Stormwater Management Report

Matunuck Beach Condos
Located in South Kingstown, RI
Applicant: Douglas Enterprises, LTD
6-22-2021
Revised 2-17-2022
Table of Contents

Executive Summary
RIDEM Appendix A Checklist

1.0 Project Description .................................................................................................................. 1

2.0 Site Conditions .......................................................................................................................... 1
   2.1 Soils ........................................................................................................................................ 1
   2.2 Existing Site Conditions .......................................................................................................... 1
   2.3 Post Site Conditions .............................................................................................................. 2

3.0 Minimum Standards .................................................................................................................. 3
   3.1 Standard 1: LID Site Planning and Design Strategies ........................................................... 3
   3.2 Standard 2: Groundwater Recharge ....................................................................................... 4
   3.3 Standard 3: Water Quality ..................................................................................................... 5
   3.4 Standard 4: Conveyance and Natural Channel Protection .................................................... 6
      3.4.1 Drainage Network Design Parameters ............................................................................ 6
      3.4.2 Channel Protection Volume ............................................................................................. 6
   3.5 Standard 5: Overbank Flood Protection & Downstream Analysis ......................................... 7
      3.5.1 Method of Analysis ......................................................................................................... 7
      3.5.2 Design Storm .................................................................................................................. 7
      3.5.3 Design Point Breakdown ................................................................................................. 7
      3.5.4 $Q_p$ BMP Calculations .................................................................................................. 10
      3.5.6 Overbank Flood Protection Conclusion ......................................................................... 10
   3.6 Standard 6: Redevelopment and Infill Projects .................................................................... 11
   3.7 Standard 7: Pollution Prevention ........................................................................................... 11
   3.8 Standard 8: Land Uses with Higher Potential Pollutant Loads (LUHPPLs) .......................... 11
   3.9 Standard 9: Illicit Discharges ................................................................................................. 11
   3.10 Standard 10: Construction Activity Soil Erosion, Runoff and Sedimentation and Pollution Prevention Control Measure Requirements ........................................................................ 11
   3.11 Standard 11: Stormwater Management System Operation and Maintenance ................... 11

Appendix A ....................................................................................................................................... 12
   A2.1 Soil Evaluations .................................................................................................................... 13
   A3.1 Water Quality HydroCAD Storm Analysis ......................................................................... 33
   A3.2.0 Drainage Network Hydraulic Calculations ....................................................................... 38
   A3.2.1 HydroCAD Node Diagram ............................................................................................... 43
   A3.2.2 HydroCAD 1-Year Storm Analysis .................................................................................. 48
   A3.2.3 HydroCAD 10-Year Storm Analysis ................................................................................ 52
   A3.2.4 HydroCAD 25-Year Storm Analysis ................................................................................ 56
   A3.2.5 HydroCAD 100-Year Storm Analysis .............................................................................. 60
   A3.3 Stormcrete Specifications .................................................................................................... 82

Watershed Maps ............................................................................................................................ 94
Executive Summary

On behalf of the Client, we are submitting drainage calculations for the proposed development at Matunuck Beach Road in South Kingstown, RI. The site is located on Assessors’ Plat 92-2 Lot 56. The site exists today as a vacant lot comprised almost entirely of heavy brush with some grassed areas. The client proposes to construct six new condominium complexes (12 total units) with associated parking areas. The site will consist of a new 20’ private roadway which would allow access from the 12 units to Matunuck Beach Road. The 12 units are proposed to be serviced by private sewer and public water.

The post development stormwater will be treated for water quality using Best Management Practices (BMPs). The Site has been designed to meet the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM).

Post development flows are mitigated and stormwater quality will be improved by the use of an Underground Infiltration System and a series of Stormcrete Precast Porous Concrete Slabs (considered underground infiltration devices). These BMP’s are designed to control runoff for the 1 through 100-year storm events, as well as provide water quality treatment and recharge of stormwater runoff from the proposed development. These will also remove TSS (total suspended solids) generated by the proposed parking areas and access roadway.

This report details how the site will show no net increase in stormwater peak runoff or volume from predevelopment to post development conditions, and how the proposed BMPs will provide water quality treatment for stormwater runoff.

Predevelopment Conditions versus Post Development Conditions for each watershed are summarized below:

<table>
<thead>
<tr>
<th>Subwatershed (design point)</th>
<th>1.2” Peak Flow</th>
<th>1-yr Peak Flow</th>
<th>10-yr Peak Flow</th>
<th>25-yr Peak Flow</th>
<th>100-yr Peak Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>DP-1:</td>
<td>0.01</td>
<td>0.02</td>
<td>0.00</td>
<td>0.04</td>
<td>0.08</td>
</tr>
<tr>
<td>DP-2:</td>
<td>1.16</td>
<td>0.86</td>
<td>0.19</td>
<td>0.00</td>
<td>7.66</td>
</tr>
<tr>
<td>Totals:</td>
<td>1.17</td>
<td>0.88</td>
<td>0.19</td>
<td>0.04</td>
<td>7.74</td>
</tr>
</tbody>
</table>

All flows in cubic feet per second (cfs)

<table>
<thead>
<tr>
<th>Subwatershed (design point)</th>
<th>1.2” Peak Volume</th>
<th>1-yr Peak Volume</th>
<th>10-yr Peak Volume</th>
<th>100-yr Peak Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>DP-1:</td>
<td>0.001</td>
<td>0.002</td>
<td>0.001</td>
<td>0.003</td>
</tr>
<tr>
<td>DP-2:</td>
<td>0.059</td>
<td>0.037</td>
<td>0.027</td>
<td>0.000</td>
</tr>
<tr>
<td>Totals:</td>
<td>0.060</td>
<td>0.039</td>
<td>0.028</td>
<td>0.003</td>
</tr>
</tbody>
</table>

All flows in cubic feet per second (ac-f)
### Subwatershed (design point) 1.2” Peak Flow 1-yr Peak Flow 10-yr Peak Flow 25-yr Peak Flow 100-yr Peak Flow
<table>
<thead>
<tr>
<th>Subwatershed (design point)</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP-3*</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.02</td>
<td>0.35</td>
<td>1.49</td>
<td>0.52</td>
<td>2.50</td>
<td>1.93</td>
<td>4.79</td>
</tr>
<tr>
<td>Totals:</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.02</td>
<td>0.35</td>
<td>1.49</td>
<td>0.52</td>
<td>2.50</td>
<td>1.93</td>
<td>4.79</td>
</tr>
</tbody>
</table>

*Design Point 3 directly discharges towards Potter Pond (RI0010043E-05) which is a tidal body of water greater than 50 acres in surface area. According to Section 3.3.5 of the RISDISM, the Overbank Flood Protection (Qp) criteria for peak flow attenuation of the 10 through 100-year storm events can be waived for sites that discharge to bodies of water greater than 50.0 acres in surface area, along with tidal waters. In this case, the design point has been designed to mitigate stormwater runoff to the maximum extent practicable.
APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME
Matunuck Beach Condominiums

TOWN
South Kingstown

BRIEF PROJECT DESCRIPTION:
The client proposes to construct six new condominium complexes (12 total units) with associated parking areas and roadway.

Stormwater Management Plan (SMP) Elements – Minimum Standards

Note: All stormwater construction projects must submit a Stormwater Management Plan (SMP). However, not every element listed below is required per the RIDEM Stormwater Rules and the RIPDES Construction General Permit (CGP). This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)
☒ Residential ☐ Commercial ☐ Federal ☐ Retrofit ☐ Restoration
☐ Road ☐ Utility ☐ Fill ☐ Dredge ☐ Mine
☐ Other (specify):

SITE INFORMATION
☒ Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.) See Guidance to identify receiving waters.
☒ Groundwater ☒ Surface Water ☐ MS4
☐ GAA ☐ Isolated Wetland ☐ RIDOT
☒ GA ☒ Named Waterbody ☐ RIDOT Alteration Permit is Approved
☐ GB ☐ Unnamed Waterbody Connected to Named Waterbody ☐ Town
☐ Other (specify):

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQv and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.
☐ Groundwater or Disconnected Wetland ☐ SRWP
☒ Waterbody Name: Potter Pond ☐ Coldwater ☐ Warmwater ☒ Unassessed
☒ Waterbody ID: RI0010043E-05 ☐ 4th order stream of pond 50 acres or more
☐ TMDL for: N/A ☐ Watershed of flood prone river (e.g., Pocasset River)
☐ Contributes to a priority outfall listed in the TMDL ☐ Contributes stormwater to a public beach
☐ 303(d) list – Impairment(s) for: ☐ Contributes to shellfishing grounds
## PROJECT HISTORY

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIDEM Pre- Application Meeting</td>
<td>Meeting Date:</td>
</tr>
<tr>
<td>Municipal Master Plan Approval</td>
<td>Approval Date:</td>
</tr>
<tr>
<td>Subdivision Suitability Required</td>
<td>Approval #:</td>
</tr>
<tr>
<td>Previous Enforcement Action has been taken on the property</td>
<td>Enforcement #:</td>
</tr>
</tbody>
</table>

## FLOODPLAIN & FLOODWAY

- Riverine 100-year floodplain: FEMA FLOODPLAIN FIRMETTE has been reviewed and the 100-year floodplain is on site
- Delineated from FEMA Maps

**NOTE:** Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculated by Professional Engineer</td>
<td></td>
</tr>
<tr>
<td>Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain</td>
<td>Amount of Fill (CY):</td>
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## CRMC JURISDICTION

- CRMC Assent required
- Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
- Sea level rise mitigation has been designed into this project

## LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:

### 1. OFFICE OF WASTE MANAGEMENT (OWM)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known or suspected releases of HAZARDOUS MATERIAL are present at the site</td>
<td>RIDEM CONTACT:</td>
</tr>
<tr>
<td>(Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Known or suspected releases of PETROLEUM PRODUCT are present at the site</td>
<td></td>
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<tr>
<td>(Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)</td>
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</table>

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
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<tbody>
<tr>
<td>This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities</td>
<td>SITE ID#:</td>
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**Note:** If any boxes in 1 above are checked, the applicant must contact the RIDEM OWM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to “Red,” “Yellow” or “Green” as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration.

### 2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 “LUHPPLS,” THE SITE IS/HAS:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
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<tbody>
<tr>
<td>Industrial Site with RIPDES MSGP, except where No Exposure Certification exists.</td>
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</tr>
</tbody>
</table>

- Auto Fueling Facility (e.g., gas station)
- Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area
| ☐ Road Salt Storage and Loading Areas (exposed to rainwater) |
| ☐ Outdoor Storage and Loading/Unloading of Hazardous Substances |

### 3. STORMWATER INDUSTRIAL PERMITTING

- ☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)  
  **Activities:**  
  **Sector:**  
  **MSGP permit #:**

- ☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.

- ☐ Additional stormwater treatment is required by the MSGP  
  **Explain:**

### REDEVELOPMENT STANDARD – MINIMUM STANDARD 6

- ☒ Pre Construction Impervious Area  
  - ☒ Total Pre-Construction Impervious Area (TIA) 0.001ac  
  - ☒ Total Site Area (TSA) 2.315 acres  
  - ☒ Jurisdictional Wetlands (JW) 0  
  - ☐ Conservation Land (CL) 0  

- ☒ Calculate the Site Size (defined as contiguous properties under same ownership)  
  - ☒ Site Size (SS) = (TSA) – (JW) – (CL) 2.315 acres  
  - ☒ (TIA) / (SS) = 0  
  - ☐ (TIA) / (SS) > 0.4?  

- ☐ YES, Redevelopment

### PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

**(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)**

This section may be deleted if not required.

**Note:** A written description must be provided specifying why each method is not being used or is not applicable at the Site. Appropriate answers may include:

- Town requires … (state the specific local requirement)
- Meets Town’s dimensional requirement of …
- Not practical for site because …
- Applying for waiver/variance to achieve this (pending/approved/denied)
- Applying for waiver/variance to seek relief from this (pending/approved/denied)

#### A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS

- ☒ Sensitive resource areas and site constraints are identified (required)
- ☒ Local development regulations have been reviewed (required)
- ☒ All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction
- ☐ Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. **Note:** If Conservation Development has been used, check box and skip to Subpart C
- ☒ As much natural vegetation and pre-development hydrology as possible has been maintained

**IF NOT IMPLEMENTED, EXPLAIN HERE**
### B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS

- Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies.
- Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B).
- Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA’s).
- Development sites and building envelopes have been positioned outside of floodplains.
- Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features.
- Development sites and building envelopes have been located to minimize impacts to steep slopes (≥15%).
- Other (describe):

### C) MINIMIZE CLEARING AND GRADING

- Site clearing has been restricted to minimum area needed for building footprints, development activities, construction access, and safety.
- Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities).
- Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s).
- Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent.

### D) REDUCE IMPERVIOUS COVER

- Reduced roadway widths (≤22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000).
- Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface).
- Reduced building footprint: Explain approach:

- Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface)
- Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around)
- Reduced parking lot area: Explain approach
- Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc.
- Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance)
- Other (describe):

### E) DISCONNECT IMPERVIOUS AREA

- Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible.
- Residential street edges allow side-of-the-road drainage into vegetated open swales.
- Parking lot landscaping breaks up impervious expanse AND accepts runoff.
- Other (describe):

### F) MITIGATE RUNOFF AT THE POINT OF GENERATION

- Small-scale BMPs have been designated to treat runoff as close as possible to the source.
APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST

Updated 12/2019

G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION
☐ Low-maintenance landscaping has been proposed using native species and cultivars
☐ Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan
☒ Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots

H) RESTORE STREAMS/WETLANDS
☐ Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands
☐ Removal of invasive species
☒ Other

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td></td>
</tr>
</tbody>
</table>

The project has been designed to meet the groundwater recharge standard.

If “No,” the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);

Your waiver request has been explained in the Narrative, if applicable.

☐ ☒ Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPLP Identification?

If “Yes,” has approval for infiltration by the Office of Waste Management Site Project Manager, per Part 1, Minimum Standard 8, been requested?

| TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2) |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Design Point | Impervious Area Treated (sq ft) | Total Re, Required (cu ft) | LID Stormwater Credits (see RISDISM Section 4.6.1) | Recharge Required by Remaining BMPs (cu ft) | Recharge Provided by BMPs (cu ft) |
| DP-1: | 0 | 0 | N/A | 0 | 0 |
| DP-2: | 25,308 | 1,265 | N/A | 1,265 | 2,047 |
| DP-3: | 14,898 | 745 | N/A | 745 | 1,873 |
| TOTALS: | 40,206 | 2,010 | N/A | 2,010 | 3,920 |

Notes:
1. Only BMPs listed in RISDISM Table 3-5 “List of BMPs Acceptable for Recharge” may be used to meet the recharge requirement.
2. Recharge requirement must be satisfied for each waterbody ID.

☒ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

Stormwater Report
## WATER QUALITY – MINIMUM STANDARD 3

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>
| ☒   | ☐  | Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
| ☒   | ☐  | Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
| ☒   | ☐  | If “Yes,” either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
| ☐   | ☐  | If “Yes,” either TR-55 or TR-20 was used to calculate WQv; and,
| ☐   | ☐  | If “No,” the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
| ☐   | ☐  | Not Applicable
| ☒   | ☐  | Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?

- ☒  Does this project propose an increase of impervious cover to a receiving water body with impairments?
  - If “Yes,” please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.

| ☐   | ☒  | RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
| ☒   | ☐  | The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
| ☐   | ☒  | BMPs are proposed that are on the approved technology list. If “Yes,” please provide all required worksheets from the manufacturer.
| ☐   | ☒  | Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements.
  - If “Yes,” please describe:

### TABLE 3-1: Summary of Water Quality (see RICR 8.9)

<table>
<thead>
<tr>
<th>Design Point and WB ID</th>
<th>Impervious area treated (sq ft)</th>
<th>Total WQv Required (cu ft)</th>
<th>LID Stormwater Credits (see RICR 8.18)</th>
<th>Water Quality Treatment Remaining (cu ft)</th>
<th>Water Quality Provided by BMPs (cu ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP-1:</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DP-2:</td>
<td>25,308</td>
<td>2,109</td>
<td>N/A</td>
<td>2,109</td>
<td>2,047*</td>
</tr>
<tr>
<td>DP-3:</td>
<td>14,898</td>
<td>1,242</td>
<td>N/A</td>
<td>1,242</td>
<td>1,873</td>
</tr>
<tr>
<td>TOTALS:</td>
<td>40,206</td>
<td>3,144</td>
<td>N/A</td>
<td>3,351</td>
<td>3,920</td>
</tr>
</tbody>
</table>

Notes:
1. Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
2. For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

- ☒  YES
  - This project has met the setback requirements for each BMP.
- ☐  NO
  - If “No,” please explain:

  ☒  Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):
  - Stormwater Report

*rounding in HydroCAD. 100% of impervious areas are directed to a water quality BMP and fully treated/ infiltrated.
CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☒</td>
</tr>
</tbody>
</table>

Is this standard waived? If “Yes,” please indicate one or more of the reasons below:

☒ The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.

☐ The project directs is a small facility with impervious cover of less than or equal to 1 acre.

☐ The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).

☒ ☐ Conveyance and natural channel protection for the site have been met.

☐ If “No,” explain why:

<table>
<thead>
<tr>
<th>Design Point</th>
<th>Receiving Water Body Name</th>
<th>Coldwater Fishery? (Y/N)</th>
<th>Total CPv Required (cu ft)</th>
<th>Total CPv Provided (cu ft)</th>
<th>Average Release Rate Modeled in the 1-yr storm (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP-3:</td>
<td>Potter Pond</td>
<td>N</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

TOTALS:

Note: The Channel Protection Volume Standard must be met in each waterbody ID.

The site has been designed to fully infiltrate the channel protection volume

☐ YES

☐ NO

The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM).

☐ YES

☐ NO

Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If “Yes,” please indicate restrictions and solutions below.

☒ Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

1-year storm event HydroCAD Analysis in the Stormwater Report
### OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

Is this standard waived? If yes, please indicate one or more of the reasons below:

- ☒ The project directs discharge to a large river (i.e., 4th-order stream or larger). See Appendix I for statewide list and map of stream orders, bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
- ☐ A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).

| ☐   | ☒  |

Does the project flow to an MS4 system or subject to other stormwater requirements?

If “Yes,” indicate as follows:

- ☐ RIDOT
- ☐ Other (specify):

**Note:** The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT’s regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.

Indicate below which model was used for your analysis.

- ☐ TR-55
- ☐ TR-20
- ☒ HydroCAD
- ☐ Bentley/Haestad
- ☐ Intellisolve
- ☐ Other (Specify):

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If “No,” please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):

| ☒   | ☐  |

Do off-site areas contribute to the sub-watersheds and design points? If “Yes,”

- ☒ Are the areas modeled as “present condition” for both pre- and post-development analysis?
- ☒ Are the off-site areas shown on the subwatershed maps?

| ☒   | ☐  |

Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?

| ☒   | ☐  |

Calculate the following:

- ☒ Area of disturbance within the sub-watershed (areas) 2.315 acres
- ☒ Impervious cover (%) 44

| ☐   | ☒  |

Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?

| ☒   | ☐  |

Does this project meet the overbank flood protection standard?
Table 5-1 Hydraulic Analysis Summary

<table>
<thead>
<tr>
<th>Subwatershed (Design Point)</th>
<th>1.2” Peak Flow (cfs) **</th>
<th>1-yr Peak Flow (cfs)</th>
<th>10-yr Peak Flow (cfs)</th>
<th>100-yr Peak Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre (cfs)</td>
<td>Post (cfs)</td>
<td>Pre (cfs)</td>
<td>Post (cfs)</td>
</tr>
<tr>
<td>DP-1:</td>
<td>0.01</td>
<td>0.02</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>DP-2:</td>
<td>1.16</td>
<td>0.86</td>
<td>0.19</td>
<td>0.00</td>
</tr>
<tr>
<td>DP-3:*</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>TOTALS:</td>
<td>1.26</td>
<td>0.97</td>
<td>0.28</td>
<td>0.06</td>
</tr>
</tbody>
</table>

* Design Point 3 directly discharges towards Potter Pond (RI0010043E-05) which is a tidal body of water greater than 50 acres in surface area. According to Section 3.3.5 of the RISDISM, the Overbank Flood Protection (Qp) criteria for peak flow attenuation of the 10 through 100 year storm events can be waived for sites that discharge to bodies of water greater than 50.0 acres in surface area, along with tidal waters. In this case, the design point has been designed to mitigate stormwater runoff to the maximum extent practicable.

