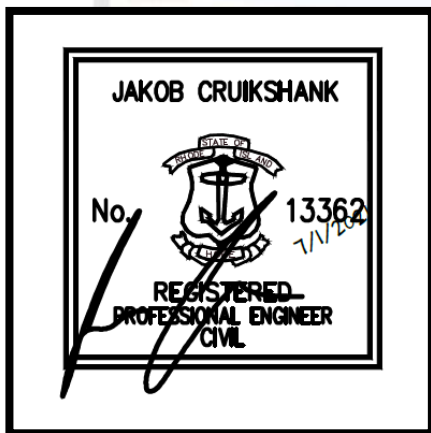
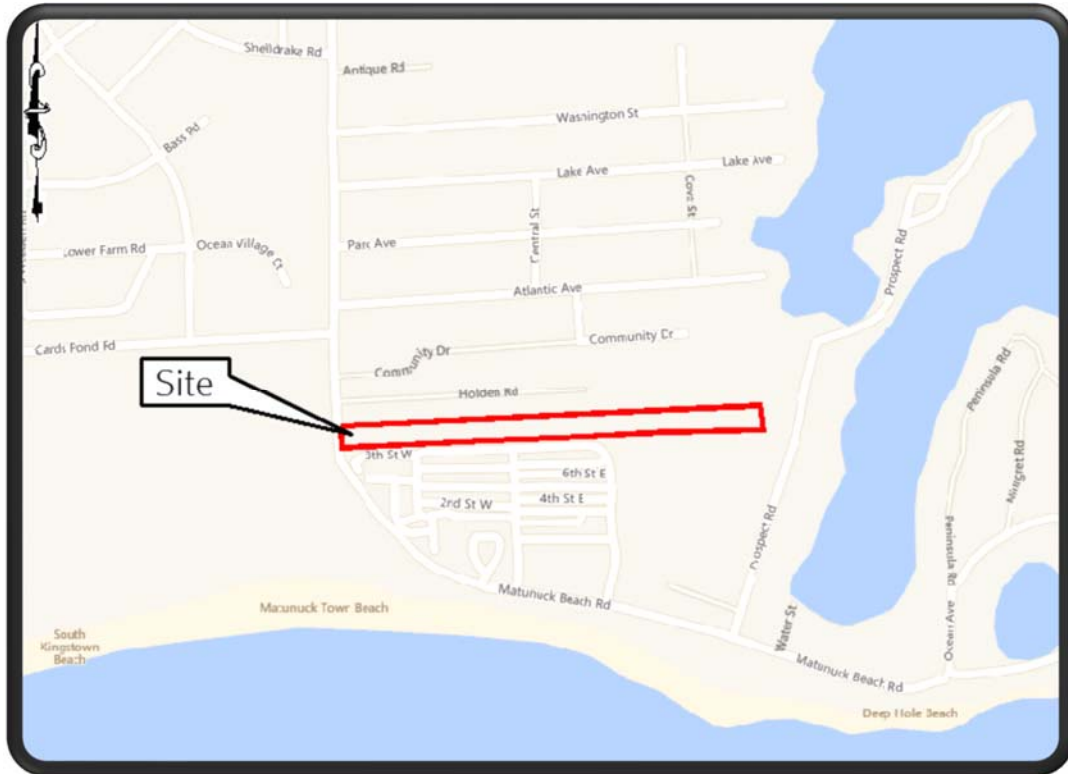




# Stormwater Management Report



## Matunuck Beach Condos

Located in South Kingstown, RI  
Applicant: Douglas Enterprises, LTD

6-22-2021

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## 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 chambers). 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 remove 85% or more of 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:

Subwatershed (design point)	1.2" Peak Flow		1-yr Peak Flow		10-yr Peak Flow		25-yr Peak Flow		100-yr Peak Flow	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
DP-1:	0.01	0.01	0.00	0.02	0.08	0.08	0.15	0.12	0.31	0.20
DP-2:	1.28	0.75	0.12	0.05	7.16	6.50	13.57	12.48	27.52	24.11
Totals:	1.29	0.76	0.12	0.07	7.24	6.58	13.72	12.60	27.83	24.31

All flows in cubic feet per second (cfs)

Subwatershed (design point)	1.2" Peak Volume		1-yr Peak Volume		10-yr Peak Volume		100-yr Peak Volume	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
DP-1:	0.001	0.001	0.001	0.002	0.007	0.006	0.023	0.014
DP-2:	0.076	0.053	0.020	0.013	0.744	0.698	2.698	2.691
Totals:	0.077	0.054	0.021	0.015	0.751	0.704	2.721	2.705

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	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	DP-3*:	0.09	0.09	0.09	0.02	0.35	1.01	0.52	2.06	1.89
Totals:	0.09	0.09	0.09	0.02	0.35	1.01	0.52	2.06	1.89	4.27

\*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**

<b>PROJECT NAME</b> Matunuck Beach Condominiums	<b>(RIDEM USE ONLY)</b>
<b>TOWN</b> South Kingstown	STW/WQC File #:
<b>BRIEF PROJECT DESCRIPTION:</b> The client proposes to construct six new condominium complexes (12 total units) with associated parking areas and roadway.	Date Received:

### Stormwater Management Plan (SMP) Elements – Minimum Standards

Submit **four separately bound** documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to [Suggestions to Promote Brevity](#).

**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)

<input checked="" type="checkbox"/> Residential	<input type="checkbox"/> Commercial	<input type="checkbox"/> Federal	<input type="checkbox"/> Retrofit	<input type="checkbox"/> Restoration
<input type="checkbox"/> Road	<input type="checkbox"/> Utility	<input type="checkbox"/> Fill	<input type="checkbox"/> Dredge	<input type="checkbox"/> Mine
<input type="checkbox"/> 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](#).

<input checked="" type="checkbox"/> <b>Groundwater</b>	<input checked="" type="checkbox"/> <b>Surface Water</b>	<input type="checkbox"/> <b>MS4</b>
<input type="checkbox"/> GAA	<input type="checkbox"/> Isolated Wetland	<input type="checkbox"/> RIDOT
<input checked="" type="checkbox"/> GA	<input checked="" type="checkbox"/> Named Waterbody	<input type="checkbox"/> RIDOT Alteration Permit is Approved
<input type="checkbox"/> GB	<input type="checkbox"/> Unnamed Waterbody Connected to Named Waterbody	<input type="checkbox"/> Town
<input checked="" type="checkbox"/> 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.

<input type="checkbox"/> Groundwater or Disconnected Wetland	<input type="checkbox"/> SRWP
<input checked="" type="checkbox"/> Waterbody Name: Potter Pond	<input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater <input checked="" type="checkbox"/> Unassessed
<input checked="" type="checkbox"/> Waterbody ID: RI0010043E-05	<input type="checkbox"/> 4 <sup>th</sup> order stream of pond 50 acres or more
<input type="checkbox"/> TMDL for: N/A	<input type="checkbox"/> Watershed of flood prone river (e.g., Pocasset River)
<input type="checkbox"/> Contributes to a priority outfall listed in the TMDL	<input type="checkbox"/> Contributes stormwater to a public beach
<input type="checkbox"/> 303(d) list – Impairment(s) for:	<input type="checkbox"/> Contributes to shellfishing grounds

<b>PROJECT HISTORY</b>		
<input type="checkbox"/> RIDEM Pre- Application Meeting	Meeting Date:	<input type="checkbox"/> Minutes Attached
<input type="checkbox"/> Municipal Master Plan Approval	Approval Date:	<input type="checkbox"/> Minutes Attached
<input type="checkbox"/> Subdivision Suitability Required	Approval #:	
<input type="checkbox"/> Previous Enforcement Action has been taken on the property	Enforcement #:	
<b>FLOODPLAIN &amp; FLOODWAY</b> See <a href="#">Guidance Pertaining to Floodplain and Floodways</a>		
<input checked="" type="checkbox"/> Riverine 100-year floodplain: <b>FEMA FLOODPLAIN FIRMETTE</b> has been reviewed and the 100-year floodplain is on site		
<input type="checkbox"/> Delineated from FEMA Maps		
<b>NOTE:</b> 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		
<input type="checkbox"/> Calculated by Professional Engineer		
<input type="checkbox"/> Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY):	
	Amount of Cut (CY):	
<input type="checkbox"/> Restrictions or modifications are proposed to the flow path or velocities in a floodway		
<input type="checkbox"/> Floodplain storage capacity is impacted		
<input type="checkbox"/> Project area is not within 100-year floodplain as defined by RIDEM		

<b>CRMC JURISDICTION</b>
<input checked="" type="checkbox"/> CRMC Assent required
<input type="checkbox"/> Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
<input type="checkbox"/> Sea level rise mitigation has been designed into this project

<b>LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:</b>		
<b>1. OFFICE OF WASTE MANAGEMENT (OWM)</b>		
<input type="checkbox"/> Known or suspected releases of HAZARDOUS MATERIAL are present at the site (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))		<b>RIDEM CONTACT:</b>
<input type="checkbox"/> Known or suspected releases of PETROLEUM PRODUCT are present at the site (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)		
<input type="checkbox"/> This site is identified on the <a href="#">RIDEM Environmental Resources Map</a> as one of the following regulated facilities		<b>SITE ID#:</b>
<input type="checkbox"/> CERCLIS/Superfund (NPL)		
<input type="checkbox"/> State Hazardous Waste Site (SHWS)		
<input type="checkbox"/> Environmental Land Usage Restriction (ELUR)		
<input type="checkbox"/> Leaking Underground Storage Tank (LUST)		
<input type="checkbox"/> Closed Landfill		
<b>Note:</b> 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.		
<b>2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:</b>		
<input type="checkbox"/> Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. <a href="http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php">http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php</a>		
<input type="checkbox"/> Auto Fueling Facility (e.g., gas station)		
<input type="checkbox"/> Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area		

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<input type="checkbox"/>	Road Salt Storage and Loading Areas (exposed to rainwater)	
<input type="checkbox"/>	Outdoor Storage and Loading/Unloading of Hazardous Substances	
<b>3. STORMWATER INDUSTRIAL PERMITTING</b>		
<input type="checkbox"/>	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:
<input type="checkbox"/>	Construction is proposed on a site that is subject to <a href="#">THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.</a>	MSGP permit #
<input type="checkbox"/>	Additional stormwater treatment is required by the MSGP Explain:	

<b>REDEVELOPMENT STANDARD – MINIMUM STANDARD 6</b>		
<input checked="" type="checkbox"/> Pre Construction Impervious Area		
<input checked="" type="checkbox"/>	Total Pre-Construction Impervious Area (TIA) 0.001ac	
<input checked="" type="checkbox"/>	Total Site Area (TSA) 2.315 acres	
<input checked="" type="checkbox"/>	Jurisdictional Wetlands (JW) 0	
<input type="checkbox"/>	Conservation Land (CL) 0	
<input checked="" type="checkbox"/> Calculate the Site Size (defined as contiguous properties under same ownership)		
<input checked="" type="checkbox"/>	Site Size (SS) = (TSA) – (JW) – (CL) 2.315 acres	
<input checked="" type="checkbox"/>	(TIA) / (SS) = 0	<input type="checkbox"/> (TIA) / (SS) >0.4?
<input type="checkbox"/> YES, Redevelopment		

<b>PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1</b> (NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS) This section may be deleted if not required.	
<p><b>Note:</b> 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:</p> <ul style="list-style-type: none"> <li>• Town requires ... (state the specific local requirement)</li> <li>• Meets Town’s dimensional requirement of ...</li> <li>• Not practical for site because ...</li> <li>• Applying for waiver/variance to achieve this (pending/approved/denied)</li> <li>• Applying for wavier/variance to seek relief from this (pending/approved/denied)</li> </ul>	
<p><b>A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Sensitive resource areas and site constraints are identified (required)</li> <li><input checked="" type="checkbox"/> Local development regulations have been reviewed (required)</li> <li><input checked="" type="checkbox"/> All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction</li> <li><input type="checkbox"/> Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. <b>Note:</b> If Conservation Development has been used, check box and skip to Subpart C</li> <li><input checked="" type="checkbox"/> As much natural vegetation and pre-development hydrology as possible has been maintained</li> </ul>	<p><b>IF NOT IMPLEMENTED, EXPLAIN HERE</b></p>

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<p><b>B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies</li> <li><input checked="" type="checkbox"/> Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B)</li> <li><input type="checkbox"/> Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's)</li> <li><input checked="" type="checkbox"/> Development sites and building envelopes have been positioned outside of floodplains</li> <li><input checked="" type="checkbox"/> Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features</li> <li><input checked="" type="checkbox"/> Development sites and building envelopes have been located to minimize impacts to steep slopes (<math>\geq 15\%</math>)</li> <li><input type="checkbox"/> Other (describe):</li> </ul>	
<p><b>C) MINIMIZE CLEARING AND GRADING</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety.</li> <li><input checked="" type="checkbox"/> Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities)</li> <li><input checked="" type="checkbox"/> 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)</li> <li><input checked="" type="checkbox"/> Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent</li> </ul>	
<p><b>D) REDUCE IMPERVIOUS COVER</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Reduced roadway widths (<math>\leq 22</math> feet for ADT <math>\leq 400</math>; <math>\leq 26</math> feet for ADT 400 - 2,000)</li> <li><input type="checkbox"/> Reduced driveway areas (length minimized via reduced ROW width (<math>\leq 45</math> ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to <math>\leq 9</math> ft. wide one lane; <math>\leq 18</math> ft. wide two lanes; shared driveways; pervious surface)</li> <li><input type="checkbox"/> Reduced building footprint: Explain approach:</li>   <li><input type="checkbox"/> Reduced sidewalk area (<math>\leq 4</math> ft. wide; one side of the street; unpaved path; pervious surface)</li> <li><input type="checkbox"/> Reduced cul-de-sacs (radius <math>&lt; 45</math> ft; vegetated island; alternative turn-around)</li> <li><input type="checkbox"/> Reduced parking lot area: Explain approach</li> <li><input checked="" type="checkbox"/> Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc.</li> <li><input checked="" type="checkbox"/> Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance)</li> <li><input type="checkbox"/> Other (describe):</li> </ul>	
<p><b>E) DISCONNECT IMPERVIOUS AREA</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible</li> <li><input type="checkbox"/> Residential street edges allow side-of-the-road drainage into vegetated open swales</li> <li><input type="checkbox"/> Parking lot landscaping breaks up impervious expanse AND accepts runoff</li> <li><input type="checkbox"/> Other (describe):</li> </ul>	
<p><b>F) MITIGATE RUNOFF AT THE POINT OF GENERATION</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Small-scale BMPs have been designated to treat runoff as close as possible to the source</li> </ul>	

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<p><b>G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION</b></p> <p><input type="checkbox"/> Low-maintenance landscaping has been proposed using native species and cultivars</p> <p><input type="checkbox"/> Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan</p> <p><input checked="" type="checkbox"/> Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots</p>	
<p><b>H) RESTORE STREAMS/WETLANDS</b></p> <p><input type="checkbox"/> Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands</p> <p><input type="checkbox"/> Removal of invasive species</p> <p><input checked="" type="checkbox"/> Other</p>	<p>No streams are on site and buffer for wetland to the East is not being disturbed</p>

**PART 3. SUMMARY OF REMAINING STANDARDS**

<b>GROUNDWATER RECHARGE – MINIMUM STANDARD 2</b>		
<b>YES</b>	<b>NO</b>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The project has been designed to meet the groundwater recharge standard.
<input type="checkbox"/>	<input type="checkbox"/>	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);
<input type="checkbox"/>	<input type="checkbox"/>	Your waiver request has been explained in the Narrative, if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
<input type="checkbox"/>	<input type="checkbox"/>	If “Yes,” has approval for infiltration by the Office of Waste Management Site Project Manager, per Part 1, Minimum Standard 8, been requested?

