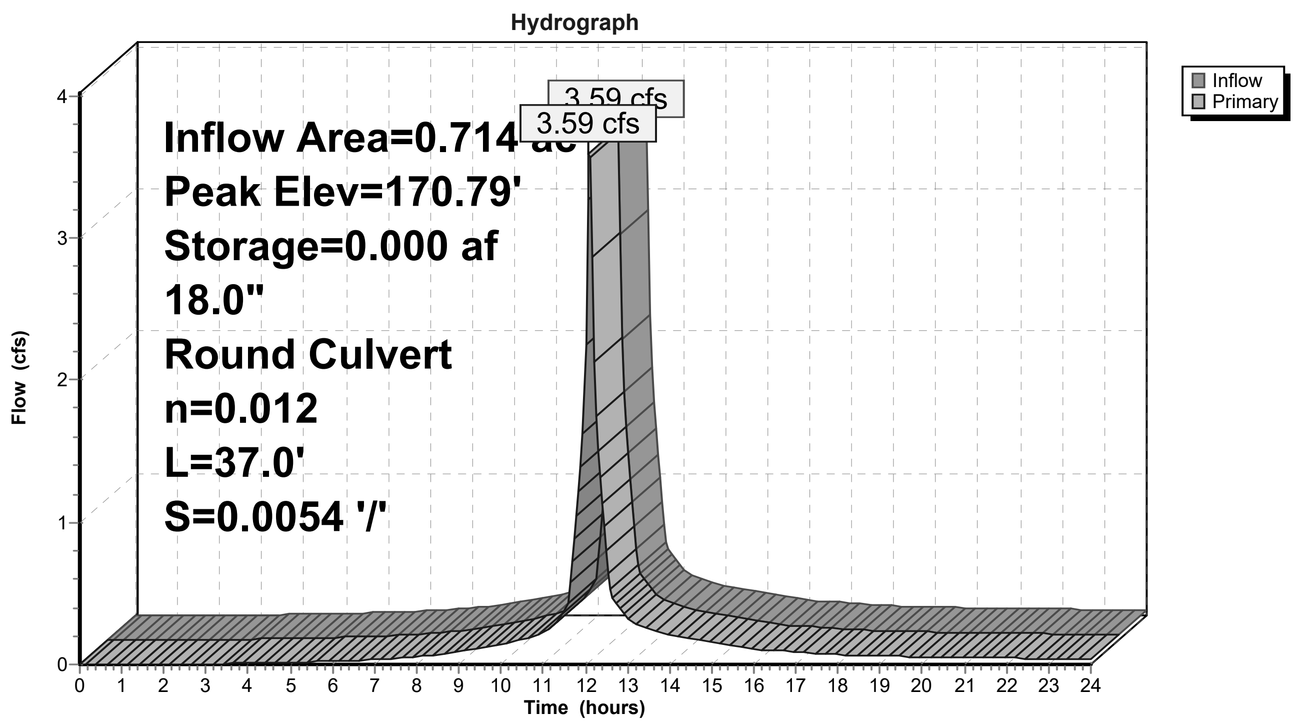
Plug-Flow detention time= 0.2 min calculated for 0.277 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (782.1 - 782.0)

Volume	Invert	Avail.Storage	Storage Description
#1	169.70'	0.001 af	**4.00'D x 4.29'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	169.70'	**18.0" Round 18" HDPE N-12** L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 169.70' / 169.50' S= 0.0054 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.00 cfs @ 12.09 hrs HW=170.77' TW=170.46' (Dynamic Tailwater)
└─**1=18" HDPE N-12** (Outlet Controls 3.00 cfs @ 3.12 fps)

Pond C04P: Catch Basin #4



Summary for Pond C05P: Catch Basin #5

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)

Inflow Area = 0.035 ac,100.00% Impervious, Inflow Depth > 5.63" for 25YR-24HR event
Inflow = 0.20 cfs @ 12.09 hrs, Volume= 0.016 af
Outflow = 0.18 cfs @ 12.09 hrs, Volume= 0.016 af, Atten= 7%, Lag= 0.3 min
Primary = 0.18 cfs @ 12.09 hrs, Volume= 0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 170.80' @ 12.16 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 174.40' Surf.Area= 0.000 ac Storage= 0.001 af

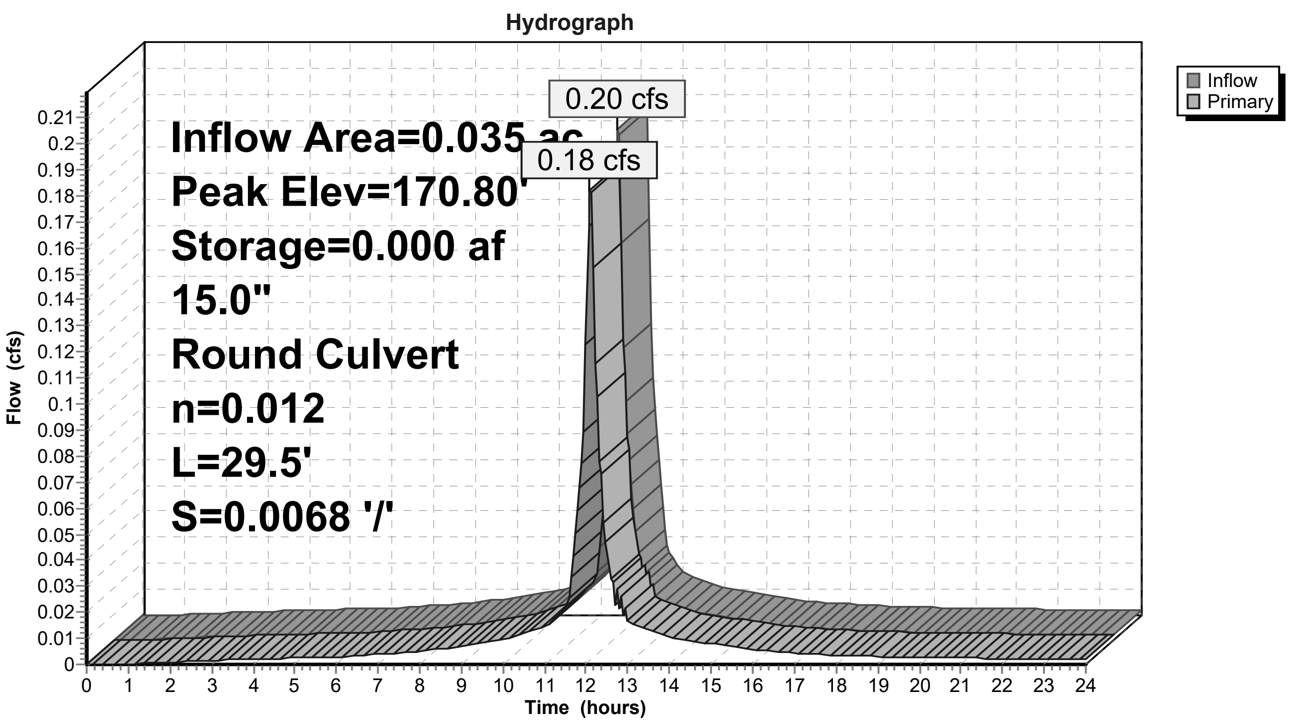
Plug-Flow detention time= 1.4 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (746.2 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	170.00'	0.001 af	**4.00'D x 4.40'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	170.00'	**15.0" Round 15" HDPE N-12** L= 29.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.00' / 169.80' S= 0.0068 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=170.66' TW=170.77' (Dynamic Tailwater)
↑—**1=15" HDPE N-12** (Controls 0.00 cfs)

Pond C05P: Catch Basin #5



Summary for Pond C06P: Catch Basin #6

Inflow Area = 0.291 ac, 64.81% Impervious, Inflow Depth > 4.19" for 25YR-24HR event
Inflow = 1.35 cfs @ 12.09 hrs, Volume= 0.101 af
Outflow = 1.35 cfs @ 12.09 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.1 min
Primary = 1.35 cfs @ 12.09 hrs, Volume= 0.101 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 171.16' @ 12.11 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 176.40' Surf.Area= 0.000 ac Storage= 0.002 af

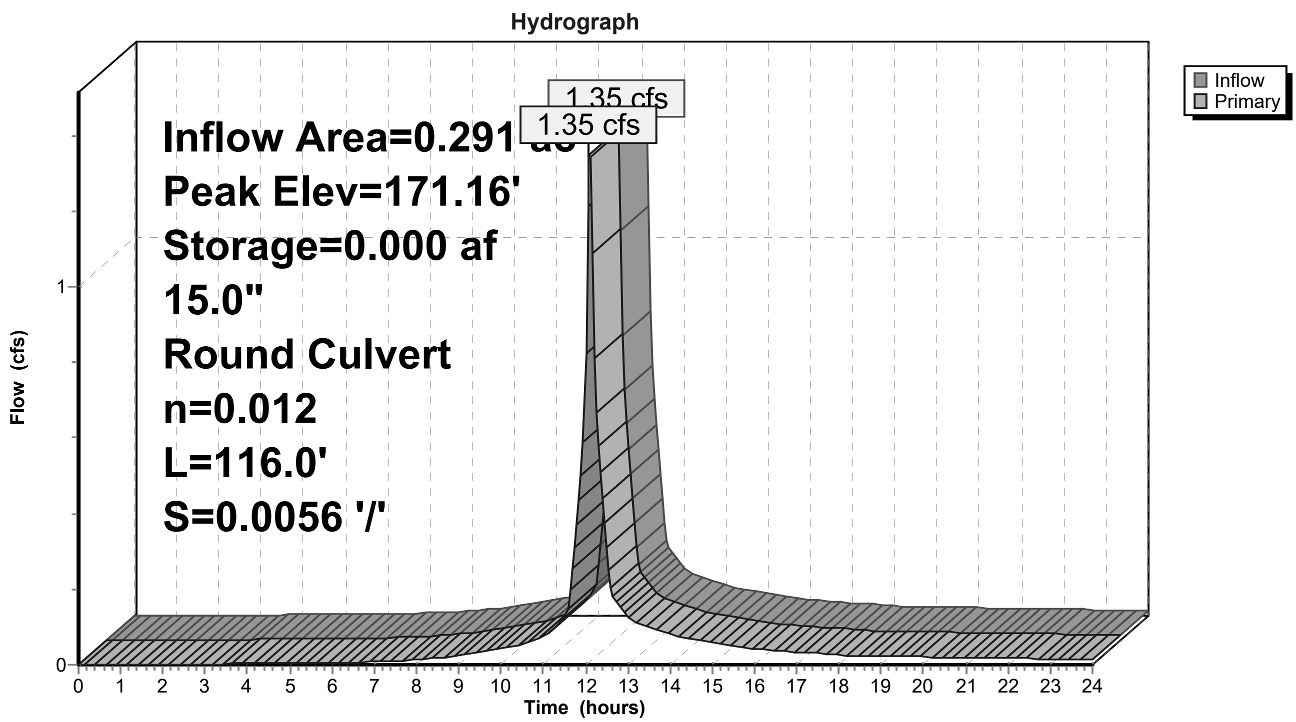
Plug-Flow detention time= 0.4 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (795.0 - 794.8)

Volume	Invert	Avail.Storage	Storage Description
#1	170.45'	0.002 af	**4.00'D x 5.95'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	170.45'	**15.0" Round 15" HDPE N-12** L= 116.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 170.45' / 169.80' S= 0.0056 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.16 cfs @ 12.09 hrs HW=171.15' TW=170.77' (Dynamic Tailwater)
↑—**1=15" HDPE N-12** (Outlet Controls 1.16 cfs @ 2.39 fps)

Pond C06P: Catch Basin #6



Summary for Pond C07P: Catch Basin #7

Inflow Area = 0.151 ac, 59.22% Impervious, Inflow Depth > 3.96" for 25YR-24HR event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 0.050 af
Outflow = 0.68 cfs @ 12.09 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.1 min
Primary = 0.68 cfs @ 12.09 hrs, Volume= 0.050 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 176.26' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 180.37' Surf.Area= 0.000 ac Storage= 0.001 af

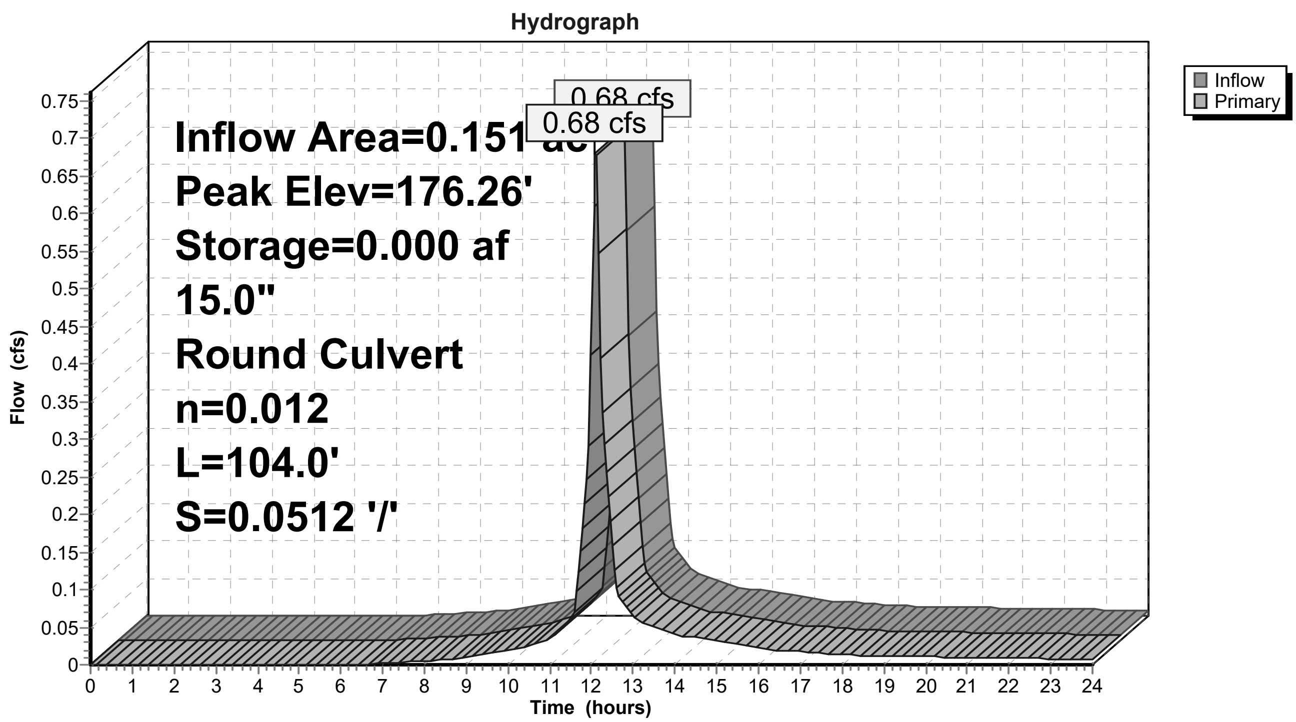
Plug-Flow detention time= 0.4 min calculated for 0.050 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (806.6 - 806.3)

Volume	Invert	Avail.Storage	Storage Description
#1	175.87'	0.001 af	**4.00'D x 4.50'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.87'	**15.0" Round 15" HDPE N-12** L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.87' / 170.55' S= 0.0512 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.67 cfs @ 12.09 hrs HW=176.25' TW=171.15' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Inlet Controls 0.67 cfs @ 2.10 fps)

Pond C07P: Catch Basin #7



Summary for Pond C08P: Catch Basin #8

Inflow Area = 0.058 ac, 67.56% Impervious, Inflow Depth > 4.28" for 25YR-24HR event
Inflow = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af
Outflow = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.1 min
Primary = 0.28 cfs @ 12.09 hrs, Volume= 0.021 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 180.12' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 184.38' Surf.Area= 0.000 ac Storage= 0.001 af

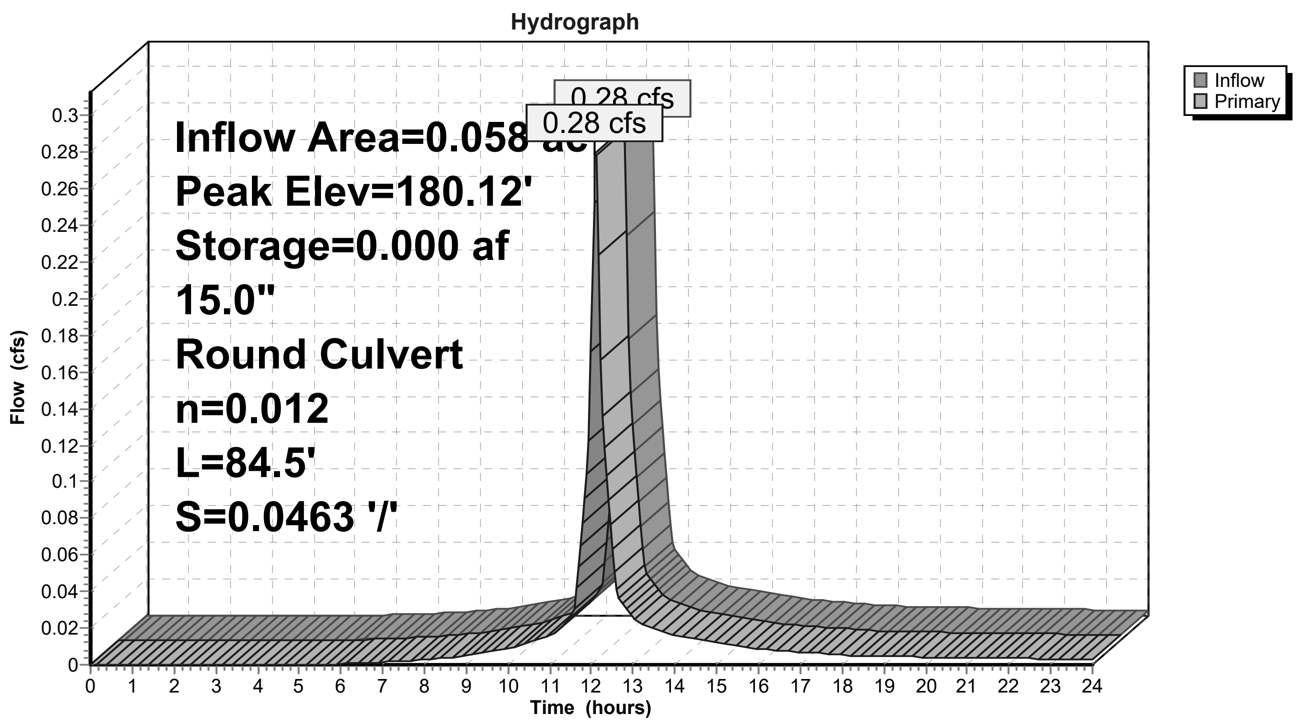
Plug-Flow detention time= 0.6 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (798.4 - 798.0)

Volume	Invert	Avail.Storage	Storage Description
#1	179.88'	0.001 af	**4.00'D x 4.50'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	179.88'	**15.0" Round 15" HDPE N-12** L= 84.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.88' / 175.97' S= 0.0463 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.27 cfs @ 12.09 hrs HW=180.12' TW=176.25' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Inlet Controls 0.27 cfs @ 1.67 fps)

Pond C08P: Catch Basin #8



Summary for Pond C10P: Catch Basin #10

Inflow Area = 0.045 ac,100.00% Impervious, Inflow Depth > 5.63" for 25YR-24HR event
Inflow = 0.25 cfs @ 12.09 hrs, Volume= 0.021 af
Outflow = 0.25 cfs @ 12.09 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.09 hrs, Volume= 0.021 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 175.57' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 176.75' Surf.Area= 0.000 ac Storage= 0.000 af

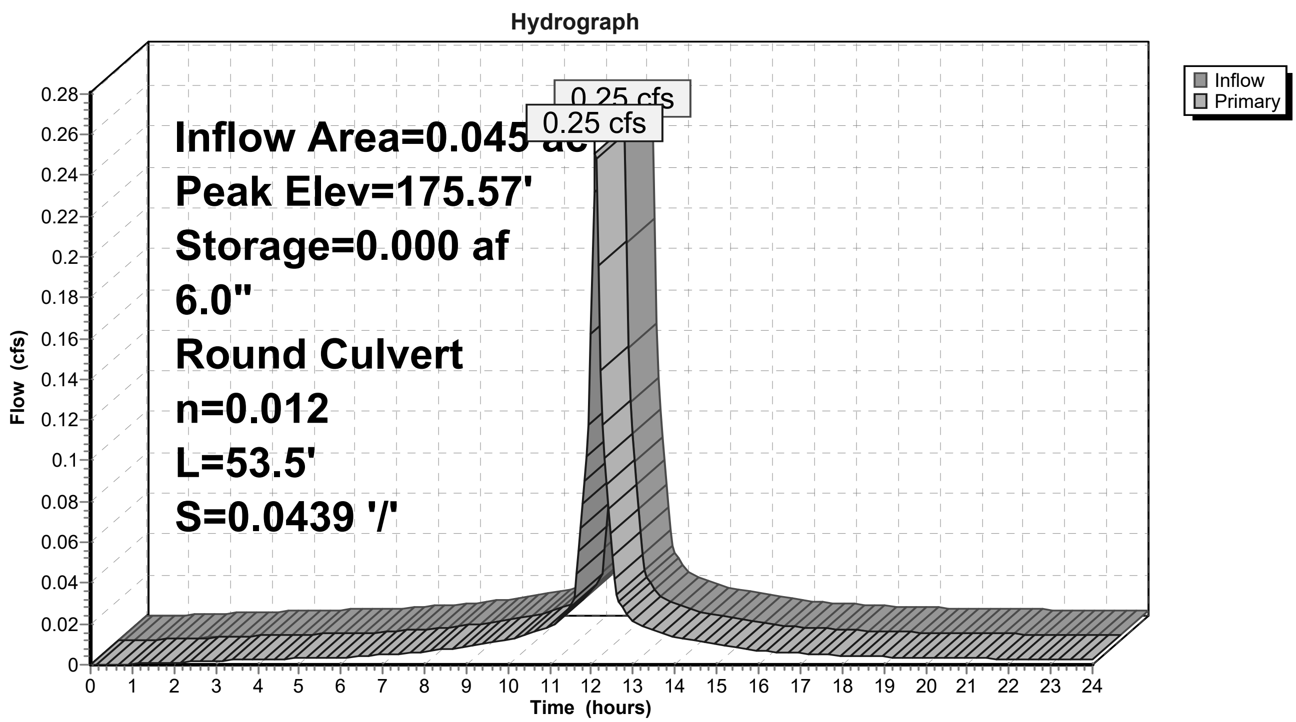
Plug-Flow detention time= 0.2 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (745.2 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	175.25'	0.000 af	**2.00'D x 1.50'H 2' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.25'	**6.0" Round 6" HDPE N-12** L= 53.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.25' / 172.90' S= 0.0439 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.24 cfs @ 12.09 hrs HW=175.56' TW=171.14' (Dynamic Tailwater)
└─**1=6" HDPE N-12** (Inlet Controls 0.24 cfs @ 1.90 fps)

Pond C10P: Catch Basin #10



Summary for Pond D03P: Drain Manhole #3

Inflow Area = 3.143 ac, 73.95% Impervious, Inflow Depth > 0.67" for 25YR-24HR event
Inflow = 2.17 cfs @ 12.09 hrs, Volume= 0.175 af
Outflow = 2.17 cfs @ 12.09 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min
Primary = 2.17 cfs @ 12.09 hrs, Volume= 0.175 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 175.63' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 181.30' Surf.Area= 0.000 ac Storage= 0.002 af

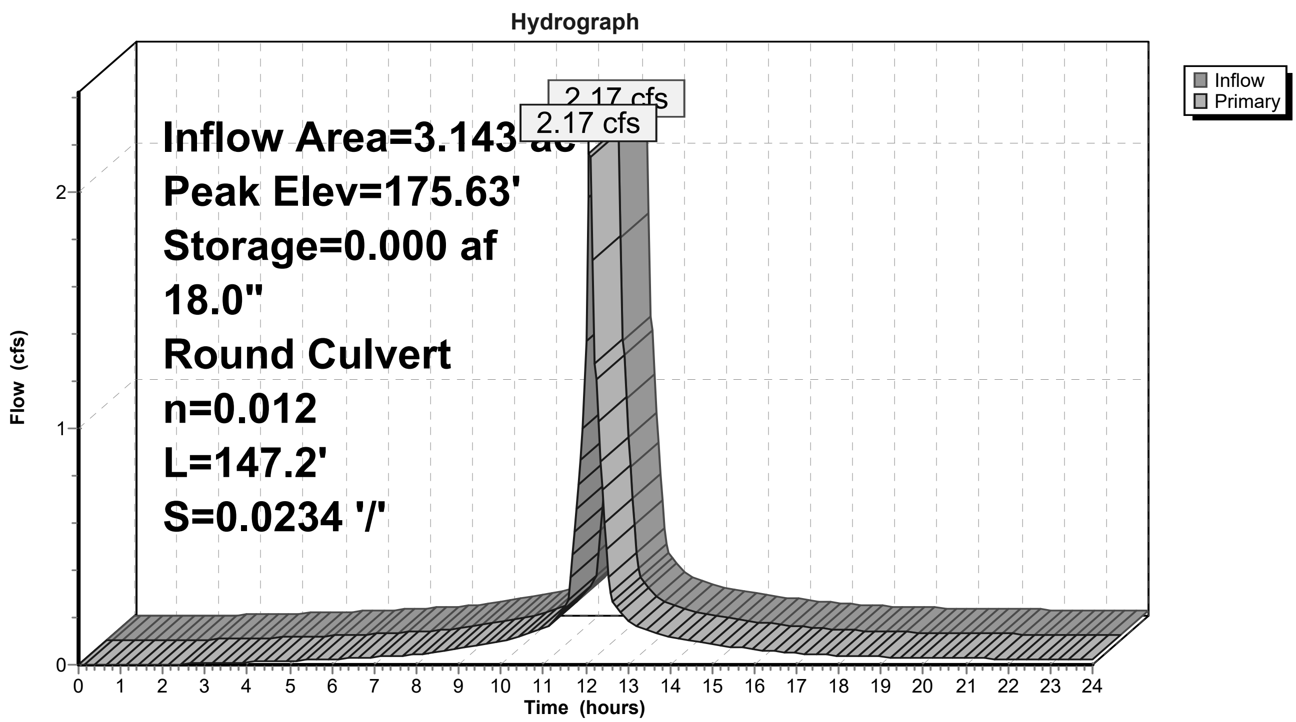
Plug-Flow detention time= 0.3 min calculated for 0.175 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (763.5 - 763.3)

Volume	Invert	Avail.Storage	Storage Description
#1	174.94'	0.002 af	**4.00'D x 6.35'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	174.95'	**18.0" Round 18" HDPE N-12** L= 147.2' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.95' / 171.50' S= 0.0234 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=2.11 cfs @ 12.09 hrs HW=175.62' TW=169.92' (Dynamic Tailwater)
↑—**1=18" HDPE N-12** (Inlet Controls 2.11 cfs @ 2.78 fps)

Pond D03P: Drain Manhole #3



Summary for Pond D04P: Drain Manhole #4

Inflow Area = 0.714 ac, 76.46% Impervious, Inflow Depth > 4.66" for 25YR-24HR event
Inflow = 3.59 cfs @ 12.09 hrs, Volume= 0.278 af
Outflow = 3.58 cfs @ 12.09 hrs, Volume= 0.277 af, Atten= 0%, Lag= 0.0 min
Primary = 3.58 cfs @ 12.09 hrs, Volume= 0.277 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 170.42' @ 12.38 hrs Surf.Area= 0.000 ac Storage= 0.001 af
Flood Elev= 176.45' Surf.Area= 0.000 ac Storage= 0.002 af

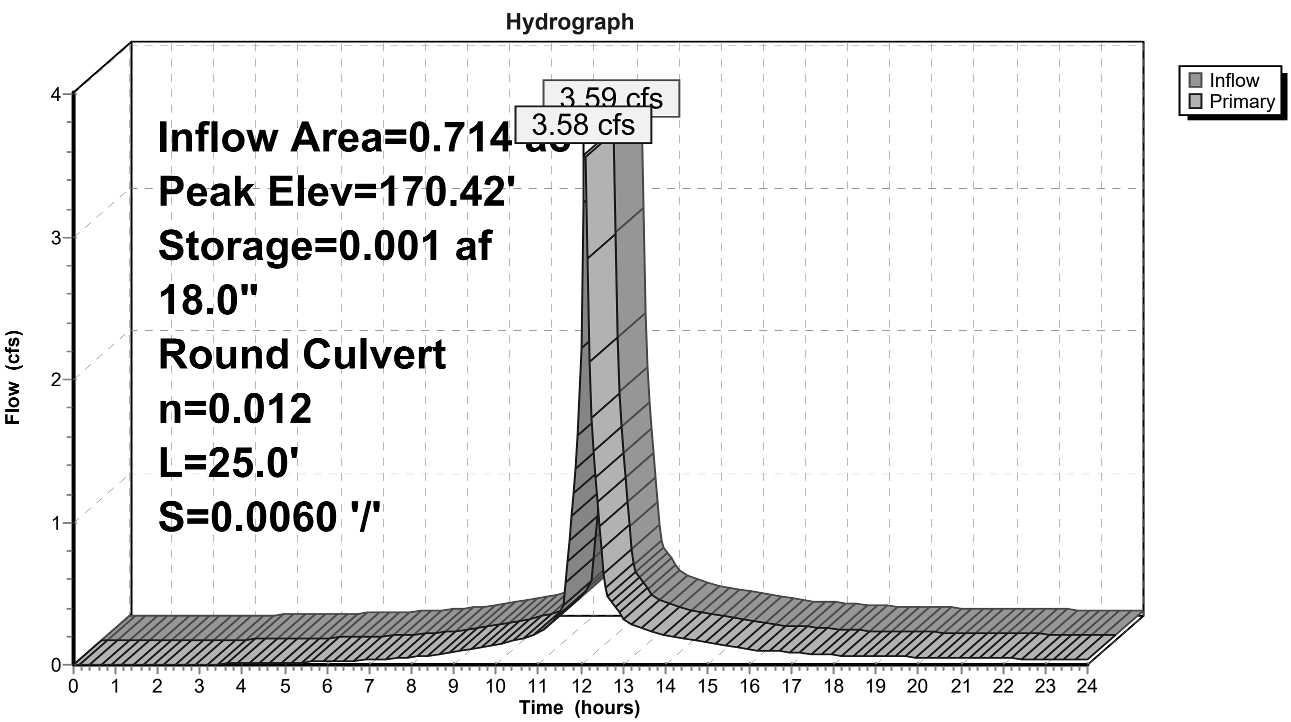
Plug-Flow detention time= 0.8 min calculated for 0.277 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (782.6 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1	168.50'	0.002 af	**4.00'D x 7.95'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	168.50'	**18.0" Round 18" HDPE N-12** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.50' / 168.35' S= 0.0060 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=169.88' TW=169.92' (Dynamic Tailwater)
└─**1=18" HDPE N-12** (Controls 0.00 cfs)

Pond D04P: Drain Manhole #4



Summary for Pond D05P: Drain Manhole #5

Inflow Area = 0.714 ac, 76.46% Impervious, Inflow Depth > 4.66" for 25YR-24HR event
Inflow = 3.59 cfs @ 12.09 hrs, Volume= 0.278 af
Outflow = 3.59 cfs @ 12.09 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min
Primary = 3.59 cfs @ 12.09 hrs, Volume= 0.278 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 170.50' @ 12.37 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 174.30' Surf.Area= 0.000 ac Storage= 0.001 af

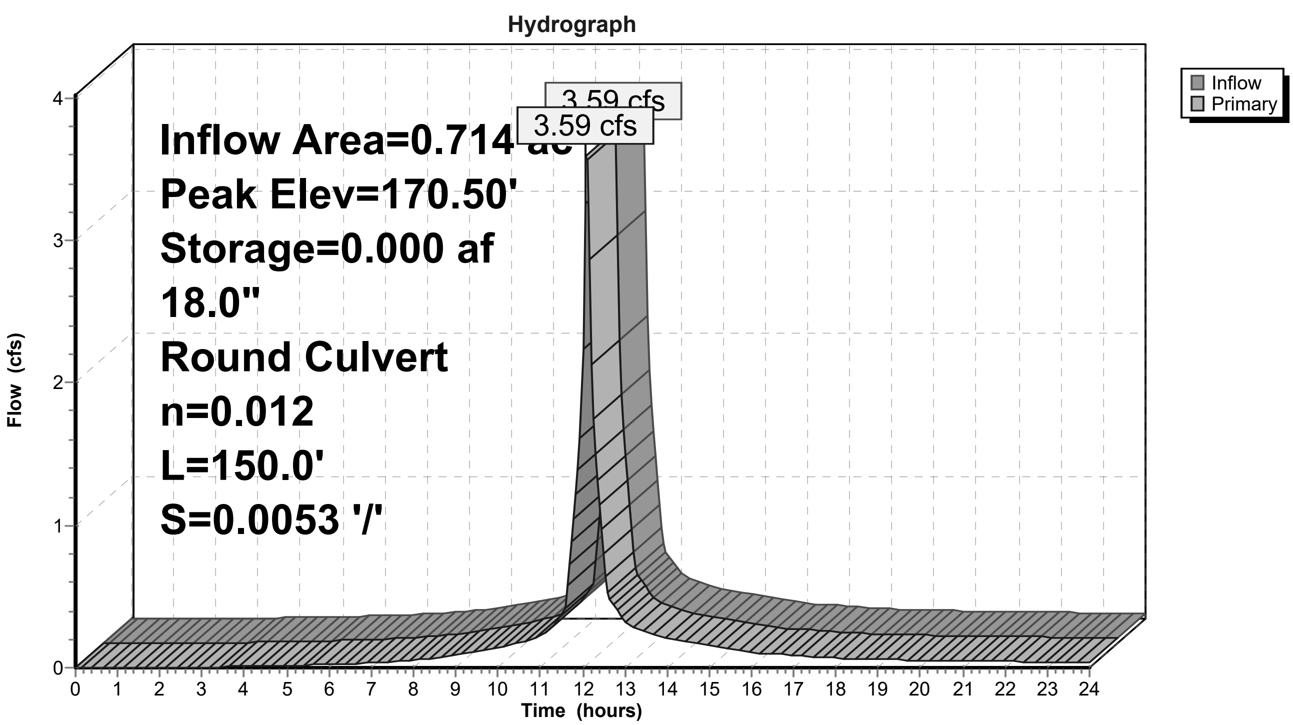
Plug-Flow detention time= 0.3 min calculated for 0.277 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (782.3 - 782.1)

Volume	Invert	Avail.Storage	Storage Description
#1	169.40'	0.001 af	**4.00'D x 4.90'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	169.40'	**18.0" Round 18" HDPE N-12** L= 150.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 169.40' / 168.60' S= 0.0053 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.01 cfs @ 12.09 hrs HW=170.46' TW=169.88' (Dynamic Tailwater)
↑—**1=18" HDPE N-12** (Outlet Controls 3.01 cfs @ 3.17 fps)

Pond D05P: Drain Manhole #5



Summary for Pond D06P: Drain Manhole #6

[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 1.438 ac,100.00% Impervious, Inflow Depth > 5.63" for 25YR-24HR event
Inflow = 8.08 cfs @ 12.09 hrs, Volume= 0.674 af
Outflow = 8.08 cfs @ 12.09 hrs, Volume= 0.674 af, Atten= 0%, Lag= 0.0 min
Primary = 8.08 cfs @ 12.09 hrs, Volume= 0.674 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 187.27' @ 12.09 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 192.50' Surf.Area= 0.000 ac Storage= 0.002 af

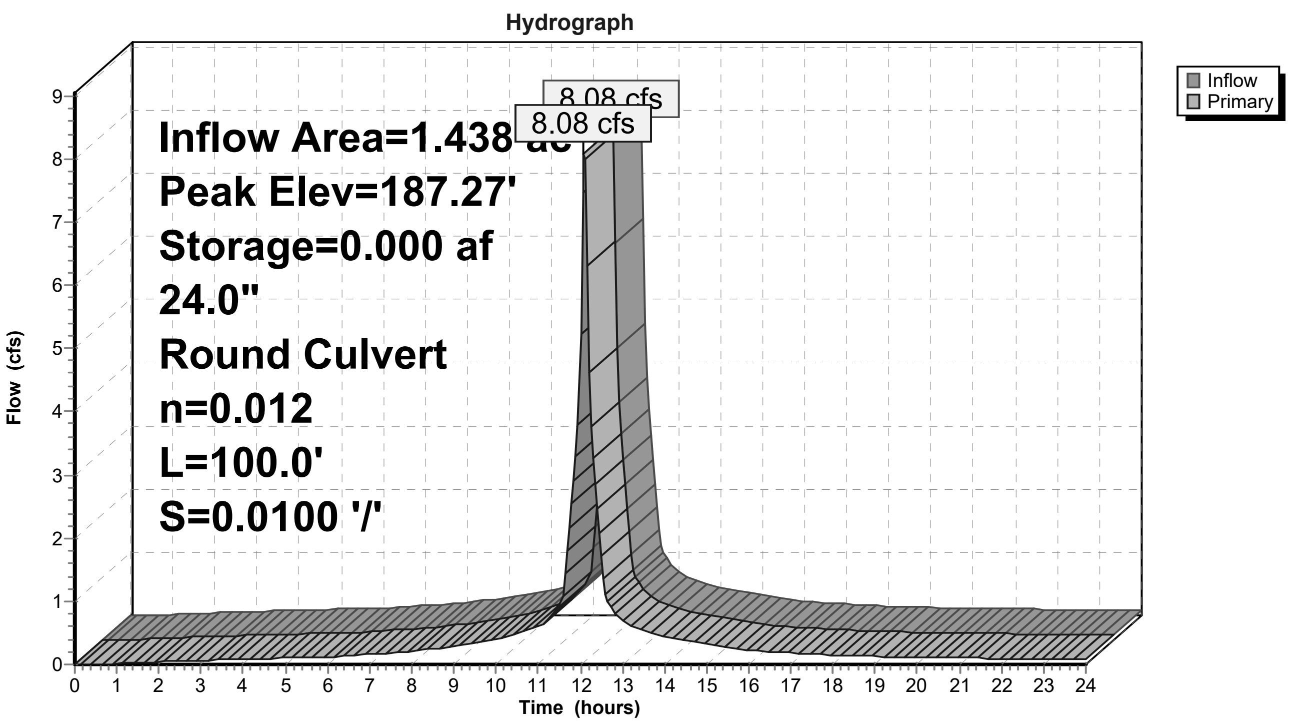
Plug-Flow detention time= 0.1 min calculated for 0.674 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (745.1 - 745.1)

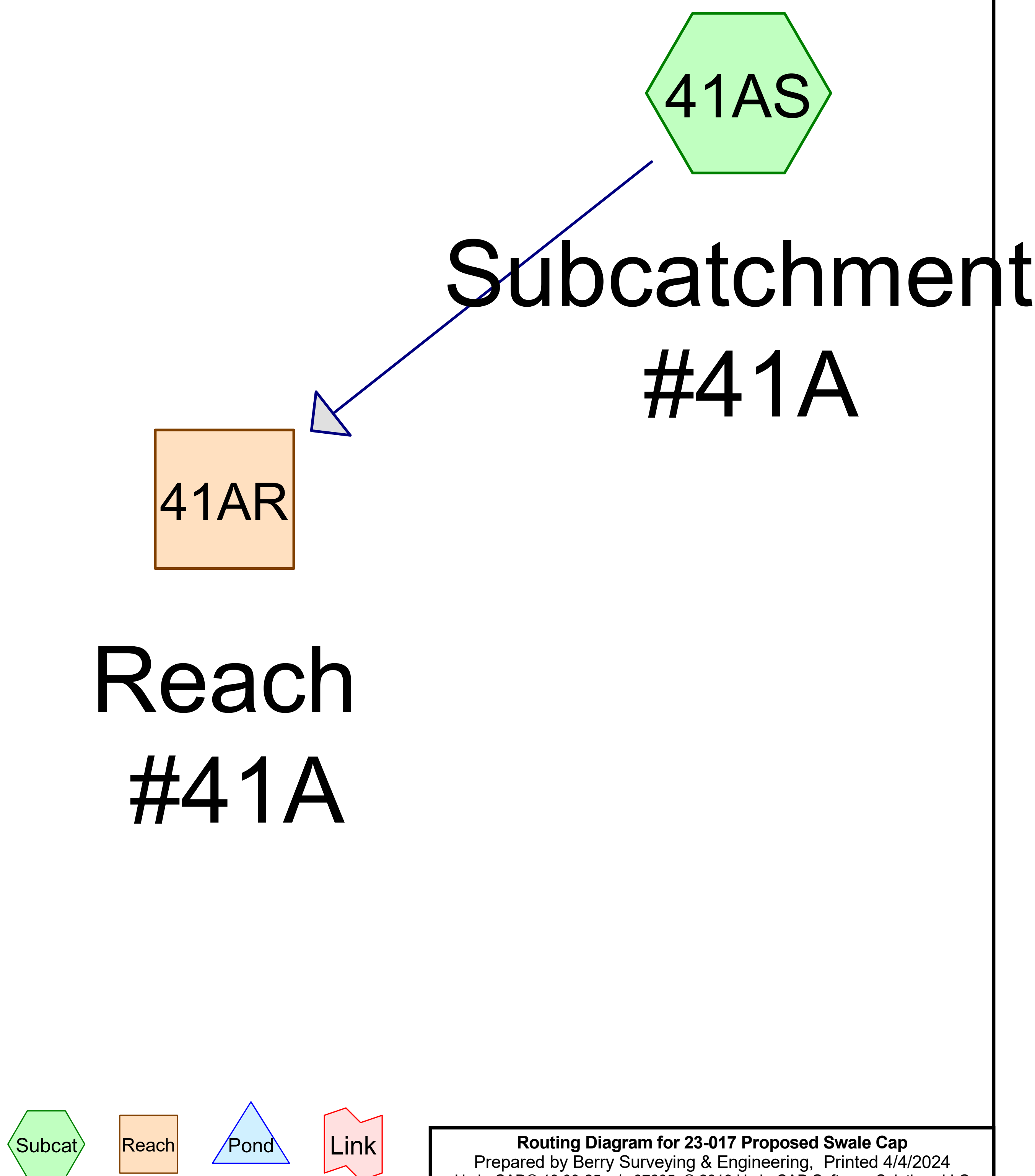
Volume	Invert	Avail.Storage	Storage Description
#1	186.00'	0.002 af	**4.00'D x 6.50'H 4' Dia. Structure**

Device	Routing	Invert	Outlet Devices
#1	Primary	186.00'	**24.0" Round 24" HDPE N-12** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 186.00' / 185.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=7.86 cfs @ 12.09 hrs HW=187.25' TW=184.26' (Dynamic Tailwater)
└─**1=24" HDPE N-12** (Inlet Controls 7.86 cfs @ 3.81 fps)

Pond D06P: Drain Manhole #6





Routing Diagram for 23-017 Proposed Swale Cap
Prepared by Berry Surveying & Engineering, Printed 4/4/2024

Project Notes

CarlsonSurface||
RationalHydrographMethod|2|
ModifiedRational|5|1.00|1.00|1.00|
UnitHydrographMethod|1|

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.174	39	>75% Grass cover, Good, HSG A (41AS)
0.237	61	>75% Grass cover, Good, HSG B (41AS)
0.010	96	Gravel surface, HSG A (41AS)
0.013	96	Gravel surface, HSG B (41AS)
0.158	98	Paved parking, HSG A (41AS)
0.354	98	Paved parking, HSG B (41AS)
0.013	98	Roofs, HSG B (41AS)
0.959	**78**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.342	HSG A	41AS
0.616	HSG B	41AS
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.959		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.174	0.237	0.000	0.000	0.000	0.411	>75% Grass cover, Good	41AS
0.010	0.013	0.000	0.000	0.000	0.023	Gravel surface	41AS
0.158	0.354	0.000	0.000	0.000	0.512	Paved parking	41AS
0.000	0.013	0.000	0.000	0.000	0.013	Roofs	41AS
0.342	**0.616**	**0.000**	**0.000**	**0.000**	**0.959**	**TOTAL AREA**	

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 41AS: Subcatchment #41A Runoff Area=41,769 sf 54.73% Impervious Runoff Depth>4.49"
Tc=6.0 min CN=78 Runoff=4.92 cfs 0.359 af

Reach 41AR: Reach #41A Avg. Flow Depth=0.43' Max Vel=2.37 fps Inflow=4.92 cfs 0.359 af
n=0.022 L=10.0' S=0.0050 '/' Capacity=88.02 cfs Outflow=4.92 cfs 0.359 af

Total Runoff Area = 0.959 ac Runoff Volume = 0.359 af Average Runoff Depth = 4.49"
45.27% Pervious = 0.434 ac 54.73% Impervious = 0.525 ac

Summary for Subcatchment 41AS: Subcatchment #41A

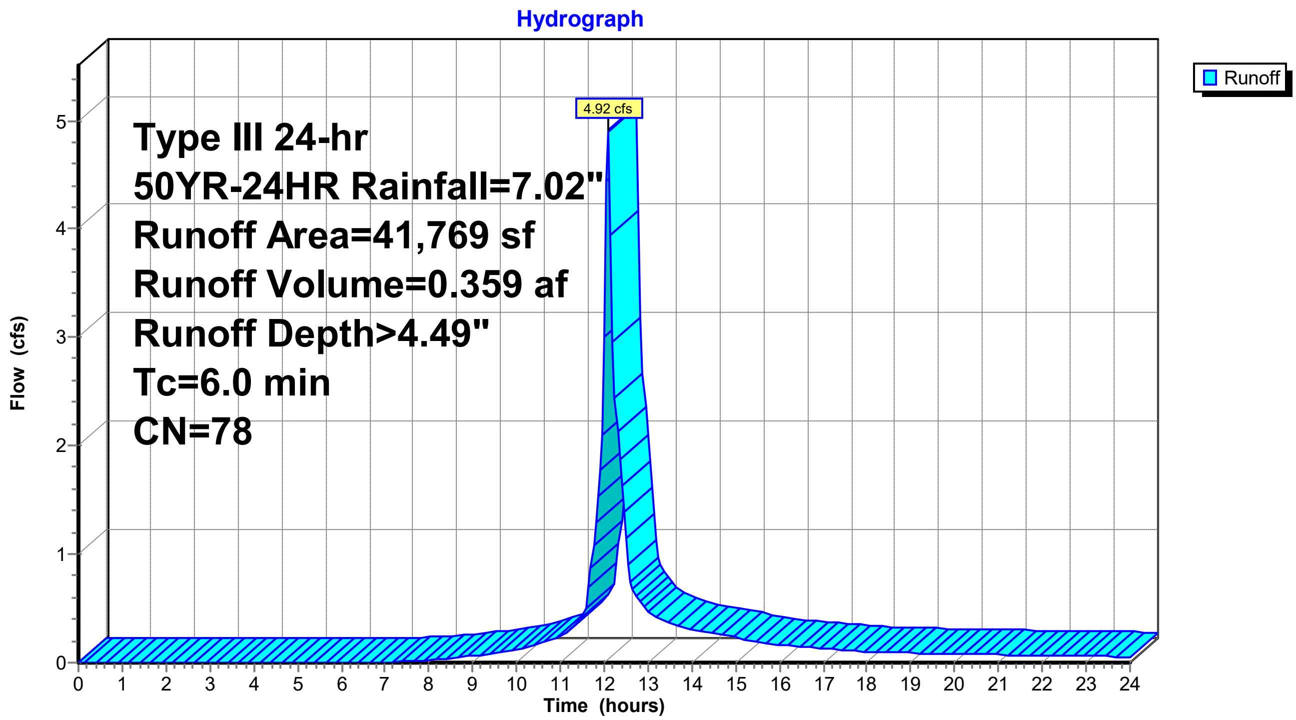
Runoff = 4.92 cfs @ 12.09 hrs, Volume= 0.359 af, Depth> 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50YR-24HR Rainfall=7.02"

Area (sf)	CN	Description
7,583	39	>75% Grass cover, Good, HSG A
6,876	98	Paved parking, HSG A
456	96	Gravel surface, HSG A
10,304	61	>75% Grass cover, Good, HSG B
15,428	98	Paved parking, HSG B
564	96	Gravel surface, HSG B
558	98	Roofs, HSG B
41,769	78	Weighted Average
18,907		45.27% Pervious Area
22,862		54.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment 41AS: Subcatchment #41A



Summary for Reach 41AR: Reach #41A

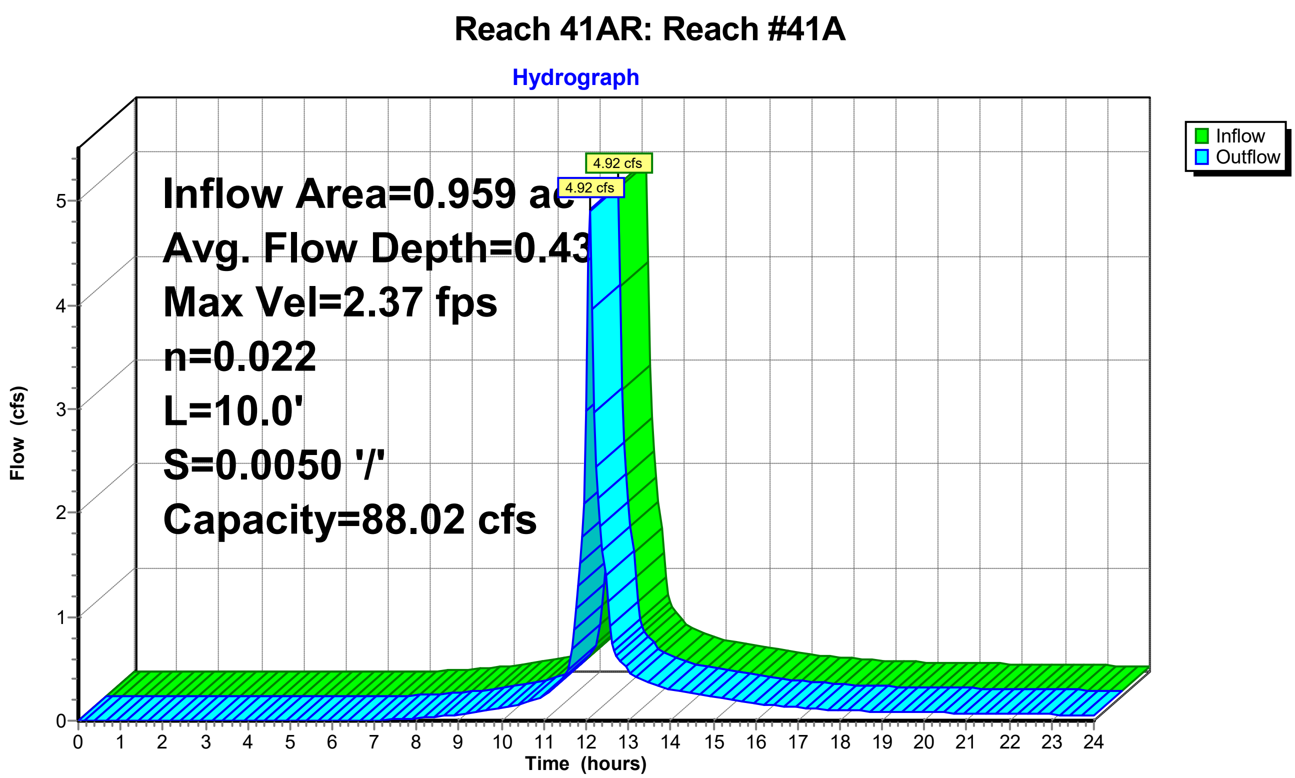
[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 0.959 ac, 54.73% Impervious, Inflow Depth > 4.49" for 50YR-24HR event
Inflow = 4.92 cfs @ 12.09 hrs, Volume= 0.359 af
Outflow = 4.92 cfs @ 12.09 hrs, Volume= 0.359 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.37 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 0.2 min

Peak Storage= 21 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.43'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 88.02 cfs

4.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 10.0' Slope= 0.0050 '/'
Inlet Invert= 184.00', Outlet Invert= 183.95'



Appendix III - Calculations, Charts, & Graphs

Extreme Precipitation Tables
Watershed Report Card/303d List
Rip Rap Calculations
AoT Stormwater Treatment Spreadsheets
NCRS USDA Web-soil Map
Site Specific Soil Survey Report & Plan
Stormwater System Management: Inspection & Maintenance Manual, Plan,
Invasive Species & NHDES Green SnoPro Utilization Chart
Infiltration Feasibility Study & Report
Ksat Values for New Hampshire Soils, SSSNNE Special Publication #5, 2009
UNH Stormwater Center Hybrid Bioretention Template
StormTech SC-740 Chamber Submittal
Filtrexx Specifications Sheets

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Metadata for Point	
Smoothing	Yes
State	
Location	
Latitude	43.205 degrees North
Longitude	70.995 degrees West
Elevation	50 feet
Date/Time	Fri Apr 07 2023 13:37:20 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.81	1.03	**1yr**	0.70	0.98	1.20	1.53	1.97	2.56	2.81	**1yr**	2.27	2.71	3.12	3.84	4.41	**1yr**
2yr	0.32	0.49	0.61	0.80	1.01	1.28	**2yr**	0.87	1.16	1.49	1.89	2.41	3.08	3.43	**2yr**	2.73	3.30	3.80	4.52	5.15	**2yr**
5yr	0.37	0.57	0.72	0.96	1.23	1.57	**5yr**	1.06	1.44	1.84	2.36	3.03	3.89	4.39	**5yr**	3.45	4.22	4.83	5.70	6.45	**5yr**
10yr	0.40	0.63	0.80	1.09	1.42	1.84	**10yr**	1.22	1.69	2.17	2.80	3.61	4.65	5.29	**10yr**	4.11	5.08	5.81	6.80	7.65	**10yr**
25yr	0.46	0.74	0.94	1.30	1.72	2.27	**25yr**	1.49	2.08	2.69	3.50	4.54	5.87	6.77	**25yr**	5.20	6.51	7.41	8.58	9.59	**25yr**
50yr	0.52	0.83	1.06	1.49	2.00	2.66	**50yr**	1.73	2.45	3.17	4.15	5.41	7.02	8.17	**50yr**	6.21	7.85	8.91	10.24	11.39	**50yr**
100yr	0.58	0.94	1.21	1.71	2.33	3.12	**100yr**	2.01	2.88	3.74	4.92	6.43	8.39	9.86	**100yr**	7.42	9.48	10.72	12.23	13.53	**100yr**
200yr	0.64	1.05	1.37	1.96	2.71	3.68	**200yr**	2.34	3.39	4.42	5.85	7.68	10.03	11.90	**200yr**	8.87	11.44	12.89	14.61	16.07	**200yr**
500yr	0.76	1.25	1.63	2.37	3.32	4.55	**500yr**	2.86	4.21	5.49	7.32	9.67	12.70	15.27	**500yr**	11.24	14.68	16.47	18.49	20.21	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.36	0.45	0.60	0.74	0.90	**1yr**	0.64	0.88	0.91	1.25	1.52	1.94	2.49	**1yr**	1.72	2.39	2.92	3.28	3.96	**1yr**
2yr	0.31	0.48	0.60	0.81	0.99	1.18	**2yr**	0.86	1.15	1.36	1.82	2.34	2.99	3.33	**2yr**	2.65	3.21	3.69	4.41	5.03	**2yr**
5yr	0.35	0.54	0.67	0.92	1.16	1.40	**5yr**	1.01	1.37	1.61	2.14	2.77	3.61	4.05	**5yr**	3.20	3.89	4.50	5.35	6.03	**5yr**
10yr	0.38	0.59	0.73	1.02	1.32	1.60	**10yr**	1.14	1.56	1.82	2.43	3.12	4.14	4.69	**10yr**	3.66	4.51	5.22	6.18	6.90	**10yr**
25yr	0.44	0.67	0.83	1.19	1.57	1.91	**25yr**	1.35	1.87	2.12	2.84	3.64	4.94	5.67	**25yr**	4.37	5.45	6.37	7.49	8.28	**25yr**
50yr	0.49	0.74	0.92	1.33	1.79	2.20	**50yr**	1.54	2.15	2.37	3.20	4.08	5.65	6.54	**50yr**	5.00	6.29	7.40	8.65	9.55	**50yr**
100yr	0.55	0.83	1.03	1.49	2.05	2.52	**100yr**	1.77	2.46	2.67	3.60	4.55	6.44	7.54	**100yr**	5.70	7.25	8.61	10.00	10.92	**100yr**
200yr	0.61	0.92	1.16	1.68	2.34	2.89	**200yr**	2.02	2.83	2.99	4.05	5.08	7.34	8.85	**200yr**	6.50	8.51	10.03	11.55	12.51	**200yr**
500yr	0.71	1.06	1.37	1.99	2.82	3.50	**500yr**	2.44	3.42	3.50	4.72	5.91	8.68	10.73	**500yr**	7.68	10.32	12.28	14.00	14.91	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.71	0.87	1.07	**1yr**	0.75	1.05	1.23	1.72	2.18	2.76	3.02	**1yr**	2.44	2.90	3.34	4.12	4.73	**1yr**
2yr	0.33	0.50	0.62	0.84	1.03	1.24	**2yr**	0.89	1.21	1.46	1.94	2.50	3.19	3.54	**2yr**	2.82	3.41	3.92	4.66	5.30	**2yr**
5yr	0.39	0.60	0.75	1.02	1.30	1.57	**5yr**	1.12	1.54	1.84	2.47	3.16	4.18	4.71	**5yr**	3.70	4.53	5.18	6.06	6.85	**5yr**
10yr	0.45	0.70	0.87	1.21	1.56	1.90	**10yr**	1.35	1.86	2.21	3.01	3.80	5.16	5.87	**10yr**	4.57	5.64	6.42	7.40	8.32	**10yr**
25yr	0.55	0.84	1.05	1.49	1.96	2.44	**25yr**	1.70	2.39	2.84	3.91	4.87	6.83	7.84	**25yr**	6.04	7.54	8.50	9.75	10.75	**25yr**
50yr	0.64	0.97	1.21	1.74	2.34	2.94	**50yr**	2.02	2.87	3.44	4.75	5.90	8.45	9.79	**50yr**	7.48	9.41	10.54	11.96	13.15	**50yr**
100yr	0.74	1.12	1.41	2.03	2.79	3.54	**100yr**	2.41	3.46	4.17	5.80	7.15	10.45	12.22	**100yr**	9.25	11.75	13.05	14.70	16.05	**100yr**
200yr	0.86	1.30	1.64	2.38	3.32	4.28	**200yr**	2.86	4.18	5.06	7.08	8.66	12.98	15.08	**200yr**	11.49	14.50	16.16	18.04	19.63	**200yr**
500yr	1.05	1.56	2.01	2.93	4.16	5.48	**500yr**	3.59	5.35	6.52	9.23	11.17	17.33	20.20	**500yr**	15.33	19.42	21.45	23.71	25.63	**500yr**

Welcome to New Hampshire's Watershed Report Cards built from the 2020/2022, 305(b)/303(d)

Each Watershed Report Card covers a single 12-digit Hydrologic Unit Code (HUC12), on average a 34 square mile area. Each Watershed Report Card has three components;

1. REPORT CARD - A one page card that summarizes the overall use support for Aquatic Life Integrity, Primary Contact (i.e. Swimming), and Secondary Contact (i.e. Boating) Designated Uses on every Assessment Unit ID (AUID) within the HUC12.
2. HUC 12 MAP - A map of the watershed with abbreviated labels for each AUID within the HUC12.
3. ASSESSMENT DETAILS - Anywhere from one to forty pages with the detailed assessment information for each and every AUID in the Report Card and Map.

How are the Surface Water Quality Assessment determinations made?

All readily available data with reliable Quality Assurance/Quality Control is used in the biennial surface water quality assessments. For a full understanding of how the Surface Water Quality Standards (Env-Wq 1700) are translated into surface water quality assessments we urge the reader to review the 2020/2022 Consolidated Assessment and Listing Methodology (CALM).

Where can I find more advanced mapping resources?

GIS files are available by assessment cycle at the NHDES FTP site.

I'd like to see the more raw water quality data?

The web mapping tool allows you to download the data used in the assessment of the primary contact and aquatic life designated uses by clicking on the "Data Access Waterbody Data (Aquatic Life and Swimming Uses)" link for any assessment unit.

How are assessments coded in the report card?

