DiPrete Engineering

Stormwater Management Report

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STATE OF RHODE ISLAND AND
5013
REGISTERED 02/18/2022
PROFESSIONAL ENGINEER
CIVIL

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 devices). These BMP's are designed to control runoff for the 1 through 100-year storm events, as well as provide water quality treatment and recharge of stormwater runoff from the proposed development. These will also remove TSS (total suspended solids) generated by the proposed parking areas and access roadway.

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

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

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	0.02	0.00	0.04	0.08	0.14	0.15	0.19	0.31	0.32
DP-2:	1.16	0.86	0.19	0.00	7.66	6.35	13.51	12.20	26.27	23.95
Totals:	1.17	0.88	0.19	0.04	7.74	6.49	13.66	12.39	26.58	24.27

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	0.002	0.001	0.003	0.007	0.010	0.023	0.023
DP-2:	0.059	0.037	0.027	0.000	0.731	0.671	2.668	2.637
Totals:	0.060	0.039	0.028	0.003	0.738	0.681	2.691	2.660

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	1.49	0.52	2.50	1.93	4.79
Totals:	0.09	0.09	0.09	0.02	0.35	1.49	0.52	2.50	1.93	4.79

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

APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

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

Stormwater Management Plan (SMP) Elements – Minimum Standards

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)

☒ Residential	☐ Commercial	☐ Federal	☐ Retrofit	☐ Restoration
☐ Road	☐ Utility	☐ Fill	☐ Dredge	☐ Mine
☐ Other (specify):				

SITE INFORMATION

☒ Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.) See Guidance to identify receiving waters.

☒ **Groundwater**	☒ **Surface Water**	☐ **MS4**
☐ GAA	☐ Isolated Wetland	☐ RIDOT
☒ GA	☒ Named Waterbody	☐ RIDOT Alteration Permit is Approved
☐ GB	☐ Unnamed Waterbody Connected to Named Waterbody	☐ Town
		☒ Other (specify):

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.

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

PROJECT HISTORY		
☐ RIDEM Pre- Application Meeting	Meeting Date:	☐ Minutes Attached
☐ Municipal Master Plan Approval	Approval Date:	☐ Minutes Attached
☐ Subdivision Suitability Required	Approval #:	
☐ Previous Enforcement Action has been taken on the property	Enforcement #:	

FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways	
☒ Riverine 100-year floodplain: **FEMA FLOODPLAIN FIRMETTE** has been reviewed and the 100-year floodplain is on site	
☐ Delineated from FEMA Maps	
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional	
☐ Calculated by Professional Engineer	
☐ Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY):
	Amount of Cut (CY):
☐ Restrictions or modifications are proposed to the flow path or velocities in a floodway	
☐ Floodplain storage capacity is impacted	
☐ Project area is not within 100-year floodplain as defined by RIDEM	

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

LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:			
1. OFFICE OF WASTE MANAGEMENT (OWM)			
	☐ 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))		**RIDEM CONTACT:**
	☐ 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)		
	☐ This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities		**SITE ID#**:
		☐ CERCLIS/Superfund (NPL)	
		☐ State Hazardous Waste Site (SHWS)	
		☐ Environmental Land Usage Restriction (ELUR)	
		☐ Leaking Underground Storage Tank (LUST)	
		☐ Closed Landfill	
Note: If any boxes in 1 above are checked, the applicant must contact the RIDEM OWM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration**.**			
2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:			
	☐ Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php		
	☐ Auto Fueling Facility (e.g., gas station)		
	☐ Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area		

	☐ Road Salt Storage and Loading Areas (exposed to rainwater)	
	☐ Outdoor Storage and Loading/Unloading of Hazardous Substances	
3.	**STORMWATER INDUSTRIAL PERMITTING**	
	☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
	☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
	☐ Additional stormwater treatment is required by the MSGP Explain:	

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

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)

This section may be deleted if not required.

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

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

A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS	**IF NOT IMPLEMENTED, EXPLAIN HERE**
☒ Sensitive resource areas and site constraints are identified (required) ☒ Local development regulations have been reviewed (required) ☒ All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction ☐ Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. **Note:** If Conservation Development has been used, check box and skip to Subpart C ☒ As much natural vegetation and pre-development hydrology as possible has been maintained	

B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS ☒ Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies ☒ Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) ☐ Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) ☒ Development sites and building envelopes have been positioned outside of floodplains ☒ Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features ☒ Development sites and building envelopes have been located to minimize impacts to steep slopes (≥15%) ☐ Other (describe):	
C) MINIMIZE CLEARING AND GRADING ☒ Site clearing has been restricted to minimum area needed for building footprints, development activities, construction access, and safety. ☒ Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) ☒ Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s) ☒ Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent	
D) REDUCE IMPERVIOUS COVER ☒ Reduced roadway widths (≤22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) ☐ Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface) ☐ Reduced building footprint: Explain approach: ☐ Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) ☐ Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) ☐ Reduced parking lot area: Explain approach ☒ Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. ☒ Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) ☐ Other (describe):	
E) DISCONNECT IMPERVIOUS AREA ☒ Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible ☐ Residential street edges allow side-of-the-road drainage into vegetated open swales ☐ Parking lot landscaping breaks up impervious expanse AND accepts runoff ☐ Other (describe):	
F) MITIGATE RUNOFF AT THE POINT OF GENERATION ☒ Small-scale BMPs have been designated to treat runoff as close as possible to the source	

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

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2		
YES	**NO**	
☒	☐	The project has been designed to meet the groundwater recharge standard.
☐	☐	If "No," the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);
☐	☐	Your waiver request has been explained in the Narrative, if applicable.
☐	☒	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
☐	☐	If "Yes," has approval for infiltration by the Office of Waste Management Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)
(Add or Subtract Rows as Necessary)

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

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

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

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WATER QUALITY – MINIMUM STANDARD 3		
YES	**NO**	
☒	☐	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
☒	☐	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
☒	☐	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
☐	☐	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
☐	☐	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
☐	☐	Not Applicable
☒	☐	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
☐	☒	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.
☐	☒	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
☒	☐	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
☐	☒	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
☐	☒	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

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

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

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

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

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

*rounding in HydroCAD. 100% of impervious areas are directed to a water quality BMP and fully treated/ infiltrated.

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4		
YES	**NO**	
☐	☒	Is this standard waived? If "Yes," please indicate one or more of the reasons below:
		☒ The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters. ☐ The project directs is a small facility with impervious cover of less than or equal to 1 acre. ☐ The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).
☒	☐	Conveyance and natural channel protection for the site have been met. If "No,' explain why:

TABLE 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
TOTALS:					
Note: The Channel Protection Volume Standard must be met in each waterbody ID. **The site has been designed to fully infiltrate the channel protection volume**					
☐ YES ☐ NO	The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM).				
☐ YES ☐ NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If "Yes," please indicate restrictions and solutions below.				
☒ Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.). **1-year storm event HydroCAD Analysis in the Stormwater Report**					

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5			
YES	**NO**		
☒	☐	Is this standard waived? If yes, please indicate one or more of the reasons below:	
		☒	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for 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.
		☐	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).
☐	☒	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:	
		☐	RIDOT
		☐	Other (specify):
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☐ TR-55 ☐ TR-20 ☒ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☐ Other (Specify):	
YES	**NO**		
☒	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☒	☐	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☒	☐	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☒	☐	Are the off-site areas shown on the subwatershed maps?	
☒	☐	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☒	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☒	☐	Calculate the following:	
		☒	Area of disturbance within the sub-watershed (areas) 2.315 acres
		☒	Impervious cover (%) 44
☐	☒	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?	
☒	☐	Does this project meet the overbank flood protection standard?	

Table 5-1 Hydraulic Analysis Summary								
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	0.02	0.00	0.04	0.08	0.14	0.15	0.19
DP-2:	1.16	0.86	0.19	0.00	7.66	6.35	13.51	12.20
DP-3:*	0.09	0.09	0.09	0.02	0.35	1.49	0.52	2.50
TOTALS:	1.26	0.97	0.28	0.06	8.09	7.98	14.18	14.89

* 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_v	WQ_v	CP_v (Y/N/NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/No	Technical Justification (Design Report page number)	Distance Provided
Stormcrete A	2	Permeable Pavement	Y	Y	Y	N/A	N/A	N/A	Y	Section 2.3	309 ft
Stormcrete B	3	Permeable Pavement	Y	Y	Y	N/A	N/A	N/A	Y	Section 2.3	20 ft
QP UIS	2	Underground Infiltration	Y	N/A	N/A	N/A	N/A	E	Y	Section 2.3	111 ft
WQ Stormtech	2	Underground Infiltration	Y	Y	Y	N/A	N/A	E	Y	Section 2.3	75 ft
		TOTALS:									

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-1	TH-101	4.00	8.00	4.00	A	8.27
Stormcrete B	3	Permeable Pavement	TH-109	TH-109A	4.00	11.00	7.00	A	8.27
QP UIS	2	Underground Infiltration	TH-103	TH-104	0.50	5.00	4.50	A	8.27
WQ Stormtech	2	Underground Infiltration	TH-104	TH-21-11	2.00	6.00	4.00	A	8.27
		TOTALS:							

* 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**	
☐	☐	☒	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
☐	☐	☐	Are these activities already covered under an MSGP? If "No," please explain if you have applied for an MSGP or intend to do so?
☐	☐	☐	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:
☐	☐	☐	Additional BMPs, or additional pretreatment BMP's if any, that meet RIPDES MSGP requirements; Please list BMPs:
			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.).

ILLICIT DISCHARGES – MINIMUM STANDARD 9			
Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.			
YES	**NO**	**N/A**	
☒	☐	☐	Have you checked for illicit discharges?
☐	☒	☐	Have any been found and/or corrected? If "Yes," please identify.

☐	☐	☒	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10				
YES	**NO**	**N/A**		
☒	☐	☐	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?	
☒	☐	☐	Have you provided a **separately-bound** document based upon the SESC Template? 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:	
			☐	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
			☐	Provide Natural Buffers and Maintain Existing Vegetation
			☐	Minimize Area of Disturbance
			☐	Minimize the Disturbance of Steep Slopes
			☐	Preserve Topsoil
			☐	Stabilize Soils
			☐	Protect Storm Drain Inlets
			☐	Protect Storm Drain Outlets
			☐	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
			☐	Establish Perimeter Controls and Sediment Barriers
			☐	Divert or Manage Run-On from Up-Gradient Areas
			☐	Properly Design Constructed Stormwater Conveyance Channels
			☐	Retain Sediment On-Site
			☐	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
			☐	Apply Construction Activity Pollution Prevention Control Measures
			☐	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
			☐	Qualified SESC Plan Preparer's Information and Certification
			☐	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
			☐	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9		
Operation and Maintenance Section		
YES	**NO**	
☒	☐	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
☒	☐	Have you provided a **separately-bound** 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?
☒	☐	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
☒	☐	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
☐	☒	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations).

