Stormwater and Drainage Report

For

TowerNorth

759 West Center Street Suite 301

West Bridgewater, MA 02379

1185 Long Pond Road

Brewster, MA 02631

Barnstable County

Prepared By:

Advanced Engineering Group, P.C.

500 North Broadway

East Providence, RI 02914

November 2024

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1.0 Introduction

This report will demonstrate that the proposed Cell Tower and access road development located at 1185 Long Pond Road will not increase stormwater runoff off property to the north. There is no nearby tributary wetland area, however, treatment of stormwater will be accomplished in accordance with the Town of Brewster stormwater regulations. The proposed development consists of construction of a 3,000 square foot compound area housing the cell tower and associated communications and power equipment. The compound will be accessed via a 475-foot access road with access to Long Pond Road via the parking lot entrance. Approximately 320 feet will traverse a proposed gravel surface to the proposed compound.

The design of the site will utilize the latest Low-Impact-Development (LID) principles in accordance with Town of Brewster standards. The goal in the design is to achieve the smallest possible environmental footprint to blend into the surrounding area. The LID elements employed in this design are as follows:

- Semi-porous driving surfaces
- Stormwater swale with flow diffusing level spreader
- Infiltration trench with overflow spreader
- Sheet flow and spread discharges
- Grassed and landscaped storage areas

Through the use of these low impact drainage design elements, water quality will be maintained as well as groundwater recharge.

2.0 Methodology

The stormwater analysis is based on the Soil Conservation Service Technical Release 55 *Urban Hydrology for Small Watersheds* June 1986 utilizing the Type III distribution hydrograph. Both pre- and post- development hydrologic conditions and detention pond design were analyzed for the 2, 10, and 100-year storm events. These storm events correspond to 24-hour rainfall depths of 3.25, 4.72, 5.64, and 7.05 inches, respectively, based on the NOAA Atlas 14 Northeast Regional Climate data for Brewster, MA. The total site area that is to be developed is approximately 7,300 square feet including the access roadway extending east from the rear of the existing parking lot. This report will demonstrate that all proposed site stormwater discharges for all storms up to and including the 100-year frequency storm will be at or below existing discharge rates. The proposed BMP will attenuate peak flow as well as provide water quality.

3.0 Existing Conditions

The existing parcel, which the cell tower development is to occupy, consists of approximately 2.2 acres of which 28,875 SF is developed and paved. The remainder is wooded. The site is broken

down into three (3) primary watershed areas that are ultimately part of the larger Lond Pond Watershed. Long Pond lies approximately 0.4 miles to the southeast of the site. The land is categorized as **Hydrologic Group A** throughout the parcel; Soil types are predominantly Carver, coarse sand with moderate slopes. See **Figure 1** for a map and description.

The topography of the parcel consists of moderately to shallow sloped land dividing the site into three watershed areas. *Watershed 1* sloping to the north with an area of 30,783 square feet that exits the site to the north as concentrated flow via a ravine. *Watershed 2* consisting of 40,902 square feet sloping to the south which exits the site via a slight channel forming shallow concentrated flow and contains a portion of the rear parking area and portion of the roof to the existing building structure. *Watershed 3* is a small area consisting of 9,223 square feet in the southeast corner of the site which drains separately to the south. A portion of this watershed will be diverted to the north as part of the proposed cell tower compound.



Figure 1: Site Location

3.1 Existing Conditions Computations

The existing site is divided into three primary watershed areas as mentioned above. The computations are as follows:

Watershed 1(EWS 1):

Area = 30,783 SF
CN = Wooded land 100%, Poor ground cover HSG A; CN=45
Time of concentration:
Sheet Flow: 100 ft s = 0.03ft/ft ground n = 0.40
Shallow Concentrated Flow = 210 ft, s=0.04 ft/ft

Watershed 2 (EWS 2):

Area = 40,902 SF
26,782 SF woods
14,120 SF Paved (tributary to rear)
Composite CN = 63
Time of Concentration
Sheet Flow: 100 ft s = s=0.0140ft/ft
Shallow concentrated Flow: 215 ft, 0.0140 ft/ft

Watershed 3 (EWS 3):

Area = 9,223 SF
100% woods
14,120 SF Paved (tributary to rear)
CN = Wooded land 100%, Poor ground cover HSG A; CN=45
Time of Concentration
Sheet Flow: 100 ft s = s=0.0140ft/ft
Shallow concentrated Flow: 0.0140 ft/ft



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
252A	Carver coarse sand, 0 to 3 percent slopes	9.6	56.3%
252B	Carver coarse sand, 3 to 8 percent slopes	7.2	42.3%
252C	Carver coarse sand, 8 to 15 percent slopes	0.2	1.3%
Totals for Area of Interest		**17.1**	**100.0%**

Figure 2 – Soils Map

4.0 Proposed Conditions

As introduced, the project consists of the development of a 3,000 square foot cell tower compound which consists of the cell tower pole, equipment cabinet, and access surface. The compound surface is made up of a semi-pervious 4-inch-thick layer of crush stone. In addition, a 12-foot wide, 320-foot-long access road will allow access from the rear of the existing parking lot. This access roadway is to also be semi-pervious, constructed with a typical section of processed aggregate. This access road also has provisions for a turnaround at the compound gate. The compound is to be completely fenced with an access gate for security. The proposed development will be graded to reflect the natural topography with minimal fill matching the existing landscape. Other than the proposed tower, utilities, and carrier equipment, no new impervious surface will be introduced as part of the proposed design.

4.1 Proposed Drainage System Calculations

As stated in the Introduction, LID elements will be introduced in the design to minimize the environmental footprint of the proposed development. The calculations will be based on the proposed gravel driveway and communications compound area.

- Infiltration rate 5 min per in.
- 100-year storm design
- Gravel driveway
- Crushed Stone Compound area with 4-inch stone thickness.
- Total developed area 7,300 square feet
- Stone trench around compound area

4.2 Required Water Quality Volume and Total Suspended Solids Analysis:

7,300 square foot gravel driveway and compound = 7,300 square feet x 1 inch x (1 foot/12 inches) = 608.3 cubic feet

Total swale holding capacity (excluding subsurface leaching trench and pond) = 2,200 cubic feet

Additional Storage Provided within Design:

The proposed facility consists of a 50 foot x60 foot stone compound area that will be used to capture part of the runoff as well as a 2'x2'x50' infiltration trench along the northern side of the compound.

Storage Provided in Compound:

50*60*(4)*(.40)/(12) = 396 cubic feet= 2,962 gallons

Storage Provided in Infiltration Trench

166*2*(.40) =600 cubic feet

Total Proposed Storage

396 + 600 = **996 cubic feet**

Although infiltration was not included in the calculation above, the open drainage system has enough surface area and provides sufficient soil abstraction to allow for the quality storm event to infiltrate the soil in less than 72-hours. The sandy soil reflects a percolation rate that is less than 5 minutes/in. 5 minutes/in has been conservatively used in these computations. LID BMP used in these computations are as follows:

- Crushed Stone Compound and access roadway - The entire compound area and access roadway from the rear of the existing paved parking lot is to be crushed stone allowing for partial infiltration of stormwater into the ground.

- Infiltration Resource Area - This BMP will consist of a pea stone trench 2 feet x 2 feet x 50 feet filled to the top with pea stone. This will provide stormwater storage for the tributary stormwater from the crushed stone compound area. The trench will store up to the 2-year frequency storm event. Excess stormwater will then overtop via a broad crest weir across the length that will level spread to the natural flow patterns at the Watershed 1 design point.

- Wet swale - A wet bottom swale will be used to promote stormwater infiltration filtering out pollutants and mitigating peak discharge flows prior to existing the site for the larger watershed 1. Stormwater flow will enter this swale where retention is promoted. The swale will contain the water quality event of 2 inches of rainfall and an overtopping weir for all storms exceeding the 2-year storm event. This outflow will then be combined with the remaining watershed flow (onsite) to demonstrate peak flow mitigation at or below existing levels.

- Open Flow Drainage - All stormwater flow within the development envelope will drain via sheet flow to the discharge locations. Flow is the routed through a rip-rap flow diffuser

pads at the discharge. Stormwater will then follow existing drainage patterns prior to exiting the site.

The proposed drainage system will improve water quality runoff by removing approximately 80% of the Total Suspended Solids (TSS). TSS removal is accomplished by way of vegetated swale providing filtration of the stormwater runoff allowing for suspended particle removal along with supplementing the subsurface leaching systems to further reduce the TSS.

Surface Swale (SS) with infiltration pond (IP) WS 2= 80% removal rate
Crushed Stone Compound Area (CSCA) WS 1= 80% removal rate
Remaining TSS = 20%

4.3 Drainage Calculations

The Proposed watersheds are broken down into two distinct sub-watershed areas that are tributary to each of the designated design points. The breakdown is as follows:

Watershed 1A – Compound to Trench

Overall, Area: 3,000 SF

- Crushed Stone Area: 2,650 SF CN: 60
- Impervious: 350 SF CN: 98

Time of Concentration: 5 min.

Watershed 1B – Tributary to DP 1

Remaining as existing conditions:

- Forest - Poor ground cover: 28,466 SF CN: 45

Tc – 21.3 min

Watershed 2 DP 2

Overall, Area: 42,092SF

- Woods – Poor ground cover: CN: 45
- Gravel Road CN: 76
- Existing Parking: CN: 98

Time of Concentration: Sheet Flow: 23.7 min
Shallow Concentrated Flow: 5.6 min

Total 30 min.

Watershed 3 DP 3

Overall, Area: 7,350 SF

- Woods – Poor ground cover: CN: 45

Time of Concentration: Sheet Flow: 5 min (min)

5.0 Stormwater Standards

The following standards represent the MADEP – Bureau of Resource Protection. The responses demonstrate the level of compliance with the stated standard for a new development project.

Standard 1: No New Untreated Discharges

There are no untreated point source discharges proposed for this development project and no adjacent wetland areas.

Standard 2: Peak Rate Attenuation

All proposed peak flows generated by the proposed development have been attenuated for all storms up to and including the 100-year event. Peak stormwater for each of the benchmark storm events as measured at the three (3) discharge points and will be at or lower than the existing stormwater flows as measured at the same design point.

Standard 3: Recharge

The site has been designed to promote groundwater recharge. The compound to utilize a crushed stone surface to enhance permeability as well as a pea stone recharge trench. An infiltration wet basin will also be used to accept flow from the dirt access road. There is insignificant impervious surface being added to the site.

Standard 4: Water Quality

A Long-term Pollution Prevention Plan has been developed that includes the following:

- Good Housekeeping practices
- Provisions for storing materials
- Vehicle washing controls
- Requirements for routine inspections and maintenance of BMP's
- Pet waste management
- Snow removal and storage
- Preventions of illicit discharges

BMP is sized based on 1/2" to 1" of water quality volume.

Standard 5: Land Uses with Higher Potential Pollutant Loads
N/A

Standard 6 : Critical Areas
N/A

Standard 7: Re-developments and Other Projects Subject to the Standards-Only the Maximum Practicable.
N/A

Standard 8: Construction Period Pollution and Erosion and Sedimentation Control
A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth has been included in the Stormwater Report.

Standard 9: Operation and Maintenance Plan
Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- Name of Owners
- Party responsible
- Schedule of maintenance
- Plan showing BMP locations
- Public safety features
- Estimated operations budget
- Operation Log Forms
- Homeowners Deed

Standard 10: Prohibition of Discharges
The Long-Term Pollution Plan includes measures to prevent illicit discharges.

6.0 Scour and Erosion Computation at Discharge Computation

As required by DEP Stormwater Design Standards, an erosion computation has been performed to determine that the discharge from the retention basin will not adversely impact the adjacent wetland area. The computation has been performed for the 10-year frequency and 100-year frequency storm events. The computation is as follows:

Watershed 2

Q_{10} = 1.16 ft^3/s ;

V = Q/A =1.16 /(2.25) = 0.71 ft/s

Q_{100} = 2.56 ft^3/s

V = Q/A = 2.56/ (2.25) = 1.13 ft/s

Based on Erosion and Sedimentation Control Handbook; Goldman, Jackson, Bursztynsky ©1986 McGraw Hill Figure 7.45

rip-rap needed at outlet using a minimum stone size of 20 lbs.

L = 5 feet with upstream width of 3 x D_o (12") = 3 feet

End width w_d = D_o + (0.4) x (L) = (0.4)(5) = 2 feet

7.0 Stormwater Operations and Maintenance Procedures

7.1 Construction Period Controls

Proper control measures during the construction stages of this project are needed to prevent erosion and sedimentation problems. Open excavation and piled material and equipment shall be properly managed to avoid conditions that may be detrimental to the project. Refer to the Plan details for the proposed erosion and sedimentation measures during the construction period. This section will serve as a summary for these procedures. The SWPPP and the full owner maintenance forms are included in the Appendix of this report:

1. The installer shall examine the work area and site conditions under which this work is to be performed prior to installation of sedimentation and erosion control.

2. The contractor shall establish the limit of work (construction or silt fence) as indicated in the Construction Drawings and maintain the limit of work in good conditions throughout the duration of the work.

3. The Contractor shall install silt bags within existing catch basins to protect against siltation. The Contractor shall regularly, and at least once a week, remove the silt sac and properly dispose of the accumulated sediments and replace the silt sac in the catch basin.

4. The contractor shall construct the “Entrance Protection Pad” at entrances to and from paved roads. All construction site vehicles exiting the work site shall use the “Stone Tracking Pad” to avoid tracking sediment off-site. The contractor shall remove all sediments spilled, dropped, washed, or tracked onto public ways.

5. All excavated areas rendering a slope greater than 3 horizontal to 1 vertical (3:1) shall be stabilized with the installation of erosion control blankets.

6. All unsuitable and excess material not intended for reuse or re-purpose within the site shall be stripped from areas impacted by construction and disposed off-site.

7. Excavated material or imported material shall not be piled in areas where sediments may damage stormwater system on the site.

8. The Contractor shall remove all construction debris for disposal from the site and properly transport to an approved disposal location.

9. After every rainstorm the Contractor shall examine the conditions of all the erosion and sedimentation controls and perform any required repairs or replacements.

10. The Contractor shall maintain on-site 200 linear feet of extra silt fence in the event erosion occurs and immediate action is necessary. If erosion occurs during construction the Contractor shall take immediate steps to contain material on site an prevent future erosion.

11. Stabilization for construction of the driveway shall be achieved by installing the gravel base immediately after the rough grading and sub-base compaction is complete.

12. The Contractor shall avoid smearing the bottom levels of the excavation and the exposed excavation face walls for subsurface leaching systems. The contractor shall scarify any areas where smearing occurs to provide adequate filtration through the soil.

13. The Contractor shall avoid using dirty or silty crushed stone for the construction of the leaching systems. The Contractor shall use washed crushed stone for the construction of the subsurface leaching system.

14. All protective measures (silt sacs, silt fences, and hay bale) installed on site or in the catch basins within the site shall be removed once the site work is complete and the disturbed areas are stabilized.

7.2 Operation and Maintenance Plan

A properly operating drainage system is the basis for long life of the roads and parking areas and for the protection of wetland resources against pollutants carried by stormwater. If the drainage system fails to work, frequent pooling of stormwater would be expected to occur within the site leading to saturation of the gravel base and shortening the life expectancy of the site improvements. The owner or designated representative will be responsible for maintenance and operation of the drainage system. A copy of the Site Plan suffices as means of illustration of the location of the stormwater system, or other drawings depicting the site with all components of the drainage system. To provide for adequate maintenance of the drainage system, the following inspections and procedures will be required:

1. Inspect inlets after major storm events (typically a storm of one inch (1") of rainfall) and at least four times a year.

2. All debris at the inlet grates shall be removed and properly disposed of clearing the entire surface of the inlet grates.

3. If standing water is observed above the grate inlet rim 24 hours past a storm event inspect the system for the presence of clogging or obstruction. If clogging or an obstacle exists arrange for the system to be cleaned.

4. At the leaching systems locations, inspect the system by inspecting the interior of the pipe. Measure the depth of standing water and compare it to the actual depth of the pipe. If the standing water is greater than half the depth of the pipe, the leaching system shall be cleaned and inspected on a quarterly basis.

5. The leaching trench is considered in failure when pooling occurs after a rain event at the inlet structure serving the system; and an investigation has determined that no apparent clogging or obstructions within the drainpipe are present. To repair this situation, a contractor shall be hired to install the same size system in an adjacent area to the leaching system in failure, subject to subsurface soil investigations to determine soil permeability. The contractor shall connect the new system to the old failed system's inlet with the same size pipe and slope that currently exists.

8.0 Summary

All computations for the pre and post development runoff for each of the design storm events are in compliance with Massachusetts Section 6 of the Town of Brewster Stormwater regulations and Massachusetts Stormwater Management Standards. It can be demonstrated from the following tables the peak flows are attenuated.

Table 6.1 Existing /Proposed Conditions Peak Flow Comparisons

6.1.1 Watershed 1

Storm Event	*Existing Conditions Flow*	*Proposed Conditions Flow*
2-year storm	0.01 CFS	0.01 CFS
10-year storm	0.55 CFS	0.06 CFS
25-year storm	0.21 CFS	0.20 CFS
100-year storm	0.53 CFS	0.48 CFS

6.1.2 Watershed 2

Storm Event	*Existing Conditions Flow*	*Proposed Conditions Flow*
2-year storm	0.35 CFS	0.00 CFS
10-year storm	0.55 CFS	0.11 CFS
25-year storm	1.22 CFS	1.18 CFS
100-year storm	1.82 CFS	1.92 CFS

6.1.3 Watershed 3

Storm Event	*Existing Conditions Flow*	*Proposed Conditions Flow*
2-year storm	0.01 CFS	0.00 CFS (<0.01)
10-year storm	0.01 CFS	0.01 CFS
25-year storm	0.09 CFS	0.07 CFS
100-year storm	0.24 CFS	0.19 CFS

From the above comparison, the difference between existing and proposed conditions is relatively close since the watersheds are relatively small with Group A soils indicative of high infiltration rates. The pea stone trench will capture stormwater sheeting off the compound area for storms up to the 25-year storm with insignificant overflow occurring for the lesser frequency storms. This is magnified with the crush stone bottom which is also semi pervious. This will allow the proposed compound to meet the stormwater rechange. Water quality is also maintained with the stormwater retention area for Watershed 2 which will capture all storms up to the 2-year frequency storm event. Discharging low flow over a level spread broad crest rip rap weir. Watershed 3 will experience reduction in flow because of the reduction of approximately 30 % in overall watershed area from the existing condition.

Total Suspended Solids have been attenuated through the use of infiltration trench and crushed stone bed for the compound area for watershed 1. Suspended solids have also been attenuated for Watershed 2 and 3 through overall reduction in area and use of wet swale in Watershed 2.

In compliance with the Town of Brewster Stormwater regulations, recharge of groundwater table has been achieved. All stormwater generated from the proposed compound will be attenuated through the stone trench and pervious stone layer and subgrade of the compound itself for all stormwater events up to the 10 -year storm.

As part of the Town of Brewster Stormwater regulations removal of nitrates from the stormwater is also to be considered. With the storm providing water quality swales and crushed stone bed along with an infiltration pond and infiltration trench, all stormwater up to the 2-year storm will be stored completely. This equates to approximately 3.5 inches of rainfall which is beyond the volume of the water quality event storm (1”). Therefore, the system as designed for each of the Design Point discharge areas exceeds the minimum criteria.

APPENDIX 1

- Stormwater Checklist
- Operation and Maintenance Agreement

Storm Water Pollution Prevention Plan

for:

TowerNorth

759 West Center Street Suite 301

West Bridgewater, MA 02379

Operator:

Tower North

SWPPP Contact:

SWPPP Preparation Date:

September 2024

Estimated Project Dates:

Project Start Date: 11/1/24

Project Completion Date: 4/15/25

CERTIFICATION:

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate 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 of violations.

Name of Owner:_____

Signature of Owner:_____ Date:_____

Name of Operator:_____

Signature of Operator:_____ Date:_____

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Title:_____

Operator:_____

As a subcontractor, you are required to comply with the Storm Water Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement.

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the BMPs and practices described in the SWPPP.

This certification is hereby signed in reference to the above-named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

Signature: _____

Title: _____

Date: _____

The above to be filled out once contract has been awarded.

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SWPPP APPENDICES

Appendix A – General Location Map(s)

Appendix B – Site Plans (See Construction Plan Set)

Appendix C – Copy of Regulatory Permits

Appendix D – Inspection Reports

Appendix E – Corrective Action Log

Appendix F – SWPPP Amendment Log

Appendix G – Post Construction BMP's Inspection Reports

Appendix H – Post Construction BMP's Inspection Log

SECTION 1: SITE EVALUATION, ASSESSMENT, AND PLANNING

1.1 Project/Site Information

Project/Site Name: Proposed Communication Tower Site

Project Street/Location: 1185 Long Pond Road

City: Brewster State: MA ZIP Code: 02631

County or Similar Subdivision: Bristol County

Latitude/Longitude (Use **one** of three possible formats, and specify method)

Latitude:	Longitude:
1. 41°-44'-30" N (degrees, minutes, seconds)	1. 70°-03'-12" W (degrees, minutes, seconds)
2. 41 º-44'.50 N (degrees, minutes, decimal)	2. 71 º03.3" W (degrees, minutes, decimal)
3. _ _ . _ _ _ _ º N (decimal)	3. _ _ . _ _ _ _ º W (decimal)

Method for determining latitude/longitude:

☐ USGS topographic map (specify scale: _____) ☐ EPA Web site ☐ GPS

☒ Other (please specify): Google Earth

Is the project located in Indian country? ☐ Yes ☒ No

If yes, name of Reservation, or if not part of a Reservation, indicate "not applicable." _____

Is this project considered a federal facility? ☐ Yes ☒ No

EPA project or permit tracking number*: _____

1.2 Contact Information/Responsible Parties

Operator:

North Tower Inc

Project Manager or Site Supervisor:

SWPPP Contact:

This SWPPP was prepared by:

Advanced Engineering Group, P.C.
500 North Broadway
East Providence, RI 02914

contractor(s): To be filled out once contract has been awarded.

Insert Company or Organization Name:
Insert Name:
Insert Address:
Insert City, State, Zip Code:
Insert Telephone Number:
Insert Fax/Email:

Emergency 24-Hour Contact: To be filled out once contract has been awarded.

Insert Company or Organization Name:
Insert Name:
Insert Telephone Number:

1.3 Nature and Sequence of Construction Activity

Proposed improvements include the demolition of existing gate and bituminous pavement at intersection. Construction of traffic control devices including speed humps, reconfiguration of approach roadway and circulation. Construction of new gate house and entrance control devices.

Based on the *Waterbody Assessment and TMDL Status* mapping for Rehoboth, MA, there are no known impairments or TMDL designations for Cole Brook.

According to Massachusetts GIS mapping, the site is not located within or adjacent to any known NHESP Priority Habitats of Rare Species, NHESP Estimated Habitats or Rare Species, or other Critical Areas denoted by the Commonwealth of Massachusetts.

What is the function of the construction activity?