Assessment outcomes are displayed on a color scale as well as an alpha numeric scale that provides additional distinctions for the designated use and parameter level assessments as outlined in the table below.

		Severe Not Supporting, Severe	**Poor** Not Supporting, Marginal	**Likely Bad** Insufficient Information – Potentially Not Supporting	**No Data** No Data	**Likely Good** Insufficient Information – Potentially Full Supporting	**Marginal** Full Support, Marginal	**Good** Full Support, Good
CATEGORY	**Description**							
Category 2	Meets standards						2-M or 2-OBS	2-G
Category 3	Insufficient Information			3-PNS	3-ND	3-PAS		
Category 4	Does not Meet Standards;							
4A	TMDL* Completed	4A-P	4A-M or 4A-T					
4B	Other enforceable measure will correct the issue.	4B-P	4B-M or 4B-T					
4C	Non-pollutant (i.e. exotic weeds)	4C-P	4C-M					
Category 5	TMDL* Needed	5-P	5-M or 5-T					

* TMDL stands for Total Maximum Daily Load studies

Watershed 305(b) Assessment Summary Report:

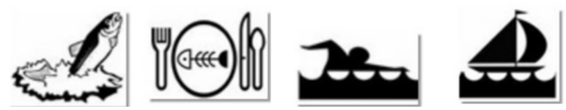
Assessment Cycle: 2020/2022

HUC 12: 010600030903

HUC 12 Name: Bellamy River

(Locator map on next page only applies to this HUC12)

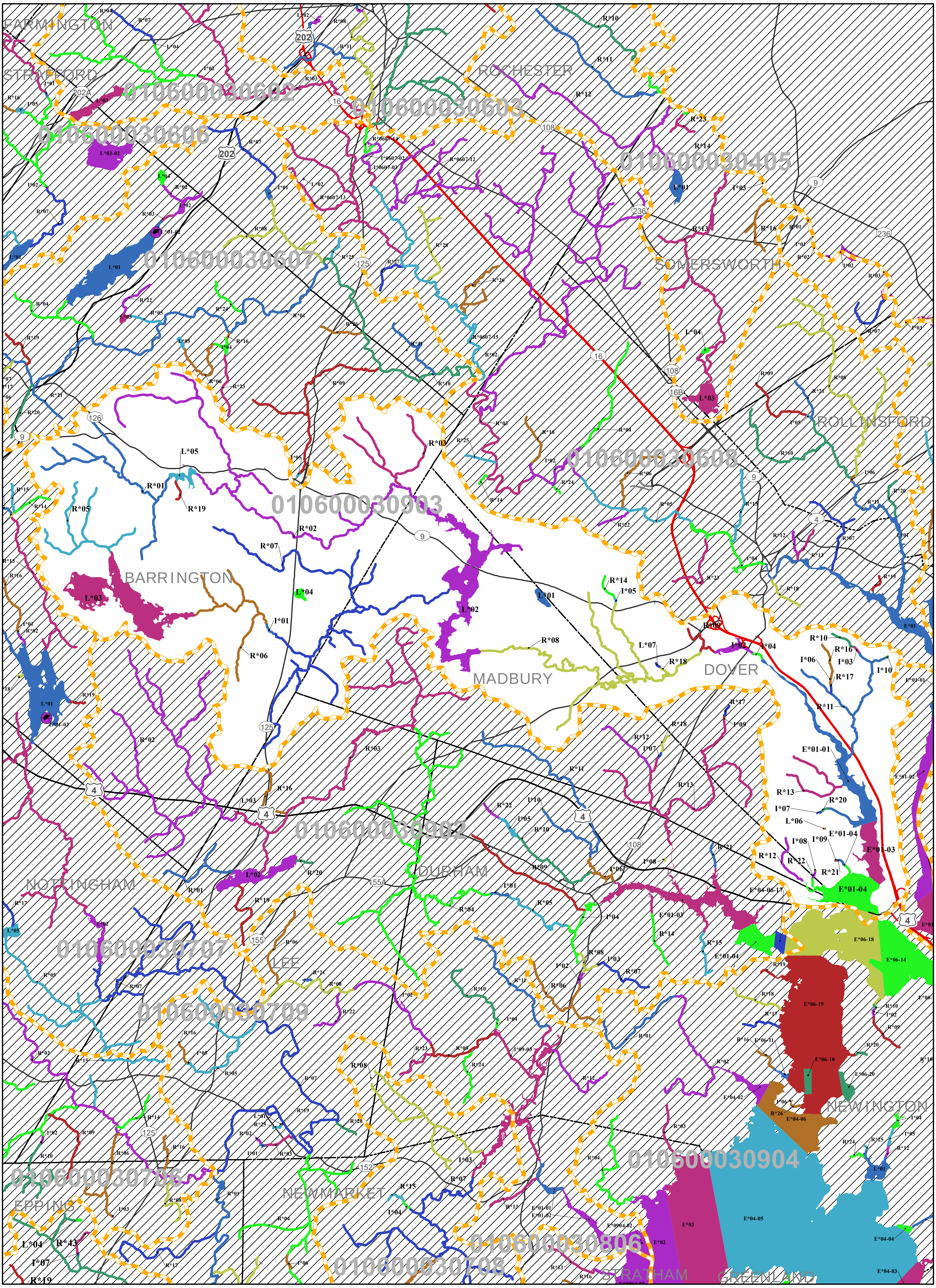
Good	Meets water quality standards/thresholds by a relatively large margin.
Marginal	Meets water quality standards/thresholds but only marginally.
Likely Good	Limited data available, however, the data that is available suggests that the parameter is Potentially Attaining Standards (PAS).
No Current Data	Insufficient information to make an assessment decision.
Likely Bad	Limited data available, however, the data that is available suggests that the parameter is Potentially Not Supporting (PNS) water quality standards.
Poor	Not meeting water quality standards/thresholds. The impairment is marginal.
Severe	Not meeting water quality standards/thresholds. The impairment is more severe and causes poor water quality.



Assessment Unit ID	Map Label	Assessment Unit Name	Aquatic Life	Fish Consump.	Swimming	Boating
NHEST600030903-01-01	E*01-01	Bellamy River North		5-M	2-G	2-G
NHEST600030903-01-03	E*01-03	Bellamy River South Clement Point	5-P	5-M	2-G	2-G
NHEST600030903-01-04	E*01-04	Bellamy River South	5-P	5-M	2-G	2-G
NHIMP600030903-01	I*01	Bellamy River	3-ND	4A-M	3-ND	3-ND
NHIMP600030903-02	I*02	Bellamy River - Sawyers Mill Dam Pond	5-M	4A-M	5-M	3-ND
NHIMP600030903-03	I*03	Canney Brook - Wildlife Pond	3-ND	4A-M	3-ND	3-ND
NHIMP600030903-04	I*04	Bellamy River Iv Dam	3-ND	4A-M	3-ND	3-ND
NHIMP600030903-05	I*05	Knox Marsh Brook	3-ND	4A-M	3-ND	3-ND
NHIMP600030903-06	I*06	Unnamed Brook - Thornwood Commons Pond	3-ND	4A-M	3-ND	3-ND
NHIMP600030903-07	I*07	Unnamed Brook - Bellamy River Wildlife Pond	3-ND	4A-M	3-ND	3-ND
NHIMP600030903-08	I*08	Unnamed Brook - Farm Pond	3-ND	4A-M	3-ND	3-ND
NHIMP600030903-09	I*09	Unnamed Brook - Webster Brook Dam	3-ND	4A-M	3-ND	3-ND

NHIMP600030903-10	I*10	Unnamed Brook - Farm Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030903-01	L*01	Barbadoes Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030903-02	L*02	Bellamy Reservoir	5-M	4A-M	3-ND	3-ND
NHLAK600030903-03	L*03	Swains Lake	5-P	4A-M	3-PAS	3-ND
NHLAK600030903-04	L*04	Winkley Pond	5-P	4A-M	3-ND	3-ND
NHLAK600030903-05	L*05	Branch Mallego Brook Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030903-06	L*06	Farm Pond	3-ND	4A-M	3-ND	3-ND
NHLAK600030903-07	L*07	Unnamed Pond	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-01	R*01	Madla Brook	5-M	4A-M	3-ND	3-ND
NHRIV600030903-02	R*02	Mallego Brook	5-P	4A-M	3-ND	3-ND
NHRIV600030903-03	R*03	Calef Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-05	R*05	Unnamed Brook - To Swains Lake	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-06	R*06	Bellamy River - Unnamed Brook	5-M	4A-M	3-ND	3-ND
NHRIV600030903-07	R*07	Bellamy River	5-P	4A-M	4A-P	4A-P
NHRIV600030903-08	R*08	Bellamy River - Kelly Brook - Knox Marsh Brook	5-P	4A-M	4A-P	3-PAS
NHRIV600030903-09	R*09	Bellamy River - Unnamed Brook	5-M	4A-M	4A-P	3-ND
NHRIV600030903-10	R*10	Canney Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-11	R*11	Varney Brook - Canney Brook	3-ND	4A-M	4A-P	4A-M
NHRIV600030903-12	R*12	Unnamed Brook - To Bellamy River Royalls Cove	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-13	R*13	Garrison Brook	3-ND	4A-M	4A-P	3-ND
NHRIV600030903-14	R*14	Knox Marsh Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-16	R*16	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-17	R*17	Varney Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-18	R*18	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-19	R*19	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-20	R*20	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-21	R*21	Unnamed Brook	3-ND	4A-M	3-ND	3-ND
NHRIV600030903-22	R*22	Unnamed Brook	3-ND	4A-M	3-ND	3-ND

AUIDs For HUC12: 010600030903 - Bellamy River



HUC12 Boundaries
Town Boundaries

Major Roads
Interstate Highway
US Highway
State Highway

Assessment Unit Coloring AUs Ending with:
0 =
1 =
2 =
3 =
4 =
5 =
6 =
7 =
8 =
9 =

N
W E
S

Abbrv. Label: L* 03
HUC 12: 010 700060201
AUID = NH L AK700060201 - 03

Assessment Unit IDs are derived from the HUC12 they reside within. The labels have been shortened on this map for presentation purposes.
Example: the Label "L*03" in HUC12 = 010700060201 represents AUID = "NHLAK700060201-03"
In rare cases where an AUID extends beyond the boundary of a single HUC12, additional portions of the end of the HUC 12 number have also been replaced.

0 0.8 1.6 2.4 3.2 Miles

Scale:1:78,820

S:\WD-Watershed\WQ_Planning\305b_303d\2020\Report_Cards\HUC12_maps

Assessment Unit ID: NHRIV600030903-02
Assessment Unit Name: Mallego Brook
Town(s) Primary Town is Listed First: Barrington, Madbury

Size: 9.5430 MILES
Assessment Unit Category: 5-P
Beach: N

2020/2022, 305(b)/303(d) - All Reviewed Parameters by Assessment Unit

Designated Use Description	Desig. Use Category	Parameter Name	Parameter Threatened (Y/N)	Last Sample	Last Exceed	Parameter Category	TMDL Priority
Aquatic Life Integrity	5-P	AMMONIA (TOTAL)	N	2016	N/A	3-PAS	
		Benthic-Macroinvertebrate Bioassessments (Streams)	N			3-ND	
		CHLORIDE	N	2019	N/A	3-PAS	
		DISSOLVED OXYGEN SATURATION	N	2019	2017	5-M	LOW
		Fishes Bioassessments (Streams)	N			3-PAS	
		OXYGEN, DISSOLVED	N	2019	2018	5-M	LOW
		PH	N	2019	2019	5-P	LOW
		TURBIDITY	N	2019	N/A	3-PAS	
Fish Consumption	4A-M	MERCURY - FISH CONSUMPTION ADVISORY	N			4A-M	
Potential Drinking Water Supply	2-G						
Primary Contact Recreation	3-ND	Escherichia coli	N			3-ND	
Secondary Contact Recreation	3-ND	Escherichia coli	N			3-ND	
Wildlife	3-ND						

Good	Marginal	Likely Good	No Current Data	Likely Bad	Poor	Severe
Meets water quality standards/thresholds by a relatively large margin.	Meets water quality standards/thresholds but only marginally.	Limited data available. The data that is available suggests that the parameter is Potentially Attaining Standards (PAS)	Insufficient information to make an assessment decision.	Limited data available The data that is available suggests that the parameter is Potentially Not Supporting (PNS) water quality standards.	Not meeting water quality standards/thresholds. The impairment is marginal.	Not meeting water quality standards/thresholds The impairment is more severe and causes poor water quality.

RIP RAP CALCULATIONS

23-017 Calef Highway

TurboCam International

Barrington, NH

Berry Surveying & Engineering

335 Second Crown Point Road

TURBOCAM, INC., Barrington, NH

2/5/2024 / Rev: 4/4/24

Rip Rap equations were obtained from the *Stormwater Management and Erosion Control Handbook for Urban and Developing Areas in New Hampshire.* Rip Rap was sized for the 25 year storm event. (Some d50 sizes and T values have been modified)

TAILWATER < HALF THE Do

La = (1.8 x Q) / Do 3/2 + (7 x Do)   Q = Peak Flow & Do is Pipe Diameter

W = La + 3*Do or defined channel width

d50 = (0.02 x Q4/3) / (Tw x Do)   Tw = Tailwater Depth

T = Largest Stone Size x 1.5

Culvert or Catch Basin	Tailwater (Feet) Tw	Discharge (C.F.S.) Q	Diameter of Pipe Do	Length of Rip Rap La (feet)	Width of Rip Rap W (feet)	d50-Stone Rip Rap d50(ft.)	Actual Size	Thickness
24" HDPE (Pond #D06P)	0.40	8.08	2.00	19.1	25.1	0.41	0.50	1.20
18" HDPE (Pond #101P)	0.30	6.63	1.50	17.0	21.5	0.55	0.67	2.00
24" HDPE (Pond #C03P)	0.40	6.59	2.00	18.2	24.2	0.31	0.50	1.20
15" HDPE (Pond #102P)	0.25	3.07	1.25	12.7	16.5	0.29	0.50	1.20

Please note that the designer chose to use the 25 Year Event for the dimensional calculations.

Table 7-24 -- Recommended Rip Rap Gradation Ranges		
d50 Size =	0.5 Feet	6 Inches
% of Weight Smaller Than the Given d50 Size	Size of Stone (Inches) From	To
100%	9	12
85%	8	11
50%	6	9
15%	2	3

Table 7-24 -- Recommended Rip Rap Gradation Ranges		
d50 Size =	0.67 Feet	8 Inches
% of Weight Smaller Than the Given d50 Size	Size of Stone (Inches) From	To
100%	12	16
85%	10	14
50%	8	12
15%	2	4

STATE OF NEW HAMPSHIRE – KENNETH A. BERRY No. 14243 LICENSED – PROFESSIONAL ENGINEER

GROUNDWATER RECHARGE VOLULME (GRV) CALCULATION
(Env-Wq 1507.04)

0.10	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
2.44	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
0.25	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
-	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.24	inches	Rd = Weighted groundwater recharge depth	
0.6762	ac-in	GRV = AI * Rd	
2,455	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12”)	

Provide calculations below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):

Infiltrates 7,592 CF from P-103

Infiltrates 10,542 CF from P-104

BIORETENTION SYSTEM WITH INTERNAL STORAGE RESERVOIR
(UNH Stormwater Center Specification)

Type/Node Name: **Bioretention W/ ISR #101 (101P)**

Enter the node name in the drainage analysis if applicable.

2.57	ac	A = Area draining to the practice	
1.96	ac	A_I = Impervious area draining to the practice	
0.76	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.74	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.90	ac-in	WQV= 1" x Rv x A	
6,884	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
688	cf	10% x WQV (check calc for sediment forebay)	
1,721	cf	25% x WQV (check calc for water stored in saturated zone)	
Sediment Forebay		Method of Pretreatment	
2,435	cf	If pretrt is sed forebay: V_{SED} (sediment forebay volume)	**$\geq$ 10%WQV**
7,117	cf	Volume below lowest orifice[1]	**$\geq$ 100%WQV**
2,046	cf	Water stored in voids of saturated zone	**$\geq$ 26%WQV**
0.16	cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec)[2]	
182.77	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.13	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**< $2Q_{WQV}$**
29.42	hours	T_{ED} = Drawdown time of extended detention = $2WQV/Q_{WQV}$	**$\geq$ 24-hrs**
18.00	in	Depth of Filter Media	**$\geq$ 18"**
2.00	:1	Pond side slopes	**$\geq$ 3:1**
Angle Grate		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of $\leq$6")?	
184.32	ft	Peak elevation of the 50-year storm event (E_{50})	
185.00	ft	Berm elevation of the pond	
YES		$E_{50} \leq$ the berm elevation?	**← yes**

1. Volume stored above the wetland soil and below the high flow by-pass.

Designer's Notes:

26% WQV = 1,790 CF

1,705 SF Bottom Pond, Stone = 40% Voids, 39" ISR Stone Base

Min ISR height @ Liner Low Point = 2.50'

2.50FT*1,705 SF= 4,262 CF * 40% Voids = 1,705 CF

Triangle of ISR remaining between liner low and high point

Max ISR height above triangle = 1'

0.5*1FT*1,705 SF= 852 CF * 40% Voids = 341 CF

341 CF + 1,705 CF = 2,046 CF Total ISR Storage

Summary for Pond 101P: Bioretention W/ ISR #101

Inflow Area = 2.570 ac, 76.38% Impervious, Inflow Depth > 5.67" for 50YR-24HR event
Inflow = 15.21 cfs @ 12.09 hrs, Volume= 1.215 af
Outflow = 15.00 cfs @ 12.11 hrs, Volume= 1.030 af, Atten= 1%, Lag= 1.0 min
Primary = 0.14 cfs @ 12.11 hrs, Volume= 0.199 af
Secondary = 8.13 cfs @ 12.11 hrs, Volume= 0.605 af
Tertiary = 6.73 cfs @ 12.11 hrs, Volume= 0.225 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 184.32' @ 12.11 hrs Surf.Area= 1,705 sf Storage= 11,854 cf
Flood Elev= 185.00' Surf.Area= 1,705 sf Storage= 14,868 cf

Plug-Flow detention time= 124.9 min calculated for 1.030 af (85% of inflow)
Center-of-Mass det. time= 58.9 min (826.0 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	178.25'	171 cf	**Peastone (Irregular)** Listed below (Recalc) -Impervious 426 cf Overall x 40.0% Voids
#2	178.50'	512 cf	**Biomedia (Irregular)** Listed below (Recalc) 2,558 cf Overall x 20.0% Voids
#3	180.00'	13,577 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
#4	184.00'	2,435 cf	**Sediment Forebay (Irregular)** Listed below (Recalc) -Impervious
		16,693 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.25	1,705	338.9	0	0	1,705
178.50	1,705	338.9	426	426	1,790

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
178.50	1,705	338.9	0	0	1,705
180.00	1,705	338.9	2,558	2,558	2,213

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
180.00	1,705	338.9	0	0	1,705
181.00	2,086	349.8	1,892	1,892	2,395
182.00	2,483	360.8	2,282	4,174	3,111
183.00	2,893	371.7	2,685	6,859	3,844
184.00	3,357	386.1	3,122	9,981	4,792
185.00	3,839	399.8	3,595	13,577	5,734

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.00	204	76.7	0	0	204
185.00	1,141	337.2	609	609	8,787
186.00	2,610	503.6	1,826	2,435	19,928

Device	Routing	Invert	Outlet Devices
#1	Primary	178.25'	**15.0" Round 15" HDPE N-12** L= 22.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 178.25' / 177.90' S= 0.0159 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Secondary	178.25'	**18.0" Round 18" HDPE N-12** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 178.25' / 178.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 1	178.25'	**1.5" Vert. 1.50" Orifice** C= 0.600
#4	Device 3	178.50'	**10.000 in/hr BioMedia over Surface area**
#5	Device 2	183.10'	**3.0" Vert. 3" Orifice (3) STR B X 3.00** C= 0.600
#6	Device 2	184.00'	**48.0" Horiz. 48" Outlet Structure** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	184.00'	**15.0' long x 8.0' breadth 15' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.14 cfs @ 12.11 hrs HW=184.32' TW=175.07' (Dynamic Tailwater)
└─**1=15" HDPE N-12** (Passes 0.14 cfs of 13.78 cfs potential flow)
  └─**3=1.50" Orifice** (Orifice Controls 0.14 cfs @ 11.80 fps)
    └─**4=BioMedia** (Passes 0.14 cfs of 0.39 cfs potential flow)

Secondary OutFlow Max=8.02 cfs @ 12.11 hrs HW=184.32' TW=178.90' (Dynamic Tailwater)
└─**2=18" HDPE N-12** (Passes 8.02 cfs of 19.62 cfs potential flow)
  ├─**5=3" Orifice (3) STR B** (Orifice Controls 0.74 cfs @ 5.03 fps)
  └─**6=48" Outlet Structure** (Weir Controls 7.28 cfs @ 1.84 fps)

Tertiary OutFlow Max=6.63 cfs @ 12.11 hrs HW=184.32' TW=178.90' (Dynamic Tailwater)
└─**7=15' Emergency Spillway** (Weir Controls 6.63 cfs @ 1.40 fps)

Stage-Area-Storage for Pond 101P: Bioretention W/ ISR #101

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
178.25	0	0	183.45	1,705	8,889
178.35	0	68	183.55	1,705	9,201
178.45	**0**	136	183.65	1,705	9,518
178.55	**1,705**	188	183.75	1,705	9,839
178.65	1,705	222	183.85	1,705	10,165
178.75	1,705	256	183.95	1,705	10,496
178.85	1,705	290	184.05	1,705	10,843
178.95	1,705	324	184.15	1,705	11,210
179.05	1,705	358	184.25	1,705	11,588
179.15	1,705	392	184.35	1,705	11,978
179.25	1,705	426	184.45	1,705	12,381
179.35	1,705	460	184.55	1,705	12,799
179.45	1,705	494	184.65	1,705	13,230
179.55	1,705	529	184.75	1,705	13,678
179.65	1,705	563	184.85	1,705	14,141
179.75	1,705	597	184.95	1,705	14,621
179.85	1,705	631	185.05	1,705	14,926
179.95	1,705	665	185.15	1,705	15,053
180.05	1,705	768	185.25	1,705	15,191
180.15	1,705	942	185.35	1,705	15,343
180.25	1,705	1,120	185.45	1,705	15,509
180.35	1,705	1,301	185.55	1,705	15,689
180.45	1,705	1,486	185.65	1,705	15,884
180.55	1,705	1,676	185.75	1,705	16,095
180.65	1,705	1,868	185.85	1,705	16,322
180.75	1,705	2,065	185.95	1,705	**16,565**
180.85	1,705	2,266			
180.95	1,705	2,471			
181.05	1,705	2,679			
181.15	1,705	2,891			
181.25	1,705	3,108			
181.35	1,705	3,328			
181.45	1,705	3,552			
181.55	1,705	3,780			
181.65	1,705	4,012			
181.75	1,705	4,248			
181.85	1,705	4,488			
181.95	1,705	4,732			
182.05	1,705	4,981			
182.15	1,705	5,233			
182.25	1,705	5,489			
182.35	1,705	5,749			
182.45	1,705	6,014			
182.55	1,705	6,282			
182.65	1,705	6,555			
182.75	1,705	6,831			
182.85	1,705	7,112			
182.95	1,705	7,397			
183.05	1,705	7,687			
183.15	1,705	7,980			
183.25	1,705	8,279			
183.35	1,705	8,581			

Lowest Orifice Elev. = 183.20'
Volume Range = 183.10'-180'
Volume = 7,834 CF - 717 CF = 7,117 CF

Stage-Area-Storage for Pond 101P: Bioretention W/ ISR #101

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
178.25	0	0
178.35	0	68
178.45	**0**	136
178.55	**1,705**	188
178.65	1,705	222
178.75	1,705	256
178.85	1,705	290
178.95	1,705	324
179.05	1,705	358
179.15	1,705	392
179.25	1,705	426
179.35	1,705	460
179.45	1,705	494
179.55	1,705	529
179.65	1,705	563
179.75	1,705	597
179.85	1,705	631
179.95	1,705	665
180.05	1,705	768
180.15	1,705	942
180.25	1,705	1,120
180.35	1,705	1,301
180.45	1,705	1,486
180.55	1,705	1,676
180.65	1,705	1,868
180.75	1,705	2,065
180.85	1,705	2,266
180.95	1,705	2,471
181.05	1,705	2,679
181.15	1,705	2,891
181.25	1,705	3,108
181.35	1,705	3,328
181.45	1,705	3,552
181.55	1,705	3,780
181.65	1,705	4,012
181.75	1,705	4,248
181.85	1,705	4,488
181.95	1,705	4,732
182.05	1,705	4,981
182.15	1,705	5,233
182.25	1,705	5,489
182.35	1,705	5,749
182.45	1,705	6,014
182.55	1,705	6,282
182.65	1,705	6,555
182.75	1,705	6,831
182.85	1,705	7,112
182.95	1,705	7,397
183.05	1,705	7,687
183.15	1,705	7,980
183.25	1,705	8,279
183.35	1,705	8,581
183.45	1,705	8,889
183.55	1,705	9,201
183.65	1,705	9,518
183.75	1,705	9,839
183.85	1,705	10,165
183.95	1,705	10,496
184.05	1,705	10,843
184.15	1,705	11,210
184.25	1,705	11,588
184.35	1,705	11,978
184.45	1,705	12,381
184.55	1,705	12,799
184.65	1,705	13,230
184.75	1,705	13,678
184.85	1,705	14,141
184.95	1,705	14,621
185.05	1,705	14,926
185.15	1,705	15,053
185.25	1,705	15,191
185.35	1,705	15,343
185.45	1,705	15,509
185.55	1,705	15,689
185.65	1,705	15,884
185.75	1,705	16,095
185.85	1,705	16,322
185.95	1,705	**16,565**

WQV = 6,884 CF
WQV Elev. = 182.77'

Stage-Discharge for Pond 101P: Bioretention W/ ISR #101

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Tertiary (cfs)
178.25	0.00	0.00	0.00	0.00
178.45	0.00	0.00	0.00	0.00
178.65	0.03	0.03	0.00	0.00
178.85	0.04	0.04	0.00	0.00
179.05	0.05	0.05	0.00	0.00
179.25	0.06	0.06	0.00	0.00
179.45	0.06	0.06	0.00	0.00
179.65	0.07	0.07	0.00	0.00
179.85	0.07	0.07	0.00	0.00
180.05	0.08	0.08	0.00	0.00
180.25	0.08	0.08	0.00	0.00
180.45	0.09	0.09	0.00	0.00
180.65	0.09	0.09	0.00	0.00
180.85	0.09	0.09	0.00	0.00
181.05	0.10	0.10	0.00	0.00
181.25	0.10	0.10	0.00	0.00
181.45	0.10	0.10	0.00	0.00
181.65	0.11	0.11	0.00	0.00
181.85	0.11	0.11	0.00	0.00
182.05	0.11	0.11	0.00	0.00
182.25	0.12	0.12	0.00	0.00
182.45	0.12	0.12	0.00	0.00
182.65	0.12	0.12	0.00	0.00
182.85	0.13	0.13	0.00	0.00
183.05	0.13	0.13	0.00	0.00
183.25	0.25	0.13	0.12	0.00
183.45	0.47	0.13	0.34	0.00
183.65	0.60	0.14	0.46	0.00
183.85	0.70	0.14	0.56	0.00
184.05	1.65	0.14	1.10	0.41
184.25	10.61	0.14	5.85	4.61
184.45	25.02	0.15	13.19	11.68
184.65	41.58	0.15	20.23	21.20
184.85	52.32	0.15	20.58	31.59
185.05	64.33	0.15	20.93	43.25
185.25	77.50	0.16	21.27	56.08
185.45	91.30	0.16	21.61	69.54
185.65	106.03	0.16	21.94	83.93
185.85	**122.08**	**0.16**	**22.27**	**99.64**

WQV Elev. = 182.77'
WQV Discharge = 0.13 CFS

BIORETENTION SYSTEM WITH INTERNAL STORAGE RESERVOIR
(UNH Stormwater Center Specification)

Type/Node Name: **Bioretention W/ ISR #102 (102P)**

Enter the node name in the drainage analysis if applicable.

Value	Unit	Description	Criteria
1.62	ac	A = Area draining to the practice	
1.05	ac	A_I = Impervious area draining to the practice	
0.65	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.63	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.03	ac-in	WQV= 1" x Rv x A	
3,725	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
372	cf	10% x WQV (check calc for sediment forebay)	
931	cf	25% x WQV (check calc for water stored in saturated zone)	
Sediment Forebay		Method of Pretreatment	
570	cf	If pretrt is sed forebay: V_{SED} (sediment forebay volume)	**≥ 10%WQV**
4,952	cf	Volume below lowest orifice[1]	**≥ 100%WQV**
1,177+/-	cf	Water stored in voids of saturated zone	**≥ 26%WQV**
0.09	cfs	$2Q_{avg}$ = 2* WQV / 24 hrs * (1hr / 3600 sec)[2]	
168.56	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
0.06	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	**< $2Q_{WQV}$**
34.49	hours	T_{ED} = Drawdown time of extended detention = $2WQV/Q_{WQV}$	**≥ 24-hrs**
18.00	in	Depth of Filter Media	**≥ 18"**
2.00	:1	Pond side slopes	**≥ 3:1**
Angle Grate		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of ≤6")?	
170.89	ft	Peak elevation of the 50-year storm event (E_{50})	
172.50	ft	Berm elevation of the pond	
YES		E_{50} ≤ the berm elevation?	**← yes**

1. Volume stored above the wetland soil and below the high flow by-pass.

Designer's Notes:

26% WQV = 969 CF

2,141 SF Bottom Pond, Stone = 40% Voids, 18" ISR Stone Base

Min ISR height @ Liner Low Point = 1.25'

1.25FT*2,141 SF= 2,676 CF * 40% Voids = 1,070 CF

Triangle of ISR remaining between liner low and high point

Max ISR height above triangle = 0.25'

0.5*0.25FT*2,141 SF= 267 CF * 40% Voids = 107 CF

107 CF + 1,070 CF = 1,177 +/- CF Total ISR Storage

P-104 area has been disconnected for the WQV Calculation, No P-104 discharge through 25YR Event

Summary for Pond 102P: Bioretention W/ ISR #102

[80] Warning: Exceeded Pond C03P by 0.08' @ 11.85 hrs (3.70 cfs 0.170 af)

Inflow Area = 4.190 ac, 71.89% Impervious, Inflow Depth > 2.36" for 50YR-24HR event
Inflow = 8.79 cfs @ 12.10 hrs, Volume= 0.824 af
Outflow = 3.93 cfs @ 12.30 hrs, Volume= 0.685 af, Atten= 55%, Lag= 12.2 min
Primary = 0.09 cfs @ 12.30 hrs, Volume= 0.101 af
Secondary = 3.84 cfs @ 12.30 hrs, Volume= 0.584 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 170.89' @ 12.30 hrs Surf.Area= 2,141 sf Storage= 11,819 cf
Flood Elev= 172.50' Surf.Area= 2,141 sf Storage= 18,568 cf

Plug-Flow detention time= 118.7 min calculated for 0.684 af (83% of inflow)
Center-of-Mass det. time= 57.7 min (840.4 - 782.7)

Volume	Invert	Avail.Storage	Storage Description
#1	165.75'	214 cf	**Peastone (Irregular)** Listed below (Recalc) -Impervious 535 cf Overall x 40.0% Voids
#2	166.00'	642 cf	**Biomedia (Irregular)** Listed below (Recalc) 3,212 cf Overall x 20.0% Voids
#3	167.50'	570 cf	**Forebay (Irregular)** Listed below (Recalc) -Impervious
#4	167.50'	5,235 cf	**Cell (Irregular)** Listed below (Recalc) -Impervious
#5	169.50'	11,825 cf	**Open Water Storage (Irregular)** Listed below (Recalc) -Impervious
#6	165.75'	82 cf	**4.00'D x 6.50'H Outlet Structure** -Impervious
		18,568 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
165.75	2,141	208.5	0	0	2,141
166.00	2,141	208.5	535	535	2,193

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
166.00	2,141	208.5	0	0	2,141
167.50	2,141	208.5	3,212	3,212	2,454

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
167.50	190	64.7	0	0	190
168.00	233	71.4	106	106	270
169.00	336	85.2	283	389	459
169.50	390	91.6	181	570	559

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
167.50	2,141	208.5	0	0	2,141
168.00	2,474	221.0	1,153	1,153	2,582
169.00	2,804	229.3	2,637	3,790	2,955
169.50	2,977	233.6	1,445	5,235	3,151

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
169.50	3,387	262.2	0	0	3,387
170.00	3,608	269.4	1,748	1,748	3,719
171.00	3,942	278.4	3,774	5,522	4,198
172.00	4,288	287.6	4,114	9,636	4,700
172.50	4,470	292.4	2,189	11,825	4,964

Device	Routing	Invert	Outlet Devices
#1	Primary	165.75'	**6.0" Round 6" HDPE N-12 (Str A)** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.75' / 165.50' S= 0.0057 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	165.75'	**1.2" Vert. 1.25" Orifice (Str A)** C= 0.600
#3	Secondary	165.75'	**15.0" Round 15" HDPE N-12 (Str B)** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 165.75' / 165.50' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#4	Device 2	166.00'	**10.000 in/hr BioMedia over Surface area**
#5	Device 3	169.25'	**8.0" Vert. 8" Orifice (Str B) (2) X 2.00** C= 0.600
#6	Device 3	171.75'	**48.0" Horiz. 48" Outlet Structure (Str B)** C= 0.600 Limited to weir flow at low heads
#7	Tertiary	172.00'	**10.0' long x 10.0' breadth 10' Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.09 cfs @ 12.30 hrs HW=170.89' TW=165.70' (Dynamic Tailwater)
↑—**1=6" HDPE N-12 (Str A)** (Passes 0.09 cfs of 1.65 cfs potential flow)
  ↑—**2=1.25" Orifice (Str A)** (Orifice Controls 0.09 cfs @ 10.86 fps)
    ↑—**4=BioMedia** (Passes 0.09 cfs of 0.50 cfs potential flow)

Secondary OutFlow Max=3.84 cfs @ 12.30 hrs HW=170.89' TW=165.70' (Dynamic Tailwater)
↑—**3=15" HDPE N-12 (Str B)** (Passes 3.84 cfs of 12.56 cfs potential flow)
  ↑—**5=8" Orifice (Str B) (2)** (Orifice Controls 3.84 cfs @ 5.50 fps)
  └—**6=48" Outlet Structure (Str B)** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=165.75' TW=165.50' (Dynamic Tailwater)
↑—**7=10' Emergency Spillway** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 102P: Bioretention W/ ISR #102

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
165.75	0	0
165.85	0	87
165.95	**0**	174
166.05	**2,141**	239
166.15	2,141	283
166.25	2,141	327
166.35	2,141	372
166.45	2,141	416
166.55	2,141	460
166.65	2,141	504
166.75	2,141	548
166.85	2,141	592
166.95	2,141	636
167.05	2,141	680
167.15	2,141	724
167.25	2,141	768
167.35	2,141	812
167.45	2,141	856
167.55	2,141	996
167.65	2,141	1,238
167.75	2,141	1,487
167.85	2,141	1,744
167.95	2,141	2,008
168.05	2,141	2,279
168.15	2,141	2,556
168.25	2,141	2,836
168.35	2,141	3,120
168.45	2,141	3,409
168.55	2,141	3,702
168.65	2,141	4,000
168.75	2,141	4,302
168.85	2,141	4,608
168.95	2,141	4,919
169.05	2,141	5,234
169.15	2,141	5,554
169.25	2,141	5,878
169.35	2,141	6,207
169.45	2,141	6,540
169.55	2,141	6,879
169.65	2,141	7,223
169.75	2,141	7,572
169.85	2,141	7,925
169.95	2,141	8,283
170.05	2,141	8,645
170.15	2,141	9,010
170.25	2,141	9,379
170.35	2,141	9,750
170.45	2,141	10,126
170.55	2,141	10,504
170.65	2,141	10,886
170.75	2,141	11,271
170.85	2,141	11,660
170.95	2,141	12,052
171.05	2,141	12,448
171.15	2,141	12,846
171.25	2,141	13,249
171.35	2,141	13,654
171.45	2,141	14,064
171.55	2,141	14,476
171.65	2,141	14,892
171.75	2,141	15,312
171.85	2,141	15,735
171.95	2,141	16,161
172.05	2,141	16,591
172.15	2,141	17,025
172.25	2,141	17,462
172.35	2,141	17,902
172.45	2,141	**18,345**

Lowest Orifice Elev. = 169.25'
Volume Range = 169.25'-167.50'
Volume = 5,878 CF - 926 CF = 4,952 CF

Stage-Area-Storage for Pond 102P: Bioretention W/ ISR #102

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
165.75	0	0
165.85	0	87
165.95	**0**	174
166.05	**2,141**	239
166.15	2,141	283
166.25	2,141	327
166.35	2,141	372
166.45	2,141	416
166.55	2,141	460
166.65	2,141	504
166.75	2,141	548
166.85	2,141	592
166.95	2,141	636
167.05	2,141	680
167.15	2,141	724
167.25	2,141	768
167.35	2,141	812
167.45	2,141	856
167.55	2,141	996
167.65	2,141	1,238
167.75	2,141	1,487
167.85	2,141	1,744
167.95	2,141	2,008
168.05	2,141	2,279
168.15	2,141	2,556
168.25	2,141	2,836
168.35	2,141	3,120
168.45	2,141	3,409
168.55	2,141	3,702
168.65	2,141	4,000
168.75	2,141	4,302
168.85	2,141	4,608
168.95	2,141	4,919
169.05	2,141	5,234
169.15	2,141	5,554
169.25	2,141	5,878
169.35	2,141	6,207
169.45	2,141	6,540
169.55	2,141	6,879
169.65	2,141	7,223
169.75	2,141	7,572
169.85	2,141	7,925
169.95	2,141	8,283
170.05	2,141	8,645
170.15	2,141	9,010
170.25	2,141	9,379
170.35	2,141	9,750
170.45	2,141	10,126
170.55	2,141	10,504
170.65	2,141	10,886
170.75	2,141	11,271
170.85	2,141	11,660
170.95	2,141	12,052
171.05	2,141	12,448
171.15	2,141	12,846
171.25	2,141	13,249
171.35	2,141	13,654
171.45	2,141	14,064
171.55	2,141	14,476
171.65	2,141	14,892
171.75	2,141	15,312
171.85	2,141	15,735
171.95	2,141	16,161
172.05	2,141	16,591
172.15	2,141	17,025
172.25	2,141	17,462
172.35	2,141	17,902
172.45	2,141	**18,345**

WQV = 3,725 CF
WQV Elev. = 168.56'

Stage-Discharge for Pond 102P: Bioretention W/ ISR #102

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Tertiary (cfs)
165.75	0.00	0.00	0.00	0.00
165.95	0.00	0.00	0.00	0.00
166.15	0.02	0.02	0.00	0.00
166.35	0.03	0.03	0.00	0.00
166.55	0.03	0.03	0.00	0.00
166.75	0.04	0.04	0.00	0.00
166.95	0.04	0.04	0.00	0.00
167.15	0.04	0.04	0.00	0.00
167.35	0.05	0.05	0.00	0.00
167.55	0.05	0.05	0.00	0.00
167.75	0.05	0.05	0.00	0.00
167.95	0.06	0.06	0.00	0.00
168.15	0.06	0.06	0.00	0.00
168.35	0.06	0.06	0.00	0.00
168.55	0.06	0.06	0.00	0.00
168.75	0.06	0.06	0.00	0.00
168.95	0.07	0.07	0.00	0.00
169.15	0.07	0.07	0.00	0.00
169.35	0.14	0.07	0.07	0.00
169.55	0.64	0.07	0.57	0.00
169.75	1.43	0.08	1.35	0.00
169.95	2.11	0.08	2.04	0.00
170.15	2.61	0.08	2.53	0.00
170.35	3.02	0.08	2.94	0.00
170.55	3.39	0.08	3.30	0.00
170.75	3.71	0.08	3.63	0.00
170.95	4.02	0.09	3.93	0.00
171.15	4.29	0.09	4.21	0.00
171.35	4.56	0.09	4.47	0.00
171.55	4.80	0.09	4.71	0.00
171.75	5.04	0.09	4.95	0.00
171.95	8.94	0.09	8.85	0.00
172.15	15.74	0.10	14.20	1.45
172.35	**19.80**	**0.10**	**14.44**	**5.26**

WQV Elev. = 168.56'
WQV Discharge = 0.06 CFS

INFILTRATION PRACTICE CRITERIA
(Env-Wq 1508.06)

Type/Node Name: **Infiltration Pond #103 (103P)**

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

Value	Unit	Description	Criteria
YES		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	← yes
0.18	ac	A = Area draining to the practice	
-	ac	A_I = Impervious area draining to the practice	
-	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.05	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.01	ac-in	WQV= 1" x Rv x A	
33	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
8	cf	25% x WQV (check calc for sediment forebay volume)	
Treated flow		Method of pretreatment? (not required for clean or roof runoff)	
N/A	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	≥ 25%WQV
7,592	cf	V = Volume[1] (attach a stage-storage table)	≥ WQV
689	sf	A_{SA} = Surface area of the bottom of the pond	
3.00	iph	$Ksat_{DESIGN}$ = Design infiltration rate[2]	
0.2	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	≤ 72-hrs
175.00	feet	E_{BTM} = Elevation of the bottom of the basin	
172.10	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
168.68	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
2.90	feet	D_{SHWT} = Separation from SHWT	≥ *[3]
6.3	feet	D_{ROCK} = Separation from bedrock	≥ *[3]
N/A	ft	D_{amend} = Depth of amended soil, if applicable due high infiltation rate	≥ 24"
N/A	ft	D_T = Depth of trench, if trench proposed	4 - 10 ft
N/A	Yes/No	If a trench or underground system is proposed, has observation well been provided?	←yes
N/A		If a trench is proposed, does materialmeet Env-Wq 1508.06(k)(2) requirements.[4]	← yes
Yes	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	← yes
2.0	:1	If a basin is proposed, pond side slopes.	≥3:1
178.68	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
179.18	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
180.00	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench?[5]	← yes
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. $Ksat_{DESIGN}$ includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

Designer's Notes: Receives flow from Bioretention W/ ISR #101

Summary for Pond 103P: Infiltration Pond #103

Inflow Area = 0.180 ac, 0.00% Impervious, Inflow Depth > 26.50" for 10YR-24HR event
Inflow = 8.81 cfs @ 12.16 hrs, Volume= 0.398 af
Outflow = 1.16 cfs @ 12.71 hrs, Volume= 0.321 af, Atten= 87%, Lag= 32.9 min
Discarded = 0.22 cfs @ 12.71 hrs, Volume= 0.204 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.94 cfs @ 12.71 hrs, Volume= 0.117 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 178.68' @ 12.71 hrs Surf.Area= 3,228 sf Storage= 7,367 cf
Flood Elev= 180.00' Surf.Area= 3,897 sf Storage= 12,067 cf

Plug-Flow detention time= 207.5 min calculated for 0.321 af (81% of inflow)
Center-of-Mass det. time= 161.3 min (983.6 - 822.3)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	12,067 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
175.00	689	156.4	0	0	689
176.00	1,523	271.2	1,079	1,079	4,601
177.00	2,020	308.3	1,766	2,844	6,336
178.00	2,889	381.1	2,442	5,286	10,345
179.00	3,394	399.3	3,138	8,424	11,541
180.00	3,897	414.2	3,643	12,067	12,588

Device	Routing	Invert	Outlet Devices
#1	Primary	178.75'	**15.0" Round 15" HDPE N-12 (W/ Wier Lip) w/ 3.0" inside fill** L= 15.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 177.00' S= 0.0968 '/' Cc= 0.900 n= 0.012, Flow Area= 1.05 sf
#2	Secondary	175.75'	**15.0" Round 15" HDPE N-12 (Str B)** L= 22.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.75' / 175.50' S= 0.0111 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	178.60'	**48.0" Horiz. 48" Orifice (Str B)** C= 0.600 Limited to weir flow at low heads
#4	Tertiary	179.00'	**10.0' long x 10.0' breadth 10' E. Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	175.00'	**3.000 in/hr Infiltration over Surface area**

Discarded OutFlow Max=0.22 cfs @ 12.71 hrs HW=178.68' (Free Discharge)
└─**5=Infiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' TW=177.07' (Dynamic Tailwater)
└─**1=15" HDPE N-12 (W/ Wier Lip)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.93 cfs @ 12.71 hrs HW=178.68' TW=174.71' (Dynamic Tailwater)
└─**2=15" HDPE N-12 (Str B)** (Passes 0.93 cfs of 8.97 cfs potential flow)
  └─**3=48" Orifice (Str B)** (Weir Controls 0.93 cfs @ 0.93 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' TW=172.00' (Dynamic Tailwater)
└─**4=10' E. Spillway** (Controls 0.00 cfs)

Summary for Pond 103P: Infiltration Pond #103

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=37)

Inflow Area = 0.180 ac, 0.00% Impervious, Inflow Depth > 58.35" for 50YR-24HR event
Inflow = 15.47 cfs @ 12.10 hrs, Volume= 0.876 af
Outflow = 13.10 cfs @ 12.17 hrs, Volume= 0.761 af, Atten= 15%, Lag= 4.1 min
Discarded = 0.24 cfs @ 12.17 hrs, Volume= 0.226 af
Primary = 1.01 cfs @ 12.17 hrs, Volume= 0.125 af
Secondary = 9.84 cfs @ 12.15 hrs, Volume= 0.379 af
Tertiary = 1.52 cfs @ 12.17 hrs, Volume= 0.030 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 179.18' @ 12.17 hrs Surf.Area= 3,480 sf Storage= 9,032 cf
Flood Elev= 180.00' Surf.Area= 3,897 sf Storage= 12,067 cf

Plug-Flow detention time= 108.9 min calculated for 0.759 af (87% of inflow)
Center-of-Mass det. time= 63.4 min (879.9 - 816.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	12,067 cf	**Open Water Storage (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
175.00	689	156.4	0	0	689
176.00	1,523	271.2	1,079	1,079	4,601
177.00	2,020	308.3	1,766	2,844	6,336
178.00	2,889	381.1	2,442	5,286	10,345
179.00	3,394	399.3	3,138	8,424	11,541
180.00	3,897	414.2	3,643	12,067	12,588

Device	Routing	Invert	Outlet Devices
#1	Primary	178.75'	**15.0" Round 15" HDPE N-12 (W/ Wier Lip) w/ 3.0" inside fill** L= 15.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 177.00' S= 0.0968 '/' Cc= 0.900 n= 0.012, Flow Area= 1.05 sf
#2	Secondary	175.75'	**15.0" Round 15" HDPE N-12 (Str B)** L= 22.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.75' / 175.50' S= 0.0111 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	178.60'	**48.0" Horiz. 48" Orifice (Str B)** C= 0.600 Limited to weir flow at low heads
#4	Tertiary	179.00'	**10.0' long x 10.0' breadth 10' E. Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	175.00'	**3.000 in/hr Infiltration over Surface area**

Discarded OutFlow Max=0.24 cfs @ 12.17 hrs HW=179.14' (Free Discharge)
└─**5=Infiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=0.90 cfs @ 12.17 hrs HW=179.14' TW=177.91' (Dynamic Tailwater)
└─**1=15" HDPE N-12 (W/ Wier Lip)** (Inlet Controls 0.90 cfs @ 1.97 fps)

Secondary OutFlow Max=9.84 cfs @ 12.15 hrs HW=179.15' TW=175.65' (Dynamic Tailwater)
└─**2=15" HDPE N-12 (Str B)** (Inlet Controls 9.84 cfs @ 8.02 fps)
  └─**3=48" Orifice (Str B)** (Passes 9.84 cfs of 16.68 cfs potential flow)

Tertiary OutFlow Max=1.33 cfs @ 12.17 hrs HW=179.14' TW=172.12' (Dynamic Tailwater)
└─**4=10' E. Spillway** (Weir Controls 1.33 cfs @ 0.94 fps)

Stage-Area-Storage for Pond 103P: Infiltration Pond #103

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
175.00	689	0	177.60	2,523	4,205
175.05	723	35	177.65	2,567	4,332
175.10	758	72	177.70	2,612	4,461
175.15	793	111	177.75	2,657	4,593
175.20	830	152	177.80	2,703	4,727
175.25	867	194	177.85	2,749	4,863
175.30	905	238	177.90	2,795	5,002
175.35	944	285	177.95	2,842	5,143
175.40	983	333	178.00	2,889	5,286
175.45	1,024	383	178.05	2,913	5,431
175.50	1,065	435	178.10	2,938	5,577
175.55	1,107	489	178.15	2,962	5,725
175.60	1,150	546	178.20	2,987	5,874
175.65	1,194	604	178.25	3,011	6,024
175.70	1,239	665	178.30	3,036	6,175
175.75	1,284	728	178.35	3,061	6,327
175.80	1,330	794	178.40	3,086	6,481
175.85	1,377	861	178.45	3,111	6,636
175.90	1,425	931	178.50	3,136	6,792
175.95	1,474	1,004	178.55	3,162	6,949
176.00	1,523	1,079	178.60	3,187	7,108
176.05	1,546	1,156	178.65	3,213	7,268
176.10	1,570	1,233	178.70	3,238	7,429
176.15	1,593	1,312	178.75	3,264	7,592
176.20	1,617	1,393	178.80	3,290	7,756
176.25	1,641	1,474	178.85	3,316	7,921
176.30	1,665	1,557	178.90	3,342	8,087
176.35	1,689	1,641	178.95	3,368	8,255
176.40	1,713	1,726	179.00	3,394	8,424
176.45	1,738	1,812	179.05	3,418	8,594
176.50	1,763	1,899	179.10	3,443	8,766
176.55	1,788	1,988	179.15	3,467	8,939
176.60	1,813	2,078	179.20	3,492	9,113
176.65	1,838	2,170	179.25	3,516	9,288
176.70	1,864	2,262	179.30	3,541	9,464
176.75	1,889	2,356	179.35	3,566	9,642
176.80	1,915	2,451	179.40	3,591	9,821
176.85	1,941	2,547	179.45	3,616	10,001
176.90	1,967	2,645	179.50	3,641	10,183
176.95	1,993	2,744	179.55	3,666	10,365
177.00	2,020	2,844	179.60	3,692	10,549
177.05	2,060	2,946	179.65	3,717	10,734
177.10	2,100	3,050	179.70	3,742	10,921
177.15	2,140	3,156	179.75	3,768	11,109
177.20	2,181	3,264	179.80	3,794	11,298
177.25	2,223	3,375	179.85	3,819	11,488
177.30	2,264	3,487	179.90	3,845	11,680
177.35	2,307	3,601	179.95	3,871	11,873
177.40	2,349	3,717	180.00	**3,897**	**12,067**
177.45	2,392	3,836			
177.50	2,435	3,957			
177.55	2,479	4,079			

Lowest Outlet Elev. = 178.75'
Storage = 7,592 CF

INFILTRATION PRACTICE CRITERIA
(Env-Wq 1508.06)

Type/Node Name: **StormTech Inf. Overflow #104 (104P)**

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

Value	Unit	Description	Criteria
YES		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	**← yes**
2.57	ac	A = Area draining to the practice	
1.96	ac	A_I = Impervious area draining to the practice	
0.76	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.74	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.89	ac-in	WQV= 1" x Rv x A	
6,870	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
1,717	cf	25% x WQV (check calc for sediment forebay volume)	
Isolator Row		Method of pretreatment? (not required for clean or roof runoff)	
N/A	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
10,542	cf	V = Volume[1] (attach a stage-storage table)	**≥ WQV**
1,564	sf	A_{SA} = Surface area of the bottom of the pond	
3.00	iph	$Ksat_{DESIGN}$ = Design infiltration rate[2]	
17.6	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
174.00	feet	E_{BTM} = Elevation of the bottom of the basin	
172.27	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
168.60	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
1.73	feet	D_{SHWT} = Separation from SHWT	**≥ *[3]**
5.4	feet	D_{ROCK} = Separation from bedrock	**≥ *[3]**
N/A	ft	D_{amend} = Depth of amended soil, if applicable due high infiltation rate	**≥ 24"**
N/A	ft	D_T = Depth of trench, if trench proposed	**4 - 10 ft**
YES	Yes/No	If a trench or underground system is proposed, has observation well been provided?	**←yes**
N/A		If a trench is proposed, does materialmeet Env-Wq 1508.06(k)(2) requirements.[4]	**← yes**
N/A	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	**← yes**
N/A	:1	If a basin is proposed, pond side slopes.	**≥3:1**
175.66	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
179.09	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
179.75	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench?[5]	**← yes**
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	**← yes**

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. $Ksat_{DESIGN}$ includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

Designer's Notes: Receives treated flow from Bioretention W/ ISR #101 & Overflow from Infiltration Basin #103
As there is no WQV calculation with the BMP, the inflow area and % impervious reflect drain down time only

Summary for Pond 104P: StormTech Inf. Overflow #104

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 2.570 ac, 76.38% Impervious, Inflow Depth > 1.41" for 10YR-24HR event
Inflow = 1.08 cfs @ 12.71 hrs, Volume= 0.302 af
Outflow = 0.40 cfs @ 12.80 hrs, Volume= 0.288 af, Atten= 63%, Lag= 5.5 min
Discarded = 0.40 cfs @ 12.80 hrs, Volume= 0.288 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 175.66' @ 15.17 hrs Surf.Area= 0.134 ac Storage= 0.047 af
Flood Elev= 179.75' Surf.Area= 0.134 ac Storage= 0.271 af

Plug-Flow detention time= 54.1 min calculated for 0.288 af (95% of inflow)
Center-of-Mass det. time= 28.4 min (913.4 - 885.0)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	0.014 af	**34.75'W x 45.00'L x 1.00'H Lower Stone** 0.036 af Overall x 40.0% Voids
#2	175.00'	0.138 af	**34.75'W x 122.50'L x 4.75'H Upper Stone** 0.464 af Overall - 0.118 af Embedded = 0.346 af x 40.0% Voids
#3	175.50'	0.118 af	**ADS_StormTech SC-740 +Cap** x 112 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		0.271 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Primary	175.40'	**15.0" Round 15" HDPE Overflow** L= 4.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.40' / 175.20' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	179.00'	**15.0" Horiz. 15" Internal Stack** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.40 cfs @ 12.80 hrs HW=175.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.00' TW=174.95' (Dynamic Tailwater)
↑—**2=15" HDPE Overflow** (Controls 0.00 cfs)
  ↑—**3=15" Internal Stack** (Controls 0.00 cfs)

Summary for Pond 104P: StormTech Inf. Overflow #104

[80] Warning: Exceeded Pond 103P by 0.16' @ 12.55 hrs (2.35 cfs 0.116 af)

Inflow Area = 2.570 ac, 76.38% Impervious, Inflow Depth > 2.70" for 50YR-24HR event
Inflow = 9.98 cfs @ 12.15 hrs, Volume= 0.578 af
Outflow = 0.75 cfs @ 12.55 hrs, Volume= 0.475 af, Atten= 93%, Lag= 24.2 min
Discarded = 0.40 cfs @ 12.15 hrs, Volume= 0.465 af
Primary = 0.34 cfs @ 12.55 hrs, Volume= 0.010 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 179.09' @ 12.56 hrs Surf.Area= 0.134 ac Storage= 0.245 af
Flood Elev= 179.75' Surf.Area= 0.134 ac Storage= 0.271 af

Plug-Flow detention time= 247.6 min calculated for 0.475 af (82% of inflow)
Center-of-Mass det. time= 168.4 min (991.5 - 823.0)

Volume	Invert	Avail.Storage	Storage Description
#1	174.00'	0.014 af	**34.75'W x 45.00'L x 1.00'H Lower Stone** 0.036 af Overall x 40.0% Voids
#2	175.00'	0.138 af	**34.75'W x 122.50'L x 4.75'H Upper Stone** 0.464 af Overall - 0.118 af Embedded = 0.346 af x 40.0% Voids
#3	175.50'	0.118 af	**ADS_StormTech SC-740 +Cap** x 112 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		0.271 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.00'	**3.000 in/hr Exfiltration over Surface area**
#2	Primary	175.40'	**15.0" Round 15" HDPE Overflow** L= 4.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.40' / 175.20' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#3	Device 2	179.00'	**15.0" Horiz. 15" Internal Stack** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.40 cfs @ 12.15 hrs HW=175.65' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=0.32 cfs @ 12.55 hrs HW=179.08' TW=175.40' (Dynamic Tailwater)
↑—**2=15" HDPE Overflow** (Passes 0.32 cfs of 10.34 cfs potential flow)
  ↑—**3=15" Internal Stack** (Weir Controls 0.32 cfs @ 0.95 fps)

Stage-Area-Storage for Pond 104P: StormTech Inf. Overflow #104

Elevation (feet)	Surface (acres)	Storage (acre-feet)
174.00	0.036	0.000
174.10	0.036	0.001
174.20	0.036	0.003
174.30	0.036	0.004
174.40	0.036	0.006
174.50	0.036	0.007
174.60	0.036	0.009
174.70	0.036	0.010
174.80	0.036	0.011
174.90	0.036	0.013
175.00	**0.134**	0.014
175.10	0.134	0.018
175.20	0.134	0.022
175.30	0.134	0.026
175.40	0.134	0.030
175.50	0.134	0.034
175.60	0.134	0.042
175.70	0.134	0.050
175.80	0.134	0.058
175.90	0.134	0.066
176.00	0.134	0.073
176.10	0.134	0.081
176.20	0.134	0.089
176.30	0.134	0.096
176.40	0.134	0.104
176.50	0.134	0.111
176.60	0.134	0.119
176.70	0.134	0.126
176.80	0.134	0.133
176.90	0.134	0.140
177.00	0.134	0.147
177.10	0.134	0.154
177.20	0.134	0.160
177.30	0.134	0.166
177.40	0.134	0.173
177.50	0.134	0.179
177.60	0.134	0.184
177.70	0.134	0.189
177.80	0.134	0.194
177.90	0.134	0.198
178.00	0.134	0.203
178.10	0.134	0.206
178.20	0.134	0.210
178.30	0.134	0.214
178.40	0.134	0.218
178.50	0.134	0.222
178.60	0.134	0.226
178.70	0.134	0.230
178.80	0.134	0.234
178.90	0.134	0.238
179.00	0.134	0.242
179.10	0.134	0.245
179.20	0.134	0.249
179.30	0.134	0.253
179.40	0.134	0.257
179.50	0.134	0.261
179.60	0.134	0.265
179.70	0.134	**0.269**

Lowest Orifice Elev. = 179.00'
Volume = 0.242 AF = 10,542 CF

United States Department of Agriculture

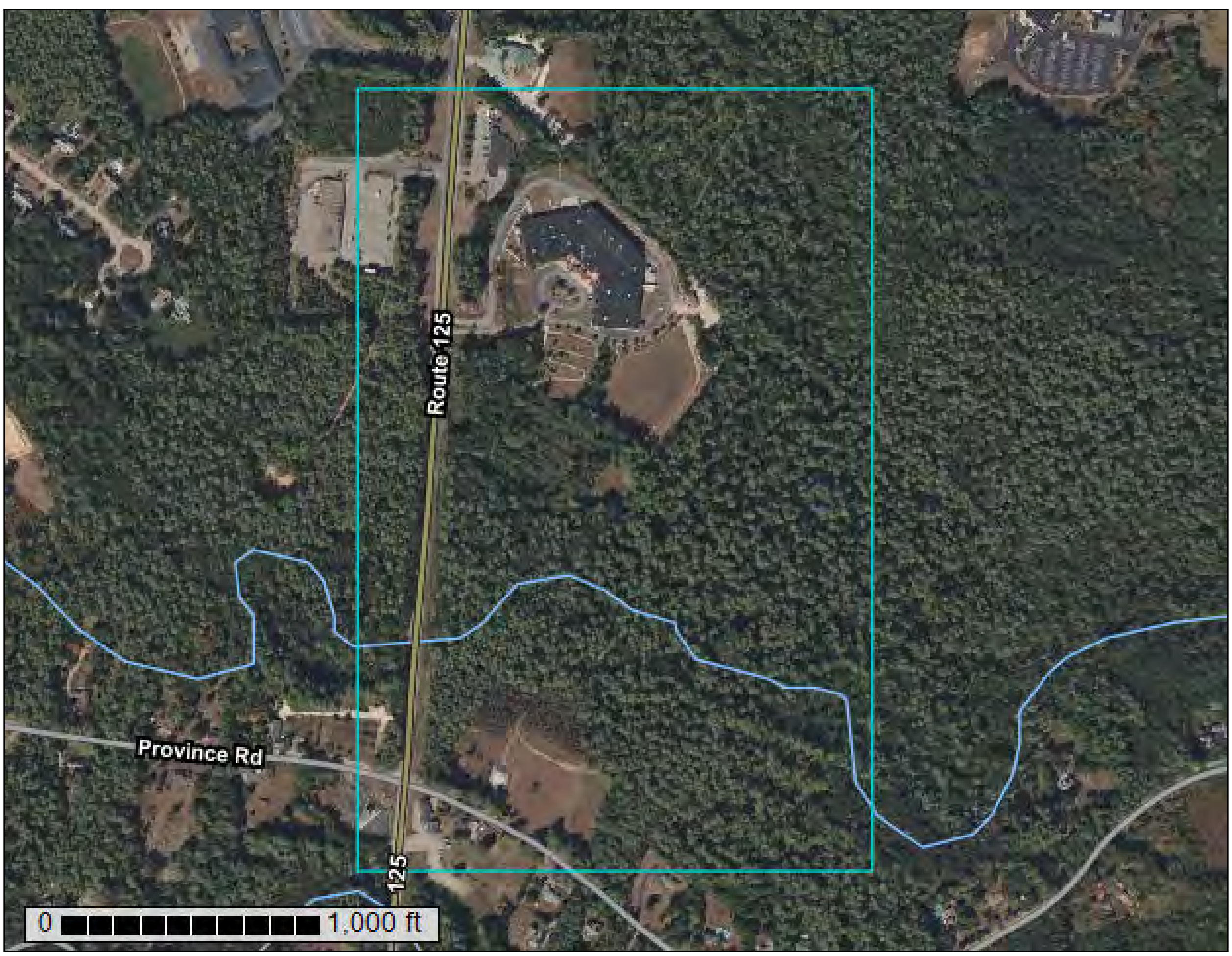
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Strafford County, New Hampshire



April 6, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

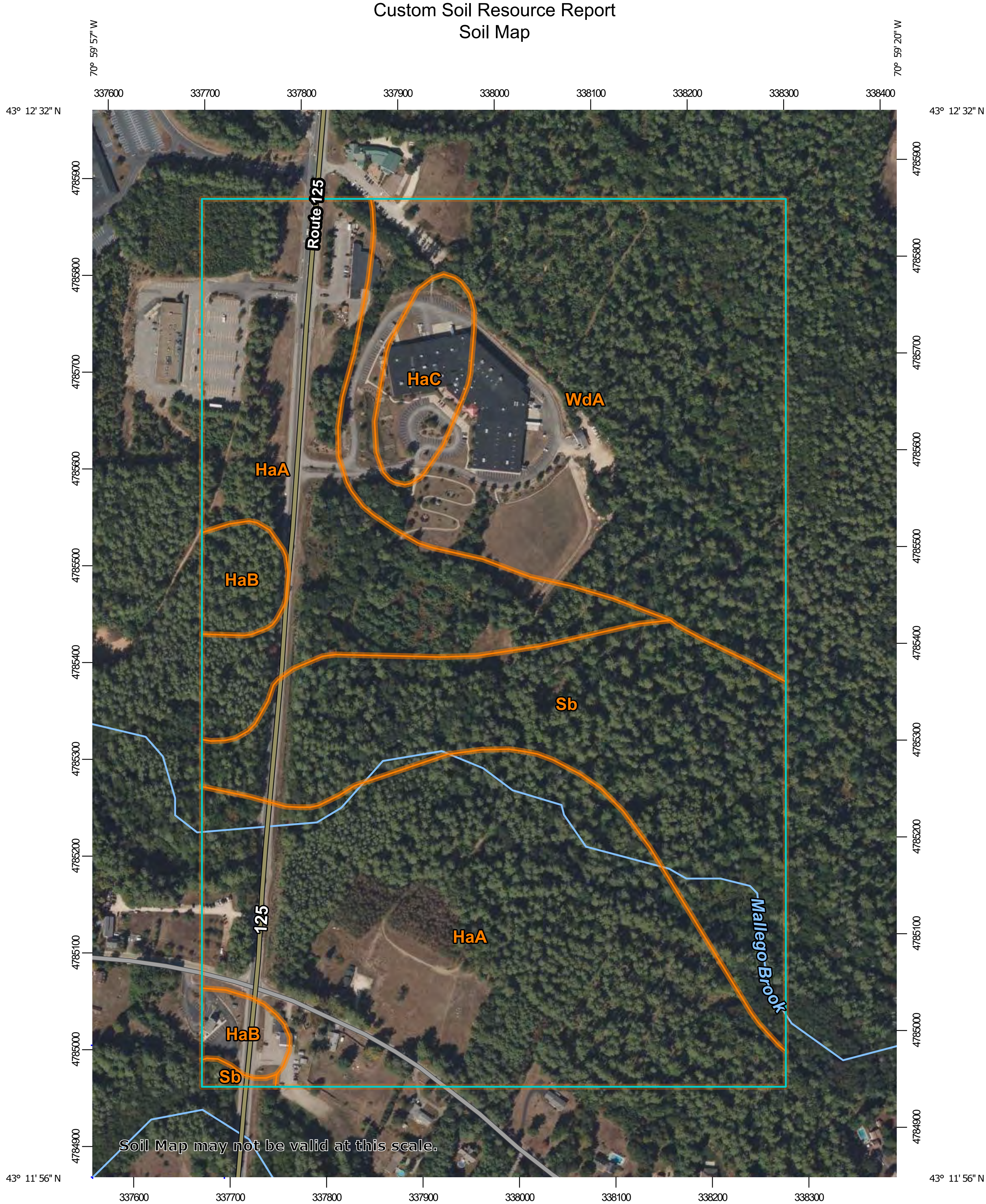
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:5,370 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 250, 500, 1000, 1500

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 23, Sep 9, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 19, 2020—Sep 20, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HaA	Hinckley loamy sand, 0 to 3 percent slopes	63.6	46.1%
HaB	Hinckley loamy sand, 3 to 8 percent slopes	3.9	2.8%
HaC	Hinckley loamy sand, 8 to 15 percent slopes	3.8	2.8%
Sb	Saugatuck loamy sand	25.6	18.6%
WdA	Windsor loamy sand, 0 to 3 percent slopes	40.9	29.7%
Totals for Area of Interest		**137.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Strafford County, New Hampshire

HaA—Hinckley loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svm7
Elevation: 0 to 1,420 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Outwash terraces, kame terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear, convex
Across-slope shape: Linear, concave, convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

HaB—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, moraines, kames, outwash plains, kame terraces, eskers
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Outwash deltas, outwash terraces, moraines, kames, outwash plains, kame terraces, eskers
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent

Landform: Outwash deltas, outwash terraces, moraines, kames, outwash plains, kame terraces, eskers
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

HaC—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svm9
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, moraines, kames, outwash plains, kame terraces, eskers
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Outwash terraces, moraines, kames, outwash plains, eskers
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, moraines, outwash plains, kame terraces, eskers, kames
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Sb—Saugatuck loamy sand

Map Unit Setting

National map unit symbol: 9d8r
Elevation: 300 to 1,000 feet
Mean annual precipitation: 27 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 125 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Saugatuck and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saugatuck

Setting

Landform: Outwash terraces
Parent material: Outwash

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 7 inches: sand
H3 - 7 to 26 inches: loamy sand
H4 - 26 to 42 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 16 inches to undefined
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Not named wet

Percent of map unit: 15 percent

Landform: Outwash terraces
Hydric soil rating: Yes

WdA—Windsor loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkg
Elevation: 0 to 990 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Outwash terraces, outwash plains, deltas, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Deerfield, loamy sand

Percent of map unit: 10 percent
Landform: Outwash plains, deltas, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley, loamy sand

Percent of map unit: 5 percent
Landform: Deltas, kames, outwash plains, eskers
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

John P. Hayes III CSS, CWS,
7 Limestone Way
North Hampton, NH 03862
603-205-4396
johnphayes@comcast.net

5/15/23
Christopher Berry **Job # 23-006**
Berry Surveying and Engineering
335 Second Crown Point Road
Barrington NH 03825

Site Specific Soil Survey 5/5/23
Map 238 Lot 44-1
Calef Highway Barrington, NH

Dear Chris,

This letter report presents the findings of a Site Specific Soil Survey conducted on the referenced properties by John P. Hayes III on May 5 2023. The soil survey was conducted in accordance with the New Hampshire Supplement of the Site-Specific Soil Mapping Standard For New Hampshire and Vermont, Special Publication # 3, Version 7.0 July 2021, published by the Society of Soil Scientist of Northern New England. Soil series information was also taken from the Soil Survey of Strafford County New Hampshire issued March 1973.

