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Stormwater Management Report

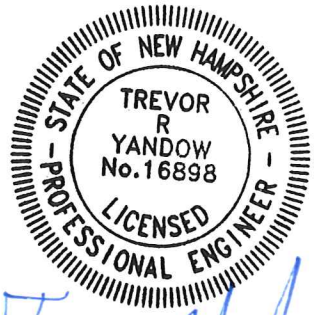
Housing for Older Persons Development

Tax Map H Parcel 42
23 Main Street
Brookline, New Hampshire 03033

Prepared for:
Jay Chrystal
14 Ben Farnsworth Road
Brookline, New Hampshire 03033

Revised May 13, 2022

Prepared by: Trevor R. Yandow, PE
Reviewed by: Trevor R. Yandow, PE



5/13/22

MLS Project: 03077.05

Index

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Storm Water Management Report
Housing for Older Persons Development (HOPD)
Map H Parcel 42
23 Main Street, Brookline, New Hampshire

Revised May 13, 2022

I. Introduction

These drainage calculations have been prepared in support of the above referenced development project on tax parcel H-42 in Brookline, New Hampshire. The project will involve the construction of approximately 505 linear feet of paved roadway, 17 elderly housing units, associated driveways, utilities, and stormwater mitigation infrastructure.

II. Site Description

This site is located at 23 Main Street, Brookline. This site consists of mostly forested land. One single-family home exists on the property and is slated for demolition. The property is across from Sargent Road, Old Milford Road and Elm Street, which are all on the east side of Main Street. It is bordered on the west in part by the Nissitissit River and Village Brook. The Nissitissit River is a fourth order (or greater) river and is therefore part of the Comprehensive Shoreland Water Quality Protection Act so, the site will also be regulated under RSA 483-B. Existing topography mainly consist of slopes up to 25% with some portions of the site exceeding 25%. The site slopes up from the frontage along Main Street, approximate elevation of 244', to a peak elevation of approximately 270'.

The existing soil types for the parcel were prepared in accordance with Site Specific Soil Mapping Standards for Vermont and New Hampshire, Special Publication #3, Version 7, published by the Society of Soil Scientists of Northern New England dated July 2021 in cooperation with the National Resource Conservation Service. Site specific soil mapping was conducted by this office. The respective hydrologic soil group for each soil type was determined by using the Ksat Values for New Hampshire Soils, SSSNNE Special Publication No. 5. Soil series observed on the parcel consisted of the following:

Site Specific Soil Map Key		
Soil ID and Slope phase	**Description**	**Hydrologic Soil Group**

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118A	Sudbury Fine Sandy Loam (Moderately Well Drained)	B
118B	Sudbury Fine Sandy Loam	B
118C	Sudbury Fine Sandy Loam	B
118D	Sudbury Fine Sandy Loam	B
212A	Hinckley Gravelly Loamy Sand (Excessively Drained)	A
212B	Hinckley Gravelly Loamy Sand	A
212C	Hinckley Gravelly Loamy Sand	A
212D	Hinckley Gravelly Loamy Sand	A
212E	Hinckley Gravelly Loamy Sand	A
913A	Sudbury Fine Sandy Loam (Somewhat Poorly Drained)	C
913B	Sudbury Fine Sandy Loam	C
913C	Sudbury Fine Sandy Loam	C
546A	Walpole Sandy Loam (Poorly Drained)	C
Slope Phases: A 0-3%, B 3-8%, C 8-15%, D 15-25%, E 25-50%		

More detailed information regarding the site-specific soil mapping in described in the site-specific soil report which is included as part of this application.

III. Drainage Design

To meet the requirements of the Town of Brookline and the NHDES Alteration of Terrain Bureau, storm water generated from the proposed development is conveyed to a series of infiltration ponds throughout the site. The site was analyzed for the 2, 10, 25 and 50 year storm events.