** Utilize modified curve number method or split pervious /impervious method in HydroCAD.

Note: The hydraulic analysis must demonstrate no impact to each individual subwatershed DP unless each DP discharges to the same wetland or water resource.

<table>
<thead>
<tr>
<th>Indicate as follows where the pertinent calculations and/or information for the items above are provided</th>
<th>Name of report/document, page numbers, appendices, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.</td>
<td>Stormwater Report</td>
</tr>
<tr>
<td>Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.</td>
<td>Stormwater Report</td>
</tr>
<tr>
<td>Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.</td>
<td>Stormwater Report</td>
</tr>
<tr>
<td>Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).</td>
<td>Stormwater Report</td>
</tr>
</tbody>
</table>

Table 5-2 Summary of Best Management Practices

<table>
<thead>
<tr>
<th>BMP ID</th>
<th>DP #</th>
<th>BMP Type (e.g., bioretention, tree filter)</th>
<th>BMP Functions</th>
<th>Bypass Type</th>
<th>Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4</th>
<th>Distance Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre-Treatment (Y/N/NA)</td>
<td>Rev</td>
<td>WQv</td>
<td>CPv (Y/N/NA)</td>
</tr>
<tr>
<td>Stormcrete A</td>
<td>2</td>
<td>Permeable Pavement</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>Stormcrete B</td>
<td>3</td>
<td>Permeable Pavement</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>QP UIS</td>
<td>2</td>
<td>Underground Infiltration</td>
<td>Y</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>WQ Stormtech</td>
<td>2</td>
<td>Underground Infiltration</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N/A</td>
</tr>
<tr>
<td>TOTALS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5.3 Summary of Soils to Evaluate Each BMP

<table>
<thead>
<tr>
<th>DP #</th>
<th>BMP ID</th>
<th>BMP Type (e.g., bioretention, tree filter)</th>
<th>Soils Analysis for Each BMP</th>
<th>Exfiltration Rate Applied (in/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Test Pit ID# and Ground Elevation</td>
<td>SHWT Elevation (ft)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Primary</td>
<td>Secondary</td>
</tr>
<tr>
<td>Stormcrete A</td>
<td>2</td>
<td>Permeable Pavement</td>
<td>TH-1 TH-101</td>
<td>4.00</td>
</tr>
<tr>
<td>Stormcrete B</td>
<td>3</td>
<td>Permeable Pavement</td>
<td>TH-109 TH-109A</td>
<td>4.00</td>
</tr>
<tr>
<td>QP UIS</td>
<td>2</td>
<td>Underground Infiltration</td>
<td>TH-103 TH-104</td>
<td>0.50</td>
</tr>
<tr>
<td>WQ Stormtech</td>
<td>2</td>
<td>Underground Infiltration</td>
<td>TH-104 TH-21-11</td>
<td>2.00</td>
</tr>
<tr>
<td>TOTALS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For underground infiltration systems (UIS) bottom equals bottom of stone, for surface infiltration basins bottom equals bottom of basin, for filters bottom equals interface of storage and top of filter layer.

LAND USES WITH HIGHER POTENTIAL POLLUTANTS LOADS (LUHPPLs) – MINIMUM STANDARD 8

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.</td>
</tr>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Are these activities already covered under an MSGP? If “No,” please explain if you have applied for an MSGP or intend to do so?</td>
</tr>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>List the specific BMPs that are proposed for this project that receive stormwater from LUHPPL drainage areas. These BMP types must be listed in RISDISM Table 3-3, “Acceptable BMPs for Use at LUHPPLs.” Please list BMPs:</td>
</tr>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Additional BMPs, or additional pretreatment BMP’s if any, that meet RIPDES MSGP requirements; Please list BMPs:</td>
</tr>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).</td>
</tr>
</tbody>
</table>

ILlicit DISChARGES – MINIMUM STANDARD 9

Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>☐</td>
<td>☐</td>
<td>Have you checked for illicit discharges?</td>
</tr>
</tbody>
</table>
| ☐   | ☒  | ☐  | Have any been found and/or corrected? If “Yes,” please identify.
| ☐ | ☐ | ☒ | Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

### SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

If “No,” include a document with your submittal that addresses the following elements of an SESC Plan:

- ☐ Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
- ☐ Provide Natural Buffers and Maintain Existing Vegetation
- ☐ Minimize Area of Disturbance
- ☐ Minimize the Disturbance of Steep Slopes
- ☐ Preserve Topsoil
- ☐ Stabilize Soils
- ☐ Protect Storm Drain Inlets
- ☐ Protect Storm Drain Outlets
- ☐ Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
- ☐ Establish Perimeter Controls and Sediment Barriers
- ☐ Divert or Manage Run-On from Up-Gradient Areas
- ☐ Properly Design Constructed Stormwater Conveyance Channels
- ☐ Retain Sediment On-Site
- ☐ Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
- ☐ Apply Construction Activity Pollution Prevention Control Measures
- ☐ Install, Inspect, and Maintain Control Measures and Take Corrective Actions
- ☐ Qualified SESC Plan Preparer’s Information and Certification
- ☐ Operator’s Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
- ☐ Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

### STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9

**Operation and Maintenance Section**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒</td>
<td>☐</td>
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<tr>
<td>☒</td>
<td>☐</td>
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<td>☒</td>
<td>☐</td>
</tr>
</tbody>
</table>

| ☒   | ☐  | Is the property owner or homeowner’s association responsible for the stormwater maintenance of all BMP’s? If “No,” you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.). |

| ☐   | ☒  | Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). |
If “Yes,” have you obtained them? Or please explain your plan to obtain them:

- Is stormwater being directed from public areas to private property? If “Yes,” note the following:
  
  **Note:** This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.

**Pollution Prevention Section**

- Designated snow stockpile locations?
- Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
- Asphalt-only based sealants?
- Pet waste stations? (Note: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
- Regular sweeping? Please describe:
  
  Please see Operations & Maintenance Manual prepared by DiPrete Engineering

- De-icing specifications, in accordance with RIS DISM Appendix G. (NOTE: If the groundwater is GAA, or this area contributes to a drinking water supply, then this could be an important part of your pollution prevention plan).
- A prohibition of phosphate-based fertilizers? (Note: If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

**PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS**

**Existing and Proposed Subwatershed Mapping (REQUIRED)**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>
| ☒   | ☐  | Existing and proposed drainage area delineations
| ☒   | ☐  | Locations of all streams and drainage swales
| ☒   | ☐  | Drainage flow paths, mapped according to the DEM **Guidance for Preparation of Drainage Area Maps** (included in RIS DISM Appendix K)
| ☒   | ☐  | Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
| ☒   | ☐  | Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
| ☒   | ☐  | Mapped seasonal high-water-table test pit locations
| ☒   | ☐  | Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
| ☒   | ☐  | Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
| ☒   | ☐  | Mapped bedrock outcrops adjacent to any infiltration BMP
| ☐   | ☒  | Soils were logged by:

  - ☒ DEM-licensed Class IV soil evaluator
    
    Name: Christian Sutter, License Number D-4077
  
  - ☐ RI-registered P.E.
    
    Name:

**Subwatershed and Impervious Area Summary**

<table>
<thead>
<tr>
<th>Subwatershed (area to each design point)</th>
<th>First Receiving Water ID or MS4</th>
<th>Area Disturbed (units)</th>
<th>Existing Impervious (units)</th>
<th>Proposed Impervious (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP-1:</td>
<td>N/A</td>
<td>0.024 ac</td>
<td>0.001 ac</td>
<td>0.007 ac</td>
</tr>
<tr>
<td>DP-2:</td>
<td>N/A</td>
<td>1.627 ac</td>
<td>0 ac</td>
<td>0.581 ac</td>
</tr>
<tr>
<td>DP-3:</td>
<td>Potter Pond (WBIP RI0010043E-05)</td>
<td>0.655 ac</td>
<td>0 ac</td>
<td>0.342 ac</td>
</tr>
</tbody>
</table>
### APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST

**Updated 12/2019**

<table>
<thead>
<tr>
<th></th>
<th>2.306 ac</th>
<th>0.001 ac</th>
<th>0.940 ac</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTALS:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Site Construction Plans (Indicate that the following applicable specifications are provided)

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>
1.0 Project Description

The purpose of this report is to specify a Stormwater Management System to be implemented in the new Matunuck Beach Condos on Matunuck Beach Road. The site totals 4.77 acres located on Assessor’s Plat 92.2, Lot 56 in South Kingstown, Rhode Island. Of the total 4.77 acres, only 2.29 acres are within the proposed limit of disturbance. To the North and South of the site are existing residential developments. Matunuck Beach Road borders the West portion of the site, and the Wetland/Salt Marsh to Potter Pond (WBIP R10010043E-05) is to the East of the site. The proposed development will consist of six condominium complexes (12 total units) with associated roadways, parking, and utilities. The site will be serviced by public water and private sewer.

The stormwater quality will be improved by utilizing Best Management Practices (BMPs) as established by the RISDISM for the treatment and recharge of stormwater runoff from the proposed development. BMPs will consist of an Underground Infiltration System and a series of Stormcrete Precast Porous Concrete Slabs (considered underground infiltration devices) located within select parking areas. The site has been designed to meet the RIDEM Stormwater Design and Installations Standards Manual.

2.0 Site Conditions

2.1 SOILS
There are the following soil types within the analyzed area of the Site as mapped by the NRCS USDA Soil Conservation service:

<table>
<thead>
<tr>
<th>Soil Symbol</th>
<th>Description</th>
<th>Hydrologic Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>BhB</td>
<td>Bridgehampton silt loam, 3 to 8 percent slopes</td>
<td>B</td>
</tr>
<tr>
<td>FtA</td>
<td>Fortress sand</td>
<td>A</td>
</tr>
<tr>
<td>MU</td>
<td>Merrimac-Urban land complex</td>
<td>A</td>
</tr>
<tr>
<td>Mk</td>
<td>Matunuck mucky peat, 0 to 2 percent slopes</td>
<td>A</td>
</tr>
</tbody>
</table>

The onsite soils are MU (Merrimac-Urban land complex) and FtA (Fortress Sand) which are both Hydrologic Group A. Soils surrounding the site include Bhb and Mk. Hydrologic Group A has been used for modeling the site.

Site specific soil evaluations can be found in Appendix A2.1.

2.2 EXISTING SITE CONDITIONS

Currently the site is predominately heavy brush and grass. There are residential developments to the North and South of the site. To the West is Matunuck Beach Road and to the East is an existing Wetland/Salt Marsh to Potter Pond. All stormwater currently flows overland via sheet flow to three design points: to Matunuck Beach Road, to the Southwestern property line, and to the Wetlands/Salt Marsh to the East. None of the stormwater on site is currently treated for water quality, stormwater recharge or mitigation before being discharged.
2.3 POST SITE CONDITIONS

The water quality and stormwater recharge volume as established by the RISDISM for the treatment of stormwater runoff will be provided by utilizing BMP’s. The BMP’s on site will consist of an Underground Infiltration Chamber and a series of Stormcrete Precast Porous Concrete Slabs (considered underground infiltration devices). Refer to Appendix A3.2.1 for a detailed breakdown of the areas.

The proposed drainage analysis uses stormwater management systems to control and treat runoff from the proposed development. The following BMP’s are used on site and have been designed to include the following elements:

- Precast Porous Concrete Slabs (underground infiltration chambers)
  - Extremely high stormwater intake rate of 250 in/hr
  - Infiltrates the water quality storm event and larger storm events where shown
  - Provides stormwater recharge
  - Washed crushed stone reservoir course
  - Setback to building foundation of 10’ met (20’ minimum provided)

- Underground Infiltration System (Stormtech chambers)
  - Infiltrates the water quality storm event
  - Provides stormwater recharge
  - Setback to OWTS of 25’ met (56.9’ provided)

- Underground Infiltration System (Pipe Chambers)
  - 48” perforated pipes in stone surrounds
  - Infiltrates the 1 year storm event and larger storm events where shown
  - Provides peak mitigation
  - Setback to property line of 10’ met (21’ minimum provided)

The above elements will be used to meet the design standards of the Rhode Island Stormwater Design and Installation Standard. By reducing post development stormwater flow rate to a level no greater than the predevelopment rate, the goal of the proposed drainage system is achieved. Any potential impacts from the proposed development on the abutting properties and wetland areas have been mitigated.
3.0 Minimum Standards

The site has been designed to meet the minimum standards as outlined in the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM). The following sections outline how the site meets and exceeds the minimum required standards.

3.1 Minimum Standard 1: LID Site Planning and Design Strategies

See “Appendix A: Stormwater Management Checklist” from the RISDISM provided at the beginning of this report.
3.2 Minimum Standard 2: Groundwater Recharge

Groundwater is to be recharged per watershed based on impervious area coverage in accordance with section 3.2.2 of the RISDISM.

Groundwater recharge is determined from the following equation:

\[ R_{e} = \frac{1}{12} F I \]

Where:

- \( R_{e} \) = Groundwater Recharge Volume (cf)
- \( F \) = Recharge Factor based on Hydrologic Soil Groups (HSG) (see table below)
- \( I \) = Impervious Area (sf)

<table>
<thead>
<tr>
<th>HSG</th>
<th>Recharge Factor (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.60</td>
</tr>
<tr>
<td>B</td>
<td>0.35</td>
</tr>
<tr>
<td>C</td>
<td>0.25</td>
</tr>
<tr>
<td>D</td>
<td>0.10</td>
</tr>
</tbody>
</table>

See Table 2-1 of the Appendix A checklist for a summary of recharge values.

The required recharge volume is based on all impervious area on site, not just areas which are captured in the proposed BMPs.

See Appendix A3.1 for the water quality storm HydroCAD analysis. The water quality storm is calculated in HydroCAD using the ‘calculate separate Pervious/Impervious runoff’ option.
3.3 Minimum Standard 3: Water Quality
All stormwater is treated through an approved BMP before being discharged. This site has been
designed to use Stormtech Underground Infiltration Chambers and a series of Stormcrete Precast
Porous Concrete Slabs to treat stormwater before being infiltrated. There are no pollutant-specific
requirements and/or pollutant removal efficiencies applicable to the site as the result of SAMP, TMDL,
or other watershed-specific requirements. See Table 3-1 of the Appendix A Checklist for a detailed
summary of the water quality calculations.

The site has been designed to meet the water quality requirements through the use of a Stormtech
Underground Infiltration System and a series of Stormcrete Precast Porous Concrete Slabs (considered
underground infiltration devices) located within parking areas on site. The Stormcrete system consists of
a 6” porous concrete slab capable of a minimum average infiltration rate of 250 in/hr, followed by a 2”
washed crushed stone leveling course layer, and a washed crushed stone reservoir course layer.
According to Stormcrete specifications the porous concrete slabs have a void ratio of 15-25%, so a 20%
void ratio has been used in HydroCAD when modeling the Stormcrete Layer. Treatment System A has
been sized to fully capture and infiltrate up to the 25-yr storm, with the 100-yr storm having minimal
bypass, and Treatment System B has been designed to meet the water quality and recharge
requirements, but the overbank flood protection (Qp) criteria for peak flow attenuation of the 10
through 100-year storm events can be waived as Design Point 3 discharges to Potter Pond (>50 acres)
per Section 3.3.5 of the RISDISM. Treatment System B has been designed to mitigate stormwater runoff
to the maximum extent practicable. Refer to Appendix A3.1 for the water quality storm HydroCAD
results and Appendix A3.3 for additional Stormcrete specifications.

Stormcrete slabs are generally 4.0’ in width and 5’ in length and placed within parking areas to limit
trafficability and promote longevity. Stormcrete also comes in 2.0’ widths which is ideal for use as a
“run-on row” for first flush runoff:

Run-on Row
In all systems, the first row of Stormcrete has been designed as a “run-on row”. This row will be exposed
to the majority of sediment from the first flush of stormwater runoff, and therefore is most likely to be
the first part of the system to reduce in performance. Even though the remainder of the system is still
more than capable of capturing the WQ storm with a fully clogged run-on row, the row has specifically
been designed as a reduced width of 2’ (as opposed to the standard 4’ width) to facilitate easier
removal/ replacement if required over time. Furthermore, the site has been designed to promote sheet
flow onto the Stormcrete where practicable, to further reduce the potential for clogging and reduce
maintenance.
3.4 Minimum Standard 4: Conveyance and Natural Channel Protection

3.4.1 Drainage Network Design Parameters:

A. PIPES
   - All drainage pipes are HDPE or equivalent unless otherwise noted.
   - Manning’s coefficient = 0.012 for HDPE Pipe
   - Diameters & lengths as specified
   - The 100-year design storm is utilized for the drainage pipe design
   - The rational method has been used for the closed drainage system.

B. STRUCTURES
   - Manholes – Pre-cast concrete with inverts as specified.
   - Catch Basins – Pre-cast concrete with inverts and Grates as specified.

3.4.2 Channel Protection Volume:
The site has been designed to fully infiltrate the channel protection volume. The channel protection requirement has been met.
See table 4-1 of the Appendix A Checklist for a Summary of Channel Protection Volumes. See Appendix A3.2.2 for the 1-year storm event HydroCAD analysis.
3.5 Minimum Standard 5: Overbank Flood Protection & Downstream Analysis

3.5.1 Method of Analysis
USDA Soil Conservation Service Method as defined by Technical Release No. 20 (TR-20) determines Stormwater runoff rate and volume. Type III rainfall distribution is utilized. Time of concentration is determined using Technical Release No 55 (TR-55) methodology, through the computer program HydroCAD ver. 10.0 by HydroCAD Software Solutions LLC.

Soil evaluations have been performed by DiPrete Engineering. The existing soil has a texture of Sand, Sandy Loam, Loamy Sand and Silt. All infiltration areas have been modeled in HydroCAD with an 8.27 in/hr infiltration rate per table 5-3 in section 5.3.4 of the RISDISM. Where native soil has an infiltration rate less than that of sand in the infiltration areas, native soil is to be excavated and filled with ASTM 33 sand or equivalent material to meet the infiltration rate of 8.27 in/hr for all infiltration areas.

The drainage systems have been designed to mitigate all stormwater flows for the 1 through 100-year storm events. Any emergency/overflow outlets have been sized to handle the 100-year storm event.

3.5.2 Design Storm
Analysis of 1-year, 10-year, 25-year, and 100-year frequency storms are included. The following 24-hour rainfall intensities are obtained from the Rhode Island Stormwater Design and Installation Standards Manual, Table 3-1 for Washington County.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Rainfall Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>2.8 inches</td>
</tr>
<tr>
<td>10 year</td>
<td>4.9 inches</td>
</tr>
<tr>
<td>25 year</td>
<td>6.1 inches</td>
</tr>
<tr>
<td>100 year</td>
<td>8.5 inches</td>
</tr>
</tbody>
</table>

3.5.3 Design Point Breakdown
The site is analyzed as 3 watershed areas. In the pre-development stage there are 6 subcatchments. In the post-development stage there are 7 subcatchments. A description of each watershed and associated subcatchments are summarized as follows, for cover types see color watershed maps located in back of this report. Numbers in parentheses () indicate the HydroCAD Node Number.

**Design Point 1:**
Watershed #1 flows to Design Point-1 (DP-1 Matunuck Beach Road). This watershed consists of the Western portion of the site that goes to Matunuck Beach Road.

In pre-development conditions there is only one subcatchment to Design Point-1. WPre-10 (10) consists of approximately 0.08 acres at the Western side of the site that flows directly to Design Point-1. Stormwater reaches DP-1 (11) by overland sheet flow.

In post development conditions there is only one subcatchment to Design Point-1. WPost-101 (101) consists of a small area on the Western side of the site where stormwater continues to flow overland by sheet flow to Design Point-1 as it did in the pre-development conditions.