The properties that are subject of the soil survey is located on the The parcel is located on the southeast side of Route 125, northeast of Providence road, and northwest of Mallego Brook, in Barrington,NH. Lot 44-1 is approximately 8.0 acres in size. The plans used for these soil maps are a 50 scale plan, where 1 inch equals 50 feet, with one foot contours.

The purpose of the soil survey is to provide the client with soils information for urban and suburban or rural land planning. Soil characteristics on the property were evaluated through observation of numerous test pits, and hand auger probes conducted throughout the property. Slope phases were determined with the use of the topography provided on the plan. The Site-specific Soil Map Units identified are taken from the New Hampshire State-Wide Numerical Soils Legend, Issue #10 January 2011, and are briefly described below. Official Series Descriptions (OSD) for each of these soil series are enclosed with this report. The soil map units comply with the Range In Characteristics described in the OSD. Any limiting inclusions on the site, do not exceed 15 percent of any of the soil map units. Dissimilar inclusions, if any, will be noted in the report. Limits of the Site Specific mapping units are highlighted on the plan. The Hydrological Soil Groups for each of the soil series was determined using SSSNNE Publication No. 5 Ksat Values for New Hampshire Soils September 2009. Limits of the Site Specific mapping units are highlighted on the plan.

Portions of the soil map with the map unit denominator of P and VP contain poorly drained soils, and very poorly drained soils respectively. Portions of the soil map with the map unit 400, contain disturbed soils that have been excavated and/or regraded, that are moderately well drained, to somewhat poorly drained, and are sandy in texture. Portions of the soil map with the map unit 900, contain disturbed soils that have been excavated down to, or near the water table, and are poorly drained. These soils are also sandy in texture. A Disturbed Soil Mapping Unit Supplement for New Hampshire DES AoT Site Specific Soil Maps is also included. This supplement explains the additional information given about each disturbed soil map units that are present on the site.

MAP UNIT #	SOIL TAXANOMI C NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
26	**Windsor**	B C	A	The Windsor series consists of very deep, excessively drained soils formed in sandy outwash or eolian deposits. These soils are located in the northwest portion of the property. The soil texture is loamy sand over sand. These soils are deep to bedrock. Saturated hydraulic conductivity is high or very high. Some inclusions of moderately drained Deerfield soils may be present, but are less than 10 percent of the mapped area. Estimated seasonal high water tables in these soils range from 38 to 60 inches.
34 P	**Wareham**	A B C	C	The Wareham series consists of very deep, poorly and drained sandy soils formed in outwash on plains, deltas, and terraces. These soils are located in the wetland areas in the northeastern portion of the property. The soil texture is loamy coarse sand over coarse sand. These soils are deep to bedrock. Permeability is rapid throughout these soils. Some inclusions of somewhat poorly drained Deerfield Variant soils may be present, but are less than 10 percent of the mapped area.Estimated seasonal high water tables in these soils range from 0 to 10 inches.
115 VP	**Scarboro**	A	D	The Scarboro series consists of very deep, very poorly drained soils in sandy glaciofluvial deposits on outwash plains. These soils are located in the wetland area in the southern portion of the property. The soil texture consists of 4 to 16 inches of organic material over sand. These soils are deep to bedrock. Saturated hydraulic conductivity is high or very high. Some inclusions of poorly drained Wareham soils may be present, but are less than 10 percent of the mapped area. These soils are semi permanantly to permanately saturated.
118	**Sudbury**	A B	B	The Sudbury series consists of very deep, moderately well drained soils on outwash plains. These soils are located in the southwestern portion of the property. The soil texture is sandy loam over gravelly coarse sand. These soils are deep to bedrock.Saturated hydraulic conductivity is moderately high or high in the upper solum and high or very high in the lower solum and substratum. Some inclusions of moderately drained Deerfield and Elmridge soils, or the somewhat poorly drained

MAP UNIT #	SOIL TAXANOMI C NAME	SLOPES	HYDRO LOGIC SOIL GROUP	DESCRIPTION
118	**Sudbury**	**A B**	**B**	component of this soil series may be present, but are less than 10 percent of the mapped area. Estimated seasonal high water tables in these soils range from 15 to 38 inches.
238	**Elmridge**	**A B**	**C**	The Elmridge series consists of very deep, moderately well drained soils formed in loamy over clayey sediments. These soils are located in the southern, central area of the property. The soil texture is fine sandy loam over silt loam and/or silty clay loam.. These soils are deep to bedrock. Saturated hydraulic conductivity is high in the upper loamy horizons and low to moderately high in the underlying clayey horizons.Some inclusions of moderately well drained Sudbury or Deerfield soils, and somewhat poorly drained component of the Sudbury soils may be present, but are less than 10 percent of the mapped area. Estimated seasonal high water tables in these soils range from 15 to 38 inches.
313	**Deerfield**	**A B C D E**	**B**	The Deerfield series consists of very deep, moderately well drained soils formed in glaciofluvial deposits. These soils are located throughout the property. The soil texture is loamy sand over sand. These soils are deep to bedrock.Saturated hydraulic conductivity is high or very high. Some inclusions of excessively well drained Windsor, and somewhat poorly drained Deerfield Variant, soils may be present, but are less than 10 percent of the mapped area. Estimated seasonal high water tables in these soils range from 15 to 38 inches.
400 (dbadb)	**Udorthents (sandy or gravelly) (moderately well drained)**	**B C D E**	**B**	Udorthents are disturbed soils that have been excavated and/or regraded, and are sandy or gravelly in texture. These soils are located mostly in the northeast portion of the property.There is also an area of this disturbed map unit in the central portion of the lot. These disturbed soils are mostly derived from the Windsor and/or Deerfield soil series. The soil textures ore loamy sand over stratified sand. These soils are moderately well drained, and are deep to bedrock. Saturated hydraulic conductivity is high or very high. Estimated seasonal high water tables in these soils range from 15 to 38 inches.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDROLOGIC SOIL GROUP	DESCRIPTION
400(spd) (ebadb)	**Udorthents (sandy or gravelly) (somewhat poorly drained)**	**A**	**C**	Udorthents are disturbed soils that have been excavated and/or regraded, and are sandy or gravelly in texture. These soils are located along the northwest property line, adjacent to Route 125. These soils appear to be the lower horizons of either the Windsor and/or Deerfield soil series. The soil texture is sand and fine sand.. These soils are somewhat poorly drained, and are deep to bedrock. Saturated hydraulic conductivity is high or very high. Estimated seasonal high water tables in these soils range from 10 to 15 inches.
546 P	**Walpole**	**A B C**	**C**	The Walpole Series consists of very deep, poorly drained sandy soils formed in outwash and stratified drift. These soils are located in the wetland areas, in the southern portion of the property.The soil texture is loamy sand over sandy loam over gravelly sand. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil, and high or very high in the substratum. Some inclusions of the very poorly drained Scarboro soil series, and the somewhat poorly drained component of the Sudbury soils may be present, but are less than 10 percent of the mapped area. Estimated seasonal high water tables in these soils range from 0 to 10 inches.
900 P	**Endoaquents (sandy or gravelly)**	**A B**	**C**	Endoaquents represents areas of disturbed soils where the soil material was excavated down to, or near, the water table, and are sandy or gravelly in texture.These soils are located in the northeast portion of the property, adjacent to Route 125. These disturbed soils are in an area that has been excavated. They appear to be the lower horizons of either the Windsor and/or Deerfield soil series. The soil texture is sand and fine sand.. These soils are poorly drained, and are deep to bedrock. Saturated hydraulic conductivity is high or very high. Estimated seasonal high water tables in these soils range from 0 to 10 inches.
913	**Sudbury (somewhat poorly drained)**	**A**	**C**	The Sudbury somewhat poorly drained series consists of very deep, soils on outwash plains.. These soils are located adjacent to the wetland area in the southwestern portion the property. The soil texture is sandy loam over gravelly coarse sand. These soils are deep to bedrock.

MAP UNIT #	SOIL TAXANOMIC NAME	SLOPES	HYDROLOGIC SOIL GROUP	DESCRIPTION
913	**Sudbury (somewhat poorly drained)**	**A**	**C**	Saturated hydraulic conductivity is moderately high or high in the upper solum and high or very high in the lower solum and substratum. Some inclusions of poorly drained Walpole, and the moderately well drained component of the Sudbury series may be present, but are less than 10 percent of the mapped area. Estimated seasonal high water tables in these soils range from 10 to 15 inches.

Slope Phases

Alpha Slope Symbol	Range
A	**0 – 3%**
B	**3 – 8%**
C	**8 – 15%**
D	**15 – 25%**
E	**25 – 50%**
F	**> 50%**

I trust that this Soil Survey and report meet your current planning needs. Please do not hesitate to contact me if you have any questions.

Sincerely:

John P. Hayes III CSS, CWS

Disturbed Soil Mapping Unit Supplement
for New Hampshire
DES AoT Site Specific Soil Maps

Introduction

The NRCS NH State-Wide Legend, as amended, contains a number of distinct map units used for identifying areas of soils altered or disturbed by human influence. However, in preparing the required Site Specific Soils Maps for compliance with NH Department of Environmental Services Alteration of Terrain (AoT) rules, additional information is often needed and desired. This supplement provides a means to supply the user a more detailed soil mapping unit description to meet this need.

Purpose

To provide soil scientists with additional soil mapping tools for disturbed sites and miscellaneous areas to enhance site specific soil maps and interpretations to reflect new requirements under the revised NH Alteration of Terrain regulations. This supplement is intended to allow the creation of soil maps with mapping units that can be expanded beyond those of the NRCS NH State-Wide Numerical Legend and the standards of the National Cooperative Soil Survey for disturbed units in order to provide specific information useful in preparation of site specific soils maps and reports to comply with NHDES Env-Wq 1500-Alteration of Terrain.

Note that the disturbed soil supplement has been created by SSSNNE and is not a product of the NRCS or the National Cooperative Soil Survey. Additionally, the supplemental legend can only be used in conjunction with the Site Specific Soil Mapping standards and cannot be used to create a stand-alone soils map.

For the purposes of this supplement, the definition of disturbed land, including excavate and fill, is as defined by RSA 485-A: 6, VIII; RSA 485-A: 17, and NHDES Env-Wq 1500.

Map Notation

Notation on the Site Specific Soil Map completed to comply with the NH AoT rules should include the following disclaimer:

Site-Specific Soil Map

1. This detailed Site-Specific Soil Map conforms to the standards of SSSNNE Publication No. 3, as amended, "Site-Specific Soil Mapping Standards for NH and VT".

2. This map has been prepared to comply with soil mapping requirements of RSA 485 A: 17and NHDES Env-Wq 1500, Alteration of Terrain.

3. See accompanying narrative report for methodology, map symbol legend, and interpretations.

Map Symbol Denominators for Disturbed Unit Supplements

The map symbols for Site-Specific Soil Mapping of disturbed soils in New Hampshire is a two part symbol with parts separated by a forward slash (/).

The first part consists of the USDA-NRCS Disturbed Map Unit symbol from the NH State-Wide Numerical Soil Legend. The map symbol is composed of 1 to 3 digits followed by a capital letter designating slope.

The second part consists of symbols of the SSSNNE NH Disturbed Soil Supplement to the Site Specific Soil Survey Standards, as detailed below. The disturbed map symbol is composed of 5 lower case letters.

Thus a Site Specific map symbol for a map prepared for an AoT application would be formatted as follows:

400A/aaaaa

These SSSNNE NH Disturbed Soil Supplemental symbols can only be used in conjunction with the USDA-NRCS Disturbed Map Unit symbols for the NH Statewide Numerical Soil Legend.

Supplemental Symbols

The five components of the Disturbed Soil Mapping Unit Supplement are as follows:

Symbol 1: Drainage Class
a-Excessively Drained
b-Somewhat Excessively Drained
c-Well Drained
d-Moderately Well Drained
e-Somewhat Poorly Drained
f-Poorly Drained
g-Very Poorly Drained
h-Not Determined

Symbol 2: Parent Material (of naturally formed soil only, if present)
a-No natural soil within 60"
b-Glaciofluvial Deposits (outwash/terraces of sand or sand and gravel)
c-Glacial Till Material (active ice)
d-Glaciolacustrine very fine sand and silt deposits (glacial lakes)
e-Loamy/sandy over Silt/Clay deposits
f-Marine Silt and Clay deposits (ocean waters)
g-Alluvial Deposits (floodplains)
h-Organic Materials-Fresh water Bogs, etc
i- Organic Materials-Tidal Marsh

Symbol 3: Restrictive/Impervious Layers
a-None
b-Bouldery surface with more than 15% of the surface covered with boulders
c-Mineral restrictive layer(s) are present in the soil profile less than 40 inches below the soil surface such as hard pan, platy structure or clayey texture with consistence of at least firm (i.e. more than 20 newtons). For other examples of soil characteristics that qualify for restrictive layers, see "Soil Manual for Site evaluations in NH" 2nd Ed., (page 3-17, figure 3-14)
d-Bedrock in the soil profile; 0-20 inches
e-Bedrock in the soil profile; 20-60 inches
f-Areas where depth to bedrock is so variable that a single soil type cannot be applied, will be mapped as a complex of soil types
g-Subject to Flooding
h–Man-made impervious surface including pavement, concrete, or built-up surfaces (i.e. buildings) with no morphological restrictive layer within control section

Symbol 4: Estimated Ksat* (most limiting layer excluding symbol 3h above).
a- High.
b-Moderate
c-Low
d-Not determined
*See "Guidelines for Ksat Class Placement" in Chapter 3 of the Soil Survey Manual, USDA

Symbol 5: Hydrologic Soil Group*
a-Group A
b-Group B
c-Group C
d-Group D
e-Not determined

*excluding man-made surface impervious/restrictive layers

Disturbed Map Units

This edition of the New Hampshire State-Wide Numerical Soil Legend contains eleven distinct map units used for identifying areas of soils altered or disturbed by human influence and the addition of one naturally formed map unit. These map units were designed for the Order 2 and Order 3 levels of mapping intensity, but can be used in Order 1 mapping if appropriate.

The definition of disturbed map units is intentionally brief and vague. Classification at the Great Group level allows for a wide range in soil properties and behavioral characteristics. The variability in soil properties typically requires on-site investigations before any interpretation can be developed. The map unit descriptions are intended to provide guidance in differentiating map units. The author of the soil map is expected to provide additional information to reflect the nature of the disturbed areas within the survey area.

I. Excavated land

300 Udipsamments

This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the entire particle-size class control section (25 - 100 cm or 10 - 40 inches). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class ranges from excessively drained to well drained. The Hydrologic Soil Group (HSG) is A. Typical sand pit.

350 Udipsamments, wet substratum

This map unit is characterized by soil textures of loamy fine sand to sand and gravel throughout the entire particle-size class control section (25 - 100 cm or 10 - 40 inches). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class ranges from moderately well drained to somewhat poorly drained.

400 Udorthents, sandy or gravelly

This map unit typically includes the following concepts: 1) very gravelly (> 35%) sand or very gravelly loamy sand; Or 2) sand or loamy sand textures that may have lenses of loamy very fine sand or finer somewhere in the particle-size class control section (25 - 100 cm or 10 - 40"). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class ranges from excessively drained to somewhat poorly drained. Typical gravel pit.

Disturbed Map Units (continued)

500 Udorthents, loamy

This map unit is characterized typically by soil textures that are sandy loam, loam, or silt loam within the particle size control section (25 – 100cm or 10 – 40"). Saturated hydraulic conductivity (K_{sat}) is low through high. Drainage class ranges from well drained to somewhat poorly drained. These areas typically represent excavated glacial till or perhaps areas where sand and gravel was excavated down to the loamy underlying material.

550 Udorthents, Bedrock substratum

This map unit is characterized by soil textures of sandy loam, loam, or silt loam within the particle-size class control section (25 - 100 cm or 10 - 40 inches). These areas typically represent excavated soil materials where the range in depth to bedrock is 10 - 60 inches (25 - 152 cm). Saturated hydraulic conductivity (K_{sat}) is low through high. Drainage class ranges from somewhat excessively drained to somewhat poorly drained.

600 Endoaquents, loamy

This map unit represents areas where soil material was excavated down to, or near the water table. Soil material is typically sandy loam, loam or silt loam within the particle-size class control section (25 - 100 cm or 10 - 40 inches). Saturated hydraulic conductivity (K_{sat}) is low through high. Drainage class is poorly or very poorly drained. The Hydrologic Soil Group (HSG) is D.

900 Endoaquents, sandy or gravelly

This map unit represents areas where soil material was excavated down to / near the water table. This map unit is characterized typically by soil textures of: 1) very gravelly (> 35% gravel) sand or very gravelly loamy sand or; 2) sand or loamy sand textures that may have lenses of loamy very fine sand or finer somewhere in the particle-size class control section (25 - 100 cm or 10 - 40"). Saturated hydraulic conductivity (K_{sat}) is high or very high. Drainage class is poorly or very poorly drained. The Hydrologic Soil Group (HSG) is D. Typical gravel pit dug down to or close to the water table.

Disturbed Map Units (continued)

II. Filled land

100 Udorthents, wet substratum

This map unit represents areas that have been filled and leveled over what were originally hydric soils.

199 Dumps, bark chips, and organic material

This map unit consists of man-made deposits of bark, wood chips, sawdust, paper mill sludge, cinders, waste paper, ashes, and other similar refuse from the operation of paper mills and sawmills.

200 Udorthents, refuse substratum

This map unit represents alternating layers of soil and refuse such as in sanitary landfills. Closed landfills typically have 2 feet of loamy material capping the area.

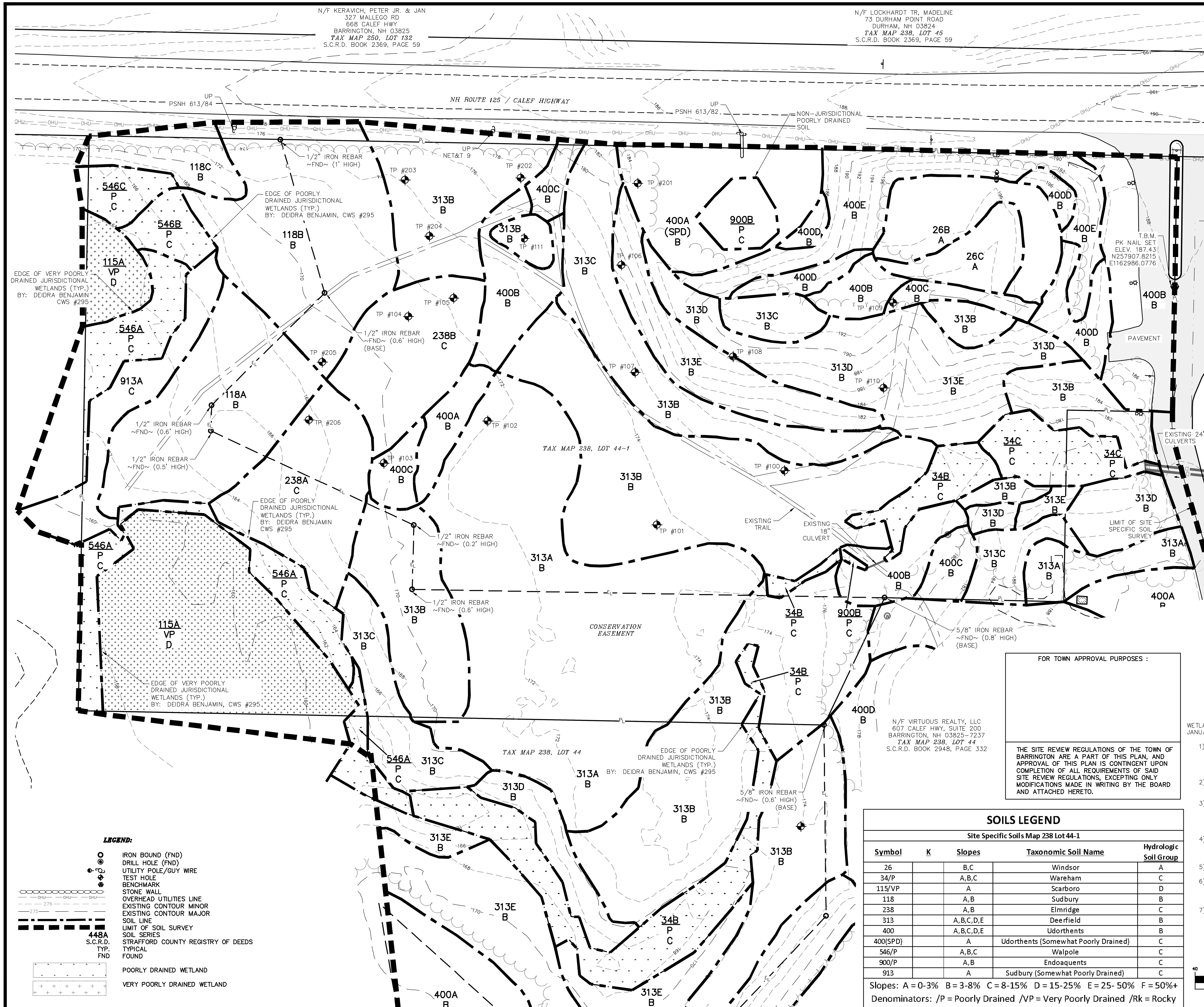
299 Udorthents, smoothed

This map unit represents areas that have been cut and filled to create a large level or nearly level area. Soil material making up the map units typically came from the immediate area. School athletic fields are an example (unless they were created on hydric soils – see Map Unit 100).

III. Bottom Land

7 Fluvaquents

This map unit represents areas of various kinds of soil materials on the bottom lands of streams and rivers. The soil material ranges in texture from silt loam to sand and gravel within the particle-size class control section (25 - 100 cm or 10 - 40 inches). Drainage class is poorly or very poorly drained. The Hydrologic Soil Group (HSG) is D.



FOR TOWN APPROVAL PURPOSES :

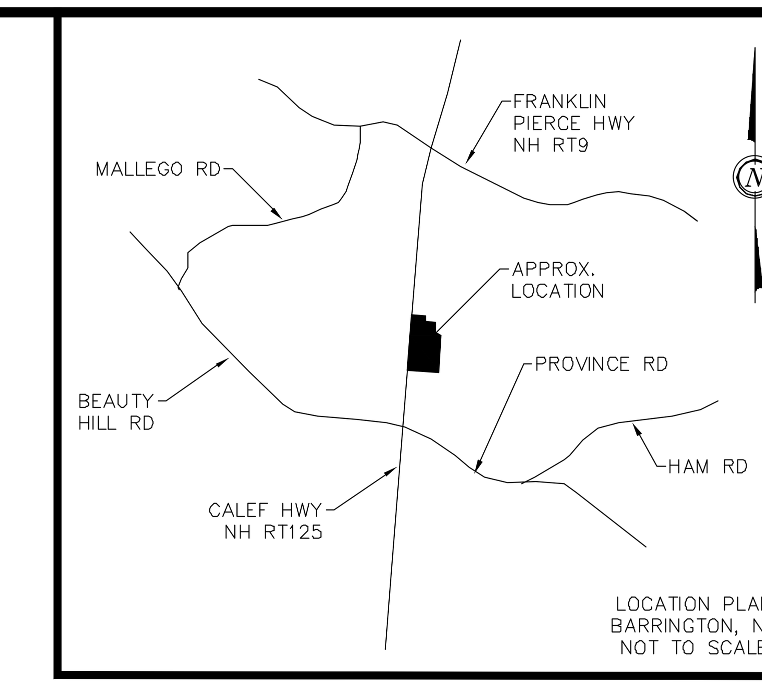
THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

SOILS LEGEND

Site Specific Soils Map 238 Lot 44-1

Symbol	K	Slopes	Taxonomic Soil Name	Hydrologic Soil Group
26		B,C	Windsor	A
34/P		A,B,C	Wareham	C
115/VP		A	Scarboro	D
118		A,B	Sudbury	B
238		A,B	Elmridge	C
313		A,B,C,D,E	Deerfield	B
400		A,B,C,D,E	Udorthents	B
400(SPD)		A	Udorthents (Somewhat Poorly Drained)	C
546/P		A,B,C	Walpole	C
900/P		A,B	Endoaquents	C
913		A	Sudbury (Somewhat Poorly Drained)	C

Slopes: A = 0-3% B = 3-8% C = 8-15% D = 15-25% E = 25- 50% F = 50%+
Denominators: /P = Poorly Drained /VP = Very Poorly Drained /Rk = Rocky



NOTES:

1.) OWNER: NHBBC, LLC
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

1A.) APPLICANT: TURBOCAM, INC.
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

2.) TAX MAP 238, LOT 44-1

3.) LOT AREA: 346,738 Sq.Ft., 7.96 Ac.

4.) S.C.R.D. BOOK 3689, PAGE 754

5.) I HEREBY CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE & BELIEF, THIS PARCEL DOES NOT FALL WITHIN THE FLOOD PLAIN FLOOD HAZARD REF.: FEMA COMMUNITY# -330178, MAP# - 33017C0305E, DATED: SEPT. 30, 2015.

6.) VERTICAL DATUM BASED ON NAVD88 ELEVATIONS. HORIZONTAL COORDINATES BASED ON NAD83. COORDINATES GATHERED USING CARLSON BRX7 SURVEY GRADE GPS RECEIVERS.

7.) THE BOUNDARY LINES SHOWN ON THIS PLAN ARE THE RESULT OF A CLOSED TRAVERSE PERFORMED BY THIS OFFICE IN APRIL OF 2023, WITH AN ERROR OF CLOSURE OF BETTER THAN 1 PART IN 10,000.

8.) THE INTENT OF THIS PLAN IS TO SHOW THE SITE SPECIFIC SOIL SURVEY OF TAX MAP 238, LOT 44-1 AS OF THE DATE OF THE SURVEY (APRIL 2023 & JANUARY 2024).

JOHN P. HAYES, III CSS #87 DEIDRA BENJAMIN, CWS #295

WETLANDS WERE DELINEATED BY DEIDRA BENJAMIN, CWS, IN APRIL OF 2023 AND JANUARY OF 2024 UTILIZING THE FOLLOWING STANDARDS:

1) FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, VERSION 7.0. 2010. L.M. VASILAS, G.W. HURT, AND C.V. NOBLE (EDS.). UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE, IN COOPERATION WITH THE NATIONAL TECHNICAL COMMITTEE FOR HYDRIC SOILS.
2) FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. VERSION 3. APRIL 2004. NEIWPCC WETLANDS WORKGROUP. WILMINGTON, MA 01887.
3) NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.1.0 (HTTP://WETLAND_PLANTS.USACE.ARMY.MIL). U.S. ARMY CORPS OF ENGINEERS, ENGINEER RESEARCH AND DEVELOPMENT CENTER, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, HANOVER, NH, AND BONAP, CHAPEN HILL.
4) STATE OF NEW HAMPSHIRE 2014 WETLAND PLANT LIST. LICHVAR, R.W., M. BUTTERWICH, N.C. MELVIN, AND W.N. KIRCHNER. 2014. THE NATIONAL WETLAND PLANT LIST: 2014 UPDATE OF WETLAND RATINGS. PHYTONEURON 2014-41:1-42.
5) CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL. JANUARY 1987. WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y-87-1.
6) REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION. JANUARY 2012, VERSION 2. U.S. ARMY CORPS OF ENGINEERS. ENVIRONMENTAL LABORATORY ERDC/EL TR-12-1.
7) CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES. DECEMBER 1979. L. COWARDIN, V. CARTER, F. GOLET, AND E. LAROE. US DEPARTMENT OF THE INTERIOR. FISH AND WILDLIFE SERVICE. FWS/OBS-79/31.

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

SITE SPECIFIC SOILS MAP
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 40 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 100

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
6-12	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
12-16	10YR 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
16-20	2.5Y 6/4 Light Yellowish Brown	Sand	Single Grain	Loose
20-68	2.5Y 6/2 Light Brownish Gray	Stratified Sand and Fine Sand with Redoximorphic features present	Granular	Friable

ESHWT: 20 in. **Restrictive Layer : None** **Observed H2O: 50 in.** **Refusal: None**

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 101

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
6-12	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
12-18	2.5Y 6/4 Light Yellowish Brown	Loamy Sand with Redoximorphic features present	Granular	Friable
18-30	2.5Y 4/ Light Yellowish Brown	Sand with Redoximorphic features present	Single Grain	Loose
30-48	2.5YR 4/4 Reddish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose
48-70	2.5Y 6/3 Light Yellowish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 42 in. Restrictive Layer : None Observed H2O: 50 in. Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 102

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
6-16	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
16-24	2.5Y 6/4 Light Yellowish Brown	Sand	Single Grain	Loose
24-70	2.5Y 6/2 Light Brownish Gray	Stratified Sand and Fine Sand with Redoximorphic features present	Granular	Friable

ESHWT: 24 in. Restrictive Layer : None Observed H2O: 50 in. Refusal: None

Test Pit 103

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-4	10YR 2/2 Very Dark Brown	Loamy Sand	Granular	Friable
4-16	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
16-20	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
20-36	2.5Y 6/3 Light Yellowish Brown	Sand with Redoximorphic features present	Single Grain	Loose
36-50	2.5YR 4/4 Reddish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose
50-56	2.5Y 6/3 Light Yellowish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 20 in. Restrictive Layer : None Observed H2O: 48 in. Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 104

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-5	10YR 3/2 Dark Grayish Brown	Fine Sandy Loam	Granular	Friable
5-14	10YR 5/4 Yellowish Brown	Fine Sandy Loam	Granular	Friable
14-20	2.5Y 4/4 Olive Brown	Fine Sandy Loam	Granular	Friable
20-28	2.5Y 5/2 Grayish Brown	Fine Sandy Loam with Redoximorphic features present	Massive	Friable
28-50	5Y 4/3 Olive	Silty Clay Loam with Redoximorphic features present	Massive	Firtm
50-72	5GY 5/1	Silty Clay with Redoximorphic features present	Massive	Firtm

ESHWT: 20 in. Restrictive Layer : None Observed H2O: 24 in. Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 105

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Fine Sandy Loam	Granular	Friable
6-14	10YR 5/4 Yellowish Brown	Fine Sandy Loam	Granular	Friable
14-20	2.5Y 4/4 Olive Brown	Fine Sandy Loam	Granular	Friable
20-32	2.5Y 5/2 Grayish Brown	Fine Sandy Loam with Redoximorphic features present	Massive	Friable
32-50	5Y 4/3 Olive	Silty Clay Loam with Redoximorphic features present	Massive	Firtm
50-80	5GY 5/1	Silty Clay with Redoximorphic features present	Massive	Firtm

ESHWT: 20 in. **Restrictive Layer : None** **Observed H2O: 28 in.** **Refusal: None**

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 106

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-8	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
8-18	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
18-32	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
32-70	2.5Y 6/3 Light Yellowish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 32 in. Restrictive Layer : None Observed H2O: None Refusal: None

Test Pit 107

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-8	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
8-18	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
18-30	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
30-68	2.5Y 6/2 Light Brownish Gray	Stratified Sand and Fine Sand with Redoximorphic features present	Granular	Friable

ESHWT: 30 in. Restrictive Layer : None Observed H2O: None Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 108

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
8-16	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
16-28	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
28-72	2.5Y 6/2 Light Brownish Gray	Stratified Sand and Fine Sand with Redoximorphic features present	Granular	Friable

ESHWT: 28 in. Restrictive Layer : None Observed H2O: None Refusal: None

Test Pit 109

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-4	10YR 3/3 Dark Brown	Loamy Sand	Granular	Friable
4-22	10YR 4/6 Yellowish Brown	Gravelly Sand	Single Grain	Loose
22-28	10 YR 2/2 Very Dark Brown	Loamy Sand	Granular	Friable
28-38	10 YR 5/4 Yellowish Brown	Gravelly Sand	Single Grain	Loose
38-64	2.5Y 6/3 Light Yellowish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 38 in. Restrictive Layer : None Observed H2O: None Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 4/25/23
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 110

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
8-14	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
14-28	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
28-70	2.5Y 6/2 Light Brownish Gray	Stratified Sand and Fine Sand with Redoximorphic features present	Granular	Friable

ESHWT: 28 in. Restrictive Layer : None Observed H2O: None Refusal: None

Test Pit 111

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-10	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
10-22	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
22-30	2.5Y 5/4 Yellowish Brown	Gravelly Sand	Single Grain	Loose
30-74	2.5Y 6/3 Light Yellowish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 30 in. Restrictive Layer : None Observed H2O: 50 in. Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 1/22/24
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 201

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
8-14	7.5YR 5/6 Strong Brown	Loamy Sand	Granular	Friable
14-26	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
26-36	10YR 6/4 Light Yellowish Brown	Sand	Single Grain	Loose
36-65	2.5Y 6/3 Light Yellowish Brown	Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 36 in. Restrictive Layer : None Observed H2O: None Refusal: None

Test Pit 202

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-16	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
16-28	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
28-36	10YR 6/4 Light Yellowish Brown	Sand	Single Grain	Loose
36-64	2.5Y 6/3 Light Yellowish Brown	Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 36 in. Restrictive Layer : None Observed H2O: 50 in. Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 1/22/24
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 203

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-8	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
8-16	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
16-24	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
24-65	2.5Y 6/3 Light Yellowish Brown	Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 24 in. Restrictive Layer : None Observed H2O: 56 in. Refusal: None

Test Pit 204

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-8	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
8-18	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
18-30	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
30-68	2.5Y 6/3 Light Yellowish Brown	Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 24 in. Restrictive Layer : None Observed H2O: 54 in. Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 1/22/24
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 205

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-6	10YR 3/2 Dark Grayish Brown	Fine Sandy Loam	Granular	Friable
6-14	10YR 5/4 Yellowish Brown	Fine Sandy Loam	Granular	Friable
14-22	2.5Y 4/4 Olive Brown	Fine Sandy Loam	Granular	Friable
22-36	2.5Y 5/3 Light Olive Brown	Fine Sandy Loam with Redoximorphic features present	Granular	Friable
36-55	2.5Y 5/2 Grayish Brown	Very Fine Sand and Silt with Redoximorphic features present	Massive	Firm
55-65	5Y 4/3 Olive	Silty Clay Loam with Redoximorphic features present	Massive	Firm

ESHWT: 22 in. Restrictive Layer : None Observed H2O: 36 in. Refusal: None

John P. Hayes III CSS, CWS
7 Limestone Way
North Hampton, NH 03862
Phone:603-205-4396
johnphayes@comcast.net

Job# 23-006

Test Pit Logs 1/22/24
Map 238 Lot 44-1
607 Calef Highway Barrington NH

Test Pit 206

Depth (inches)	Color	Textural Classification	Soil Structure	Soil Consistance
0-4	10YR 3/2 Dark Grayish Brown	Loamy Sand	Granular	Friable
4-14	10YR 5/6 Yellowish Brown	Loamy Sand	Granular	Friable
14-20	2.5Y 6/4 Light Yellowish Brown	Loamy Sand	Granular	Friable
20-28	2.5Y 6/3 Light Yellowish Brown	Sand with Redoximorphic features present	Single Grain	Loose
28-62	2.5YR 4/4 Reddish Brown	Gravelly Sand with Redoximorphic features present	Single Grain	Loose

ESHWT: 20 in.   Restrictive Layer : None   Observed H2O: 32 in.   Refusal: None

BERRY SURVEYING & ENGINEERING
335 Second Crown Point Road
Barrington, NH 03825
Phone: (603) 332-2863
Fax: (603) 335-4623
www.BerrySurveying.Com

Stormwater System Management:

Inspection and Maintenance Manual

Calef Highway
Barrington, NH
Tax Map 238, Lot 44-1

Prepared for

TURBOCAM, INC.
607 Calef Highway
Barrington, NH 03825

Land of

NHBBC, LLC
Calef Highway
Barrington, NH 03825

Prepared By

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825
603-332-2863

File Number
DB2023-017

STATE OF NEW HAMPSHIRE – PROFESSIONAL ENGINEER – KENNETH A. BERRY No. 14243 LICENSED

February 5, 2024
Revised: April 4, 2024

Table of Contents

Introduction

The Best Management Practices (BMP) described in this manual are specified in more detail within the plan set giving design details and specifications. The New Hampshire Stormwater Manual, Volume 2, Post-Construction Best Management Practices Selection & Design (December 2008, NHDES & US EPA) is included by reference to this manual. Additional details, construction specifications, and example drawings are provided within this reference. (http://des.nh.gov/organization/divisions/water/stormwater/)

The BMP's are covered below in the general order in which the storm water flows. Each BMP has a description and maintenance consideration listed. A Check List table is provided after the narrative to summarize the maintenance responsibilities and schedule. A Log Form is also provided for the owners use.

For details regarding the design of the Storm Water System see also Drainage Analysis & Sediment and Erosion Control Plan also published by Berry Surveying & Engineering originally dated February 5, 2024, as revised. See also plan set completed for TURBOCAM, INC. originally dated February 5, 2024, as revised.

Andrew Knapp, Director of EHS, Facilities & Maintenance, or his successor, is responsible for the Stormwater System Operation and Maintenance. A significant step in this responsibility is the Inspection and Maintenance of each component of the system. Ongoing, semi-annual, and annual inspection and maintenance requirement are documented below and must be taken seriously. Failure of any component of the system can result in surface water run-off ponding and/or freezing in the roadway and parking lots, leaving the developed site untreated, and/or causing violations to issued permits. The owner must maintain, and have available, plans of the Stormwater System in order to properly inspect and maintain the system. (Reduced copies attached.) The Director of EHS, Facilities & Maintenance, Andrew Knapp, or his successor / operator, is responsible to ensure that any subsequent owner or subcontractor has copies of the Log Form and Annual Report records and fully understands the responsibilities of this plan. The grantor owner will ensure this document is provided to the grantee owner by duplicating the Ownership Responsibility Sheet which is found toward the back of this document, which will be maintained with the Inspection & Maintenance Logs, provided to the Town of Barrington, Planning Department, with the Annual Report.

The operator of Tax Map 238, Lot 44-1, TURBOCAM, INC., and owner of the property, NHBBC, LLC, are proposing the development of a Light Manufacturing facility consisting of 65,109 square feet which includes office and loading dock area. There are 67 parking spaces located on the parcel. Surface water runoff is being managed and treated by a two Bioretention W/ ISRs, an Infiltration Basin and StormTech Chamber Infiltration Basin.

The following drainage features will all require periodic inspections and maintenance based on this manual:

Catch Basins 1-10 (Ponds #C01-#C08, #C10)

Drain Manholes #1 through #6 (Ponds #D01-#D06)

Conveyance Swales and Roadside Ditches

Bioretention W/ ISR #101 – P-101 w/ Outlet Structures and matted Spillway

Infiltration Basin #103 – P-103 w/ outlet structures, & matted spillway.

StormTech SC-740 Chambers w/ Infiltration #104 – P-104 with outlet structure & Isolator Row

Bioretention W/ ISR #102 – P-102 with outlet structures and matted spillway.

Outlet Protection and Level Spreaders

Roadway and Wall Underdrains

Generator Containment System Manual Drain W/ Gate Valve

Catch Basins (Without Sumps) & Drain Manholes

Description: Catch Basins are used throughout the site to capture and, along with culvert pipes and manhole, route surface water runoff to stormwater treatment and detention infrastructure. During construction the catch basins will be protected by inlet protection per the approved construction plans. The practice of street sweeping on a bi-annual basis will help reduce maintenance of these catch basins and culvert pipes.

Note: Deep sump catch basins are not allowed to be used on this proposed development due to wildlife concerns and any manufacturer sump resulting in a catch basin must be filled with washed crushed stone. Sediment should be trapped in the sediment forebays but is also a concern in earlier structures. See construction details for specifications of these conveyance practices.

Maintenance Considerations: Sediment must be removed from Catch Basins and Manholes on a regular basis, at least twice a year and more often if post-winter maintenance and street sweeping is not conducted. Inspections should be conducted periodically. At a minimum they should be cleaned after snow-melt and after leaf-drop. Disposal of all material, sediment, and debris must be done in accordance with state and federal regulations. Culvert pipes will be inspected to ensure that surface water runoff is capable of leaving the structures. Drain manholes will be inspected to make sure there is not sediment build-up or blockages.

Note The generator containment system contains a manual drain w/ gate valve. Close attention must be paid to this drain to ensure ponding doesn't occur within the generator containment system.

Conveyance Swale

Description: Conveyance swales are stabilized channels designed to convey runoff at non-erosive velocities. They may be stabilized using vegetation, riprap, or a combination, or with an alternative lining designed to accommodate design flows while protecting the integrity of the sides and bottom of the channel. Conveyance channels may provide incidental water quality benefits, but are not specifically designed to provide treatment. Conveyance swales are not considered a Treatment or Pretreatment Practice under the AoT regulations, unless they are also designed to meet the requirements of an acceptable Treatment/Pretreatment Practice as described elsewhere in this Chapter. See SWM Volume 2, 4-6.3 Conveyance Practices, Conveyance Swale, page 166.

Maintenance Considerations: Grassed channels should be inspected periodically (at least annually) for sediment accumulation, erosion, and condition of surface lining (vegetation or riprap). Repairs, including stone or vegetation replacement, should be made based on this inspection. Remove sediment and debris annually, or more frequently as warranted by inspection. Mow vegetated channels based on frequency specified by design. Mowing at least once per year is required to control establishment of woody vegetation. It is recommended to cut grass no shorter than 4 inches.

Sediment Forebay

Description: A sediment forebay is an impoundment, basin, or other storage structure designed to dissipate the energy of incoming runoff and allow for initial settling of coarse sediments. Forebays are used for pretreatment of runoff prior to discharge into the primary water quality treatment BMP. In some cases, forebays may be constructed as separate structures but often, they are integrated into the design of larger stormwater management structures. See SWM Volume 2, 4-4.1 Pre-treatment Practices, Sediment Forebay, page 140.

Maintenance Considerations: Forebays help reduce the sediment load to downstream BMPs, and will therefore require more frequent cleaning. Inspect at least annually; Conduct periodic mowing of embankments (generally two times per year) to control growth of woody vegetation on embankments; Remove debris from outlet structures at least once annually; Remove and dispose of accumulated sediment based on inspection; Install and maintain a staff gage or other measuring device, to indicate depth of sediment accumulation and level at which clean-out is required. Preserving the drainage between the Sediment Forebay and the stormwater BMP by inspecting and maintaining the connecting drainage pipes and perforations should be completed semi annually or as required to ensure the forebay is dry.

In-Ground Infiltration Basin (Basin #103 & StormTech SC-740 P-104)

Description: Infiltration basins are impoundments designed to temporarily store runoff, allowing all or a portion of the water to infiltrate into the ground. An infiltration basin is designed to completely drain between storm events. An infiltration basin is specifically designed to retain and infiltrate the entire Water Quality Volume. Some infiltration basins may infiltrate additional volumes during larger storm events, but many will be designed to release stormwater exceeding the water quality volume from the larger storms. In a properly sited and designed infiltration basin, water quality treatment is provided by runoff pollutants binding to soil particles beneath the basin as water percolates into the subsurface. Biological and chemical processes occurring in the soil also contribute to the breakdown of pollutants. Infiltrated water is used by plants to support growth or it is recharged to the underlying groundwater. As with all impoundment BMPs, surface infiltration basins should be designed with an outlet structure to pass peak flows during a range of storm events, as well as with an emergency spillway to pass peak flows around the embankment during extreme storm events that exceed the combined infiltration capacity and outlet structure capacity of the facility. See SWM Volume 2, 4-3.3b, Treatment Practices, In-Ground Infiltration Basin, page 88.

Maintenance Considerations: Removal of debris from inlet and outlet structures. Removal of accumulated sediment. Inspection and repair of outlet structures and appurtenances. Inspection of infiltration components at least twice annually, and following any rainfall event exceeding 2.5 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection. Inspection of pretreatment measures at least twice annually, and removal of accumulated sediment as warranted by inspection, but no less than once annually. If an infiltration system does not drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore infiltration function, including but not limited to removal of accumulated sediments or reconstruction of the infiltration trench.

Proposed side slopes of 2:1 will be maintained with a weedwhacker, with vegetation being removed from the BMP with each maintenance application.

StormTech Chamber: P-104 Infiltration

Description: The StormTech Chamber System and Isolator Row are trademark products of the Advance Drainage System (ADS) company. The purchase and installation of this system will conform to ADS proprietary rights. The design engineer has specifically used the Isolator Row and StormTech Chamber specifications in the design of this installation. The design is based on the StormTech SC-740 Chambers with an Isolator Row for sediment isolation. The system is designed as an infiltration practice. The volume in the washed crushed stone and in the specified chambers will act as detention in connection with the Outlet Structure discharge stack. Runoff that enters this system does so at the isolator row. P-104 contains 112 chambers in seven rows of sixteen chambers. The top of the outlet structure stack is designed to pass larger storm events. Multiple inspection ports are located throughout the system.

Inspection: Semi-annual and severe rain storm event inspections will be conducted by a trained individual with the capability to observe the condition of the pre-treatment measures and the condition of the Isolator Row especially regarding the depth and extent of sediment buildup. The Isolator Row should initially be inspected semi-annually however this schedule may need to be adjusted based on findings, condition of the pre-treatment measures, and use of the parking facilities. See list of known qualified inspection / maintenance professionals below. The inlet structure and outlet structure must also be inspected. The inspection process requires the removal of Drain Manhole covers.

Maintenance Considerations: Sediment collected in the Isolator Row will be removed with the JetVac process, consisting of high-pressure water scouring and suction retrieval of the captured sediment and pollutants. The orifice cover plate installed to ensure that runoff is routed to the Isolator Row must be in place and if not re-installed to the original specifications. The stack in the outlet structure must be maintained to ensure that there is no buildup that prevents the proper operation of the outlet.

See Infiltration above regarding the annual inspection of infiltration capabilities for P-104. The stormwater practice should be dry within 72 hours of the end of a storm event.

A copy of the ADS StormTech SC-740 Chamber manual and ADS StormTech Isolator Row O&M Manual are attached.

After the system construction and before operation of the site, it is recommended that a long-term agreement for Inspection and Maintenance be established.

As for Isolator Row inspection and maintenance, Catch Basin maintenance, the regional ADS, Inc. representatives recommend using any of the following contacts:

Stormwater Compliance, LLC;
Attn: Nathan Marles, 1-877-271-9055; nmarles@lidtech.com
163 Thadeus Street, Portland, ME 04106
Info@stormwatercomp.com

Ted Berry Company;
Attn: Dave Beauchamp, 207-897-3348; david.beauchamp@tedberrycompany.com
521 Federal Road, Livermore, ME 04253
Info@tedberrycompany.com

Bellemore Septic Sewer & Drain
Attn: Ray Bellemore, 603-641-6640
raymond@bellemore.com
PO Box 10369
Bedford, NH 03110

ADS / StormTech Contact: Aaron Cheever, PE, Advance Drainage Systems, Inc.
aaron.cheever@ads-pipe.com 1-978-302-0650

Bioretention W/ Internal Storage Reservoir (ISR)

Description: A practice that provides temporary storage of runoff for filtering through an engineered soil media, augmented for enhanced phosphorus removal, followed by detention and denitrification in a subsurface internal storage reservoir (ISR) comprised of gravel. Runoff flows are routed through filter media and directed to the underlying ISR via an impermeable membrane for temporary storage. An elevated outlet control at the top of the ISR is designed to provide a retention time of at least 24 hours in the system to allow for sufficient time for denitrification and nitrogen reduction to occur prior to discharge. The design storage capacity for using the cumulative performance curves is comprised of void spaces in the filter media, temporary ponding at the surface of the practice and the void spaces in the gravel ISR. The volume of the ISR will exceed 26% of the Water Quality Volume (WQV). Reference: 2017 NH Small MS4 General Permit, Appendix F Attachment 3, and UNH Stormwater Center, "UNH Stormwater Center Hybrid Bioretention Template" (2020). *UNH Stormwater Center*. 73. https://scholars.unh.edu/stormwater/73

Maintenance Considerations: The outlet to the Internal Storage Reservoir consists of a 1.25” or 1.5” orifice in a threaded end-cap after the goose-neck pipe within the concrete outlet structure. The inlet manifold and threaded pipe outlet manifold system is designed so that the ISR, or anaerobic reservoir can be completely drained and the sump of the outlet structure pumped dry. The orifice requires periodic inspection, initially on a semi-annual basis. This time increment may need to be adjusted based on the experience on the maintenance of the device. The draining of the ISR would only be accomplished if issues developed.

The enhanced bio-media will require additional material rototilled into the top 10-inches to foot of the rain garden after a period of approximately 20 years. The timing of this maintenance period is a factor of the methodology applied during construction and will need to be evaluated as the rain gardens age.

Rain Gardens should be inspected at least twice annually and following any rainfall event exceeding 2.5 inches in a twenty-four hour period. Maintenance rehabilitation will be conducted as warranted by each inspection. Trash and debris will be removed at each inspection.

On an annual basis the infiltration capabilities need to be confirmed by evaluation the drawdown time. If the bioretention system does not drain within 72-hours following a rainfall event, a qualified professional will assess the condition of the rain garden to determine measures required to restore the infiltration function. This is normally the direct result of sediment accumulation which will be removed to restore the filter media ratio.

Proposed side slopes of 2:1 will be maintained with a weedwhacker, with vegetation being removed from the BMP with each maintenance application.

Stone Berm Level Spreader

Description: A stone berm level spreader is an outlet structure constructed at zero percent grade across a slope used to convert concentrated flow to "sheet flow." It disperses or "spreads" flow thinly over a receiving area, usually consisting of undisturbed, vegetated ground. The conversion of concentrated flow to shallow, sheet flow allows runoff to be discharged at non-erosive velocities onto natural ground. To stabilize the spreader outlet, a stone berm is provided to dissipate flow energy, and help disperse flows along the length of the spreader. Level spreaders are not designed to remove pollutants from stormwater; however, some suspended sediment and associated phosphorous, nitrogen, metals and hydrocarbons will settle out of the runoff through settlement, filtration, infiltration, absorption, decomposition and volatilization. See SWM Volume 2, 4-6.6 Conveyance Practices, Stone Berm Level Spreader, page 162.

Maintenance Considerations: Inspect at least once annually for accumulation of sediment and debris and for signs of erosion within approach channel, spreader channel or down-slope of the spreader. Remove debris whenever observed during inspection. Remove sediment when accumulation exceeds 25% of spreader channel depth. Mow as required by landscaping design. At a minimum, mow annually to control woody vegetation within the spreader. Snow should not be stored within or down-slope of the level spreader or its approach channel. Repair any erosion and re-grade or replace stone berm material, as warranted by inspection. Reconstruct the spreader if down-slope channelization indicates that the spreader is not level or that discharge has become concentrated, and corrections cannot be made through minor re-grading.

Stabilization for Long Term Cover

Vegetated Stabilization – Original Planting

All areas that are disturbed during construction will be stabilized with vegetated material within 30 days of breaking ground. Construction will be managed in such a manner that erosion is prevented and that no abutter's property will be subjected to any siltation, unless otherwise permitted. All areas to be planted with grass for long-term cover will follow the specification and on Sheet E-102 using seeding mixture C, as follows:

Mixture	Pounds per Acre	Pounds per 1,000 Sq. Ft.
Tall Fescue	24	0.55
Creeping Red Fescue	24	0.55
Total	48	1.10

Conservation Mix

Virginia Wild Rye	Native	FACW-
Little Bluestem	Native	FACU
Big Bluestem	Native	FAC
Red Fescue	Native	FACU
Switch Grass	Native	FAC
Partridge Pea	Native	FACU
Showy Tick Trefoil	Native	FAC
Butterfly Milkweed	Native	NI
Beggar Ticks	Native	FACW
Purple Joe Pye Weed	Native	FAC
Black Eyed Susan	Native	FACU-
Total	**25**	**0.57**

Conservation Mix to be provided by New England Wetland Plants, Inc., Amherst, MA as outline in their New England Conservation / Wildlife Mix or approved equal. Mix to be applied at a rate of 25 lbs. per acre or one-lb. per 1750 square feet. Ratio of seed is proprietary and substitutions are not allowed.

Conservation Mix will used to stabilize all 2:1 slopes and all land area disturbed within the wetland buffer.

