

STORMWATER REPORT

**79 Hill Street, Lot 10
Topsfield, Massachusetts**

February 15, 2023

Applicant:
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15 Timber Lane
Topsfield, MA 01983

Prepared By
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W&S Project Data
TOPS-0077
Shill#79.dwg
EXISTING.hcp
PROPOSED.hcp
p:\TOPS-0077(79 Hill Street)\drainage\stormwater_report.docx



Project Narrative

The subject property is located at 79 Hill Street in Topsfield located within the O-R-A Zoning District. It is currently an undeveloped lot covered by trees and undergrowth with remains of old foundations and stone walls present on the lot.

The proposal is to construct a four-bedroom (9 Habitable Room Max.) single family house on the lot. Coinciding with this proposal will be the construction of a paved driveway, regrading a portion of the lot, a proposed septic system and proposed stormwater management area to capture roof runoff.

Peak Rate Runoff Tables

Examining the following Peak Rate/Volume of Runoff and Basin Performance table, the proposed stormwater management system is effective for mitigating the peak flow rates from the limit of watershed analysis for the 2-year, 10-year and 100-year storm events using the NOAA-14 Atlas Point Precipitation Frequency Estimates in order to be conservative. See attached table.

Total Peak Runoff Tables

Table 1.0: Total Peak Rate of Runoff Comparison Location 1L				
Description	2 Year	10 Year		100 Year
Existing Peak Rate of Runoff (cfs)	1.23	3.29		7.18
Proposed Peak Rate of Runoff (cfs)	1.20	3.10		6.56
Difference	-0.03	-0.19		-0.62

Table 1.1: Total Peak Volume of Runoff Comparison Location 1L				
Description	2 Year	10 Year		100 Year
Existing Peak Volume of Runoff (cf)	6,247	15,447		32,942
Proposed Peak Volume of Runoff (cf)	5,843	13,965		29,151
Difference	-404	-1,482		-3,971

Drawdown Within 72 Hours:

$$T_{\text{drawdown}} = [R_v \text{ total} / (K)(\text{Bottom Area})]$$

Stormwater Management Area 1P – Roof Recharge System

$$R_{v\ 1P} = 996 \text{ ft}^3 \text{ (peak volume in 100yr storm)}$$

$$K = 1.02 \text{ in/hr (Rawls Rate)}$$

$$\text{Bottom Area} = 504 \text{ ft}^2$$

$$T_{\text{drawdown}} = 996 / [(1.02)(504)/12] = 23.2 \text{ hours} < 72 \text{ hours}$$

Stormwater Management Area 2P – Stormwater Management Area for driveway & front yard

$$R_{v\ 2P} = 3,545 \text{ ft}^3 \text{ (peak volume in 100yr storm)}$$

$$K = 1.02 \text{ in/hr (Rawls Rate)}$$

$$\text{Bottom Area} = 1150 \text{ ft}^2$$

$$T_{\text{drawdown}} = 3545 / [(1.02)(1150)/12] = 36.3 \text{ hours} < 72 \text{ hours}$$

Recharge Volume:

$$R_v \text{ required} = (\text{Impervious Area}) (F)$$

Site consists of Hydrologic Soils Group C: $F_C = 0.25 \text{ in.}$

Site Impervious Area Draining to Recharge Facilities:

Stormwater Management Area 1P– Roof Recharge System

$$A_{\text{imp C soils}} = 2,547 \text{ ft}^2$$

$$R_v \text{ required} = [(2,547) (0.25)/12] = 53.0 \text{ ft}^3$$

$$R_v \text{ provided} = 1,110 \text{ ft}^3; \text{ Therefore Okay}$$

Stormwater Management Area 2P Stormwater Management Area for driveway & front yard

$$A_{\text{imp C soils}} = 4419 \text{ ft}^2$$

$$R_v \text{ required} = [(4419) (0.25)/12] = 92.1 \text{ ft}^3$$

$$R_v \text{ provided} = 3717 \text{ ft}^3 \text{ below outlet; Therefore Okay}$$

Water Quality Volume:

$$V_{\text{wq required}} = (A_{\text{imp}})(D_{\text{wq}})$$

$$D_{\text{WQ}} = 0.5 \text{ in}$$

Stormwater Management Area 1P– Roof Recharge System

$$V_{\text{wq required}} = [(0) (0.5)/12] = 0 \text{ ft}^3$$

Exempt from this requirement, roof runoff only considered clean by DEP for certain types

Stormwater Management Area 1P– Stormwater Management Area for driveway & front yard

$$V_{\text{wq required}} = [(4419) (0.5)/12] = 184.1 \text{ ft}^3$$

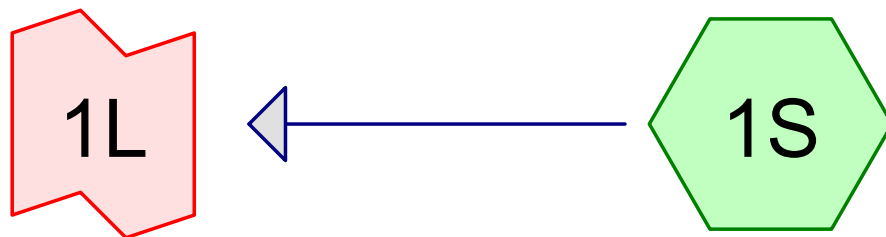
$$V_{\text{wq provided}} = 3717 \text{ ft}^3 \text{ below outlet; Therefore Okay}$$

HydroCAD Data



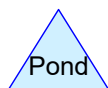
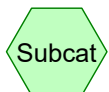
Existing Condition





Flow to the West

Existing Condition



Routing Diagram for EXISTING

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EXISTING

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.29	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.19	2
3	100-yr	Type III 24-hr		Default	24.00	1	8.21	2

EXISTING

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,375	74	>75% Grass cover, Good, HSG C (1S)
82,722	70	Woods, Good, HSG C (1S)
85,097	70	TOTAL AREA

EXISTING

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
85,097	HSG C	1S
0	HSG D	
0	Other	
85,097		TOTAL AREA

EXISTING

Type III 24-hr 2-yr Rainfall=3.29"

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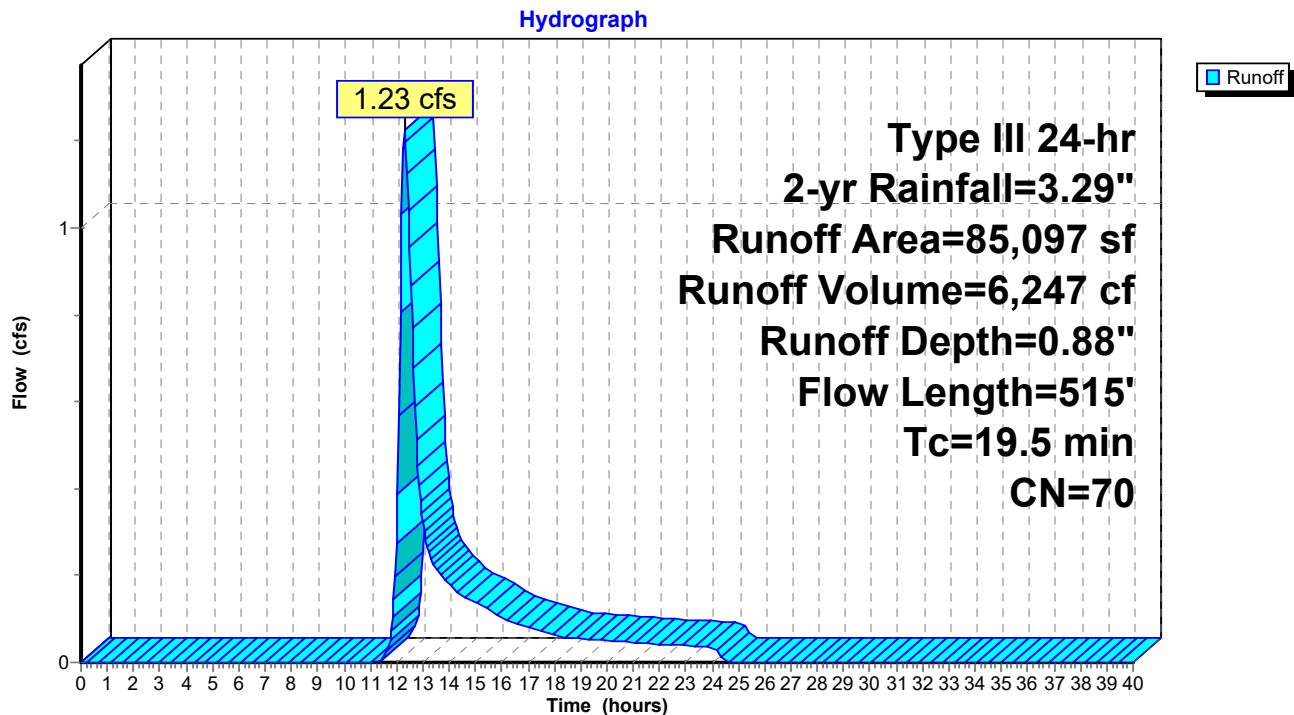
Summary for Subcatchment 1S: Existing Condition

Runoff = 1.23 cfs @ 12.31 hrs, Volume= 6,247 cf, Depth= 0.88"
 Routed to Link 1L : Flow to the West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
82,722	70	Woods, Good, HSG C
2,375	74	>75% Grass cover, Good, HSG C
85,097	70	Weighted Average
85,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0680	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
6.5	415	0.0450	1.06		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.5	515	Total			

Subcatchment 1S: Existing Condition

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Existing Condition Watershed Analysis - 79 Hill Street Topsfield MA

Type III 24-hr 2-yr Rainfall=3.29"

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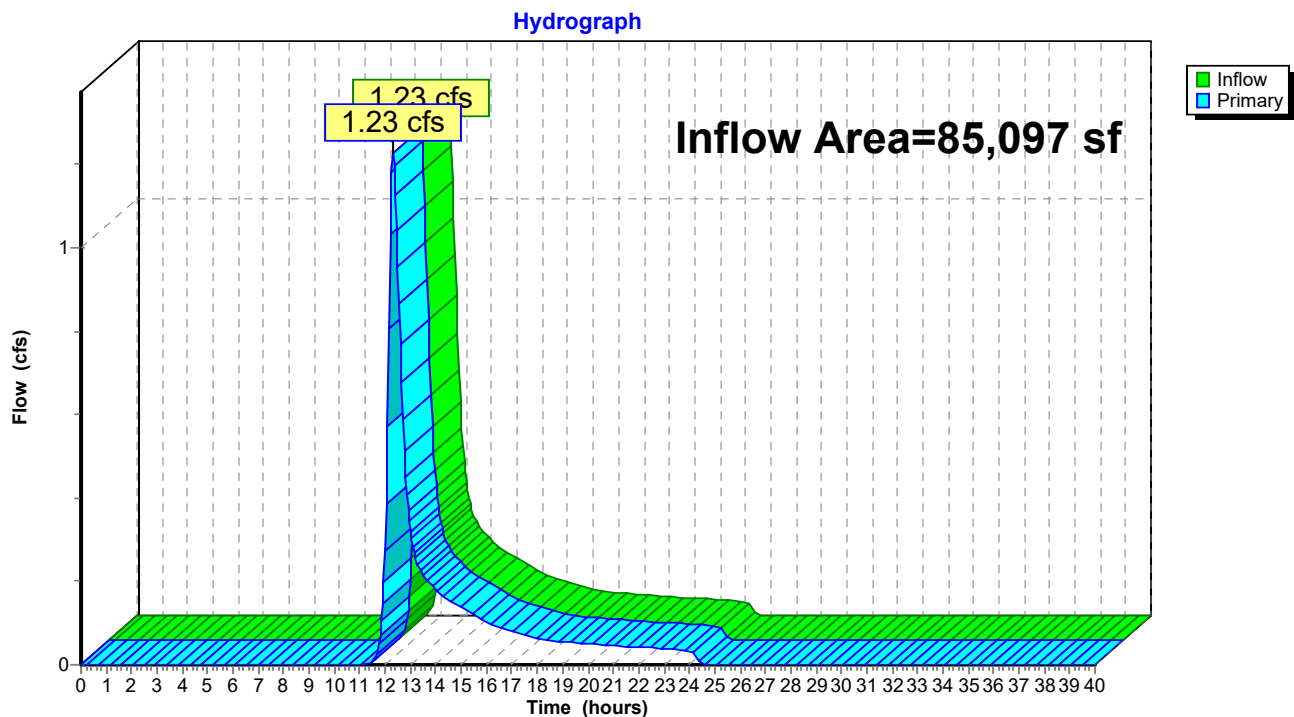
Page 6

Summary for Link 1L: Flow to the West

Inflow Area = 85,097 sf, 0.00% Impervious, Inflow Depth = 0.88" for 2-yr event
Inflow = 1.23 cfs @ 12.31 hrs, Volume= 6,247 cf
Primary = 1.23 cfs @ 12.31 hrs, Volume= 6,247 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Flow to the West



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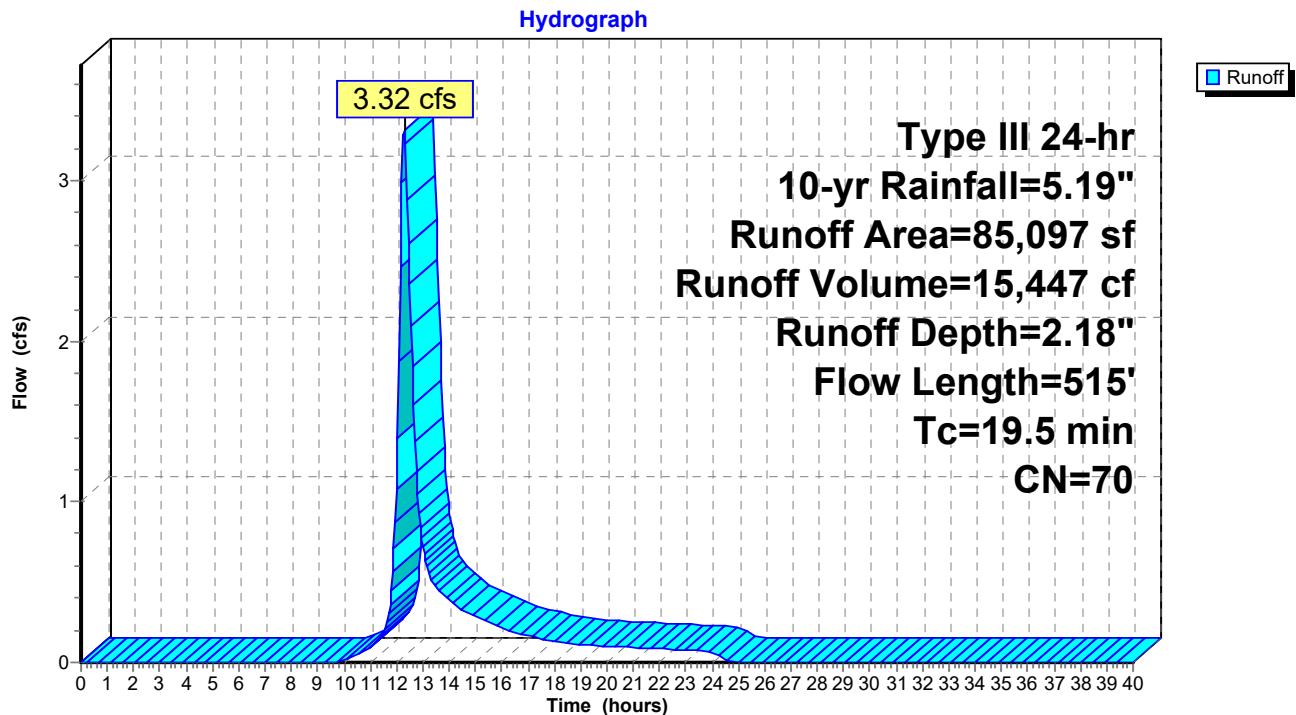
Summary for Subcatchment 1S: Existing Condition

Runoff = 3.32 cfs @ 12.28 hrs, Volume= 15,447 cf, Depth= 2.18"
 Routed to Link 1L : Flow to the West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
82,722	70	Woods, Good, HSG C
2,375	74	>75% Grass cover, Good, HSG C
85,097	70	Weighted Average
85,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0680	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
6.5	415	0.0450	1.06		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.5	515	Total			

Subcatchment 1S: Existing Condition

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Existing Condition Watershed Analysis - 79 Hill Street Topsfield MA

Type III 24-hr 10-yr Rainfall=5.19"