Infiltration rates were determined using the K_{SAT} *Values for New Hampshire Soils, SSSNNE Special Publication No. 5*. The soils onsite are identified as Hinckley Loamy Sand and the published infiltration rate for Hinckley soils in the low B horizon is 6 inches per hour. A design rate of 3 inches per hour was used in the design of the infiltration ponds. The ponds are designed with riprap spillways to discharge the larger storm events.

A single observation point is modeled to compare peak flows from pre-development and post-development. The results of the analysis are denoted in the "Summary" section of this report.

- Observation Point 1 (OP-1) represents runoff that flows into the Nissitissit River at the southern extent of the property.

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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 10.0 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 each of the design storm events. The runoff is effectively collected, treated, and discharged at a controlled rate. The proposed stormwater mitigation reduces peak flow rates and volumes generated from the site for all storms.

Summary tables below for pre and post-development peak runoff rates and volumes are shown on the following page.

Table 1: Peak Rate of Stormwater Discharge Summary

Location	Q 2-YR (CFS)			Q 10-YR (CFS)			Q 25-YR (CFS)			Q 50-YR (CFS)		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
OP-1	1.38	0.17	-1.21	3.40	2.02	-1.38	5.23	4.67	-0.56	7.96	7.71	-0.25

Table 2: Peak Volume of Stormwater Discharge Summary

Location	V 2-YR (AF)			V 10-YR (AF)			V 25-YR (AF)			V 50-YR (AF)		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
OP-1	0.131	0.090	-0.041	0.395	0.394	-0.001	0.765	0.740	-0.025	1.203	1.116	-0.087

Extreme Precipitation Tables

Northeast Regional Climate Center

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

Smoothing	Yes
State	New Hampshire
Location	
Longitude	71.657 degrees West
Latitude	42.731 degrees North
Elevation	0 feet
Date/Time	Tue, 04 Jan 2022 14:27:34 -0500