☐ Residential ☐ Commercial ☐ Industrial ☐ Road Construction ☒ Linear Utility

Estimated Project Start Date: 11/01/2024

Estimated Project Completion Date: 04/15/2025

1.4 Soils, Slopes, Vegetation, and Current Drainage Patterns:

According to the Soil Survey for Barnstable County, prepared by the USDA Natural Resource Conservation Service, the soils on the site consist of the following:

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
252A	Carver coarse sand, 0 to 3 percent slopes	9.6	56.3%
252B	Carver coarse sand, 3 to 8 percent slopes	7.2	42.3%
252C	Carver coarse sand, 8 to 15 percent slopes	0.2	1.3%
Totals for Area of Interest		**17.1**	**100.0%**

Based on the Soil Survey Data soils consist of sandy gravel with some steep slopes. Some urban land complex is somewhat denser and consists of some silty-loamy mix in the areas near the roadway. Depth to water table is generally greater than 3 feet.

Slopes:

Grades on the site can be characterized as sloping towards the north offsite. There is no onsite wetland areas present within 2,000 ft.

Drainage Patterns:

Drainage patterns generally drain to the north via a concentrated ravine. This ravine is thickly wooded.

1.5 Construction Site Estimates:

The following are estimates of the construction site:

Total project area:	0.10 acres
Construction site area to be disturbed :	0.05 acres
Percentage impervious area before construction:	2%
Runoff coefficient before construction:	65
Percentage impervious area after construction:	2%

Runoff coefficient after construction	65

1.6 Receiving Waters:

Description of Receiving Water: N/A

Description of storm sewer systems: sewer/septic

Description of impaired waters or waters subject to TMDLs: None identified

1.7 Site Features and Sensitive Areas to be Protected:

Description of unique features that are to be preserved: N/A

1.8 Potential Sources of Pollution:

Potential sources of sediment to stormwater runoff:

- Site Excavation Operations
- Construction of new building
- Vehicle tracking
- Stripping of Topsoil
- Stockpiling

Potential pollutants and sources, other than sediment, to stormwater runoff:

- Vehicle Washout Area
- Building Materials & Construction
- Material Storage Area for Building Construction

1.9 Endangered Species Certification:

Are endangered or threatened species and critical habitats on or near the project area?

☐ Yes ☒ No

Describe how this determination was made:

Massachusetts GIS Mapping

If yes, describe the species and/or critical habitat:

If yes, describe or refer to documentation that determines the likelihood of an impact on identified species and/or habitat and the steps taken to address that impact. (Note, if species are on or near your project site, EPA strongly recommends that the site operator work closely with the appropriate field office of the U.S. Fish and Wildlife Service or National Marine Fisheries Service. For concerns related to state or tribal listing of species, please contact a state or tribal official.)

1.10 Historic Preservation:

Are there any historic sites on or near the construction site?

☐ Yes ☒ No

Describe how this determination was made:

http://www.nps.gov/nr

If yes, describe or refer to documentation that determines the likelihood of an impact on this historic site and the steps taken to address that impact.

1.11 Applicable Federal, Tribal, State or Local Programs:

N/A

1.12 Maps:

- See Appendix B.

SECTION 2: EROSION AND SEDIMENTATION CONTROLS

The purpose of erosion controls is to prevent sediment from moving onto, around, or off of the construction site. Properly installed and maintained erosion controls are the primary defense against sediment pollution.

Sedimentation controls are a second line of defense against moving sediment. The purpose is to prevent moving sediment from leaving the construction site and entering environmentally important areas.

Runoff controls are used to slow the velocity of concentrated water flows. By intercepting and diverting stormwater runoff to a stabilized outlet or treatment BMP, erosion and sedimentation are reduced.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil:

Proposed improvements/alterations associated with the subject project include limited clearing, excavations, filling, grading, installation of structures, sediment/water quality facility, impervious surfaces, utilities, fencing, loaming, seeding, maintenance/repair/modification of specified stormwater control structures, and installation of permanent and temporary erosion and sedimentation controls. The above described proposed activities will take place within the minimum amount of space required to satisfy the federal, state, and local requirements of project design, safety, maintenance, and environmental protection.

2.2 Construction Activity:

- **BEFORE EARTHWORK**

  - Prior to the start of any construction activities on site, a pre-construction conference shall be held on site to establish supervisory and inspection procedures for sediment and erosion control measures. This meeting shall be attended by the operator contractor, applicant/owner, engineer and the local erosion control agent.
  - Stake the limit of work in the field to ensure that all work will be inside the erosion control measures. The limit of work will be indicated by a temporary haybale and/or silt fence barrier.
  - Protect all planned infiltration sites and qualifying pervious areas from compaction.
  - Clear and grub vegetation as required. Remove all stumps from project site.
  - Install stone construction entrance/exit mat at all site construction entrances/exits as detailed.
  - Construct temporary sediment & dewatering basins.
  - Protect all existing drainage structures from sediment by installing Siltsacks® at all catch basins within or near the project area.
  - Perform earthwork & rock excavation.
  - Construction preparation and mobilization. Will include delivery of construction materials to site to be stockpiled on site.

- **DURING EARTHWORK**

  - Construction of the stormwater management features and site utilities (i.e. water, drainage etc.). No storm water runoff to be directed toward stormwater management features until site is stabilized.
  - Water will be used to control any dust that may occur during construction.
  - Site grading and installation of pavement.
  - Silt fence / haybale barrier will be continually inspected and maintained during this phase.

- **FINAL STABILIZATION**

  - Construction completion and final punch list items will be addressed.
  - Final site clean-up and de-mobilization will occur.
  - Stormwater management features will be cleaned if necessary.
  - Haybale / silt fence siltation barrier will be removed during this phase.

2.3 Control Stormwater Flowing onto and Through the Project:

- The Contractor will provide erosion and sediment control measures along the project limits as shown on the Contract drawings or as directed by the Architect/Engineer. The required erosion control measures will be installed prior to any grubbing, excavation, filling, or any other soil disturbance within the project area. Proposed vegetative and structural measures that will be implemented during construction include permanent vegetative cover, temporary mulching, dust control, & haybale / silt fence siltation barrier.

  Adequate sedimentation control measures for cleaning and flushing of existing drainage systems will be installed at the lowest downstream drainage structure to collect debris and filter flushing water prior to discharging to the drainage outfall(s) and/or the last drain pipe specified within the systems.

2.4 Stabilize Soils:

- Haybale / silt fence siltation barrier will be installed to collect all sediment suspended in storm water runoff.
- Temporary vegetative cover will be established using hydro-seeding for areas of exposed soil, including stockpiles where construction activity will cease for more than 14 days.
- Organic mulch will be applied to exposed soils during short periods of construction.
- Dust from the site will be controlled by applying potable water to disturbed areas.
- Immediately after formation of final grades install erosion control matting as detailed
- Permanent stabilization will be done immediately after final grades are achieved.

2.5 Protect Slopes:

- Erosion Control Blanket (ECB) will be installed on graded slopes equal to or steeper than 3(H):1(V).

2.6 Protect Storm Drain Inlets:

- No stormwater inlets and closed drainage system to be present on the proposed site.

2.7 Establish Perimeter Controls and Sediment Barriers:

- The Contractor will provide erosion and sediment control measures along the project limits as shown on the Contract drawings or as directed by the Engineer. The required erosion control measures will be installed prior to any grubbing, excavation, filling, or any other soil disturbance within the adjacent project area. Proposed vegetative and structural measures that will be implemented during construction include permanent vegetative cover, temporary mulching, dust control, haybale & siltation barrier.

2.8 Retain Sediment On-Site and Control Dewatering Practices:

- ***Sediment Basins/Traps shall be installed as required during construction. Sediment Basins will be sized as follows:***

$$\text{Sediment Basin Volume} = 3{,}600 \frac{\text{cubic feet}}{\text{Acre}} \times \text{Contributing Area (acre)}$$

- The Contractor shall be responsible for routinely inspecting, cleaning and making necessary repairs to erosion control measures in accordance with the Contract Documents. Any sedimentation that will interfere with the proper function of an erosion control device shall be removed by the Contractor.

2.9 Establish Stabilized Construction Exits/Entrances:

- Crushed Stone Entrance/Exit anti-tracking pads will be installed at each entrance/exit as detailed on the Contract Drawings. The crushed stone pad will remain in place until the pavement binder course is installed.

2.10 Additional BMP's:

- Public lots, public and private roadways and gutters shall be swept clean. Sweeping shall occur on a weekly basis at minimum.
- All installed catch basins will be inspected within 24 hours after every rainstorm. Should catch basin sumps become filled with sediment to half their depth (2 feet), they shall be cleaned immediately.
- All installed drain manholes will be inspected within 24 hours after every rainstorm. Should manholes become filled with sediment to a depth of one (1) foot, they shall be cleaned immediately.
- Stormwater basins should not receive any stormwater runoff until the entire contributing drainage area to the basin has received final stabilization. Basin shall be monitored after every rainstorm for any slope erosion, ponding and accumulation of sediments.

SECTION 3: GOOD HOUSEKEEPING BMP's

3.1 Material Handling and Waste Management:

- The Contractor shall dispose of all types of waste generated at the site as regulated by State and Federal agencies. All waste materials will be collected and disposed of into dumpsters. Dumpsters will be placed away from storm water conveyance systems and environmentally sensitive areas.

- All paints, solvents, concrete sealers or other chemicals shall be stored in weather proof containers.

3.2 Establish Proper Material Staging Areas:

- Construction equipment and maintenance materials will be stored within the designated combined storage area. Staging area shall be enclosed with a construction fence surrounded by haybales.

3.3 Designate Washout Areas:

- Vehicle wash down area shall be a minimum 20' x 20' area surrounded by reinforced haybales.

- The Contractor shall be responsible for routinely inspecting, cleaning and making necessary repairs to erosion control measures in accordance with the Contract Documents. Any sedimentation that will interfere with the proper function of an erosion control device shall be removed by Contractor.

3.4 Establish proper equipment/vehicle fueling and maintenance practices:

- Vehicle fueling area shall be a minimum 20' x 20' area surrounded by reinforced haybales. No vehicles will be left unattended in project areas, which, in the event of a hazardous material spill, would flow into any portion of the drainage system. Vehicles will be fueled in areas that will not lead to a discharge of fuel into Waters of the State or storm water conveyance system.

3.5 Control of Allowable Non-Storm Water Discharges

The following activities are potential sources of allowable non-stormwater discharges:

1. Vehicle washing without detergents;
2. Watering for dust control;
3. Dewatering of uncontaminated groundwater.

3.6 Spill Prevention and Control Plan

Spills related to construction vehicles and materials will be prevented by the following construction procedures:

1. No vehicles will be left unattended in project areas, which in the event of a hazardous material

spill, would flow into any portion of the drainage system.

2. Vehicles will be fueled in areas using procedures that will not lead to a discharge of fuel into Waters of the State.

3. In the event of a release of hazardous material, the Contractor will take all measures to stop and/or contain the leak and without exacerbating the release, attempt to remove equipment from the areas likely to cause a discharge of hazardous materials into Water of the State. Further, site supervisors shall be contacted and, should it be determined that the spill is of a reportable quantity, the State shall be notified. A licensed hazardous waste remediation contractor shall be engaged to remediate the spill in accordance with State Regulations and procedures.

In order to prevent pollution of surface waters, the following construction procedures are prohibited:

1. Dumping of or discharging of spoil material or excessively turbid water into any stream corridor, any wetland, any surface waters, or at unspecified locations.

2. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.

3. Disposal of excess of unsuitable excavation material in wetlands area, even with permission of the property owner.

4. Open burning of project debris.

5. Location of storage stockpiles in environmentally sensitive areas.

6. Discharge of contaminated groundwater, unless specifically authorized by the State.

7. Discharge of wastewater from washout of concrete, unless the discharge is contained and managed by appropriate controls.

8. Discharge of wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials.

9. Discharge of fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance. Proper storage and spill prevention practices must be utilized.

10. Discharge of soaps or solvents used in vehicle and equipment washing.

11. Discharge of toxic or hazardous substances from a spill or other release.

3.7 Additional BMPs:

- No additional BMPs are anticipated.

3.8 Construction Site Good Housekeeping BMPs:

1. Good housekeeping and material management reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

A. All materials stored on-site will be stored in a neat, orderly manner in their appropriate containers and under a roof or other weather proof enclosure.

B. Products shall be kept in their original containers with the original manufacturer's label.

C. Substances should not be mixed with one another, unless recommended by the manufacturer.

D. Whenever possible, all of a product will be used up before disposing of a container.

E. The system's manager shall inspect the site daily to ensure proper use and disposal of materials on-site during all construction phases.

F. Original materials labels and material safety data sheets which contain important information shall be kept on site.

G. Petroleum Products:

1.) All on-site vehicles and parking areas shall be regularly monitored for leaks and receive regular preventive maintenance to prevent leakage.

2.) Petroleum products shall be stored under cover and shall be in tightly sealed containers which are clearly labeled.

H. Fertilizers:

1.) Fertilizers shall only be used in the minimum amounts as recommended by the manufacturer.

2.) The contents of any un-used fertilizer shall be transferred to a clearly labeled, sealable plastic bin, to avoid spillage.

I. Paints, Solvents:

1.) All paints and solvents shall be stored in original manufacturer's containers in a covered location.

2.) The use of paints and solvents shall, whenever possible, be limited to service or storage bays and not in parking or success ways that are tributary to the drainage system.

2. Spill Control Practices:

A. Manufacturer's recommended methods shall be clearly posted for spill clean-up and site personnel shall be made aware of the procedures and the locations of clean-up information and supplies.

B. Material and equipment necessary for spill clean-up will be kept on-site in a designated material storage area. Equipment will include, but not be limited to, brooms, dust pans, mops, rages, gloves, goggles, absorbent materials, sand, sawdust and plastic & metal trash containers specifically kept and labeled for this purpose.

C. All spills will be cleaned-up immediately after discovery.

D. Spills of toxic or hazardous material or nature will be reported to the appropriate state, local or federal agency, as required by-law.

E. The spill prevention plan will include provisions to adapt the plan to ensure that spills will not reoccur, and how to clean up the spill if there is another one.

F. Site operations and daily use shall consider the ultimate disposition of stormwater and other site-generated forms of runoff. The washing of vehicles shall be limited areas within the building, as they are served by the floor drain system. Wash water with its combination of solvents, detergents and oil/greases should not be allowed to enter any part of the on-site drainage system.

G. Snow Plowing – snow plowing operations shall stockpile snow, ice and accumulated materials in areas where snow melt will flow into the on-site drainage systems, including drainage basins. No plowing or storage of snow into wetlands or areas draining to wetland.

H. Salt use site-wide shall be applied to the minimum extent possible to maintain safe conditions.

SECTION 4: POST-CONSTRUCTION BMPs

4.1 Post-Construction BMP's:

- Haybale / silt fence siltation barrier will be removed during this phase.
- The Contractor must perform a full maintenance & clean-up of the Stormwater Management System & site prior to turnover to the Owner/Lessee.
- Stormwater management basin(s) must be inspected annually and after every rainstorm event of two inches or more to ensure that the design infiltration rate is being met. The basin must be inspected for any ponding and accumulation of sediment. Remove & dispose accumulated sediment and debris by hand. Any oil or grease found in the basin at the time of inspection must be cleaned up with oil absorption pads and disposed of at an approved off-site location.
- All catch basins must be inspected and maintained on a bi-annual basis in March and October of each year. Catch basins must be inspected to ensure they have adequate sump capacity, frames and grates are not damaged, oil/water separating devices are in place. Catch basin sumps are to be cleaned out during bi-annual inspections in March and October of each year. Immediately clean the catch basin sump if two feet or more of sediment has accumulated within the catch basin.
- All drain manholes must be inspected and maintained on a bi-annual basis in March and October of each year. Drain manholes must be inspected to ensure frames and covers are not damaged and no blockages have occurred within the manhole. Drain manholes are to be cleaned out during bi-annual inspections in March and October of each year immediately clean the drain manhole if one foot or more of sediment has accumulated within the drain manhole.
- Water quality structures must be inspected and maintained on a bi-annual basis in March and October of each year. Water quality structures must be inspected to ensure frames and covers are not damaged and they are functioning as designed. Water quality structures are to be cleaned out during bi-annual inspections in March and October of each year. Immediately clean the water quality structure if one foot or more of sediment has accumulated within the structure.
- Parking lots, roads and all access ways and gutters must be swept clean of all sediment and debris on a Bi-Annual basis in March and October.

SECTION 5: MAINTENANCE and INSPECTIONS

5.1 Inspections:

Minimum Monitoring and Reporting Requirements

All storm water control measures, disturbed areas, areas used for the storage of materials that are exposed to precipitation (including unstabilized soil stockpiles), discharge locations, and locations where vehicles enter or exit the site must be inspected at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event.

General Notes

- A separate inspection report will be prepared for each inspection.
- The Inspection Reference Number shall be a combination of the Construction Contract Number – Consecutively numbered inspections.
- Each report will be signed and dated by the Inspector and forwarded to the Engineer within 24 hours of the inspection.
- Each report will be signed and dated by the Engineer and returned to the Inspector within 24 hours of receipt. The Engineer will also forward a copy of each signed and dated report to the Contractor's designated representative within the same time period.
- It is the responsibility of the Site Contractor to maintain a copy of the SWPPP, copies of all completed inspection reports, and amendments as part of the SWPPP documentation at the project field office during construction.

Submitting Monthly Reports

During Construction the inspector will maintain a Monthly Inspection Report.

At a minimum, the monthly inspection report will include:

- A summary narrative of the month's inspections.
    - Introduction – Inspector, rain gauge information.
    - Summary of Site Activities - # of investigations; date(s) of weather events resulting in precipitation in a 24-hour period or significant snow melt.
    - Site Review and Discussion – for each inspection, a paragraph including date, time, weather, and precipitation events; general observations, issues, actions taken to resolve previous inspection's corrective actions; ongoing issues; associated photo/figure numbers.
    - Outstanding issues – continued erosion and sediment control issues not addressed since previous month's inspection report.
    - Summary
- A copy of each completed, dated, and signed inspection report.
- Associated photos – each photo should be dated and have a unique identification # and written description indicating where it is located within the project area. If a close up photo is required, it should be preceded with

a photo including both the detail area and some type of visible fixed reference point. Photos should be annotated with Station numbers and other identifying information where needed.

- A copy of the daily rainfall summary data for the month as reported by the selected rain gauge.
- A CD containing a complete copy of all portions of the monthly report in .pdf format.

See attachments for a sample copy of the Inspection Report.

5.2 Corrective Actions:

If, in the opinion of the Engineer, corrective action is required, the Engineer shall note it on the inspection report and shall notify and direct the Contractor to take corrective action and make all necessary repairs whenever maintenance of the erosion and pollution controls is required.

In accordance with applicable permits and the SWPPP, non-compliance issues shall be addressed no later than seven (7) calendar days from the date of inspection.

In accordance with the SWPPP the Contractor shall commence with the requisite cleaning and maintenance measures no later than the next consecutive calendar day after receiving such a directive from the Engineer, and shall aggressively and expeditiously perform such cleaning and maintenance work until the original problem is remedied to the complete satisfaction of the Engineer.

See attachments for a sample copy of the Corrective Action Log.

5.3 Maintenance:

Maintenance procedures for erosion and sedimentation controls and stormwater management structures/facilities are described on the Contract Documents and plans.

Construction shall not commence or continue until all specified erosion and pollution controls are in place, properly installed and accepted by the Engineer.

Erosion and pollution controls shall be maintained by the Contractor to the satisfaction of the Engineer. Erosion and pollution controls must be able to prevent, under normal weather conditions, both the movement of soil materials and the intrusion of sediment-laden discharges into environmentally sensitive areas or adjacent properties.

Erosion and pollution controls will be cleaned as noted in the Contract Drawings or as directed by the Engineer; after every rainstorm; and/or when sediment deposits reach the heights indicated on the Contract Documents and plans.

Erosion control measures shall remain in place until all disturbed earth has been securely stabilized and accepted by Engineer. Before final removal, all accumulated sediment on the upstream side shall be removed and legally disposed of off site. After removal of erosion control measures, disturbed areas shall be regarded and stabilized as necessary.

5.4 Long-term Maintenance:

Once construction has been completed and has received Final Acceptance, it is the responsibility of the Operator to inspect and maintain all storm water structures on a regular basis.

At the time of Final Inspection, the Owner will appoint an individual who will be responsible for conducting inspections and maintaining records.

The stormwater management system requires regular maintenance to function at its designed efficiency. The Operator or subsequent operators will be responsible for the inspection, maintenance and repairs to the stormwater management structures on the Site as noted on the Contract Documents and plans. See Appendix for a sample copy of the Inspection Report and Inspection Log.

SECTION 6: Amendments

This SWPPP is intended to be a working document. It is expected that amendments will be required throughout the construction of the project. **Even if practices are installed on site according to the approved plan, the site is only in compliance when erosion and sedimentation are effectively controlled throughout the entire site.**

The SWPPP shall be amended within 7 days whenever there is a change in design, construction, operation, maintenance or other procedure which has a significant effect on the potential for the discharge of pollutants, or if the SWPPP proves to be ineffective in achieving its objectives (i.e. the selected BMP's are not effective in controlling erosion or sedimentation).

All revisions must be recorded in the Record of Amendments Log Sheet within the SWPPP, and dated red-line drawings and/or a detailed written description must be appended to the SWPPP. Inspection Forms must be revised to reflect all amendments. Update the Revision Date and the Version # in the footer of the Report to reflect amendments made.

All SWPPP Amendments, except minor non-technical revisions, must be approved by the Engineer. See Appendix for a sample copy of the Amendment Log.

SECTION 7: Recordkeeping

It is the Contractors' and the Operator's responsibility to have the following documents at the Field Office and immediately available for Agency review upon request:

- A copy of the fully signed and dated SWPPP, which includes:
    - Copy of Regulatory Permits.
      - See Appendix C.
    - Inspection Reports,
      - See Appendix D.
    - Corrective Action Log,
      - See Appendix E.
    - SWPPP Amendment Log,
      - See Appendix F.
    - Post Construction BMP Inspection Reports,
      - See Appendix G.
    - Post Construction BMP Inspection Logs,
      - See Appendix H.
- Copies of all signed and dated Inspection reports

SECTION 8: Final Stabilization

All areas disturbed by construction not designated as a hard surface or not stabilized otherwise shall be seeded and mulched on a minimum of 6" topsoil. Seeding should only be applied between March 1 to May 31 or August 1 thru September 30. All seeded areas shall be watered, fertilized, reseeded as necessary to insure a minimum of 70% growth. Temporary stabilization shall be completed with 7 days of last disturbance on all disturbed areas where construction activities will be ceased or suspended for 14 days or more. All areas must be stabilized prior to the onset of winter.

Appendix A – General Location Map(s)



source:: http://www.usgs.gov

FIGURE -1

. Swansea, MA

USGS Topographic Map

Contour Interval 10 Feet

Scale: N.T.S.



source:: Google Earth

FIGURE -2

Swansea, MA

Aerial View

Scale: N.T.S.

Appendix B – Site Plans (see Construction Set)

TowerNorth

750 WEST CENTER STREET, SUITE 301
WEST BRIDGEWATER, MA 02379

MA1005-B

1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.

2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.

3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE LESEE/LICENSEE REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.

4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.

5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS / CONTRACT DOCUMENTS.

7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S / VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.

8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.

9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETCETERA DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.

13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.

14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.

15. THE CONTRACTOR SHALL NOTIFY THE LESEE/LICENSEE REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESEE/LICENSEE REPRESENTATIVE.

16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.