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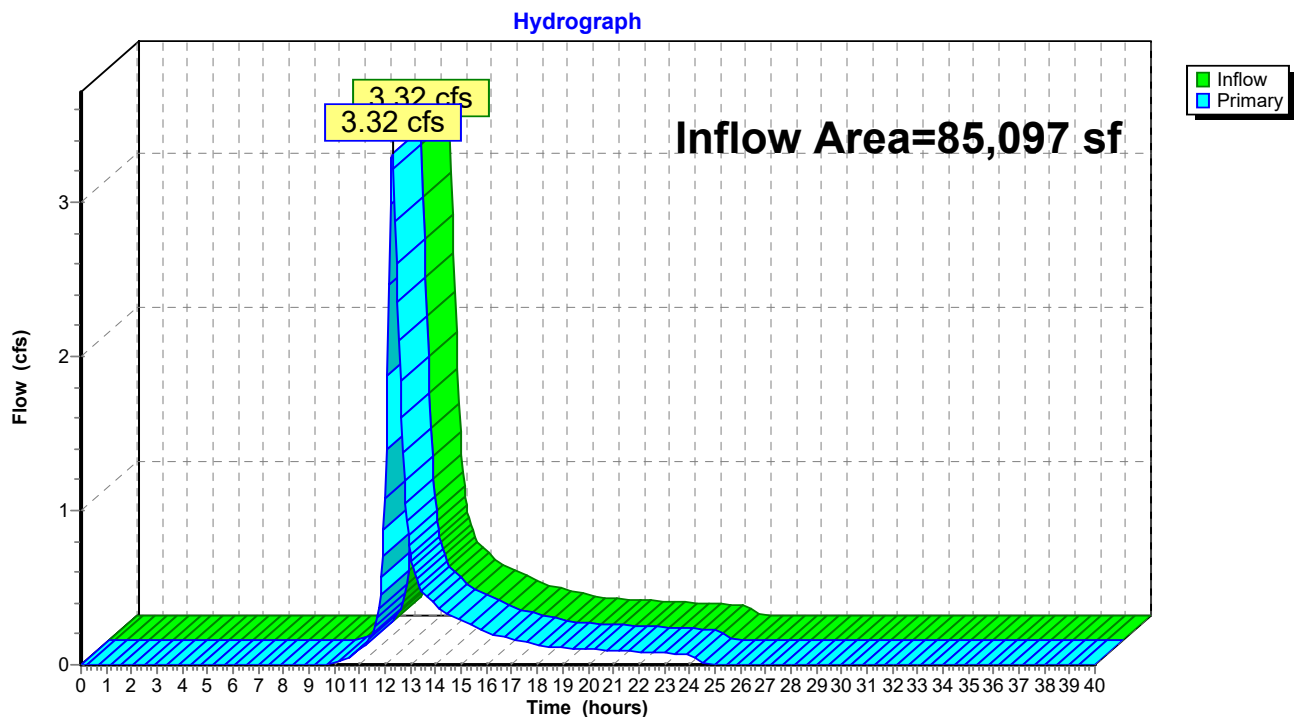
Page 8

Summary for Link 1L: Flow to the West

Inflow Area = 85,097 sf, 0.00% Impervious, Inflow Depth = 2.18" for 10-yr event
Inflow = 3.32 cfs @ 12.28 hrs, Volume= 15,447 cf
Primary = 3.32 cfs @ 12.28 hrs, Volume= 15,447 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Flow to the West



EXISTING

Type III 24-hr 100-yr Rainfall=8.21"

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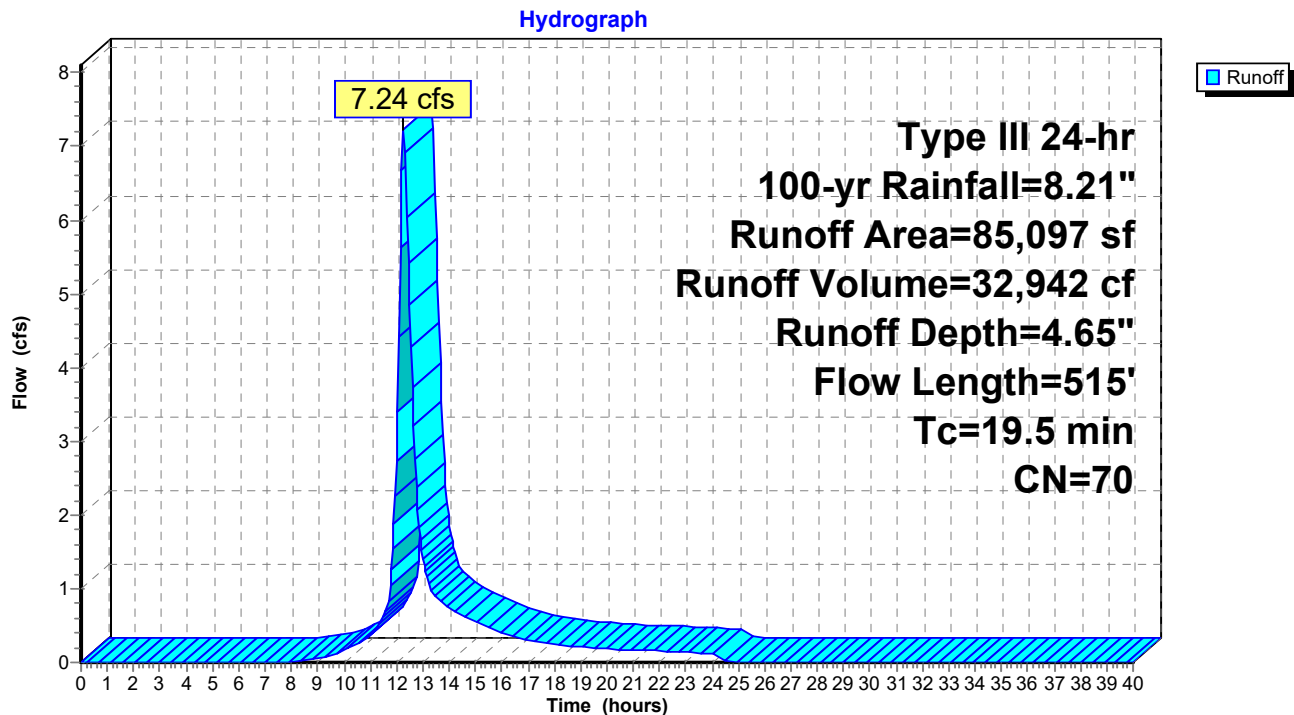
Summary for Subcatchment 1S: Existing Condition

Runoff = 7.24 cfs @ 12.27 hrs, Volume= 32,942 cf, Depth= 4.65"
 Routed to Link 1L : Flow to the West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=8.21"

Area (sf)	CN	Description
82,722	70	Woods, Good, HSG C
2,375	74	>75% Grass cover, Good, HSG C
85,097	70	Weighted Average
85,097		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0680	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
6.5	415	0.0450	1.06		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.5	515	Total			

Subcatchment 1S: Existing Condition

EXISTING

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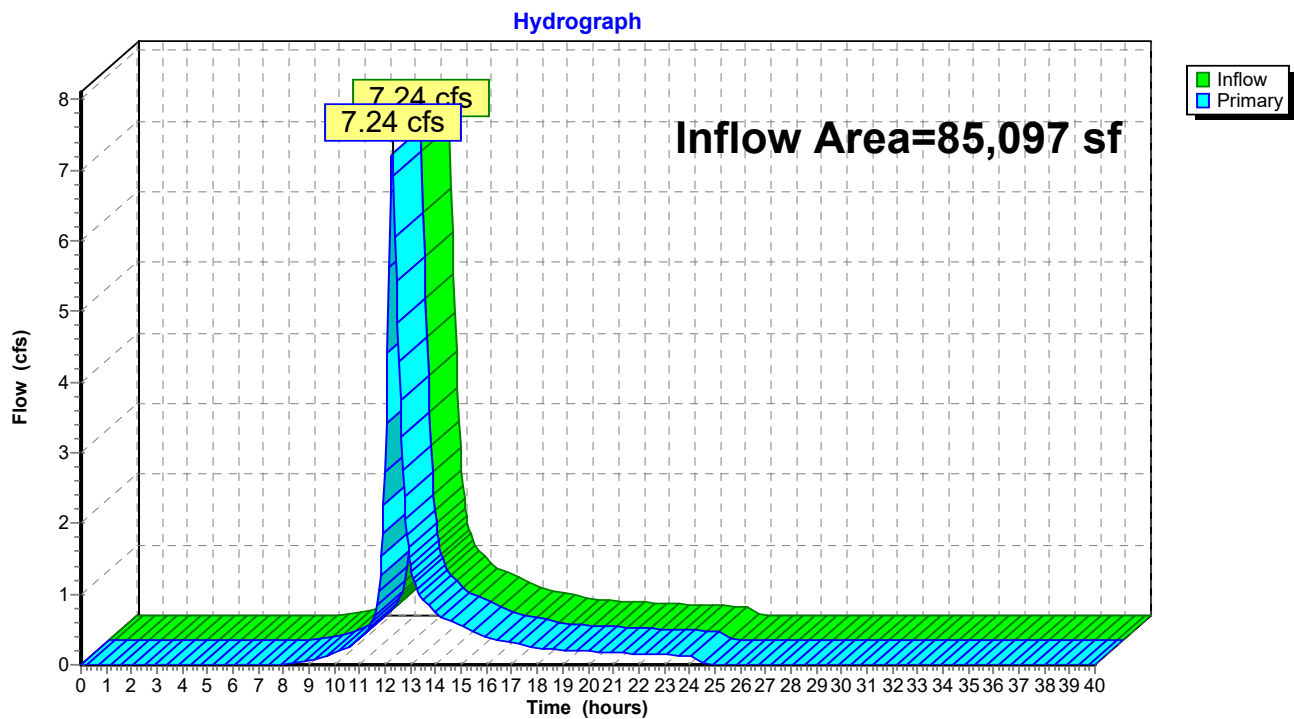
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Summary for Link 1L: Flow to the West

Inflow Area = 85,097 sf, 0.00% Impervious, Inflow Depth = 4.65" for 100-yr event
Inflow = 7.24 cfs @ 12.27 hrs, Volume= 32,942 cf
Primary = 7.24 cfs @ 12.27 hrs, Volume= 32,942 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Flow to the West

Proposed Condition





PR ROOF

Subsurface Drainage
Structure

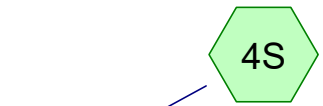


PR-SWMA

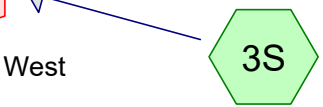
SWMA



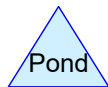
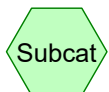
Flow to the West



PR-YARD



Remaining Land



Routing Diagram for PROPOSED

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.29	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.19	2
3	100-yr	Type III 24-hr		Default	24.00	1	8.21	2

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
38,430	74	>75% Grass cover, Good, HSG C (2S, 3S, 4S)
4,419	98	Paved parking, HSG C (2S)
2,547	98	Roofs, HSG C (1S)
40,003	70	Woods, Good, HSG C (3S, 4S)
85,399	74	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
85,399	HSG C	1S, 2S, 3S, 4S
0	HSG D	
0	Other	
85,399		TOTAL AREA

PROPOSED

Type III 24-hr 2-yr Rainfall=3.29"

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Summary for Subcatchment 1S: PR ROOF

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 649 cf, Depth= 3.06"
 Routed to Pond 1P : Subsurface Drainage Structure

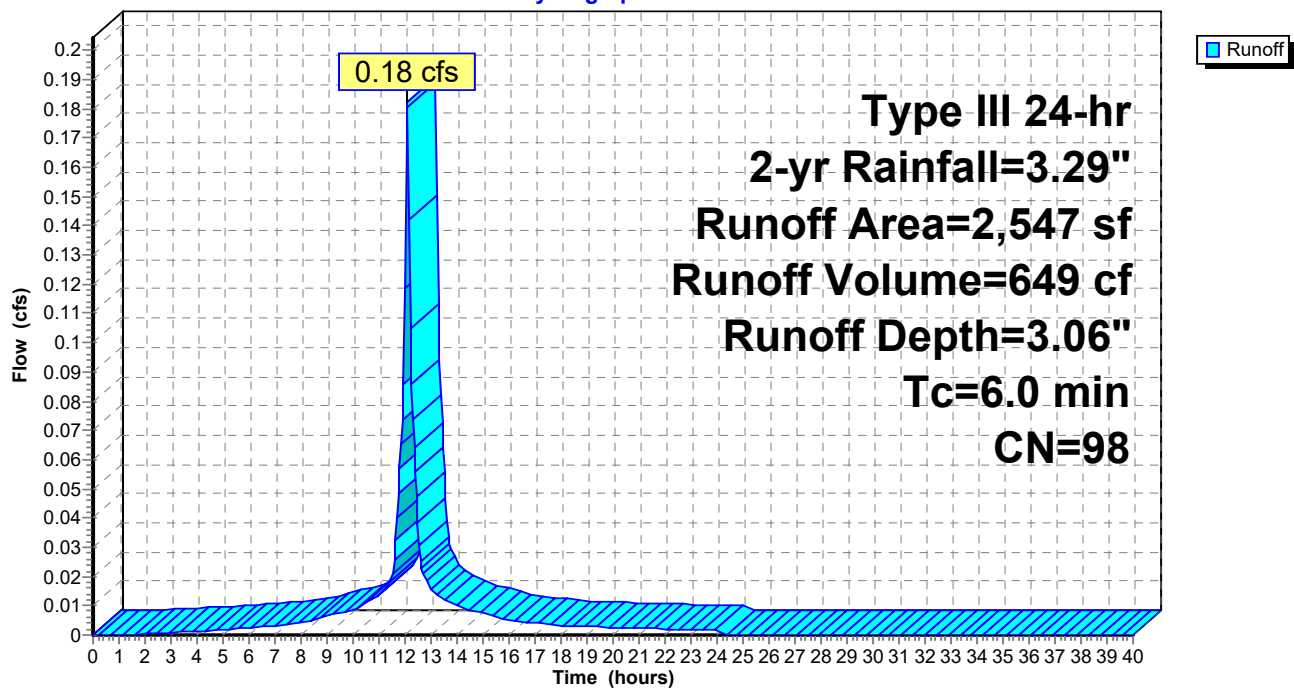
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
2,547	98	Roofs, HSG C
2,547		100.00% Impervious Area

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

Subcatchment 1S: PR ROOF

Hydrograph



PROPOSED

Type III 24-hr 2-yr Rainfall=3.29"

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Summary for Subcatchment 2S: PR-SWMA

Runoff = 0.49 cfs @ 12.09 hrs, Volume= 1,554 cf, Depth= 1.76"
 Routed to Pond 2P : SWMA

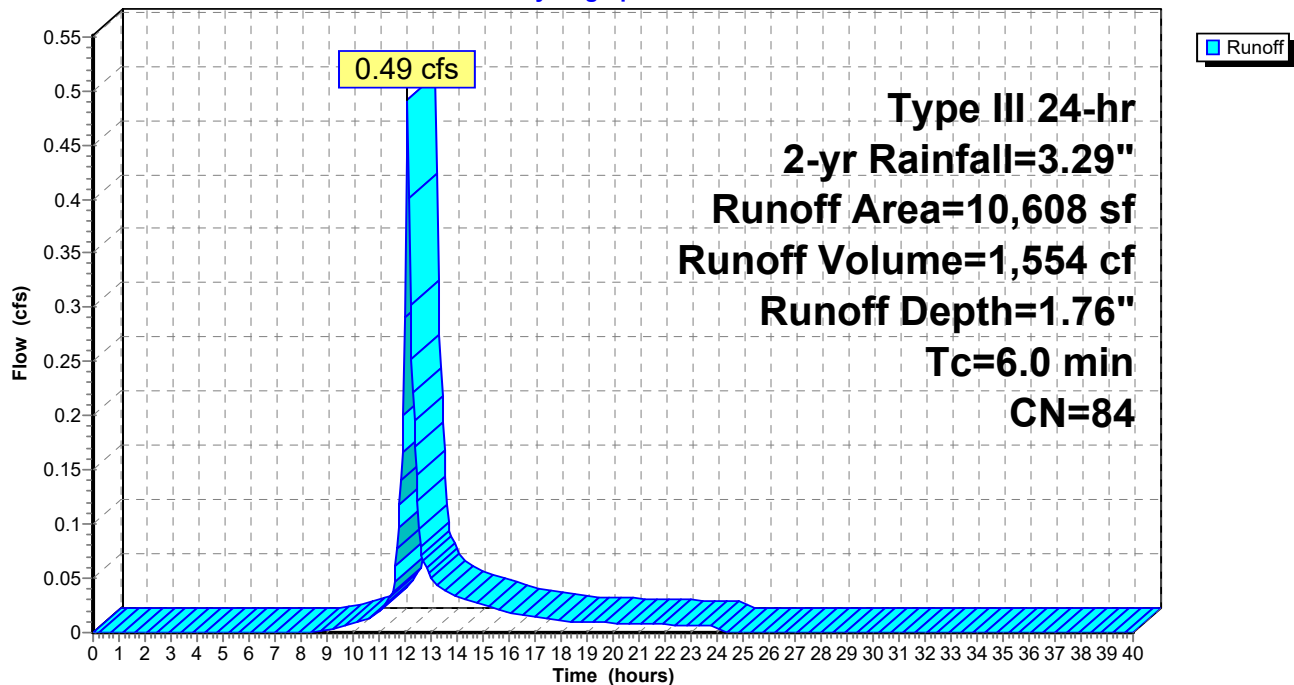
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
4,419	98	Paved parking, HSG C
6,189	74	>75% Grass cover, Good, HSG C
10,608	84	Weighted Average
6,189		58.34% Pervious Area
4,419		41.66% Impervious Area

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

Subcatchment 2S: PR-SWMA

Hydrograph



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Summary for Subcatchment 3S: Remaining Land