Stormwater BMP Mix:
The grass that is planted within a stormwater BMP will be a mix designed for both inundation and dry conditions such as Ernst Seeds, Retention Basin Floor Mix ERNMX-126.

Maintenance Considerations: Permanent seeded areas for long-term cover will be inspected on a periodic basis looking for signs of growth loss or erosion. Any areas found to be damaged will be repaired and replanted to reestablish the growth. The grass should be mowed at least twice per year and any dead material removed. Any woody growth that becomes established will need to be cut and removed.

Long-term maintenance of the land cover is critical and must be maintained at least 85% grass / vegetation coverage, must be inspected for concentrated flow, rills, and channels; and must be repaired as necessary to prevent erosion.

Control of Invasive Plants

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

Snow Removal & Winter Maintenance

Description: Drainage and stormwater systems need to be maintained during the winter months so that surface water runoff from a rain storm does not become a impounding and icing problem. Catch basins must remain viable and where sheet flow is a design factor, the edge of pavement and should need to be maintained so that runoff can leave the pavement area. Sand and salt should be used at the rate that prevents sedimentation problems or excess salt deposited but yet enough to allow for protection for pedestrians and vehicles.

Maintenance Considerations: Catch basins are required to be kept viable by removing snow that is block surface water runoff from entering the structure. The edge of pavement where surface water sheet flow is designed to leave the paved area, the edge of pavement and shoulder need to be plowed to allow runoff to leave the pavement. Snow is to piled in designated areas and removed from the site when the on-site storage locations have been exceeded. At the end of the winter season, sediment is to be swept from the paved surfaces and removed from the drainage system. (Sumps if provided, sediment forebays, swale lines.) (See catch basin and drainage pipe maintenance.) NHDES offers training (Green SnowPro Certification) for contractors and owners. https://www.des.nh.gov/land/roads/road-salt-reduction/green-snowpro-certification Please find attached NHDES Green SnoPro Utilization Chart which is required to be used.

Annual Report

Description: The owner is responsible to keep an **I & M Activity Log** that documents inspection, maintenance and repairs to the storm water management system, and a **Deicing Log** to track the amount and type of deicing material applied to the site. The original owner is responsible to ensure that any subsequent owner (s) have copies of the Stormwater System Operation: Inspection & Maintenance Manual, copies of past logs and check lists. This includes any owner association for potential condominium conversion of the property. The Annual Report will be prepared and submitted to the Town of Barrington, Planning Department with copies of both logs and check lists no later than December 15th of each year and made available to NHDES upon request. Upon an ownership change, the Annual Report will include the Transfer of Ownership Responsibility Forms duplicated from the form found below.

The plans that accompany this manual include a plan sheet, "Inspection & Maintenance Plan" and copies of the Stormwater Treatment Design Sheets. The owner will also maintain a complete set of the approved original design plans.

Respectfully
BERRY SURVEYING & ENGINEERING

Kenneth A. Berry, PE, LLS
CPSWQ, CPESC, CESSWI
Principal, VP – Technical Operations

Christopher R. Berry, SIT
Principal - President
Design Engineer

Kevin R. Poulin, PE
Design Engineer

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Inspection & Maintenance Manual Checklist

Calef Highway, Barrington, NH, Tax Map 238, Lot 44-1
TURBOCAM, INC.
607 Calef Highway Suite 200
Barrington, NH 03825

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Pavement Sweeping	Three Times Per Year	Clean Pavement	Pavement areas will be swept and sedimentation removed so the surface is clean
		Litter/Trash Removal	Routinely	Inspect dumpsters, outdoor waste receptacles area, and yard areas.	Parcel will be free of litter/trash.
		Deicing Agents	N/A	N/A	Use salt as the primary agent for roadway safety during winter.
		Invasive Species	Two times per year.	Inspect for Invasive Species	Remove and dispose invasive species.
		Closed Drainage System:			
		Drainage Pipes	1 time per 2 years	Check for sediment accumulation & clogging.	Less than 2" sediment depth
		Catch Basins & Drain Manholes	2 times per year	Check for sediment accumulation & clogging.	Any accumulated Sediment or debris.

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Bioretention W/ ISRs, & Infiltration Ponds	2 times per year	Check for sediment and debris accumulation buildup.	Remove sediment & debris when required. Remove Invasive Species
		Bioretention W/ ISR and system clean-outs.	Annually	72-Hour drawdown time evaluation and vegetation evaluation. Underdrain flushing.	Remove dead & diseased vegetation along with all debris, take corrective measures of filtration media if required. Flush underdrain clean-outs with a hose. Weed whacker required for 2:1 slopes. All weed whacked vegetation to be removed
		Stormtech Chamber Pond	Annually	Evaluate the volume of sediment in the isolator row.	When required, vacuum the isolator row and remove the accumulated sediment.
		Infiltration Ponds	Annually after a storm event of greater than 2.5-inches	Evaluate the drawdown of the StormTech System and Infiltration Basin systems to ensure that through infiltration the system is completely drained in 72 hours.	When required, vacuum the isolator row and remove the accumulated sediment. Ensure sediment is not entering the Infiltration Basin.

☑	Date	BMP / System	Minimum Inspection Frequency	Minimum Inspection Requirements	Maintenance / Cleanout Threshold
		Riprap Outlet Protection	Annually	Check for sediment buildup and structure damage.	Remove excess sediment and repair damage.
		Winter Maintenance	Ongoing	Remove snow as directed.	Ongoing
		Post Winter Maintenance	Annually	Remove excess sand, gross solids, and repair vegetation and plantings	Parcel will be free of excess sand, litter/trash.
		Annual Report	1 time per year	Submit Annual Report to Barrington Planning Dept. and kept on file by the owner.	Report to be submitted on or before December 15th each year.

Inspection Check List: Page 3

The following drainage features will all require periodic inspections and maintenance based on this manual in addition to deep sump catch basins throughout:

Catch Basins 1-10 (Ponds #C01-#C08, #C10)

Drain Manholes #1 through #6 (Ponds #D01-#D06)

Conveyance Swales and Roadside Ditches

Bioretention W/ ISR #101 – P-101 w/ Outlet Structures and matted Spillway

Infiltration Basin #103 – P-103 w/ outlet structures, & matted spillway.

StormTech SC-740 Chambers w/ Infiltration #104 – P-104 with outlet structure & Isolator Row

Bioretention W/ ISR #102 – P-102 with outlet structures and matted spillway.

Outlet Protection and Level Spreaders

Roadway and Wall Underdrains

Generator Containment System Manual Drain W/ Gate Valve

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Inspection & Maintenance Manual Log Form

Calef Highway, Barrington, NH, Tax Map 238, Lot 44-1
TURBOCAM, INC. / NHBBC, LLC
607 Calef Highway Suite 200
Barrington, NH 03825

BMP / System	Date Inspected	Inspector	Cleaning/Repair (List Items & Comments)	Repair Date	Performed By:

STORMWATER SYSTEM OPERATIONS: INSPECTION & MAINTENANCE MANUAL

Deicing Log Form

Calef Highway, Barrington, NH, Tax Map 238, Lot 44-1
TURBOCAM, INC. / NHBBC, LLC
607 Calef Highway Suite 200
Barrington, NH 03825

Date	Amount Applied	Performed By:	Date	Amount Applied	Performed By:

STORMWATER SYSTEM OPERATION & MAINTENANCE PLAN CERTIFICATION

Owner	Responsibility
Name: TURBOCAM, INC. / NHBBC, LLC Owner Andrew Knapp, Director of EHS, Facilities & Maintenance Address: 607 Calef Highway Suite 200 Barrington, NH 03825 Telephone: 1-603-905-0203 E-mail: andy.knapp@turbocam.com	The owner is responsible for the conduct of all construction activities, and ultimate compliance with all the provisions of the Stormwater System Operation & Maintenance Plan and the implementation of the Inspection and Maintenance Manual.

Calef Highway, Barrington, NH, Tax Map 238, Lot 44-1

OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: ________________________________ Date: _____________________

Printed Name:

Representing:

Control of Invasive Plants

New Hampshire
Department of Agriculture,
Markets & Food
Douglas Cygan
603-271-3488
doug.cygan@agr.nh.gov

This guide lists garden plants and weeds which are already causing significant changes to natural areas in the Mid-Atlantic. **Measures for controlling each species are indicated by number, e.g., (3), in the text with a full explanation at the end of this article.** Click on the word Control: to jump to that section. Then click your "back" button to return to the text. Following each section suggested alternative plants are given. These alternatives are native plants, well adapted and needing little care, attractive to birds and butterflies, and an important part of the food web for our indigenous species.

INVASIVE TREES

NORWAY MAPLE (*Acer platanoides*) has large leaves similar to sugar maple. To easily confirm that the plant is Norway maple, break off a leaf and if it's truly Norway maple it will exude milky white sap. Fall foliage is yellow. (Exception: cultivars such as 'Crimson King,' which have red leaves in spring or summer, may have red autumn leaves.) The leaves turn color late, usually in late October after native trees have dropped their foliage. This tree suppresses growth of grass, garden plants, and forest understory beneath it, at least as far as the drip-line. Its wind-borne seeds can germinate and grow in deep shade. The presence of young Norway maples in our woodlands is increasing.
Control: (1); (7), (8), (9), or (10); (11) in mid-October to early November, before the leaves turn color.

TREE OF HEAVEN (*Ailanthus altissima*), is incredibly tough and can grow in the poorest conditions. It produces huge quantities of wind-borne seeds, grows rapidly, and secretes a toxin that kills other plants. Its long compound leaves, with 11-25 lance-shaped leaflets, smell like peanut butter or burnt coffee when crushed. Once established, this tree cannot be removed by mechanical means alone.
Control: (1) - seedlings only. Herbicide - use Garlon 3a (9) with no more than a 1" gap between cuts, or (10); plus (11) on re-growth. Or paint bottom 12" of bark with Garlon 4 Ultra (in February or March to protect surrounding plants). USE MAXIMUM STRENGTH SPECIFIED ON LABEL for all herbicide applications on Ailanthus. Glyphosate is not effective against Ailanthus.

INVASIVE SHRUBS

AUTUMN OLIVE (*Eleagnus umbellata*): Formerly recommended for erosion control and wildlife value, these have proved highly invasive and diminish the overall quality of wildlife habitat.
Control: (1) - up to 4" diameter trunks; (7) or (10) or bury stump. Do not mow.
MULTIFLORA ROSE (*Rosa multiflora*), formerly recommended for erosion control, hedges, and wildlife habitat, becomes a huge shrub that chokes out all other vegetation and is too dense for many species of birds to nest in, though a few favor it. In shade, it grows up trees like a vine. It is covered with white flowers in June. (Our native roses have fewer flowers, mostly pink.) Distinguish multiflora by its size, and by the presence of very hard, curved thorns, and a fringed edge to the leaf stalk.
Control: (1) - pull seedlings, dig out larger plants at least 6" from the crown and 6" down; (4) on extensive infestations; (10) or (11). It may remain green in winter, so herbicide may *applied when other plants are dormant. For foliar application, mix Rodeo with extra sticker-spreader, or use Roundup Sure Shot Foam on small plants.*

BUSH HONEYSUCKLES (*Lonicera spp.*), including Belle, Amur, Morrow's, and Tatarian honeysuckle. (In our region, assume that any honeysuckle is exotic unless it is a scarlet-flowered vine). Bush honeysuckles create denser shade than native shrubs, reducing plant diversity and eliminating nest sites for many forest interior species.
Control: (2) on ornamentals; (1); on shady sites only, brush cut in early spring and again in early fall (3); (4) during the growing season; (7); or (10) late in the growing season.

BLUNT-LEAVED PRIVET (*Ligustrum* obtusifolium). *Control*: (1); (7) or (10); or trim off all flowers. Do not cut back or mow.

BURNING BUSH, WINGED EUONYMUS (*Euonymus alatus*), identified by wide, corky wings on the branches.
Control: (1); (7) or (10); or trim off all flowers.

JAPANESE BARBERRY (*Berberis thunbergii*), and all cultivars and varieties.
Control: (1); (7) or (10); or trim off all flowers.

INVASIVE WOODY VINES

All of these vines shade out the shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle. DO NOT PLANT NEXT TO OPEN SPACE.

JAPANESE HONEYSUCKLE (*Lonicera japonica*), including Hall's honeysuckle, has gold-and-white flowers with a heavenly scent and sweet nectar in June. This is probably the familiar honeysuckle of your childhood. It is a rampant grower that spirals around trees, often strangling them.
Control: (1); (3); (10); (11) in fall or early spring when native vegetation is dormant. Plan to re-treat repeatedly.

ORIENTAL BITTERSWEET (*Celastrus orbiculatus*) has almost completely displaced American bittersweet (*C. scandens*). The Asian plant has its flowers and bright orange seed capsules in clusters all along the stem, while the native species bears them only at the branch tips.
Control: (1); keep ornamental plants cut back, remove all fruits as soon as they open, and bag or burn fruits; to eradicate use Garlon 3a (10).

JAPANESE KNOTWEED, MEXICAN BAMBOO (*Polygonum cuspidatum*) can grow in shade. The stems have knotty joints, reminiscent of bamboo. It grows 6-10' tall and has large pointed oval or triangular leaves.
Control: Cut at least 3 times each growing season and/or treat with Rodeo (10) or (11). In gardens, heavy mulch or dense shade may kill it.

INVASIVE HERBACEOUS PLANTS

GARLIC MUSTARD (*Alliaria petiolata*, *A. officinalis*), a white-flowered biennial with rough, scalloped leaves (kidney-, heart- or arrow-shaped), recognizable by the smell of garlic and taste of mustard when its leaves are crushed. (The odor fades by fall.)
Control: Pull before it flowers in spring (1), removing crown and roots. Tamp down soil afterwards. Once it has flowered, cut (2), being careful not to scatter seed, then bag and burn or send to the landfill. (11) may be appropriate in some settings.

JAPANESE STILT GRASS (*Microstegium vimineum*) can be identified by its lime-green color and a line of silvery hairs down the middle of the 2-3" long blade. It tolerates sun or dense shade and quickly invades areas left bare or disturbed by tilling or flooding. An annual grass, it builds up a large seed bank in the soil.

Control: Easily pulled in early to mid-summer (1) - be sure to pull before it goes to seed. If seeds have formed, bag and burn or send to landfill. Mowing weekly or when it has just begun to flower may prevent it from setting seed (3). Use glyphosate (11) or herbicidal soap (less effective) on large infestations. Follow up with (5) in spring.

MILE-A-MINUTE VINE, DEVIL'S TAIL TEARTHUMB (*Polygonum perfoliatum*), a rapidly growing annual vine with triangular leaves, barbed stems, and turquoise berries in August which are spread by birds. It quickly covers and shades out herbaceous plants.
Control: same as for stilt grass.

SPOTTED KNAPWEED (*Centaurea maculosa*), a biennial with thistle-like flowers.
Control: Do NOT pull (1) unless the plant is young and the ground is very soft - the tap root will break off and produce several new plants. Wear sturdy gloves. (2); (6); (10) or (11).

~ ~ ~ ~ ~ ~ ~ ~

CONTROL MEASURES

(1) PULL seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs.
(2) DEADHEAD to prevent spread of seeds of invasive plants. Cut off seeds or fruits before they ripen. Bag, and burn or send to a landfill.
(3) MOW or CUTTING at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year.
(4) CONTROLLED BURNING during the spring, repeated over several years, allows native vegetation to compete more effectively with the invasive species. This requires a permit. Spot treatment with glyphosate in late fall can be used to make this method more effective.
(5) Use a CORN-BASED PRE-EMERGENCE HERBICIDE on annual weeds. This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.
(6) In lawns, SPOT TREAT with BROAD-LEAF WEEDKILLER. Good lawn-care practices (test soil; use lime and fertilizer only when soil test shows a need; mow high and frequently; leave clippings on lawn) reduce weed infestations.
(7) CUT DOWN the tree. Grind out the stump, or clip off re-growth.
(8) GIRDLE tree: cut through the bark and growing layer (cambium) all around the trunk, about 6" above the ground. Girdling is most effective in spring when the sap is rising, and from middle to late summer when the tree is sending down food to the roots. Clip off sucker sprouts.
(9) FRILL: Using a machete, hatchet or similar device, hack scars (several holes in larger trees) downward into the cambium layer, and squirt in glyphosate (or triclopyr if recommended in text above). Follow label directions for Injection and Frill Applications. This is most effective from middle to late summer. Clip off any sucker sprouts or treat with glyphosate.
(10) CUT STEM / CUT STUMP WITH GLYPHOSATE (or triclopyr if specified above). Follow label directions for Cut Stump Application. Clip off sucker sprouts or paint with glyphosate. See Note on Herbicides.
(11) FOLIAR SPRAY WITH GLYPHOSATE herbicide (see Note on Herbicides). Use a backpack or garden sprayer or mist blower, following label directions. Avoid overspray and/or dripping onto non-target plants, because glyphosate kills most plants except moss. If it rolls off waxy or grass-like foliage, use additional sticker-spreader. Deciduous trees, shrubs, and perennials move nutrients down to the roots in late summer. Glyphosate is particularly effective at this time and when plants have just gone out of flowering. Several invasive species retain their foliage after native plants have lost theirs, and resume growth earlier in spring than most natives. This allows you to treat them without harming the natives. However, the plant must be actively growing for the herbicide to work. Retreatments may be necessary the following year if suckering occurs or the plant hasn't been entirely killed.

NOTE ON HERBICIDES: It is highly recommended that small populations try to be controlled using non-chemical methods wherever feasible. However, for large infestations, and for a few plants specified above, herbicide use is essential. Apply herbicides carefully to avoid non-target plants, glyphosate is the least environmentally damaging herbicide in most cases. Add food coloring for visibility, and a soap-based sticker such as Cide-Kick. Glyphosate is ineffective on some plants; for these, triclopyr (Garlon) may be indicated. When using herbicides, read the entire label and observe all precautions listed, including proper disposal. If in doubt, call your local Cooperative Extension Service.

Pavement Temp. (°F) and Trend (↑ ↓)	Weather Condition	Maintenance Actions	Application Rate (lbs/per 1000 sq.ft.)			
			Salt Prewetted/Pretreated with salt brine	Salt Prewetted/Pretreated with other blends	Dry salt	Winter sand
>30 ↑	Snow	Plow, treat intersections only				Not recommended
	Frz. Rain	Apply chemical				Not recommended
30 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				Not recommended
25 - 30 ↑	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				Not recommended
25 - 30 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
20 - 25 ↑	Snow or frz. Rain	Plow and Apply chemical				3.25 for frz. Rain
20 - 25 ↓	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
15 - 20 ↑	Snow	Plow and apply chemical				Not recommended
	Frz. Rain	Apply chemical				3.25
15 - 20 ↓	Snow or Frz. Rain	Plow and apply chemical				3.25 for frz. Rain
0 to 15 ↑↓	Snow	Plow, treat with blends, sand hazardous areas	Not recommended		Not recommended	5.0 and spot-treat as needed
< 0	Snow	Plow, treat with blends, sand hazardous areas	Not recommended		Not recommended	5.0 and spot-treat as needed

Table 19. Application Rates for Deicing

These rates & table format are based on road application guidelines (Mn Snow & Ice Control Field Handbook, Manual 2005-1). Develop your own application rates by adjusting your current rates incrementally downward toward these guidelines. Where temperature categories overlap, select the rate most applicable to your situation.

Infiltration Feasibility Report

Calef Highway
Barrington, NH
Tax Map 238, Lot 44-1

Prepared for

TURBOCAM, INC.
607 Calef Highway
Barrington, NH 03825

Land of

NHBBC, LLC
Calef Highway
Barrington, NH 03825

Prepared By

Berry Surveying & Engineering
335 Second Crown Point Road
Barrington, NH 03825
603-332-2863

STATE OF NEW HAMPSHIRE – KENNETH A. BERRY No. 14243 LICENSED – PROFESSIONAL ENGINEER –

File Number
DB2023-017

February 5, 2024
Revised: April 4, 2024

Table of Contents

1.0 Location of Practices:

The project proposes two locations of infiltration for ground water recharge as well as channel flow protection purposes via Infiltration Pond #103 and Stormtech Infiltration System #104.

Infiltration Pond #103 (Pond #103) – This Infiltration Pond is at the southwesterly corner of the light manufacturing facility, adjacent to StormTech Infiltration Basin #104 and along Calef Highway. A back berm prevents runoff from Calef Highway entering the practice. Flow is received from Bioretention W/ ISR #101 above the WQV.

Stormtech Infiltration System #104 (Pond #104) – This infiltration basin is at the southwesterly corner of the light manufacturing facility between the building and Gravel Wetland #101. Runoff is collected in an isolator row where pre-treatment occurs before being infiltrated into the ground. This practice infiltrates treated flow from Bioretention W/ ISR #101 and receives overflow from Infiltration Basin #103 above the WQV.

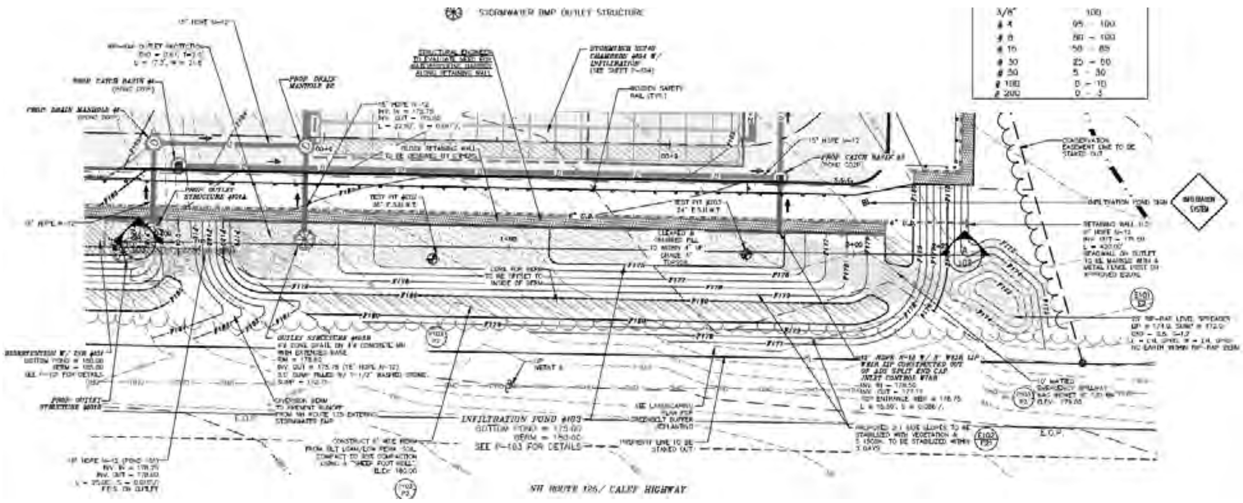
2.0 Existing Topography at the Location of the Practice

Infiltration Basin #103 (Pond #103) – The existing topography within the area is at a 4-12% slope. The area is currently vacant, unmaintained land.

Stormtech Infiltration System #104 (Pond #104) – The existing topography within the area is at a 2-10% slope. The area is currently vacant, unmaintained land.

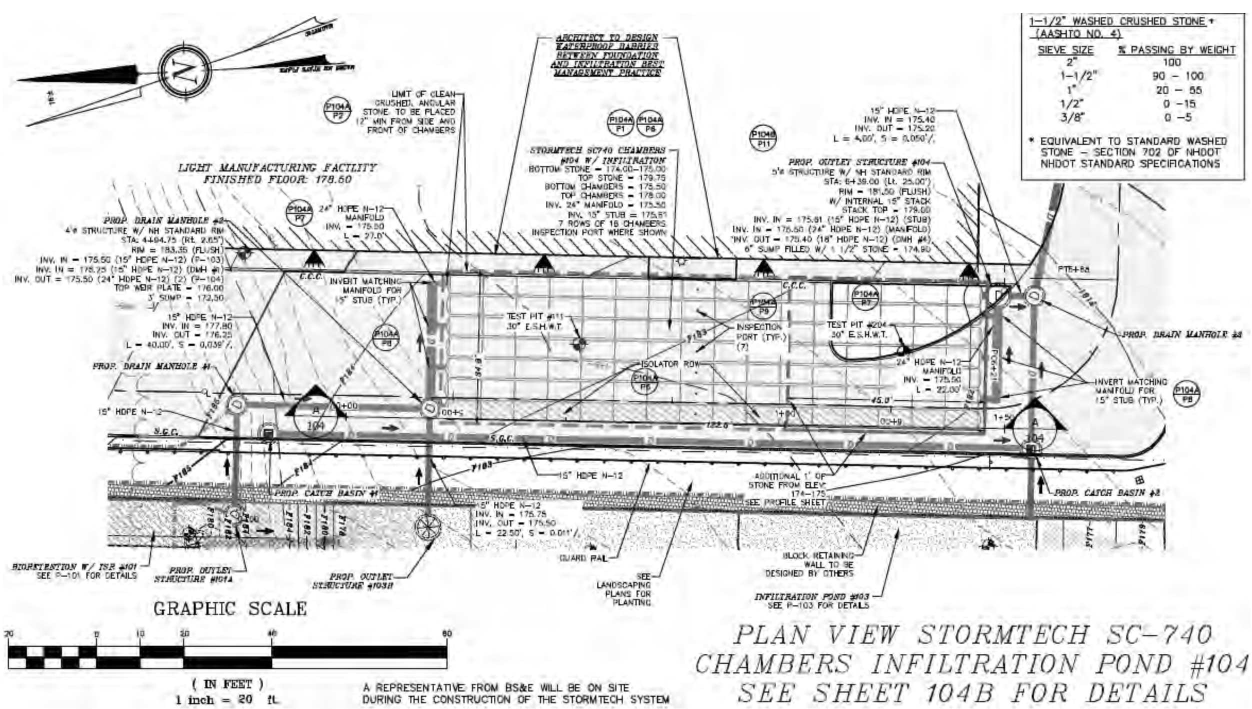
3.0 Test Pit Locations

Infiltration Pond #103 (Pond #103) – The practice has a surface area of 689 SF at the lowest point. The practice is located over test pits #202 & #203. See test pit profiles below. See test pit locations on Sheet P-103, Infiltration Pond #103 Plan. The test holes were completed in April 2023 & January 2024, (See Site Specific Soil Reports by John P Hayes III). The soil in the vicinity of this practice is Deerfield (313B & 313C) and Udorthents (which is derived from Deerfield and Windsor) (400C), both considered to be HSG B soil where the most restrictive published Ksat is 6 inches per hour. This practice was designed using 3 in. / hr. The southern side slope of the Infiltration Pond is located within Sudbury. This portion of the pond is proposed to lined with a low perm material, and Sudbury soil is not considered due to this liner.



Infiltration Basin #103 (Pond #103) – (Reference Sheet P-103)

Stormtech Infiltration System #104 (Pond #104) – The practice has a surface area of 1,564 SF at the lowest point. The practice is located over test pits #111 & #204. See test pit profiles below. See test pit locations on Sheet P-104, Proposed Stormtech Infiltration System #1 Detail Plan. The test holes were completed in April 2023 & January 2024, (See Site Specific Soil Reports by John P Hayes III). The soil in the vicinity of this practice is Deerfield (313B) and Udorthents (which is derived from Deerfield and Windsor) (400A), both considered to be HSG B soil where the most restrictive published Ksat is 6 inches per hour. This practice was designed using 3 in. / hr.



Stormtech Infiltration System #104 (Pond #104) – (Reference Sheet P-104)

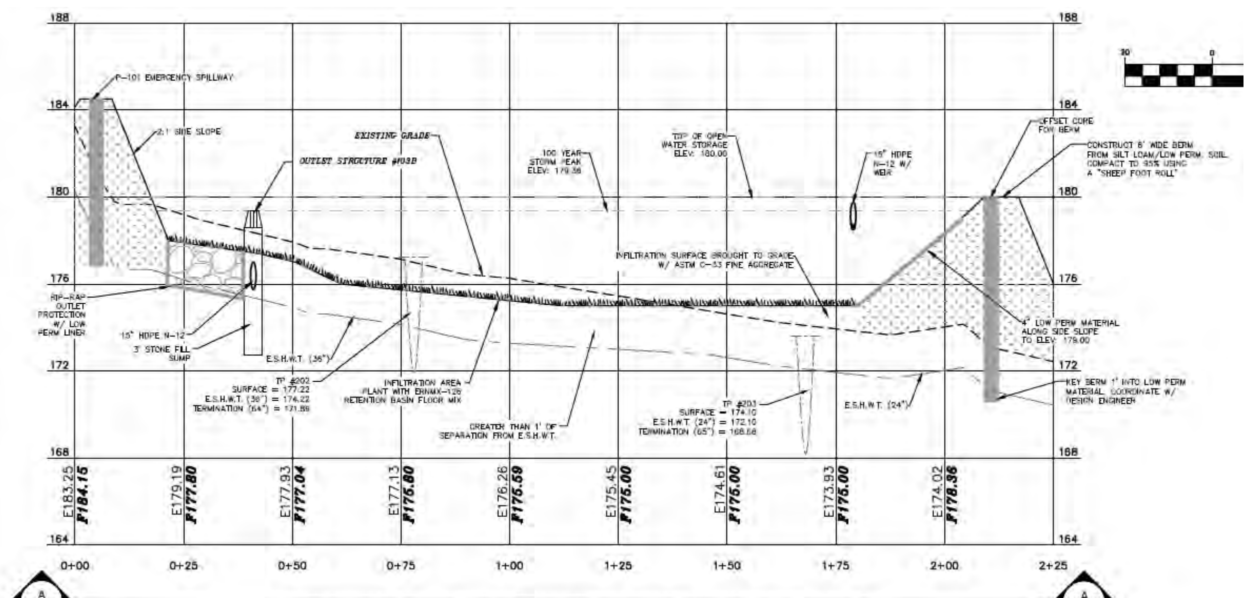
4.0 Seasonal High Water Table (SHWT) and Bedrock Elevations

TP #202:	Existing Surface Elevation of TP =	177.22
	SHWT = 36 Inches	174.22
	Bedrock > 64 Inches	171.89’
	Ground Water = 50 Inches	173.05
	Deepest Elevation of TP = 64 Inches	171.89’

Infiltration Basin #103 (Pond #103): Inv. Pond Bottom 175.00’ – 178.00’

TP #203:	Existing Surface Elevation of TP =	174.10’
	SHWT = 24 Inches	172.10’
	Bedrock > 65 Inches	168.68’
	Ground Water = 56 Inches	169.43’
	Deepest Elevation of TP = 65 Inches	168.68’

See cross section below.



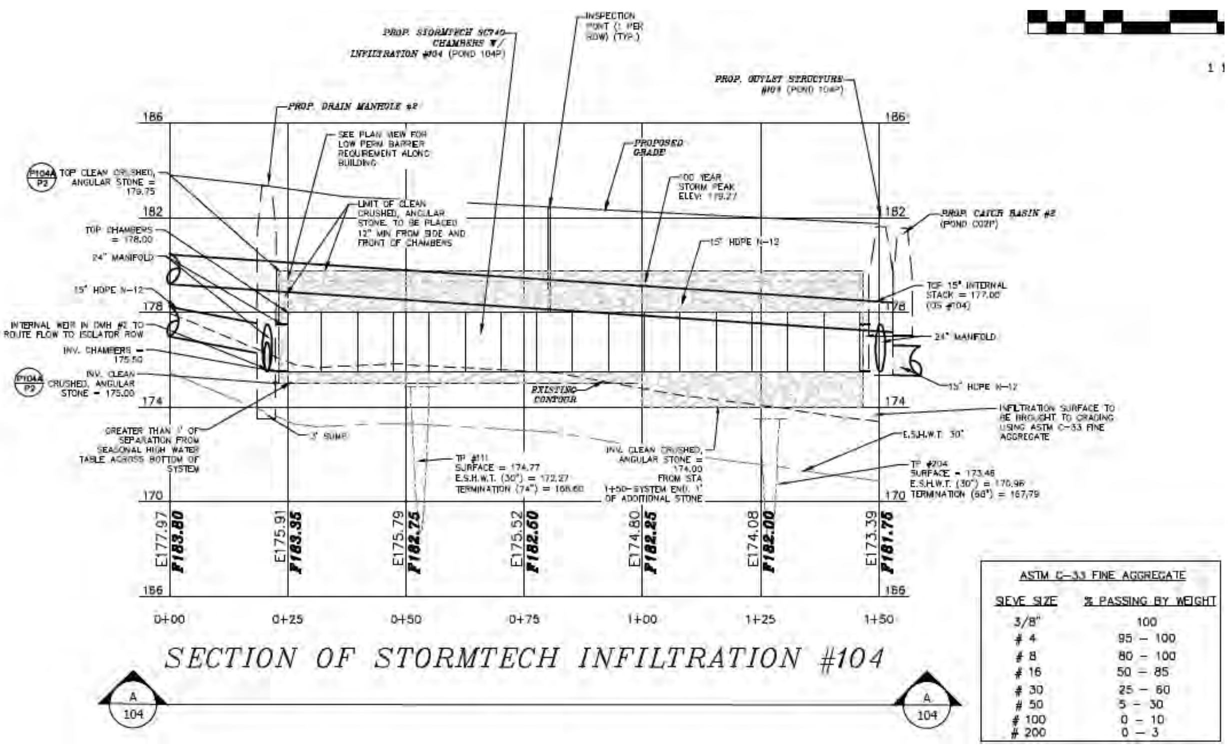
SECTION OF INFILTRATION POND #103

TP #111:	Existing Surface Elevation of TP =	174.77’
	SHWT = 30 Inches	172.27’
	Bedrock > 74 Inches	168.60’
	Ground Water = 50 Inches	170.60
	Deepest Elevation of TP = 74 Inches	168.60’

Stormtech Infiltration System #104 (Pond #104): Inv. Stone Storage 174.00’ – 175.00’

TP #204:	Existing Surface Elevation of TP =	173.46’
	SHWT = 30 Inches	170.96’
	Bedrock > 68 Inches	167.79’
	Ground Water = 54 Inches	168.96
	Deepest Elevation of TP = 68 Inches	167.79’

See cross section below.



5.0 Profile descriptions

The following test pit data was collected, see profiles below.

TEST PIT #202

0-16” 10YR 3/2 DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

16-28” 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

28-36” 10YR 5/6 LIGHT YELLOWISH BROWN, SAND, SINGLE GRAIN, LOOSE

36-64” 2.5Y 6/3 LIGHT YELLOWISH BROWN, SAND WITH REDOX. FEATURES PRESENT, SINGLE GRAIN, LOOSE

E.S.H.W.T. @ 36"
RESTRICTIVE LAYER @ NONE
GROUND WATER @ 50"
TERMINATED @ 64"
REFUSAL @ NONE

TEST PIT #203

0-8” 10YR 3/2 DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

8-16” 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

16-24” 2.5Y 6/4 LIGHT YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

24-65” 2.5Y 6/3 LIGHT YELLOWISH BROWN, SAND WITH REDOX. FEATURES PRESENT, SINGLE GRAIN, LOOSE

E.S.H.W.T. @ 24"
RESTRICTIVE LAYER @ NONE
GROUND WATER @ 56"
TERMINATED @ 65"
REFUSAL @ NONE

TEST PIT #111

0-10” 10YR 3/2 DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

10-22” 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

22-30” 2.5Y 5/4 YELLOWISH BROWN, GRAVELLY SAND, SINGLE GRAIN, LOOSE

30-74” 2.5Y 6/3 LIGHT YELLOWISH BROWN, GRAVELLY SAND WITH REDOX. FEATURES PRESENT, SINGLE GRAIN, LOOSE

E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ NONE
GROUND WATER @ 50"
TERMINATED @ 74"
REFUSAL @ NONE

TEST PIT #204

0-8” 10YR 3/2 DARK GRAYISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

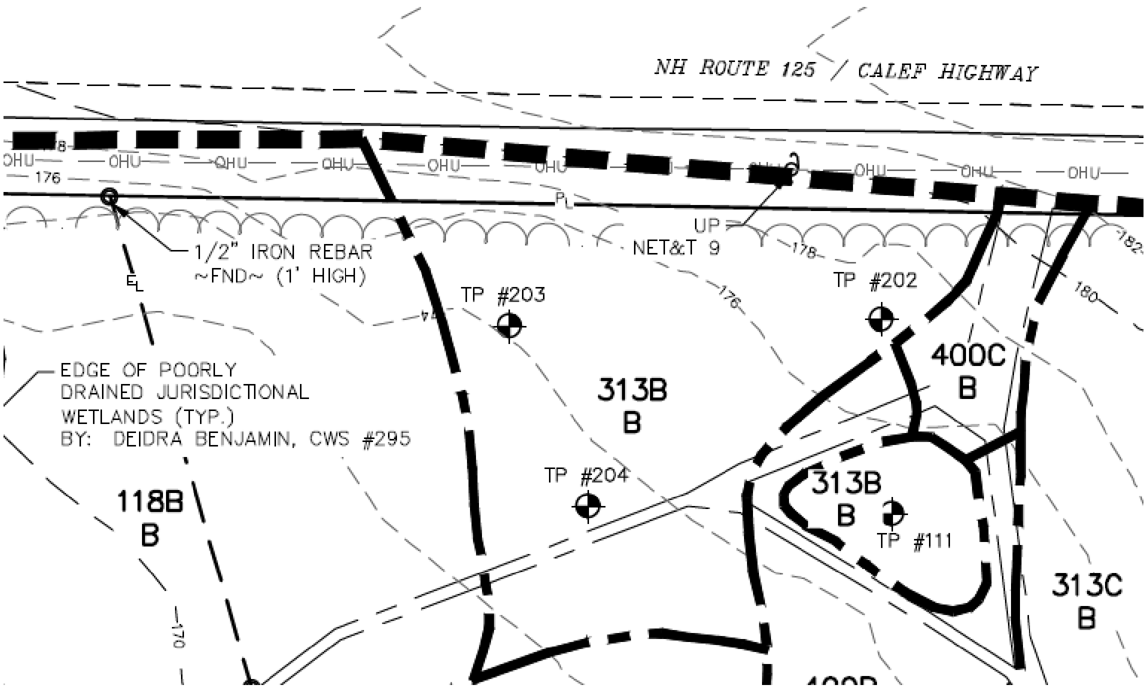
8-18” 10YR 5/6 YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

18-30” 2.5Y 6/4 LIGHT YELLOWISH BROWN, LOAMY SAND, GRANULAR, FRIABLE

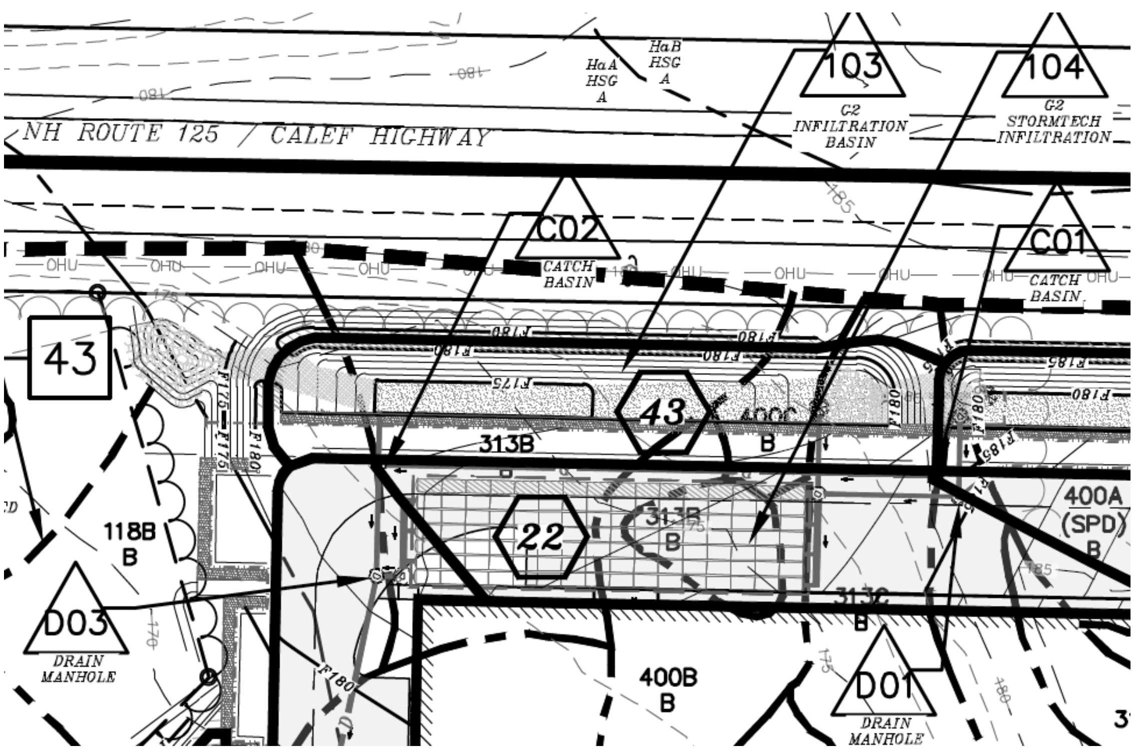
30-68” 2.5Y 6/3 LIGHT YELLOWISH BROWN, SAND WITH REDOX. FEATURES PRESENT, SINGLE GRAIN, LOOSE

E.S.H.W.T. @ 30"
RESTRICTIVE LAYER @ NONE
GROUND WATER @ 54"
TERMINATED @ 68"
REFUSAL @ NONE

6.0 Soil Plan in the Area of the Constructed Practice



Infiltration Pond #103 (Pond #103) & Stormtech Infiltration System #104 (Pond #104) is located over Deerfield soil. See Test Pits #202 & #203 for Pond #103 and test pits #111 & #204 for Pond #104.



Infiltration Pond #103 (Pond #103) & Stormtech Infiltration System #104 (Pond #104)

7.0 Summary of Infiltration Rate

Infiltration Basin #103 & Stormtech Infiltration System #104 are located in Deerfield (313B & 313C) and Udorthents (which is derived from Deerfield and Windsor) (400A & 400C), both are considered to be HSG B, soil area as mapped by Site Specific Soil Survey by John P. Hayes III, CSS, with a documented Ksat of 6 inches per hour. The design exfiltration rate for the infiltration practices is 3 inches per hour.

Amoozemeter testing was not conducted on site and the alternate method of using the USDA / NRCS published values was employed. Reference is made to K Sat Values for New Hampshire Soils (Including Hydrologic and DES Soil Lot Sizing Groups, sponsored by the Society of Soil Scientists of Northern New England, Publication #5 dated September 2009.

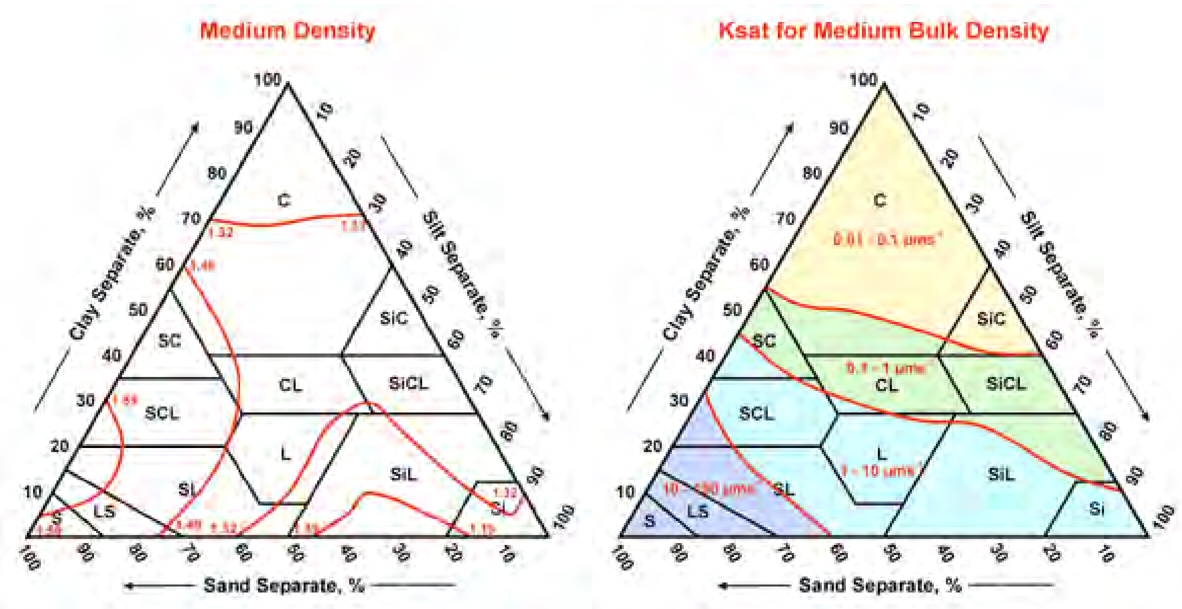
Respectfully submitted:

BERRY SURVEYING & ENGINEERING

Kevin R. Poulin, PE
Project Engineer

Kenneth A. Berry, PE, LLS
CPSWQ, CPESC, CESSWI
Principal, VP – Technical Operations

K_{sat} VALUES
FOR
NEW HAMPSHIRE SOILS
(Including Hydrologic and DES Soil Lot Sizing Groups)



From: Guide for Estimating Ksat from Soil Properties (**Exhibit 618-9**). (http://soils.usda.gov/technical/handbook/contents/part618ex.html)

Sponsored by the Society of Soil Scientists of Northern New England
SSSNNE Special Publication No. 5
September, 2009

K_{sat} VALUES
FOR
NEW HAMPSHIRE SOILS

ABOUT THE SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND

The Society of Soil Scientists of Northern New England (SSSNNE) is a non-profit professional organization of soil scientists, both in the private and public sectors, which is dedicated to the advancement of soil science. The Society fosters the profession of soil classification, mapping and interpretation, and encourages the dissemination of information concerning soil science. With the intent of contributing to the general human welfare, the Society seeks to educate the public on the wise use of soils and the associated natural resources.

INTRODUCTION

The publication "K_{sat} Values for New Hampshire Soils" is designed to assist soil scientists, engineers, and other professionals by assembling tables of existing data for all soil series currently on the state soil legend with regard to K_{sat} values and hydrologic groupings (Hyd.Grp.). The need for this information has become more important since the adoption by the New Hampshire Department of Environmental Services of the revised Alteration of Terrain rules for stormwater management. Additional information has been provided for each soil series with regard to landform, temperature regime (Temp.), soil textures, NHDES Soil Lot Size Groupings (Group), whether the soil is a Spodosol (Spodosol?) and other information which will be valuable to a variety of soil information users.

The data for each soil series has been sorted 3 ways for ease of searching:

Table A-Sorted by Numerical Legend
Table B-Sorted by Soil Series Name
Table C-Sorted by NHDES Soil Group for Establishing Lot Size

The report represents cumulative efforts by private soil scientists and NHDES staff with assistance from the USDA Natural Resource Conservation Service.

Comments or inquires on the information in this publication may be directed to the Board of Directors at the following address:

Society of Soil Scientists
of Northern New England
PO Box 76
Durham, NH 03824

SATURATED HYDRAULIC CONDUCTIVITY (K_{SAT})

K_{sat} refers to the ease with which pores in a saturated soil transmit water. The estimates presented here are expressed in terms of inches per hour (NRCS official data presents K_{sat} in both micrometers per second and inches per hour). K_{sat} values are based on soil characteristics observed in the field, particularly structure, consistence, porosity, and texture. (USDA NRCS, Web Soil Survey)

Saturated flow occurs when the soil water pressure is positive; that is, when the soil matric potential is zero (satiated wet condition). In most soils this situation takes place when about 95 percent of the total pore space is filled with water. The remaining 5 percent is filled with entrapped air. Saturated hydraulic conductivity cannot be used to describe water movement under unsaturated conditions. (Soil Survey Manual, 1993)

It is commonly known that soil features (and thus data) for a certain soil series name may be slightly different from one county soil survey to the next and the range in characteristics (via the Typical Pedon) may be slightly different. For example – a Marlow soil (series) in Carroll County may have a higher sand content in its B horizon as opposed to a Marlow soil (series) in Coos County; resulting in a slightly different Ksat range for the B horizon.

The K_{sat} data for this publication was obtained from the USDA-NRCS Soil Data Mart using the Typical Pedon from the county that best reflected the soil and/or had the most acres of that soil. This data is presented in B and C horizons only as it is assumed that the topsoil (A or A_p horizon) will be removed in typical construction practices.

References:

Web Soil Survey. *Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/.*

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/*.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.*

HYDROLOGIC SOIL GROUPS

Hydrologic group is a group of soils having the same runoff potential under similar storm and cover conditions.

Hydrologic groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning stormwater management, watershed protection, and flood-prevention projects and for planning or designing structures for the use, control, and disposal of water.

Classifications assigned to soils were based on the use of rainfall-runoff data from small watersheds and infiltrometer plots. From these data, relationships between soil properties and hydrologic groups were established. Assignment of soils to hydrologic groups is based on the relationship between soil properties and hydrologic groups. Wetness characteristics, permeability after prolonged wetting, and depth to very slowly permeable layers are properties that assist in estimating hydrologic groups. Minimum annual steady ponded infiltration rate for a bare ground surface determines the hydrologic soil groups.

Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonally high water table, intake rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. (The influence of ground cover is treated independently, not in hydrologic soil groups.).

The soils in the United States are placed into four groups, A, B, C, and D, and three dual classes, *A/D, B/D,* and *C/D.* In the definitions of the classes, infiltration rate is the rate at which water enters the soil at the surface and is controlled by the surface conditions. Transmission rate is the rate at which water moves in the soil and is controlled by soil properties. Definitions of the classes are as follows:

Group A- Saturated hydraulic conductivity is very high or in the upper half of high and internal free water occurrence is very deep. Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely through the soil. Group A soils typically have less than 10 percent clay and more than 90 percent sand or gravel and have gravel or sand textures. Some soils having loamy sand, sandy loam, loam or silt loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group A are as follows. The saturated hydraulic conductivity of all soil layers exceeds 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer are in group A if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 10 micrometers per second (1.42 inches per hour).

Group B- Saturated hydraulic conductivity is in the lower half of high or in the upper half of moderately high and free water occurrence is deep or very deep. Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission through the soil is unimpeded. Group B soils typically have between 10 percent and 20 percent clay and 50 percent to 90 percent sand and have loamy sand or sandy loam textures. Some soils having loam, silt loam, silt, or sandy clay loam textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group B are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] ranges from 10.0 micrometers per second (1.42 inches per hour) to 40.0 micrometers per second (5.67 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a water impermeable layer or water table are in group B if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 4.0 micrometers per second (0.57 inches per hour) but is less than 10.0 micrometers per second (1.42 inches per hour).

Group C- Saturated hydraulic conductivity is in the lower half of moderately high or in the upper half of moderately low and internal free water occurrence is deeper than shallow. Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission through the soil is somewhat restricted. Group C soils typically have between 20 percent and 40 percent clay and less than 50 percent sand and have loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Some soils having clay, silty clay, or sandy clay textures may be placed in this group if they are well aggregated, of low bulk density, or contain greater than 35 percent rock fragments. The limits on the diagnostic physical characteristics of group C are as follows. The saturated hydraulic conductivity in the least transmissive layer between the surface and 50 centimeters [20 inches] is between 1.0 micrometers per second (0.14 inches per hour) and 10.0 micrometers per second (1.42 inches per hour). The depth to any water impermeable layer is greater than 50 centimeters [20 inches]. The depth to the water table is greater than 60 centimeters [24 inches]. Soils that are deeper than 100 centimeters [40 inches] to a restriction or water table are in group C if the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface exceeds 0.40 micrometers per second (0.06 inches per hour) but is less than 4.0 micrometers per second (0.57 inches per hour). .

Group D- Saturated hydraulic conductivity is below the upper half of moderately low, and/or internal free water occurrence is shallow or very shallow and transitory through permanent. Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential. All soils with a depth to a water impermeable layer less than 50 centimeters [20 inches] and all soils with a water table within 60 centimeters [24 inches] of the surface are in this group, although some may have a dual classification, as described in the next section, if they can be adequately drained. The limits on the physical diagnostic characteristics of group D are as follows. For soils with a water impermeable layer at a depth between 50 centimeters and 100 centimeters [20 and 40 inches], the saturated hydraulic conductivity in the least transmissive soil layer is less than or equal to 1.0 micrometers per second (0.14 inches per hour). For soils that are deeper than 100 centimeters [40 inches] to a restriction or water table, the saturated hydraulic conductivity of all soil layers within 100 centimeters [40 inches] of the surface is less than or equal to 0.40 micrometers per second (0.06 inches per hour).

Dual hydrologic soil groups-Certain wet soils are placed in group D based solely on the presence of a water table within 60 centimeters [24 inches] of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups *(A/D, B/D,* and *C/D)* based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition. For the purpose of hydrologic soil group, adequately drained means that the seasonal high water table is kept at least 60 centimeters [24 inches] below the surface in a soil where it would be higher in a natural state.

References:

National Engineering Handbook*,* Natural Resource Conservation Service, U.S. Department of Agriculture.

Soil Data Mart. *http://soildatamart.nrcs.usda.gov/*.