		If "Yes," have you obtained them? Or please explain your plan to obtain them:
☐	☒	Is stormwater being directed from public areas to private property? If "Yes," note the following: Note: This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.
Pollution Prevention Section		
☒	☐	Designated snow stockpile locations?
☐	☒	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
☒	☐	Asphalt-only based sealants?
☐	☒	Pet waste stations? (Note: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
☒	☐	Regular sweeping? Please describe: Please see Operations & Maintenance Manual prepared by DiPrete Engineering
☒	☐	De-icing specifications, in accordance with 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).
☒	☐	A prohibition of phosphate-based fertilizers? (Note: If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

Existing and Proposed Subwatershed Mapping (REQUIRED)			
YES	**NO**		
☒	☐		Existing and proposed drainage area delineations
☒	☐		Locations of all streams and drainage swales
☒	☐		Drainage flow paths, mapped according to the DEM *Guidance for Preparation of Drainage Area Maps* (included in RISDISM Appendix K)
☒	☐		Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
☒	☐		Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
☒	☐		Mapped seasonal high-water-table test pit locations
☒	☐		Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
☒	☐		Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
☒	☐		Mapped bedrock outcrops adjacent to any infiltration BMP
☒	☐		Soils were logged by a:
		☒	DEM-licensed Class IV soil evaluator Name: Christian Sutter, License Number D-4077
		☐	RI-registered P.E. Name:

Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	**First Receiving Water ID or MS4**	**Area Disturbed (units)**	**Existing Impervious (units)**	**Proposed Impervious (units)**
DP-1:	N/A	0.024 ac	0.001 ac	0.007 ac
DP-2:	N/A	1.627 ac	0 ac	0.581ac
DP-3:	Potter Pond (WBIP RI0010043E-05)	0.655ac	0 ac	0.342 ac

TOTALS:		2.306 ac	0.001 ac	0.940 ac

Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	**NO**	
☒	☐	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
☒	☐	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
☒	☐	Boundaries of existing predominant vegetation and proposed limits of clearing
☒	☐	Site Location clarification
☒	☐	Location and field-verified boundaries of resource protection areas such as: ► freshwater and coastal wetlands, including lakes and ponds ► coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
☒	☐	All required setbacks (e.g., buffers, water-supply wells, septic systems)
☒	☐	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: ► 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; ► Design water surface elevations (applicable storms); ► Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.; ► Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.); ► 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; ► Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting
☒	☐	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
☐	☒	Mapping of any OWM-approved remedial actions/systems (including ELURs)
☒	☐	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; ► Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements; ► 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.); ► Cross sections of roadways, with edge details such as curbs and sidewalks; ► Location and dimensions of channel modifications, such as bridge or culvert crossings
☐	☒	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization

1.0 Project Description

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

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

2.0 Site Conditions

2.1 SOILS

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

Soil Symbol	Description	Hydrologic Group
BhB	Bridgehampton 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.

2.3 POST SITE CONDITIONS

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

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

- Precast Porous Concrete Slabs (underground infiltration chambers)
    - Extremely high stormwater intake rate of 250 in/hr
    - Infiltrates the water quality storm event and larger storm events where shown
    - Provides stormwater recharge
    - Washed crushed stone reservoir course
    - Setback to building foundation of 10' met (20' minimum provided)
- Underground Infiltration System (Stormtech chambers)
    - Infiltrates the water quality storm event
    - Provides stormwater recharge
    - Setback to OWTS of 25' met (56.9' provided)
- Underground Infiltration System (Pipe Chambers)
    - 48" perforated pipes in stone surrounds
    - Infiltrates the 1 year storm event and larger storm events where shown
    - Provides peak mitigation
    - Setback to property line of 10' met (21' minimum provided)

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

3.0 Minimum Standards

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

3.1 Minimum Standard 1: LID Site Planning and Design Strategies

See “Appendix A: Stormwater Management Checklist” from the RISDISM provided at the beginning of this report.

3.2 Minimum Standard 2: Groundwater Recharge

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

Groundwater recharge is determined from the following equation:
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.

3.3 Minimum Standard 3: Water Quality

All stormwater is treated through an approved BMP before being discharged. This site has been designed to use Stormtech Underground Infiltration Chambers and a series of Stormcrete Precast Porous Concrete Slabs to treat stormwater before being infiltrated. There are no pollutant-specific requirements and/or pollutant removal efficiencies applicable to the site as the result of SAMP, TMDL, or other watershed-specific requirements. See Table 3-1 of the Appendix A Checklist for a detailed summary of the water quality calculations.

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

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

Run-on Row

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

3.4 Minimum Standard 4: Conveyance and Natural Channel Protection

3.4.1 Drainage Network Design Parameters:

A. PIPES

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

B. STRUCTURES

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

3.4.2 Channel Protection Volume:

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

See table 4-1 of the Appendix A Checklist for a Summary of Channel Protection Volumes. See Appendix A3.2.2 for the 1-year storm event HydroCAD analysis.

3.5 Minimum Standard 5: Overbank Flood Protection & Downstream Analysis

3.5.1 Method of Analysis

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

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

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

3.5.2 Design Storm

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

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 6 subcatchments. In the post-development stage there are 7 subcatchments. A description of each watershed and associated subcatchments are summarized as follows, for cover types see color watershed maps located in back of this report. Numbers in parentheses ( ) indicate the HydroCAD Node Number.

<u>Design Point 1:</u>

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	0.050	74	6.0

Design Point 2:

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

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

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

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

In post development conditions, there are 4 subcatchments:

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

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

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

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

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	8.049	63	14.3
WPre-20a	1.317	43	38.9
WPre-22	1.008	33	19.8
WPost-201	9.014	61	14.3
WPost-203	0.337	78	6.0
WPost-205	0.732	71	6.0
WPost-208	0.260	39	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 2 subcatchments:

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

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

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

	Area (acres)	CN	Tc (min)
WPre-30	1.327	44	17.4
WPre-32	0.161	69	6.0
WPost-301	1.273	63	17.4
WPost-305	0.277	57	6.0

3.5.4 Q_p BMP Calculations

Mitigated stormwater is discharged to Design Point 2 via a level spreader. The level spreader has been included in the HydroCAD model. The results demonstrate that all design storms are discharged at non erosive velocities (<3fps). See Appendix A3 for detailed calculations. Mitigated stormwater is discharged to Design Point 3 via overland flow. The results demonstrate that all design storms are discharged at non erosive velocities (<3fps). See Appendix A3 for detailed calculations.

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

3.5.6 Overbank Flood Protection Conclusion

The tables below presents a summary of the pre development flows vs. the mitigated post development flows.

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

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	0.02	0.00	0.04	0.08	0.14	0.15	0.19
DP-2:	1.16	0.86	0.19	0.00	7.66	6.35	13.51	12.20
DP-3*:	0.09	0.09	0.09	0.02	0.35	1.49	0.52	2.50
Totals:	1.26	0.97	0.28	0.06	8.09	7.98	14.18	14.89

All flows in cubic feet per second (cfs)

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

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

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	0.002	0.001	0.003	0.007	0.010	0.023	0.023
DP-2:	0.059	0.037	0.027	0.000	0.731	0.671	2.668	2.637
Totals:	0.060	0.039	0.028	0.003	0.738	0.681	2.691	2.660

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

3.6 Minimum Standard 6: Redevelopment and Infill Projects.

The site is not classified as a redevelopment or infill project.

3.7 Minimum Standard 7: Pollution Prevention

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

3.8 Minimum Standard 8: Land Uses with High Potential Pollutant Loads (LUHPPls)

The site is not considered LUHPPL.

3.9 Minimum Standard 9: Illicit Discharges

There are no proposed Illicit Discharges on site. The site will be serviced by public water and sewer.

3.10 Minimum Standard 10: Construction Activity Soil Erosion, Runoff and Sedimentation and Pollution Prevention Control Measure Requirements

See the SESC for this development prepared by DiPrete Engineering.

3.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance

See the O&M for this development prepared by DiPrete Engineering.

Appendix A

A2.1 Soil Evaluations

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 R. Biancuzzo
Property Location: Matunuck Beach Road (AP 92-2 Lots 56) South Kingstown, RI
Date of Test Hole: October 23, 2020
Soil Evaluator: Chris Duhamel License Number: D-4006
Weather: Cloudy, 60's Shaded: Yes ☐ No ☑ Time: 1:00 pm

TH 101 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
Ap	0-6"	C	S	10YR 2/2					fsl	1-sbk	fri	4
2C	6-96"			10YR 4/4					gcos	0-sg	L	1m

TH 102 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
Ap	0-13"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw1	13-24"	S	S	10YR 4/4					fsl	1-sbk	fri	4
Bw2	24-36"	C	S	10YR 5/6					fsl	1-sbk	fri	4
C	36-48"	C	S	2.5Y 4/4					fsl	0-m	fri	7
2C	48-96"			2.5Y 3/2					gcos	0-sg	L	1m

TH 101 Soil Class Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)
TH 102 Soil Class Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 36" (og)

Comments:

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 R. Biancuzzo
Property Location: Matunuck Beach Road (AP 92-2 Lots 56) South Kingstown, RI
Date of Test Hole: October 23, 2020
Soil Evaluator: Chris Duhamel License Number: D-4006
Weather: Cloudy, 60's Shaded: Yes ☐ No ☑ Time: 1:00 pm

TH 103 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
Ap1	0-16"	C	S	10YR 2/2					fsl	1-sbk	fri	4
Ap2	16-27"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	27-35"	C	S	10YR 4/3					fsl	0-m	fri	4
2C1	35-53"	C	S	10YR 4/6					gcos	0-sg	L	1m
2C2	53-96"			10YR 4/4					vgcos	0-sg	L	1m

TH 104 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
Ap	0-12"	C	S	10YR 2/2					fsl	1-sbk	fri	4
Bw	12-17"	S	S	10YR 3/2					ls	1-sbk	fri	3
2C1	17-36"	C	S	2.5Y 4/4					gcos	0-sg	L	1m
2C2	36-56"	C	S	10YR 5/2					gs	0-sg	L	1m
2C3	56-96"			10YR 5/4					gcos	0-sg	L	1m

TH 103 Soil Class Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)
TH 104 Soil Class Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

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 R. Biancuzzo
Property Location: Matunuck Beach Road (AP 92-2 Lots 56) South Kingstown, RI
Date of Test Hole: October 23, 2020
Soil Evaluator: Chris Duhamel License Number: D-4006
Weather: Cloudy, 60's Shaded: Yes ☐ No ☑ Time: 1:00 pm

TH 108 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
Ap	0-6"	C	S	10YR 2/1					fsl	1-sbk	fri	4
Bw	6-27"	C	S	10YR 5/6					fsl	1-sbk	fri	4
C	27-51"	C	S	10YR 7/1					sil	0-m	fri	7
2C	51-96"			10YR 4/4					gcos	0-sg	L	1m

TH 109 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
Ap	0-6"	C	S	10YR 2/1					fsl	1-sbk	fri	4
Bw	6-29"	S	S	10YR 5/6					fsl	1-sbk	fri	4
C	29-48"	C	S	10YR 7/1					sil	0-m	fri	7
2C	48-96"			10YR 4/3					gcos	0-sg	L	1m

TH 108 Soil Class Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)
TH 109 Soil Class Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

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 R. Biancuzzo
Property Location: Matunuck Beach Road (AP 92-2 Lots 56) South Kingstown, RI
Date of Test Hole: October 23, 2020
Soil Evaluator: Chris Duhamel License Number: D-4006
Weather: Cloudy, 60's Shaded: Yes ☐ No ☑ Time: 1:00 pm

TH 110 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
Ap	0-14"	C	S	10YR 2/1					fsl	1-sbk	fri	4
Bw	14-31"	C	S	10YR 5/6					fsl	1-sbk	fri	4
C	31-52"	C	S	10YR 7/1					sil	0-m	fri	7
2C	52-96"			10YR 4/4					gcos	0-sg	L	1m
TH____ Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				

TH 110 Soil Class Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth 52" SHWT 30" (og)

TH _____ Soil Class _____ Total Depth _____ Impervious/Limiting Layer Depth _____ (og) GW Seepage Depth _____ SHWT _____ (og)

Comments: _____

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** NA

Property Owner: Eileen R. Biancuzzo
Property Location: Matunuck Beach Rd. (AP 92-2 Lot 56) South Kingstown, RI
Date of Test Hole: February 20, 2019
Soil Evaluator: Chris Sutter License Number: D-4077
Weather: Clear, 30's Shaded: Yes ☐ No ☑ Time: 8:00 am

TH 1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
HTM	0-10"	C	S				loamy			Fill
C	10-108"			2.5Y 5/4			gcbs	0-sg	L	1m

TH 2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
HTM	0-46"	C	S				loamy			Fill
Ab	46-50"	C	S	10YR 3/2			sl	1-sbk	fri	3
Bw	50-64"	C	S	10YR 4/6			gsl	1-sbk	fri	3
C	64-100"			2.5Y 5/4			gcbs	0-sg	L	1m

TH 1 Soil Class Outwash Total Depth 108" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)
TH 2 Soil Class Outwash Total Depth 100" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth 82" SHWT 24" (og)

Comments:

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** NA

Property Owner: Eileen R. Biancuzzo
Property Location: Matunuck Beach Rd. (AP 92-2 Lot 56) South Kingstown, RI
Date of Test Hole: February 20, 2019
Soil Evaluator: Chris Sutter License Number: D-4077
Weather: Clear, 30's Shaded: Yes ☐ No ☑ Time: 8:00 am