Runoff = 0.44 cfs @ 12.33 hrs, Volume= 2,331 cf, Depth= 0.88"
 Routed to Link 1L : Flow to the West

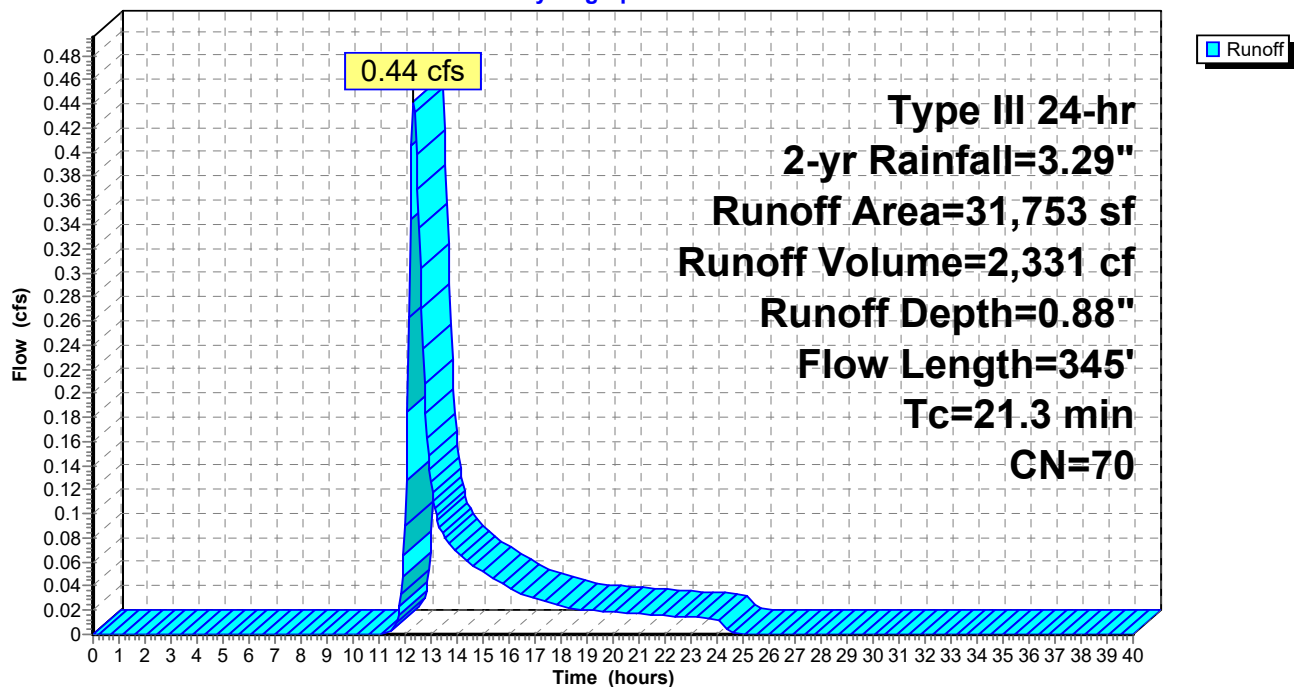
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
30,003	70	Woods, Good, HSG C
1,750	74	>75% Grass cover, Good, HSG C
31,753	70	Weighted Average
31,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0350	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
4.3	245	0.0360	0.95		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
21.3	345	Total			

Subcatchment 3S: Remaining Land

Hydrograph



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Summary for Subcatchment 4S: PR-YARD

Runoff = 0.86 cfs @ 12.18 hrs, Volume= 3,512 cf, Depth= 1.04"
 Routed to Link 1L : Flow to the West

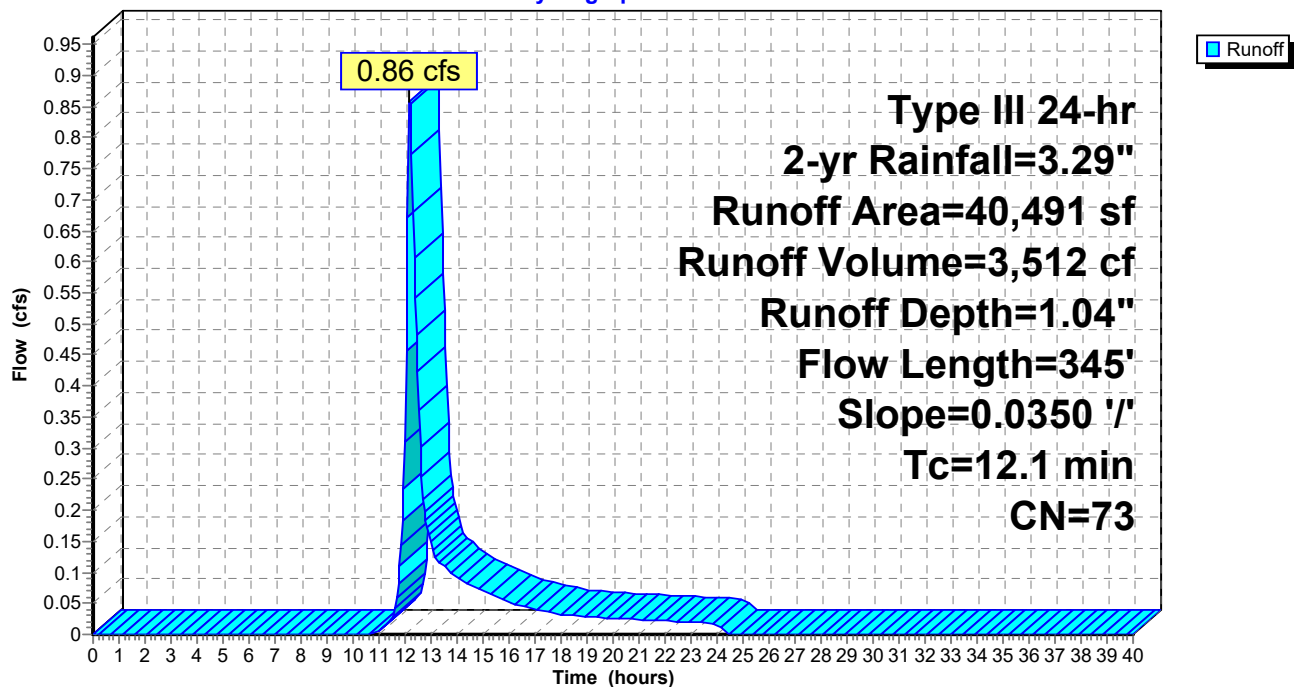
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
30,491	74	>75% Grass cover, Good, HSG C
10,000	70	Woods, Good, HSG C
40,491	73	Weighted Average
40,491		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0350	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.28"
4.4	245	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	345	Total			

Subcatchment 4S: PR-YARD

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.29"

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Summary for Pond 1P: Subsurface Drainage Structure

Inflow Area = 2,547 sf, 100.00% Impervious, Inflow Depth = 3.06" for 2-yr event
 Inflow = 0.18 cfs @ 12.09 hrs, Volume= 649 cf
 Outflow = 0.01 cfs @ 11.45 hrs, Volume= 649 cf, Atten= 93%, Lag= 0.0 min
 Discarded = 0.01 cfs @ 11.45 hrs, Volume= 649 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 90.39' @ 13.56 hrs Surf.Area= 504 sf Storage= 261 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 169.5 min (925.3 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.50'	450 cf	16.00'W x 31.50'L x 3.54'H Field A 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	90.00'	659 cf	Cultec R-330XLHD x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	89.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.01 cfs @ 11.45 hrs HW=89.54' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

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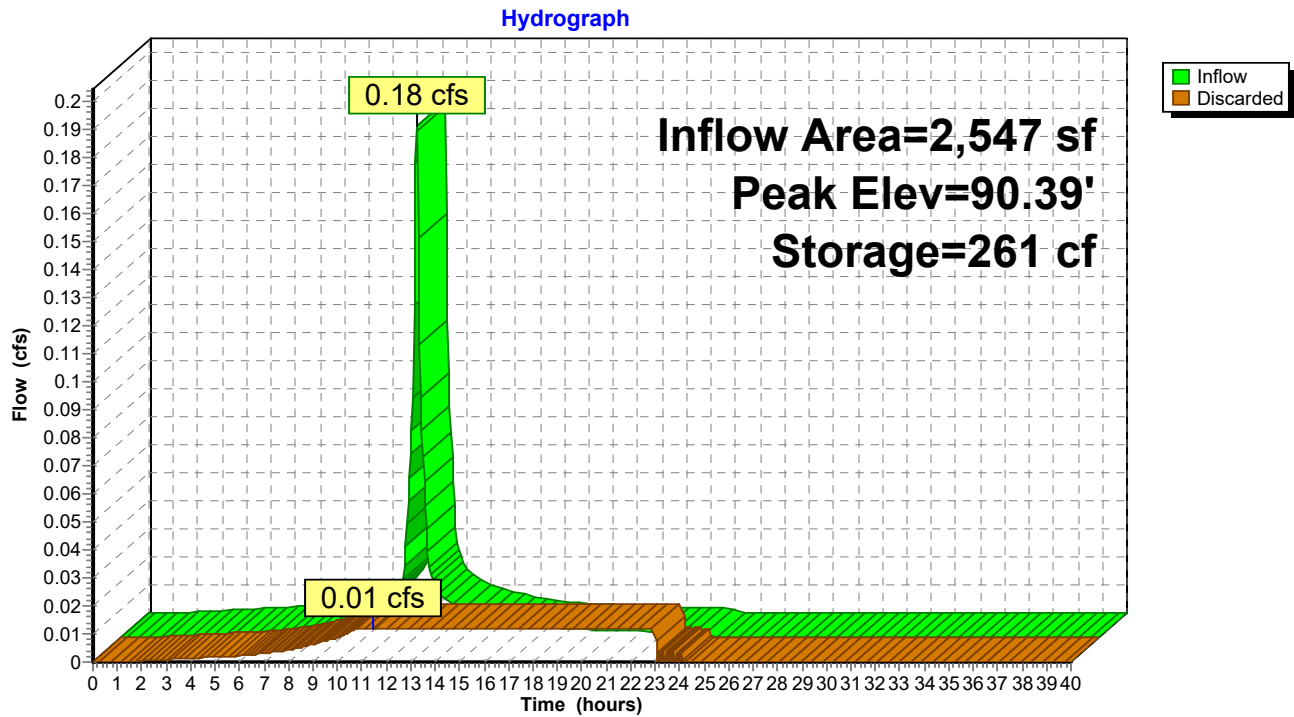
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Type III 24-hr 2-yr Rainfall=3.29"

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Pond 1P: Subsurface Drainage Structure



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Type III 24-hr 2-yr Rainfall=3.29"

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Summary for Pond 2P: SWMA

Inflow Area = 10,608 sf, 41.66% Impervious, Inflow Depth = 1.76" for 2-yr event
 Inflow = 0.49 cfs @ 12.09 hrs, Volume= 1,554 cf
 Outflow = 0.03 cfs @ 14.00 hrs, Volume= 1,556 cf, Atten= 93%, Lag= 114.5 min
 Discarded = 0.03 cfs @ 14.00 hrs, Volume= 1,556 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 1L : Flow to the West

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 97.55' @ 14.00 hrs Surf.Area= 1,387 sf Storage= 701 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 214.9 min (1,043.2 - 828.3)

Volume	Invert	Avail.Storage	Storage Description
#1	97.00'	6,990 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.00	1,150	0	0
98.00	1,580	1,365	1,365
99.00	2,060	1,820	3,185
100.00	2,600	2,330	5,515
100.50	3,300	1,475	6,990

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.00'	1.020 in/hr Exfiltration over Surface area
#2	Primary	99.25'	4.0" Round Culvert L= 45.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 99.25' / 98.00' S= 0.0278 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf

Discarded OutFlow Max=0.03 cfs @ 14.00 hrs HW=97.55' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=97.00' TW=0.00' (Dynamic Tailwater)
 ↑**2=Culvert** (Controls 0.00 cfs)

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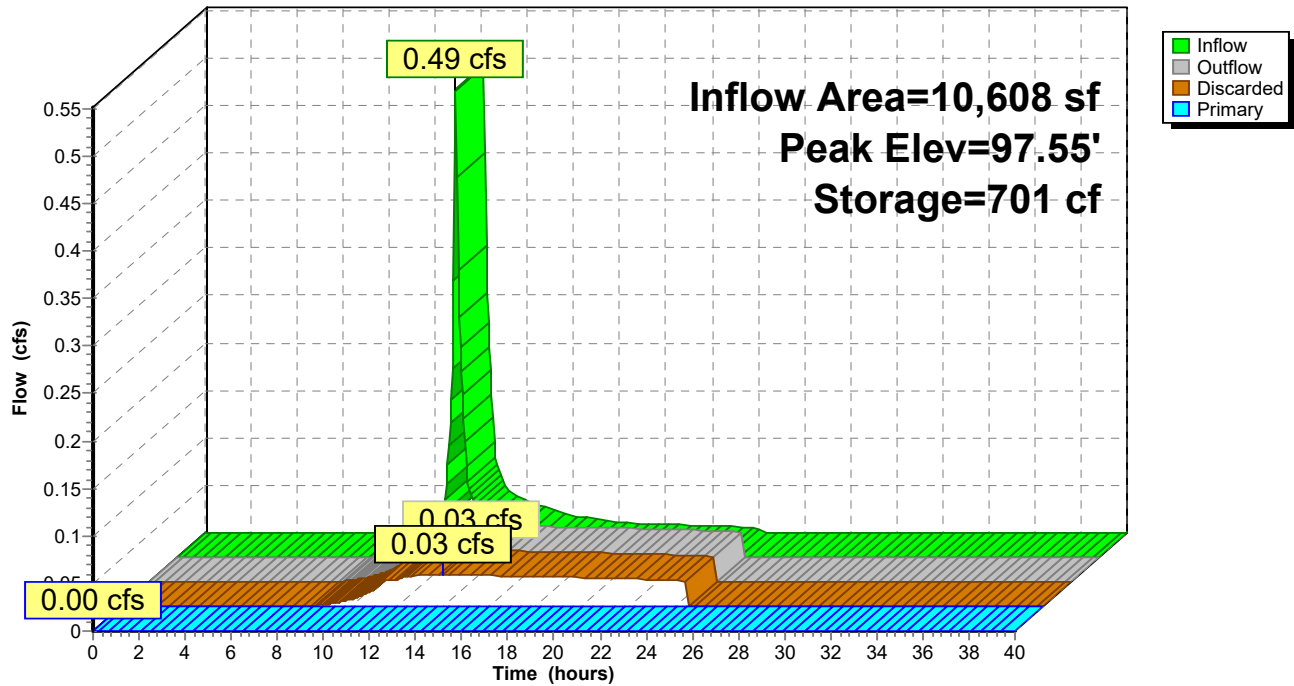
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Pond 2P: SWMA

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.29"

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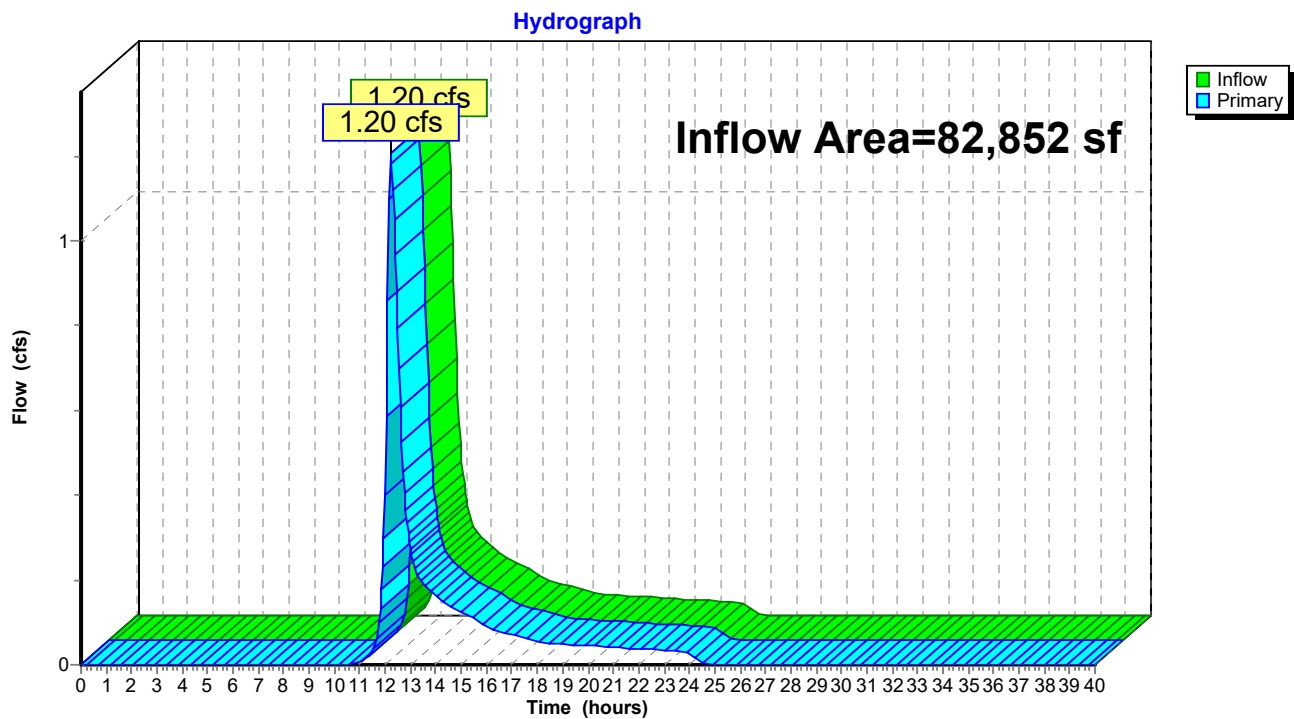
Page 13