17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. CALL THE FOLLOWING FOR ALL PRE-CONSTRUCTION NOTIFICATION 72-HOURS PRIOR TO ANY EXCAVATION ACTIVITY: DIG SAFE SYSTEM (MA, ME, NH, RI, VT): 1-888-344-7233 CALL BEFORE YOU DIG (CT): 1-800-922-4455

18. ALL DIMENSIONS SHOWN THUS ± ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS WHICH EFFECT THE CONTRACTORS WORK. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH PROJECT OWNER PRIOR TO CONSTRUCTION.

19. NORTH ARROW SHOWN ON PLANS REFERS TO APPROXIMATE TRUE NORTH. PRIOR TO THE START OF CONSTRUCTION, ORIENTING OR FABRICATING OF ANTENNA MOUNTS, CONTRACTOR SHALL CONSULT WITH PROJECT OWNER'S RF ENGINEER AND FIELD VERIFY ALL ANTENNA SECTOR LOCATIONS AND ANTENNA AZIMUTHS.

20. THE CONTRACTOR AND OR HIS SUB CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

21. ANTENNA INSTALLATION SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES.

22. COAXIAL CABLE CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE PROVIDED BY THE PROJECT OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. A SCHEDULE OF PROJECT OWNER SUPPLIED MATERIALS IS ATTACHED TO THE BID DOCUMENTS (SEE EXHIBIT 3). ALL OTHER HARDWARE TO BE PROVIDED BY THE CONTRACTOR. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.

23. WHEN "PAINT TO MATCH" IS SPECIFIED FOR ANTENNA CONCEALMENT, PAINT PRODUCT FOR ANTENNA RADOME SHALL BE SHERWIN WILLIAMS COROTHANE II. SURFACE PREPARATION AND APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND PROJECT OWNER'S GUIDELINE'S.

24. COORDINATION, LAYOUT, AND FURNISHING OF CONDUIT, CABLE AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

25. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.

26. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW.

27. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF UTILITY COMPANY ENGINEERING. THE AREAS OF THE PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE EQUIPMENT, DRIVEWAY OR LEASE AREA SHALL BE RESTORED TO ORIGINAL CONDITION.

28. GRAVEL SHALL BE GRADED TO A UNIFORM SLOPE, FERTILIZED, SEEDED AND COVERED WITH MULCH UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN SOIL EROSION AND SEDIMENTATION CONTROLS AT ALL TIMES.

29. DURING CONSTRUCTION. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS.

30. FOR WIRELESS COMMUNICATIONS SYSTEMS. PROJECT OWNER'S IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE RTS RADIO CABINETS. PROJECT OWNER RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.

31. SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:

AMERICAN CONCRETE INSTITUTE (ACI) 318: BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE;

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

MANUAL OF STEEL CONSTRUCTION, ASD, NINTH EDITION;

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-H, STRUCTURAL STANDARDS FOR STEEL

ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.

APPLICABLE BUILDING CODES:
SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.

BUILDING CODE:

MASSACHUSETTS STATE BUILDING CODE 780 CMR, 9TH EDITION
ELECTRICAL CODE: MASSACHUSETTS 527 CMR 12.00 (NEC 2020)
NFPA 780, 2017

VICINITY MAP



NORTH

VICINITY MAP
SCALE: NTS

SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
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C-1	EXISTING CONDITION & 300' RADIUS PLOT PLAN	10
C-2	ORTHO PLAN	10
Z-1	SITE PLAN	10
Z-2	COMPOUND PLAN & ELEVATION	10
Z-3	DETAILS	10
L-1	PROPOSED LANDSCAPING PLAN	10
EWA	EXISTING WATERHSED AREAS	10
PWA	PROPOSED WATERSHED AREAS	10

PROJECT SUMMARY

SITE NUMBER:	MA1005-B
SITE NAME:	BREWSTER B
SITE ADDRESS:	1185 LONG POND ROAD BREWSTER, MA 02631
ASSESSOR'S PARCEL NO.:	MAP: 85 LOT: 110
CONSTRUCTION TYPE:	NSB
PROPERTY OWNER:	WVB LLC 38 LINCOLN AVE BUZZARDS BAY, MA 02532
APPLICANT, LESSEE/LICENSEE, PROJECT OWNER:	TOWERNORTH DEVELOPMENT LLC 750 W CENTER STREET, FLOOR 3, WEST BRIDGEWATER, MA 02379
TOWER TYPE:	MONOPOLE
TOWER HEIGHT:	125 FEET

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

ADVANCED ENGINEERING GROUP, P.C.
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Surveying - Telecommunications
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East Providence, RI 02914
Tel: (401) 354-2403
Fax: (401) 633-6354

TowerNorth
750 WEST CENTER STREET, SUITE 301
WEST BRIDGEWATER, MA 02379

COMMONWEALTH OF MASSACHUSETTS
SCOTT N. ADAMS
CIVIL
No. 46006
REGISTERED PROFESSIONAL ENGINEER

AEG PROJECT #: 2019-0027

DRAWN BY: JWH/MER

CHECKED BY: SNA

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MA1005-B

1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

TITLE SHEET

SHEET NUMBER

T-1



NORTH

1 / C-1 300' RADIUS PLAN

SCALE: 1" = 60'

0 60' 120'

GENERAL NOTES:

1.	FIELD SURVEY DATE:	JULY 14, 2022
2.	VERTICAL DATUM:	NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
3.	HORIZONTAL DATUM:	NORTH AMERICAN DATUM OF 1983 (NAD83)
4.	CENTER OF PROPOSED TOWER	LAT: 41° 44' 30.59" N LONG: 70° 03' 07.47" W ELEV: 125'± A.G.L. (111'± AMSL)
5.	PROPERTY OWNER:	WVB LLC 38 LINCOLN AVE BUZZARDS BAY, MA 02532
6.	SITE NUMBER:	MA1005-B
7.	SITE ADDRESS:	1185 LONG POND ROAD BREWSTER, MA 02631
8.	APPLICANT, LESSEE/LICENSEE & PROJECT OWNER:	TOWERNORTH DEVELOPMENT LLC 750 W CENTER STREET, FLOOR 3, WEST BRIDGEWATER, MA 02379
9.	JURISDICTION:	TOWN OF BREWSTER
10.	TAX ID:	MAP: 85 LOT: 110
11.	DEED REFERENCE:	BOOK: 25949 PAGE: 149
12.	PLAN REFERENCES:	TOWN OF BREWSTER ASSESSORS MAPS & PLAN REFERENCES AS INDICATED BELOW
13.	ZONING JURISDICTION:	TOWN OF BREWSTER RES MID DENSITY

14. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. CALL THE FOLLOWING FOR ALL PRE-CONSTRUCTION NOTIFICATION 72-HOURS PRIOR TO ANY EXCAVATION ACTIVITY:
DIG SAFE SYSTEM (MA, ME, NH, RI, VT): 1-888-344-7233
CALL BEFORE YOU DIG (CT): 1-800-922-4455
15. PROPERTY LINE INFORMATION IS COMPILED FROM ASSESSORS PLANS, DEEDS, AND PLANS OF RECORD AND IS NOT TO BE CONSTRUED AS HAVING BEEN OBTAINED AS THE RESULT OF A FIELD BOUNDARY SURVEY, AND IS SUBJECT TO CHANGE AS AN ACCURATE FIELD SURVEY MAY DISCLOSE. A FULL BOUNDARY SURVEY WAS NOT PERFORMED.
16. REFERENCE TITLE REPORT ENTITLED: "MEMORANDUM OF OPTION AND LAND LEASE" BY WENDY CARRICK OF SBA NETWORK SERVICES, LLC DATED 06/28/16.
17. THE PURPOSE OF THIS SURVEY IS TO SUPPORT THE DESIGN AND CONSTRUCTION OF A TELECOMMUNICATION FACILITY. USE OF THIS SURVEY BY ANYONE OTHER THAN CENTERLINE, AND USE OF THIS SURVEY FOR ANY PURPOSE NOT RELATED TO THE DESIGN OF THE INTENDED FACILITY IS STRICTLY PROHIBITED.
18. BEARING SYSTEM OF THIS PLAN IS BASED ON TRUE NORTH. TRUE NORTH WAS ESTABLISHED FROM GPS READINGS ON 07/14/22.
19. SITE IS OUTSIDE THE 1% CHANCE ANNUAL FLOOD ZONE BASED ON FLOOD INSURANCE RATE MAP – TOWN OF BREWSTER MA – BARNSTABLE COUNTY – COMMUNITY NUMBER: 250001C0606J, MAP REVISED: JULY 16, 2014.
20. WETLANDS WERE NOT OBSERVED WITHIN 100' OF THE LIMIT OF WORK.
21. IN THE EVENT THAT BENCHMARKS (TBM'S), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY, ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.
22. THE PROPERTY LINES SHOWN ON THIS PLAN ARE THE LINES DIVIDING EXISTING OWNERSHIPS, AND THE LINES OF STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED, AND NO NEW LINES FOR DIVISION OF EXISTING OWNERSHIP OR FOR NEW WAYS ARE SHOWN.

LEGEND

- PROPERTY LINE
- ABUTTING PROPERTY LINE
- 30 EXISTING CONTOUR
- E E E ELECTRIC LINE
- T T T TELCO LINE
- EXIST. TREE LINE
- PROP. TREE LINE
- OHW OHW OHW OVERHEAD UTILITY
- x x x FENCE
- PROP. EASEMENT/ LEASE AREA
- CATCH BASIN
- IRON ROD
- UTILITY POLE
- LIGHT POLE
- SEWER MAN HOLE
- MAN HOLE

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COMMONWEALTH OF MASSACHUSETTS
SCOTT N. ADAMS
CIVIL
No. 46006
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AEG PROJECT #: 2019-0027

DRAWN BY: JWH/MER

CHECKED BY: SNA

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MA1005-B

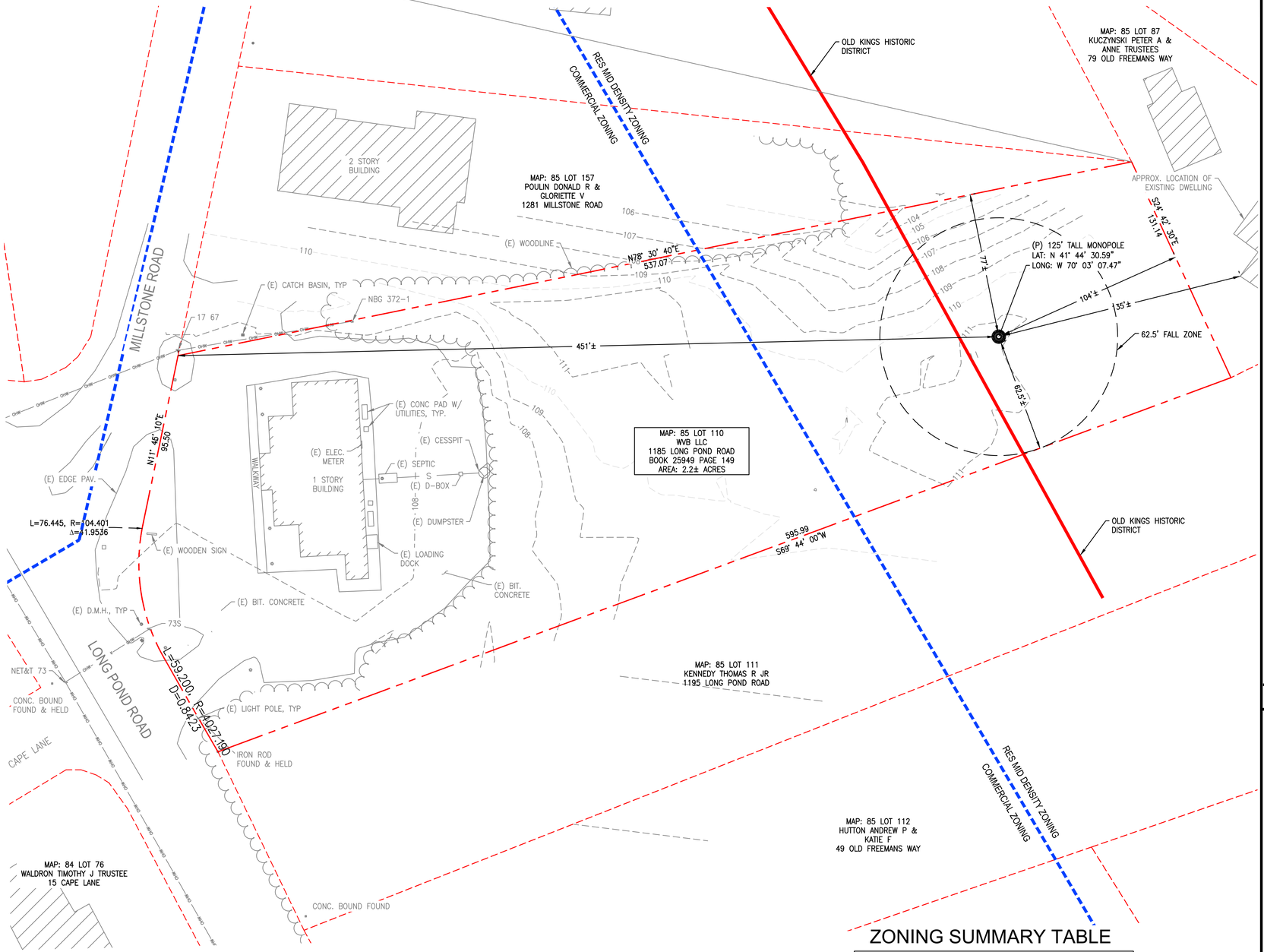
1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

EXISTING CONDITION & 300' RADIUS PLOT PLAN

SHEET NUMBER

C-1



NORTH

1 / C-2 EXISTING SITE PLAN

SCALE: 1" =125'

0 125' 240'

ZONING SUMMARY TABLE

ZONING DISTRICT: (RM) RES MID DENSITY
ASSESSORS MAP: MAP: 85 LOT: 110

DIMENSION:	REQUIRED	(P) MONOPOLE
FRONTAGE	150'	231'
FRONT YARD SETBACK	40'	451'±
SIDE YARD SETBACK	25'	62.5'±
REAR YARD SETBACK	25'	104'±
MAXIMUM LOT COVERAGE	25%	3.5%

* DIMENSIONS ARE MEASURED TO FACE OF TOWER.

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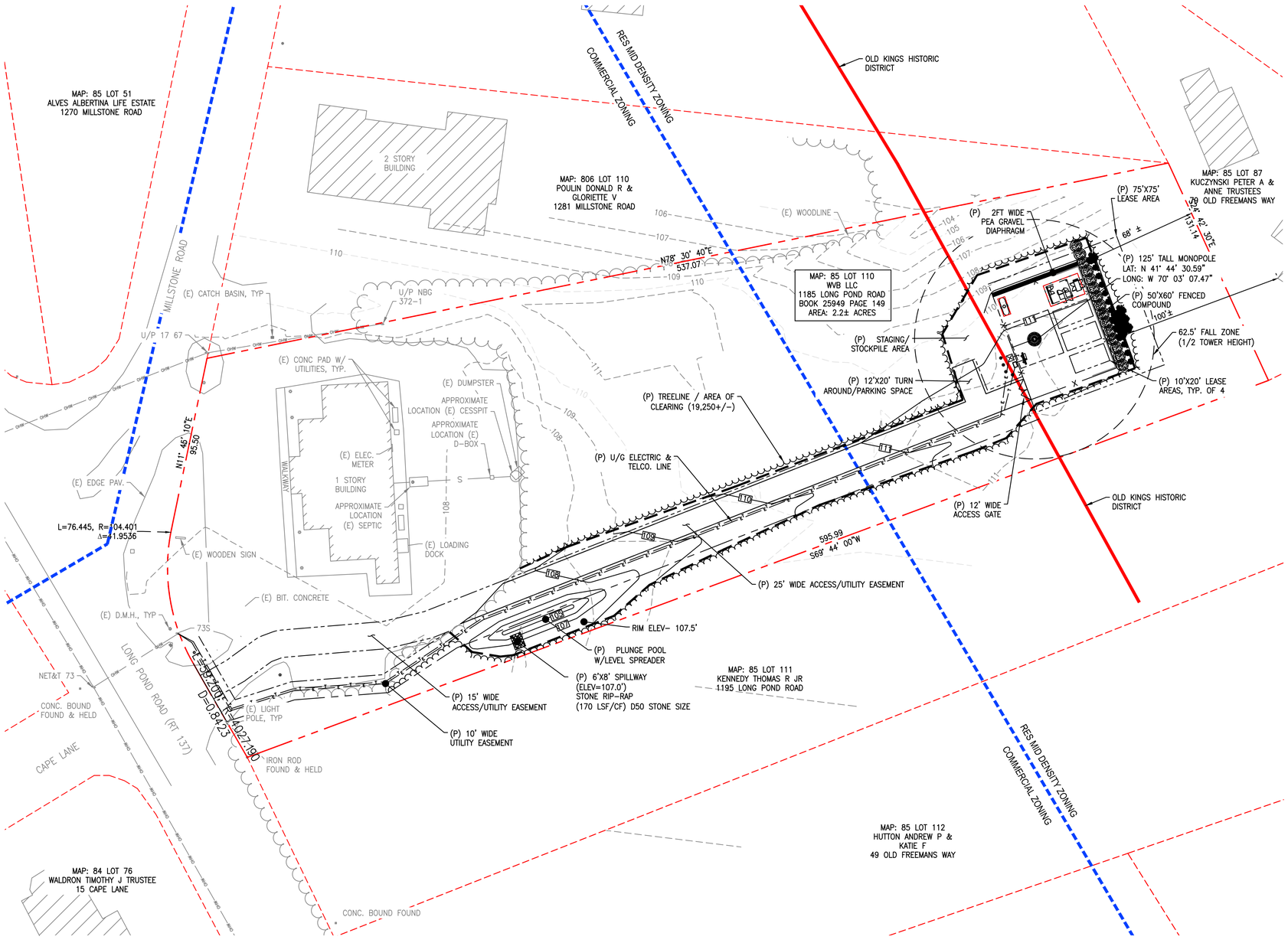
1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

EXISTING CONDITION & 300' RADIUS PLOT PLAN

SHEET NUMBER

C-2



GENERAL NOTES:

1. THE TYPE, DIMENSIONS, MOUNTING HARDWARE, AND POSITIONS OF ALL PROJECT OWNER'S EQUIPMENT ARE SHOWN IN ILLUSTRATIVE FASHION. THESE DRAWINGS ARE NOT INTENDED FOR CONSTRUCTION. ACTUAL HARDWARE DETAILS AND FINAL LOCATIONS MAY DIFFER SLIGHTLY FROM WHAT IS SHOWN.

2. THE PROJECT OWNER'S PCS FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.

3. THE PROJECT OWNER'S BASE TRANSMISSION STATION (BTS) CABINET IS A VANDAL RESISTANT STEEL CABINET CONTAINING RECTIFIERS, AMPLIFIERS, RADIOS, AND OTHER INTEGRATED ELECTRONIC CONTROL EQUIPMENT. BATTERY BACKUP FOR EMERGENCY STANDBY POWER IS CONTAINED WITHIN A SEPARATE BATTERY RACK CONTAINING 12-VOLT, CLOSED-CELL DC BATTERIES. THE BATTERIES ARE LEAD-ACID RECHARGEABLE STANDBY INDUSTRIAL POWER CELLS MANUFACTURED TO MEET ENVIRONMENTAL QUALITY AND RUGGEDNESS STANDARDS OF THE INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA). THE BATTERY CHARGING SYSTEM IS COMPUTER-CONTROLLED AND THE EQUIPMENT CABINET IS REMOTELY MONITORED AT PROJECT OWNER'S NETWORK OPERATIONS CONTROL CENTER 24-HOURS A DAY, 7 DAYS A WEEK FOR FAULTS AND ALARMS.

4. THE DESIGN OF THE ANTENNA MOUNTING HARDWARE AND STRUCTURAL REINFORCEMENT OF EXISTING BUILDING ROOF/FLOOR (IF NECESSARY) TO SUPPORT THE BTS EQUIPMENT CABINETS WILL MEET THE ANSI/EIA/TIA-222-G STANDARDS FOR STRUCTURAL STEEL ANTENNA SUPPORTING STRUCTURES AND STATE BUILDING CODE REQUIREMENTS. DETAILED CONSTRUCTION DRAWINGS AND STRUCTURAL CALCULATIONS WILL BE PREPARED BY A REGISTERED PROFESSIONAL ENGINEER AND SUBMITTED WITH A BUILDING PERMIT APPLICATION FOR REVIEW AND APPROVAL BY THE LOCAL BUILDING CODE ENFORCEMENT OFFICIAL.

5. ONCE THE FACILITY BECOMES FULLY OPERATIONAL, NORMAL AND ROUTINE MAINTENANCE BY PROJECT OWNER'S TECHNICIANS WILL BE PERFORMED ON A MONTHLY BASIS. THEREFORE, THE ESTIMATED VEHICLE TRIP GENERATION RATE IS 2 TRIPS PER MONTH. THE AVERAGE DAILY TRIP GENERATION RATE (ADT) IS 0.07.

6. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS FOR WIRELESS COMMUNICATIONS SYSTEMS. PROJECT OWNER'S IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.