TH 3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
A	0-8"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	8-38"	C	S	10YR 4/6					fsl	1-sbk	fri	4
2C	38-108"			2.5Y 5/4					gcbcos	0-sg	L	1m

TH 4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
HTM	0-12"	C	S						loamy			Fill
Ab	12-20"	C	S	10YR 3/2					fsl	1-sbk	fri	4
Bw	20-72"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	72-108"			2.5Y 5/4					gcbcos	0-sg	L	1m

TH 3 Soil Class Outwash Total Depth 108" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT >108" (og)
TH 4 Soil Class Outwash Total Depth 108" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT >108" (og)

Comments:

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** NA

Property Owner: Eileen R. Biancuzzo
Property Location: Matunuck Beach Rd. (AP 92-2 Lot 56) South Kingstown, RI
Date of Test Hole: February 20, 2019
Soil Evaluator: Chris Sutter License Number: D-4077
Weather: Clear, 30's Shaded: Yes ☐ No ☑ Time: 8:00 am

TH 5 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
HTM	0-24"	C	S				mixed			Fill
Ab	24-30"	C	S	10YR 3/2			fsl	1-sbk	fri	4
Bw	30-60"	C	S	10YR 4/6			fsl	1-sbk	fri	4
C	60-108"			2,5Y 5/3			vfsl	0-m	fri	7

TH 6 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
Ap	0-8"	C	S	10YR 3/2			sil	1-sbk	fri	4
Bw	8-24"	C	S	10YR 4/6			sil	1-sbk	fri	4
C	24-60"	C	S	2.5Y 5/3			sil	1-sbk	fri	7
2C	60-108"			2.5Y 5/4			s	0-sg	L	1

TH 5 Soil Class Outwash Total Depth 108" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 36" (og)
TH 6 Soil Class Outwash Total Depth 108" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth 96" SHWT 72" (og)

Comments:

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 ☑ Time: 9:00AM

TH 21-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
A	0-6"	C	S	10YR 3/2					sl	1-sbk	fri	3
Bw	6-22"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	22-43"	C	S	2.5Y 4/1	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	43-96"			2.5Y 4/4					gcbs	0-sg	L	1m

TH 21-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
A	0-6"	C	S	10YR 3/2					sl	1-sbk	fri	3
Bw	6-28"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	28-44"	C	S	2.5Y 4/1	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	44-96"			2.5Y 4/4					gcbs	0-sg	L	1m

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:

Revised 11/25/18

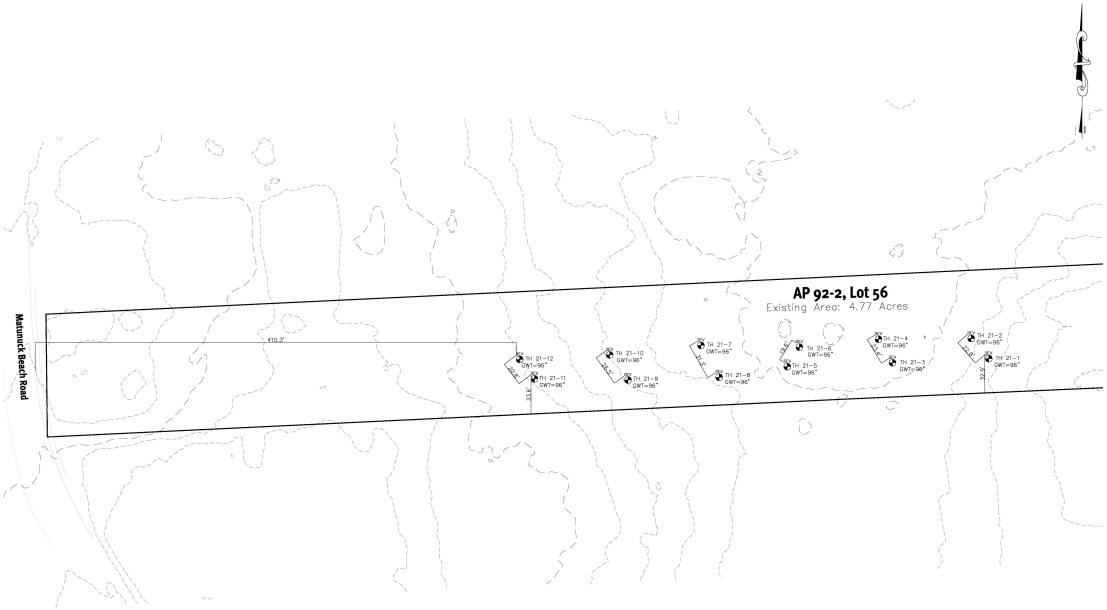
Part B

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

Please use the area below to locate:

1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*
   ***OFFSETS MUST BE SHOWN**

Key:
- Approximate location of test holes
- Approximate location of bedrock test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north



Bedrock THs	
TH	Depth

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

Certification

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

Part A prepared by: _____ (Signature) D-4077 (License #)

Part B prepared by: _____ (Signature) D-4077 (License #)

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ **Additional Field Review Required** ☐

Explanation: _____

_____

_____

_____ _____

Signature Authorized Agent Date

Revised 11/25/18

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 ☑ Time: 9:00AM

TH 21-3 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-6"	C	S	10YR 3/2			sl	1-sbk	fri	3
Bw	6-21"	C	S	10YR 4/6			fsl	1-sbk	fri	4
C	21-45"	C	S	2.5Y 4/1			fsl	0-m	fri	7
2C	45-96"			2.5Y 4/4			gcbs	0-sg	L	1m

TH 21-4 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-6"	C	S	10YR 3/2			sl	1-sbk	fri	3
Bw	6-18"	C	S	10YR 4/6			fsl	1-sbk	fri	4
C	18-44"	C	S	2.5Y 4/1			fsl	0-m	fri	7
2C	44-96"			2.5Y 4/4			gcbs	0-sg	L	1m

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:

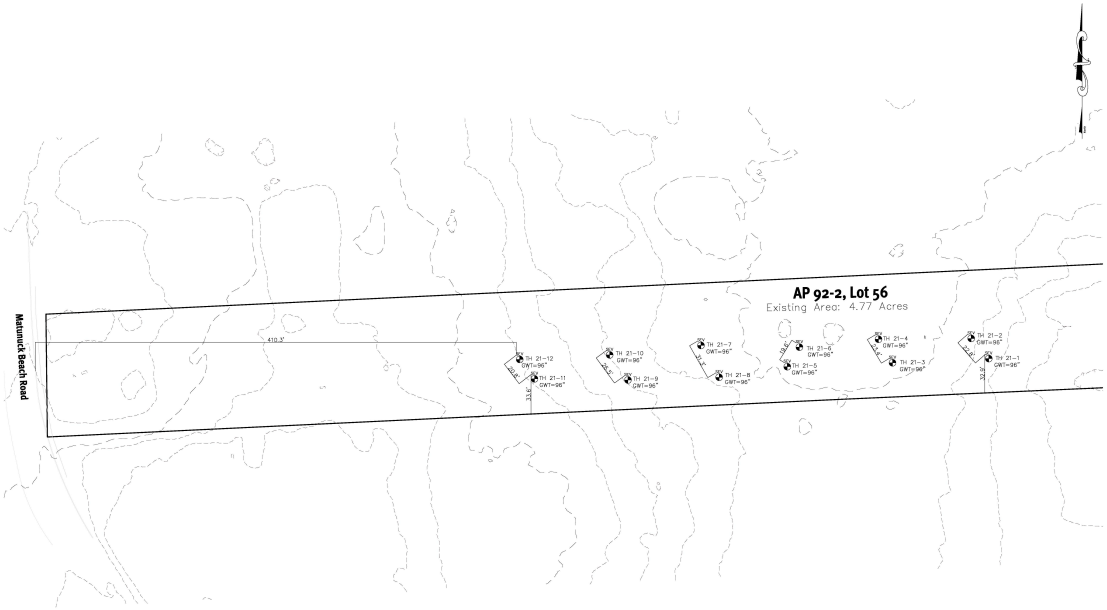
Part B

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
- x% Estimated gradient and direction of slope
- N Approximate direction of due north



Bedrock THs	
TH	Depth

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

Certification

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

Part A prepared by: _____ (Signature) D-4077 (License #)

Part B prepared by: _____ (Signature) D-4077 (License #)

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ **Additional Field Review Required** ☐

Explanation: _____

_____

_____

_____ _____

Signature Authorized Agent Date

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 ☑ Time: 9:00AM

TH 21-5 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-4"	C	S	10YR 3/2			sl	1-sbk	fri	3
Bw	4-18"	C	S	10YR 4/6			fsl	1-sbk	fri	4
C	18-38"	C	S	2.5Y 4/1			fsl	0-m	fri	7
2C	38-96"			2.5Y 4/4			gcbs	0-sg	L	1m

TH 21-6 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-6"	C	S	10YR 3/2			sl	1-sbk	fri	3
Bw	6-18"	C	S	10YR 4/6			fsl	1-sbk	fri	4
C	18-39"	C	S	2.5Y 4/3			fsl	0-m	fri	7
2C	39-96"			2.5Y 4/4			gcbs	0-sg	L	1m

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:

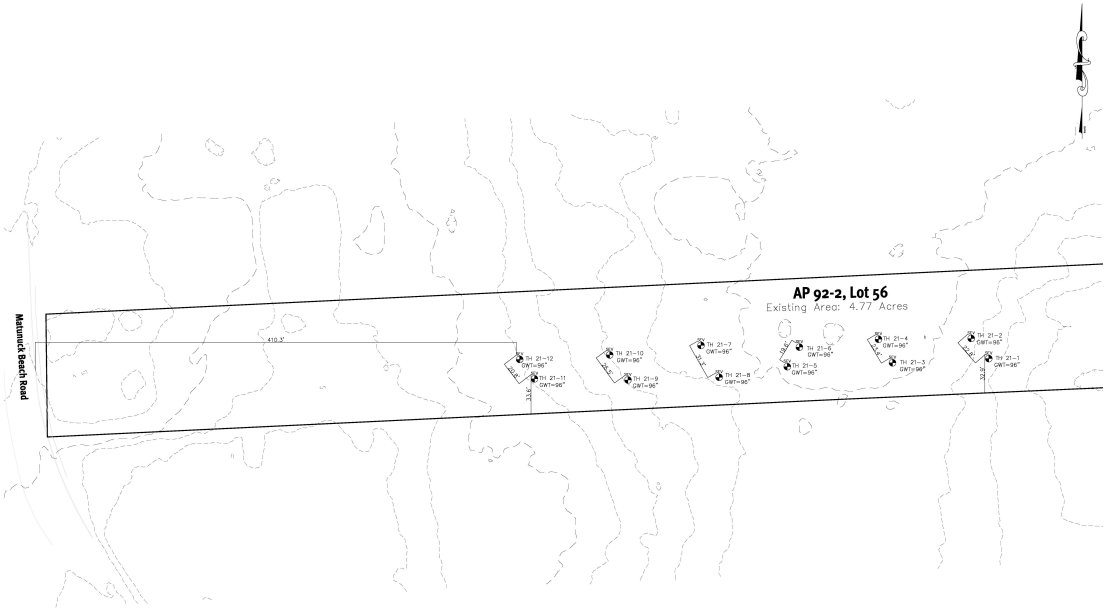
Part B

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

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
- x% Estimated gradient and direction of slope
- N Approximate direction of due north



Bedrock THs	
TH	Depth

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

Certification

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

Part A prepared by: _____ D-4077 (Signature / License #) Part B prepared by: _____ D-4077 (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 ☑ Time: 9:00AM

TH 21-7 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
A	0-6"	C	S	10YR 3/2					sl	1-sbk	fri	3
Bw	6-28"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	18-38"	C	S	2.5Y 4/1	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	44-96"			2.5Y 4/4					gcbs	0-sg	L	1m