Summary for Link 1L: Flow to the West

Inflow Area = 82,852 sf, 5.33% Impervious, Inflow Depth = 0.85" for 2-yr event
 Inflow = 1.20 cfs @ 12.22 hrs, Volume= 5,843 cf
 Primary = 1.20 cfs @ 12.22 hrs, Volume= 5,843 cf, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Flow to the West



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Summary for Subcatchment 1S: PR ROOF

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 1,051 cf, Depth= 4.95"
 Routed to Pond 1P : Subsurface Drainage Structure

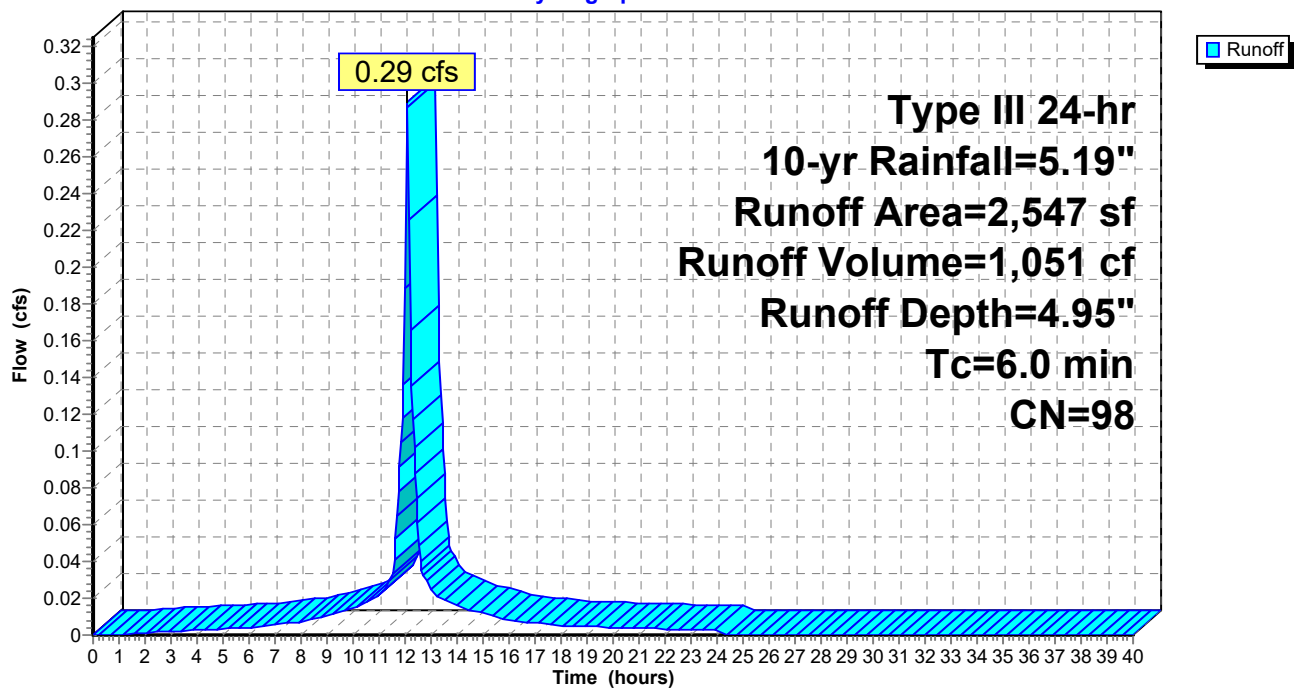
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
2,547	98	Roofs, HSG C
2,547		100.00% Impervious Area

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

Subcatchment 1S: PR ROOF

Hydrograph



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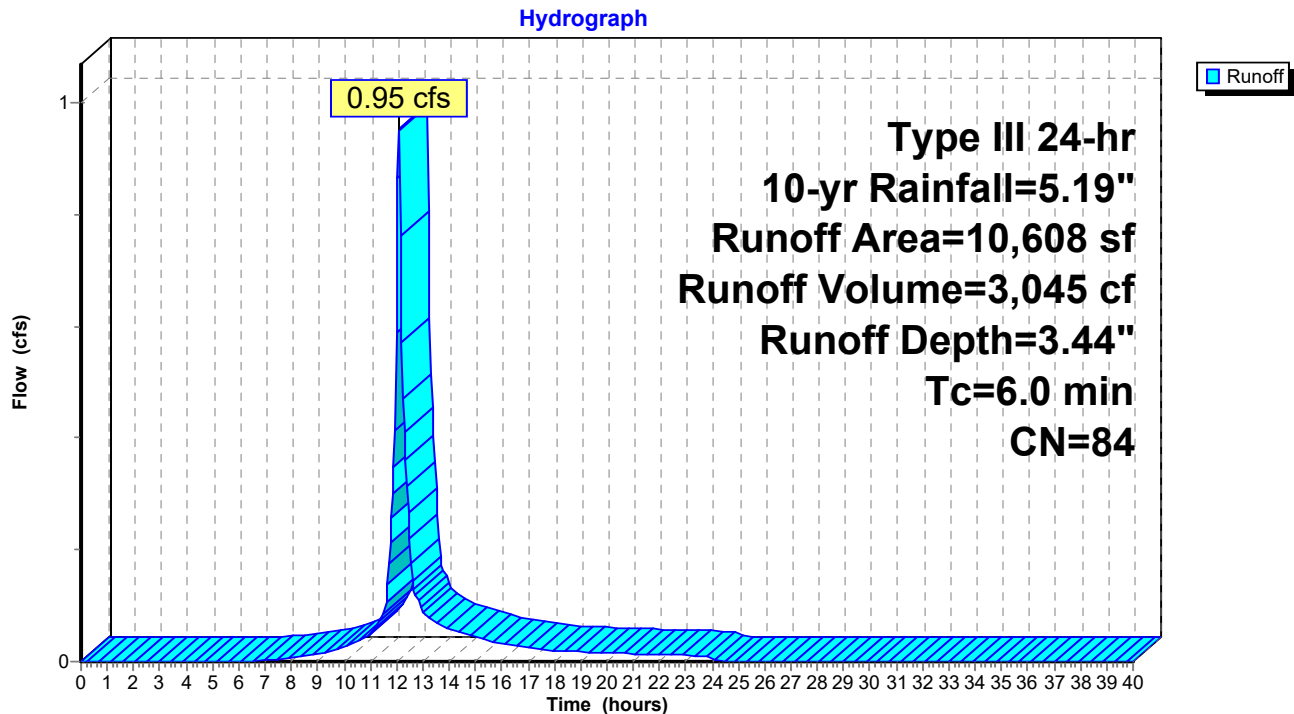
Summary for Subcatchment 2S: PR-SWMA

Runoff = 0.95 cfs @ 12.09 hrs, Volume= 3,045 cf, Depth= 3.44"
 Routed to Pond 2P : SWMA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
4,419	98	Paved parking, HSG C
6,189	74	>75% Grass cover, Good, HSG C
10,608	84	Weighted Average
6,189		58.34% Pervious Area
4,419		41.66% Impervious Area

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

Subcatchment 2S: PR-SWMA

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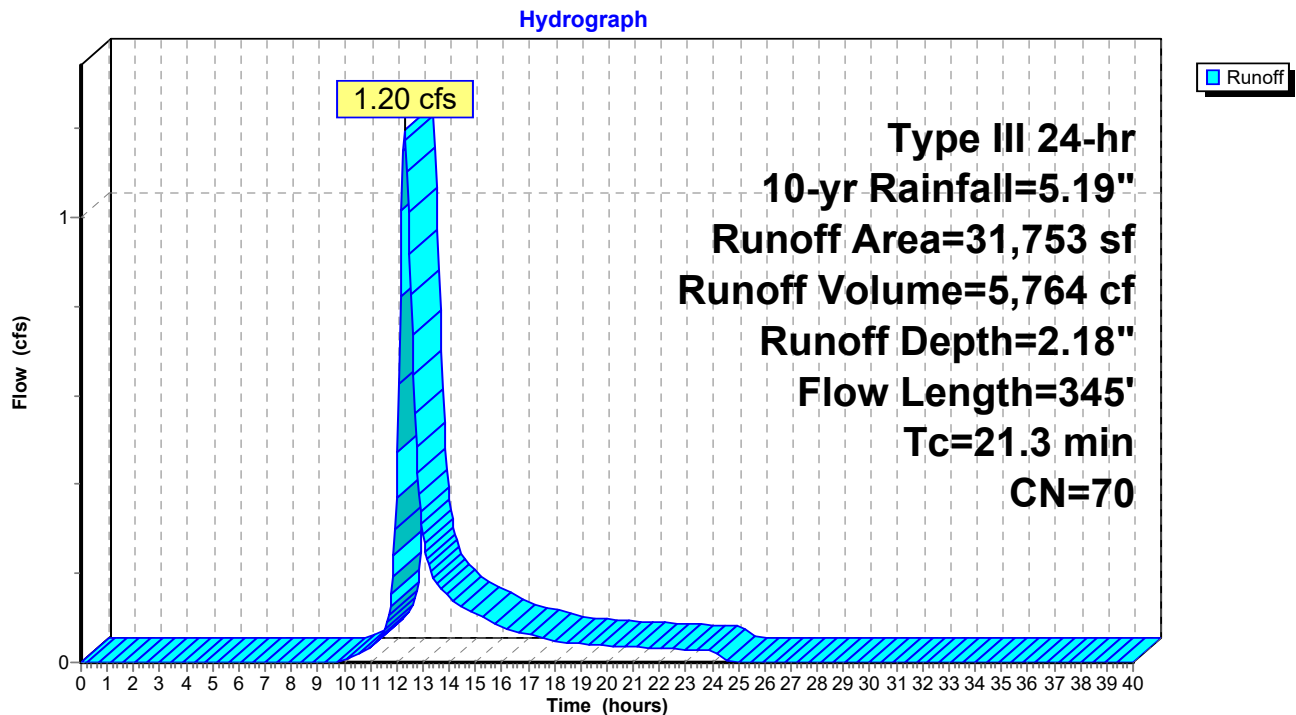
Summary for Subcatchment 3S: Remaining Land

Runoff = 1.20 cfs @ 12.31 hrs, Volume= 5,764 cf, Depth= 2.18"
 Routed to Link 1L : Flow to the West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
30,003	70	Woods, Good, HSG C
1,750	74	>75% Grass cover, Good, HSG C
31,753	70	Weighted Average
31,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0350	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
4.3	245	0.0360	0.95		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
21.3	345	Total			

Subcatchment 3S: Remaining Land

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Summary for Subcatchment 4S: PR-YARD

Runoff = 2.14 cfs @ 12.17 hrs, Volume= 8,201 cf, Depth= 2.43"
 Routed to Link 1L : Flow to the West

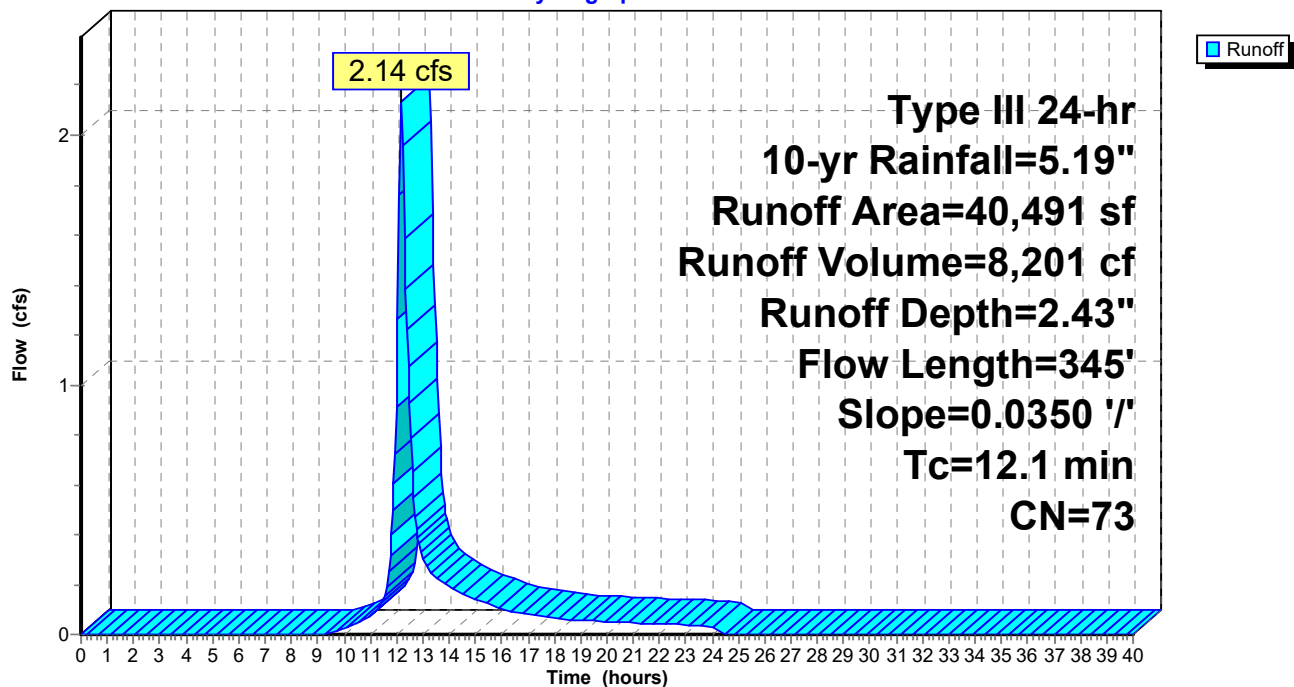
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
30,491	74	>75% Grass cover, Good, HSG C
10,000	70	Woods, Good, HSG C
40,491	73	Weighted Average
40,491		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0350	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.28"
4.4	245	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	345	Total			

Subcatchment 4S: PR-YARD

Hydrograph



PROPOSED*Type III 24-hr 10-yr Rainfall=5.19"*

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Summary for Pond 1P: Subsurface Drainage Structure

Inflow Area = 2,547 sf, 100.00% Impervious, Inflow Depth = 4.95" for 10-yr event
 Inflow = 0.29 cfs @ 12.09 hrs, Volume= 1,051 cf
 Outflow = 0.01 cfs @ 10.40 hrs, Volume= 1,052 cf, Atten= 96%, Lag= 0.0 min
 Discarded = 0.01 cfs @ 10.40 hrs, Volume= 1,052 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 91.03' @ 14.97 hrs Surf.Area= 504 sf Storage= 516 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 361.6 min (1,109.0 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.50'	450 cf	16.00'W x 31.50'L x 3.54'H Field A 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	90.00'	659 cf	Cultec R-330XLHD x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	89.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.01 cfs @ 10.40 hrs HW=89.54' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.01 cfs)

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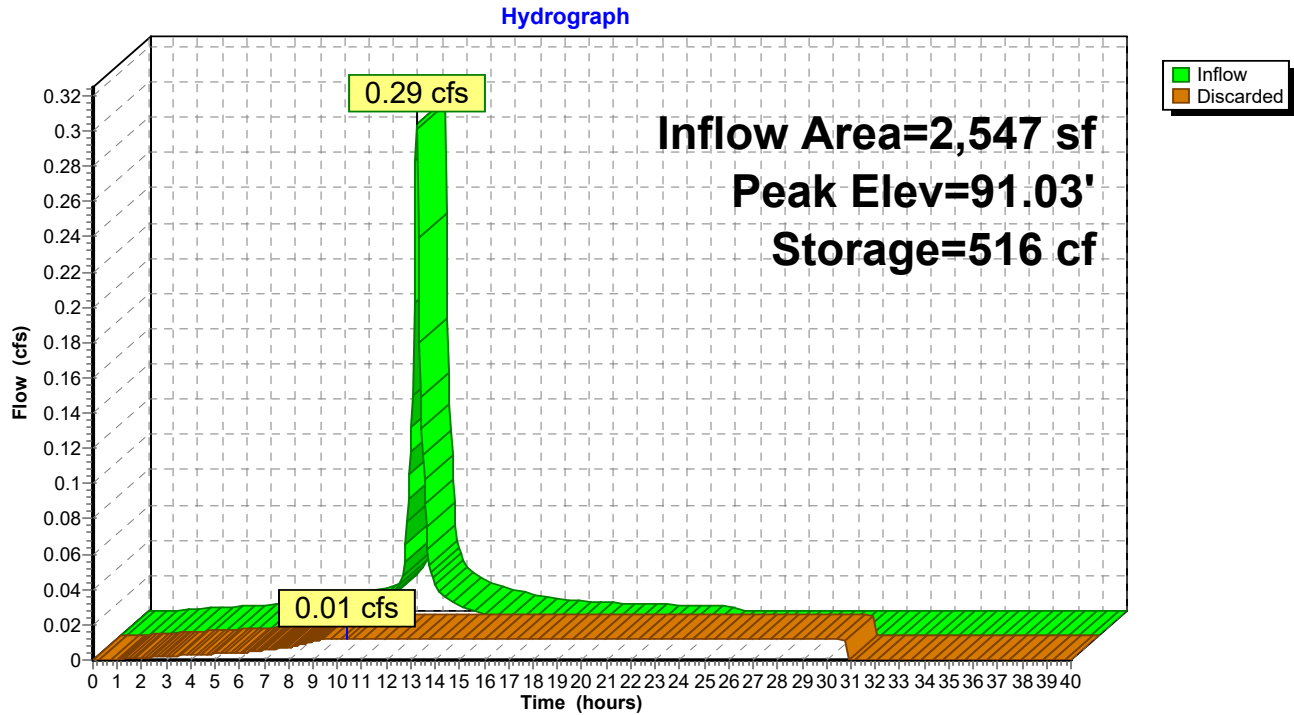
Proposed Condition Watershed Analysis - 79 Hill Street Topsfield MA