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MA1005-B

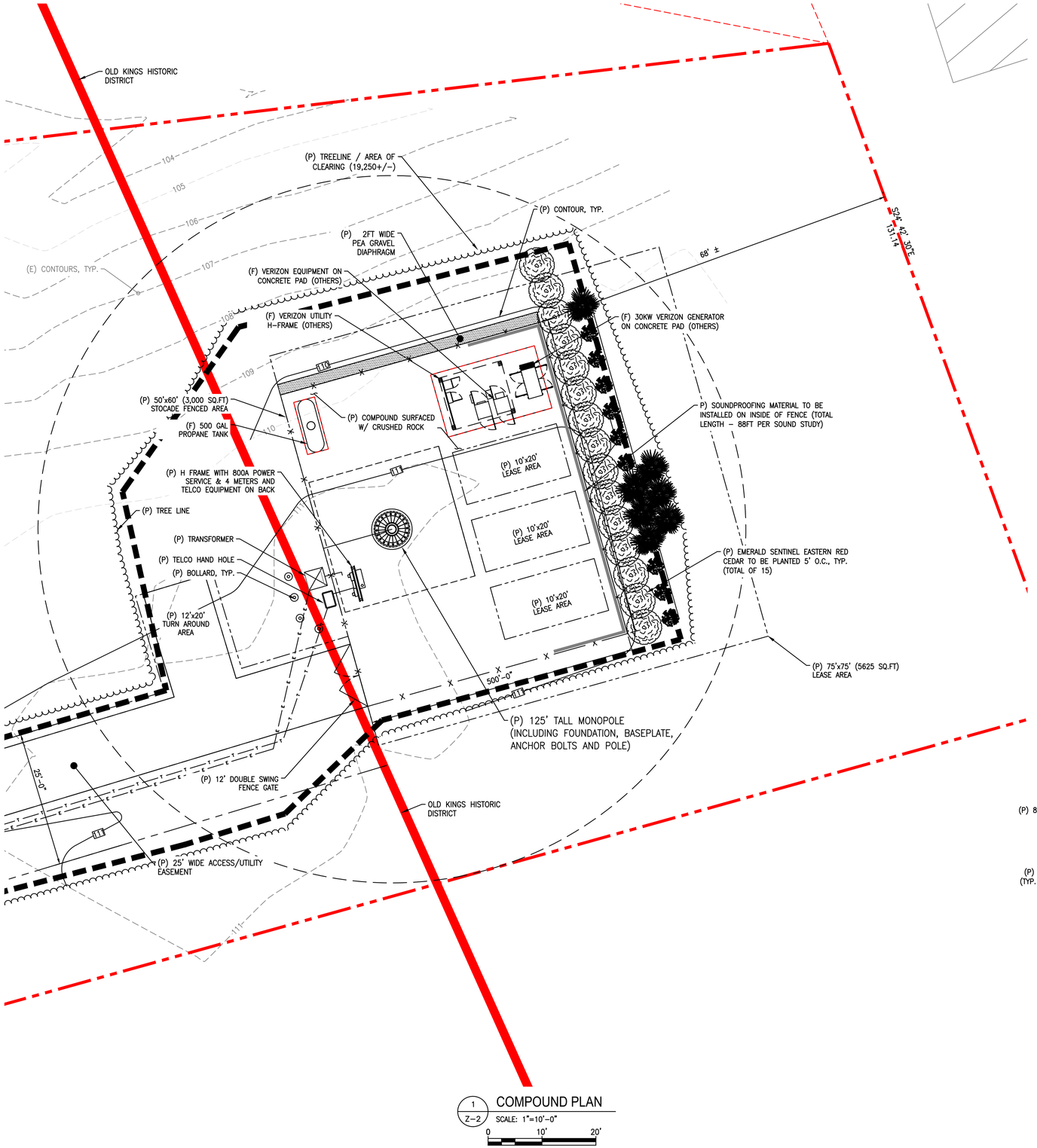
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SHEET TITLE

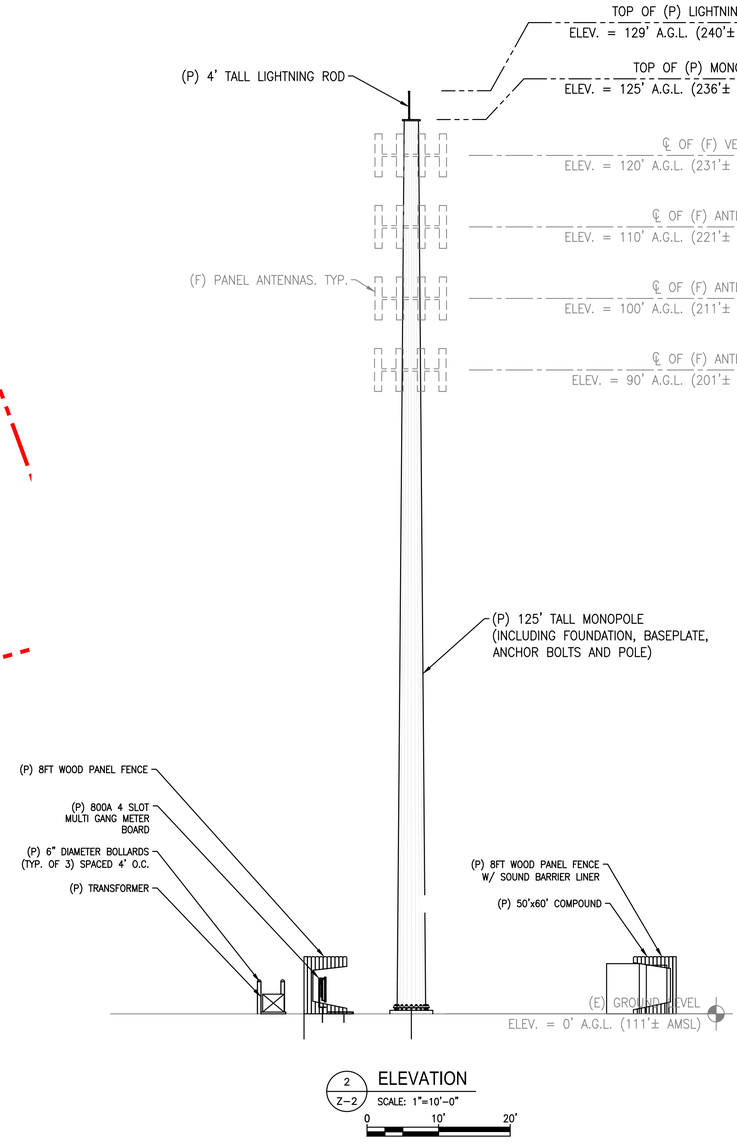
SITE PLAN

SHEET NUMBER

Z-1



1 Z-2 **COMPOUND PLAN**
SCALE: 1"=10'-0"
0 10' 20'



2 Z-2 **ELEVATION**
SCALE: 1"=10'-0"
0 10' 20'

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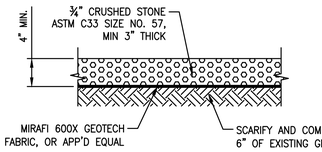
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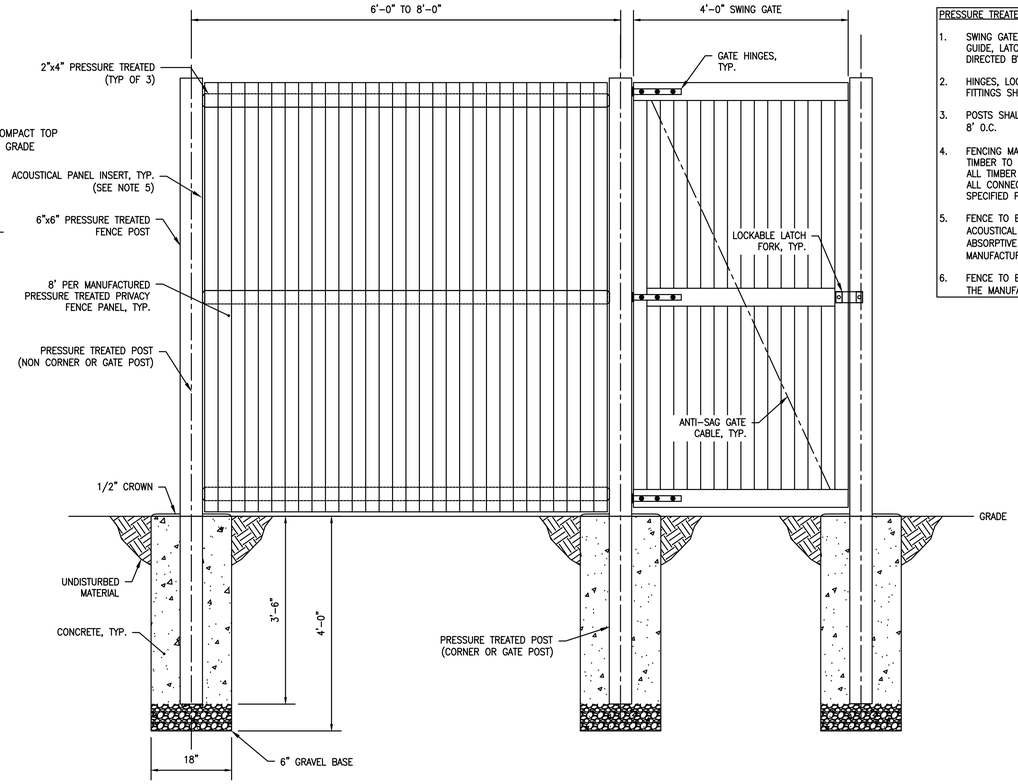
COMPOUND PLAN
& ELEVATION

SHEET NUMBER

Z-2



1 Z-3 GRAVEL COMPOUND DETAIL
SCALE: N.T.S.



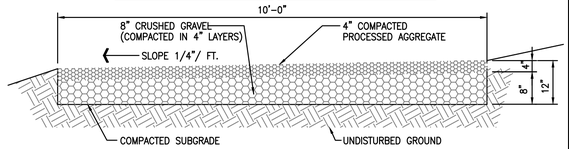
3 Z-3 8FT TALL 'DOG EAR' ACOUSTIC FENCE ASSEMBLY
SCALE: 1" = 8'-0"

PRESSURE TREATED STOCKADE FENCE NOTES:

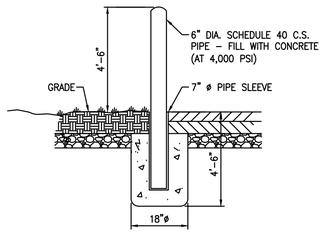
1. SWING GATE SHALL BE PROVIDED WITH A LOCK KEEPER, LOCK KEEPER GUIDE, LATCH FORK, FORK CATCHES, GATE STOP LOCATED AS DIRECTED BY THE ENGINEER.
2. HINGES, LOCK KEEPER, LATCH FORKS, AND OTHER NECESSARY FENCE FITTINGS SHALL BE OF GALVANIZED STEEL.
3. POSTS SHALL BE SPACED EQUAL DISTANCE BUT NOT MORE THAN 8' O.C.
4. FENCING MATERIAL SHALL BE TREATED PINE, GRADE "A" TIMBER TO BE HEM-FIR OR BETTER, Fb=950 PSI
   ALL TIMBER TO BE TREATED
   ALL CONNECTIONS AS PER ACCEPTED TIMBER PRACTICES OR AS SPECIFIED PER THE AMERICAN TIMBER CONSTRUCTION MANUAL
5. FENCE TO BE FULL ABSORPTIVE SOUND FENCE AS MANUFACTURED BY ACOUSTICAL SOLUTIONS - (1-INCH) "PRIVACYSHIELD OUTDOOR ABSORPTIVE SOUNDPROOFING BLANKET".
   MANUFACTURER'S CONTACT INFORMATION:1-800-782-5742
6. FENCE TO BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS

CRUSHED GRAVEL	
SIEVE	% PASSING BY WEIGHT
5"	100
3 1/2"	90-100
1 1/2"	55-95
1/4"	25-60
#10	15-45
#40	5-25
#100	0-10
#200	0-5

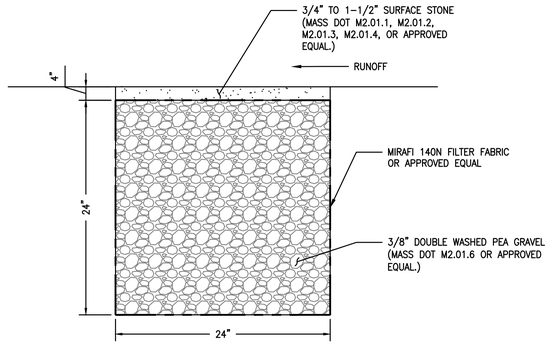
PROCESSED AGGREGATE	
SIEVE	% PASSING BY WEIGHT
2 1/4"	100
2"	95-100
3/4"	50-75
1/4"	25-45
#40	5-20
#100	2-12



4 Z-3 GRAVEL ROAD DETAILS
SCALE: N.T.S.

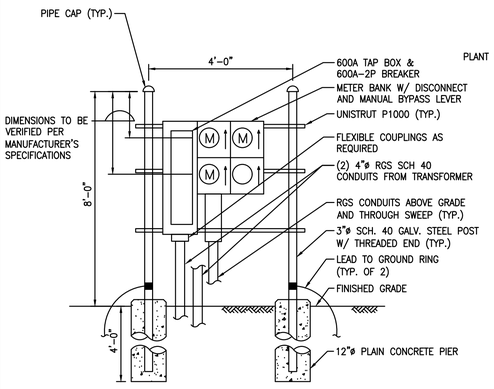


2 Z-3 BOLLARD DETAIL
SCALE: N.T.S.

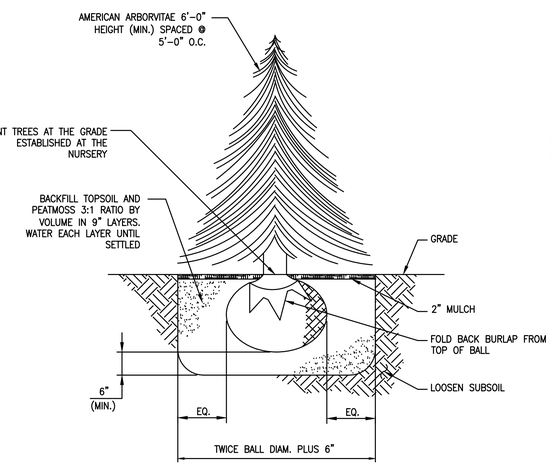


NOTE:
PEA GRAVEL DIAPHRAGM SHALL BE INSTALLED AROUND DOWNHILL SIDE OF FENCED COMPOUND.

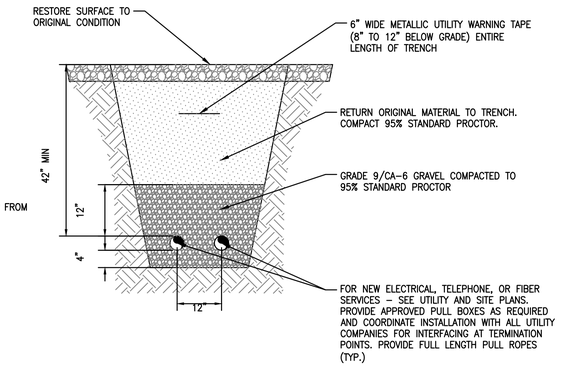
9 Z-3 PEA GRAVEL DIAPHRAGM DETAIL
SCALE: N.T.S.



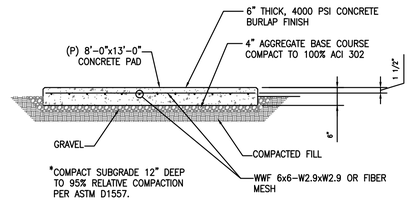
5 Z-3 METER BOARD DETAIL
SCALE: N.T.S.



6 Z-3 PLANTING DETAIL
SCALE: N.T.S.



7 Z-3 TRENCH DETAIL AT ACCESS CROSSING
SCALE: N.T.S.



8 Z-3 CONCRETE PAD DETAIL
SCALE: N.T.S.

LEGEND

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AEG PROJECT #: 2019-0027

DRAWN BY: JWH/MER

CHECKED BY: SNA

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MA1005-B

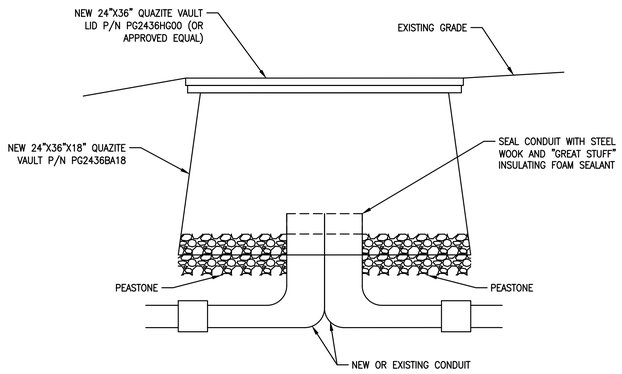
1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

DETAILS

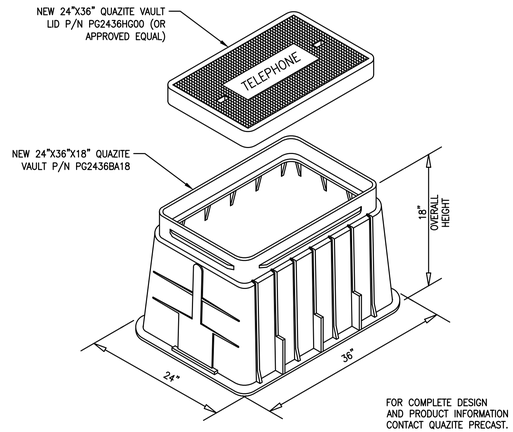
SHEET NUMBER

Z-3



1 Z–4 TELCO HANDHOLE WITH LID DETAIL

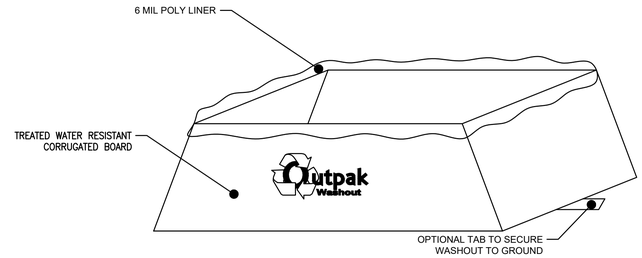
SCALE: N.T.S.



FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT QUAZITE PRECAST.

2 Z–4 TELCO HANDHOLE ISOMETRIC

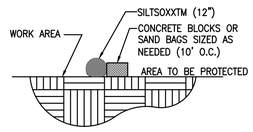
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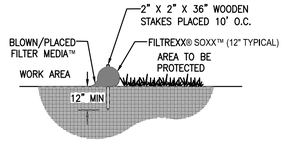
1. THE WASHOUT SHALL BE INSTALLED PRIOR TO USING MATERIALS THAT REQUIRE WASHOUT ON THIS PROJECT.
2. AS NECESSARY, SIGNS SHALL BE PLACED THROUGHOUT THE SITE TO INDICATE THE LOCATION OF THE WASHOUT.
3. THE WASHOUT AREA WILL BE REPLACED AS NECESSARY TO MAINTAIN CAPACITY FOR LIQUID WASTE.
4. WASHOUT RESIDUE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF AT AN APPROVED WASTE FACILITY.
5. DO NOT WASHOUT INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS.
6. AVOID DUMPING EXCESS CONCRETE IN NON–DESIGNATED DUMPING AREAS.
7. LOCATE WASHOUT AT LEAST 50' (15 METERS) FROM STORM DRAIN, OPEN DITCHES, OR WATER BODIES.
8. THE WASHOUT SHALL BE USED ONLY FOR NON–HAZARDOUS WASTES.

3 Z–4 CONCRETE WASHOUT STATION

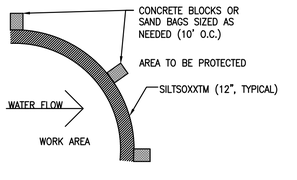
SCALE: NTS



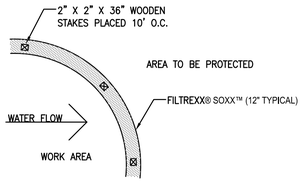
SECTION NTS



SECTION NTS



PAVEMENT OR IMPERVIOUS SURFACE

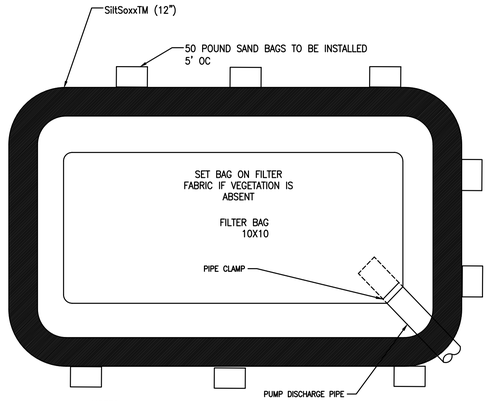


PERVIOUS AREA

NOTES:
1. ALL MATERIAL TO MEET SPECIFICATIONS.
2. FILTER MEDIA TO MEET APPLICATION REQUIREMENTS.
3. FILTER MEDIA TO BE DISPERSED ON SITE, AS DETERMINED BY ADVANCED ENGINEERING GROUP PC

4 Z–4 FILTREXX BIOSOXX DETAIL

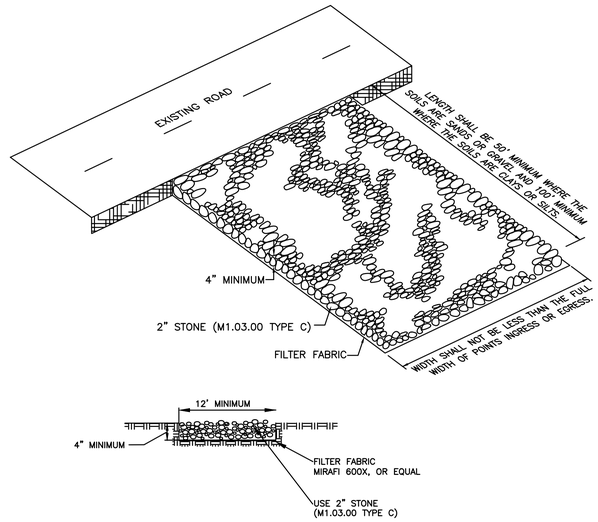
SCALE: NTS



NOTES:
1. ENSURE DISCHARGE AREA IS COVERED BY STABLE VEGETATION.
2. USE DIFFUSER NOZZLE OR LOW DISCHARGE RATE TO PREVENT SCOURING
3. TO BE PLACED AT AN UPLAND LOCATION THAT WILL ALLOW WATER TO DRAIN TO THE GROUND
4. THE SIZE OF THE STRAW BALE ENCLOSURE TO BE 10' X10' AND CAN BE ADJUSTED BASED ON WATER VOLUME
5. ADDITIONAL STRAW BALES CAN BE USED TO INCREASE RETENTION & FILTRATION

5 Z–4 DEWATERING BASIN DETAIL

SCALE: N.T.S.



INSTALLATION

THE AREA OF THE ENTRANCE SHOULD BE CLEARED OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL, THE STONE SHALL BE PLACED TO THE SPECIFIED DIMENSIONS, AS NOTED ABOVE.

MAINTENANCE

THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENTS ONTO PUBLIC RIGHT–OF–WAYS THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE, OR ADDITIONAL LENGTH, AS CONDITIONS DEMAND, AND REPAIR, AND / OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT–OF–WAYS MUST BE REMOVED IMMEDIATELY.

LOCATION

SEE GENERAL & LOCATION PLAN FOR LOCATION OF CONSTRUCTION ENTRANCE.

6 Z–4 ERSION CONTROL ENTERANCE PAD DETAIL

SCALE: NTS

EROSION & SEDIMENT CONTROL NOTES:

1.) PRIOR TO STARTING ANY WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL EROSION CONTROL MEASURES AS SHOWN ON THE PLANS AND AS IDENTIFIED IN FEDERAL, STATE, AND LOCAL APPROVAL DOCUMENTS PERTAINING TO THIS PROJECT.

2.) CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION CONRTOL MEASURES, AND REMOVE SEDIMENT THEREFROM ON A WEEKLY BASIS AND WITHIN TWELVE HOURS AFTER EACH STORM EVENT AND DISPOSE OF SEDIMENTS IN AN UPLAND AREA SUCH THAT THEY DO NOT ENCUMBER OTHER DRAINAGE STRUCTURES AND PROTECTED AREAS.

3.) CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT REGULATORY PROTECTED AREAS, WETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT.

4.) CONTRACTOR SHALL PERFORM CONSTRUCTION SEQUENCING SUCH THAT EARTH MATERIALS ARE EXPOSED FOR A MINIMUM OF TIME BEFORE THEY ARE COVERED, SEEDED, OR OTHERWISE STABILIZED TO PREVENT EROSION.

5.) UPON COMPLETION OF CONSTRUCTION AND ESTABLISHMENT OF PERMANENT GROUND COVER, CONTRACTOR SHALL REMOVE AND DISPOSE OF EROSION CONTROL MEASURES AND SEDIMENT.

6) ALL DISTURBED AREAS OUTSIDE THE LIMITS OF THE DRIVE/COMPOUND SHALL BE PERMANENTLY ESTABLISHED WITH A VEGETATIVE GROUND COVER. GRADED AREAS SHALL BE PROTECTED WITH STRAW MULCH UNTIL A GOOD VEGETATIVE COVER IS ESTABLISHED.

