STORMWATER MANAGEMENT REPORT

Commercial Site Redevelopment

AP 114 LOT 601
72 JOHNNYCAKE HILL ROAD
MIDDLETOWN, RI

NOVEMBER, 2022

Prepared for:

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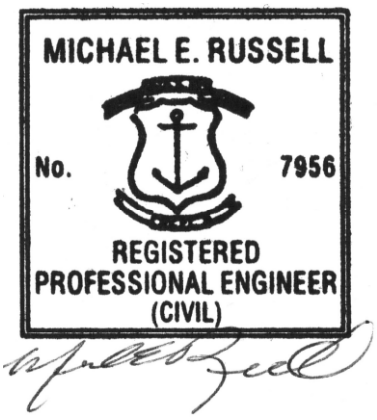

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INTRODUCTION

This report was prepared to address the Stormwater Management System (SMS) for the Commercial Site Redevelopment on AP 114 Lot 601, 72 Johnnycake Hill Road in Middletown, RI. The redevelopment will create a new 15,000 sf commercial structure with associated landscaping, lighting, utilities & stormwater management system. This report will outline and summarize the current SMS as well the improvements of the proposed redevelopment. Said improvements are intended to control peak runoff & volume rates for the added impervious area(s). Additionally, the proposed SMS will provide, at minimum, the water quality & stormwater recharge volumes as required for redevelopment projects. The SMS as proposed will comply with the Town of Middletown's & State of Rhode Island's Stormwater Management Policy (2018).

EXISTING CONDITIONS (SUMMARY)

The subject property is approximately 3.05 acres in area and fronts along Johnnycake Hill Road (Map 114, Lot 601). The existing ground cover consists of a large commercial structure, a driveway and parking area, a large lawn/field, and some woods along the rear and eastern edge of the property. The site slopes generally towards the West. The elevation change across the site is approximately 25 feet. Currently, most of the Runoff from the site sheet flows across the site to towards either the Northwestern corner of the lot or toward the Southwestern corner of the lot (Johnnycake Hill Road). The summary of the Pre-Development Analysis is located in Appendix 1 of this report.

PROPOSED CONDITIONS (SUMMARY)

The redevelopment will create a new 15,000 sf commercial structure with associated landscaping, lighting, utilities & stormwater management system. Site grading will create the cuts & fills throughout the project limits to create the desired site layout and function and will maintain pre-development runoff patterns. A stormwater collection system will be incorporated into the site to collect runoff from impervious surfaces and landscaped areas within the limit of disturbance. This system consists of a trench drain, stormceptor unit, area drain, and infiltration chambers. The stormceptor unit will provide pre-treatment for the infiltration chambers. The system will accommodate a 100-year storm event, handle the water quality volume (WQv) and provide for total suspended solids (TSS) removal. This overall system is designed to accommodate, at minimum, the water quality volume (WQv) and recharge volume (ReV) required for new development projects. Low impact development practices (LID) will be employed to the maximum extent practicable. Summary of the Post-Development Conditions Analysis is located in Appendix 1 of this report.

SITE SOIL & GROUNDWATER CONDITIONS

The underlying watershed soils within the developed area consist of the Udorthents-Urban land complex series (Hydrologic Group A). A soil evaluation and groundwater determination was performed in October and November of 2022. Soil textures below the fill consisted primarily of a silty sandy loam with groundwater elevation approximately 10 feet below original grade.

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METHODOLOGY

HydroCad® Stormwater Modeling System was used to quantify stormwater runoff generated by WQv, 1-year, 2-year, 10-year, 25-year, and 100-year design storms in pre and post development conditions. The calculations were performed using "Dynamic Storage-Indication" to also analyze the impact of the pipe size, material and slope selection in upstream structures. The HydroCad® program utilizes Natural Resource Conservation Service (NRCS) techniques (TR-20) to predict stormwater runoff for given design storms. The calculations performed by HydroCad® are based on the NRCS model return frequency Type III distribution and a user specified design storms. The calculation is also performed using the simple dynamic method which utilizes *Rawls Rate* for infiltration based on soil texture.

The analysis is performed by modeling the drainage area as subcatchments and ponds. A subcatchment is an area that produces runoff and drains into a pond. A pond can be a natural depression, wetland, or manmade structure that detains or retains stormwater runoff. The drainage network pipe design adequacy is evaluated by integrating it in the HydroCad® pond model for drainage structures. The pipes are modeled as the pond outlet-culvert type. Manning's Equation and/or Hazen-Williams hydraulic equations were also utilized to determine the required pipe sizes as well as minimum and maximum pipe slopes.

DRAINAGE SYSTEM MODEL

The proposed development is analyzed by creating an existing condition or pre-development model and a full build-out or post-development model. The models were created to compare the existing and post-development runoff to the abutting properties and existing SMS. The post-development analysis results are also utilized to adequately size the proposed practices. Analysis within the site was performed using WQv, 1, 2, 10, 25 and 100-year design storm projections. All excess stormwater runoff captured on site will be treated and retained/recharged on site. On site post-development runoff rates flowing overland toward abutting properties will not exceed pre-development runoff rates up to the 100-year event.

The pre-development HydroCad® model within the site consists of four subcatchments, One subcatchment represents the runoff flowing across the northern portion of the site towards the Westerly Abutter. Another subcatchment encompasses the runoff that is captured by on-site gravel swale with area drain which then discharges towards the Westerly abutter. The last 2 subcatchments are the areas that flow towards Johnnycake Hill Road, one of these subcatchments is the parking lot runoff that travels down the driveway towards Johnnycake while the final is the Southern part of the site that sheet flows towards Johnnycake. The existing roof area on site is tied into the municipal system. This was created to determine the existing stormwater runoff originating from the site.

Post-development subcatchment models were created for the site. Subcatchment models represent the drainage areas to each of the proposed reaches, drainage structures, or storage & treatment areas. Each of these areas provides elements of treatment, storage, and infiltration in order to effectively mitigate flows to the Point of Analysis in each analyzed storm event. See Post-Development output in Appendix B and summary at the end of this narrative.

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The majority of the new impervious areas discharge into a trench drain, before flowing through a stormceptor unit and then entering an underground infiltration system. The entirety of the new roof area discharge into an underground infiltration system.

STORMWATER TREATMENT

Stormwater runoff will be treated through the use of Best Management Practices (BMP's). The BMP's used within the proposed development include a trench drain, area drain, stormceptor unit and infiltration chambers. These BMP's will aid in the removal of pollutants within the stormwater runoff as well as provide recharge to the groundwater aquifer.

This system will provide pollutant removal and treatment to the maximum extent practicable for the proposed redevelopment.

ANALYSIS DATA

The following information was used in performing the calculations for the drainage system.

RUNOFF SUMMARY AT ANALYSIS POINTS		
Cover Description		
Cover Type	Hydrologic condition	Curve Number (Class: A , B , C, D)
Landscaping, Lawns	Good	39 , 61 , 74 , 80
Woods	Good	30 , 55 , 70 , 77
Gravel	Good	76 , 85 , 89 , 91
Buildings	-	98
Pavement	-	98
Brick Walkways	-	98

Rainfall Data (Type III - 24 Hour Storm Duration*)

Storm Event	Rainfall
WQv	1.2 inches
1 - Year	2.8 inches
2 - Year	3.3 inches
10 - Year	4.9 inches
25 - Year	6.1 inches

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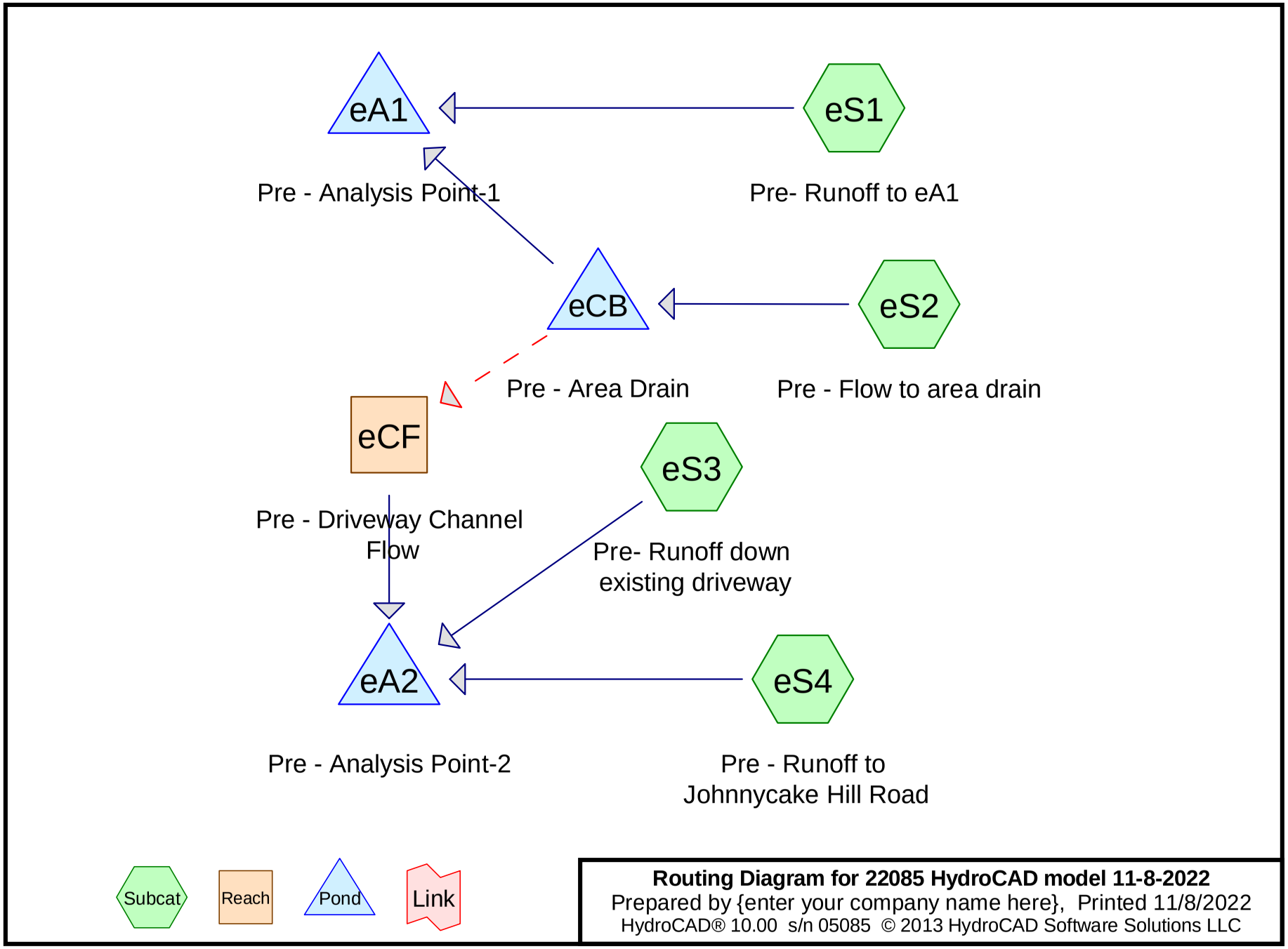


Routing Diagram for 22085 HydroCAD model 11-8-2022
Prepared by {enter your company name here}, Printed 11/8/2022

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
97,504	74	>75% Grass cover, Good, HSG C (eS1, eS2, eS3, eS4)
547	98	Existing Pavement (eS1)
22,757	98	Paved parking, HSG C (eS3, eS4)
1,250	98	Walks/Stairs/Dock (eS3, eS4)
67,142	70	Woods, Good, HSG C (eS1, eS2, eS3, eS4)
189,200	**76**	**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond eA1: Pre - Analysis Point-1 Inflow=3.09 cfs 15,493 cf
Primary=3.09 cfs 15,493 cf

Pond eA2: Pre - Analysis Point-2 Inflow=5.68 cfs 23,407 cf
Primary=5.68 cfs 23,407 cf

Pond eCB: Pre - Area Drain Peak Elev=79.79' Storage=525 cf Inflow=1.38 cfs 5,242 cf
Primary=0.22 cfs 3,909 cf Secondary=1.08 cfs 1,332 cf Outflow=1.30 cfs 5,241 cf

Reach eCF: Pre - Driveway Channel Flow Avg. Flow Depth=0.18' Max Vel=3.43 fps Inflow=1.08 cfs 1,332 cf
n=0.013 L=260.0' S=0.0231 '/' Capacity=17.17 cfs Outflow=1.06 cfs 1,332 cf

Subcatchment eS1: Pre- Runoff to eA1 Runoff Area=67,397 sf 0.81% Impervious Runoff Depth=2.06"
Flow Length=580' Slope=0.0500 '/' Tc=13.5 min CN=71/98 Runoff=2.87 cfs 11,584 cf

Subcatchment eS2: Pre - Flow to area drain Runoff Area=28,561 sf 0.00% Impervious Runoff Depth=2.20"
Flow Length=305' Slope=0.0500 '/' Tc=11.7 min CN=73/0 Runoff=1.38 cfs 5,242 cf

Subcatchment eS3: Pre- Runoff down existing driveway Runoff Area=27,311 sf 79.11% Impervious Runoff Depth=4.17"
Tc=5.0 min CN=74/98 Runoff=2.78 cfs 9,482 cf

Subcatchment eS4: Pre - Runoff to Johnnycake Hill Road Runoff Area=65,931 sf 3.64% Impervious Runoff Depth=2.29"
Flow Length=343' Slope=0.0500 '/' Tc=11.6 min CN=73/98 Runoff=3.30 cfs 12,593 cf

Total Runoff Area = 189,200 sf Runoff Volume = 38,901 cf Average Runoff Depth = 2.47"
87.02% Pervious = 164,646 sf 12.98% Impervious = 24,554 sf

Summary for Pond eA1: Pre - Analysis Point-1

Inflow Area = 95,958 sf, 0.57% Impervious, Inflow Depth = 1.94" for 10-Year event
Inflow = 3.09 cfs @ 12.20 hrs, Volume= 15,493 cf
Primary = 3.09 cfs @ 12.20 hrs, Volume= 15,493 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond eA2: Pre - Analysis Point-2

Inflow Area = 93,242 sf, 25.75% Impervious, Inflow Depth = 3.01" for 10-Year event
Inflow = 5.68 cfs @ 12.17 hrs, Volume= 23,407 cf
Primary = 5.68 cfs @ 12.17 hrs, Volume= 23,407 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond eCB: Pre - Area Drain

Inflow Area = 28,561 sf, 0.00% Impervious, Inflow Depth = 2.20" for 10-Year event
Inflow = 1.38 cfs @ 12.17 hrs, Volume= 5,242 cf
Outflow = 1.30 cfs @ 12.22 hrs, Volume= 5,241 cf, Atten= 6%, Lag= 2.8 min
Primary = 0.22 cfs @ 12.22 hrs, Volume= 3,909 cf
Secondary = 1.08 cfs @ 12.22 hrs, Volume= 1,332 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 79.79' @ 12.22 hrs Surf.Area= 1,266 sf Storage= 525 cf
Flood Elev= 79.15' Surf.Area= 280 sf Storage= 27 cf

Plug-Flow detention time= 8.6 min calculated for 5,236 cf (100% of inflow)
Center-of-Mass det. time= 8.5 min (854.8 - 846.3)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	815 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	76.00'	2 cf	**1.00'D x 3.00'H Vertical Cone/Cylinder**
		817 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	50	0	0
80.00	1,579	815	815

Device	Routing	Invert	Outlet Devices
#1	Primary	77.27'	**4.0" Round Culvert** L= 160.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.27' / 77.14' S= 0.0008 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Secondary	79.65'	**8.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.22 cfs @ 12.22 hrs HW=79.79' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.22 cfs @ 2.54 fps)

Secondary OutFlow Max=1.06 cfs @ 12.22 hrs HW=79.79' TW=79.67' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.06 cfs @ 0.93 fps)

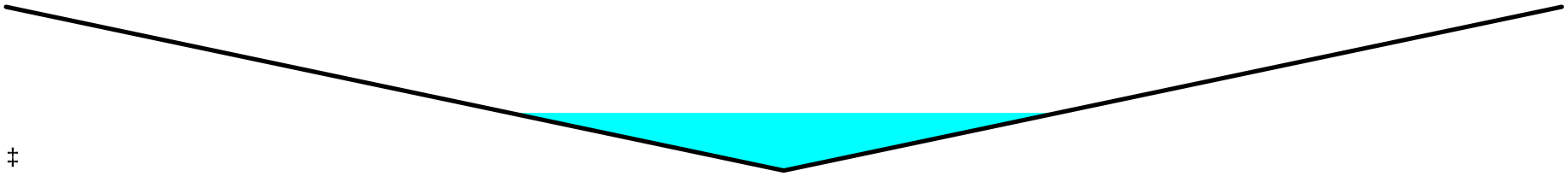
Summary for Reach eCF: Pre - Driveway Channel Flow

Inflow = 1.08 cfs @ 12.22 hrs, Volume= 1,332 cf
Outflow = 1.06 cfs @ 12.24 hrs, Volume= 1,332 cf, Atten= 2%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Max. Velocity= 3.43 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.61 fps, Avg. Travel Time= 2.7 min

Peak Storage= 81 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 0.50' Flow Area= 2.5 sf, Capacity= 17.17 cfs

Custom cross-section, Length= 260.0' Slope= 0.0231 '/'
Constant n= 0.013 Asphalt, smooth
Inlet Invert= 79.50', Outlet Invert= 73.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-5.00	0.50	0.00
0.00	0.00	0.50
5.00	0.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.50	2.5	10.0	650	17.17

Summary for Subcatchment eS1: Pre- Runoff to eA1

Runoff = 2.87 cfs @ 12.20 hrs, Volume= 11,584 cf, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	23,538	74	>75% Grass cover, Good, HSG C
	43,312	70	Woods, Good, HSG C
*	547	98	Existing Pavement
	67,397	72	Weighted Average
	66,850	71	99.19% Pervious Area
	547	98	0.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
4.5	300	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.6	230	0.0500	5.90	29.51	**Channel Flow, CD** Area= 5.0 sf Perim= 10.2' r= 0.49' n= 0.035 Earth, dense weeds
13.5	580	Total			

Summary for Subcatchment eS2: Pre - Flow to area drain

Runoff = 1.38 cfs @ 12.17 hrs, Volume= 5,242 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	20,512	74	>75% Grass cover, Good, HSG C
	8,049	70	Woods, Good, HSG C
*	0	98	Existing Pavement
	28,561	73	Weighted Average
	28,561	73	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0500	0.10		**Sheet Flow, AB**
					Grass: Bermuda n= 0.410 P2= 3.30"
1.1	100	0.0500	1.57		**Shallow Concentrated Flow, BC**
					Short Grass Pasture Kv= 7.0 fps
1.0	65	0.0500	1.12		**Shallow Concentrated Flow, CD**
					Woodland Kv= 5.0 fps
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, DE**
					Short Grass Pasture Kv= 7.0 fps
11.7	305	Total			