Type III 24-hr 10-yr Rainfall=5.19"

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Pond 1P: Subsurface Drainage Structure



PROPOSED*Type III 24-hr 10-yr Rainfall=5.19"*

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Summary for Pond 2P: SWMA

Inflow Area = 10,608 sf, 41.66% Impervious, Inflow Depth = 3.44" for 10-yr event
 Inflow = 0.95 cfs @ 12.09 hrs, Volume= 3,045 cf
 Outflow = 0.04 cfs @ 15.35 hrs, Volume= 3,046 cf, Atten= 96%, Lag= 195.6 min
 Discarded = 0.04 cfs @ 15.35 hrs, Volume= 3,046 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 1L : Flow to the West

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 98.20' @ 15.35 hrs Surf.Area= 1,677 sf Storage= 1,693 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 447.1 min (1,256.1 - 809.1)

Volume	Invert	Avail.Storage	Storage Description
#1	97.00'	6,990 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.00	1,150	0	0
98.00	1,580	1,365	1,365
99.00	2,060	1,820	3,185
100.00	2,600	2,330	5,515
100.50	3,300	1,475	6,990

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.00'	1.020 in/hr Exfiltration over Surface area
#2	Primary	99.25'	4.0" Round Culvert L= 45.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 99.25' / 98.00' S= 0.0278 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf

Discarded OutFlow Max=0.04 cfs @ 15.35 hrs HW=98.20' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=97.00' TW=0.00' (Dynamic Tailwater)
 ↑**2=Culvert** (Controls 0.00 cfs)

PROPOSED

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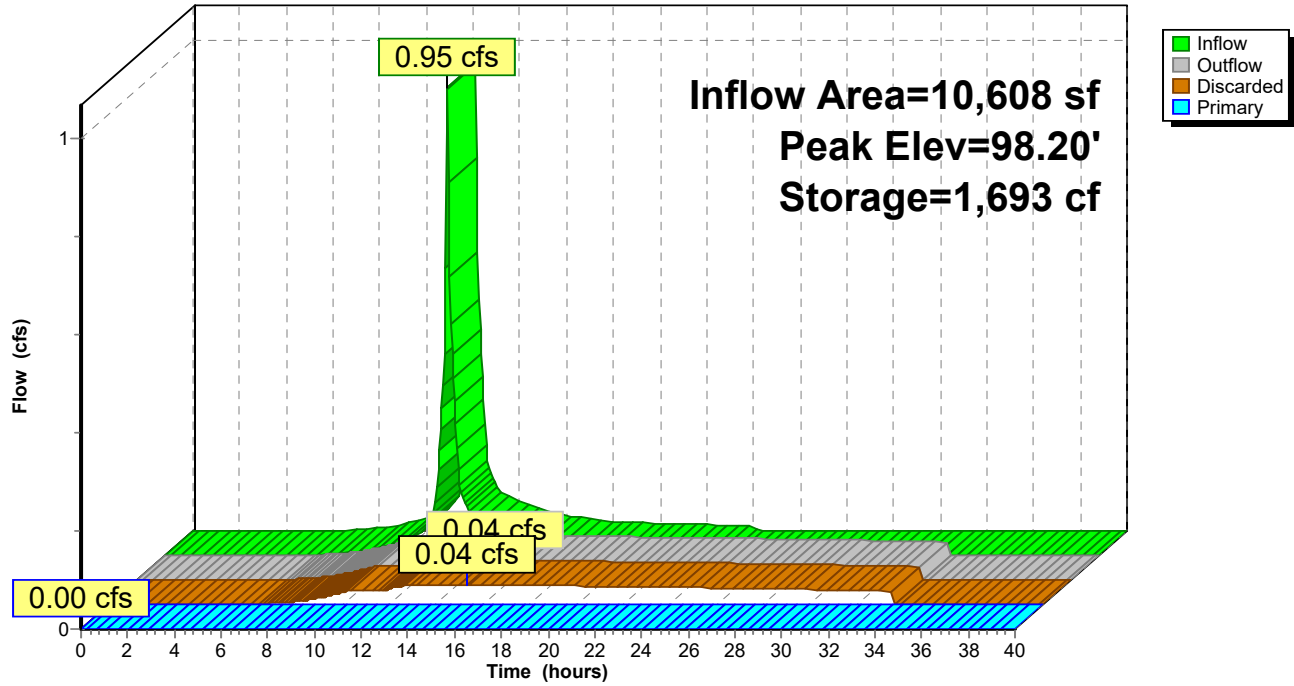
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Pond 2P: SWMA

Hydrograph



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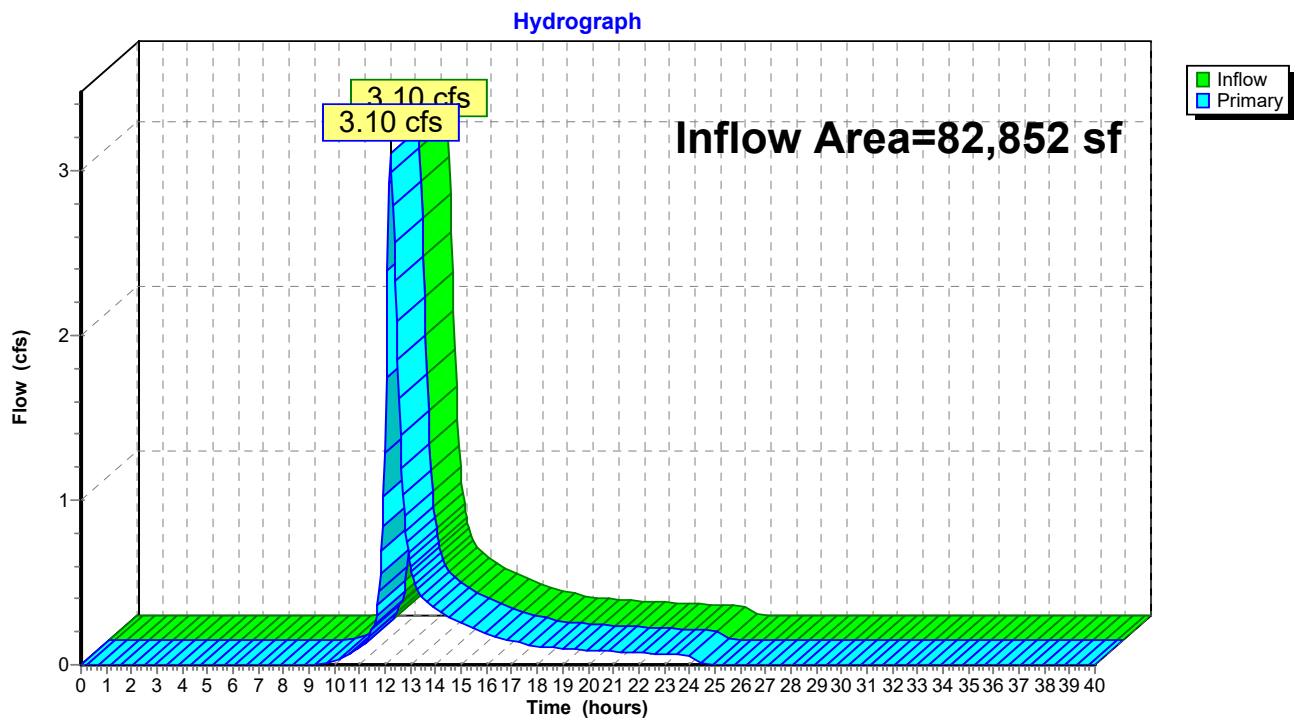
Page 22

Summary for Link 1L: Flow to the West

Inflow Area = 82,852 sf, 5.33% Impervious, Inflow Depth = 2.02" for 10-yr event
 Inflow = 3.10 cfs @ 12.21 hrs, Volume= 13,965 cf
 Primary = 3.10 cfs @ 12.21 hrs, Volume= 13,965 cf, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Flow to the West



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Type III 24-hr 100-yr Rainfall=8.21"

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Summary for Subcatchment 1S: PR ROOF

Runoff = 0.46 cfs @ 12.09 hrs, Volume= 1,692 cf, Depth= 7.97"
 Routed to Pond 1P : Subsurface Drainage Structure

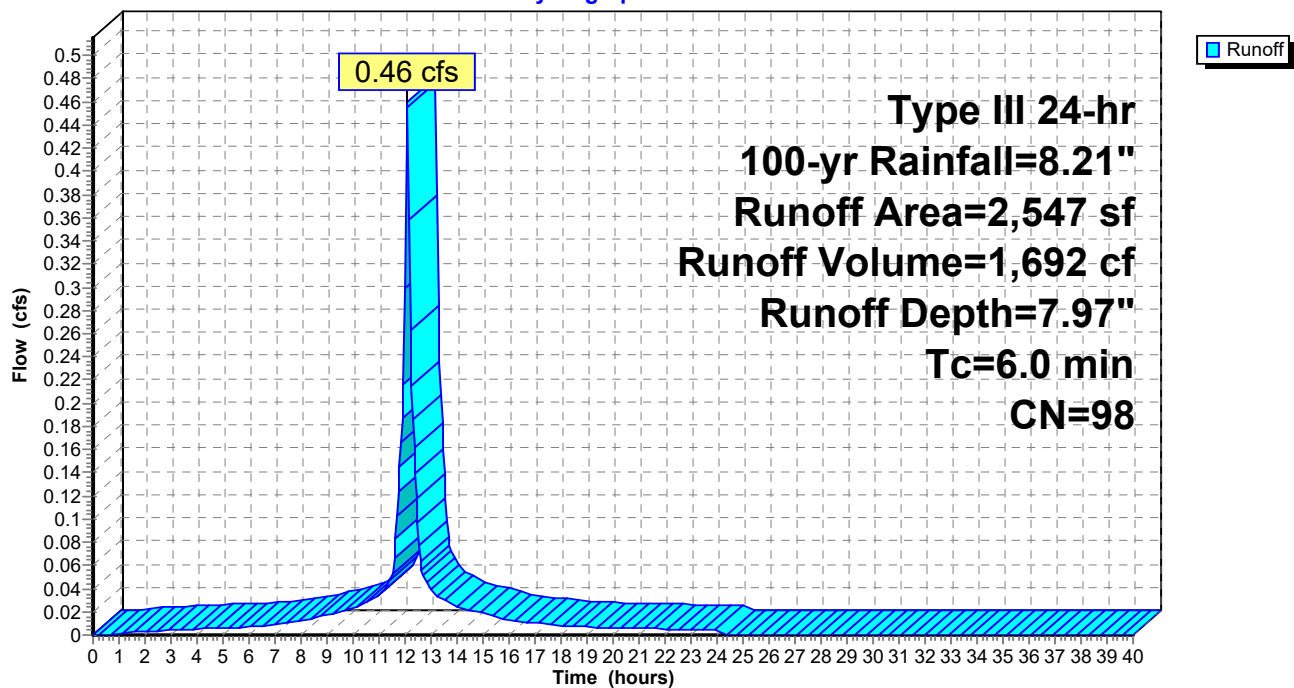
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=8.21"

Area (sf)	CN	Description
2,547	98	Roofs, HSG C
2,547		100.00% Impervious Area

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

Subcatchment 1S: PR ROOF

Hydrograph



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Type III 24-hr 100-yr Rainfall=8.21"

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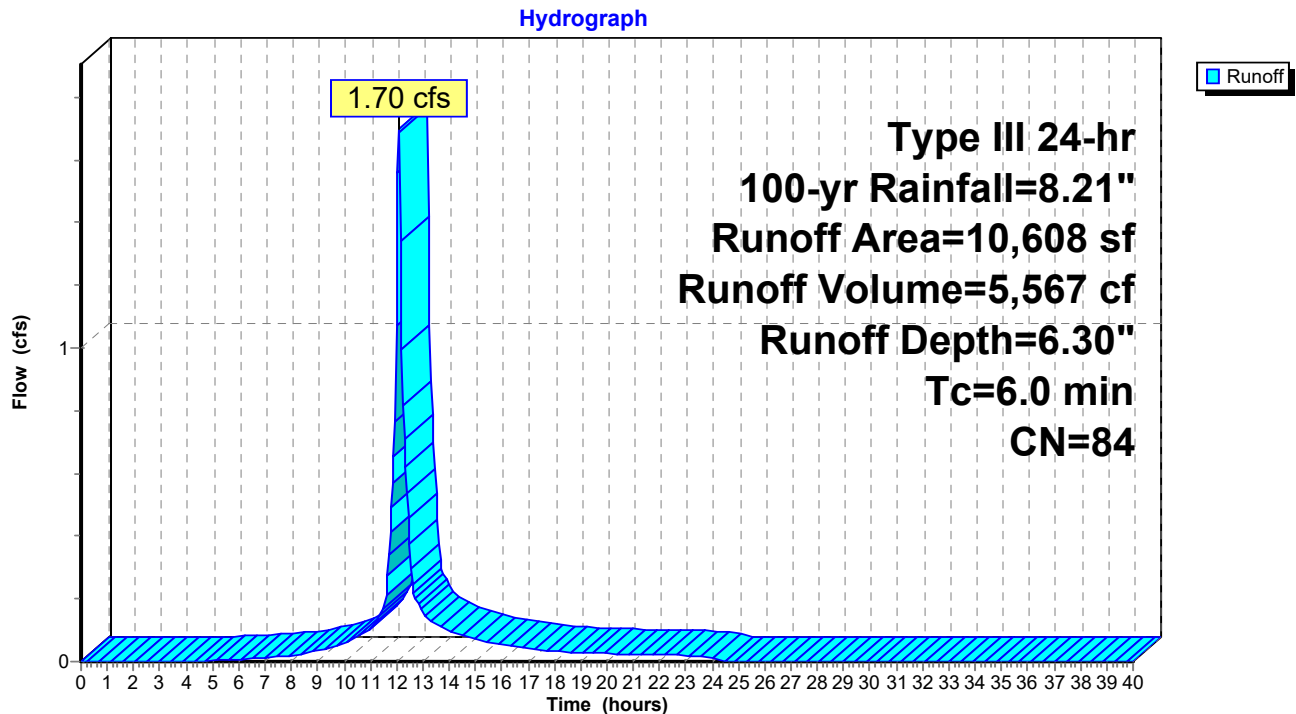
Summary for Subcatchment 2S: PR-SWMA

Runoff = 1.70 cfs @ 12.09 hrs, Volume= 5,567 cf, Depth= 6.30"
 Routed to Pond 2P : SWMA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=8.21"

Area (sf)	CN	Description
4,419	98	Paved parking, HSG C
6,189	74	>75% Grass cover, Good, HSG C
10,608	84	Weighted Average
6,189		58.34% Pervious Area
4,419		41.66% Impervious Area

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

Subcatchment 2S: PR-SWMA

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Type III 24-hr 100-yr Rainfall=8.21"

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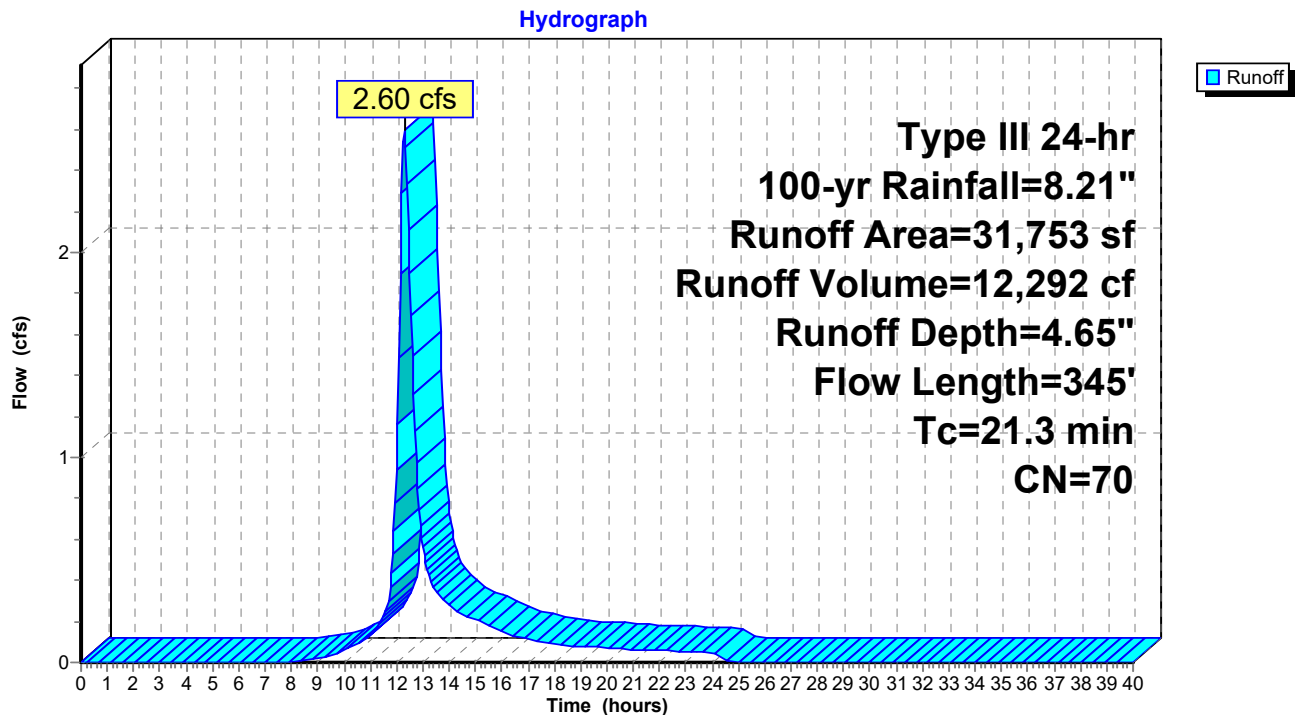
Summary for Subcatchment 3S: Remaining Land