TH 21-8 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
A	0-6"	C	S	10YR 3/2					sl	1-sbk	fri	3
Bw	6-31"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	31-60"	C	S	2.5Y 4/1					fsl	0-m	fri	7
2C	60-96"			2.5Y 4/4					gcbs	0-sg	L	1m

TH 21-7 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)
TH 21-8 Soil Class Eolian/Outwash Total Depth 96" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT 96" (og)

Comments:

Revised 11/25/18

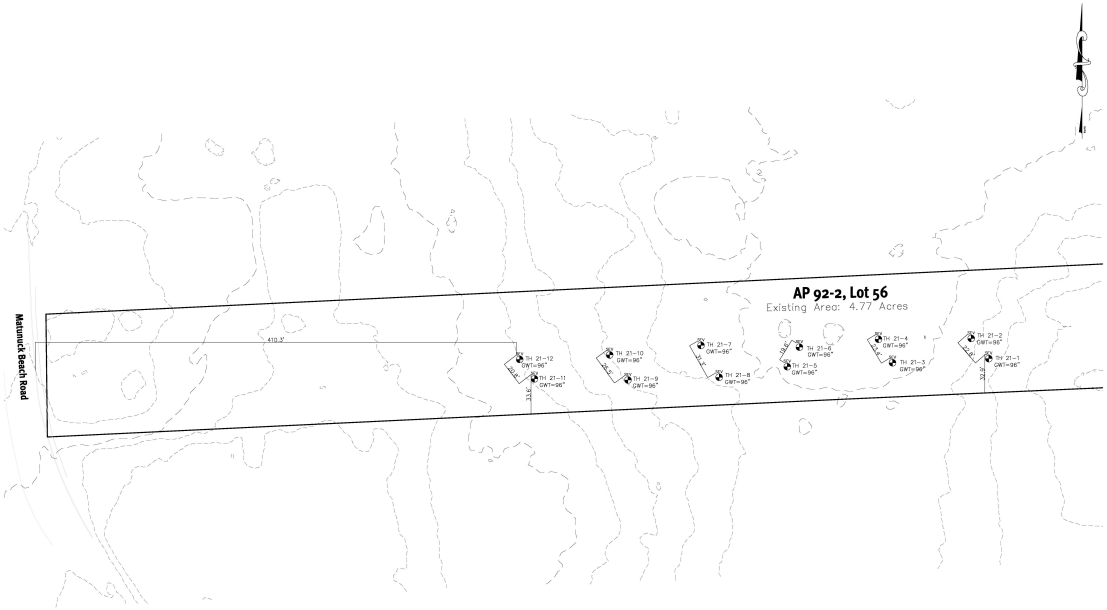
Part B

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

Please use the area below to locate:

1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*
   ***OFFSETS MUST BE SHOWN**

Key:
- Approximate location of test holes
- Approximate location of bedrock test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north



Bedrock THs	
TH	Depth

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

Certification

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

Part A prepared by: _____ D-4077 (Signature / License #)

Part B prepared by: _____ D-4077 (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 ☑ Time: 9:00AM

TH 21-9 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-4"	C	S	10YR 3/2			sl	1-sbk	fri	3
Bw	4-15"	C	S	10YR 4/6			fsl	1-sbk	fri	4
C	15-32"	C	S	2.5Y 4/1			fsl	0-m	fri	7
2C	32-96"			2.5Y 4/4			gcbs	0-sg	L	1m

TH 21-10 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-4"	C	S	10YR 3/2			sl	1-sbk	fri	3
Bw	4-24"	C	S	10YR 4/6			fsl	1-sbk	fri	4
C	24-36"	C	S	2.5Y 4/1			fsl	0-m	fri	7
2C	36-96"			2.5Y 4/4			gcbs	0-sg	L	1m

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:

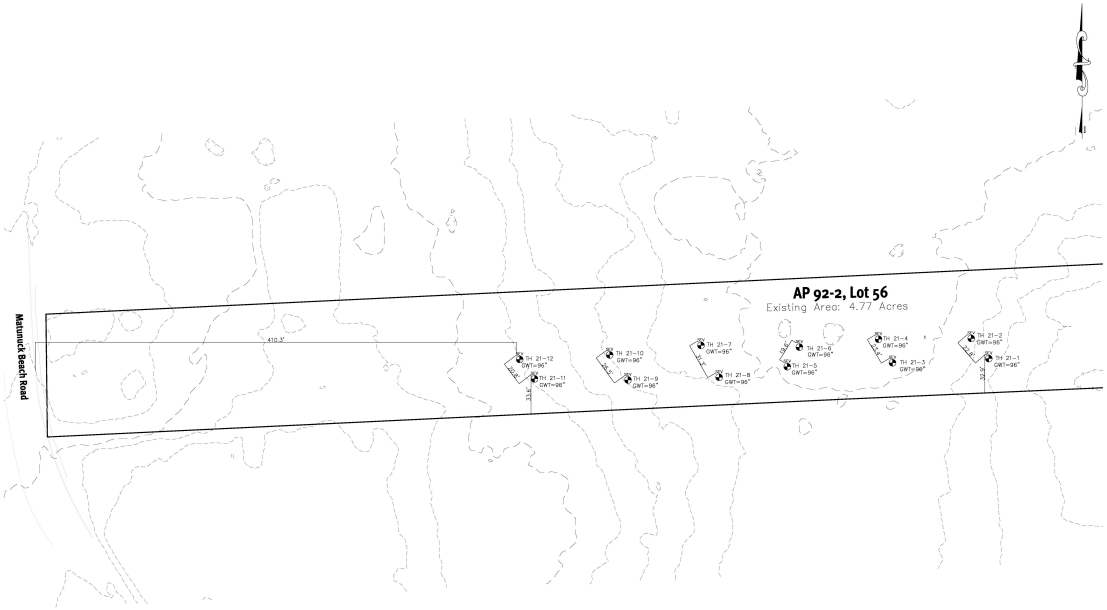
Part B

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
- x% Estimated gradient and direction of slope
- N Approximate direction of due north



Bedrock THs	
TH	Depth

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: CWS&B (Signature) D-4077 (License #) Part B prepared by: CWS&B (Signature) D-4077 (License #)

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ **Additional Field Review Required** ☐

Explanation: _____

Signature Authorized Agent _____ Date _____

Revised 11/25/18

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 ☑ Time: 9:00AM

TH 21-11 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
A	0-6"	C	S	10YR 3/2					sl	1-sbk	fri	3
Bw	6-30"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	30-44	C	S	2.5Y 4/3					fsl	0-m	fri	7
2C	44-96"			2.5Y 4/4					gcbs	0-sg	L	1m

TH 21-12 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				
A	0-6"	C	S	10YR 3/2					sl	1-sbk	fri	3
Bw	6-32"	C	S	10YR 4/6					fsl	1-sbk	fri	4
C	32-60"	C	S	2.5Y 4/1	7.5YR 5/8	C	3	P	fsl	0-m	fri	7
2C	60-96"			2.5Y 4/4					gcbs	0-sg	L	1m

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,
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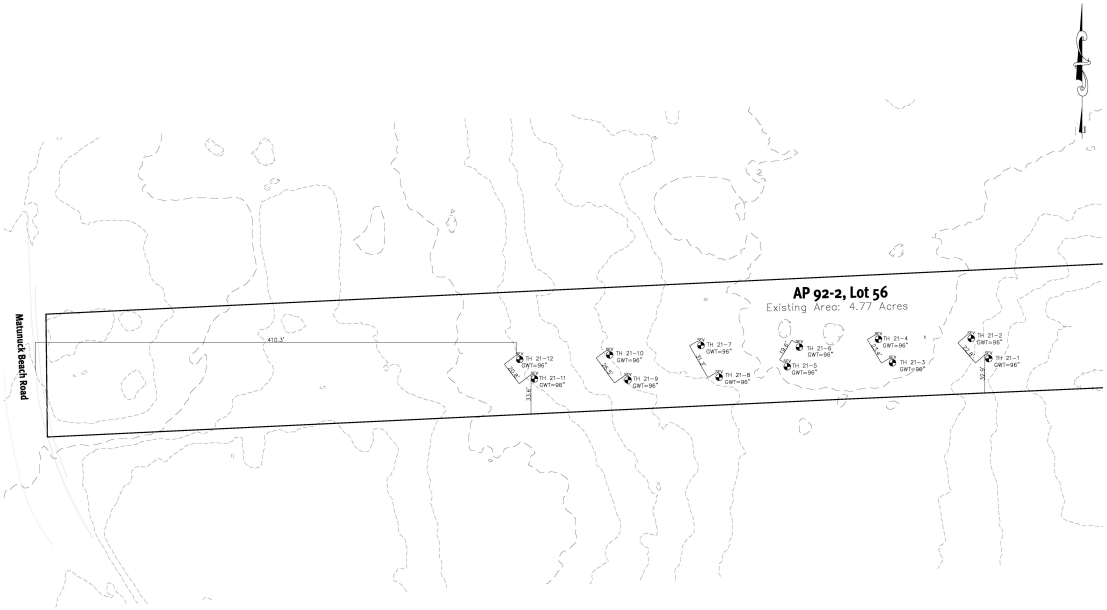

Bedrock THs	
TH	Depth

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Part A prepared by: _____ (Signature) D-4077 (License #) Part B prepared by: _____ (Signature) D-4077 (License #)

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ **Additional Field Review Required** ☐

Explanation: _____

_____ Signature Authorized Agent _____ Date

Revised 11/25/18

A3.1 Water Quality HydroCAD Storm Analysis

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=8.049 ac 37.01% Impervious Runoff Depth=0.36"
Flow Length=791' Tc=14.3 min CN=42/98 Runoff=2.53 cfs 0.245 af

Subcatchment 20a: WPRe-20a Runoff Area=1.317 ac 8.85% Impervious Runoff Depth=0.09"
Flow Length=484' Tc=38.9 min CN=37/98 Runoff=0.06 cfs 0.010 af

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

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

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

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

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

Pond 31: Ex Low Point Peak Elev=12.06' Storage=271 cf Inflow=0.14 cfs 0.015 af
Discarded=0.03 cfs 0.015 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.015 af

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

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

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

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=0.051 ac 36.77% Impervious Runoff Depth=0.36"
Tc=6.0 min CN=60/98 Runoff=0.02 cfs 0.002 af

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Link 209: DP-2 Low Point/ SW Property Line Inflow=0.86 cfs 0.037 af
Primary=0.86 cfs 0.037 af

Link 306: DP-3 Wetlands/ Salt Marsh

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

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

Eric Beck

Digitally signed by Eric Beck
Date: 2021.10.12 12:18:23 -04'00'

Eric A. Beck, P.E. Date
Administrator of Groundwater and Wetlands Protection
RIDEM

ATTACHMENTS

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

Model #	Water Quality Flow Rate (cfs)	Approximate Impervious Treatment Area (acres)
CS-3	1.02	0.93
CS-4	1.80	1.68
CS-5	2.81	2.63
CS-6	4.05	3.78
CS-8	7.20	6.73
CS-10	11.3	10.56
CS-12	16.2	15.14

Table 2: Standard Hydrocarbon & Sediment Storage Capacity of Cascade Separator® Devices

Model #	Structure Inside Diameter (ft)	Oil Spill Volume (gal)	Sediment Storage Volume (ft^3)
CS-4	4	141	18.9
CS-5	5	269.3	29.4
CS-6	6	475.9	42.4
CS-8	8	1128	75.3
CS-10	10	2203.2	117.7
CS-12	12	3807.1	169.6

A3.2.0 Drainage Network Hydraulic Calculations

DiPrete Engineering
Engineers • Planners • Surveyors

Project Name: Matunuck Condos
Project Number: 2389-002

25-Year Storm
Date: 6/23/2021

Pipe Analysis

Pipe ID	Pipe Length	Pipe Size	Pipe Slope	Flow Rate	Capacity Full	Velocity	Invert Down	Invert Up
	(ft)	(in)	(%)	(cfs)	(cfs)	(ft/s)	(Ft)	(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

DiPrete Engineering
Engineers • Planners • Surveyors

Project Name: Matunuck Condos
Project Number: 2389-002

100-Year Storm
Date: 6/23/2021

Pipe Analysis

Pipe ID	Pipe Length	Pipe Size	Pipe Slope	Flow Rate	Capacity Full	Velocity	Invert Down	Invert Up
	(ft)	(in)	(%)	(cfs)	(cfs)	(ft/s)	(Ft)	(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

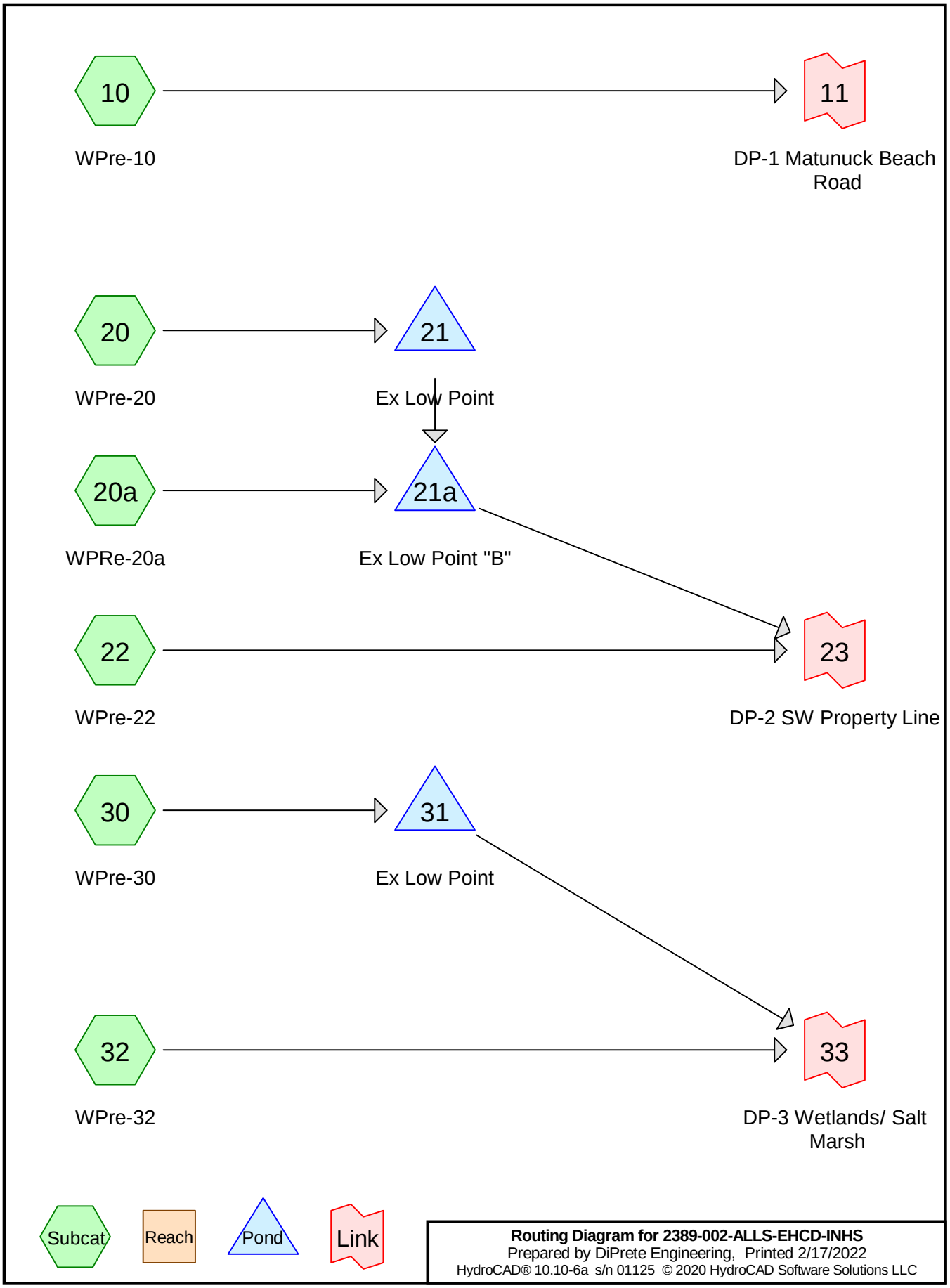
DiPrete Engineering
Engineers • Planners • Surveyors

Project Name: Matunuck Condos
Project Number: 2389-002

10-Year Storm
Date: 6/23/2021

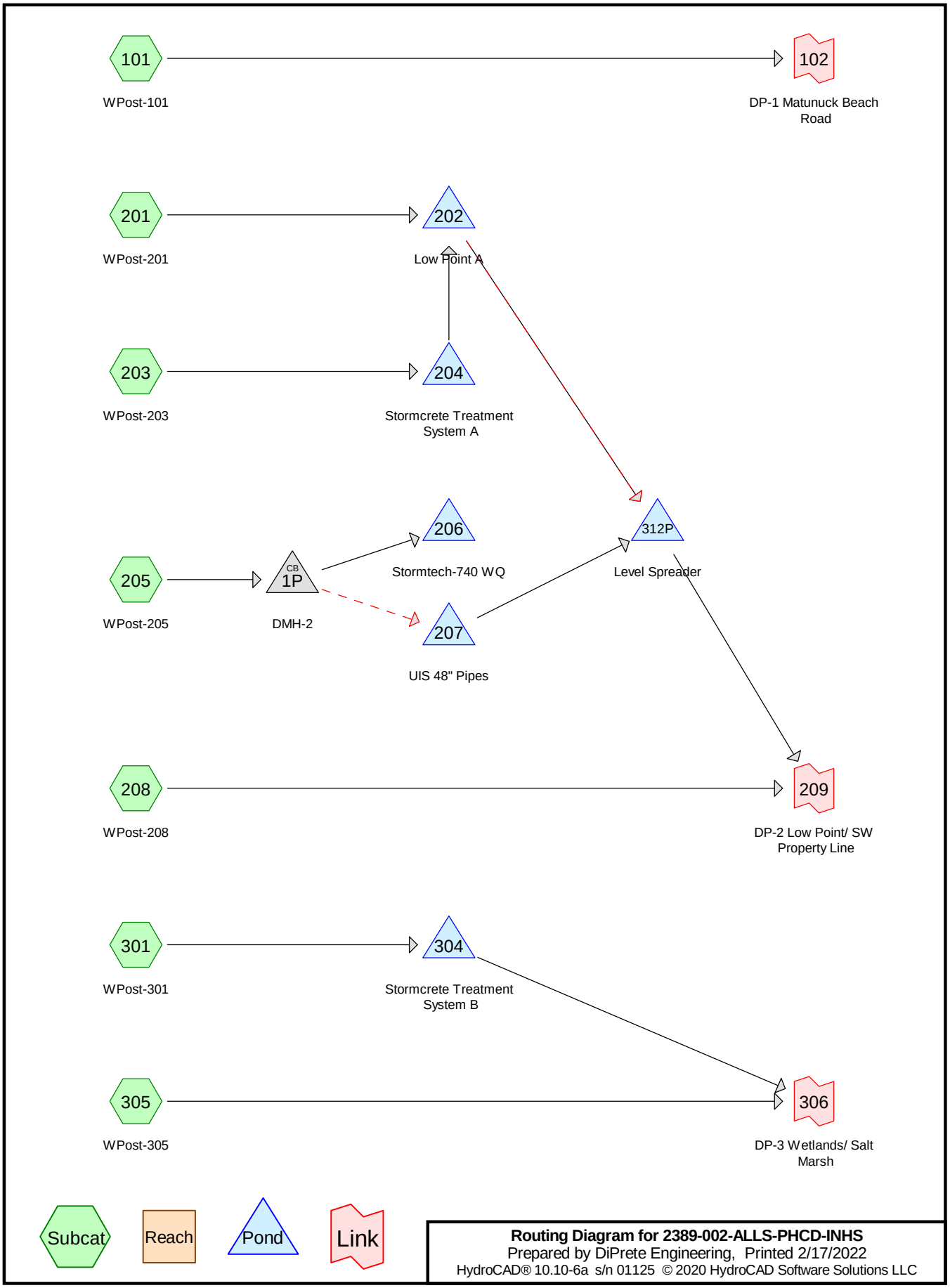
Structure	Area	Inlet Time	Intensity	Runoff C	Q=Cia	Q Carry over	Q Captured	Q Bypassed	Bypass Structure	Inlet Type	Curb Opening	Curb Opening	Grate Length	Grate Width	Depth	Spread
	(sf)	(min)	(in/hr)	(C)	(cfs)	(cfs)	(cfs)	(cfs)			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
7	4,101	6	6.94	0.66	0.44	0	0.35	0.09	---	Grate 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

A3.2.1 HydroCAD Node Diagram


10
WPre-10
11
DP-1 Matunuck Beach Road
20
WPre-20
21
Ex Low Point
20a
WPRe-20a
21a
Ex Low Point "B"
22
WPre-22
23
DP-2 SW Property Line
30
WPre-30
31
Ex Low Point
32
WPre-32
33
DP-3 Wetlands/ Salt Marsh
Subcat
Reach
Pond
Link
Routing Diagram for 2389-002-ALLS-EHCD-INHS
Prepared by DiPrete Engineering, Printed 2/17/2022
HydroCAD® 10.10-6a s/n 01125 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.285	39	>75% Grass cover, Good, HSG A (10, 20, 20a, 22, 30, 32)
0.404	61	>75% Grass cover, Good, HSG B (10, 20, 20a, 22)
1.545	30	Brush, Good, HSG A (20, 20a, 22, 30, 32)
0.221	48	Brush, Good, HSG B (10, 20, 20a, 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, 20a, 30, 32)
0.257	98	Offsite Impervious, HSG B (10, 20)
1.311	98	Offsite Roofs, HSG A (20, 20a, 30, 32)
0.093	98	Offsite Roofs, HSG B (20)
11.944	**56**	**TOTAL AREA**



Routing Diagram for 2389-002-ALLS-PHCD-INHS
Prepared by DiPrete Engineering, Printed 2/17/2022
HydroCAD® 10.10-6a s/n 01125 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.713	39	>75% Grass cover, Good, HSG A (201, 203, 205, 208, 301, 305)
0.536	61	>75% Grass cover, Good, HSG B (101, 201, 203)
0.227	30	Brush, Good, HSG A (201, 205, 301)
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)
0.723	98	Impervious, HSG A (201, 203, 205, 301)
0.045	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)
1.311	98	Offsite Roofs, HSG A (201, 301, 305)
0.093	98	Offsite Roofs, HSG B (201)
0.166	98	Roofs, HSG A (205, 301)
11.944	**62**	**TOTAL AREA**

A3.2.2 HydroCAD 1-Year Storm Analysis

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

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

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

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

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

Subcatchment 30: WPre-30 Runoff Area=1.327 ac 13.60% Impervious Runoff Depth=0.00"
Flow Length=355' Tc=17.4 min CN=44 Runoff=0.00 cfs 0.001 af

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

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

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

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

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

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

Link 33: DP-3 Wetlands/ Salt Marsh Inflow=0.09 cfs 0.008 af
Primary=0.09 cfs 0.008 af

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Link 209: DP-2 Low Point/ SW Property Line Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 306: DP-3 Wetlands/ Salt Marsh

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

A3.2.3 HydroCAD 10-Year Storm Analysis

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

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

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

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

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

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

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

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

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

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

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

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

Link 33: DP-3 Wetlands/ Salt Marsh Inflow=0.35 cfs 0.025 af
Primary=0.35 cfs 0.025 af

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

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

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

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

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

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

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

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

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

Pond 202: Low Point A Peak Elev=7.91' Storage=7,729 cf Inflow=9.53 cfs 0.984 af
Discarded=0.26 cfs 0.298 af Primary=1.35 cfs 0.186 af Secondary=5.00 cfs 0.500 af Outflow=6.61 cfs 0.984 af

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

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

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

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

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

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

Link 209: DP-2 Low Point/ SW Property Line Inflow=6.35 cfs 0.671 af
Primary=6.35 cfs 0.671 af

Link 306: DP-3 Wetlands/ Salt Marsh

Inflow=1.49 cfs 0.090 af
Primary=1.49 cfs 0.090 af

A3.2.4 HydroCAD 25-Year Storm Analysis

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

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

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

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

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

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

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

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

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

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

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

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

Link 33: DP-3 Wetlands/ Salt Marsh Inflow=0.52 cfs 0.063 af
Primary=0.52 cfs 0.063 af

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: WPost-101 Runoff Area=0.051 ac 36.77% Impervious Runoff Depth=3.27"
Tc=6.0 min CN=74 Runoff=0.19 cfs 0.014 af

Subcatchment 201: WPost-201 Runoff Area=9.015 ac 34.38% Impervious Runoff Depth=2.07"
Flow Length=791' Tc=14.3 min CN=61 Runoff=16.01 cfs 1.557 af

Subcatchment 203: WPost-203 Runoff Area=0.337 ac 55.35% Impervious Runoff Depth=3.67"
Tc=6.0 min CN=78 Runoff=1.45 cfs 0.103 af

Subcatchment 205: WPost-205 Runoff Area=0.731 ac 53.89% Impervious Runoff Depth=2.98"
Tc=6.0 min CN=71 Runoff=2.55 cfs 0.182 af

Subcatchment 208: WPost-208 Runoff Area=0.260 ac 0.00% Impervious Runoff Depth=0.47"
Tc=6.0 min CN=39 Runoff=0.05 cfs 0.010 af

Subcatchment 301: WPost-301 Runoff Area=1.273 ac 40.93% Impervious Runoff Depth=2.25"
Flow Length=344' Tc=17.4 min CN=63 Runoff=2.30 cfs 0.238 af

Subcatchment 305: WPost-305 Runoff Area=0.277 ac 29.96% Impervious Runoff Depth=1.74"
Tc=6.0 min CN=57 Runoff=0.52 cfs 0.040 af

Pond 1P: DMH-2 Peak Elev=8.48' Inflow=2.55 cfs 0.182 af
Primary=0.66 cfs 0.090 af Secondary=2.41 cfs 0.092 af Outflow=2.55 cfs 0.182 af

Pond 202: Low Point A Peak Elev=8.16' Storage=10,604 cf Inflow=16.01 cfs 1.557 af
Discarded=0.27 cfs 0.316 af Primary=2.64 cfs 0.304 af Secondary=9.51 cfs 0.937 af Outflow=12.43 cfs 1.557 af

Pond 204: Stormcrete Treatment System A Peak Elev=9.61' Storage=908 cf Inflow=1.45 cfs 0.103 af
Discarded=0.37 cfs 0.103 af Primary=0.00 cfs 0.000 af Outflow=0.37 cfs 0.103 af

Pond 206: Stormtech-740 WQ Peak Elev=8.47' Storage=0.017 af Inflow=0.66 cfs 0.090 af
Outflow=0.10 cfs 0.090 af

Pond 207: UIS 48" Pipes Peak Elev=8.48' Storage=0.049 af Inflow=2.41 cfs 0.092 af
Discarded=0.21 cfs 0.092 af Primary=0.00 cfs 0.000 af Outflow=0.21 cfs 0.092 af

Pond 304: Stormcrete Treatment System B Peak Elev=14.06' Storage=532 cf Inflow=2.30 cfs 0.238 af
Discarded=0.10 cfs 0.105 af Primary=2.20 cfs 0.134 af Outflow=2.30 cfs 0.238 af

Pond 312P: Level Spreader Peak Elev=6.42' Storage=520 cf Inflow=12.16 cfs 1.241 af
Discarded=0.01 cfs 0.019 af Primary=12.15 cfs 1.222 af Outflow=12.16 cfs 1.241 af

Link 102: DP-1 Matunuck Beach Road Inflow=0.19 cfs 0.014 af
Primary=0.19 cfs 0.014 af

Link 209: DP-2 Low Point/ SW Property Line Inflow=12.20 cfs 1.232 af
Primary=12.20 cfs 1.232 af

Link 306: DP-3 Wetlands/ Salt Marsh

Inflow=2.50 cfs 0.174 af
Primary=2.50 cfs 0.174 af

A3.2.5 HydroCAD 100-Year Storm Analysis

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

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

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

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

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

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

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

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

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

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

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

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

Link 33: DP-3 Wetlands/ Salt Marsh Inflow=1.93 cfs 0.200 af
Primary=1.93 cfs 0.200 af

Summary for Subcatchment 10: WPre-10

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

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

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					**Direct Entry,**

Summary for Subcatchment 20: WPre-20

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

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

Area (ac)	CN	Description
4.419	39	>75% Grass cover, Good, HSG A
0.392	61	>75% Grass cover, Good, HSG B
0.090	30	Brush, Good, HSG A
0.048	48	Brush, Good, HSG B
0.112	96	Gravel surface, HSG A
0.010	96	Gravel surface, HSG B
1.497	98	Offsite Impervious, HSG A
0.247	98	Offsite Impervious, HSG B
1.141	98	Offsite Roofs, HSG A
0.093	98	Offsite Roofs, HSG B
8.049	63	Weighted Average
5.070	42	62.99% Pervious Area
2.979	98	37.01% Impervious Area

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

Summary for Subcatchment 20a: WPRe-20a

Runoff = 1.15 cfs @ 12.62 hrs, Volume= 0.197 af, Depth= 1.79"
Routed to Pond 21a : Ex Low Point "B"

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

Area (ac)	CN	Description
0.775	39	>75% Grass cover, Good, HSG A
0.003	61	>75% Grass cover, Good, HSG B
0.339	30	Brush, Good, HSG A
0.083	48	Brush, Good, HSG B
0.036	98	Offsite Impervious, HSG A
0.081	98	Offsite Roofs, HSG A
1.317	43	Weighted Average
1.200	37	91.15% Pervious Area
0.117	98	8.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.8	100	0.0050	0.05		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
2.1	384	0.0349	3.01		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
38.9	484	Total			

Summary for Subcatchment 22: WPre-22

Runoff = 0.32 cfs @ 12.51 hrs, Volume= 0.067 af, Depth= 0.80"
Routed to Link 23 : DP-2 SW Property Line

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

Area (ac)	CN	Description
0.293	39	>75% Grass cover, Good, HSG A
0.002	61	>75% Grass cover, Good, HSG B
0.688	30	Brush, Good, HSG A
0.025	48	Brush, Good, HSG B
1.007	33	Weighted Average
1.007	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		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
0.8	166	0.0518	3.66		**Shallow Concentrated Flow, B** Unpaved Kv= 16.1 fps
19.8	266	Total			

Summary for Subcatchment 30: WPre-30

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

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

Area (ac)	CN	Description
0.721	39	>75% Grass cover, Good, HSG A
0.425	30	Brush, Good, HSG A
0.122	98	Offsite Impervious, HSG A
0.059	98	Offsite Roofs, HSG A
1.327	44	Weighted Average
1.146	36	86.40% Pervious Area
0.180	98	13.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	92	0.0130	0.10		**Sheet Flow, A** Grass: Dense n= 0.240 P2= 3.30"
0.6	38	0.0026	1.04		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
1.2	225	0.0396	3.20		**Shallow Concentrated Flow, C** 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"
Routed to Link 33 : DP-3 Wetlands/ Salt Marsh

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

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					**Direct Entry,**

Summary for Pond 21: Ex Low Point

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

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 8.91' @ 12.28 hrs Surf.Area= 9,536 sf Storage= 11,980 cf

Plug-Flow detention time= 34.9 min calculated for 2.727 af (100% of inflow)
Center-of-Mass det. time= 34.9 min (879.2 - 844.3)

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

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'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	7.75'	**8.0' long x 5.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.23 cfs @ 12.28 hrs HW=8.91' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=25.77 cfs @ 12.28 hrs HW=8.91' TW=7.98' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 25.77 cfs @ 2.77 fps)

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

Inflow Area = 9.366 ac, 33.05% Impervious, Inflow Depth = 3.42" for 100-Year event
Inflow = 26.29 cfs @ 12.28 hrs, Volume= 2.668 af
Outflow = 26.18 cfs @ 12.30 hrs, Volume= 2.668 af, Atten= 0%, Lag= 1.1 min
Discarded = 0.13 cfs @ 12.30 hrs, Volume= 0.067 af
Primary = 26.05 cfs @ 12.30 hrs, Volume= 2.602 af
Routed to Link 23 : DP-2 SW Property Line

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

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

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.20	141	0	0
7.50	1,637	267	267
8.00	5,571	1,802	2,069
9.00	8,000	6,786	8,854

Device	Routing	Invert	Outlet Devices
#1	Discarded	7.20'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	7.50'	**30.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 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=0.13 cfs @ 12.30 hrs HW=7.98' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=26.05 cfs @ 12.30 hrs HW=7.98' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 26.05 cfs @ 1.80 fps)

Summary for Pond 31: Ex Low Point

Inflow Area = 1.327 ac, 13.60% Impervious, Inflow Depth = 1.90" for 100-Year event
Inflow = 1.77 cfs @ 12.28 hrs, Volume= 0.210 af
Outflow = 1.66 cfs @ 12.36 hrs, Volume= 0.210 af, Atten= 6%, Lag= 4.8 min
Discarded = 0.08 cfs @ 12.36 hrs, Volume= 0.074 af
Primary = 1.58 cfs @ 12.36 hrs, Volume= 0.136 af
Routed to Link 33 : DP-3 Wetlands/ Salt Marsh

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

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

Volume	Invert	Avail.Storage	Storage Description
#1	11.50'	1,407 cf	**Custom Stage Data (Prismatic)** 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

Device	Routing	Invert	Outlet Devices
#1	Discarded	11.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	12.25'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

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

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

Summary for Link 11: DP-1 Matunuck Beach Road

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

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

Summary for Link 23: DP-2 SW Property Line

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

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

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

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

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

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 101: WPost-101 Runoff Area=0.051 ac 36.77% Impervious Runoff Depth=5.38"
Tc=6.0 min CN=74 Runoff=0.32 cfs 0.023 af

Subcatchment 201: WPost-201 Runoff Area=9.015 ac 34.38% Impervious Runoff Depth=3.83"
Flow Length=791' Tc=14.3 min CN=61 Runoff=30.81 cfs 2.877 af

Subcatchment 203: WPost-203 Runoff Area=0.337 ac 55.35% Impervious Runoff Depth=5.85"
Tc=6.0 min CN=78 Runoff=2.29 cfs 0.165 af

Subcatchment 205: WPost-205 Runoff Area=0.731 ac 53.89% Impervious Runoff Depth=5.02"
Tc=6.0 min CN=71 Runoff=4.30 cfs 0.306 af

Subcatchment 208: WPost-208 Runoff Area=0.260 ac 0.00% Impervious Runoff Depth=1.37"
Tc=6.0 min CN=39 Runoff=0.30 cfs 0.030 af

Subcatchment 301: WPost-301 Runoff Area=1.273 ac 40.93% Impervious Runoff Depth=4.07"
Flow Length=344' Tc=17.4 min CN=63 Runoff=4.31 cfs 0.431 af

Subcatchment 305: WPost-305 Runoff Area=0.277 ac 29.96% Impervious Runoff Depth=3.36"
Tc=6.0 min CN=57 Runoff=1.07 cfs 0.078 af

Pond 1P: DMH-2 Peak Elev=8.87' Inflow=4.30 cfs 0.306 af
Primary=1.05 cfs 0.115 af Secondary=3.36 cfs 0.191 af Outflow=4.30 cfs 0.306 af

Pond 202: Low Point A Peak Elev=8.86' Storage=19,079 cf Inflow=31.91 cfs 2.902 af
Discarded=0.30 cfs 0.347 af Primary=6.53 cfs 0.643 af Secondary=15.80 cfs 1.912 af Outflow=22.63 cfs 2.902 af

Pond 204: Stormcrete Treatment System A Peak Elev=9.75' Storage=1,048 cf Inflow=2.29 cfs 0.165 af
Discarded=0.37 cfs 0.140 af Primary=1.60 cfs 0.025 af Outflow=1.97 cfs 0.165 af