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	2.69	3.11	3.82	4.43	**1yr**
2yr	0.34	0.52	0.64	0.85	1.07	1.34	**2yr**	0.92	1.22	1.55	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	0.78	1.04	1.33	1.69	**5yr**	1.15	1.53	1.95	2.44	3.03	3.76	4.26	**5yr**	3.33	4.09	4.73	5.61	6.30	**5yr**
10yr	0.45	0.70	0.89	1.21	1.57	2.01	**10yr**	1.35	1.81	2.33	2.91	3.61	4.45	5.09	**10yr**	3.94	4.89	5.66	6.67	7.41	**10yr**
25yr	0.53	0.84	1.07	1.47	1.96	2.52	**25yr**	1.69	2.26	2.94	3.67	4.55	5.58	6.45	**25yr**	4.93	6.21	7.18	8.38	9.19	**25yr**
50yr	0.59	0.95	1.22	1.72	2.32	3.01	**50yr**	2.00	2.68	3.52	4.40	5.42	6.61	7.73	**50yr**	5.85	7.43	8.60	9.97	10.82	**50yr**
100yr	0.68	1.10	1.42	2.01	2.74	3.59	**100yr**	2.37	3.17	4.19	5.24	6.45	7.85	9.26	**100yr**	6.95	8.90	10.29	11.87	12.75	**100yr**
200yr	0.78	1.27	1.64	2.35	3.25	4.27	**200yr**	2.81	3.76	5.01	6.26	7.69	9.31	11.10	**200yr**	8.24	10.68	12.33	14.13	15.03	**200yr**
500yr	0.93	1.53	2.00	2.90	4.07	5.39	**500yr**	3.51	4.71	6.33	7.91	9.69	11.70	14.13	**500yr**	10.35	13.58	15.67	17.80	18.68	**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	1.37	1.69	2.24	2.39	**1yr**	1.98	2.30	2.65	3.35	3.71	**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	3.26	**2yr**	2.60	3.14	3.64	4.35	4.96	**2yr**
5yr	0.36	0.56	0.69	0.95	1.21	1.41	**5yr**	1.04	1.38	1.64	2.12	2.71	3.54	3.96	**5yr**	3.13	3.81	4.41	5.25	5.90	**5yr**
10yr	0.40	0.61	0.76	1.06	1.36	1.58	**10yr**	1.18	1.55	1.77	2.41	3.07	4.08	4.57	**10yr**	3.61	4.40	5.09	6.04	6.73	**10yr**
25yr	0.45	0.68	0.85	1.21	1.59	1.83	**25yr**	1.38	1.79	2.05	2.87	3.61	4.89	5.53	**25yr**	4.33	5.32	6.16	7.26	7.99	**25yr**
50yr	0.48	0.74	0.92	1.32	1.77	2.06	**50yr**	1.53	2.02	2.29	3.28	4.09	5.64	6.39	**50yr**	4.99	6.15	7.11	8.35	9.11	**50yr**
100yr	0.52	0.78	0.98	1.42	1.94	2.32	**100yr**	1.68	2.27	2.57	3.19	4.64	6.51	7.39	**100yr**	5.76	7.11	8.20	9.60	10.37	**100yr**
200yr	0.56	0.84	1.06	1.54	2.15	2.60	**200yr**	1.86	2.54	2.85	3.54	5.30	7.53	8.56	**200yr**	6.66	8.23	9.45	11.04	11.81	**200yr**
500yr	0.62	0.92	1.18	1.72	2.45	3.05	**500yr**	2.11	2.99	3.32	4.06	6.33	9.15	10.41	**500yr**	8.10	10.01	11.41	13.26	14.01	**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	0.98	1.17	**1yr**	0.85	1.15	1.31	1.71	2.13	2.69	3.01	**1yr**	2.38	2.90	3.45	4.25	4.79	**1yr**
2yr	0.36	0.56	0.69	0.93	1.15	1.33	**2yr**	0.99	1.30	1.51	1.95	2.49	3.09	3.49	**2yr**	2.74	3.36	3.86	4.60	5.23	**2yr**
5yr	0.44	0.67	0.84	1.15	1.46	1.71	**5yr**	1.26	1.67	1.90	2.41	3.02	3.99	4.54	**5yr**	3.53	4.37	5.05	5.98	6.71	**5yr**
10yr	0.52	0.79	0.98	1.37	1.77	2.10	**10yr**	1.53	2.05	2.38	2.88	3.58	4.84	5.59	**10yr**	4.29	5.38	6.21	7.29	8.11	**10yr**
25yr	0.65	1.00	1.24	1.77	2.33	2.74	**25yr**	2.01	2.68	3.11	3.64	4.46	6.26	7.32	**25yr**	5.54	7.04	8.18	9.51	10.44	**25yr**
50yr	0.78	1.19	1.48	2.13	2.87	3.36	**50yr**	2.48	3.28	3.81	4.35	5.27	7.60	9.01	**50yr**	6.73	8.66	10.09	11.64	12.65	**50yr**
100yr	0.94	1.42	1.78	2.57	3.53	4.12	**100yr**	3.04	4.03	4.67	5.95	6.24	9.25	11.06	**100yr**	8.18	10.64	12.45	14.25	15.33	**100yr**
200yr	1.13	1.70	2.15	3.12	4.35	5.05	**200yr**	3.75	4.94	5.71	7.26	7.38	11.23	13.60	**200yr**	9.94	13.07	15.37	17.45	18.60	**200yr**
500yr	1.45	2.16	2.78	4.03	5.74	6.57	**500yr**	4.95	6.43	7.47	9.48	9.20	14.51	17.88	**500yr**	12.84	17.20	20.32	22.84	24.03	**500yr**