Soil Survey Manual. *Soil Survey Division Staff. 1993. Soil survey manual. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 18.*

TABLE A

NUMERICAL LEGEND

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Madawaska, aquentic	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	loamy over sandy, sandy-skeletal	yes	gravelly loamy sand in C
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Chichester	442	0.6	2.0	2.00	6.0	B		Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over loam
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Ricker	674	2.0	6.0	2.00	6.0	A	4	Organic over bedrock (up to 4" of mineral)	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep

(grey)	no longer recognized
(light shading)	organic materials

TABLE B

SOIL SERIES

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Abenaki	501	0.6	2.0	6.00	99.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Acton	146	2.0	20.0	2.00	20.0	B	3	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Adams	36	6.0	20.0	20.00	99.0	A	1	Outwash and Stream Terraces	frigid	sandy	yes	
Agawam	24	6.0	20.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	0.6	2.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Au Gres	516					B	5	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bangor	572	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Becket	56	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	0.6	2.0	0.06	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bemis	224	0.6	0.2	0.00	0.2	C	5	Firm, platy, loamy till	cryic	loamy	no	
Berkshire	72	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bernardston	330	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Bice	226	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	no	sandy loam
Biddeford	234	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	frigid	fine	no	organic over clay
Binghamville	534	0.2	2.0	0.06	0.2	D	5	Terraces and glacial lake plains	mesic	silty	no	
Boscawen	220	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Boxford	32	0.1	0.2	0.00	0.2	C	3	Silt and Clay Deposits	mesic	fine	no	silty clay loam
Brayton	240	0.6	2.0	0.06	0.6	C	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Buckland	237	0.6	2.0	0.06	0.2	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Bucksport	895					D	6	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	0.2	6.0	0.02	0.2	D	6	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Buxton	232	0.1	0.6	0.00	0.2	C	3	Silt and Clay Deposits	frigid	fine	no	silty clay
Cabot	589	0.6	2.0	0.06	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Caesar	526	20.0	100.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	coarse sand	no	
Canaan	663	2.0	20.0	2.00	20.0	C	4	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Canterbury	166	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Canton	42	2.0	6.0	6.00	20.0	B	2	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Cardigan	357	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Catden	296					A/D	6	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Champlain	35	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	gravelly sand	no	
Charles	209	0.6	100.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	silty	no	
Charlton	62	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Chatfield	89	0.6	6.0	0.60	6.0	B	4	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Chatfield Var.	289	0.6	6.0	0.60	6.0	B	3	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Chichester	442	0.6	2.0	2.00	6.0	B		Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Chocorua	395			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Cohas	505	0.6	2.0	0.60	100.0	C	5	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Colonel	927	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Colton	22	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Croghan	613	20.0	100.0	20.00	100.0	B	3	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	6.0	20.0	20.00	100.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	0.6	2.0	0.60	2.0	C	3	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Dutchess	366	0.6	2.0	0.60	2.0	B	2	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Eldridge	38	6.0	20.0	0.06	0.6	C	3	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elliottsville	128	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Elmridge	238	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116					C	3	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Fryeburg	208	0.6	2.0	2.00	6.0	B	2	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Gilmanton	478	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Glebe	671	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Gloucester	11	6.0	20.0	6.00	20.0	A	1	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Glover	NA	0.6	2.0	0.60	2	D	4	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Grange	433	0.6	2.0	0.60	2.0	C	5	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Greenwood	295					A/D	6	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Groveton	27	0.6	2.0	0.60	6.0	B	2	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	0.6	2.0	0.60	6.0	B	2	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	0.6	2.0	0.20	2.0	B	2	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	0.6	2.0	20.00	100.0	B	2	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Henniker	46	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hermon	55	2.0	20.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	6.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hitchcock	130	0.6	2.0	0.06	0.6	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Hogback	91	2.0	6.0	2.00	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	0.6	6.0	0.60	6.0	C/D	4	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Hoosic	510	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Houghtonville	795	0.6	6.0	0.60	6.0	B	2	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Howland	566	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Ipswich	397					D	6	Tidal Flat	mesic	hemic/sapric	no	deep organic
Kearsarge	359	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Kinsman	614	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Lanesboro	228	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Leicester	514	0.6	6.0	0.60	20.0	C	5	Loose till, loamy textures	mesic	loamy	no	
Lim	3	0.6	2.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	0.6	2.0	0.60	2.0	C	5	Flood Plain (Bottom Land)	mesic	silty	no	
Lombard	259	0.6	6.0	2.00	20.0	C/D	2	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Lovewell	307	0.6	2.0	0.60	2.0	B	3	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Lyman	92	2.0	6.0	2.00	6.0	A/D	4	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Lyme	246	0.6	6.0	0.60	6.0	C	5	Loose till, sandy textures	frigid	loamy	no	
Machias	520	2.0	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Macomber	252	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Madawaska	28	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
ladawaska, aquer	48	0.6	2.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Masardis	23	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Mashpee	315	6.0	20.0	6.00	20.0	B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Matunuck	797			20.00	100.0	D	6	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	0.0	0.2	0.00	0.2	D	6	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	0.6	2.0	0.60	2.0	D	6	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Melrose	37	2.0	6.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Merrimac	10	2.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Metacomet	458	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	6.0	100.0	6.00	100.0	B	3	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39					C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Millsite	251	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monadnock	142	0.6	2.0	2.00	6.0	B	2	Loose till, sandy textures	frigid	oamy over sandy, sandy-skeleta	yes	gravelly loamy sand in C
Monarda	569	0.2	2.0	0.02	0.2	D	5	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Monson	133	0.6	2.0	0.60	2.0	D	4	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Montauk	44	0.6	6.0	0.06	0.6	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Moosilauke	414	6.0	20.0	6.00	20.0	C	5	Loose till, sandy textures	frigid	sandy	no	

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Mundal	610	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Natchaug	496			0.20	2.0	D	6	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Naumburg	214	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	frigid	sandy	yes	
Newfields	444	0.6	2.0	0.60	2.0	B	3	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	0.6	2.0	0.60	2.0	C	3	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	0.6	6.0	6.00	20.0	B	3	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Occum	1	0.6	2.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	0.6	6.0	6.00	20.0	B	2	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Ossipee	495			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497			20.00	100.0	D	6	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Paxton	66	0.6	2.0	0.00	0.2	C	3	Firm, platy, loamy till	mesic	loamy	no	
Peacham	549	0.6	2.0	0.00	0.2	D	6	Firm, platy, silty till, schist & phylitte	frigid	loamy	no	organic over loam
Pemi	633	0.6	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	
Pennichuck	460	0.6	2.0	0.60	2.0	B	4	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Peru	78	0.6	2.0	0.06	0.6	C	3	Firm, platy, loamy till	frigid	loamy	yes	
Pillsbury	646	0.6	2.0	0.06	0.2	C	5	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314					B	5	Outwash and Stream Terraces	mesic	sandy	yes	
Pittstown	334	0.6	2.0	0.06	0.2	C	3	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	0.6	2.0	0.06	0.6	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Pondicherry	992			6.00	20.0	D	6	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Poocham	230	0.6	2.0	0.20	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	0.6	6.0	6.00	20.0	B	3	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Quonset	310	2.0	20.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Rawsonville	98	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Raynham	533	0.2	2.0	0.06	0.2	C	5	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	0.6	2.0	6.00	100.0	D	5	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Redstone	665	2.0	6.0	6.00	20.0	A	1	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Ricker	674	2.0	6.0	2.00	6.0	A	4	rganic over bedrock (up to 4" of minera	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Ridgebury	656	0.6	6.0	0.00	0.2	C	5	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	0.2	2.0	0.06	0.6	C	5	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	0.6	6.0	6.00	20.0	C	5	Flood Plain (Bottom Land)	frigid	loamy	no	
Saco	6	0.6	2.0	6.00	20.0	D	6	Flood Plain (Bottom Land)	mesic	silty	no	strata
Saddleback	673	0.6	2.0	0.60	2.0	C/D	4	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Salmon	630	0.6	2.0	0.60	2.0	B	2	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Saugatuck	16	0.06	0.2	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	0.0	0.2	0.00	0.2	D	5	Silt and Clay Deposits	frigid	fine	no	
Scarboro	115	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Scio	531	0.6	2.0	0.60	2.0	B	3	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scitico	33	0.0	0.2	0.00	0.2	C	5	Silt and Clay Deposits	mesic	fine	no	
Scituate	448	0.6	2.0	0.06	0.2	C	3	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Searsport	15	6.0	20.0	6.00	20.0	D	6	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Shaker	439	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Shapleigh	136					C/D	4	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Sheepscot	14	6.0	20.0	6.00	20.0	B	3	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	0.6	2.0	0.06	0.6	C	3	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Squamscott	538	6.0	20.0	0.06	0.6	C	5	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stetson	523	0.6	6.0	6.00	20.0	B	2	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Stissing	340	0.6	2.0	0.06	0.2	C	5	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Success	154	2.0	6.0	6.00	20.0	A	1	Sandy Till	frigid	sandy-skeletal	yes	cemented
Sudbury	118	2.0	6.0	2.00	20.0	B	3	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand

Soil Series	legend number	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Group	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Suffield	536	0.6	2.0	0.00	0.2	C	3	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	0.6	2.0	0.60	6.0	B	3	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Suncook	2	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	6.0	20.0	6.00	20.0	A	1	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Surplus	669	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	0.6	6.0	0.60	6.0	B	3	Loose till, loamy textures	mesic	loamy	no	
Swanton	438	2.0	6.0	0.00	0.2	C	5	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Telos	123	0.6	2.0	0.02	0.2	C	3	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Thorndike	84	0.6	2.0	0.60	2.0	C/D	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Timakwa	393			6.00	100.0	D	6	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Tunbridge	99	0.6	6.0	0.60	6.0	C	4	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Unadilla	30	0.6	2.0	2.00	20.0	B	2	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Vassalboro	150					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Walpole	546	2.0	6.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	6.0	20.0	6.00	20.0	C	5	Outwash and Stream Terraces	mesic	sandy	no	
Warwick	210	2.0	6.0	20.00	100.0	A	1	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Waskish	195					D	6	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waumbeck	58	2.0	20.0	6.00	20.0	B	3	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Westbrook	597			0.00	2.0	D	6	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	0.0	0.2	0.00	0.2	D	6	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Windsor	26	6.0	20.0	6.00	20.0	A	1	Outwash and Stream Terraces	mesic	sandy	no	
Winnecook	88	0.6	2.0	0.60	2.0	C	4	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Winooski	9	0.6	6.0	0.60	6.0	B		Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Winooski	103	0.6	6.0	0.60	6.0	B	3	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Wonsqueak	995			0.20	2.0	D	6	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Woodbridge	29	0.6	2.0	0.00	0.6	C	3	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Woodstock	93	2.0	6.0	2.00	6.0	C/D	4	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep

(gray shading) no longer recognized
(stippled shading) organic materials

TABLE C

NHDES SOIL GROUPINGS

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Adams	36	1	6.0	20.0	20.00	99.0	A	Outwash and Stream Terraces	frigid	sandy	yes	
Boscawen	220	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	no	loamy cap
Caesar	526	1	20.0	100.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	coarse sand	no	
Champlain	35	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	gravelly sand	no	
Colton	22	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	
Colton, gravelly	21	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly surface
Gloucester	11	1	6.0	20.0	6.00	20.0	A	Sandy Till	mesic	sandy-skeletal	no	loamy cap
Hermon	55	1	2.0	20.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	loamy cap
Hinckley	12	1	6.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	
Hoosic	510	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	slate, loamy cap
Masardis	23	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	slate, loamy cap
Merrimac	10	1	2.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	gravelly sand	no	loamy cap
Quonset	310	1	2.0	20.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	sandy-skeletal	no	shale
Redstone	665	1	2.0	6.0	6.00	20.0	A	Weathered Bedrock Till	frigid	fragmental	yes	loamy cap
Success	154	1	2.0	6.0	6.00	20.0	A	Sandy Till	frigid	sandy-skeletal	yes	cemented
Suncook	2	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	occasionally flooded
Suncook	402	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	mesic	sandy	no	frequent flooding
Sunday	102	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	occasionally flooded
Sunday	202	1	6.0	20.0	6.00	20.0	A	Flood Plain (Bottomland)	frigid	sandy	no	frequently flooded
Warwick	210	1	2.0	6.0	20.00	100.0	A	Outwash and Stream Terraces	mesic	loamy-skeletal	no	loamy over slate gravel
Windsor	26	1	6.0	20.0	6.00	20.0	A	Outwash and Stream Terraces	mesic	sandy	no	
Abenaki	501	2	0.6	2.0	6.00	99.0	B	Outwash and Stream Terraces	frigid	loamy over sandy-skeletal	no	loamy over gravelly
Agawam	24	2	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Allagash	127	2	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	loamy over sandy
Bangor	572	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam
Berkshire	72	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	fine sandy loam
Bice	226	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	no	sandy loam
Canton	42	2	2.0	6.0	6.00	20.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	loamy over loamy sand
Charlton	62	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	fine sandy loam
Dutchess	366	2	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	very channery
Fryeburg	208	2	0.6	2.0	2.00	6.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Groveton	27	2	0.6	2.0	0.60	6.0	B	Outwash and Stream Terraces	frigid	loamy	yes	loamy over sandy
Hadley	8	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand
Hadley	108	2	0.6	2.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	strata of fine sand, occ flooded
Hartland	31	2	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	very fine sandy loam
Haven	410	2	0.6	2.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	loamy over sand/gravel
Houghtonville	795	2	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	cobbly fine sandy loam
Lombard	259	2	0.6	6.0	2.00	20.0	C/D	Weathered bedrock, phyllite	frigid	loamy	no	very channery
Monadnock	142	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	oamy over sandy, sandy-skeleta	yes	gravelly loamy sand in C
Occum	1	2	0.6	2.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	loamy over loamy sand
Ondawa	101	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy over loamy sand
Ondawa	201	2	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	occ flood, loamy over l. sand
Salmon	630	2	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Stetson	523	2	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	loamy over gravelly
Unadilla	30	2	0.6	2.0	2.00	20.0	B	Terraces and glacial lake plains	mesic	silty	no	silty over gravelly
Chichester	442	2	0.6	2.0	2.00	6.0	B	Loose till, sandy textures	frigid	loamy over sandy	no	loamy over loamy sand
Acton	146	3	2.0	20.0	2.00	20.0	B	Loose till, sandy textures	mesic	sandy-skeletal	no	cobbly loamy sand
Becket	56	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	gravelly sandy loam in Cd
Belgrade	532	3	0.6	2.0	0.06	2.0	B	Terraces and glacial lake plains	mesic	silty	no	strata of fine sand
Bernardston	330	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Boxford	32	3	0.1	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	silty clay loam

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Buckland	237	3	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Buxton	232	3	0.1	0.6	0.00	0.2	C	Silt and Clay Deposits	frigid	fine	no	silty clay
Canterbury	166	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	loam in Cd
Chatfield Var.	289	3	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	mwd to swpd
Chesuncook	126	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Colonel	927	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	loam in Cd
Croghan	613	3	20.0	100.0	20.00	100.0	B	Outwash and Stream Terraces	frigid	sandy	yes	single grain in C
Dartmouth	132	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	thin strata silty clay loam
Deerfield	313	3	6.0	20.0	20.00	100.0	B	Outwash and Stream Terraces	mesic	sandy	no	single grain in C
Dixfield	378	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Dixmont	578	3	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy	yes	silt loam, platy in C
Duane	413	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	cemented (ortstein)
Eldridge	38	3	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	no	
Elmridge	238	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	loamy over clayey	no	
Elmwood	338	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	
Finch	116	3					C	Outwash and Stream Terraces	frigid	sandy	yes	cemented (ortstein)
Gilmanton	478	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	no	fine sandy loam in Cd
Henniker	46	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Hitchcock	130	3	0.6	2.0	0.06	0.6	B	Terraces and glacial lake plains	mesic	silty	no	silt loam to silt in C
Howland	566	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	silt loam, platy in Cd
Lanesboro	228	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	channery silt loam in Cd
Lovewell	307	3	0.6	2.0	0.60	2.0	B	Flood Plain (Bottom Land)	frigid	silty	no	very fine sandy loam
Machias	520	3	2.0	6.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy or sandy-skeletal	yes	strata sand/gravel in C
Madawaska	28	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
ladawaska, aquer	48	3	0.6	2.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	loamy over sandy	yes	sandy or sandy-skeletal
Marlow	76	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	fine sandy loam in Cd
Melrose	37	3	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	loamy over clayey	no	silty clay loam in C
Metacomet	458	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	no	loamy sand in Cd
Metallak	404	3	6.0	100.0	6.00	100.0	B	Flood Plain (Bottom Land)	frigid	loamy over sandy	no	sandy or sandy-skeletal
Millis	39	3					C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Montauk	44	3	0.6	6.0	0.06	0.6	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Mundal	610	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	gravelly sandy loam in Cd
Newfields	444	3	0.6	2.0	0.60	2.0	B	Loose till, sandy textures	mesic	loamy over sandy	no	sandy or sandy-skeletal
Nicholville	632	3	0.6	2.0	0.60	2.0	C	Terraces and glacial lake plains	frigid	silty	yes	very fine sandy loam
Ninigret	513	3	0.6	6.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	loamy over sandy	no	sandy or sandy-skeletal
Paxton	66	3	0.6	2.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Peru	78	3	0.6	2.0	0.06	0.6	C	Firm, platy, loamy till	frigid	loamy	yes	
Pittstown	334	3	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	channery silt loam in Cd
Plaisted	563	3	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd
Podunk	104	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	frigid	loamy	no	loamy to coarse sand in C
Poocham	230	3	0.6	2.0	0.20	2.0	B	Terraces and glacial lake plains	mesic	silty	no	silt loam in C
Pootatuck	4	3	0.6	6.0	6.00	20.0	B	Flood Plain (Bottom Land)	mesic	loamy	no	single grain in C
Scio	531	3	0.6	2.0	0.60	2.0	B	Terraces and glacial lake plains	mesic	silty	no	gravelly sand in 2C
Scituate	448	3	0.6	2.0	0.06	0.2	C	Firm, platy, sandy till	mesic	loamy	no	loamy sand in Cd
Sheepscot	14	3	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	frigid	sandy-skeletal	yes	gravelly coarse sand
Sisk	667	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	sandy loam in Cd
Skerry	558	3	0.6	2.0	0.06	0.6	C	Firm, platy, sandy till	frigid	loamy	yes	loamy sand in Cd
Sudbury	118	3	2.0	6.0	2.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	no	loam over gravelly sand
Suffield	536	3	0.6	2.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	silty over clayey	no	deep to clay C
Sunapee	168	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	
Sunapee var	269	3	0.6	2.0	0.60	6.0	B	Loose till, loamy textures	frigid	loamy	yes	frigid dystrudept
Surplus	669	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	cryic	loamy	yes	mwd, sandy loam in Cd
Sutton	68	3	0.6	6.0	0.60	6.0	B	Loose till, loamy textures	mesic	loamy	no	
Telos	123	3	0.6	2.0	0.02	0.2	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	yes	channery silt loam in Cd

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Waumbeck	58	3	2.0	20.0	6.00	20.0	B	Loose till, sandy textures	frigid	sandy-skeletal	yes	very cobbly loamy sand
Winooski	103	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty	no	very fine sandy loam
Woodbridge	29	3	0.6	2.0	0.00	0.6	C	Firm, platy, loamy till	mesic	loamy	no	sandy loam in Cd
Winooski	9	3	0.6	6.0	0.60	6.0	B	Flood Plain (Bottom Land)	mesic	silty over loamy	no	
Canaan	663	4	2.0	20.0	2.00	20.0	C	Weathered Bedrock Till	frigid	loamy-skeletal	yes	less than 20 in. deep
Cardigan	357	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	20 to 40 in. deep
Chatfield	89	4	0.6	6.0	0.60	6.0	B	Loose till, bedrock	mesic	loamy	no	20 to 40 in. deep
Elliottsville	128	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	frigid	loamy	yes	20 to 40 in. deep
Glebe	671	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	cryic	loamy	yes	20 to 40 in. deep
Glover	NA	4	0.6	2.0	0.60	2	D	Friable till, silty, schist & phyllite	frigid	loamy	no	less than 20 in. deep
Hogback	91	4	2.0	6.0	2.00	6.0	C	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Hollis	86	4	0.6	6.0	0.60	6.0	C/D	Loose till, bedrock	mesic	loamy	no	less than 20 in. deep
Kearsarge	359	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy	no	less than 20 in. deep
Lyman	92	4	2.0	6.0	2.00	6.0	A/D	Loose till, bedrock	frigid	loamy	yes	less than 20 in. deep
Macomber	252	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Millsite	251	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	no	20 to 40 in. deep
Monson	133	4	0.6	2.0	0.60	2.0	D	Friable till, silty, schist & phyllite	frigid	loamy	yes	less than 20 in. deep
Pennichuck	460	4	0.6	2.0	0.60	2.0	B	Friable till, silty, schist & phyllite	mesic	loamy-skeletal	no	20 to 40 in. deep
Rawsonville	98	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Ricker	674	4	2.0	6.0	2.00	6.0	A	rganic over bedrock (up to 4" of minera	cryic	fibric to hemic	no	well drained, less than 20 in. deep
Saddleback	673	4	0.6	2.0	0.60	2.0	C/D	Loose till, bedrock	cryic	loamy	yes	less than 20 in. deep
Shapleigh	136	4					C/D	Sandy Till	mesic	sandy	yes	less than 20 in. deep
Thorndike	84	4	0.6	2.0	0.60	2.0	C/D	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	less than 20 in. deep
Tunbridge	99	4	0.6	6.0	0.60	6.0	C	Loose till, bedrock	frigid	loamy	yes	20 to 40 in. deep
Winnecook	88	4	0.6	2.0	0.60	2.0	C	Friable till, silty, schist & phyllite	frigid	loamy-skeletal	yes	20 to 40 in. deep
Woodstock	93	4	2.0	6.0	2.00	6.0	C/D	Loose till, bedrock	frigid	loamy	no	less than 20 in. deep
Au Gres	516	5					B	Outwash and Stream Terraces	frigid	sandy	yes	single grain, loose
Bemis	224	5	0.6	0.2	0.00	0.2	C	Firm, platy, loamy till	cryic	loamy	no	
Binghamville	534	5	0.2	2.0	0.06	0.2	D	Terraces and glacial lake plains	mesic	silty	no	
Brayton	240	5	0.6	2.0	0.06	0.6	C	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Cabot	589	5	0.6	2.0	0.06	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Charles	209	5	0.6	100.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	silty	no	
Cohas	505	5	0.6	2.0	0.60	100.0	C	Flood Plain (Bottom Land)	frigid	co. loamy over sandy (skeletal)	no	
Grange	433	5	0.6	2.0	0.60	2.0	C	Outwash and Stream Terraces	frigid	co. loamy over sandy (skeletal)	no	
Kinsman	614	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Leicester	514	5	0.6	6.0	0.60	20.0	C	Loose till, loamy textures	mesic	loamy	no	
Lim	3	5	0.6	2.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Limerick	109	5	0.6	2.0	0.60	2.0	C	Flood Plain (Bottom Land)	mesic	silty	no	
Lyme	246	5	0.6	6.0	0.60	6.0	C	Loose till, sandy textures	frigid	loamy	no	
Mashpee	315	5	6.0	20.0	6.00	20.0	B	Outwash and Stream Terraces	mesic	sandy	yes	
Monarda	569	5	0.2	2.0	0.02	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	
Moosilauke	414	5	6.0	20.0	6.00	20.0	C	Loose till, sandy textures	frigid	sandy	no	
Naumburg	214	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	frigid	sandy	yes	
Pemi	633	5	0.6	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	
Pillsbury	646	5	0.6	2.0	0.06	0.2	C	Firm, platy, loamy till	frigid	silty	no	
Pipestone	314	5					B	Outwash and Stream Terraces	mesic	sandy	yes	
Raynham	533	5	0.2	2.0	0.06	0.2	C	Terraces and glacial lake plains	mesic	silty	no	
Raypol	540	5	0.6	2.0	6.00	100.0	D	Outwash and Stream Terraces	mesic	co. loamy over sandy (skeletal)	no	
Ridgebury	656	5	0.6	6.0	0.00	0.2	C	Firm, platy, loamy till	mesic	loamy	no	
Rippowam	5	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	mesic	loamy	no	
Roundabout	333	5	0.2	2.0	0.06	0.6	C	Terraces and glacial lake plains	frigid	silty	no	silt loam in the C
Rumney	105	5	0.6	6.0	6.00	20.0	C	Flood Plain (Bottom Land)	frigid	loamy	no	

Soil Series	number	NHDES Soil Group	Ksat low - B in/hr	Ksat high - B in/hr	Ksat low - C in/hr	Ksat high - C in/hr	Hyd. Grp.	Land Form	Temp.	Soil Textures	Spodosol ?	Other
Saugatuck	16	5	0.06	0.2	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	yes	ortstein
Scantic	233	5	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	
Scitico	33	5	0.0	0.2	0.00	0.2	C	Silt and Clay Deposits	mesic	fine	no	
Shaker	439	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	mesic	co. loamy over clayey	no	
Squamscott	538	5	6.0	20.0	0.06	0.6	C	Sandy/loamy over silt/clay	mesic	sandy over loamy	yes	
Stissing	340	5	0.6	2.0	0.06	0.2	C	Firm, platy, silty till, schist & phyllite	mesic	loamy	no	
Swanton	438	5	2.0	6.0	0.00	0.2	C	Sandy/loamy over silt/clay	frigid	co. loamy over clayey	no	
Walpole	546	5	2.0	6.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Wareham	34	5	6.0	20.0	6.00	20.0	C	Outwash and Stream Terraces	mesic	sandy	no	
Biddeford	234	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	frigid	fine	no	organic over clay
Bucksport	895	6					D	Organic Materials - Freshwater	frigid	sapric	no	deep organic
Burnham	131	6	0.2	6.0	0.02	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over silt
Catden	296	6					A/D	Organic Materials - Freshwater	mesic	sapric	no	deep organic
Chocorua	395	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Greenwood	295	6					A/D	Organic Materials - Freshwater	frigid	hemic	no	deep organic
Ipswich	397	6					D	Tidal Flat	mesic	hemic/sapric	no	deep organic
Matunuck	797	6			20.00	100.0	D	Tidal Flat	mesic	sandy	no	organic over sand
Maybid	134	6	0.0	0.2	0.00	0.2	D	Silt and Clay Deposits	mesic	fine	no	silt over clay
Meadowsedge	894	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Medomak	406	6	0.6	2.0	0.60	2.0	D	Flood Plain (Bottom Land)	frigid	silty	no	organic over silt
Natchaug	496	6			0.20	2.0	D	Organic Materials - Freshwater	mesic	loamy	no	organic over loam
Ossipee	495	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam
Pawcatuck	497	6			20.00	100.0	D	Tidal Flat	mesic	sandy or sandy-skeletal	no	organic over sand
Peacham	549	6	0.6	2.0	0.00	0.2	D	Firm, platy, silty till, schist & phyllite	frigid	loamy	no	organic over loam
Pondicherry	992	6			6.00	20.0	D	Organic Materials - Freshwater	frigid	sandy or sandy-skeletal	no	organic over sand
Saco	6	6	0.6	2.0	6.00	20.0	D	Flood Plain (Bottom Land)	mesic	silty	no	strata
Scarboro	115	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	mesic	sandy	no	organic over sand, non stony
Searsport	15	6	6.0	20.0	6.00	20.0	D	Outwash and Stream Terraces	frigid	sandy	no	organic over sand
Timakwa	393	6			6.00	100.0	D	Organic Materials - Freshwater	mesic	sandy or sandy-skeletal	no	organic over sand
Vassalboro	150	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Waskish	195	6					D	Organic Materials - Freshwater	frigid	peat	no	deep organic
Westbrook	597	6			0.00	2.0	D	Tidal Flat	mesic	loamy	no	organic over loam
Whitman	49	6	0.0	0.2	0.00	0.2	D	Firm, platy, loamy till	mesic	loamy	no	mucky loam
Wonsqueak	995	6			0.20	2.0	D	Organic Materials - Freshwater	frigid	loamy	no	organic over loam

no longer recognized

organic materials

denotes break betweenSoil Group

ORDER FORM

Ksat VALUES
FOR
NEW HAMPSHIRE SOILS
(Including Hydrologic and Soil Lot Sizing Groups)

SSSNNE Publication #5

DATE_________

Mail Copy of Publication #5 to:

Name____
Address____
City_______________State________________Zip_________

Quantity of Publications_____ @ $8.00 = Total Order: $_________

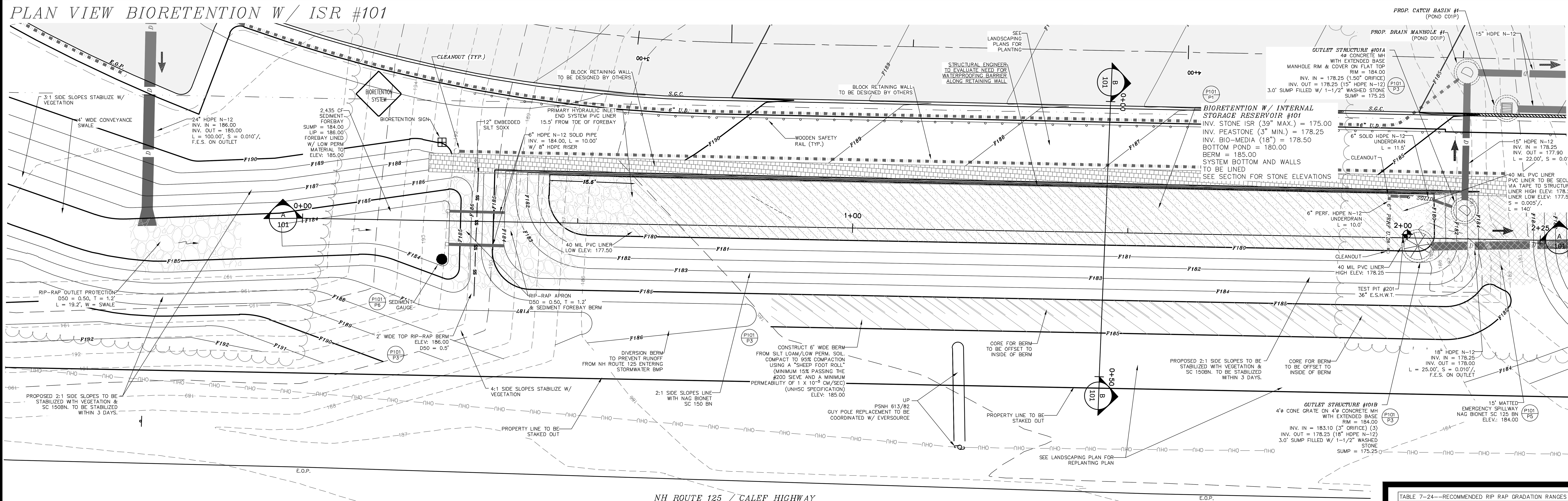
Amount Enclosed: $_________

Enclose check or money order for the full amount payable to:

Society of Soil Scientists of Northern New England
PO Box 76
Durham, NH 03824

Please allow 4 weeks for delivery.

PLAN VIEW BIORETENTION W/ ISR #101



GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.

TABLE 7-24--RECOMMENDED RIP RAP GRADATION RANGES		
d50 SIZE= 0.5 FEET	6 INCHES	
% OF WEIGHT SMALLER THAN THE GIVEN d50 SIZE	SIZE OF STONE (INCHES) FROM	TO
100%	9	12
85%	8	11
50%	6	9
15%	2	3

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

VERTICAL SCALE: 1" = 4'

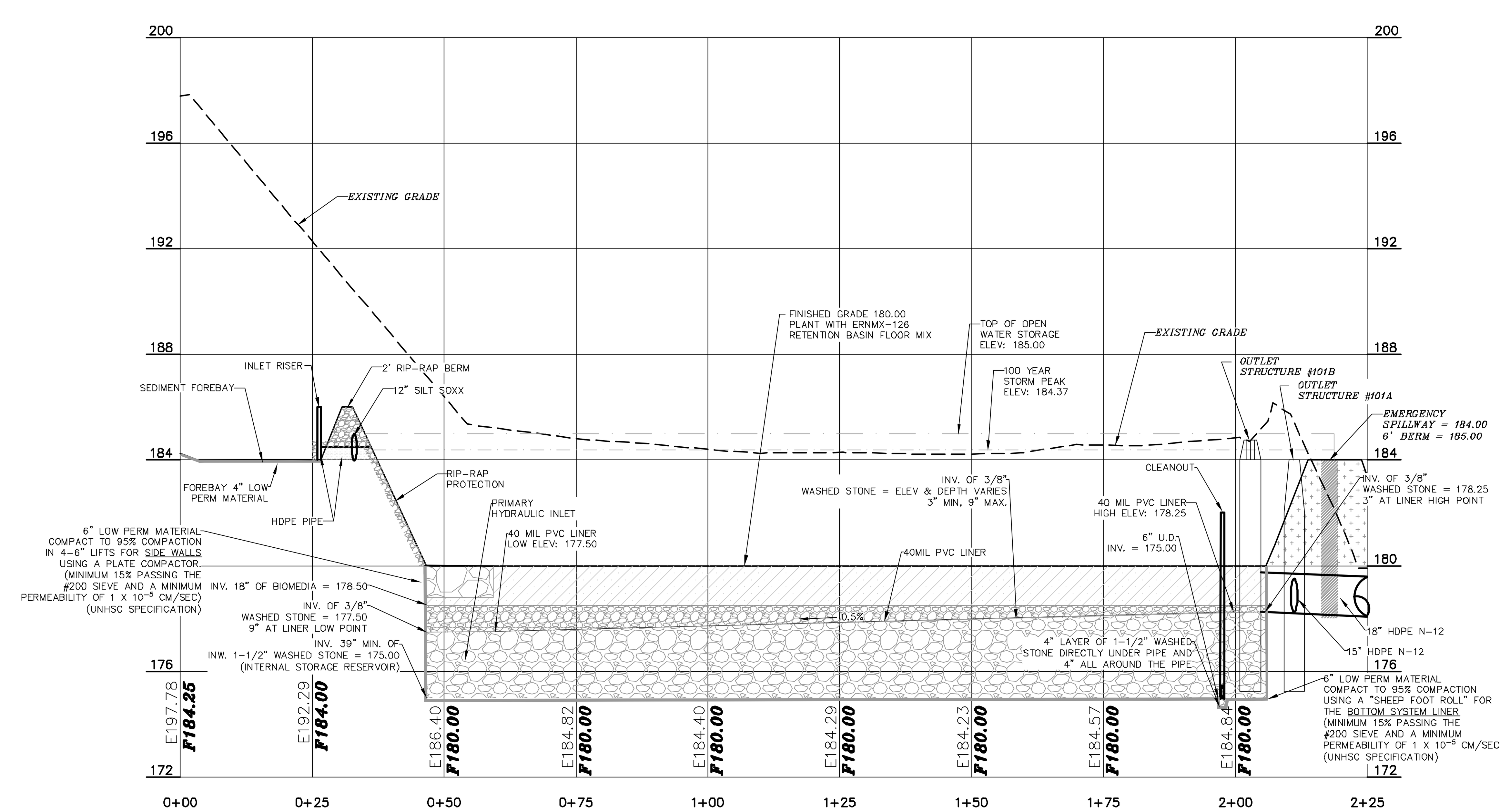
EXISTING LEGEND:

- IRON BOUND/IRON ROD (FND)
- IRON PIPE (FND)
- STONE BOUND (FND)
- UTILITY POLE / GUY WIRE
- SINGLE POST SIGN
- TEMPORARY BENCHMARK
- WELL
- TESTHOLE
- PERIMETER BOUNDARY LINE
- EXISTING CONSERVATION EASEMENT LINE
- BUILDING SETBACK LINE
- NHDES PROTECTIVE WELL RADIUS
- OVERHEAD UTILITIES
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- POORLY DRAINED WETLAND LINE
- VERY POORLY DRAINED WETLAND LINE
- 50' WETLAND BUFFER LINE
- TREE LINE

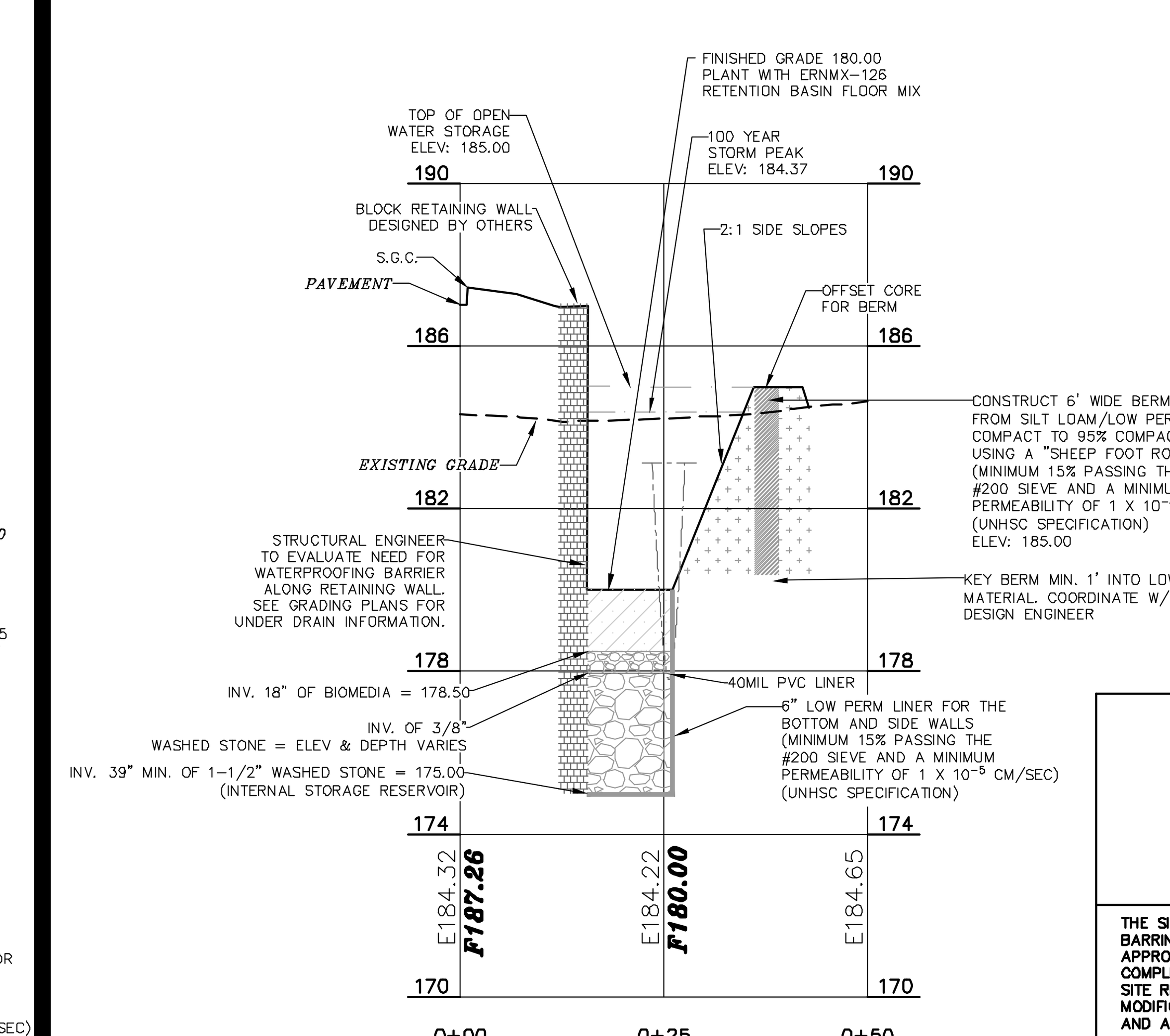
FND FOUND
TYP TYPICAL
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS

PROPOSED LEGEND:

- TEMPORARY BENCHMARK (T.B.M.)
- DETAIL SHEET / DETAIL
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- ROAD CENTERLINE
- SHOULDER
- PAVEMENT SEAM
- DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
- UNDERDRAIN
- GUARD RAIL
- EXISTING SPOT GRADE
- PROPOSED SPOT GRADE
- FLOW ARROW
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- RETAINING WALL
- STORMTECH CHAMBERS/ISOLATOR ROW
- DRAIN MANHOLE W/STRUCTURE
- CATCH BASIN W/ STRUCTURE
- STORMWATER BMP OUTLET STRUCTURE



SECTION OF BIORETENTION W/ ISR #101



SECTION OF BIORETENTION W/ ISR #101

FOR TOWN APPROVAL PURPOSES :

THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

PLAN VIEW/ SECTIONS

P-101A

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

BIORETENTION W/ ISR #101 PLAN VIEW & PROFILES
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : AS SHOWN
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14243 LICENSED PROFESSIONAL ENGINEER

P1

UNH STORMWATER CENTER SPECIFICATIONS ACCEPTABLE PARTICLE SIZE DISTRIBUTION OF FINAL BIORETENTION SOIL MIX			
MEDIA TYPE	SIEVE #	SIZE (IN)	% PASSING
COURSE SAND	4	0.187	100
MEDIUM SAND	10	0.079	95
FINE SAND	40	0.017	15–40
SILTS	200	0.003	10–20
CLAYS	<200	PAN	0–5

3/8" WASHED CRUSHED STONE*	
SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	95 – 100
# 4	22 – 55
# 8	0 – 10

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

1-1/2" WASHED CRUSHED STONE*	
SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 – 100
1"	20 – 55
1/2"	0 – 15
3/8"	0 – 5

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

BIORETENTION SOIL MEDIA COMPONENTS
–AMOUNTS MIXED BY TOTAL VOLUME
*60–85% SAND
*15–25% LOAM OR TOPSOIL
*3–8% ORGANIC MATTER
*5% WATER TREATMENT RESIDUALS OR 0.5% IRON FILINGS

WATER TREATMENT RESIDUALS OR IRON FILINGS ARE REQUIRED DUE TO THE CLASS "A" RECEIVING WATERS

REFER TO THE "UNHSC STANDARD DETAIL, BIORETENTION ISR STORMWATER SYSTEM", FEBRUARY 2020 FOR FURTHER PUBLISHED GENERAL CONSTRUCTION GUIDELINES

STABILIZATION NOTE:
SEE NOTE #6, SHEET E-102, DETAIL E-18
SIDE SLOPES ARE TO BE STABILIZED WITHIN THREE WORKING DAY UPON COMPLETION OF FINAL GRADE.

CONSTRUCTION NOTE: THE DESIGN ENGINEER IS TO BE ON SITE PRIOR TO AND DURING THE PLACEMENT OF THE RESERVOIR STONE, AND TO WITNESS THE INSTALLATION OF THE UNDER-DRAIN AND LINER. PLEASE PROVIDE 48 HOURS NOTICE PRIOR TO REQUESTED INSPECTION.

PVC LINER TO BE 40 TO 60 MIL, PREFERABLY SEAMLESS. IF SEAMS ARE UNAVOIDABLE, THE SEAMS SHOULD BE SEALED

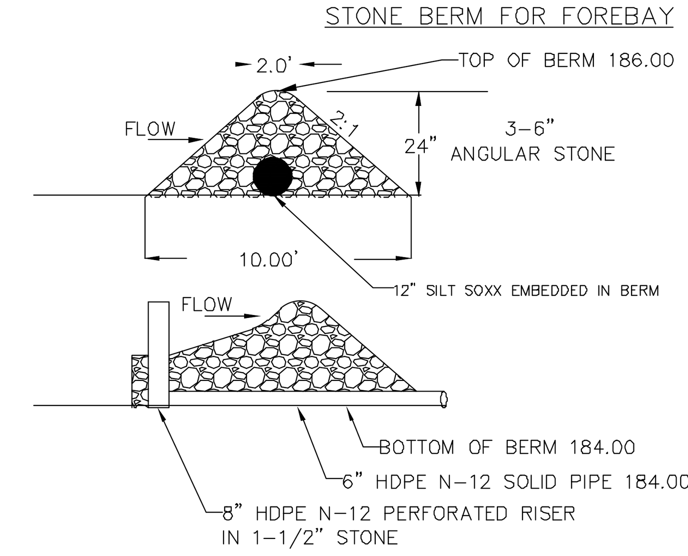
DESIGN REFERENCES

1 UNH STORMWATER CENTER.
https://scholars.unh.edu/stormwater/73/

BIORETENTION W/ ISR CONSTRUCTION SPECIFICATIONS

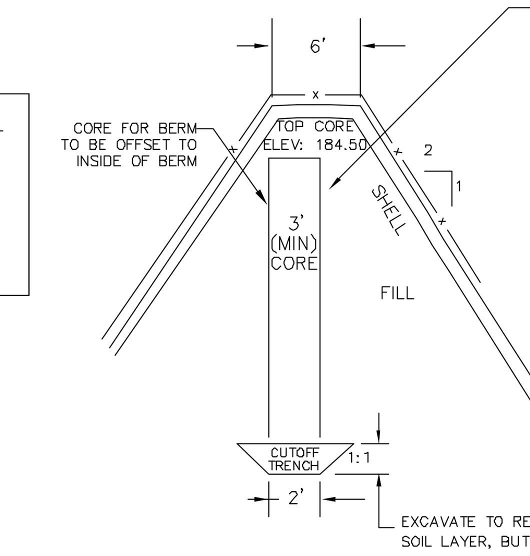
P2

STONE BERM FOR FOREBAY



P3

LOW PERMEABILITY MATERIAL GRADATION	
SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45



1.) 3' CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL MEETING THE REQUIREMENT OF THE LOW PERM SPECIFICATION

2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.

3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.

4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.

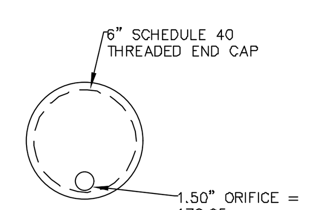
5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.

6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

BIORETENTION W/ ISR BERM CONSTRUCTION
NOT TO SCALE

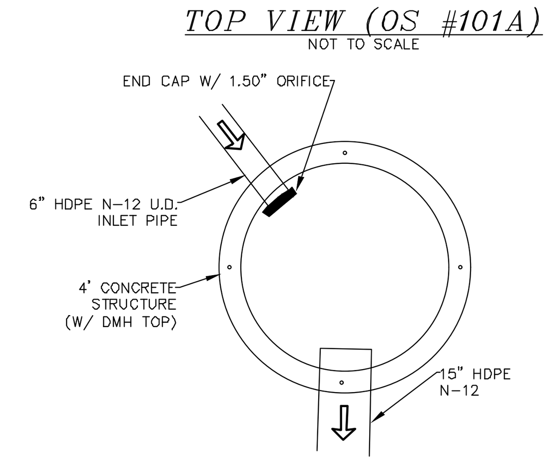
BIORETENTION W/ ISR STRUCTURES & DETAILS
NOT TO SCALE

P4

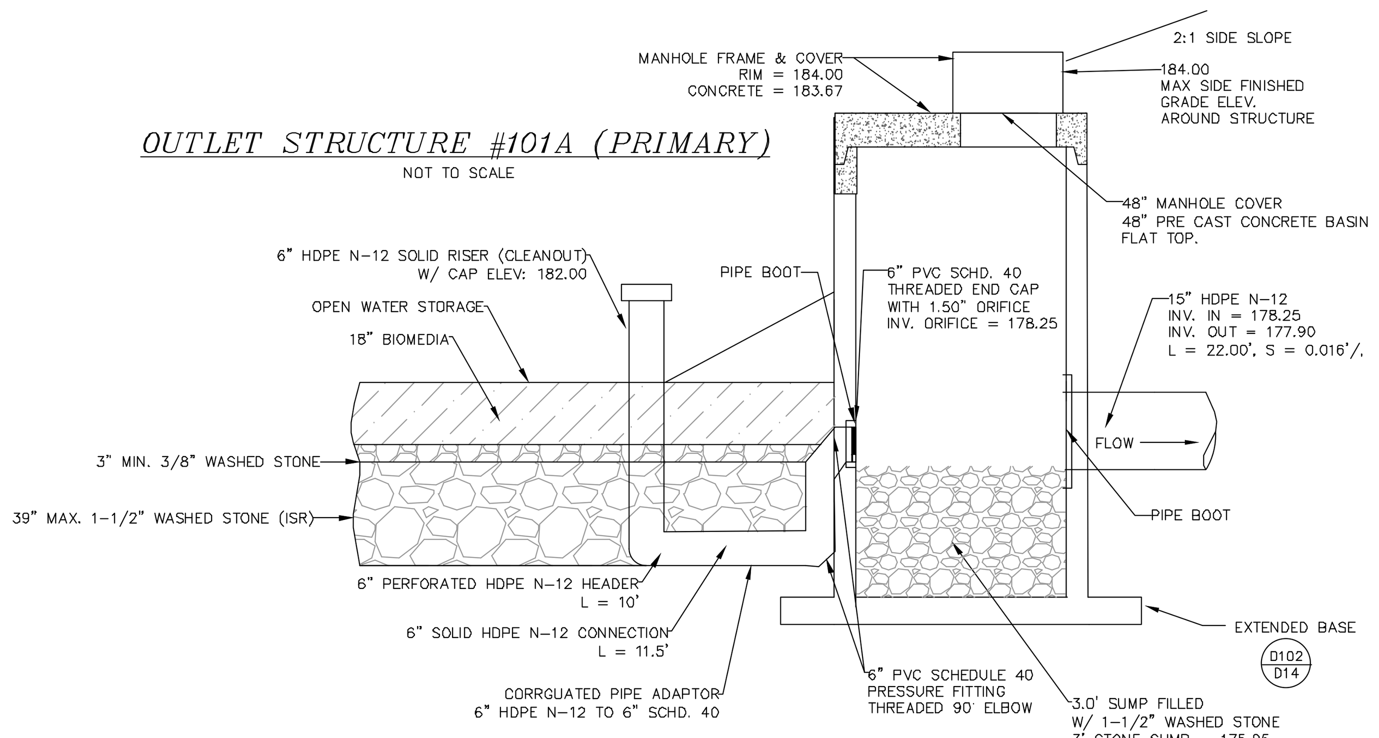


CAP WITH CONTROL ORIFICE (OS #101A)
NOT TO SCALE

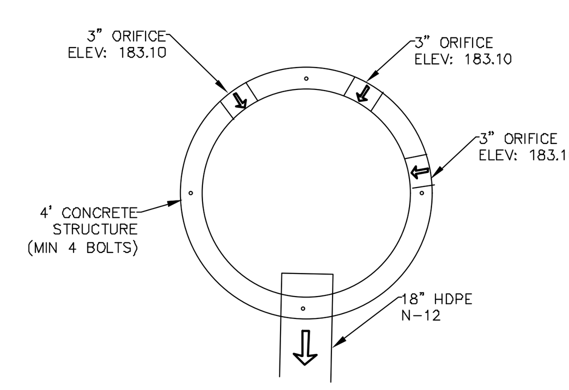
TOP VIEW (OS #101A)
NOT TO SCALE



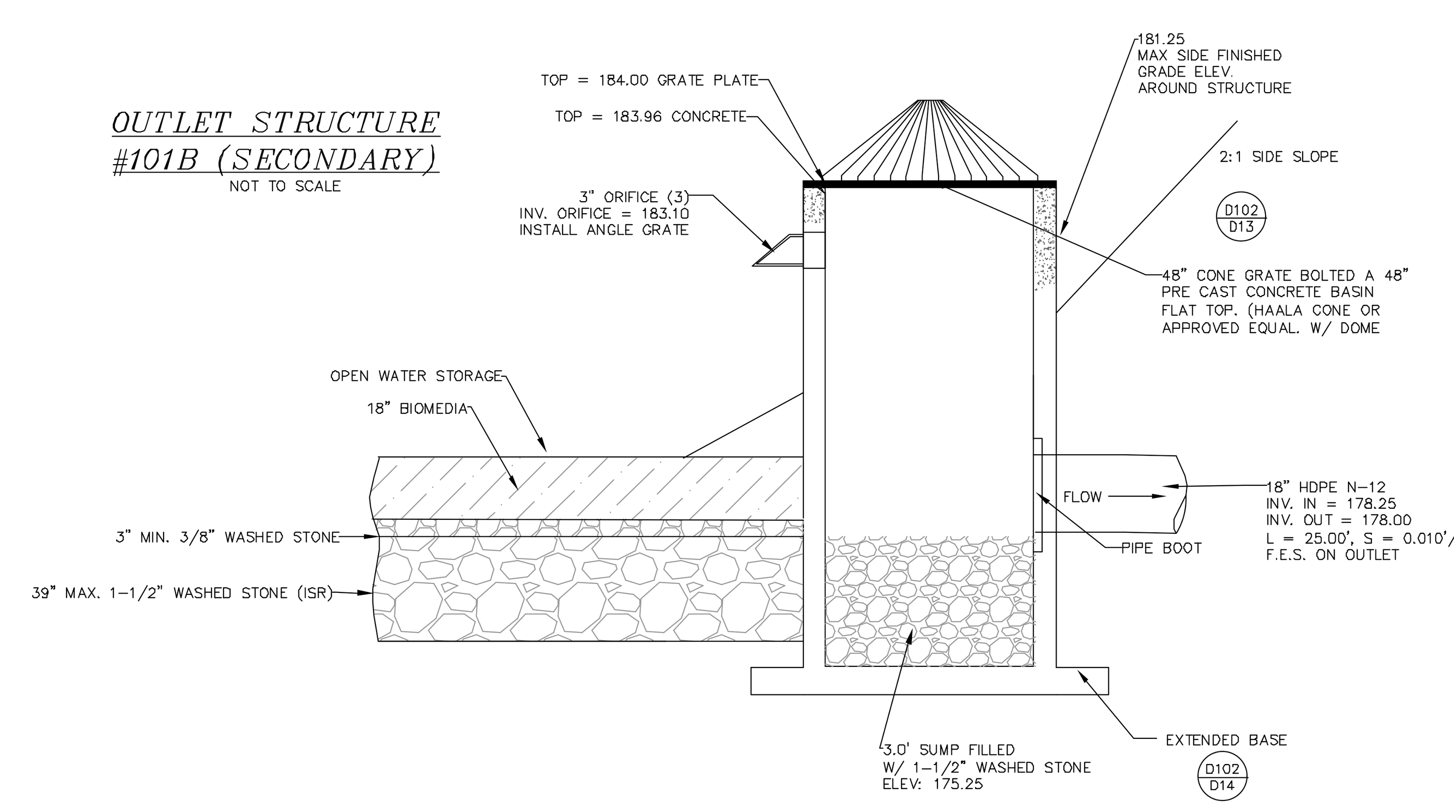
OUTLET STRUCTURE #101A (PRIMARY)
NOT TO SCALE



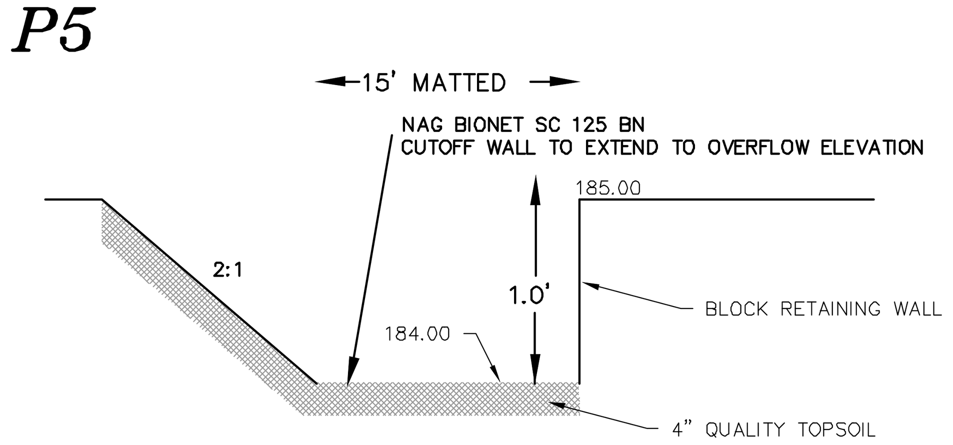
TOP VIEW (OS #101B)
NOT TO SCALE



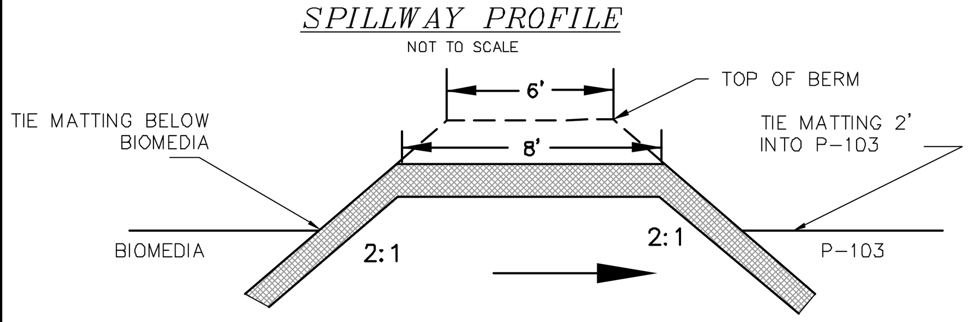
OUTLET STRUCTURE #101B (SECONDARY)
NOT TO SCALE



P5



SPILLWAY PROFILE
NOT TO SCALE



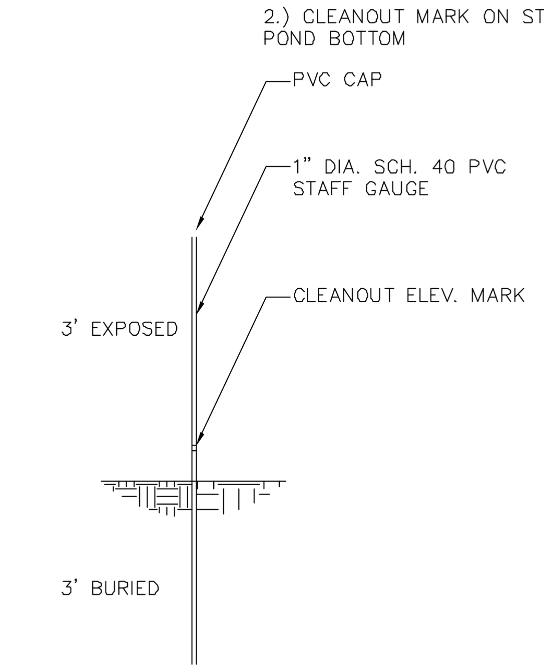
SPILLWAY PROFILE
NOT TO SCALE

P6

SEDIMENT FORBAY GAUGE DETAIL

1.) SCHEDULE 40 PVC TO BE DRIVEN OR PLACED IN GROUND A MIN. 3'

2.) CLEANOUT MARK ON STAFF TO BE RED PAINT SET 6" ABOVE POND BOTTOM



FOR TOWN APPROVAL PURPOSES :

THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

DETAILS

P-101B

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

BIORETENTION W/ ISR #101 DETAILS
FOR
TURBOCAM, INC.
LAND OF
NHBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 14-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : N/A
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE – KENNETH A. BERRY No. 14243 LICENSED – PROFESSIONAL ENGINEER

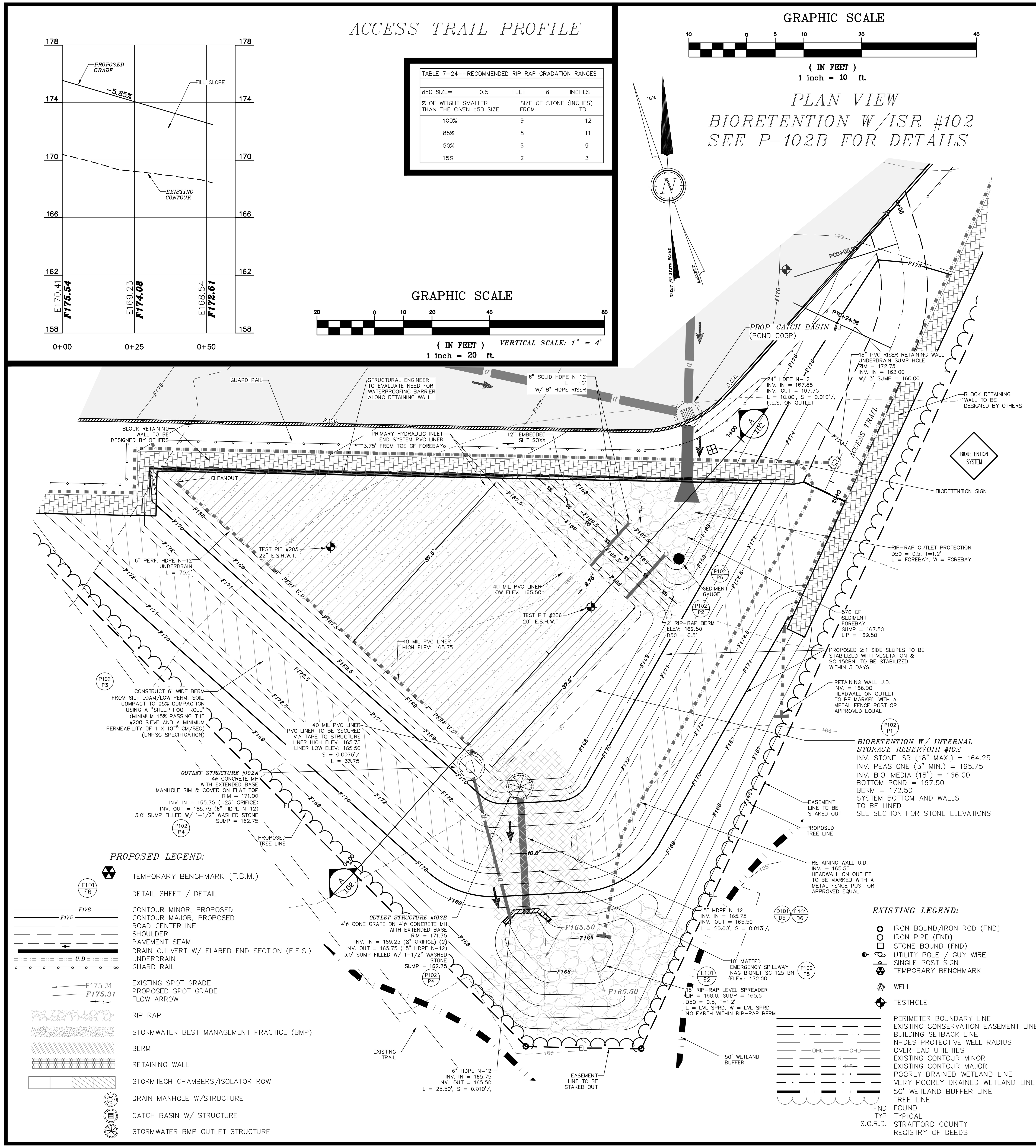
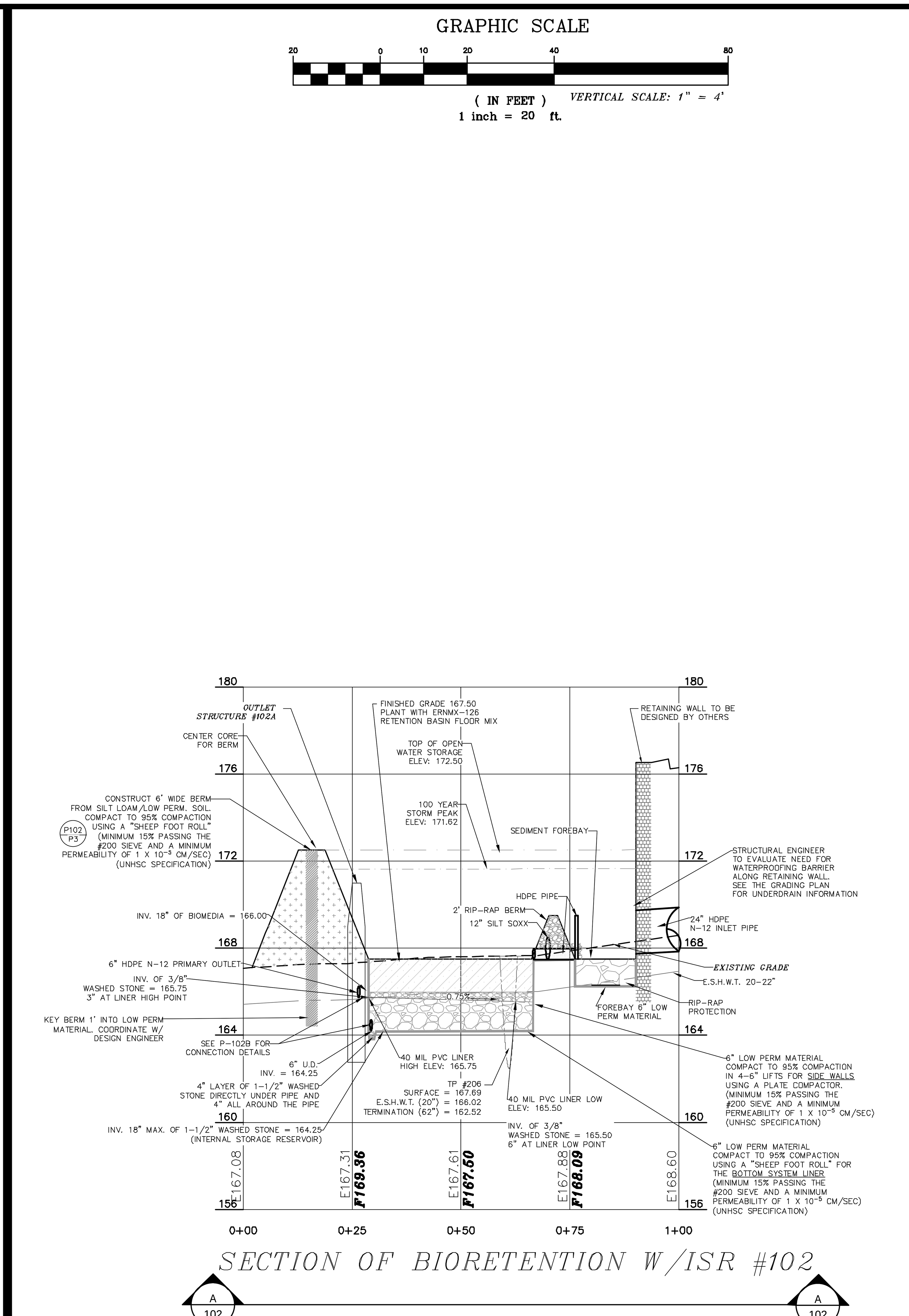


TABLE 7-24--RECOMMENDED RIP RAP GRADATION RANGES		
d50 SIZE= 0.5 FEET	6 INCHES	
% OF WEIGHT SMALLER THAN THE GIVEN d50 SIZE	SIZE OF STONE (INCHES) FROM	TO
100%	9	12
85%	8	11
50%	6	9
15%	2	3



SECTION OF BIORETENTION W/ISR #102

FOR TOWN APPROVAL PURPOSES :

THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

PLAN VIEW/ SECTIONS

P-102A

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

BIORETENTION W/ ISR #102 PLAN VIEW & PROFILES

FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : AS SHOWN
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14243 LICENSED PROFESSIONAL ENGINEER

P1

UNH STORMWATER CENTER SPECIFICATIONS ACCEPTABLE PARTICLE SIZE DISTRIBUTION OF FINAL BIORETENTION SOIL MIX			
MEDIA TYPE	SIEVE #	SIZE (IN)	% PASSING
COURSE SAND	4	0.187	100
MEDIUM SAND	10	0.079	95
FINE SAND	40	0.017	15–40
SILTS	200	0.003	10–20
CLAYS	<200	PAN	0–5

3/8" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
1/2"	100
3/8"	95 – 100
# 4	22 – 55
# 8	0 – 10

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

1-1/2" WASHED CRUSHED STONE*

SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 – 100
1"	20 – 55
1/2"	0 –15
3/8"	0 –5

* EQUIVALENT TO STANDARD WASHED STONE – SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

BIORETENTION SOIL MEDIA COMPONENTS
–AMOUNTS MIXED BY TOTAL VOLUME
*60–85% SAND
*15–25% LOAM OR TOPSOIL
*3–8% ORGANIC MATTER
*5% WATER TREATMENT RESIDUALS OR 0.5% IRON FILINGS

WATER TREATMENT RESIDUALS OR IRON FILINGS ARE REQUIRED DUE TO THE CLASS "A" RECEIVING WATERS

REFER TO THE "UNHSC STANDARD DETAIL, BIORETENTION ISR STORMWATER SYSTEM", FEBRUARY 2020 FOR FURTHER PUBLISHED GENERAL CONSTRUCTION GUIDELINES

STABILIZATION NOTE:
SEE NOTE #6, SHEET E-102, DETAIL E-18
SIDE SLOPES ARE TO BE STABILIZED WITHIN THREE WORKING DAY UPON COMPLETION OF FINAL GRADE.