LEGEND

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TowerNorth
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WEST BRIDGEWATER, MA 02379

COMMONWEALTH OF MASSACHUSETTS
SCOTT N. ADAMS
CIVIL
No. 46006
REGISTERED PROFESSIONAL ENGINEER

AEG PROJECT #: 2019–0027

DRAWN BY: JWH/MER

CHECKED BY: SNA

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MA1005-B

1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

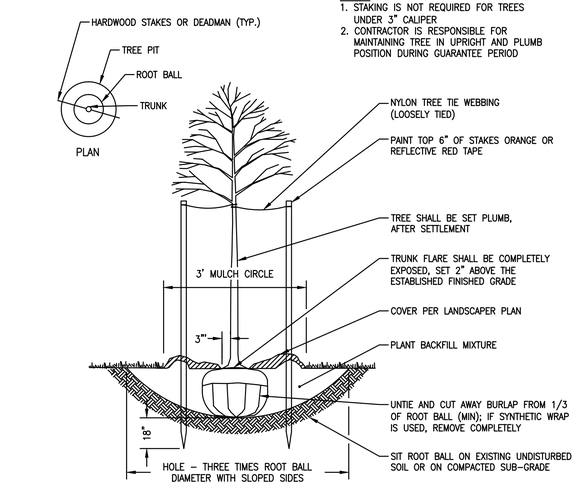
DETAILS

SHEET NUMBER

Z-4

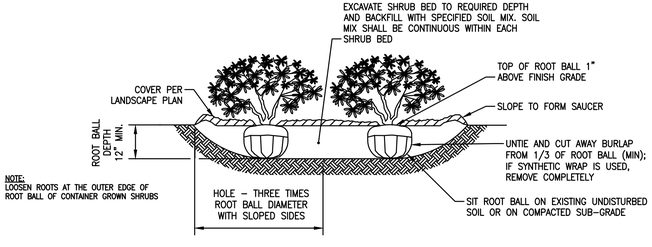
LANDSCAPING SCHEDULE

KEY	BOTANICAL NAME	COMMON NAME	PLANT SPACING	QUANTITY	SIZE
	MYRICA PNESYLVANICA	NORTHERN BAYBERRY (SHRUB)	5 FT O.C.	7	7 GAL.
	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	EMERALD SENTINEL EASTERN RED CEDAR (TREE)	5 FT O.C.	15	5'
	ILEX GLABRA SHAMROCK	SHAMROCK INKBERRY (SHRUB)	5 FT O.C.	9	2.5'–3'



NOTES:
1. STAKING IS NOT REQUIRED FOR TREES UNDER 3" CALIPER
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING TREE IN UPRIGHT AND PLUMB POSITION DURING GUARANTEE PERIOD

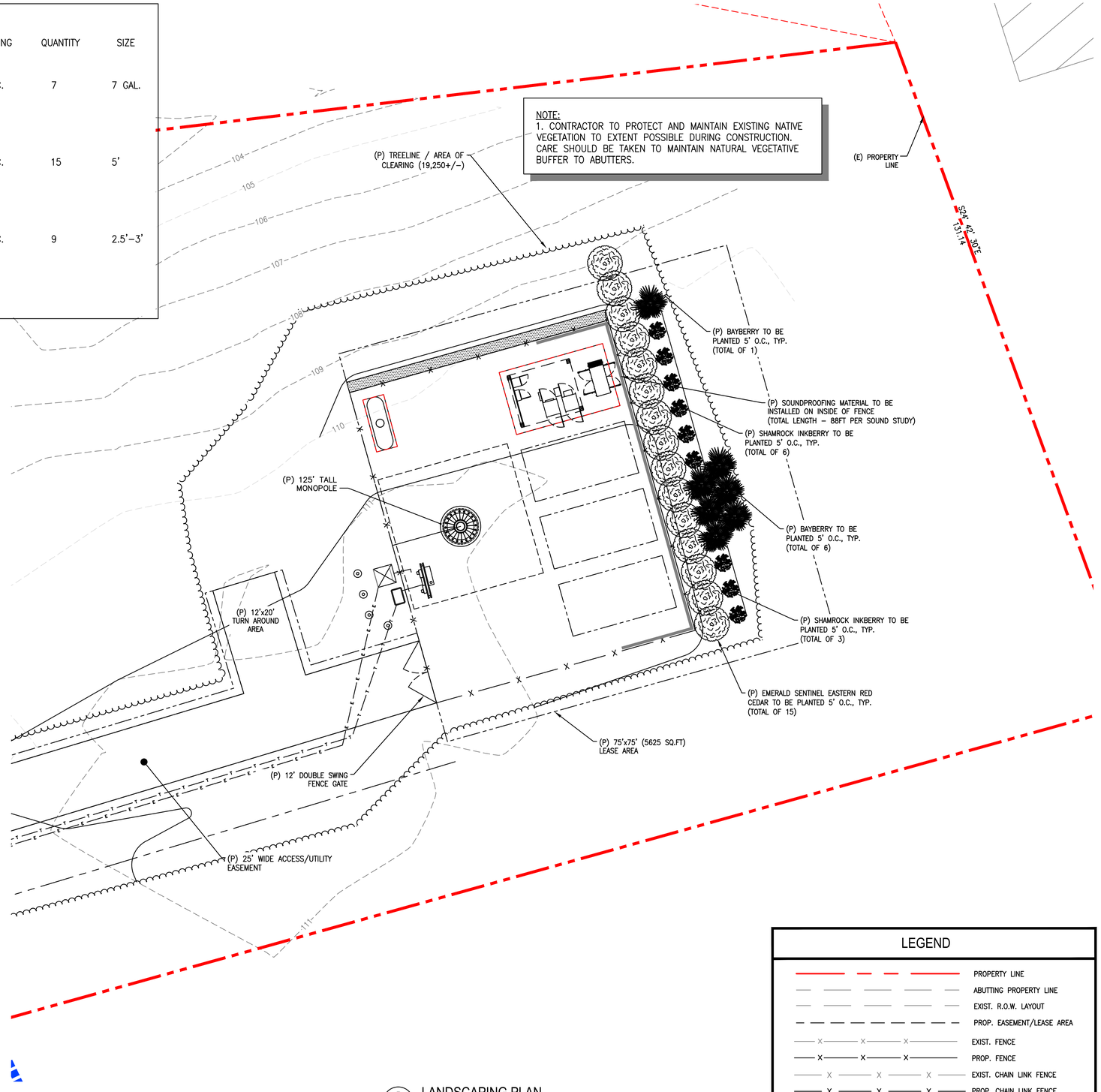
1 L–1 TREE PLANTING DETAIL
SCALE: N.T.S.



NOTE:
LOOSEN ROOTS AT THE OUTER EDGE OF ROOT BALL OF CONTAINER GROWN SHRUBS

2 L–1 SHRUB PLANTING DETAIL
SCALE: N.T.S.

NOTE:
1. CONTRACTOR TO PROTECT AND MAINTAIN EXISTING NATIVE VEGETATION TO EXTENT POSSIBLE DURING CONSTRUCTION. CARE SHOULD BE TAKEN TO MAINTAIN NATURAL VEGETATIVE BUFFER TO ABUTTERS.



3 L–1 LANDSCAPING PLAN
SCALE: 1"=10'–0"

LEGEND

- PROPERTY LINE
- ABUTTING PROPERTY LINE
- EXIST. R.O.W. LAYOUT
- PROP. EASEMENT/LEASE AREA
- EXIST. FENCE
- PROP. FENCE
- EXIST. CHAIN LINK FENCE
- PROP. CHAIN LINK FENCE
- LIMITS OF WORK
- EXIST. EDGE OF TREE CANOPY
- PROP. EDGE OF TREE CANOPY

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BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

PROPOSED LANDSCAPING PLAN

SHEET NUMBER

L-1

Appendix C – Copy of Regulatory Permits

Appendix D– Inspection Reports

SWPPP Inspection Report

Project Information			
Name			
Location			
Construction No.			
F.A.P. No.			
Project Manager			
Contractor			
E&S Subcontractor			
Inspection Information			
Inspector (name & Certification			
Inspection Date		**Start/End Time**	
Inspection Type **☐ Weekly ☐ Pre-Storm Event ☐ During Storm Event ☐Post-Storm Event ☐Violation**			
Weather Information			
Last Rain Event **Date: Duration (hrs): Approximate Rainfall (in):**			
Rain Gage:			
Weather at time of this inspection:			

Certification Statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or 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."		
Inspector: **Print Name:**	**Signature:**	**Date:**

PROJECT: **INSPECTION DATE:**

Site-specific BMPs

Number the structural and non-structural BMPs identified in the SWPPP on the site map and list the below (add as necessary). Bring a copy of this inspection form and numbered site map with you during your inspections. This list will help ensure that you are inspecting all required BMPs at your site.

	Location/Station	**BMP Description**	**Installed & Operating Properly?**	**Assoc. Photo/ Figure #**	**Corrective Action Needed (Yes or No; if 'Yes', please detail action required**
1			☐ Yes ☐ No		
2			☐ Yes ☐ No		
3			☐ Yes ☐ No		
4			☐ Yes ☐ No		
5			☐ Yes ☐ No		
6			☐ Yes ☐ No		
7			☐ Yes ☐ No		

8			☐ Yes ☐ No		
9			☐ Yes ☐ No		
10			☐ Yes ☐ No		
11			☐ Yes ☐ No		
12			☐ Yes ☐ No		
13			☐ Yes ☐ No		
14			☐ Yes ☐ No		
15			☐ Yes ☐ No		

SWPPP Inspection Report

Page __ of __

PROJECT: _____ **INSPECTION DATE:** _____

	Location/Station	BMP Description	Installed & Operating Properly?	Assoc. Photo/ Figure #	Corrective Action Needed (Yes or No; if 'Yes', please detail action required
16			☐ Yes ☐ No		
17			☐ Yes ☐ No		
18			☐ Yes ☐ No		
19			☐ Yes ☐ No		
20			☐ Yes ☐ No		
21			☐ Yes ☐ No		
22			☐ Yes ☐ No		
23			☐ Yes ☐ No		
24			☐ Yes ☐ No		
25			☐ Yes ☐ No		

26			☐ Yes ☐ No		
27			☐ Yes ☐ No		
28			☐ Yes ☐ No		
29			☐ Yes ☐ No		
30			☐ Yes ☐ No		

(Add more as necessary)

PROJECT: **INSPECTION DATE:**

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Please customize this list as needed for conditions at the site. If item is not applicable, please note why.

	Location/Station		**Assoc. Photo/ Figure #**	**Corrective Action Needed (If 'Yes', please detail action required and include location/station)**
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	☐ Yes ☐ No ☐ N/A		
2	Are natural resource areas (e.g., streams, wetlands, trees, etc.) protected with barriers or similar BMPs?	☐ Yes ☐ No ☐ N/A		
3	Are perimeter controls and sediment barriers adequately installed and maintained?	☐ Yes ☐ No ☐ N/A		
4	Are discharge points and receiving waters free of sediment deposits?	☐ Yes ☐ No ☐ N/A		
5	Are storm drain inlets properly protected?	☐ Yes ☐ No ☐ N/A		
6	Is there evidence of sediment being tracked into the street?	☐ Yes ☐ No ☐ N/A		
7	Is trash/litter from work areas collected and placed in covered dumpsters?	☐ Yes ☐ No ☐ N/A		
8	Are washout facilities (e.g., paint, concrete) available, clearly marked, and maintained?	☐ Yes ☐ No ☐ N/A		

9	Are vehicle and equipment fueling, cleaning and maintenance areas free of spills, leaks, or any other deleterious material?	☐ Yes ☐ No ☐ N/A		
10	Are materials that are potential stormwater contaminants stored inside or under cover?	☐ Yes ☐ No ☐ N/A		
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	☐ Yes ☐ No ☐ N/A		
12	Is there evidence of previous or ongoing discharges?	☐ Yes ☐ No ☐ N/A		
13	Are additional BMPs required?	☐ Yes ☐ No ☐ N/A		
14	(Other)	☐ Yes ☐ No ☐ N/A		
15	(Other)	☐ Yes ☐ No ☐ N/A		

(Add more as necessary)

PROJECT: _____ **INSPECTION DATE:** _____

General Field Comments:

PROJECT: **INSPECTION DATE:**

Photos:

(Associated photos – each photo should be dated and have a unique identification # and written description indicating where it is located within the project area. If a close up photo is required, it should be preceded with a photo including both the detail area and some type of visible fixed reference point. Photos should be annotated with Station numbers and other identifying information where needed.)

Photo #	Station:
(insert Photo here)	Description:

Photo #	Station:
(insert Photo here)	Description:

Photo #	Station:
(insert Photo here)	Description:

Photo #	Station:
(insert Photo here)	Description:

Photo #	Station:
(insert Photo here)	Description:

Photo #	Station:
(insert Photo here)	Description:

Appendix E– Corrective Action Log

PROJECT: _____ **INSPECTION DATE:** _____

Corrective Action Log:

Describe repair, replacement, and maintenance of BMPs, actions taken, date completed, and note the person that completed the work.

	Location/Station	Corrective Action	Date Completed	Person Responsible

Appendix F – SWPPP Amendments Log

PROJECT: _____

SWPPP Amendment Log

Describe amendment to be made to SWPPP, the date, and the person/title making the amendment. ALL amendments must be approved by the Engineer.

Amendment Number	Date	Description of Amendment	Amended by: Person/Title	R.E. initials
1				
2				
3				
4				
5				
6				
7				
8				

9				
10				
11				
12				
13				
14				

Add more lines/pages as necessary

Appendix G – Post-Construction BMP Inspection Reports

Inspection and Maintenance Checklist

Catch Basins, Manholes, and Inlets

Date: _____ BMP ID: _____

Inspectors: _____ Contract #: _____

Nearest

Distance

Location: _____ Intersection: _____ N W S E

Utility Pole #: _____ N W S E

Type of Inspection: (circle one) Storm Weekly Monthly Annual Final TMDL

_____

	Issue		Condition to inspect for	Condition Exists (Y/N)	Comments	Photo ID
		a	Leaves, trash or debris blocking front of catch basin opening/inlet by more than 10%			

1	Trash & Debris	b	Leaves, trash or debris in the catch basin exceeds 60% of the sump depth (measured from the bottom of basin to invert of the lowest pipe)			
		c	Leaves, trash or debris in the catch basin < 6-inches from the lowest pipe (clearance from the debris surface to the invert of the lowest pipe)			
		d	Leaves, trash or debris blocking 1/3 height of any inlet or outlet pipe			
		e	Dead animals or vegetation that could generate odors			
2	Sediment	a	Sediment in the catch basin exceeds 60% of the sump depth (measured from the bottom of basin to invert of the lowest pipe)			
		b	Sediment in the catch basin < 6-inches from the lowest pipe (clearance from the sediment surface to the invert of the lowest pipe)			
3	Vegetation	a	Vegetation growing across and blocking more than 10% of the basin opening			
		b	Vegetation growing in inlet/outlet pipe joints or in structure			
4	Contamination	a	Any evidence of oil, gasoline, contaminants or other pollutants			

	Issue		Condition to inspect for	Condition Exists (Y/N)	Comments	Photo ID
5	Structure	a	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch			
		b	Frame not sitting flush on top slab			
		c	Structure unsound due to fracture/cracks in basin walls or bottom			
		d	Grout fillet has separated or cracked wider than ½-inch and longer than 1-foot at any joint w/inlet/outlet pipe			
		e	Inlet or outlet pipes damaged, causing restriction of opening			
		f	Cover not in place or missing			
		g	Cover Locking mechanism not working			
		h	Cover cannot be removed			

		i	Ladder Rungs unsafe			
		j	Grate opening wider than 7/8 –inch			
		k	Grate is damaged or missing			
6	Inter-Connection	a	pipes connected to roadside drainage system.			
7	Flooding	a	Structure causes or contributes significantly to street flooding			
8	Dry Weather Discharge	a	Flowing water observed in/out of structure during dry weather conditions (at least 72 hours after ppt event)			

Overall Condition: Good Fair Poor Diagram (Plan View): Include flow direction, inverts, North arrow

Maintenance Required: Yes No

Notes:

Inspection and Maintenance Checklist

Stormwater Management Basin

Date: _____ BMP ID: _____

Inspectors: _____ Contract #: _____

Nearest

Distance

Location: _____ Intersection: _____ N W S E

Utility Pole #: _____ N W S E

Type of Inspection: (circle one) Storm Weekly Monthly Annual

	Issue		Condition to inspect for	Condition Exists (Y/N)	Comments	Photo ID
		a	Discharge water has obvious signs of poor water quality (clarity, odor, sedimentation, color, staining (iron-fixing OK))			
		b	Trash or debris >1 cubic foot (one standard size garbage can); Visual evidence of dumping			
		c	Any evidence of oil, gasoline, contaminants or other pollutants			

1	General					
2	Storage Area	a	Areas of accumulated sediment > 6-inches OR affects inletting or outletting condition of basin			
3	Debris Barriers/ Trash Racks	a	Trash or debris is plugging more than 20% of the openings.			
4	Flooding	a	Structure causes or contributes significantly to street flooding			

Overall Condition: Good Fair Poor Diagram (Plan View): Include flow direction, inverts, North arrow

Maintenance Required: Yes No

Notes:

Inspection and Maintenance Checklist

Oil/Water Separators

Date: _____ BMP ID: _____

Inspectors: _____ Contract #: _____

Nearest

Distance

Location: _____ Intersection: _____ N W S E

Utility Pole #: _____ N W S E

Type of Inspection: (circle one) Storm Weekly Monthly Annual

	Issue		Condition to inspect for	Condition Exists (Y/N)	Comments	Photo ID
1	Water Quality	a	Discharge Water has obvious signs of poor water quality (clarity, odor, sedimentation, color, staining (iron fixing OK))			
2	Sediment Accumulation	a	Accumulated sediment >10% of designed pond depth or affects inletting or outletting condition of basin			
3	Trash & Debris Accumulation	a	Trash or debris >1 cubic foot (one standard size garbage can); Visual evidence of dumping			

4	Oil Accumulation	a	Oil accumulations that exceed 1-inch at the surface of the water			
5	Pipes	a	Inlet or outlet piping damaged or broken and in need of repair			
6	Access Cover	a	Cover damaged or cannot be opened; corrosion/deformation of cover			
7	Vault Structure	a	Cracks wider than ½-inch or evidence of soil particles entering the structure through the cracks; not structurally sound			
		b	Cracks wider than ½-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through cracks			
8	Baffles	a	Baffles corroding, cracking, warping and/or showing signs of failure			
9	Access Ladder	a	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, &/or misaligned.			
10	Flooding	a	Structure causes or contributes significantly to street flooding			
11	Dry Weather Discharge	a	Flowing water observed in/out of structure during dry weather conditions (at least 72 hours after ppt event)		Include last precipitation event DATE & AMOUNT DWD; Fill out Dry Weather Discharge Survey and forward to NRU	

Overall Condition: Good Fair Poor Diagram (Plan View): Include flow direction, inverts, North arrow

Maintenance Required: Yes No

Notes:

Inspection and Maintenance Checklist

Swirl Chambers

Date: _____ BMP ID: _____

Inspectors: _____ Contract #: _____

Nearest

Distance

Location: _____ Intersection: _____ N W S E

Utility Pole #: _____ N W S E

Type of Inspection: (circle one) Storm Weekly Monthly Annual

	Issue		Condition to inspect for	Condition Exists (Y/N)	Comments	Photo ID
1	Water Quality	a	Discharge water has obvious signs of poor water quality (clarity, odor, sedimentation, color, staining (iron-fixing OK))			
2	Sediment Accumulation	a	Sediment depth is within 6-inches of dry weather water surface elevation.			
3	Trash & Debris Accumulation	a	Trash or debris accumulated in vault, inlet/outlet pipe			

4	Oil Accumulation	a	Oil accumulations that exceed 1-inch at the surface of the water			
5	Pipes	a	Inlet or outlet piping damaged or broken and in need of repair			
6	Access Cover	a	Cover damaged or cannot be opened; corrosion/deformation of cover			
7	Vault Structure	a	Cracks wider than ½-inch or evidence of soil particles entering the structure through the cracks; not structurally sound			
		b	Cracks wider than ½-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through cracks			
8	Baffles	a	Baffles corroding, cracking, warping and/or showing signs of failure			
9	Flooding	a	Structure causes or contributes significantly to street flooding			
10	Dry Weather Discharge	a	Flowing water observed in/out of structure during dry weather conditions (at least 72 hours after ppt event)		Include last precipitation event DATE & AMOUNT DWD; Fill out Dry Weather Discharge Survey and forward to NRU	

Overall Condition: Good Fair Poor Diagram (Plan View): Include flow direction, inverts, North arrow

Maintenance Required: Yes No

Notes:

OUTFALL INSPECTION

Date: Time: Sub-Basin:

Last Rain Event: Investigators:

Note: If more than one pipe is located in a single area, complete a separate sheet for each one. (Use the same Outfall ID for each pipe at the location but assign a different Pipe ID to each pipe.)

Outfall ID: _____ Pipe ID: _____

State Highway: _____

Sketch of outfall structures (if outfall has multiple pipes, indicate which one is reported on this sheet.) Indicate location of edge of pavement and nearest CB or MH. If possible, indicate # and direction of inlets into the CB or MH.