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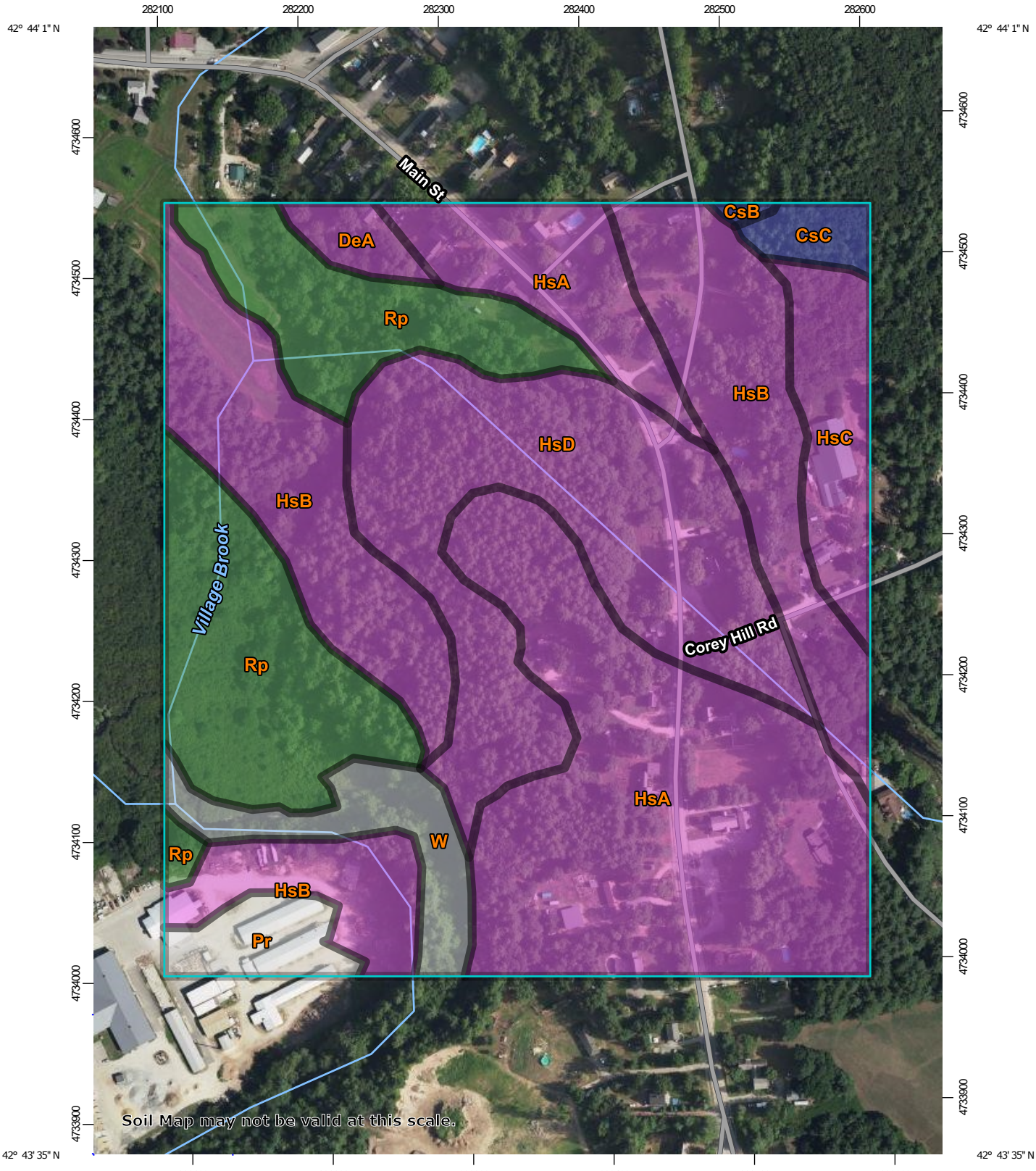
Northeast Regional Climate Center



Map Scale: 1:3,890 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

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 24, Aug 31, 2021

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

Date(s) aerial images were photographed: Aug 12, 2019—Sep 29, 2019

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
CsB	Chatfield-Hollis complex, 3 to 8 percent slopes	B	0.1	0.2%
CsC	Chatfield-Hollis complex, 8 to 15 percent slopes, rocky	B	0.9	1.3%
DeA	Deerfield loamy fine sand, 0 to 3 percent slopes	A	0.9	1.4%
HsA	Hinckley loamy sand, 0 to 3 percent slopes	A	19.2	28.1%
HsB	Hinckley loamy sand, 3 to 8 percent slopes	A	15.5	22.6%
HsC	Hinckley loamy sand, 8 to 15 percent slopes	A	3.1	4.6%
HsD	Hinckley loamy sand, 15 to 35 percent slopes	A	12.7	18.6%
Pr	Pits, gravel		1.6	2.3%
Rp	Rippowam fine sandy loam	A/D	11.6	17.0%
W	Water (less than 40 acres)		2.7	3.9%
Totals for Area of Interest			**68.4**	**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