CONSTRUCTION NOTE: THE DESIGN ENGINEER IS TO BE ON SITE PRIOR TO AND DURING THE PLACEMENT OF THE RESERVOIR STONE, AND TO WITNESS THE INSTALLATION OF THE UNDER-DRAIN AND LINER. PLEASE PROVIDE 48 HOURS NOTICE PRIOR TO REQUESTED INSPECTION.

PVC LINER TO BE 40 TO 60 MIL. THE SEAMS SHALL BE SEALED

TESTING TO DETERMINE HYDRAULIC CONDUCTIVITY AND NEED FOR BOTTOM/SIDE SYSTEM LINER TO BE DETERMINED DURING CONSTRUCTION PROCESS.

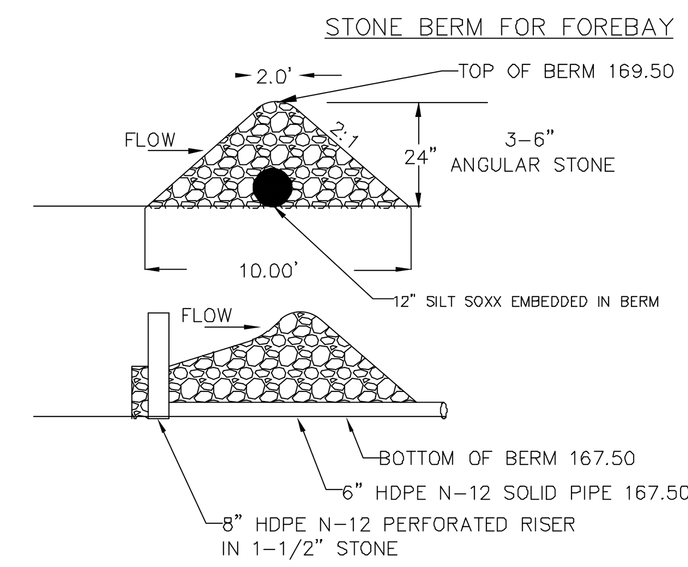
DESIGN REFERENCES

1 UNH STORMWATER CENTER.
https://scholars.unh.edu/stormwater/73/

BIORETENTION W/ ISR CONSTRUCTION SPECIFICATIONS

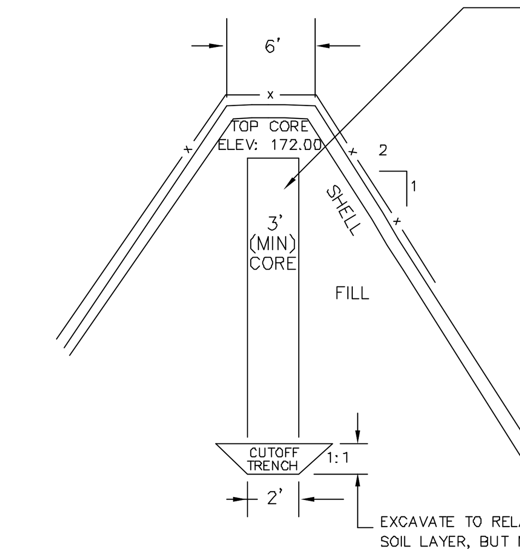
P2

STONE BERM FOR FOREBAY



P3

LOW PERMEABILITY MATERIAL GRADATION	
SIEVE SIZE	% PASSING BY WEIGHT
#4	95 – 100
#40	60 – 95
#100	40 – 60
#200	25 – 45



1.) 3' CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL MEETING THE REQUIREMENT OF THE LOW PERM SPECIFICATION

2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.

3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.

4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.

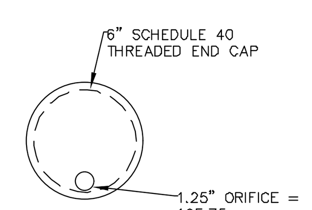
5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.

6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

BIORETENTION W/ ISR BERM CONSTRUCTION
NOT TO SCALE

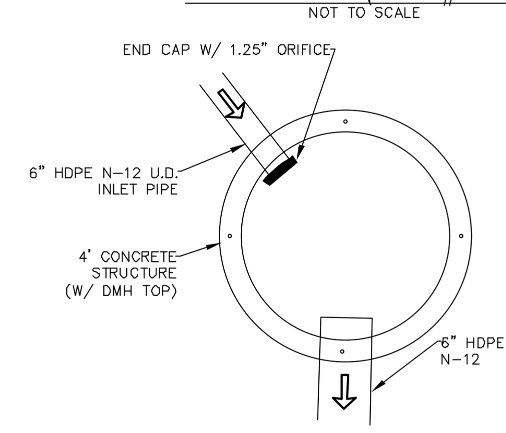
BIORETENTION W/ ISR STRUCTURES & DETAILS
NOT TO SCALE

P4

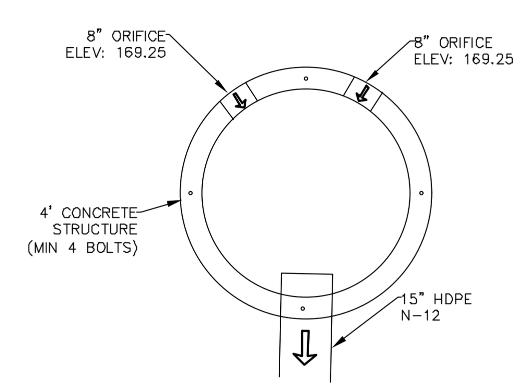


CAP WITH CONTROL ORIFICE (OS #102A)
NOT TO SCALE

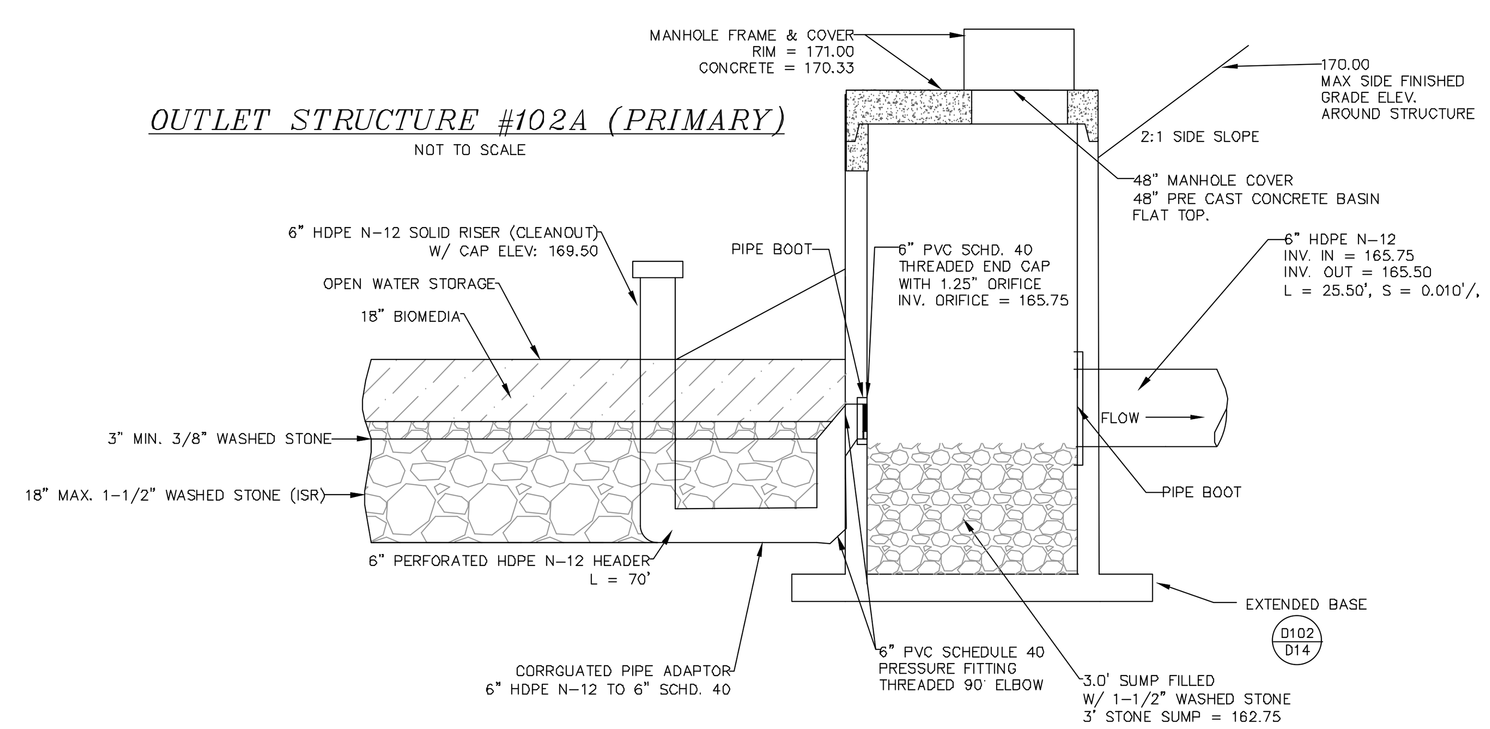
TOP VIEW (OS #102A)
NOT TO SCALE



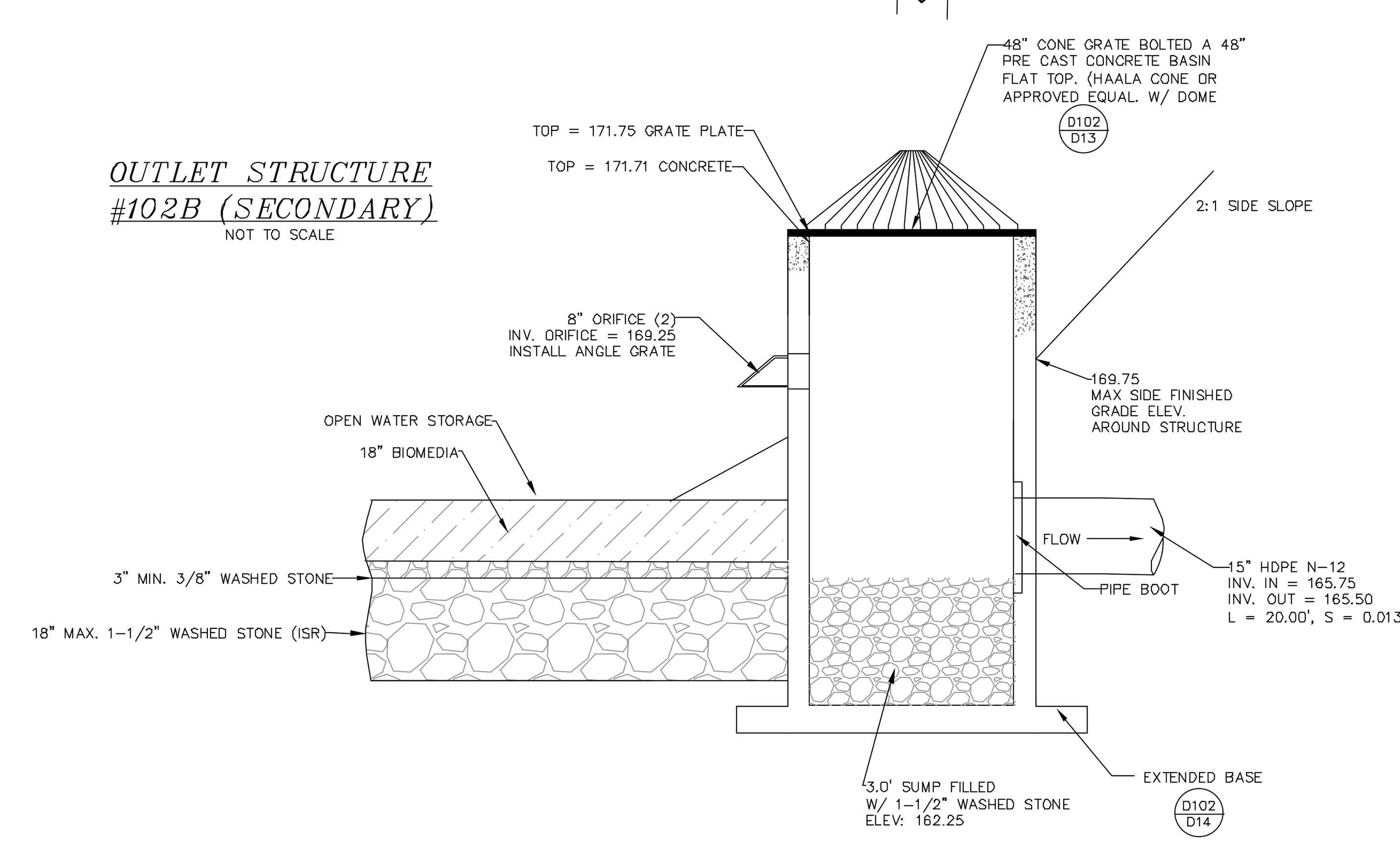
TOP VIEW (OS #102B)
NOT TO SCALE



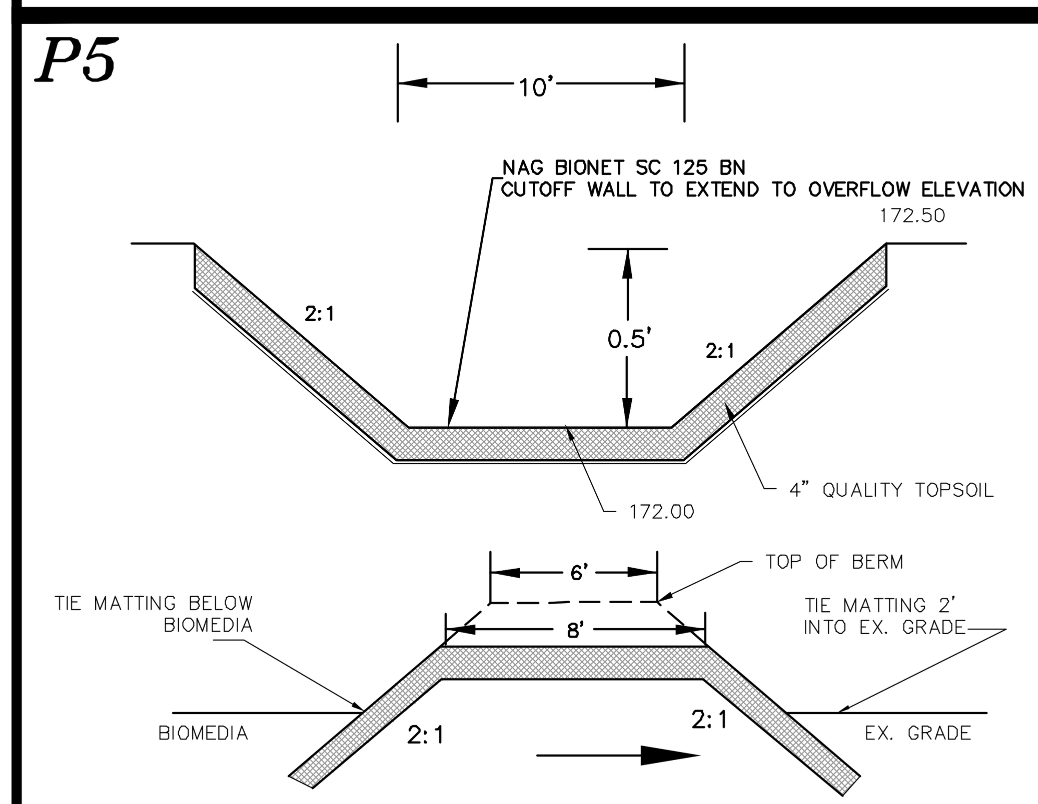
OUTLET STRUCTURE #102A (PRIMARY)
NOT TO SCALE



OUTLET STRUCTURE #102B (SECONDARY)
NOT TO SCALE



P5



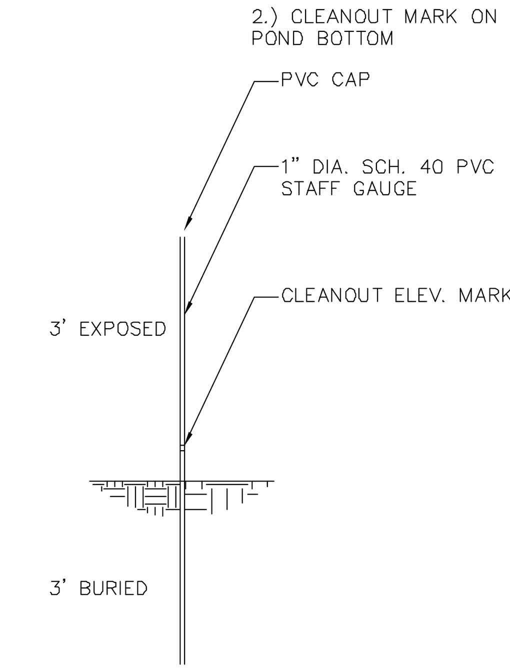
EMERGENCY SPILLWAY PROFILE
NOT TO SCALE

P6

SEDIMENT FORBAY GAUGE DETAIL

1.) SCHEDULE 40 PVC TO BE DRIVEN OR PLACED IN GROUND A MIN. 3'

2.) CLEANOUT MARK ON STAFF TO BE RED PAINT SET 6" ABOVE POND BOTTOM



FOR TOWN APPROVAL PURPOSES :

THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

DETAILS

P–102B

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

BIORETENTION W/ ISR #102 DETAILS

FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : N/A
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 – 017

STATE OF NEW HAMPSHIRE – KENNETH A. BERRY No. 14243 LICENSED PROFESSIONAL ENGINEER

EXISTING LEGEND:

- IRON BOUND/IRON ROD (FND)
- IRON PIPE (FND)
- STONE BOUND (FND)
- UTILITY POLE / GUY WIRE
- SINGLE POST SIGN
- TEMPORARY BENCHMARK
- WELL
- TESTHOLE
- PERIMETER BOUNDARY LINE
- EXISTING CONSERVATION EASEMENT LINE
- BUILDING SETBACK LINE
- NHDES PROTECTIVE WELL RADIUS
- OVERHEAD UTILITIES
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- POORLY DRAINED WETLAND LINE
- VERY POORLY DRAINED WETLAND LINE
- 50' WETLAND BUFFER LINE
- TREE LINE

FND FOUND
TYP TYPICAL
S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS

PROPOSED LEGEND:

- TEMPORARY BENCHMARK (T.B.M.)
- DETAIL SHEET / DETAIL
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- ROAD CENTERLINE
- SHOULDER
- PAVEMENT SEAM
- DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
- UNDERDRAIN
- GUARD RAIL
- EXISTING SPOT GRADE
- PROPOSED SPOT GRADE
- FLOW ARROW
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- RETAINING WALL
- STORMTECH CHAMBERS/ISOLATOR ROW
- DRAIN MANHOLE W/STRUCTURE
- CATCH BASIN W/ STRUCTURE
- STORMWATER BMP OUTLET STRUCTURE

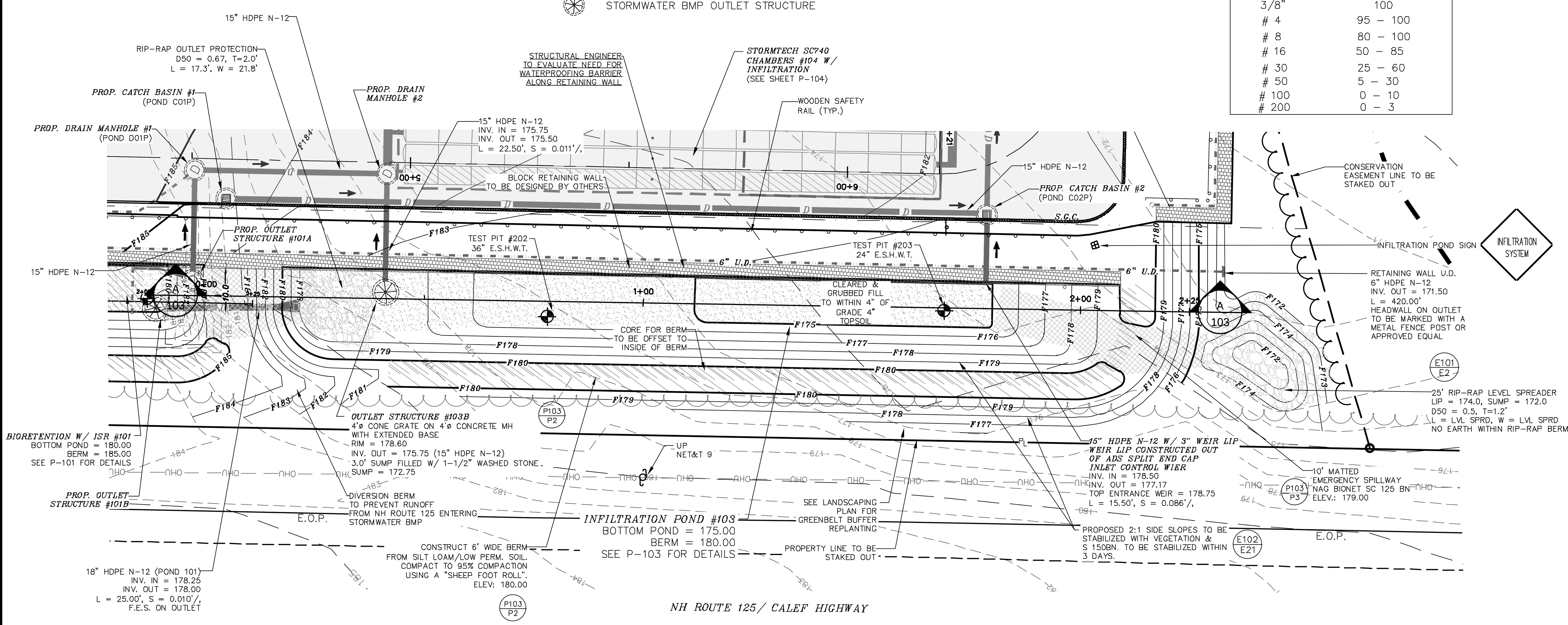
PLAN VIEW INFILTRATION POND #103

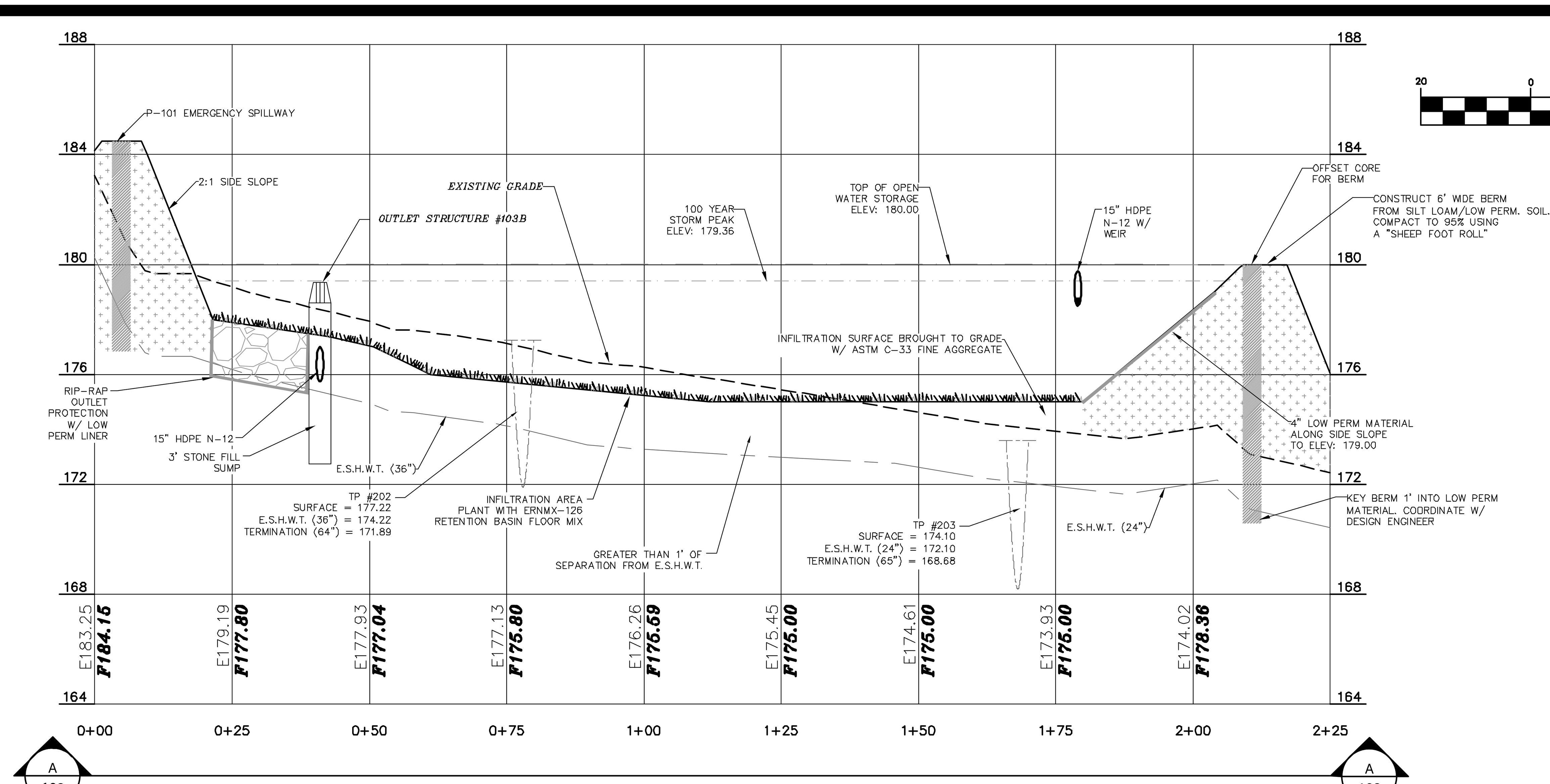
STABILIZATION NOTE:
SEE NOTE #6, SHEET E-102, DETAIL E-18
SIDE SLOPES ARE TO BE STABILIZED WITHIN THREE WORKING DAY UPON COMPLETION OF FINAL GRADE.

INFILTRATION SURFACE PROTECTION NOTE:
SEE EROSION AND SEDIMENT CONTROL PLAN
IT IS RECOMMENDED THAT THE CONTRACTOR TAKE MEASURES TO PROTECT THE INFILTRATION SURFACE FROM SEDIMENTATION CAUSED BY EROSION ON THE SIDE SLOPES

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

ASTM C-33 FINE AGGREGATE	
SIEVE SIZE	% PASSING BY WEIGHT
3/8"	100
# 4	95 - 100
# 8	80 - 100
# 16	50 - 85
# 30	25 - 60
# 50	5 - 30
# 100	0 - 10
# 200	0 - 3



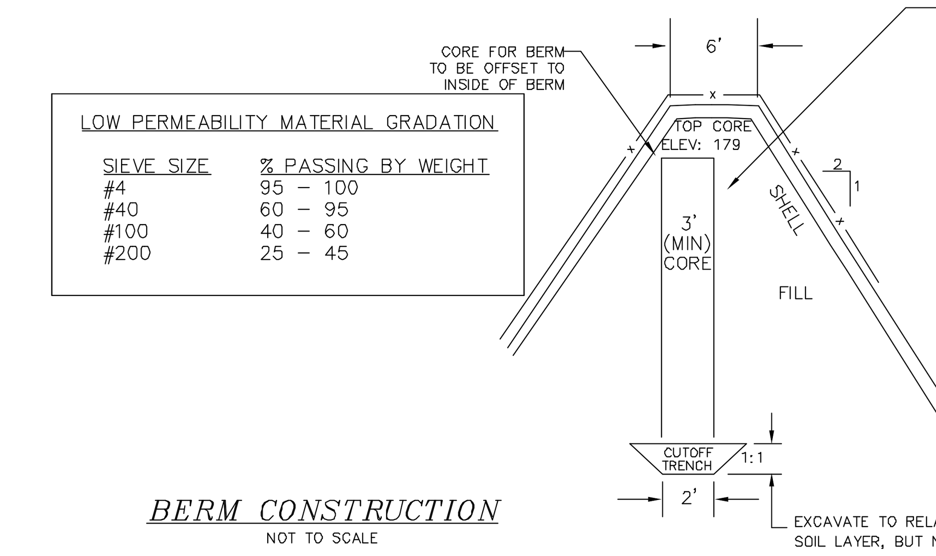


SECTION OF INFILTRATION POND #103

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.
VERTICAL SCALE: 1" = 4'

P1

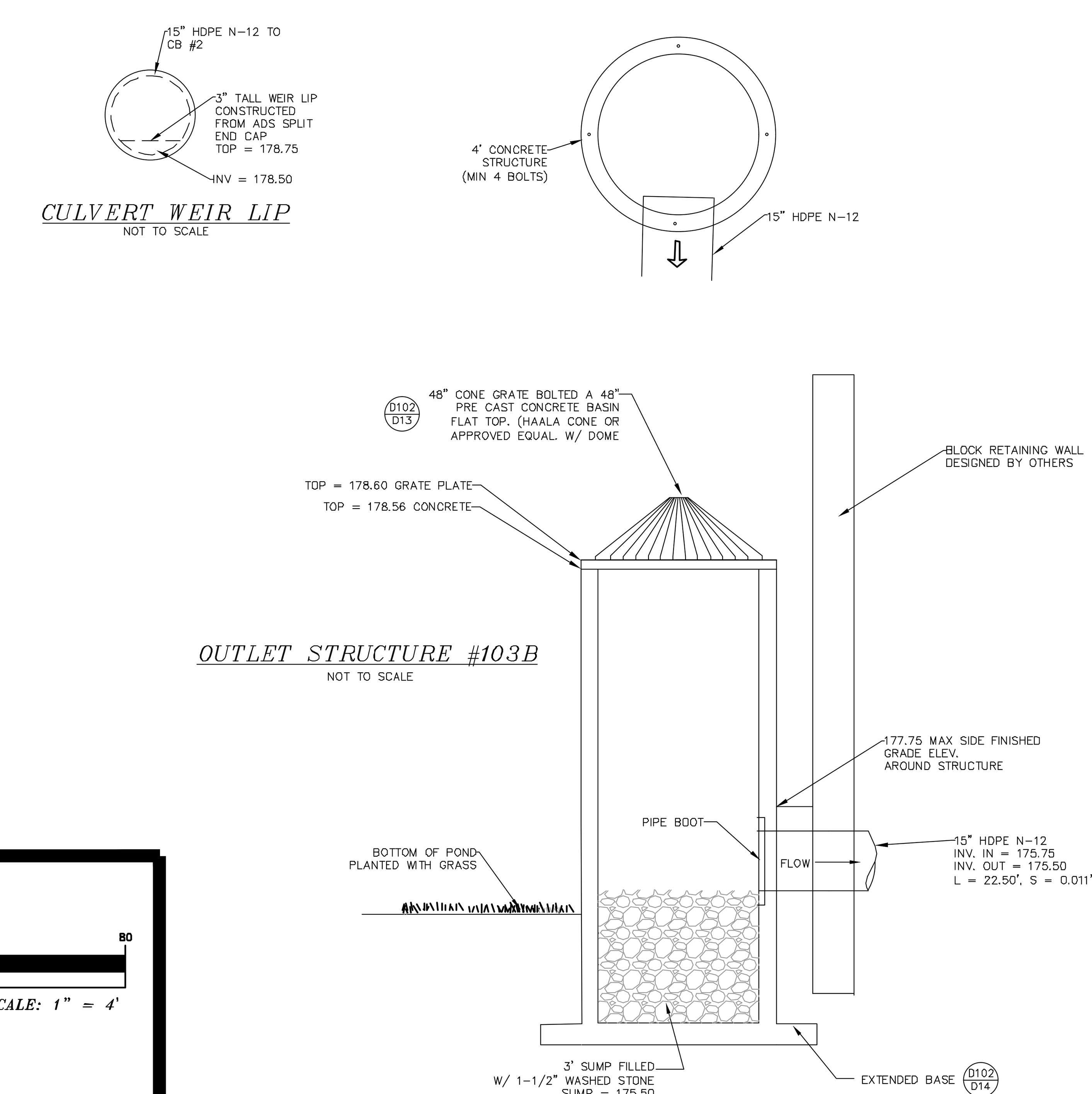
LOW PERMEABILITY MATERIAL GRADATION	
SIEVE SIZE	% PASSING BY WEIGHT
#4	95 - 100
#40	60 - 95
#100	40 - 60
#200	25 - 45



BERM CONSTRUCTION
NOT TO SCALE

1.) 3' CORE IS TO BE CONSTRUCTED OF COMPACTED LOAM MATERIAL.
2.) CORE IS TO BE INSTALLED & COMPACTED IN 12" LIFTS.
3.) INSTALLATION OF ENTIRE DRAINAGE STRUCTURE IS TO BE OVERSEEN BY DESIGN ENGINEER.
4.) GENERAL FILL MATERIALS ARE TO PLACED & COMPACTED IN 12" LIFTS.
5.) GENERAL FILL MATERIAL MAY BE INSTALLED USING ONSITE MATERIALS.
6.) CORE IS TO BE CONSTRUCTED UNDERNEATH THE PROPOSED SPILLWAY.

P2

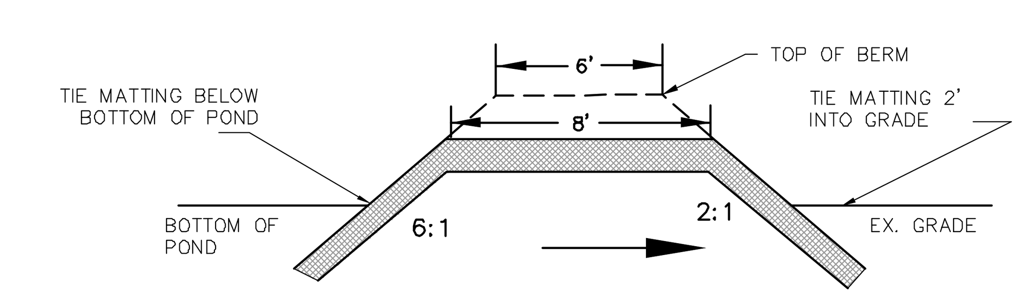


TOP VIEW
NOT TO SCALE

CULVERT WEIR LIP
NOT TO SCALE

OUTLET STRUCTURE #103B
NOT TO SCALE

P3



EMERGENCY SPILLWAY PROFILE
NOT TO SCALE

FOR TOWN APPROVAL PURPOSES :

THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

P-103

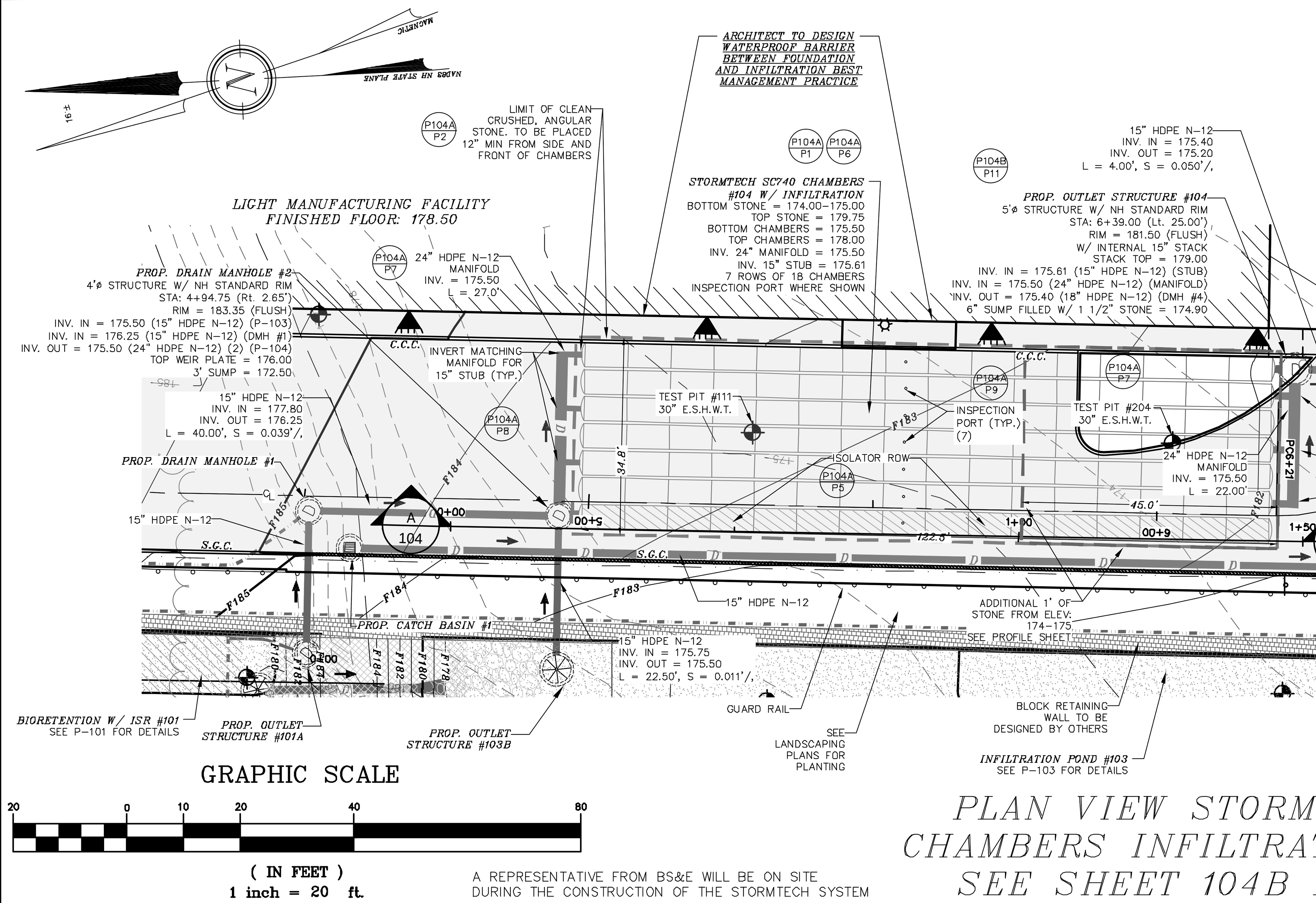
REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

INFILTRATION POND #103
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14243
LICENSED
PROFESSIONAL ENGINEER



1-1/2" WASHED CRUSHED STONE * (AASHTO NO. 4)	
SIEVE SIZE	% PASSING BY WEIGHT
2"	100
1-1/2"	90 - 100
1"	20 - 55
1/2"	0 - 15
3/8"	0 - 5

* EQUIVALENT TO STANDARD WASHED STONE - SECTION 702 OF NHDOT NHDOT STANDARD SPECIFICATIONS

A REPRESENTATIVE FROM BS&E WILL BE ON SITE DURING THE CONSTRUCTION OF THE STORMTECH SYSTEM

PLAN VIEW STORMTECH SC-740 CHAMBERS INFILTRATION POND #104
SEE SHEET 104B FOR DETAILS

P1

1. ALL DESIGN SPECIFICATIONS FOR STORMTECH SC-740 CHAMBERS SHALL BE IN ACCORDANCE WITH THE STORMTECH DESIGN MANUAL, ADVANCED DRAINAGE SYSTEM, INC (ADS STORMTECH)
2. THE INSTALLATION OF STORMTECH SC-740 CHAMBERS SHALL BE IN ACCORDANCE WITH THE LATEST STORMTECH INSTALLATION INSTRUCTIONS
3. THE CONTRACTOR IS ADVISED TO REVIEW AND UNDERSTAND THE INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING SYSTEM INSTALLATION. CALL **1-888-892-2694** OR VISIT **WWW.STORMTECH.COM** TO RECIEVE A COPY OF THE LATEST STORMTECH INSTALLATION INSTRUCTIONS
4. CHAMBERS SHALL MEET THE DESIGN REQUIREMENTS AND LOAD FACTORS SPECIFIED IN SECTION 12.12 OF THE LATEST EDITION OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

SC-740 NOTES

P2

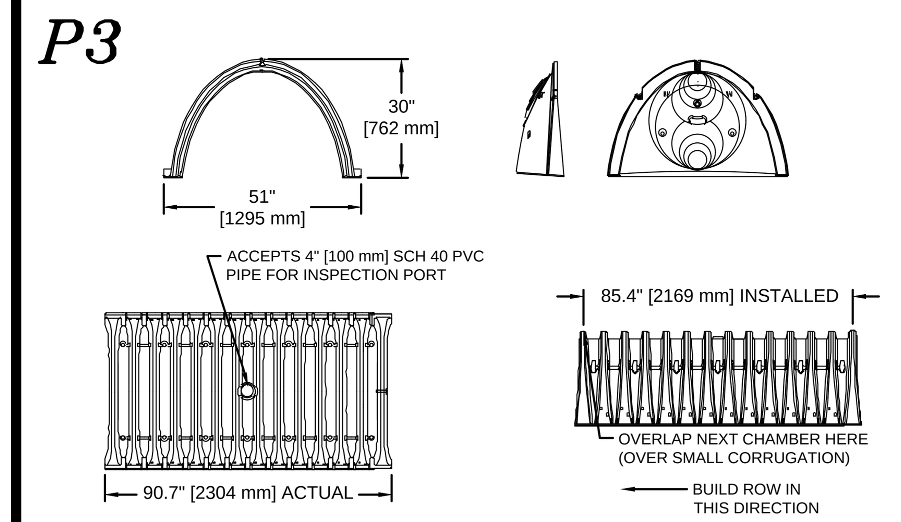
ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	AASHTO M43 DESIGNATION[1]	COMPACTION/DENSITY REQUIREMENT
(D) FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISH GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THIS LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
(C) FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" [457 mm] ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THIS LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, < 35% FINES. MOST PAVEMENT SUB-BASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTION AFTER 12" [305 mm] OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" [152 mm] LIFTS TO A MIN. 95% STANDARD PROCTOR DENSITY. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs [53 kN]. DYNAMIC FORCE NOT TO EXCEED 20,000 lbs [89 kN].
(B) EMBEDMENT STONE SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4 - 2 INCH [19 - 51 mm]	3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
(A) FOUNDATION STONE BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4 - 2 INCH [19 - 51 mm]	3, 35, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY[2].

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE.
2. AS AN ALTERNATE TO PROCTOR TESTING AND FIELD DENSITY MEASUREMENTS ON OPEN GRADED STONE, STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9in [229 mm] (MAX) LIFTS USING TWO FULL COVERAGES WITH AN APPROPRIATE COMPACTOR.

STORMTECH ACCEPTABLE FILL MATERIALS

P3



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W x H x INSTALLED LENGTH)	51.0" x 30.0" x 85.4" [1295 mm x 762 mm x 2169 mm]
CHAMBER STORAGE	45.9 CUBIC FEET [1.30 m3]
MINIMUM INSTALLED STORAGE	74.9 CUBIC FEET [2.12 m3]
WEIGHT	75 lbs. [33.6 kg]

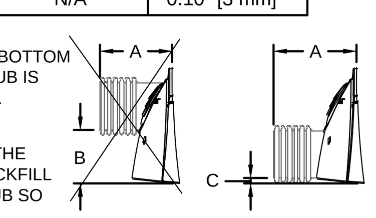
STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART#	STUB	A	B	C
SC740EPE06T	6" [150 mm]	10.90" [277 mm]	18.50" [470 mm]	N/A
SC740EPE06B	6" [150 mm]	10.90" [277 mm]	N/A	0.50" [13 mm]
SC740EPE08T	8" [200 mm]	12.20" [310 mm]	16.50" [419 mm]	N/A
SC740EPE08B	8" [200 mm]	12.20" [310 mm]	N/A	0.60" [15 mm]
SC740EPE10T	10" [250 mm]	13.40" [340 mm]	14.50" [368 mm]	N/A
SC740EPE10B	10" [250 mm]	13.40" [340 mm]	N/A	0.70" [18 mm]
SC740EPE12T	12" [300 mm]	14.70" [373 mm]	12.50" [318 mm]	N/A
SC740EPE12B	12" [300 mm]	14.70" [373 mm]	N/A	1.20" [30 mm]
SC740EPE15T	15" [375 mm]	18.40" [467 mm]	9.00" [229 mm]	N/A
SC740EPE15B	15" [375 mm]	18.40" [467 mm]	N/A	1.30" [33 mm]
SC740EPE18T	18" [450 mm]	19.70" [500 mm]	5.00" [127 mm]	N/A
SC740EPE18B	18" [450 mm]	19.70" [500 mm]	N/A	1.60" [41 mm]
*SC740EPE24B	24" [600 mm]	18.50" [470 mm]	N/A	0.10" [3 mm]

NOTE: ALL DIMENSIONS ARE NOMINAL

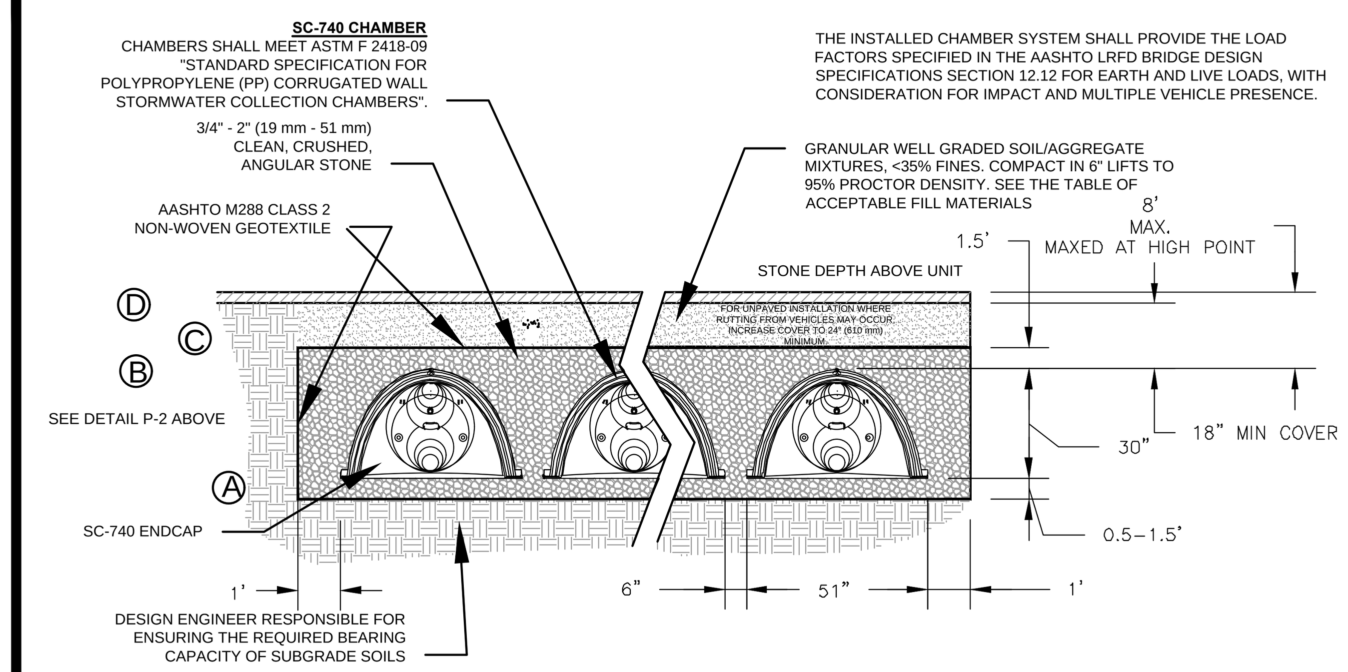
ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

*FOR THE SC740EPE24B THE 24" [600 mm] STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" [44 mm]. BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.



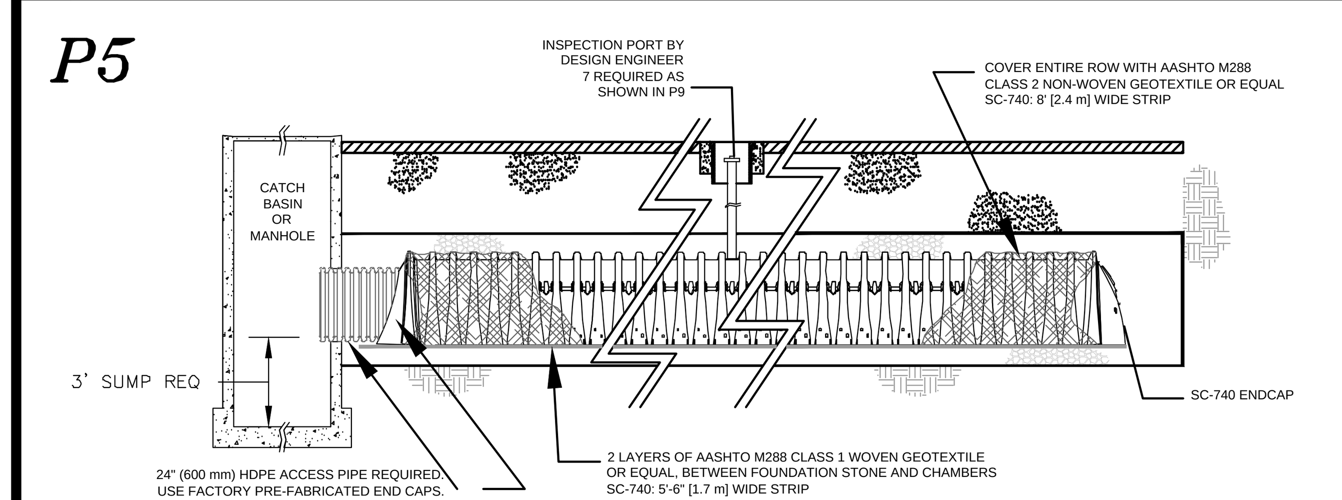
SC-740 TECHNICAL SPEC.

P4



SC-740 STANDARD CROSS SECTION

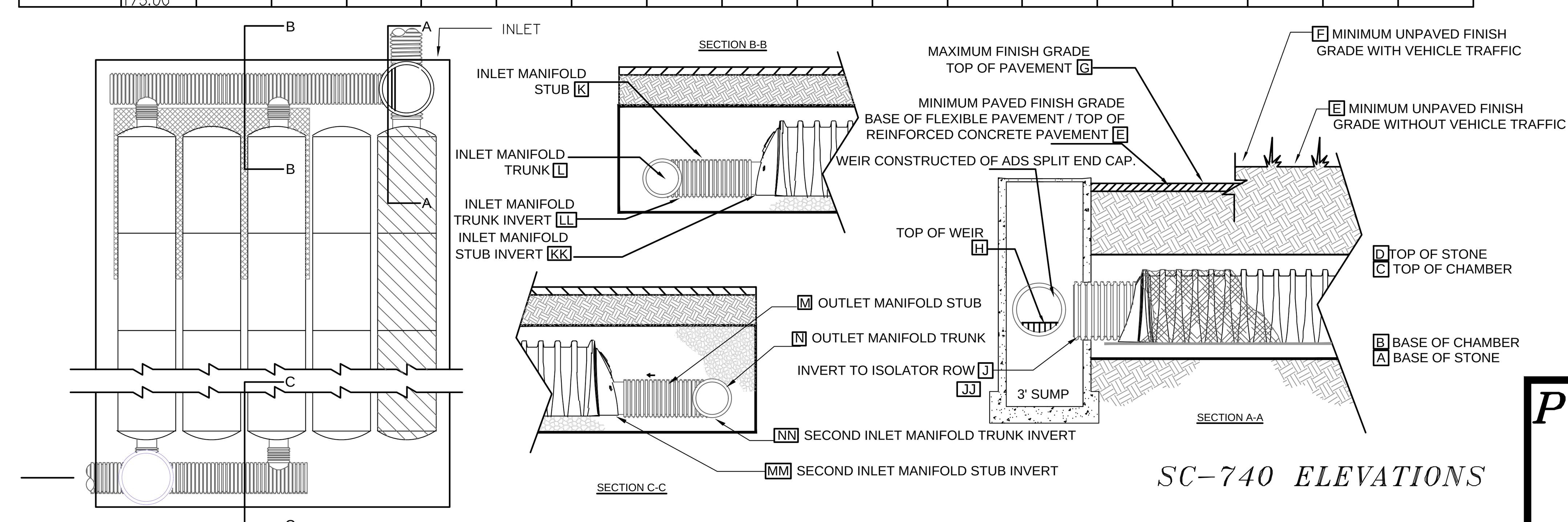
P5



SC-740 ISOLATOR ROW (TM) DETAIL

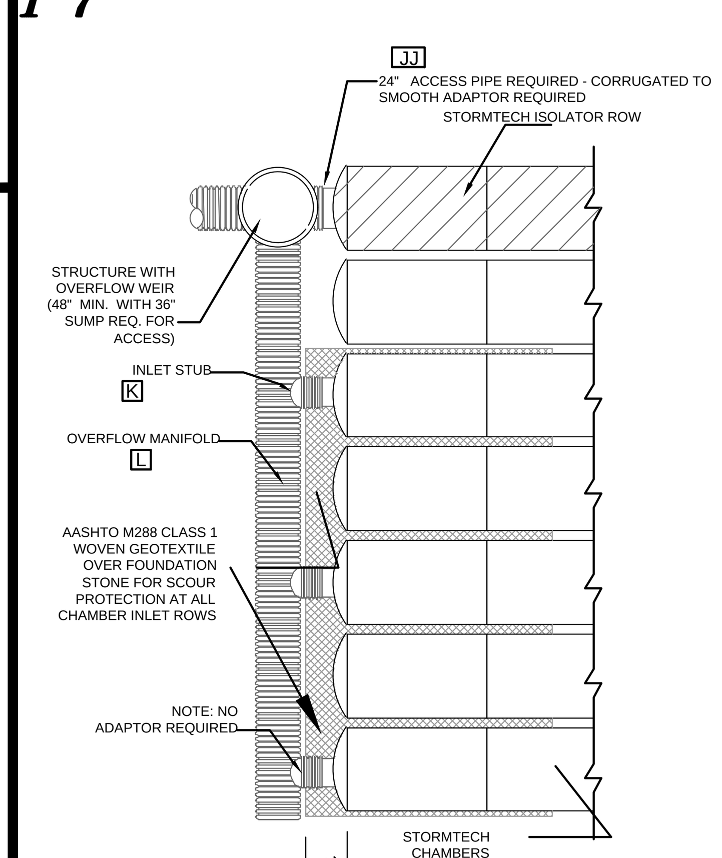
P6

	A	B	C	D	E	F	G	H	J	JJ	K	KK	L	LL	M	MM	N	NN
BED 1/ONLY	174.00 OR 175.00	175.50	179.00	179.50	181.82	N/A	183.88	176.00	175.50	24" HDPE	15" HDPE	175.61	24" HDPE	175.50	15" HDPE	175.61	24" HDPE	175.50



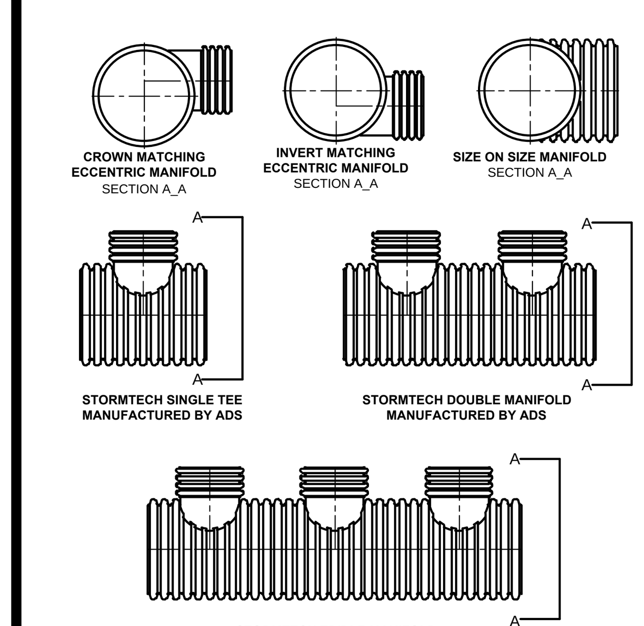
SC-740 ELEVATIONS

P7



SC-740 MANIFOLD DETAIL

P8



STUB SIZE	HEADER PIPE SIZES									
	48"	42"	36"	30"	24"	18"	15"	12"	10"	8"
24"	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	-	-	-	-	-
18"	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	-	-	-	-
15"	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	-	-	-
12"	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	-	-
10"	-	-	-	-	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	-
8"	-	-	-	-	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL
6"	-	-	-	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL	AVAIL

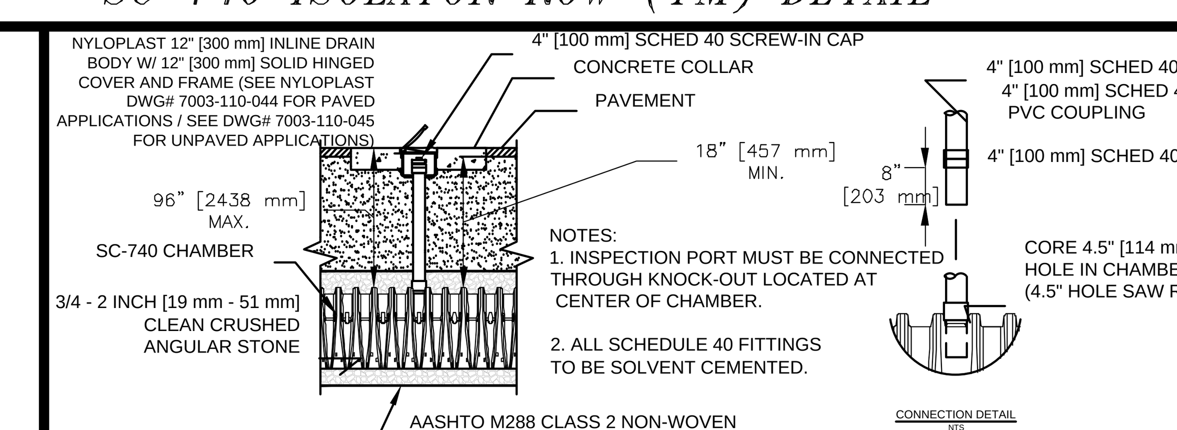
AVAIL - STANDARD HEADERS AVAILABLE

ADS 1-800-821-6710

MANIFOLDS ARE DESIGNED TO BE COUPLED TO STORMTECH PREFABRICATED END CAPS. WHEN USING STANDARD END CAPS, CORRUGATED PIPE UP TO 18 INCHES CAN BE INSERTED DIRECTLY INTO THE END CAP. FOR 24" INLET PIPES, A CORRUGATED TO SMOOTH PIPE ADAPTER IS REQUIRED.

MANIFOLDS

P9



NOTES:
1. INSPECTION PORT MUST BE CONNECTED THROUGH KNOCK-OUT LOCATED AT CENTER OF CHAMBER.
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.

SC-740 INSPECTION PORT DETAIL

P10

INSPECTION AND MAINTENANCE:

DUE TO THE CRITICAL NATURE OF INSPECTION AND MAINTENANCE STORMTECH SYSTEM AS DETAILED IN THE DESIGN MANUAL, ADVANCED DRAINAGE SYSTEM, INC (ADS STORMTECH) THE FOLLOWING THREE FIRMS ARE RECOMMENDED FOR THIS TASK. IT IS HIGHLY RECOMMENDED THAT THE OPERATOR OF THE PROPERTY HAVE A LONG TERM INSPECTION AND MAINTENANCE CONTACT WITH A FIRM THAT CAN COMPLETE THESE VITAL SERVICES.

