



MERIDIAN

LAND SERVICES, INC.

CIVIL ENGINEERING | LAND SURVEYING | PERMITTING | SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

Office: 31 Old Nashua Road, Suite 2, Amherst, NH 03031

Mailing: PO Box 118, Milford, NH 03055

Phone: 603-673-1441 * Fax 603-673-1584

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Stormwater Management Report

Subdivision of Lot F-34

Tax Map F Lot 34

Route 13

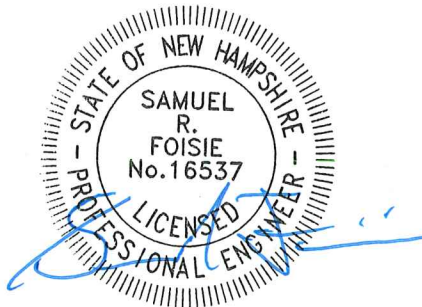
Brookline, New Hampshire 03033

Prepared for:

Federal Hill Properties, LLC

25 Merrit Parkway

Nashua, New Hampshire 03062



October 5, 2023

Prepared by: Noah C. Greene, EIT

Reviewed by: Samuel R. Foisie, PE



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Storm Water Management Report

Subdivision of Lot F-34

Map F Parcel 34

NH Route 13, Brookline, New Hampshire

I. Introduction

These drainage calculations have been prepared in support of the above referenced development project on tax parcel F-34 in Brookline, New Hampshire. The project will involve the construction of a 75-foot common driveway that will service the two lots.

II. Site Description

This site is located on Route 13, Brookline. The site consists of almost entirely forested land in its existing conditions. The property is located South of the intersection of Milford Street and NH Route 13.

The following are existing soil types for the offsite areas that were determined using United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey:

CmC Canton Stony Fine Sandy Loam, 3 to 8 Percent Slopes HSG B



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III. Drainage Design

To meet the requirements of the Town of Brookline, storm water generated from the proposed development is conveyed to two separate infiltration basins located downslope of the proposed development. The site was analyzed for the 25-year storm event.

Two observation points were analyzed to compare the peak flows generated by the existing site and the proposed development. Observation Point 'OP-1' represents the runoff generated from the northern half of the site from the centerline of the proposed common drive. The runoff from the common drive is conveyed via a roadside swale and culvert that outlets on the eastern side of the individual drives and is conveyed to the infiltration basin via a conveyance swale. The conveyance swale and pond are designed to capture the runoff from the common driveway and any proposed development on the site.

Observation Point 'OP-2' represents the runoff from the southern half of the site from the centerline of the proposed common drive. The runoff from the common drive is conveyed via a roadside swale and culvert that outlets on the eastern side of the individual drives and is conveyed to the infiltration basin via a conveyance swale. The conveyance swale and pond are designed to capture the runoff from the common driveway and any proposed development on the site.



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IV. Methodology

The quantity of runoff and the conveyance of that flow through the site are determined using the software package HydroCAD 10.20-2g by HydroCAD Software Solutions, LLC. HydroCAD is a computer aided design program for modeling storm water hydrology based on the Soil Conservation Service (SCS) TR-55 method combined with standard hydraulics calculations.

V. Summary

The proposed drainage design effectively mitigates runoff during the 25-year storm events. The runoff is effectively collected and discharged at a controlled rate. The proposed stormwater mitigation reduces peak flow rates generated from the site for all storms.

Summary tables below for pre- and post-development peak runoff rates are shown in the table below.

Table 1: Peak Rate of Stormwater Discharge Summary

Location	Q 25-YR (CFS)		
	Pre	Post	Δ
OP-1	2.71	2.71	0.00
OP-2	1.54	1.36	-0.18

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Metadata for Point

Smoothing

State

Location

Latitude

Longitude

Elevation

Date/Time

Yes

New Hampshire

New Hampshire, United States

42.747 degrees North

71.667 degrees West

90 feet

Thu Aug 17 2023 09:39:02 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.69	0.87	1.09	1yr	0.75	1.02	1.26	1.58	1.99	2.52	2.79	1yr	2.23	2.68	3.10	3.82	4.42	1yr
2yr	0.34	0.52	0.64	0.85	1.06	1.34	2yr	0.92	1.22	1.54	1.93	2.41	3.01	3.36	2yr	2.66	3.23	3.74	4.46	5.08	2yr
5yr	0.40	0.62	0.77	1.04	1.33	1.68	5yr	1.15	1.53	1.95	2.44	3.03	3.76	4.26	5yr	3.33	4.09	4.74	5.60	6.29	5yr
10yr	0.45	0.70	0.89	1.20	1.57	2.00	10yr	1.35	1.81	2.33	2.91	3.61	4.45	5.09	10yr	3.94	4.90	5.67	6.66	7.39	10yr
25yr	0.53	0.84	1.07	1.47	1.95	2.52	25yr	1.69	2.26	2.93	3.67	4.54	5.57	6.46	25yr	4.93	6.22	7.19	8.37	9.16	25yr
50yr	0.59	0.95	1.22	1.72	2.31	3.01	50yr	2.00	2.67	3.52	4.40	5.42	6.61	7.74	50yr	5.85	7.45	8.61	9.96	10.78	50yr
100yr	0.68	1.10	1.42	2.01	2.74	3.58	100yr	2.37	3.17	4.19	5.24	6.45	7.85	9.29	100yr	6.95	8.93	10.31	11.85	12.69	100yr
200yr	0.77	1.26	1.64	2.35	3.25	4.27	200yr	2.80	3.75	5.01	6.26	7.69	9.32	11.14	200yr	8.25	10.71	12.35	14.10	14.95	200yr
500yr	0.93	1.53	2.00	2.90	4.07	5.39	500yr	3.51	4.70	6.33	7.91	9.69	11.70	14.19	500yr	10.36	13.64	15.70	17.76	18.56	500yr