<b>TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)</b> (Add or Subtract Rows as Necessary)					
<b>Design Point</b>	<b>Impervious Area Treated (sq ft)</b>	<b>Total Re<sub>v</sub> Required (cu ft)</b>	<b>LID Stormwater Credits (see RISDISM Section 4.6.1)</b>	<b>Recharge Required by Remaining BMPs (cu ft)</b>	<b>Recharge Provided by BMPs (cu ft)</b>
			<b>Portion of Re<sub>v</sub> directed to a QPA (cu ft)</b>		
DP-1:	0	0	N/A	0	0
DP-2:	24,176	1,209	N/A	1,209	2,004
DP-3:	13,547	677	N/A	677	1,786
<b>TOTALS:</b>	37,723	1,886	N/A	1,886	3,790
<b>Notes:</b>					
<p>1. Only BMPs listed in RISDISM Table 3-5 “List of BMPs Acceptable for Recharge” may be used to meet the recharge requirement.</p> <p>2. Recharge requirement must be satisfied for each waterbody ID.</p>					
<p><input checked="" type="checkbox"/> Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):</p>					
<p>Stormwater Report</p>					

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

WATER QUALITY – MINIMUM STANDARD 3		
YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	If “Yes,” either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
<input type="checkbox"/>	<input type="checkbox"/>	If “Yes,” either TR-55 or TR-20 was used to calculate WQv; and,
<input type="checkbox"/>	<input type="checkbox"/>	If “No,” the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
<input type="checkbox"/>	<input type="checkbox"/>	Not Applicable
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The Water Quality Guidance Document ( <a href="#">Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters</a> ) has been followed as applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	BMPs are proposed that are on the <a href="#">approved technology list</a> . If “Yes,” please provide all required worksheets from the manufacturer.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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)					
Design Point and WB ID	Impervious area treated (sq ft)	Total WQv Required (cu ft)	LID Stormwater Credits (see RICR 8.18)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
			WQv directed to a QPA (cu ft)		
DP-1:	0	0	N/A	0	0
DP-2:	24,176	2,015	N/A	2,015	2,015
DP-3:	13,547	1,129	N/A	1,129	1,786
<b>TOTALS:</b>	37,723	3,144	N/A	3,144	3,801
<b>Notes:</b>					
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.					
<input checked="" type="checkbox"/> YES	This project has met the setback requirements for each BMP.				
<input type="checkbox"/> NO	If “No,” please explain:				
<input checked="" type="checkbox"/>	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				

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4		
YES	NO	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this standard waived? If “Yes,” please indicate one or more of the reasons below:
		<input checked="" type="checkbox"/> 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. <input type="checkbox"/> The project directs is a small facility with impervious cover of less than or equal to 1 acre. <input type="checkbox"/> 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). ( <u>Note</u> : LID design strategies can greatly reduce the peak discharge rate).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conveyance and natural channel protection for the site have been met. If “No,” explain why:

TABLE 4-1: Summary of Channel Protection Volumes (see RICR 8.10)					
Design Point	Receiving Water Body Name	Coldwater Fishery? (Y/N)	Total CPv Required (cu ft)	Total CPv Provided (cu ft)	Average Release Rate Modeled in the 1-yr storm (cfs)
DP-3:	Potter Pond	N	N/A	N/A	N/A
<b>TOTALS:</b>					
<p><u>Note</u>: The Channel Protection Volume Standard must be met in each waterbody ID.</p> <p><b>The site has been designed to fully infiltrate the channel protection volume</b></p> <input type="checkbox"/> YES <input type="checkbox"/> 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).					
<input type="checkbox"/> YES <input type="checkbox"/> NO           Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If “Yes,” please indicate restrictions and solutions below.					
<input checked="" type="checkbox"/> 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.).  <b>1-year storm event HydroCAD Analysis in the Stormwater Report</b>					

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<b>OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5</b>		
<b>YES</b>	<b>NO</b>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this standard waived? If yes, please indicate one or more of the reasons below:
	<input checked="" type="checkbox"/>	The project directs discharge to a large river (i.e., 4th-order stream or larger. See 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.
	<input type="checkbox"/>	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).
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does the project flow to an MS4 system or subject to other stormwater requirements? If “Yes,” indicate as follows:
	<input type="checkbox"/>	RIDOT
	<input type="checkbox"/>	Other (specify):
<p><b>Note:</b> The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT’s regulations indicate that post-volumes must be <b>less</b> 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.</p>		
		Indicate below which model was used for your analysis. <input type="checkbox"/> TR-55 <input type="checkbox"/> TR-20 <input checked="" type="checkbox"/> HydroCAD <input type="checkbox"/> Bentley/Haestad <input type="checkbox"/> Intellisolve <input type="checkbox"/> Other (Specify):
<b>YES</b>	<b>NO</b>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.):
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Do off-site areas contribute to the sub-watersheds and design points? If “Yes,”
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Are the areas modeled as “present condition” for both pre- and post-development analysis?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Are the off-site areas shown on the subwatershed maps?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is a Downstream Analysis required (see RICR 8.11.E.1)?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Calculate the following:
	<input checked="" type="checkbox"/>	Area of disturbance within the sub-watershed (areas) 2.315 acres
	<input checked="" type="checkbox"/>	Impervious cover (%) 43.84
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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)?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet the overbank flood protection standard?

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

**Table 5-1 Hydraulic Analysis Summary**

Subwatershed (Design Point)	1.2" Peak Flow (cfs) **		1-yr Peak Flow (cfs)		10-yr Peak Flow (cfs)		100-yr Peak Flow (cfs)	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
DP-1:	0.01	0.01	0.00	0.02	0.08	0.08	0.31	0.20
DP-2:	1.28	0.75	0.12	0.05	7.16	6.50	27.52	24.11
DP-3:*	0.09	0.09	0.09	0.02	0.35	1.01	1.89	4.27
<b>TOTALS:</b>	1.38	0.85	0.21	0.09	7.59	7.59	29.72	28.58

\* 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.

Indicate as follows where the pertinent calculations and/or information for the items above are provided	Name of report/document, page numbers, appendices, etc.
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.	Stormwater Report
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.	Stormwater Report
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	Stormwater Report
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	Stormwater Report

**Table 5-2 Summary of Best Management Practices**

BMP ID	DP #	BMP Type (e.g., bioretention, tree filter)	BMP Functions					Bypass Type	Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4		
			Pre-Treatment (Y/N/NA)	Re <sub>v</sub>	WQ <sub>v</sub>	CP <sub>v</sub> (Y/N/NA)	Overbank Flood Reduction (Y/N/NA)		External (E) Internal (I) or NA	Yes/No	Technical Justification (Design Report page number)
Stormcrete A	2	Permeable Pavement	Y	Y	Y	N/A	N/A	N/A	Y	Section 2.3	65 ft
Stormcrete B	3	Permeable Pavement	Y	Y	Y	N/A	N/A	N/A	Y	Section 2.3	15 ft
Stormcrete C	3	Permeable Pavement	Y	Y	Y	N/A	N/A	N/A	Y	Section 2.3	60 ft
QP UIS	2	Underground Infiltration	Y	N/A	N/A	N/A	N/A	E	Y	Section 2.3	62 ft
WQ Stormtech	2	Underground Infiltration	Y	Y	Y	N/A	N/A	E	Y	Section 2.3	27 ft

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

Table 5-2 Summary of Best Management Practices										
BMP ID	DP #	BMP Type (e.g., bioretention, tree filter)	BMP Functions				Bypass Type	Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4		
			Pre- Treat ment (Y/N/ NA)	Re <sub>v</sub>	WQ <sub>v</sub>	CP <sub>v</sub> (Y/N/ NA)		Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/ No
		<b>TOTALS:</b>								

Table 5.3 Summary of Soils to Evaluate Each BMP									
DP #	BMP ID	BMP Type (e.g., bioretention, tree filter)	Soils Analysis for Each BMP						
			Test Pit ID# and Ground Elevation		SHWT Elevation (ft)	Bottom of Practice Elevation* (ft)	Separation Distance Provided (ft)	Hydrologic Soil Group (A, B, C, D)	Exfiltration Rate Applied (in/hr)
			Primary	Secondary					
Stormcrete A	2	Permeable Pavement	TH-101	TH-102	4.00	7.20	3.20	A	8.27
Stormcrete B	3	Permeable Pavement	TH-108	TH-109	9.50	14.20	4.70	A	8.27
Stormcrete C	3	Permeable Pavement	TH-5	TH-109	6.00	11.60	5.60	A	8.27
QP UIS	2	Underground Infiltration	TH-103	TH-104	1.00	5.00	4.00	A	8.27
WQ Stormtech	2	Underground Infiltration	TH-104	TH-21-11	3.00	6.00	3.00	A	8.27
		<b>TOTALS:</b>							

\* For underground infiltration systems (UICs) 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			
YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are these activities already covered under an MSGP? If “No,” please explain if you have applied for an MSGP or intend to do so?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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:
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Additional BMPs, or additional pretreatment BMP’s if any, that meet RIPDES MSGP requirements; Please list BMPs:

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

			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.).

<b>ILLICIT DISCHARGES – MINIMUM STANDARD 9</b>			
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.			
YES	NO	N/A	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you checked for illicit discharges?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Have any been found and/or corrected? If “Yes,” please identify.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

<b>SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10</b>			
YES	NO	N/A	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you provided a <b>separately-bound</b> document based upon the <a href="#">SESC Template</a> ? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).
			If “No,” include a document with your submittal that addresses the following elements of an SESC Plan:
<input type="checkbox"/>	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:		
<input type="checkbox"/>	Provide Natural Buffers and Maintain Existing Vegetation		
<input type="checkbox"/>	Minimize Area of Disturbance		
<input type="checkbox"/>	Minimize the Disturbance of Steep Slopes		
<input type="checkbox"/>	Preserve Topsoil		
<input type="checkbox"/>	Stabilize Soils		
<input type="checkbox"/>	Protect Storm Drain Inlets		
<input type="checkbox"/>	Protect Storm Drain Outlets		
<input type="checkbox"/>	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures		
<input type="checkbox"/>	Establish Perimeter Controls and Sediment Barriers		
<input type="checkbox"/>	Divert or Manage Run-On from Up-Gradient Areas		
<input type="checkbox"/>	Properly Design Constructed Stormwater Conveyance Channels		
<input type="checkbox"/>	Retain Sediment On-Site		
<input type="checkbox"/>	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows		
<input type="checkbox"/>	Apply Construction Activity Pollution Prevention Control Measures		
<input type="checkbox"/>	Install, Inspect, and Maintain Control Measures and Take Corrective Actions		
<input type="checkbox"/>	Qualified SESC Plan Preparer’s Information and Certification		
<input type="checkbox"/>	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		
<input type="checkbox"/>	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required		

<b>STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9</b>			
<b>Operation and Maintenance Section</b>			
YES	NO		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?	

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<input checked="" type="checkbox"/>	<input type="checkbox"/>	Have you provided a <b>separately-bound</b> Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If “No,” why not?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.).
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is stormwater being directed from public areas to private property? If “Yes,” note the following: <u>Note:</u> 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.
<b>Pollution Prevention Section</b>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Designated snow stockpile locations?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Asphalt-only based sealants?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pet waste stations? ( <u>Note:</u> 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).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Regular sweeping? Please describe: Please see Operations & Maintenance Manual prepared by DiPrete Engineering
<input checked="" type="checkbox"/>	<input type="checkbox"/>	De-icing specifications, in accordance with RISDISM 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).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A prohibition of phosphate-based fertilizers? ( <u>Note:</u> 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**

<b>Existing and Proposed Subwatershed Mapping (REQUIRED)</b>		
<b>YES</b>	<b>NO</b>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed drainage area delineations
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Locations of all streams and drainage swales
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Drainage flow paths, mapped according to the DEM <i>Guidance for Preparation of Drainage Area Maps</i> (included in RISDISM Appendix K)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped seasonal high-water-table test pit locations
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped bedrock outcrops adjacent to any infiltration BMP
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Soils were logged by a:
	<input checked="" type="checkbox"/>	DEM-licensed Class IV soil evaluator

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

	Name: Christian Sutter, License Number D-4077
<input type="checkbox"/>	RI-registered P.E. Name:

<b>Subwatershed and Impervious Area Summary</b>				
<b>Subwatershed (area to each design point)</b>	<b>First Receiving Water ID or MS4</b>	<b>Area Disturbed (units)</b>	<b>Existing Impervious (units)</b>	<b>Proposed Impervious (units)</b>
<b>DP-1:</b>	N/A	0.024 ac	0.001 ac	0.001 ac
<b>DP-2:</b>	N/A	1.627 ac	0 ac	0.555ac
<b>DP-3:</b>	Potter Pond (WBIP RI0010043E-05)	0.655ac	0 ac	0.311 ac
<b>TOTALS:</b>		2.306 ac	0.001 ac	0.867 ac

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<b>Site Construction Plans (Indicate that the following applicable specifications are provided)</b>		
<b>YES</b>	<b>NO</b>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Boundaries of existing predominant vegetation and proposed limits of clearing
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Site Location clarification
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location and field-verified boundaries of resource protection areas such as: <ul style="list-style-type: none"> <li>▶ freshwater and coastal wetlands, including lakes and ponds</li> <li>▶ coastal shoreline features</li> </ul> Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All required setbacks (e.g., buffers, water-supply wells, septic systems)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Representative cross-section and profile drawings, and notes and details of structural stormwater management practices and conveyances (i.e., storm drains, open channels, swales, etc.), which include: <ul style="list-style-type: none"> <li>▶ Location and size of the stormwater treatment practices (type of practice, depth, area). Stormwater treatment practices (BMPs) must have labels that correspond to RISDISM Table 5-2;</li> <li>▶ Design water surface elevations (applicable storms);</li> <li>▶ Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.;</li> <li>▶ Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.);</li> <li>▶ Location of floodplain and, if applicable, floodway limits and relationship of site to upstream and downstream properties or drainage that could be affected by work in the floodplain;</li> <li>▶ Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting</li> </ul>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mapping of any OWM-approved remedial actions/systems (including ELURs)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; <ul style="list-style-type: none"> <li>▶ Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements;</li> <li>▶ Location of existing and proposed conveyance systems, such as grass channels, swales, and storm drains, and location(s) of final discharge point(s) (wetland, waterbody, etc.);</li> <li>▶ Cross sections of roadways, with edge details such as curbs and sidewalks;</li> <li>▶ Location and dimensions of channel modifications, such as bridge or culvert crossings</li> </ul>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization

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## 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 chambers) located along separate portions of the roadway and 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:

Soil Symbol	Description	Hydrologic Group
BhB	Bridgeton silt loam, 3 to 8 percent slopes	B
FtA	Fortress sand	A
MU	Merrimac-Urban land complex	A
Mk	Matunuck mucky peat, 0 to 2 percent slopes	A

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.

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## 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 chambers). 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
  - Provides stormwater recharge
  - Washed crushed stone reservoir course
  - Setback to building foundation of 10' met (15.5' minimum provided)
- Underground Infiltration System (Stormtech chambers)
  - Infiltrates the water quality storm event
  - Provides stormwater recharge
  - Setback to OWTS of 25' met (27.5' provided)
- Underground Infiltration System (Pipe Chambers)
  - 48" pipes
  - Infiltrates the 1 year storm event
  - Provides peak mitigation
  - Setback to property line of 10' met (14' 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 has been mitigated.

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### **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.

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### 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:

$$Re_v = 1'' * F * I / 12$$

Where:

$Re_v$  = Groundwater Recharge Volume (cf)

F = Recharge Factor based on Hydrologic Soil Groups (HSG) (see table below)

I = Impervious Area (sf)

HSG	Recharge Factor (F)
A	0.60
B	0.35
C	0.25
D	0.10

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.

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### 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 within the stone infiltration storage beneath the proposed roadway. 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 chambers) located along several portions of the roadway and 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 12" (Treatment System A, B & C) 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 the 100-yr storm, and Treatment System B and C have 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 and C have 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 2.0' in width and 5' in length and placed at the low points along the proposed roadway and parking area. Stormcrete check dams are placed where applicable in accordance with the detail found on sheet 12 of the plan set to allow the system the greatest opportunity to function as designed and reduce the potential for clogging to the greatest extent practicable.

#### Run-on Row

In all systems, the first row of Stormcrete has been designed as a "run-on row". While it is not necessarily designed as a pretreatment device, 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 specifically designed to ensure that run-on to the Stormcrete systems is sheet flow, utilizing the entire system (no concentrated flows), to allow the system the greatest opportunity to function as designed and reduce the potential for clogging to the greatest extent practicable.

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### **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 – 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.

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### 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 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.

1 year =	2.8 inches
10 year =	4.9 inches
25 year =	6.1 inches
100 year=	8.5 inches

#### 3.5.3 Design Point Breakdown

The site is analyzed as 3 watershed areas. In the pre-development stage there are 5 subcatchments. In the post-development stage there are 8 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.

	Area (acres)	CN	Tc (min)
WPre-10	0.084	56	6.0
WPost-101	0.034	71	6.0

Design Point 2:

Watershed #2 flows to Design Point- 2 (DP-2 SW Property Line). This watershed consists of a majority of the Western half 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 an existing low point on site, ultimately discharging to the design point. The design point is the Southwestern property line of the proposed site. In pre-development conditions there are two subcatchments to Design Point-2.

WPre-20 (20) consists of the Northwestern area of the site and the Southwestern area of the neighboring lot which flow via overland flow to an existing low point (21). This existing low point discharges to Design Point-2 (DP-2 SW Property Line) in higher event storms.

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) represents the Northwestern area of the site and the Western area of the neighboring lot to the North which flow via sheet flow to the existing low point on site (202). Expansion of the existing low point in proposed on the proposed site. For higher event storms, stormwater is discharged to Design Point-2 via an outlet control drainage structure.

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

WPost-205 (205) represents stormwater runoff center area of the site that is directed to Design Point-2 via proposed underground infiltration systems and drainage network.