Location Sketch

Plan View

Outfall Flows to:

	Fresh	Tidal
Stream/River		
Lake/Pond		
Bay		
Wetland		

Pipe size (dia): _____ inches Condition: Poor Fair Excellent Material: _____

_____

Headwall: Yes No Condition: Poor Fair Excellent Material: _____

Flared End Section: Yes No Condition: Poor Fair Excellent

Rip-Rap: Yes No Condition: Poor Fair Excellent

Bituminous lined ditch: Yes No Condition: Poor Fair Excellent

Vegetative Swale: Yes No Condition: Poor Fair Excellent

DRY WEATHER DISCHARGE

YES NO UNKNOWN

Notes:

Problems Noted:

Sedimentation? Yes No

Scouring? Yes No

Trash? Yes No

Flooding? Yes No

IF YES –

COMPLETE DRY

Distance to edge of pavement: _____ ft. N W S E

WEATHER DISCHARGE SURVEY

Nearest Intersection: _____ Distance: _____ N W S E

Across

Nearest Utility Pole: _____ Adjacent Distance: _____ N W S E

Across

Nearest House #: _____ Adjacent Distance: _____ N W S E

Photos:

ILLICIT DISCHARGES

DRY WEATHER FLOW SURVEY

Survey to be taken 72-hours AFTER a 0.10" rain event

I. General Information

Date:	Time:	Outfall ID:
Last Rain Event:	Investigators:	

II. Illicit Discharge Flow Measurements

Approx Width of Water Surface:	☐ <1"	☐ 1" – 6"	☐ 6" – 12"	☐ >12"
Approx Depth of Water:	☐ <1"	☐ 1" – 6"	☐ 6" – 12"	☐ >12"
Approx Flow Velocity (visual):	☐ drip	☐ trickle	☐ moderate	☐ substantial

III. Visual Observations

Immediate Surrounding Land Use:

☐ Highway ☐ Commercial ☐ Residential ☐ Municipal ☐ Open Space ☐ Industrial ☐ Other

Odor:

☐ None ☐ Sewage ☐ Rotten Eggs ☐ Oil/Gas ☐ Laundry ☐ Other

Color:

☐ None ☐ Red ☐ Yellow ☐ Brown ☐ Green ☐ Orange ☐ Other

Floatables:

☐ None ☐ Sewage/ Toilet Paper ☐ Oil Sheen ☐ Laundry/Soap Suds ☐ Other

Staining:

☐ None ☐ Black ☐ Brown ☐ Yellow ☐ White ☐ Orange ☐ Other

Clarity:

☐ Clear ☐ Cloudy ☐ Opaque

Notes:

Vegetation/Algae Growth:

☐ None ☐ Normal ☐ Excessive ☐ Inhibited

Sedimentation:

☐ No ☐ Yes

Scouring:

☐ No ☐ Yes

ILLICIT DISCHARGES

REPORTING FORM

REPORTING INFORMATION

DATE: _____ TIME: _____

CALLER/REPORTING PERSON:

NAME: _____ PHONE: _____

BUSINESS: _____ADDRESS: _____

BRIEF SUMMARY:

_____

_____

_____

_____

_____

NAME OF PERSON TAKING CALL/COMPLAINT: _____

ILLICIT DISCHARGE IDENTIFICATION

WHEN WAS THE DISCHARGE SEEN: DATE: _____ TIME: _____

LOCATION: (highway and mile marker; nearest cross street; landmarks; directions)

DISCHARGE:

1. IS THE MATERIAL IN THE STORM DRAIN? YES / NO
2. IS THE MATERIAL JUST ON THE HIGHWAY? YES / NO
3. IS THE SUBSTANCE A KNOWN HAZARDOUS MATERIAL? YES / NO
4. IS THE SUBSTANCE A KNOWN NON-HAZARDOUS MATERIAL? YES / NO
5. IS THE SUBSTANCE UNKNOWN AND CANNOT BE IDENTIFIED? YES / NO

DESCRIPTION OF SUBSTANCE:

Appendix H– Post-Construction BMP Inspection Log

POST-CONSTRUCTION INSPECTION LOG

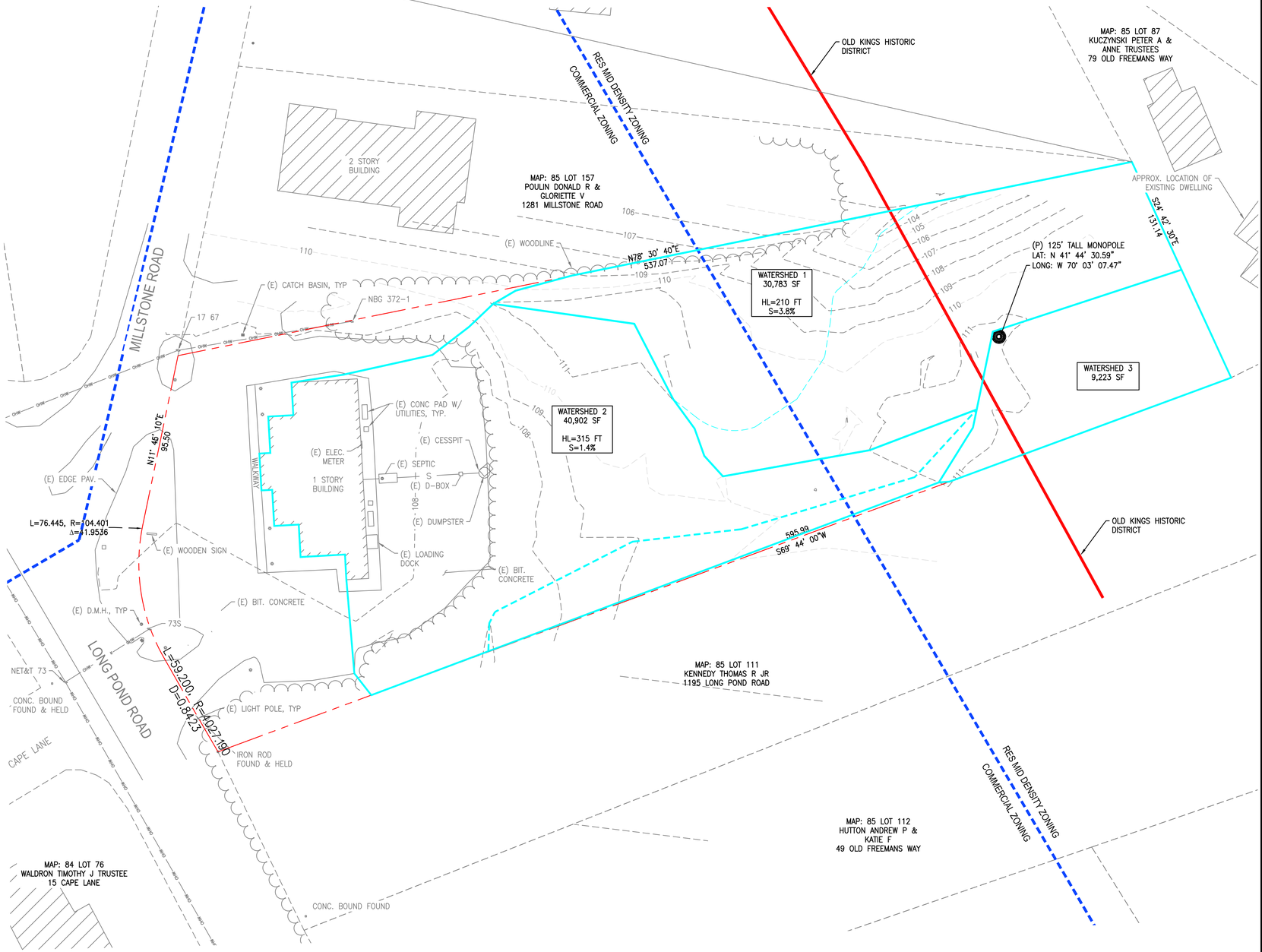
Log the inspections and maintenance actions for each structural BMP installed as part of the Contract.

BMP	INSPECTION			MAINTENANCE		
	DATE	TYPE	SEDIMENT ACCUMULATION	REQUIRED? If YES, detail work required	SCHEDULED MAINTENANCE DATE	NEXT INSPECTION DATE

Add more lines/pages as necessary

APPENDIX 2

WATERSHED MAPS



LEGEND

- PROPERTY LINE
- ABUTTING PROPERTY LINE
- EXISTING CONTOUR
- ELECTRIC LINE
- TELCO LINE
- EXIST. TREE LINE
- PROP. TREE LINE
- OVERHEAD UTILITY
- FENCE
- PROP. EASEMENT/ LEASE AREA
- CATCH BASIN
- IRON ROD
- UTILITY POLE
- LIGHT POLE
- SEWER MAN HOLE
- MAN HOLE

ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development
Surveying - Telecommunications
500 North Broadway
East Providence, RI 02914
Tel: (401) 354-2403
Fax: (401) 633-6354

TowerNorth
750 WEST CENTER STREET, SUITE 301
WEST BRIDGEWATER, MA 02379

COMMONWEALTH OF MASSACHUSETTS
SCOTT N. ADAMS
CIVIL
No. 46006
REGISTERED PROFESSIONAL ENGINEER

AEG PROJECT #: 2019-0027

DRAWN BY: JWH/MER

CHECKED BY: SNA

SUBMITTALS

REV#	DATE	DESCRIPTION
0	10/21/22	ISSUED FOR REVIEW
1	10/26/22	ISSUED FOR CONSTRUCTION
2	11/28/22	REVISED
3	12/14/22	REVISED
4	01/17/23	REVISED
5	10/03/23	REVISED
6	03/29/24	REVISED
7	04/15/24	REVISED
8	04/17/24	REVISED
9	05/29/24	REVISED

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MA1005-B

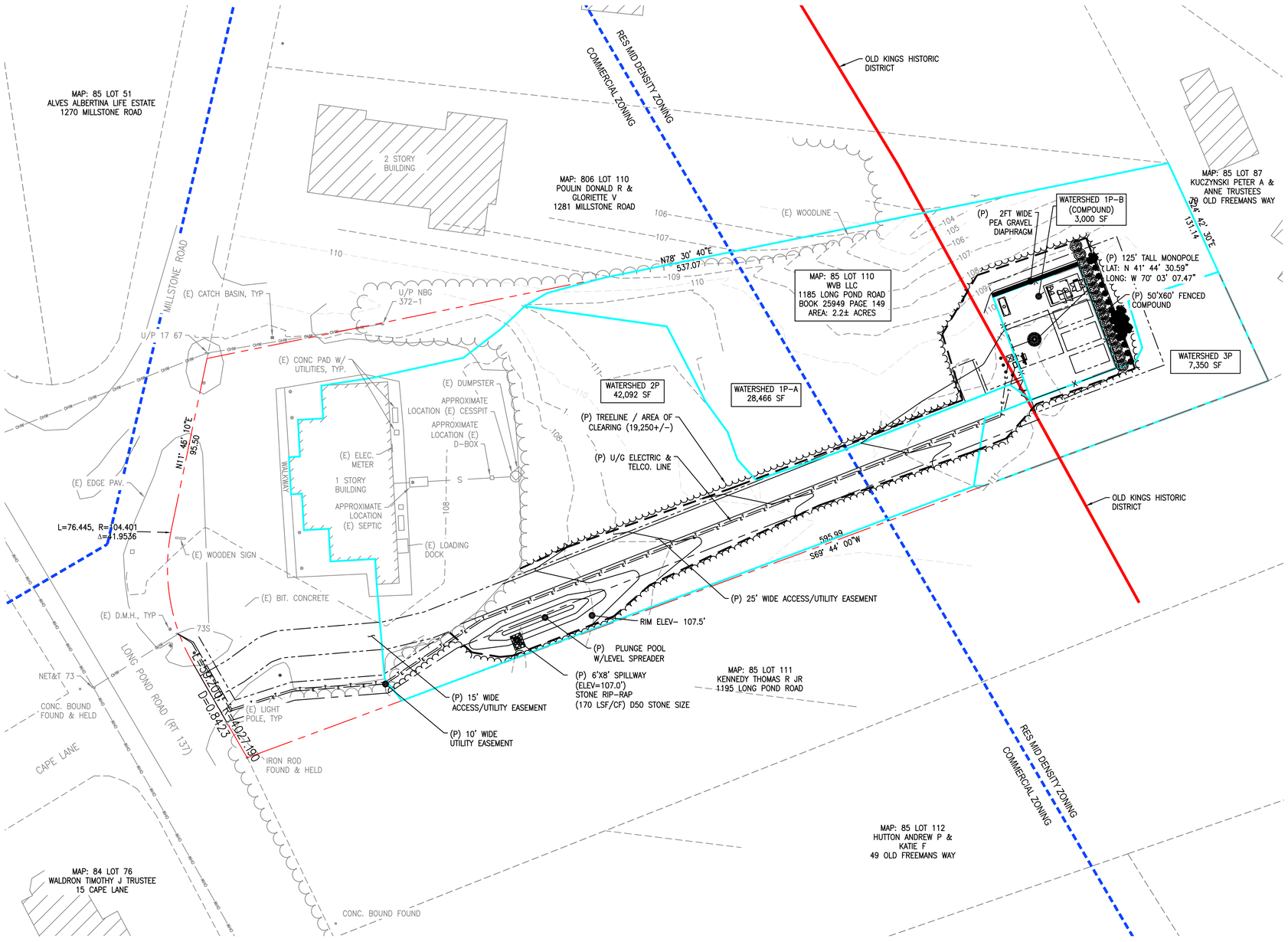
1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

EXISTING WATERSHED AREAS

SHEET NUMBER

EWA



NORTH

1 PWA PROPOSED WATERSHED AREAS

SCALE: 1" = 30'-0"

0 30' 60'

PROPERTY LINE
ABUTTING PROPERTY LINE
EXISTING CONTOUR
ELECTRIC LINE
TELCO LINE
EXIST. TREE LINE
PROP. TREE LINE
OVERHEAD UTILITY
FENCE
PROP. EASEMENT/ LEASE AREA
CATCH BASIN
IRON ROD
UTILITY POLE
LIGHT POLE
SEWER MAN HOLE
MAN HOLE

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9	05/29/24	REVISED

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MA1005-B

1185 LONG POND ROAD
BREWSTER, MA 02631
BARNSTABLE COUNTY

SHEET TITLE

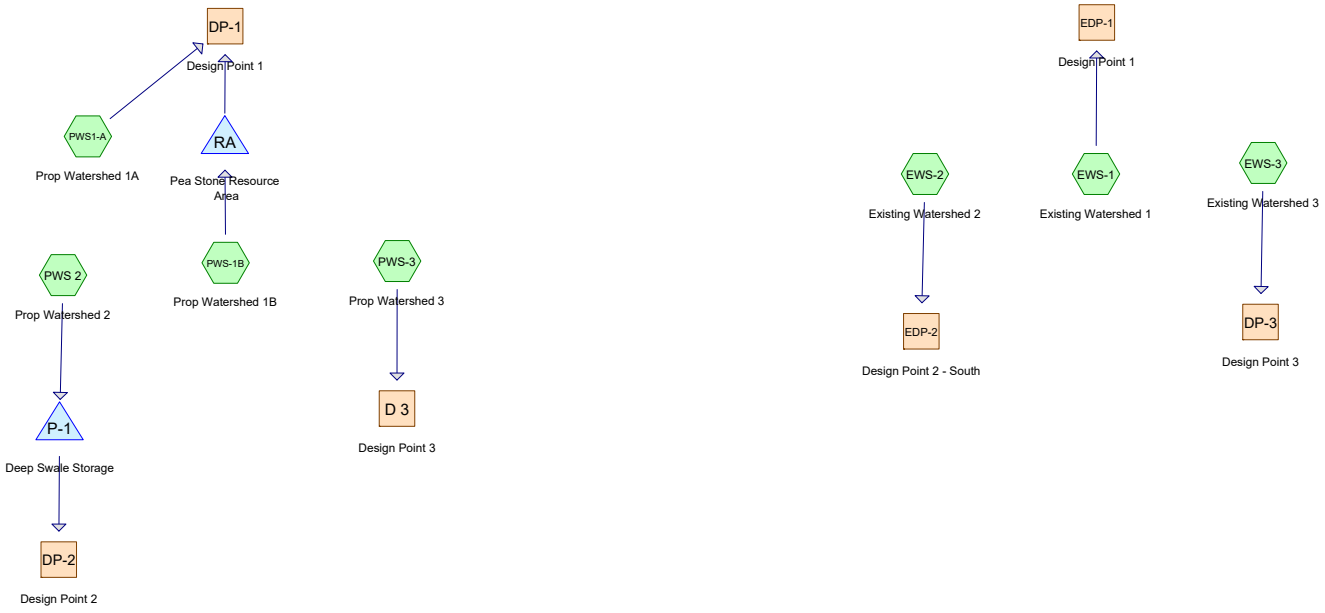
PROPOSED WATERSHED AREAS

SHEET NUMBER

PWA

APPENDIX 3

HYDROCAD STORMWATER MODEL COMPUTATIONS



Subcat Reach Pond Link

Routing Diagram for Brewster - Tower North - hydroCAD- Rev
Prepared by HDR, Inc, Printed 11/12/2024
HydroCAD® 10.20-2g s/n 01042 © 2022 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.062	40	Crushed Stone surface and storage (PWS-1B)
0.008	98	Equioment pads (PWS-1B)
0.324	98	Existing Parking (PWS 2)
0.324	98	Existing Parking Lot (EWS-2)
0.075	76	Gravel roads, HSG A (PWS 2)
2.922	45	Woods, Poor, HSG A (EWS-1, EWS-2, EWS-3, PWS 2, PWS-3, PWS1-A)
3.716	**55**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.998	HSG A	EWS-1, EWS-2, EWS-3, PWS 2, PWS-3, PWS1-A
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.718	Other	EWS-2, PWS 2, PWS-1B
3.716		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchme Numbers
0.000	0.000	0.000	0.000	0.062	0.062	Crushed Stone surface and storage	
0.000	0.000	0.000	0.000	0.008	0.008	Equioment pads	
0.000	0.000	0.000	0.000	0.324	0.324	Existing Parking	
0.000	0.000	0.000	0.000	0.324	0.324	Existing Parking Lot	
0.075	0.000	0.000	0.000	0.000	0.075	Gravel roads	
2.922	0.000	0.000	0.000	0.000	2.922	Woods, Poor	
2.998	**0.000**	**0.000**	**0.000**	**0.718**	**3.716**	**TOTAL AREA**	

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

Subcatchment EWS-1: Existing Watershed 1 Runoff Area=30,783 sf 0.00% Impervious Runoff Depth>1.11"
Flow Length=310' Tc=21.0 min CN=45 Runoff=0.53 cfs 0.065 af

Subcatchment EWS-2: Existing Watershed Runoff Area=40,902 sf 34.52% Impervious Runoff Depth>2.69"
Flow Length=315' Slope=0.0140 '/' Tc=25.6 min CN=63 Runoff=1.92 cfs 0.210 af

Subcatchment EWS-3: Existing Watershed 3 Runoff Area=9,223 sf 0.00% Impervious Runoff Depth>1.12"
Tc=5.0 min CN=45 Runoff=0.24 cfs 0.020 af

Subcatchment PWS 2: Prop Watershed 2 Runoff Area=42,092 sf 33.55% Impervious Runoff Depth>2.88"
Flow Length=400' Tc=30.3 min CN=65 Runoff=1.98 cfs 0.232 af

Subcatchment PWS-1B: Prop Watershed 1B Runoff Area=3,050 sf 11.48% Impervious Runoff Depth>1.28"
Tc=6.0 min CN=47 Runoff=0.09 cfs 0.007 af

Subcatchment PWS-3: Prop Watershed 3 Runoff Area=7,350 sf 0.00% Impervious Runoff Depth>1.12"
Tc=5.0 min CN=45 Runoff=0.19 cfs 0.016 af

Subcatchment PWS1-A: Prop Watershed 1A Runoff Area=28,466 sf 0.00% Impervious Runoff Depth>1.11"
Flow Length=310' Tc=21.3 min CN=45 Runoff=0.48 cfs 0.060 af

Reach D 3: Design Point 3 Inflow=0.19 cfs 0.016 af
Outflow=0.19 cfs 0.016 af

Reach DP-1: Design Point 1 Inflow=0.48 cfs 0.060 af
Outflow=0.48 cfs 0.060 af

Reach DP-2: Design Point 2 Inflow=1.82 cfs 0.119 af
Outflow=1.82 cfs 0.119 af

Reach DP-3: Design Point 3 Inflow=0.24 cfs 0.020 af
Outflow=0.24 cfs 0.020 af

Reach EDP-1: Design Point 1 Inflow=0.53 cfs 0.065 af
Outflow=0.53 cfs 0.065 af

Reach EDP-2: Design Point 2 - South Inflow=1.92 cfs 0.210 af
Outflow=1.92 cfs 0.210 af

Pond P-1: Deep Swale Storage Peak Elev=107.16' Storage=1,447 cf Inflow=1.98 cfs 0.232 af
Discarded=0.15 cfs 0.123 af Primary=1.82 cfs 0.119 af Outflow=1.97 cfs 0.242 af

Pond RA: Pea Stone Resource Area Peak Elev=106.05' Storage=0.001 af Inflow=0.09 cfs 0.007 af
Discarded=0.03 cfs 0.007 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.007 af

Total Runoff Area = 3.716 ac Runoff Volume = 0.610 af Average Runoff Depth = 1.97"
82.34% Pervious = 3.060 ac 17.66% Impervious = 0.656 ac

Summary for Subcatchment EWS-1: Existing Watershed 1

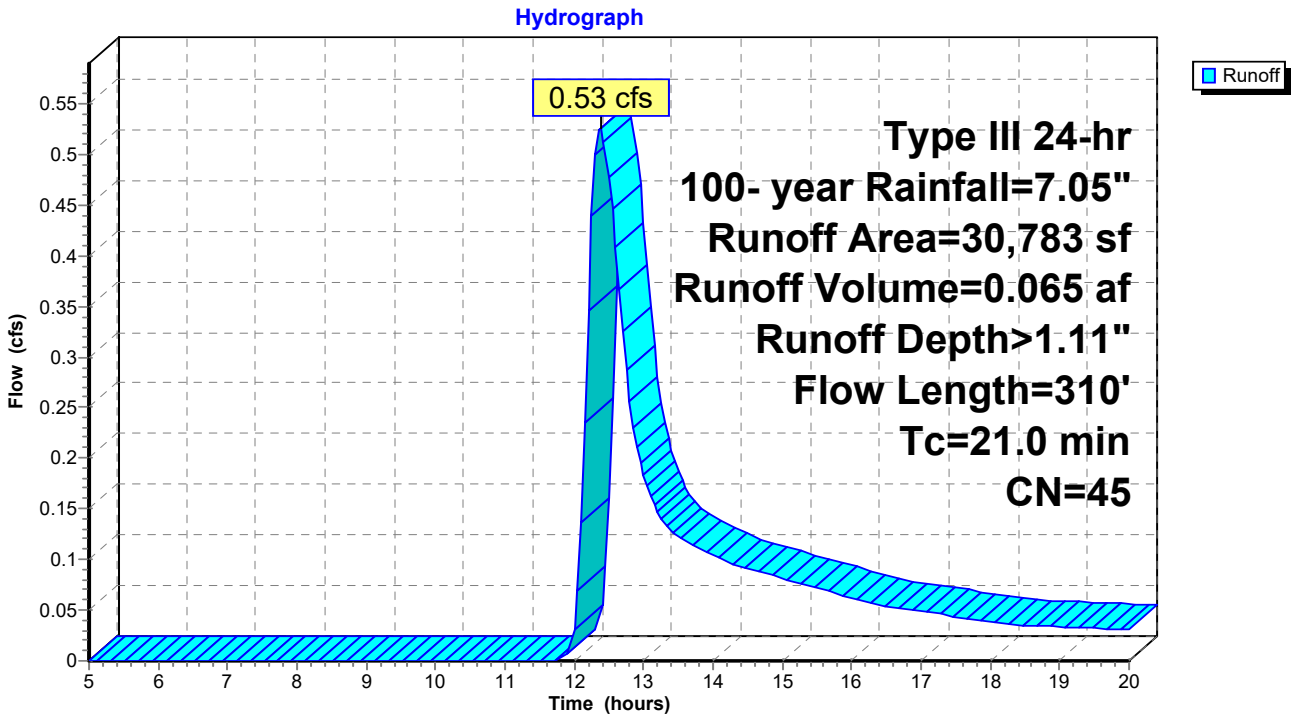
Runoff = 0.53 cfs @ 12.37 hrs, Volume= 0.065 af, Depth> 1.11"
Routed to Reach EDP-1 : Design Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100- year Rainfall=7.05"

Area (sf)	CN	Description
30,783	45	Woods, Poor, HSG A
30,783		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.50"
3.5	210	0.0400	1.00		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
21.0	310	Total			

Subcatchment EWS-1: Existing Watershed 1



Summary for Subcatchment EWS-2: Existing Watershed 2

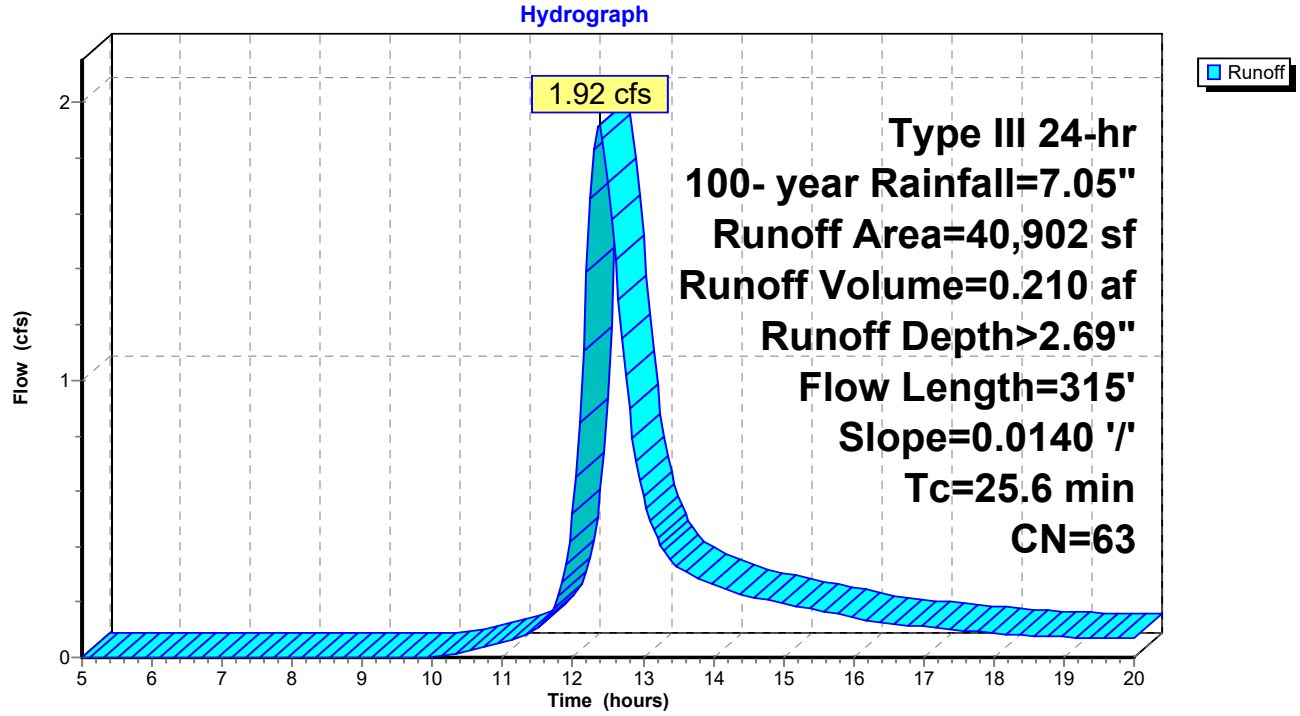
Runoff = 1.92 cfs @ 12.37 hrs, Volume= 0.210 af, Depth> 2.69"
Routed to Reach EDP-2 : Design Point 2 - South

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100- year Rainfall=7.05"

	Area (sf)	CN	Description
	26,782	45	Woods, Poor, HSG A
*	14,120	98	Existing Parking Lot
	40,902	63	Weighted Average
	26,782		65.48% Pervious Area
	14,120		34.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0140	0.07		**Sheet Flow, Overland Flow** Woods: Light underbrush n= 0.400 P2= 3.50"
1.9	215	0.0140	1.90		**Shallow Concentrated Flow, Shallow Concentreated flow** Unpaved Kv= 16.1 fps
25.6	315	Total			

Subcatchment EWS-2: Existing Watershed 2



Summary for Subcatchment EWS-3: Existing Watershed 3

[49] Hint: Tc<2dt may require smaller dt

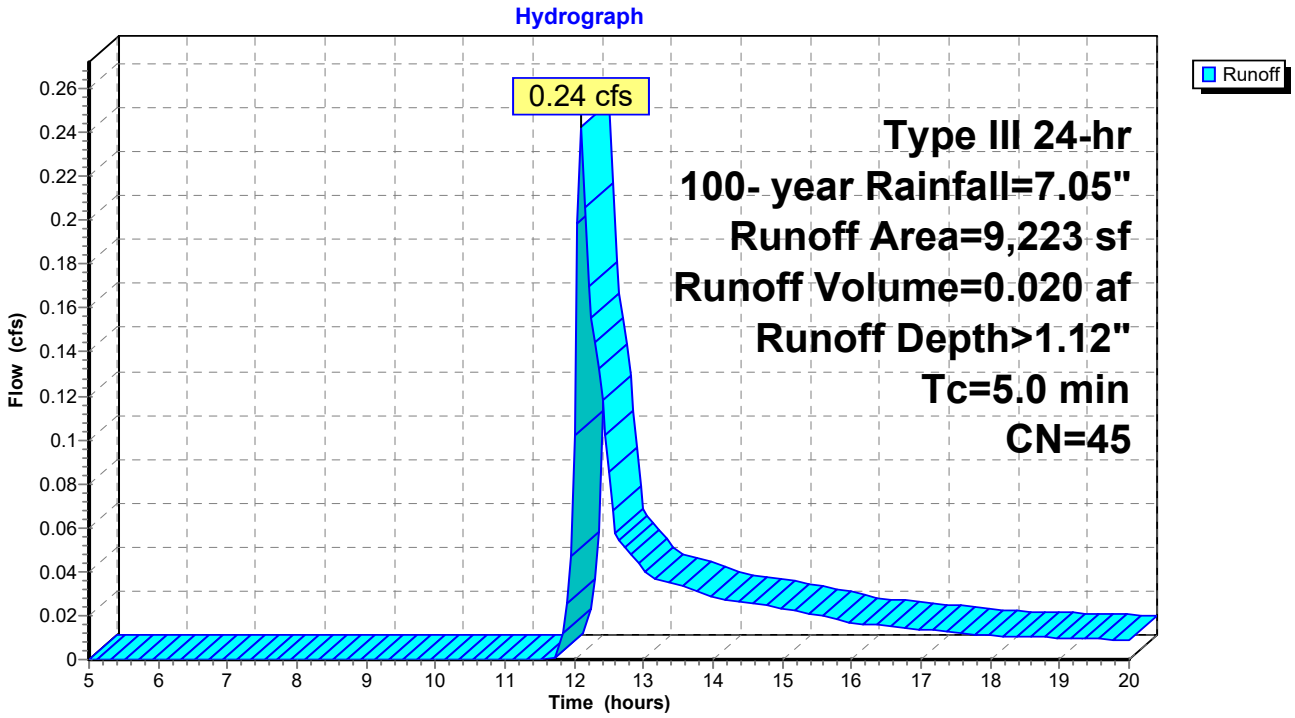
Runoff = 0.24 cfs @ 12.10 hrs, Volume= 0.020 af, Depth> 1.12"
Routed to Reach DP-3 : Design Point 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100- year Rainfall=7.05"

Area (sf)	CN	Description
9,223	45	Woods, Poor, HSG A
9,223		100.00% Pervious Area

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

Subcatchment EWS-3: Existing Watershed 3



Summary for Subcatchment PWS 2: Prop Watershed 2

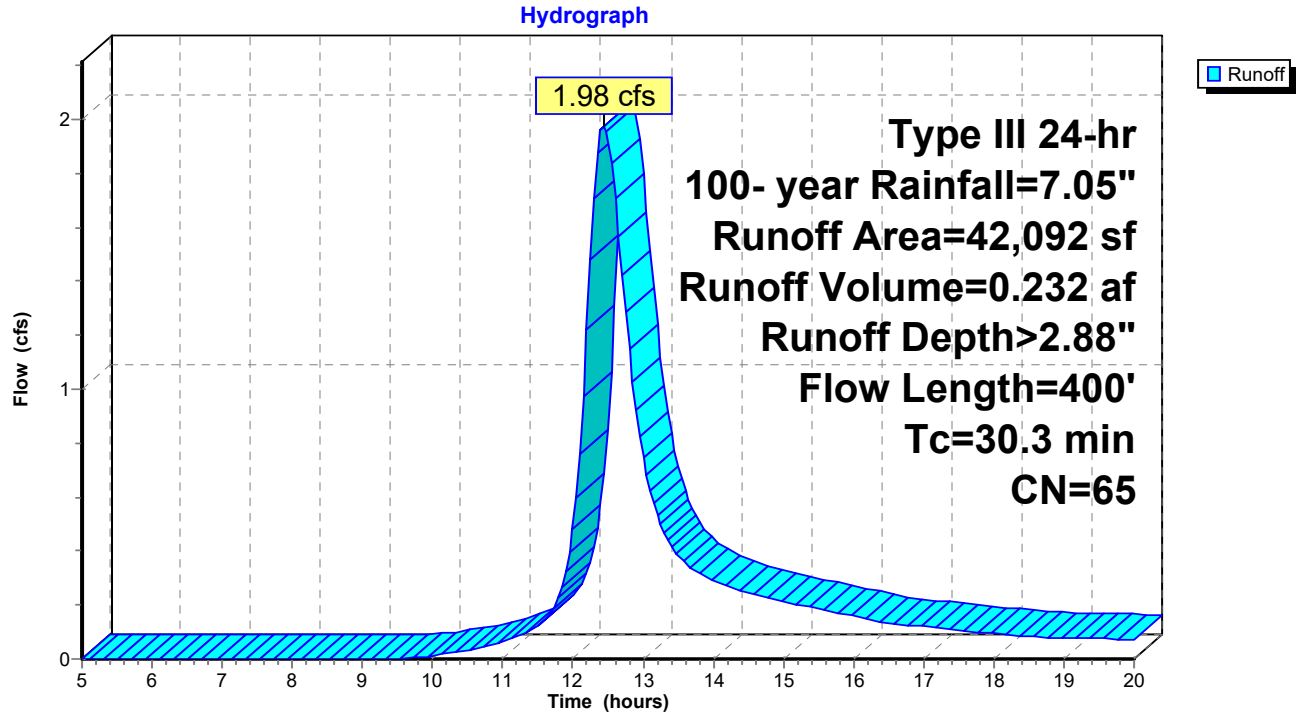
Runoff = 1.98 cfs @ 12.44 hrs, Volume= 0.232 af, Depth> 2.88"
Routed to Pond P-1 : Deep Swale Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100- year Rainfall=7.05"

	Area (sf)	CN	Description
	24,690	45	Woods, Poor, HSG A
	3,282	76	Gravel roads, HSG A
*	14,120	98	Existing Parking
	42,092	65	Weighted Average
	27,972		66.45% Pervious Area
	14,120		33.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	100	0.0140	0.07		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.50"
5.6	200	0.0140	0.59		**Shallow Concentrated Flow, shallow flow** Woodland Kv= 5.0 fps
1.0	100	0.0100	1.61		**Shallow Concentrated Flow, Unpaved** Unpaved Kv= 16.1 fps
30.3	400	Total			

Subcatchment PWS 2: Prop Watershed 2



Summary for Subcatchment PWS-1B: Prop Watershed 1B

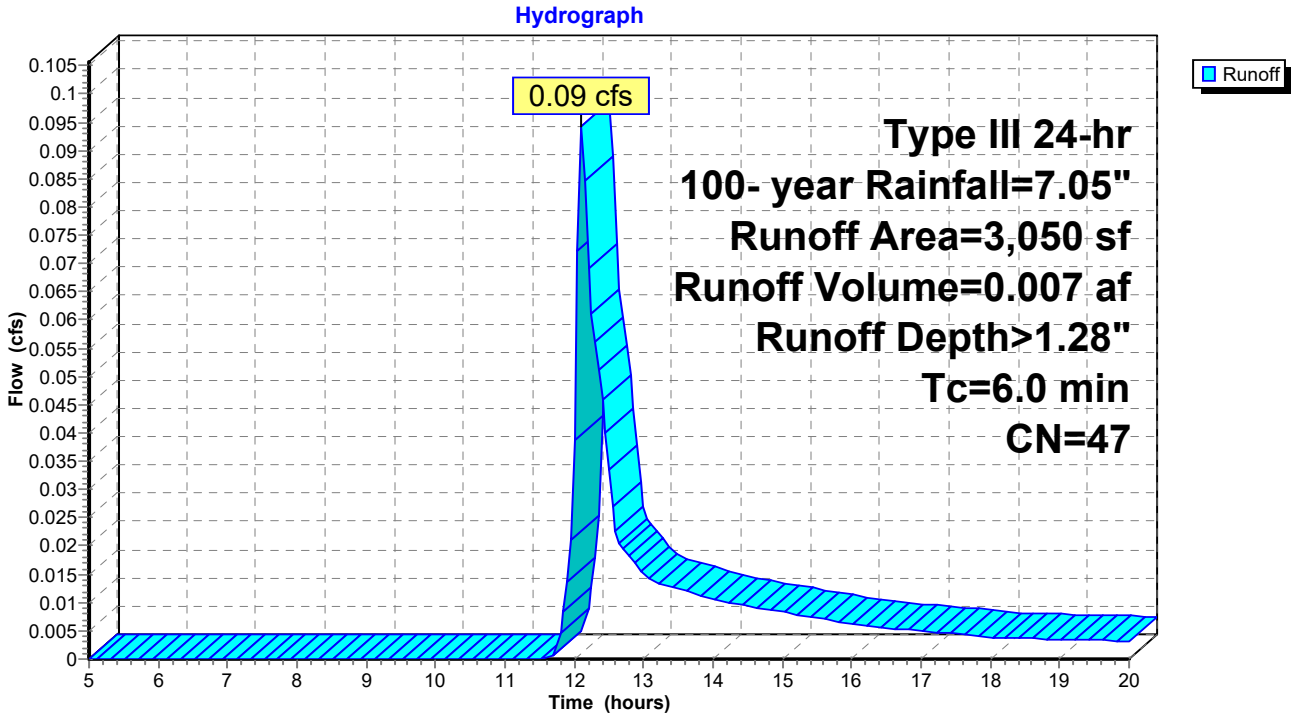
Runoff = 0.09 cfs @ 12.11 hrs, Volume= 0.007 af, Depth> 1.28"
Routed to Pond RA : Pea Stone Resource Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100- year Rainfall=7.05"

	Area (sf)	CN	Description
*	350	98	Equioment pads
*	2,700	40	Crushed Stone surface and storage
	3,050	47	Weighted Average
	2,700		88.52% Pervious Area
	350		11.48% Impervious Area

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

Subcatchment PWS-1B: Prop Watershed 1B



Summary for Subcatchment PWS-3: Prop Watershed 3

[49] Hint: Tc<2dt may require smaller dt

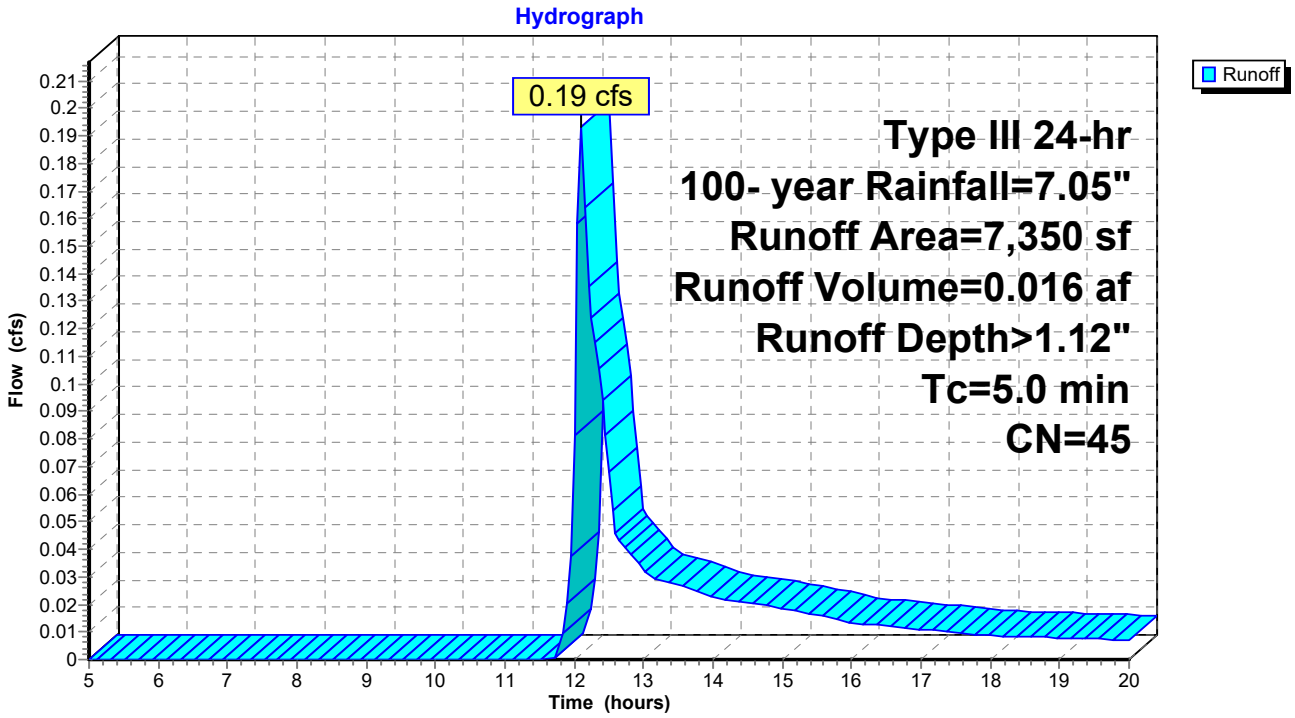
Runoff = 0.19 cfs @ 12.10 hrs, Volume= 0.016 af, Depth> 1.12"
Routed to Reach D 3 : Design Point 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100- year Rainfall=7.05"

Area (sf)	CN	Description
7,350	45	Woods, Poor, HSG A
7,350		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, overland - sheet**

Subcatchment PWS-3: Prop Watershed 3



Summary for Subcatchment PWS1-A: Prop Watershed 1A

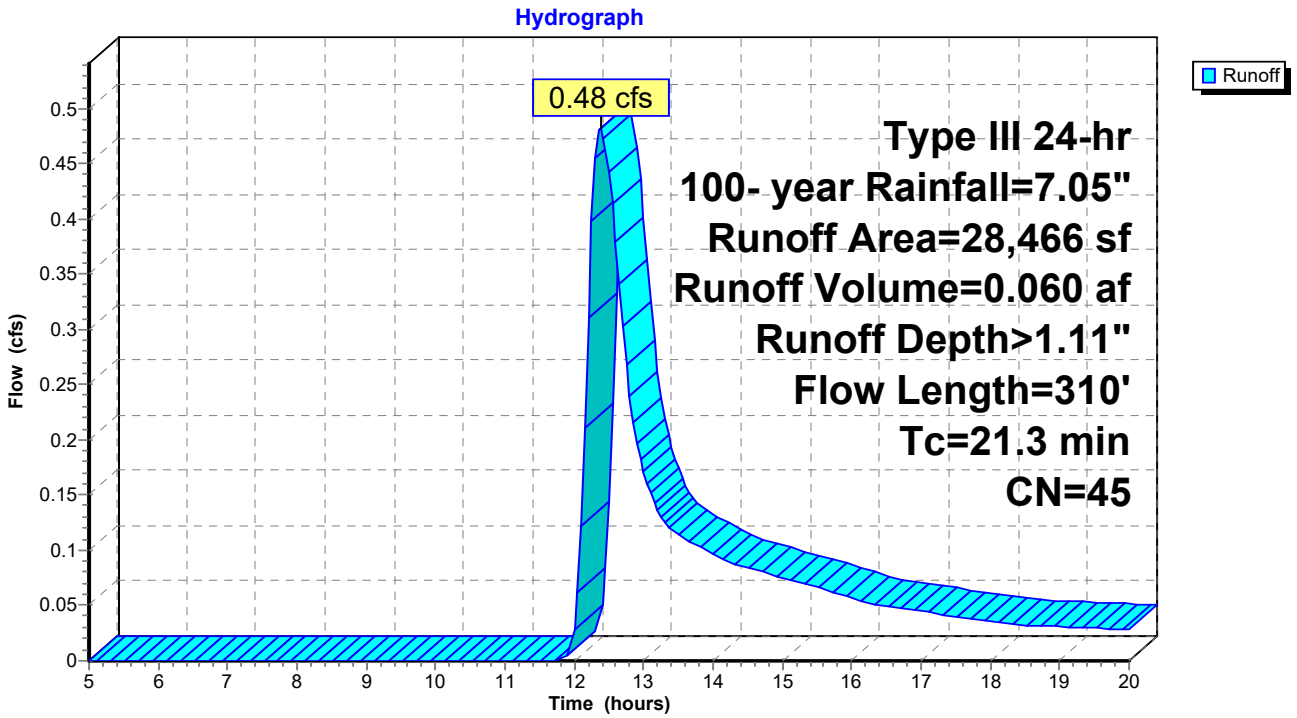
Runoff = 0.48 cfs @ 12.38 hrs, Volume= 0.060 af, Depth> 1.11"
Routed to Reach DP-1 : Design Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100- year Rainfall=7.05"

Area (sf)	CN	Description
28,466	45	Woods, Poor, HSG A
28,466		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.5	100	0.0300	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.8	210	0.0340	0.92		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
21.3	310	Total			

Subcatchment PWS1-A: Prop Watershed 1A



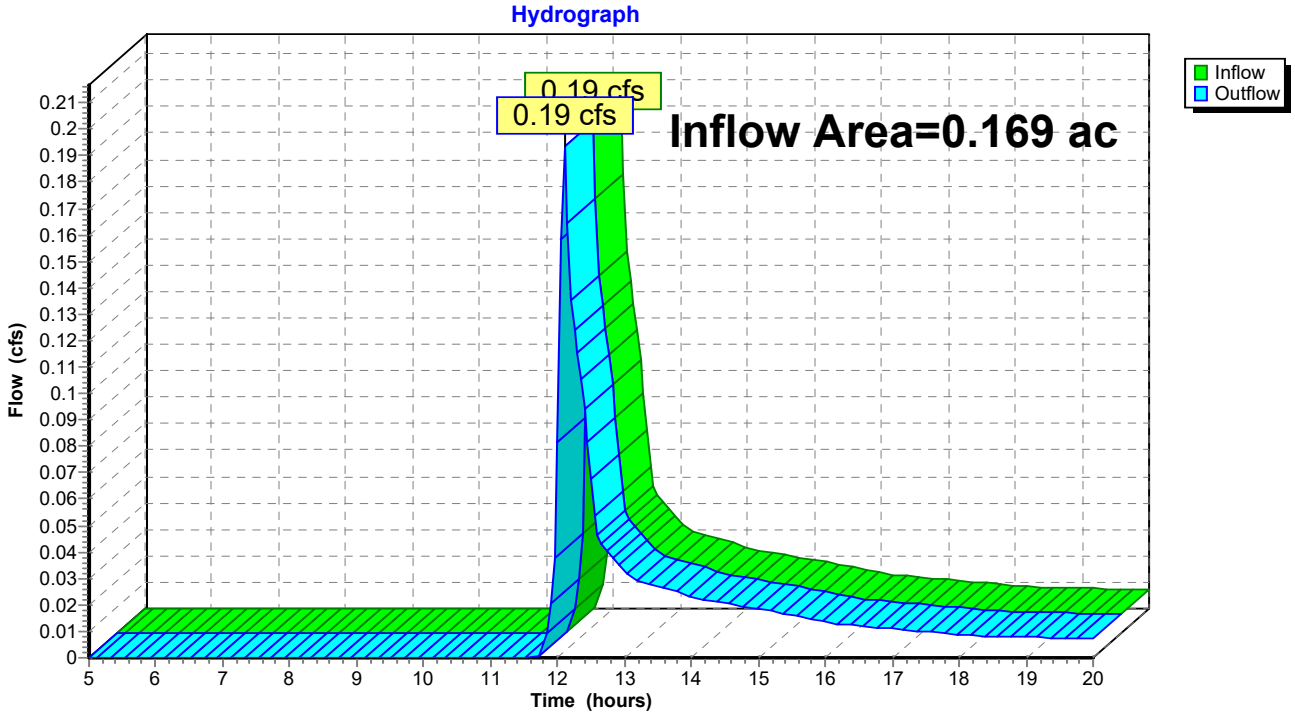
Summary for Reach D 3: Design Point 3

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

Inflow Area = 0.169 ac, 0.00% Impervious, Inflow Depth > 1.12" for 100- year event
Inflow = 0.19 cfs @ 12.10 hrs, Volume= 0.016 af
Outflow = 0.19 cfs @ 12.10 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

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

Reach D 3: Design Point 3



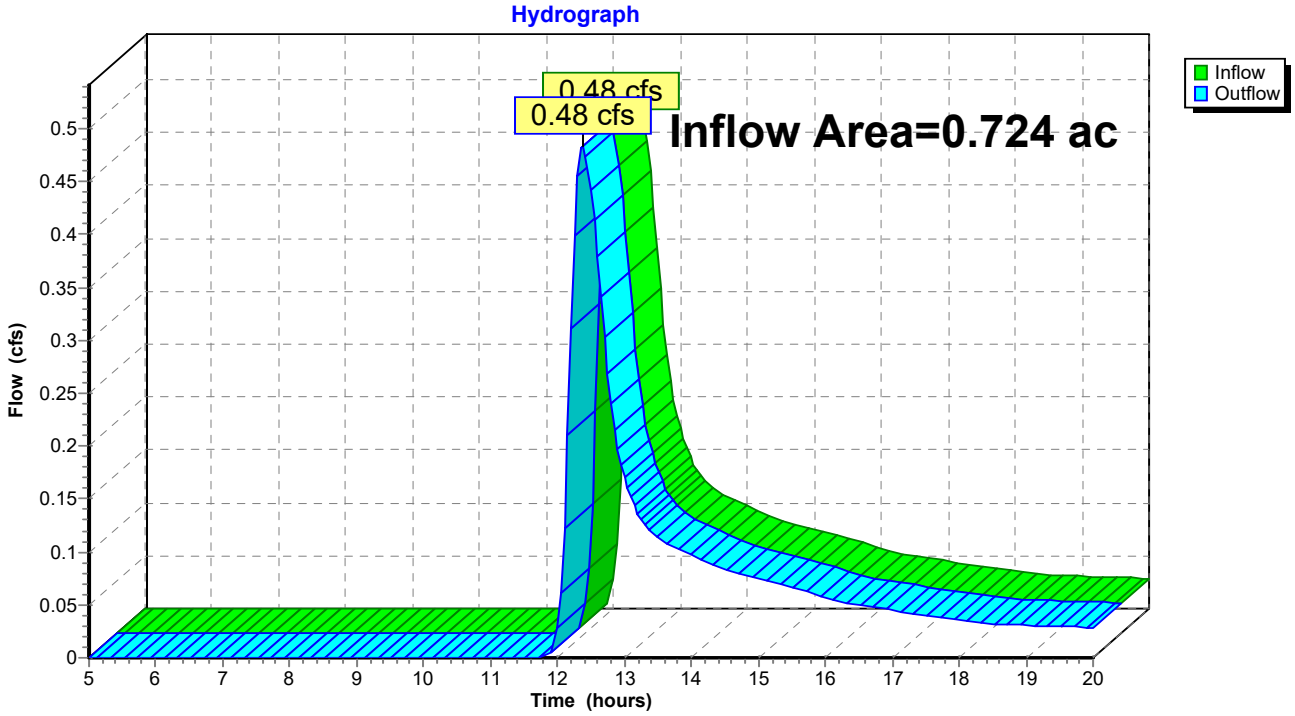
Summary for Reach DP-1: Design Point 1

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

Inflow Area = 0.724 ac, 1.11% Impervious, Inflow Depth > 1.00" for 100- year event
Inflow = 0.48 cfs @ 12.38 hrs, Volume= 0.060 af
Outflow = 0.48 cfs @ 12.38 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Design Point 1



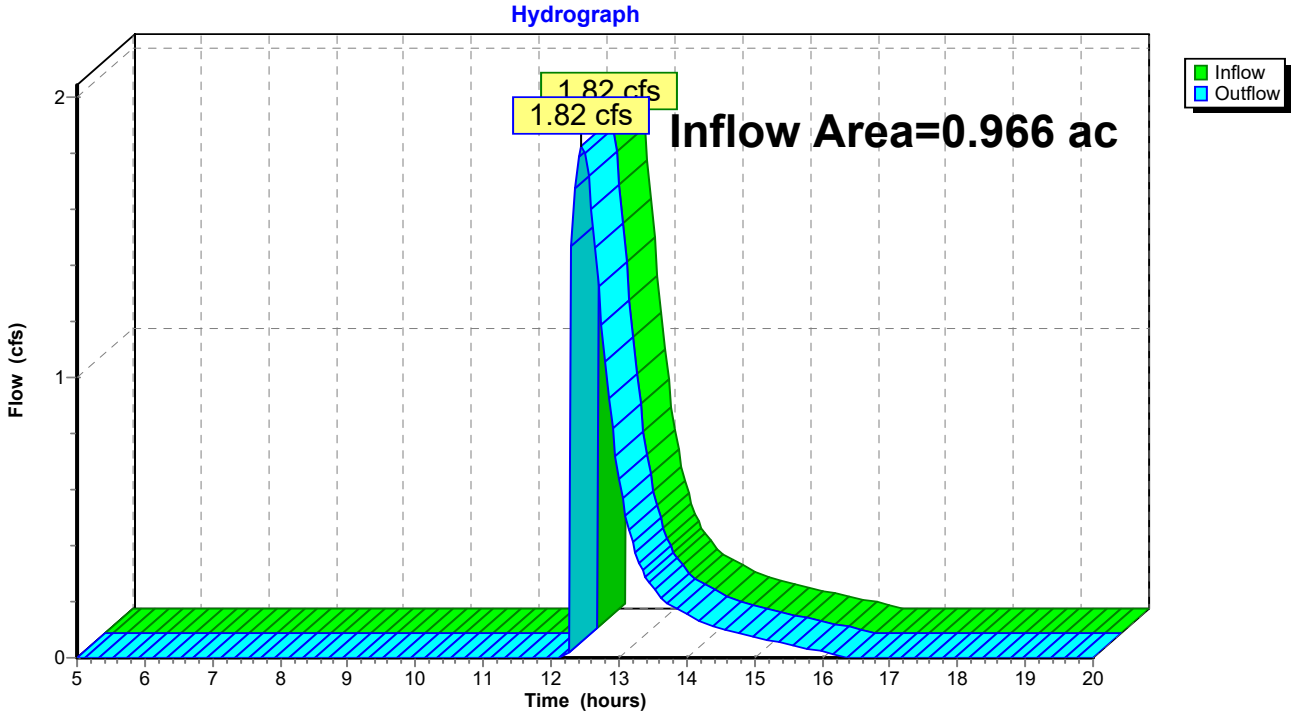
Summary for Reach DP-2: Design Point 2

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

Inflow Area = 0.966 ac, 33.55% Impervious, Inflow Depth = 1.48" for 100- year event
Inflow = 1.82 cfs @ 12.45 hrs, Volume= 0.119 af
Outflow = 1.82 cfs @ 12.45 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Design Point 2



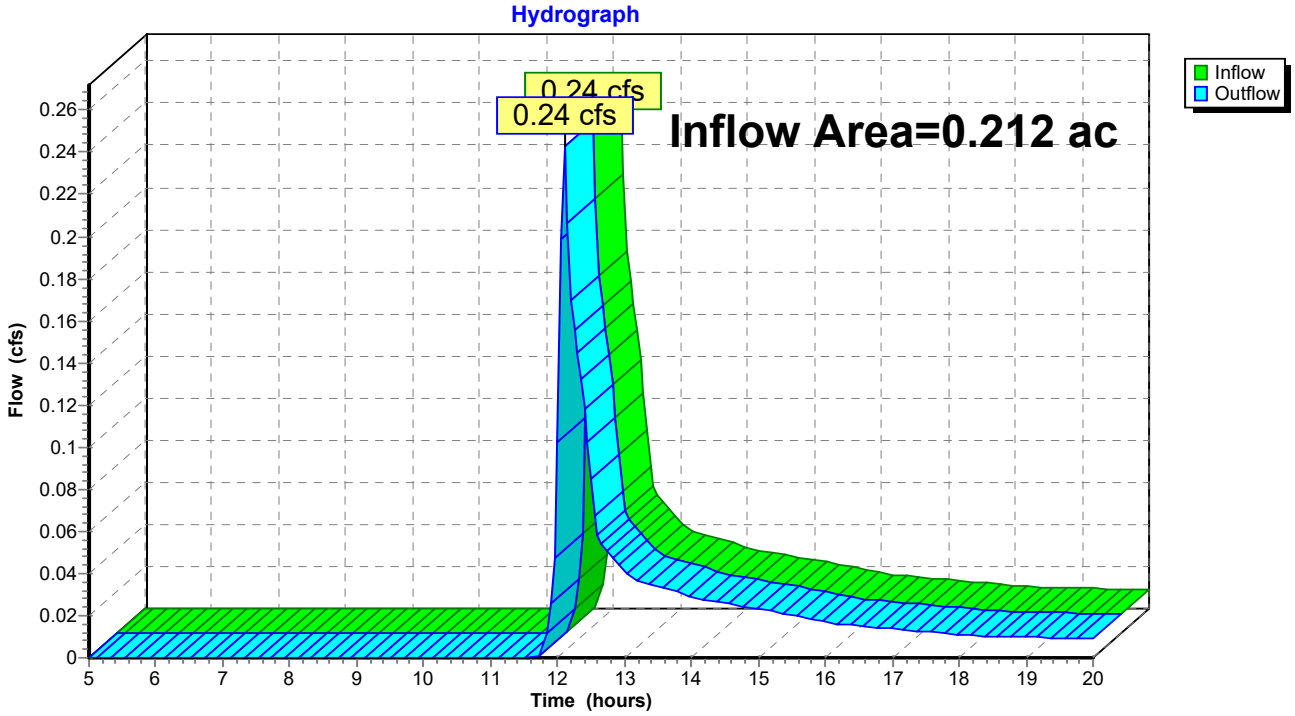
Summary for Reach DP-3: Design Point 3

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

Inflow Area = 0.212 ac, 0.00% Impervious, Inflow Depth > 1.12" for 100- year event
Inflow = 0.24 cfs @ 12.10 hrs, Volume= 0.020 af
Outflow = 0.24 cfs @ 12.10 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-3: Design Point 3



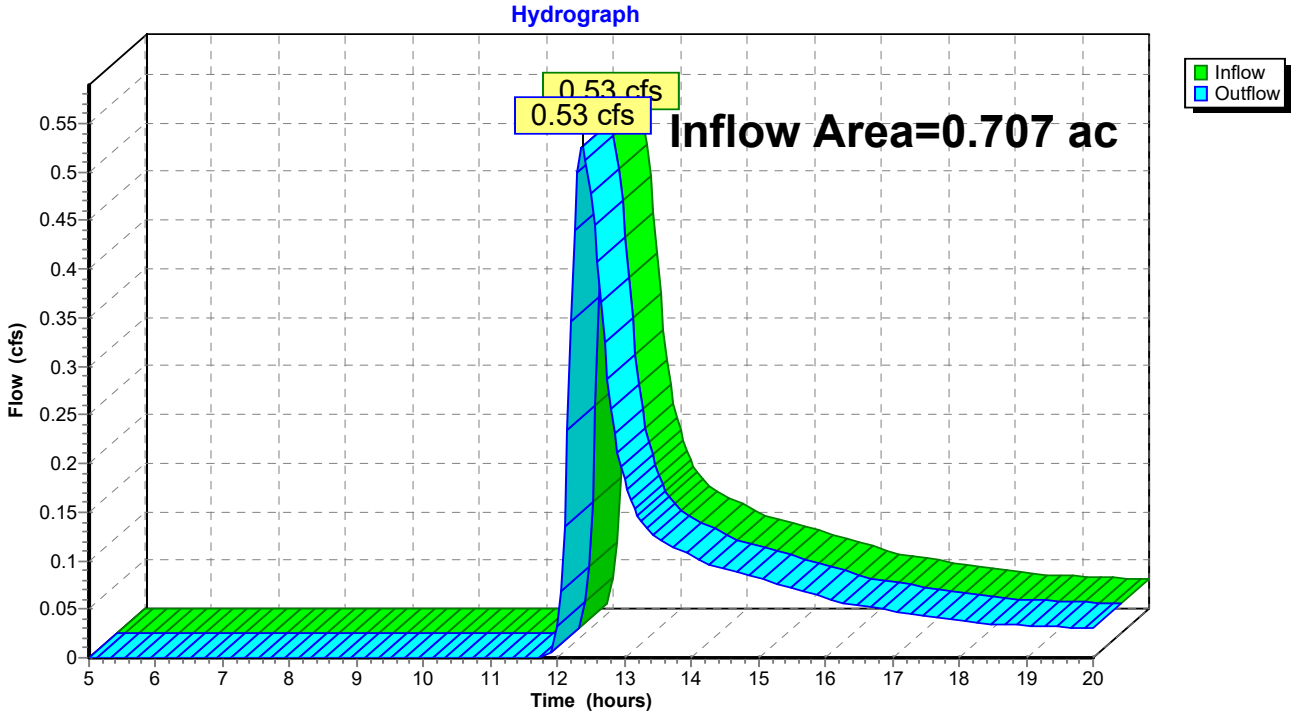
Summary for Reach EDP-1: Design Point 1

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

Inflow Area = 0.707 ac, 0.00% Impervious, Inflow Depth > 1.11" for 100- year event
Inflow = 0.53 cfs @ 12.37 hrs, Volume= 0.065 af
Outflow = 0.53 cfs @ 12.37 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

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

Reach EDP-1: Design Point 1



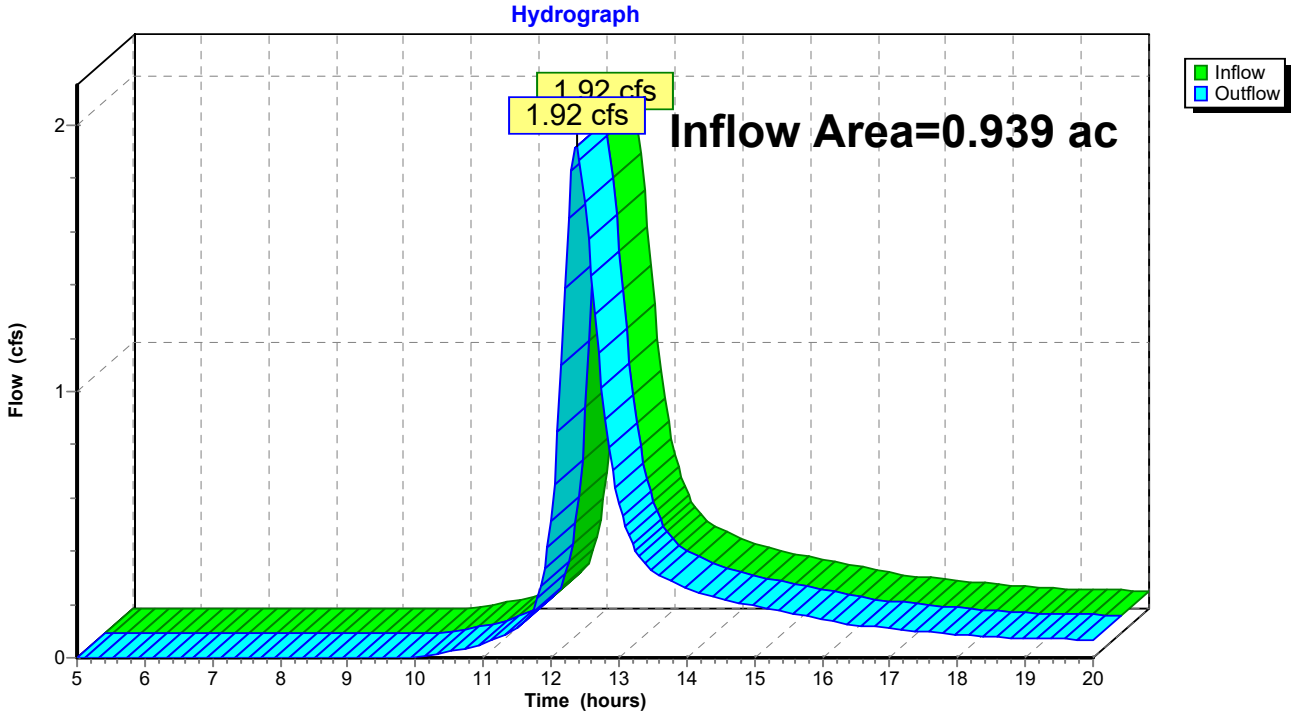
Summary for Reach EDP-2: Design Point 2 - South

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

Inflow Area = 0.939 ac, 34.52% Impervious, Inflow Depth > 2.69" for 100- year event
Inflow = 1.92 cfs @ 12.37 hrs, Volume= 0.210 af
Outflow = 1.92 cfs @ 12.37 hrs, Volume= 0.210 af, Atten= 0%, Lag= 0.0 min

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

Reach EDP-2: Design Point 2 - South



Summary for Pond P-1: Deep Swale Storage

Inflow Area = 0.966 ac, 33.55% Impervious, Inflow Depth > 2.88" for 100- year event
Inflow = 1.98 cfs @ 12.44 hrs, Volume= 0.232 af
Outflow = 1.97 cfs @ 12.45 hrs, Volume= 0.242 af, Atten= 0%, Lag= 1.0 min
Discarded = 0.15 cfs @ 12.45 hrs, Volume= 0.123 af
Primary = 1.82 cfs @ 12.45 hrs, Volume= 0.119 af
Routed to Reach DP-2 : Design Point 2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Starting Elev= 107.00' Surf.Area= 932 sf Storage= 1,295 cf
Peak Elev= 107.16' @ 12.45 hrs Surf.Area= 984 sf Storage= 1,447 cf (152 cf above start)

Plug-Flow detention time= 57.3 min calculated for 0.211 af (91% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,803 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

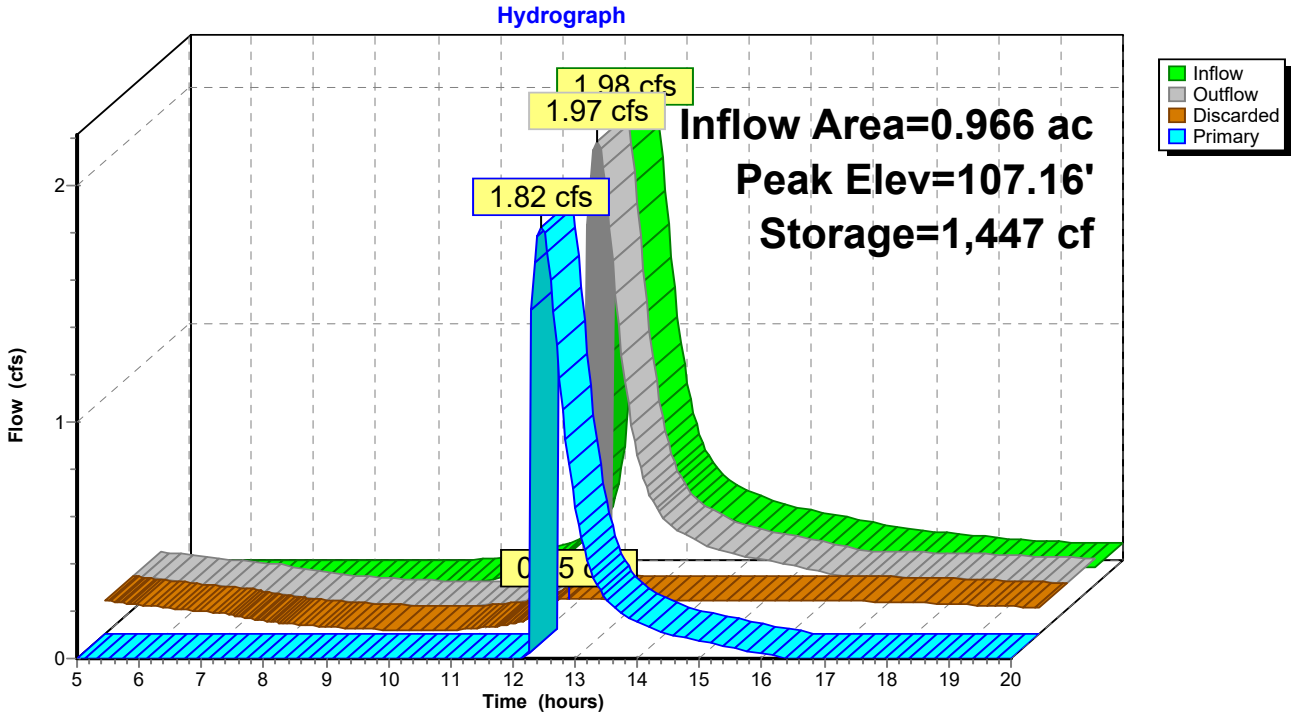
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
105.00	400	0	0	400
107.50	1,100	1,803	1,803	1,139

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**5.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 100.00' Phase-In= 1.00'
#2	Primary	107.00'	**12.0' long + 1.0 '/' SideZ x 4.0' breadth Broad-Crested Rectangular Weir** 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.15 cfs @ 12.45 hrs HW=107.16' (Free Discharge)
1=Exfiltration (Controls 0.15 cfs)

Primary OutFlow Max=1.82 cfs @ 12.45 hrs HW=107.16' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 1.82 cfs @ 0.94 fps)

Pond P-1: Deep Swale Storage



Summary for Pond RA: Pea Stone Resource Area

[92] Warning: Device #2 is above defined storage

Inflow Area = 0.070 ac, 11.48% Impervious, Inflow Depth > 1.28" for 100- year event
Inflow = 0.09 cfs @ 12.11 hrs, Volume= 0.007 af
Outflow = 0.03 cfs @ 12.50 hrs, Volume= 0.007 af, Atten= 64%, Lag= 23.1 min
Discarded = 0.03 cfs @ 12.50 hrs, Volume= 0.007 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 106.05' @ 12.50 hrs Surf.Area= 0.005 ac Storage= 0.001 af

Plug-Flow detention time= 15.6 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 15.0 min (854.2 - 839.2)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	0.004 af	**2.00'W x 50.00'L x 2.00'H Prismatoid Z=1.0** 0.010 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	105.00'	**5.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 100.00' Phase-In= 0.01'
#2	Primary	109.50'	**50.0' long + 1.0 '/' SideZ x 2.0' breadth Broad-Crested Rectangular Weir** 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 12.50 hrs HW=106.04' (Free Discharge)
1=Exfiltration (Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=105.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond RA: Pea Stone Resource Area