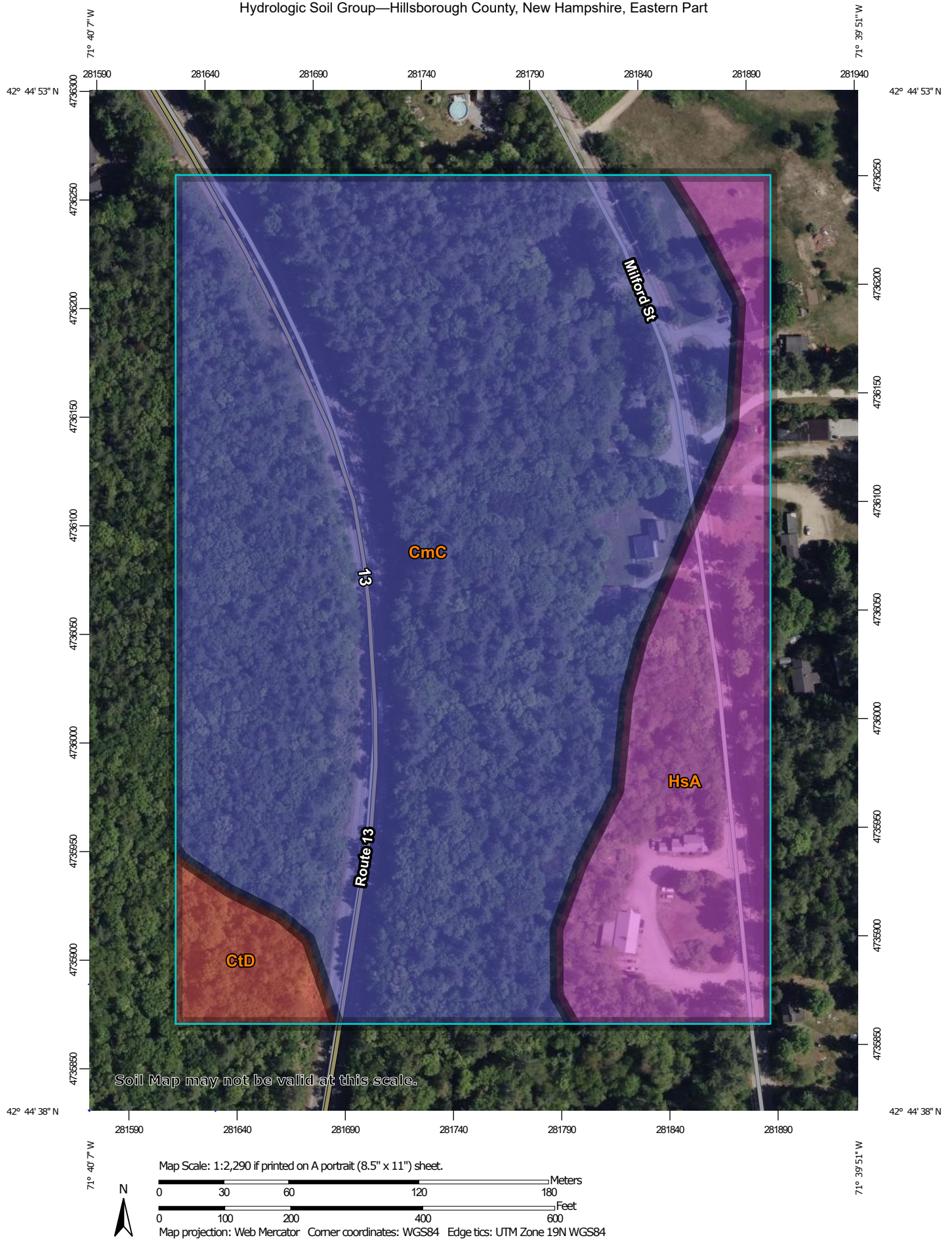
Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.21	0.32	0.39	0.53	0.65	0.77	1yr	0.56	0.75	0.99	1.36	1.68	2.24	2.40	1yr	1.98	2.30	2.61	3.38	3.69	1yr
2yr	0.32	0.49	0.61	0.82	1.02	1.21	2yr	0.88	1.18	1.37	1.77	2.27	2.93	3.27	2yr	2.59	3.14	3.63	4.35	4.95	2yr
5yr	0.36	0.55	0.69	0.94	1.20	1.41	5yr	1.04	1.38	1.64	2.12	2.71	3.53	3.96	5yr	3.13	3.81	4.40	5.23	5.89	5yr
10yr	0.40	0.61	0.75	1.05	1.36	1.58	10yr	1.17	1.54	1.77	2.41	3.07	4.09	4.58	10yr	3.62	4.41	5.08	6.01	6.71	10yr
25yr	0.45	0.68	0.85	1.21	1.59	1.83	25yr	1.37	1.79	2.04	2.87	3.61	4.89	5.56	25yr	4.33	5.34	6.15	7.23	7.97	25yr
50yr	0.48	0.73	0.91	1.31	1.76	2.06	50yr	1.52	2.01	2.29	3.28	4.08	5.63	6.44	50yr	4.99	6.20	7.09	8.31	9.08	50yr
100yr	0.51	0.78	0.97	1.41	1.93	2.31	100yr	1.67	2.26	2.56	3.19	4.63	6.51	7.47	100yr	5.76	7.18	8.17	9.55	10.34	100yr
200yr	0.55	0.83	1.06	1.53	2.14	2.60	200yr	1.84	2.54	2.85	3.53	5.28	7.52	8.68	200yr	6.66	8.35	9.42	10.98	11.79	200yr
500yr	0.61	0.91	1.17	1.71	2.43	3.05	500yr	2.09	2.98	3.32	4.06	6.31	9.14	10.61	500yr	8.09	10.20	11.36	13.19	14.00	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.32	0.49	0.60	0.80	0.99	1.17	1yr	0.85	1.15	1.31	1.71	2.12	2.69	3.00	1yr	2.38	2.89	3.45	4.24	4.78	1yr
2yr	0.36	0.56	0.69	0.93	1.15	1.33	2yr	0.99	1.30	1.50	1.94	2.48	3.10	3.48	2yr	2.74	3.35	3.87	4.60	5.24	2yr
5yr	0.44	0.67	0.84	1.15	1.46	1.71	5yr	1.26	1.67	1.89	2.41	3.01	3.99	4.56	5yr	3.53	4.38	5.06	5.99	6.70	5yr
10yr	0.51	0.79	0.98	1.37	1.77	2.09	10yr	1.53	2.04	2.37	2.87	3.57	4.84	5.62	10yr	4.29	5.40	6.23	7.31	8.09	10yr
25yr	0.65	0.99	1.24	1.77	2.32	2.73	25yr	2.01	2.67	3.10	3.62	4.44	6.25	7.37	25yr	5.53	7.09	8.22	9.54	10.38	25yr
50yr	0.78	1.19	1.48	2.13	2.87	3.35	50yr	2.47	3.27	3.79	4.33	5.24	7.59	9.07	50yr	6.72	8.72	10.15	11.69	12.55	50yr
100yr	0.94	1.42	1.78	2.57	3.52	4.11	100yr	3.04	4.02	4.65	5.91	6.18	9.23	11.16	100yr	8.17	10.73	12.53	14.31	15.17	100yr
200yr	1.13	1.70	2.15	3.11	4.34	5.03	200yr	3.74	4.92	5.68	7.22	7.31	11.21	13.73	200yr	9.92	13.20	15.49	17.55	18.37	200yr
500yr	1.45	2.15	2.77	4.02	5.72	6.55	500yr	4.94	6.40	7.42	9.42	9.10	14.47	18.07	500yr	12.81	17.38	20.51	22.98	23.65	500yr

Hydrologic Soil Group—Hillsborough County, New Hampshire, Eastern Part



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 1:20,000.

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: Hillsborough County, New Hampshire, Eastern Part
 Survey Area Data: Version 25, Sep 12, 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
CmC	Canton fine sandy loam, 8 to 15 percent slopes, very stony	B	20.5	77.0%
CtD	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	D	1.0	3.6%
HsA	Hinckley loamy sand, 0 to 3 percent slopes	A	5.2	19.4%
Totals for Area of Interest			26.7	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

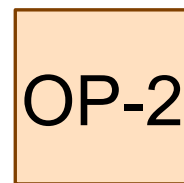
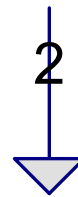
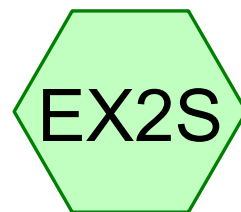
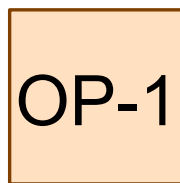
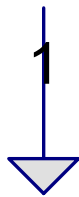
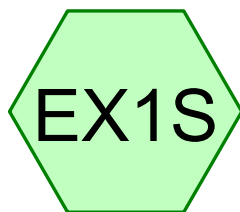
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

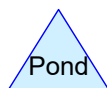
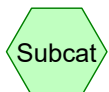
Tie-break Rule: Higher

Section 1.0: Existing Conditions

Routing Diagram
Area and Soils Listings
Design – 25-Year Storm



Observation Point 'OP-1' Observation Point 'OP-2'



Routing Diagram for 6115EX01

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6115EX01

Prepared by Meridian Land Services Inc

Printed 8/21/2023

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.438	61	>75% Grass cover, Good HSG B (EX1S, EX2S)
2.968	55	Woods, Good HSG B (EX1S, EX2S)
3.406	56	TOTAL AREA

6115EX01

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Printed 8/21/2023

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.406	HSG B	EX1S, EX2S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
3.406		TOTAL AREA

6115EX01*Type III 24-hr 25-Year Rainfall=5.57"*

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Printed 8/21/2023

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX1S: 1

Runoff Area=99,743 sf 0.00% Impervious Runoff Depth=1.35"

Flow Length=457' Slope=0.0980 '/' Tc=10.4 min CN=56 Runoff=2.71 cfs 0.257 af

Subcatchment EX2S: 2

Runoff Area=48,620 sf 0.00% Impervious Runoff Depth=1.35"

Flow Length=214' Slope=0.1034 '/' Tc=6.0 min CN=56 Runoff=1.54 cfs 0.125 af

Reach OP-1: Observation Point 'OP-1'

Inflow=2.71 cfs 0.257 af

Outflow=2.71 cfs 0.257 af

Reach OP-2: Observation Point 'OP-2'

Inflow=1.54 cfs 0.125 af

Outflow=1.54 cfs 0.125 af

Total Runoff Area = 3.406 ac Runoff Volume = 0.383 af Average Runoff Depth = 1.35"
100.00% Pervious = 3.406 ac 0.00% Impervious = 0.000 ac

Section 1.1: Existing Conditions,
25-Year Storm

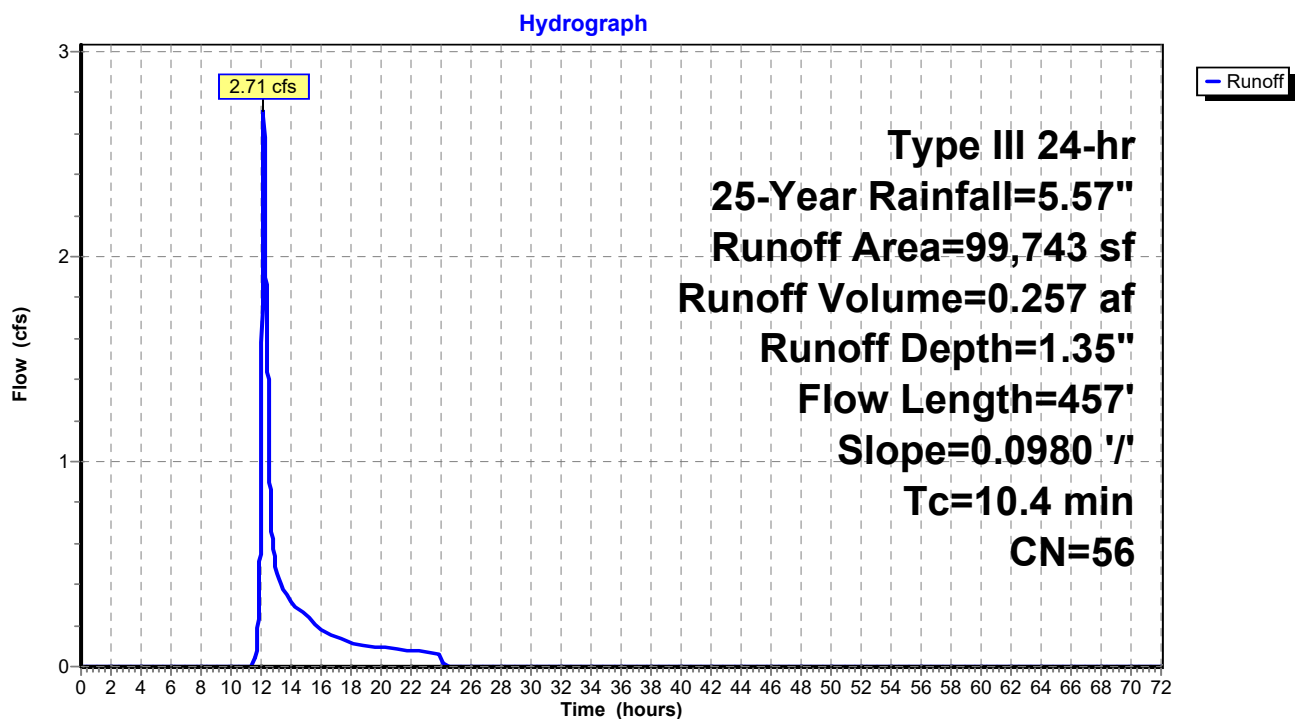
Summary for Subcatchment EX1S: 1

Runoff = 2.71 cfs @ 12.16 hrs, Volume= 0.257 af, Depth= 1.35"
 Routed to Reach OP-1 : Observation Point 'OP-1'

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.57"

Area (sf)	CN	Description
87,955	55	Woods, Good HSG B
11,788	61	>75% Grass cover, Good HSG B
99,743	56	Weighted Average
99,743		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	457	0.0980	0.73		Lag/CN Method,

Subcatchment EX1S: 1

Summary for Subcatchment EX2S: 2

Runoff = 1.54 cfs @ 12.10 hrs, Volume= 0.125 af, Depth= 1.35"
 Routed to Reach OP-2 : Observation Point 'OP-2'

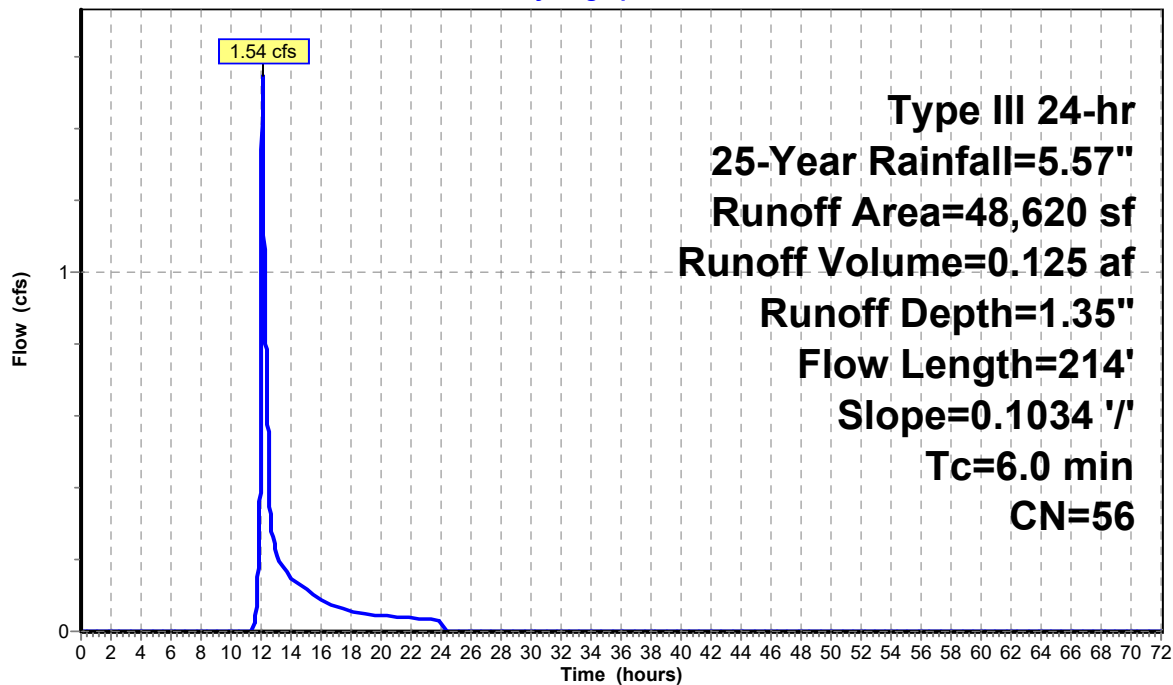
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.57"

Area (sf)	CN	Description
41,324	55	Woods, Good HSG B
7,296	61	>75% Grass cover, Good HSG B
48,620	56	Weighted Average
48,620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	214	0.1034	0.65		Lag/CN Method,
5.5	214	Total, Increased to minimum Tc = 6.0 min			

Subcatchment EX2S: 2

Hydrograph



Summary for Reach OP-1: Observation Point 'OP-1'

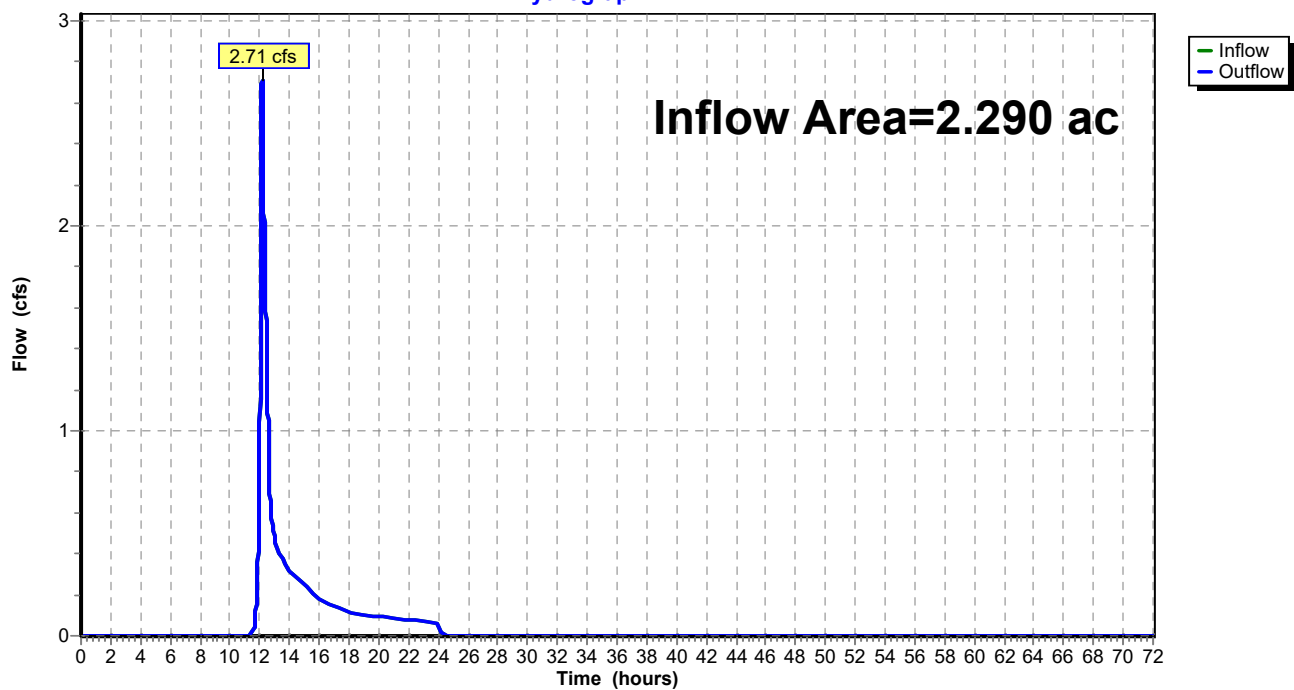
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.290 ac, 0.00% Impervious, Inflow Depth = 1.35" for 25-Year event
Inflow = 2.71 cfs @ 12.16 hrs, Volume= 0.257 af
Outflow = 2.71 cfs @ 12.16 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

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

Reach OP-1: Observation Point 'OP-1'

Hydrograph



Summary for Reach OP-2: Observation Point 'OP-2'

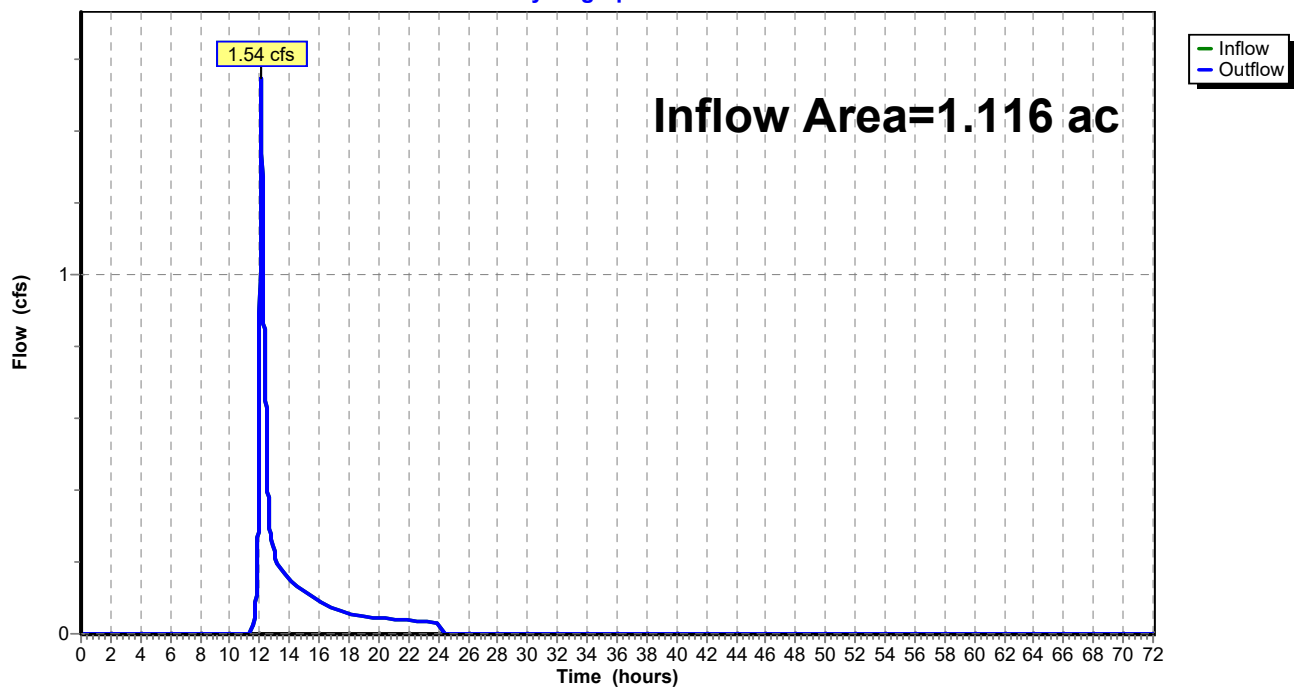
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.116 ac, 0.00% Impervious, Inflow Depth = 1.35" for 25-Year event
Inflow = 1.54 cfs @ 12.10 hrs, Volume= 0.125 af
Outflow = 1.54 cfs @ 12.10 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.0 min

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

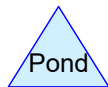
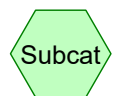
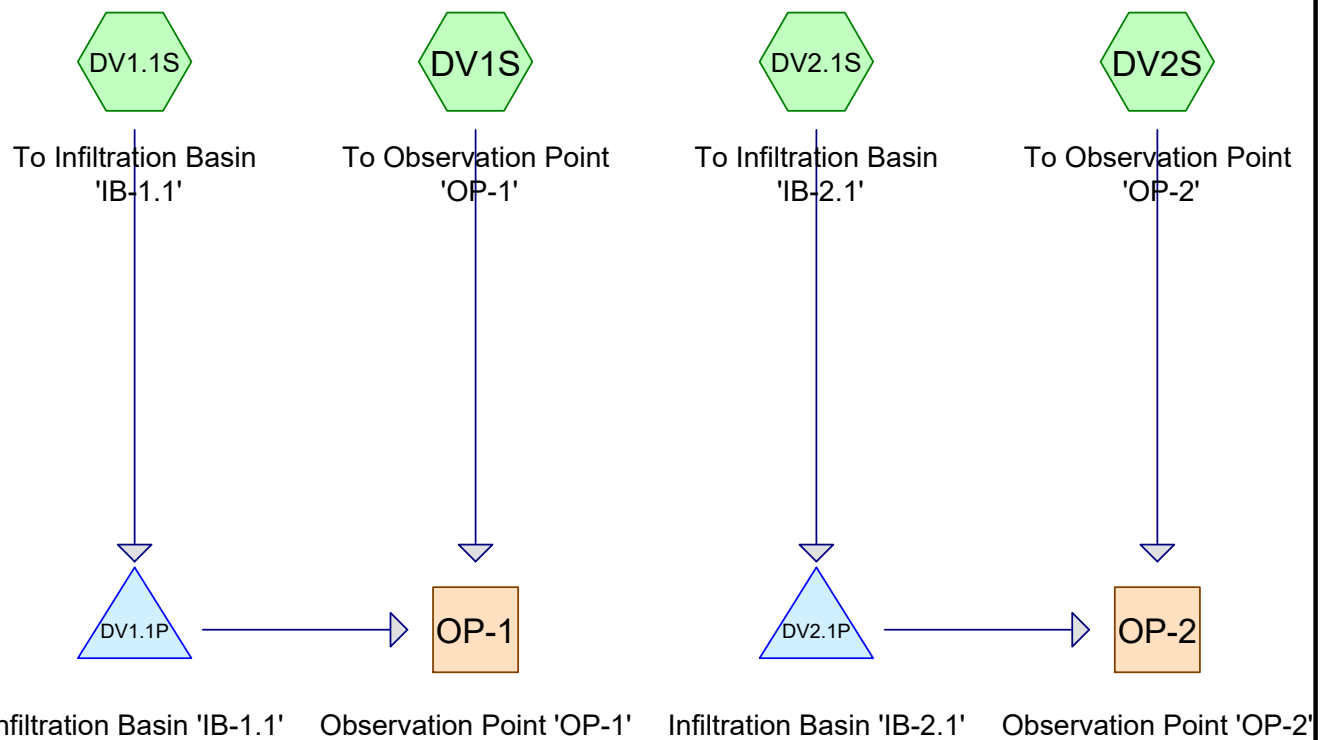
Reach OP-2: Observation Point 'OP-2'

Hydrograph



Section 2.0: Post-Developed Conditions

Routing Diagram
Area and Soils Listings
25-Year Storm Nodes



Routing Diagram for 6115DV01A

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6115DV01A

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.051	61	>75% Grass cover, Good HSG B (DV1.1S, DV1S, DV2.1S, DV2S)
0.144	98	Paved parking HSG B (DV1.1S, DV2.1S)
0.088	98	Roofs HSG B (DV1.1S, DV2.1S, DV2S)
2.124	55	Woods, Good HSG B (DV1.1S, DV1S, DV2.1S, DV2S)
3.406	60	TOTAL AREA

6115DV01A

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.406	HSG B	DV1.1S, DV1S, DV2.1S, DV2S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
3.406		TOTAL AREA

6115DV01A*Type III 24-hr 25-Year Rainfall=5.57"*

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

Subcatchment DV1.1S: To Infiltration Runoff Area=25,755 sf 15.45% Impervious Runoff Depth=2.04"
Flow Length=235' Slope=0.1023 '/' Tc=6.0 min CN=65 Runoff=1.37 cfs 0.101 af

Subcatchment DV1S: To Observation Point Runoff Area=78,821 sf 0.00% Impervious Runoff Depth=1.35"
Flow Length=382' Slope=0.0971 '/' Tc=9.0 min CN=56 Runoff=2.24 cfs 0.203 af

Subcatchment DV2.1S: To Infiltration Runoff Area=19,163 sf 29.16% Impervious Runoff Depth=2.56"
Flow Length=155' Slope=0.1049 '/' Tc=6.0 min CN=71 Runoff=1.31 cfs 0.094 af

Subcatchment DV2S: To Observation Point Runoff Area=24,624 sf 2.13% Impervious Runoff Depth=1.50"
Flow Length=196' Slope=0.1016 '/' Tc=6.0 min CN=58 Runoff=0.90 cfs 0.070 af

Reach OP-1: Observation Point 'OP-1' Inflow=2.71 cfs 0.230 af
Outflow=2.71 cfs 0.230 af

Reach OP-2: Observation Point 'OP-2' Inflow=1.36 cfs 0.095 af
Outflow=1.36 cfs 0.095 af

Pond DV1.1P: Infiltration Basin 'IB-1.1' Peak Elev=311.40' Storage=1,017 cf Inflow=1.37 cfs 0.101 af
Discarded=0.10 cfs 0.074 af Primary=0.69 cfs 0.027 af Outflow=0.80 cfs 0.101 af

Pond DV2.1P: Infiltration Basin 'IB-2.1' Peak Elev=317.65' Storage=993 cf Inflow=1.31 cfs 0.094 af
Discarded=0.10 cfs 0.070 af Primary=0.71 cfs 0.024 af Outflow=0.81 cfs 0.094 af

Total Runoff Area = 3.406 ac Runoff Volume = 0.468 af Average Runoff Depth = 1.65"
93.20% Pervious = 3.174 ac 6.80% Impervious = 0.232 ac

Summary for Subcatchment DV1.1S: To Infiltration Basin 'IB-1.1'

Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.101 af, Depth= 2.04"
 Routed to Pond DV1.1P : Infiltration Basin 'IB-1.1'

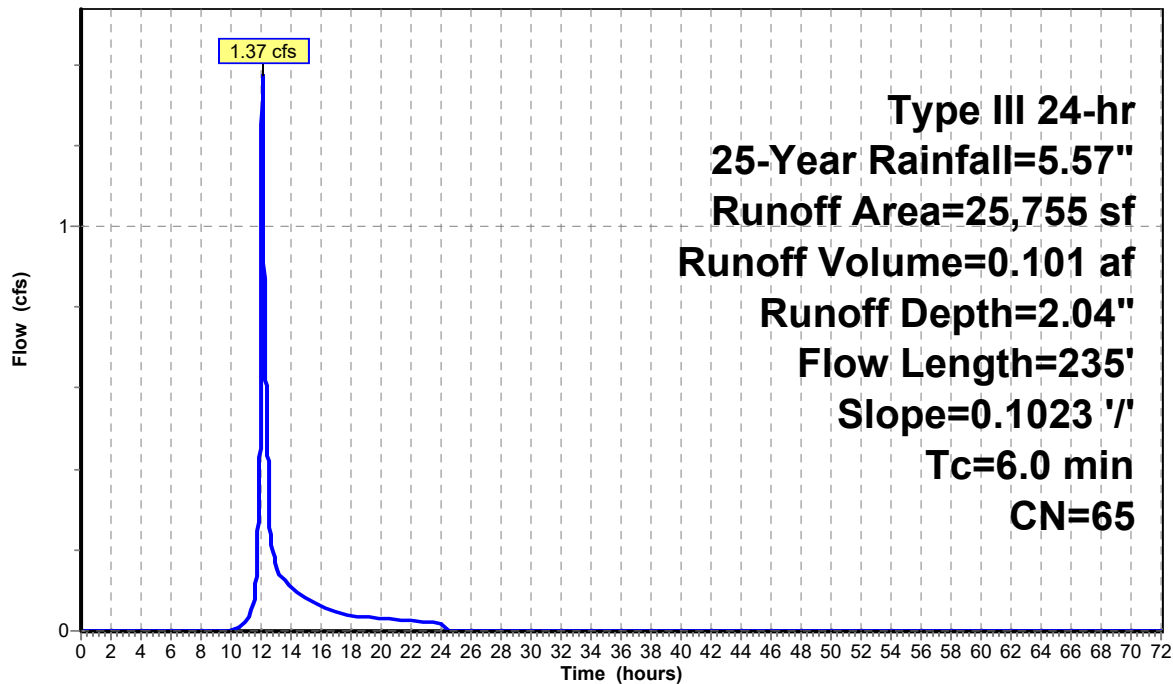
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.57"

Area (sf)	CN	Description
5,565	55	Woods, Good HSG B
3,148	98	Paved parking HSG B
832	98	Roofs HSG B
16,210	61	>75% Grass cover, Good HSG B
25,755	65	Weighted Average
21,775		84.55% Pervious Area
3,980		15.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	235	0.1023	0.82		Lag/CN Method,
4.8	235	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DV1.1S: To Infiltration Basin 'IB-1.1'

Hydrograph



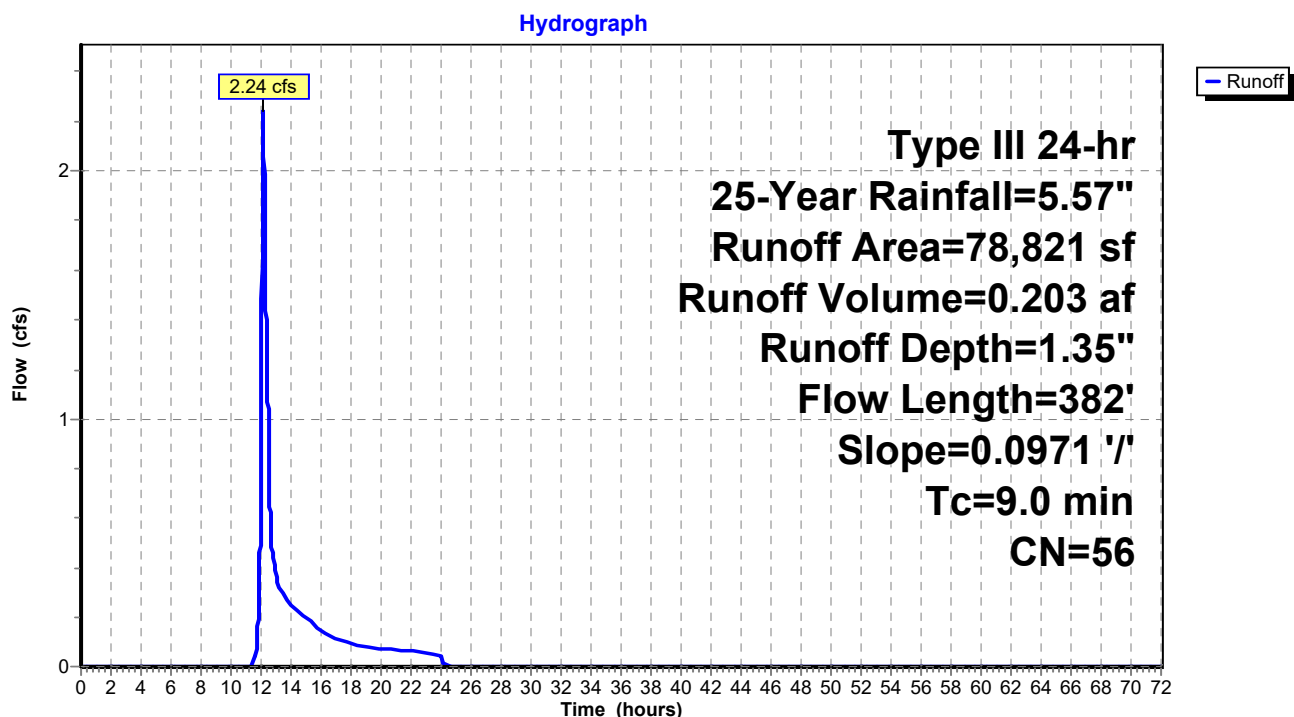
Summary for Subcatchment DV1S: To Observation Point 'OP-1'

Runoff = 2.24 cfs @ 12.14 hrs, Volume= 0.203 af, Depth= 1.35"
 Routed to Reach OP-1 : Observation Point 'OP-1'

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.57"

Area (sf)	CN	Description
67,327	55	Woods, Good HSG B
11,494	61	>75% Grass cover, Good HSG B
78,821	56	Weighted Average
78,821		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	382	0.0971	0.70		Lag/CN Method,

Subcatchment DV1S: To Observation Point 'OP-1'

Summary for Subcatchment DV2.1S: To Infiltration Basin 'IB-2.1'

Runoff = 1.31 cfs @ 12.09 hrs, Volume= 0.094 af, Depth= 2.56"
 Routed to Pond DV2.1P : Infiltration Basin 'IB-2.1'

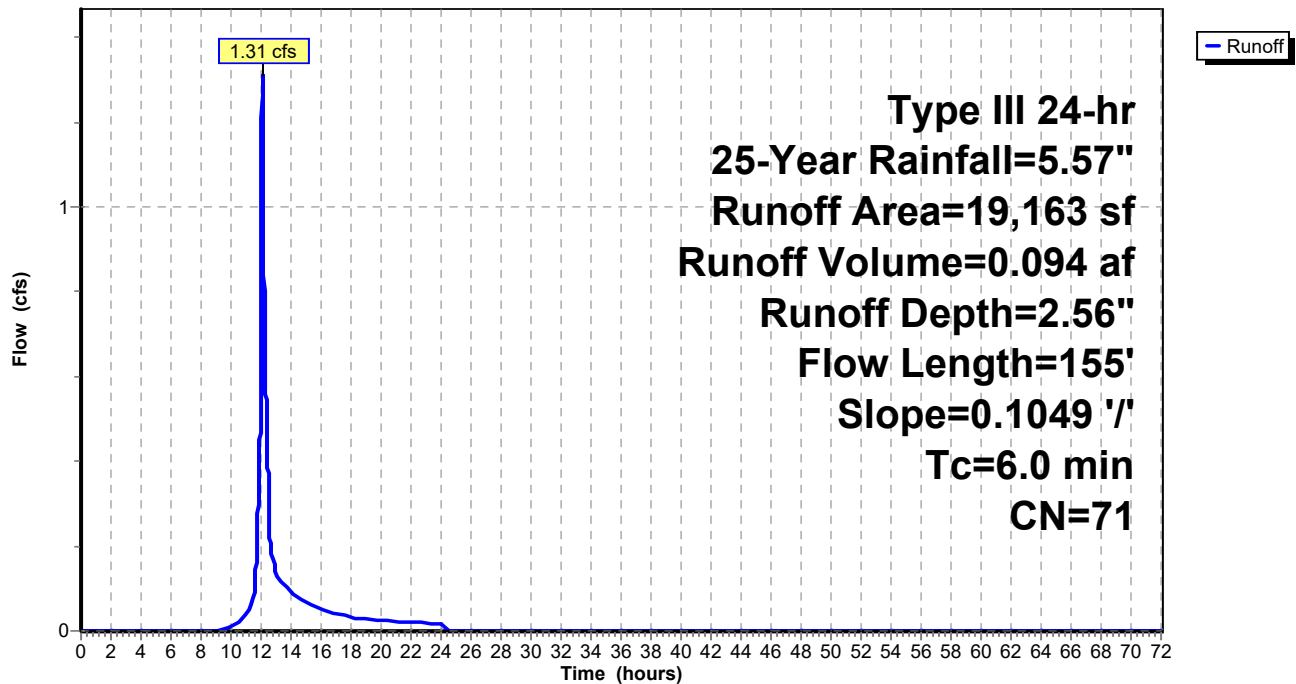
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.57"

Area (sf)	CN	Description
2,717	55	Woods, Good HSG B
2,475	98	Roofs HSG B
3,112	98	Paved parking HSG B
10,859	61	>75% Grass cover, Good HSG B
19,163	71	Weighted Average
13,576		70.84% Pervious Area
5,587		29.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	155	0.1049	0.90		Lag/CN Method,
2.9	155	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DV2.1S: To Infiltration Basin 'IB-2.1'

Hydrograph



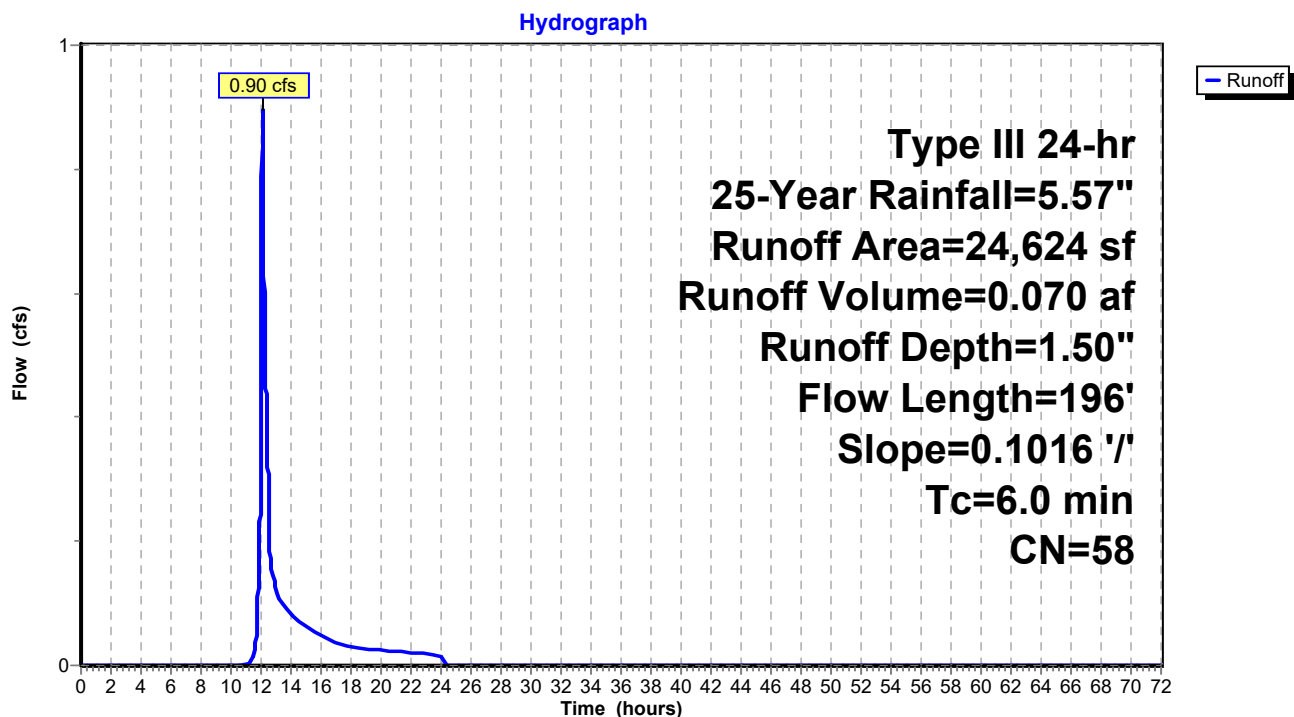
Summary for Subcatchment DV2S: To Observation Point 'OP-2'

Runoff = 0.90 cfs @ 12.10 hrs, Volume= 0.070 af, Depth= 1.50"
 Routed to Reach OP-2 : Observation Point 'OP-2'

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.57"

Area (sf)	CN	Description
16,893	55	Woods, Good HSG B
525	98	Roofs HSG B
7,206	61	>75% Grass cover, Good HSG B
24,624	58	Weighted Average
24,099		97.87% Pervious Area
525		2.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	196	0.1016	0.66		Lag/CN Method,
4.9	196	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DV2S: To Observation Point 'OP-2'

Summary for Reach OP-1: Observation Point 'OP-1'

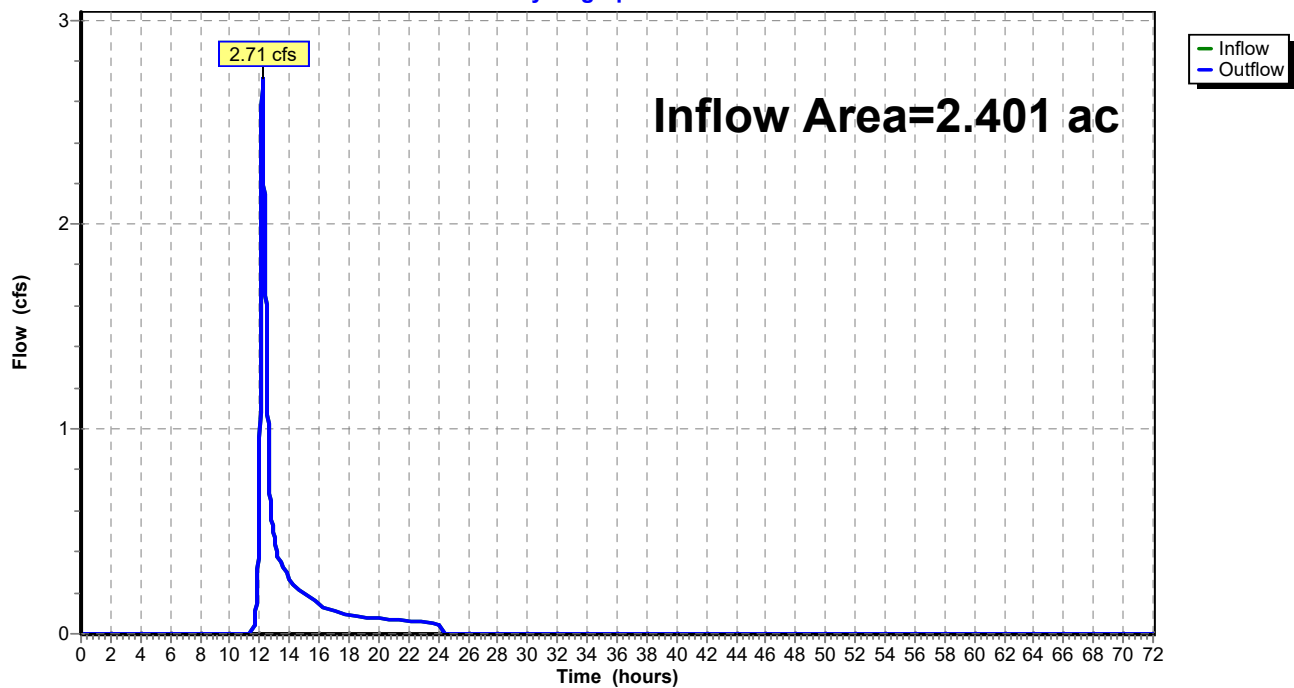
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.401 ac, 3.81% Impervious, Inflow Depth = 1.15" for 25-Year event
Inflow = 2.71 cfs @ 12.18 hrs, Volume= 0.230 af
Outflow = 2.71 cfs @ 12.18 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.0 min

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

Reach OP-1: Observation Point 'OP-1'

Hydrograph



Summary for Reach OP-2: Observation Point 'OP-2'

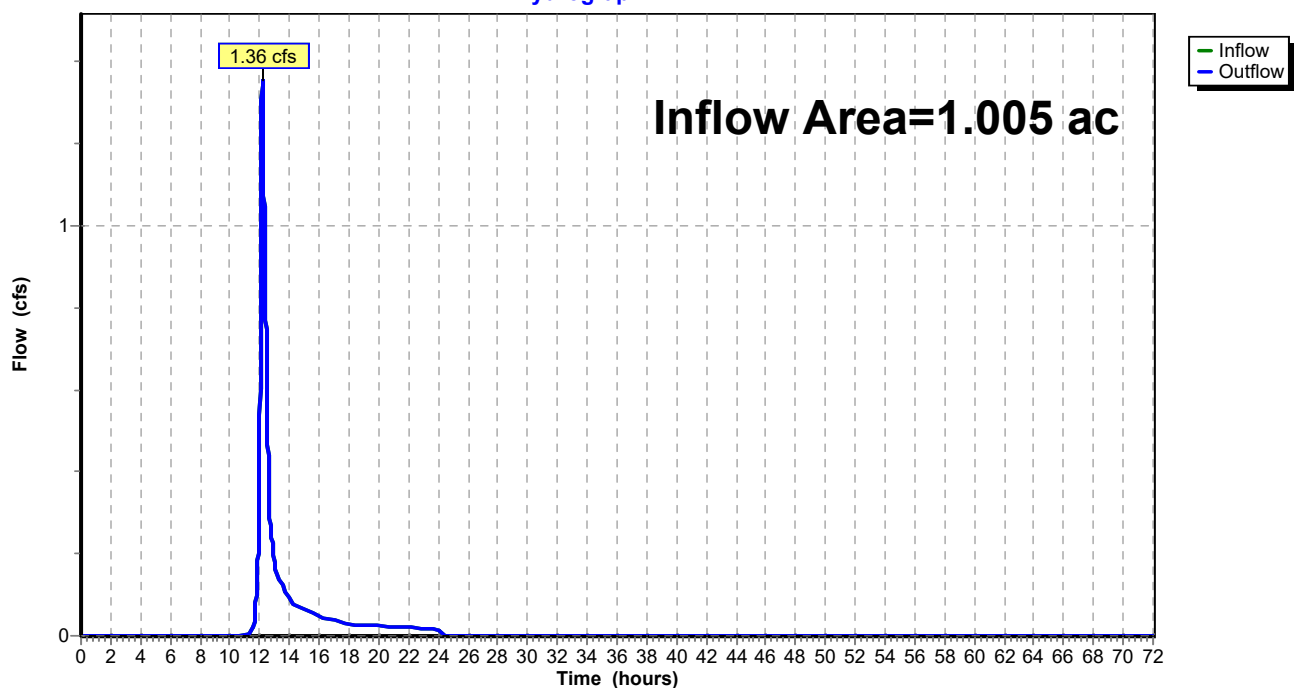
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.005 ac, 13.96% Impervious, Inflow Depth = 1.13" for 25-Year event
Inflow = 1.36 cfs @ 12.17 hrs, Volume= 0.095 af
Outflow = 1.36 cfs @ 12.17 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

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

Reach OP-2: Observation Point 'OP-2'

Hydrograph



Summary for Pond DV1.1P: Infiltration Basin 'IB-1.1'

Inflow Area = 0.591 ac, 15.45% Impervious, Inflow Depth = 2.04" for 25-Year event
 Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.101 af
 Outflow = 0.80 cfs @ 12.23 hrs, Volume= 0.101 af, Atten= 42%, Lag= 7.9 min
 Discarded = 0.10 cfs @ 12.23 hrs, Volume= 0.074 af
 Primary = 0.69 cfs @ 12.23 hrs, Volume= 0.027 af
 Routed to Reach OP-1 : Observation Point 'OP-1'

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 311.40' @ 12.23 hrs Surf.Area= 1,169 sf Storage= 1,017 cf

Plug-Flow detention time= 86.0 min calculated for 0.101 af (100% of inflow)
 Center-of-Mass det. time= 86.0 min (940.4 - 854.4)

Volume	Invert	Avail.Storage	Storage Description
#1	310.00'	1,474 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
310.00	361	185.4	0	0	361
311.75	1,444	239.2	1,474	1,474	2,216

Device	Routing	Invert	Outlet Devices
#1	Discarded	310.00'	3.750 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	311.25'	5.0' long x 7.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

Discarded OutFlow Max=0.10 cfs @ 12.23 hrs HW=311.40' (Free Discharge)

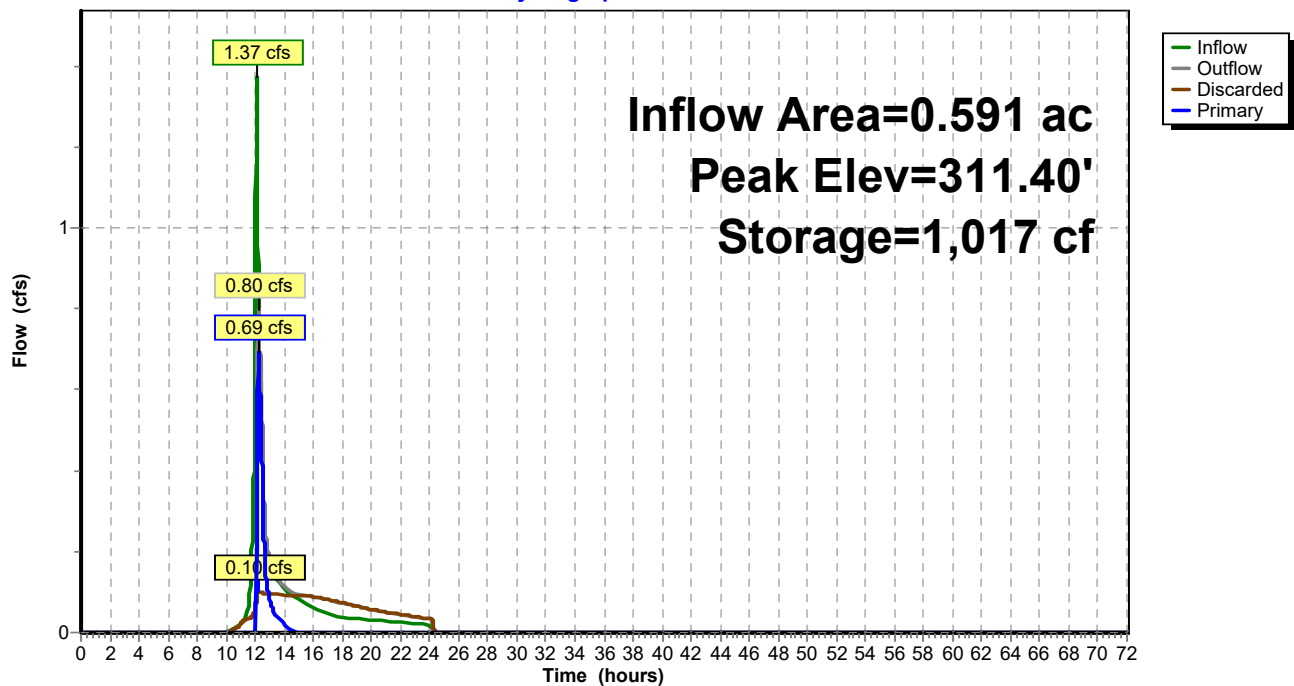
↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.69 cfs @ 12.23 hrs HW=311.40' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.69 cfs @ 0.93 fps)

Pond DV1.1P: Infiltration Basin 'IB-1.1'

Hydrograph



Summary for Pond DV2.1P: Infiltration Basin 'IB-2.1'

Inflow Area = 0.440 ac, 29.16% Impervious, Inflow Depth = 2.56" for 25-Year event
 Inflow = 1.31 cfs @ 12.09 hrs, Volume= 0.094 af
 Outflow = 0.81 cfs @ 12.20 hrs, Volume= 0.094 af, Atten= 38%, Lag= 6.5 min
 Discarded = 0.10 cfs @ 12.20 hrs, Volume= 0.070 af
 Primary = 0.71 cfs @ 12.20 hrs, Volume= 0.024 af
 Routed to Reach OP-2 : Observation Point 'OP-2'

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 317.65' @ 12.20 hrs Surf.Area= 1,137 sf Storage= 993 cf

Plug-Flow detention time= 82.9 min calculated for 0.094 af (100% of inflow)
 Center-of-Mass det. time= 82.9 min (922.5 - 839.5)

Volume	Invert	Avail.Storage	Storage Description									
#1	316.25'	1,433 cf	Custom Stage Data (Irregular) Listed below (Recalc)									
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)			Cum.Store (cubic-feet)			Wet.Area (sq-ft)			
316.25	353	183.2	0			0			353			
318.00	1,401	216.9	1,433			1,433			1,482			
Device	Routing	Invert	Outlet Devices									
#1	Discarded	316.25'	3.750 in/hr Exfiltration over Surface area Phase-In= 0.01'									
#2	Primary	317.50'	5.0' long x 7.0' breadth Broad-Crested Rectangular Weir									
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00									
			2.50 3.00 3.50 4.00 4.50 5.00 5.50									
			Coef. (English) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65									
			2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78									

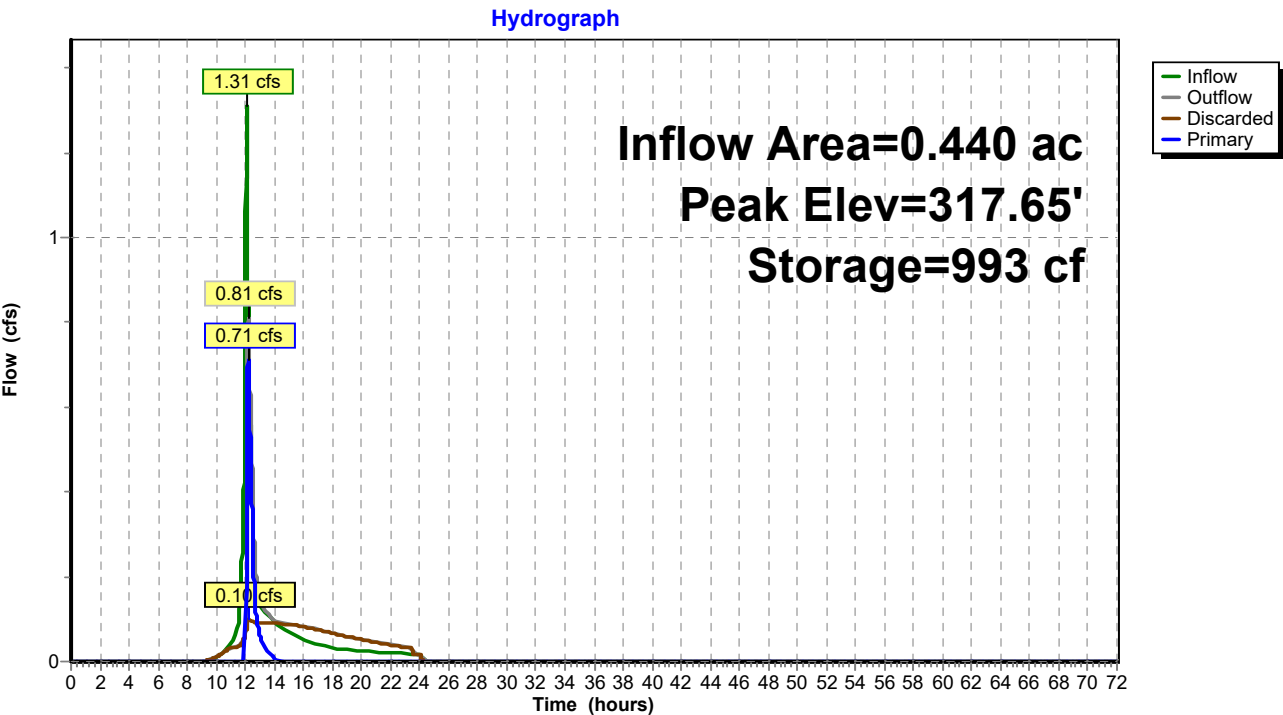
Discarded OutFlow Max=0.10 cfs @ 12.20 hrs HW=317.65' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.71 cfs @ 12.20 hrs HW=317.65' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.71 cfs @ 0.94 fps)

Pond DV2.1P: Infiltration Basin 'IB-2.1'



Section 3.0: Drainage Area Plans

DRN-EX: Existing Conditions
DRN-DV: Developed Conditions

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LEGEND: EXISTING CONDITIONS

EX 1R

REACH

EX 1S

SUBCATCHMENT

EX 1P

POND

OP-1

OBSERVATION POINT

SUB-CATCHMENT DELINEATION

T_c - TIME OF CONCENTRATION PATH

EXISTING 2' CONTOUR INTERVAL

EXISTING 10' CONTOUR INTERVAL

- NOTES:
- PER THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) NATIONAL COOPERATIVE SOIL SURVEY (NRCS) WEB SOIL SURVEY (WSS) THE SITE IS ENTIRELY COMPRISED OF:
CMC CANTON FINE SANDY LOAM, 8 TO 15 PERCENT, VERY STONY HSG A



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MERIDIANLANDSERVICES.COM FAX: 603-673-1584

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FEDERAL HILL PROPERTIES, LLC.
NEW HAMPSHIRE ROUTE 13
MAP F LOT 34
BROOKLINE, NEW HAMPSHIRE

CUTLER AND BURHAM
SUBDIVISION
DRAINAGE AREA PLAN
EXISTING CONDITIONS

AUGUST 23, 2023

SCALE: 1" = 50'

DRN-EX

SHEET

FILE: 6115P01C.dwg

PROJECT: 6115.01

SHEET NO. 1 OF 1

Plotted: 10/5/2023 2:40 PM By: NCG
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LEGEND: DEVELOPED CONDITIONS

- DV 1R

REACH
- DV 1S

SUBCATCHMENT
- DV 1P

POND
- OP-1

OBSERVATION POINT
- SUB-CATCHMENT DELINEATION
- Tc

TIME OF CONCENTRATION PATH
- EXISTING 2' CONTOUR INTERVAL
- EXISTING 10' CONTOUR INTERVAL
- PROPOSED 2'/10' CONTOUR INTERVAL

NOTES:

1. PER THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) NATIONAL COOPERATIVE SOIL SURVEY (NRCS) WEB SOIL SURVEY (WSS) THE SITE IS ENTIRELY COMPRISED OF:

CMC CANTON FINE SANDY LOAM, 8 TO 15 PERCENT, VERY STONY HSG A



MERIDIAN

LAND SERVICES, INC.

ENGINEERING | SURVEYING | PERMITTING
SOIL & WETLAND MAPPING | SEPTIC DESIGN
31 OLD NASBURN ROAD, AMHERST, NH 03001 TEL: 603-673-1441
MERIDIANLANDSERVICES.COM FAX: 603-673-1584

REV.	DATE	DESCRIPTION	DR	CK
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D				
C	10/5/23	STAFF REPORT COMMENTS	NGG	SRF
B	9/14/23	THIRD PARTY REVIEW COMMENTS	NGG	SRF
A	9/7/23	STAFF REPORT COMMENTS	NGG	SRF

CUTLER AND BURNHAM
SUBDIVISION
DRAINAGE AREA PLAN
DEVELOPED CONDITIONS

AUGUST 23, 2023

FEDERAL HILL PROPERTIES, LLC.
NEW HAMPSHIRE ROUTE 13
MAP F LOT 34
BROOKLINE, NEW HAMPSHIRE

SCALE: 1" = 50'

DRN-DV

SHEET

FILE: 6115P01C.dwg

PROJECT: 6115.01

SHEET NO. 2 OF 2