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Site Specific Soil Survey Report, August 5, 2021
Property: Map H, Lot 42, 23-25 Main Street, Brookline, NH
Owner: J.W & R.A Chrystal Revocable Trust of 1999

1) This Map and Report are prepared in accordance with Site Specific Soil Mapping Standards for Vermont and New Hampshire, Special Publication #3, Version 7, published by the Society of Soil Scientists of Northern New England dated July 2021 in cooperation with the National Resource Conservation Service. The intent of this map and report is to facilitate soil-based stormwater management & engineering design and apply site specific soil hydrologic groups to drainage design through the Alteration of Terrain Application process. This site consists of approximately 18 acres of forested land with level to very steep slopes. There are approximately 12 acres of upland soils and 6 acres of wetland soils on the property. One old single-family home exists on the property and is slated for demolition. The site is being developed for an elderly housing complex with roadway(s), drainage, utilities, onsite septic systems, and an on-site community water system dedicated to the complex. A substantial amount of soil will be removed from the site, incidental to construction, due to the grades and grading requirements.

2) The soil mapping commenced on June 25, 2021, with three deep (40 feet +/-) borings using a Diedrich D-50 drilling rig. Soils were observed via auger flight sampling and split spoon sampling at selected intervals. On July 6, 2021, additional test pits were completed in lower topographic settings with a Tohatsu Mini Excavator having an 8-foot reach. Wetland boundaries were flagged in the field on July 6th following the additional test pits and the break between somewhat poorly drained soils and moderately well drained soils were field mapped on March 14, 2022, via dutch auger utilizing the wetland flags (survey located on-site) as control. Snow cover was absent on this date and frost was not an issue. The break between moderately well drained and well drained soils was interpreted using the two-foot contour map, developed by an on-site survey, and test pit data logs. Due to the nature of the soils, excessively drained outwash sand and gravel, this is a common and acceptable means of interpreting this drainage class boundary.

3) This site is located at 23-25 Main Street, Brookline, NH. The property is across from Sargent Road, Old Milford Road and Elm Street, which are all on the east side of Main Street. It is bordered on the west in part by the Nissitissit River and Village Brook. The Nissitissit River is a fourth order (or greater) river and is therefore part of the Comprehensive Shoreland Water Quality Protection Act so, the site will also be regulated under RSA 483-B. The property is identified on Brookline Tax Map H as Lot 42. A complete site survey of the property including wetland flag location, test pit and boring locations and two-foot topographic contour generation was conducted by this office.

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4) As noted, this map and report have been prepared for the design and implementation of stormwater management through permitting with the NH DES Alteration of Terrain Department. It will also be used in conjunction with the NH DES Subsurface Systems Bureau for Subdivision and Septic System Design Approvals.

5) Soils Observed:

Site Specific Soil Map Key

Soil ID and Slope Phase	Description	Hydrologic Soil Group
212A	Hinckley Gravelly Loamy Sand (Excessively drained)	A
212B	Hinckley Gravelly Loamy Sand	A
212C	Hinckley Gravelly Loamy Sand	A
212D	Hinckley Gravelly Loamy Sand	A
212E	Hinckley Gravelly Loamy Sand	A
118A	Sudbury Fine Sandy Loam (Moderately Well Drained)	B
118B	Sudbury Fine Sandy Loam	B
118C	Sudbury Fine Sandy Loam	B
118D	Sudbury Fine Sandy Loam	B
913A	Sudbury Fine Sandy Loam (Somewhat Poorly Drained)	C
913B	Sudbury Fine Sandy Loam	C
913C	Sudbury Fine Sandy Loam	C
546A	Walpole Sandy Loam (Poorly Drained)	C

Slope Phases: A 0-3%, B 3-8%, C 8-15%, D15-25%, E 25-50%

6) Series Descriptions from on-site evaluations:

Hinckley: Soils on site are very deep gravelly excessively drained outwash from the Nissitissit River. The Majority of the deposit occurs on an elevated plateau approximately 45 feet above the current river elevation which is a Kame Terrace Deposit. Other deposits occur in the lower elevation toward the west site of the property along with Sudbury. This area is not technically on a Kame Terrace but either a lower outwash terrace of more recent deposit or erosional feature of the larger Kame Terrace. Permeability is rapid in the solum and very rapid in the parent materials or substratum. Slopes on site range from nearly level (<3%) to very steep (up to 50%). In Brookline NH, Mean Annual Temperature is 43 degrees and mean annual Precipitation is 45.1 inches.

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Typical Pedon: Hinckley Gravelly Loamy Sand, Mature White Pine Forest at an average elevation on site of 235-265 feet+/-.

Ap	0-10"	Dark Brown (10YR 3/3) Fine sandy loam, weak fine granular, very friable
Bw1	10-26"	Yellowish Brown (10YR 5/6) sandy loam, angular blocky, friable
Bw2	26-34"	Light Olive Brown (2.5Y 6/4), gravelly loamy sand, weak fine granular, very friable
C	34-86"	2.5Y 6/4 Light Yellowish Brown gravelly/very gravelly coarse to medium sand, single grain loose.

* In Borings, these deposits were recorded to a maximum depth of 42 feet.
* Seasonal High-Water Tables ranging from 40" to approximately 38 feet.
* Common to few medium to fine roots with depth throughout profiles.

Sudbury: Soils on-site are very deep gravelly moderately well and somewhat poorly drained occurring on an outwash plain adjacent to the Nissitissit River, Village Brook and an un-name tributary to Village Brook flowing westerly under Main Street. Slopes are nearly level for most of the area mapped to moderately steep in transition to the Kame Terrace noted above. Permeability is moderate to rapid in the solum and very rapid in the parent material or substratum. Mean annual temperature and precipitation are as noted above.

Typical Pedon: Sudbury Gravelly Loamy Sand, Mature White Pine Forest at an elevation ranging from 225 to 235 feet +/-

Ap	0-10"	Dark Brown (10YR 3/3) Fine Sandy Loam, weak fine granular, very friable
Bw1	10-28:	Dark Yellowish Brown (10YR 4/6) Sandy Loam, Angular Blocky Friable.
Bw2	28-34"	Light Olive Brown (2.5Y 5/4) gravelly loamy sand, weak fine granular, very friable. Common prominent redox depletions of 2.5Y 5/2 and redox concentrations of 10yr 5/6 or redder.
C	34-86"	Light Yellowish Brown (2.5Y 6/3) Gravelly sand, single grain loose. Many deposits heavily stained with 5YR 4/6 iron concentrations in mass and few areas noted with Black manganese staining in small concentrations.

- Seasonal High-Water Tables generally in the 24-30" range for Moderately well drained and <15" for somewhat poorly drained soils.
- Common medium roots generally to 30"

Walpole: Soils on-site are assumed to be very deep (soils not observed below 30" due to wetness and inability to sample accurately due to free water) poorly drained outwash sands and gravels from the Nissitissit River, Village Brook and an un-name tributary to Village Brook crossing under Main Street

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

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from the west. These soils exist in the immediate area of the flood plain associated with the river at the edge of the current outwash terrace. Permeably is assumed to be rapid in the solum and very rapid in the substratum or parent materials based on wet and or saturated auger samples. These soils classify as Hydric having Seasonal High-Water tables immediately below the A horizon with a reduced matrix.

Typical Pedon: Sudbury Fine Sandy Loam in a mature White Pine Forest and scrub shrub fringe of the Nissitissit River, other tributaries and back water areas. Elevation less than 225 feet.