Runoff = 2.60 cfs @ 12.30 hrs, Volume= 12,292 cf, Depth= 4.65"
 Routed to Link 1L : Flow to the West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=8.21"

Area (sf)	CN	Description
30,003	70	Woods, Good, HSG C
1,750	74	>75% Grass cover, Good, HSG C
31,753	70	Weighted Average
31,753		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.0	100	0.0350	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
4.3	245	0.0360	0.95		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
21.3	345	Total			

Subcatchment 3S: Remaining Land

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Type III 24-hr 100-yr Rainfall=8.21"

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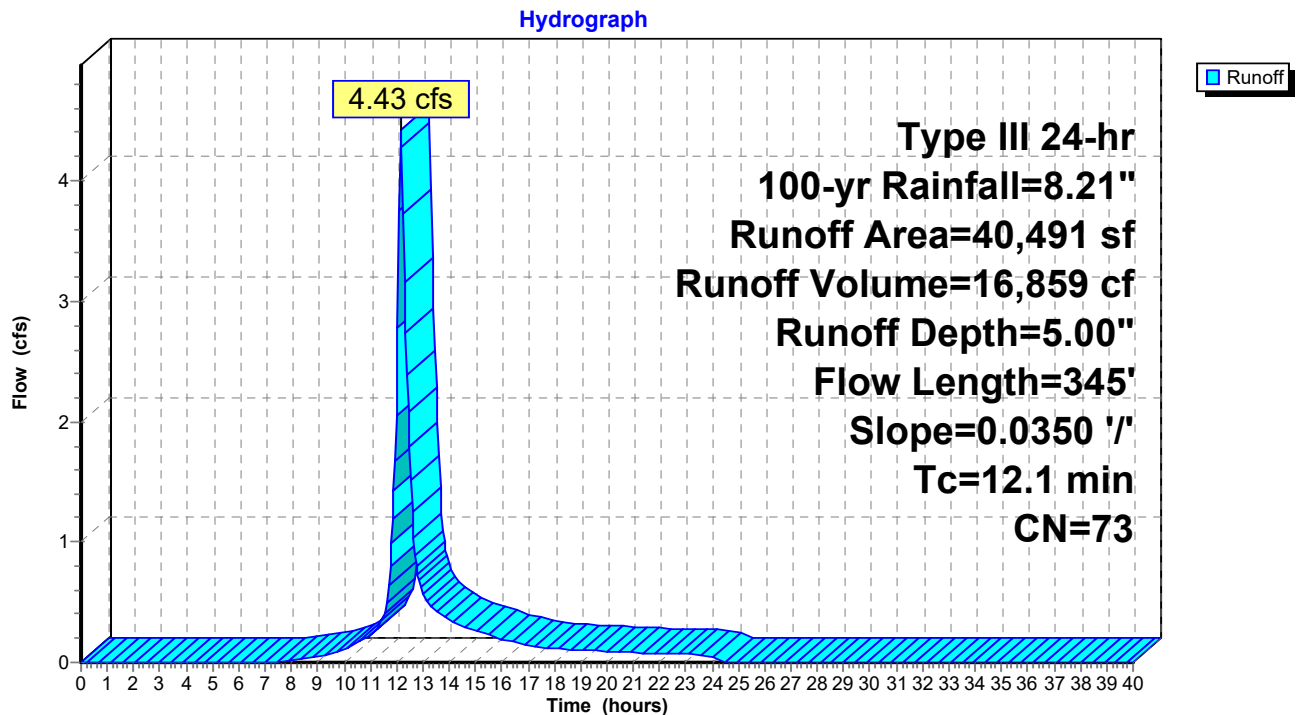
Summary for Subcatchment 4S: PR-YARD

Runoff = 4.43 cfs @ 12.17 hrs, Volume= 16,859 cf, Depth= 5.00"
 Routed to Link 1L : Flow to the West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=8.21"

Area (sf)	CN	Description
30,491	74	>75% Grass cover, Good, HSG C
10,000	70	Woods, Good, HSG C
40,491	73	Weighted Average
40,491		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0350	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.28"
4.4	245	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.1	345	Total			

Subcatchment 4S: PR-YARD

PROPOSED*Type III 24-hr 100-yr Rainfall=8.21"*

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Summary for Pond 1P: Subsurface Drainage Structure

Inflow Area = 2,547 sf, 100.00% Impervious, Inflow Depth = 7.97" for 100-yr event
 Inflow = 0.46 cfs @ 12.09 hrs, Volume= 1,692 cf
 Outflow = 0.01 cfs @ 8.90 hrs, Volume= 1,523 cf, Atten= 97%, Lag= 0.0 min
 Discarded = 0.01 cfs @ 8.90 hrs, Volume= 1,523 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 92.48' @ 16.37 hrs Surf.Area= 504 sf Storage= 996 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 589.2 min (1,330.1 - 740.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.50'	450 cf	16.00'W x 31.50'L x 3.54'H Field A 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	90.00'	659 cf	Cultec R-330XLHD x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	89.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.01 cfs @ 8.90 hrs HW=89.54' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

PROPOSED

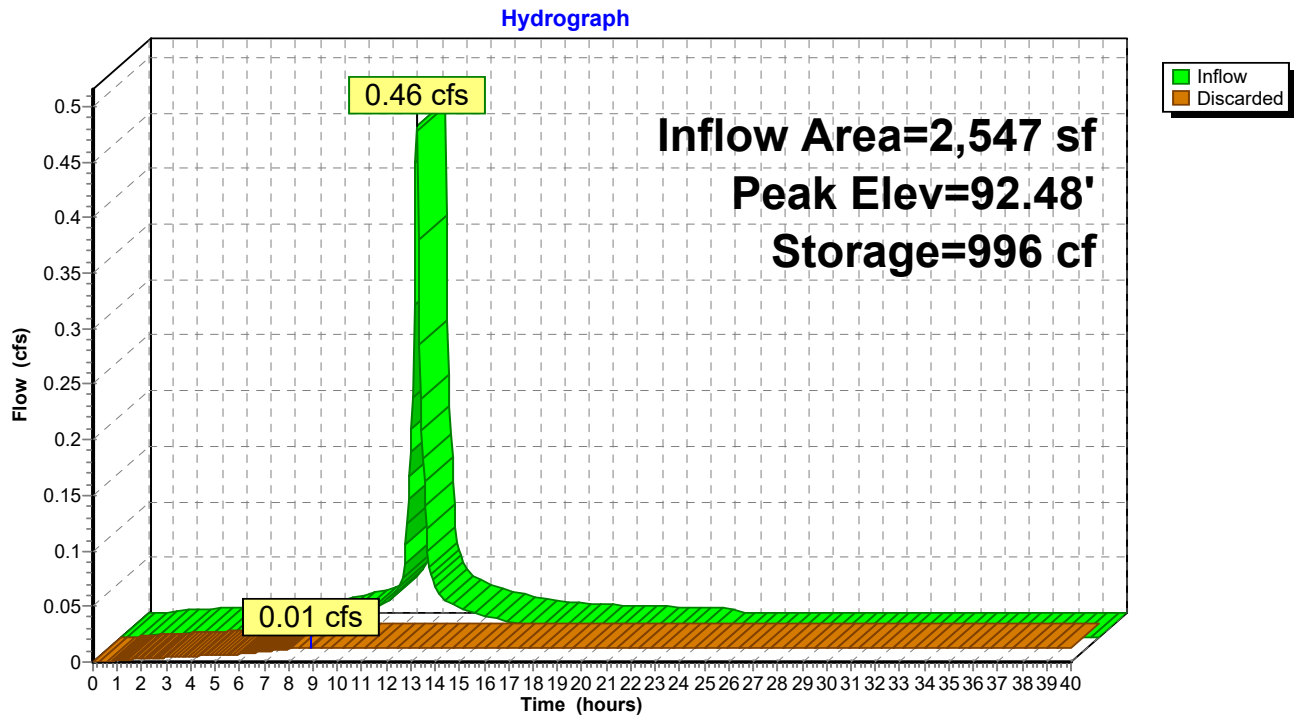
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Pond 1P: Subsurface Drainage Structure



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Type III 24-hr 100-yr Rainfall=8.21"

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Summary for Pond 2P: SWMA

Inflow Area = 10,608 sf, 41.66% Impervious, Inflow Depth = 6.30" for 100-yr event
 Inflow = 1.70 cfs @ 12.09 hrs, Volume= 5,567 cf
 Outflow = 0.05 cfs @ 16.06 hrs, Volume= 4,919 cf, Atten= 97%, Lag= 238.2 min
 Discarded = 0.05 cfs @ 16.06 hrs, Volume= 4,919 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link 1L : Flow to the West

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
 Peak Elev= 99.17' @ 16.06 hrs Surf.Area= 2,152 sf Storage= 3,545 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 611.1 min (1,403.3 - 792.2)

Volume	Invert	Avail.Storage	Storage Description
#1	97.00'	6,990 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
97.00	1,150	0	0
98.00	1,580	1,365	1,365
99.00	2,060	1,820	3,185
100.00	2,600	2,330	5,515
100.50	3,300	1,475	6,990

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.00'	1.020 in/hr Exfiltration over Surface area
#2	Primary	99.25'	4.0" Round Culvert L= 45.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 99.25' / 98.00' S= 0.0278 '/' Cc= 0.900 n= 0.010, Flow Area= 0.09 sf

Discarded OutFlow Max=0.05 cfs @ 16.06 hrs HW=99.17' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=97.00' TW=0.00' (Dynamic Tailwater)
 ↑**2=Culvert** (Controls 0.00 cfs)

PROPOSED

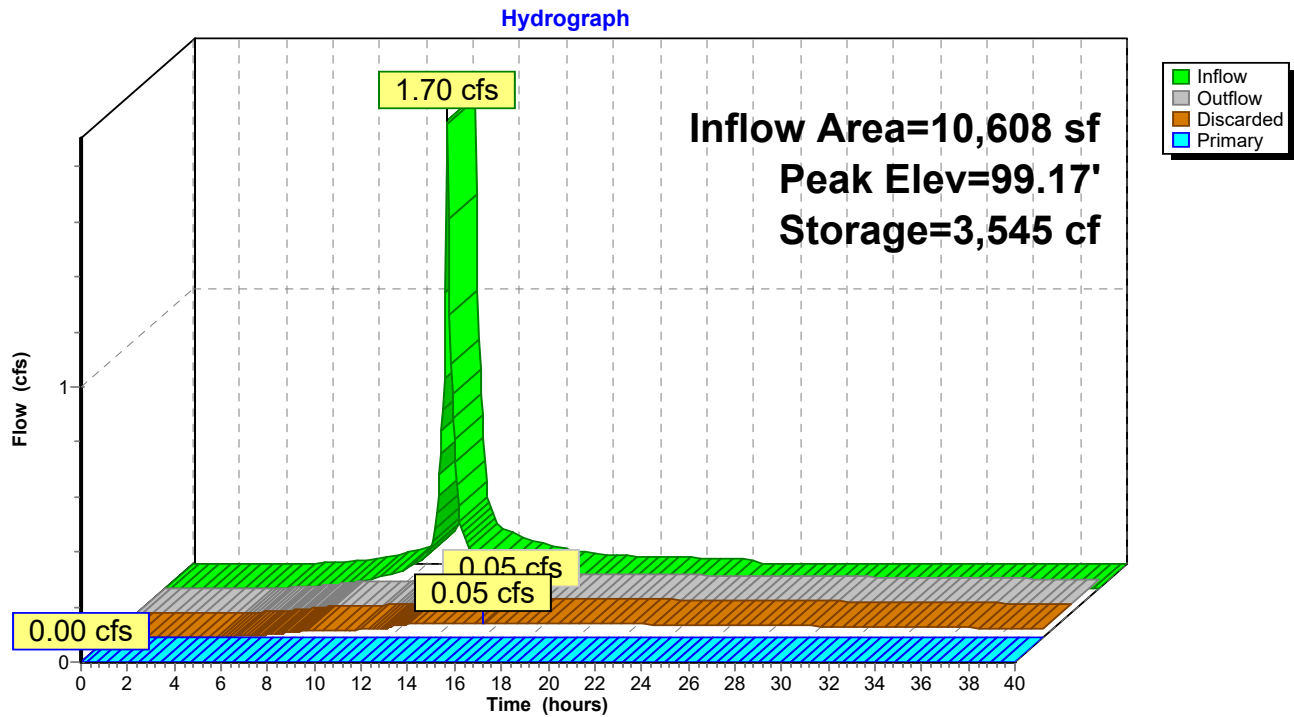
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Pond 2P: SWMA



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Type III 24-hr 100-yr Rainfall=8.21"

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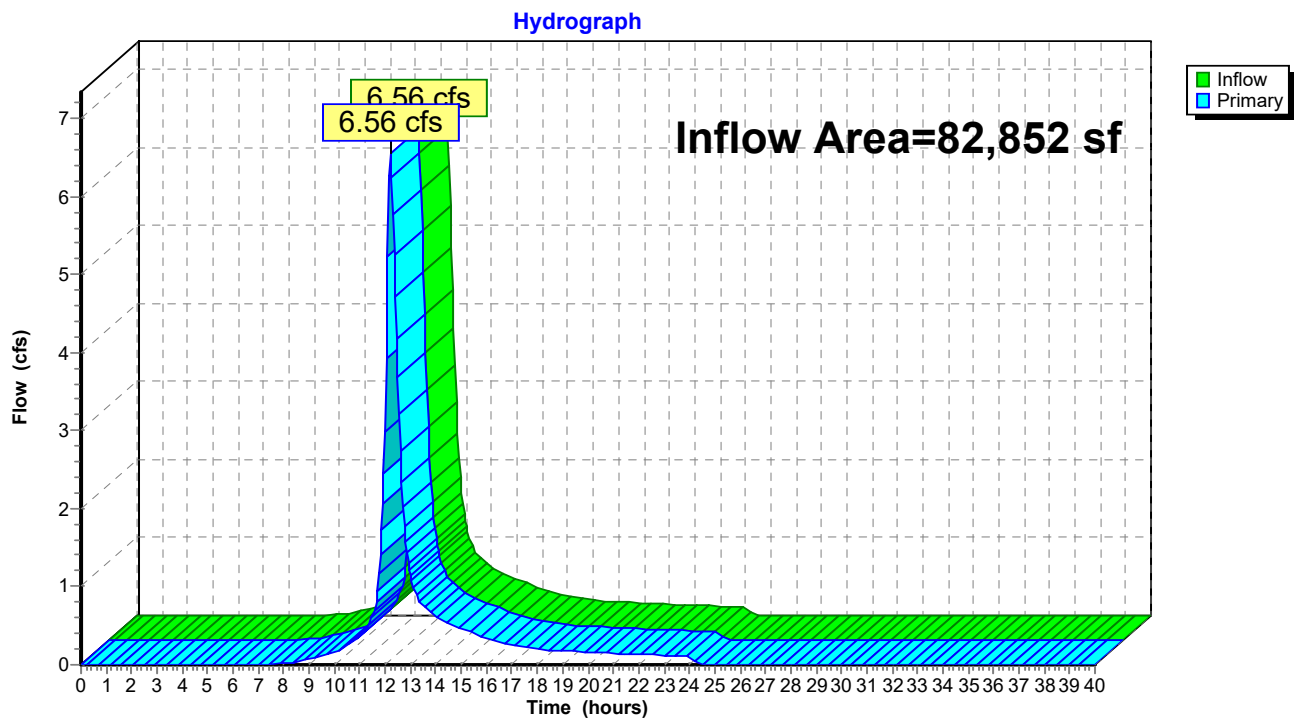
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Summary for Link 1L: Flow to the West

Inflow Area = 82,852 sf, 5.33% Impervious, Inflow Depth = 4.22" for 100-yr event
 Inflow = 6.56 cfs @ 12.20 hrs, Volume= 29,151 cf
 Primary = 6.56 cfs @ 12.20 hrs, Volume= 29,151 cf, Atten= 0%, Lag= 0.0 min
 Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Flow to the West



| Long Term Operation & Maintenance Plan

This Operation & Maintenance Plan is prepared to comply with provisions set forth in the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards.