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point-1.
### Design Point 2:

Watershed #2 flows to Design Point- 2 (DP-2 SW Property Line). This watershed consists of the central portion of the site and a portion of the Northern neighboring residential lot where stormwater flows to the Southwestern property line of the proposed site. Stormwater within this watershed travels via overland flow to existing low points offsite and onsite, ultimately discharging to the design point. The design point is the lowest region of the Southwestern property where there is no vegetated berm inhibiting the offsite discharge. In pre-development conditions there are three subcatchments to Design Point-2.

WPre-20 (20) primarily consists of the upstream neighboring lot which discharges stormwater via overland flow to an existing low point (21). This existing low point overflows into an adjacent low point (21a) before ultimately discharging to Design Point-2 (DP-2 SW Property Line).

WPre-20a (20a) primarily consists of upstream neighboring lot areas and a portion of onsite area, which flow via overland flow to an existing low point (21a). This existing low point discharges directly to Design Point-2 (DP-2 SW Property Line).

WPre-22 (22) consists stormwater runoff from the Southwestern area of the site that flows to DP-2 via overland flow.

In post development conditions, there are 4 subcatchments:

WPost-201 (201) is similar to WPre-20 (20) in that it primarily consists of the upstream neighboring lot which discharges stormwater via overland flow to an existing low point (202). Since the existing low point extends into the proposed lot, expansion of the existing low point is proposed (202). Stormwater is discharged to Design Point-2 via outlet control drainage structures.

WPost-203 (203) represents the Western portion of the site where overland stormwater runoff flows via sheet flow and is infiltrated by the proposed Stormcrete Precast Porous Concrete in the proposed parking area (204).

WPost-205 (205) represents stormwater runoff from then central portion of the site that is directed to proposed underground infiltration systems (206, 207) via an underground drainage network. The infiltration systems infiltrate all storms except the 100-yr storm, a portion of which is bypassed to Design Point-2 via an outlet control structure.

WPost-208 (208) represents stormwater runoff from the Southwestern area of the site that is directed to Design Point-2 via the existing berm/ grade of the site.

<table>
<thead>
<tr>
<th></th>
<th>Area (acres)</th>
<th>CN</th>
<th>Tc (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPre-10</td>
<td>0.084</td>
<td>56</td>
<td>6.0</td>
</tr>
<tr>
<td>WPost-101</td>
<td>0.050</td>
<td>74</td>
<td>6.0</td>
</tr>
</tbody>
</table>
Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point-2.

<table>
<thead>
<tr>
<th>Area (acres)</th>
<th>CN</th>
<th>Tc (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPre-20</td>
<td>8.049</td>
<td>63</td>
</tr>
<tr>
<td>WPre-20a</td>
<td>1.317</td>
<td>43</td>
</tr>
<tr>
<td>WPost-201</td>
<td>9.014</td>
<td>61</td>
</tr>
<tr>
<td>WPost-203</td>
<td>0.337</td>
<td>78</td>
</tr>
<tr>
<td>WPost-205</td>
<td>0.732</td>
<td>71</td>
</tr>
<tr>
<td>WPost-208</td>
<td>0.260</td>
<td>39</td>
</tr>
</tbody>
</table>

**Design Point 3:**
Watershed #3 flows to Design Point-3 (DP-3 Wetlands/Salt Marsh). This watershed consists of the Eastern portion of the site that goes to the existing Wetlands/Salt Marsh to Potter Pond on the East side of the site.

In pre-development conditions there are two subcatchment to Design Point-3.

WPre-30 (30) consists of the Eastern area of the site and the Eastern area of the neighboring lot to the North which stormwater runoff flows via overland sheet flow to an existing low point on the proposed site. This existing low point outlets to Design Point-3 in higher event storms.

WPre-32 (32) represents the Eastern area of the site that stormwater runoff flows directly to Design Point-3 (DP-3 Wetlands/Salt Marsh).

In post development conditions, there are 2 subcatchments:

WPost-301 (301) represents the Eastern portion of the site where stormwater runoff flows overland and is infiltrated by the proposed Stormcrete Precast Porous Concrete in the proposed parking area.

WPost-305 (305) consists of stormwater runoff that continues to flow overland directly to Design Point-3.

Below is a summary of the hydrologic parameters for the pre and post development sub-areas in Design Point-3.

<table>
<thead>
<tr>
<th>Area (acres)</th>
<th>CN</th>
<th>Tc (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPre-30</td>
<td>1.327</td>
<td>44</td>
</tr>
<tr>
<td>WPre-32</td>
<td>0.161</td>
<td>69</td>
</tr>
<tr>
<td>WPost-301</td>
<td>1.273</td>
<td>63</td>
</tr>
<tr>
<td>WPost-305</td>
<td>0.277</td>
<td>57</td>
</tr>
</tbody>
</table>
3.5.4 Qp BMP Calculations
Mitigated stormwater is discharged to Design Point 2 via a level spreader. The level spreader has been included in the HydroCAD model. The results demonstrate that all design storms are discharged at non erosive velocities (<3fps). See Appendix A3 for detailed calculations. Mitigated stormwater is discharged to Design Point 3 via overland flow. The results demonstrate that all design storms are discharged at non erosive velocities (<3fps). See Appendix A3 for detailed calculations.

It should also be noted that the proposed discharge velocities are less than the corresponding existing discharge velocities at both design points.

3.5.6 Overbank Flood Protection Conclusion
The tables below presents a summary of the pre development flows vs. the mitigated post development flows.

Pre Development Flows vs. Post Development Flows Mitigated Watershed #1: (DL-1)Watershed #1: (DP-1)

<table>
<thead>
<tr>
<th>Subwatershed (design point)</th>
<th>1.2&quot; Peak Flow</th>
<th>1-yr Peak Flow</th>
<th>10-yr Peak Flow</th>
<th>100-yr Peak Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>DP-1:</td>
<td>0.01</td>
<td>0.02</td>
<td>0.00</td>
<td>0.04</td>
</tr>
<tr>
<td>DP-2:</td>
<td>1.16</td>
<td>0.86</td>
<td>0.19</td>
<td>0.00</td>
</tr>
<tr>
<td>DP-3*:</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>Totals:</td>
<td>1.26</td>
<td>0.97</td>
<td>0.28</td>
<td>0.06</td>
</tr>
</tbody>
</table>

All flows in cubic feet per second (cfs)

There are minor increases to Design Point one 1 associated with a new driveway the must be pitched toward Matunuck Beach Road to maintain stormwater flow parameters at the entry, but the proposed road profile has been designed as conservatively as possible to minimize the impacts and the resultant increases are considered negligible.

*Design Point 3 directly discharges towards Potter Pond (RI0010043E-05) which is a tidal body of water greater than 50 acres in surface area. According to Section 3.3.5 of the RISDISM, the Overbank Flood Protection (Qp) criteria for peak flow attenuation of the 10 through 100 year storm events can be waived for sites that discharge to bodies of water greater than 50.0 acres in surface area, along with tidal waters. In this case, the design point has been designed to mitigate stormwater runoff to the maximum extent practicable.

<table>
<thead>
<tr>
<th>Subwatershed (design point)</th>
<th>1.2&quot; Peak Volume</th>
<th>1-yr Peak Volume</th>
<th>10-yr Peak Volume</th>
<th>100-yr Peak Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>DP-1:</td>
<td>0.001</td>
<td>0.002</td>
<td>0.001</td>
<td>0.003</td>
</tr>
<tr>
<td>DP-2:</td>
<td>0.059</td>
<td>0.037</td>
<td>0.027</td>
<td>0.000</td>
</tr>
<tr>
<td>Totals:</td>
<td>0.060</td>
<td>0.039</td>
<td>0.028</td>
<td>0.003</td>
</tr>
</tbody>
</table>

All flows in cubic feet per second (ac-f)
3.6 Minimum Standard 6: Redevelopment and Infill Projects.
The site is not classified as a redevelopment or infill project.

3.7 Minimum Standard 7: Pollution Prevention
A Soil Erosion and Sediment Control Plan (SESC) for this development can be found under a separate document. See the Soil Erosion and Sediment Control Plan for the development prepared by DiPrete Engineering. The SESC contains information for construction pollution prevention. For post construction pollution prevention see the Operations and Maintenance (O&M) document prepared for this development by DiPrete Engineering.

3.8 Minimum Standard 8: Land Uses with High Potential Pollutant Loads (LUHPPLs)
The site is not considered LUHPPL.

3.9 Minimum Standard 9: Illicit Discharges
There are no proposed Illicit Discharges on site. The site will be serviced by public water and sewer.

3.10 Minimum Standard 10: Construction Activity Soil Erosion, Runoff and Sedimentation and Pollution Prevention Control Measure Requirements
See the SESC for this development prepared by DiPrete Engineering.

3.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance
See the O&M for this development prepared by DiPrete Engineering.
Appendix A
A2.1 Soil Evaluations
## Site Evaluation Form

**Part A – Soil Profile Description**

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth</th>
<th>Horizon Boundaries</th>
<th>Soil Colors</th>
<th>Re-Dox</th>
<th>Texture</th>
<th>Structure</th>
<th>Consistency</th>
<th>Soil Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ap</td>
<td>0-6&quot;</td>
<td>C</td>
<td>S</td>
<td>10YR 2/2</td>
<td>fsl</td>
<td>1-sbk</td>
<td>fri</td>
<td>4</td>
</tr>
<tr>
<td>2C</td>
<td>6-96&quot;</td>
<td></td>
<td>10YR 4/4</td>
<td></td>
<td>gcos</td>
<td>0-sg</td>
<td>L</td>
<td>1m</td>
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</table>

<table>
<thead>
<tr>
<th>Horizon</th>
<th>Depth</th>
<th>Horizon Boundaries</th>
<th>Soil Colors</th>
<th>Re-Dox</th>
<th>Texture</th>
<th>Structure</th>
<th>Consistency</th>
<th>Soil Category</th>
</tr>
</thead>
<tbody>
<tr>
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<td>S</td>
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<td>fsl</td>
<td>1-sbk</td>
<td>fri</td>
<td>4</td>
</tr>
<tr>
<td>Bw1</td>
<td>13-24&quot;</td>
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<td>S</td>
<td>10YR 4/4</td>
<td>fsl</td>
<td>1-sbk</td>
<td>fri</td>
<td>4</td>
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<tr>
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<td>S</td>
<td>10YR 5/6</td>
<td>fsl</td>
<td>1-sbk</td>
<td>fri</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>36-48&quot;</td>
<td>C</td>
<td>S</td>
<td>2.5Y 4/4</td>
<td>fsl</td>
<td>0-m</td>
<td>fri</td>
<td>7</td>
</tr>
<tr>
<td>2C</td>
<td>48-96&quot;</td>
<td></td>
<td>2.5Y 3/2</td>
<td></td>
<td>gcos</td>
<td>0-sg</td>
<td>L</td>
<td>1m</td>
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### Comments:

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**Revised 11/25/18**
<table>
<thead>
<tr>
<th>Soil Class</th>
<th>Outwash</th>
<th>Total Depth</th>
<th>96&quot;</th>
<th>Impervious/Limiting Depth (og)</th>
<th>GW Seepage Depth</th>
<th>SHWT</th>
<th>96&quot; (og)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH 103</td>
<td>Outwash</td>
<td>96&quot;</td>
<td>NA</td>
<td>NA (og)</td>
<td>NA</td>
<td>NA</td>
<td>96&quot; (og)</td>
</tr>
<tr>
<td>TH 104</td>
<td>Outwash</td>
<td>96&quot;</td>
<td>NA</td>
<td>NA (og)</td>
<td>NA</td>
<td>NA</td>
<td>96&quot; (og)</td>
</tr>
</tbody>
</table>

Comments:
## Site Evaluation Form

**Property Owner:** Eileen R. Biancuzzo  
**Property Location:** Matunuck Beach Road (AP 92-2 Lots 56) South Kingstown, RI  
**Date of Test Hole:** October 23, 2020  
**Soil Evaluator:** Chris Duhamel  
**License Number:** D-4006  
**Weather:** Cloudy, 60’s  

### Soil Profile Description

<table>
<thead>
<tr>
<th>Horizon Boundaries</th>
<th>Soil Colors</th>
<th>Re-Dox</th>
<th>Texture</th>
<th>Structure</th>
<th>Consistence</th>
<th>Soil Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ap</strong> 0-6”</td>
<td>C</td>
<td>S</td>
<td>10YR 2/1</td>
<td>fsl</td>
<td>1-sbk</td>
<td>4</td>
</tr>
<tr>
<td><strong>Bw</strong> 6-27”</td>
<td>C</td>
<td>S</td>
<td>10YR 5/6</td>
<td>fsl</td>
<td>1-sbk</td>
<td>4</td>
</tr>
<tr>
<td><strong>C</strong> 27-51”</td>
<td>C</td>
<td>S</td>
<td>10YR 7/1</td>
<td>sil</td>
<td>0-m</td>
<td>7</td>
</tr>
<tr>
<td><strong>2C</strong> 51-96”</td>
<td>C</td>
<td>S</td>
<td>10YR 4/4</td>
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<td>0-sg</td>
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**TH 108 Outwash**  
**Total Depth 96”**  
**Impervious/Limiting Layer Depth NA (og)**  
**GW Seepage Depth NA**  
**SHWT 96” (og)**

**TH 109 Outwash**  
**Total Depth 96”**  
**Impervious/Limiting Layer Depth NA (og)**  
**GW Seepage Depth NA**  
**SHWT 96” (og)**

---

**Comments:**

---

**Revised 11/25/18**
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TH 1 Soil Class: Outwash  
TH 2 Soil Class: Outwash  

Total Depth: 108"  
Total Depth: 100"  
Impervious/Limiting Layer Depth: NA (og)  
Impervious/Limiting Layer Depth: NA (og)  
GW Seepage Depth: NA  
GW Seepage Depth: NA  
SHWT: 96" (og)  
SHWT: 82" (og)  

Comments:
## Site Evaluation Form

### Part A – Soil Profile Description

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### Comments:

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**Revised 11/25/18**
## Site Evaluation Form

**Property Owner:** Eileen R. Biancuzzo  
**Property Location:** Matunuck Beach Rd. (AP 92-2 Lot 56) South Kingstown, RI  
**Date of Test Hole:** February 20, 2019  
**Soil Evaluator:** Chris Sutter  
**License Number:** D-4077  
**Weather:** Clear, 30's  
**Time:** 8:00 am

### Horizon Boundaries

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<td>30-60&quot;</td>
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### Horizon Boundaries

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### Outwash

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**Comments:**

Revised 11/25/18

---

**Application Number:** NA
**Site Evaluation Form**

**Part A – Soil Profile Description**

**Property Owner:** Eileen Biancuzzo  
**Property Location:** Matunuck Beach Road (AP 92-2, Lot 56), South Kingstown, RI  
**Date of Test Hole:** February 22, 2021  
**Soil Evaluator:** Chris Sutter  
**Weather:** Cloudy, 30’s  
**License Number:** D-4077  
**Time:** 9:00 AM

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**TH 21-1 Eolian/Outwash**

**Total Depth:** 96"  
**Impervious/Limiting Layer Depth:** NA (og)  
**GW Seepage Depth:** NA  
**SHWT:** 96" (og)

---

**TH 21-2 Eolian/Outwash**

**Total Depth:** 96"  
**Impervious/Limiting Layer Depth:** NA (og)  
**GW Seepage Depth:** NA  
**SHWT:** 96" (og)

---

**Comments:**

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**Revised 11/25/18**
Part B

Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer
Please use the area below to locate:
1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*
*OFFSET MUST BE SHOWN

1. Relief and Slope: +/- 2%
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch.
   NO ✔ YES
3. Restrictive Layer or Bedrock within 4’ below original ground within 25 feet of test hole? Provide all test hole locations & depths above.
   NO ✔ YES
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch.
   NO ✔ YES
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch.
   NO ✔ YES
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42?
   NO ✔ YES
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch.
   NO ✔ YES
8. Site’s potential for flooding or ponding: NONE ✔ SLIGHT ☐ MODERATE ☐ SEVERE ☐
9. Landscape position: Backslope
10. Vegetation: Trees and brush
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: ____________________________________________________________________________________________

Certification
The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: ___________________________ Signature: ___________________________ D-4077 License #: ___________________________ Part B prepared by: ___________________________ Signature: ___________________________ D-4077 License #: ___________________________

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ Additional Field Review Required ☐

Explanation: ____________________________________________________________________________________________

_________________________________________ ___________________________
Signature Authorized Agent Date

Revised 11/25/18 22
## Site Evaluation Form

**Property Owner:** Eileen Biancuzzo  
**Property Location:** Matunuck Beach Road (AP 92-2, Lot 56), South Kingstown, RI  
**Date of Test Hole:** February 22, 2021  
**Soil Evaluator:** Chris Sutter  
**Weather:** Cloudy, 30's  
**License Number:** D-4077  
**Time:** 9:00AM

### Part A – Soil Profile Description

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### Comments:

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Revised 11/25/18

23
Part B

Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:
1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*

*OFFSETS MUST BE SHOWN

---

1. Relief and Slope: +/− 2%

2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO ✔ YES 

3. Restrictive Layer or Bedrock within 4’ below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO ✔ YES 

4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO ✔ YES 

5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO ✔ YES 

6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO ✔ YES 

7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO ✔ YES 

8. Site’s potential for flooding or ponding: NONE ✔ SLIGHT ☐ MODERATE ☐ SEvere ☐ 

9. Landscape position: Backslope 

10. Vegetation: Trees and brush 

11. Indicate approximate location of property lines and roadways. 

12. Additional comments, site constraints or additional information regarding site: 

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: D-4077 Part B prepared by: D-4077

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐ 

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐ 

Wet Season Determination required ☐ Additional Field Review Required ☐ 

Explanation: 

__________________________  ____________________________  ____________________________
Signature Authorized Agent  Date  Date
Property Owner: Eileen Biancuzzo  
Property Location: Matunuck Beach Road (AP 92-2, Lot 56), South Kingstown, RI  
Date of Test Hole: February 22, 2021  
Soil Evaluator: Chris Sutter  
License Number: D-4077  
Weather: Cloudy, 30's  
Shaded: Yes ☑ No ☑  
Time: 9:00 AM

### Site Evaluation Form

#### Part A – Soil Profile Description

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**TH 21-5 Eolian/Outwash 96" NA NA 96"**

**TH 21-6 Eolian/Outwash 96" NA NA 96"**

---

Comments:
Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:
1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object. *

*OFFSETS MUST BE SHOWN

---

1. Relief and Slope: +/- 2%
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO YES
3. Restrictive Layer or Bedrock within 4’ below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO YES
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO YES
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO YES
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO YES
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO YES
8. Site’s potential for flooding or ponding: NONE SLIGHT MODERATE SEvere
9. Landscape position: Backslope
10. Vegetation: Trees and brush
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site:

Certification
The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: D-4077
Part B prepared by: D-4077

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur Inconclusive Disclaim
Unwitnessed Soil Evaluations Decision: Accept Inconclusive Disclaim
Wet Season Determination required Additional Field Review Required
Explanation: 

Signature Authorized Agent Date

---

Revised 11/25/18 26
### Site Evaluation Form

**Property Owner:** Eileen Biancuzzo  
**Property Location:** Matunuck Beach Road (AP 92-2, Lot 56), South Kingstown, RI  
**Date of Test Hole:** February 22, 2021  
**Soil Evaluator:** Chris Sutter  
**Weather:** Cloudy, 30's  
**License Number:** D-4077  
**Application Number:** 2032-1432

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**TH 21-7**  
**Soil Class:** Eolian/Outwash  
**Total Depth:** 96"  
**Impervious/Limiting Layer Depth:** NA  
**GW Seepage Depth:** NA  
**SHWT:** 96" (og)

**TH 21-8**  
**Soil Class:** Eolian/Outwash  
**Total Depth:** 96"  
**Impervious/Limiting Layer Depth:** NA  
**GW Seepage Depth:** NA  
**SHWT:** 96" (og)

Comments:

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Revised 11/25/18  
27
Part B

Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:
1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*