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

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

	Area (acres)	CN	Tc (min)
WPre-20	9.297	60	14.3
WPre-22	1.100	33	19.8
WPost-201	9.021	61	14.3

WPost-203	0.277	72	6.0
WPost-205	0.803	71	6.0
WPost-208	0.250	40	6.0

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 3 subcatchments:

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

WPost-303 (303) represents the Northeastern area of the site and the Eastern area of the neighboring lot to the North where stormwater runoff flows overland and is infiltrated by the proposed Stormcrete Precast Porous Concrete in the proposed roadway.

WPost-305 (305) consists of stormwater runoff that flows directly to Design Point-3 by the proposed grade of the Eastern area of the proposed site, and by the existing grade of an area in the neighboring lot to the North.

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

	Area (acres)	CN	Tc (min)
WPre-30	1.303	44	17.4
WPre-32	0.161	69	6.0
WPost-301	1.164	60	17.0
WPost-303	0.119	73	6.0
WPost-305	0.276	57	6.0

---

### **3.5.4 Q<sub>p</sub> BMP Calculations**

The section includes calculations for each Q<sub>p</sub> BMP for the site. Calculations include Rip Rap Aprons and Level Spreader calculations for the existing low point on site.

### **Outlet Protection**

The level spreader is designed at the drainage pipe discharges. The level spreader is designed to prevent scour at the storm water outlet and to minimize the potential for downstream erosion by reducing the velocity of concentrated storm water flows.

### 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)

Subwatershed (design point)	1.2" Peak Flow		1-yr Peak Flow		10-yr Peak Flow		100-yr Peak Flow	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
DP-1:	0.01	0.01	0.03	0.02	0.08	0.08	0.31	0.20
DP-2:	1.28	0.75	0.12	0.05	7.16	6.50	27.52	24.11
DP-3*:	0.09	0.09	0.09	0.02	0.35	1.01	1.89	4.27
Totals:	1.38	0.85	0.24	0.09	7.59	7.59	27.92	28.58

All flows in cubic feet per second (cfs)

\*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.

Subwatershed (design point)	1.2" Peak Volume		1-yr Peak Volume		10-yr Peak Volume		100-yr Peak Volume	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
DP-1:	0.001	0.001	0.001	0.002	0.007	0.006	0.023	0.014
DP-2:	0.076	0.053	0.020	0.013	0.744	0.698	2.698	2.691
Totals:	0.077	0.054	0.021	0.015	0.751	0.704	2.721	2.705

All flows in cubic feet per second (ac-f)

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### **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.

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## Appendix A

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## A2.1 Soil Evaluations



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program



Site Evaluation Form
Part A - Soil Profile Description

Application Number 2032-1432

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 [x]

Time: 9:00AM

Table with 11 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab., S., Contr.), Texture, Structure, Consistence, Soil Category. Contains two soil profile sections (TH 21-1 and TH 21-2) with data for horizons A, Bw, C, and 2C.

TH 21-1 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

TH 21-2 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

**Part B**





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

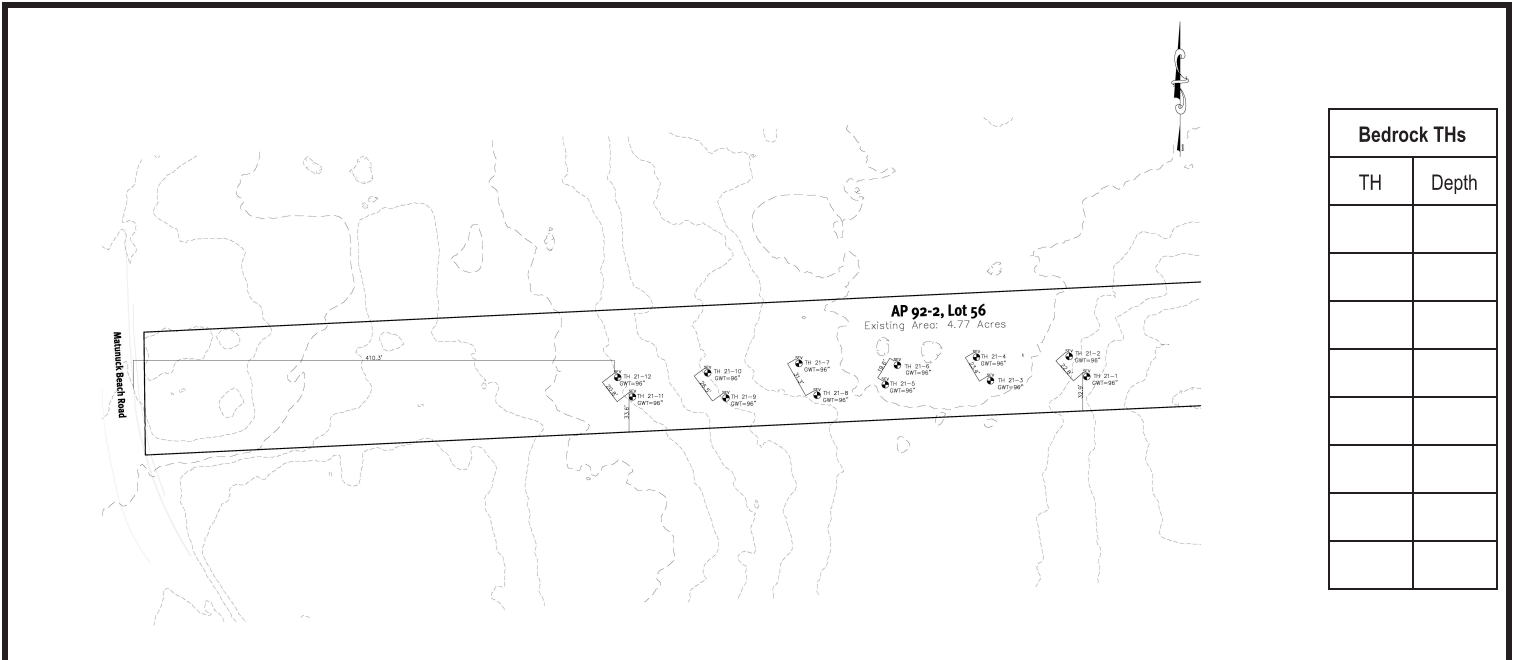
**Please use the area below to locate:**

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**

**Key:**

-  Approximate location of test holes
-  Approximate location of bedrock test holes
-  Estimated gradient and direction of slope
-  Approximate direction of due north



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: *CEO SB* D-4077 Part B prepared by: *CEO SB* D-4077  
Signature License # 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 \_\_\_\_\_



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Weather: Cloudy, 30's

Shaded: Yes [ ] No [x]

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Table with 10 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab., S., Contr.), Texture, Structure, Consistence, Soil Category. Contains two soil profile sections (TH 21-3 and TH 21-4) with 5 horizons each.

TH 21-3 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)
TH 21-4 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

**Part B**





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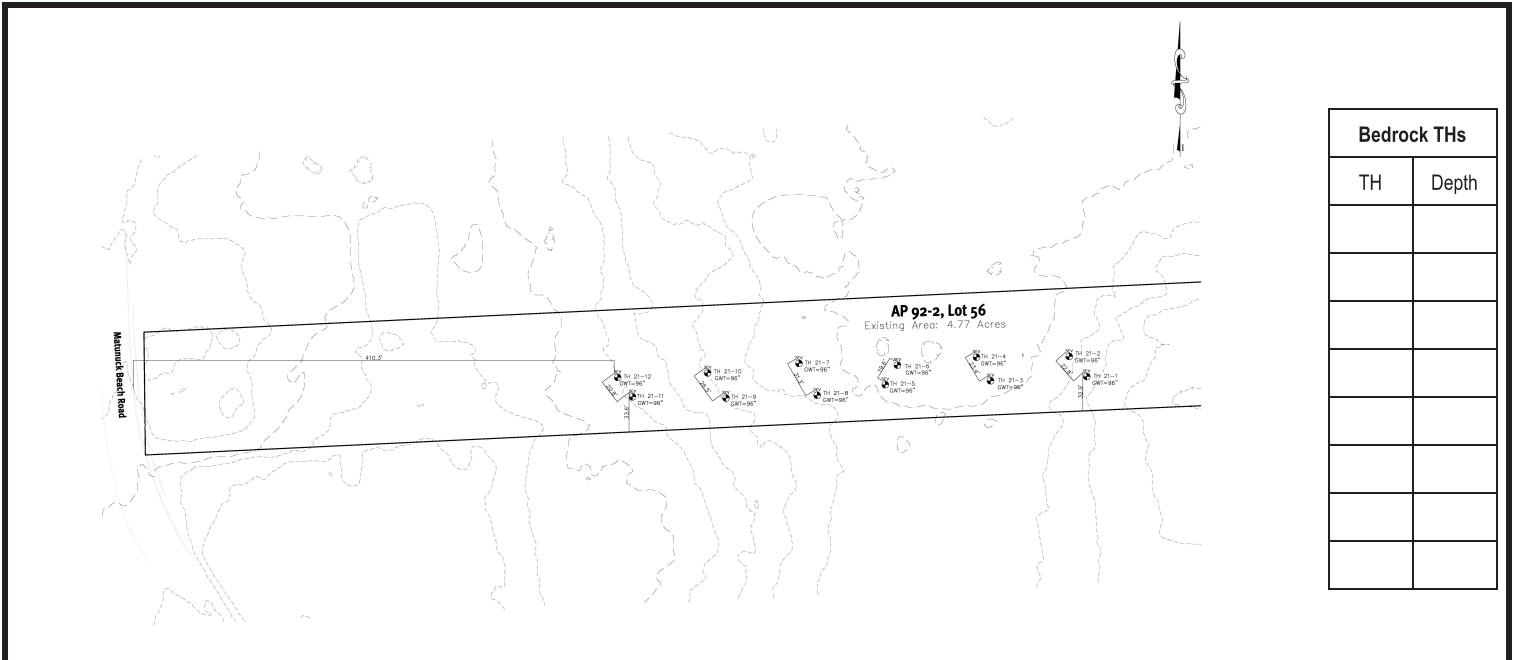
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**Key:**

-  Approximate location of test holes
-  Approximate location of bedrock test holes
-  Estimated gradient and direction of slope
-  Approximate direction of due north



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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
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**Unwitnessed Soil Evaluations Decision:** Accept  Inconclusive  Disclaim

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TH 21-5 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

TH 21-6 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

**Part B**





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

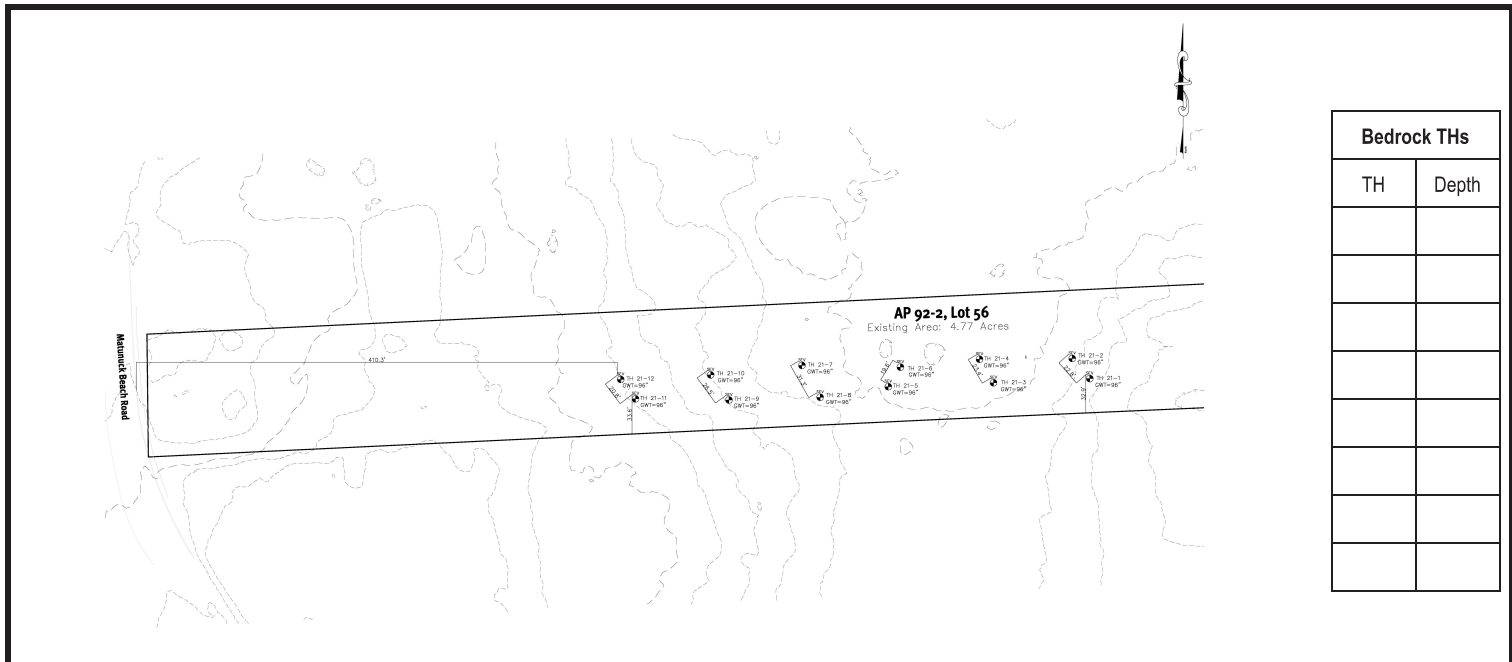
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Explanation: \_\_\_\_\_

\_\_\_\_\_  
Signature Authorized Agent

\_\_\_\_\_  
Date



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
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License Number: D-4077

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Shaded: Yes [ ] No [x]

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

Comments:

**Part B**





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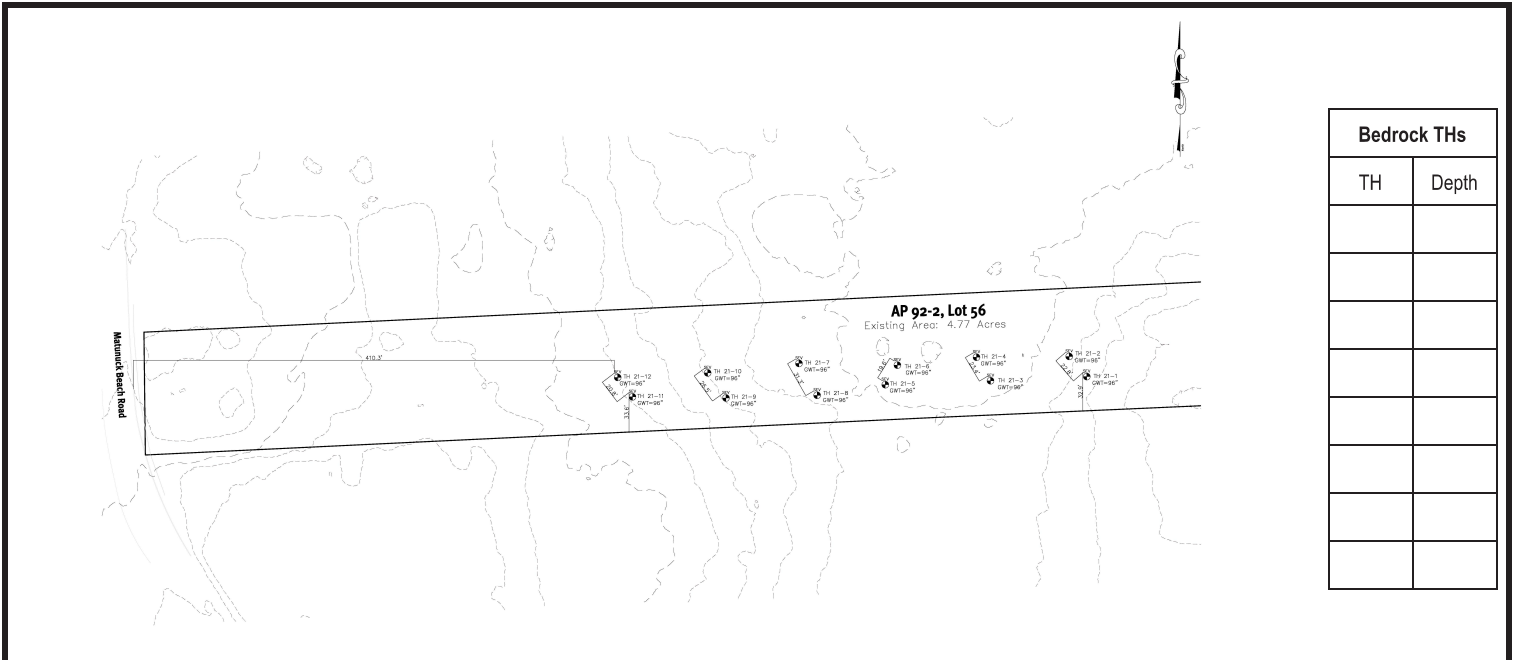
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Part A prepared by: *CEO SB* D-4077 Part B prepared by: *CEO SB* D-4077  
Signature License # Signature License #

**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 \_\_\_\_\_



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program



Site Evaluation Form
Part A - Soil Profile Description

Application Number 2032-1432

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 [x]

Time: 9:00AM

Table with 10 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab., S., Contr.), Texture, Structure, Consistence, Soil Category. Contains two soil profile sections (TH 21-9 and TH 21-10) with horizons A, Bw, C, and 2C.