Structural Best Management Practices (BMPs) require periodic maintenance to ensure proper function and efficiency in pollutant removal from stormwater discharges that would otherwise reach wetland resource areas untreated. Maintenance schedules found below are as recommended in MassDEP's Massachusetts Stormwater Handbook and/or as recommended in the manufacturer's specifications.

The following BMP provides groundwater recharge

Subsurface Infiltration Chambers – Pond 1P

Chamber maintenance is not generally required. However, recharge systems are prone to failure due to clogging. Regulating the sediment and petroleum product input into the proposed recharge system is the priority maintenance activity. Sediments and any oil spillage should be trapped and removed before they reach the chambers. Any upstream devices connected to the infiltration system (catch basins, deep sump manholes, proprietary devices) shall be inspected and cleaned at least twice per year to prevent sediments and debris from entering and clogging the recharge system.

Sediments must also be removed whenever the depth of deposits is greater than or equal to 3".

The contractor shall verify that the required washed crushed stone and geotechnical fabric materials are clean and free of sediments and petroleum residue prior to, during and after chamber system installation. Inspections of the chamber system shall be made by after every major storm for the first few months after construction to verify that proper functioning has been achieved. During the initial inspection the water level should be measured and recorded in a permanent log over several days to check the drainage duration and verify that sediments are not accumulating. If ponded water is present after 24 hours or an accumulation of sediment or debris is noted within the chambers the owner or designated property manager and engineer shall determine the cause for this condition and devise an action plan to improve system functionality.

Once the chamber system has been verified to perform as designed, interior chamber conditions shall be inspected at least twice per year. Post construction inspections (to be conducted through inspection ports) shall consist of documenting interior and stone bed conditions, measured water depth and presence of sediment. Should inspection indicate that the system is clogged (ponding water present after 24 hours and/or sediment accumulations) replacement or major repair actions may be required. Should the system require replacement or major repair actions the owner or designated property manager and engineer shall determine the cause for this condition and devise an action plan

The inspection and maintenance of the subsurface infiltration system shall belong to the owner or designated property manager.

Stormwater Management Area-Pond 2P

Basins are prone to clogging and failure so it is imperative to develop and implement aggressive maintenance plans and schedules. If required, installing the required pretreatment BMPs, e.g. deep-sump catch basins and sediment forebays, will significantly reduce the maintenance requirements for the basin.

Inspections and preventative maintenance shall be performed at least twice a year, and after every time drainage discharges through the high outlet orifice or a major storm event which is defined as a storm that is equal to or greater than the 2-year, 24-hour storm (3.1 inches in a 24-hour storm).

After the basin is on line, inspect it after every major storm for the first few months to ensure that it is stabilized and functioning properly. Take corrective action if necessary.

Note the time that water remains standing in the basin after a storm event. Standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity of the basin may have been overestimated or the bottom has been clogged.

If the reason is clogging, determine the cause, e.g. erosion, excessive compaction, or low spots and take the necessary corrective action. Thereafter, inspect the infiltration basin at least twice per year.

Important items to check during the inspections include:

1. Signs of differential settlement,
2. Cracking,
3. Erosion,
4. Leakage in the embankments,
5. Tree growth on the embankments,
6. Condition of riprap,
7. Sediment accumulation and,
8. Health of the turf.

At least twice a year the buffer area, side slopes, and basin bottom shall be mowed. Remove the grass clippings and accumulated organic matter to prevent an impervious organic mat from forming. Remove trash and debris at this time as well as using deep tilling to break up any clogged surfaces, revegetate immediately.

Remove sediment from the basin as necessary only when the floor of the basin is completely dry. Use light equipment to remove the top layer to prevent compacting the underlying soil. Deep till the remaining soil and revegetate as soon as possible.

Inspection and Maintenance Form

Refer to Sections above for frequency of inspection

Inspector:

Date:

Inspector Title:

Days since last rainfall:

Amount of last rainfall:

Structural Controls: Subsurface Drainage Structure

Structure Identification	Location	Condition Stone Bed	Settlement over system	Sediment Buildup in Basin
Pond 1P	Rear of house	Poor Fair Good	Yes No	Minor <input type="checkbox"/> Moderate <input type="checkbox"/> Major <input type="checkbox"/>
				Minor <input type="checkbox"/> Moderate <input type="checkbox"/> Major <input type="checkbox"/>
				Minor <input type="checkbox"/> Moderate <input type="checkbox"/> Major <input type="checkbox"/>
				Minor <input type="checkbox"/> Moderate <input type="checkbox"/> Major <input type="checkbox"/>
				Minor <input type="checkbox"/> Moderate <input type="checkbox"/> Major <input type="checkbox"/>
				Minor <input type="checkbox"/> Moderate <input type="checkbox"/> Major <input type="checkbox"/>

Maintenance required

To be performed by:

On or before:

Inspection and Maintenance Form

Refer to Sections above for frequency of inspection

Inspector:

Date:

Inspector Title:

Days since last rainfall:

Amount of last
rainfall:

Structural Controls: Stormwater Management Area

Structure Identification	Location	Condition of side slope % vegetated	Sediment buildup in basin % accumulation	Rilling or gullyng
Pond 2P	Front of house			Minor <input type="checkbox"/>
				Moderate <input type="checkbox"/>
				Major <input type="checkbox"/>
				Minor <input type="checkbox"/>
				Moderate <input type="checkbox"/>
				Major <input type="checkbox"/>
				Minor <input type="checkbox"/>
				Moderate <input type="checkbox"/>
				Major <input type="checkbox"/>
				Minor <input type="checkbox"/>
				Moderate <input type="checkbox"/>
				Major <input type="checkbox"/>

Maintenance required

To be performed by:

On or before:





POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.311 (0.241-0.390)	0.374 (0.289-0.469)	0.476 (0.367-0.599)	0.561 (0.430-0.710)	0.677 (0.504-0.895)	0.765 (0.557-1.03)	0.857 (0.608-1.20)	0.961 (0.647-1.38)	1.11 (0.720-1.64)	1.23 (0.781-1.86)
10-min	0.441 (0.342-0.553)	0.530 (0.410-0.665)	0.675 (0.521-0.850)	0.795 (0.610-1.01)	0.960 (0.714-1.27)	1.08 (0.791-1.46)	1.21 (0.861-1.70)	1.36 (0.915-1.95)	1.57 (1.02-2.33)	1.75 (1.11-2.64)
15-min	0.519 (0.402-0.650)	0.623 (0.482-0.782)	0.793 (0.612-0.999)	0.934 (0.717-1.18)	1.13 (0.840-1.49)	1.27 (0.929-1.72)	1.43 (1.01-2.00)	1.60 (1.08-2.29)	1.85 (1.20-2.74)	2.06 (1.30-3.10)
30-min	0.716 (0.554-0.897)	0.858 (0.664-1.08)	1.09 (0.840-1.37)	1.28 (0.983-1.62)	1.55 (1.15-2.05)	1.75 (1.27-2.36)	1.96 (1.39-2.74)	2.19 (1.48-3.14)	2.54 (1.64-3.75)	2.82 (1.78-4.25)
60-min	0.913 (0.707-1.14)	1.09 (0.845-1.37)	1.39 (1.07-1.74)	1.63 (1.25-2.06)	1.97 (1.46-2.60)	2.22 (1.62-3.00)	2.48 (1.76-3.48)	2.79 (1.87-3.98)	3.22 (2.09-4.77)	3.58 (2.27-5.41)
2-hr	1.18 (0.919-1.47)	1.43 (1.11-1.78)	1.84 (1.43-2.30)	2.17 (1.68-2.74)	2.64 (1.99-3.49)	2.99 (2.20-4.03)	3.36 (2.42-4.73)	3.82 (2.57-5.43)	4.50 (2.93-6.62)	5.09 (3.23-7.63)
3-hr	1.36 (1.07-1.69)	1.66 (1.30-2.06)	2.15 (1.68-2.68)	2.56 (1.99-3.20)	3.11 (2.35-4.10)	3.53 (2.61-4.75)	3.98 (2.88-5.59)	4.53 (3.06-6.42)	5.38 (3.50-7.89)	6.12 (3.90-9.15)
6-hr	1.75 (1.39-2.16)	2.14 (1.69-2.64)	2.78 (2.19-3.44)	3.31 (2.60-4.13)	4.05 (3.08-5.30)	4.58 (3.42-6.15)	5.17 (3.77-7.24)	5.91 (4.01-8.32)	7.05 (4.60-10.3)	8.04 (5.13-11.9)
12-hr	2.21 (1.77-2.71)	2.71 (2.16-3.33)	3.53 (2.80-4.34)	4.20 (3.32-5.20)	5.13 (3.93-6.67)	5.82 (4.37-7.74)	6.57 (4.81-9.11)	7.49 (5.11-10.5)	8.91 (5.84-12.9)	10.1 (6.49-14.9)
24-hr	2.65 (2.14-3.23)	3.29 (2.65-4.00)	4.33 (3.47-5.29)	5.19 (4.13-6.37)	6.38 (4.92-8.24)	7.25 (5.49-9.60)	8.21 (6.06-11.4)	9.40 (6.44-13.1)	11.3 (7.42-16.2)	12.9 (8.29-18.9)
2-day	3.02 (2.45-3.65)	3.82 (3.10-4.62)	5.12 (4.14-6.21)	6.20 (4.98-7.57)	7.69 (6.00-9.91)	8.77 (6.71-11.6)	9.98 (7.46-13.8)	11.6 (7.95-16.0)	14.1 (9.29-20.1)	16.3 (10.5-23.7)
3-day	3.32 (2.71-3.99)	4.18 (3.41-5.03)	5.58 (4.53-6.75)	6.74 (5.45-8.20)	8.35 (6.54-10.7)	9.51 (7.31-12.5)	10.8 (8.12-14.9)	12.5 (8.63-17.2)	15.3 (10.1-21.7)	17.7 (11.4-25.7)
4-day	3.60 (2.95-4.32)	4.49 (3.67-5.39)	5.93 (4.84-7.15)	7.13 (5.78-8.64)	8.78 (6.90-11.2)	9.98 (7.70-13.1)	11.3 (8.53-15.6)	13.1 (9.04-18.0)	15.9 (10.6-22.6)	18.5 (11.9-26.7)
7-day	4.38 (3.61-5.22)	5.29 (4.36-6.32)	6.79 (5.57-8.14)	8.03 (6.55-9.68)	9.73 (7.69-12.4)	11.0 (8.50-14.3)	12.4 (9.33-16.9)	14.2 (9.84-19.3)	17.1 (11.4-24.1)	19.7 (12.7-28.3)
10-day	5.07 (4.21-6.03)	6.01 (4.98-7.16)	7.54 (6.22-9.01)	8.81 (7.22-10.6)	10.6 (8.37-13.3)	11.8 (9.19-15.3)	13.3 (10.0-17.9)	15.1 (10.5-20.5)	17.9 (11.9-25.2)	20.5 (13.3-29.3)
20-day	7.03 (5.88-8.30)	8.05 (6.73-9.53)	9.73 (8.10-11.5)	11.1 (9.20-13.3)	13.0 (10.4-16.2)	14.5 (11.2-18.4)	16.0 (12.0-21.1)	17.8 (12.5-23.9)	20.3 (13.6-28.3)	22.5 (14.6-32.0)
30-day	8.64 (7.27-10.2)	9.74 (8.19-11.5)	11.5 (9.66-13.6)	13.0 (10.8-15.5)	15.1 (12.0-18.6)	16.7 (12.9-21.0)	18.3 (13.6-23.7)	20.0 (14.1-26.7)	22.3 (15.0-31.0)	24.2 (15.8-34.3)
45-day	10.7 (9.04-12.5)	11.9 (10.0-13.9)	13.8 (11.6-16.2)	15.4 (12.9-18.2)	17.6 (14.1-21.6)	19.3 (15.0-24.1)	21.0 (15.6-27.0)	22.7 (16.1-30.2)	24.9 (16.8-34.3)	26.5 (17.3-37.3)
60-day	12.4 (10.6-14.5)	13.7 (11.6-16.0)	15.7 (13.3-18.4)	17.4 (14.6-20.5)	19.7 (15.8-24.0)	21.5 (16.8-26.7)	23.3 (17.3-29.7)	24.9 (17.7-33.1)	27.0 (18.3-37.1)	28.5 (18.6-40.0)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

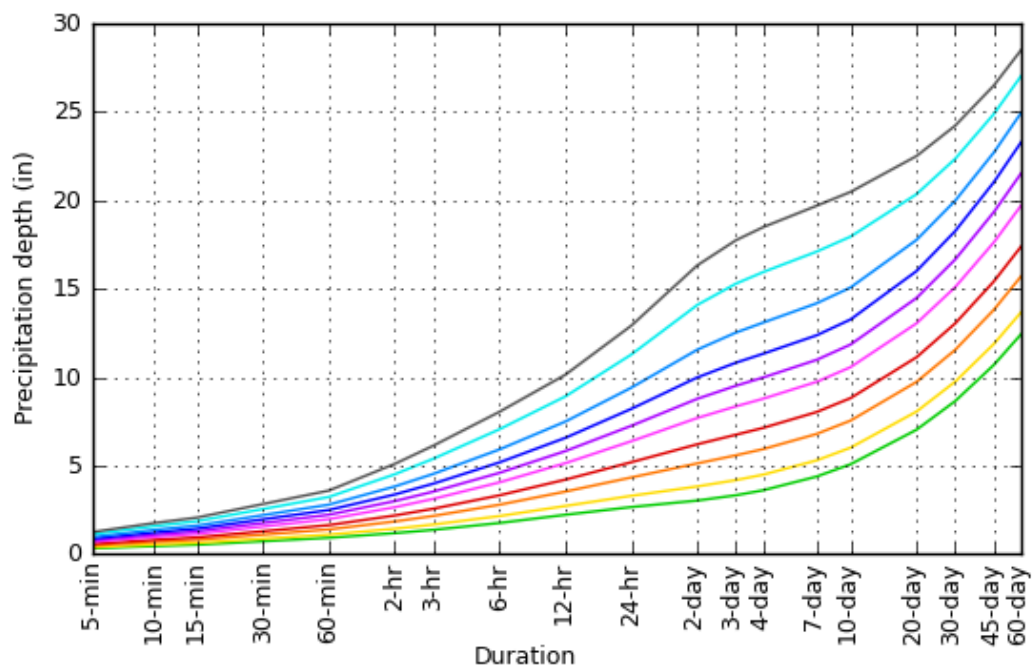
Please refer to NOAA Atlas 14 document for more information.

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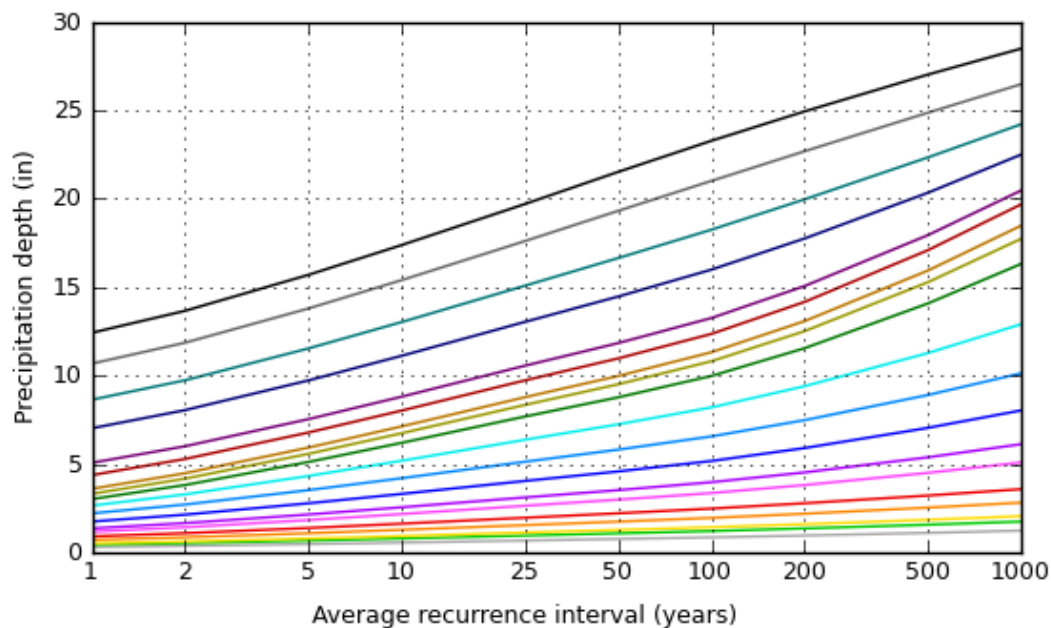
PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 42.6184°, Longitude: -70.9633°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

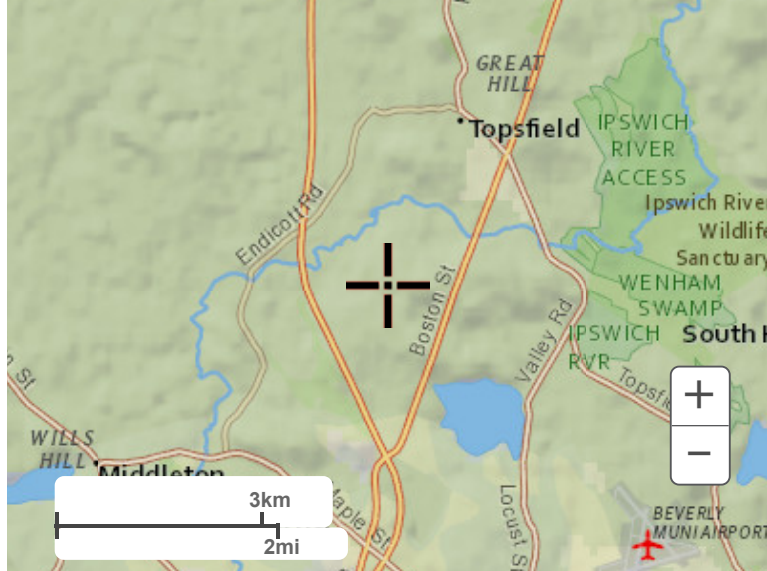


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

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Maps & aeriels

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

Hydrologic Soil Group—Essex County, Massachusetts, Northern Part (79 Hill Street Topsfield MA)



Map Scale: 1:1,670 if printed on A landscape (11" x 8.5") sheet.