Pond 206: Stormtech-740 WQ Peak Elev=8.84' Storage=0.019 af Inflow=1.05 cfs 0.115 af
Outflow=0.10 cfs 0.115 af

Pond 207: UIS 48" Pipes Peak Elev=8.84' Storage=0.055 af Inflow=3.36 cfs 0.191 af
Discarded=0.21 cfs 0.120 af Primary=2.54 cfs 0.071 af Outflow=2.75 cfs 0.191 af

Pond 304: Stormcrete Treatment System B Peak Elev=14.09' Storage=550 cf Inflow=4.31 cfs 0.431 af
Discarded=0.10 cfs 0.130 af Primary=4.20 cfs 0.301 af Outflow=4.31 cfs 0.431 af

Pond 312P: Level Spreader Peak Elev=6.51' Storage=551 cf Inflow=23.77 cfs 2.626 af
Discarded=0.01 cfs 0.020 af Primary=23.77 cfs 2.607 af Outflow=23.77 cfs 2.626 af

Link 102: DP-1 Matunuck Beach Road Inflow=0.32 cfs 0.023 af
Primary=0.32 cfs 0.023 af

Link 209: DP-2 Low Point/ SW Property Line Inflow=23.95 cfs 2.637 af
Primary=23.95 cfs 2.637 af

Link 306: DP-3 Wetlands/ Salt Marsh

Inflow=4.79 cfs 0.379 af
Primary=4.79 cfs 0.379 af

Summary for Subcatchment 101: WPost-101

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

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

Area (ac)	CN	Description
0.029	61	>75% Grass cover, Good, HSG B
0.003	48	Brush, Good, HSG B
0.007	98	Impervious, HSG B
0.011	98	Offsite Impervious, HSG B
0.051	74	Weighted Average
0.032	60	63.23% Pervious Area
0.019	98	36.77% 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 = 30.81 cfs @ 12.20 hrs, Volume= 2.877 af, Depth= 3.83"
Routed to Pond 202 : Low Point A

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

Area (ac)	CN	Description
5.153	39	>75% Grass cover, Good, HSG A
0.416	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
0.004	98	Impervious, HSG A
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
9.015	61	Weighted Average
5.916	41	65.62% Pervious Area
3.099	98	34.38% Impervious Area

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

Summary for Subcatchment 203: WPost-203

Runoff = 2.29 cfs @ 12.09 hrs, Volume= 0.165 af, Depth= 5.85"
Routed to Pond 204 : Stormcrete Treatment System A

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

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.090	61	>75% Grass cover, Good, HSG B
0.149	98	Impervious, HSG A
0.038	98	Impervious, HSG B
0.337	78	Weighted Average
0.151	52	44.65% Pervious Area
0.187	98	55.35% Impervious Area

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

Summary for Subcatchment 205: WPost-205

Runoff = 4.30 cfs @ 12.09 hrs, Volume= 0.306 af, Depth= 5.02"
Routed to Pond 1P : DMH-2

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

Area (ac)	CN	Description
0.337	39	>75% Grass cover, Good, HSG A
0.000	30	Brush, Good, HSG A
0.284	98	Impervious, HSG A
0.111	98	Roofs, HSG A
0.731	71	Weighted Average
0.337	39	46.11% Pervious Area
0.394	98	53.89% Impervious Area

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

Summary for Subcatchment 208: WPost-208

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

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

Area (ac)	CN	Description
0.260	39	>75% Grass cover, Good, HSG A
0.260	39	100.00% Pervious Area

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

Summary for Subcatchment 301: WPost-301

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

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

Area (ac)	CN	Description
0.709	39	>75% Grass cover, Good, HSG A
0.043	30	Brush, Good, HSG A
0.287	98	Impervious, HSG A
0.122	98	Offsite Impervious, HSG A
0.057	98	Offsite Roofs, HSG A
0.055	98	Roofs, HSG A
1.273	63	Weighted Average
0.752	38	59.07% Pervious Area
0.521	98	40.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	92	0.0130	0.10		**Sheet Flow, A**
					Grass: Dense n= 0.240 P2= 3.30"
0.6	38	0.0030	1.11		**Shallow Concentrated Flow, B**
					Paved Kv= 20.3 fps
0.7	138	0.0410	3.26		**Shallow Concentrated Flow, C**
					Unpaved Kv= 16.1 fps
0.5	76	0.0131	2.32		**Shallow Concentrated Flow, D**
					Paved Kv= 20.3 fps
17.4	344	Total			

Summary for Subcatchment 305: WPost-305

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

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

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

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

Summary for Pond 1P: DMH-2

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

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

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

			n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Secondary	5.50'	**24.00" Round Culvert to QP Section**
			L= 8.0' CMP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 5.50' / 5.50' S= 0.0000 '/' Cc= 0.900
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#3	Device 2	7.40'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.04 cfs @ 12.11 hrs HW=8.64' TW=8.26' (Dynamic Tailwater)
└**1=Culvert to WQ/ISO Section** (Inlet Controls 1.04 cfs @ 2.99 fps)

Secondary OutFlow Max=3.47 cfs @ 12.07 hrs HW=8.16' TW=8.11' (Dynamic Tailwater)
└**2=Culvert to QP Section** (Inlet Controls 3.47 cfs @ 1.10 fps)
└**3=Broad-Crested Rectangular Weir** (Passes 3.47 cfs of 5.37 cfs potential flow)

Summary for Pond 202: Low Point A

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

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

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

Volume	Invert	Avail.Storage	Storage Description
#1	7.00'	27,624 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
7.00	4,880	0	0
7.50	9,364	3,561	3,561
8.00	11,362	5,182	8,743
9.00	13,000	12,181	20,924
9.50	13,800	6,700	27,624

Device	Routing	Invert	Outlet Devices
#1	Discarded	7.00'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	7.35'	**18.00" Round Culvert**
			L= 45.9' RCP, mitered to conform to fill, Ke= 0.700
			Inlet / Outlet Invert= 7.35' / 5.50' S= 0.0403 '/' Cc= 0.900
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#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= 52.0' RCP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 7.00' / 5.50' S= 0.0288 '/' Cc= 0.900
n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

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

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

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

Summary for Pond 204: Stormcrete Treatment System A

Inflow Area = 0.337 ac, 55.35% Impervious, Inflow Depth = 5.85" for 100-Year event
Inflow = 2.29 cfs @ 12.09 hrs, Volume= 0.165 af
Outflow = 1.97 cfs @ 12.13 hrs, Volume= 0.165 af, Atten= 14%, Lag= 2.9 min
Discarded = 0.37 cfs @ 11.72 hrs, Volume= 0.140 af
Primary = 1.60 cfs @ 12.13 hrs, Volume= 0.025 af
Routed to Pond 202 : Low Point A

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

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

Volume	Invert	Avail.Storage	Storage Description
#1	9.70'	233 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) -Impervious
#2	9.20'	194 cf	**6" Stormcrete Slab (Prismatic)** Listed below (Recalc) -Impervious 972 cf Overall x 20.0% Voids
#3	9.03'	109 cf	**2" Leveling Course (No. 8 Stone) (Prismatic)** Listed below (Recalc) -Impervious 330 cf Overall x 33.0% Voids
#4	8.03'	642 cf	**12" Reservoir (No. 57 Stone) (Prismatic)** Listed below (Recalc) 1,944 cf Overall x 33.0% Voids
		1,178 cf	Total Available Storage

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

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

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

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

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.03'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	9.70'	**64.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.37 cfs @ 11.72 hrs HW=8.05' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=1.58 cfs @ 12.13 hrs HW=9.75' TW=8.29' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Weir Controls 1.58 cfs @ 0.51 fps)

Summary for Pond 206: Stormtech-740 WQ

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

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

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

Volume	Invert	Avail.Storage	Storage Description
#1A	6.00'	0.009 af	**20.50'W x 24.98'L x 3.50'H Field A** 0.041 af Overall - 0.013 af Embedded = 0.028 af x 33.0% Voids
#2A	6.50'	0.013 af	**ADS_StormTech SC-740 +Cap** x 12 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 12 Chambers in 4 Rows
		0.022 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	6.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.10 cfs @ 10.34 hrs HW=6.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Summary for Pond 207: UIS 48" Pipes

Inflow	=	3.36 cfs @	12.07 hrs,	Volume=	0.191 af
Outflow	=	2.75 cfs @	12.17 hrs,	Volume=	0.191 af, Atten= 18%, Lag= 6.1 min
Discarded	=	0.21 cfs @	11.63 hrs,	Volume=	0.120 af
Primary	=	2.54 cfs @	12.17 hrs,	Volume=	0.071 af

Routed to Pond 312P : Level Spreader

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

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

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

Storage Group A created with Chamber Wizard

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

Discarded OutFlow Max=0.21 cfs @ 11.63 hrs HW=5.06' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=2.54 cfs @ 12.17 hrs HW=8.84' TW=6.48' (Dynamic Tailwater)
└**3=Culvert** (Passes 2.54 cfs of 5.81 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.54 cfs @ 1.90 fps)

Summary for Pond 304: Stormcrete Treatment System B

Inflow Area = 1.273 ac, 40.93% Impervious, Inflow Depth = 4.07" for 100-Year event
Inflow = 4.31 cfs @ 12.24 hrs, Volume= 0.431 af
Outflow = 4.31 cfs @ 12.24 hrs, Volume= 0.431 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.10 cfs @ 10.71 hrs, Volume= 0.130 af
Primary = 4.20 cfs @ 12.24 hrs, Volume= 0.301 af
Routed to Link 306 : DP-3 Wetlands/ Salt Marsh

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 14.09' @ 12.24 hrs Surf.Area= 540 sf Storage= 550 cf

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

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

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	540	0	0
14.25	540	135	135

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.50	540	0	0
14.00	540	270	270

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.33	540	0	0
13.50	540	92	92

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
11.00	540	0	0
13.33	540	1,258	1,258

Device	Routing	Invert	Outlet Devices
#1	Discarded	11.00'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	14.00'	**60.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.10 cfs @ 10.71 hrs HW=11.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.10 cfs)

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

Summary for Pond 312P: Level Spreader

Inflow Area = 9.352 ac, 35.13% Impervious, Inflow Depth = 3.37" for 100-Year event
Inflow = 23.77 cfs @ 12.34 hrs, Volume= 2.626 af
Outflow = 23.77 cfs @ 12.34 hrs, Volume= 2.626 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.64 hrs, Volume= 0.020 af
Primary = 23.77 cfs @ 12.34 hrs, Volume= 2.607 af
Routed to Link 209 : DP-2 Low Point/ SW Property Line

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

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

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

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

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

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

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

Summary for Link 102: DP-1 Matunuck Beach Road

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

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

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

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

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

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

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

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

A3.3 Stormcrete Specifications

PRECAST POROUS CONCRETE PAVING SLABS/SYSTEM

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

PART 1 GENERAL

Section Includes:

1.0 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 ½" dia. lifting swivels for use with the imbedded lifting points.
14. All slabs shall be provided with ½" Nylon Stormcrete® lifting point protection caps (Part No. 12NC) and approved ½" dia. lifting swivels for use in covering the imbedded lifting points.
15. Precast porous concrete shall be cast upside down against a steel form and shall be vibrated throughout their entire section during the manufacturing process.

Note: Edge restraint should be provided (by contractor) on all perimeter sides of precast porous concrete pavement installations. Edge restraint may be mounted in asphalt pavement, but use of asphalt pavement as edge restraint shall not be permitted.