TH 21-9 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

TH 21-10 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

**Part B**





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

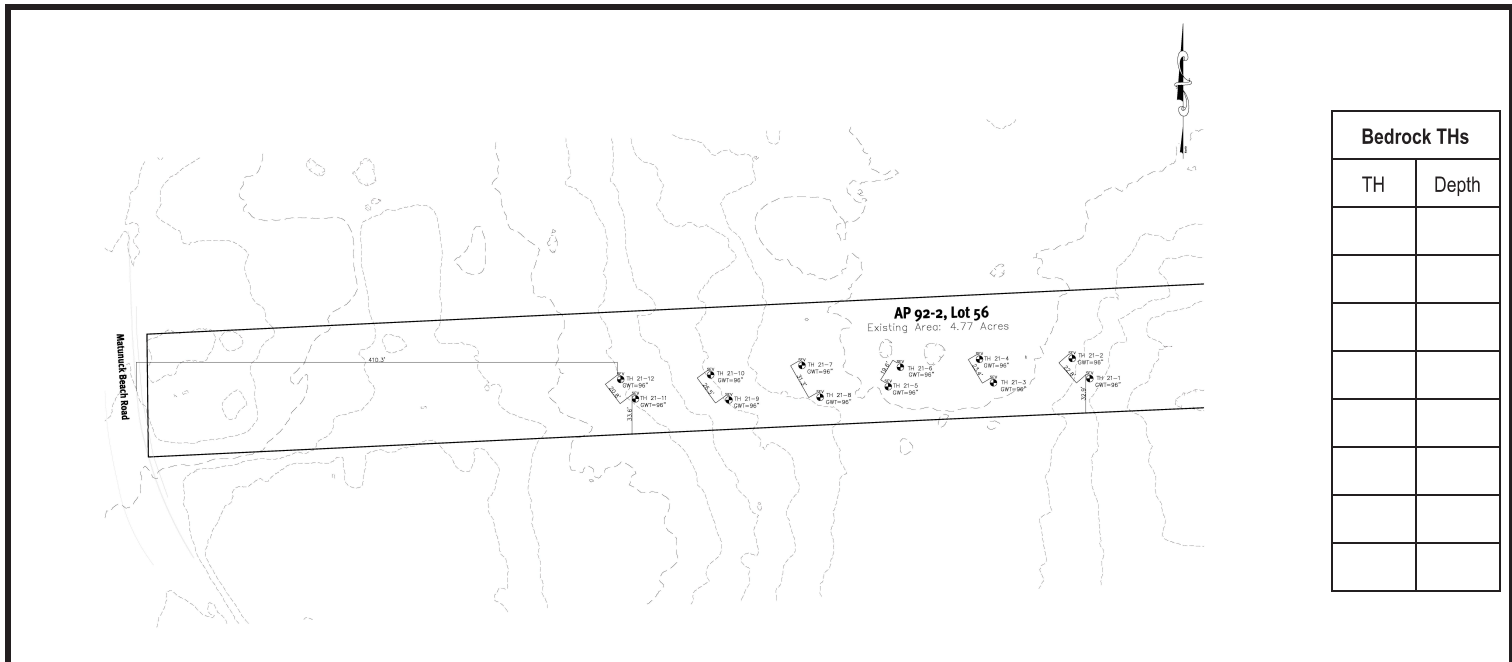
**Please use the area below to locate:**

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**

**Key:**

-  Approximate location of test holes
-  Approximate location of bedrock test holes
-  Estimated gradient and direction of slope
-  Approximate direction of due north



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: *CEO JB* D-4077 Part B prepared by: *CEO JB* D-4077  
Signature License # 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



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program



Site Evaluation Form
Part A - Soil Profile Description

Application Number 2032-1432

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 [x]

Time: 9:00AM

Table with 11 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab., S., Contr.), Texture, Structure, Consistence, Soil Category. Contains two soil profile sections (21-11 and 21-12) with data for horizons A, Bw, C, and 2C.

TH 21-11 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

TH 21-12 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

**Part B**





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

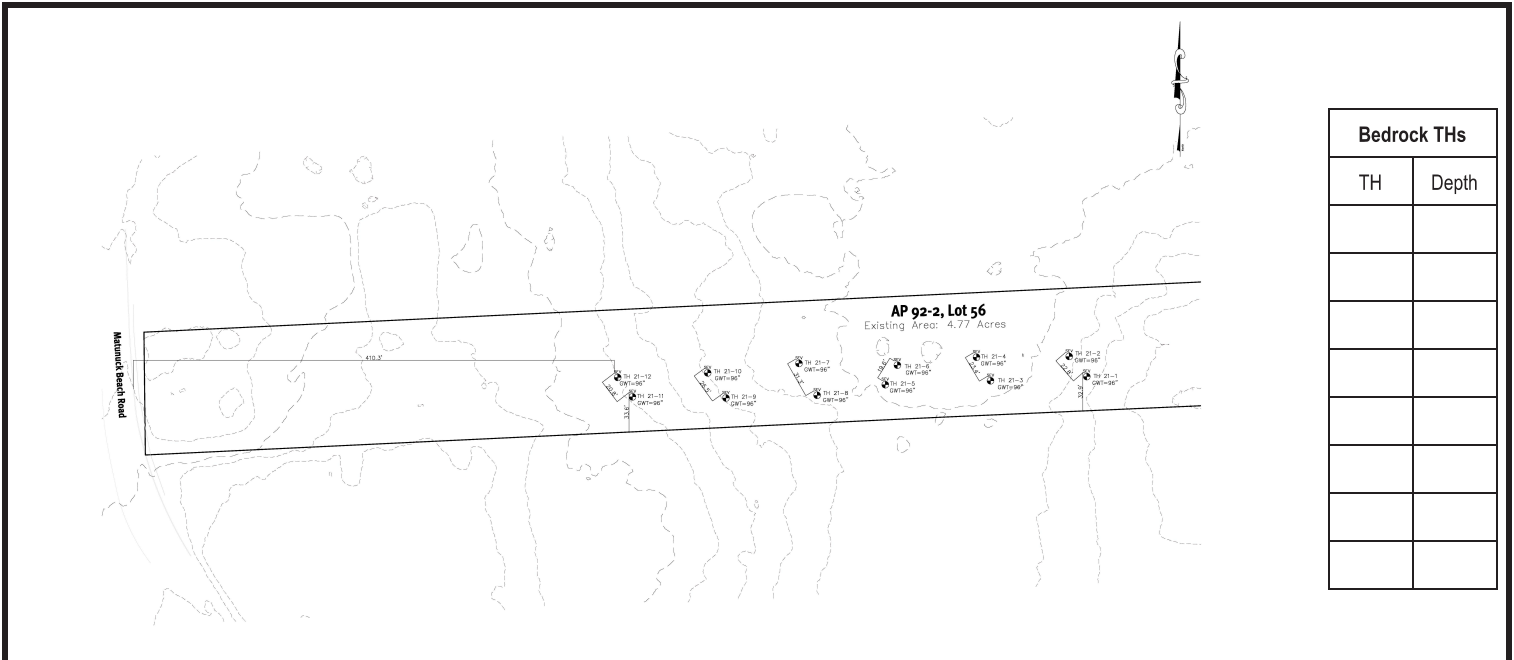
**Please use the area below to locate:**

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**

**Key:**

-  Approximate location of test holes
-  Approximate location of bedrock test holes
-  Estimated gradient and direction of slope
-  Approximate direction of due north



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: *CEO SB* D-4077 Part B prepared by: *CEO SB* D-4077  
Signature License # 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 \_\_\_\_\_

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### A3.1 Water Quality HydroCAD Storm Analysis

**2389-002-ALLS-EHCD-INHS**

Type III 24-hr WQ Storm Rainfall=1.20"

Prepared by DiPrete Engineering

Printed 6/23/2021

HydroCAD® 10.10-4b s/n 01125 © 2020 HydroCAD Software Solutions LLC

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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, Split Pervious/Imperv.  
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=0.13"  
Tc=6.0 min CN=49/98 Runoff=0.01 cfs 0.001 af

**Subcatchment 20: WPre-20** Runoff Area=9.297 ac 33.29% Impervious Runoff Depth=0.33"  
Flow Length=791' Tc=14.3 min CN=41/98 Runoff=2.63 cfs 0.254 af

**Subcatchment 22: WPre-22** Runoff Area=1.100 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=1.303 ac 13.84% Impervious Runoff Depth=0.14"  
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=7.92' Storage=3,986 cf Inflow=2.63 cfs 0.254 af  
Discarded=0.15 cfs 0.178 af Primary=1.28 cfs 0.076 af Outflow=1.43 cfs 0.254 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=1.28 cfs 0.076 af  
Primary=1.28 cfs 0.076 af

**Link 33: DP-3 Wetlands/ Salt Marsh** Inflow=0.09 cfs 0.007 af  
Primary=0.09 cfs 0.007 af

**2389-002-ALLS-PHCD-INHS**

Type III 24-hr WQ Storm Rainfall=1.20"

Prepared by DiPrete Engineering

Printed 6/23/2021

HydroCAD® 10.10-4b s/n 01125 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2  
 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=0.034 ac 30.95% Impervious Runoff Depth=0.31"  
 Tc=6.0 min CN=60/98 Runoff=0.01 cfs 0.001 af

**Subcatchment 201: WPost-201** Runoff Area=9.021 ac 34.31% Impervious Runoff Depth=0.34"  
 Flow Length=791' Tc=14.3 min CN=41/98 Runoff=2.63 cfs 0.254 af

**Subcatchment 203: WPost-203** Runoff Area=0.277 ac 42.27% Impervious Runoff Depth=0.42"  
 Tc=6.0 min CN=52/98 Runoff=0.13 cfs 0.010 af

**Subcatchment 205: WPost-205** Runoff Area=0.803 ac 54.53% Impervious Runoff Depth=0.54"  
 Tc=6.0 min CN=39/98 Runoff=0.48 cfs 0.036 af

**Subcatchment 208: WPost-208** Runoff Area=0.250 ac 0.00% Impervious Runoff Depth=0.00"  
 Tc=6.0 min CN=40/0 Runoff=0.00 cfs 0.000 af

**Subcatchment 301: WPost-301** Runoff Area=1.164 ac 36.27% Impervious Runoff Depth=0.36"  
 Flow Length=268' Tc=16.9 min CN=38/98 Runoff=0.34 cfs 0.035 af

**Subcatchment 303: WPost-303** Runoff Area=0.119 ac 57.96% Impervious Runoff Depth=0.57"  
 Tc=6.0 min CN=39/98 Runoff=0.08 cfs 0.006 af

**Subcatchment 305: WPost-305** Runoff Area=0.276 ac 29.84% Impervious Runoff Depth=0.29"  
 Tc=6.0 min CN=39/98 Runoff=0.09 cfs 0.007 af

**Pond 1P: DMH-2** Peak Elev=7.27' Inflow=0.48 cfs 0.036 af  
 Primary=0.48 cfs 0.036 af Secondary=0.00 cfs 0.000 af Outflow=0.48 cfs 0.036 af

**Pond 202: Low Point A** Peak Elev=7.56' Storage=3,999 cf Inflow=2.63 cfs 0.254 af  
 Discarded=0.23 cfs 0.201 af Primary=0.20 cfs 0.021 af Secondary=0.55 cfs 0.032 af Outflow=0.98 cfs 0.254 af

**Pond 204: Stormcrete Treatment System A** Peak Elev=8.33' Storage=2 cf Inflow=0.13 cfs 0.010 af  
 Discarded=0.13 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.010 af

**Pond 206: Stormtech-740WQ** Peak Elev=7.26' Storage=0.008 af Inflow=0.48 cfs 0.036 af  
 Outflow=0.10 cfs 0.036 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 302: Stormcrete Treatment System B** Peak Elev=8.52' Storage=77 cf Inflow=0.34 cfs 0.035 af  
 Discarded=0.23 cfs 0.035 af Primary=0.00 cfs 0.000 af Outflow=0.23 cfs 0.035 af

**Pond 304: Stormcrete Treatment System C** Peak Elev=8.34' Storage=1 cf Inflow=0.08 cfs 0.006 af  
 Discarded=0.08 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.006 af

**Link 102: DP-1 Matunuck Beach Road** Inflow=0.01 cfs 0.001 af  
 Primary=0.01 cfs 0.001 af

**2389-002-ALLS-PHCD-INHS**

Prepared by DiPrete Engineering

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*Type III 24-hr WQ Storm Rainfall=1.20"*

Printed 6/23/2021

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

Inflow=0.75 cfs 0.053 af  
Primary=0.75 cfs 0.053 af

**Link 306: DP-3 Wetlands/ Salt Marsh**

Inflow=0.09 cfs 0.007 af  
Primary=0.09 cfs 0.007 af

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### A3.2.0 Drainage Network Hydraulic Calculations



**Pipe Analysis**

Pipe ID	Pipe Length (ft)	Pipe Size (in)	Pipe Slope (%)	Flow Rate (cfs)	Capacity Full (cfs)	Velocity (ft/s)	Invert Down (Ft)	Invert Up (ft)
1	20.60	18	0.50%	3.5	8.05	4.4	6.71	6.81
7	28.15	18	0.75%	2.9	9.84	4.8	6.81	7.02
6	103.32	12	3.31%	2.2	7.03	7.9	7.52	10.94
5	70.02	12	2.50%	1.6	6.11	6.5	10.94	12.69
4	71.02	12	2.32%	0.9	5.89	5.5	12.69	14.34
16	34.04	6	4.88%	0.2	1.34	4.8	14.84	16.50
22	54.90	6	5.36%	0.2	1.41	4.9	14.84	17.78
21	27.59	6	0.50%	0.2	0.43	1.1	17.78	17.92
19	16.53	6	0.50%	0.2	0.43	2.1	17.92	18.00
13	34.53	6	3.80%	0.2	1.19	4.4	13.19	14.50
9	36.13	6	2.94%	0.2	1.04	4.0	11.44	12.50
8	101.19	12	0.50%	0.7	2.73	2.8	7.33	7.84



**Pipe Analysis**

Pipe ID	Pipe Length (ft)	Pipe Size (in)	Pipe Slope (%)	Flow Rate (cfs)	Capacity Full (cfs)	Velocity (ft/s)	Invert Down (Ft)	Invert Up (ft)
1	20.60	18	0.50%	4.5	8.05	4.7	6.71	6.81
7	28.15	18	0.75%	3.7	9.84	5.2	6.81	7.02
6	103.32	12	3.31%	2.9	7.03	8.5	7.52	10.94
5	70.02	12	2.50%	2.0	6.11	7.0	10.94	12.69
4	71.02	12	2.32%	1.2	5.89	5.9	12.69	14.34
16	34.04	6	4.88%	0.3	1.34	5.1	14.84	16.50
22	54.90	6	5.36%	0.3	1.41	5.3	14.84	17.78
21	27.59	6	0.50%	0.3	0.43	1.4	17.78	17.92
19	16.53	6	0.50%	0.3	0.43	1.4	17.92	18.00
13	34.53	6	3.80%	0.3	1.19	4.7	13.19	14.50
9	36.13	6	2.94%	0.3	1.04	4.2	11.44	12.50
8	101.19	12	0.50%	0.8	2.73	3.1	7.33	7.84



# DiPrete Engineering


Engineers • Planners • Surveyors

Project Name: Matunuck Condos 100-Year Storm

Project Number: 2389-002 Date: 6/23/2021

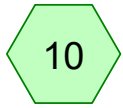
## HGL at Structure

Structure	Rim Elevation (ft)	HGL Elevation (ft)	Rim-HGL (ft)
2	8.54	0.00	N/A
1	12.90	7.61	5.29
10	12.63	7.82	4.80
9	15.14	11.39	3.76
8	16.89	13.09	3.80
7	18.54	14.65	3.89
15	19.98	16.66	3.32
20	19.09	17.93	1.16
18	19.48	18.40	1.07
17	20.96	18.47	2.49
14	18.10	14.67	3.43
12	17.50	12.68	4.82
11	11.25	8.22	3.03

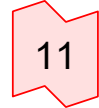
 <b>DiPrete Engineering</b> Engineers • Planners • Surveyors			Project Name: Matunuck Condos Project Number: 2389-002							10-Year Storm Date: 6/23/2021						
Structure	Area	Inlet Time	Intensity	Runoff C	Q=Cia	Q Carry over	Q Captured	Q Bypassed	Bypass Structure	Inlet Type	Curb Opening	Curb Opening	Grate Length	Grate Width	Depth	Spread
	(sf)	(min)	(in/hr)	(C)	(cfs)	(cfs)	(cfs)	(cfs)			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
7	4,101	6	6.94	0.66	0.44	0	0.35	0.09	---	Grate inlet	---	---	2	2	0.098	4.879
8	3,770	6	6.938	0.65	0.39	0	0.32	0.07	---	Grate inlet	---	---	2	2	0.094	4.7
9	3,725	6	6.938	0.65	0.39	0	0.32	0.07	---	Grate inlet	---	---	2	2	0.094	4.68
10	5,631	6	6.938	0.64	0.58	0	0.44	0.14	---	Grate inlet	---	---	2	2	0.109	5.432
11	4,509	6	6.938	0.74	0.54	0	0.41	0.13	---	Grate inlet	---	---	2	2	0.106	5.277