AS FOR ISOLATOR ROW MAINTENANCE, CB MAINTENANCE, ETC., REGIONAL ADS REPRESENTATIVES RECOMMEND USING ANY OF THE FOLLOWING CONTACTS:

STORMWATER COMPLIANCE, LLC;
ATTN: NATHAN MARLES, 1-877-271-9055; NMARLES@LIDTECH.COM
163 THADEUS STREET, PORTLAND, ME 04106
INFO@STORMWATERCOMP.COM

TED BERRY COMPANY;
ATTN: DAVE BEAUCHAMP, 207-897-3348; DAVID.BEAUCHAMP@TEDBERRYCOMPANY.COM
521 FEDERAL ROAD, LIVERMORE, ME 04253
INFL@TEDBERRYCOMPANY.COM

BELLEMORE SEPTIC, SEWER, & DRAIN;
ATTN: RAY BELLEMORE, 603-641-6640; RAYMOND@BELLEMORE.COM
PO BOX 10369, BEDFORD, NH 03110

CONTACT AARON CHEEVER, P.E., ADVANCE DRAINAGE SYSTEMS, INC.
AARON.CHEEVER@ADS-PIPE.COM 1-978-302-0650
FOR PRODUCT AND PRICING

EXISTING LEGEND:

- IRON BOUND/IRON ROD (FND)
- IRON PIPE (FND)
- STONE BOUND (FND)
- UTILITY POLE / GUY WIRE
- SINGLE POST SIGN
- TEMPORARY BENCHMARK
- WELL
- TESTHOLE
- PERIMETER BOUNDARY LINE
- EXISTING CONSERVATION EASEMENT LINE
- BUILDING SETBACK LINE
- NHDES PROTECTIVE WELL RADIUS
- OVERHEAD UTILITIES
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- POORLY DRAINED WETLAND LINE
- VERY POORLY DRAINED WETLAND LINE
- 50' WETLAND BUFFER LINE
- TREE LINE
- FND FOUND
- TYP TYPICAL
- S.C.R.D. STRAFFORD COUNTY REGISTRY OF DEEDS

PROPOSED LEGEND:

- TEMPORARY BENCHMARK (T.B.M.)
- DETAIL SHEET / DETAIL
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- ROAD CENTERLINE
- SHOULDER
- PAVEMENT SEAM
- DRAIN CULVERT W/ FLARED END SECTION (F.E.S.)
- UNDERDRAIN
- GUARD RAIL
- EXISTING SPOT GRADE
- PROPOSED SPOT GRADE
- FLOW ARROW
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- RETAINING WALL
- STORMTECH CHAMBERS/ISOLATOR ROW
- DRAIN MANHOLE W/STRUCTURE
- CATCH BASIN W/ STRUCTURE
- STORMWATER BMP OUTLET STRUCTURE

FOR TOWN APPROVAL PURPOSES :

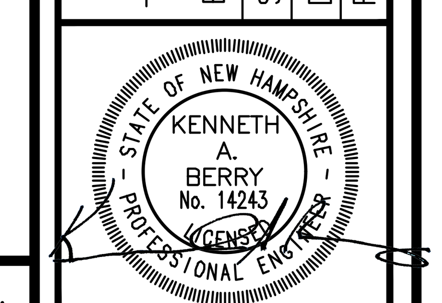
THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

STORMTECH SC740 CHAMBERS INFILTRATION POND #104
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

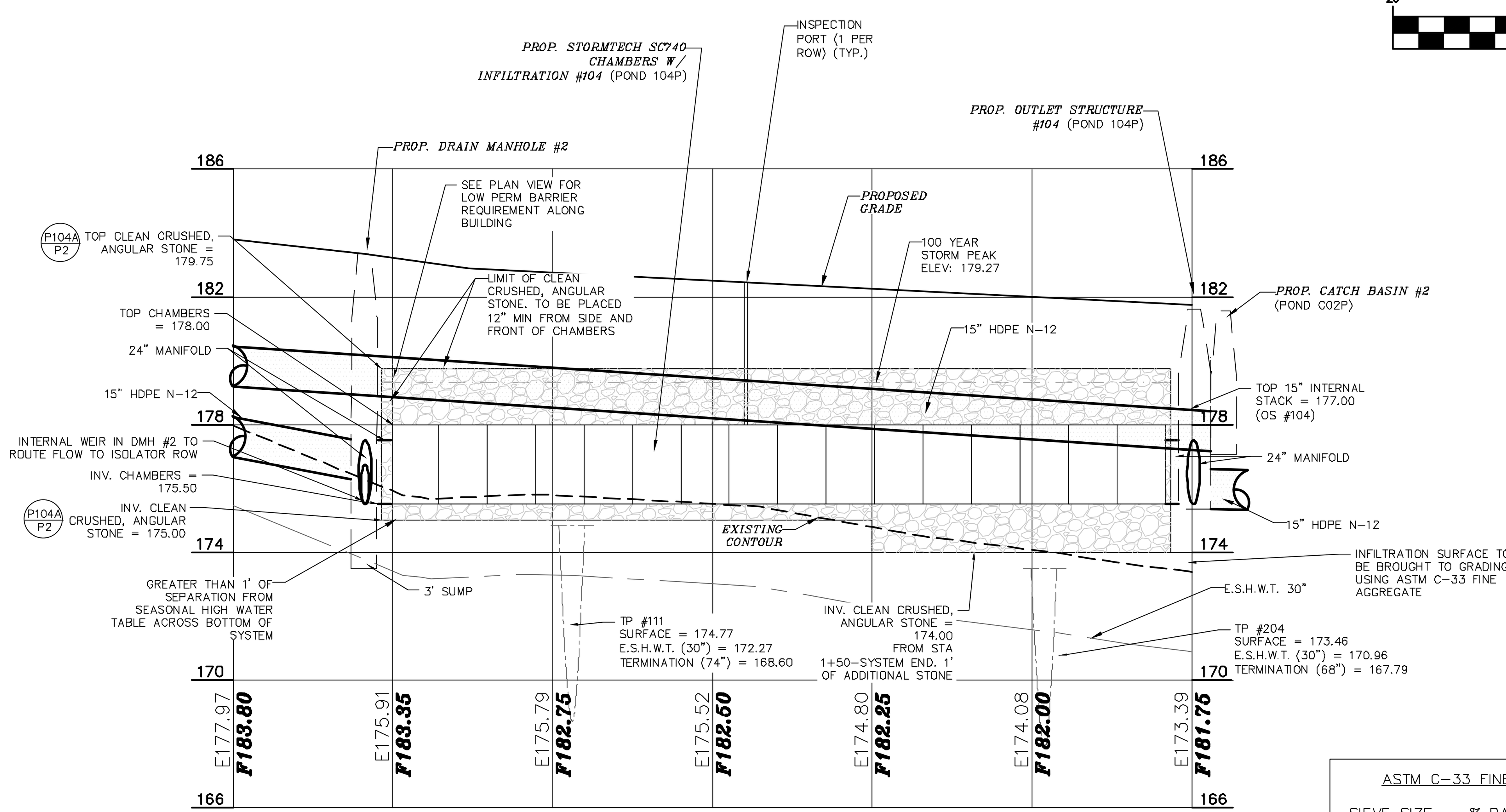


P-104A

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET) VERTICAL SCALE: 1" = 4'
1 inch = 20 ft.



SECTION OF STORMTECH INFILTRATION #104

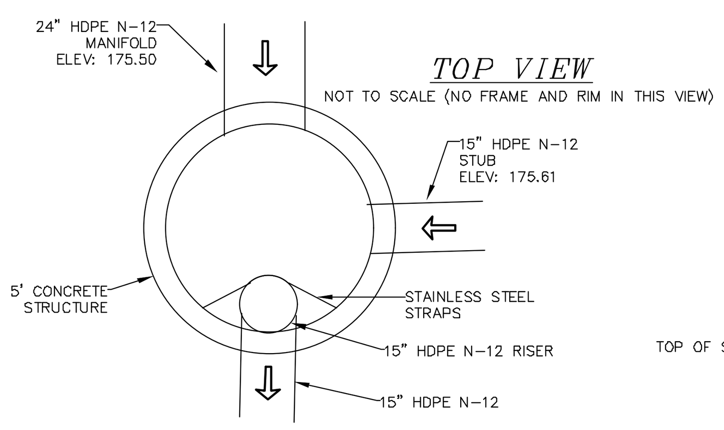
A 104 — A 104

ASTM C-33 FINE AGGREGATE	
SIEVE SIZE	% PASSING BY WEIGHT
3/8"	100
# 4	95 - 100
# 8	80 - 100
# 16	50 - 85
# 30	25 - 60
# 50	5 - 30
# 100	0 - 10
# 200	0 - 3

P11

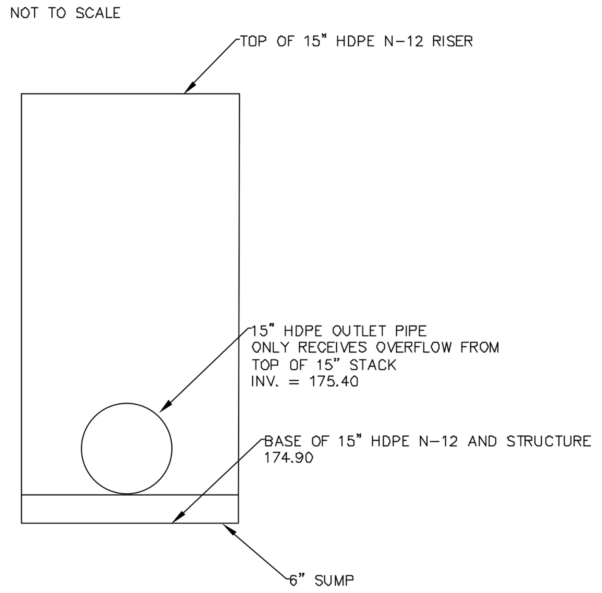
TOP VIEW

NOT TO SCALE (NO FRAME AND RIM IN THIS VIEW)



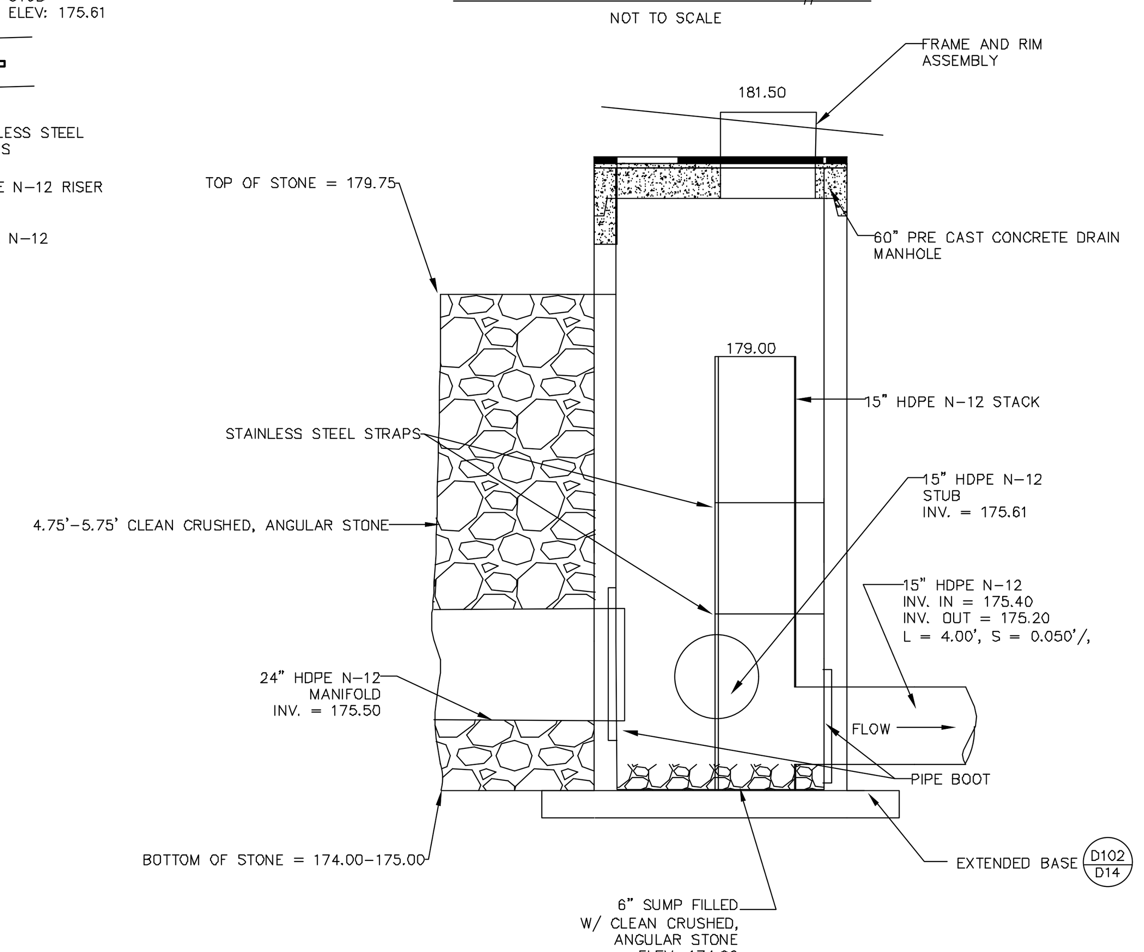
ORIFICE SCHEMATIC #104

NOT TO SCALE



OUTLET STRUCTURE #104

NOT TO SCALE



FOR TOWN APPROVAL PURPOSES :

THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.

P-104B

REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

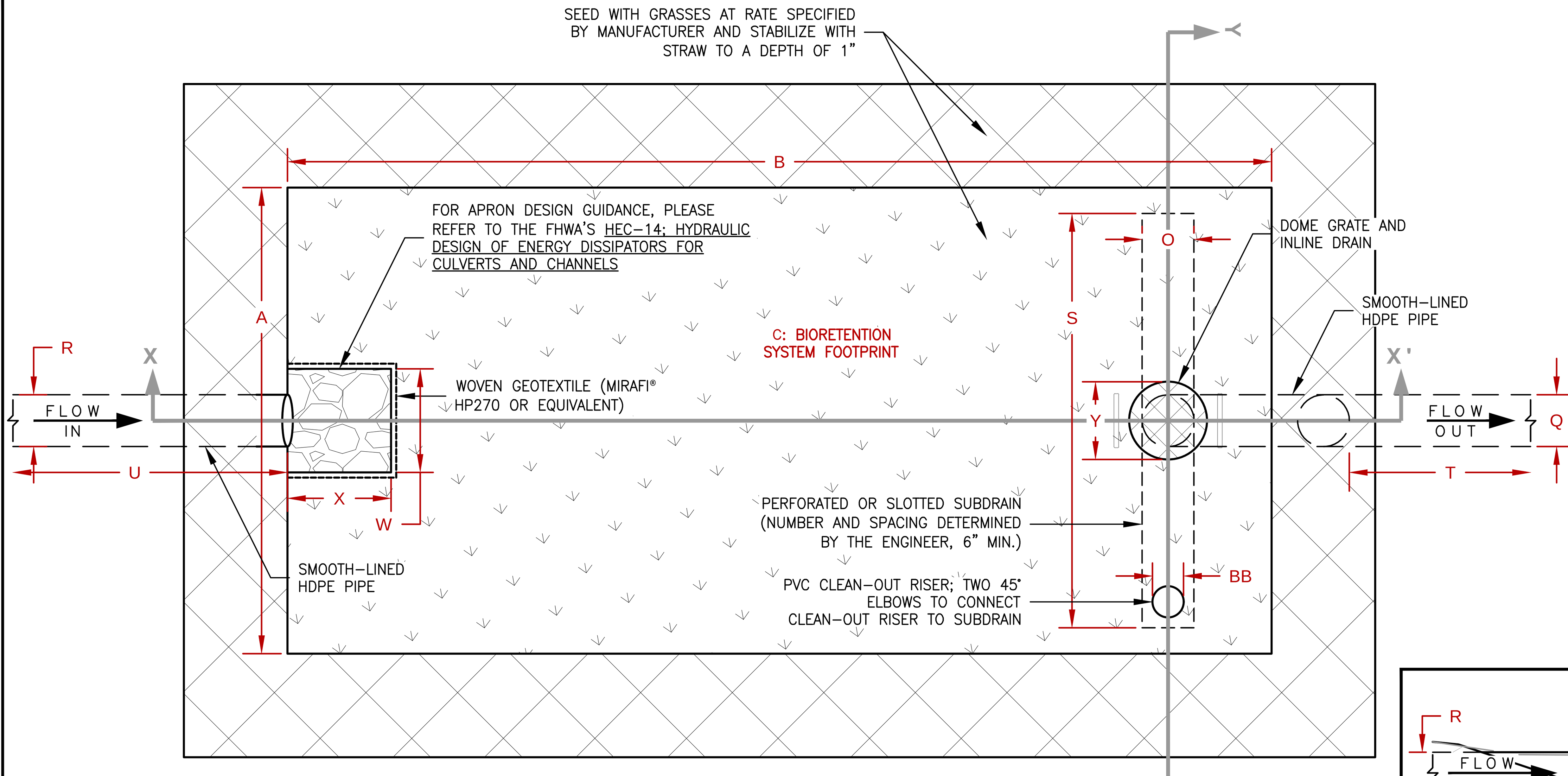
STORMTECH SC740 P104 CROSS SECTIONS

FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 14-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 20 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE KENNETH A. BERRY No. 14243 LICENSED PROFESSIONAL ENGINEER

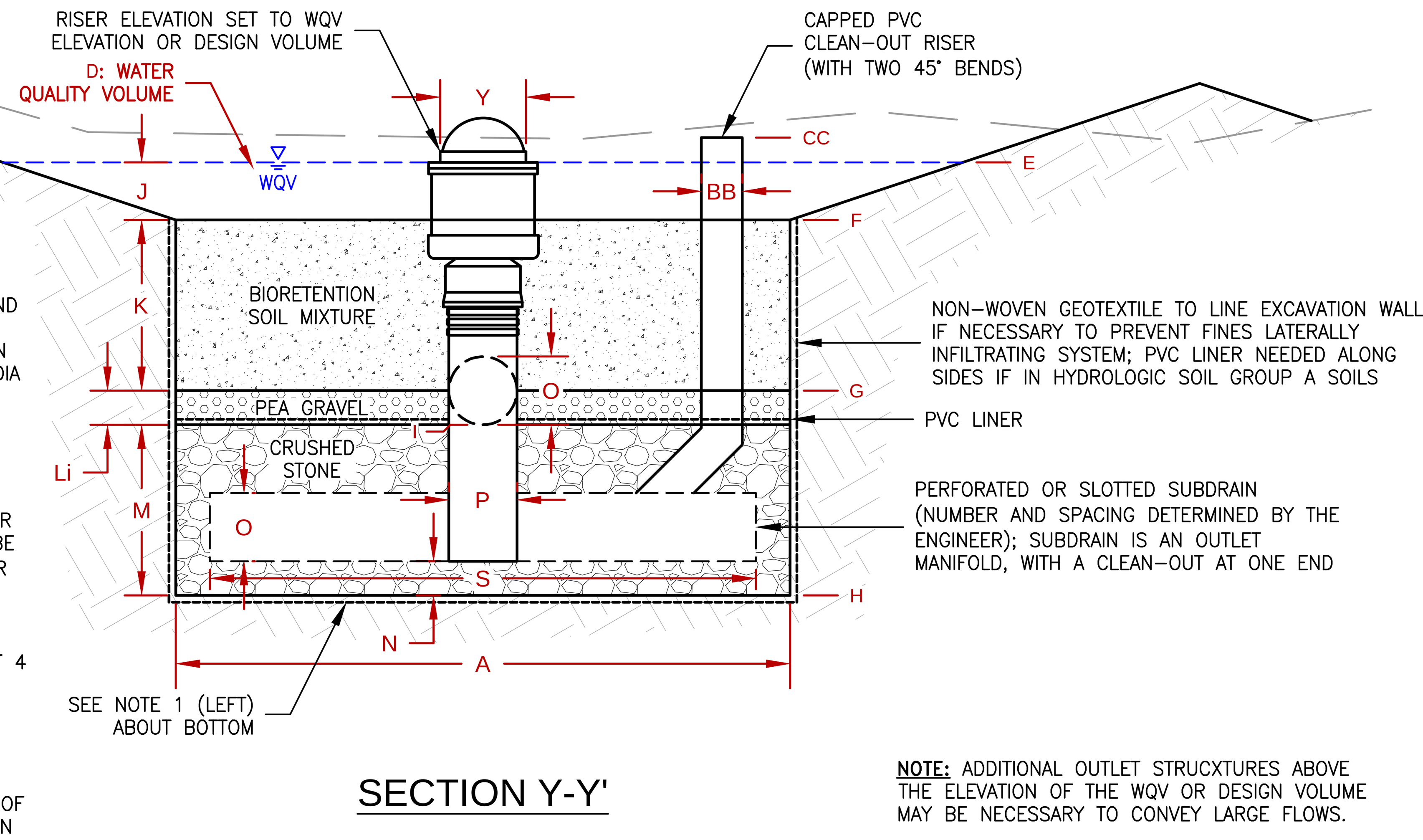


PLAN VIEW

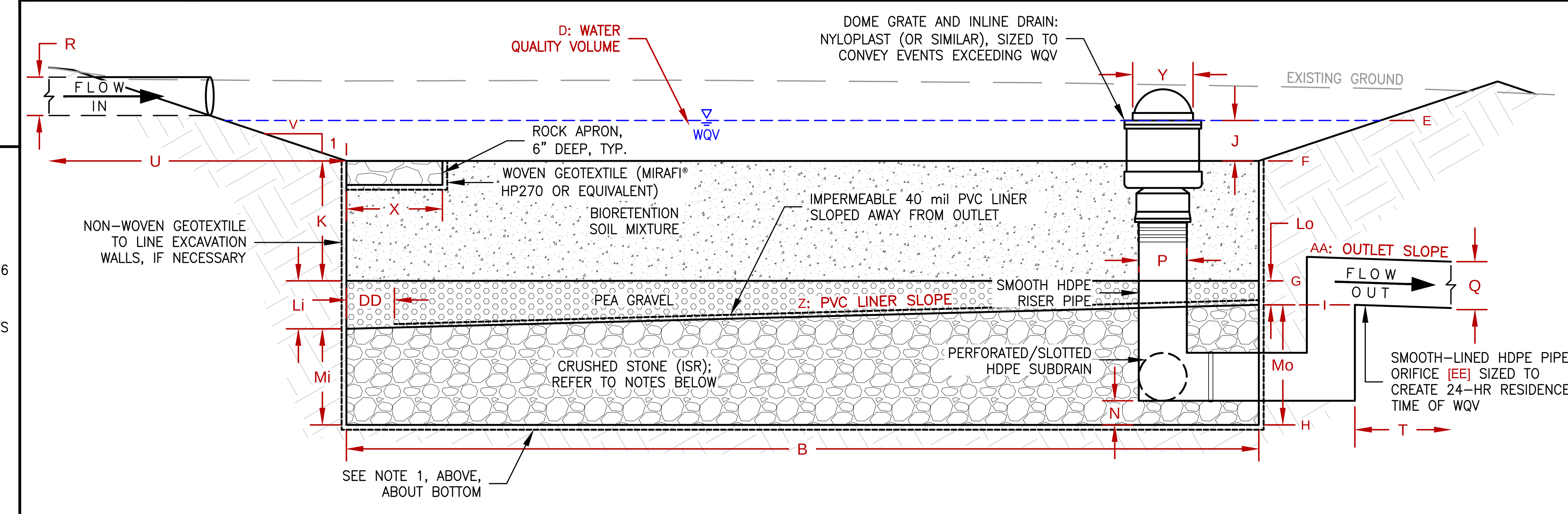
NOTE 1: BOTTOM PERMEABILITY AND LINER
IF A NATIVE, LOW HYDRAULIC CONDUCTIVITY SOIL ($k \leq 0.03$ft/day) IS NOT PRESENT BELOW THE PEA GRAVEL ELEVATION, A LOW PERMEABILITY LINER OR SOIL SHOULD BE USED TO MINIMIZE INFILTRATION AND PRESERVE HORIZONTAL FLOW IN THE STONE. THIS LINER EXTENDS FROM THE BASE OF THE EXCAVATION TO ABOVE THE TOP OF THE BIORETENTION SOIL MEDIA LAYER. IF GEOTECHNICAL TESTS CONFIRM THE NEED FOR A LINER, ACCEPTABLE OPTIONS INCLUDE:

a. SOIL COMPACTION; 6–12 in CLAY SOIL (MINIMUM 15% PASSING THE #200 SIEVE AND A MAXIMUM PERMEABILITY OF 1x10–5 cm/s)
b. A 40 mil PVC LINER WITH SAND BEDDING AND/OR NON-WOVEN GEOTEXTILE. PVC LINERSEAMS MAY BE WELDED, TAPED (WATERPROOF ROOFING TAPE), OR OVERLAPPED (MINIMUM ONE FOOT). THE PERFORMANCE OBJECTIVE IS TO CREATE AND MAINTAIN AN ANAEROBIC ZONE IN THE STONE*
c. A BENTONITE LAYER WITH MINIMUM THICKNESS OF 4 in
d. USE OF CHEMICAL ADDITIVES (SEE NRCS AGRICULTURAL HANDBOOK #386, DATED 1961)
e. OR AN OTHERWISE PREPARED DESIGN BY A PROFESSIONAL ENGINEER

*IF ENGINEER BELIEVES THE PVC LINER IS AT RISK OF PUNCTURE, THE LINER MAY BE SANDWICHED BETWEEN NON-WOVEN GEOTEXTILE OR SAND (3 in THICKNESS)



SECTION Y-Y'



SECTION X-X'

NOTES:

1. FOR FULL BIORETENTION STORMWATER SYSTEM SPECIFICATIONS, PLEASE REFER TO THE UNH STORMWATER CENTER'S BIORETENTION SPECIFICATIONS PUBLICATION, DATED FEBRUARY 2017, FOUND AT: https://www.unh.edu/unhsc/sites/default/files/media/unhsc_bsm_spec_2-28-17_0.pdf
2. SYSTEM FOOTPRINT NEED NOT BE RECTANGULAR. ANY SHAPE IS POSSIBLE. THESE DETAILS USE THE RECTANGULAR SHAPE AS AN EXAMPLE.
3. THESE DETAILS ARE NOT TO SCALE; FOR DIMENSIONS AND SPECIFICATIONS, REFERENCE EACH LETTER TO THE TABLE OF METRICS.
4. BIORETENTION SOIL MIX SHALL NOT BE PLACED UNTIL AFTER ENGINEERING APPROVAL AND INSPECTION OF SUBGRADE.
5. BIORETENTION SYSTEM IS RECOMMENDED TO HAVE PRETREATMENT (FOREBAY, SWALE, OR OTHER APPROVED STRUCTURE). PRETREATMENT IS REQUIRED FOR PROJECTS REQUIRING ALTERATION OF TERRAIN (AOT) PERMITTING.
6. PLANT THE SYSTEM AS SPECIFIED; AT A MINIMUM, SEED THE SYSTEM FLOOR AND SIDE SLOPES WITH RYE GRASS MIXTURE CONTAINING PERENNIAL AND WINTER RYES, AT A RATE SPECIFIED BY THE MANUFACTURER. STABILIZE THE SLOPES WITH STRAW TO A DEPTH OF 1".
7. GENERAL CONSTRUCTION GUIDELINES:
   - 7.1. VERIFY THAT NO FOREIGN OR DELETERIOUS MATERIAL OR LIQUID SUCH AS PAINT, PAINT WASHOUT, CONCRETE SLURRY, ASPHALT/CONCRETE LAYERS OR CHUNKS, CEMENT, PLASTER, OILS, GASOLINE, DIESEL FUEL, PAINT THINNER, TURPENTINE, TAR, ROOFING COMPOUND, SOLID WASTE, OR ACID HAS BEEN DEPOSITED IN PLANTING SOIL (BIORETENTION MEDIA OR LOAM ON SIDE SLOPES).
   - 7.2. PROCEED WITH PLACEMENT OF ANY SUBSURFACE MATERIALS ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.
   - 7.3. COMPACT EACH BLENDED LIFT OF BIORETENTION SOIL MEDIA TO 75% OF MAXIMUM STANDARD PROCTOR DENSITY ACCORDING TO ASTM D698.
   - 7.4. GRADE SOIL MEDIA TO A SMOOTH, UNIFORM SURFACE PLANE WITH LOOSE, UNIFORMLY FINE TEXTURE. ROLL AND RAKE, REMOVE RIDGES, AND FILL DEPRESSIONS TO MEET FINISH GRADES.
   - 7.5. LIGHTLY COMPACT FINISHED FLOOR ELEVATION AND FINISHED SLOPES USING THE BUCKET OF AN EXCAVATOR, NON-MOTORIZED ROLLER, HAND TAMP, OR OTHER MEANS, THEN ROUGHEN SURFACE WITH A RAKE TO LOOSEN SOILS BEFORE SEEDING.
   - 7.6. DO NOT COMPACT THE SUBGRADE AT THE BOTTOM OF EXCAVATION UNLESS PERMEABILITY EXCEEDS $1x10^{-5}$ cm/s
8. BIORETENTION SOIL MEDIA (BSM) MIXTURE SPECIFICATIONS:
   - 8.1. STICKS AND ROOTS SHOULD BE MINIMIZED IN THE BSM MIXTURE, AND PREFERABLY LIMITED TO NOTHING LARGER THAN 4.76 mm (0.187 in).
   - 8.2. DEBRIS AND OTHER FOREIGN MATERIALS SHOULD BE MINIMIZED.
   - 8.3. ORGANIC MATTER SHOULD MAKE UP A MINIMUM OF 3% BY VOLUME AND A MAXIMUM 8% BY VOLUME OF THE BSM.
   - 8.4. BSM MIXTURE SHOULD HAVE A SOIL REACTION pH OF 6 TO 7.
   - 8.5. CATION EXCHANGE CAPACITY (CEC) OF BSM SHOULD BE A MINIMUM OF 10 meq PER 100 mL AT A pH OF 7.0.
9. IF BSM IS PURCHASED FROM A MANUFACTURER, BSM MIXTURE SHALL NOT CONTAIN THE FOLLOWING:
   - 9.1. UNACCEPTABLE MATERIALS: CONCRETE SLURRY, CONCRETE LAYERS OR CHUNKS, CEMENT, PLASTER, BUILDING DEBRIS, ASPHALT, BRICKS, OILS, GASOLINE, DIESEL FUEL, PAINT THINNER, TURPENTINE, TAR, ROOFING COMPOUND, ACID, SOLID WASTE, OR OTHER EXTRANEOUS MATERIALS THAT ARE HARMFUL TO PLANTS.
   - 9.2. UNSUITABLE MATERIALS: STONES, ROOTS, PLANTS, SOD, CLAY LUMPS, OR POCKETS OF COARSE SAND THAT EXCEED A COMBINED MAXIMUM OF 5% BY DRY WEIGHT OF THE MANUFACTURED SOIL.
   - 9.3. LARGE MATERIALS: STONES, CLODS, ROOTS, CLAY LUMPS EXCEEDING 0.187 in (4.76 mm) IN ANY DIMENSION.
10. ORGANIC SOIL AMENDMENTS:
    - 10.1. NO COMPOST SHOULD BE USED IN THE PLANTING MIX (USED ON THE SIDE SLOPES AND SURROUNDING AREA) UNLESS SPECIFIED BY THE ENGINEER.
    - 10.1. SPHAGNUM PEAT: PARTIALLY DECOMPOSED SPHAGNUM PEAT MOSS, FINELY DIVIDED OR OF GRANULAR TEXTURE WITH 100% PASSING THROUGH A 1/2-in (13 mm) SIEVE, WITH A pH OF 3.4 TO 4.8.
    - 10.2. WOOD DERIVATIVES: SHREDDED WOOD, WOOD CHIPS, GROUND BARK, OR WOOD WASTE; OF UNIFORM TEXTURE AND FREE OF STONES, STICKS, SOIL, OR TOXIC MATERIAL.
11. THE CRUSHED STONE LAYER SHOULD CONSIST OF AASHTO #5 STONE (3/4-in).
12. THE VOLUME OF WATER CONTAINED ABOVE THE BSM ELEVATION AND BELOW THE HIGH FLOW SPILLWAY IS STATISTICALLY DESIGNED TO HOLD A SPECIFIC RUNOFF VOLUME.
13. THE DESIGN VOLUME ABOVE THE BSM IS PREFERABLY THE WQV. THIS VOLUME MAY NOT BE ACHIEVABLE FOR RETROFIT INSTALLATIONS

BIORETENTION SYSTEM DESIGN METRICS

ID	DESIGN PARAMETER	MIN	DESIGN	UNITS
A	SYSTEM FLOOR WIDTH			FT
B	SYSTEM FLOOR LENGTH			FT
C	BIORETENTION FOOTPRINT AREA			SF
D	WATER QUALITY VOLUME			CF
E	WQV AND RISER CAP ELEVATION			FT
F	SYSTEM FLOOR ELEVATION			FT
G	BOTTOM BSM ELEVATION			FT
H	BOTTOM STONE ELEVATION			FT
I	TOP STONE/OUTLET INVERT ELEVATION			FT
J	WQV PONDING DEPTH			IN
K	BSM MEDIA DEPTH	18		IN
Li	INLET END PEA GRAVEL DEPTH			IN
Lo	OUTLET END PEA GRAVEL DEPTH	3		IN
Mi	INLET END CRUSHED STONE DEPTH			IN
Mo	OUTLET END CRUSHED STONE DEPTH	14		IN
N	SUBDRAIN DEPTH ABOVE BOTTOM	4		IN
O	PERFORATED SUBDRAIN DIAMETER	6		IN

BIORETENTION SYSTEM DESIGN METRICS

ID	DESIGN PARAMETER	MIN	DESIGN	UNITS
P	RISER PIPE DIAMETER	6		IN
Q	OUTLET PIPE DIAMETER	6		IN
R	INFLOW PIPE DIAMETER			IN
S	PERFORATED SUBDRAIN LENGTH			FT
T	OUTLET PIPE LENGTH			FT
U	INFLOW PIPE LENGTH			FT
V	SLOPE GRADE (RUN PER 1ft RISE)			FT
W	ROCK APRON WIDTH			FT
X	ROCK APRON LENGTH			FT
Y	RISER DOME GRATE DIAMETER			IN
Z	PVC LINER SLOPE			%
AA	OUTLET PIPE SLOPE			%
BB	CLEAN-OUT RISER DIAMETER			IN
CC	CLEAN-OUT RISER ELEVATION			FT
DD	PVC LINER GAP	0.1*B		FT
EE	OUTLET PIPE ORIFICE DIAMETER	1		IN

ACCEPTABLE PARTICLE SIZE DISTRIBUTION OF FINAL BIORETENTION SOIL MIX

MEDIA TYPE	SIEVE #	SIZE (in)	SIZE (mm)	% PASSING
COARSE SAND	4	0.187	4.76	100
MEDIUM SAND	10	0.079	2.00	95
FINE SAND	40	0.017	0.42	40–15
SILTS	200	0.003	0.075	10–20
CLAYS	<200	PAN	PAN	0–5

BIORETENTION SOIL MEDIA COMPONENTS:*

- AMOUNTS MIXED BY TOTAL VOLUME
- 60–85% – SAND (0.5 TO 2.0 mm) (SEE SPECS ABOVE)
- 15–25% – LOAM OR TOPSOIL
- 3–8% – ORGANIC MATTER
- 0–5% – WATER TREATMENT RESIDUALS OR IRON FILINGS**

*ALTERNATELY, USE MEDIA SPECIFIED IN THE ALTERATION OF TERRAIN RULES, Env-Wq 1508.07(k)
**THIS IS AN AMENDMENT USED FOR ENHANCED PHOSPHORUS ADSORPTION

INTERNAL STORAGE RESERVOIR (ISR) NOTES:

- THE HYBRID BIORETENTION SYSTEM HARBORS AN ANAEROBIC INTERNAL STORAGE RESERVOIR FOR NITROGEN REMOVAL.
- THE ISR IS SEPARATED BY AN IMPERMEABLE PVC LINER BETWEEN THE PEA GRAVEL AND CRUSHED STONE LAYERS.
- THE PVC LINER SLOPES FROM THE OUTLET TOWARDS THE INLET TO MAXIMIZE STORAGE RETENTION AND PROVIDE EXTRA TREATMENT/FILTER TIME VIA PLUG FLOW THROUGH CRUSHED STONE.
- DESIGN GUIDELINES FOR THE SUBSURFACE GRAVEL WETLAND SPECIFICATIONS (UNHSC, 2016) IDENTIFIED THAT THE WATER VOLUME IN THE ISR BE AT LEAST 0.26*WQV [WATER QUALITY VOLUME], OR 26% OF THE WQV.
- PVC LINER THICKNESS OF 40 TO 60 mil, PREFERABLY SEAMLESS. IF SEAMS ARE UNAVOIDABLE, THE SEAMS SHOULD BE SEALED.

UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER
University of New Hampshire
35 Colovos Road
Durham, NH 03824
Phone (603) 862-2818
Fax (603) 862-3957
http://www.unh.edu/unhsc

No.	Date	Revision
02	10 Sept 2019	DES Revisions
01	12 Mar 2019	Initial design

Designed:	Checked:	Approved:
JCB	TPB/JJH	TPB/JJH

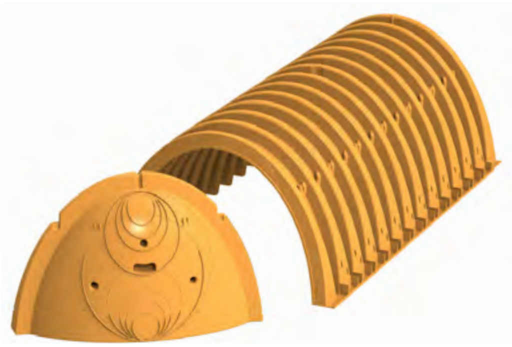
GRAPHIC SCALE
N/A - DRAWING NOT TO SIZE
Original Drawing Size = 34 x 22 in.

Project:
STANDARD DETAIL BIORETENTION ISR
STORMWATER SYSTEM

Date: 21 FEB 2020
Sheet No. 01 of 01

StormTech® SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



Nominal Chamber Specifications
(not to scale)

Size (L x W x H)
85.4” x 51” x 30”
2,170 mm x 1,295 mm x 762 mm

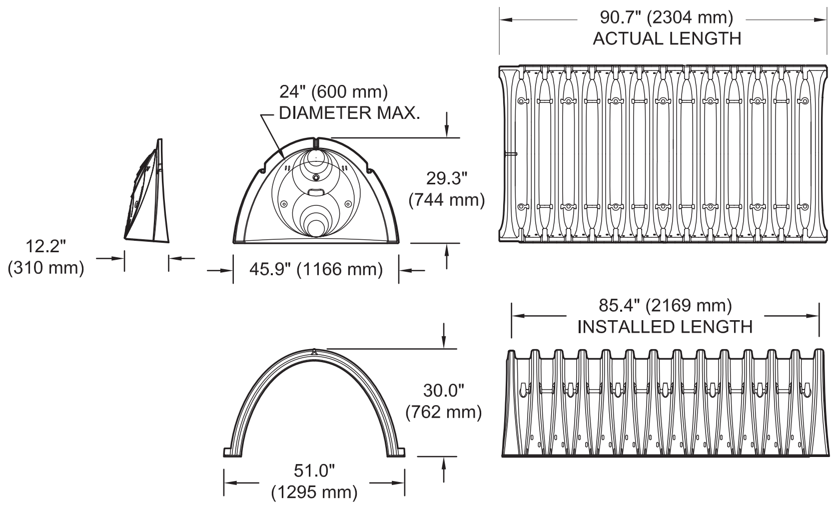
Chamber Storage
45.9 ft^3 (1.30 m^3)

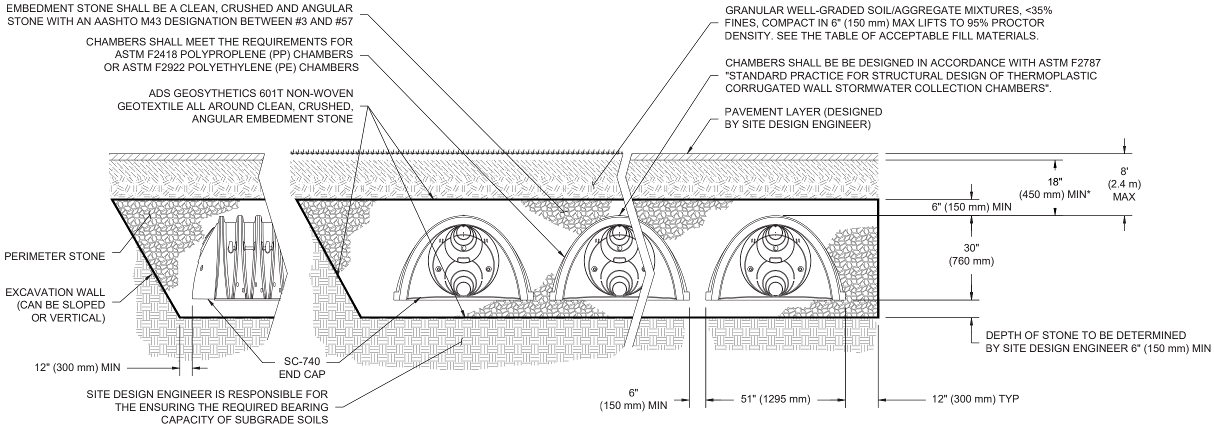
Min. Installed Storage*
74.9 ft^3 (2.12 m^3)

Weight
74.0 lbs (33.6 kg)

Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

*Assumes 6” (150 mm) stone above, below and between chambers and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

ADS StormTech™

StormTech SC-740 Specifications

Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)		Cumulative Chamber Storage ft^3 (m^3)	Total System Cumulative Storage ft^3 (m^3)
42 (1067)	↑	45.90 (1.300)	74.90 (2.121)
41 (1041)		45.90 (1.300)	73.77 (2.089)
40 (1016)		45.90 (1.300)	72.64 (2.057)
39 (991)	Stone Cover	45.90 (1.300)	71.52 (2.025)
38 (965)		45.90 (1.300)	70.39 (1.993)
37 (940)		45.90 (1.300)	69.26 (1.961)
36 (914)	↓	45.90 (1.300)	68.14 (1.929)
35 (889)		45.85 (1.298)	66.98 (1.897)
34 (864)		45.69 (1.294)	65.75 (1.862)
33 (838)		45.41 (1.286)	64.46 (1.825)
32 (813)		44.81 (1.269)	62.97 (1.783)
31 (787)		44.01 (1.246)	61.36 (1.737)
30 (762)		43.06 (1.219)	59.66 (1.689)
29 (737)		41.98 (1.189)	57.89 (1.639)
28 (711)		40.80 (1.155)	56.05 (1.587)
27 (686)		39.54 (1.120)	54.17 (1.534)
26 (660)		38.18 (1.081)	52.23 (1.479)
25 (635)		36.74 (1.040)	50.23 (1.422)
24 (610)		35.22 (0.977)	48.19 (1.365)
23 (584)		33.64 (0.953)	46.11 (1.306)
22 (559)		31.99 (0.906)	44.00 (1.246)
21 (533)		30.29 (0.858)	1.85 (1.185)
20 (508)		28.54 (0.808)	39.67 (1.123)
19 (483)		26.74 (0.757)	37.47 (1.061)
18 (457)		24.89 (0.705)	35.23 (0.997)
17 (432)		23.00 (0.651)	32.96 (0.939)
16 (406)		21.06 (0.596)	30.68 (0.869)
15 (381)		19.09 (0.541)	28.36 (0.803)
14 (356)		17.08 (0.484)	26.03 (0.737)
13 (330)		15.04 (0.426)	23.68 (0.670)
12 (305)		12.97 (0.367)	21.31 (0.608)
11 (279)		10.87 (0.309)	18.92 (0.535)
10 (254)		8.74 (0.247)	16.51 (0.468)
9 (229)		6.58 (0.186)	14.09 (0.399)
8 (203)		4.41 (0.125)	11.66 (0.330)
7 (178)		2.21 (0.063)	9.21 (0.264)
6 (152)	↑	0 (0)	6.76 (0.191)
5 (127)		0 (0)	5.63 (0.160)
4 (102)	Stone Foundation	0 (0)	4.51 (0.128)
3 (76)		0 (0)	3.38 (0.096)
2 (51)		0 (0)	2.25 (0.064)
1 (25)	↓	0 (0)	1.13 (0.032)

Note: Add 1.13 ft^3 (0.032 m^3) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft^3 (m^3)

	Bare Chamber Storage ft^3 (m^3)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740 Chamber	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

English Tons (yds^3)	Stone Foundation Depth		
	6"	12"	16"
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
Metric Kilograms (m^3)	**150 mm**	**300 mm**	**450 mm**
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6" (150 mm) of stone above and between chambers.

Volume Excavation Per Chamber yd^3 (m^3)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as depth of cover increases.

ADS StormTech products, manufactured in accordance with ASTM F2418 or ASTMF2922, comply with all requirements in the Build America, Buy America (BABA) Act.

Working on a project?
Visit us at adspipe.com/stormtech and utilize the Design Tool

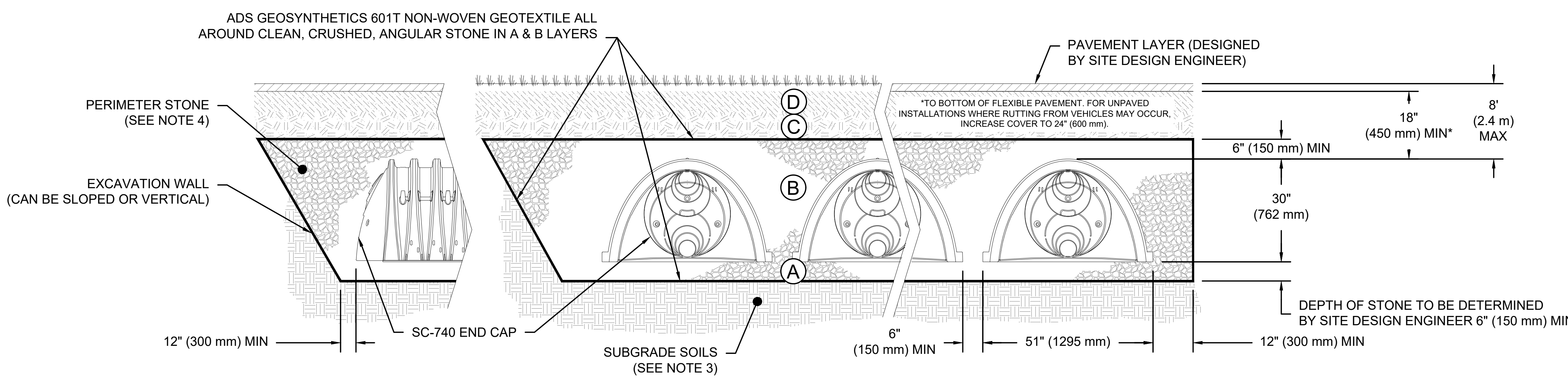
ADS StormTech™

adspipe.com
800-821-6710

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

SC-740 STANDARD CROSS SECTION

DATE: 9/12/22 | DRAWN: KLJ | PROJECT #: | CHECKED: KLJ

DATE | DRWN | CHKD | DESCRIPTION

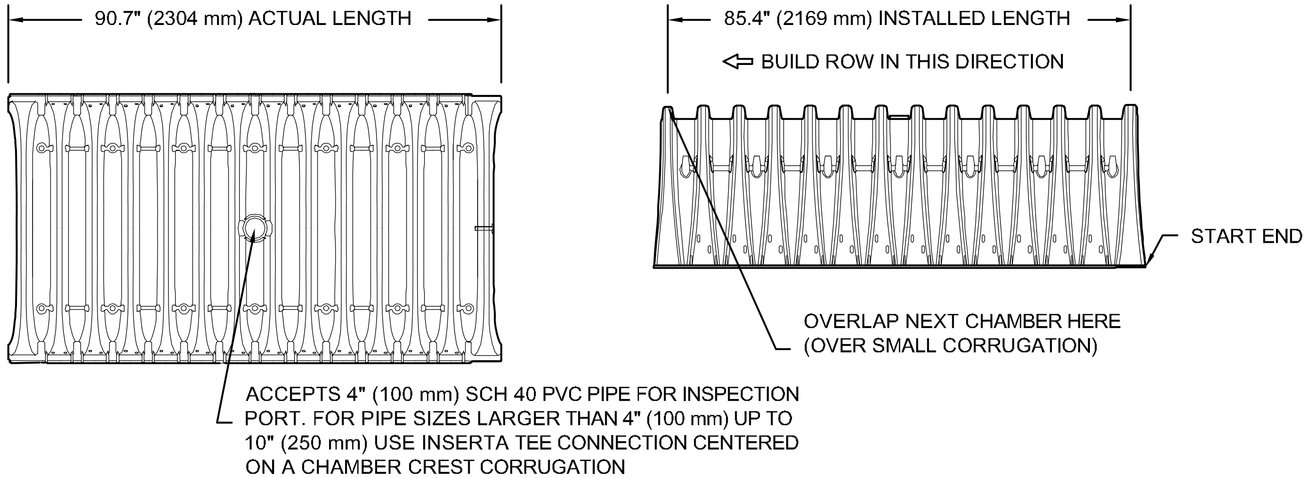
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

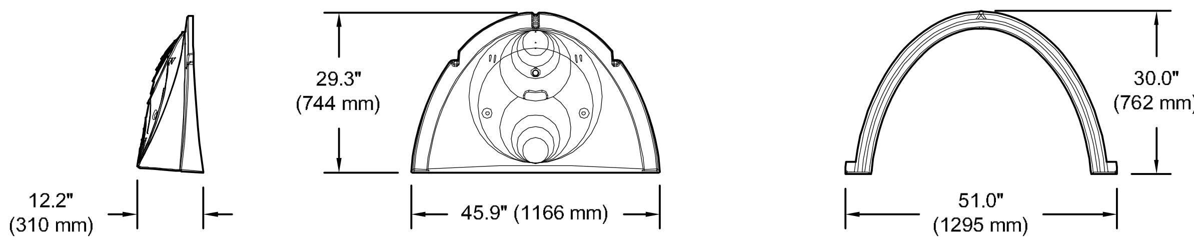
StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026

SC-740 TECHNICAL SPECIFICATION

NTS

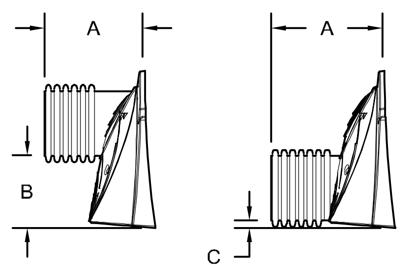




NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



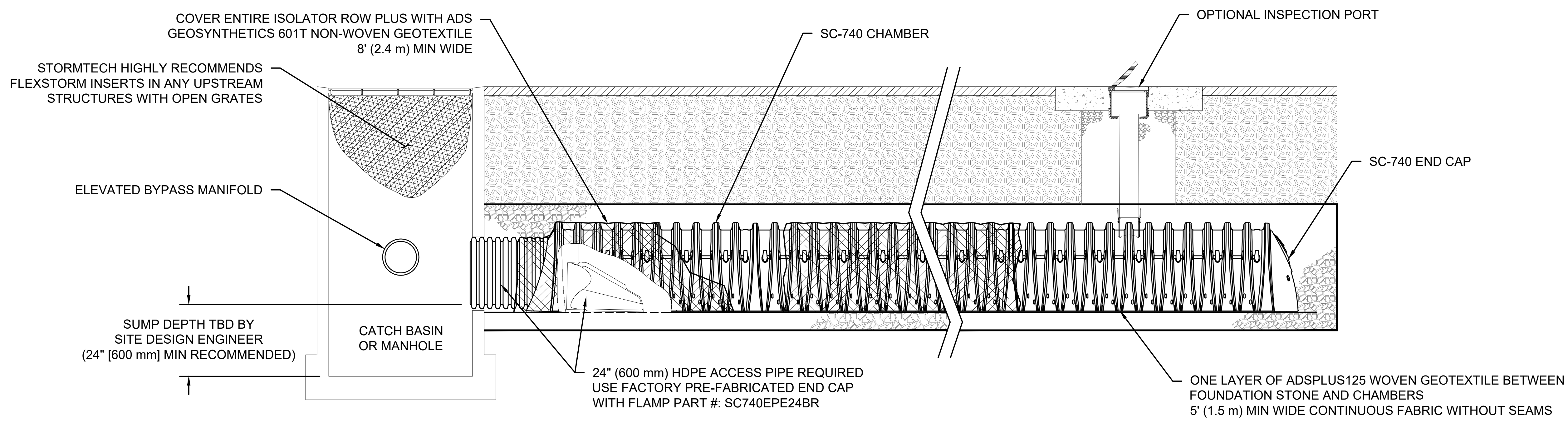
STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL



SC-740 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

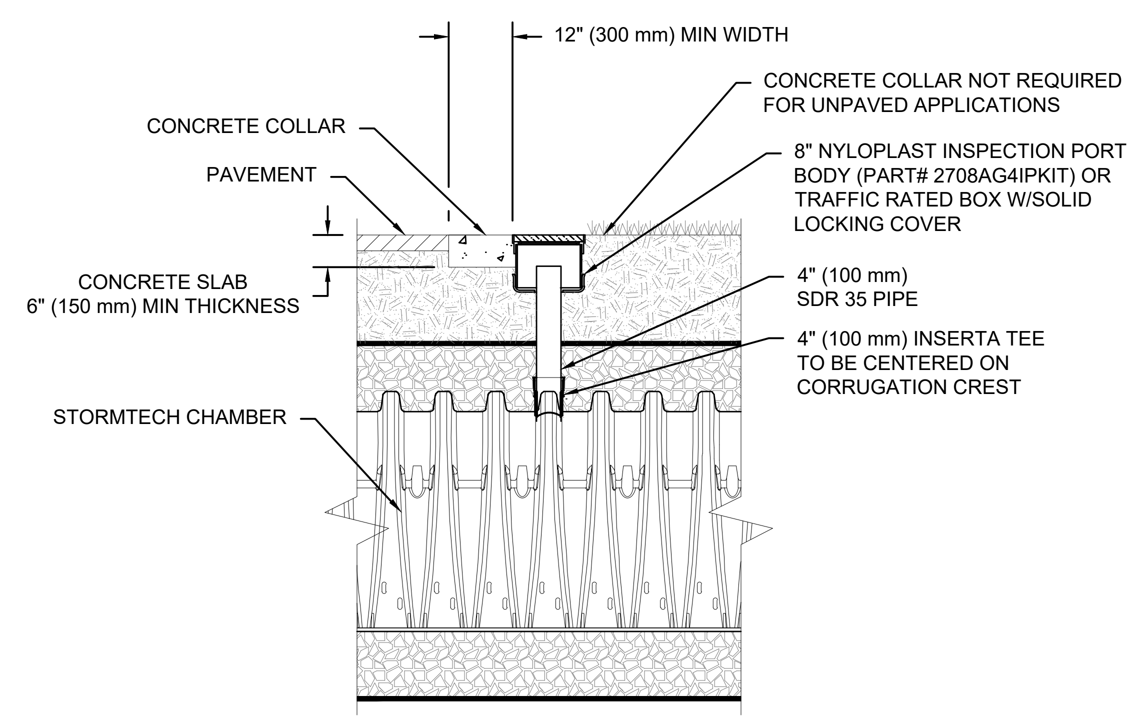
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER)

NTS

SC-740
ISOLATOR ROW PLUS DETAILS
DATE: 9/12/22 DRAWN: KLJ
PROJECT #: CHECKED: KLJ

DATE	DRWN	CHKD	DESCRIPTION

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

SHEET 1 OF 1

Isolator® Row Plus
O&M Manual

ADS StormTech™

The Isolator® Row Plus

Introduction

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row Plus is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

The Isolator Row Plus

The Isolator Row Plus is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-7200 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for sediment settling and filtration as stormwater rises in the Isolator Row Plus and passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow stormwater to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row Plus protecting the adjacent stone and chambers storage areas from sediment accumulation.

ADS geotextile fabric is placed between the stone and the Isolator Row Plus chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the chamber's sidewall. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-7200 models as these chambers do not have perforated side walls.

The Isolator Row Plus is designed to capture the "first flush" runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row Plus and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

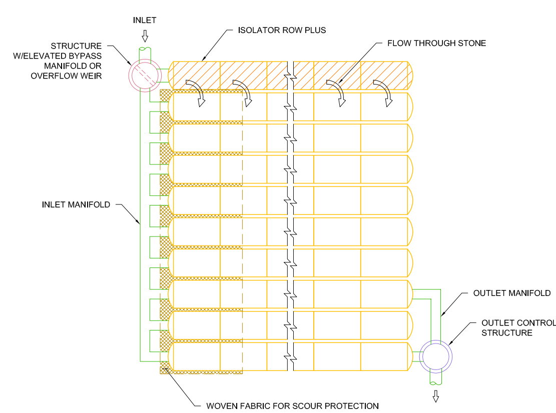
The Isolator Row FLAMP™ (patent pending) is a flared end ramp apparatus attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance by enhancing outflow of solid debris that would otherwise collect at the chamber's end. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row Plus may be part of a treatment train system. The treatment train design and pretreatment device selection by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, StormTech recommend using the Isolator Row Plus to minimize maintenance requirements and maintenance costs.

Note: *See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row Plus.*

Looking down the Isolator Row PLUS from the manhole opening, ADS PLUS Fabric is shown between the chamber and stone base.

StormTech Isolator Row PLUS with Overflow Spillway (not to scale)



Isolator Row Plus Inspection/Maintenance

Inspection

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row Plus should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

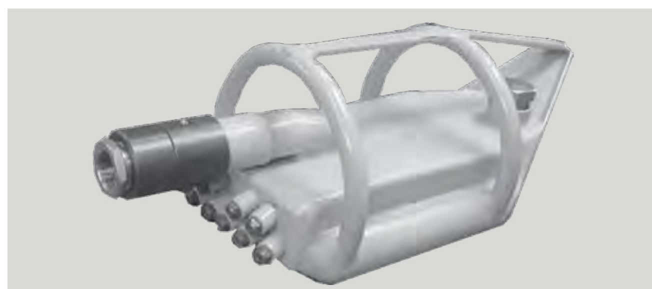
The Isolator Row Plus incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

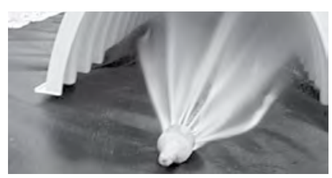
If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row Plus, clean-out should be performed.

Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

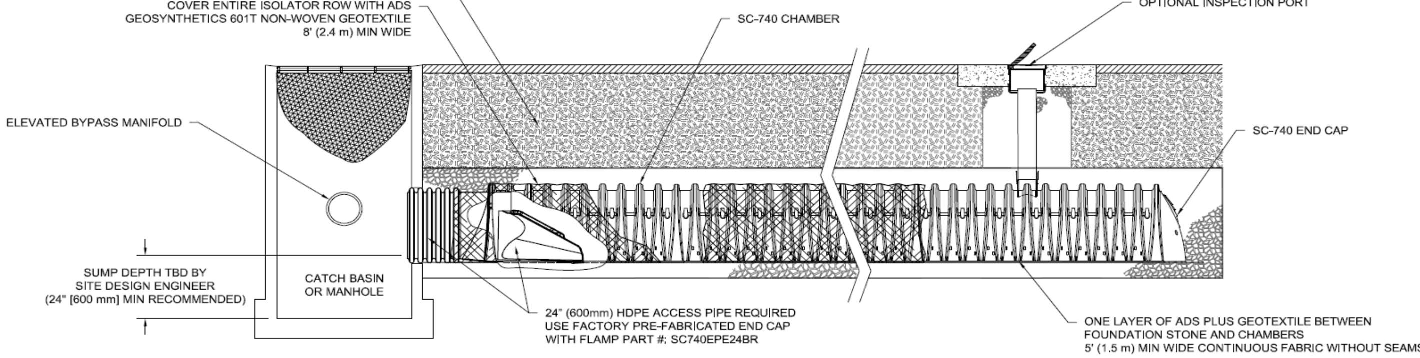
Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row Plus lengths up to 200' (61 m). **The JetVac process shall only be performed on StormTech Isolator Row Plus that have ADS Plus Fabric (as specified by StormTech) over their angular base stone.**





StormTech Isolator Row PLUS (*not to scale*)

***Note:** Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-7200 chamber models and is not required over the entire Isolator Row PLUS.*



Isolator Row Plus Step By Step Maintenance Procedures

Step 1

Inspect Isolator Row Plus for sediment.