Summary for Subcatchment eS3: Pre- Runoff down existing driveway

Runoff = 2.78 cfs @ 12.07 hrs, Volume= 9,482 cf, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	5,461	74	>75% Grass cover, Good, HSG C
	245	70	Woods, Good, HSG C
*	1,005	98	Walks/Stairs/Dock
	20,600	98	Paved parking, HSG C
	27,311	93	Weighted Average
	5,706	74	20.89% Pervious Area
	21,605	98	79.11% Impervious Area

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

Summary for Subcatchment eS4: Pre - Runoff to Johnnycake Hill Road

Runoff = 3.30 cfs @ 12.17 hrs, Volume= 12,593 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	47,993	74	>75% Grass cover, Good, HSG C
	15,536	70	Woods, Good, HSG C
*	245	98	Walks/Stairs/Dock
	2,157	98	Paved parking, HSG C
	65,931	74	Weighted Average
	63,529	73	96.36% Pervious Area
	2,402	98	3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	13	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
3.0	280	0.0500	1.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.6	343	Total			

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond eA1: Pre - Analysis Point-1 Inflow=7.50 cfs 35,796 cf
Primary=7.50 cfs 35,796 cf

Pond eA2: Pre - Analysis Point-2 Inflow=14.23 cfs 53,362 cf
Primary=14.23 cfs 53,362 cf

Pond eCB: Pre - Area Drain Peak Elev=79.95' Storage=739 cf Inflow=3.38 cfs 12,722 cf
Primary=0.23 cfs 6,980 cf Secondary=3.05 cfs 5,741 cf Outflow=3.28 cfs 12,721 cf

Reach eCF: Pre - Driveway Channel Flow Avg. Flow Depth=0.26' Max Vel=4.46 fps Inflow=3.05 cfs 5,741 cf
n=0.013 L=260.0' S=0.0231 '/' Capacity=17.17 cfs Outflow=3.04 cfs 5,741 cf

Subcatchment eS1: Pre- Runoff to eA1 Runoff Area=67,397 sf 0.81% Impervious Runoff Depth=5.13"
Flow Length=580' Slope=0.0500 '/' Tc=13.5 min CN=71/98 Runoff=7.27 cfs 28,817 cf

Subcatchment eS2: Pre - Flow to area drain Runoff Area=28,561 sf 0.00% Impervious Runoff Depth=5.35"
Flow Length=305' Slope=0.0500 '/' Tc=11.7 min CN=73/0 Runoff=3.38 cfs 12,722 cf

Subcatchment eS3: Pre- Runoff down existing driveway Runoff Area=27,311 sf 79.11% Impervious Runoff Depth=7.76"
Tc=5.0 min CN=74/98 Runoff=5.13 cfs 17,650 cf

Subcatchment eS4: Pre - Runoff to Johnnycake Hill Road Runoff Area=65,931 sf 3.64% Impervious Runoff Depth=5.45"
Flow Length=343' Slope=0.0500 '/' Tc=11.6 min CN=73/98 Runoff=7.94 cfs 29,971 cf

Total Runoff Area = 189,200 sf Runoff Volume = 89,160 cf Average Runoff Depth = 5.65"
87.02% Pervious = 164,646 sf 12.98% Impervious = 24,554 sf

Summary for Pond eA1: Pre - Analysis Point-1

Inflow Area = 95,958 sf, 0.57% Impervious, Inflow Depth = 4.48" for 100-Year event
Inflow = 7.50 cfs @ 12.19 hrs, Volume= 35,796 cf
Primary = 7.50 cfs @ 12.19 hrs, Volume= 35,796 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond eA2: Pre - Analysis Point-2

Inflow Area = 93,242 sf, 25.75% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 14.23 cfs @ 12.14 hrs, Volume= 53,362 cf
Primary = 14.23 cfs @ 12.14 hrs, Volume= 53,362 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond eCB: Pre - Area Drain

Inflow Area = 28,561 sf, 0.00% Impervious, Inflow Depth = 5.35" for 100-Year event
Inflow = 3.38 cfs @ 12.16 hrs, Volume= 12,722 cf
Outflow = 3.28 cfs @ 12.19 hrs, Volume= 12,721 cf, Atten= 3%, Lag= 1.8 min
Primary = 0.23 cfs @ 12.19 hrs, Volume= 6,980 cf
Secondary = 3.05 cfs @ 12.19 hrs, Volume= 5,741 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 79.95' @ 12.19 hrs Surf.Area= 1,502 sf Storage= 739 cf
Flood Elev= 79.15' Surf.Area= 280 sf Storage= 27 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.6 min (829.4 - 820.7)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	815 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	76.00'	2 cf	**1.00'D x 3.00'H Vertical Cone/Cylinder**
		817 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	50	0	0
80.00	1,579	815	815

Device	Routing	Invert	Outlet Devices
#1	Primary	77.27'	**4.0" Round Culvert** L= 160.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.27' / 77.14' S= 0.0008 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Secondary	79.65'	**8.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.23 cfs @ 12.19 hrs HW=79.95' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.23 cfs @ 2.62 fps)

Secondary OutFlow Max=3.03 cfs @ 12.19 hrs HW=79.95' TW=79.76' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 3.03 cfs @ 1.27 fps)

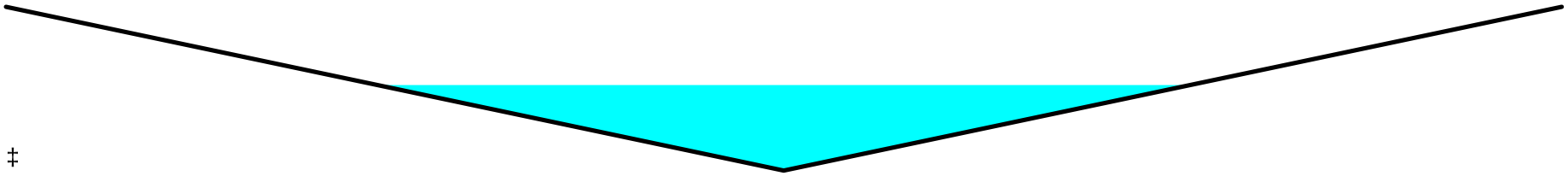
Summary for Reach eCF: Pre - Driveway Channel Flow

Inflow = 3.05 cfs @ 12.19 hrs, Volume= 5,741 cf
Outflow = 3.04 cfs @ 12.21 hrs, Volume= 5,741 cf, Atten= 0%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Max. Velocity= 4.46 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.02 fps, Avg. Travel Time= 2.1 min

Peak Storage= 178 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.50' Flow Area= 2.5 sf, Capacity= 17.17 cfs

Custom cross-section, Length= 260.0' Slope= 0.0231 '/'
Constant n= 0.013 Asphalt, smooth
Inlet Invert= 79.50', Outlet Invert= 73.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-5.00	0.50	0.00
0.00	0.00	0.50
5.00	0.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.50	2.5	10.0	650	17.17

Summary for Subcatchment eS1: Pre- Runoff to eA1

Runoff = 7.27 cfs @ 12.19 hrs, Volume= 28,817 cf, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	23,538	74	>75% Grass cover, Good, HSG C
	43,312	70	Woods, Good, HSG C
*	547	98	Existing Pavement
	67,397	72	Weighted Average
	66,850	71	99.19% Pervious Area
	547	98	0.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
4.5	300	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.6	230	0.0500	5.90	29.51	**Channel Flow, CD** Area= 5.0 sf Perim= 10.2' r= 0.49' n= 0.035 Earth, dense weeds
13.5	580	Total			

Summary for Subcatchment eS2: Pre - Flow to area drain

Runoff = 3.38 cfs @ 12.16 hrs, Volume= 12,722 cf, Depth= 5.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	20,512	74	>75% Grass cover, Good, HSG C
	8,049	70	Woods, Good, HSG C
*	0	98	Existing Pavement
	28,561	73	Weighted Average
	28,561	73	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0500	0.10		**Sheet Flow, AB**
					Grass: Bermuda n= 0.410 P2= 3.30"
1.1	100	0.0500	1.57		**Shallow Concentrated Flow, BC**
					Short Grass Pasture Kv= 7.0 fps
1.0	65	0.0500	1.12		**Shallow Concentrated Flow, CD**
					Woodland Kv= 5.0 fps
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, DE**
					Short Grass Pasture Kv= 7.0 fps
11.7	305	Total			

Summary for Subcatchment eS3: Pre- Runoff down existing driveway

Runoff = 5.13 cfs @ 12.07 hrs, Volume= 17,650 cf, Depth= 7.76"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	5,461	74	>75% Grass cover, Good, HSG C
	245	70	Woods, Good, HSG C
*	1,005	98	Walks/Stairs/Dock
	20,600	98	Paved parking, HSG C
	27,311	93	Weighted Average
	5,706	74	20.89% Pervious Area
	21,605	98	79.11% Impervious Area

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

Summary for Subcatchment eS4: Pre - Runoff to Johnnycake Hill Road

Runoff = 7.94 cfs @ 12.16 hrs, Volume= 29,971 cf, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	47,993	74	>75% Grass cover, Good, HSG C
	15,536	70	Woods, Good, HSG C
*	245	98	Walks/Stairs/Dock
	2,157	98	Paved parking, HSG C
	65,931	74	Weighted Average
	63,529	73	96.36% Pervious Area
	2,402	98	3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	13	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
3.0	280	0.0500	1.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.6	343	Total			

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond eA1: Pre - Analysis Point-1 Inflow=0.01 cfs 348 cf
Primary=0.01 cfs 348 cf

Pond eA2: Pre - Analysis Point-2 Inflow=0.59 cfs 2,271 cf
Primary=0.59 cfs 2,271 cf

Pond eCB: Pre - Area Drain Peak Elev=77.37' Storage=1 cf Inflow=0.01 cfs 121 cf
Primary=0.01 cfs 120 cf Secondary=0.00 cfs 0 cf Outflow=0.01 cfs 120 cf

Reach eCF: Pre - Driveway Channel Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.013 L=260.0' S=0.0231 '/' Capacity=17.17 cfs Outflow=0.00 cfs 0 cf

Subcatchment eS1: Pre- Runoff to eA1 Runoff Area=67,397 sf 0.81% Impervious Runoff Depth=0.04"
Flow Length=580' Slope=0.0500 '/' Tc=13.5 min CN=71/98 Runoff=0.01 cfs 228 cf

Subcatchment eS2: Pre - Flow to area drain Runoff Area=28,561 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=305' Slope=0.0500 '/' Tc=11.7 min CN=73/0 Runoff=0.01 cfs 121 cf

Subcatchment eS3: Pre- Runoff down existing driveway Runoff Area=27,311 sf 79.11% Impervious Runoff Depth=0.79"
Tc=5.0 min CN=74/98 Runoff=0.55 cfs 1,804 cf

Subcatchment eS4: Pre - Runoff to Johnnycake Hill Road Runoff Area=65,931 sf 3.64% Impervious Runoff Depth=0.08"
Flow Length=343' Slope=0.0500 '/' Tc=11.6 min CN=73/98 Runoff=0.05 cfs 467 cf

Total Runoff Area = 189,200 sf Runoff Volume = 2,620 cf Average Runoff Depth = 0.17"
87.02% Pervious = 164,646 sf 12.98% Impervious = 24,554 sf

Summary for Pond eA1: Pre - Analysis Point-1

Inflow Area = 95,958 sf, 0.57% Impervious, Inflow Depth = 0.04" for WQv event
Inflow = 0.01 cfs @ 13.79 hrs, Volume= 348 cf
Primary = 0.01 cfs @ 13.79 hrs, Volume= 348 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond eA2: Pre - Analysis Point-2

Inflow Area = 93,242 sf, 25.75% Impervious, Inflow Depth = 0.29" for WQv event
Inflow = 0.59 cfs @ 12.08 hrs, Volume= 2,271 cf
Primary = 0.59 cfs @ 12.08 hrs, Volume= 2,271 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond eCB: Pre - Area Drain

Inflow Area = 28,561 sf, 0.00% Impervious, Inflow Depth = 0.05" for WQv event
Inflow = 0.01 cfs @ 12.55 hrs, Volume= 121 cf
Outflow = 0.01 cfs @ 12.56 hrs, Volume= 120 cf, Atten= 0%, Lag= 0.2 min
Primary = 0.01 cfs @ 12.56 hrs, Volume= 120 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.37' @ 12.56 hrs Surf.Area= 1 sf Storage= 1 cf
Flood Elev= 79.15' Surf.Area= 280 sf Storage= 27 cf

Plug-Flow detention time= 6.6 min calculated for 120 cf (99% of inflow)
Center-of-Mass det. time= 2.5 min (1,013.0 - 1,010.5)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	815 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
#2	76.00'	2 cf	**1.00'D x 3.00'H Vertical Cone/Cylinder**
		817 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	50	0	0
80.00	1,579	815	815

Device	Routing	Invert	Outlet Devices
#1	Primary	77.27'	**4.0" Round Culvert** L= 160.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.27' / 77.14' S= 0.0008 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Secondary	79.65'	**8.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.01 cfs @ 12.56 hrs HW=77.37' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.01 cfs @ 0.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=76.00' TW=79.50' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

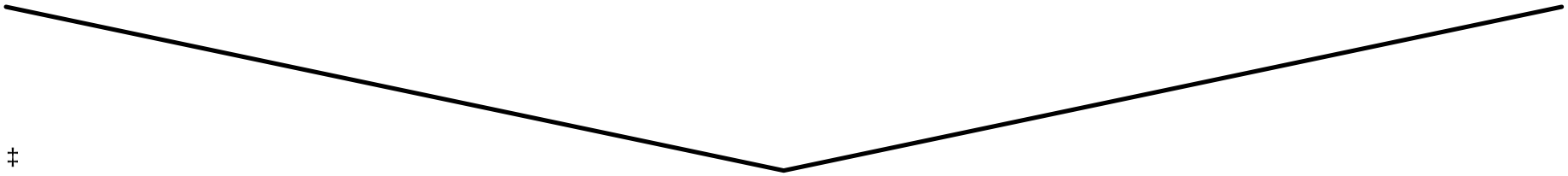
Summary for Reach eCF: Pre - Driveway Channel Flow

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.50' Flow Area= 2.5 sf, Capacity= 17.17 cfs

Custom cross-section, Length= 260.0' Slope= 0.0231 '/'
Constant n= 0.013 Asphalt, smooth
Inlet Invert= 79.50', Outlet Invert= 73.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-5.00	0.50	0.00
0.00	0.00	0.50
5.00	0.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.50	2.5	10.0	650	17.17

Summary for Subcatchment eS1: Pre- Runoff to eA1

Runoff = 0.01 cfs @ 12.18 hrs, Volume= 228 cf, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	23,538	74	>75% Grass cover, Good, HSG C
	43,312	70	Woods, Good, HSG C
*	547	98	Existing Pavement
	67,397	72	Weighted Average
	66,850	71	99.19% Pervious Area
	547	98	0.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
4.5	300	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.6	230	0.0500	5.90	29.51	**Channel Flow, CD** Area= 5.0 sf Perim= 10.2' r= 0.49' n= 0.035 Earth, dense weeds
13.5	580	Total			

Summary for Subcatchment eS2: Pre - Flow to area drain

Runoff = 0.01 cfs @ 12.55 hrs, Volume= 121 cf, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	20,512	74	>75% Grass cover, Good, HSG C
	8,049	70	Woods, Good, HSG C
*	0	98	Existing Pavement
	28,561	73	Weighted Average
	28,561	73	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0500	0.10		**Sheet Flow, AB**
					Grass: Bermuda n= 0.410 P2= 3.30"
1.1	100	0.0500	1.57		**Shallow Concentrated Flow, BC**
					Short Grass Pasture Kv= 7.0 fps
1.0	65	0.0500	1.12		**Shallow Concentrated Flow, CD**
					Woodland Kv= 5.0 fps
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, DE**
					Short Grass Pasture Kv= 7.0 fps
11.7	305	Total			

Summary for Subcatchment eS3: Pre- Runoff down existing driveway

Runoff = 0.55 cfs @ 12.07 hrs, Volume= 1,804 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	5,461	74	>75% Grass cover, Good, HSG C
	245	70	Woods, Good, HSG C
*	1,005	98	Walks/Stairs/Dock
	20,600	98	Paved parking, HSG C
	27,311	93	Weighted Average
	5,706	74	20.89% Pervious Area
	21,605	98	79.11% Impervious Area

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

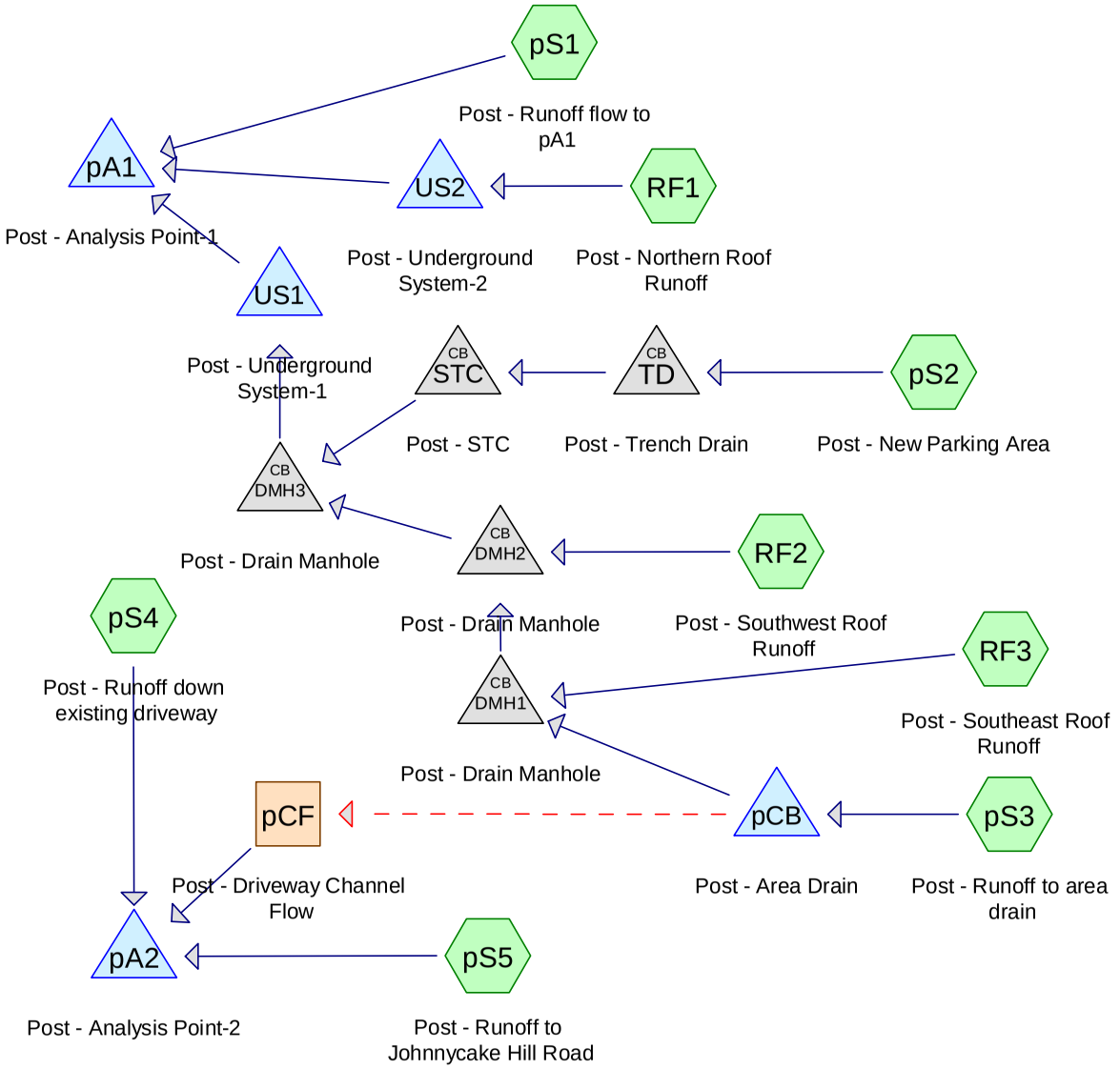
Summary for Subcatchment eS4: Pre - Runoff to Johnnycake Hill Road