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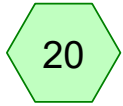
### A3.2.1 HydroCAD Node Diagram



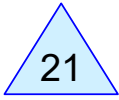
WPre-10



DP-1 Matunuck Beach Road



WPre-20



Ex Low Point



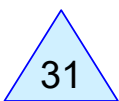
WPre-22



DP-2 SW Property Line



WPre-30



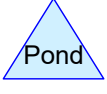
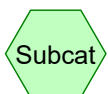
Ex Low Point



WPre-32



DP-3 Wetlands/ Salt Marsh



Routing Diagram for 2389-002-ALLS-EHCD-INHS  
Prepared by DiPrete Engineering, Printed 6/23/2021  
HydroCAD® 10.10-4b s/n 01125 © 2020 HydroCAD Software Solutions LLC

**2389-002-ALLS-EHCD-INHS**

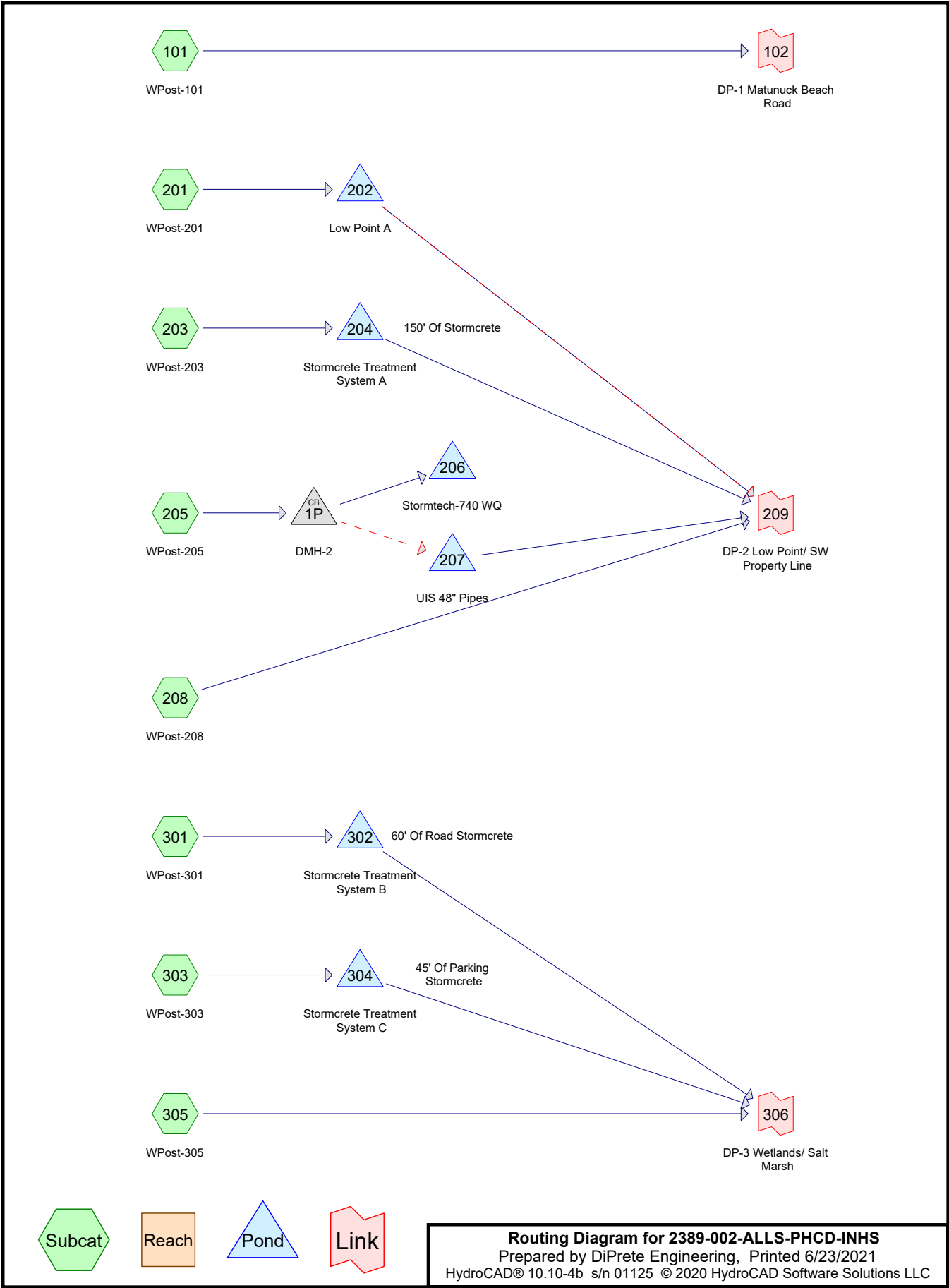
Prepared by DiPrete Engineering

HydroCAD® 10.10-4b s/n 01125 © 2020 HydroCAD Software Solutions LLC

Printed 6/23/2021

**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
6.285	39	>75% Grass cover, Good, HSG A (10, 20, 22, 30, 32)
0.404	61	>75% Grass cover, Good, HSG B (10, 20, 22)
1.545	30	Brush, Good, HSG A (20, 22, 30, 32)
0.221	48	Brush, Good, HSG B (10, 20, 22)
0.112	96	Gravel surface, HSG A (20)
0.010	96	Gravel surface, HSG B (20)
0.001	98	Impervious, HSG B (10)
1.705	98	Offsite Impervious, HSG A (20, 30, 32)
0.257	98	Offsite Impervious, HSG B (10, 20)
1.311	98	Offsite Roofs, HSG A (20, 30, 32)
0.093	98	Offsite Roofs, HSG B (20)
<b>11.944</b>	<b>56</b>	<b>TOTAL AREA</b>



**2389-002-ALLS-PHCD-INHS**

Prepared by DiPrete Engineering

Printed 6/23/2021

HydroCAD® 10.10-4b s/n 01125 © 2020 HydroCAD Software Solutions LLC

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**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
6.787	39	>75% Grass cover, Good, HSG A (201, 203, 205, 208, 301, 303, 305)
0.530	61	>75% Grass cover, Good, HSG B (101, 201, 203, 208)
0.228	30	Brush, Good, HSG A (201, 205, 301, 305)
0.044	48	Brush, Good, HSG B (101, 201)
0.112	96	Gravel surface, HSG A (201)
0.010	96	Gravel surface, HSG B (201)
0.641	98	Impervious, HSG A (203, 205, 301, 303)
0.052	98	Impervious, HSG B (101, 203)
1.705	98	Offsite Impervious, HSG A (201, 301, 305)
0.259	98	Offsite Impervious, HSG B (101, 201, 203)
1.311	98	Offsite Roofs, HSG A (201, 301, 305)
0.093	98	Offsite Roofs, HSG B (201)
0.173	98	Roofs, HSG A (205, 301, 303)
<b>11.944</b>	<b>61</b>	<b>TOTAL AREA</b>

---

### A3.2.2 HydroCAD 1-Year Storm Analysis

**2389-002-ALLS-EHCD-INHS**

Type III 24-hr 1-Year Rainfall=2.80"

Prepared by DiPrete Engineering

Printed 6/23/2021

HydroCAD® 10.10-4b s/n 01125 © 2020 HydroCAD Software Solutions LLC

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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

<b>Subcatchment 10: WPre-10</b>	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
<b>Subcatchment 20: WPre-20</b>	Runoff Area=9.297 ac 33.29% Impervious Runoff Depth=0.26" Flow Length=791' Tc=14.3 min CN=60 Runoff=1.06 cfs 0.205 af
<b>Subcatchment 22: WPre-22</b>	Runoff Area=1.100 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=266' Tc=19.8 min CN=33 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 30: WPre-30</b>	Runoff Area=1.303 ac 13.84% Impervious Runoff Depth=0.00" Flow Length=355' Tc=17.4 min CN=44 Runoff=0.00 cfs 0.001 af
<b>Subcatchment 32: WPre-32</b>	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
<b>Pond 21: Ex Low Point</b>	Peak Elev=7.78' Storage=3,151 cf Inflow=1.06 cfs 0.205 af Discarded=0.14 cfs 0.185 af Primary=0.12 cfs 0.020 af Outflow=0.26 cfs 0.205 af
<b>Pond 31: Ex Low Point</b>	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
<b>Link 11: DP-1 Matunuck Beach Road</b>	Inflow=0.00 cfs 0.001 af Primary=0.00 cfs 0.001 af
<b>Link 23: DP-2 SW Property Line</b>	Inflow=0.12 cfs 0.020 af Primary=0.12 cfs 0.020 af
<b>Link 33: DP-3 Wetlands/ Salt Marsh</b>	Inflow=0.09 cfs 0.008 af Primary=0.09 cfs 0.008 af

**2389-002-ALLS-PHCD-INHS**

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Type III 24-hr 1-Year Rainfall=2.80"

Printed 6/23/2021

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

<b>Subcatchment 101: WPost-101</b>	Runoff Area=0.034 ac 30.95% Impervious Runoff Depth=0.65" Tc=6.0 min CN=71 Runoff=0.02 cfs 0.002 af
<b>Subcatchment 201: WPost-201</b>	Runoff Area=9.021 ac 34.31% Impervious Runoff Depth=0.29" Flow Length=791' Tc=14.3 min CN=61 Runoff=1.22 cfs 0.220 af
<b>Subcatchment 203: WPost-203</b>	Runoff Area=0.277 ac 42.27% Impervious Runoff Depth=0.69" Tc=6.0 min CN=72 Runoff=0.20 cfs 0.016 af
<b>Subcatchment 205: WPost-205</b>	Runoff Area=0.803 ac 54.53% Impervious Runoff Depth=0.65" Tc=6.0 min CN=71 Runoff=0.53 cfs 0.043 af
<b>Subcatchment 208: WPost-208</b>	Runoff Area=0.250 ac 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=40 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 301: WPost-301</b>	Runoff Area=1.164 ac 36.27% Impervious Runoff Depth=0.26" Flow Length=268' Tc=16.9 min CN=60 Runoff=0.13 cfs 0.026 af
<b>Subcatchment 303: WPost-303</b>	Runoff Area=0.119 ac 57.96% Impervious Runoff Depth=0.74" Tc=6.0 min CN=73 Runoff=0.09 cfs 0.007 af
<b>Subcatchment 305: WPost-305</b>	Runoff Area=0.276 ac 29.84% Impervious Runoff Depth=0.19" Tc=6.0 min CN=57 Runoff=0.02 cfs 0.004 af
<b>Pond 1P: DMH-2</b>	Peak Elev=7.42' Inflow=0.53 cfs 0.043 af Primary=0.53 cfs 0.043 af Secondary=0.06 cfs 0.001 af Outflow=0.53 cfs 0.043 af
<b>Pond 202: Low Point A</b>	Peak Elev=7.45' Storage=3,027 cf Inflow=1.22 cfs 0.220 af Discarded=0.21 cfs 0.206 af Primary=0.05 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.220 af
<b>Pond 204: Stormcrete Treatment System A</b>	Peak Elev=8.33' Storage=3 cf Inflow=0.20 cfs 0.016 af Discarded=0.20 cfs 0.016 af Primary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.016 af
<b>Pond 206: Stormtech-740WQ</b>	Peak Elev=7.42' Storage=0.010 af Inflow=0.53 cfs 0.043 af Outflow=0.10 cfs 0.043 af
<b>Pond 207: UIS 48" Pipes</b>	Peak Elev=5.00' Storage=0.000 af Inflow=0.06 cfs 0.001 af Discarded=0.06 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.001 af
<b>Pond 302: Stormcrete Treatment System B</b>	Peak Elev=8.34' Storage=2 cf Inflow=0.13 cfs 0.026 af Discarded=0.13 cfs 0.026 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.026 af
<b>Pond 304: Stormcrete Treatment System C</b>	Peak Elev=8.35' Storage=2 cf Inflow=0.09 cfs 0.007 af Discarded=0.09 cfs 0.007 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.007 af
<b>Link 102: DP-1 Matunuck Beach Road</b>	Inflow=0.02 cfs 0.002 af Primary=0.02 cfs 0.002 af

**2389-002-ALLS-PHCD-INHS**

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*Type III 24-hr 1-Year Rainfall=2.80"*

Printed 6/23/2021

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

Inflow=0.05 cfs 0.013 af  
Primary=0.05 cfs 0.013 af

**Link 306: DP-3 Wetlands/ Salt Marsh**

Inflow=0.02 cfs 0.004 af  
Primary=0.02 cfs 0.004 af

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### A3.2.3 HydroCAD 10-Year Storm Analysis

**2389-002-ALLS-EHCD-INHS**

Type III 24-hr 10-Year Rainfall=4.90"

Prepared by DiPrete Engineering

Printed 6/23/2021

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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

<b>Subcatchment 10: WPre-10</b>	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
<b>Subcatchment 20: WPre-20</b>	Runoff Area=9.297 ac 33.29% Impervious Runoff Depth=1.24" Flow Length=791' Tc=14.3 min CN=60 Runoff=9.18 cfs 0.963 af
<b>Subcatchment 22: WPre-22</b>	Runoff Area=1.100 ac 0.00% Impervious Runoff Depth=0.03" Flow Length=266' Tc=19.8 min CN=33 Runoff=0.00 cfs 0.003 af
<b>Subcatchment 30: WPre-30</b>	Runoff Area=1.303 ac 13.84% Impervious Runoff Depth=0.37" Flow Length=355' Tc=17.4 min CN=44 Runoff=0.17 cfs 0.040 af
<b>Subcatchment 32: WPre-32</b>	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
<b>Pond 21: Ex Low Point</b>	Peak Elev=8.24' Storage=6,267 cf Inflow=9.18 cfs 0.963 af Discarded=0.18 cfs 0.223 af Primary=7.16 cfs 0.741 af Outflow=7.34 cfs 0.963 af
<b>Pond 31: Ex Low Point</b>	Peak Elev=12.19' Storage=485 cf Inflow=0.17 cfs 0.040 af Discarded=0.05 cfs 0.040 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.040 af
<b>Link 11: DP-1 Matunuck Beach Road</b>	Inflow=0.08 cfs 0.007 af Primary=0.08 cfs 0.007 af
<b>Link 23: DP-2 SW Property Line</b>	Inflow=7.16 cfs 0.744 af Primary=7.16 cfs 0.744 af
<b>Link 33: DP-3 Wetlands/ Salt Marsh</b>	Inflow=0.35 cfs 0.025 af Primary=0.35 cfs 0.025 af

**2389-002-ALLS-PHCD-INHS**

Type III 24-hr 10-Year Rainfall=4.90"

Prepared by DiPrete Engineering

Printed 6/23/2021

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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

<b>Subcatchment 101: WPost-101</b>	Runoff Area=0.034 ac 30.95% Impervious Runoff Depth=2.04" Tc=6.0 min CN=71 Runoff=0.08 cfs 0.006 af
<b>Subcatchment 201: WPost-201</b>	Runoff Area=9.021 ac 34.31% Impervious Runoff Depth=1.31" Flow Length=791' Tc=14.3 min CN=61 Runoff=9.54 cfs 0.984 af
<b>Subcatchment 203: WPost-203</b>	Runoff Area=0.277 ac 42.27% Impervious Runoff Depth=2.12" Tc=6.0 min CN=72 Runoff=0.68 cfs 0.049 af
<b>Subcatchment 205: WPost-205</b>	Runoff Area=0.803 ac 54.53% Impervious Runoff Depth=2.04" Tc=6.0 min CN=71 Runoff=1.89 cfs 0.137 af
<b>Subcatchment 208: WPost-208</b>	Runoff Area=0.250 ac 0.00% Impervious Runoff Depth=0.21" Tc=6.0 min CN=40 Runoff=0.01 cfs 0.004 af
<b>Subcatchment 301: WPost-301</b>	Runoff Area=1.164 ac 36.27% Impervious Runoff Depth=1.24" Flow Length=268' Tc=16.9 min CN=60 Runoff=1.08 cfs 0.121 af
<b>Subcatchment 303: WPost-303</b>	Runoff Area=0.119 ac 57.96% Impervious Runoff Depth=2.20" Tc=6.0 min CN=73 Runoff=0.30 cfs 0.022 af
<b>Subcatchment 305: WPost-305</b>	Runoff Area=0.276 ac 29.84% Impervious Runoff Depth=1.05" Tc=6.0 min CN=57 Runoff=0.28 cfs 0.024 af
<b>Pond 1P: DMH-2</b>	Peak Elev=7.62' Inflow=1.89 cfs 0.137 af Primary=0.70 cfs 0.078 af Secondary=1.75 cfs 0.058 af Outflow=1.89 cfs 0.137 af
<b>Pond 202: Low Point A</b>	Peak Elev=7.91' Storage=7,654 cf Inflow=9.54 cfs 0.984 af Discarded=0.26 cfs 0.296 af Primary=1.36 cfs 0.186 af Secondary=5.03 cfs 0.502 af Outflow=6.65 cfs 0.984 af
<b>Pond 204: Stormcrete Treatment System A</b>	Peak Elev=8.36' Storage=34 cf Inflow=0.68 cfs 0.049 af Discarded=0.57 cfs 0.049 af Primary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.049 af
<b>Pond 206: Stormtech-740WQ</b>	Peak Elev=7.62' Storage=0.011 af Inflow=0.70 cfs 0.078 af Outflow=0.10 cfs 0.078 af
<b>Pond 207: UIS 48" Pipes</b>	Peak Elev=7.47' Storage=0.034 af Inflow=1.75 cfs 0.058 af Discarded=0.17 cfs 0.053 af Primary=0.17 cfs 0.005 af Outflow=0.33 cfs 0.058 af
<b>Pond 302: Stormcrete Treatment System B</b>	Peak Elev=10.10' Storage=457 cf Inflow=1.08 cfs 0.121 af Discarded=0.23 cfs 0.098 af Primary=0.84 cfs 0.023 af Outflow=1.07 cfs 0.121 af
<b>Pond 304: Stormcrete Treatment System C</b>	Peak Elev=9.98' Storage=176 cf Inflow=0.30 cfs 0.022 af Discarded=0.09 cfs 0.022 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.022 af
<b>Link 102: DP-1 Matunuck Beach Road</b>	Inflow=0.08 cfs 0.006 af Primary=0.08 cfs 0.006 af

**2389-002-ALLS-PHCD-INHS**

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*Type III 24-hr 10-Year Rainfall=4.90"*

Printed 6/23/2021

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

Inflow=6.50 cfs 0.698 af  
Primary=6.50 cfs 0.698 af

**Link 306: DP-3 Wetlands/ Salt Marsh**

Inflow=1.01 cfs 0.047 af  
Primary=1.01 cfs 0.047 af

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### A3.2.4 HydroCAD 25-Year Storm Analysis

**2389-002-ALLS-EHCD-INHS**

Type III 24-hr 25-Year Rainfall=6.10"

Prepared by DiPrete Engineering

Printed 6/23/2021

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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

<b>Subcatchment 10: WPre-10</b>	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
<b>Subcatchment 20: WPre-20</b>	Runoff Area=9.297 ac 33.29% Impervious Runoff Depth=1.99" Flow Length=791' Tc=14.3 min CN=60 Runoff=15.69 cfs 1.540 af
<b>Subcatchment 22: WPre-22</b>	Runoff Area=1.100 ac 0.00% Impervious Runoff Depth=0.19" Flow Length=266' Tc=19.8 min CN=33 Runoff=0.03 cfs 0.017 af
<b>Subcatchment 30: WPre-30</b>	Runoff Area=1.303 ac 13.84% Impervious Runoff Depth=0.78" Flow Length=355' Tc=17.4 min CN=44 Runoff=0.51 cfs 0.084 af
<b>Subcatchment 32: WPre-32</b>	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
<b>Pond 21: Ex Low Point</b>	Peak Elev=8.49' Storage=8,185 cf Inflow=15.69 cfs 1.540 af Discarded=0.19 cfs 0.232 af Primary=13.57 cfs 1.308 af Outflow=13.76 cfs 1.540 af
<b>Pond 31: Ex Low Point</b>	Peak Elev=12.29' Storage=704 cf Inflow=0.51 cfs 0.084 af Discarded=0.06 cfs 0.060 af Primary=0.26 cfs 0.024 af Outflow=0.32 cfs 0.084 af
<b>Link 11: DP-1 Matunuck Beach Road</b>	Inflow=0.15 cfs 0.012 af Primary=0.15 cfs 0.012 af
<b>Link 23: DP-2 SW Property Line</b>	Inflow=13.57 cfs 1.325 af Primary=13.57 cfs 1.325 af
<b>Link 33: DP-3 Wetlands/ Salt Marsh</b>	Inflow=0.52 cfs 0.062 af Primary=0.52 cfs 0.062 af

**2389-002-ALLS-PHCD-INHS**

Type III 24-hr 25-Year Rainfall=6.10"

Prepared by DiPrete Engineering

Printed 6/23/2021

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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

<b>Subcatchment 101: WPost-101</b>	Runoff Area=0.034 ac 30.95% Impervious Runoff Depth=2.98" Tc=6.0 min CN=71 Runoff=0.12 cfs 0.009 af
<b>Subcatchment 201: WPost-201</b>	Runoff Area=9.021 ac 34.31% Impervious Runoff Depth=2.07" Flow Length=791' Tc=14.3 min CN=61 Runoff=16.02 cfs 1.558 af
<b>Subcatchment 203: WPost-203</b>	Runoff Area=0.277 ac 42.27% Impervious Runoff Depth=3.08" Tc=6.0 min CN=72 Runoff=1.00 cfs 0.071 af
<b>Subcatchment 205: WPost-205</b>	Runoff Area=0.803 ac 54.53% Impervious Runoff Depth=2.98" Tc=6.0 min CN=71 Runoff=2.80 cfs 0.199 af
<b>Subcatchment 208: WPost-208</b>	Runoff Area=0.250 ac 0.00% Impervious Runoff Depth=0.53" Tc=6.0 min CN=40 Runoff=0.06 cfs 0.011 af
<b>Subcatchment 301: WPost-301</b>	Runoff Area=1.164 ac 36.27% Impervious Runoff Depth=1.99" Flow Length=268' Tc=16.9 min CN=60 Runoff=1.84 cfs 0.193 af
<b>Subcatchment 303: WPost-303</b>	Runoff Area=0.119 ac 57.96% Impervious Runoff Depth=3.17" Tc=6.0 min CN=73 Runoff=0.44 cfs 0.031 af
<b>Subcatchment 305: WPost-305</b>	Runoff Area=0.276 ac 29.84% Impervious Runoff Depth=1.74" Tc=6.0 min CN=57 Runoff=0.52 cfs 0.040 af
<b>Pond 1P: DMH-2</b>	Peak Elev=7.83' Inflow=2.80 cfs 0.199 af Primary=0.66 cfs 0.094 af Secondary=2.66 cfs 0.105 af Outflow=2.80 cfs 0.199 af
<b>Pond 202: Low Point A</b>	Peak Elev=8.20' Storage=10,987 cf Inflow=16.02 cfs 1.558 af Discarded=0.28 cfs 0.314 af Primary=2.89 cfs 0.315 af Secondary=8.61 cfs 0.929 af Outflow=11.77 cfs 1.558 af
<b>Pond 204: Stormcrete Treatment System A</b>	Peak Elev=8.52' Storage=187 cf Inflow=1.00 cfs 0.071 af Discarded=0.57 cfs 0.071 af Primary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.071 af
<b>Pond 206: Stormtech-740WQ</b>	Peak Elev=7.82' Storage=0.013 af Inflow=0.66 cfs 0.094 af Outflow=0.10 cfs 0.094 af
<b>Pond 207: UIS 48" Pipes</b>	Peak Elev=7.82' Storage=0.040 af Inflow=2.66 cfs 0.105 af Discarded=0.17 cfs 0.067 af Primary=0.97 cfs 0.039 af Outflow=1.14 cfs 0.105 af
<b>Pond 302: Stormcrete Treatment System B</b>	Peak Elev=10.15' Storage=470 cf Inflow=1.84 cfs 0.193 af Discarded=0.23 cfs 0.130 af Primary=1.61 cfs 0.063 af Outflow=1.84 cfs 0.193 af
<b>Pond 304: Stormcrete Treatment System C</b>	Peak Elev=10.05' Storage=186 cf Inflow=0.44 cfs 0.031 af Discarded=0.09 cfs 0.027 af Primary=0.30 cfs 0.004 af Outflow=0.38 cfs 0.031 af
<b>Link 102: DP-1 Matunuck Beach Road</b>	Inflow=0.12 cfs 0.009 af Primary=0.12 cfs 0.009 af

**2389-002-ALLS-PHCD-INHS**

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*Type III 24-hr 25-Year Rainfall=6.10"*

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

Inflow=12.48 cfs 1.294 af  
Primary=12.48 cfs 1.294 af

**Link 306: DP-3 Wetlands/ Salt Marsh**

Inflow=2.06 cfs 0.107 af  
Primary=2.06 cfs 0.107 af

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### A3.2.5 HydroCAD 100-Year Storm Analysis

**2389-002-ALLS-EHCD-INHS**

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

Prepared by DiPrete Engineering

Printed 6/23/2021

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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

<b>Subcatchment 10: WPre-10</b>	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
<b>Subcatchment 20: WPre-20</b>	Runoff Area=9.297 ac 33.29% Impervious Runoff Depth=3.71" Flow Length=791' Tc=14.3 min CN=60 Runoff=30.71 cfs 2.877 af
<b>Subcatchment 22: WPre-22</b>	Runoff Area=1.100 ac 0.00% Impervious Runoff Depth=0.80" Flow Length=266' Tc=19.8 min CN=33 Runoff=0.35 cfs 0.073 af
<b>Subcatchment 30: WPre-30</b>	Runoff Area=1.303 ac 13.84% Impervious Runoff Depth=1.90" Flow Length=355' Tc=17.4 min CN=44 Runoff=1.74 cfs 0.206 af
<b>Subcatchment 32: WPre-32</b>	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
<b>Pond 21: Ex Low Point</b>	Peak Elev=8.93' Storage=12,150 cf Inflow=30.71 cfs 2.877 af Discarded=0.23 cfs 0.252 af Primary=27.32 cfs 2.625 af Outflow=27.54 cfs 2.877 af
<b>Pond 31: Ex Low Point</b>	Peak Elev=12.37' Storage=957 cf Inflow=1.74 cfs 0.206 af Discarded=0.08 cfs 0.073 af Primary=1.55 cfs 0.133 af Outflow=1.62 cfs 0.206 af
<b>Link 11: DP-1 Matunuck Beach Road</b>	Inflow=0.31 cfs 0.023 af Primary=0.31 cfs 0.023 af
<b>Link 23: DP-2 SW Property Line</b>	Inflow=27.52 cfs 2.698 af Primary=27.52 cfs 2.698 af
<b>Link 33: DP-3 Wetlands/ Salt Marsh</b>	Inflow=1.89 cfs 0.197 af Primary=1.89 cfs 0.197 af

**Total Runoff Area = 11.944 ac Runoff Volume = 3.242 af Average Runoff Depth = 3.26"**  
**71.80% Pervious = 8.577 ac 28.20% Impervious = 3.368 ac**

**2389-002-ALLS-EHCD-INHS**

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

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**Summary for Subcatchment 10: WPre-10**

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 3.25"

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
0.000	39	>75% Grass cover, Good, HSG A
0.008	61	>75% Grass cover, Good, HSG B
0.065	48	Brush, Good, HSG B
0.001	98	Impervious, HSG B
0.010	98	Offsite Impervious, HSG B
0.084	56	Weighted Average
0.073	49	86.67% Pervious Area
0.011	98	13.33% Impervious Area

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

**Summary for Subcatchment 20: WPre-20**

Runoff = 30.71 cfs @ 12.20 hrs, Volume= 2.877 af, Depth= 3.71"

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
5.148	39	>75% Grass cover, Good, HSG A
0.395	61	>75% Grass cover, Good, HSG B
0.406	30	Brush, Good, HSG A
0.131	48	Brush, Good, HSG B
0.112	96	Gravel surface, HSG A
0.010	96	Gravel surface, HSG B
1.533	98	Offsite Impervious, HSG A
0.247	98	Offsite Impervious, HSG B
1.222	98	Offsite Roofs, HSG A
0.093	98	Offsite Roofs, HSG B
9.297	60	Weighted Average
6.202	41	66.71% Pervious Area
3.096	98	33.29% Impervious Area

**2389-002-ALLS-EHCD-INHS**

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

Prepared by DiPrete Engineering

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	68	0.0279	0.13		<b>Sheet Flow, A</b> Grass: Dense n= 0.240 P2= 3.30"
0.6	79	0.0114	2.17		<b>Shallow Concentrated Flow, B</b> Paved Kv= 20.3 fps
3.7	494	0.0192	2.23		<b>Shallow Concentrated Flow, C</b> Unpaved Kv= 16.1 fps
0.6	99	0.0182	2.74		<b>Shallow Concentrated Flow, D</b> Paved Kv= 20.3 fps
0.4	51	0.0196	2.25		<b>Shallow Concentrated Flow, E</b> Unpaved Kv= 16.1 fps
14.3	791	Total			

**Summary for Subcatchment 22: WPre-22**

Runoff = 0.35 cfs @ 12.51 hrs, Volume= 0.073 af, Depth= 0.80"

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
0.348	39	>75% Grass cover, Good, HSG A
0.002	61	>75% Grass cover, Good, HSG B
0.726	30	Brush, Good, HSG A
0.025	48	Brush, Good, HSG B
1.100	33	Weighted Average
1.100	33	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.0	100	0.0260	0.09		<b>Sheet Flow, A</b> Woods: Light underbrush n= 0.400 P2= 3.30"
0.8	166	0.0501	3.60		<b>Shallow Concentrated Flow, B</b> Unpaved Kv= 16.1 fps
19.8	266	Total			

**Summary for Subcatchment 30: WPre-30**

Runoff = 1.74 cfs @ 12.28 hrs, Volume= 0.206 af, Depth= 1.90"

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"

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

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Area (ac)	CN	Description
0.712	39	>75% Grass cover, Good, HSG A
0.410	30	Brush, Good, HSG A
0.122	98	Offsite Impervious, HSG A
0.059	98	Offsite Roofs, HSG A
1.303	44	Weighted Average
1.122	36	86.16% Pervious Area
0.180	98	13.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	92	0.0130	0.10		<b>Sheet Flow, A</b> Grass: Dense n= 0.240 P2= 3.30"
0.6	38	0.0026	1.04		<b>Shallow Concentrated Flow, B</b> Paved Kv= 20.3 fps
1.2	225	0.0396	3.20		<b>Shallow Concentrated Flow, C</b> Unpaved Kv= 16.1 fps
17.4	355	Total			

**Summary for Subcatchment 32: WPre-32**

Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 4.78"

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
0.077	39	>75% Grass cover, Good, HSG A
0.003	30	Brush, Good, HSG A
0.050	98	Offsite Impervious, HSG A
0.031	98	Offsite Roofs, HSG A
0.161	69	Weighted Average
0.080	39	49.67% Pervious Area
0.081	98	50.33% Impervious Area

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

**Summary for Pond 21: Ex Low Point**

Inflow Area = 9.297 ac, 33.29% Impervious, Inflow Depth = 3.71" for 100-Year event  
 Inflow = 30.71 cfs @ 12.20 hrs, Volume= 2.877 af  
 Outflow = 27.54 cfs @ 12.28 hrs, Volume= 2.877 af, Atten= 10%, Lag= 4.6 min  
 Discarded = 0.23 cfs @ 12.28 hrs, Volume= 0.252 af  
 Primary = 27.32 cfs @ 12.28 hrs, Volume= 2.625 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 8.93' @ 12.28 hrs Surf.Area= 9,590 sf Storage= 12,150 cf

Plug-Flow detention time= 33.0 min calculated for 2.876 af (100% of inflow)

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

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Center-of-Mass det. time= 33.1 min ( 883.7 - 850.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	12,823 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	1,100	0	0
7.50	5,140	1,560	1,560
8.00	6,770	2,978	4,538
9.00	9,800	8,285	12,823

Device	Routing	Invert	Outlet Devices
#1	Discarded	7.00'	<b>1.020 in/hr Exfiltration over Surface area</b>
#2	Primary	7.75'	<b>8.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b>
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=0.23 cfs @ 12.28 hrs HW=8.93' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.23 cfs)

**Primary OutFlow** Max=27.31 cfs @ 12.28 hrs HW=8.93' TW=0.00' (Dynamic Tailwater)

↑2=**Broad-Crested Rectangular Weir** (Weir Controls 27.31 cfs @ 2.89 fps)

**Summary for Pond 31: Ex Low Point**

Inflow Area = 1.303 ac, 13.84% Impervious, Inflow Depth = 1.90" for 100-Year event  
 Inflow = 1.74 cfs @ 12.28 hrs, Volume= 0.206 af  
 Outflow = 1.62 cfs @ 12.36 hrs, Volume= 0.206 af, Atten= 7%, Lag= 4.9 min  
 Discarded = 0.08 cfs @ 12.36 hrs, Volume= 0.073 af  
 Primary = 1.55 cfs @ 12.36 hrs, Volume= 0.133 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 12.37' @ 12.36 hrs Surf.Area= 3,187 sf Storage= 957 cf