*OFFSETS MUST BE SHOWN

---

1. Relief and Slope: +/− 2%
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch.
3. Restrictive Layer or Bedrock within 4’ below original ground within 25 feet of test hole? Provide all test hole locations & depths above.
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch.
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch.
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42?
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch.
8. Site’s potential for flooding or ponding: NONE ✓ SLIGHT □ MODERATE □ SEVERE □
9. Landscape position: Backslope
10. Vegetation: Trees and brush
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site:

Certification
The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: Signature License #
Part B prepared by: Signature License #

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur □ Inconclusive □ Disclaim □
Unwitnessed Soil Evaluations Decision: Accept □ Inconclusive □ Disclaim □
Wet Season Determination required □ Additional Field Review Required □

Explanation:

Signature Authorized Agent Date

Revised 11/25/18
### Site Evaluation Form

**Part A – Soil Profile Description**

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**Comments:**

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Revised 11/25/18

29
Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:
1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*

*OFFSETS MUST BE SHOWN

1. Relief and Slope: +/- 2%

2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO ✓ YES

3. Restrictive Layer or Bedrock within 4’ below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO ✓ YES

4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO ✓ YES

5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO ✓ YES

6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO ✓ YES

7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO ✓ YES

8. Site's potential for flooding or ponding: NONE ✓ SLIGHT ☐ MODERATE ☐ SEVERE ☐

9. Landscape position: Backslope

10. Vegetation: Trees and brush

11. Indicate approximate location of property lines and roadways.

12. Additional comments, site constraints or additional information regarding site:

Certification

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Part A prepared by: Signature

D-4077 License #

Part B prepared by: Signature

D-4077 License #

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ Additional Field Review Required ☐

Explanation:

_________________________________________
Signature Authorized Agent

Date

Revised 11/25/18

30
### Site Evaluation Form
**Property Owner:** Eileen Biancuzzo  
**Property Location:** Matunuck Beach Road (AP 92-2, Lot 56), South Kingstown, RI  
**Date of Test Hole:** February 22, 2021  
**Soil Evaluator:** Chris Sutter  
**Weather:** Cloudy, 30's  
**License Number:** D-4077

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**Comments:**

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**Revised 11/25/18**
1. Relief and Slope: +/- 2%
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO ✓ YES 
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO ✓ YES 
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8. Site's potential for flooding or ponding: NONE ✓ SLIGHT □ MODERATE □ SEVERE □ 
9. Landscape position: Backslope 
10. Vegetation: Trees and brush
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: 

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: D-4077 Part B prepared by: D-4077

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur □ Inconclusive □ Disclaim □ 
Unwitnessed Soil Evaluations Decision: Accept □ Inconclusive □ Disclaim □ 
Wet Season Determination required □ Additional Field Review Required □ 

Explanation: 

Signature Authorized Agent ___________________________ Date

Revised 11/25/18
A3.1 Water Quality HydroCAD Storm Analysis
### Subcatchment 10: WPre-10
- Runoff Area: 0.084 ac, 13.33% Impervious
- Runoff Depth: 0.13" (Tc=6.0 min, CN=49/98, Runoff=0.01 cfs, 0.001 af)

### Subcatchment 20: WPre-20
- Runoff Area: 8.049 ac, 37.01% Impervious
- Runoff Depth: 0.36" (Flow Length: 791’, Tc=14.3 min, CN=42/98, Runoff=2.53 cfs, 0.245 af)

### Subcatchment 20a: WPre-20a
- Runoff Area: 1.317 ac, 8.85% Impervious
- Runoff Depth: 0.09" (Flow Length: 484’, Tc=38.9 min, CN=37/98, Runoff=0.06 cfs, 0.010 af)

### Subcatchment 22: WPre-22
- Runoff Area: 1.007 ac, 0.00% Impervious
- Runoff Depth: 0.00" (Flow Length: 266’, Tc=19.8 min, CN=33/0, Runoff=0.00 cfs, 0.000 af)

### Subcatchment 30: WPre-30
- Runoff Area: 1.327 ac, 13.60% Impervious
- Runoff Depth: 0.13" (Flow Length: 355’, Tc=17.4 min, CN=36/98, Runoff=0.14 cfs, 0.015 af)

### Subcatchment 32: WPre-32
- Runoff Area: 0.161 ac, 50.33% Impervious
- Runoff Depth: 0.50" (Tc=6.0 min, CN=39/98, Runoff=0.09 cfs, 0.007 af)

### Pond 21: Ex Low Point
- Peak Elev: 7.91’
- Storage: 3,919 cf
- Inflow: 2.53 cfs, 0.245 af
- Discarded: 0.15 cfs, 0.176 af
- Primary: 1.16 cfs, 0.069 af
- Outflow: 1.31 cfs, 0.245 af

### Pond 21a: Ex Low Point "B"
- Peak Elev: 7.56’
- Storage: 390 cf
- Inflow: 1.22 cfs, 0.079 af
- Discarded: 0.05 cfs, 0.020 af
- Primary: 1.16 cfs, 0.059 af
- Outflow: 1.21 cfs, 0.079 af

### Pond 31: Ex Low Point
- Peak Elev: 12.06’
- Storage: 271 cf
- Inflow: 0.14 cfs, 0.015 af
- Discarded: 0.03 cfs, 0.015 af
- Primary: 0.00 cfs, 0.000 af
- Outflow: 0.03 cfs, 0.015 af

### Link 11: DP-1 Matunuck Beach Road
- Inflow: 0.01 cfs, 0.001 af
- Primary: 0.01 cfs, 0.001 af

### Link 23: DP-2 SW Property Line
- Inflow: 1.16 cfs, 0.059 af
- Primary: 1.16 cfs, 0.059 af

### Link 33: DP-3 Wetlands/ Salt Marsh
- Inflow: 0.09 cfs, 0.007 af
- Primary: 0.09 cfs, 0.007 af
Type III 24-hr WQ Storm Rainfall=1.20"  
Prepared by DiPrete Engineering  
HydroCAD® 10.10-6a  s/n 01125 © 2020 HydroCAD Software Solutions LLC  
Page 1

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: WPost-101
- Runoff Area=0.051 ac  36.77% Impervious  Runoff Depth=0.36"  
  Tc=6.0 min  CN=60/98  Runoff=0.02 cfs  0.002 af

Subcatchment 201: WPost-201
- Runoff Area=9.015 ac  34.38% Impervious  Runoff Depth=0.34"  
  Flow Length=791’  Tc=14.3 min  CN=41/98  Runoff=2.64 cfs  0.255 af

Subcatchment 203: WPost-203
- Runoff Area=0.337 ac  55.35% Impervious  Runoff Depth=0.55"  
  Tc=6.0 min  CN=52/98  Runoff=0.20 cfs  0.015 af

Subcatchment 205: WPost-205
- Runoff Area=0.731 ac  53.89% Impervious  Runoff Depth=0.53"  
  Tc=6.0 min  CN=39/98  Runoff=0.43 cfs  0.032 af

Subcatchment 208: WPost-208
- Runoff Area=0.260 ac  0.00% Impervious  Runoff Depth=0.00"  
  Tc=6.0 min  CN=39/0  Runoff=0.00 cfs  0.000 af

Subcatchment 301: WPost-301
- Runoff Area=1.273 ac  40.93% Impervious  Runoff Depth=0.40"  
  Flow Length=344’  Tc=17.4 min  CN=38/98  Runoff=0.41 cfs  0.043 af

Subcatchment 305: WPost-305
- Runoff Area=0.277 ac  29.96% Impervious  Runoff Depth=0.30"  
  Tc=6.0 min  CN=39/98  Runoff=0.09 cfs  0.007 af

Pond 1P: DMH-2
- Peak Elev=7.10’  Inflow=0.43 cfs  0.032 af  
  Primary=0.43 cfs  0.032 af  Secondary=0.00 cfs  0.000 af  Outflow=0.43 cfs  0.032 af

Pond 202: Low Point A
- Peak Elev=7.55’ Storage=4,042 cf  Inflow=2.64 cfs  0.255 af  
  Discarded=0.23 cfs  0.204 af  Primary=0.19 cfs  0.021 af  Secondary=0.51 cfs  0.029 af  Outflow=0.93 cfs  0.255 af

Pond 204: Stormcrete Treatment System A
- Peak Elev=8.04’ Storage=4 cf  Inflow=0.20 cfs  0.015 af  
  Discarded=0.20 cfs  0.015 af  Primary=0.00 cfs  0.000 af  Outflow=0.20 cfs  0.015 af

Pond 206: Stormtech-740 WQ
- Peak Elev=7.09’ Storage=0.007 af  Inflow=0.43 cfs  0.032 af  
  Outflow=0.10 cfs  0.032 af

Pond 207: UIS 48” Pipes
- Peak Elev=5.00’ Storage=0.000 af  Inflow=0.00 cfs  0.000 af  
  Discarded=0.00 cfs  0.000 af  Primary=0.00 cfs  0.000 af  Outflow=0.00 cfs  0.000 af

Pond 304: Stormcrete Treatment System B
- Peak Elev=13.62’ Storage=458 cf  Inflow=0.41 cfs  0.043 af  
  Discarded=0.10 cfs  0.043 af  Primary=0.00 cfs  0.000 af  Outflow=0.10 cfs  0.043 af

Pond 312P: Level Spreader
- Peak Elev=6.28’ Storage=475 cf  Inflow=0.70 cfs  0.050 af  
  Discarded=0.01 cfs  0.013 af  Primary=0.86 cfs  0.037 af  Outflow=0.87 cfs  0.050 af

Link 102: DP-1 Matunuck Beach Road
- Inflow=0.02 cfs  0.002 af  Primary=0.02 cfs  0.002 af

Link 209: DP-2 Low Point/ SW Property Line
- Inflow=0.86 cfs  0.037 af  Primary=0.86 cfs  0.037 af
Link 306: DP-3 Wetlands/ Salt Marsh

- Inflow = 0.09 cfs, 0.007 af
- Primary = 0.09 cfs, 0.007 af
4. The RIDEM reserves the right to suspend or revoke this Certification if updated design, installation, and O&M manuals are not provided to the RIDEM within thirty (30) days of RIDEM request or one hundred and eighty (180) days prior to the expiration date of this Certification. All revisions must be reviewed and approved by the RIDEM prior to re-certification.

ATTACHMENTS

Table 1: RIDEM Approved Cascade Separator Sizing Table for 50% TSS Removal

<table>
<thead>
<tr>
<th>Model #</th>
<th>Water Quality Flow Rate (cfs)</th>
<th>Approximate Impervious Treatment Area (acres)</th>
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Table 2: Standard Hydrocarbon & Sediment Storage Capacity of Cascade Separator® Devices

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<th>Model #</th>
<th>Structure Inside Diameter (ft)</th>
<th>Oil Spill Volume (gal)</th>
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A3.2.0 Drainage Network Hydraulic Calculations
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<th>Pipe Slope</th>
<th>Flow Rate</th>
<th>Capacity Full</th>
<th>Velocity</th>
<th>Invert Down</th>
<th>Invert Up</th>
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<td>(%)</td>
<td>(cfs)</td>
<td>(cfs)</td>
<td>(ft/s)</td>
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<td>Capacity Full (cfs)</td>
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### HGL at Structure

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A3.2.1 HydroCAD Node Diagram
### Area Listing (all nodes)

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<th>CN</th>
<th>Description</th>
<th>Subcatchment-numbers</th>
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<tr>
<td><strong>11.944</strong></td>
<td><strong>56</strong></td>
<td><strong>TOTAL AREA</strong></td>
<td></td>
</tr>
</tbody>
</table>
## Area Listing (all nodes)

<table>
<thead>
<tr>
<th>Area</th>
<th>CN</th>
<th>Description</th>
<th>(subcatchment-numbers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.713</td>
<td>39</td>
<td>&gt;75% Grass cover, Good, HSG A</td>
<td>(201, 203, 205, 208, 301, 305)</td>
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<tr>
<td>0.536</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
<td>(101, 201, 203)</td>
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<tr>
<td>0.227</td>
<td>30</td>
<td>Brush, Good, HSG A</td>
<td>(201, 205, 301)</td>
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<tr>
<td>0.044</td>
<td>48</td>
<td>Brush, Good, HSG B</td>
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<tr>
<td>0.112</td>
<td>96</td>
<td>Gravel surface, HSG A</td>
<td>(201)</td>
</tr>
<tr>
<td>0.010</td>
<td>96</td>
<td>Gravel surface, HSG B</td>
<td>(201)</td>
</tr>
<tr>
<td>0.723</td>
<td>98</td>
<td>Impervious, HSG A</td>
<td>(201, 203, 205, 301)</td>
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<tr>
<td>0.045</td>
<td>98</td>
<td>Impervious, HSG B</td>
<td>(101, 203)</td>
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<tr>
<td>1.705</td>
<td>98</td>
<td>Offsite Impervious, HSG A</td>
<td>(201, 301, 305)</td>
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<tr>
<td>0.259</td>
<td>98</td>
<td>Offsite Impervious, HSG B</td>
<td>(101, 201)</td>
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<td>1.311</td>
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<td>Offsite Roofs, HSG A</td>
<td>(201, 301, 305)</td>
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<td>0.093</td>
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<td>Offsite Roofs, HSG B</td>
<td>(201)</td>
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<td>0.166</td>
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<td>Roofs, HSG A</td>
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<td><strong>62</strong></td>
<td><strong>TOTAL AREA</strong></td>
<td><strong>62</strong></td>
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</tbody>
</table>
A3.2.2 HydroCAD 1-Year Storm Analysis
Type III 24-hr 1-Year Rainfall=2.80"

Prepared by DiPrete Engineering
Printed 2/17/2022

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 10: WPre-10
Runoff Area=0.084 ac  13.33% Impervious  Runoff Depth=0.17"
  Tc=6.0 min  CN=56  Runoff=0.00 cfs  0.001 af

Subcatchment 20: WPre-20
Runoff Area=8.049 ac  37.01% Impervious  Runoff Depth=0.35"
  Flow Length=791’  Tc=14.3 min  CN=63  Runoff=1.49 cfs  0.236 af

Subcatchment 20a: WPRe-20a
Runoff Area=1.317 ac  8.85% Impervious  Runoff Depth=0.00"
  Flow Length=484’  Tc=38.9 min  CN=43  Runoff=0.00 cfs  0.000 af

Subcatchment 22: WPre-22
Runoff Area=1.007 ac  0.00% Impervious  Runoff Depth=0.00"
  Flow Length=266’  Tc=19.8 min  CN=33  Runoff=0.00 cfs  0.000 af

Subcatchment 30: WPre-30
Runoff Area=1.327 ac  13.60% Impervious  Runoff Depth=0.00"
  Flow Length=355’  Tc=17.4 min  CN=44  Runoff=0.00 cfs  0.000 af

Subcatchment 32: WPre-32
Runoff Area=0.161 ac  50.33% Impervious  Runoff Depth=0.57"
  Tc=6.0 min  CN=69  Runoff=0.09 cfs  0.008 af

Pond 21: Ex Low Point
Peak Elev=7.80’  Storage=3,268 cf  Inflow=1.49 cfs  0.236 af
  Discarded=0.14 cfs  0.189 af  Primary=0.23 cfs  0.048 af  Outflow=0.37 cfs  0.236 af

Pond 21a: Ex Low Point "B"
Peak Elev=7.52’  Storage=300 cf  Inflow=0.23 cfs  0.048 af
  Discarded=0.04 cfs  0.021 af  Primary=0.19 cfs  0.027 af  Outflow=0.23 cfs  0.048 af

Pond 31: Ex Low Point
Peak Elev=11.50’  Storage=0 cf  Inflow=0.00 cfs  0.001 af
  Discarded=0.00 cfs  0.001 af  Primary=0.00 cfs  0.000 af  Outflow=0.00 cfs  0.001 af

Link 11: DP-1 Matunuck Beach Road
Inflow=0.00 cfs  0.001 af  Primary=0.00 cfs  0.001 af

Link 23: DP-2 SW Property Line
Inflow=0.19 cfs  0.027 af  Primary=0.19 cfs  0.027 af

Link 33: DP-3 Wetlands/ Salt Marsh
Inflow=0.09 cfs  0.008 af  Primary=0.09 cfs  0.008 af
### Time span
- Time span: 0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2

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

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

### Subcatchment 101: WPost-101
- Runoff Area: 0.051 ac 36.77% Impervious Runoff Depth: 0.78"  
  - Tc=6.0 min  
  - CN=74  
  - Runoff=0.04 cfs 0.003 af

### Subcatchment 201: WPost-201
- Runoff Area: 9.015 ac 34.38% Impervious Runoff Depth: 0.29"  
  - Flow Length=791‘  
  - Tc=14.3 min  
  - CN=61  
  - Runoff=1.22 cfs 0.220 af

### Subcatchment 203: WPost-203
- Runoff Area: 0.337 ac 55.35% Impervious Runoff Depth: 0.99"  
  - Tc=6.0 min  
  - CN=78  
  - Runoff=0.38 cfs 0.028 af

### Subcatchment 205: WPost-205
- Runoff Area: 0.731 ac 53.89% Impervious Runoff Depth: 0.65"  
  - Tc=6.0 min  
  - CN=71  
  - Runoff=0.48 cfs 0.040 af

### Subcatchment 208: WPost-208
- Runoff Area: 0.260 ac 0.00% Impervious Runoff Depth: 0.00"  
  - Tc=6.0 min  
  - CN=39  
  - Runoff=0.00 cfs 0.000 af

### Subcatchment 301: WPost-301
- Runoff Area: 1.273 ac 40.93% Impervious Runoff Depth: 0.35"  
  - Flow Length=344‘  
  - Tc=17.4 min  
  - CN=63  
  - Runoff=0.23 cfs 0.037 af

### Subcatchment 305: WPost-305
- Runoff Area: 0.277 ac 29.96% Impervious Runoff Depth: 0.19"  
  - Tc=6.0 min  
  - CN=57  
  - Runoff=0.02 cfs 0.004 af

### Pond 1P: DMH-2
- Peak Elev=7.32’  
- Inflow=0.48 cfs 0.040 af  
  - Primary=0.48 cfs 0.040 af  
  - Secondary=0.00 cfs 0.000 af  
  - Outflow=0.48 cfs 0.040 af

### Pond 202: Low Point A
- Peak Elev=7.45’  
- Storage=3,072 cf  
  - Inflow=1.22 cfs 0.220 af  
  - Discarded=0.21 cfs 0.208 af  
  - Primary=0.04 cfs 0.012 af  
  - Secondary=0.00 cfs 0.000 af  
  - Outflow=0.25 cfs 0.220 af

### Pond 204: Stormcrete Treatment System A
- Peak Elev=8.04’  
- Storage=7 cf  
  - Inflow=0.38 cfs 0.028 af  
  - Discarded=0.37 cfs 0.028 af  
  - Primary=0.00 cfs 0.000 af  
  - Outflow=0.37 cfs 0.028 af

### Pond 206: Stormtech-740 WQ
- Peak Elev=7.32’  
- Storage=0.009 af  
  - Inflow=0.48 cfs 0.040 af  
  - Outflow=0.10 cfs 0.040 af

### Pond 207: UIS 48" Pipes
- Peak Elev=5.00’  
- Storage=0.000 af  
  - Inflow=0.00 cfs 0.000 af  
  - Discarded=0.00 cfs 0.000 af  
  - Primary=0.00 cfs 0.000 af  
  - Outflow=0.00 cfs 0.000 af

### Pond 304: Stormcrete Treatment System B
- Peak Elev=12.02’  
- Storage=181 cf  
  - Inflow=0.23 cfs 0.037 af  
  - Discarded=0.10 cfs 0.037 af  
  - Primary=0.00 cfs 0.000 af  
  - Outflow=0.10 cfs 0.037 af

### Pond 312P: Level Spreader
- Peak Elev=6.05’  
- Storage=402 cf  
  - Inflow=0.04 cfs 0.012 af  
  - Discarded=0.01 cfs 0.012 af  
  - Primary=0.00 cfs 0.000 af  
  - Outflow=0.01 cfs 0.012 af

### Link 102: DP-1 Matunuck Beach Road
- Inflow=0.04 cfs 0.003 af  
  - Primary=0.04 cfs 0.003 af

### Link 209: DP-2 Low Point/ SW Property Line
- Inflow=0.00 cfs 0.000 af  
  - Primary=0.00 cfs 0.000 af
Link 306: DP-3 Wetlands/ Salt Marsh

Inflow=0.02 cfs 0.004 af
Primary=0.02 cfs 0.004 af
A3.2.3 HydroCAD 10-Year Storm Analysis
Type III 24-hr 10-Year Rainfall=4.90" 

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10: WPre-10
- Runoff Area=0.084 ac  13.33% Impervious  Runoff Depth=0.99" 
  Tc=6.0 min  CN=56  Runoff=0.08 cfs  0.007 af

Subcatchment 20: WPre-20
- Runoff Area=8.049 ac  37.01% Impervious  Runoff Depth=1.45" 
  Flow Length=791’  Tc=14.3 min  CN=63  Runoff=9.67 cfs  0.970 af

Subcatchment 20a: WPRe-20a
- Runoff Area=1.317 ac  8.85% Impervious  Runoff Depth=0.33" 
  Flow Length=484’  Tc=38.9 min  CN=43  Runoff=0.10 cfs  0.036 af

Subcatchment 22: WPre-22
- Runoff Area=1.007 ac  0.00% Impervious  Runoff Depth=0.03" 
  Flow Length=266’  Tc=19.8 min  CN=33  Runoff=0.00 cfs  0.003 af

Subcatchment 30: WPre-30
- Runoff Area=1.327 ac  13.60% Impervious  Runoff Depth=0.37" 
  Flow Length=355’  Tc=17.4 min  CN=44  Runoff=0.17 cfs  0.041 af

Subcatchment 32: WPre-32
- Runoff Area=0.161 ac  50.33% Impervious  Runoff Depth=1.89" 
  Tc=6.0 min  CN=69  Runoff=0.35 cfs  0.025 af

Pond 21: Ex Low Point
- Peak Elev=8.27’  Storage=6,449 cf  Inflow=9.67 cfs  0.970 af
  Discarded=0.18 cfs  0.224 af  Primary=7.77 cfs  0.746 af  Outflow=7.95 cfs  0.970 af

Pond 21a: Ex Low Point “B”
- Peak Elev=7.73’  Storage=841 cf  Inflow=7.78 cfs  0.782 af
  Discarded=0.08 cfs  0.053 af  Primary=7.66 cfs  0.728 af  Outflow=7.74 cfs  0.782 af

Pond 31: Ex Low Point
- Peak Elev=12.20’  Storage=496 cf  Inflow=0.17 cfs  0.041 af
  Discarded=0.05 cfs  0.041 af  Primary=0.00 cfs  0.000 af  Outflow=0.05 cfs  0.041 af

Link 11: DP-1 Matunuck Beach Road
- Inflow=0.08 cfs  0.007 af  
  Primary=0.08 cfs  0.007 af

Link 23: DP-2 SW Property Line
- Inflow=7.66 cfs  0.731 af  
  Primary=7.66 cfs  0.731 af

Link 33: DP-3 Wetlands/ Salt Marsh
- Inflow=0.35 cfs  0.025 af  
  Primary=0.35 cfs  0.025 af
Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 101: WPost-101**
Runoff Area=0.051 ac 36.77% Impervious Runoff Depth=2.28"
Tc=6.0 min  CN=74  Runoff=0.14 cfs  0.010 af

**Subcatchment 201: WPost-201**
Runoff Area=9.015 ac 34.38% Impervious Runoff Depth=1.31"
Flow Length=791’ Tc=14.3 min CN=61  Runoff=9.53 cfs  0.984 af

**Subcatchment 203: WPost-203**
Runoff Area=0.337 ac 55.35% Impervious Runoff Depth=2.63"
Tc=6.0 min CN=78  Runoff=1.04 cfs  0.074 af

**Subcatchment 205: WPost-205**
Runoff Area=0.731 ac 53.89% Impervious Runoff Depth=2.04"
Tc=6.0 min CN=71  Runoff=1.72 cfs  0.124 af

**Subcatchment 208: WPost-208**
Runoff Area=0.260 ac 0.00% Impervious Runoff Depth=0.18"
Tc=6.0 min CN=39  Runoff=0.01 cfs  0.004 af

**Subcatchment 301: WPost-301**
Runoff Area=1.273 ac 40.93% Impervious Runoff Depth=1.45"
Flow Length=344’ Tc=17.4 min CN=63  Runoff=1.42 cfs  0.153 af

**Subcatchment 305: WPost-305**
Runoff Area=0.277 ac 29.96% Impervious Runoff Depth=1.05"
Tc=6.0 min CN=57  Runoff=0.29 cfs  0.024 af

**Pond 1P: DMH-2**
Peak Elev=7.61’ Inflow=1.72 cfs  0.124 af
Primary=0.72 cfs  0.075 af  Secondary=1.57 cfs  0.050 af  Outflow=1.72 cfs  0.124 af

**Pond 202: Low Point A**
Peak Elev=7.91’ Storage=7.729 cf  Inflow=9.53 cfs  0.984 af
Discarded=0.26 cfs  0.298 af  Primary=1.35 cfs  0.186 af  Secondary=5.00 cfs  0.500 af  Outflow=6.61 cfs  0.984 af

**Pond 204: Stormcrete Treatment System A**
Peak Elev=8.72’ Storage=445 cf  Inflow=1.04 cfs  0.074 af
Discarded=0.37 cfs  0.074 af  Primary=0.00 cfs  0.000 af  Outflow=0.37 cfs  0.074 af

**Pond 206: Stormtech-740 WQ**
Peak Elev=7.60’ Storage=0.011 af  Inflow=0.72 cfs  0.075 af
Outflow=0.10 cfs  0.075 af

**Pond 207: UIS 48" Pipes**
Peak Elev=7.31’ Storage=0.029 af  Inflow=1.57 cfs  0.050 af
Discarded=0.21 cfs  0.050 af  Primary=0.00 cfs  0.000 af  Outflow=0.21 cfs  0.050 af

**Pond 304: Stormcrete Treatment System B**
Peak Elev=14.04’ Storage=523 cf  Inflow=1.42 cfs  0.153 af
Discarded=0.10 cfs  0.087 af  Primary=1.31 cfs  0.066 af  Outflow=1.41 cfs  0.153 af

**Pond 312P: Level Spreader**
Peak Elev=6.36’ Storage=501 cf  Inflow=6.35 cfs  0.686 af
Discarded=0.01 cfs  0.019 af  Primary=6.34 cfs  0.667 af  Outflow=6.35 cfs  0.686 af

**Link 102: DP-1 Matunuck Beach Road**
Inflow=0.14 cfs  0.010 af  Primary=0.14 cfs  0.010 af

**Link 209: DP-2 Low Point/ SW Property Line**
Inflow=6.35 cfs  0.671 af  Primary=6.35 cfs  0.671 af
Link 306: DP-3 Wetlands/ Salt Marsh

Inflow=1.49 cfs  0.090 af
Primary=1.49 cfs  0.090 af
A3.2.4 HydroCAD 25-Year Storm Analysis
Type III 24-hr 25-Year Rainfall=6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10: WPre-10
Runoff Area=0.084 ac  13.33% Impervious  Runoff Depth=1.66"
  Tc=6.0 min   CN=56   Runoff=0.15 cfs  0.012 af

Subcatchment 20: WPre-20
Runoff Area=8.049 ac  37.01% Impervious  Runoff Depth=2.25"
  Flow Length=791’  Tc=14.3 min   CN=63   Runoff=15.72 cfs  1.507 af

Subcatchment 20a: WPre-20a
Runoff Area=1.317 ac  8.85% Impervious  Runoff Depth=0.71"
  Flow Length=484’  Tc=38.9 min   CN=43   Runoff=0.34 cfs  0.078 af

Subcatchment 22: WPre-22
Runoff Area=1.007 ac  0.00% Impervious  Runoff Depth=0.19"
  Flow Length=266’  Tc=19.8 min   CN=33   Runoff=0.03 cfs  0.016 af

Subcatchment 30: WPre-30
Runoff Area=1.327 ac  13.60% Impervious  Runoff Depth=0.78"
  Flow Length=355’  Tc=17.4 min   CN=44   Runoff=0.52 cfs  0.086 af

Subcatchment 32: WPre-32
Runoff Area=0.161 ac  50.33% Impervious  Runoff Depth=2.79"
  Tc=6.0 min   CN=69   Runoff=0.52 cfs  0.037 af

Pond 21: Ex Low Point
Peak Elev=8.49’  Storage=8,240 cf  Inflow=15.72 cfs  1.507 af
  Discarded=0.20 cfs  0.235 af   Primary=13.59 cfs  1.272 af   Outflow=13.78 cfs  1.507 af

Pond 21a: Ex Low Point "B"
Peak Elev=7.82’  Storage=1,211 cf  Inflow=13.67 cfs  1.350 af
  Discarded=0.10 cfs  0.058 af   Primary=13.51 cfs  1.293 af   Outflow=13.61 cfs  1.350 af

Pond 31: Ex Low Point
Peak Elev=12.29’  Storage=707 cf  Inflow=0.52 cfs  0.086 af
  Discarded=0.06 cfs  0.060 af   Primary=0.27 cfs  0.025 af   Outflow=0.33 cfs  0.086 af

Link 11: DP-1 Matunuck Beach Road
Inflow=0.15 cfs  0.012 af
  Primary=0.15 cfs  0.012 af

Link 23: DP-2 SW Property Line
Inflow=13.51 cfs  1.309 af
  Primary=13.51 cfs  1.309 af

Link 33: DP-3 Wetlands/ Salt Marsh
Inflow=0.52 cfs  0.063 af
  Primary=0.52 cfs  0.063 af
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<th>Subcatchment</th>
<th>Runoff Area</th>
<th>Impervious</th>
<th>Runoff Depth</th>
<th>Tc (min)</th>
<th>CN</th>
<th>Runoff (cfs)</th>
<th>Impervious (af)</th>
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<tbody>
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<td>0.051 ac</td>
<td>36.77%</td>
<td>3.27&quot;</td>
<td>6.0</td>
<td>74</td>
<td>0.19 cfs</td>
<td>0.014 af</td>
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<td>201: WPost-201</td>
<td>9.015 ac</td>
<td>34.38%</td>
<td>2.07&quot;</td>
<td>14.3</td>
<td>61</td>
<td>16.01 cfs</td>
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<td>203: WPost-203</td>
<td>0.337 ac</td>
<td>55.35%</td>
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<td>6.0</td>
<td>78</td>
<td>1.45 cfs</td>
<td>0.103 af</td>
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<tr>
<td>205: WPost-205</td>
<td>0.731 ac</td>
<td>53.89%</td>
<td>2.98&quot;</td>
<td>6.0</td>
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<td>2.55 cfs</td>
<td>0.182 af</td>
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<tr>
<td>208: WPost-208</td>
<td>0.260 ac</td>
<td>0.00%</td>
<td>0.47&quot;</td>
<td>6.0</td>
<td>39</td>
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<td>0.010 af</td>
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<tr>
<td>301: WPost-301</td>
<td>1.273 ac</td>
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<td>17.4</td>
<td>63</td>
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<tr>
<td>305: WPost-305</td>
<td>0.277 ac</td>
<td>29.96%</td>
<td>1.74&quot;</td>
<td>6.0</td>
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<td>0.52 cfs</td>
<td>0.040 af</td>
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<table>
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<tr>
<th>Pond 1P: DMH-2</th>
<th>Peak Elev=8.48'</th>
<th>Inflow=2.55 cfs</th>
<th>Outflow=2.55 cfs</th>
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<tr>
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<td>Primary=0.66 cfs</td>
<td>Secondary=2.41 cfs</td>
<td>Outflow=2.55 cfs</td>
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<tr>
<td>202: Low Point A</td>
<td>Peak Elev=8.16'</td>
<td>Inflow=16.01 cfs</td>
<td>Outflow=12.43 cfs</td>
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<td>Discarded=0.27 cfs</td>
<td>Primary=2.64 cfs</td>
<td>Secondary=9.51 cfs</td>
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<td>0.316 af</td>
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<tr>
<td>204: Stormcrete Treatment System A</td>
<td>Peak Elev=9.61'</td>
<td>Inflow=1.45 cfs</td>
<td>Outflow=0.37 cfs</td>
</tr>
<tr>
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<td>Discarded=0.37 cfs</td>
<td>Primary=0.00 cfs</td>
<td>Secondary=0.37 cfs</td>
</tr>
<tr>
<td></td>
<td>0.103 af</td>
<td>0.000 af</td>
<td>0.103 af</td>
</tr>
<tr>
<td>206: Stormtech-740 WQ</td>
<td>Peak Elev=8.47'</td>
<td>Inflow=0.66 cfs</td>
<td>Outflow=0.10 cfs</td>
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<td>Storage=0.017 af</td>
<td>0.090 af</td>
<td>0.090 af</td>
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<tr>
<td>207: UIS 48'' Pipes</td>
<td>Peak Elev=8.48'</td>
<td>Inflow=2.41 cfs</td>
<td>Outflow=0.21 cfs</td>
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<td>Discarded=0.21 cfs</td>
<td>Primary=0.00 cfs</td>
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<tr>
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<td>0.092 af</td>
<td>0.000 af</td>
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<tr>
<td>304: Stormcrete Treatment System B</td>
<td>Peak Elev=14.06'</td>
<td>Inflow=2.30 cfs</td>
<td>Outflow=2.30 cfs</td>
</tr>
<tr>
<td></td>
<td>Discarded=0.10 cfs</td>
<td>Primary=2.20 cfs</td>
<td>Secondary=2.30 cfs</td>
</tr>
<tr>
<td></td>
<td>0.105 af</td>
<td>0.134 af</td>
<td>0.238 af</td>
</tr>
<tr>
<td>312P: Level Spreader</td>
<td>Peak Elev=6.42'</td>
<td>Inflow=12.16 cfs</td>
<td>Outflow=12.16 cfs</td>
</tr>
<tr>
<td></td>
<td>Discarded=0.01 cfs</td>
<td>Primary=12.15 cfs</td>
<td>Secondary=12.16 cfs</td>
</tr>
<tr>
<td></td>
<td>0.019 af</td>
<td>1.222 af</td>
<td>1.241 af</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Link 102: DP-1 Matunuck Beach Road</th>
<th>Inflow=0.19 cfs</th>
<th>0.014 af</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary=0.19 cfs</td>
<td>0.014 af</td>
</tr>
<tr>
<td>Link 209: DP-2 Low Point/ SW Property Line</td>
<td>Inflow=12.20 cfs</td>
<td>1.232 af</td>
</tr>
<tr>
<td></td>
<td>Primary=12.20 cfs</td>
<td>1.232 af</td>
</tr>
</tbody>
</table>
Link 306: DP-3 Wetlands/ Salt Marsh

Inflow=2.50 cfs  0.174 af
Primary=2.50 cfs  0.174 af
A3.2.5 HydroCAD 100-Year Storm Analysis
Type III 24-hr 100-Year Rainfall=8.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10: WPre-10
- Runoff Area=0.084 ac  13.33% Impervious  Runoff Depth=3.25"
  - Tc=6.0 min  CN=56  Runoff=0.31 cfs  0.023 af

Subcatchment 20: WPre-20
- Runoff Area=8.049 ac  37.01% Impervious  Runoff Depth=4.07"
  - Flow Length=791'  Tc=14.3 min  CN=63  Runoff=29.35 cfs  2.727 af

Subcatchment 20a: WPRe-20a
- Runoff Area=1.317 ac  8.85% Impervious  Runoff Depth=1.79"
  - Flow Length=484'  Tc=38.9 min  CN=43  Runoff=1.15 cfs  0.197 af

Subcatchment 22: WPre-22
- Runoff Area=1.007 ac  0.00% Impervious  Runoff Depth=0.80"
  - Flow Length=266'  Tc=19.8 min  CN=33  Runoff=0.32 cfs  0.067 af

Subcatchment 30: WPre-30
- Runoff Area=1.327 ac  13.60% Impervious  Runoff Depth=1.90"
  - Flow Length=355'  Tc=17.4 min  CN=44  Runoff=1.77 cfs  0.210 af

Subcatchment 32: WPre-32
- Runoff Area=0.161 ac  50.33% Impervious  Runoff Depth=4.78"
  - Tc=6.0 min  CN=69  Runoff=0.90 cfs  0.064 af

Pond 21: Ex Low Point
- Peak Elev=8.91'  Storage=11,980 cf  Inflow=29.35 cfs  2.727 af
  - Discarded=0.23 cfs  0.255 af  Primary=25.80 cfs  2.472 af  Outflow=26.02 cfs  2.727 af

Pond 21a: Ex Low Point "B"
- Peak Elev=7.98'  Storage=1,978 cf  Inflow=26.29 cfs  2.668 af
  - Discarded=0.13 cfs  0.067 af  Primary=26.05 cfs  2.602 af  Outflow=26.18 cfs  2.668 af

Pond 31: Ex Low Point
- Peak Elev=12.38'  Storage=962 cf  Inflow=1.77 cfs  0.210 af
  - Discarded=0.08 cfs  0.074 af  Primary=1.58 cfs  0.136 af  Outflow=1.66 cfs  0.210 af

Link 11: DP-1 Matunuck Beach Road
- Inflow=0.31 cfs  0.023 af
  - Primary=0.31 cfs  0.023 af

Link 23: DP-2 SW Property Line
- Inflow=26.27 cfs  2.668 af
  - Primary=26.27 cfs  2.668 af

Link 33: DP-3 Wetlands/ Salt Marsh
- Inflow=1.93 cfs  0.200 af
  - Primary=1.93 cfs  0.200 af
Summary for Subcatchment 10: WPre-10

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 3.25"
Routed to Link 11 : DP-1 Matunuck Beach Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>39</td>
<td>&gt;75% Grass cover, Good, HSG A</td>
</tr>
<tr>
<td>0.008</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
</tr>
<tr>
<td>0.065</td>
<td>48</td>
<td>Brush, Good, HSG B</td>
</tr>
<tr>
<td>0.001</td>
<td>98</td>
<td>Impervious, HSG B</td>
</tr>
<tr>
<td>0.010</td>
<td>98</td>
<td>Offsite Impervious, HSG B</td>
</tr>
<tr>
<td>0.084</td>
<td>56</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>0.073</td>
<td>49</td>
<td>86.67% Pervious Area</td>
</tr>
<tr>
<td>0.011</td>
<td>98</td>
<td>13.33% Impervious Area</td>
</tr>
</tbody>
</table>

Tc Length Slope Velocity Capacity Description
(min) (feet) (ft/ft) (ft/sec) (cfs)
6.0

Summary for Subcatchment 20: WPre-20

Runoff = 29.35 cfs @ 12.20 hrs, Volume= 2.727 af, Depth= 4.07"
Routed to Pond 21 : Ex Low Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.419</td>
<td>39</td>
<td>&gt;75% Grass cover, Good, HSG A</td>
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<tr>
<td>0.392</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
</tr>
<tr>
<td>0.090</td>
<td>30</td>
<td>Brush, Good, HSG A</td>
</tr>
<tr>
<td>0.048</td>
<td>48</td>
<td>Brush, Good, HSG B</td>
</tr>
<tr>
<td>0.112</td>
<td>96</td>
<td>Gravel surface, HSG A</td>
</tr>
<tr>
<td>0.010</td>
<td>96</td>
<td>Gravel surface, HSG B</td>
</tr>
<tr>
<td>1.497</td>
<td>98</td>
<td>Offsite Impervious, HSG A</td>
</tr>
<tr>
<td>0.247</td>
<td>98</td>
<td>Offsite Impervious, HSG B</td>
</tr>
<tr>
<td>1.141</td>
<td>98</td>
<td>Offsite Roofs, HSG A</td>
</tr>
<tr>
<td>0.093</td>
<td>98</td>
<td>Offsite Roofs, HSG B</td>
</tr>
<tr>
<td>8.049</td>
<td>63</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>5.070</td>
<td>42</td>
<td>62.99% Pervious Area</td>
</tr>
<tr>
<td>2.979</td>
<td>98</td>
<td>37.01% Impervious Area</td>
</tr>
</tbody>
</table>
Summary for Subcatchment 20a: WPRe-20a

Runoff = 1.15 cfs @ 12.62 hrs, Volume= 0.197 af, Depth= 1.79"

Routed to Pond 21a : Ex Low Point "B"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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<tr>
<td>0.775</td>
<td>39</td>
<td>&gt;75% Grass cover, Good, HSG A</td>
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<tr>
<td>0.003</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
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<tr>
<td>0.339</td>
<td>30</td>
<td>Brush, Good, HSG A</td>
</tr>
<tr>
<td>0.083</td>
<td>48</td>
<td>Brush, Good, HSG B</td>
</tr>
<tr>
<td>0.036</td>
<td>98</td>
<td>Offsite Impervious, HSG A</td>
</tr>
<tr>
<td>0.081</td>
<td>98</td>
<td>Offsite Roofs, HSG A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.065</td>
</tr>
</tbody>
</table>

Summary for Subcatchment 22: WPre-22

Runoff = 0.32 cfs @ 12.51 hrs, Volume= 0.067 af, Depth= 0.80"

Routed to Link 23 : DP-2 SW Property Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"
Summary for Subcatchment 30: WPre-30

Runoff = 1.77 cfs @ 12.28 hrs, Volume= 0.210 af, Depth= 1.90"
Routed to Pond 31 : Ex Low Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>&gt;75% Grass cover, Good, HSG A</td>
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<tr>
<td>0.002</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
</tr>
<tr>
<td>0.688</td>
<td>30</td>
<td>Brush, Good, HSG A</td>
</tr>
<tr>
<td>0.025</td>
<td>48</td>
<td>Brush, Good, HSG B</td>
</tr>
<tr>
<td>1.007</td>
<td>33</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>1.007</td>
<td>33</td>
<td>100.00% Pervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.0</td>
<td>100</td>
<td>0.0260</td>
<td>0.09</td>
<td></td>
<td>Sheet Flow, A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Woods: Light underbrush ( n = 0.400 ) ( P2 = 3.30&quot; )</td>
</tr>
<tr>
<td>0.8</td>
<td>166</td>
<td>0.0518</td>
<td>3.66</td>
<td></td>
<td>Shallow Concentrated Flow, B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unpaved ( Kv = 16.1 ) fps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.4</td>
<td>355</td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

Summary for Subcatchment 32: WPre-32

Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 4.78"
Routed to Link 33 : DP-3 Wetlands/ Salt Marsh

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"
Summary for Pond 21: Ex Low Point

Inflow Area = 8.049 ac, 37.01% Impervious, Inflow Depth = 4.07" for 100-Year event
Inflow = 29.35 cfs @ 12.20 hrs, Volume= 2.727 af
Outflow = 26.02 cfs @ 12.28 hrs, Volume= 2.727 af, Atten= 11%, Lag= 4.7 min
Discarded = 0.23 cfs @ 12.28 hrs, Volume= 0.255 af
Primary = 25.80 cfs @ 12.28 hrs, Volume= 2.472 af
Routed to Pond 21a : Ex Low Point "B"

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.91' @ 12.28 hrs  Surf.Area= 9,536 sf  Storage= 11,980 cf
Plug-Flow detention time= 34.9 min calculated for 2.727 af (100% of inflow)
Center-of-Mass det. time= 34.9 min ( 879.2 - 844.3 )

Volume Invert Avail.Storage Storage Description
#1 7.00' 12,823 cf Custom Stage Data (Prismatic) Listed below (Recalc)

Device Routing Invert Outlet Devices
#1 Discarded 7.00' 1.020 in/hr Exfiltration over Surface area
#2 Primary 7.75' 8.0' long x 5.0' breadth Broad-Crested Rectangular Weir
Discarded OutFlow  Max=0.23 cfs @ 12.28 hrs  HW=8.91’  (Free Discharge)

Exfiltration (Exfiltration Controls 0.23 cfs)

Primary OutFlow  Max=25.77 cfs @ 12.28 hrs  HW=8.91’  TW=7.98’  (Dynamic Tailwater)

Broad-Crested Rectangular Weir (Weir Controls 25.77 cfs @ 2.77 fps)

Summary for Pond 21a: Ex Low Point "B"

Inflow Area = 9.366 ac, 33.05% Impervious  Inflow Depth = 3.42”  for 100-Year event
Inflow  = 26.29 cfs @ 12.28 hrs, Volume= 2.668 af
Outflow = 26.18 cfs @ 12.30 hrs, Volume= 2.668 af, Atten= 0%, Lag= 1.1 min
Discarded = 0.13 cfs @ 12.30 hrs, Volume= 0.067 af
Primary  = 26.05 cfs @ 12.30 hrs, Volume= 2.602 af

Routed to Link 23 : DP-2 SW Property Line

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 7.98’ @ 12.30 hrs  Surf.Area= 5,441 sf  Storage= 1,978 cf

Plug-Flow detention time= 3.4 min calculated for 2.668 af (100% of inflow)
Center-of-Mass det. time= 3.4 min ( 854.3 - 850.9 )

Volume Invert Avail.Storage Storage Description
#1 7.20’ 8,854 cf Custom Stage Data (Prismatic) Listed below (Recalc)

<table>
<thead>
<tr>
<th>Elevation</th>
<th>Surf.Area</th>
<th>Inc.Store</th>
<th>Cum.Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>(feet)</td>
<td>(sq-ft)</td>
<td>(cubic-feet)</td>
<td>(cubic-feet)</td>
</tr>
<tr>
<td>7.20</td>
<td>141</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7.50</td>
<td>1,637</td>
<td>267</td>
<td>267</td>
</tr>
<tr>
<td>8.00</td>
<td>5,571</td>
<td>1,802</td>
<td>2,069</td>
</tr>
<tr>
<td>9.00</td>
<td>8,000</td>
<td>6,786</td>
<td>8,854</td>
</tr>
</tbody>
</table>

Device Routing Invert Outlet Devices
#1 Discarded 7.20’ 1.020 in/hr Exfiltration over Surface area  Phase-In= 0.01’
#2 Primary 7.50’ 30.0’ long x 5.0’ 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) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.65
2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow  Max=0.13 cfs @ 12.30 hrs  HW=7.98’  (Free Discharge)

Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow  Max=26.05 cfs @ 12.30 hrs  HW=7.98’  TW=0.00’  (Dynamic Tailwater)

Broad-Crested Rectangular Weir (Weir Controls 26.05 cfs @ 1.80 fps)
Summary for Pond 31: Ex Low Point

Inflow Area = 1.327 ac, 13.60% Impervious, Inflow Depth = 1.90" for 100-Year event
Inflow = 1.77 cfs @ 12.28 hrs, Volume= 0.210 af
Outflow = 1.66 cfs @ 12.36 hrs, Volume= 0.210 af, Atten= 6%, Lag= 4.8 min
Discarded = 0.08 cfs @ 12.36 hrs, Volume= 0.074 af
Primary = 1.58 cfs @ 12.36 hrs, Volume= 0.136 af

Routed to Link 33: DP-3 Wetlands/ Salt Marsh

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 12.38' @ 12.36 hrs  Surf.Area= 3,199 sf  Storage= 962 cf

Plug-Flow detention time= 62.7 min calculated for 0.210 af (100% of inflow)
Center-of-Mass det. time= 62.7 min (958.0 - 895.2)

<table>
<thead>
<tr>
<th>Volume</th>
<th>Invert</th>
<th>Avail.Storage</th>
<th>Storage Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>11.50'</td>
<td>1,407 cf</td>
<td>Custom Stage Data (Prismatic) Listed below (Recalc)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11.50</td>
<td>76</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11.75</td>
<td>376</td>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td>12.00</td>
<td>839</td>
<td>152</td>
<td>208</td>
</tr>
<tr>
<td>12.25</td>
<td>2,373</td>
<td>402</td>
<td>610</td>
</tr>
<tr>
<td>12.50</td>
<td>4,005</td>
<td>797</td>
<td>1,407</td>
</tr>
</tbody>
</table>

Device Routing Invert Outlet Devices
#1 Discarded 11.50' 1.020 in/hr Exfiltration over Surface area
#2 Primary 12.25' 15.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65
2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.36 hrs  HW=12.38' (Free Discharge)
Exfiltration (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=1.58 cfs @ 12.36 hrs  HW=12.38'  TW=0.00' (Dynamic Tailwater)
Broad-Crested Rectangular Weir (Weir Controls 1.58 cfs @ 0.83 fps)

Summary for Link 11: DP-1 Matunuck Beach Road

Inflow Area = 0.084 ac, 13.33% Impervious, Inflow Depth = 3.25" for 100-Year event
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af
Primary = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Summary for Link 23: DP-2 SW Property Line

Inflow Area = 10.373 ac, 29.84% Impervious, Inflow Depth = 3.09" for 100-Year event
Inflow = 26.27 cfs @ 12.30 hrs, Volume= 2.668 af
Primary = 26.27 cfs @ 12.30 hrs, Volume= 2.668 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link 33: DP-3 Wetlands/Salt Marsh

Inflow Area = 1.487 ac, 17.56% Impervious, Inflow Depth = 1.62” for 100-Year event
Inflow = 1.93 cfs @ 12.34 hrs, Volume= 0.200 af
Primary = 1.93 cfs @ 12.34 hrs, Volume= 0.200 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
<table>
<thead>
<tr>
<th>Subcatchment</th>
<th>Runoff Area</th>
<th>Impervious</th>
<th>Runoff Depth</th>
<th>Tc</th>
<th>CN</th>
<th>Runoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>101: WPost-101</td>
<td>0.051 ac</td>
<td>36.77%</td>
<td>5.38&quot;</td>
<td>6.0 min</td>
<td>74</td>
<td>0.32 cfs</td>
</tr>
<tr>
<td>201: WPost-201</td>
<td>9.015 ac</td>
<td>34.38%</td>
<td>3.83&quot;</td>
<td>14.3 min</td>
<td>61</td>
<td>30.81 cfs</td>
</tr>
<tr>
<td>203: WPost-203</td>
<td>0.337 ac</td>
<td>55.35%</td>
<td>5.85&quot;</td>
<td>6.0 min</td>
<td>78</td>
<td>2.29 cfs</td>
</tr>
<tr>
<td>205: WPost-205</td>
<td>0.731 ac</td>
<td>53.89%</td>
<td>5.02&quot;</td>
<td>6.0 min</td>
<td>71</td>
<td>4.30 cfs</td>
</tr>
<tr>
<td>208: WPost-208</td>
<td>0.260 ac</td>
<td>0.00%</td>
<td>1.37&quot;</td>
<td>6.0 min</td>
<td>39</td>
<td>0.30 cfs</td>
</tr>
<tr>
<td>301: WPost-301</td>
<td>1.273 ac</td>
<td>40.93%</td>
<td>4.07&quot;</td>
<td>17.4 min</td>
<td>63</td>
<td>4.31 cfs</td>
</tr>
<tr>
<td>305: WPost-305</td>
<td>0.277 ac</td>
<td>29.96%</td>
<td>3.36&quot;</td>
<td>6.0 min</td>
<td>57</td>
<td>1.07 cfs</td>
</tr>
</tbody>
</table>

**Pond 1P: DMH-2**
- Peak Elev: 8.87'
- Inflow: 4.30 cfs
- Runoff: 0.32 cfs
- Tc: 6.0 min
- CN: 74
- Runoff: 0.023 af

**Pond 202: Low Point A**
- Peak Elev: 8.86'
- Inflow: 31.91 cfs
- Storage: 19,079 cf
- Discarded: 0.30 cfs
- Primary: 6.53 cfs
- Secondary: 15.80 cfs
- Outflow: 22.63 cfs

**Pond 204: Stormcrete Treatment System A**
- Peak Elev: 9.75'
- Inflow: 2.29 cfs
- Storage: 1,048 cf
- Discarded: 0.37 cfs
- Primary: 1.60 cfs
- Secondary: 4.20 cfs
- Outflow: 5.80 cfs

**Pond 206: Stormtech-740 WQ**
- Peak Elev: 8.84'
- Inflow: 1.05 cfs
- Storage: 0.019 af
- Discarded: 0.21 cfs
- Primary: 2.54 cfs
- Outflow: 2.75 cfs

**Pond 207: UIS 48" Pipes**
- Peak Elev: 8.84'
- Inflow: 3.36 cfs
- Storage: 0.055 af
- Discarded: 0.21 cfs
- Primary: 2.54 cfs
- Outflow: 2.75 cfs

**Pond 304: Stormcrete Treatment System B**
- Peak Elev: 14.09'
- Inflow: 4.31 cfs
- Storage: 550 cf
- Discarded: 0.10 cfs
- Primary: 4.20 cfs
- Outflow: 4.31 cfs

**Pond 312P: Level Spreader**
- Peak Elev: 6.51'
- Inflow: 23.77 cfs
- Storage: 551 cf
- Discarded: 0.01 cfs
- Primary: 23.77 cfs
- Outflow: 23.77 cfs

**Link 102: DP-1 Matunuck Beach Road**
- Inflow: 0.32 cfs
- Primary: 0.32 cfs

**Link 209: DP-2 Low Point/ SW Property Line**
- Inflow: 23.95 cfs
- Primary: 23.95 cfs
Link 306: DP-3 Wetlands/ Salt Marsh

Inflow=4.79 cfs  0.379 af
Primary=4.79 cfs  0.379 af
Summary for Subcatchment 101: WPost-101

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 5.38"
Routed to Link 102 : DP-1 Matunuck Beach Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr  100-Year Rainfall=8.50"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>0.029</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
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<tr>
<td>0.003</td>
<td>48</td>
<td>Brush, Good, HSG B</td>
</tr>
<tr>
<td>0.007</td>
<td>98</td>
<td>Impervious, HSG B</td>
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<tr>
<td>0.011</td>
<td>98</td>
<td>Offsite Impervious, HSG B</td>
</tr>
<tr>
<td>0.051</td>
<td>74</td>
<td>Weighted Average</td>
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<tr>
<td>0.032</td>
<td>60</td>
<td>63.23% Pervious Area</td>
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<tr>
<td>0.019</td>
<td>98</td>
<td>36.77% Impervious Area</td>
</tr>
</tbody>
</table>

Tc, Length, Slope, Velocity, Capacity, Description
6.0 Direct Entry,

Summary for Subcatchment 201: WPost-201

Runoff = 30.81 cfs @ 12.20 hrs, Volume= 2.877 af, Depth= 3.83"
Routed to Pond 202 : Low Point A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr  100-Year Rainfall=8.50"

<table>
<thead>
<tr>
<th>Area (ac)</th>
<th>CN</th>
<th>Description</th>
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<tbody>
<tr>
<td>5.153</td>
<td>39</td>
<td>&gt;75% Grass cover, Good, HSG A</td>
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<td>0.416</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
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<tr>
<td>0.184</td>
<td>30</td>
<td>Brush, Good, HSG A</td>
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<tr>
<td>0.041</td>
<td>48</td>
<td>Brush, Good, HSG B</td>
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<td>0.112</td>
<td>96</td>
<td>Gravel surface, HSG A</td>
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<tr>
<td>0.010</td>
<td>96</td>
<td>Gravel surface, HSG B</td>
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<tr>
<td>0.004</td>
<td>98</td>
<td>Impervious, HSG A</td>
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<td>1.533</td>
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<td>Offsite Impervious, HSG A</td>
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<td>0.247</td>
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<td>Offsite Impervious, HSG B</td>
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<td>1.221</td>
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<td>Offsite Roofs, HSG A</td>
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<tr>
<td>0.093</td>
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<td>Offsite Roofs, HSG B</td>
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<tr>
<td>9.015</td>
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<td>Weighted Average</td>
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<tr>
<td>5.916</td>
<td>41</td>
<td>65.62% Pervious Area</td>
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<tr>
<td>3.099</td>
<td>98</td>
<td>34.38% Impervious Area</td>
</tr>
<tr>
<td>Tc (min)</td>
<td>Length (feet)</td>
<td>Slope (ft/ft)</td>
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<tr>
<td>---------</td>
<td>---------------</td>
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<tr>
<td>9.0</td>
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</table>

**Summary for Subcatchment 203: WPost-203**

Runoff = 2.29 cfs @ 12.09 hrs, Volume= 0.165 af, Depth= 5.85"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

<table>
<thead>
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<th>Area (ac)</th>
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<th>Description</th>
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<td>0.090</td>
<td>61</td>
<td>&gt;75% Grass cover, Good, HSG B</td>
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<tr>
<td>0.149</td>
<td>98</td>
<td>Impervious, HSG A</td>
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<tr>
<td>0.038</td>
<td>98</td>
<td>Impervious, HSG B</td>
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<tr>
<td>0.337</td>
<td>78</td>
<td>Weighted Average</td>
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<tr>
<td>0.151</td>
<td>52</td>
<td>44.65% Pervious Area</td>
</tr>
<tr>
<td>0.187</td>
<td>98</td>
<td>55.35% Impervious Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td>6.0</td>
<td>Direct Entry,</td>
</tr>
</tbody>
</table>

**Summary for Subcatchment 205: WPost-205**

Runoff = 4.30 cfs @ 12.09 hrs, Volume= 0.306 af, Depth= 5.02"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"
Area (ac)  CN  Description
0.337   39 >75% Grass cover, Good, HSG A
0.000   30 Brush, Good, HSG A
0.284   98 Impervious, HSG A
0.111   98 Roofs, HSG A

0.731   71 Weighted Average
0.337   39 46.11% Pervious Area
0.394   98 53.89% Impervious Area

Tc  Length  Slope  Velocity  Capacity  Description
(min)  (feet)  (ft/ft)  (ft/sec)  (cfs)
6.0

Direct Entry,

Summary for Subcatchment 208: WPost-208

Runoff = 0.30 cfs @ 12.11 hrs, Volume= 0.030 af, Depth= 1.37"
Routed to Link 209 : DP-2 Low Point/ SW Property Line

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)  CN  Description
0.260   39 >75% Grass cover, Good, HSG A

0.260   39 100.00% Pervious Area

Tc  Length  Slope  Velocity  Capacity  Description
(min)  (feet)  (ft/ft)  (ft/sec)  (cfs)
6.0

Direct Entry,

Summary for Subcatchment 301: WPost-301

Runoff = 4.31 cfs @ 12.24 hrs, Volume= 0.431 af, Depth= 4.07"
Routed to Pond 304 : Stormcrete Treatment System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.50"

Area (ac)  CN  Description
0.709   39 >75% Grass cover, Good, HSG A
0.043   30 Brush, Good, HSG A
0.287   98 Impervious, HSG A
0.122   98 Offsite Impervious, HSG A
0.057   98 Offsite Roofs, HSG A
0.055   98 Roofs, HSG A

1.273   63 Weighted Average
0.752   38 59.07% Pervious Area
0.521   98 40.93% Impervious Area
Tc Length Slope Velocity Capacity Description
(min) (feet) (ft/ft) (ft/sec) (cfs)

15.6 92 0.0130 0.10 Sheet Flow, A
Grass: Dense  n= 0.240  P2= 3.30"

0.6 38 0.0030 1.11 Shallow Concentrated Flow, B
Paved  Kv= 20.3 fps

0.7 138 0.0410 3.26 Shallow Concentrated Flow, C
Unpaved  Kv= 16.1 fps

0.5 76 0.0131 2.32 Shallow Concentrated Flow, D
Paved  Kv= 20.3 fps

17.4 344 Total

Summary for Subcatchment 305: WPost-305

Runoff  =  1.07 cfs @  12.09 hrs, Volume= 0.078 af, Depth= 3.36"
Routed to Link 306 : DP-3 Wetlands/ Salt Marsh

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr  100-Year Rainfall=8.50"

Area (ac) CN Description

0.194 39 >75% Grass cover, Good, HSG A
0.000 30 Brush, Good, HSG A
0.000 98 Impervious, HSG A
0.050 98 Offsite Impervious, HSG A
0.033 98 Offsite Roofs, HSG A
0.277 57 Weighted Average
0.194 39 70.04% Pervious Area
0.083 98 29.96% Impervious Area

Tc Length Slope Velocity Capacity Description
(min) (feet) (ft/ft) (ft/sec) (cfs)

6.0 Direct Entry,

Summary for Pond 1P: DMH-2

Inflow Area = 0.731 ac, 53.89% Impervious, Inflow Depth = 5.02” for 100-Year event
Inflow  =  4.30 cfs @  12.09 hrs, Volume= 0.306 af
Outflow  =  4.30 cfs @  12.09 hrs, Volume= 0.306 af, Atten= 0%, Lag= 0.0 min
Primary  =  1.05 cfs @  12.11 hrs, Volume= 0.115 af
Routed to Pond 206 : Stormtech-740 WQ
Secondary  =  3.36 cfs @  12.07 hrs, Volume= 0.191 af
Routed to Pond 207 : UIS 48” Pipes

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 8.87’ @ 12.17 hrs

Device Routing Invert Outlet Devices
#1 Primary 6.65’ 8.00’ Round Culvert to WQ/ISO Section
L= 9.6’ CMP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 6.65’ / 6.55’  S= 0.0104’/’  Cc= 0.900

74
Type III 24-hr 100-Year Rainfall=8.50"

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#### #2 Secondary 5.50'

- **n = 0.012** Corrugated PP, smooth interior, Flow Area= 0.35 sf
- **24.00" Round Culvert to QP Section**
  - L= 8.0’ CMP, square edge headwall, Ke= 0.500
  - Inlet / Outlet Invert= 5.50’ / 5.50’ S= 0.0000 ' / Cc= 0.900
- **n = 0.012** Corrugated PP, smooth interior, Flow Area= 3.14 sf

#### #3 Device 2 7.40'

- **6.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
  - Head (feet) 0.20 0.40 0.60 0.80 1.00
  - Coef. (English) 2.80 2.92 3.08 3.30 3.32

#### Summary for Pond 202: Low Point A

- Inflow Area = 9.352 ac, 35.13% Impervious, Inflow Depth = 3.72” for 100-Year event
- **Inflow = 31.91 cfs @ 12.19 hrs, Volume= 2.902 af**
- **Outflow = 22.63 cfs @ 12.36 hrs, Volume= 2.902 af, Atten= 29%, Lag= 10.2 min**
- **Discarded = 0.30 cfs @ 12.36 hrs, Volume= 0.347 af**
- **Primary = 6.53 cfs @ 12.36 hrs, Volume= 0.643 af**
- Routed to Pond 312P: Level Spreader
- **Secondary = 15.80 cfs @ 12.36 hrs, Volume= 1.912 af**
- Routed to Pond 312P: Level Spreader

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
- Peak Elev= 8.86' @ 12.36 hrs  Surf.Area= 12,765 sf  Storage= 19,079 cf

Plug-Flow detention time= 36.3 min calculated for 2.902 af (100% of inflow)
- Center-of-Mass det. time= 36.3 min ( 883.9 - 847.5 )

### Volume Invert Avail.Storage Storage Description

<table>
<thead>
<tr>
<th>#1</th>
<th>7.00’</th>
<th>27,624 cf</th>
<th><strong>Custom Stage Data (Prismatic)</strong> Listed below (Recalc)</th>
</tr>
</thead>
<tbody>
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<td>4,880</td>
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<tr>
<td>7.50</td>
<td>9,364</td>
<td>3,561</td>
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<td>8,743</td>
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<td>13,000</td>
<td>12,181</td>
<td>20,924</td>
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<td>9.50</td>
<td>13,800</td>
<td>6,700</td>
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### Device Routing Invert Outlet Devices

<table>
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<tr>
<th>#1</th>
<th>Discarded</th>
<th>7.00’</th>
<th><strong>1.020 in/hr Exfiltration over Surface area</strong> Phase-In= 0.01’</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2</td>
<td>Primary</td>
<td>7.35’</td>
<td><strong>18.00” Round Culvert</strong> L= 45.9’ RCP, mitered to conform to fill, Ke= 0.700</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Inlet / Outlet Invert= 7.35’ / 5.50’ S= 0.0403 ‘ / Cc= 0.900</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf</td>
</tr>
<tr>
<td>#3</td>
<td>Device 4</td>
<td>7.45’</td>
<td><strong>15.00” W x 12.00” H Vert. Orifice/Grate X 4.00</strong> C= 0.600</td>
</tr>
</tbody>
</table>

75
Limited to weir flow at low heads

18.00" Round Culvert X 2.00

L = 52.0' RCP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 7.00' / 5.50' S= 0.0288 '/' Cc= 0.900
n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Discarded OutFlow  Max=0.30 cfs @ 12.36 hrs  HW=8.86' (Free Discharge)
1=Exfiltration  (Exfiltration Controls 0.30 cfs)

Primary OutFlow  Max=6.53 cfs @ 12.36 hrs  HW=8.86'  TW=6.51'  (Dynamic Tailwater)
2=Culvert  (Inlet Controls 6.53 cfs @ 3.70 fps)

Secondary OutFlow  Max=15.80 cfs @ 12.36 hrs  HW=8.86'  TW=6.51'  (Dynamic Tailwater)
3=Orifice/Grate  (Passes 15.80 cfs of 22.61 cfs potential flow)
4=Culvert  (Inlet Controls 15.80 cfs @ 4.47 fps)

Summary for Pond 204: Stormcrete Treatment System A

Inflow Area = 0.337 ac, 55.35% Impervious, Inflow Depth = 5.85" for 100-Year event
Inflow = 2.29 cfs @ 12.09 hrs, Volume= 0.165 af
Outflow = 1.97 cfs @ 12.13 hrs, Volume= 0.165 af, Atten= 14%, Lag= 2.9 min
Discarded = 0.37 cfs @ 11.72 hrs, Volume= 0.140 af
Primary = 1.60 cfs @ 12.13 hrs, Volume= 0.025 af

Routed to Pond 202 : Low Point A

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 9.75' @ 12.13 hrs  Surf.Area= 1,944 sf  Storage= 1,048 cf

Plug-Flow detention time= 11.8 min calculated for 0.165 af (100% of inflow)
Center-of-Mass det. time= 11.8 min ( 816.9 - 805.2 )

Volume  Invert  Avail.Storage  Storage Description
#1  9.70'  233 cf  Custom Stage Data (Prismatic) Listed below (Recalc) -Impervious
#2  9.20'  194 cf  6" Stormcrete Slab (Prismatic) Listed below (Recalc) -Impervious
      972 cf Overall x 20.0% Voids
#3  9.03'  109 cf  2" Leveling Course (No. 8 Stone) (Prismatic) Listed below (Recalc) -Impervious
      330 cf Overall x 33.0% Voids
#4  8.03'  642 cf  12" Reservoir (No. 57 Stone) (Prismatic) Listed below (Recalc)
      1,944 cf Overall x 33.0% Voids

1,178 cf Total Available Storage

Elevation  Surf.Area  Inc.Store  Cum.Store
(Feet)  (sq-ft)  (cubic-feet)  (cubic-feet)
9.70  1,944  0  0
9.80  2,714  233  233

Elevation  Surf.Area  Inc.Store  Cum.Store
(Feet)  (sq-ft)  (cubic-feet)  (cubic-feet)
9.20  1,944  0  0
9.70  1,944  972  972
Elevation Surf.Area Inc.Store Cum.Store
(feet) (sq-ft) (cubic-feet) (cubic-feet)
9.03 1,944 0 0
9.20 1,944 330 330

Elevation Surf.Area Inc.Store Cum.Store
(feet) (sq-ft) (cubic-feet) (cubic-feet)
8.03 1,944 0 0
9.03 1,944 1,944 1,944

Device Routing Invert Outlet Devices
#1 Discarded 8.03' 8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2 Primary 9.70' 64.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65
2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow  Max=0.37 cfs @ 11.72 hrs  HW=8.05' (Free Discharge)
Primary OutFlow  Max=1.58 cfs @ 12.13 hrs  HW=9.75'  TW=8.29' (Dynamic Tailwater)

Summary for Pond 206: Stormtech-740 WQ

Inflow Area = 0.731 ac, 53.89% Impervious, Inflow Depth = 1.88” for 100-Year event
Inflow = 1.05 cfs @ 12.11 hrs, Volume= 0.115 af
Outflow = 0.10 cfs @ 10.34 hrs, Volume= 0.115 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.10 cfs @ 10.34 hrs, Volume= 0.115 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 8.84' @ 12.19 hrs  Surf.Area= 0.012 ac  Storage= 0.019 af

Plug-Flow detention time= 63.4 min calculated for 0.114 af (100% of inflow)
Center-of-Mass det. time= 63.3 min (972.6 - 909.3)

Volume Invert Avail.Storage Storage Description
#1A 6.00’ 0.009 af 20.50’W x 24.98’L x 3.50’H Field A
Overall - 0.013 af Embedded = 0.028 af x 33.0% Voids
#2A 6.50’ 0.013 af ADS_StormTech SC-740 +Cap x 12 Inside #1
Effective Size= 44.6’W x 30.0’H => 6.45 sf x 7.12’L = 45.9 cf
Overall Size= 51.0’W x 30.0’H x 7.56’L with 0.44’ Overlap
12 Chambers in 4 Rows

0.022 af  Total Available Storage

Storage Group A created with Chamber Wizard

Device Routing Invert Outlet Devices
#1 Discarded 6.00’ 8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
Discarded OutFlow  Max=0.10 cfs @ 10.34 hrs  HW=6.04’ (Free Discharge)
Exfiltration  (Exfiltration Controls 0.10 cfs)

Summary for Pond 207: UIS 48” Pipes

<table>
<thead>
<tr>
<th></th>
<th>Inflow</th>
<th>Outflow</th>
<th>Discarded</th>
<th>Primary</th>
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<tbody>
<tr>
<td>Inflow</td>
<td>3.36 cfs @ 12.07 hrs, Volume= 0.191 af</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outflow</td>
<td>2.75 cfs @ 12.17 hrs, Volume= 0.191 af, Atten= 18%, Lag= 6.1 min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discarded</td>
<td>0.21 cfs @ 11.63 hrs, Volume= 0.120 af</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>2.54 cfs @ 12.17 hrs, Volume= 0.071 af</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Routed to Pond 312P: Level Spreader

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 8.84’ @ 12.17 hrs  Surf.Area= 0.025 ac  Storage= 0.055 af

Plug-Flow detention time= 76.9 min calculated for 0.191 af (100% of inflow)
Center-of-Mass det. time= 76.9 min (843.6 - 766.6)

Volume  Invert  Avail.Storage  Storage Description
#1A  5.00’  0.027 af  27.13’W x 40.00’L x 5.50’H Field A
0.137 af Overall - 0.055 af Embedded = 0.082 af x 33.0% Voids
#2A  5.50’  0.046 af  ADS N-12 48” x 4 Inside #1
Inside= 47.7”W x 47.7”H => 12.40 sf x 20.00’L = 248.0 cf
Outside= 54.0”W x 54.0”H => 14.86 sf x 20.00’L = 297.1 cf
Row Length Adjustment= +8.00’ x 12.40 sf x 4 rows
24.13’ Header x 12.40 sf x 2 = 598.3 cf Inside

0.073 af Total Available Storage

Storage Group A created with Chamber Wizard

Device  Routing  Invert  Outlet Devices
#1 Discarded  5.00’  8.270 in/hr Exfiltration over Surface area  Phase-In= 0.01’
#2 Device 3  8.50’  4.0’ long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3 Primary  5.50’  12.00” Round Culvert  L= 31.0’ Ke= 0.500
Inlet / Outlet Invert= 5.50’ / 5.50’  S= 0.0000 '/'  Cc= 0.900
n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow  Max=0.21 cfs @ 11.63 hrs  HW=5.06’ (Free Discharge)
Exfiltration  (Exfiltration Controls 0.21 cfs)

Primary OutFlow  Max=2.54 cfs @ 12.17 hrs  HW=8.84’  TW=6.48’ (Dynamic Tailwater)
Sharp-Crested Rectangular Weir  (Weir Controls 2.54 cfs @ 1.90 fps)

Summary for Pond 304: Stormcrete Treatment System B

78
Inflow Area = 1.273 ac, 40.93% Impervious, Inflow Depth = 4.07" for 100-Year event
Inflow  = 4.31 cfs @ 12.24 hrs, Volume= 0.431 af
Outflow = 4.31 cfs @ 12.24 hrs, Volume= 0.431 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.10 cfs @ 10.71 hrs, Volume= 0.130 af
Primary = 4.20 cfs @ 12.24 hrs, Volume= 0.301 af

Routed to Link 306: DP-3 Wetlands/ Salt Marsh
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 14.09' @ 12.24 hrs Surf.Area= 540 sf Storage= 550 cf

Plug-Flow detention time= 20.7 min calculated for 0.431 af (100% of inflow)    Center-of-Mass det. time= 20.7 min ( 867.9 - 847.2 )

<table>
<thead>
<tr>
<th>Volume</th>
<th>Invert</th>
<th>Avail.Storage</th>
<th>Storage Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 14.00'</td>
<td>135 cf</td>
<td>Custom Stage Data (Prismatic) Listed below (Recalc) -Impervious</td>
<td></td>
</tr>
<tr>
<td>#2 13.50'</td>
<td>54 cf</td>
<td>6&quot; Stormcrete Slab (Prismatic) Listed below (Recalc) -Impervious 270 cf Overall x 20.0% Voids</td>
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</tr>
<tr>
<td>#3 13.33'</td>
<td>30 cf</td>
<td>2&quot; Leveling Course (No. 8 Stone) (Prismatic) Listed below (Recalc) -Impervious 92 cf Overall x 33.0% Voids</td>
<td></td>
</tr>
<tr>
<td>#4 11.00'</td>
<td>415 cf</td>
<td>12&quot; Reservoir (No. 57 Stone) (Prismatic) Listed below (Recalc) 1,258 cf Overall x 33.0% Voids</td>
<td></td>
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635 cf Total Available Storage

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<tbody>
<tr>
<td>14.00</td>
<td>540</td>
<td>0</td>
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</tr>
<tr>
<td>14.25</td>
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<tbody>
<tr>
<td>13.50</td>
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<tbody>
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<tr>
<td>13.33</td>
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Device Routing Invert Outlet Devices

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<th>Device</th>
<th>Routing</th>
<th>Invert</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>#1</td>
<td>Discarded</td>
<td>11.00'</td>
<td>8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'</td>
</tr>
<tr>
<td>#2</td>
<td>Primary</td>
<td>14.00'</td>
<td>60.0' long x 3.0' breadth Broad-Crested Rectangular Weir</td>
</tr>
</tbody>
</table>

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 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
Discarded OutFlow  Max=0.10 cfs @ 10.71 hrs  HW=11.04'  (Free Discharge)
  ^---1=Exfiltration  (Exfiltration Controls 0.10 cfs)

Primary OutFlow  Max=4.20 cfs @ 12.24 hrs  HW=14.09'  TW=0.00'  (Dynamic Tailwater)
  ^---2=Broad-Crested Rectangular Weir  (Weir Controls 4.20 cfs @ 0.75 fps)

Summary for Pond 312P: Level Spreader

Inflow Area = 9.352 ac, 35.13% Impervious, Inflow Depth = 3.37" for 100-Year event
Inflow = 23.77 cfs @ 12.34 hrs, Volume= 2.626 af
Outflow = 23.77 cfs @ 12.34 hrs, Volume= 2.626 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.64 hrs, Volume= 0.020 af
Primary = 23.77 cfs @ 12.34 hrs, Volume= 2.607 af

Routed to Link 209: DP-2 Low Point/ SW Property Line

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 6.51' @ 12.34 hrs  Surf.Area= 324 sf  Storage= 551 cf

Plug-Flow detention time= 6.1 min calculated for 2.626 af (100% of inflow)
Center-of-Mass det. time= 6.1 min ( 850.8 - 844.7 )

Volume  Invert  Avail.Storage  Storage Description
---  -------  --------  -------------------------------
#1  4.00'    709 cf    Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation  Surf.Area  Inc.Store  Cum.Store
(feet)    (sq-ft)    (cubic-feet)    (cubic-feet)
4.00      90       0          0
6.25   324      466       466
7.00   324      243       709

Device  Routing  Invert  Outlet Devices
#1 Primary  6.25'  54.0' long Sharp-Crested Rectangular Weir  2 End Contraction(s)
#2 Discarded  4.00'  1.020 in/hr Exfiltration over Surface area  Phase-In= 0.01'

Discarded OutFlow  Max=0.01 cfs @ 11.64 hrs  HW=6.28'  (Free Discharge)
  ^---2=Exfiltration  (Exfiltration Controls 0.01 cfs)

Primary OutFlow  Max=23.76 cfs @ 12.34 hrs  HW=6.51'  TW=0.00'  (Dynamic Tailwater)
  ^---1=Sharp-Crested Rectangular Weir  (Weir Controls 23.76 cfs @ 1.68 fps)

Summary for Link 102: DP-1 Matunuck Beach Road

Inflow Area = 0.051 ac, 36.77% Impervious, Inflow Depth = 5.38" for 100-Year event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af
Primary = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Summary for Link 209: DP-2 Low Point/ SW Property Line

Inflow Area = 9.612 ac, 34.18% Impervious, Inflow Depth = 3.29” for 100-Year event
Inflow = 23.95 cfs @ 12.34 hrs, Volume= 2.637 af
Primary = 23.95 cfs @ 12.34 hrs, Volume= 2.637 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link 306: DP-3 Wetlands/ Salt Marsh

Inflow Area = 1.550 ac, 38.97% Impervious, Inflow Depth = 2.93” for 100-Year event
Inflow = 4.79 cfs @ 12.24 hrs, Volume= 0.379 af
Primary = 4.79 cfs @ 12.24 hrs, Volume= 0.379 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
A3.3 Stormcrete Specifications
PRECAST POROUS CONCRETE PAVING SLABS/SYSTEM

NOTE: This guide specification shall govern the materials, methods of installation and performance of the Stormcrete® Precast Porous Concrete Stormwater System (Stormcrete® System) supplied by Porous Technologies, LLC, 163 Thadeus Street, South Portland, ME 04106 (telephone 888-357-1161) in all applications. The Stormcrete® System includes precast porous concrete paving slabs, edge restraints, un-compacted/screed crushed stone levelling layer (base) and compacted crushed stone storage reservoir (subbase) layer over a prepared subgrade. System installations may also include drainage pipe, and separation geotextile and/or membrane, as specified by the project design professional.

PART 1 GENERAL

Section Includes:

1.00 Summary
1.01 References
1.02 Submittals
1.03 Quality Assurance
1.04 Weather Considerations
1.05 Delivery, Handling and Storage

1.0 SUMMARY

Furnish all labor, materials, equipment and incidentals required and install the precast pervious concrete paving slab units, edge restraint, and subbase materials as shown on the drawings and as specified herein.

Before slab units are installed, ensure all materials and preparation for subbase and edge restraints are acceptable to owner and manufacturer of precast pervious concrete paving slabs.

Preparation of subbase materials shall include proper compaction procedures, placement of geotextiles (if required), conditions of subgrade soils, and any other potential obstructions to ensure a satisfactory installation as specified herein.

1.01 REFERENCES

1. American Society for Testing and Materials(ASTM) and other testing standards, in any case the Current Edition shall be the reference:

   a) ASTM C33/C33M Standard Specification for Concrete Aggregates
   b) ASTM C42/C42M Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
d) ASTM C 1701/1701M Standard Test Method for Infiltration Rate of In Place Pervious Concrete.
e) ASTM D1751, Standard Specification for Preformed Expansion Joint Filler or Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
f) ASTM D1754/1754M Standard Test Method for Density and Void Content of Hardened Pervious Concrete

1.02 SUBMITTALS

1. Shop drawings; including installation plan showing layout of each full and partial precast porous concrete paving slab, individual slab drawings detailing lifting points in surface and all dimensions, edge restraint detail(s), and geotextile manufacturer data specification sheets.

2. Test results performed by an independent testing laboratory of the following:

   a) Particle-size analysis in accordance with ASTM C 136/136M Testing methods for Sieve Analysis of Fine and Coarse Aggregates for the crushed stone storage reservoir (subbase) and un-compacted/screed crushed stone levelling layer with source(s) of supply(s) noted.

   b) Infiltration rate of Precast Porous Concrete Paving Slabs in accordance with ASTM C 1701/C 1701M Standard Test Method for Infiltration Rate of In Place Pervious Concrete

   c) Density and void content results for the Precast Porous Concrete Paving Slabs in accordance with ASTM D1754/1754M Standard Test Method for Density and Void Content of Hardened Pervious Concrete.

3. Results of other tests specified by the project design professional.

1.03 QUALITY ASSURANCE: Installation Contractor Qualifications

1. Installation Contractor (Superintendent and Foreman) shall successfully complete the “Stormcrete® Precast Porous Concrete Installation Training Program” and shall be certified as successfully completing said program prior to the commencement of installation, or Mock-up creation procedures. Personnel who have successfully completed the Stormcrete® Precast Porous Concrete Installation Training Program shall be responsible for reviewing the Stormcrete® Handling and Installation manual and the completed Program Examination (and correct test answers) with laborers under their employ. An individual who has successfully completed the Training Program shall be onsite providing supervision during all phases of the Stormcrete® System Installation, including the reservoir course and screeding layer installations.

2. The installation contractor shall use adequate forces including equipment and skilled workers. Workers shall be trained and experienced in the necessary crafts and completely familiar with the specified methods needed for proper performance of this Specification.

3. Installation shall include planning the work, horizontal and vertical layout, fine grading of subgrades, installing membrane and/or geotextile in accordance with the respective manufacturer’s recommendations, placing and compacting crushed stone reservoir storage (subbase), place and screed crushed stone leveling course (base), installation of edge restraint, and placing precast porous concrete paving slabs.
4. All materials, methods of installation and workmanship shall conform to requirements of ASTM, ACI, Department of Transportation, or other applicable Standards.
5. The contractor shall all Obtain Federal, State and/or Municipal approvals that may be required for this project.
6. Contractor’s installation plan shall be reviewed in a pre-construction meeting with Precast Porous Concrete Panel manufacturer’s representatives, paving slab installation contractor, general contractor and project design professional.

1.04 WEATHER CONSIDERATIONS
1. Crushed stone subbase shall not be placed and/or compact in rain or snow, or on saturated or frozen subgrade.
2. Crushed stone base shall not be placed and/or screeded in rain or snow, or on saturated or frozen subbase.
3. Precast porous concrete slabs shall not be placed in heavy rain or snow, or on saturated or frozen base.

1.05 DELIVERY, HANDLING AND STORAGE
1. Delivery shall be coordinated so as not to interfere with other construction and to avoid delays.
2. Slabs shall be offloaded by a forklift of required capacity operated by a trained and certified operator. Forklift shall be equipped with 6-ft. long forks as required to safely offload slabs. Slabs delivered on pallets can be offloaded in its entirety.
3. Safe load capacity of forklift shall be in accordance with Occupational Safety & Health Administration (OSHA) recommended practices. Forklift capacity shall be verified to ensure that the machine is operating at a safe load capacity.
4. 5’x 4’ slabs: store slabs on level ground and with 4-in. by 4-in. (minimum), timbers placed as dunnage parallel to one another and located directly beneath imbedded lifting points. Dunnage shall be placed between each (3) slabs. Slabs may be stored in stacks of no higher than (6) slabs with dunnage beneath every (3) slabs.
5. For 5’ x 2’ and 4’ x 2.5’ slabs: slabs shall be stored in stacks no more than 6 slabs high. Slabs delivered on pallets may be stored in their entirety.
6. Slabs shall be stored such that they are kept free from mud, dirt, grass cuttings, accumulation of foliage and debris.

PART 2 PRODUCTS

2.00 SUMMARY

Section Includes:
2.01 Precast Porous Concrete Paving Slab
2.02 Edge Material/Joint Filler
2.03 Crushed Stone Storage Reservoir (Subbase) and Leveling Course
2.04 Geotextile
2.05 Impermeable Liner
2.01 PRECAST POROUS CONCRETE PAVING SLAB

1. Precast Porous Concrete Paving Slab shall be: Stormcrete® Precast Porous Concrete Paving Slab System supplied by Porous Technologies, LLC, 163 Thadeus Street, South Portland, ME 04106 (888-357-1161).

2. Permanent lifting points shall be imbedded in the slab surface for ease of slab installation, maintenance, removal and reinstallation.

3. Slabs shall be reinforced with Monofilament Microsynthetic microfibers such as BASF MasterFiber M 100 or approved equal.

4. Typical dimensions of precast porous concrete slabs provided shall be;
   i) 5 ft. by 4 ft.
   ii) 5 ft. by 2 ft.
   iii) 4 ft. by 2.5 ft.

   All slabs shall be 6” thick unless otherwise specified. Refer to project specific drawing(s) for required Precast Porous Concrete slab sizing and numbers.

5. Slabs shall be manufactured for field placement with butt joints. Ship-lap joints shall not be permitted.

6. A minimum average infiltration rate of 250 in./hr. shall be demonstrated in accordance with ASTM C 1701/C 1701M.

7. Slabs shall have a void ratio of 15-25% when tested in conformance with ASTM C 1688: Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete.

8. Concrete average unit weight shall be 124 LB/CF (+/- 4%) when tested in conformance with ASTM C 1688: Standard Test Method for Density and Void Content of Freshly Mixed Pervious Concrete.

9. Each individual Precast Porous Slab shall be weighed and the unit shall be labelled with the weight, size and date of manufacture.

10. The slab unit shall include a minimum of 2 imbedded lifting permanent lifting points in the surface of the unit.

11. Precast porous concrete slabs shall be cured by the manufacturer’s approved methods.

12. All slabs shall be provided with a self-stick adhesive label which includes the date of manufacture and slab weight.

13. All slabs shall be provided with 1/8” spacers (preventing slab to slab contact) and approved ½” dia. lifting swivels for use with the imbedded lifting points.

14. All slabs shall be provided with ½” Nylon Stormcrete® lifting point protection caps (Part No. 12NC) and approved ½” dia. lifting swivels for use in covering the imbedded lifting points.

15. Precast porous concrete shall be cast upside down against a steel form and shall be vibrated throughout their entire section during the manufacturing process.
Note: Edge restraint should be provided (by contractor) on all perimeter sides of precast porous concrete pavement installations. Edge restraint may be mounted in asphalt pavement, but use of asphalt pavement as edge restraint shall not be permitted.

2.02 EDGE MATERIAL/JOINT FILLER

1. Edge restraint installed at exterior sides of precast porous concrete paving slabs shall be as follows:
   a) Material: 1/2 –inch thick pre-molded expansion joint filler conforming to ASTM D1751 [aluminum, plastic, concrete edge restraint material or other expansion joint material.] or joint filler consisting of closed cell foam backer rod and polyurethane non-sag elastomeric sealant. [Sikaflex – 15LM, as manufactured by Sika Corp. or approved equal].
   b) Manufacturer: [State approved edge restraint manufacturers acceptable to the owner and precast porous concrete paving slab manufacturer.]
   c) Material Standards: [Specify applicable edge restraint material standards.]

2.03 CRUSHED STONE STORAGE RESERVOIR (SUBBASE) AND LEVELING COURSE

1. Use of screened rounded gravel is prohibited.
2. All crushed stone shall be double-washed and clean and free of all fines and debris.
3. Compacted crushed stone for storage reservoir (subbase) shall conform to ASTM C 33 Size No. 57 Grading Requirements for Coarse Aggregates. Minimum thickness of compacted storage reservoir (subbase) layer shall be 6 in.
4. Un-compacted/screed crushed stone for leveling course (base) shall conform to ASTM C 33 Size No. 8 Grading Requirements for Coarse Aggregates. Thickness of un-compacted/screed leveling course layer shall be 2 in.

2.04 GEOTEXTILE

1. Subgrade shall not be compacted or permanently covered with geotextile unless approved by the Engineer of Record and shall be as follows:
   a) Material Type: Geotextile shall be Non-Woven geotextile.
   b) Manufacturer: [State approved geotextile manufacturers acceptable to the owner/designer].
   c) Material Standards: [AASHTO M288 Class 2]

2.05 IMPERMEABLE LINER

1. Impermeable liner shall be transported, stored and placed in a manner to eliminate any possibility of puncture or penetration.
a) Material Type: 30 mil Grey Poly Vinyl Chloride sheeting, 30 +/- mil., 73 lbs/in Tensile Strength, 8 lbs. tear strength, 3% Dimensional Stability, Low Temperature Impact -20 degrees F.
b) Manufacturer: [State approved geotextile manufacturers].

PART 3       EXECUTION

Section Includes:
3.00 Summary
3.01 Site Preparation
3.02 Examination
3.03 Installation
3.04 Edge Restraint
3.05 Protection
3.06 Maintenance

3.00     Summary

Note: Compaction of subgrade to at least 95% Modified Proctor relative compaction per ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)) is recommended for detention or non-infiltration storm water systems beneath light-duty parking lots and pedestrian sidewalks. Excavation and replacement of the subgrade, possibly with geotextile or geogrid reinforcement, may be necessary where weak, disturbed and/or saturated subgrade soils are present. State Department of Transportation aggregate materials used for roadway and highway flexible pavements are recommended for replacement of weak, disturbed and/or saturated subgrade soils. Compaction of aggregate to a minimum of 95% ASTM D 1557 relative compaction is recommended. Manually operated compactors may be used in areas not accessible to self-propelled rollers. Such areas might include around light pole bases, utility structures, buildings, tree wells and other site improvements.

3.01     SITE PREPARATION

1. Infiltration System Subgrade Preparation
a) Verify that all field infiltration and permeability testing of the subgrade has been performed, that test results meet the project design requirements and [construction of the infiltration
beds] has been approved by the project design professional and accepted by the owner.

b) The subgrade under all infiltration [bed] areas shall not be compacted or permanently covered with geotextile unless approved by the project design professional.

c) Prepared subgrades shall not be subject to construction equipment traffic.

d) Temporary haul roads consisting of crushed stone over a reinforcing geotextile shall be provided as required to prevent the over-compaction of Subgrade Soils.

e) Where erosion has caused accumulation of sediment or ponding on the subgrade, remove sediment with light equipment [and/or manually]. Scarify the underlying soils to a minimum depth of 6 inches with a York rake, or equivalent equipment, and a small/light tractor.

f) Restore any subgrade areas damaged by erosion, ponding, or traffic compaction to design line and grades prior to installation of [filter fabric,] [filter sand layer or] storage reservoir layer.

3.02 EXAMINATION: Acceptance of Site Conditions

1. General contractor shall inspect, accept and document in writing to the slab installation subcontractor that site conditions meet specifications for the following items prior to installation of concrete paving slabs.

   a) Verify that subgrade is dry and relative compaction, surface tolerances and elevations conform to construction drawings and specified requirements.

   b) Verify location, type, and elevations of edge restraints, utility structures, and manholes.

2. Precast porous concrete paving system installation shall not proceed until nonconforming site installations conditions are corrected by the general contractor or designated subcontractor.

3.03 INSTALLATION:

1. General

   a) Any excess thickness of soil placed over the soil subgrade to trap sediment transported by runoff from adjacent construction areas shall be removed before placement of [geotextile and] storage reservoir layer.

   b) Keep area where precast porous concrete paving slabs are to be installed free of sediment during the entire construction period. [Geotextiles and] Storage reservoir crushed stone contaminated with sediment shall be removed and replaced with clean materials.

   c) Do not damage drainpipes, underdrains, observation wells, roadway boxes, manholes or any other utilities during installation. Report any damage immediately to the project design professional. Any damage shall be replaced or repaired as part of the bid price of this item (by the contractor)

   d) Installation of Precast Porous Concrete slabs shall be in strict accordance with the manufacturer’s recommendations, all information contained in this specification, and all related drawings.

   e) Subbase crushed stone materials contaminated with sediment shall be removed and replaced with clean materials.
2. Geotextiles and Impermeable Liner

a) Place geotextile on prepared subgrade and secure in place to prevent wrinkling.
b) Overlap geotextile edges in accordance with the manufacturer’s requirements, and a minimum of 12 in. in the direction of drainage flow.
c) Place impermeable liner as shown on plans after all material that may potentially puncture the liner have been removed from the excavated area.
d) Overlap impermeable liner a minimum of 12 in. in the direction of drainage flow.
e) Firmly secure the impermeable liner at the top of excavation prior to the placement of reservoir material.

3. Compacted Reservoir Storage Layer (Subbase)

a) Coordinate and construct all required concrete footings and foundation for all utility posts and signage posts with inserted post sleeves.
b) Place open graded stone base/reservoir conforming to ASTM C33 No. 57 (or stone size as Local Regulations may require) washed crushed stone over prepared subgrade; spread and level evenly by raking to specified thickness. Do not disturb prepared subgrade or shift, wrinkle or fold the geotextile. Place crushed stone to protect geotextile from tearing under equipment tires and tracks.
c) Compact reservoir storage layer, with a minimum of two complete coverages, one pass each in mutually perpendicular directions, with a 1 to 3 ton smooth, double or single, drum roller operated in vibratory mode. Following vibratory compaction, apply two complete coverages, one pass each in mutually perpendicular directions, with the roller operated in static mode. Continue static rolling until there is no visible movement, weaving or deflection in the surface of the storage reservoir layer. In areas that are too small to permit the use of a 1 to 3 ton drum roller a walk behind plate compactor shall be used on each lift of 6". Compaction using the plate compactor shall require four complete coverages, two passes each in mutually perpendicular directions.
d) The surface tolerance of the compacted storage reservoir layer shall be +/- 3/4 in. under a 10 ft. straightedge. Prior to placing the washed aggregate (custom), the recommended subbase surface tolerance should +/- 3/8 in. under a 10 ft. straight edge.
e) Compacted storage reservoir area shall not substantially exceed that which is covered by paving slabs by the end-of-day.
f) In all cases reservoir stone shall be placed and compacted against rigid lateral boundaries, i.e., in situ, undisturbed native soils, fill materials compacted to 98% Standard Proctor density or concrete curb and headers. Compaction of reservoir stone against any flexible boundaries shall not be allowed.

Note: Geogrid shall be required at the discretion of the design engineer. Excavation and replacement of the subgrade, possibly with geotextile or geogrid reinforcement, might be necessary where weak, disturbed and/or saturated subgrade soils are present. State Department of Transportation aggregate materials used for roadway and highway flexible pavements are recommended for replacement of weak, disturbed and/or saturated subgrade soils.
4. Un-compacted/screed Crushed Stone Levelling Layer (Base)

   a) Place and spread ASTM C 33 Size Number 8 (3/8”) crushed stone evenly over screed rails to achieve a thickness of 2 inches minimum. Level the surface of crushed stone with a screed.
   b) Do not compact or disturb screeded leveling layer.
   c) The surface tolerance of the screed leveling layer shall be + 1/4 in. under a 10 ft. straightedge.
   d) Screed leveling layer placed shall not substantially exceed that which is covered by paving slabs by the end-of-day.

5. Precast Porous Concrete Paving Slab Placement

   a) Lay slabs in pattern(s) shown on approved drawings and manufacturer’s layout plan. Cut slabs as indicated to complete pattern.
   b) For gutter applications, slabs shall be placed perpendicular to the adjacent curb. The angle between the curb and slab shall be greater than or equal to 90°.
   c) Slabs shall only be lifted and placed using lifting swivels (Part No.12LS) and spreader chains. Chains, cables or slings should never be wrapped around slabs for lifting under any circumstances. Lifting swivel bolts shall be securely bolted snug but not over-tightened to avoid damage to the surface.
   d) Place Precast porous concrete slabs without using metal hammers, pry bars or drift pins. Make horizontal adjustments to placement of laid slabs with wood wedges and levers, and rubber mallets as needed.
   e) Adjacent slabs shall be separated from each other by 1/8”. Manufacturer supplied spacers (Part No 18SP) shall be used to ensure proper joint spacing.
   f) The porous concrete panels shall be installed so that there is no lippage or surface unevenness greater than 1/8” difference in height between slabs and adjacent surfaces.
   g) Joints between adjacent rows of slabs shall be staggered when possible.
   h) Joints shall never be filled with loose material including but not limited to (sand, stone dust, stone chips, etc.)
   i) Horizontal joint lines shall not deviate more than ±½ in. over 50 ft. from string lines.
   j) Fill gaps at the edges of the paved area with properly-sized cut slabs.
   k) Cut end slabs to be placed along the edge or corners with a diamond blade masonry saw. Cut units shall be no narrower than 18” and cutting shall occur so that a minimum distance of 8” is maintained between embedded lifters and cut edges.
   l) Core drill or cut slabs as may be necessary to fit over, and/or around, existing Utility Structures or Poles, and Sign Posts prior to slab placement.
   m) Cut Slabs using hand-held, or machine driven diamond cut off saw having the required blade diameter to safely cut slabs.
   n) Protect adjacent slabs surfaces from dust infiltration when cutting slabs.
   o) Seal outside edges and around installed new concrete footing and foundations, Utility Structures or Poles and Sign Posts as indicated on the approved Permit Plans with approved materials as per Section 2.02 EDGE MATERIAL/JOINT FILLER of these Specifications.
p) Adjust bond pattern at pavement edges such that cutting of edge slabs is minimized. Do not expose cut slabs to vehicular traffic. [Cut slabs at edges as indicated on the drawings.]
q) Keep skid steer and forklift equipment off unrestrained paving slabs.
r) After an area is completely paved, set the precast porous concrete slabs into the screed crushed stone leveling course layer by trafficking with light rubber-tired equipment.
s) Remove and replace any slabs cracked or damaged during installation with new ones. Reset slabs not in conformance with specified installation tolerances.
t) Installer shall warranty for a period of one year from the date of installation that installed slabs shall be free of rocking or pumping evidenced by visible vertical movement. Any slabs observed to be moving shall be removed and the screeding course shall be re-screeded and the slabs reset.
u) Check final surface elevations of set slabs for conformance to design drawings. The final surface tolerance from grade elevations shall not deviate more than ± 1/4 in. under a 10 ft. straightedge.
v) The surface elevation of set slabs shall be flush with manholes or the top of utility structures.
w) Hairline cracks in placed slabs shall be considered as to not interfere with the proper functioning or performance of the system. Where approved by the Engineer, larger cracks or occasional imperfections may be repaired under the direction of the manufacturer. The repairs must be properly finished and cured. The color of the repair area must match as closely as possible with the rest of the element color. Repairs shall be made with a mixture of sand and cement, as directed by the manufacturer.
x) In all cases reservoir stone shall be placed and compacted against rigid lateral boundaries, i.e., in situ, undisturbed native soils, fill materials compacted to 98% Standard Proctor density or concrete curb and headers. Compaction of reservoir stone against any flexible boundaries shall not be allowed.

Note: The uniformity of the un-compacted/screed crushed stone levelling base layer determines the differential settlement between precast porous concrete paving slabs. The slab installation contractor should not correct deficiencies in the smoothness of the leveling layer surface by randomly placing additional stone, raking, compaction or by other similar means.

3.04 EDGE RESTRAINT

1. Install edge restraints per the drawings and manufacturer’s recommendations at the indicated locations and elevations.

Edge restraint should be provided (by contractor) on all perimeter sides of precast porous concrete pavement installations. Edge restraint may be mounted in asphalt pavement, but use of asphalt pavement as edge restraint is not allowed.
3.05 PROTECTION

1. Immediately after Precast porous concrete slabs have been placed; use provided (by manufacturer) plastic caps to fill imbedded lifting points. Care should be taken to make sure the plastic caps are flush with the surface; do not press caps down into the imbedded lifting points.
2. After work in this section is complete, the general contractor shall be responsible for protecting the Precast porous paving slab system from damage and/or contamination with mud, dirt, grass cuttings, accumulation of foliage and debris.
3. The surface of the Precast porous paving slabs shall be covered during the placement of adjacent soils or paving materials.

3.06 MAINTENANCE