Runoff = 0.05 cfs @ 12.16 hrs, Volume= 467 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	47,993	74	>75% Grass cover, Good, HSG C
	15,536	70	Woods, Good, HSG C
*	245	98	Walks/Stairs/Dock
	2,157	98	Paved parking, HSG C
	65,931	74	Weighted Average
	63,529	73	96.36% Pervious Area
	2,402	98	3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	13	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
3.0	280	0.0500	1.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.6	343	Total			



Routing Diagram for 22085 HydroCAD model 11-8-2022

Prepared by {enter your company name here}, Printed 11/8/2022

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
83,981	74	>75% Grass cover, Good, HSG C (pS1, pS3, pS4, pS5)
20,106	98	Existing Pavement (pS4)
537	98	Existing pavement (pS2)
859	98	New Pavement (pS2)
2,157	98	Paved parking, HSG C (pS5)
15,000	98	Roofs, HSG C (RF1, RF2, RF3)
1,249	98	Walks/Stairs/Dock (pS4, pS5)
300	98	Wall & Walks (pS1, pS2)
65,006	70	Woods, Good, HSG C (pS1, pS3, pS4, pS5)
189,195	**78**	**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond DMH1: Post - Drain Manhole Peak Elev=77.88' Inflow=0.82 cfs 4,797 cf
8.0" Round Culvert n=0.013 L=80.0' S=0.0100 '/' Outflow=0.82 cfs 4,797 cf

Pond DMH2: Post - Drain Manhole Peak Elev=77.25' Inflow=1.24 cfs 6,254 cf
8.0" Round Culvert n=0.013 L=75.0' S=0.0107 '/' Outflow=1.24 cfs 6,254 cf

Pond DMH3: Post - Drain Manhole Peak Elev=75.56' Inflow=1.40 cfs 6,818 cf
8.0" Round Culvert n=0.013 L=10.0' S=0.0120 '/' Outflow=1.40 cfs 6,818 cf

Pond pA1: Post - Analysis Point-1 Inflow=2.54 cfs 10,263 cf
Primary=2.54 cfs 10,263 cf

Pond pA2: Post - Analysis Point-2 Inflow=5.35 cfs 21,857 cf
Primary=5.35 cfs 21,857 cf

Pond pCB: Post - Area Drain Peak Elev=80.09' Storage=888 cf Inflow=0.97 cfs 3,691 cf
Primary=0.46 cfs 3,339 cf Secondary=0.00 cfs 0 cf Outflow=0.46 cfs 3,339 cf

Reach pCF: Post - Driveway Channel Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.013 L=260.0' S=0.0231 '/' Capacity=17.17 cfs Outflow=0.00 cfs 0 cf

Subcatchment pS1: Post - Runoff flow to pA1 Runoff Area=60,020 sf 0.41% Impervious Runoff Depth=2.05"
Flow Length=580' Slope=0.0500 '/' Tc=13.5 min CN=71/98 Runoff=2.54 cfs 10,263 cf

Subcatchment pS2: Post - New Parking Area Runoff Area=1,452 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=0/98 Runoff=0.16 cfs 564 cf

Subcatchment pS3: Post - Runoff to area drain Runoff Area=20,112 sf 0.00% Impervious Runoff Depth=2.20"
Flow Length=305' Slope=0.0500 '/' Tc=11.7 min CN=73/0 Runoff=0.97 cfs 3,691 cf

Subcatchment pS4: Post - Runoff down existing driveway Runoff Area=26,680 sf 79.12% Impervious Runoff Depth=4.17"
Tc=5.0 min CN=74/98 Runoff=2.72 cfs 9,264 cf

Subcatchment pS5: Post - Runoff to Johnnycake Hill Road Runoff Area=65,931 sf 3.64% Impervious Runoff Depth=2.29"
Flow Length=346' Slope=0.0500 '/' Tc=11.6 min CN=73/98 Runoff=3.30 cfs 12,593 cf

Subcatchment RF1: Post - Northern Roof Runoff Runoff Area=7,500 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=0/98 Runoff=0.84 cfs 2,915 cf

Subcatchment RF2: Post - Southwest Roof Runoff Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=0/98 Runoff=0.42 cfs 1,457 cf

Subcatchment RF3: Post - Southeast Roof Runoff Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=0/98 Runoff=0.42 cfs 1,457 cf

Pond STC: Post - STC Peak Elev=76.97' Inflow=0.16 cfs 564 cf
6.0" Round Culvert n=0.013 L=13.0' S=0.0115 '/' Outflow=0.16 cfs 564 cf

Pond TD: Post - Trench Drain Peak Elev=77.29' Inflow=0.16 cfs 564 cf
6.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.16 cfs 564 cf

Pond US1: Post - Underground System-1 Peak Elev=75.21' Storage=3,987 cf Inflow=1.40 cfs 6,818 cf
Discarded=0.05 cfs 6,818 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 6,818 cf

Pond US2: Post - Underground System-2 Peak Elev=77.19' Storage=1,460 cf Inflow=0.84 cfs 2,915 cf
Discarded=0.03 cfs 2,915 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 2,915 cf

Total Runoff Area = 189,195 sf Runoff Volume = 42,204 cf Average Runoff Depth = 2.68"
78.75% Pervious = 148,987 sf 21.25% Impervious = 40,208 sf

Summary for Pond DMH1: Post - Drain Manhole

Inflow Area = 23,862 sf, 15.72% Impervious, Inflow Depth = 2.41" for 10-Year event
Inflow = 0.82 cfs @ 12.08 hrs, Volume= 4,797 cf
Outflow = 0.82 cfs @ 12.08 hrs, Volume= 4,797 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.08 hrs, Volume= 4,797 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.88' @ 12.08 hrs
Flood Elev= 80.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	77.20'	**8.0" Round Culvert** L= 80.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.20' / 76.40' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.82 cfs @ 12.08 hrs HW=77.87' TW=77.24' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.82 cfs @ 2.90 fps)

Summary for Pond DMH2: Post - Drain Manhole

Inflow Area = 27,612 sf, 27.16% Impervious, Inflow Depth = 2.72" for 10-Year event
Inflow = 1.24 cfs @ 12.07 hrs, Volume= 6,254 cf
Outflow = 1.24 cfs @ 12.07 hrs, Volume= 6,254 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.24 cfs @ 12.07 hrs, Volume= 6,254 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.25' @ 12.08 hrs
Flood Elev= 80.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.30'	**8.0" Round Culvert** L= 75.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 76.30' / 75.50' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.23 cfs @ 12.07 hrs HW=77.23' TW=75.55' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.23 cfs @ 3.52 fps)

Summary for Pond DMH3: Post - Drain Manhole

Inflow Area = 29,064 sf, 30.80% Impervious, Inflow Depth = 2.82" for 10-Year event
Inflow = 1.40 cfs @ 12.07 hrs, Volume= 6,818 cf
Outflow = 1.40 cfs @ 12.07 hrs, Volume= 6,818 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.40 cfs @ 12.07 hrs, Volume= 6,818 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 75.56' @ 12.07 hrs
Flood Elev= 78.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**8.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 74.50' / 74.38' S= 0.0120 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.39 cfs @ 12.07 hrs HW=75.55' TW=73.26' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.39 cfs @ 3.98 fps)

Summary for Pond pA1: Post - Analysis Point-1

Inflow Area = 96,584 sf, 17.29% Impervious, Inflow Depth = 1.28" for 10-Year event
Inflow = 2.54 cfs @ 12.20 hrs, Volume= 10,263 cf
Primary = 2.54 cfs @ 12.20 hrs, Volume= 10,263 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond pA2: Post - Analysis Point-2

Inflow Area = 92,611 sf, 25.39% Impervious, Inflow Depth = 2.83" for 10-Year event
Inflow = 5.35 cfs @ 12.11 hrs, Volume= 21,857 cf
Primary = 5.35 cfs @ 12.11 hrs, Volume= 21,857 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond pCB: Post - Area Drain

Inflow Area = 20,112 sf, 0.00% Impervious, Inflow Depth = 2.20" for 10-Year event
Inflow = 0.97 cfs @ 12.17 hrs, Volume= 3,691 cf
Outflow = 0.46 cfs @ 12.51 hrs, Volume= 3,339 cf, Atten= 52%, Lag= 20.6 min
Primary = 0.46 cfs @ 12.51 hrs, Volume= 3,339 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 80.09' @ 12.46 hrs Surf.Area= 1,131 sf Storage= 888 cf
Flood Elev= 80.30' Surf.Area= 1,500 sf Storage= 1,167 cf

Plug-Flow detention time= 74.2 min calculated for 3,337 cf (90% of inflow)
Center-of-Mass det. time= 27.6 min (873.9 - 846.3)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	1,167 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	612	0	0
80.00	978	795	795
80.30	1,500	372	1,167

Device	Routing	Invert	Outlet Devices
#1	Device 2	79.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	77.60'	**4.0" Round Culvert** L= 30.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.60' / 77.30' S= 0.0100 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

#3	Secondary	80.10'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.46 cfs @ 12.51 hrs HW=80.08' TW=77.64' (Dynamic Tailwater)
└─**2=Culvert** (Outlet Controls 0.46 cfs @ 5.31 fps)
└─**1=Orifice/Grate** (Passes 0.46 cfs of 2.89 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=79.50' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

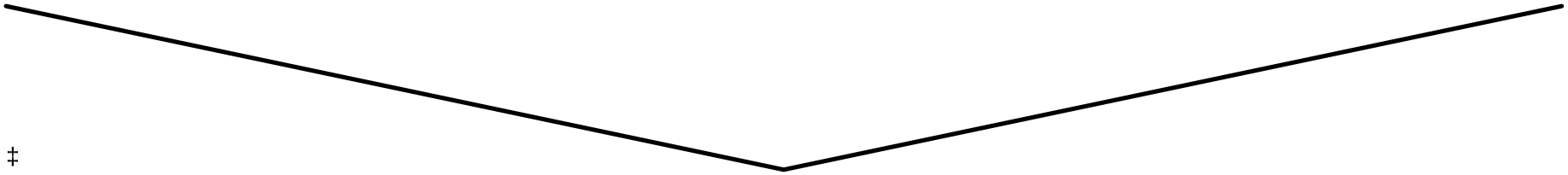
Summary for Reach pCF: Post - Driveway Channel Flow

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.50' Flow Area= 2.5 sf, Capacity= 17.17 cfs

Custom cross-section, Length= 260.0' Slope= 0.0231 '/'
Constant n= 0.013 Asphalt, smooth
Inlet Invert= 79.50', Outlet Invert= 73.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-5.00	0.50	0.00
0.00	0.00	0.50
5.00	0.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.50	2.5	10.0	650	17.17

Summary for Subcatchment pS1: Post - Runoff flow to pA1

Runoff = 2.54 cfs @ 12.20 hrs, Volume= 10,263 cf, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	16,507	74	>75% Grass cover, Good, HSG C
	43,269	70	Woods, Good, HSG C
*	244	98	Wall & Walks
	60,020	71	Weighted Average
	59,776	71	99.59% Pervious Area
	244	98	0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
4.5	300	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.6	230	0.0500	5.90	29.51	**Channel Flow, CD** Area= 5.0 sf Perim= 10.2' r= 0.49' n= 0.035 Earth, dense weeds
13.5	580	Total			

Summary for Subcatchment pS2: Post - New Parking Area

Runoff = 0.16 cfs @ 12.07 hrs, Volume= 564 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	859	98	New Pavement
*	56	98	Wall & Walks
*	537	98	Existing pavement
	1,452	98	Weighted Average
	1,452	98	100.00% Impervious Area

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

Summary for Subcatchment pS3: Post - Runoff to area drain

Runoff = 0.97 cfs @ 12.17 hrs, Volume= 3,691 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	14,168	74	>75% Grass cover, Good, HSG C
	5,944	70	Woods, Good, HSG C
*	0	98	Existing Pavement
	20,112	73	Weighted Average
	20,112	73	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0500	0.10		**Sheet Flow, AB**
					Grass: Bermuda n= 0.410 P2= 3.30"
1.1	100	0.0500	1.57		**Shallow Concentrated Flow, BC**
					Short Grass Pasture Kv= 7.0 fps
1.0	65	0.0500	1.12		**Shallow Concentrated Flow, CD**
					Woodland Kv= 5.0 fps
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, DE**
					Short Grass Pasture Kv= 7.0 fps
11.7	305	Total			

Summary for Subcatchment pS4: Post - Runoff down existing driveway

Runoff = 2.72 cfs @ 12.07 hrs, Volume= 9,264 cf, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	5,313	74	>75% Grass cover, Good, HSG C
	257	70	Woods, Good, HSG C
*	20,106	98	Existing Pavement
*	1,004	98	Walks/Stairs/Dock
	26,680	93	Weighted Average
	5,570	74	20.88% Pervious Area
	21,110	98	79.12% Impervious Area

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

Summary for Subcatchment pS5: Post - Runoff to Johnnycake Hill Road

Runoff = 3.30 cfs @ 12.17 hrs, Volume= 12,593 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
	47,993	74	>75% Grass cover, Good, HSG C
	15,536	70	Woods, Good, HSG C
*	245	98	Walks/Stairs/Dock
	2,157	98	Paved parking, HSG C
	65,931	74	Weighted Average
	63,529	73	96.36% Pervious Area
	2,402	98	3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	16	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
3.0	280	0.0500	1.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.6	346	Total			

Summary for Subcatchment RF1: Post - Northern Roof Runoff

Runoff = 0.84 cfs @ 12.07 hrs, Volume= 2,915 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
7,500	98	Roofs, HSG C
7,500	98	100.00% Impervious Area

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

Summary for Subcatchment RF2: Post - Southwest Roof Runoff

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 1,457 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
3,750	98	Roofs, HSG C
3,750	98	100.00% Impervious Area

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

Summary for Subcatchment RF3: Post - Southeast Roof Runoff

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 1,457 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
3,750	98	Roofs, HSG C
3,750	98	100.00% Impervious Area

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

Summary for Pond STC: Post - STC

Inflow Area = 1,452 sf,100.00% Impervious, Inflow Depth = 4.66" for 10-Year event
Inflow = 0.16 cfs @ 12.07 hrs, Volume= 564 cf
Outflow = 0.16 cfs @ 12.07 hrs, Volume= 564 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.16 cfs @ 12.07 hrs, Volume= 564 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 76.97' @ 12.07 hrs
Flood Elev= 78.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.70'	**6.0" Round Culvert** L= 13.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 76.70' / 76.55' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.16 cfs @ 12.07 hrs HW=76.96' TW=75.55' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.16 cfs @ 2.23 fps)

Summary for Pond TD: Post - Trench Drain

Inflow Area = 1,452 sf,100.00% Impervious, Inflow Depth = 4.66" for 10-Year event
Inflow = 0.16 cfs @ 12.07 hrs, Volume= 564 cf
Outflow = 0.16 cfs @ 12.07 hrs, Volume= 564 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.16 cfs @ 12.07 hrs, Volume= 564 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.29' @ 12.07 hrs
Flood Elev= 78.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	**6.0" Round Culvert** L= 5.0' RCP, sq.cut end projecting, Ke= 0.500

Inlet / Outlet Invert= 77.00' / 76.95' S= 0.0100 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.16 cfs @ 12.07 hrs HW=77.29' TW=76.96' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.16 cfs @ 2.00 fps)

Summary for Pond US1: Post - Underground System-1

Inflow Area = 29,064 sf, 30.80% Impervious, Inflow Depth = 2.82" for 10-Year event
Inflow = 1.40 cfs @ 12.07 hrs, Volume= 6,818 cf
Outflow = 0.05 cfs @ 11.20 hrs, Volume= 6,818 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.20 hrs, Volume= 6,818 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 75.21' @ 17.40 hrs Surf.Area= 2,313 sf Storage= 3,987 cf
Flood Elev= 76.00' Surf.Area= 2,314 sf Storage= 4,628 cf

Plug-Flow detention time= 668.3 min calculated for 6,812 cf (100% of inflow)
Center-of-Mass det. time= 668.6 min (1,478.0 - 809.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	72.50'	1,708 cf	**44.25'W x 52.28'L x 3.50'H Field A** 8,097 cf Overall - 2,920 cf Embedded = 5,177 cf x 33.0% Voids
#2A	73.00'	2,920 cf	**ADS_StormTech SC-740** x 63 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
#3	75.50'	0 cf	**0.50'D x 2.00'H Vertical Cone/Cylinder**
		4,628 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	75.75'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 11.20 hrs HW=72.55' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=72.50' TW=0.00' (Dynamic Tailwater)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond US2: Post - Underground System-2

Inflow Area = 7,500 sf,100.00% Impervious, Inflow Depth = 4.66" for 10-Year event
Inflow = 0.84 cfs @ 12.07 hrs, Volume= 2,915 cf
Outflow = 0.03 cfs @ 10.12 hrs, Volume= 2,915 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.03 cfs @ 10.12 hrs, Volume= 2,915 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.19' @ 15.06 hrs Surf.Area= 1,355 sf Storage= 1,460 cf
Flood Elev= 79.00' Surf.Area= 1,355 sf Storage= 2,684 cf

Plug-Flow detention time= 383.0 min calculated for 2,912 cf (100% of inflow)
Center-of-Mass det. time= 383.1 min (1,130.5 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	75.50'	1,013 cf	**30.00'W x 45.16'L x 3.50'H Field A** 4,742 cf Overall - 1,671 cf Embedded = 3,071 cf x 33.0% Voids
#2A	76.00'	1,671 cf	**ADS_StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	78.50'	0 cf	**0.50'D x 0.75'H Vertical Cone/Cylinder**
		2,684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	75.50'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	78.75'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 10.12 hrs HW=75.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=75.50' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond DMH1: Post - Drain Manhole Peak Elev=79.32' Inflow=1.06 cfs 9,049 cf
8.0" Round Culvert n=0.013 L=80.0' S=0.0100 '/' Outflow=1.06 cfs 9,049 cf

Pond DMH2: Post - Drain Manhole Peak Elev=78.59' Inflow=1.79 cfs 11,662 cf
8.0" Round Culvert n=0.013 L=75.0' S=0.0107 '/' Outflow=1.79 cfs 11,662 cf

Pond DMH3: Post - Drain Manhole Peak Elev=76.35' Inflow=2.07 cfs 12,673 cf
8.0" Round Culvert n=0.013 L=10.0' S=0.0120 '/' Outflow=2.07 cfs 12,673 cf

Pond pA1: Post - Analysis Point-1 Inflow=6.47 cfs 30,774 cf
Primary=6.47 cfs 30,774 cf

Pond pA2: Post - Analysis Point-2 Inflow=12.99 cfs 49,384 cf
Primary=12.99 cfs 49,384 cf

Pond pCB: Post - Area Drain Peak Elev=80.28' Storage=1,137 cf Inflow=2.38 cfs 8,958 cf
Primary=0.47 cfs 6,437 cf Secondary=1.94 cfs 2,170 cf Outflow=2.36 cfs 8,607 cf

Reach pCF: Post - Driveway Channel Flow Avg. Flow Depth=0.22' Max Vel=3.97 fps Inflow=1.94 cfs 2,170 cf
n=0.013 L=260.0' S=0.0231 '/' Capacity=17.17 cfs Outflow=1.91 cfs 2,170 cf

Subcatchment pS1: Post - Runoff flow to pA1 Runoff Area=60,020 sf 0.41% Impervious Runoff Depth=5.12"
Flow Length=580' Slope=0.0500 '/' Tc=13.5 min CN=71/98 Runoff=6.47 cfs 25,597 cf

Subcatchment pS2: Post - New Parking Area Runoff Area=1,452 sf 100.00% Impervious Runoff Depth=8.36"
Tc=5.0 min CN=0/98 Runoff=0.29 cfs 1,012 cf

Subcatchment pS3: Post - Runoff to area drain Runoff Area=20,112 sf 0.00% Impervious Runoff Depth=5.35"
Flow Length=305' Slope=0.0500 '/' Tc=11.7 min CN=73/0 Runoff=2.38 cfs 8,958 cf

Subcatchment pS4: Post - Runoff down existing driveway Runoff Area=26,680 sf 79.12% Impervious Runoff Depth=7.76"
Tc=5.0 min CN=74/98 Runoff=5.01 cfs 17,243 cf

Subcatchment pS5: Post - Runoff to Johnnycake Hill Road Runoff Area=65,931 sf 3.64% Impervious Runoff Depth=5.45"
Flow Length=346' Slope=0.0500 '/' Tc=11.6 min CN=73/98 Runoff=7.94 cfs 29,971 cf

Subcatchment RF1: Post - Northern Roof Runoff Runoff Area=7,500 sf 100.00% Impervious Runoff Depth=8.36"
Tc=5.0 min CN=0/98 Runoff=1.48 cfs 5,225 cf

Subcatchment RF2: Post - Southwest Roof Runoff Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=8.36"
Tc=5.0 min CN=0/98 Runoff=0.74 cfs 2,612 cf

Subcatchment RF3: Post - Southeast Roof Runoff Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=8.36"
Tc=5.0 min CN=0/98 Runoff=0.74 cfs 2,612 cf

Pond STC: Post - STC Peak Elev=77.07' Inflow=0.29 cfs 1,012 cf
6.0" Round Culvert n=0.013 L=13.0' S=0.0115 '/' Outflow=0.29 cfs 1,012 cf

Pond TD: Post - Trench Drain Peak Elev=77.41' Inflow=0.29 cfs 1,012 cf
6.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.29 cfs 1,012 cf

Pond US1: Post - Underground System-1 Peak Elev=75.96' Storage=4,596 cf Inflow=2.07 cfs 12,673 cf
Discarded=0.05 cfs 8,154 cf Primary=0.65 cfs 4,520 cf Outflow=0.70 cfs 12,673 cf

Pond US2: Post - Underground System-2 Peak Elev=78.83' Storage=2,608 cf Inflow=1.48 cfs 5,225 cf
Discarded=0.03 cfs 4,567 cf Primary=0.15 cfs 658 cf Outflow=0.19 cfs 5,225 cf

Total Runoff Area = 189,195 sf Runoff Volume = 93,231 cf Average Runoff Depth = 5.91"
78.75% Pervious = 148,987 sf 21.25% Impervious = 40,208 sf

Summary for Pond DMH1: Post - Drain Manhole

Inflow Area = 23,862 sf, 15.72% Impervious, Inflow Depth = 4.55" for 100-Year event
Inflow = 1.06 cfs @ 12.05 hrs, Volume= 9,049 cf
Outflow = 1.06 cfs @ 12.05 hrs, Volume= 9,049 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.06 cfs @ 12.05 hrs, Volume= 9,049 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 79.32' @ 12.06 hrs
Flood Elev= 80.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	77.20'	**8.0" Round Culvert** L= 80.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.20' / 76.40' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.00 cfs @ 12.05 hrs HW=79.22' TW=78.47' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 1.00 cfs @ 2.87 fps)

Summary for Pond DMH2: Post - Drain Manhole

Inflow Area = 27,612 sf, 27.16% Impervious, Inflow Depth = 5.07" for 100-Year event
Inflow = 1.79 cfs @ 12.06 hrs, Volume= 11,662 cf
Outflow = 1.79 cfs @ 12.06 hrs, Volume= 11,662 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.79 cfs @ 12.06 hrs, Volume= 11,662 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 78.59' @ 12.07 hrs
Flood Elev= 80.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.30'	**8.0" Round Culvert** L= 75.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 76.30' / 75.50' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.76 cfs @ 12.06 hrs HW=78.50' TW=76.30' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.76 cfs @ 5.05 fps)

Summary for Pond DMH3: Post - Drain Manhole

Inflow Area = 29,064 sf, 30.80% Impervious, Inflow Depth = 5.23" for 100-Year event
Inflow = 2.07 cfs @ 12.07 hrs, Volume= 12,673 cf
Outflow = 2.07 cfs @ 12.07 hrs, Volume= 12,673 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.07 cfs @ 12.07 hrs, Volume= 12,673 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 76.35' @ 12.07 hrs
Flood Elev= 78.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**8.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 74.50' / 74.38' S= 0.0120 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.04 cfs @ 12.07 hrs HW=76.30' TW=74.33' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.04 cfs @ 5.84 fps)

Summary for Pond pA1: Post - Analysis Point-1

Inflow Area = 96,584 sf, 17.29% Impervious, Inflow Depth = 3.82" for 100-Year event
Inflow = 6.47 cfs @ 12.19 hrs, Volume= 30,774 cf
Primary = 6.47 cfs @ 12.19 hrs, Volume= 30,774 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond pA2: Post - Analysis Point-2

Inflow Area = 92,611 sf, 25.39% Impervious, Inflow Depth = 6.40" for 100-Year event
Inflow = 12.99 cfs @ 12.14 hrs, Volume= 49,384 cf
Primary = 12.99 cfs @ 12.14 hrs, Volume= 49,384 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond pCB: Post - Area Drain

Inflow Area = 20,112 sf, 0.00% Impervious, Inflow Depth = 5.35" for 100-Year event
Inflow = 2.38 cfs @ 12.16 hrs, Volume= 8,958 cf
Outflow = 2.36 cfs @ 12.19 hrs, Volume= 8,607 cf, Atten= 1%, Lag= 1.5 min
Primary = 0.47 cfs @ 12.53 hrs, Volume= 6,437 cf
Secondary = 1.94 cfs @ 12.18 hrs, Volume= 2,170 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 80.28' @ 12.18 hrs Surf.Area= 1,466 sf Storage= 1,137 cf
Flood Elev= 80.30' Surf.Area= 1,500 sf Storage= 1,167 cf

Plug-Flow detention time= 40.7 min calculated for 8,600 cf (96% of inflow)
Center-of-Mass det. time= 18.6 min (839.3 - 820.7)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	1,167 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	612	0	0
80.00	978	795	795
80.30	1,500	372	1,167

Device	Routing	Invert	Outlet Devices
#1	Device 2	79.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	77.60'	**4.0" Round Culvert** L= 30.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.60' / 77.30' S= 0.0100 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

#3	Secondary	80.10'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.47 cfs @ 12.53 hrs HW=80.17' TW=77.68' (Dynamic Tailwater)
└─**2=Culvert** (Outlet Controls 0.47 cfs @ 5.37 fps)
└─**1=Orifice/Grate** (Passes 0.47 cfs of 3.09 cfs potential flow)

Secondary OutFlow Max=1.90 cfs @ 12.18 hrs HW=80.28' TW=79.72' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.90 cfs @ 1.07 fps)

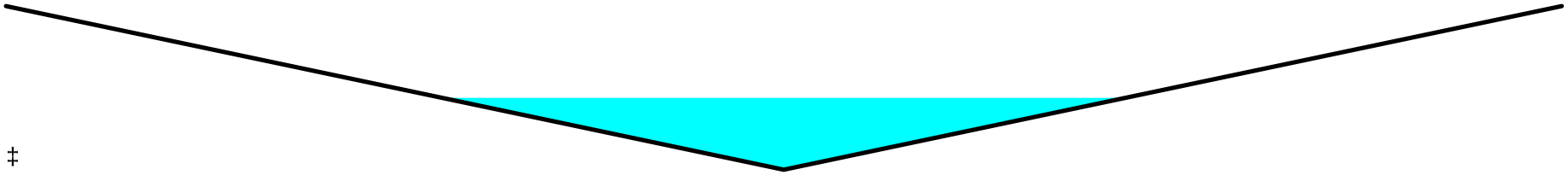
Summary for Reach pCF: Post - Driveway Channel Flow

Inflow	=	1.94 cfs @	12.18 hrs,	Volume=	2,170 cf
Outflow	=	1.91 cfs @	12.20 hrs,	Volume=	2,170 cf, Atten= 2%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Max. Velocity= 3.97 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 2.4 min

Peak Storage= 125 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 0.50' Flow Area= 2.5 sf, Capacity= 17.17 cfs

Custom cross-section, Length= 260.0' Slope= 0.0231 '/'
Constant n= 0.013 Asphalt, smooth
Inlet Invert= 79.50', Outlet Invert= 73.50'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-5.00	0.50	0.00
0.00	0.00	0.50
5.00	0.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.50	2.5	10.0	650	17.17

Summary for Subcatchment pS1: Post - Runoff flow to pA1

Runoff = 6.47 cfs @ 12.19 hrs, Volume= 25,597 cf, Depth= 5.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	16,507	74	>75% Grass cover, Good, HSG C
	43,269	70	Woods, Good, HSG C
*	244	98	Wall & Walks
	60,020	71	Weighted Average
	59,776	71	99.59% Pervious Area
	244	98	0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
4.5	300	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.6	230	0.0500	5.90	29.51	**Channel Flow, CD** Area= 5.0 sf Perim= 10.2' r= 0.49' n= 0.035 Earth, dense weeds
13.5	580	Total			

Summary for Subcatchment pS2: Post - New Parking Area

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 1,012 cf, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	859	98	New Pavement
*	56	98	Wall & Walks
*	537	98	Existing pavement
	1,452	98	Weighted Average
	1,452	98	100.00% Impervious Area

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

Summary for Subcatchment pS3: Post - Runoff to area drain

Runoff = 2.38 cfs @ 12.16 hrs, Volume= 8,958 cf, Depth= 5.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	14,168	74	>75% Grass cover, Good, HSG C
	5,944	70	Woods, Good, HSG C
*	0	98	Existing Pavement
	20,112	73	Weighted Average
	20,112	73	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0500	0.10		**Sheet Flow, AB**
					Grass: Bermuda n= 0.410 P2= 3.30"
1.1	100	0.0500	1.57		**Shallow Concentrated Flow, BC**
					Short Grass Pasture Kv= 7.0 fps
1.0	65	0.0500	1.12		**Shallow Concentrated Flow, CD**
					Woodland Kv= 5.0 fps
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, DE**
					Short Grass Pasture Kv= 7.0 fps
11.7	305	Total			

Summary for Subcatchment pS4: Post - Runoff down existing driveway

Runoff = 5.01 cfs @ 12.07 hrs, Volume= 17,243 cf, Depth= 7.76"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	5,313	74	>75% Grass cover, Good, HSG C
	257	70	Woods, Good, HSG C
*	20,106	98	Existing Pavement
*	1,004	98	Walks/Stairs/Dock
	26,680	93	Weighted Average
	5,570	74	20.88% Pervious Area
	21,110	98	79.12% Impervious Area

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

Summary for Subcatchment pS5: Post - Runoff to Johnnycake Hill Road

Runoff = 7.94 cfs @ 12.16 hrs, Volume= 29,971 cf, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
	47,993	74	>75% Grass cover, Good, HSG C
	15,536	70	Woods, Good, HSG C
*	245	98	Walks/Stairs/Dock
	2,157	98	Paved parking, HSG C
	65,931	74	Weighted Average
	63,529	73	96.36% Pervious Area
	2,402	98	3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	16	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
3.0	280	0.0500	1.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.6	346	Total			

Summary for Subcatchment RF1: Post - Northern Roof Runoff

Runoff = 1.48 cfs @ 12.07 hrs, Volume= 5,225 cf, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
7,500	98	Roofs, HSG C
7,500	98	100.00% Impervious Area

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

Summary for Subcatchment RF2: Post - Southwest Roof Runoff

Runoff = 0.74 cfs @ 12.07 hrs, Volume= 2,612 cf, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
3,750	98	Roofs, HSG C
3,750	98	100.00% Impervious Area

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

Summary for Subcatchment RF3: Post - Southeast Roof Runoff

Runoff = 0.74 cfs @ 12.07 hrs, Volume= 2,612 cf, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Description
3,750	98	Roofs, HSG C
3,750	98	100.00% Impervious Area

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

Summary for Pond STC: Post - STC

Inflow Area = 1,452 sf,100.00% Impervious, Inflow Depth = 8.36" for 100-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 1,012 cf
Outflow = 0.29 cfs @ 12.07 hrs, Volume= 1,012 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.29 cfs @ 12.07 hrs, Volume= 1,012 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.07' @ 12.07 hrs
Flood Elev= 78.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.70'	**6.0" Round Culvert** L= 13.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 76.70' / 76.55' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.28 cfs @ 12.07 hrs HW=77.07' TW=76.31' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.28 cfs @ 2.53 fps)

Summary for Pond TD: Post - Trench Drain

Inflow Area = 1,452 sf,100.00% Impervious, Inflow Depth = 8.36" for 100-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 1,012 cf
Outflow = 0.29 cfs @ 12.07 hrs, Volume= 1,012 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.29 cfs @ 12.07 hrs, Volume= 1,012 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.41' @ 12.07 hrs
Flood Elev= 78.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	**6.0" Round Culvert** L= 5.0' RCP, sq.cut end projecting, Ke= 0.500

Inlet / Outlet Invert= 77.00' / 76.95' S= 0.0100 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.28 cfs @ 12.07 hrs HW=77.40' TW=77.07' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.28 cfs @ 2.29 fps)

Summary for Pond US1: Post - Underground System-1

Inflow Area = 29,064 sf, 30.80% Impervious, Inflow Depth = 5.23" for 100-Year event
Inflow = 2.07 cfs @ 12.07 hrs, Volume= 12,673 cf
Outflow = 0.70 cfs @ 12.59 hrs, Volume= 12,673 cf, Atten= 66%, Lag= 31.1 min
Discarded = 0.05 cfs @ 12.40 hrs, Volume= 8,154 cf
Primary = 0.65 cfs @ 12.59 hrs, Volume= 4,520 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 75.96' @ 12.58 hrs Surf.Area= 2,314 sf Storage= 4,596 cf
Flood Elev= 76.00' Surf.Area= 2,314 sf Storage= 4,628 cf

Plug-Flow detention time= 497.6 min calculated for 12,663 cf (100% of inflow)
Center-of-Mass det. time= 498.3 min (1,306.0 - 807.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	72.50'	1,708 cf	**44.25'W x 52.28'L x 3.50'H Field A** 8,097 cf Overall - 2,920 cf Embedded = 5,177 cf x 33.0% Voids
#2A	73.00'	2,920 cf	**ADS_StormTech SC-740** x 63 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
#3	75.50'	0 cf	**0.50'D x 2.00'H Vertical Cone/Cylinder**
		4,628 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	75.75'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.40 hrs HW=75.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.64 cfs @ 12.59 hrs HW=75.96' TW=0.00' (Dynamic Tailwater)
└**2=Orifice/Grate** (Weir Controls 0.64 cfs @ 1.49 fps)

Summary for Pond US2: Post - Underground System-2

Inflow Area = 7,500 sf,100.00% Impervious, Inflow Depth = 8.36" for 100-Year event
Inflow = 1.48 cfs @ 12.07 hrs, Volume= 5,225 cf
Outflow = 0.19 cfs @ 12.61 hrs, Volume= 5,225 cf, Atten= 87%, Lag= 32.4 min
Discarded = 0.03 cfs @ 12.40 hrs, Volume= 4,567 cf
Primary = 0.15 cfs @ 12.61 hrs, Volume= 658 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 78.83' @ 12.61 hrs Surf.Area= 1,355 sf Storage= 2,608 cf
Flood Elev= 79.00' Surf.Area= 1,355 sf Storage= 2,684 cf

Plug-Flow detention time= 609.6 min calculated for 5,225 cf (100% of inflow)
Center-of-Mass det. time= 609.6 min (1,349.0 - 739.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	75.50'	1,013 cf	**30.00'W x 45.16'L x 3.50'H Field A** 4,742 cf Overall - 1,671 cf Embedded = 3,071 cf x 33.0% Voids
#2A	76.00'	1,671 cf	**ADS_StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	78.50'	0 cf	**0.50'D x 0.75'H Vertical Cone/Cylinder**
		2,684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	75.50'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	78.75'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.40 hrs HW=78.51' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.15 cfs @ 12.61 hrs HW=78.83' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.15 cfs @ 0.92 fps)

Time span=0.00-48.00 hrs, dt=0.04 hrs, 1201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Pond DMH1: Post - Drain Manhole Peak Elev=77.37' Inflow=0.10 cfs 308 cf
8.0" Round Culvert n=0.013 L=80.0' S=0.0100 '/' Outflow=0.10 cfs 308 cf

Pond DMH2: Post - Drain Manhole Peak Elev=76.54' Inflow=0.19 cfs 616 cf
8.0" Round Culvert n=0.013 L=75.0' S=0.0107 '/' Outflow=0.19 cfs 616 cf

Pond DMH3: Post - Drain Manhole Peak Elev=74.79' Inflow=0.23 cfs 735 cf
8.0" Round Culvert n=0.013 L=10.0' S=0.0120 '/' Outflow=0.23 cfs 735 cf

Pond pA1: Post - Analysis Point-1 Inflow=0.01 cfs 184 cf
Primary=0.01 cfs 184 cf

Pond pA2: Post - Analysis Point-2 Inflow=0.58 cfs 2,230 cf
Primary=0.58 cfs 2,230 cf

Pond pCB: Post - Area Drain Peak Elev=79.13' Storage=85 cf Inflow=0.00 cfs 85 cf
Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Reach pCF: Post - Driveway Channel Flow Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.013 L=260.0' S=0.0231 '/' Capacity=17.17 cfs Outflow=0.00 cfs 0 cf

Subcatchment pS1: Post - Runoff flow to pA1 Runoff Area=60,020 sf 0.41% Impervious Runoff Depth=0.04"
Flow Length=580' Slope=0.0500 '/' Tc=13.5 min CN=71/98 Runoff=0.01 cfs 184 cf

Subcatchment pS2: Post - New Parking Area Runoff Area=1,452 sf 100.00% Impervious Runoff Depth=0.99"
Tc=5.0 min CN=0/98 Runoff=0.04 cfs 119 cf

Subcatchment pS3: Post - Runoff to area drain Runoff Area=20,112 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=305' Slope=0.0500 '/' Tc=11.7 min CN=73/0 Runoff=0.00 cfs 85 cf

Subcatchment pS4: Post - Runoff down existing driveway Runoff Area=26,680 sf 79.12% Impervious Runoff Depth=0.79"
Tc=5.0 min CN=74/98 Runoff=0.54 cfs 1,763 cf

Subcatchment pS5: Post - Runoff to Johnnycake Hill Road Runoff Area=65,931 sf 3.64% Impervious Runoff Depth=0.08"
Flow Length=346' Slope=0.0500 '/' Tc=11.6 min CN=73/98 Runoff=0.05 cfs 467 cf

Subcatchment RF1: Post - Northern Roof Runoff Runoff Area=7,500 sf 100.00% Impervious Runoff Depth=0.99"
Tc=5.0 min CN=0/98 Runoff=0.19 cfs 616 cf

Subcatchment RF2: Post - Southwest Roof Runoff Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=0.99"
Tc=5.0 min CN=0/98 Runoff=0.10 cfs 308 cf

Subcatchment RF3: Post - Southeast Roof Runoff Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=0.99"
Tc=5.0 min CN=0/98 Runoff=0.10 cfs 308 cf

Pond STC: Post - STC Peak Elev=76.82' Inflow=0.04 cfs 119 cf
6.0" Round Culvert n=0.013 L=13.0' S=0.0115 '/' Outflow=0.04 cfs 119 cf

Pond TD: Post - Trench Drain Peak Elev=77.13' Inflow=0.04 cfs 119 cf
6.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.04 cfs 119 cf

Pond US1: Post - Underground System-1 Peak Elev=72.70' Storage=156 cf Inflow=0.23 cfs 735 cf
Discarded=0.05 cfs 735 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 735 cf

Pond US2: Post - Underground System-2 Peak Elev=75.88' Storage=169 cf Inflow=0.19 cfs 616 cf
Discarded=0.03 cfs 616 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 616 cf

Total Runoff Area = 189,195 sf Runoff Volume = 3,850 cf Average Runoff Depth = 0.24"
78.75% Pervious = 148,987 sf 21.25% Impervious = 40,208 sf

Summary for Pond DMH1: Post - Drain Manhole

Inflow Area = 23,862 sf, 15.72% Impervious, Inflow Depth = 0.15" for WQv event
Inflow = 0.10 cfs @ 12.07 hrs, Volume= 308 cf
Outflow = 0.10 cfs @ 12.07 hrs, Volume= 308 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 12.07 hrs, Volume= 308 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.37' @ 12.07 hrs
Flood Elev= 80.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	77.20'	**8.0" Round Culvert** L= 80.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.20' / 76.40' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.09 cfs @ 12.07 hrs HW=77.37' TW=76.54' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.09 cfs @ 2.00 fps)

Summary for Pond DMH2: Post - Drain Manhole

Inflow Area = 27,612 sf, 27.16% Impervious, Inflow Depth = 0.27" for WQv event
Inflow = 0.19 cfs @ 12.07 hrs, Volume= 616 cf
Outflow = 0.19 cfs @ 12.07 hrs, Volume= 616 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.07 hrs, Volume= 616 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 76.54' @ 12.07 hrs
Flood Elev= 80.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.30'	**8.0" Round Culvert** L= 75.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 76.30' / 75.50' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.19 cfs @ 12.07 hrs HW=76.54' TW=74.79' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.19 cfs @ 2.48 fps)

Summary for Pond DMH3: Post - Drain Manhole

Inflow Area = 29,064 sf, 30.80% Impervious, Inflow Depth = 0.30" for WQv event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 735 cf
Outflow = 0.23 cfs @ 12.07 hrs, Volume= 735 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.23 cfs @ 12.07 hrs, Volume= 735 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 74.79' @ 12.07 hrs
Flood Elev= 78.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	74.50'	**8.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 74.50' / 74.38' S= 0.0120 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.23 cfs @ 12.07 hrs HW=74.79' TW=72.60' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.23 cfs @ 2.31 fps)

Summary for Pond pA1: Post - Analysis Point-1

Inflow Area = 96,584 sf, 17.29% Impervious, Inflow Depth = 0.02" for WQv event
Inflow = 0.01 cfs @ 14.64 hrs, Volume= 184 cf
Primary = 0.01 cfs @ 14.64 hrs, Volume= 184 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond pA2: Post - Analysis Point-2

Inflow Area = 92,611 sf, 25.39% Impervious, Inflow Depth = 0.29" for WQv event
Inflow = 0.58 cfs @ 12.08 hrs, Volume= 2,230 cf
Primary = 0.58 cfs @ 12.08 hrs, Volume= 2,230 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2

Summary for Pond pCB: Post - Area Drain

Inflow Area = 20,112 sf, 0.00% Impervious, Inflow Depth = 0.05" for WQv event
Inflow = 0.00 cfs @ 12.55 hrs, Volume= 85 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 79.13' @ 24.72 hrs Surf.Area= 661 sf Storage= 85 cf
Flood Elev= 80.30' Surf.Area= 1,500 sf Storage= 1,167 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	1,167 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	612	0	0
80.00	978	795	795
80.30	1,500	372	1,167

Device	Routing	Invert	Outlet Devices
#1	Device 2	79.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	77.60'	**4.0" Round Culvert** L= 30.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 77.60' / 77.30' S= 0.0100 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

#3	Secondary	80.10'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=77.20' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.00 cfs of 0.35 cfs potential flow)
└**1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=79.50' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

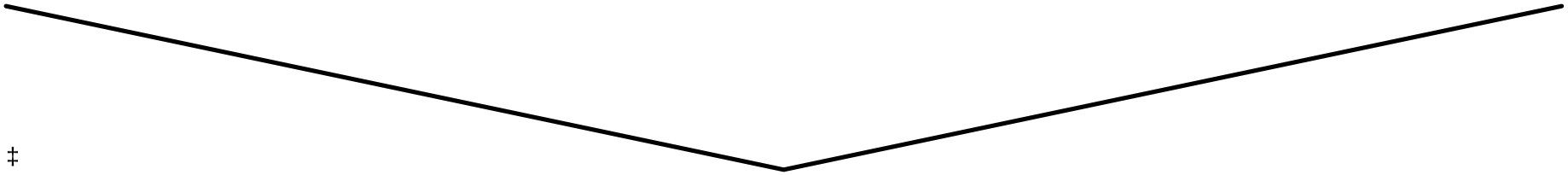
Summary for Reach pCF: Post - Driveway Channel Flow

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.50' Flow Area= 2.5 sf, Capacity= 17.17 cfs

Custom cross-section, Length= 260.0' Slope= 0.0231 '/'
Constant n= 0.013 Asphalt, smooth
Inlet Invert= 79.50', Outlet Invert= 73.50'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-5.00	0.50	0.00
0.00	0.00	0.50
5.00	0.50	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
0.50	2.5	10.0	650	17.17

Summary for Subcatchment pS1: Post - Runoff flow to pA1

Runoff = 0.01 cfs @ 14.64 hrs, Volume= 184 cf, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	16,507	74	>75% Grass cover, Good, HSG C
	43,269	70	Woods, Good, HSG C
*	244	98	Wall & Walks
	60,020	71	Weighted Average
	59,776	71	99.59% Pervious Area
	244	98	0.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
4.5	300	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
0.6	230	0.0500	5.90	29.51	**Channel Flow, CD** Area= 5.0 sf Perim= 10.2' r= 0.49' n= 0.035 Earth, dense weeds
13.5	580	Total			

Summary for Subcatchment pS2: Post - New Parking Area

Runoff = 0.04 cfs @ 12.07 hrs, Volume= 119 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
*	859	98	New Pavement
*	56	98	Wall & Walks
*	537	98	Existing pavement
	1,452	98	Weighted Average
	1,452	98	100.00% Impervious Area

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

Summary for Subcatchment pS3: Post - Runoff to area drain

Runoff = 0.00 cfs @ 12.55 hrs, Volume= 85 cf, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	14,168	74	>75% Grass cover, Good, HSG C
	5,944	70	Woods, Good, HSG C
*	0	98	Existing Pavement
	20,112	73	Weighted Average
	20,112	73	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0500	0.10		**Sheet Flow, AB**
					Grass: Bermuda n= 0.410 P2= 3.30"
1.1	100	0.0500	1.57		**Shallow Concentrated Flow, BC**
					Short Grass Pasture Kv= 7.0 fps
1.0	65	0.0500	1.12		**Shallow Concentrated Flow, CD**
					Woodland Kv= 5.0 fps
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, DE**
					Short Grass Pasture Kv= 7.0 fps
11.7	305	Total			

Summary for Subcatchment pS4: Post - Runoff down existing driveway

Runoff = 0.54 cfs @ 12.07 hrs, Volume= 1,763 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	5,313	74	>75% Grass cover, Good, HSG C
	257	70	Woods, Good, HSG C
*	20,106	98	Existing Pavement
*	1,004	98	Walks/Stairs/Dock
	26,680	93	Weighted Average
	5,570	74	20.88% Pervious Area
	21,110	98	79.12% Impervious Area

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

Summary for Subcatchment pS5: Post - Runoff to Johnnycake Hill Road

Runoff = 0.05 cfs @ 12.16 hrs, Volume= 467 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
	47,993	74	>75% Grass cover, Good, HSG C
	15,536	70	Woods, Good, HSG C
*	245	98	Walks/Stairs/Dock
	2,157	98	Paved parking, HSG C
	65,931	74	Weighted Average
	63,529	73	96.36% Pervious Area
	2,402	98	3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.30"
0.2	16	0.0500	1.12		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
3.0	280	0.0500	1.57		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.6	346	Total			

Summary for Subcatchment RF1: Post - Northern Roof Runoff

Runoff = 0.19 cfs @ 12.07 hrs, Volume= 616 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

Area (sf)	CN	Description
7,500	98	Roofs, HSG C
7,500	98	100.00% Impervious Area

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

Summary for Subcatchment RF2: Post - Southwest Roof Runoff

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 308 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

Area (sf)	CN	Description
3,750	98	Roofs, HSG C
3,750	98	100.00% Impervious Area

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

Summary for Subcatchment RF3: Post - Southeast Roof Runoff

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 308 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.04 hrs
Type III 24-hr WQv Rainfall=1.20"

Area (sf)	CN	Description
3,750	98	Roofs, HSG C
3,750	98	100.00% Impervious Area

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

Summary for Pond STC: Post - STC

Inflow Area = 1,452 sf,100.00% Impervious, Inflow Depth = 0.99" for WQv event
Inflow = 0.04 cfs @ 12.07 hrs, Volume= 119 cf
Outflow = 0.04 cfs @ 12.07 hrs, Volume= 119 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.04 cfs @ 12.07 hrs, Volume= 119 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 76.82' @ 12.07 hrs
Flood Elev= 78.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.70'	**6.0" Round Culvert** L= 13.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 76.70' / 76.55' S= 0.0115 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.04 cfs @ 12.07 hrs HW=76.82' TW=74.79' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.04 cfs @ 1.57 fps)

Summary for Pond TD: Post - Trench Drain

Inflow Area = 1,452 sf,100.00% Impervious, Inflow Depth = 0.99" for WQv event
Inflow = 0.04 cfs @ 12.07 hrs, Volume= 119 cf
Outflow = 0.04 cfs @ 12.07 hrs, Volume= 119 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.04 cfs @ 12.07 hrs, Volume= 119 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 77.13' @ 12.07 hrs
Flood Elev= 78.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	**6.0" Round Culvert** L= 5.0' RCP, sq.cut end projecting, Ke= 0.500

Inlet / Outlet Invert= 77.00' / 76.95' S= 0.0100 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.04 cfs @ 12.07 hrs HW=77.13' TW=76.82' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.04 cfs @ 1.42 fps)

Summary for Pond US1: Post - Underground System-1

Inflow Area = 29,064 sf, 30.80% Impervious, Inflow Depth = 0.30" for WQv event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 735 cf
Outflow = 0.05 cfs @ 12.00 hrs, Volume= 735 cf, Atten= 76%, Lag= 0.0 min
Discarded = 0.05 cfs @ 12.00 hrs, Volume= 735 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 72.70' @ 12.45 hrs Surf.Area= 2,313 sf Storage= 156 cf
Flood Elev= 76.00' Surf.Area= 2,314 sf Storage= 4,628 cf

Plug-Flow detention time= 15.2 min calculated for 735 cf (100% of inflow)
Center-of-Mass det. time= 15.2 min (796.3 - 781.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	72.50'	1,708 cf	**44.25'W x 52.28'L x 3.50'H Field A** 8,097 cf Overall - 2,920 cf Embedded = 5,177 cf x 33.0% Voids
#2A	73.00'	2,920 cf	**ADS_StormTech SC-740** x 63 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 9 rows
#3	75.50'	0 cf	**0.50'D x 2.00'H Vertical Cone/Cylinder**
		4,628 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	75.75'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.00 hrs HW=72.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=72.50' TW=0.00' (Dynamic Tailwater)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond US2: Post - Underground System-2

Inflow Area = 7,500 sf,100.00% Impervious, Inflow Depth = 0.99" for WQv event
Inflow = 0.19 cfs @ 12.07 hrs, Volume= 616 cf
Outflow = 0.03 cfs @ 11.88 hrs, Volume= 616 cf, Atten= 83%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.88 hrs, Volume= 616 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.04 hrs / 2
Peak Elev= 75.88' @ 12.53 hrs Surf.Area= 1,355 sf Storage= 169 cf
Flood Elev= 79.00' Surf.Area= 1,355 sf Storage= 2,684 cf

Plug-Flow detention time= 31.1 min calculated for 616 cf (100% of inflow)
Center-of-Mass det. time= 31.1 min (812.1 - 781.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	75.50'	1,013 cf	**30.00'W x 45.16'L x 3.50'H Field A** 4,742 cf Overall - 1,671 cf Embedded = 3,071 cf x 33.0% Voids
#2A	76.00'	1,671 cf	**ADS_StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	78.50'	0 cf	**0.50'D x 0.75'H Vertical Cone/Cylinder**
		2,684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	75.50'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	78.75'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 11.88 hrs HW=75.55' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=75.50' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

COMMERCIAL SITE REDEVELOPMENT

72 Johnnycake Hill Road - Middletown, RI

STORMWATER MANAGEMENT

STORMWATER RUNOFF VOLUME & FLOW RATES SUMMARY

SDE Job No.: 22085 Date: 11/8/2022 Revised:

Prepared by: SJE Checked by: MER

PRE-DEVELOPMENT

Analysis Points	Storm Event											
	1.2 inch Storm		1-yr		2-yr		10-yr		25-yr		100-yr	
(Subcatchment/Pond)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)
eA1	**0.01**	348	**1.00**	5,481	**1.44**	7,776	**3.09**	15,493	**4.46**	21,865	**7.50**	35,796.0
eA2	**0.59**	2,271	**2.23**	9,415	**2.92**	12,291	**5.68**	23,407	**8.67**	32,622	**14.23**	53,362.0
Totals	**0.60**	2,619	**3.23**	14,896	**4.36**	20,067	**8.77**	38,900	**13.13**	54,487	**21.73**	89,158.0

POST-DEVELOPMENT

Analysis Points	Storm Event											
	1.2 inch Storm		1-yr		2-yr		10-yr		25-yr		100-yr	
(Subcatchment/Pond)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)	Rate (cfs)	Vol. (cf)
pA1	**0.01**	184	**0.71**	3,281	**1.09**	4,739	**2.54**	10,263	**3.76**	16,070	**6.47**	30,774
pA2	**0.58**	2,230	**2.20**	9,300	**2.88**	12,066	**5.35**	21,857	**7.36**	30,357	**12.99**	49,384
Totals	**0.59**	2,414	**2.91**	12,581	**3.97**	16,805	**7.89**	32,120	**11.12**	46,427	**19.46**	80,158

Notes:

Totals *are the summations of the Analysis points values (Overall combine values leaving the site).*

Analysis points ***eA1*** *&* ***pA1*** *are pre-development and post-development comparisons. (Site's runoff flow to the Northwest)*

Analysis points eA1 & pA1 are pre-development and post-development comparisons. (Site's runoff flow to Johnnycake Hill Road)

Refer to Hydrocad® calculations for additional information.

COMMERCIAL SITE REDEVELOPMENT

72 Johnnycake Hill Road - Middletown, RI

STORMWATER MANAGEMENT

STORMWATER RECHARGE CALCULATION WORKSHEET

SDE Job No.: 22085 Date: 11/8/2022 Revised:

Prepared by: SJE Checked by: MER

Hydrologic Group	A	B	C	D	ReV
Target Runoff Depth Factor (Inches of Runoff)	0.60	0.35	0.25	0.10	**(cf)**
Total Increase of Impervious Areas, (sf):					
Proposed Driveway & Parking	1,452				
Proposed Buildings	15,000				
X inches of runoff, (cf)	823	0	0	0	823
Total Recharge Volume Required = 1" x F x Ai / 12 , (ac-ft.)				**Total ReV (cf) =**	**823**

Structure	Infiltration Rate (inches / hour)	Recharged Volume (cu.ft.)	ReV Volume Below Outlet Structure (cu.ft.)
Underground Infiltration System-1	1.02	2,800	4,437
Underground Infiltration System-1	1.02	1,606	2,572
Total Recharge Volume Provided, (cf) =		**4,408**	**7,009**

Note:

1. System Infiltration rates are derived from the 1982 Rawls rates based on field observed soil texture (HSG C).
2. Recharged volume are calculated utilizing Simple Dynamic Method : Automated
3. Calculations are based on 1-Yr , 24-Hr storm event.

COMMERCIAL SITE REDEVELOPMENT

72 Johnnycake Hill Road - Middletown, RI

STORMWATER MANAGEMENT

WATER QUALITY TREATMENT VOLUME CALCULATION WORKSHEET

SDE Job No.: 22085 Date: 11/8/2022 Revised:

Prepared by: SJE Checked by: MER

Impervious Area	**Area sf**		**X in. of runoff 1.0 cf**		**1.2 inch rainfall cf**
Total Impervious Area Excluding Roof	*1,452*		*121*		
Building Roof Area	*15,000*		*1,250*		
1.2 inch rainfall total runoff					**4,406**
Total Water Quality Volume , (cf) =			***1,371***		**4,406**
System Water Quality Volume **(volumes below lowest outlet device)**	*Impervious Area to BMP*	WQv	Treatment Required (cf)	Pretreatment Provided (cf)	Extended Treatment (cf)
(STC) Stormceptor 450i =	*1452*	121	25% = 30	30	
(BR1) Bio-Retention Basin-1 =			75% = 91		Stores & infiltrates WQv storm
	7,500	625	100% = 625		
(US2) Infiltration System-2 =	*7,500*	625	100% = 625		Stores & infiltrates WQv storm
Total =				30	1,341
Total Water Quality Volume Available , (cf) =			**1,371**		

Note:

1. Total water quality volume (WQV) in the 1.2 inch rainfall event is the inflow volume flowing toward the drainage system.
2. Recharged volume are calculated utilizing Simple Dynamic Method : Automated
3. Refer to HydroCAD report for additional information.

COMMERCIAL SITE REDEVELOPMENT

72 Johnnycake Hill Road - Middletown, RI

STORMWATER MANAGEMENT

TSS REMOVAL CALCULATION WORKSHEET

SDE Job No.: 22085 Date: 11/8/2022 Revised:

Prepared by: SJE Checked by: MER

Design Point PA1 - Westerly Abutter

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
Stormceptor 450i	25.0%	1.000	0.250	0.750
Underground Infiltration Chambers	90.0%	0.750	0.675	0.075
		0.075	0.000	0.075
		Total TSS Removal =	**92.5%**	

COMMERCIAL SITE REDEVELOPMENT

72 Johnnycake Hill Road - Middletown, RI

STORMWATER MANAGEMENT

REQUIRED RECHARGE VOLUME DRAWDOWN TIME CALCULATION WORKSHEET

SDE Job No.: 22085 Date: 11/8/2022 Revised:

Prepared by: SJE Checked by: MER

Infiltration Chambers

Parameters	Infiltration System-1			
Required Recharge Volume , ***ReV (cf)***	4,437			
Infiltration BMP Bottom Area , ***BA (sf)***	2,313			
Sat. Hydraulic Conductivity , ***K (in./hr)***	1.02			
Drawdown Time , T (hrs.) =	22.6	> 72 hours		

T = ***Rev / (K*** x ***BA)***

Infiltration Chambers

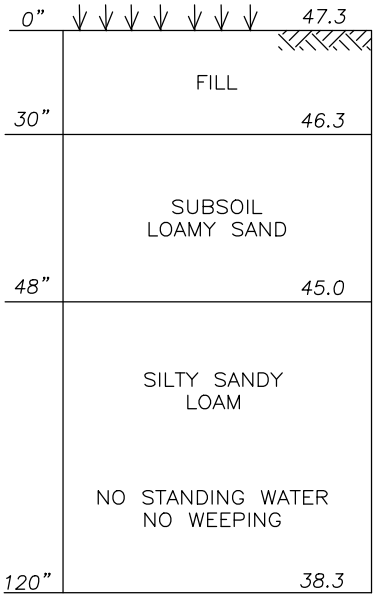
Parameters	Infiltration System-2			
Required Recharge Volume , ***ReV (cf)***	2,572			
Infiltration BMP Bottom Area , ***BA (sf)***	1,355			
Sat. Hydraulic Conductivity , ***K (in./hr)***	1.02			
Drawdown Time , T (hrs.) =	22.3	> 72 hours		

T = ***Rev / (K*** x ***BA)***

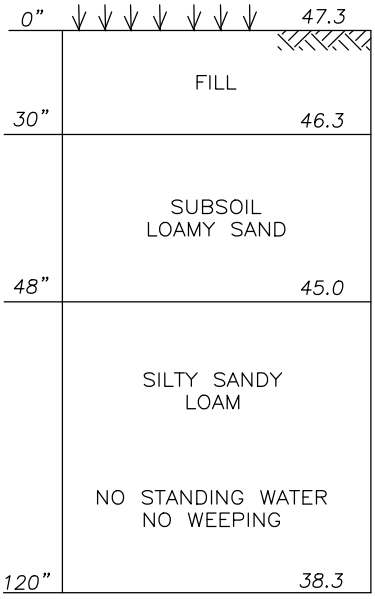
Note:

1. Volume are calculated utilizing Simple Dynamic Method : Automated
2. Required drawdown volume is based on storage volume below outlet pipe.
3. Calculations are based on 1-Yr , 24-Hr storm event.
4. System Infiltration rates are derived from the 1982 Rawls rates based on field observed soil texture (HSG C).
5. System is designed as non-infiltrating, infiltration rates were only applied to determine drawdown.
6. Refer to HydroCAD report for additional information.

TP–1



TP–2



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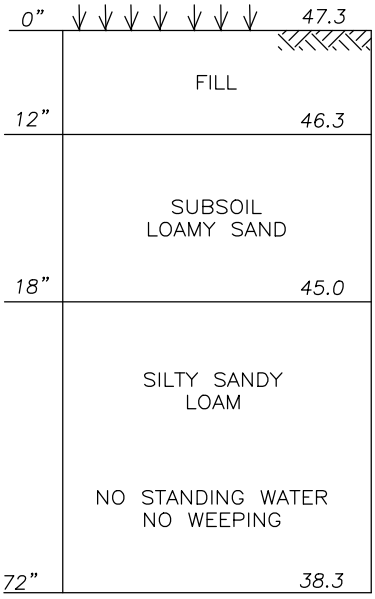
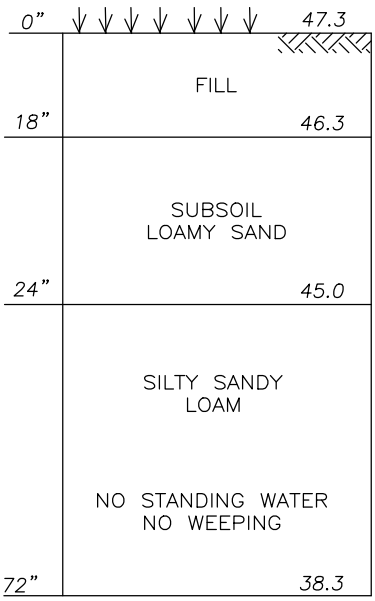


SOIL NOTES

SOIL EVALUATION PERFORMED BY
MICHAEL E. RUSSELL ON OCTOBER 17,
2022 & NOVEMBER 8, 2022.

TP–4



LDEC
Land Development Engineering & Consulting, LLC
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SOIL LOGS

72 JOHNNYCAKE HILL ROAD
MIDDLETOWN, RHODE ISLAND

ASSESSORS MAP 114, PARCEL 601

DATE: NOVEMBER 8, 2022			REV. DATE:
PROJ.#: 22085	SCALE : NTS	DRAWN BY: SJE	CHECK BY: MER
ISSUED FOR : PERMITTING			
PREPARED FOR: GG PROPERTIES, LLC.			

SIEVE ANALYSIS
USING MECHANICAL AND HYDROMETER METHODS

GENERAL DATA			
Project:	72 Johnny Cake Hill Rd	USDA Description:	Sandy Loam
Location:	Middletown, RI	Test Pit Number	TP-1
Date:	10/25/2022	Sample Number:	
		Tested By:	JC

MECHANICAL ANALYSIS I			
Container Number:	46	Container Mass, g:	101.87
Container & Wet Soil, g:	1972.45	Dry Soil Mass, g:	1701.83
Container & Dry Soil, g:	1803.70	Moisture Content, %:	9.9%
Mass of Water, g:	168.75	Control Sieve:	#270

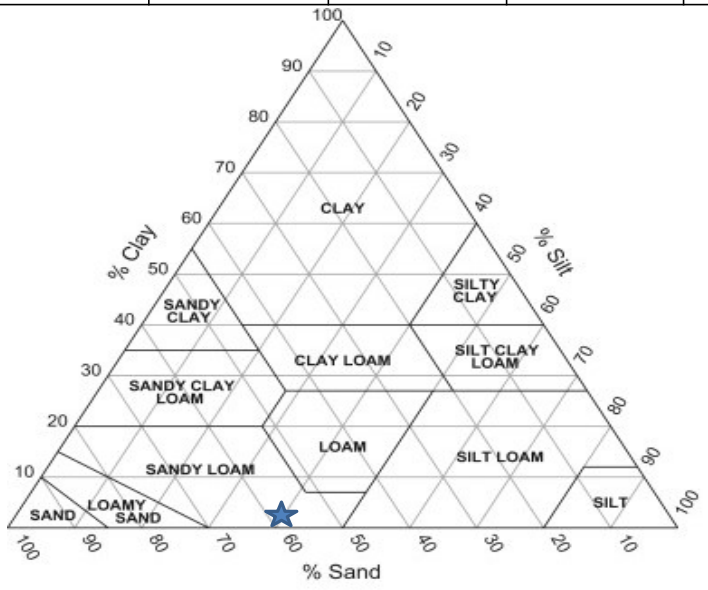
Sieve	Opening (mm)	Log Opening	Weight Retain (g)	Percent Retained	Total Percent Finer by Mass	Total Percent Finer by Mass (-#10 Sieve)
1"	25.400	1.405	0.00	0.00%	100.00%	100.00%
3/4"	19.100	1.281	120.67	7.09%	92.91%	100.00%
1/2"	12.700	1.104	277.43	16.30%	83.70%	100.00%
3/8"	9.525	0.979	322.42	18.95%	81.05%	100.00%
#4	4.760	0.678	422.18	24.81%	75.19%	100.00%
#10	2.000	0.301	517.98	30.44%	69.56%	100.00%
#20	0.840	-0.076	616.19	36.21%	63.79%	91.70%
#40	0.420	-0.377	708.18	41.61%	58.39%	83.93%
#60	0.250	-0.602	824.44	48.44%	51.56%	74.11%
#100	0.149	-0.827	951.79	55.93%	44.07%	63.36%
#200	0.074	-1.131	1158.92	68.10%	31.90%	45.86%
#270	0.053	-1.276	1213.59	71.31%	28.69%	41.24%
PAN	0	----	1701.83	100.00%	0.00%	0.00%

HYDROMETER ANALYSIS			
Hydrometer Type:	152H	Dispersing Agent:	Sodium Hexametaphosphate
Zero Correction:	5.5	Amount:	125 ml at 4 Percent Concentration
Meniscus:	0.5	Specific Gravity of Solids:	2.65 (Assumed)
Dry Mass of Sample, g:	50.00	Specific Gravity Correction Factor, a:	1
		Hygroscopic Correction Factor:	1

Date	Time of Reading	Time (min)	Temp (C)	Act Hyd	Cor Hyd	Act % Finer	Adj % Finer	Min Cor	L	L/t	A	Diameter (mm)	Total % Finer
25-Oct	8:54:00 AM	0											
25-Oct	8:54:30 AM	0.5	20.4	50.0	44.75	89.50%	41.04%	50.5	8.01	16.026	0.01358	0.0544	41.04%
25-Oct	8:55:00 AM	1	20.4	47.5	42.25	84.50%	38.75%	48.0	8.42	8.423	0.01358	0.0394	38.75%
25-Oct	8:56:00 AM	2	20.4	42.0	36.75	73.50%	33.71%	42.5	9.33	4.663	0.01358	0.0293	33.71%
25-Oct	8:58:00 AM	4	20.4	35.5	30.25	60.50%	27.75%	36.0	10.39	2.598	0.01358	0.0219	27.75%
25-Oct	9:02:00 AM	8	20.4	29.0	23.75	47.50%	21.78%	29.5	11.46	1.432	0.01358	0.0163	21.78%
25-Oct	9:09:00 AM	15	20.7	24.5	19.33	38.65%	17.72%	25.0	12.20	0.813	0.01353	0.0122	17.72%
25-Oct	9:24:00 AM	30	20.8	20.0	14.85	29.70%	13.62%	20.5	12.94	0.431	0.01351	0.0089	13.62%
25-Oct	9:54:00 AM	60	21.0	16.5	11.40	22.80%	10.46%	17.0	13.51	0.225	0.01348	0.0064	10.46%
25-Oct	10:54:00 AM	120	21.5	13.5	8.53	17.05%	7.82%	14.0	14.00	0.117	0.01304	0.0045	7.82%
25-Oct	12:54:00 PM	240	22.3	11.0	6.23	12.45%	5.71%	11.5	14.41	0.060	0.01327	0.0033	5.71%
25-Oct	4:54:00 AM	480	23.8	9.5	5.10	10.20%	4.68%	10.0	14.66	0.031	0.01330	0.0023	4.68%
26-Oct	8:54:00 AM	1440	21.8	9.0	4.10	8.20%	3.76%	9.5	14.74	0.010	0.01335	0.0014	3.76%

GRAINSIZE SUMMARY — From Split Sample - Percent Passing #10 Sieve

	Percent Gravel	Percent Sand	Percent Silt	Percent Clay	
Total		58.8%	36.6%	4.7%	



SIEVE ANALYSIS
USING MECHANICAL AND HYDROMETER METHODS

GENERAL DATA			
Project:	72 Johnny Cake	USDA Description:	Sandy Loam
Location:	Middletown, RI	Test Pit Number	TP-2
Date:	10/26/2022	Sample Number:	
		Tested By:	JC

MECHANICAL ANALYSIS I			
Container Number:	41	Container Mass, g:	174.13
Container & Wet Soil, g:	1966.02	Dry Soil Mass, g:	1589.42
Container & Dry Soil, g:	1763.55	Moisture Content, %:	12.7%
Mass of Water, g:	202.47	Control Sieve:	#270

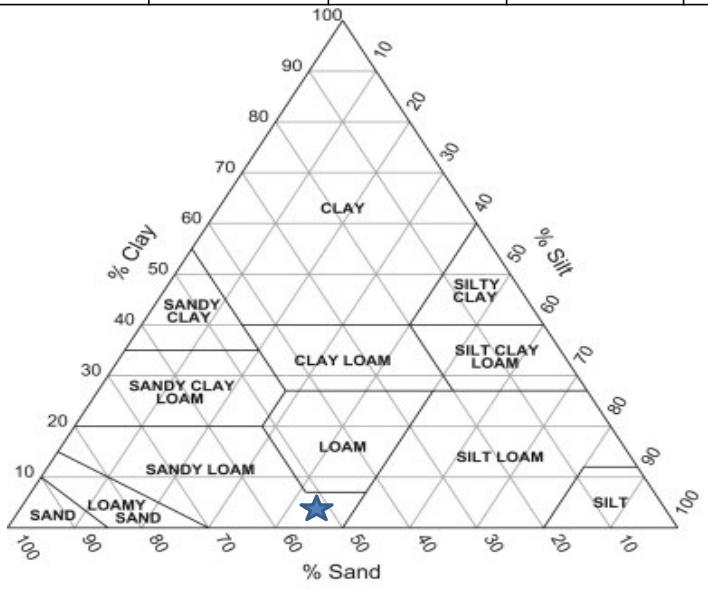
Sieve	Opening (mm)	Log Opening	Weight Retain (g)	Percent Retained	Total Percent Finer by Mass	Total Percent Finer by Mass (-#10 Sieve)
1"	25.400	1.405	0.00	0.00%	100.00%	100.00%
3/4"	19.100	1.281	39.42	2.48%	97.52%	100.00%
1/2"	12.700	1.104	109.52	6.89%	93.11%	100.00%
3/8"	9.525	0.979	141.72	8.92%	91.08%	100.00%
#4	4.760	0.678	217.62	13.69%	86.31%	100.00%
#10	2.000	0.301	299.63	18.85%	81.15%	100.00%
#20	0.840	-0.076	393.77	24.77%	75.23%	92.70%
#40	0.420	-0.377	488.68	30.75%	69.25%	85.34%
#60	0.250	-0.602	590.99	37.18%	62.82%	77.41%
#100	0.149	-0.827	714.52	44.95%	55.05%	67.83%
#200	0.074	-1.131	925.43	58.22%	41.78%	51.48%
#270	0.053	-1.276	965.77	60.76%	39.24%	48.35%
PAN	0	----	1589.42	100.00%	0.00%	0.00%

HYDROMETER ANALYSIS			
Hydrometer Type:	152H	Dispersing Agent:	Sodium Hexametaphosphate
Zero Correction:	6	Amount:	125 ml at 4 Percent Concentration
Meniscus:	1	Specific Gravity of Solids:	2.65 (Assumed)
Dry Mass of Sample, g:	40.40	Specific Gravity Correction Factor, a:	1
		Hygroscopic Correction Factor:	1

Date	Time of Reading	Time (min)	Temp (C)	Act Hyd	Cor Hyd	Act % Finer	Adj % Finer	Min Cor	L	L/t	A	Diameter (mm)	Total % Finer
26-Oct	8:55:00 AM	0											
26-Oct	8:55:30 AM	0.5	21.8	43.0	37.60	93.07%	47.91%	44.0	9.08	18.159	0.01335	0.0569	47.91%
26-Oct	8:55:00 AM	1	21.8	41.0	35.60	88.12%	45.36%	42.0	9.41	9.408	0.01335	0.0409	45.36%
26-Oct	8:57:00 AM	2	21.8	36.0	30.60	75.74%	38.99%	37.0	10.23	5.114	0.01335	0.0302	38.99%
26-Oct	8:59:00 AM	4	21.8	31.0	25.60	63.37%	32.62%	32.0	11.05	2.762	0.01335	0.0222	32.62%
26-Oct	9:03:00 AM	8	21.8	26.0	20.60	50.99%	26.25%	27.0	11.87	1.484	0.01335	0.0163	26.25%
26-Oct	9:10:00 AM	15	21.8	22.5	17.10	42.33%	21.79%	23.5	12.44	0.830	0.01335	0.0122	21.79%
26-Oct	9:25:00 AM	30	22.0	19.0	13.65	33.79%	17.39%	20.0	13.02	0.434	0.01332	0.0088	17.39%
26-Oct	9:55:00 AM	60	22.1	16.0	10.68	26.42%	13.60%	17.0	13.51	0.225	0.01330	0.0063	13.60%
26-Oct	10:55:00 AM	120	22.3	13.5	8.23	20.36%	10.48%	14.5	13.92	0.116	0.01327	0.0045	10.48%
26-Oct	12:55:00 PM	240	23.0	11.0	5.90	14.60%	7.52%	12.0	14.33	0.060	0.01316	0.0032	7.52%
26-Oct	4:55:00 PM	480	23.0	9.5	4.40	10.89%	5.61%	10.5	14.58	0.030	0.01316	0.0023	5.61%
27-Oct	8:54:00 AM	1440	22.1	9.0	3.68	9.10%	4.68%	10.0	14.66	0.010	0.01330	0.0013	4.68%

GRAINSIZE SUMMARY — From Split Sample - Percent Passing #10 Sieve

	Percent Gravel	Percent Sand	Percent Silt	Percent Clay	
Total		51.6%	42.7%	5.6%	



SIEVE ANALYSIS
USING MECHANICAL AND HYDROMETER METHODS

GENERAL DATA			
Project:	72 Johnny Cake Hill	USDA Description:	Sandy Loam
Location:	Middletown, RI	Test Pit Number	TP-3
Date:	10/27/2022	Sample Number:	
		Tested By:	JC

MECHANICAL ANALYSIS I			
Container Number:	43	Container Mass, g:	102.41
Container & Wet Soil, g:	1962.9	Dry Soil Mass, g:	1671.52
Container & Dry Soil, g:	1773.93	Moisture Content, %:	11.3%
Mass of Water, g:	188.97	Control Sieve:	#270

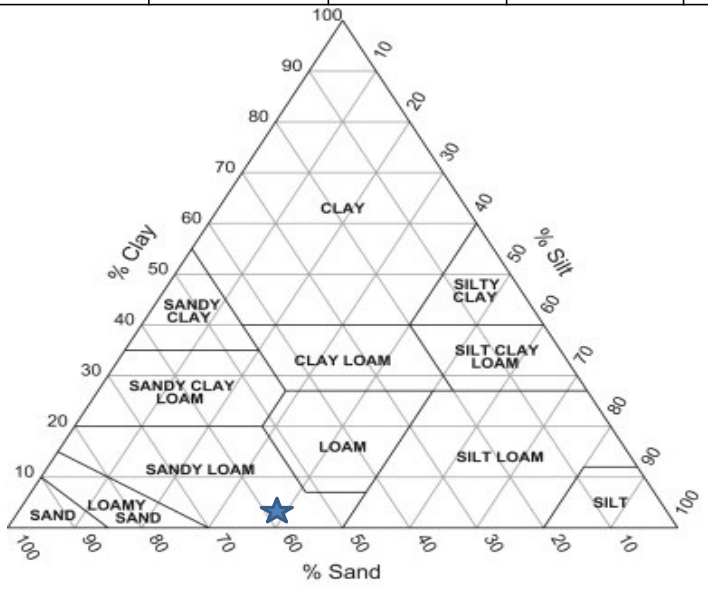
Sieve	Opening (mm)	Log Opening	Weight Retain (g)	Percent Retained	Total Percent Finer by Mass	Total Percent Finer by Mass (-#10 Sieve)
1"	25.400	1.405	0.00	0.00%	100.00%	100.00%
3/4"	19.100	1.281	58.70	3.51%	96.49%	100.00%
1/2"	12.700	1.104	108.15	6.47%	93.53%	100.00%
3/8"	9.525	0.979	157.51	9.42%	90.58%	100.00%
#4	4.760	0.678	257.20	15.39%	84.61%	100.00%
#10	2.000	0.301	358.98	21.48%	78.52%	100.00%
#20	0.840	-0.076	462.43	27.67%	72.33%	92.12%
#40	0.420	-0.377	582.10	34.82%	65.18%	83.00%
#60	0.250	-0.602	732.72	43.84%	56.16%	71.53%
#100	0.149	-0.827	909.74	54.43%	45.57%	58.04%
#200	0.074	-1.131	1112.56	66.56%	33.44%	42.59%
#270	0.053	-1.276	1148.37	68.70%	31.30%	39.86%
PAN	0	----	1671.52	100.00%	0.00%	0.00%

HYDROMETER ANALYSIS			
Hydrometer Type:	152H	Dispersing Agent:	Sodium Hexametaphosphate
Zero Correction:	6	Amount:	125 ml at 4 Percent Concentration
Meniscus:	1	Specific Gravity of Solids:	2.65 (Assumed)
Dry Mass of Sample, g:	50.00	Specific Gravity Correction Factor, a:	1
		Hygroscopic Correction Factor:	1

Date	Time of Reading	Time (min)	Temp (C)	Act Hyd	Cor Hyd	Act % Finer	Adj % Finer	Min Cor	L	L/t	A	Diameter (mm)	Total % Finer
27-Oct	8:46:00 AM	0											
27-Oct	8:46:30 AM	0.5	22.0	50.0	44.65	89.30%	38.03%	51.0	7.93	15.862	0.01332	0.0530	38.03%
27-Oct	8:47:00 AM	1	22.0	49.0	43.65	87.30%	37.18%	50.0	8.10	8.095	0.01332	0.0379	37.18%
27-Oct	8:48:00 AM	2	22.0	44.0	38.65	77.30%	32.92%	45.0	8.92	4.458	0.01332	0.0281	32.92%
27-Oct	8:50:00 AM	4	22.0	37.0	31.65	63.30%	26.96%	38.0	10.06	2.516	0.01332	0.0211	26.96%
27-Oct	8:54:00 AM	8	22.1	32.0	26.68	53.35%	22.72%	33.0	10.88	1.361	0.01330	0.0155	22.72%
27-Oct	9:01:00 AM	15	22.1	27.5	22.18	44.35%	18.89%	28.5	11.62	0.775	0.01330	0.0117	18.89%
27-Oct	9:16:00 AM	30	22.3	21.5	16.23	32.45%	13.82%	22.5	12.61	0.420	0.01327	0.0086	13.82%
27-Oct	9:46:00 AM	60	22.4	18.0	12.75	25.50%	10.86%	19.0	13.18	0.220	0.01326	0.0062	10.86%
27-Oct	10:46:00 AM	120	22.7	15.0	9.83	19.65%	8.37%	16.0	13.67	0.114	0.01321	0.0045	8.37%
27-Oct	12:46:00 PM	240	23.3	12.0	6.98	13.95%	5.94%	13.0	14.17	0.059	0.01311	0.0032	5.94%
27-Oct	4:46:00 PM	480	24.3	10.0	5.23	10.45%	4.45%	11.0	14.49	0.030	0.01295	0.0023	4.45%
28-Oct	8:46:00 AM	1440	20.2	9.5	3.70	7.40%	3.15%	10.5	14.58	0.010	0.01361	0.0014	3.15%

GRAINSIZE SUMMARY — From Split Sample - Percent Passing #10 Sieve

	Percent Gravel	Percent Sand	Percent Silt	Percent Clay	
Total		60.1%	35.4%	4.5%	



SIEVE ANALYSIS
USING MECHANICAL AND HYDROMETER METHODS

GENERAL DATA			
Project:	72 Johnny Cake Hill	USDA Description:	Sandy Loam
Location:	Middletown, RI	Test Pit Number	TP-4
Date:	10/31/2022	Sample Number:	
		Tested By:	JC

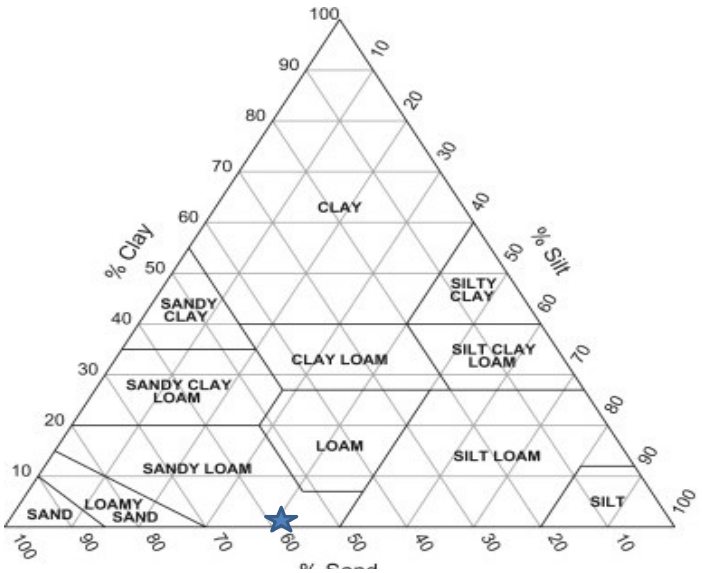
MECHANICAL ANALYSIS I			
Container Number:	61	Container Mass, g:	106.45
Container & Wet Soil, g:	1975.37	Dry Soil Mass, g:	1688.82
Container & Dry Soil, g:	1795.27	Moisture Content, %:	10.7%
Mass of Water, g:	180.1	Control Sieve:	#200

Sieve	Opening (mm)	Log Opening	Weight Retain (g)	Percent Retained	Total Percent Finer by Mass	Total Percent Finer by Mass (-#10 Sieve)
1-1/2"	38.100	1.706	109.53	6.49%	93.51%	100.00%
1"	25.400	1.405	180.20	10.67%	89.33%	100.00%
3/4"	19.100	1.281	196.31	11.62%	88.38%	100.00%
1/2"	12.700	1.104	283.09	16.76%	83.24%	100.00%
3/8"	9.525	0.979	371.65	22.01%	77.99%	100.00%
#4	4.760	0.678	464.93	27.53%	72.47%	100.00%
#10	2.000	0.301	560.51	33.19%	66.81%	100.00%
#20	0.840	-0.076	668.58	39.59%	60.41%	90.42%
#40	0.420	-0.377	787.51	46.63%	53.37%	79.88%
#60	0.250	-0.602	956.28	56.62%	43.38%	64.92%
#100	0.149	-0.827	1168.64	69.20%	30.80%	46.10%
#200	0.074	-1.131	1221.21	72.31%	27.69%	41.44%
#270	0.053	-1.276	1221.21	72.31%	27.69%	41.44%
PAN	0	----	1688.82	100.00%	0.00%	0.00%

HYDROMETER ANALYSIS			
Hydrometer Type:	152H	Dispersing Agent:	Sodium Hexametaphosphate
Zero Correction:	7	Amount:	125 ml at 4 Percent Concentration
Meniscus:	1	Specific Gravity of Solids:	2.65 (Assumed)
Dry Mass of Sample, g:	25.51	Specific Gravity Correction Factor, a:	1
		Hygroscopic Correction Factor:	1

Date	Time of Reading	Time (min)	Temp (C)	Act Hyd	Cor Hyd	Act % Finer	Adj % Finer	Min Cor	L	L/t	A	Diameter (mm)	Total % Finer
31-Oct	8:43:00 AM	0	20.2										
31-Oct	8:43:30 AM	0.5	20.2	29.0	22.20	87.02%	36.07%	30.0	11.38	22.754	0.01361	0.0649	36.07%
31-Oct	8:44:00 AM	1	20.2	28.5	21.70	85.06%	35.25%	29.5	11.46	11.459	0.01361	0.0461	35.25%
31-Oct	8:45:00 PM	2	20.2	26.5	19.70	77.22%	32.00%	27.5	11.79	5.894	0.01361	0.0330	32.00%
31-Oct	8:47:00 PM	4	20.2	23.0	16.20	63.50%	26.32%	24.0	12.36	3.090	0.01361	0.0239	26.32%
31-Oct	8:51:00 AM	8	20.2	19.0	12.20	47.82%	19.82%	20.0	13.02	1.627	0.01361	0.0174	19.82%
31-Oct	8:58:00 AM	15	20.2	17.0	10.20	39.98%	16.57%	18.0	13.35	0.890	0.01361	0.0128	16.57%
31-Oct	9:13:00 AM	30	20.5	14.0	7.28	28.52%	11.82%	15.0	13.84	0.461	0.01356	0.0092	11.82%
31-Oct	9:43:00 AM	60	20.7	12.0	5.33	20.87%	8.65%	13.0	14.17	0.236	0.01353	0.0066	8.65%
31-Oct	10:43:00 AM	120	21.2	10.0	3.45	13.52%	5.60%	11.0	14.49	0.121	0.01346	0.0047	5.60%
31-Oct	12:43:00 PM	240	22.0	9.0	2.65	10.39%	4.31%	10.0	14.66	0.061	0.01332	0.0033	4.31%
31-Oct	4:43:00 PM	480	22.8	8.0	1.85	7.25%	3.01%	9.0	14.82	0.031	0.01319	0.0023	3.01%
1-Nov	8:43:00 AM	1440	22.8	7.0	0.85	3.33%	1.38%	8.0	14.99	0.010	0.01319	0.0013	1.38%

GRAINSIZE SUMMARY	From Split Sample - Percent Passing #10 Sieve			
	Percent Gravel	Percent Sand	Percent Silt	Percent Clay
Total		58.6%	38.4%	3.0%



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

PROJECT NAME **Commercial Site Redevelopment**	**(RIDEM USE ONLY)** **STW/WQC File #:** **Date Received:**
TOWN **Middletown**	
BRIEF PROJECT DESCRIPTION: Construction of a 15,000 sf commercial structure with associated site improvements.	

Stormwater Management Plan (SMP) Elements – Minimum Standards

When submitting a SMP,[1] submit four separately bound documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to Suggestions to Promote Brevity**.**

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

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)

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

SITE INFORMATION

☒ Vicinity Map

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

☒ **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: North Easton Pond (Green End Pond)	☐ Coldwater	☒ Warmwater	☐ Unassessed
☒ Waterbody ID: RI0007035l-03	☒ 4th order stream of pond 50 acres or more		
☒ TMDL for: Total Phosphorus & Chlorophyll	☐ 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: Total Phosphorus, Chlorophyll a, Other flow regime alterations, Total Organic Carbon	☐ Contributes to shellfishing grounds		

[1] Applications for a Construction General Permit that do not require any other permits from RIDEM and will disturb less than 5 acres over the entire course of the project do not need to submit a SMP. The Appendix A checklist must still be submitted.

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 Land Revitalization and Sustainable Materials Management (OLRSMM)			
	☐ 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 OLRSMM 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**): 43,770 sf	
	☒ Total Site Area (**TSA**): 132,776	
	☒ Jurisdictional Wetlands (**JW**): 0 sf	
	☒ Conservation Land (**CL**): 0 sf	
☒ Calculate the Site Size (defined as contiguous properties under same ownership)		
	☒ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**): 43,770 sf	
	☒ (**TIA**) / (**SS**) = 0.33	☐ (**TIA**) / (**SS**) >**0.4**?
☐ YES, Redevelopment		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)
This section may be deleted if not required.

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

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

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

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

G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION ☐ Low-maintenance landscaping has been proposed using native species and cultivars ☐ Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan ☐ Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots	
H) RESTORE STREAMS/WETLANDS ☐ Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands ☐ Removal of invasive species ☐ Other	

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 OLRSMM Site Project Manager, per Part 1, Minimum Standard 8, been requested?

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

Design Point	**Impervious Area Treated (sq ft)**	**Total Re_v Required (cu ft)**	**LID Stormwater Credits (see RISDISM Section 4.6.1)**	**Recharge Required by Remaining BMPs (cu ft)**	**Recharge Provided by BMPs (cu ft)**
			Portion of Re_v directed to a QPA (cu ft)		
DP-1:	16,452	823	0	823	4,408
DP-2:					
DP-3:					
DP-4:					
TOTALS:					

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

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

See Appendix 2 in the stormwater Management Report

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

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

Design Point and WB ID	Impervious area treated (sq ft)	Total WQ_v Required (cu ft)	LID Stormwater Credits (see RICR 8.18) / WQv directed to a QPA (cu ft)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
DP-1:	16,452	1,371	0	1,371	WQv storm fully infiltrated on-site
DP-2:					
DP-3:					
DP-4:					
TOTALS:					

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

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

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

See Appendix 2 in the stormwater Management Report

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 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:					
DP-2:					
DP-3:					
DP-4:					
TOTALS:					
Note: The Channel Protection Volume Standard must be met in each waterbody ID.					
☐ 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):
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☐ TR-55 ☐ TR-20 ☐ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☐ Other (Specify):	
YES	**NO**		
☐	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☐	☐	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☐	☐	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☐	☐	Are the off-site areas shown on the subwatershed maps?	
☐	☐	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☐	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☐	☐	Calculate the following:	
		☐	Area of disturbance within the sub-watershed (areas)
		☐	Impervious cover (%)
☐	☐	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)
eA1/pA1	0.01	0.01	1.00	0.71	3.09	2.54	7.50	6.47
eA2/pA2	0.59	0.58	2.23	2.20	5.68	5.35	14.23	12.99
TOTALS:	0.60	0.59	3.23	2.91	8.77	7.89	21.73	19.46

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

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

Indicate as follows where the pertinent calculations and/or information for the items above are provided	**Name of report/document, page numbers, appendices, etc.**
Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.	See Appendix 1 of the Stormwater Management Report
Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.	See Appendix 1 of the Stormwater Management Report
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	See Appendix 1 of the Stormwater Management Report
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	See Appendix 1 of the Stormwater Management Report

Table 5-2 Summary of Best Management Practices											
BMP ID	**DP #**	**BMP Type** (e.g., bioretention, tree filter)	**BMP Functions**					**Bypass Type**	**Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4**		
			Pre-Treatment (Y/N/ NA)	Re_v	WQ_v	CP_v (Y/ N/ NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/ No	Technical Justification (Design Report page number)	Distance Provided
pA1	STC	Stormceptor	Y		30 cf			N/a	Y		
pA1	US1	Infiltration Chambers		2,800 cf	716 cf			N/a	Y		
pA1	US2	Infiltration Chambers		1,606 cf	625 cf			N/a	Y		
		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					
pA1	US1	Infiltration Chambers	TP-1	TP-2	68.0	72.50	4.5’	A	1.02
pA1	US2	Infiltration Chambers	TP-2	TP-1	71.0	75.50	4.5’	A	1.02
		TOTALS:							

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

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

ILLICIT DISCHARGES – MINIMUM STANDARD 9			
Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.			
YES	**NO**	**N/A**	
☒	☐	☐	Have you checked for illicit discharges?
☐	☒	☐	Have any been found and/or corrected? If “Yes,” please identify.
☐	☐	☐	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10				
YES	**NO**	**N/A**		
☒	☐	☐	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?	
☒	☐	☐	Have you provided a **separately-bound** document based upon the SESC Template? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).	
			If "No," include a document with your submittal that addresses the following elements of an SESC Plan:	
			☐	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
			☐	Provide Natural Buffers and Maintain Existing Vegetation
			☐	Minimize Area of Disturbance
			☐	Minimize the Disturbance of Steep Slopes
			☐	Preserve Topsoil
			☐	Stabilize Soils
			☐	Protect Storm Drain Inlets
			☐	Protect Storm Drain Outlets
			☐	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
			☐	Establish Perimeter Controls and Sediment Barriers
			☐	Divert or Manage Run-On from Up-Gradient Areas
			☐	Properly Design Constructed Stormwater Conveyance Channels
			☐	Retain Sediment On-Site
			☐	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
			☐	Apply Construction Activity Pollution Prevention Control Measures
			☐	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
			☐	Qualified SESC Plan Preparer's Information and Certification
			☐	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
			☐	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9		
Operation and Maintenance Section		
YES	**NO**	
☒	☐	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
☒	☐	Have you provided a **separately-bound** Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
☒	☐	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
☒	☐	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
☐	☒	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). If "Yes," have you obtained them? Or please explain your plan to obtain them:

☐	☒	Is stormwater being directed from public areas to private property? If "Yes," note the following: Note: This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.
Pollution Prevention Section		
☐	☒	Designated snow stockpile locations?
☐	☒	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
☐	☒	Asphalt-only based sealants?
☐	☒	Pet waste stations? (Note: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
☐	☒	Regular sweeping? Please describe:
☐	☒	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:
		☒	Laboratory Testing by Paul B. Aldinger and Associates, Inc.
		☒	RI-registered P.E. Name: Michael E. Russell, P.E.

Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	**First Receiving Water ID or MS4**	**Area Disturbed (units)**	**Existing Impervious (units)**	**Proposed Impervious (units)**
DP-1:	**RI0007035I-03**	189,195 sf.	24,554 sf	40,208 sf
DP-2:				
DP-3:				
DP-4:				
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 OLRSMM-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

Detailed Stormceptor Sizing Report – 22085 Johnnycake Hill

Project Information & Location			
Project Name	Johnnycake Hill Road - Redevelopment	**Project Number**	22085
City	Middletown	**State/ Province**	Rhode Island
Country	United States of America	**Date**	11/10/2022
Designer Information		**EOR Information (optional)**	
Name	Sarah Earle	**Name**	
Company	LDEC	**Company**	
Phone #	774-226-5434	**Phone #**	
Email	searle@sde-ldec.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	22085 Johnnycake Hill
Recommended Stormceptor Model	STC 450i
Target TSS Removal (%)	25.0
TSS Removal (%) Provided	97
PSD	Fine Distribution
Rainfall Station	PROVIDENCE WSO AIRPORT

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	97
STC 900	99
STC 1200	99
STC 1800	99
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

Stormceptor

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour).
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

State/Province	Rhode Island	**Total Number of Rainfall Events**	7929
Rainfall Station Name	PROVIDENCE WSO AIRPORT	**Total Rainfall (in)**	2585.3
Station ID #	6698	**Average Annual Rainfall (in)**	44.6
Coordinates	41°43'19"N, 71°25'57"W	**Total Evaporation (in)**	207.3
Elevation (ft)	51	**Total Infiltration (in)**	0.0
Years of Rainfall Data	58	**Total Rainfall that is Runoff (in)**	2378.0

Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (acres)	0.03
Imperviousness %	100.0

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Water Quality Objective	
TSS Removal (%)	25.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	0.29
Water Quality Flow Rate (CFS)	0.04

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Design Details	
Stormceptor Inlet Invert Elev (ft)	76.95
Stormceptor Outlet Invert Elev (ft)	76.70
Stormceptor Rim Elev (ft)	78.50
Normal Water Level Elevation (ft)	
Pipe Diameter (in)	6
Pipe Material	HDPE - plastic
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	22085 Johnnycake Hill

Site Details

Drainage Area

Total Area (acres)	0.03
Imperviousness %	100.0

Surface Characteristics

Width (ft)	72.00
Slope %	2
Impervious Depression Storage (in)	0.02
Pervious Depression Storage (in)	0.2
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (in/hr)	2.44
Min. Infiltration Rate (in/hr)	0.4
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (in/day)	0.1

Dry Weather Flow

Dry Weather Flow (cfs)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

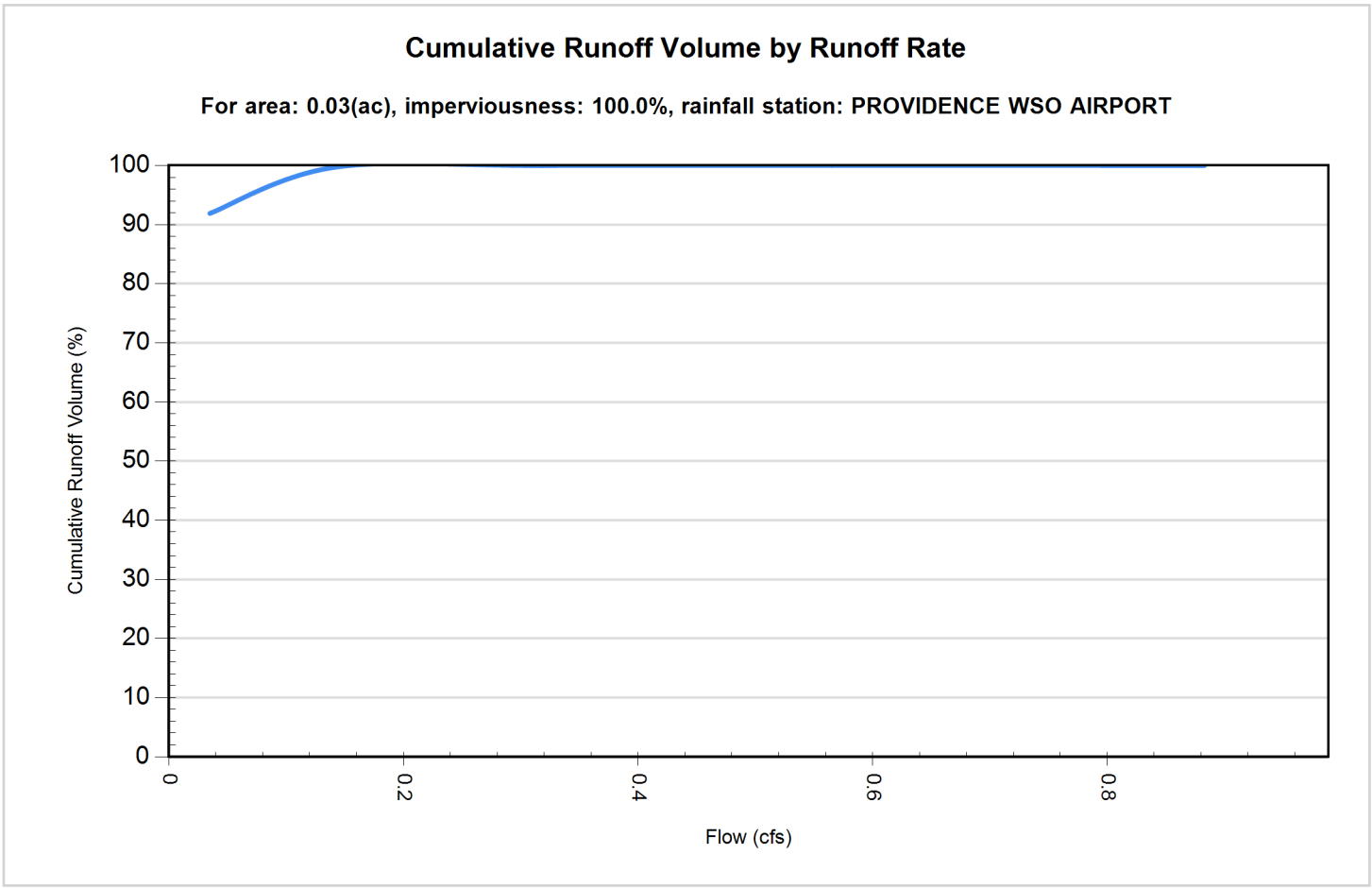
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

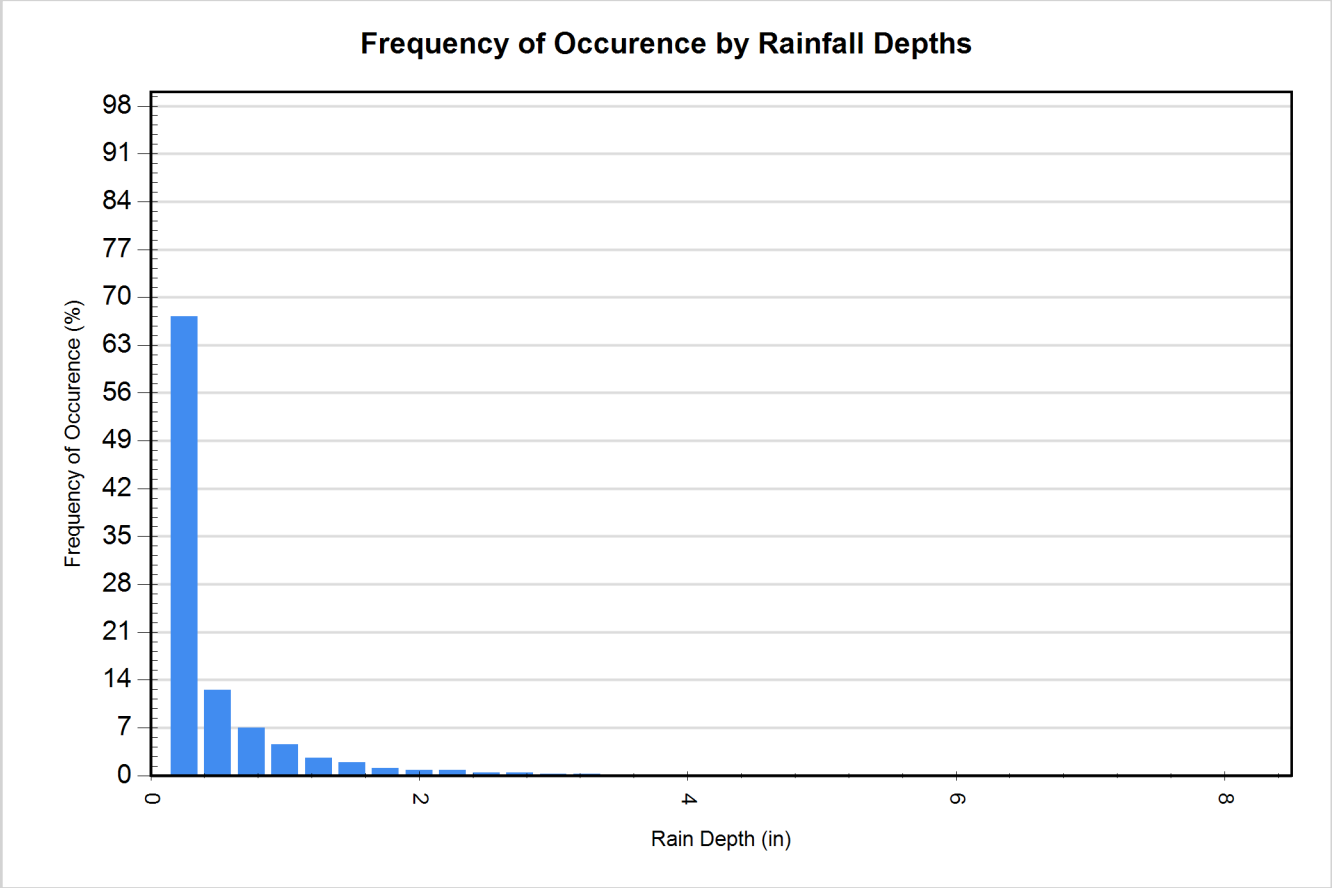
TSS Availability Parameters

Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (cfs)	Runoff Volume (ft³)	Volume Over (ft³)	Cumulative Runoff Volume (%)
0.035	245317	21644	91.9
0.141	266244	720	99.7
0.318	266964	0	100.0
0.565	266964	0	100.0
0.883	266964	0	100.0



Rainfall Event Analysis				
Rainfall Depth (in)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (in)**	**Percentage of Annual Volume (%)**
0.25	5329	67.2	356	13.8
0.50	990	12.5	359	13.9
0.75	553	7.0	344	13.3
1.00	362	4.6	319	12.4
1.25	207	2.6	232	9.0
1.50	151	1.9	208	8.0
1.75	91	1.1	148	5.7
2.00	64	0.8	120	4.6
2.25	60	0.8	128	4.9
2.50	29	0.4	69	2.7
2.75	34	0.4	89	3.5
3.00	16	0.2	46	1.8
3.25	15	0.2	47	1.8
3.50	9	0.1	30	1.2
3.75	4	0.1	14	0.6
4.00	1	0.0	4	0.2
4.25	4	0.1	17	0.6
4.50	3	0.0	13	0.5
4.75	0	0.0	0	0.0
5.00	3	0.0	15	0.6
5.25	1	0.0	5	0.2
5.50	0	0.0	0	0.0
5.75	0	0.0	0	0.0
6.00	0	0.0	0	0.0
6.25	0	0.0	0	0.0
6.50	0	0.0	0	0.0
6.75	1	0.0	7	0.3
7.00	0	0.0	0	0.0
7.25	0	0.0	0	0.0
7.50	1	0.0	7	0.3
7.75	0	0.0	0	0.0
8.00	0	0.0	0	0.0
8.25	1	0.0	8	0.3
8.25	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

WATERSHED LEGEND

- 1 — SUBCATCHMENT AREA
- 1 — POND / STRUCTURE
- 1 — REACH / CHANNEL
- A → B — Tc–FLOWPATH PRE–DEVELOPMENT (START → END)
- PRE–DEVELOPMENT SUBCATCHMENT BOUNDARY

60 0 30 60 120

SCALE: 1 INCH = 60 FEET

PRE DEVELOPMENT WATERSHED PLAN

72 JOHNNYCAKE HILL ROAD
MIDDLETOWN, RHODE ISLAND

ASSESSORS MAP 114, PARCEL 601

DATE: NOVEMBER 1, 2022	REV. DATE:
PROJ.#: 22085	SCALE : 1" = 60'
DRAWN BY: SJE	CHECK BY: MER
ISSUED FOR : PERMITTING	

PREPARED FOR: GG PROPERTIES, LLC.

LDEC
Land Development Engineering & Consulting, LLC
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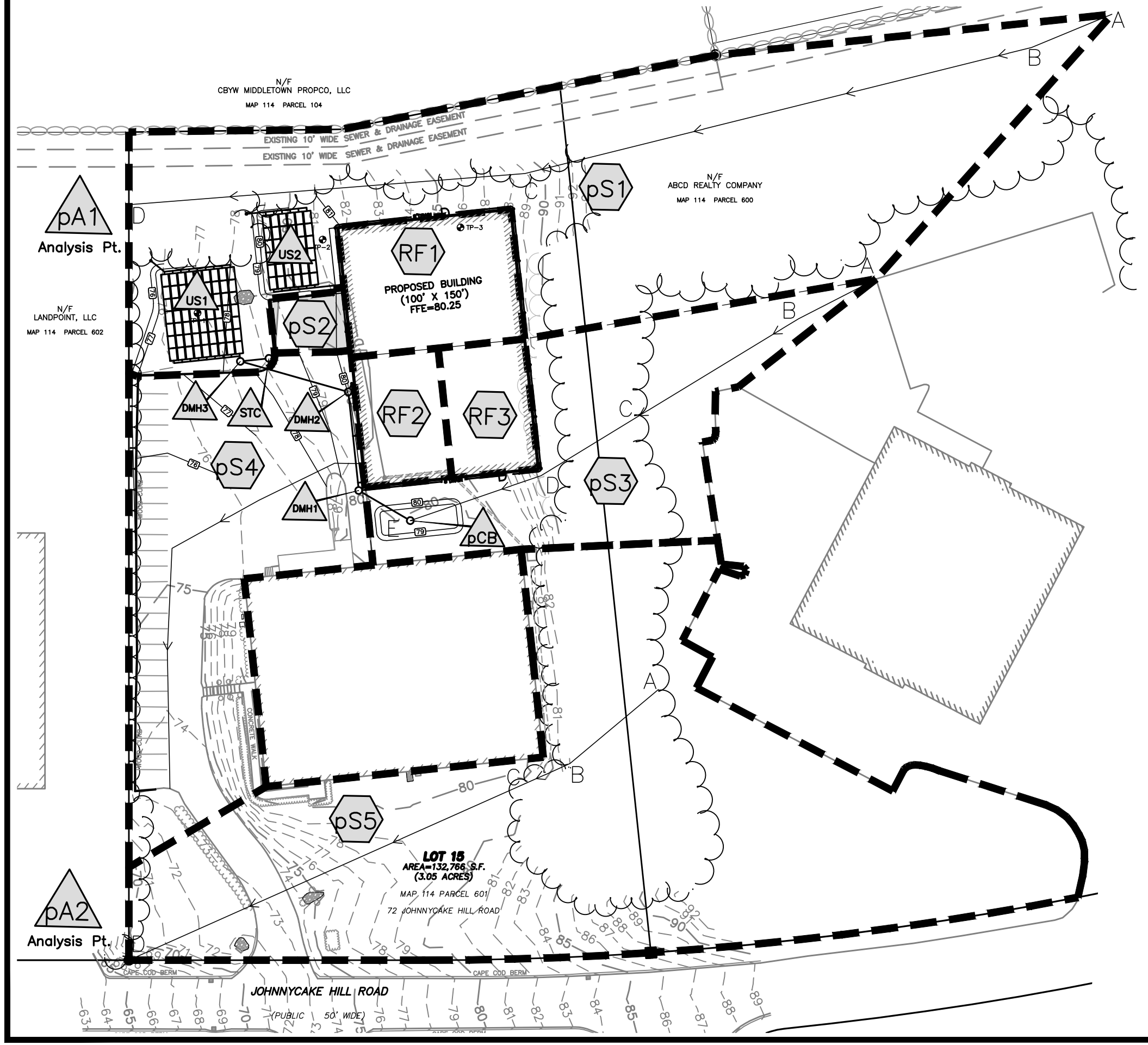

WATERSHED LEGEND

- 1 — SUBCATCHMENT AREA
- 1 — POND / STRUCTURE
- 1 — REACH / CHANNEL
- A → B — Tc–FLOWPATH (START → END) POST–DEVELOPMENT
- POSTE–DEVELOPMENT SUBCATCHMENT BOUNDARY

60 0 30 60 120

SCALE: 1 INCH = 60 FEET

POST DEVELOPMENT WATERSHED PLAN

72 JOHNNYCAKE HILL ROAD
MIDDLETOWN, RHODE ISLAND

ASSESSORS MAP 114, PARCEL 601

DATE:	REV. DATE:
NOVEMBER 1, 2022	

PROJ.#:	SCALE :	DRAWN BY:	CHECK BY:
22085	1" = 60'	SJE	MER

ISSUED FOR : PERMITTING

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