A) Inspection ports (if present)
   i. Remove lid from floor box frame
   ii. Remove cap from inspection riser
   iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
   iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Row Plus
   i. Remove cover from manhole at upstream end of Isolator Row Plus
   ii. Using a flashlight, inspect down Isolator Row Plus through outlet pipe
      1. Mirrors on poles or cameras may be used to avoid a confined space entry
      2. Follow OSHA regulations for confined space entry if entering manhole
   iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2.
   If not, proceed to Step 3.

Step 2

Clean out Isolator Row Plus using the JetVac process.

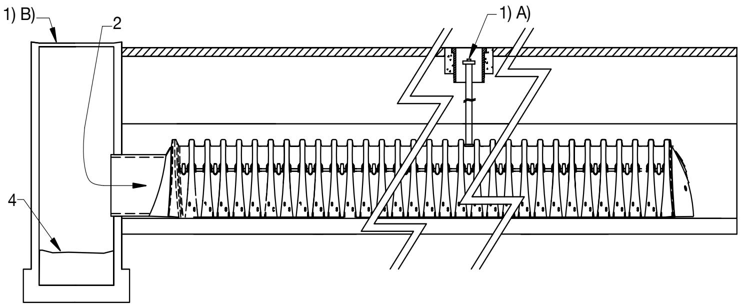
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

Step 3

Replace all caps, lids and covers, record observations and actions.

Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row PLUS, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

adspipe.com
800-821-6710

ADS StormTech® Installation Guide
SC-310/SC-740/DC-780

StormTech
Installation Video

Required Materials and Equipment List

- Acceptable fill materials per Table 1
- ADS Plus and non-woven geotextile fabrics
- StormTech solid end caps and pre-cored end caps
- StormTech chambers
- StormTech manifolds and fittings

Important Notes:

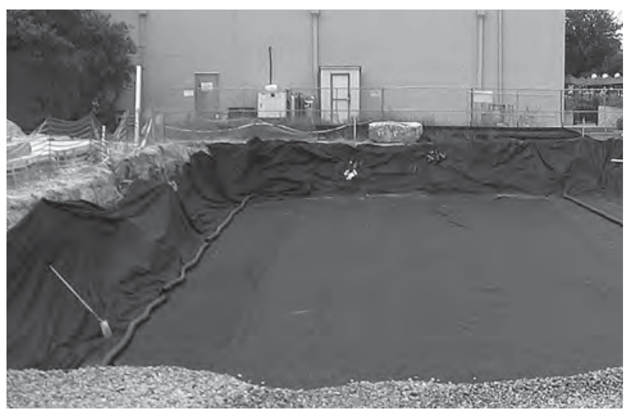
A. This installation guide provides the minimum requirements for proper installation of chambers. Non-adherence to this guide may result in damage to chambers during installation. Replacement of damaged chambers during or after backfilling is costly and very time consuming. It is recommended that all installers are familiar with this guide, and that the contractor inspects the chambers for distortion, damage and joint integrity as work progresses.

B. Use of a dozer to push embedment stone between the rows of chambers may cause damage to chambers and is not an acceptable backfill method. Any chambers damaged by using the "dump and push" method are not covered under the StormTech standard warranty.

C. Care should be taken in the handling of chambers and end caps. Avoid dropping, prying or excessive force on chambers during removal from pallet and initial placement.

Requirements for System Installation

Excavate bed and prepare subgrade per engineer's plans.



Place non-woven geotextile over prepared soils and up excavation walls. Install underdrains if required.

Place clean, crushed, angular stone foundation 6" (150 mm) min. Compact to achieve a flat surface.

Manifold, Scour Fabric and Chamber Assembly

Install manifolds and lay out ADS Plus fabric at inlet rows (min. 12.5 ft (3.8 m)) at each inlet end cap. Place a continuous piece along entire length of Isolator® Plus Row(s).

Align the first chamber and end cap of each row with inlet pipes. Contractor may choose to postpone stone placement around end chambers and leave ends of rows open for easy inspection of chambers during the backfill process.

Continue installing chambers by overlapping chamber end corrugations. Chamber joints are labeled "Lower Joint – Overlap Here" and "Build this direction – Upper Joint" Be sure that the chamber placement does not exceed the reach of the construction equipment used to place the stone. Maintain minimum 6" (150 mm) spacing between rows.

Attaching the End Caps

Lift the end of the chamber a few inches off the ground. With the curved face of the end cap facing outward, place the end cap into the chamber's end corrugation.

Prefabricated End Caps

24" (600 mm) inlets are the maximum size that can fit into a SC-740/DC-780 end cap and must be prefabricated with a 24" (600 mm) pipe stub. SC-310 chambers with a 12" (300 mm) inlet pipe must use a prefabricated end cap with a 12" (300 mm) pipe stub. When used on an Isolator Row Plus, these end caps will contain a welded FLAMP (flared end ramp) that will lay on top of the ADS Plus fabric (shown above)

Isolator Row Plus

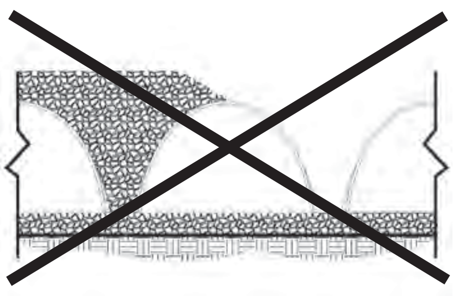
Place a continuous layer of ADS Plus fabric between the foundation stone and the Isolator Row Plus chambers, making sure the fabric lays flat and extends the entire width of the chamber feet. Drape a strip of ADS non-woven geotextile over the row of chambers (not required over DC-780). This is the same type of non-woven geotextile used as a separation layer around the angular stone of the StormTech system.

Initial Anchoring of Chambers – Embedment Stone

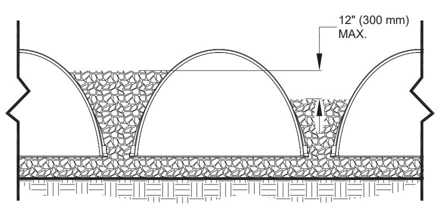
Initial embedment shall be spotted along the centerline of the chamber evenly anchoring the lower portion of the chamber. This is best accomplished with a stone conveyor or excavator reaching along the row.

No equipment shall be operated on the bed at this stage of the installation. Excavators must be located off the bed. Dump trucks shall not dump stone directly on to the bed. Dozers or loaders are not allowed on the bed at this time.

Backfill of Chambers – Embedment Stone

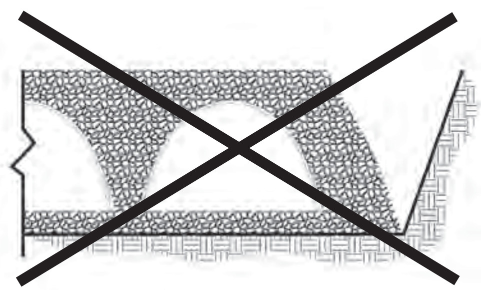


Uneven Backfill

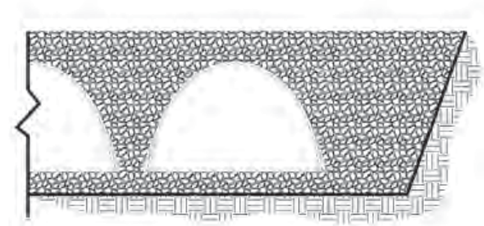


Even Backfill

Backfill chambers evenly. Stone column height should never differ by more than 12” (300 mm) between adjacent chamber rows or between chamber rows and perimeter.



Perimeter Not Backfilled



Perimeter Fully Backfilled

Perimeter stone must be brought up evenly with chamber rows. Perimeter must be fully backfilled, with stone extended horizontally to the excavation wall.

Backfill - Embedment Stone & Cover Stone

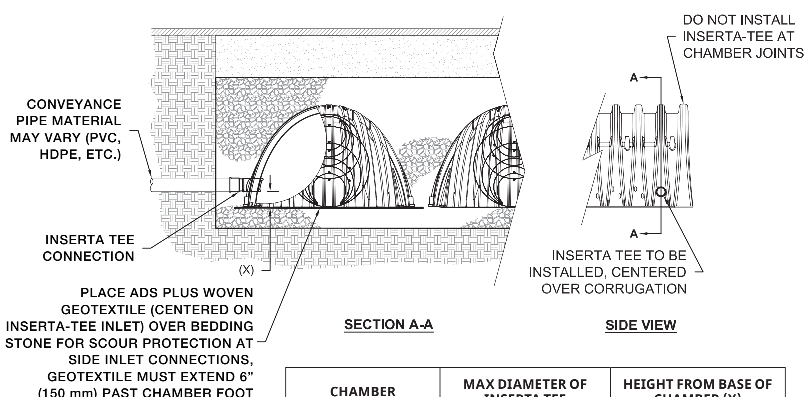
Continue evenly backfilling between rows and around perimeter until embedment stone reaches tops of chambers. Perimeter stone must extend horizontally to the excavation wall for both straight or sloped sidewalls. **Only after chambers have been backfilled to top of chamber and with a minimum 6" (150 mm) of cover stone on top of chambers can small dozers be used over the chambers for backfilling remaining cover stone.**

Small dozers and skid loaders may be used to finish grading stone backfill in accordance with ground pressure limits in Table 2. They must push material parallel to rows only. Never push perpendicular to rows. StormTech recommends that the contractor inspect chambers before placing final backfill. Any chambers damaged by construction shall be removed and replaced.

Final Backfill of Chambers – Fill Material

Install non-woven geotextile over stone. Geotextile must overlap 24" (600 mm) min. where edges meet. Compact each lift of backfill as specified in the site design engineer's drawings. Roller travel parallel with rows.

Inserta Tee Detail



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 36, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON.		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

StormTech Isolator Row Plus Detail

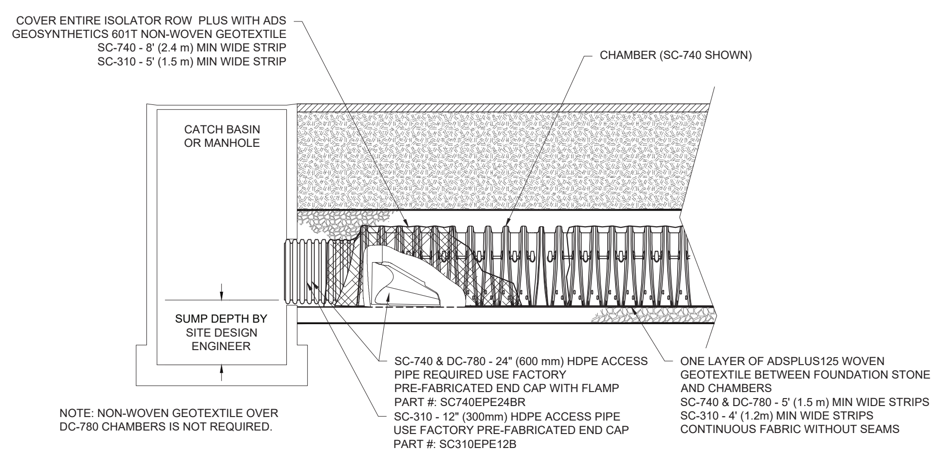


Table 1- Acceptable Fill Materials

Material Location	Description	AASHTO M43 Designation[1]	Compaction/Density Requirement
Ⓓ **Final Fill:** Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per site design engineer's plans. Paved installations may have stringent material and preparation requirements.
Ⓒ **Initial Fill:** Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 18" (450 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/aggregate mixtures, <35% fines or processed aggregate. Most pavement subbase materials can be used in lieu of this layer.	AASHTO M45 A-1, A-2-4, A-3 or AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 12" (300 mm) of material over the chambers is reached. Compact additional layers in 6" (150 mm) max. lifts to a min. 95% Proctor density for well-graded material and 95% relative density for processed aggregate materials. Roller gross vehicle weight not to exceed 12,000 lbs (53 kN). Dynamic force not to exceed 20,000 lbs (89 kN)
Ⓑ **Embedment Stone:** Embedment Stone surrounding chambers from the foundation stone to the 'C' layer above.	Clean, crushed, angular stone	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	No compaction required.
Ⓐ **Foundation Stone:** Foundation Stone below the chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone,	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	Place and compact in 6" (150 mm) lifts using two full coverages with a vibratory compactor.[2, 3]

Please Note:

1. The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone".
2. StormTech compaction requirements are met for 'A' location materials when placed and compacted in 6" (150 mm) (max) lifts using two full coverages with a vibratory compactor.
3. Where infiltration surfaces may be comprised by compaction, for standard installations and standard design load conditions, a flat surface may be achieved by raking or dragging without compaction equipment. For special load designs, contact StormTech for compaction requirements.

Figure 1- Inspection Port Detail

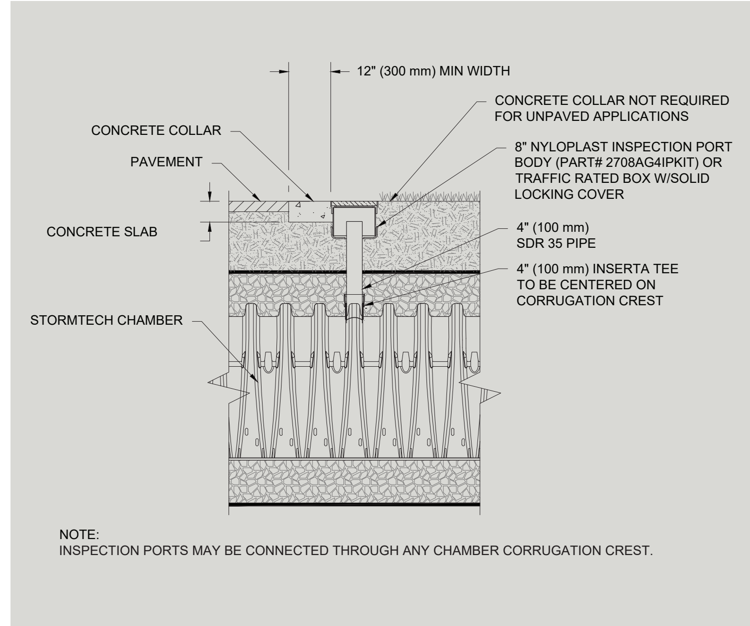
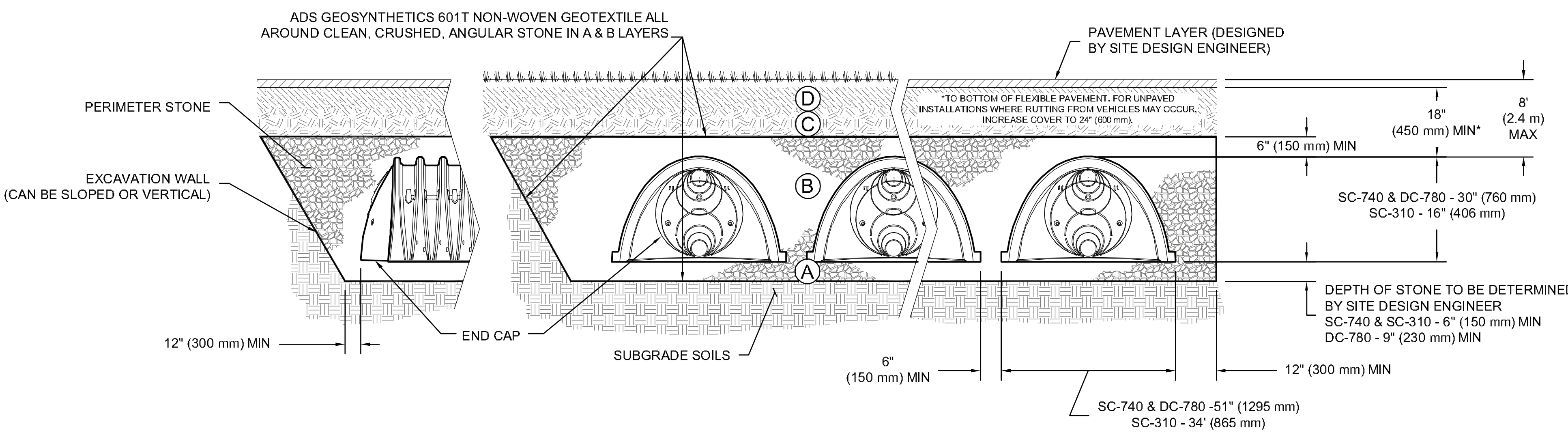


Figure 2 - Fill Material Locations



Notes:

1. 36" (900 mm) of stabilized cover materials over the chambers is recommended during the construction phase if general construction activities, such as full dump truck travel and dumping, are to occur over the bed.
2. During paving operations, dump truck axle loads on 18" (450 mm) of cover may be necessary. Precautions should be taken to avoid rutting of the road base layer, to ensure that compaction requirements have been met, and that a minimum of 18" (450 mm) of cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.
3. Ground pressure for track dozers is the vehicle operating weight divided by total ground contact area for both tracks. Excavators will exert higher ground pressures based on loaded bucket weight and boom extension.
4. Mini-excavators (< 8,000lbs/3,628 kg) can be used with at least 12" (300 mm) of stone over the chambers and are limited by the maximum ground pressures in Table 2 based on a full bucket at maximum boom extension.
5. Storage of materials such as construction materials, equipment, spoils, etc. should not be located over the StormTech system. The use of equipment over the StormTech system not covered in Table 2 (ex. soil mixing equipment, cranes, etc) is limited. Please contact StormTech for more information.
6. Allowable track loads based on vehicle travel only. Excavators shall not operate on chamber beds until the total backfill reaches 3 feet (900 mm) over the entire bed.

Table 2 - Maximum Allowable Construction Vehicle Loads[6]

Material Location	Fill Depth over Chambers in. (mm)	Maximum Allowable Wheel Loads		Maximum Allowable Track Loads[6]		Maximum Allowable Roller Loads
		Max Axle Load for Trucks lbs (kN)	Max Wheel Load for Loaders lbs (kN)	Track Width in. (mm)	Max Ground Pressure psf (kPa)	Max Drum Weight or Dynamic Force lbs (kN)
Ⓓ Final Fill Material	36" (900) Compacted	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	3880 (186) 2640 (126) 2040 (97) 1690 (81) 1470 (70)	38,000 (169)
Ⓒ Initial Fill Material	24" (600) Compacted	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	2690 (128) 1880 (90) 1490 (71) 1280 (61) 1150 (55)	20,000 (89)
	24" (600) Loose/ Dumped	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	2390 (114) 1700 (81) 1370 (65) 1190 (57) 1080 (51)	20,000 (89) Roller gross vehicle weight not toexceed 12,000 lbs. (53 kN)
	18" (450)	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	2110 (101) 1510 (72) 1250 (59) 1100 (52) 1020 (48)	20,000 (89) Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN)
Ⓑ Embedment Stone	12" (300)	16,000 (71)	NOT ALLOWED	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	1540 (74) 1190 (57) 1010 (48) 910 (43) 840 (40)	20,000 (89) Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN)
	6" (150)	8,000 (35)	NOT ALLOWED	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	1070 (51) 900 (43) 800 (38) 760 (36) 720 (34)	NOT ALLOWED

Table 3 - Placement Methods and Descriptions

Material Location	Placement Methods/ Restrictions	Wheel Load Restrictions	Track Load Restrictions	Roller Load Restrictions
		See Table 2 for Maximum Construction Loads		
Ⓓ Final Fill Material	A variety of placement methods may be used. All construction loads must not exceed the maximum limits in Table 2.	36" (900 mm) minimum cover required for dump trucks to dump over chambers.	Dozers to push parallel to rows until 36" (900mm) compacted cover is reached.[4]	Roller travel parallel to rows only until 36" (900 mm) compacted cover is reached.
Ⓒ Initial Fill Material	Excavator positioned off bed recommended. Small excavator allowed over chambers. Small dozer allowed.	Asphalt can be dumped into paver when compacted pavement subbase reaches 18" (450 mm) above top of chambers.	Small LGP track dozers & skid loaders allowed to grade cover stone with at least 6" (150 mm) stone under tracks at all times. Equipment must push parallel to rows at all times.	Use dynamic force of roller only after compacted fill depth reaches 12" (300 mm) over chambers. Roller travel parallel to chamber rows only.
Ⓑ Embedment Stone	No equipment allowed on bare chambers. Use excavator or stone conveyor positioned off bed or on foundation stone to evenly fill around all chambers to at least the top of chambers.	No wheel loads allowed. Material must be placed outside the limits of the chamber bed.	No tracked equipment is allowed on chambers until a min. 6" (150 mm) cover stone is in place.	No rollers allowed.
Ⓐ Foundation Stone	No StormTech restrictions. Contractor responsible for any conditions or requirements by others relative to subgrade bearing capacity, dewatering or protection of subgrade.			

ADS StormTech™

StormTech® Standard Limited Warranty

STANDARD LIMITED WARRANTY OF STORMTECH LLC ("STORMTECH"): PRODUCTS

(A) This Limited Warranty applies solely to the StormTech chambers and end plates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and end plates are collectively referred to as the "Products."

(B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.

(C) THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

(D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.

(E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.

(F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech's written installation instructions.

(G) THE LIMITED WARRANTY DOES NOT EXTEND TO INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES. STORMTECH SHALL NOT BE LIABLE FOR PENALTIES OR LIQUIDATED DAMAGES, INCLUDING LOSS OF PRODUCTION AND PROFITS; LABOR AND MATERIALS; OVERHEAD COSTS; OR OTHER LOSS OR EXPENSE INCURRED BY THE PURCHASER OR ANY THIRD PARTY. SPECIFICALLY EXCLUDED FROM LIMITED WARRANTY COVERAGE ARE DAMAGE TO THE PRODUCTS ARISING FROM ORDINARY WEAR AND TEAR; ALTERATION, ACCIDENT, MISUSE, ABUSE OR NEGLECT; THE PRODUCTS BEING SUBJECTED TO VEHICLE TRAFFIC OR OTHER CONDITIONS WHICH ARE NOT PERMITTED BY STORMTECH'S WRITTEN SPECIFICATIONS OR INSTALLATION INSTRUCTIONS; FAILURE TO MAINTAIN THE MINIMUM GROUND COVERS SET FORTH IN THE INSTALLATION INSTRUCTIONS; THE PLACEMENT OF IMPROPER MATERIALS INTO THE PRODUCTS; FAILURE OF THE PRODUCTS DUE TO IMPROPER SITING OR IMPROPER SIZING; OR ANY OTHER EVENT NOT CAUSED BY STORMTECH. A PRODUCT ALSO IS EXCLUDED FROM LIMITED WARRANTY COVERAGE IF SUCH PRODUCT IS USED IN A PROJECT OR SYSTEM IN WHICH ANY GEOTEXTILE PRODUCTS OTHER THAN THOSE PROVIDED BY ADVANCED DRAINAGE SYSTEMS ARE USED. THIS LIMITED WARRANTY REPRESENTS STORMTECH'S SOLE LIABILITY TO THE PURCHASER FOR CLAIMS RELATED TO THE PRODUCTS, WHETHER THE CLAIM IS BASED UPON CONTRACT, TORT, OR OTHER LEGAL THEORY.

adspipe.com
800-821-6710

Drainage Filtration Separation

ADS 0601T/O NONWOVEN GEOTEXTILE SPECIFICATION

Scope

This specification describes ADS 0601T/O nonwoven geotextile.

Filter Fabric Requirements

ADS 0601T/O is an orange nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. ADS 0601T/O is inert to biological degradation and resists naturally encountered chemicals, alkali and acids. ADS 0601T/O conforms to the physical property values listed below:

Filter Fabric Properties

Property	Test Method	Unit	Typical Value[1] MD	Typical Value[1] CD
Grab Tensile Strength	ASTM D4632	lbs (N)	175 (779)	175 (779)
Grab Tensile Elongation	ASTM D4632	%	75	75
Trapezoid Tear Strength	ASTM D4533	lbs (N)	85 (378)	85 (378)
CBR Puncture Strength	ASTM D6241	lbs (N)	480 (2136)	480 (2136)
Permittivity	ASTM D4491	sec^{-1}	1.5	1.5
Flow Rate	ASTM D4491	$gal/min/ft^2$ ($l/min/m^2$)	105 (4278)	105 (4278)
UV Resistance (at 500 hours)[1]	ASTM D4355	% strength retained	80	80

Physical Properties

Property	Test Method	Unit	Typical Value[2]
Weight	ASTM D5161	oz/yd^2 (g/m^2)	6.5 (220)
Thickness	ASTM D5199	mils (mm)	65 (1.7)
Roll Dimensions (W x L)	-	ft (m)	15 x 300 (4.5 x 91)
Roll Area	-	yd^2 (m^2)	500 (418)
Estimated Roll Weight	-	lb (kg)	220 (100)

1 Modified, Minimum Test Value
2 ASTM D4439 Standard Terminology for Geosynthetics: typical value, n-*for geosynthetics*, the mean value calculated from documented manufacturing quality control test results for a defined population obtained from one test method associated with on specific property.

Separation

ADS 315W WOVEN GEOTEXTILE SPECIFICATION

Scope

This specification describes ADS 315W woven geotextile.

Filter Fabric Requirements

ADS 315W is manufactured using high-tenacity polypropylene yarns that are woven to form a dimensionally stable network, which allows the yarns to maintain their relative position. ADS 315W resists ultraviolet deterioration, rotting and biological degradation and is inert to commonly encountered soil chemicals. ADS 315W conforms to the physical property values listed below:

Filter Fabric Properties

Property	Test Method	Unit	M.A.R.V. (Minimum Average Roll Value)[2]
Tensile Strength (Grab)	ASTM D4632	lbs (N)	315 (1400)
Elongation	ASTM D4632	%	15
CBR Puncture	ASTM D6241	lbs (N)	900 (4005)
Puncture	ASTM D4833	lbs (N)	150 (667)
Mullen Burst	ASTM D3786	psi (kPa)	600 (4134)
Trapezoidal Tear	ASTM D4533	lbs (N)	120 (533)
UV Resistance (at 500 hours)	ASTM D4355	%	70
Apparent Opening Size (AOS)*	ASTM D4751	U.S. Sieve (mm)	40 (.425)
Permittivity	ASTM D4491	sec^{-1}	.05
Water Flow Rate	ASTM D4491	gpm/ft^2 ($l/min/m^2$)	4 (163)

* Maximum average roll value.

Packaging

Roll Dimensions (W x L) - ft. (m)	12.5 x 360/ 15 x 300 / 17.5 x 258 (3.81 x 109.8/ 4.57 x 91.5 / 5.33 x 78.6)

SWPPP Cut Sheet:

Filtrexx® Sediment Control

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Sediment control is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for **perimeter control** of sediment and other soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities.

APPLICATION

Filtrexx® Sediment control is to be installed down slope of any disturbed area requiring erosion and sediment control and filtration of soluble pollutants from runoff. Sediment control is effective when installed perpendicular to sheet or low concentrated flow. Acceptable applications include:

- Site perimeters
- Above and below disturbed areas subject to sheet runoff, interrill and rill erosion
- Above and below exposed and erodable slopes
- Around area drains or inlets located in a 'sump'
- On compacted soils where trenching of silt fence is difficult or impossible
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation.
- On frozen ground where trenching of silt fence is impossible.
- On paved surfaces where trenching of silt fence is impossible.

INSTALLATION

1. Sediment control used for perimeter control of sediment and soluble pollutants in storm runoff shall meet Filtrexx® Soxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be Filtrexx® Certified™, or use pre-filled Filtrexx® Sediment control products manufactured by a Filtrexx® Certified Manufacturer™ as determined by Filtrexx® International, LLC (440-926-2607 or visit www.filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application. Look for the Filtrexx® Certified™ Seal.
3. Sediment control will be placed at locations indicated on plans as directed by the Engineer.
4. Sediment control should be installed parallel to the base of the slope or other disturbed area. In extreme conditions (i.e., 2:1 slopes), a second Sediment control shall be constructed at the top of the slope.
5. Effective Soxx™ height in the field should be as follows: 8" Diameter Sediment control = 6.5" high, 12" Diameter Sediment control = 9.5" high, 18" Diameter SiltSoxx™ = 14.5" high, 24" Diameter Sediment control = 19" high.
6. Stakes shall be installed through the middle of the Sediment control on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) hard wood stakes. In the event staking is not possible, i.e., when Sediment control is used on pavement, heavy concrete blocks shall be used behind the Sediment control to help stabilize during rainfall/runoff events.
7. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
8. Loose compost may be backfilled along the upslope side of the Sediment control, filling the seam between the soil surface and the device, improving filtration and sediment retention.
9. If the Sediment control is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for

establishment of permanent vegetation. The Engineer will specify seed requirements.

10. Filtrexx® Sediment control is not to be used in perennial, ephemeral, or intermittent streams.

See design drawing schematic for correct Filtrexx® Sediment control installation (Figure 1.1).

INSPECTION AND MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Sediment control should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Sediment control may be required to reduce effective slope length or sediment removal may be necessary. Sediment control shall be inspected until area above has been permanently stabilized and construction activity has ceased

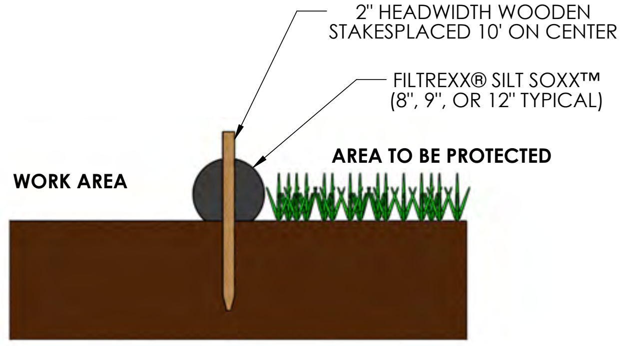
1. The Contractor shall maintain the Sediment control in a functional condition at all times and it shall be routinely inspected.
2. If the Sediment control has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Sediment control when accumulation has reached 1/2 of the effective height of the Sediment control, or as directed by the Engineer. Alternatively, a new Sediment control can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. Sediment control shall be maintained until disturbed area above the device has been permanently stabilized and construction activity has ceased.
5. The FilterMedia™ will be dispersed on site once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
6. For long-term sediment and pollution control applications, Sediment control can be seeded at the time of installation to create a vegetative filtering system for prolonged and increased filtration of sediment and soluble pollutants (contained vegetative filter strip). The appropriate seed mix shall be determined by the Engineer.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*				
	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	40 (12)	50 (15)	55 (17)	65 (20)	75 (23)

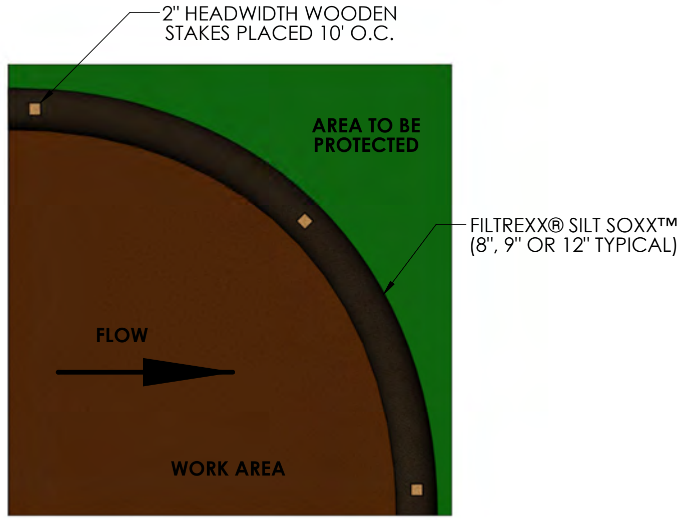
* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.

** Effective height of Sediment control after installation and with constant head from runoff as determined by Ohio State University.

FILTREXX® SILT SOXX™

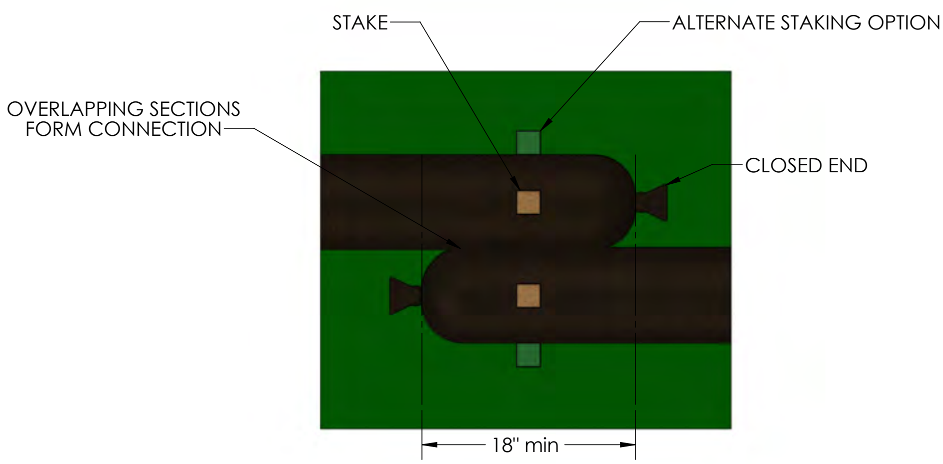


SECTION VIEW

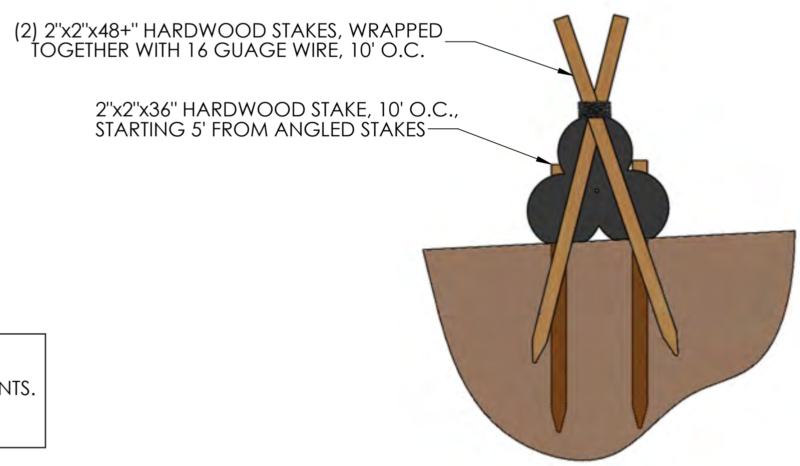


TOP VIEW

COMPOST SOCK CONNECTION/ATTACHMENT DETAIL



FILTREXX® PYRAMID STAKING DETAIL



NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. SILT SOXX™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

SWPPP Cut Sheet:

Filtrexx® Inlet Protection

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Inlet protection is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for storm drain **inlet protection** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons) on and around construction activities.

APPLICATION

Drain inlets are located in areas that receive runoff from surrounding lands, often exposed and disturbed soils, and are located at a low point, or in a sump. Inlet protection used around drain inlets (or *Drain* Inlet protection) should completely enclose the circumference of the drain and where possible should not be placed on a grade or slope. Inlet protection used around drain inlets should never be the only form of site sediment control and should be accompanied by erosion control/slope stabilization practices, such as Slope protection or rolled erosion control blankets (RECB). Inlet protection should never be placed where they divert runoff flow from the drain inlet, or on top of the inlet, which can cause flooding. Under high runoff and sediment loading conditions placement of 1-2 in (25-50 mm) diameter rock (AASHTO #2) may be placed around the outer circumference of the Inlet protection up to ½ the height of the Inlet protection. This will slow runoff velocity as it contacts the Inlet protection and will reduce sediment build-up and clogging of the Inlet protection.

Curb inlets are generally located on paved surfaces and are designed to rapidly drain storm runoff from roadways to prevent flooding that poses a hazard to vehicular traffic. Inlet protection devices should be placed in a manner which intercepts runoff prior to entering the inlet, but does not block or divert runoff from the inlet. To prevent diversion of runoff, Inlet protection used around curbs (or *Curb* Inlet protection) should be used in low points, or sumps, and minor slopes or grades. Inlet protection should never be placed in or on the curb inlet drain, or placed in a manner than obstructs vehicular traffic. Inlet protection height should be at least 1 in (25 mm) lower than top of curb inlet to allow for overflow into the drain and not over the curb. Maximum sediment removal efficiency occurs when minor ponding exists behind Inlet protection but should never lead to flooding.

Curb sediment containment systems are used to reduce the sediment and pollutant load flowing to a curb inlet. They are generally placed on paved surfaces perpendicular to runoff flow and should be lower than the height of the curb. Curb sediment containment systems should never cause flooding or placed where they are a hazard to vehicular traffic. Inlet protection used for curb sediment containment (or *Curb Sediment Containment* Inlet protection) can be placed on a grade but should never be placed directly upslope from curb inlet where it may inadvertently divert runoff from entering curb inlet.

INSTALLATION

1. Inlet protection used for inlet protection to reduce sediment and soluble pollutants entering storm drains shall meet Filtrexx® FilterSoxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be a Filtrexx® Certified™ Installer as determined by Filtrexx® International, LLC (440-926-2607 or visit web site at Filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (current list of installers can be found at www.filtrexx.com). Look for the Filtrexx® Certified™ Installer Seal.

3. Filtrexx® Inlet protection shall be placed at locations indicated on plans as directed by the Engineer. Inlet protection should be installed in a pattern that allows complete protection of the inlet area.
4. Installation of curb Inlet protection will ensure a minimal overlap of at least 1 ft (300mm) on either side of the opening being protected. The Inlet protection will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the Inlet protection in place.
5. Standard Inlet protection for curb inlet protection and curb sediment containment will use 8 in (200mm) diameter Inlet protection, and drain inlets on soil will use 12 in (300mm) or 18 in (450mm) diameter Inlet protection. In severe flow situations, larger Inlet protection may be specified by the Engineer. During curb installation, Inlet protection shall be compacted to be slightly shorter than curb height.
6. If Inlet protection becomes clogged with debris and sediment, they shall be maintained so as to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the Inlet protection may be acceptable in order to keep the area from flooding.
7. Curb and drain Inlet protection shall be positioned so as to provide a permeable physical barrier to the drain itself, allowing sediment to collect on the outside of the Inlet protection.
8. For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the Inlet protection away from the drain opening. This spacer should be a hog wire screen bent to overlap the grate opening and keep the sock from falling into the opening. Use at least one spacer for every 4 ft (1.2m) of curb drain opening. The wire grid also prevents other floatable waste from passing over the Inlet protection.
9. Stakes shall be installed through the middle of the drain Inlet protection on 5 ft (1.5m) centers, using 2 in (50mm) x 2 in (50mm) x 3 ft (1m) wood stakes.
10. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.

INSPECTION AND MAINTENANCE

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Inlet protection should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Inlet protection may be required or sediment removal may be necessary. Inlet protection shall be inspected until contributing drainage area has been permanently stabilized and construction activity has ceased

1. The Contractor shall maintain the Inlet protection in a functional condition at all times and it shall be routinely inspected.
2. If the Inlet protection has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Inlet protection when accumulation has reached 1/2 of the effective height of the Inlet protection, or as directed by the Engineer. Alternatively, for drain Inlet protection a new Soxx™ may be placed on top of the original increasing the sediment storage capacity without soil disturbance.
4. Inlet protection shall be maintained until disturbed area above or around the device has been permanently stabilized and construction activity has ceased.
5. Regular maintenance includes lifting the Inlet protection and cleaning around and under them as sediment collects.
6. The FilterMedia™ will be removed from paved areas or dispersed on site soil or behind curb once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.

Table 2.4 Spacing for Curb Sediment Containment Systems.

Grade (%)	Spacing (ft)	Spacing (mm)
0.5	100	30
1.0	50	15
2.0	25	8
3.0	16	5
4.0	13	4
5.0	10	3

Source: Fifield, 2001.

Figure 2.1. Engineering Design Drawing for Curb and Drain Inlet Protection

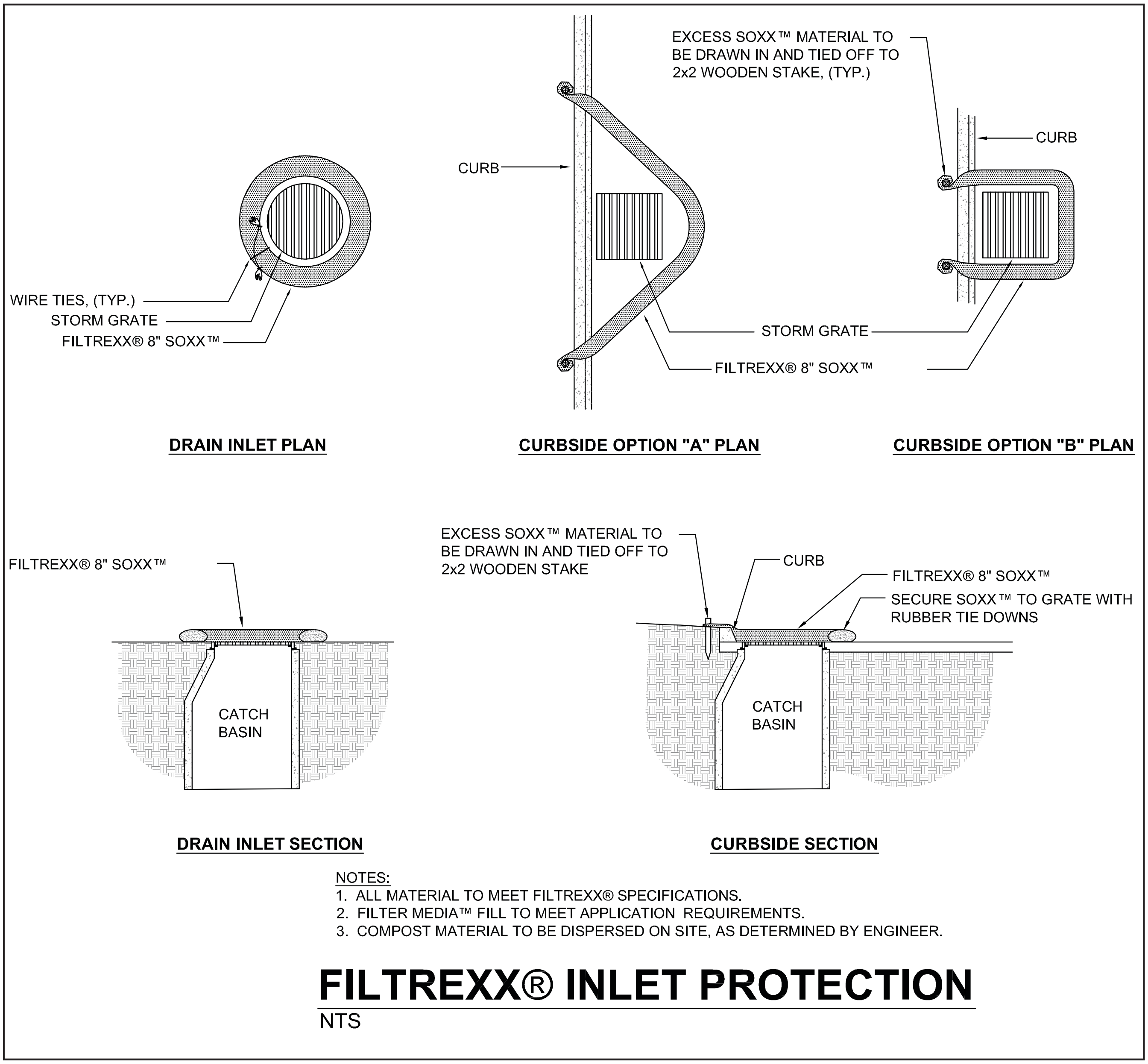
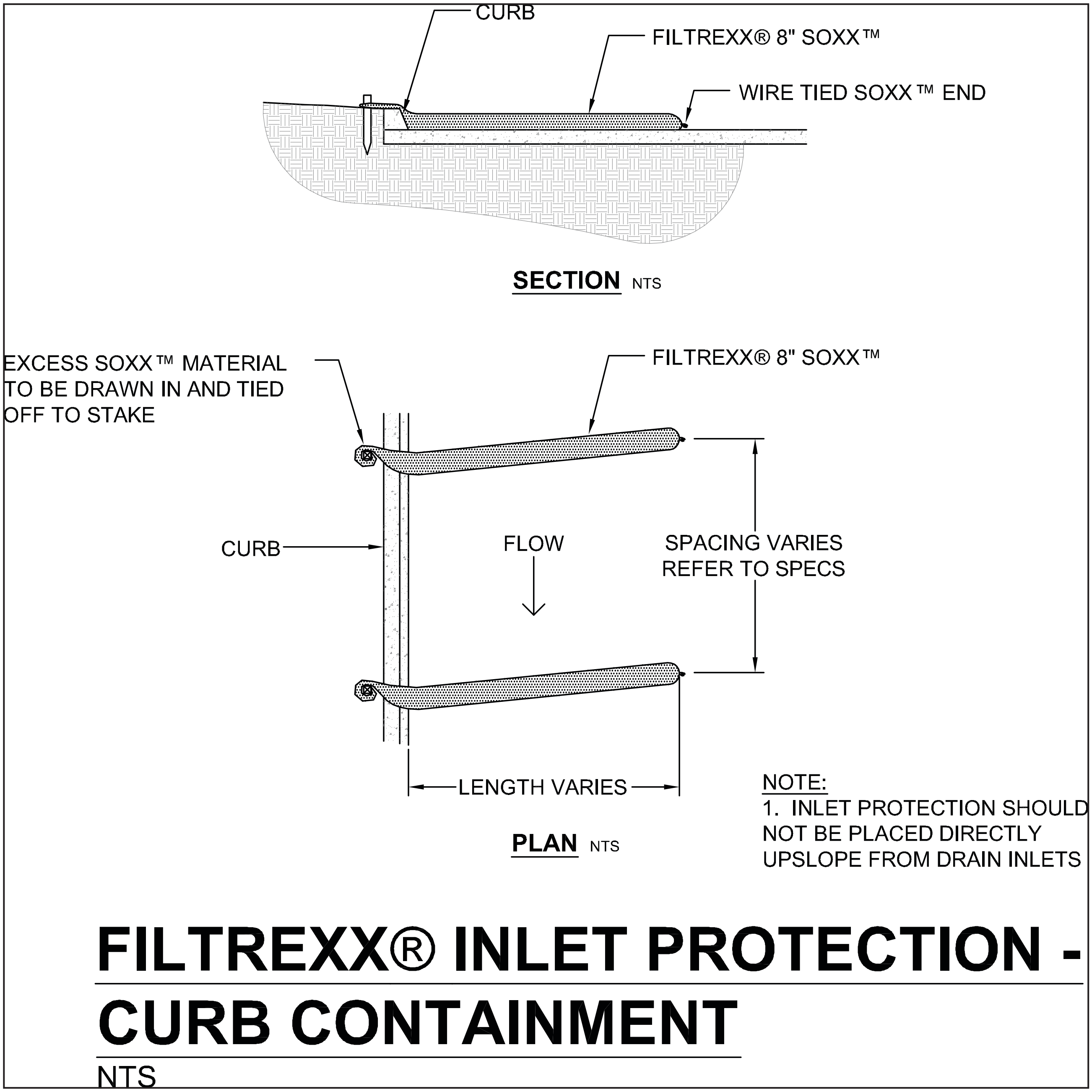
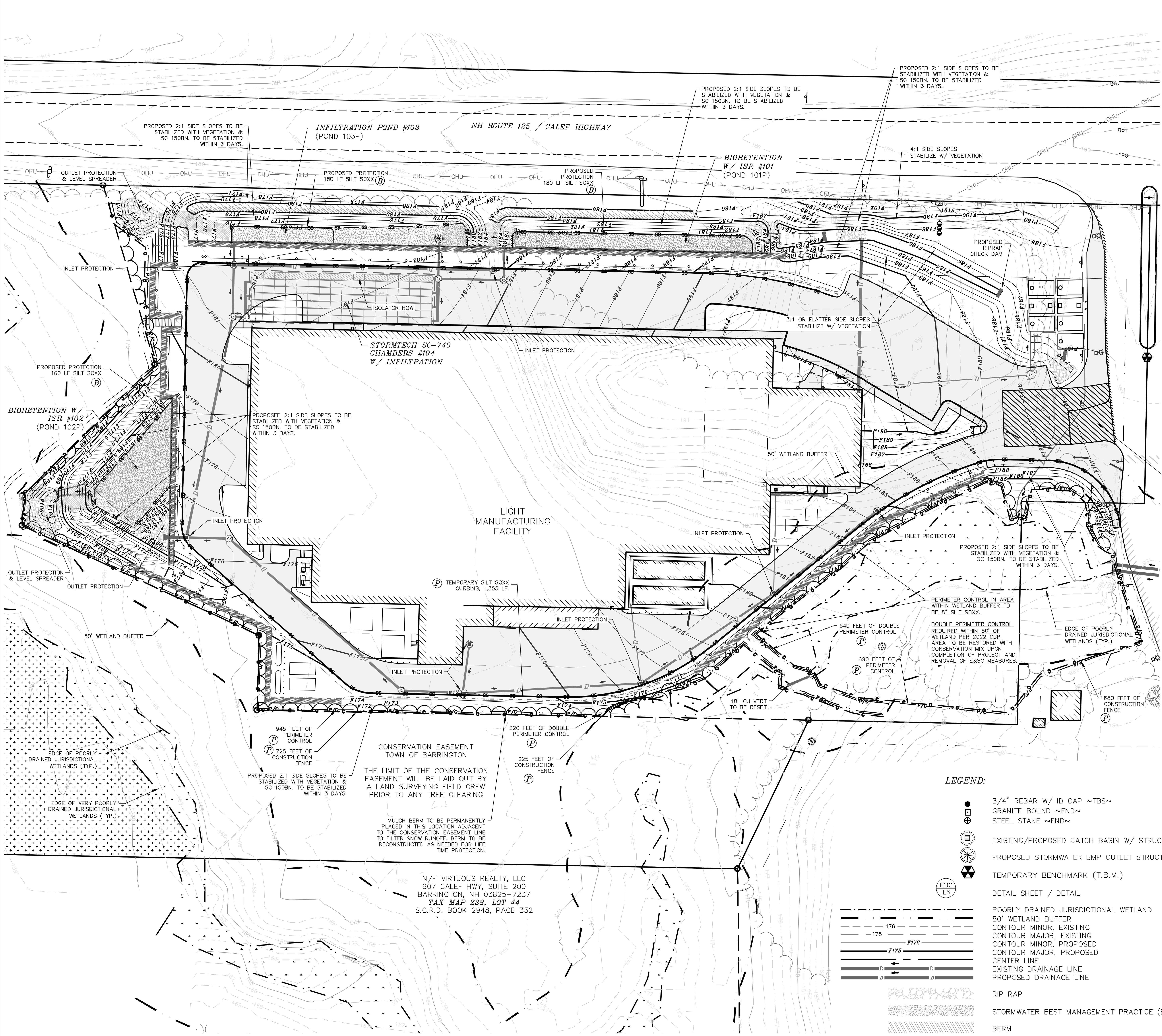


Figure 2.2. Engineering Design Drawing for Curb Sediment Containment Inlet Protection





NOTES:

1.) OWNER: NHBBC, LLC
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

2.) APPLICANT: TURBOCAM, INC.
607 CALEF HWY, SUITE 200
BARRINGTON, NH 03825

3.) THE PROJECT PARCEL IS TAX MAP 238, LOT 44-1

4.) LOT AREA: 346,738 Sq. Ft., 7.96 ACRES

5.) EROSION AND SEDIMENT CONTROL INSPECTIONS TO BE CONDUCTED ONCE PER EVERY SEVEN DAYS AND AT AN INCREASED FREQUENCY INCLUDING WITHIN 24-HOURS OF A 0.25 INCH RAIN EVENT. INSPECTIONS TO BE CONDUCTED BY A "QUALIFIED PERSON" AS DEFINED BY EPA CGP 4.1.1 AND INSPECTION REPORTS SUBMITTED O THE TOWN OF BARRINGTON, PLANNING DEPARTMENT WITHIN 24 HOURS IN ACCORDANCE WITH CGP 4.1.7 AND MAINTAINED BY THE OWNER FOR A PERIOD OF THREE YEARS AFTER THE PROJECT IS COMPLETED.

6.) PER EPA CGP 2.1.2.2 (INSTALL PERIMETER CONTROL), "YOU MUST INSTALL SEDIMENT CONTROLS ALONG THOSE PERIMETER AREAS OF YOUR SITE THAT WILL RECEIVE STORMWATER FROM EARTH DISTURBING ACTIVITIES." AS A RESULT OF SWPPP INSPECTIONS, THE CONTRACTOR MAY HAVE TO EXPAND PERIMETER CONTROLS TO MEET THIS REQUIREMENT. THE E&SC PLAN IS INITIAL GUIDANCE AS TO THE ANTICIPATED REQUIREMENTS AND IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT STORMWATER VIOLATIONS DO NOT OCCUR

7.) CONTRACTOR IS REQUIRED TO HAVE A CONSTRUCTION ENTRANCE 3" ANGULAR STONE IS REQUIRED.

8.) CONTRACTOR IS RESPONSIBLE FOR SWEEPING THE DRIVEWAY TO ENSURE THAT NO SEDIMENT IS BEING TRACKED ONTO CALEF HIGHWAY.

9.) CONTRACTOR IS RESPONSIBLE FOR CLEANING AND MAINTAINING THE INLET PROTECTION ONCE INSTALLED.

10.) FUGITIVE DUST IS TO BE CONTROLLED THROUGHOUT THE CONSTRUCTION PROCESS IN ACCORDANCE WITH ENV-A 1000.

11.) CONTRACTOR IS TO MEET THE REQUIREMENTS SPECIFIED IN RSA 430:51-57 AND AGR 3800, RELATING TO INVASIVE SPECIES.

12.) CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE WATER QUALITY FROM ANY RUNOFF DURING THE CONSTRUCTION PROCESS, IN ACCORDANCE WITH ENV-WQ 1507, IN ORDER TO PREVENT VIOLATIONS OF THE STORMWATER QUALITY STANDARDS.

13.) CONTRACTOR CAN USE SILT FENCE, SILT SOXX OR MULCH BERM FOR PERIMETER CONTROL. SPECIFIC PRACTICES MAY BE SPECIFIED, SEE PLAN. SILT FENCE OR SILT SOXX REQUIRED WHEN UPGRADIENT DISTURBED SOIL IS GREATER THAN 5%. MULCH BERM CAN BE USED WHEN THE UPGRADIENT DISTURBED SOIL IS 5% OR LESS.

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

STABILIZATION NOTE:
SEE NOTE #6, SHEET E-102, DETAIL E-18
SIDE SLOPES ARE TO BE STABILIZED WITHIN THREE WORKING DAY UPON COMPLETION OF FINAL GRADE.

LEGEND:

- 3/4" REBAR W/ ID CAP ~TBS~
- GRANITE BOUND ~FND~
- STEEL STAKE ~FND~
- EXISTING/PROPOSED CATCH BASIN W/ STRUCTURE
- PROPOSED STORMWATER BMP OUTLET STRUCTURE
- TEMPORARY BENCHMARK (T.B.M.)
- DETAIL SHEET / DETAIL
- POORLY DRAINED JURISDICTIONAL WETLAND
- 50' WETLAND BUFFER
- CONTOUR MINOR, EXISTING
- CONTOUR MAJOR, EXISTING
- CONTOUR MINOR, PROPOSED
- CONTOUR MAJOR, PROPOSED
- CENTER LINE
- EXISTING DRAINAGE LINE
- PROPOSED DRAINAGE LINE
- RIP RAP
- STORMWATER BEST MANAGEMENT PRACTICE (BMP)
- BERM
- RETAINING WALL
- STORMTECH CHAMBERS/ISOLATOR ROW
- SILT FENCE / EROSION MIX BERM
- FILTREXX 8" - 12" SILT SOXX AS SPECIFIED
- ORANGE CONSTRUCTION PERIMETER FENCE
- PERIMETER CONTROL
- (B) STORMWATER BMP PROTECTION
- (P) PERIMETER CONTROL
- (C) ROADWAY CONSTRUCTION

SOILS & DEWATERING:

313	DEERFIELD	LOAMY SAND	K= 0.15
238	ELMWOOD	FINE SANDY LOAM	K= 0.32
26	WINDSOR	LOAMY SAND	K= 0.17

SEE SITE SPECIFIC SOILS MAP (SSSM)
SEE WEBSOIL USDA-NRCS
ERODIBILITY FACTOR - K, CPESC MANUAL, ENVIROCERT INTERNATIONAL INC. & ROCKINGHAM COUNTY SOIL SURVEY, ROCKWEB SOIL ATTRIBUTES.

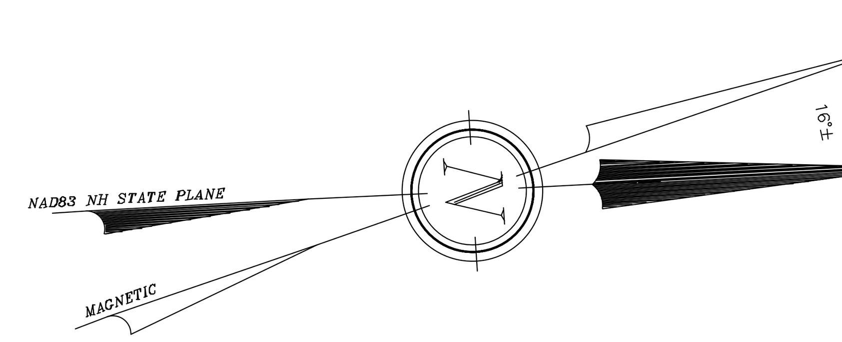
CONTRACTOR TO BE AWARE OF THE SOIL PROFILES AND ENSURE THAT PROPER EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ARE TAKEN AT ALL TIMES. ANY DEWATERING REQUIREMENTS IN NEW HAMPSHIRE REQUIRE SPECIAL PROVISIONS IN ACCORDANCE WITH THE "CLARIFICATION OF SECTION 9.1.2 (STATE OF NEW HAMPSHIRE CONDITIONS) AND OTHER NH SPECIFIC INFORMATION FOR THE U.S. EPA 2022 NPDES CONSTRUCTION GENERAL PERMIT (CGP)" DATED FEBRUARY 17, 2022 INCLUDED IN THE SWPPP.

COVER MANAGEMENT DURING CONSTRUCTION FOR EXPOSED SOIL WILL INCLUDE HAY / STRAW APPLIED AT A RATE OF 2.0 TONS PER ACRE, TEMPORARY SEEDING OF ANNUAL RYE GRASS, AND PERMANENT SEEDING AT THE EARLIES OPPORTUNITY. SEE ADDITIONAL REQUIREMENT FOR STABILIZATION ON THE EROSION AND SEDIMENT CONTROL DETAIL SHEETS, E-101 AND E-102.

THE CONSTRUCTION SCHEDULE WILL BE MANAGED SO THAT ALL STORMWATER STRUCTURES WILL BE BUILT AND STABILIZED PRIOR TO RECEIVING SURFACE WATER RUNOFF. CONTRACTOR TO BE RESPONSIBLE FOR ALL DIVERSIONS DURING CONSTRUCTION AND FOR INTERIM SEDIMENT AND EROSION CONTROL MEASURES.

FOR TOWN APPROVAL PURPOSES :

THE SITE REVIEW REGULATIONS OF THE TOWN OF BARRINGTON ARE A PART OF THIS PLAN, AND APPROVAL OF THIS PLAN IS CONTINGENT UPON COMPLETION OF ALL REQUIREMENTS OF SAID SITE REVIEW REGULATIONS, EXCEPTING ONLY MODIFICATIONS MADE IN WRITING BY THE BOARD AND ATTACHED HERETO.



REVISION	DATE	DESCRIPTION
#1A	04-04-24	BUILDING, GRADING, DRAINAGE, UTILITY, CHANGES

EROSION AND SEDIMENT CONTROL PLAN
FOR
TURBOCAM, INC.
LAND OF
NHBBC, LLC
NH ROUTE 125/CALEF HIGHWAY
BARRINGTON, N.H.
TAX MAP 238, LOT 44-1

BERRY SURVEYING & ENGINEERING
335 SECOND CROWN POINT ROAD
BARRINGTON, NH 03825 (603)332-2863

SCALE : 1 IN. EQUALS 40 FT.
DATE : FEBRUARY 5, 2024
FILE NO. : DB 2023 - 017

STATE OF NEW HAMPSHIRE
KENNETH A. BERRY
No. 14243
LICENSED
PROFESSIONAL ENGINEER