Plug-Flow detention time= 63.7 min calculated for 0.206 af (100% of inflow)

Center-of-Mass det. time= 63.7 min ( 959.0 - 895.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	11.50'	1,407 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
11.50	76	0	0
11.75	376	57	57
12.00	839	152	208
12.25	2,373	402	610
12.50	4,005	797	1,407

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

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Device	Routing	Invert	Outlet Devices
#1	Discarded	11.50'	<b>1.020 in/hr Exfiltration over Surface area</b>
#2	Primary	12.25'	<b>15.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b>
			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=12.37' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.08 cfs)

**Primary OutFlow** Max=1.55 cfs @ 12.36 hrs HW=12.37' TW=0.00' (Dynamic Tailwater)

↳ **2=Broad-Crested Rectangular Weir** (Weir Controls 1.55 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 = 10.397 ac, 29.77% Impervious, Inflow Depth = 3.11" for 100-Year event  
 Inflow = 27.52 cfs @ 12.28 hrs, Volume= 2.698 af  
 Primary = 27.52 cfs @ 12.28 hrs, Volume= 2.698 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 = 1.463 ac, 17.85% Impervious, Inflow Depth = 1.61" for 100-Year event  
 Inflow = 1.89 cfs @ 12.34 hrs, Volume= 0.197 af  
 Primary = 1.89 cfs @ 12.34 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min

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

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

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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

<b>Subcatchment 101: WPost-101</b>	Runoff Area=0.034 ac 30.95% Impervious Runoff Depth=5.02" Tc=6.0 min CN=71 Runoff=0.20 cfs 0.014 af
<b>Subcatchment 201: WPost-201</b>	Runoff Area=9.021 ac 34.31% Impervious Runoff Depth=3.83" Flow Length=791' Tc=14.3 min CN=61 Runoff=30.84 cfs 2.879 af
<b>Subcatchment 203: WPost-203</b>	Runoff Area=0.277 ac 42.27% Impervious Runoff Depth=5.14" Tc=6.0 min CN=72 Runoff=1.67 cfs 0.119 af
<b>Subcatchment 205: WPost-205</b>	Runoff Area=0.803 ac 54.53% Impervious Runoff Depth=5.02" Tc=6.0 min CN=71 Runoff=4.72 cfs 0.336 af
<b>Subcatchment 208: WPost-208</b>	Runoff Area=0.250 ac 0.00% Impervious Runoff Depth=1.48" Tc=6.0 min CN=40 Runoff=0.32 cfs 0.031 af
<b>Subcatchment 301: WPost-301</b>	Runoff Area=1.164 ac 36.27% Impervious Runoff Depth=3.71" Flow Length=268' Tc=16.9 min CN=60 Runoff=3.60 cfs 0.360 af
<b>Subcatchment 303: WPost-303</b>	Runoff Area=0.119 ac 57.96% Impervious Runoff Depth=5.26" Tc=6.0 min CN=73 Runoff=0.73 cfs 0.052 af
<b>Subcatchment 305: WPost-305</b>	Runoff Area=0.276 ac 29.84% Impervious Runoff Depth=3.36" Tc=6.0 min CN=57 Runoff=1.07 cfs 0.077 af
<b>Pond 1P: DMH-2</b>	Peak Elev=8.61' Inflow=4.72 cfs 0.336 af Primary=0.78 cfs 0.119 af Secondary=3.94 cfs 0.217 af Outflow=4.72 cfs 0.336 af
<b>Pond 202: Low Point A</b>	Peak Elev=8.86' Storage=19,010 cf Inflow=30.84 cfs 2.879 af Discarded=0.30 cfs 0.345 af Primary=6.55 cfs 0.657 af Secondary=15.25 cfs 1.878 af Outflow=22.11 cfs 2.879 af
<b>Pond 204: Stormcrete Treatment System A</b>	Peak Elev=9.08' Storage=743 cf Inflow=1.67 cfs 0.119 af Discarded=0.57 cfs 0.119 af Primary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.119 af
<b>Pond 206: Stormtech-740WQ</b>	Peak Elev=8.60' Storage=0.018 af Inflow=0.78 cfs 0.119 af Outflow=0.10 cfs 0.119 af
<b>Pond 207: UIS 48" Pipes</b>	Peak Elev=8.57' Storage=0.053 af Inflow=3.94 cfs 0.217 af Discarded=0.17 cfs 0.092 af Primary=2.94 cfs 0.125 af Outflow=3.11 cfs 0.217 af
<b>Pond 302: Stormcrete Treatment System B</b>	Peak Elev=10.25' Storage=493 cf Inflow=3.60 cfs 0.360 af Discarded=0.23 cfs 0.182 af Primary=3.37 cfs 0.178 af Outflow=3.60 cfs 0.360 af
<b>Pond 304: Stormcrete Treatment System C</b>	Peak Elev=10.08' Storage=192 cf Inflow=0.73 cfs 0.052 af Discarded=0.09 cfs 0.039 af Primary=0.64 cfs 0.014 af Outflow=0.73 cfs 0.052 af
<b>Link 102: DP-1 Matunuck Beach Road</b>	Inflow=0.20 cfs 0.014 af Primary=0.20 cfs 0.014 af

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

Inflow=24.11 cfs 2.691 af  
Primary=24.11 cfs 2.691 af

**Link 306: DP-3 Wetlands/ Salt Marsh**

Inflow=4.27 cfs 0.269 af  
Primary=4.27 cfs 0.269 af

**Total Runoff Area = 11.944 ac   Runoff Volume = 3.868 af   Average Runoff Depth = 3.89"**  
**64.55% Pervious = 7.711 ac   35.45% Impervious = 4.234 ac**

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

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**Summary for Subcatchment 101: WPost-101**

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.014 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
0.021	61	>75% Grass cover, Good, HSG B
0.003	48	Brush, Good, HSG B
0.000	98	Impervious, HSG B
0.011	98	Offsite Impervious, HSG B
0.034	71	Weighted Average
0.024	60	69.05% Pervious Area
0.011	98	30.95% Impervious Area

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

**Summary for Subcatchment 201: WPost-201**

Runoff = 30.84 cfs @ 12.20 hrs, Volume= 2.879 af, Depth= 3.83"

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
5.173	39	>75% Grass cover, Good, HSG A
0.407	61	>75% Grass cover, Good, HSG B
0.184	30	Brush, Good, HSG A
0.041	48	Brush, Good, HSG B
0.112	96	Gravel surface, HSG A
0.010	96	Gravel surface, HSG B
1.533	98	Offsite Impervious, HSG A
0.247	98	Offsite Impervious, HSG B
1.221	98	Offsite Roofs, HSG A
0.093	98	Offsite Roofs, HSG B
9.021	61	Weighted Average
5.927	41	65.69% Pervious Area
3.095	98	34.31% Impervious Area

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

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	68	0.0279	0.13		<b>Sheet Flow, A</b> Grass: Dense n= 0.240 P2= 3.30"
0.6	79	0.0114	2.17		<b>Shallow Concentrated Flow, B</b> Paved Kv= 20.3 fps
3.7	494	0.0192	2.23		<b>Shallow Concentrated Flow, C</b> Unpaved Kv= 16.1 fps
0.6	99	0.0182	2.74		<b>Shallow Concentrated Flow, D</b> Paved Kv= 20.3 fps
0.4	51	0.0196	2.25		<b>Shallow Concentrated Flow, E</b> Unpaved Kv= 16.1 fps
14.3	791	Total			

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

Runoff = 1.67 cfs @ 12.09 hrs, Volume= 0.119 af, Depth= 5.14"

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
0.064	39	>75% Grass cover, Good, HSG A
0.096	61	>75% Grass cover, Good, HSG B
0.065	98	Impervious, HSG A
0.052	98	Impervious, HSG B
0.001	98	Offsite Impervious, HSG B
0.277	72	Weighted Average
0.160	52	57.73% Pervious Area
0.117	98	42.27% Impervious Area

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

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

Runoff = 4.72 cfs @ 12.09 hrs, Volume= 0.336 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
0.365	39	>75% Grass cover, Good, HSG A
0.000	30	Brush, Good, HSG A
0.323	98	Impervious, HSG A
0.115	98	Roofs, HSG A
0.803	71	Weighted Average
0.365	39	45.47% Pervious Area
0.438	98	54.53% Impervious Area

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

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

**Summary for Subcatchment 208: WPost-208**

Runoff = 0.32 cfs @ 12.11 hrs, Volume= 0.031 af, Depth= 1.48"

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
0.244	39	>75% Grass cover, Good, HSG A
0.006	61	>75% Grass cover, Good, HSG B
0.250	40	Weighted Average
0.250	40	100.00% Pervious Area

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

**Summary for Subcatchment 301: WPost-301**

Runoff = 3.60 cfs @ 12.24 hrs, Volume= 0.360 af, Depth= 3.71"

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
0.698	39	>75% Grass cover, Good, HSG A
0.043	30	Brush, Good, HSG A
0.184	98	Impervious, HSG A
0.122	98	Offsite Impervious, HSG A
0.057	98	Offsite Roofs, HSG A
0.058	98	Roofs, HSG A
1.164	60	Weighted Average
0.742	38	63.73% Pervious Area
0.422	98	36.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	92	0.0130	0.10		<b>Sheet Flow, A</b> Grass: Dense n= 0.240 P2= 3.30"
0.6	38	0.0030	1.11		<b>Shallow Concentrated Flow, B</b> Paved Kv= 20.3 fps
0.7	138	0.0410	3.26		<b>Shallow Concentrated Flow, C</b> Unpaved Kv= 16.1 fps
16.9	268	Total			

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

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**Summary for Subcatchment 303: WPost-303**

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 0.052 af, Depth= 5.26"

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
0.050	39	>75% Grass cover, Good, HSG A
0.069	98	Impervious, HSG A
0.000	98	Roofs, HSG A
0.119	73	Weighted Average
0.050	39	42.04% Pervious Area
0.069	98	57.96% Impervious Area

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

**Summary for Subcatchment 305: WPost-305**

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 0.077 af, Depth= 3.36"

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
0.193	39	>75% Grass cover, Good, HSG A
0.000	30	Brush, Good, HSG A
0.050	98	Offsite Impervious, HSG A
0.033	98	Offsite Roofs, HSG A
0.276	57	Weighted Average
0.194	39	70.16% Pervious Area
0.082	98	29.84% Impervious Area

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

**Summary for Pond 1P: DMH-2**

Inflow Area = 0.803 ac, 54.53% Impervious, Inflow Depth = 5.02" for 100-Year event  
 Inflow = 4.72 cfs @ 12.09 hrs, Volume= 0.336 af  
 Outflow = 4.72 cfs @ 12.09 hrs, Volume= 0.336 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.78 cfs @ 12.09 hrs, Volume= 0.119 af  
 Secondary = 3.94 cfs @ 12.09 hrs, Volume= 0.217 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 8.61' @ 12.16 hrs

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

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Device	Routing	Invert	Outlet Devices
#1	Primary	6.71'	<b>8.00" Round Culvert to WQ/ISO Section</b> L= 14.8' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.71' / 6.55' S= 0.0108 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Secondary	5.55'	<b>24.00" Round Culvert to QP Section</b> L= 10.4' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.55' / 5.50' S= 0.0048 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#3	Device 2	7.40'	<b>6.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

**Primary OutFlow** Max=0.78 cfs @ 12.09 hrs HW=8.31' TW=8.09' (Dynamic Tailwater)

↑1=Culvert to WQ/ISO Section (Inlet Controls 0.78 cfs @ 2.23 fps)

**Secondary OutFlow** Max=3.94 cfs @ 12.09 hrs HW=8.33' TW=8.26' (Dynamic Tailwater)

↑2=Culvert to QP Section (Inlet Controls 3.94 cfs @ 1.25 fps)

↑3=Broad-Crested Rectangular Weir (Passes 3.94 cfs of 7.56 cfs potential flow)

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

Inflow Area =	9.021 ac, 34.31% Impervious, Inflow Depth = 3.83" for 100-Year event
Inflow =	30.84 cfs @ 12.20 hrs, Volume= 2.879 af
Outflow =	22.11 cfs @ 12.37 hrs, Volume= 2.879 af, Atten= 28%, Lag= 9.9 min
Discarded =	0.30 cfs @ 12.37 hrs, Volume= 0.345 af
Primary =	6.55 cfs @ 12.37 hrs, Volume= 0.657 af
Secondary =	15.25 cfs @ 12.37 hrs, Volume= 1.878 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 8.86' @ 12.37 hrs Surf.Area= 12,765 sf Storage= 19,010 cf

Plug-Flow detention time= 36.0 min calculated for 2.879 af (100% of inflow)

Center-of-Mass det. time= 36.0 min ( 884.6 - 848.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	27,489 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	4,468	0	0
7.50	9,396	3,466	3,466
8.00	11,299	5,174	8,640
9.00	13,000	12,150	20,789
9.50	13,800	6,700	27,489

Device	Routing	Invert	Outlet Devices
#1	Discarded	7.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	7.35'	<b>18.00" Round Culvert</b> L= 51.6' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 7.35' / 6.75' S= 0.0116 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

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

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- #3 Device 4 7.45' **15.00" W x 12.00" H Vert. Orifice/Grate X 4.00** C= 0.600  
Limited to weir flow at low heads
- #4 Secondary 7.00' **18.00" Round Culvert X 2.00**  
L= 49.5' RCP, mitered to conform to fill, Ke= 0.700  
Inlet / Outlet Invert= 7.00' / 6.75' S= 0.0051 '/ Cc= 0.900  
n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

**Discarded OutFlow** Max=0.30 cfs @ 12.37 hrs HW=8.86' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.30 cfs)

**Primary OutFlow** Max=6.55 cfs @ 12.37 hrs HW=8.86' TW=0.00' (Dynamic Tailwater)

↑2=Culvert (Inlet Controls 6.55 cfs @ 3.71 fps)

**Secondary OutFlow** Max=15.25 cfs @ 12.37 hrs HW=8.86' TW=0.00' (Dynamic Tailwater)

↑4=Culvert (Barrel Controls 15.25 cfs @ 4.45 fps)

↑3=Orifice/Grate (Passes 15.25 cfs of 22.68 cfs potential flow)

**Summary for Pond 204: Stormcrete Treatment System A**

Inflow Area = 0.277 ac, 42.27% Impervious, Inflow Depth = 5.14" for 100-Year event  
 Inflow = 1.67 cfs @ 12.09 hrs, Volume= 0.119 af  
 Outflow = 0.57 cfs @ 11.96 hrs, Volume= 0.119 af, Atten= 66%, Lag= 0.0 min  
 Discarded = 0.57 cfs @ 11.96 hrs, Volume= 0.119 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 9.08' @ 12.38 hrs Surf.Area= 3,000 sf Storage= 743 cf

Plug-Flow detention time= 5.9 min calculated for 0.118 af (100% of inflow)

Center-of-Mass det. time= 5.9 min ( 823.9 - 818.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	150 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
#2	9.50'	60 cf	<b>6" Stormcrete Slab (Prismatic)</b> Listed below (Recalc) -Impervious 300 cf Overall x 20.0% Voids
#3	9.33'	34 cf	<b>2" Leveling Course (No. 8 Stone) (Prismatic)</b> Listed below (Recalc) -Imper
#4	8.33'	990 cf	<b>12" Reservoir (No. 57 Stone) (Prismatic)</b> Listed below (Recalc) 3,000 cf Overall x 33.0% Voids
		1,234 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	600	0	0
10.25	600	150	150

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.50	600	0	0
10.00	600	300	300

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.33	600	0	0
9.50	600	102	102

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.33	3,000	0	0
9.33	3,000	3,000	3,000

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.33'	<b>8.270 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	10.00'	<b>50.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.57 cfs @ 11.96 hrs HW=8.35' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.57 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=8.33' TW=0.00' (Dynamic Tailwater)

↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond 206: Stormtech-740 WQ**

Inflow Area = 0.803 ac, 54.53% Impervious, Inflow Depth = 1.77" for 100-Year event  
 Inflow = 0.78 cfs @ 12.09 hrs, Volume= 0.119 af  
 Outflow = 0.10 cfs @ 10.25 hrs, Volume= 0.119 af, Atten= 87%, Lag= 0.0 min  
 Discarded = 0.10 cfs @ 10.25 hrs, Volume= 0.119 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 8.60' @ 12.18 hrs Surf.Area= 0.012 ac Storage= 0.018 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 53.7 min ( 981.2 - 927.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0.009 af	<b>20.50'W x 24.98'L x 3.50'H Field A</b> 0.041 af Overall - 0.013 af Embedded = 0.028 af x 33.0% Voids
#2A	6.50'	0.013 af	<b>ADS_StormTech SC-740 +Cap x 12</b> 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'	<b>8.270 in/hr Exfiltration over Surface area</b>

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**Discarded OutFlow** Max=0.10 cfs @ 10.25 hrs HW=6.04' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 0.10 cfs)