2.02 EDGE MATERIAL/JOINT FILLER

1. Edge restraint installed at exterior sides of precast porous concrete paving slabs shall be as follows:

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

2.03 CRUSHED STONE STORAGE RESERVOIR (SUBBASE) AND LEVELING COURSE

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

2.04 GEOTEXTILE

1. Subgrade shall not be compacted or permanently covered with geotextile unless approved by the Engineer of Record and shall be as follows:

    a) Material Type: Geotextile shall be Non-Woven geotextile.
    b) Manufacturer: [State approved geotextile manufacturers acceptable to the owner/designer].
    c) Material Standards: [AASHTO M288 Class 2]

2.05 IMPERMEABLE LINER

1. Impermeable liner shall be transported, stored and placed in a manner to eliminate any possibility of puncture or penetration.

a) Material Type: 30 mil Grey Poly Vinyl Chloride sheeting, 30 +/- mil., 73 lbs/in Tensile Strength, 8 lbs. tear strength, 3% Dimensional Stability, Low Temperature Impact -20 degrees F.
b) Manufacturer: [State approved geotextile manufacturers].
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^3 (2,700 kN-m/m^3)) 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^{o}.
    c) Slabs shall only be lifted and placed using lifting swivels (Part No.12LS) and spreader chains. Chains, cables or slings should never be wrapped around slabs for lifting under any circumstances. Lifting swivel bolts shall be securely bolted snug but not over-tightened to avoid damage to the surface.
    d) Place Precast porous concrete slabs without using metal hammers, pry bars or drift pins. Make horizontal adjustments to placement of laid slabs with wood wedges and levers, and rubber mallets as needed.
    e) Adjacent slabs shall be separated from each other by 1/8". Manufacturer supplied spacers (Part No 18SP) shall be used to ensure proper joint spacing.
    f) The porous concrete panels shall be installed so that there is no lippage or surface unevenness greater than 1/8" difference in height between slabs and adjacent surfaces.
    g) Joints between adjacent rows of slabs shall be staggered when possible.
    h) Joints shall never be filled with loose material including but not limited to (sand, stone dust, stone chips, etc.)
    i) Horizontal joint lines shall not deviate more than ±½ in. over 50 ft. from string lines.
    j) Fill gaps at the edges of the paved area with properly-sized cut slabs.
    k) Cut end slabs to be placed along the edge or corners with a diamond blade masonry saw. Cut units shall be no narrower than 18" and cutting shall occur so that a minimum distance of 8" is maintained between embedded lifters and cut edges.
    l) Core drill or cut slabs as may be necessary to fit over, and/or around, existing Utility Structures or Poles, and Sign Posts prior to slab placement.
    m) Cut Slabs using hand-held, or machine driven diamond cut off saw having the required blade diameter to safely cut slabs.
    n) Protect adjacent slabs surfaces from dust infiltration when cutting slabs.
    o) Seal outside edges and around installed new concrete footing and foundations, Utility Structures or Poles and Sign Posts as indicated on the approved Permit Plans with approved materials as per Section 2.02 EDGE MATERIAL/JOINT FILLER of these Specifications.

p) [Adjust bond pattern at pavement edges such that cutting of edge slabs is minimized. Do not expose cut slabs to vehicular traffic.] [Cut slabs at edges as indicated on the drawings.]
q) Keep skid steer and forklift equipment off unrestrained paving slabs.
r) After an area is completely paved, set the precast porous concrete slabs into the screed crushed stone leveling course layer by trafficking with light rubber-tired equipment.
s) Remove and replace any slabs cracked or damaged during installation with new ones. Reset slabs not in conformance with specified installation tolerances.
t) Installer shall warranty for a period of one year from the date of installation that installed slabs shall be free of rocking or pumping evidenced by visible vertical movement. Any slabs observed to be moving shall be removed and the screeding course shall be re-screeded and the slabs reset.
u) Check final surface elevations of set slabs for conformance to design drawings. The final surface tolerance from grade elevations shall not deviate more than ± 1/4 in. under a 10 ft. straightedge.
v) The surface elevation of set slabs shall be flush with manholes or the top of utility structures.
w) Hairline cracks in placed slabs shall be considered as to not interfere with the proper functioning or performance of the system. Where approved by the Engineer, larger cracks or occasional imperfections may be repaired under the direction of the manufacturer. The repairs must be properly finished and cured. The color of the repair area must match as closely as possible with the rest of the element color. Repairs shall be made with a mixture of sand and cement, as directed by the manufacturer
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.

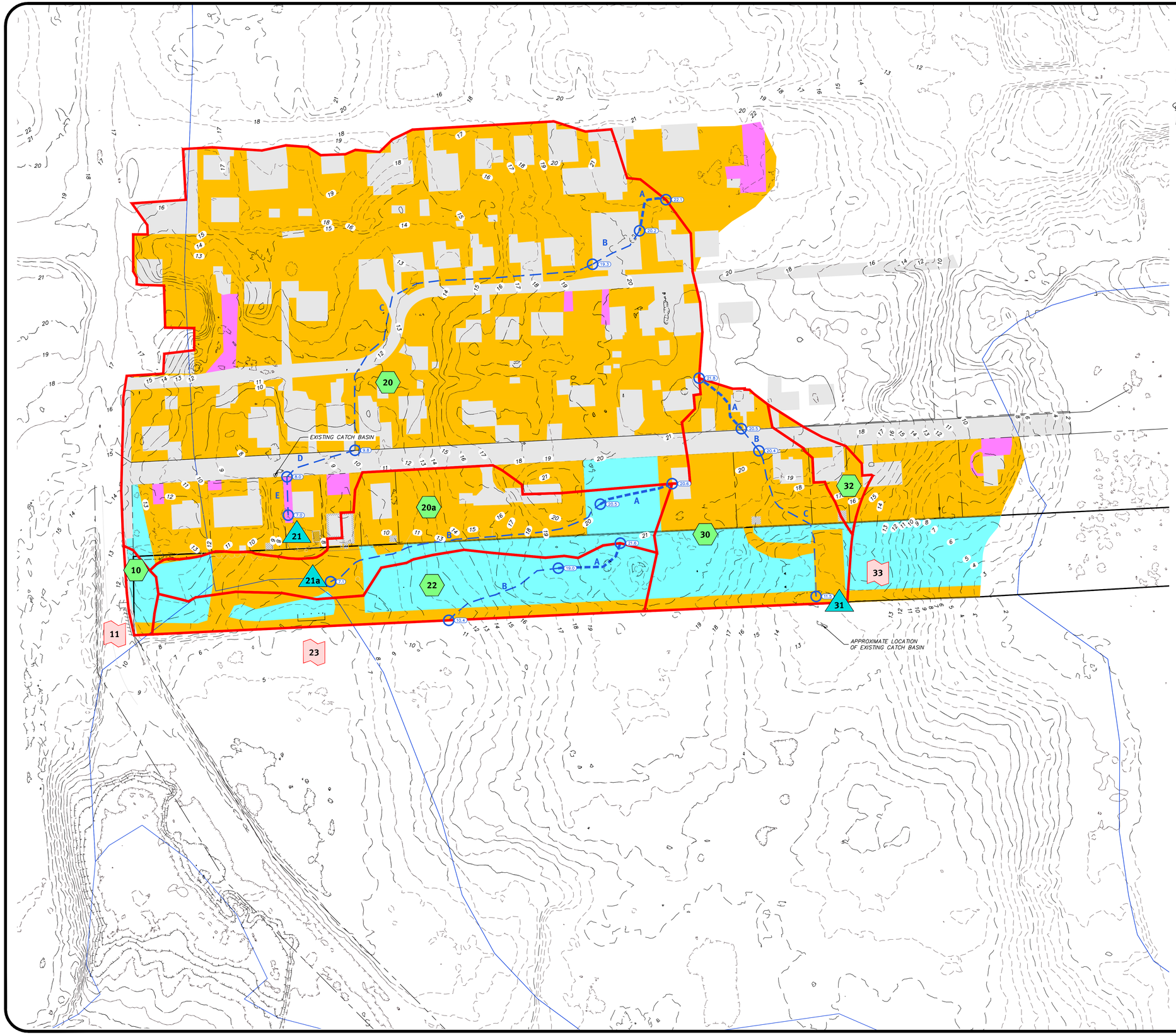
3.05 PROTECTION

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® Operation and Maintenance Manual.

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) — 37.5 A 32.5 B
- Subcat Area
- Soil Boundary
- Subcatchment — 100
- Drainage Pond/Bio Retention/ Infiltrating Swale
- Drainage Structure/Pond with Insignificant Storage — 100
- Swale — 100
- Design Point — DP
- Reach

Scale: 1"=60'

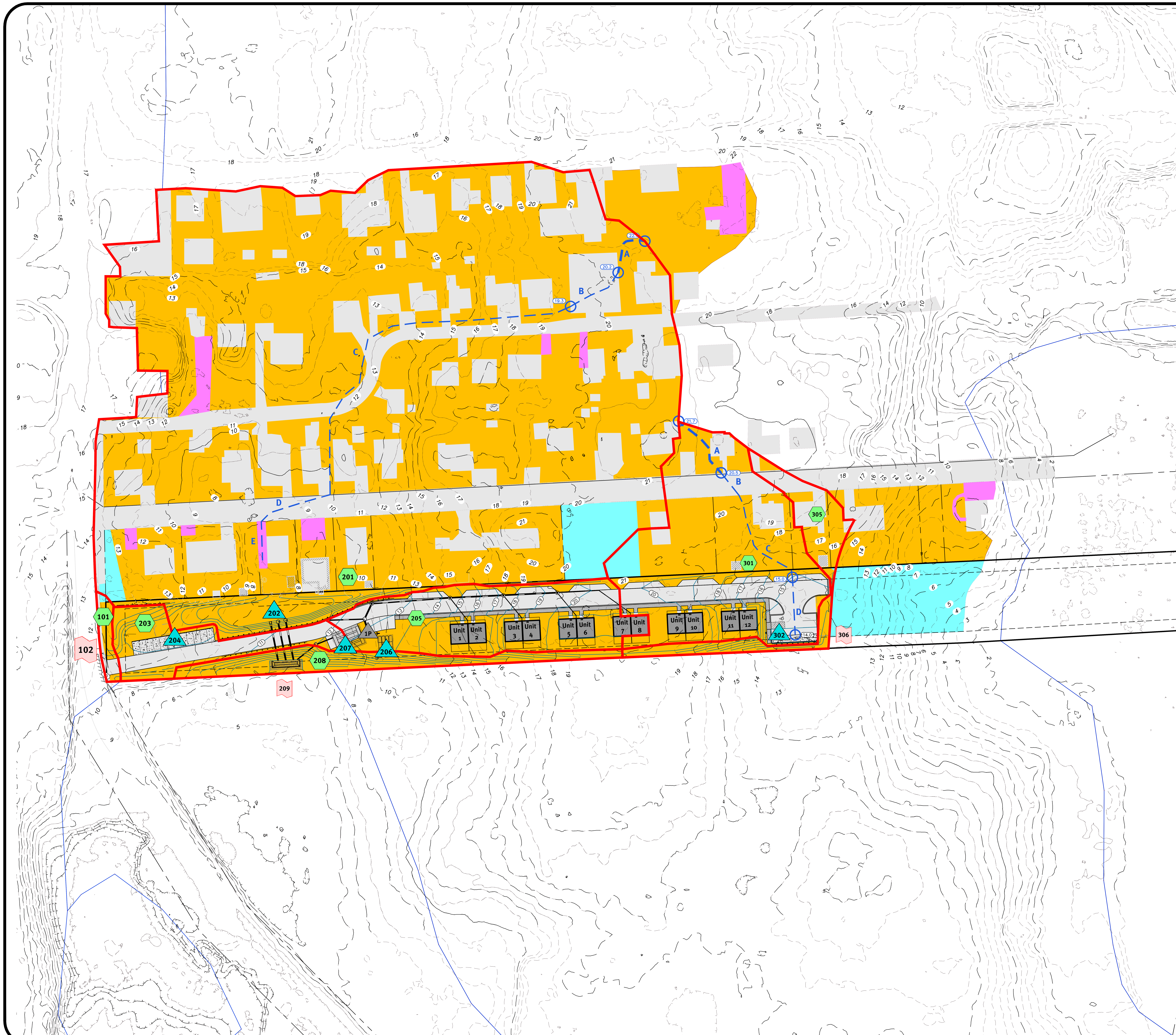
0 30' 60' 120'

Pre-Watershed Map

Matunuck Beach Condos

DiPrete Engineering

Two Stafford Court Cranston, RI 02920
tel 401-943-1000 fax 401-464-6006 www.diprete-eng.com



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) — 37.5 A 32.5 B
- 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

Scale: 1"=60'
0 30' 60' 120'

Post-Watershed Map
Matunuck Beach Condos

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