0 20 40 80 120 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

2/17/2023
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points





 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, Massachusetts, Northern Part
 Survey Area Data: Version 18, Sep 9, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	5.0	44.4%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	C/D	4.4	39.2%
311C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	C/D	1.8	16.4%
Totals for Area of Interest			11.2	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

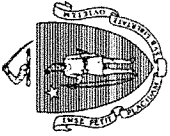
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Commonwealth of Massachusetts
City/Town of Topsfield

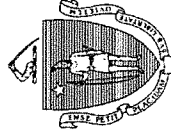
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Thomas Schutz
Owner Name
79 Hill Street
Street Address
Topsfield MA
City State
68-14
Map/Lot #
01983
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS Source 310B Soil Map Unit
- Woodbridge fine sandy loam
Soil Name
Depth to densic material
Soil Limitations
- Coarse-loamy lodgment till derived from gneiss, granite, and/or schist
Soil Parent material
Moraine Landform
3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 1964, Oldale Qgm Year Published/Source Map Unit
- Ground Moraine
Description of Geologic Map Unit:
4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No
5. Within a velocity zone? ☐ Yes ☒ No
6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: Wetland Type
7. Current Water Resource Conditions (USGS): 9/2022 Range: ☐ Above Normal ☐ Normal ☒ Below Normal
Month/Day/ Year
8. Other references reviewed: MAGIS



Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 22-1 Hole # 9/1/2022 Date 7:00am Time Sunny, 75 deg F Weather 42°37'08.8"N Latitude 70°57'48.2"W Longitude: 0-8% Slope (%)

1. Land Use Vacant lot Underbrush Some stones Surface Stones (e.g., cobbles, stones, boulders, etc.) 0-8%

Description of Location: Back of lot 12

2. Soil Parent Material: Coarse-loamy lodgment fill derived from gneiss, granite, and/or schist Moraine OS Position on Landscape (SU, SH, BS, FS, TS) OS

3. Distances from: Open Water Body >100 feet Drainage Way >25 feet Wetlands >100 feet
Property Line >10 feet Drinking Water Well >100 feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

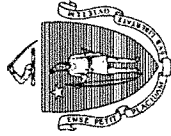
5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	FSL	10YR3/4						Gran	Fri	
6-24	Bw	FSL	10YR5/6						WBLKY	Fri	
24-72	Cd	GrFSL	2.5Y6/4	24	7.5YR5/8 & 5Y6/1		10-15		BLKY	Firm	

Additional Notes:

Very dry, weak structure. ESHWT @ 24" , Could not excavate deeper (boulder), roots to 38"+/-



Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 22-2 Hole # 9/1/2022 Date 7:00 am Time Sunny, 75 deg F Weather 42°37'08.8"N Latitude 70°57'48.2"W Longitude: 0-8% Slope (%)

1. Land Use Vacant lot Grass Vegetation Some stones Surface Stones (e.g., cobbles, stones, boulders, etc.) 0-8% Slope (%)

Description of Location: Back of lot 11

2. Soil Parent Material: Coarse-loamy lodgment fill derived from gneiss, granite, and/or schist Moraine Landform OS Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >25 feet Wetlands >100 feet
Property Line >10 feet Drinking Water Well >100 feet Other _____ feet

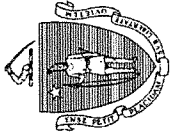
4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	FSL	10YR3/4						Gran	Fri	
6-24	Bw	FSL	10YR5/6						WBLKY	Fri	
24-100	Cd	GrFSL	2.5Y6/4	26"	7.5YR5/8 & 5Y6/1		10-15		BLKY	Firm	

Additional Notes:
Moist @ 80"; no ref @ 100; ESHWT @ 26"; roots to 40" +/-



Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 22-3 Hole # 9/1/2022 Date 7:00 am Time Sunny, 75 deg F Weather 42°37'08.8"N Latitude 70°57'48.2"W Longitude: 0-8% Slope (%)

1. Land Use Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Underbrush, mature trees Some stones Surface Stones (e.g., cobbles, stones, boulders, etc.)

Description of Location: In woods (Middle of lot 10)

2. Soil Parent Material: Coarse-loamy lodgment fill derived from gneiss, granite, and/or schist Moraine Landform OS Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >25 feet Wetlands >100 feet Property Line >10 feet Drinking Water Well >100 feet Other feet

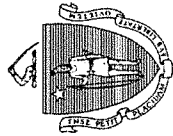
4. Unsuitable Materials Present: ☐ Yes ☒ No ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	FSL	10YR3/4						Gran	Fri	
6-22	Bw	FSL	10YR5/6						WBLKY	Fri	
22-88	Cd	GrSL	2.5Y6/4	22	7.5YR5/8 & 5Y6/1		5-10		BLKY	Firm	

Additional Notes:
ESHW @ 22"; moist @ 64"; roots to 44" +/-



Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 22-4 Date: 9/2/2022 Time: 7:00 am Sunny, 60 deg F Weather: Sunny Latitude: 42°37'08.8"N Longitude: 70°57'48.2"W
Hole # _____

1. Land Use Vacant lot Underbrush, mature trees Some stones Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)
(e.g., woodland, agricultural field, vacant lot, etc.)

Description of Location: In woods (Middle of lot 10)

2. Soil Parent Material: Coarse-loamy lodgment fill derived from gneiss, granite, and/or schist Moraine Landform OS Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >25 feet Wetlands >100 feet
Property Line >10 feet Drinking Water Well >100 feet Other _____ feet

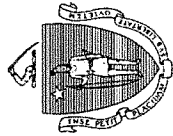
4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	FSL	10YR3/4						Gran	Fri	
6-26	Bw	FSL	10YR5/6						WBLKY	Fri	
26-86	Cd	GrSL	2.5Y6/4	26	7.5YR5/8 & 5Y6/1		10-15		BLKY	Firm	

Additional Notes:
ESHW @ 26", roots to 46" +/-; moist @ 64"



Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 22-5 Hole # 7:30 Date 7:00 am Time Sunny, 60 deg F Weather 42°37'08.8"N Latitude 70°57'48.2"W Longitude: 0-8% Slope (%)

1. Land Use: Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Underbrush, mature trees Some stones Surface Stones (e.g., cobbles, stones, boulders, etc.) 0-8% Slope (%)

Description of Location:

Coarse-loamy lodgment fill derived from gneiss, granite, and/or schist

Moraine Landform

OS

Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >25 feet Wetlands >100 feet
Property Line >10 feet Drinking Water Well >100 feet Other feet

4. Unsuitable

Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

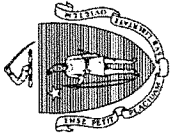
5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	FSL	10YR3/4						Gran	Fri	
6-24	Bw	FSL	10YR5/6						WBLKY	Fri	
24-84	Cd	GrSL	2.5Y6/4	24	7.5YR5/8 & 5Y6/1		10-15		BLKY	Firm	

Additional Notes:

ESHWT @ 24"; roots to 50" +/-; moist @ 70"



Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 22-6 Hole # 9/2/2022 Date 7:00 am Time Sunny, 60 deg F Weather 42°37'08.8"N Latitude 70°57'48.2"W Longitude: 0-8% Slope (%)

1. Land Use Vacant lot (e.g., woodland, agricultural field, vacant lot, etc.) Underbrush, mature trees Some stones Surface Stones (e.g., cobbles, stones, boulders, etc.)

Description of Location: In woods (Middle of lot 10)

2. Soil Parent Material: Coarse-loamy lodgment fill derived from gneiss, granite, and/or schist Moraine Landform OS Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100 feet Drainage Way >25 feet Wetlands >100 feet Property Line >10 feet Drinking Water Well >100 feet Other _____ feet

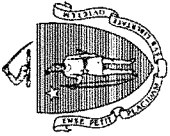
4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	Ap	FSL	10YR3/4						Gran	Fri	
6-24	Bw	FSL	10YR5/6						WBLKY	Fri	
24-78	Cd	GrSL	2.5Y6/4	24	7.5YR5/8 & 5Y6/1		10-15		BLKY	Firm	

Additional Notes:
ESHW @ 24"; roots to 42" +/-; moist @ 58"



Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

- ☐ Depth observed standing water in observation hole
- ☐ Depth weeping from side of observation hole
- ☒ Depth to soil redoximorphic features (mottles)
- ☐ Depth to adjusted seasonal high groundwater: (S_h) (USGS methodology)

Obs. Hole # 22-1,22-2,22-3 Obs. Hole # 22-4,22-5,22-6

 inches inches

 inches inches

24,26,22 inches 26,24,24 inches

 inches inches

Index Well Number

Reading Date

$$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$$

Obs. Hole/Well# S_c S_r OW_c OW_{max} OW_r S_h

2. Estimated Depth to High Groundwater: inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

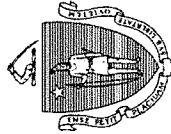
- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? ☒ Yes ☐ No

- b. If yes, at what depth was it observed (exclude A and O Horizons)?

Upper boundary: 6,6,6,6, Lower boundary: 72,100,88,86,84,78
6,6 inches

- c. If no, at what depth was impervious material observed?

Upper boundary: Lower boundary:
inches inches

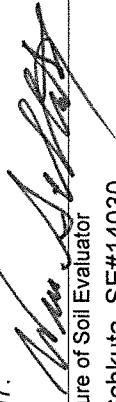


Commonwealth of Massachusetts
City/Town of Topsfield

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.



Signature of Soil Evaluator

Will Schkuta, SE#14030

Typed or Printed Name of Soil Evaluator / License #

Wendy Hansbury (BOH Agent), Mark Carleo (Tri-town inspector)

Name of Approving Authority Witness



Date

6/30/2025

Expiration Date of License

Topsfield Board of Health

Approving Authority

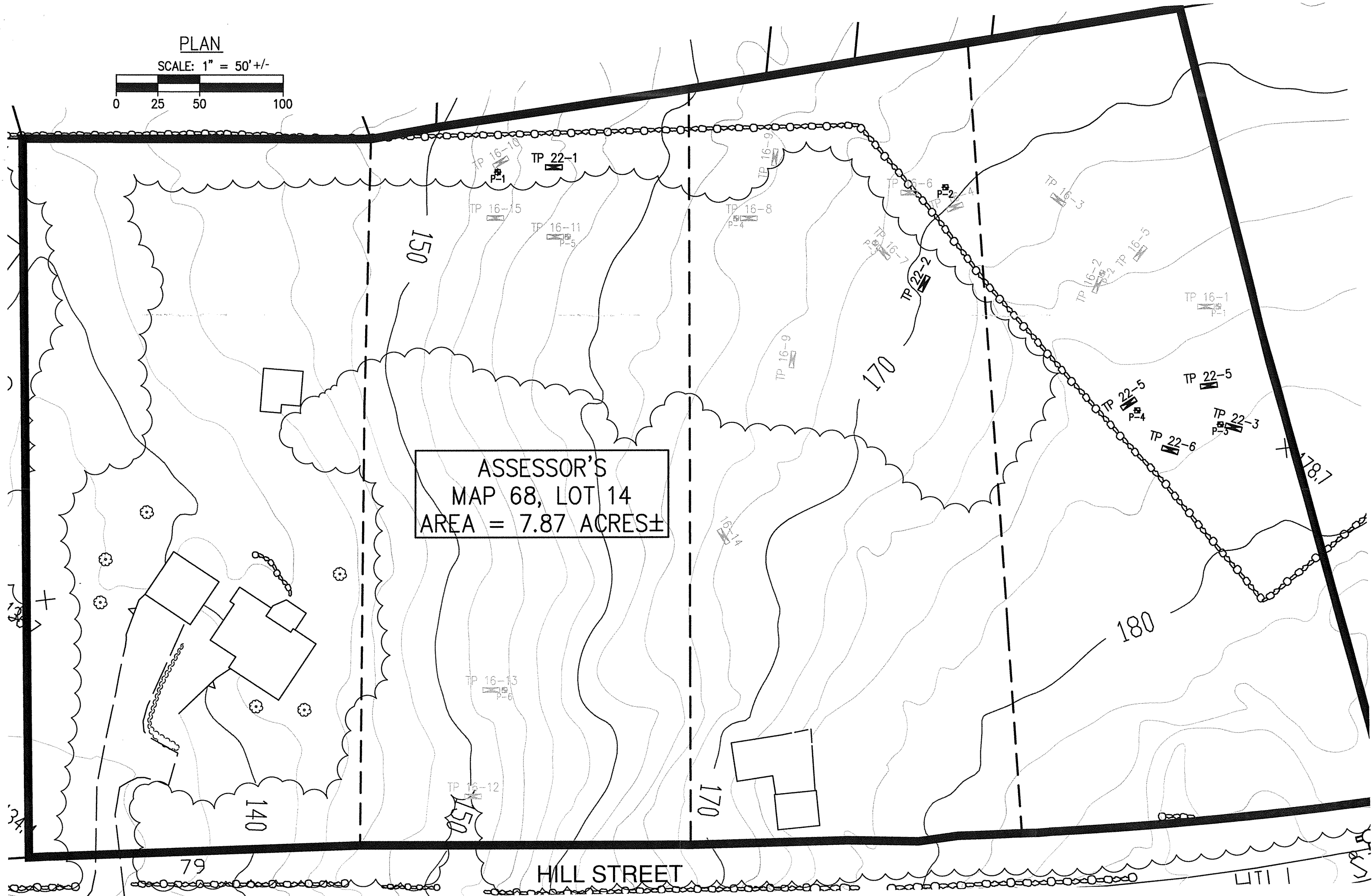
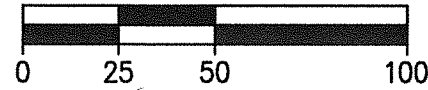
Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

See sketch attached.

PLAN

SCALE: 1" = 50' +/-





Commonwealth of Massachusetts
City/Town of Topsfield
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Site Information

Thomas Schutz

Owner Name

79 Hill Street

Street Address or Lot #

Topsfield

City/Town

MA

State

01983

Zip Code

Contact Person (if different from Owner)

Telephone Number

B. Test Results

	<u>9/1/2022</u> Date	<u>9:04 am</u> Time	<u>9/1/2022</u> Date	<u>10:26 am</u> Time
Observation Hole #	P1 (16-10)		P2 (16-4)	
Depth of Perc	36+18 = 54"		32+18 = 50"	
Start Pre-Soak	9:04		10:26	
End Pre-Soak	9:19		10:41	
Time at 12"	9:19		10:41	
Time at 9"	9:52		11:47	
Time at 6"	11:00		1:07 pm	
Time (9"-6")	68 min.		80 min	
Rate (Min./Inch)	23 MPI		27 MPI	
	Test Passed: <input checked="" type="checkbox"/>		Test Passed: <input checked="" type="checkbox"/>	
	Test Failed: <input type="checkbox"/>		Test Failed: <input type="checkbox"/>	

	<u>9/2/2022</u>	<u>8:20 am</u>	<u>9/2/2022</u>	<u>8:45 am</u>
	Date	Time	Date	Time
Observation Hole #	<u>P3 (22-3)</u>		<u>P4 (22-5)</u>	
Depth of Perc	<u>32+18 = 50"</u>		<u>26+18 = 44"</u>	
Start Pre-Soak	<u>8:25</u>		<u>8:49</u>	
End Pre-Soak	<u>8:40</u>		<u>9:04</u>	
Time at 12"	<u>8:40</u>		<u>9:04</u>	
Time at 9"	<u>10:33</u>		<u>10:18</u>	
Time at 6"	<u>1:12 pm</u>		<u>12:36</u>	
Time (9"-6")	<u>159 min</u>		<u>138 min</u>	
Rate (Min./Inch)	<u>53 MPI</u>		<u>46 MPI</u>	
	Test Passed:	<input checked="" type="checkbox"/>	Test Passed:	<input checked="" type="checkbox"/>
	Test Failed:	<input type="checkbox"/>	Test Failed:	<input type="checkbox"/>
<u>Will Schkuta, SE #14030</u>				
Test Performed By:				
<u>Mark Carleo, Tri-Town Pubic Health Inspector</u>				
<u>Wendy Hansbury, Health Director</u>				

Comments:

