NORTHEAST ENGINEERS & CONSULTANTS, INC.

Stormwater Runoff Analysis

"Aquidneck Commerce Center"
Proposed Multifamily Structure
Assessor's Map 114, Lots 129 & 504
809, 811, 819 Aquidneck Avenue
Middletown, RI

Prepared For
CCB Capital and Real Estate
543 Thames Street
Newport, RI 02840

Rev. May 2022

6 Valley Road ● Middletown, RI 02842 ● p. 401.849.0810 ● f. 401.846.4169 ● northeastengineers.com
Civil ● Site ● Land Development ● Waterfront ● Coastal Engineering ● Environmental ● Geotechnical ● Structural ● Renewable ● Surveying

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1.0 PROJECT NARRATIVE

1.1 SITE INFORMATION

City / Town:	Middletown, Rhode Island
Adjacent Roadways:	Aquidneck Avenue (RI State Roadway)
Lot(s) identification:	A.P. 114 Lots 129 & 504
Zoning District:	LBA (Limited Business – Traffic Sensitive)
Current Use:	Single Family Residential and office / Commercial
Site Area:	1.95 Acres
FEMA Zone and Map:	Zone "X (Panel 44005C0093J)

1.2 EXISTING IMPROVEMENTS AND SITE CONDITIONS

The existing Site includes two existing parcels. The southern parcel is a commercial center consisting of two freestanding office structures. A paved parking lot fronts on Aquidneck Avenue while a larger lot is also present along the rear property line. The northern property contains a single-family residence / office building with one small accessory structure. The commercial property is accessed from a single, wide, two-way curb cut while the residential property is accessed via two narrow curb cuts. Each of these curb cuts crosses over the RIDOT drainage swale which runs along the edge of the roadway with a culvert. Both properties are supplied by municipal water and sewer via mains in Aquidneck Avenue. A National Grid gas main is also present. Overhead electrical and communication services are available on the east side of the roadway. The site is surrounded by other commercial and small residential properties to the sides and to the rear. Stormwater controls are limited to several catch basins in the commercial property parking lots. There are no stormwater quality devices located on either property.

1.3 PROTECTED FEATURES

There are no features protected by the state located on either property. The properties are located in the town of Middletown Watershed Protection District Zone 2. The ultimate receiving waterbody for the property is Bailey's Brook (WB ID RI0007035R-01). This waterway has been assessed with a TMDL for bacteria (enterococcus).

1.4 SITE TERRAIN AND SOILS

In general, the site slopes from upland residential properties to the east towards Aquidneck Avenue to the west of the site. Slopes vary with an average of 8%. Portions of the commercial property have slopes exceeding 15%. The soil types on site are Ur (Urban land), Ud (Udorthents), and NeB (Newport Silt Loam) as designated by the USDA Natural Resource Conservation Service. The silt loams are a type C hydrologic soil common to this area of Aquidneck Island. Class IV soil evaluations performed on site within the Ur and Ud zones revealed **sandy loams** with water tables varying from 15 to 33 inches.

1.5 PROPOSED IMPROVEMENTS

The owner intends to first demolish the existing single-family residential/office structure and all other associated improvements. The properties are to be combined under the town's mixed-use ordinance, and a new multi-family residential structure is to be constructed in the vacated area of the site. The northernmost curb cut is to be revised to provide a one-way entrance. This entrance will provide access to a new paved driveway along the northern property line to an expanded parking lot at the rear of the site. Traffic will leave the site via the existing two-way entrance on the former commercial lot. Aside from minor grading and repaving in the existing rear parking lot necessary to meet the intended grades, no other revisions to the commercial portion of the property are proposed. The total lot coverage is within the maximum 35% lot coverage allowable by the zoning ordinance.

New public and private utility services will be provided for the site. The water service will require the approval of Newport Water while the sewer service will require approval from the Middletown Public Works Department. National grid gas must approve any connections to the main. Any existing utility stubs which are not suitable for the proposed multifamily structure will be abandoned in accordance with the regulations of the providing entity. All road cuts for utility connections will require a RIDOT utility permit. All electrical service work from the overhead lines shall be subject to design and approval by National Grid.

Stormwater control for this development will be provided by an infiltration basin located at the front of the property. Due to site space constraints, the berm for this basin will be a concrete retaining wall. Discharge from this device to the RIDOT swale during low flow events will be from five (5) 6-inch orifices evenly spaces along the frontage of the site. High flow from this device will be over a wide weir running along the entire wall frontage. Based on the modeling shown in this report, this weir will only be used during a 100-year storm event. Pretreatment from this device will be provided by a sediment forebay located at the rear of the structure and by two deep sump catch basins in the new forebay paved access drive. The remainder of the site will drain via surface flow towards Aquidneck Avenue, as in the existing conditions.

2.0 PROPOSED ALTERATIONS AND STORMWATER CONSIDERATIONS

2.1 STORMWATER SYSTEM OBJECTIVES

The objectives of the project stormwater system are to accomplish the following:

- **Provide water quality treatment and groundwater recharge for stormwater runoff in accordance with the Rhode Island Stormwater Design and Installation Standards Manual.**
- **Convey stormwater from upland residential properties through the property.**
- **Maintain the overall drainage patterns from the site to the extent practicable.**
- **Ensure no increase in peak runoff to the downstream DOT right of way.**
- **Ensure no increase in total 24-hour volume runoff to the downstream DOT right of way.**

2.2 REDEVELOPMENT SITE

As the existing site lot coverage consists of much less than 40% impervious and less than 10,000 square feet of this impervious surface is to be re-developed, this project does not qualify as a "redevelopment site" per section 3.2.6 of the RISDISM.

2.3 MINIMUM STORMWATER MANAGEMENT STANDARDS

2.3.1 MINIMUM STANDARD 1: LID SITE PLANNING AND DESIGN STRATEGIES

The proposed development utilizes LID designs conforming to the RISDISM. These elements are located immediately downstream of the new improvements and will directly treat the newly generated runoff with minimal interception of on-site clean runoff.

2.3.2 MINIMUM STANDARD 2: GROUNDWATER RECHARGE

This standard shall be met by infiltrating stormwater runoff in the detention basin and forebay. A total of forebay **0.378 acres** of impervious surfaces are intercepted by the stormwater system, including off-site impervious. This equates to a total of **343** cubic feet of recharge volume based on the underlying hydrologic soil type. Per the HydroCAD analysis of the WQ storm (split pervious method) a total of **958** cubic feet of recharge is provided. Refer to Appendix E for complete calculations.

2.3.3 MINIMUM STANDARD 3: WATER QUALITY

This standard shall be met by infiltrating stormwater runoff in the detention basin and forebay. A total of intercepted **0.378 acres** of impervious surfaces are intercepted by the stormwater system, including off-site impervious. This equates to a total of **1,372** cubic feet of water quality volume. Per the HydroCAD analysis of the WQ storm (split pervious method) a total of **1,481** cubic feet of water quality volume is provided in the forebay and infiltration basin. Refer to Appendix E for complete calculations.

2.3.4 MINIMUM STANDARD 4: CONVEYANCE AND NATURAL CHANNEL PROTECTION

This standard may be waived for facilities with less than one acre of imperious area. The development area for the multifamily structure and associated parking has considerably less than one acre of impervious.

2.3.5 MINIMUM STANDARD 5: OVERBANK FLOOD PROTECTION

The TR-20 HydroCAD model demonstrates that the proposed system will successfully mitigate the 100-year storm event. In these calculations, all pre-development land was characterized as "good condition" as required by this standard. An off-site component of runoff from upstream residential properties passes through the development area, which was also modeled as "good condition". The modeling also demonstrates that the structures and stormwater devices will safely pass the 100-year storm event without flooding or breaching.

2.3.6 MINIMUM STANDARD 6: REDEVELOPMENT AND INFILL PROJECTS

As stated in section 2.2 above, this project does not qualify as a re-development project.

2.3.7 MINIMUM STANDARD 7: POLLUTION PREVENTION

Source controls and pollution prevention measures will be present during all phases of construction. A separate stormwater pollution prevention plan (Soil Erosion and Sediment Control Narrative) will be prepared and provided upon request.

2.3.8 MINIMUM STANDARD 8: LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS

The use of this property does not quality as a LUHPPL and does not require any specific source controls, limited BMPs, or and additional state permitting.

2.3.9 MINIMUM STANDARD 9: ILLICIT DISCHARGES

Neither the using use nor any proposed uses will include any discharges considered to be "illicit" per this section of the Manual.

2.3.10 MINIMUM STANDARD 10: SOILS EROSION AND SEDIMENT CONTROL

Soil erosion and sediment control measures will be implemented during all phases of construction. A SESC plan has been provided in the permitting plan set and a separate Soil Erosion and Sediment Control Narrative will be provided upon request.

2.3.11 MINIMUM STANDARD 11: STORMWATER MANAGEMENT OPERATIONS AND MAINTENANCE

An Operations and Maintenance (O&M) Document has been prepared and submitted in addition to this narrative. This document satisfies the minimum requirements of this standard.

2.4 OVERALL STORMWATER DESIGN FUNCTION

The overall design of the stormwater system is to provide a reduction in peak rate of runoff and total volume runoff, and will meet the 11 minimum standards established in the RISDISM. All proposed stormwater devices are to be situated downstream of the proposed improvements and upstream of the existing receiving point for the runoff from this catchment. The existing drainage patterns across the site will be minimally impacted. There will be no negative impact to the receiving state right of way.

3.0 DESIGN MODELING METHODOLOGY

Runoff and routing calculations have been performed for the watershed areas affected by the proposed development under existing and proposed development conditions scenarios. Time of concentration and runoff curve number calculations have been performed using the method described in NRCS Technical Release 55 – Urban Hydrology for Small Watersheds. The TR-20 based HydroCAD modeling software has been utilized to perform the more complex runoff and routing calculations, most of which are beyond the scope of the TR-55 method.

Design rainfall events have been modeled using the Soil Conservation Service (SCS) Type III hydrograph for 24-hour duration storms. The rainfall depth for each return period is taken from the RISDISM. This guidance document splits the state into five regions for rainfall frequency based on county. The project site is located in the **Newport** County region defined in the RISDISM. The rainfall frequency values recommended by RIDEM and used in this drainage analysis are listed in the table below.

Rainfall Frequency Values for **Newport County** Rhode Island with 24-Hour Storm Duration					
RIDEM *Stormwater Design and Installation Standards manual* 3/15					
Frequency	1-Yr	2-Yr	10-Yr	25-Yr	100-Yr
Inches of Rainfall	2.8	3.3	4.9	6.1	8.6

The existing and proposed conditions runoff calculations were analyzed and the proposed stormwater system was designed to mitigate the peak runoff for the 1, 2, 10, 25, and 100-year 24-hour design storms. The resulting design effectively mitigates and treats runoff from newly developed areas of the site before allowing it to discharge in a non-erosive manner to downstream areas in accordance with the RISDISM.

3.1 ANALYSIS DESIGN POINTS AND OFF-SITE CONTRIBUTIONS

The proposed development contributes stormwater runoff to the following design points. These design points provide a direct comparison for pre-construction and post-construction runoff flows and runoff volumes.

1. Aquidneck Avenue

The following off-site areas contribute surface stormwater runoff to these design points. This runoff either drains through the project area or contributes in some manner which directly affects the design of the stormwater system and has been included in the design calculations. These areas are:

1. Upstream residential properties

Watershed maps for both the existing and proposed conditions can be found in Appendix B. These maps demonstrate the areas of the site which contribute to each of the design points and indicate the general pattern of surface or piped runoff flow.

4.0 STORMWATER RUNOFF COMPARISONS

Analysis of the existing and proposed runoff during design storms demonstrates that there will no increase in the peak runoff and total volume runoff to the downstream design points as a result of the development.

Comparisons of the runoff at the design points are given below in. The runoff volumes given have been evaluated over a 24-hour period. All of the HydroCAD modeling worksheets are attached in Appendix C and D.

4.1 SUMMARY OF STORMWATER CALCULATIONS

Table 4.1.1 Comparison of Runoff Values at the Design Point (EX vs. PR)
(RIDOT Aquidneck Avenue)

Storm Return Period	Existing Conditions Peak Runoff (cfs)	Proposed Conditions Peak Runoff (cfs)	Existing Conditions 24-hr Volume Runoff (af)	Proposed Conditions Volume 24-hr Runoff (af)
1-year	1.72	1.64	0.152	0.134
2-year	2.40	2.34	0.207	0.190
10-year	4.77	4.77	0.403	0.391
25-year	6.66	6.48	0.562	0.554
100-year	10.68	9.55	0.911	0.906

5.0 STORMWATER BMPS

5.1 INFILTRATION BASIN

Description

The detention basin collects and temporarily detains high volume stormwater runoff in order to mitigate the downstream effects. Retained stormwater is infiltrated into the soil below. The device must maintain a minimum of three feet of separation to the estimated seasonal high groundwater table. High flow stormwater is released via a concrete weir. The detention basin is not intended to have a permanent pool and is intended to drain within 36 hours following a storm event.

The detention basin for this development is identified as follows:

1. Location: west end of site adjacent to Aquidneck Avenue
   Lined or Unlined: Unlined
   Outlet Structure(s) (Y/N): Y
   Overflow weir type: Concrete weir
   Discharge location: Aquidneck Avenue drainage swale

5.2 SEDIMENT FOREBAY

Description:

A sediment forebay is a pre-treatment device which intercepts runoff and collects bulk sediments before overflowing into a primary water quality device. The outlet of the sediment forebay should be protected by rip-rap. A sediment forebay is grass lined and is not intended to have a permanent pool.

The stormwater design for this development includes the following sediment forebays:

1. Location: East of proposed structure
   Subwatershed served: 201B
   Lined or Unlined: Unlined
   Primary device supported: Infiltration Basin P2
   Overflow weir type: Stone weir

6.0 LIMITATIONS AND SPECIAL TERMS AND CONDITIONS

1. NE&C's evaluation was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area, and NE&C observed the degree of care and skill generally exercised by other consultants under similar circumstances and conditions. No warrantee expressed or implied is made.

2. Any additional research conducted should be reviewed by Northeast Engineers & Consultants, Inc., such that the conclusions presented herein may be modified.

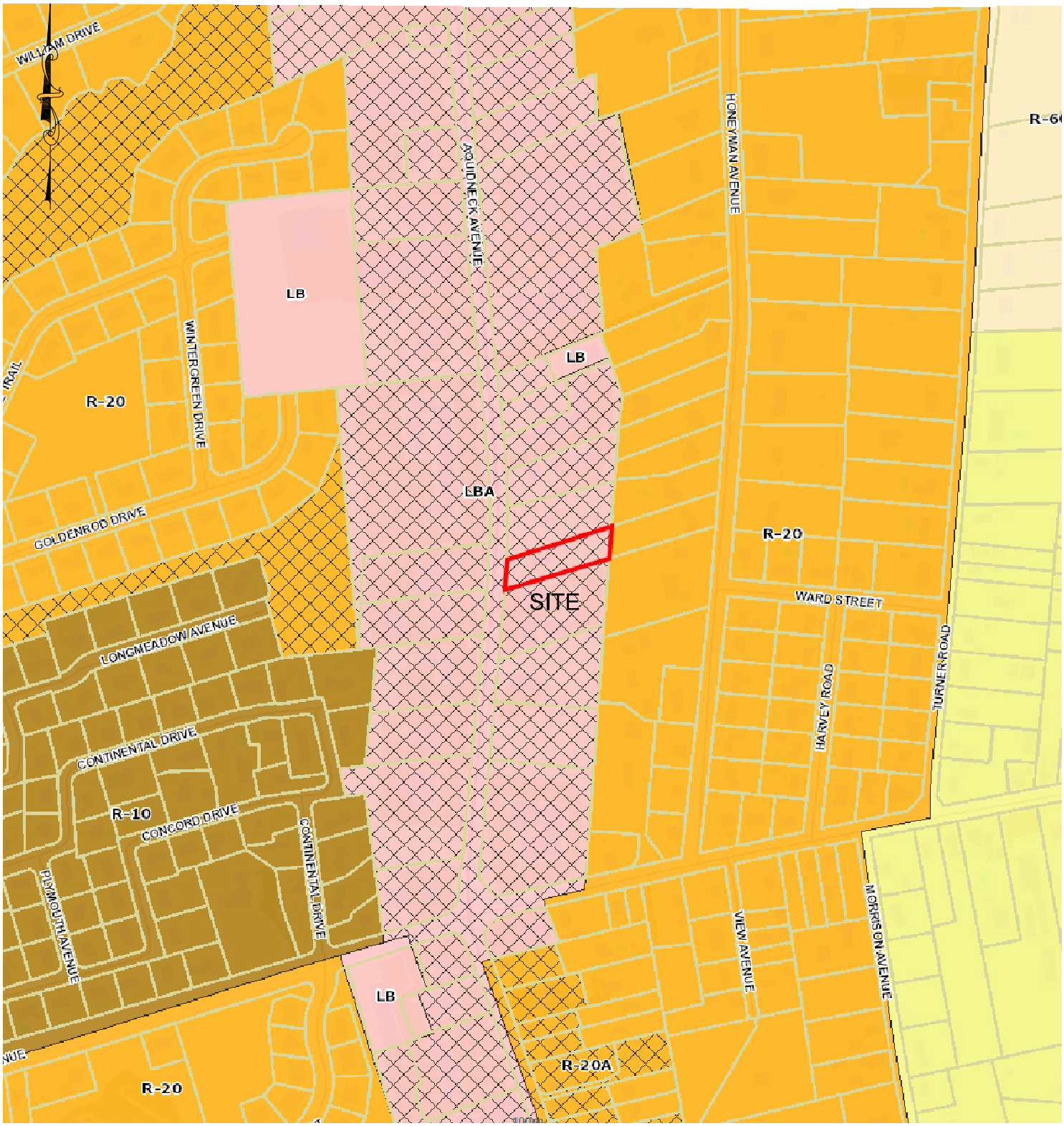
3. All observations documented in this report were performed under the existing conditions at the time of the assessment.

4. This report has been prepared on the behalf of and is for the exclusive use of the Client. This report and findings contained herein shall not, in whole or in part be disseminated or conveyed to any party, nor used by any other party in whole or in part, without the written consent of NE&C.

APPENDIX A FIGURES

Scale: NTS	Date: 30NOV21	Designed By: JJR	Drawn By: JJR	Checked By: GES

Project Title:	Drawing Title:	
AQUIDNECK COMMERCE CENTER MIDDLETOWN, RHODE ISLAND	LOCUS MAP	
Issued for: PERMITTING	Drawing Number: FIG 1	Project Number: 21247.0



Scale: NTS	Date: 30NOV21	Designed By: JJR	Drawn By: JJR	Checked By: GES

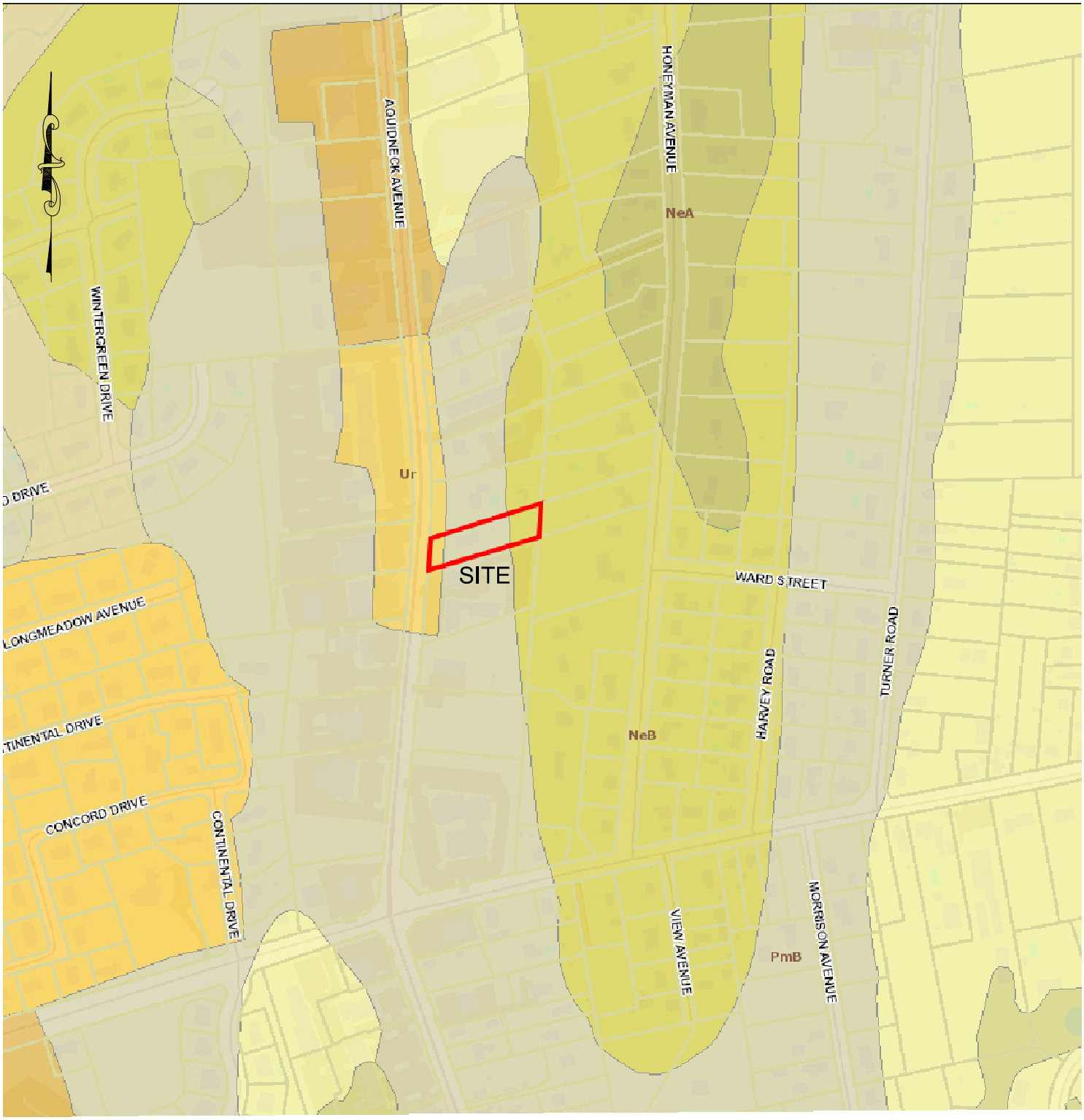
Project Title:

AQUIDNECK COMMERCE CENTER
MIDDLETOWN, RHODE ISLAND

Drawing Title:

ZONING MAP

Issued for:	Drawing Number:	Project Number:
PERMITTING	FIG 2	21247.0



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Project Title:	Drawing Title:	
AQUIDNECK COMMERCE CENTER MIDDLETOWN, RHODE ISLAND	SOILS MAP	
Issued for: PERMITTING	Drawing Number: FIG 3	Project Number: 21247.0

APPENDIX B WATERSHED MAPS

NORTHEAST ENGINEERS
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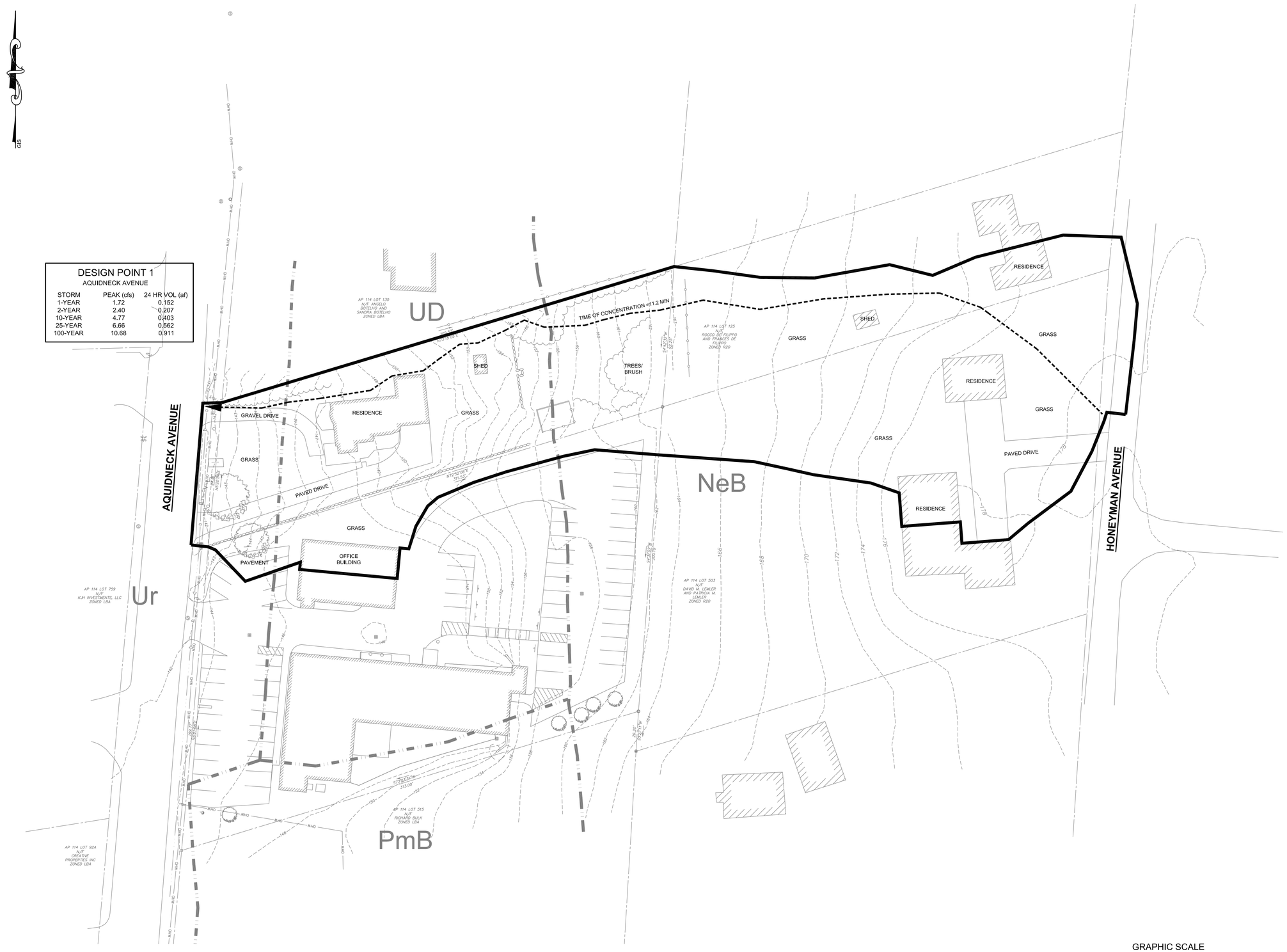
DESIGN POINT 1
AQUIDNECK AVENUE

STORM	PEAK (cfs)	24 HR VOL (af)
1-YEAR	1.72	0.152
2-YEAR	2.40	0.207
10-YEAR	4.77	0.403
25-YEAR	6.66	0.562
100-YEAR	10.68	0.911



GRAPHIC SCALE
30 0 15 30 60 120
(in feet)
1 INCH = 30 FEET

No.	Revision	Date	App.

Designed By:	JJR	Drawn by:	JJR	Checked by:	GES
Scale:	1"=30'	Date:	17FEB22		

Project Title:

AQUIDNECK COMMERCE CENTER
AP 114 LOTS 124 & 504
809, 811, 819 AQUIDNECK AVENUE
MIDDLETOWN, RHODE ISLAND

Client/Applicant: Owner:
CCB CAPITAL AND REAL ESTATE
543 THAMES STREET
NEWPORT, RI 02840

Issued for:
PERMITTING

Drawing Title:
EXISTING WATERSHED PLAN

Drawing Number: W-1
Sheet 1 of 1
Project Number: 21247.0
Survey Index: 13 – 129 – 53

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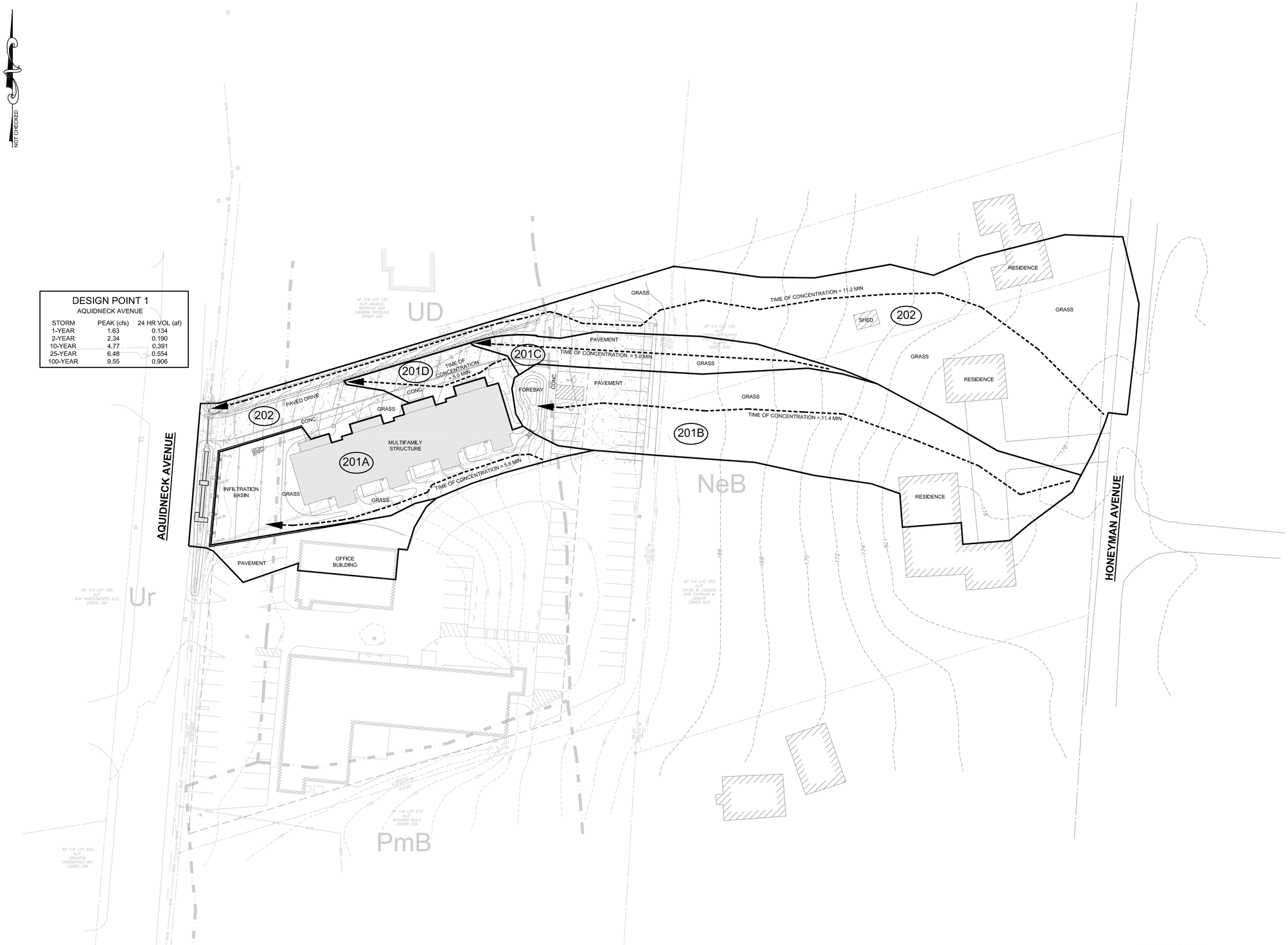
NOT CHECKED

DESIGN POINT 1
AQUIDNECK AVENUE

STORM	PEAK (cfs)	24 HR VOL (af)
1-YEAR	1.63	0.134
2-YEAR	2.34	0.190
10-YEAR	4.77	0.391
25-YEAR	6.48	0.554
100-YEAR	9.55	0.906



GRAPHIC SCALE

30 0 15 30 60 120

(in feet)

1 INCH = 30 FEET

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No.	Revision	Date	App.

Designed By:	JJR	Drawn by:	JJR	Checked by:	GES
Scale:	1"=30'	Date:	03MAY22		

Project Title:

AQUIDNECK COMMERCE CENTER
AP 114 LOTS 124 & 504
809, 811, 819 AQUIDNECK AVENUE
MIDDLETOWN, RHODE ISLAND

Client/Applicant: Owner:
CCB CAPITAL AND REAL ESTATE
543 THAMES STREET
NEWPORT, RI 02840

Issued for:
PERMITTING

Drawing Title:
PROPOSED WATERSHED PLAN

Drawing Number: W-2
Sheet 1 of 1
Project Number: 21247.0
Survey Index: 13 – 129 – 53

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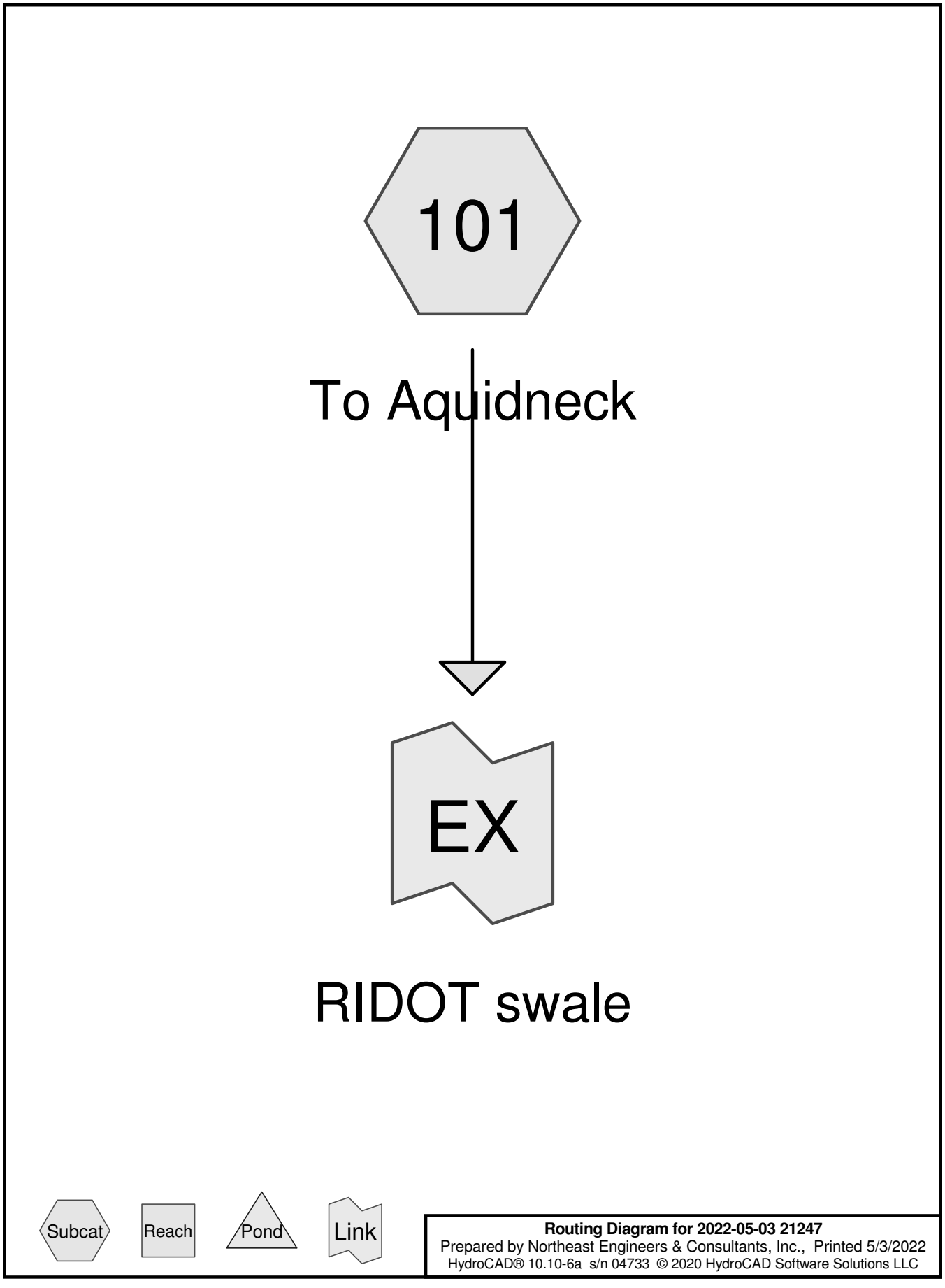
APPENDIX C EXISTING CONDITIONS HYDROCAD



Routing Diagram for 2022-05-03 21247
Prepared by Northeast Engineers & Consultants, Inc., Printed 5/3/2022

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.238	74	>75% Grass cover, Good, HSG C (101)
0.046	98	Buildings (101)
0.019	85	Dirt and Gravel Drive (101)
0.107	98	Off Site Buildings (101)
0.072	98	Off Site Pavement (101)
0.089	98	Pavement (101)
0.270	72	Woods/grass comb., Good, HSG C (101)

Summary for Subcatchment 101: To Aquidneck

Runoff = 1.72 cfs @ 12.16 hrs, Volume= 0.151 af, Depth> 0.99"
Routed to Link EX : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	4,667	98	Off Site Buildings
*	3,154	98	Off Site Pavement
*	1,992	98	Buildings
*	3,881	98	Pavement
*	840	85	Dirt and Gravel Drive
	11,741	72	Woods/grass comb., Good, HSG C
	53,931	74	>75% Grass cover, Good, HSG C
	80,206	78	Weighted Average
	66,512	74	82.93% Pervious Area
	13,694	98	17.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods** Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Link EX: RIDOT swale

Inflow Area = 1.841 ac, 17.07% Impervious, Inflow Depth > 0.99" for 1-YEAR event
Inflow = 1.72 cfs @ 12.16 hrs, Volume= 0.151 af
Primary = 1.72 cfs @ 12.16 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 101: To Aquidneck

Runoff = 2.40 cfs @ 12.16 hrs, Volume= 0.206 af, Depth> 1.34"
Routed to Link EX : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.30"

	Area (sf)	CN	Description
*	4,667	98	Off Site Buildings
*	3,154	98	Off Site Pavement
*	1,992	98	Buildings
*	3,881	98	Pavement
*	840	85	Dirt and Gravel Drive
	11,741	72	Woods/grass comb., Good, HSG C
	53,931	74	>75% Grass cover, Good, HSG C
	80,206	78	Weighted Average
	66,512	74	82.93% Pervious Area
	13,694	98	17.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods** Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Link EX: RIDOT swale

Inflow Area = 1.841 ac, 17.07% Impervious, Inflow Depth > 1.34" for 2-YEAR event
Inflow = 2.40 cfs @ 12.16 hrs, Volume= 0.206 af
Primary = 2.40 cfs @ 12.16 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 101: To Aquidneck

Runoff = 4.77 cfs @ 12.16 hrs, Volume= 0.402 af, Depth> 2.62"
Routed to Link EX : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	4,667	98	Off Site Buildings
*	3,154	98	Off Site Pavement
*	1,992	98	Buildings
*	3,881	98	Pavement
*	840	85	Dirt and Gravel Drive
	11,741	72	Woods/grass comb., Good, HSG C
	53,931	74	>75% Grass cover, Good, HSG C
	80,206	78	Weighted Average
	66,512	74	82.93% Pervious Area
	13,694	98	17.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Link EX: RIDOT swale

Inflow Area = 1.841 ac, 17.07% Impervious, Inflow Depth > 2.62" for 10-YEAR event
Inflow = 4.77 cfs @ 12.16 hrs, Volume= 0.402 af
Primary = 4.77 cfs @ 12.16 hrs, Volume= 0.402 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 101: To Aquidneck

Runoff = 6.66 cfs @ 12.16 hrs, Volume= 0.562 af, Depth> 3.66"
Routed to Link EX : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.10"

	Area (sf)	CN	Description
*	4,667	98	Off Site Buildings
*	3,154	98	Off Site Pavement
*	1,992	98	Buildings
*	3,881	98	Pavement
*	840	85	Dirt and Gravel Drive
	11,741	72	Woods/grass comb., Good, HSG C
	53,931	74	>75% Grass cover, Good, HSG C
	80,206	78	Weighted Average
	66,512	74	82.93% Pervious Area
	13,694	98	17.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods** Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Link EX: RIDOT swale

Inflow Area = 1.841 ac, 17.07% Impervious, Inflow Depth > 3.66" for 25-YEAR event
Inflow = 6.66 cfs @ 12.16 hrs, Volume= 0.562 af
Primary = 6.66 cfs @ 12.16 hrs, Volume= 0.562 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 101: To Aquidneck

Runoff = 10.68 cfs @ 12.15 hrs, Volume= 0.911 af, Depth> 5.94"
Routed to Link EX : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.60"

	Area (sf)	CN	Description
*	4,667	98	Off Site Buildings
*	3,154	98	Off Site Pavement
*	1,992	98	Buildings
*	3,881	98	Pavement
*	840	85	Dirt and Gravel Drive
	11,741	72	Woods/grass comb., Good, HSG C
	53,931	74	>75% Grass cover, Good, HSG C
	80,206	78	Weighted Average
	66,512	74	82.93% Pervious Area
	13,694	98	17.07% Impervious Area

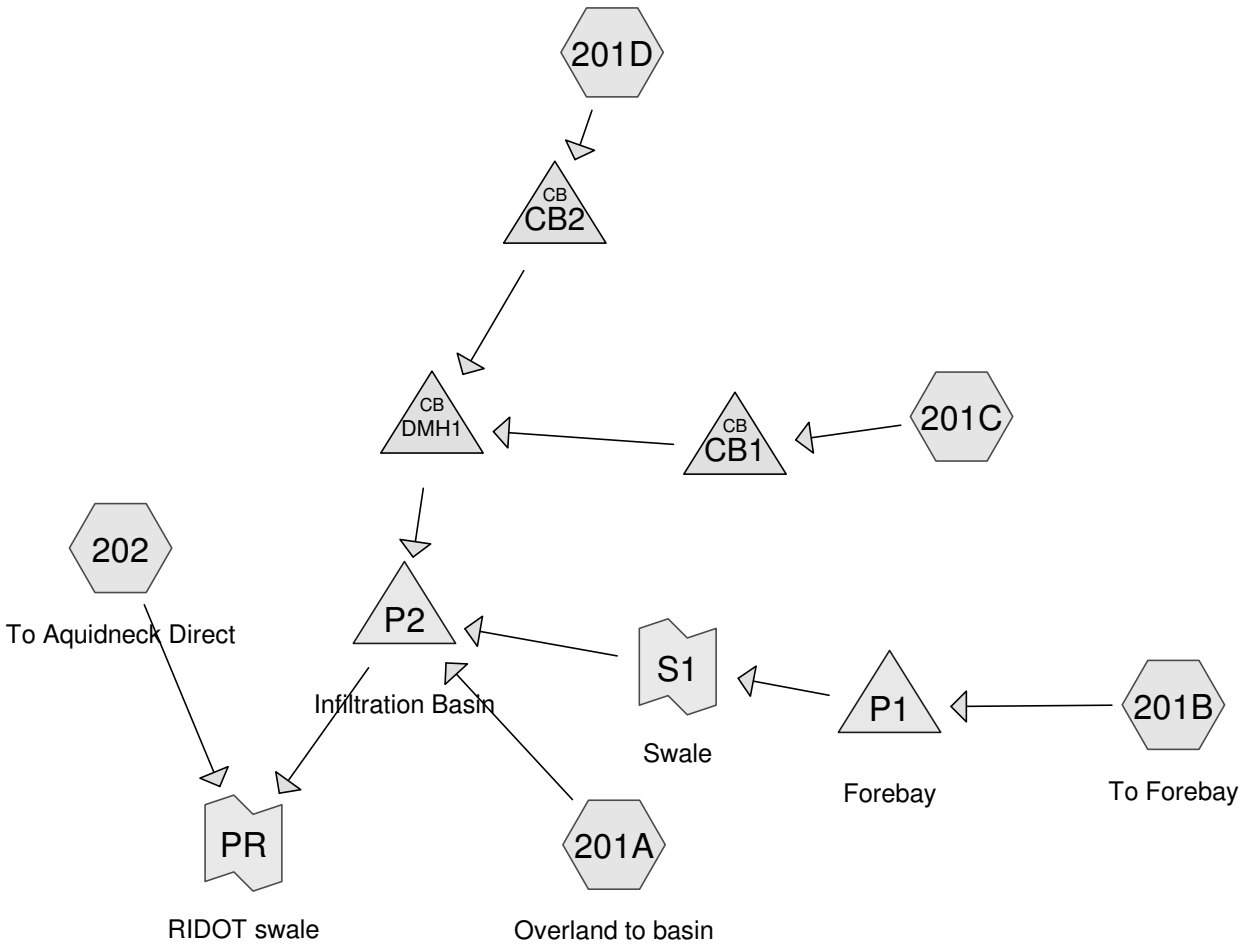
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Link EX: RIDOT swale

Inflow Area = 1.841 ac, 17.07% Impervious, Inflow Depth > 5.94" for 100-YEAR event
Inflow = 10.68 cfs @ 12.15 hrs, Volume= 0.911 af
Primary = 10.68 cfs @ 12.15 hrs, Volume= 0.911 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

APPENDIX D PROPOSED CONDITIONS HYDROCAD



Subcat Reach Pond Link

Routing Diagram for 2022-05-03 21247
Prepared by Northeast Engineers & Consultants, Inc., Printed 5/3/2022

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.273	74	>75% Grass cover, Good, HSG C (201A, 201B, 201C, 201D, 202)
0.134	98	Building (201A)
0.107	98	Off Site Buildings (201B, 202)
0.086	98	Off Site Pavement (201B, 202)
0.240	98	Pavement and concrete (201A, 201B, 201C, 201D, 202)

Summary for Subcatchment 201A: Overland to basin

Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.034 af, Depth> 1.42"
Routed to Pond P2 : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	5,845	98	Building
	6,595	74	>75% Grass cover, Good, HSG C
*	205	98	Pavement and concrete
	12,645	85	Weighted Average
	6,595	74	52.16% Pervious Area
	6,050	98	47.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0800	0.30		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.3	87	0.0800	4.24		**Shallow Concentrated Flow, Grass swale**
					Grassed Waterway Kv= 15.0 fps
5.8	187	Total			

Summary for Subcatchment 201B: To Forebay

Runoff = 0.54 cfs @ 12.17 hrs, Volume= 0.046 af, Depth> 1.16"
Routed to Pond P1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	1,258	98	Off Site Buildings
*	1,556	98	Off Site Pavement
*	3,506	98	Pavement and concrete
	14,642	74	>75% Grass cover, Good, HSG C
	20,962	81	Weighted Average
	14,642	74	69.85% Pervious Area
	6,320	98	30.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	43	0.0100	0.11		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.5	26	0.0120	0.87		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.30"
3.3	26	0.0200	0.13		**Sheet Flow, Lawn**
					Grass: Short n= 0.150 P2= 3.30"
0.7	188	0.0850	4.69		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
0.4	71	0.0210	2.94		**Shallow Concentrated Flow, Parking lot**
					Paved Kv= 20.3 fps
11.4	354	Total			

Summary for Subcatchment 201C:

Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.013 af, Depth> 1.56"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	2,299	98	Pavement and concrete
	1,971	74	>75% Grass cover, Good, HSG C
	4,270	87	Weighted Average
	1,971	74	46.16% Pervious Area
	2,299	98	53.84% Impervious Area

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

Summary for Subcatchment 201D:

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Depth> 1.88"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	1,808	98	Pavement and concrete
	698	74	>75% Grass cover, Good, HSG C
	2,506	91	Weighted Average
	698	74	27.85% Pervious Area
	1,808	98	72.15% Impervious Area

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

Summary for Subcatchment 202: To Aquidneck Direct

Runoff = 0.91 cfs @ 12.16 hrs, Volume= 0.079 af, Depth> 1.04"
Routed to Link PR : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	3,409	98	Off Site Buildings
*	2,187	98	Off Site Pavement
*	2,650	98	Pavement and concrete
	31,554	74	>75% Grass cover, Good, HSG C
	39,800	79	Weighted Average
	31,554	74	79.28% Pervious Area
	8,246	98	20.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Pond CB1:

Inflow Area = 0.098 ac, 53.84% Impervious, Inflow Depth > 1.56" for 1-YEAR event
Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.013 af
Outflow = 0.19 cfs @ 12.07 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.07 hrs, Volume= 0.013 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 151.74' @ 12.07 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	151.50'	**8.0" Round 8" ADS** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 151.50' / 146.50' S= 0.0476 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.19 cfs @ 12.07 hrs HW=151.74' TW=146.51' (Dynamic Tailwater)
1=8" ADS (Inlet Controls 0.19 cfs @ 1.66 fps)

Summary for Pond CB2:

Inflow Area = 0.058 ac, 72.15% Impervious, Inflow Depth > 1.88" for 1-YEAR event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.96' @ 12.07 hrs
Flood Elev= 148.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.75'	**8.0" Round 8" ADS** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 146.75' / 146.50' S= 0.0083 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.13 cfs @ 12.07 hrs HW=146.96' TW=146.51' (Dynamic Tailwater)
1=8" ADS (Barrel Controls 0.13 cfs @ 2.08 fps)

Summary for Pond DMH1:

Inflow Area = 0.156 ac, 60.61% Impervious, Inflow Depth > 1.68" for 1-YEAR event
Inflow = 0.32 cfs @ 12.07 hrs, Volume= 0.022 af
Outflow = 0.32 cfs @ 12.07 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.07 hrs, Volume= 0.022 af
Routed to Pond P2 : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.51' @ 12.07 hrs
Flood Elev= 149.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.17'	**12.0" Round 12" ADS** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 146.17' / 146.00' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.07 hrs HW=146.51' TW=145.20' (Dynamic Tailwater)
↑—**1=12" ADS** (Barrel Controls 0.32 cfs @ 2.04 fps)

Summary for Pond P1: Forebay

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 1.16" for 1-YEAR event
Inflow = 0.54 cfs @ 12.17 hrs, Volume= 0.046 af
Outflow = 0.53 cfs @ 12.18 hrs, Volume= 0.041 af, Atten= 1%, Lag= 0.9 min
Discarded = 0.01 cfs @ 12.18 hrs, Volume= 0.008 af
Primary = 0.52 cfs @ 12.18 hrs, Volume= 0.033 af
Routed to Link S1 : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 156.39' @ 12.18 hrs Surf.Area= 317 sf Storage= 281 cf
Flood Elev= 157.00' Surf.Area= 420 sf Storage= 505 cf

Plug-Flow detention time= 76.1 min calculated for 0.041 af (88% of inflow)
Center-of-Mass det. time= 21.5 min (871.3 - 849.8)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.00	90	0	0
156.00	250	170	170
157.00	420	335	505

Device	Routing	Invert	Outlet Devices
#1	Discarded	155.00'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	156.25'	**90.0 deg x 3.0' long x 0.75' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)

Discarded OutFlow Max=0.01 cfs @ 12.18 hrs HW=156.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.52 cfs @ 12.18 hrs HW=156.39' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.52 cfs @ 1.17 fps)

Summary for Pond P2: Infiltration Basin

Inflow Area = 0.927 ac, 40.80% Impervious, Inflow Depth > 1.16" for 1-YEAR event
Inflow = 1.14 cfs @ 12.12 hrs, Volume= 0.089 af
Outflow = 0.77 cfs @ 12.29 hrs, Volume= 0.081 af, Atten= 33%, Lag= 10.3 min
Discarded = 0.03 cfs @ 12.29 hrs, Volume= 0.026 af
Primary = 0.74 cfs @ 12.29 hrs, Volume= 0.055 af
Routed to Link PR : RIDOT swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.38' @ 12.29 hrs Surf.Area= 1,253 sf Storage= 777 cf
Flood Elev= 147.00' Surf.Area= 2,821 sf Storage= 4,096 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 38.8 min (865.9 - 827.1)

Volume	Invert	Avail.Storage	Storage Description
#1	144.25'	4,096 cf	**Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.25	120	0	0
145.00	883	376	376
146.00	1,868	1,376	1,752
147.00	2,821	2,345	4,096

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	146.25'	**60.0' long x 1.00' rise Overflow weir** 2 End Contraction(s)
#3	Device 13	142.13'	**4.0" Vert. 4" ORIFICE 1** C= 0.600 Limited to weir flow at low heads
#4	Device 14	142.13'	**4.0" Vert. 4" ORIFICE 2** C= 0.600 Limited to weir flow at low heads
#5	Device 15	142.13'	**4.0" Vert. 4" ORIFICE 3** C= 0.600 Limited to weir flow at low heads
#6	Device 16	142.13'	**4.0" Vert. 4" ORIFICE 4** C= 0.600 Limited to weir flow at low heads
#7	Device 17	142.13'	**4.0" Vert. 4" ORIFICE 5** C= 0.600 Limited to weir flow at low heads
#8	Device 3	145.10'	**12.0" Horiz. 12" GRATE 1** C= 0.600 Limited to weir flow at low heads
#9	Device 4	145.40'	**12.0" Horiz. 12" GRATE 2** C= 0.600 Limited to weir flow at low heads
#10	Device 5	145.50'	**12.0" Horiz. 12" GRATE 3** C= 0.600 Limited to weir flow at low heads
#11	Device 6	145.80'	**12.0" Horiz. 12" GRATE 4** C= 0.600 Limited to weir flow at low heads
#12	Device 7	145.80'	**12.0" Horiz. 12" GRATE 5** C= 0.600 Limited to weir flow at low heads
#13	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 1** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#14	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 2** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#15	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 3** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#16	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 4** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#17	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 5** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Discarded OutFlow Max=0.03 cfs @ 12.29 hrs HW=145.38' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.74 cfs @ 12.29 hrs HW=145.38' TW=0.00' (Dynamic Tailwater)
- **2=Overflow weir** (Controls 0.00 cfs)
- **13=6" PVC TO GRADE 1** (Passes 0.74 cfs of 1.67 cfs potential flow)
  - **3=4" ORIFICE 1** (Orifice Controls 0.74 cfs @ 8.45 fps)
    - **8=12" GRATE 1** (Passes 0.74 cfs of 1.49 cfs potential flow)
- **14=6" PVC TO GRADE 2** (Passes 0.00 cfs of 1.67 cfs potential flow)
  - **4=4" ORIFICE 2** (Passes 0.00 cfs of 0.74 cfs potential flow)
    - **9=12" GRATE 2** (Controls 0.00 cfs)
- **15=6" PVC TO GRADE 3** (Passes 0.00 cfs of 1.67 cfs potential flow)
  - **5=4" ORIFICE 3** (Passes 0.00 cfs of 0.74 cfs potential flow)
    - **10=12" GRATE 3** (Controls 0.00 cfs)
- **16=6" PVC TO GRADE 4** (Passes 0.00 cfs of 1.67 cfs potential flow)
  - **6=4" ORIFICE 4** (Passes 0.00 cfs of 0.74 cfs potential flow)
    - **11=12" GRATE 4** (Controls 0.00 cfs)
- **17=6" PVC TO GRADE 5** (Passes 0.00 cfs of 1.67 cfs potential flow)
  - **7=4" ORIFICE 5** (Passes 0.00 cfs of 0.74 cfs potential flow)
    - **12=12" GRATE 5** (Controls 0.00 cfs)

Summary for Link PR: RIDOT swale

Inflow Area = 1.841 ac, 30.83% Impervious, Inflow Depth > 0.87" for 1-YEAR event
Inflow = 1.64 cfs @ 12.16 hrs, Volume= 0.134 af
Primary = 1.64 cfs @ 12.16 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link S1: Swale

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 0.83" for 1-YEAR event
Inflow = 0.52 cfs @ 12.18 hrs, Volume= 0.033 af
Primary = 0.52 cfs @ 12.19 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.5 min
Routed to Pond P2 : Infiltration Basin

Primary outflow = Inflow delayed by 0.5 min, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 201A: Overland to basin

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 0.045 af, Depth> 1.84"
Routed to Pond P2 : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.30"

	Area (sf)	CN	Description
*	5,845	98	Building
	6,595	74	>75% Grass cover, Good, HSG C
*	205	98	Pavement and concrete
	12,645	85	Weighted Average
	6,595	74	52.16% Pervious Area
	6,050	98	47.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0800	0.30		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.3	87	0.0800	4.24		**Shallow Concentrated Flow, Grass swale**
					Grassed Waterway Kv= 15.0 fps
5.8	187	Total			

Summary for Subcatchment 201B: To Forebay

Runoff = 0.72 cfs @ 12.16 hrs, Volume= 0.062 af, Depth> 1.54"
Routed to Pond P1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.30"

	Area (sf)	CN	Description
*	1,258	98	Off Site Buildings
*	1,556	98	Off Site Pavement
*	3,506	98	Pavement and concrete
	14,642	74	>75% Grass cover, Good, HSG C
	20,962	81	Weighted Average
	14,642	74	69.85% Pervious Area
	6,320	98	30.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	43	0.0100	0.11		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.5	26	0.0120	0.87		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.30"
3.3	26	0.0200	0.13		**Sheet Flow, Lawn**
					Grass: Short n= 0.150 P2= 3.30"
0.7	188	0.0850	4.69		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
0.4	71	0.0210	2.94		**Shallow Concentrated Flow, Parking lot**
					Paved Kv= 20.3 fps
11.4	354	Total			

Summary for Subcatchment 201C:

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.016 af, Depth> 2.00"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.30"

	Area (sf)	CN	Description
*	2,299	98	Pavement and concrete
	1,971	74	>75% Grass cover, Good, HSG C
	4,270	87	Weighted Average
	1,971	74	46.16% Pervious Area
	2,299	98	53.84% Impervious Area

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

Summary for Subcatchment 201D:

Runoff = 0.16 cfs @ 12.07 hrs, Volume= 0.011 af, Depth> 2.35"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.30"

	Area (sf)	CN	Description
*	1,808	98	Pavement and concrete
	698	74	>75% Grass cover, Good, HSG C
	2,506	91	Weighted Average
	698	74	27.85% Pervious Area
	1,808	98	72.15% Impervious Area

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

Summary for Subcatchment 202: To Aquidneck Direct

Runoff = 1.25 cfs @ 12.16 hrs, Volume= 0.107 af, Depth> 1.41"
Routed to Link PR : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.30"

	Area (sf)	CN	Description
*	3,409	98	Off Site Buildings
*	2,187	98	Off Site Pavement
*	2,650	98	Pavement and concrete
	31,554	74	>75% Grass cover, Good, HSG C
	39,800	79	Weighted Average
	31,554	74	79.28% Pervious Area
	8,246	98	20.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Pond CB1:

Inflow Area = 0.098 ac, 53.84% Impervious, Inflow Depth > 2.00" for 2-YEAR event
Inflow = 0.24 cfs @ 12.07 hrs, Volume= 0.016 af
Outflow = 0.24 cfs @ 12.07 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min
Primary = 0.24 cfs @ 12.07 hrs, Volume= 0.016 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 151.77' @ 12.07 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	151.50'	**8.0" Round 8" ADS** L= 105.0' Ke= 0.500
			Inlet / Outlet Invert= 151.50' / 146.50' S= 0.0476 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.24 cfs @ 12.07 hrs HW=151.77' TW=146.55' (Dynamic Tailwater)
1=8" ADS (Inlet Controls 0.24 cfs @ 1.78 fps)

Summary for Pond CB2:

Inflow Area = 0.058 ac, 72.15% Impervious, Inflow Depth > 2.35" for 2-YEAR event
Inflow = 0.16 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.16 cfs @ 12.07 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min
Primary = 0.16 cfs @ 12.07 hrs, Volume= 0.011 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.98' @ 12.07 hrs
Flood Elev= 148.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.75'	**8.0" Round 8" ADS** L= 30.0' Ke= 0.500
			Inlet / Outlet Invert= 146.75' / 146.50' S= 0.0083 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.16 cfs @ 12.07 hrs HW=146.98' TW=146.55' (Dynamic Tailwater)
1=8" ADS (Barrel Controls 0.16 cfs @ 2.19 fps)

Summary for Pond DMH1:

Inflow Area = 0.156 ac, 60.61% Impervious, Inflow Depth > 2.13" for 2-YEAR event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 0.028 af
Outflow = 0.40 cfs @ 12.07 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 12.07 hrs, Volume= 0.028 af
Routed to Pond P2 : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.55' @ 12.07 hrs
Flood Elev= 149.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.17'	**12.0" Round 12" ADS** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 146.17' / 146.00' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.40 cfs @ 12.07 hrs HW=146.55' TW=145.34' (Dynamic Tailwater)
↑—**1=12" ADS** (Barrel Controls 0.40 cfs @ 2.17 fps)

Summary for Pond P1: Forebay

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 1.54" for 2-YEAR event
Inflow = 0.72 cfs @ 12.16 hrs, Volume= 0.062 af
Outflow = 0.72 cfs @ 12.18 hrs, Volume= 0.056 af, Atten= 1%, Lag= 0.9 min
Discarded = 0.01 cfs @ 12.18 hrs, Volume= 0.008 af
Primary = 0.71 cfs @ 12.18 hrs, Volume= 0.048 af
Routed to Link S1 : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 156.42' @ 12.18 hrs Surf.Area= 322 sf Storage= 291 cf
Flood Elev= 157.00' Surf.Area= 420 sf Storage= 505 cf

Plug-Flow detention time= 60.6 min calculated for 0.056 af (91% of inflow)
Center-of-Mass det. time= 16.9 min (858.4 - 841.5)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.00	90	0	0
156.00	250	170	170
157.00	420	335	505

Device	Routing	Invert	Outlet Devices
#1	Discarded	155.00'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	156.25'	**90.0 deg x 3.0' long x 0.75' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)

Discarded OutFlow Max=0.01 cfs @ 12.18 hrs HW=156.42' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.71 cfs @ 12.18 hrs HW=156.42' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.71 cfs @ 1.29 fps)

Summary for Pond P2: Infiltration Basin

Inflow Area = 0.927 ac, 40.80% Impervious, Inflow Depth > 1.56" for 2-YEAR event
Inflow = 1.53 cfs @ 12.11 hrs, Volume= 0.120 af
Outflow = 1.20 cfs @ 12.22 hrs, Volume= 0.111 af, Atten= 21%, Lag= 7.0 min
Discarded = 0.03 cfs @ 12.22 hrs, Volume= 0.028 af
Primary = 1.17 cfs @ 12.22 hrs, Volume= 0.083 af
Routed to Link PR : RIDOT swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.51' @ 12.22 hrs Surf.Area= 1,390 sf Storage= 961 cf
Flood Elev= 147.00' Surf.Area= 2,821 sf Storage= 4,096 cf

Plug-Flow detention time= 63.8 min calculated for 0.111 af (92% of inflow)
Center-of-Mass det. time= 25.2 min (848.0 - 822.7)

Volume	Invert	Avail.Storage	Storage Description
#1	144.25'	4,096 cf	**Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.25	120	0	0
145.00	883	376	376
146.00	1,868	1,376	1,752
147.00	2,821	2,345	4,096

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	146.25'	**60.0' long x 1.00' rise Overflow weir** 2 End Contraction(s)
#3	Device 13	142.13'	**4.0" Vert. 4" ORIFICE 1** C= 0.600 Limited to weir flow at low heads
#4	Device 14	142.13'	**4.0" Vert. 4" ORIFICE 2** C= 0.600 Limited to weir flow at low heads
#5	Device 15	142.13'	**4.0" Vert. 4" ORIFICE 3** C= 0.600 Limited to weir flow at low heads
#6	Device 16	142.13'	**4.0" Vert. 4" ORIFICE 4** C= 0.600 Limited to weir flow at low heads
#7	Device 17	142.13'	**4.0" Vert. 4" ORIFICE 5** C= 0.600 Limited to weir flow at low heads
#8	Device 3	145.10'	**12.0" Horiz. 12" GRATE 1** C= 0.600 Limited to weir flow at low heads
#9	Device 4	145.40'	**12.0" Horiz. 12" GRATE 2** C= 0.600 Limited to weir flow at low heads
#10	Device 5	145.50'	**12.0" Horiz. 12" GRATE 3** C= 0.600 Limited to weir flow at low heads
#11	Device 6	145.80'	**12.0" Horiz. 12" GRATE 4** C= 0.600 Limited to weir flow at low heads
#12	Device 7	145.80'	**12.0" Horiz. 12" GRATE 5** C= 0.600 Limited to weir flow at low heads
#13	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 1** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#14	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 2** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#15	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 3** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#16	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 4** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#17	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 5** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Discarded OutFlow Max=0.03 cfs @ 12.22 hrs HW=145.51' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.17 cfs @ 12.22 hrs HW=145.51' TW=0.00' (Dynamic Tailwater)
- **2=Overflow weir** (Controls 0.00 cfs)
- **13=6" PVC TO GRADE 1** (Passes 0.75 cfs of 1.71 cfs potential flow)
  - **3=4" ORIFICE 1** (Orifice Controls 0.75 cfs @ 8.64 fps)
    - **8=12" GRATE 1** (Passes 0.75 cfs of 2.43 cfs potential flow)
- **14=6" PVC TO GRADE 2** (Passes 0.40 cfs of 1.71 cfs potential flow)
  - **4=4" ORIFICE 2** (Passes 0.40 cfs of 0.75 cfs potential flow)
    - **9=12" GRATE 2** (Weir Controls 0.40 cfs @ 1.10 fps)
- **15=6" PVC TO GRADE 3** (Passes 0.02 cfs of 1.71 cfs potential flow)
  - **5=4" ORIFICE 3** (Passes 0.02 cfs of 0.75 cfs potential flow)
    - **10=12" GRATE 3** (Weir Controls 0.02 cfs @ 0.39 fps)
- **16=6" PVC TO GRADE 4** (Passes 0.00 cfs of 1.71 cfs potential flow)
  - **6=4" ORIFICE 4** (Passes 0.00 cfs of 0.75 cfs potential flow)
    - **11=12" GRATE 4** (Controls 0.00 cfs)
- **17=6" PVC TO GRADE 5** (Passes 0.00 cfs of 1.71 cfs potential flow)
  - **7=4" ORIFICE 5** (Passes 0.00 cfs of 0.75 cfs potential flow)
    - **12=12" GRATE 5** (Controls 0.00 cfs)

Summary for Link PR: RIDOT swale

Inflow Area = 1.841 ac, 30.83% Impervious, Inflow Depth > 1.24" for 2-YEAR event
Inflow = 2.34 cfs @ 12.19 hrs, Volume= 0.190 af
Primary = 2.34 cfs @ 12.19 hrs, Volume= 0.190 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link S1: Swale

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 1.20" for 2-YEAR event
Inflow = 0.71 cfs @ 12.18 hrs, Volume= 0.048 af
Primary = 0.71 cfs @ 12.18 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.5 min
Routed to Pond P2 : Infiltration Basin

Primary outflow = Inflow delayed by 0.5 min, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 201A: Overland to basin

Runoff = 1.11 cfs @ 12.08 hrs, Volume= 0.079 af, Depth> 3.27"
Routed to Pond P2 : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	5,845	98	Building
	6,595	74	>75% Grass cover, Good, HSG C
*	205	98	Pavement and concrete
	12,645	85	Weighted Average
	6,595	74	52.16% Pervious Area
	6,050	98	47.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0800	0.30		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.3	87	0.0800	4.24		**Shallow Concentrated Flow, Grass swale**
					Grassed Waterway Kv= 15.0 fps
5.8	187	Total			

Summary for Subcatchment 201B: To Forebay

Runoff = 1.37 cfs @ 12.16 hrs, Volume= 0.116 af, Depth> 2.89"
Routed to Pond P1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	1,258	98	Off Site Buildings
*	1,556	98	Off Site Pavement
*	3,506	98	Pavement and concrete
	14,642	74	>75% Grass cover, Good, HSG C
	20,962	81	Weighted Average
	14,642	74	69.85% Pervious Area
	6,320	98	30.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	43	0.0100	0.11		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.5	26	0.0120	0.87		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.30"
3.3	26	0.0200	0.13		**Sheet Flow, Lawn**
					Grass: Short n= 0.150 P2= 3.30"
0.7	188	0.0850	4.69		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
0.4	71	0.0210	2.94		**Shallow Concentrated Flow, Parking lot**
					Paved Kv= 20.3 fps
11.4	354	Total			

Summary for Subcatchment 201C:

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.028 af, Depth> 3.47"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	2,299	98	Pavement and concrete
	1,971	74	>75% Grass cover, Good, HSG C
	4,270	87	Weighted Average
	1,971	74	46.16% Pervious Area
	2,299	98	53.84% Impervious Area

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

Summary for Subcatchment 201D:

Runoff = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af, Depth> 3.88"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	1,808	98	Pavement and concrete
	698	74	>75% Grass cover, Good, HSG C
	2,506	91	Weighted Average
	698	74	27.85% Pervious Area
	1,808	98	72.15% Impervious Area

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

Summary for Subcatchment 202: To Aquidneck Direct

Runoff = 2.45 cfs @ 12.16 hrs, Volume= 0.206 af, Depth> 2.71"
Routed to Link PR : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	3,409	98	Off Site Buildings
*	2,187	98	Off Site Pavement
*	2,650	98	Pavement and concrete
	31,554	74	>75% Grass cover, Good, HSG C
	39,800	79	Weighted Average
	31,554	74	79.28% Pervious Area
	8,246	98	20.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Pond CB1:

Inflow Area = 0.098 ac, 53.84% Impervious, Inflow Depth > 3.47" for 10-YEAR event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.028 af
Outflow = 0.41 cfs @ 12.07 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.41 cfs @ 12.07 hrs, Volume= 0.028 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 151.87' @ 12.07 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	151.50'	**8.0" Round 8" ADS** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 151.50' / 146.50' S= 0.0476 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.41 cfs @ 12.07 hrs HW=151.87' TW=146.67' (Dynamic Tailwater)
↑**1=8" ADS** (Inlet Controls 0.41 cfs @ 2.06 fps)

Summary for Pond CB2:

Inflow Area = 0.058 ac, 72.15% Impervious, Inflow Depth > 3.88" for 10-YEAR event
Inflow = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
Primary = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.05' @ 12.07 hrs
Flood Elev= 148.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.75'	**8.0" Round 8" ADS** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 146.75' / 146.50' S= 0.0083 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.26 cfs @ 12.07 hrs HW=147.05' TW=146.67' (Dynamic Tailwater)
↑**1=8" ADS** (Barrel Controls 0.26 cfs @ 2.46 fps)

Summary for Pond DMH1:

Inflow Area = 0.156 ac, 60.61% Impervious, Inflow Depth > 3.62" for 10-YEAR event
Inflow = 0.67 cfs @ 12.07 hrs, Volume= 0.047 af
Outflow = 0.67 cfs @ 12.07 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.07 hrs, Volume= 0.047 af
Routed to Pond P2 : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.67' @ 12.07 hrs
Flood Elev= 149.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.17'	**12.0" Round 12" ADS** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 146.17' / 146.00' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.67 cfs @ 12.07 hrs HW=146.67' TW=145.60' (Dynamic Tailwater)
↑—**1=12" ADS** (Barrel Controls 0.67 cfs @ 2.48 fps)

Summary for Pond P1: Forebay

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 2.89" for 10-YEAR event
Inflow = 1.37 cfs @ 12.16 hrs, Volume= 0.116 af
Outflow = 1.36 cfs @ 12.17 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.8 min
Discarded = 0.01 cfs @ 12.17 hrs, Volume= 0.009 af
Primary = 1.35 cfs @ 12.17 hrs, Volume= 0.101 af
Routed to Link S1 : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 156.51' @ 12.17 hrs Surf.Area= 337 sf Storage= 321 cf
Flood Elev= 157.00' Surf.Area= 420 sf Storage= 505 cf

Plug-Flow detention time= 38.0 min calculated for 0.110 af (95% of inflow)
Center-of-Mass det. time= 12.0 min (835.6 - 823.6)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.00	90	0	0
156.00	250	170	170
157.00	420	335	505

Device	Routing	Invert	Outlet Devices
#1	Discarded	155.00'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	156.25'	**90.0 deg x 3.0' long x 0.75' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)

Discarded OutFlow Max=0.01 cfs @ 12.17 hrs HW=156.51' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.35 cfs @ 12.17 hrs HW=156.51' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.35 cfs @ 1.58 fps)

Summary for Pond P2: Infiltration Basin

Inflow Area = 0.927 ac, 40.80% Impervious, Inflow Depth > 2.94" for 10-YEAR event
Inflow = 2.77 cfs @ 12.11 hrs, Volume= 0.227 af
Outflow = 2.37 cfs @ 12.19 hrs, Volume= 0.217 af, Atten= 15%, Lag= 4.9 min
Discarded = 0.04 cfs @ 12.19 hrs, Volume= 0.031 af
Primary = 2.33 cfs @ 12.19 hrs, Volume= 0.185 af
Routed to Link PR : RIDOT swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.70' @ 12.19 hrs Surf.Area= 1,577 sf Storage= 1,243 cf
Flood Elev= 147.00' Surf.Area= 2,821 sf Storage= 4,096 cf

Plug-Flow detention time= 40.9 min calculated for 0.216 af (95% of inflow)
Center-of-Mass det. time= 15.1 min (826.5 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1	144.25'	4,096 cf	**Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.25	120	0	0
145.00	883	376	376
146.00	1,868	1,376	1,752
147.00	2,821	2,345	4,096

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	146.25'	**60.0' long x 1.00' rise Overflow weir** 2 End Contraction(s)
#3	Device 13	142.13'	**4.0" Vert. 4" ORIFICE 1** C= 0.600 Limited to weir flow at low heads
#4	Device 14	142.13'	**4.0" Vert. 4" ORIFICE 2** C= 0.600 Limited to weir flow at low heads
#5	Device 15	142.13'	**4.0" Vert. 4" ORIFICE 3** C= 0.600 Limited to weir flow at low heads
#6	Device 16	142.13'	**4.0" Vert. 4" ORIFICE 4** C= 0.600 Limited to weir flow at low heads
#7	Device 17	142.13'	**4.0" Vert. 4" ORIFICE 5** C= 0.600 Limited to weir flow at low heads
#8	Device 3	145.10'	**12.0" Horiz. 12" GRATE 1** C= 0.600 Limited to weir flow at low heads
#9	Device 4	145.40'	**12.0" Horiz. 12" GRATE 2** C= 0.600 Limited to weir flow at low heads
#10	Device 5	145.50'	**12.0" Horiz. 12" GRATE 3** C= 0.600 Limited to weir flow at low heads
#11	Device 6	145.80'	**12.0" Horiz. 12" GRATE 4** C= 0.600 Limited to weir flow at low heads
#12	Device 7	145.80'	**12.0" Horiz. 12" GRATE 5** C= 0.600 Limited to weir flow at low heads
#13	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 1** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#14	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 2** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#15	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 3** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#16	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 4** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#17	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 5** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Discarded OutFlow Max=0.04 cfs @ 12.19 hrs HW=145.70' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=2.33 cfs @ 12.19 hrs HW=145.70' TW=0.00' (Dynamic Tailwater)
- **2=Overflow weir** (Controls 0.00 cfs)
- **13=6" PVC TO GRADE 1** (Passes 0.78 cfs of 1.76 cfs potential flow)
  - **3=4" ORIFICE 1** (Orifice Controls 0.78 cfs @ 8.89 fps)
    - **8=12" GRATE 1** (Passes 0.78 cfs of 2.94 cfs potential flow)
- **14=6" PVC TO GRADE 2** (Passes 0.78 cfs of 1.76 cfs potential flow)
  - **4=4" ORIFICE 2** (Orifice Controls 0.78 cfs @ 8.89 fps)
    - **9=12" GRATE 2** (Passes 0.78 cfs of 1.73 cfs potential flow)
- **15=6" PVC TO GRADE 3** (Passes 0.78 cfs of 1.76 cfs potential flow)
  - **5=4" ORIFICE 3** (Orifice Controls 0.78 cfs @ 8.89 fps)
    - **10=12" GRATE 3** (Passes 0.78 cfs of 0.95 cfs potential flow)
- **16=6" PVC TO GRADE 4** (Passes 0.00 cfs of 1.76 cfs potential flow)
  - **6=4" ORIFICE 4** (Passes 0.00 cfs of 0.78 cfs potential flow)
    - **11=12" GRATE 4** (Controls 0.00 cfs)
- **17=6" PVC TO GRADE 5** (Passes 0.00 cfs of 1.76 cfs potential flow)
  - **7=4" ORIFICE 5** (Passes 0.00 cfs of 0.78 cfs potential flow)
    - **12=12" GRATE 5** (Controls 0.00 cfs)

Summary for Link PR: RIDOT swale

Inflow Area = 1.841 ac, 30.83% Impervious, Inflow Depth > 2.55" for 10-YEAR event
Inflow = 4.77 cfs @ 12.16 hrs, Volume= 0.391 af
Primary = 4.77 cfs @ 12.16 hrs, Volume= 0.391 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link S1: Swale

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 2.53" for 10-YEAR event
Inflow = 1.35 cfs @ 12.17 hrs, Volume= 0.101 af
Primary = 1.35 cfs @ 12.18 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.5 min
Routed to Pond P2 : Infiltration Basin

Primary outflow = Inflow delayed by 0.5 min, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 201A: Overland to basin

Runoff = 1.48 cfs @ 12.08 hrs, Volume= 0.106 af, Depth> 4.39"
Routed to Pond P2 : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.10"

	Area (sf)	CN	Description
*	5,845	98	Building
	6,595	74	>75% Grass cover, Good, HSG C
*	205	98	Pavement and concrete
	12,645	85	Weighted Average
	6,595	74	52.16% Pervious Area
	6,050	98	47.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0800	0.30		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.3	87	0.0800	4.24		**Shallow Concentrated Flow, Grass swale**
					Grassed Waterway Kv= 15.0 fps
5.8	187	Total			

Summary for Subcatchment 201B: To Forebay

Runoff = 1.87 cfs @ 12.15 hrs, Volume= 0.159 af, Depth> 3.97"
Routed to Pond P1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.10"

	Area (sf)	CN	Description
*	1,258	98	Off Site Buildings
*	1,556	98	Off Site Pavement
*	3,506	98	Pavement and concrete
	14,642	74	>75% Grass cover, Good, HSG C
	20,962	81	Weighted Average
	14,642	74	69.85% Pervious Area
	6,320	98	30.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	43	0.0100	0.11		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.5	26	0.0120	0.87		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.30"
3.3	26	0.0200	0.13		**Sheet Flow, Lawn**
					Grass: Short n= 0.150 P2= 3.30"
0.7	188	0.0850	4.69		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
0.4	71	0.0210	2.94		**Shallow Concentrated Flow, Parking lot**
					Paved Kv= 20.3 fps
11.4	354	Total			

Summary for Subcatchment 201C:

Runoff = 0.53 cfs @ 12.07 hrs, Volume= 0.038 af, Depth> 4.61"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.10"

	Area (sf)	CN	Description
*	2,299	98	Pavement and concrete
	1,971	74	>75% Grass cover, Good, HSG C
	4,270	87	Weighted Average
	1,971	74	46.16% Pervious Area
	2,299	98	53.84% Impervious Area

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

Summary for Subcatchment 201D:

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 0.024 af, Depth> 5.05"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.10"

	Area (sf)	CN	Description
*	1,808	98	Pavement and concrete
	698	74	>75% Grass cover, Good, HSG C
	2,506	91	Weighted Average
	698	74	27.85% Pervious Area
	1,808	98	72.15% Impervious Area

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

Summary for Subcatchment 202: To Aquidneck Direct

Runoff = 3.39 cfs @ 12.16 hrs, Volume= 0.286 af, Depth> 3.76"
Routed to Link PR : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.10"

	Area (sf)	CN	Description
*	3,409	98	Off Site Buildings
*	2,187	98	Off Site Pavement
*	2,650	98	Pavement and concrete
	31,554	74	>75% Grass cover, Good, HSG C
	39,800	79	Weighted Average
	31,554	74	79.28% Pervious Area
	8,246	98	20.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Pond CB1:

Inflow Area = 0.098 ac, 53.84% Impervious, Inflow Depth > 4.61" for 25-YEAR event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 0.038 af
Outflow = 0.53 cfs @ 12.07 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.07 hrs, Volume= 0.038 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 151.93' @ 12.07 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	151.50'	**8.0" Round 8" ADS** L= 105.0' Ke= 0.500
			Inlet / Outlet Invert= 151.50' / 146.50' S= 0.0476 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.53 cfs @ 12.07 hrs HW=151.93' TW=146.75' (Dynamic Tailwater)
1=8" ADS (Inlet Controls 0.53 cfs @ 2.23 fps)

Summary for Pond CB2:

Inflow Area = 0.058 ac, 72.15% Impervious, Inflow Depth > 5.05" for 25-YEAR event
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 0.024 af
Outflow = 0.33 cfs @ 12.07 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
Primary = 0.33 cfs @ 12.07 hrs, Volume= 0.024 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.10' @ 12.07 hrs
Flood Elev= 148.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.75'	**8.0" Round 8" ADS** L= 30.0' Ke= 0.500
			Inlet / Outlet Invert= 146.75' / 146.50' S= 0.0083 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.33 cfs @ 12.07 hrs HW=147.10' TW=146.75' (Dynamic Tailwater)
1=8" ADS (Barrel Controls 0.33 cfs @ 2.60 fps)

Summary for Pond DMH1:

Inflow Area = 0.156 ac, 60.61% Impervious, Inflow Depth > 4.77" for 25-YEAR event
Inflow = 0.87 cfs @ 12.07 hrs, Volume= 0.062 af
Outflow = 0.87 cfs @ 12.07 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
Primary = 0.87 cfs @ 12.07 hrs, Volume= 0.062 af
Routed to Pond P2 : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.75' @ 12.07 hrs
Flood Elev= 149.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.17'	**12.0" Round 12" ADS** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 146.17' / 146.00' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.87 cfs @ 12.07 hrs HW=146.75' TW=145.72' (Dynamic Tailwater)
↑—**1=12" ADS** (Barrel Controls 0.87 cfs @ 2.66 fps)

Summary for Pond P1: Forebay

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 3.97" for 25-YEAR event
Inflow = 1.87 cfs @ 12.15 hrs, Volume= 0.159 af
Outflow = 1.86 cfs @ 12.17 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.7 min
Discarded = 0.01 cfs @ 12.17 hrs, Volume= 0.010 af
Primary = 1.85 cfs @ 12.17 hrs, Volume= 0.144 af
Routed to Link S1 : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 156.57' @ 12.17 hrs Surf.Area= 347 sf Storage= 340 cf
Flood Elev= 157.00' Surf.Area= 420 sf Storage= 505 cf

Plug-Flow detention time= 30.2 min calculated for 0.153 af (96% of inflow)
Center-of-Mass det. time= 10.4 min (825.0 - 814.6)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.00	90	0	0
156.00	250	170	170
157.00	420	335	505

Device	Routing	Invert	Outlet Devices
#1	Discarded	155.00'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	156.25'	**90.0 deg x 3.0' long x 0.75' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)

Discarded OutFlow Max=0.01 cfs @ 12.17 hrs HW=156.57' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.85 cfs @ 12.17 hrs HW=156.57' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.85 cfs @ 1.74 fps)

Summary for Pond P2: Infiltration Basin

Inflow Area = 0.927 ac, 40.80% Impervious, Inflow Depth > 4.04" for 25-YEAR event
Inflow = 3.72 cfs @ 12.11 hrs, Volume= 0.312 af
Outflow = 3.19 cfs @ 12.19 hrs, Volume= 0.301 af, Atten= 14%, Lag= 4.8 min
Discarded = 0.04 cfs @ 12.19 hrs, Volume= 0.034 af
Primary = 3.15 cfs @ 12.19 hrs, Volume= 0.267 af
Routed to Link PR : RIDOT swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.91' @ 12.19 hrs Surf.Area= 1,780 sf Storage= 1,588 cf
Flood Elev= 147.00' Surf.Area= 2,821 sf Storage= 4,096 cf

Plug-Flow detention time= 33.8 min calculated for 0.301 af (96% of inflow)
Center-of-Mass det. time= 13.8 min (818.4 - 804.6)

Volume	Invert	Avail.Storage	Storage Description
#1	144.25'	4,096 cf	**Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.25	120	0	0
145.00	883	376	376
146.00	1,868	1,376	1,752
147.00	2,821	2,345	4,096

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	146.25'	**60.0' long x 1.00' rise Overflow weir** 2 End Contraction(s)
#3	Device 13	142.13'	**4.0" Vert. 4" ORIFICE 1** C= 0.600 Limited to weir flow at low heads
#4	Device 14	142.13'	**4.0" Vert. 4" ORIFICE 2** C= 0.600 Limited to weir flow at low heads
#5	Device 15	142.13'	**4.0" Vert. 4" ORIFICE 3** C= 0.600 Limited to weir flow at low heads
#6	Device 16	142.13'	**4.0" Vert. 4" ORIFICE 4** C= 0.600 Limited to weir flow at low heads
#7	Device 17	142.13'	**4.0" Vert. 4" ORIFICE 5** C= 0.600 Limited to weir flow at low heads
#8	Device 3	145.10'	**12.0" Horiz. 12" GRATE 1** C= 0.600 Limited to weir flow at low heads
#9	Device 4	145.40'	**12.0" Horiz. 12" GRATE 2** C= 0.600 Limited to weir flow at low heads
#10	Device 5	145.50'	**12.0" Horiz. 12" GRATE 3** C= 0.600 Limited to weir flow at low heads
#11	Device 6	145.80'	**12.0" Horiz. 12" GRATE 4** C= 0.600 Limited to weir flow at low heads
#12	Device 7	145.80'	**12.0" Horiz. 12" GRATE 5** C= 0.600 Limited to weir flow at low heads
#13	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 1** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#14	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 2** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#15	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 3** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#16	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 4** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#17	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 5** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Discarded OutFlow Max=0.04 cfs @ 12.19 hrs HW=145.91' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=3.15 cfs @ 12.19 hrs HW=145.91' TW=0.00' (Dynamic Tailwater)
- **2=Overflow weir** (Controls 0.00 cfs)
- **13=6" PVC TO GRADE 1** (Passes 0.80 cfs of 1.81 cfs potential flow)
  - **3=4" ORIFICE 1** (Orifice Controls 0.80 cfs @ 9.15 fps)
    - **8=12" GRATE 1** (Passes 0.80 cfs of 3.40 cfs potential flow)
- **14=6" PVC TO GRADE 2** (Passes 0.80 cfs of 1.81 cfs potential flow)
  - **4=4" ORIFICE 2** (Orifice Controls 0.80 cfs @ 9.15 fps)
    - **9=12" GRATE 2** (Passes 0.80 cfs of 2.70 cfs potential flow)
- **15=6" PVC TO GRADE 3** (Passes 0.80 cfs of 1.81 cfs potential flow)
  - **5=4" ORIFICE 3** (Orifice Controls 0.80 cfs @ 9.15 fps)
    - **10=12" GRATE 3** (Passes 0.80 cfs of 2.42 cfs potential flow)
- **16=6" PVC TO GRADE 4** (Passes 0.38 cfs of 1.81 cfs potential flow)
  - **6=4" ORIFICE 4** (Passes 0.38 cfs of 0.80 cfs potential flow)
    - **11=12" GRATE 4** (Weir Controls 0.38 cfs @ 1.09 fps)
- **17=6" PVC TO GRADE 5** (Passes 0.38 cfs of 1.81 cfs potential flow)
  - **7=4" ORIFICE 5** (Passes 0.38 cfs of 0.80 cfs potential flow)
    - **12=12" GRATE 5** (Weir Controls 0.38 cfs @ 1.09 fps)

Summary for Link PR: RIDOT swale

Inflow Area = 1.841 ac, 30.83% Impervious, Inflow Depth > 3.61" for 25-YEAR event
Inflow = 6.48 cfs @ 12.17 hrs, Volume= 0.554 af
Primary = 6.48 cfs @ 12.17 hrs, Volume= 0.554 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link S1: Swale

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 3.59" for 25-YEAR event
Inflow = 1.85 cfs @ 12.17 hrs, Volume= 0.144 af
Primary = 1.85 cfs @ 12.17 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.5 min
Routed to Pond P2 : Infiltration Basin

Primary outflow = Inflow delayed by 0.5 min, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 201A: Overland to basin

Runoff = 2.23 cfs @ 12.08 hrs, Volume= 0.164 af, Depth> 6.79"
Routed to Pond P2 : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.60"

	Area (sf)	CN	Description
*	5,845	98	Building
	6,595	74	>75% Grass cover, Good, HSG C
*	205	98	Pavement and concrete
	12,645	85	Weighted Average
	6,595	74	52.16% Pervious Area
	6,050	98	47.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0800	0.30		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.3	87	0.0800	4.24		**Shallow Concentrated Flow, Grass swale**
					Grassed Waterway Kv= 15.0 fps
5.8	187	Total			

Summary for Subcatchment 201B: To Forebay

Runoff = 2.92 cfs @ 12.15 hrs, Volume= 0.253 af, Depth> 6.30"
Routed to Pond P1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.60"

	Area (sf)	CN	Description
*	1,258	98	Off Site Buildings
*	1,556	98	Off Site Pavement
*	3,506	98	Pavement and concrete
	14,642	74	>75% Grass cover, Good, HSG C
	20,962	81	Weighted Average
	14,642	74	69.85% Pervious Area
	6,320	98	30.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	43	0.0100	0.11		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.5	26	0.0120	0.87		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.30"
3.3	26	0.0200	0.13		**Sheet Flow, Lawn**
					Grass: Short n= 0.150 P2= 3.30"
0.7	188	0.0850	4.69		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
0.4	71	0.0210	2.94		**Shallow Concentrated Flow, Parking lot**
					Paved Kv= 20.3 fps
11.4	354	Total			

Summary for Subcatchment 201C:

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 0.057 af, Depth> 7.03"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.60"

	Area (sf)	CN	Description
*	2,299	98	Pavement and concrete
	1,971	74	>75% Grass cover, Good, HSG C
	4,270	87	Weighted Average
	1,971	74	46.16% Pervious Area
	2,299	98	53.84% Impervious Area

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

Summary for Subcatchment 201D:

Runoff = 0.49 cfs @ 12.07 hrs, Volume= 0.036 af, Depth> 7.51"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.60"

	Area (sf)	CN	Description
*	1,808	98	Pavement and concrete
	698	74	>75% Grass cover, Good, HSG C
	2,506	91	Weighted Average
	698	74	27.85% Pervious Area
	1,808	98	72.15% Impervious Area

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

Summary for Subcatchment 202: To Aquidneck Direct

Runoff = 5.39 cfs @ 12.15 hrs, Volume= 0.461 af, Depth> 6.06"
Routed to Link PR : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.60"

	Area (sf)	CN	Description
*	3,409	98	Off Site Buildings
*	2,187	98	Off Site Pavement
*	2,650	98	Pavement and concrete
	31,554	74	>75% Grass cover, Good, HSG C
	39,800	79	Weighted Average
	31,554	74	79.28% Pervious Area
	8,246	98	20.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Pond CB1:

Inflow Area = 0.098 ac, 53.84% Impervious, Inflow Depth > 7.03" for 100-YEAR event
Inflow = 0.80 cfs @ 12.07 hrs, Volume= 0.057 af
Outflow = 0.80 cfs @ 12.07 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 12.07 hrs, Volume= 0.057 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 152.06' @ 12.07 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	151.50'	**8.0" Round 8" ADS** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 151.50' / 146.50' S= 0.0476 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.79 cfs @ 12.07 hrs HW=152.06' TW=146.89' (Dynamic Tailwater)
1=8" ADS (Inlet Controls 0.79 cfs @ 2.54 fps)

Summary for Pond CB2:

Inflow Area = 0.058 ac, 72.15% Impervious, Inflow Depth > 7.51" for 100-YEAR event
Inflow = 0.49 cfs @ 12.07 hrs, Volume= 0.036 af
Outflow = 0.49 cfs @ 12.07 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.07 hrs, Volume= 0.036 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 147.21' @ 12.07 hrs
Flood Elev= 148.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.75'	**8.0" Round 8" ADS** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 146.75' / 146.50' S= 0.0083 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.48 cfs @ 12.07 hrs HW=147.21' TW=146.89' (Dynamic Tailwater)
1=8" ADS (Outlet Controls 0.48 cfs @ 2.66 fps)

Summary for Pond DMH1:

Inflow Area = 0.156 ac, 60.61% Impervious, Inflow Depth > 7.21" for 100-YEAR event
Inflow = 1.28 cfs @ 12.07 hrs, Volume= 0.093 af
Outflow = 1.28 cfs @ 12.07 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min
Primary = 1.28 cfs @ 12.07 hrs, Volume= 0.093 af
Routed to Pond P2 : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.89' @ 12.07 hrs
Flood Elev= 149.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.17'	**12.0" Round 12" ADS** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 146.17' / 146.00' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.28 cfs @ 12.07 hrs HW=146.89' TW=145.98' (Dynamic Tailwater)
↑—**1=12" ADS** (Barrel Controls 1.28 cfs @ 2.93 fps)

Summary for Pond P1: Forebay

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 6.30" for 100-YEAR event
Inflow = 2.92 cfs @ 12.15 hrs, Volume= 0.253 af
Outflow = 2.91 cfs @ 12.16 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.01 cfs @ 12.16 hrs, Volume= 0.011 af
Primary = 2.90 cfs @ 12.16 hrs, Volume= 0.236 af
Routed to Link S1 : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 156.68' @ 12.16 hrs Surf.Area= 365 sf Storage= 378 cf
Flood Elev= 157.00' Surf.Area= 420 sf Storage= 505 cf

Plug-Flow detention time= 21.6 min calculated for 0.247 af (98% of inflow)
Center-of-Mass det. time= 8.4 min (810.0 - 801.7)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.00	90	0	0
156.00	250	170	170
157.00	420	335	505

Device	Routing	Invert	Outlet Devices
#1	Discarded	155.00'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	156.25'	**90.0 deg x 3.0' long x 0.75' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)

Discarded OutFlow Max=0.01 cfs @ 12.16 hrs HW=156.68' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.90 cfs @ 12.16 hrs HW=156.68' TW=0.00' (Dynamic Tailwater)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.90 cfs @ 1.99 fps)

Summary for Pond P2: Infiltration Basin

Inflow Area = 0.927 ac, 40.80% Impervious, Inflow Depth > 6.39" for 100-YEAR event
Inflow = 5.72 cfs @ 12.11 hrs, Volume= 0.494 af
Outflow = 4.53 cfs @ 12.21 hrs, Volume= 0.483 af, Atten= 21%, Lag= 6.4 min
Discarded = 0.05 cfs @ 12.21 hrs, Volume= 0.038 af
Primary = 4.48 cfs @ 12.21 hrs, Volume= 0.445 af
Routed to Link PR : RIDOT swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.26' @ 12.21 hrs Surf.Area= 2,119 sf Storage= 2,276 cf
Flood Elev= 147.00' Surf.Area= 2,821 sf Storage= 4,096 cf

Plug-Flow detention time= 25.7 min calculated for 0.483 af (98% of inflow)
Center-of-Mass det. time= 12.0 min (806.0 - 794.0)

Volume	Invert	Avail.Storage	Storage Description
#1	144.25'	4,096 cf	**Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.25	120	0	0
145.00	883	376	376
146.00	1,868	1,376	1,752
147.00	2,821	2,345	4,096

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	146.25'	**60.0' long x 1.00' rise Overflow weir** 2 End Contraction(s)
#3	Device 13	142.13'	**4.0" Vert. 4" ORIFICE 1** C= 0.600 Limited to weir flow at low heads
#4	Device 14	142.13'	**4.0" Vert. 4" ORIFICE 2** C= 0.600 Limited to weir flow at low heads
#5	Device 15	142.13'	**4.0" Vert. 4" ORIFICE 3** C= 0.600 Limited to weir flow at low heads
#6	Device 16	142.13'	**4.0" Vert. 4" ORIFICE 4** C= 0.600 Limited to weir flow at low heads
#7	Device 17	142.13'	**4.0" Vert. 4" ORIFICE 5** C= 0.600 Limited to weir flow at low heads
#8	Device 3	145.10'	**12.0" Horiz. 12" GRATE 1** C= 0.600 Limited to weir flow at low heads
#9	Device 4	145.40'	**12.0" Horiz. 12" GRATE 2** C= 0.600 Limited to weir flow at low heads
#10	Device 5	145.50'	**12.0" Horiz. 12" GRATE 3** C= 0.600 Limited to weir flow at low heads
#11	Device 6	145.80'	**12.0" Horiz. 12" GRATE 4** C= 0.600 Limited to weir flow at low heads
#12	Device 7	145.80'	**12.0" Horiz. 12" GRATE 5** C= 0.600 Limited to weir flow at low heads
#13	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 1** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#14	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 2** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#15	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 3** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#16	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 4** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#17	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 5** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 12.21 hrs HW=146.26' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=4.47 cfs @ 12.21 hrs HW=146.26' TW=0.00' (Dynamic Tailwater)
- **2=Overflow weir** (Weir Controls 0.29 cfs @ 0.37 fps)
- **13=6" PVC TO GRADE 1** (Passes 0.84 cfs of 1.89 cfs potential flow)
  - **3=4" ORIFICE 1** (Orifice Controls 0.84 cfs @ 9.59 fps)
    - **8=12" GRATE 1** (Passes 0.84 cfs of 4.08 cfs potential flow)
- **14=6" PVC TO GRADE 2** (Passes 0.84 cfs of 1.89 cfs potential flow)
  - **4=4" ORIFICE 2** (Orifice Controls 0.84 cfs @ 9.59 fps)
    - **9=12" GRATE 2** (Passes 0.84 cfs of 3.51 cfs potential flow)
- **15=6" PVC TO GRADE 3** (Passes 0.84 cfs of 1.89 cfs potential flow)
  - **5=4" ORIFICE 3** (Orifice Controls 0.84 cfs @ 9.59 fps)
    - **10=12" GRATE 3** (Passes 0.84 cfs of 3.30 cfs potential flow)
- **16=6" PVC TO GRADE 4** (Passes 0.84 cfs of 1.89 cfs potential flow)
  - **6=4" ORIFICE 4** (Orifice Controls 0.84 cfs @ 9.59 fps)
    - **11=12" GRATE 4** (Passes 0.84 cfs of 2.57 cfs potential flow)
- **17=6" PVC TO GRADE 5** (Passes 0.84 cfs of 1.89 cfs potential flow)
  - **7=4" ORIFICE 5** (Orifice Controls 0.84 cfs @ 9.59 fps)
    - **12=12" GRATE 5** (Passes 0.84 cfs of 2.57 cfs potential flow)

Summary for Link PR: RIDOT swale

Inflow Area = 1.841 ac, 30.83% Impervious, Inflow Depth > 5.91" for 100-YEAR event
Inflow = 9.55 cfs @ 12.16 hrs, Volume= 0.906 af
Primary = 9.55 cfs @ 12.16 hrs, Volume= 0.906 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link S1: Swale

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 5.90" for 100-YEAR event
Inflow = 2.90 cfs @ 12.16 hrs, Volume= 0.236 af
Primary = 2.90 cfs @ 12.17 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.5 min
Routed to Pond P2 : Infiltration Basin

Primary outflow = Inflow delayed by 0.5 min, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

APPENDIX E SUPPLEMENTARY CALCULATIONS

Northeast Engineers & Consultants, Inc.
A Knowledge Corporation®
6 Valley Road, Middletown, RI 02842
www.northeastengineers.com

Water Quality Calculations (Minimum Standard 3)

Project: 21247: "Aquidneck Commerce Center" Aquidneck Ave, Middletown, RI

Impervious Area: 0.378 acres **WQ_R: 1,372 cf**

Volume of Treatment for a WQ storm*: 958 cf

* = as taken from WQ storm discard volume for P2 and P1.

The infiltration volume exceeds the water quality volume requirement.

25% Pre-treatment volume required:

Volume 1:	Sump for CB1	50 cf
Volume 2:	Sump for CB2	50 cf
Volume 3:	Sediment Forebay	250 cf
Total Volume Provided:		350 cf
Req. Pretreatment Volume:		343 cf

Northeast Engineers & Consultants, Inc.

Groundwater Recharge Calculations (Minimum Standard 2)

Project: 21247: "Aquidneck Commerce Center" Aquidneck Ave, Middletown, RI

Impervious Area: 0.378 acres (impervious area intercepted by stormwater system, including off-site impervious)

Water Recharge Volume Calculations:

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

Impervious Area: 0.378 acres **F =** 0.25

$WRec_V$ = (Impervious Area) / 12 X F X 43,456 sf per acre

$WRec_V$ = 343 cf

Volume of Infiltration for a WQ storm*: 958 cf

* = as taken from WQ storm discard volume for P2.

Northeast Engineers & Consultants, Inc.

Pollutant Loading Analysis

The following method for Pollutant Loading Analysis (PLA) Calculations has been developed from the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM), Appendix H.3.

Stormwater pollutant export load (L, in pounds or billion colonies) from a developed site can be determined by solving the following equation.

(Eq 1) $L = [(P)(P_j)(R_V)/12](C)(A)(2.72)$

Where:

- P = rainfall depth in inches (from Figure H-8 from Appendix H.3 of the RISDISM)
- P_j = rainfall correction factor
- R_V = runoff coefficient expressing the fraction of rainfall converted to runoff
- C = flow weighted mean concentration of the pollutant in urban runoff (mg/L)
- A = contributing drainage area of development site (acres)

For bacteria, the conversion factor is modified, so the loadning equation is:

(Eq 1a) $L = 1.03(10^{-3})(P)(P_j)(R_V)](C')(A)$

Where:

- P = rainfall depth in inches (from Figure H-8 from Appendix H.3 of the RISDISM)
- P_j = rainfall correction factor
- R_V = runoff coefficient expressing the fraction of rainfall converted to runoff
- C' = flow weighted mean of bacteria concentration (#col/100 mL)
- A = contributing drainage area of development site (acres)

The runoff coefficient R_V can be determined from the following equation:

(Eq 2) $R_V = 0.05 + 0.009(\%I)$

Where:

- $\%I$ = percent of the site imperviousness

Site:	Aquidneck Commerce Center	
Contributing Site Area (ac):	**1.841**	
Pollutant Assessed:	**Bacteria (fecal coliform)**	
Rainfall Depth (P):	**47**	(from Figure H-8 of the RISDISM)
Rainfall Correction Factor (P_j):	**0.9**	(use 0.9)
C or C' (as applicable):	**varies**	(from Table H-2 of the RISDISM)
Area of Existing Impervious (ac):	**0.333**	
Existing Percent Impervious:	**18.09%**	
Area of Proposed Impervious:	**0.567**	
Proposed Percent Impervious:	**30.80%**	

Existing Conditions (L) = **119** Billion Colonies/year

Proposed Conditions (L) = **72** Billion Colonies/year

Total Pollutant Load Attributed to Improvements = **-48** Billion Colonies/year

NORTHEAST ENGINEERS
& CONSULTANTS, INC. "A Knowledge Corporation" ®
6 VALLEY ROAD MIDDLETOWN RHODE ISLAND 02842 401.849.0810 PHONE 401.846.4169 FAX

Pollutant Loading Analysis (Bacteria)

Project: Aquidneck Commerce Center **Rainfall Depth (P):** 47 (from Figure H-8 of the RISDISM)
Job Number: 21247.0 **Rainfall Correction Factor (P_J):** 0.9
Date: 22-Mar-22 **Pollutant Load (L):** $= 1.03(10^{-3})(P)(Pj)(RV)](C')(A)$

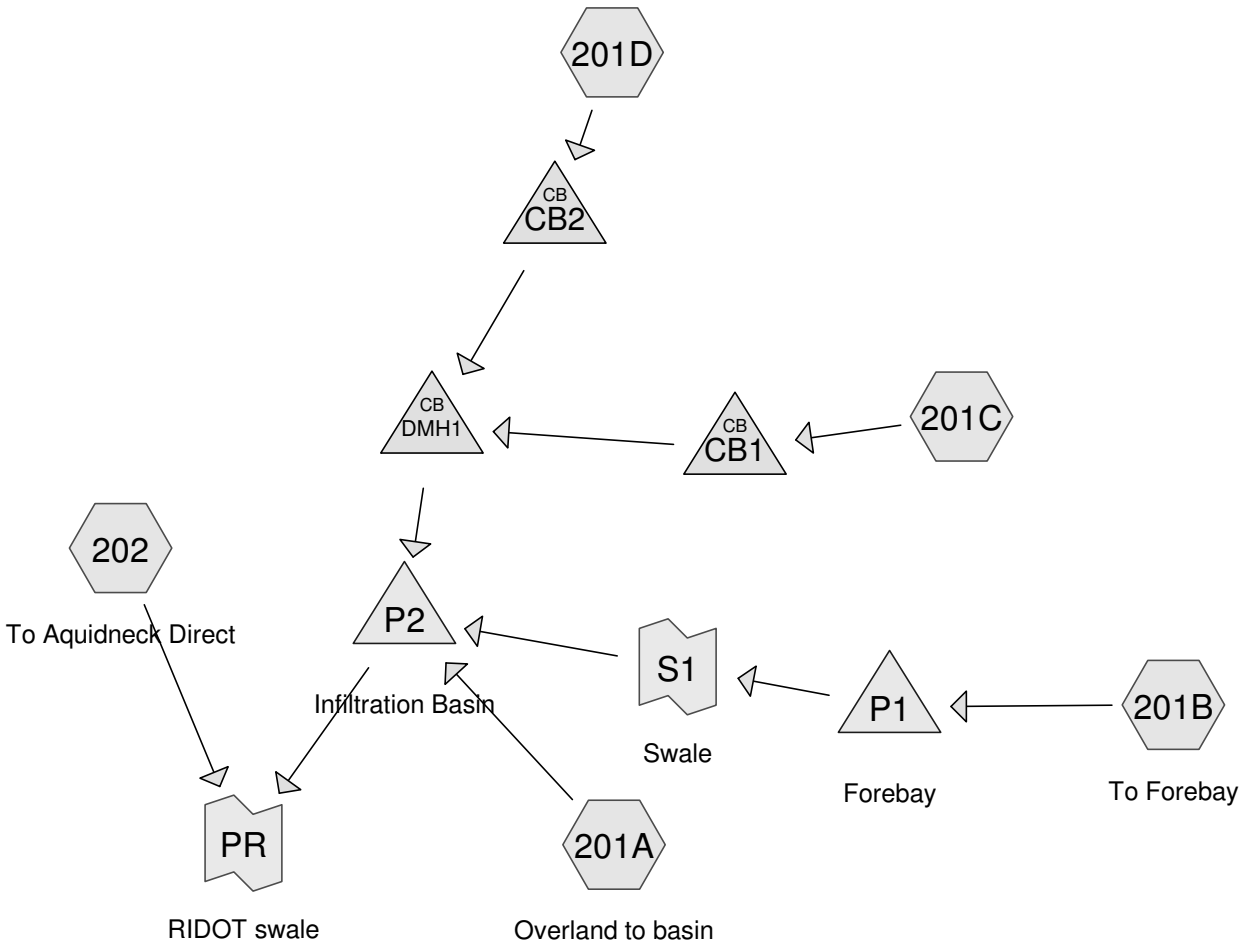
Existing Area Loading Calculations

	Area Description	A = Area (ac)	Impervious Area (ac)	Percent Impervious ($I_{\%}$)	$R_V = 0.05 + (0.009 \times I_{\%})$	$1.03 \times 10^{-3} \times P \times P_J =$	C = Loading Rate	L= Load (bc/y)	Treatment % from BMPs	FL = Final Load after Treatment (bc/y)
(1)	Total Area	1.841	0.333	18.1%	0.2128	0.0436	7000	119.5	0%	119.5
(2)	**Totals:**	**1.841**	**0.333**					**119.5**		**119.5**

Proposed Loading Calculations

	Area Description	A = Area (ac)	Impervious Area (ac)	Percent Impervious ($I_{\%}$)	$R_V = 0.05 + (0.009 \times I_{\%})$	$1.03 \times 10^{-3} \times P \times P_J =$	C = Loading Rate	L= Load (bc/y)	Treatment % from BMPs	FL = Final Load after Treatment (bc/y)
(3)	To Infiltration	0.927	0.378	40.8%	0.4170	0.0436	7000	117.9	95%	5.9
(4)	Direct	0.914	0.189	20.7%	0.2361	0.0436	7000	65.8	0%	65.8
(5)	**Totals:**	**1.841**	**0.567**					**183.7**		**71.7**

APPENDIX F WQ STORM ANALYSIS (SPLIT PERVIOUS METHOD)



Subcat Reach Pond Link

Routing Diagram for 2022-05-03 21247
Prepared by Northeast Engineers & Consultants, Inc., Printed 5/3/2022

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.273	74	>75% Grass cover, Good, HSG C (201A, 201B, 201C, 201D, 202)
0.134	98	Building (201A)
0.107	98	Off Site Buildings (201B, 202)
0.086	98	Off Site Pavement (201B, 202)
0.240	98	Pavement and concrete (201A, 201B, 201C, 201D, 202)

Summary for Subcatchment 201A: Overland to basin

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af, Depth> 0.50"
Routed to Pond P2 : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
*	5,845	98	Building
	6,595	74	>75% Grass cover, Good, HSG C
*	205	98	Pavement and concrete
	12,645	85	Weighted Average
	6,595	74	52.16% Pervious Area
	6,050	98	47.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	100	0.0800	0.30		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.3	87	0.0800	4.24		**Shallow Concentrated Flow, Grass swale**
					Grassed Waterway Kv= 15.0 fps
5.8	187	Total			

Summary for Subcatchment 201B: To Forebay

Runoff = 0.13 cfs @ 12.15 hrs, Volume= 0.014 af, Depth> 0.34"
Routed to Pond P1 : Forebay

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
*	1,258	98	Off Site Buildings
*	1,556	98	Off Site Pavement
*	3,506	98	Pavement and concrete
	14,642	74	>75% Grass cover, Good, HSG C
	20,962	81	Weighted Average
	14,642	74	69.85% Pervious Area
	6,320	98	30.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	43	0.0100	0.11		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.30"
0.5	26	0.0120	0.87		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.30"
3.3	26	0.0200	0.13		**Sheet Flow, Lawn**
					Grass: Short n= 0.150 P2= 3.30"
0.7	188	0.0850	4.69		**Shallow Concentrated Flow, Lawns. Woods**
					Unpaved Kv= 16.1 fps
0.4	71	0.0210	2.94		**Shallow Concentrated Flow, Parking lot**
					Paved Kv= 20.3 fps
11.4	354	Total			

Summary for Subcatchment 201C:

Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.005 af, Depth> 0.56"
Routed to Pond CB1 :

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
*	2,299	98	Pavement and concrete
	1,971	74	>75% Grass cover, Good, HSG C
	4,270	87	Weighted Average
	1,971	74	46.16% Pervious Area
	2,299	98	53.84% Impervious Area

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

Summary for Subcatchment 201D:

Runoff = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af, Depth> 0.73"
Routed to Pond CB2 :

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
*	1,808	98	Pavement and concrete
	698	74	>75% Grass cover, Good, HSG C
	2,506	91	Weighted Average
	698	74	27.85% Pervious Area
	1,808	98	72.15% Impervious Area

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

Summary for Subcatchment 202: To Aquidneck Direct

Runoff = 0.18 cfs @ 12.15 hrs, Volume= 0.019 af, Depth> 0.25"
Routed to Link PR : RIDOT swale

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
*	3,409	98	Off Site Buildings
*	2,187	98	Off Site Pavement
*	2,650	98	Pavement and concrete
	31,554	74	>75% Grass cover, Good, HSG C
	39,800	79	Weighted Average
	31,554	74	79.28% Pervious Area
	8,246	98	20.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.19		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.30"
2.2	530	0.0622	4.02		**Shallow Concentrated Flow, Lawns. Woods** Unpaved Kv= 16.1 fps
11.2	630	Total			

Summary for Pond CB1:

Inflow Area = 0.098 ac, 53.84% Impervious, Inflow Depth > 0.56" for WQ event
Inflow = 0.06 cfs @ 12.07 hrs, Volume= 0.005 af
Outflow = 0.06 cfs @ 12.07 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min
Primary = 0.06 cfs @ 12.07 hrs, Volume= 0.005 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 151.63' @ 12.07 hrs
Flood Elev= 154.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	151.50'	**8.0" Round 8" ADS** L= 105.0' Ke= 0.500 Inlet / Outlet Invert= 151.50' / 146.50' S= 0.0476 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.06 cfs @ 12.07 hrs HW=151.63' TW=146.36' (Dynamic Tailwater)
1=8" ADS (Inlet Controls 0.06 cfs @ 1.23 fps)

Summary for Pond CB2:

Inflow Area = 0.058 ac, 72.15% Impervious, Inflow Depth > 0.73" for WQ event
Inflow = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af
Outflow = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.07 hrs, Volume= 0.003 af
Routed to Pond DMH1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.87' @ 12.07 hrs
Flood Elev= 148.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.75'	**8.0" Round 8" ADS** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 146.75' / 146.50' S= 0.0083 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.05 cfs @ 12.07 hrs HW=146.87' TW=146.36' (Dynamic Tailwater)
1=8" ADS (Barrel Controls 0.05 cfs @ 1.59 fps)

Summary for Pond DMH1:

Inflow Area = 0.156 ac, 60.61% Impervious, Inflow Depth > 0.62" for WQ event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af
Outflow = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 12.07 hrs, Volume= 0.008 af
Routed to Pond P2 : Infiltration Basin

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 146.36' @ 12.07 hrs
Flood Elev= 149.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	146.17'	**12.0" Round 12" ADS** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 146.17' / 146.00' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.11 cfs @ 12.07 hrs HW=146.36' TW=144.80' (Dynamic Tailwater)
1=12" ADS (Barrel Controls 0.11 cfs @ 1.51 fps)

Summary for Pond P1: Forebay

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth > 0.34" for WQ event
Inflow = 0.13 cfs @ 12.15 hrs, Volume= 0.014 af
Outflow = 0.05 cfs @ 12.54 hrs, Volume= 0.010 af, Atten= 65%, Lag= 23.0 min
Discarded = 0.01 cfs @ 12.54 hrs, Volume= 0.008 af
Primary = 0.04 cfs @ 12.54 hrs, Volume= 0.002 af
Routed to Link S1 : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 156.28' @ 12.54 hrs Surf.Area= 297 sf Storage= 245 cf
Flood Elev= 157.00' Surf.Area= 420 sf Storage= 505 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 137.7 min (949.4 - 811.7)

Volume	Invert	Avail.Storage	Storage Description
#1	155.00'	505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
155.00	90	0	0
156.00	250	170	170
157.00	420	335	505

Device	Routing	Invert	Outlet Devices
#1	Discarded	155.00'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	156.25'	**90.0 deg x 3.0' long x 0.75' rise Sharp-Crested Vee/Trap Weir** Cv= 2.50 (C= 3.13)

Discarded OutFlow Max=0.01 cfs @ 12.54 hrs HW=156.28' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.04 cfs @ 12.54 hrs HW=156.28' TW=0.00' (Dynamic Tailwater)
2=Sharp-Crested Vee/Trap Weir (Weir Controls 0.04 cfs @ 0.50 fps)

Summary for Pond P2: Infiltration Basin

Inflow Area = 0.927 ac, 40.80% Impervious, Inflow Depth > 0.29" for WQ event
Inflow = 0.26 cfs @ 12.08 hrs, Volume= 0.022 af
Outflow = 0.02 cfs @ 13.71 hrs, Volume= 0.021 af, Atten= 91%, Lag= 98.0 min
Discarded = 0.02 cfs @ 13.71 hrs, Volume= 0.021 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link PR : RIDOT swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 145.09' @ 13.71 hrs Surf.Area= 968 sf Storage= 456 cf
Flood Elev= 147.00' Surf.Area= 2,821 sf Storage= 4,096 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 182.3 min (974.7 - 792.5)

Volume	Invert	Avail.Storage	Storage Description
#1	144.25'	4,096 cf	**Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.25	120	0	0
145.00	883	376	376
146.00	1,868	1,376	1,752
147.00	2,821	2,345	4,096

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.25'	**1.070 in/hr Exfiltration over Surface area**
#2	Primary	146.25'	**60.0' long x 1.00' rise Overflow weir** 2 End Contraction(s)
#3	Device 13	142.13'	**4.0" Vert. 4" ORIFICE 1** C= 0.600 Limited to weir flow at low heads
#4	Device 14	142.13'	**4.0" Vert. 4" ORIFICE 2** C= 0.600 Limited to weir flow at low heads
#5	Device 15	142.13'	**4.0" Vert. 4" ORIFICE 3** C= 0.600 Limited to weir flow at low heads
#6	Device 16	142.13'	**4.0" Vert. 4" ORIFICE 4** C= 0.600 Limited to weir flow at low heads
#7	Device 17	142.13'	**4.0" Vert. 4" ORIFICE 5** C= 0.600 Limited to weir flow at low heads
#8	Device 3	145.10'	**12.0" Horiz. 12" GRATE 1** C= 0.600 Limited to weir flow at low heads
#9	Device 4	145.40'	**12.0" Horiz. 12" GRATE 2** C= 0.600 Limited to weir flow at low heads
#10	Device 5	145.50'	**12.0" Horiz. 12" GRATE 3** C= 0.600 Limited to weir flow at low heads
#11	Device 6	145.80'	**12.0" Horiz. 12" GRATE 4** C= 0.600 Limited to weir flow at low heads
#12	Device 7	145.80'	**12.0" Horiz. 12" GRATE 5** C= 0.600 Limited to weir flow at low heads
#13	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 1** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#14	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 2** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#15	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 3** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#16	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 4** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#17	Primary	142.00'	**6.0" Round 6" PVC TO GRADE 5** L= 1.0' Ke= 0.500 Inlet / Outlet Invert= 142.00' / 142.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf

Discarded OutFlow Max=0.02 cfs @ 13.71 hrs HW=145.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=144.25' TW=0.00' (Dynamic Tailwater)
- **2=Overflow weir** (Controls 0.00 cfs)
- **13=6" PVC TO GRADE 1** (Passes 0.00 cfs of 1.34 cfs potential flow)
  - **3=4" ORIFICE 1** (Passes 0.00 cfs of 0.59 cfs potential flow)
    - **8=12" GRATE 1** (Controls 0.00 cfs)
- **14=6" PVC TO GRADE 2** (Passes 0.00 cfs of 1.34 cfs potential flow)
  - **4=4" ORIFICE 2** (Passes 0.00 cfs of 0.59 cfs potential flow)
    - **9=12" GRATE 2** (Controls 0.00 cfs)
- **15=6" PVC TO GRADE 3** (Passes 0.00 cfs of 1.34 cfs potential flow)
  - **5=4" ORIFICE 3** (Passes 0.00 cfs of 0.59 cfs potential flow)
    - **10=12" GRATE 3** (Controls 0.00 cfs)
- **16=6" PVC TO GRADE 4** (Passes 0.00 cfs of 1.34 cfs potential flow)
  - **6=4" ORIFICE 4** (Passes 0.00 cfs of 0.59 cfs potential flow)
    - **11=12" GRATE 4** (Controls 0.00 cfs)
- **17=6" PVC TO GRADE 5** (Passes 0.00 cfs of 1.34 cfs potential flow)
  - **7=4" ORIFICE 5** (Passes 0.00 cfs of 0.59 cfs potential flow)
    - **12=12" GRATE 5** (Controls 0.00 cfs)

Summary for Link PR: RIDOT swale

Inflow Area = 1.841 ac, 30.83% Impervious, Inflow Depth > 0.13" for WQ event
Inflow = 0.18 cfs @ 12.15 hrs, Volume= 0.019 af
Primary = 0.18 cfs @ 12.15 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Link S1: Swale

Inflow Area = 0.481 ac, 30.15% Impervious, Inflow Depth = 0.05" for WQ event
Inflow = 0.04 cfs @ 12.54 hrs, Volume= 0.002 af
Primary = 0.04 cfs @ 12.54 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.5 min
Routed to Pond P2 : Infiltration Basin

Primary outflow = Inflow delayed by 0.5 min, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

APPENDIX G 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 N/A (for stormwater design only)

Property Owner:
Property Location: 819 Aquidneck Ave, Middletown, Rhode Island
Date of Test Hole: October 22, 2021
Soil Evaluator: Edward J. Avizinis, CPSS, PWS License Number: D4083
Weather: Partly Cloudy – 70° Shaded: Yes ☐ No ☑ Time: 11am

TH 1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
Ap	0 – 15	c	w	10YR 3/2	-	-	SL	1 f gr	fr	-
Bg1	15 – 37	c	w	2.5Y 5/1	7.5YR 4/4	-m 4 P	grSL	1 m sbk	fr	-
Bg2	37 – 56	g	s	10YR 4/2	10YR 5/1 10YR 5/6	f 3 D f 5 P	fSL	1 m sbk	fr	-
Cg	56 – 80	-	-	2.5Y 4/1	10YR 5/1 10YR 5/6	f 3 D f 5 P	fSL	0 m	fr	-

TH 2 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	w	10YR 3/2	-	-	SL	2 m gr	fr	-
Bw1	8 – 20	c	w	10YR 3/3	-	-	SL	1 m sbk	fr	-
Bw2	20 – 32	c	w	2.5Y 5/4	7.5YR 4/6	f 1 P	SL	1 m sbk	fr	-
Cg	32 – 80	-	-	2.5Y 4/1	7.5YR 4/6	m 4 P	grSL	0 m	fr	-

TH 1 Soil Class B Total Depth 80 Impervious/Limiting Layer Depth >80 (og) GW Seepage Depth N/A SHWT 15" (og)

TH 2 Soil Class B Total Depth 80 Impervious/Limiting Layer Depth >80 (og) GW Seepage Depth N/A SHWT 32" (og)

Comments:

APPENDIX H RISDISM STORMWATER CHECKLIST (APPENDIX A)

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

PROJECT NAME **Aquidneck Commerce Center**	**(RIDEM USE ONLY)**
TOWN **Middletown**	**STW/WQC File #:**
BRIEF PROJECT DESCRIPTION: **Multifamily structure to be added to a multi-use development**	**Date Received:**

Stormwater Management Plan (SMP) Elements – Minimum Standards

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

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: Bailey's Brook	☐ Coldwater	☒ Warmwater	☐ Unassessed
☒ Waterbody ID: RI0007035R-01	☐ 4th order stream of pond 50 acres or more		
☒ TMDL for: Enterococcus	☐ 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: enterococcus, phosphorus, Lead	☐ Contributes to shell fishing 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**)	
	☐ Total Site Area (**TSA**)	
	☐ Jurisdictional Wetlands (**JW**)	
	☐ Conservation Land (**CL**)	
☐ Calculate the Site Size (defined as contiguous properties under same ownership)		
	☐ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**) 9.2 acres	
	☐ (**TIA**) / (**SS**) = 0.1%	☒ **(TIA) / (SS) >0.4? No**
☐ YES, Redevelopment		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1
(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)

A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS

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

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):	Proposed drive made one way to minimize width. Proposed width required by fire dept.
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):	No QPAs possible.
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	Defer to landscape architect
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	N/A

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 (acres)**	**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)**
Aquidneck Avenue	0.378	343	0	343	958
TOTALS:					

☒ 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, Appendix E

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. **BMPs have been designed in accordance with the manual. WQ provided exceeds that which is required. Downstream water body is impaired for bacteria per TMDL.**
☒	☐	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)					
Catchment and WB ID	**Impervious area treated (acres)**	**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)**
Aquidneck Avenue RI0007035R-01	0.378	1,372	0	1,372	1,481
☒ 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 Narrative: Appendix E**					

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-1:	N/A				
DP-2:					
DP-3:					
DP-4:					
TOTALS:					
☐ 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.).					

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):
10-year no-increase in volume runoff requirement has been met.			
		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) **0.65 acres**
		☒	Impervious cover (%) **58%**
☐	☒	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)
Aquidneck Ave	0.29	0.18	1.72	1.64	4.77	4.77	10.68	9.55
TOTALS:								

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

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 Narrative, Appendix C
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 Narrative, Appendix D
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	Stormwater Narrative, Appendix E
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	Stormwater Narrative, Appendix D

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
1	1	Infiltration Basin	Y	1,525	1,525	n/a	Y	N/A	Y	n/a	10 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					
Aquidneck	P2	Detention	TH#1		141.25	144.25	3	B	1.07
		TOTALS:							

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: Homeowner maintenance agreement will be required. Will be established as part of town permitting and recorded as required by town.

☐	☒	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:
☐	☒	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: Edward J. Avizinis, CPSS, PWS
		☐	RI-registered P.E. Name:

Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	**First Receiving Water ID or MS4**	**Area Disturbed (acres)**	**Existing Impervious (acres)**	**Proposed Impervious (acres)**
Aquidneck Avenue	RI0007035R-01	0.65	0.15	0.34
TOTALS:				

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