**Summary for Pond 207: UIS 48" Pipes**

Inflow = 3.94 cfs @ 12.09 hrs, Volume= 0.217 af  
 Outflow = 3.11 cfs @ 12.17 hrs, Volume= 0.217 af, Atten= 21%, Lag= 5.1 min  
 Discarded = 0.17 cfs @ 11.52 hrs, Volume= 0.092 af  
 Primary = 2.94 cfs @ 12.17 hrs, Volume= 0.125 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 8.57' @ 12.17 hrs Surf.Area= 0.020 ac Storage= 0.053 af

Plug-Flow detention time= 45.9 min calculated for 0.217 af (100% of inflow)  
 Center-of-Mass det. time= 45.9 min ( 807.3 - 761.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	5.50'	0.013 af	<b>48.00" Round CMP_Round 48" - Header Pipe</b> x 2 Inside #3 L= 22.0'
#2	5.50'	0.040 af	<b>48.00" Round Pipe Storage 48" x 5</b> Inside #3 L= 28.0'
#3	5.00'	0.016 af	<b>23.00'W x 38.00'L x 5.00'H Stone Storage</b> 0.100 af Overall - 0.053 af Embedded = 0.047 af x 33.0% Voids
		0.069 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	5.00'	<b>8.270 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	8.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	7.24'	<b>12.00" Round Culvert</b> L= 81.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 7.24' / 6.75' S= 0.0060 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

**Discarded OutFlow** Max=0.17 cfs @ 11.52 hrs HW=5.05' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 0.17 cfs)

**Primary OutFlow** Max=2.94 cfs @ 12.17 hrs HW=8.57' TW=0.00' (Dynamic Tailwater)

↳2=Broad-Crested Rectangular Weir (Weir Controls 0.22 cfs @ 0.76 fps)

↳3=Culvert (Barrel Controls 2.71 cfs @ 3.46 fps)

**Summary for Pond 302: Stormcrete Treatment System B**

Inflow Area = 1.164 ac, 36.27% Impervious, Inflow Depth = 3.71" for 100-Year event  
 Inflow = 3.60 cfs @ 12.24 hrs, Volume= 0.360 af  
 Outflow = 3.60 cfs @ 12.24 hrs, Volume= 0.360 af, Atten= 0%, Lag= 0.2 min  
 Discarded = 0.23 cfs @ 11.58 hrs, Volume= 0.182 af  
 Primary = 3.37 cfs @ 12.24 hrs, Volume= 0.178 af

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 10.25' @ 12.24 hrs Surf.Area= 1,200 sf Storage= 493 cf

Plug-Flow detention time= 9.0 min calculated for 0.360 af (100% of inflow)  
 Center-of-Mass det. time= 9.0 min ( 862.1 - 853.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	60 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
#2	9.50'	24 cf	<b>6" Stormcrete Slab (Prismatic)</b> Listed below (Recalc) -Impervious
			120 cf Overall x 20.0% Voids
#3	9.33'	13 cf	<b>2" Leveling Course (No. 8 Stone) (Prismatic)</b> Listed below (Recalc) -Imper
			41 cf Overall x 33.0% Voids
#4	8.33'	396 cf	<b>12" Reservoir (No. 57 Stone) (Prismatic)</b> Listed below (Recalc)
			1,200 cf Overall x 33.0% Voids
		493 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	240	0	0
10.25	240	60	60

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.50	240	0	0
10.00	240	120	120

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.33	240	0	0
9.50	240	41	41

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.33	1,200	0	0
9.33	1,200	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.33'	<b>8.270 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	10.00'	<b>10.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.23 cfs @ 11.58 hrs HW=8.35' (Free Discharge)  
 ↖1=Exfiltration (Exfiltration Controls 0.23 cfs)

**Primary OutFlow** Max=3.37 cfs @ 12.24 hrs HW=10.25' TW=0.00' (Dynamic Tailwater)  
 ↖2=Broad-Crested Rectangular Weir (Weir Controls 3.37 cfs @ 1.35 fps)

**Summary for Pond 304: Stormcrete Treatment System C**

Inflow Area = 0.119 ac, 57.96% Impervious, Inflow Depth = 5.26" for 100-Year event  
 Inflow = 0.73 cfs @ 12.09 hrs, Volume= 0.052 af  
 Outflow = 0.73 cfs @ 12.09 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.3 min  
 Discarded = 0.09 cfs @ 11.67 hrs, Volume= 0.039 af  
 Primary = 0.64 cfs @ 12.09 hrs, Volume= 0.014 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 10.08' @ 12.09 hrs Surf.Area= 450 sf Storage= 192 cf

Plug-Flow detention time= 8.9 min calculated for 0.052 af (100% of inflow)  
 Center-of-Mass det. time= 8.9 min ( 824.8 - 815.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	45 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
#2	9.50'	18 cf	<b>6" Stormcrete Slab (Prismatic)</b> Listed below (Recalc) -Impervious
			90 cf Overall x 20.0% Voids
#3	9.33'	10 cf	<b>2" Leveling Course (No. 8 Stone) (Prismatic)</b> Listed below (Recalc) -Imper
			31 cf Overall x 33.0% Voids
#4	8.33'	149 cf	<b>12" Reservoir (No. 57 Stone) (Prismatic)</b> Listed below (Recalc)
			450 cf Overall x 33.0% Voids
		222 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.00	180	0	0
10.25	180	45	45

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.50	180	0	0
10.00	180	90	90

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
9.33	180	0	0
9.50	180	31	31

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
8.33	450	0	0
9.33	450	450	450

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.33'	<b>8.270 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	10.00'	<b>10.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.09 cfs @ 11.67 hrs HW=8.35' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.09 cfs)

**Primary OutFlow** Max=0.64 cfs @ 12.09 hrs HW=10.08' TW=0.00' (Dynamic Tailwater)

↳ **2=Broad-Crested Rectangular Weir** (Weir Controls 0.64 cfs @ 0.78 fps)

**Summary for Link 102: DP-1 Matunuck Beach Road**

Inflow Area = 0.034 ac, 30.95% Impervious, Inflow Depth = 5.02" for 100-Year event  
Inflow = 0.20 cfs @ 12.09 hrs, Volume= 0.014 af  
Primary = 0.20 cfs @ 12.09 hrs, Volume= 0.014 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 = 9.548 ac, 33.64% Impervious, Inflow Depth = 3.38" for 100-Year event  
Inflow = 24.11 cfs @ 12.34 hrs, Volume= 2.691 af  
Primary = 24.11 cfs @ 12.34 hrs, Volume= 2.691 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 = 1.559 ac, 36.79% Impervious, Inflow Depth = 2.07" for 100-Year event  
Inflow = 4.27 cfs @ 12.22 hrs, Volume= 0.269 af  
Primary = 4.27 cfs @ 12.22 hrs, Volume= 0.269 af, Atten= 0%, Lag= 0.0 min

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

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### **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
  - c) ASTM C 136/136M Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

- 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 1/2" dia. lifting swivels for use with the imbedded lifting points.
14. All slabs shall be provided with 1/2" Nylon Stormcrete® lifting point protection caps (Part No. 12NC) and approved 1/2" 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].
- c) Material Standards: Thickness Conforming to ASTM D-1599, Tensile Strength ASTM D-882, Tear Strength ASTM D-882, Dimensional Stability ASTM D 1204, Low Temperature Impact ASTM D-1790

### **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/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)) 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 ±1/2 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  $\pm 1/4$  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
- y) 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

1. Conduct periodic inspections and maintenance per procedures as recommended in Stormcrete<sup>®</sup> Operation and Maintenance Manual.

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## Appendix B1.1 – Mounding Calculations

DiPrete Engineering has prepared groundwater mounding calculations for the proposed infiltration pond. The underground infiltration system has been designed to partially infiltrate the 1 through 100 year storms events.

DiPrete Engineering has calculated the groundwater mounding using the USGS Hantush Calculator. The calculator is available online at <http://pubs.usgs.gov/sir/2010/5102/>.

DiPrete Engineering has performed the calculations based on a 24 hour period. The calculator provided by the USGS requires several variables:

### **R – Recharge infiltration rate (feet/day):**

This value is calculated based on the volume infiltrated, system area, and duration of recharge. The following table provides the recharge infiltration rates used in the calculations.

100-Year

Infiltration Volume (cf)	System Area (sf)	Duration (days)	R (ft/day)
4,007	874	1	4.585

---

**Sy – Specific Yield:**

Specific Yield is specific to the parent material through which the infiltration occurs. Onsite soil evaluations classified the soils as coarse sand. A value for Sy has been obtained from Table 4.3 of Hydrology and Hydraulic Systems by Ram S. Gupta:

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**TABLE 4.3 REPRESENTATIVE VALUES  
OF SPECIFIC YIELD FOR SOILS AND ROCKS**

<b>Material</b>	<b>Specific Yield (%)</b>
Gravel, coarse	23
Gravel, medium	24
Gravel, fine	25
Sand, coarse	27
Sand, medium	28
Sand, fine	23
Silt	8
Clay	3
Sandstone, fine-grained	21
Sandstone, medium-grained	27
Limestone	14
Dune sand	38
Loess	18
Peat	44
Schist	26
Siltstone	12
Till, predominantly silt	6
Till, predominantly sand	16
Till, predominantly gravel	16
Tuff	21

*Source: Todd, 1980.*

**HYDROLOGY  
&  
HYDRAULIC  
SYSTEMS**

**RAM S. GUPTA, Ph.D., P.E.**  
*Roger Williams University, Bristol, RI  
Delta Engineers, Inc., Bristol, RI*

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**K – Hydraulic conductivity, Kh (feet/day):**

Mounding calculations require the hydraulic conductivity (Kh) value of the soils. According to USGS SIR 2010-5102, Vertical Conductivity is approximately 1/10 of horizontal conductivity. The vertical conductivity was determined based on soil texture and table 5-3 in section 5.3.4 of the RISDISM of the RISDISM. The vertical conductivity is 8.27 in/hr, which equates to a horizontal conductivity of 82.7 in/hr or 165.4 ft/day. Note this is highly conservative since the material is gravely coarse sand. The RISDISM infiltration rate of 8.27 in/hr is based on medium sand.

**x & y – ½ of the basin length:**

The x and y variables represent the length and width of the system. The overall system is approximately 38' x 23' and the ½ basin length and width is 19' x 11.5'.

**t – Duration of infiltration period in (days):**

For these calculations the infiltration period considered is one day.

**hi(0) – initial thickness of saturated zone (feet):**

The initial thickness of the saturated zone is the depth from the water table to the impervious limiting layer. Test holes performed did not encounter ledge or groundwater. Test holes reached a total depth of 8'. To be conservative the groundwater and depth to limiting layer is assumed at bottom of test hole.

**Conclusion:**

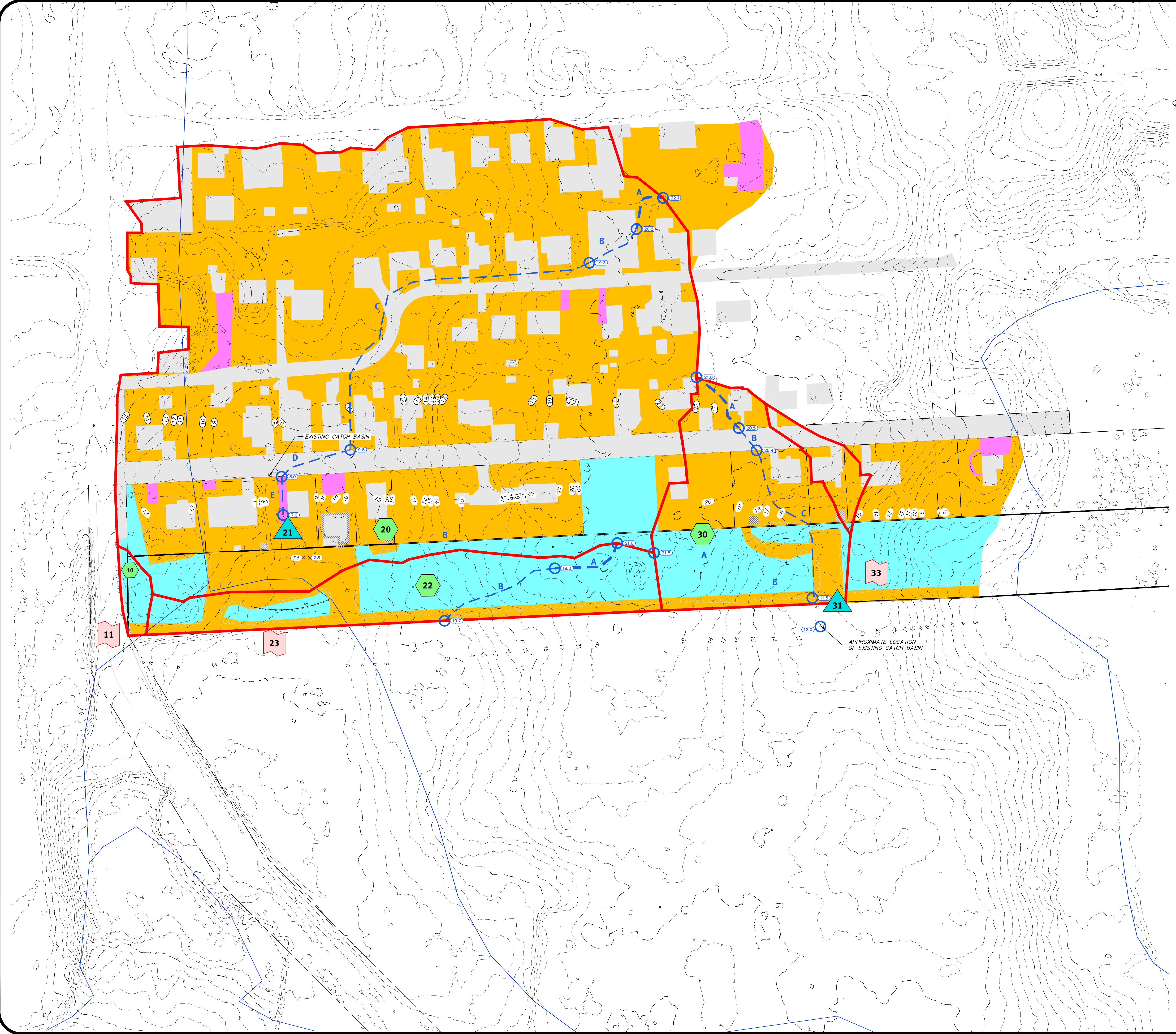
System Bottom	System Top	100-Year Mound height (ft)	100-Year Mound Elevation
5.0	10.0	3.5	4.5

The mounding height is obtained from the USGS Hantush Calculator. The mound elevation is determined by adding the mound height to the average seasonal high groundwater.

Even with the conservative assumptions noted above. The mound does not come into the system during the 100 year storm event.

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## Watershed Maps

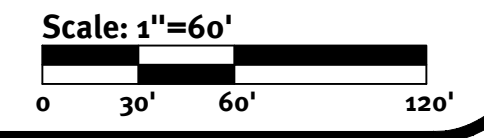


**Legend**

- Woods - A Soils
- Woods - B Soils
- Woods - C Soils
- Woods - D Soils
- Grass - A Soils
- Grass - B Soils
- Grass - C Soils
- Grass - D Soils
- Gravel - A Soils
- Gravel - B Soils
- Gravel - C Soils
- Gravel - D Soils
- Impervious
- Brush - A Soils
- Brush - B Soils
- Brush - C Soils
- Brush - D Soils
- Water

**Legend**

- Tc Line (With Elevations)
- Subcat Area
- Soil Boundary
- Subcatchment 100
- Drainage Pond/Bio Retention/Infiltrating Swale 100
- Drainage Structure/Pond with Insignificant Storage 100
- Swale 100
- Design Point DP
- Reach



**Pre-Watershed Map**  
**Matunuck Beach Condos**  
**DiPrete Engineering**

Two Stafford Court Cranston, RI 02920  
 Tel: 401-942-1000 Fax: 401-461-6000 www.diprete-eng.com  
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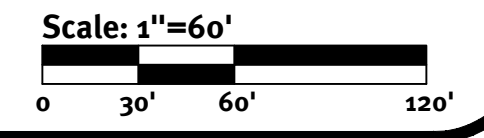


Legend

- Woods - A Soils
- Woods - B Soils
- Woods - C Soils
- Woods - D Soils
- Grass - A Soils
- Grass - B Soils
- Grass - C Soils
- Grass - D Soils
- Gravel - A Soils
- Gravel - B Soils
- Gravel - C Soils
- Gravel - D Soils
- Impervious
- Brush - A Soils
- Brush - B Soils
- Brush - C Soils
- Brush - D Soils
- Water

Legend

- Tc Line (With Elevations) 37.5A32.5B
- Subcat Area
- Soil Boundary
- Subcatchment 100
- Drainage Pond/Bio Retention/Infiltrating Swale 100
- Drainage Structure/Pond with Insignificant Storage 100
- Swale 100
- Design Point DP
- Reach



Post-Watershed Map  
**Matunuck Beach Condos**  
**DiPrete Engineering**

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