A	0-10"	Very Dark Greyish Brown (2.5Y 3/2) fine sandy loam, generally massive and friable. Some indications of weak granular structure masked by wetness.
Bw	10-20"	Dark Greyish Brown (2.5Y 4/2) sandy loam, weak fine granular, very friable.
B/C	20-30"+	Greyish Brown (2.5y 5/2) fine-medium sand, massive friable.

- Seasonal High-Water Table generally directly below the A horizon.
- Few roots noted.

This is a very consistent site with abrupt changes between drainage classes. The soil textures are predictable well sorted coarse sand with 15% - 35% fine to medium gravel throughout. Dissimilar inclusions will not vary from the catena excepting that some areas can be expected to have less than 15% gravel or more the 35% gravel varying the rock fragment modifier. In the lower area of the site, somewhat less gravel was found in the soil. There may be some inclusions that could key out as Windsor or Deerfield Loamy sand however, I did not find any sample site that did not have at least a discernable amount of fine gravel and coarser sand that is not found in these soil profile. Typically, there will also be minor slope inclusions and drainage class inclusions along the break lines. Inclusions of these types are anticipated to be less than 10%

7) Boring and Test Pit Logs attached.

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NEW HAMPSHIRE
Designer
of
Subsurface Disposal
Systems
* * *
Thomas E. Carr
No. 931
Department of Environmental Services

PAGE: 1 **TITLE: JW & RA Chrystal Rev. Trust 1999**
FILE: 3077.05 **TOWN: Brookline**

TEST PIT NO.: 1
DATE: 7-6-21

12"	10YR 3/3 Dark brown fine sandy loam
22"	10YR 3/6 Dark yellowish brown sandy loam Granular friable
30"	2.5Y 5/6 Light olive brown loamy sand, weak Fine granular, very friable
96"	2.5Y 6/3 Light yellowish brown very gravelly Coarse sand, single grain loose

WATER: none S.H.W.: 86" ROOTS 40"
LEDGE: none HARDPAN: none PERCOLATION
RATE: 2 MIN./IN. AT 30" DEPTH
DATE: 7-6-21
INSPECTED BY: T.E.C. WITNESSED BY:

TEST PIT NO.: 2
DATE: 7-6-21

8"	10YR 3/3 Dark brown fine sandy loam
24"	10YR 5/6 Yellowish brown sandy loam Granular friable
34"	2.5Y 5/6 Light olive brown gravelly loamy sand, Weak fine granular very friable
86"	2.5Y 6/4 Light Yellowish brown sand Single grain loose

WATER: None S.H.W.: 78" ROOTS: 74"
LEDGE: none HARDPAN: none
PERCOLATION RATE: 2 MIN./IN. AT 34" DEPTH
DATE: 7-6-21
INSPECTED BY: T.E.C. WITNESSED BY:

TEST PIT NO.: 3
DATE: 7-6-21

~ DEPTH ~	~~ DESCRIPTION ~~
11"	10YR 3/3 Dark brown fine sandy loam
19"	10YR 5/6 Yellowish brown sandy loam Granular friable
29"	2.5Y 5/6 Light olive brown gravelly loamy Sand, weak fine granular very friable
53"	2.5Y 6/4 Light yellowish brown sand Single grain loose

WATER: none S.H.W.: 48" ROOTS: 40"
LEDGE: none HARDPAN: none
PERCOLATION RATE: 4 MIN./IN. AT 28" DEPTH
DATE: 7-6-21
INSPECTED BY: T.E.C. WITNESSED BY:

TEST PIT NO.: 4
DATE: 7-6-21

9"	10YR 3/3 Dark brown loam
34"	2.5Y 6/4 Light yellowish brown fine to med. Sand, massive, very friable
60"	2.5Y 5/4 Light olive brown sand, single Grain loose

WATER: none S.H.W.: 48" ROOTS: 40"
LEDGE: none HARDPAN: none
PERCOLATION RATE: 2 MIN./IN. AT 32" DEPTH
DATE: 7-6-21
INSPECTED BY: T.E.C. WITNESSED BY:

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☆ ☆ ☆
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Department of Environmental Services

PAGE: 2 **TITLE: JW & RA Chrystal Rev. Trust 1999**
FILE: 3077.05 **TOWN: Brookline**

TEST PIT NO.: 5
DATE: 7-6-21

~ DEPTH ~	~~ DESCRIPTION ~~
16"	10YR 3/2 Very dark greyish brown sandy loam
31"	10YR 4/6 Dark yellowish brown sandy loam Angular blocky friable
41"	7.5YR 5/8 Strong brown extremely gravelly Coarse sand, single grain loose
84"	2.5Y 6/4 Light yellowish brown sand, single Grain loose

WATER: none *S.H.W.: 72"* *ROOTS: 42"*
LEDGE: none *HARDPAN: none*
PERCOLATION RATE: 2 MIN./IN. AT 41" DEPTH
DATE: 7-6-21
INSPECTED BY: T.E.C. *WITNESSED BY:*

TEST PIT NO.: 6
DATE:

WATER: *S.H.W.:* *ROOTS:*
LEDGE: *HARDPAN:*
PERCOLATION RATE: *MIN./IN. AT* *DEPTH*
DATE:
INSPECTED BY: T.E.C. *WITNESSED BY:*

TEST PIT NO.: 7
DATE:

~ DEPTH ~ ~~ DESCRIPTION ~~

WATER: *S.H.W.:* *ROOTS:*
LEDGE: *HARDPAN:*
PERCOLATION RATE: *MIN./IN. AT* *DEPTH*
DATE:
INSPECTED BY: T.E.C. *WITNESSED BY:*

TEST PIT NO.: 8
DATE:

~ DEPTH ~ ~~ DESCRIPTION ~~

WATER: *S.H.W.:* *ROOTS:*
LEDGE: *HARDPAN:*
PERCOLATION RATE: *MIN./IN. AT* *DEPTH*
DATE:
INSPECTED BY: T.E.C. *WITNESSED BY:*

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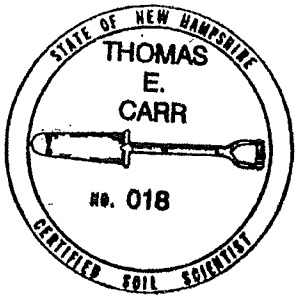


PAGE: 1 TITLE: JW & RA Chrystal Rev. Tr. 8-5-21
FILE: 3077.05 TOWN: Brookline

BORING NO.: 1
DATE: 6-25-21

9"	10YR 3/3 Dark brown fine sandy loam
9-22"	10YR 5/6 Yellowish brown sandy loam
22-30"	2.5Y 6/4 Light yellowish brown loamy Sand
30"-37'	2.5Y 6/4 Light yellowish brown gravelly Sand, single grain loose

WATER: 35.5' S.H.W.: 34' ROOTS
LEDGE: HARDPAN: PERCOLATION
RATE: MIN./IN. AT DEPTH
DATE:
INSPECTED BY: T.E.C. WITNESSED BY:

BORING NO.: 2
DATE: 6-25-21

9"	10YR 3/3 Dark brown fine sandy loam
9-20"	10YR 5/6 Yellowish brown sandy loam
20-38"	2.5Y 6/4 Light yellowish brown loamy Sand
38"-42'	2.5Y 6/4 Light yellowish brown gravelly Sand, single grain loose

WATER: 40' S.H.W.: 38' ROOTS:
LEDGE: HARDPAN:
PERCOLATION RATE: MIN./IN. AT DEPTH
DATE:
INSPECTED BY: T.E.C. WITNESSED BY:

BORING NO.: 3
DATE: 6-25-21

~ DEPTH ~	~~ DESCRIPTION ~~
9"	10YR 3/3 Dark brown fine sandy loam
9-22"	10YR 5/6 Yellowish brown sandy Loam
22-30"	2.5Y 6/4 Light yellowish brown Loamy sand
30"-37'	2.5Y 6/4 Light yellowish brown gravelly sand, single grain loose

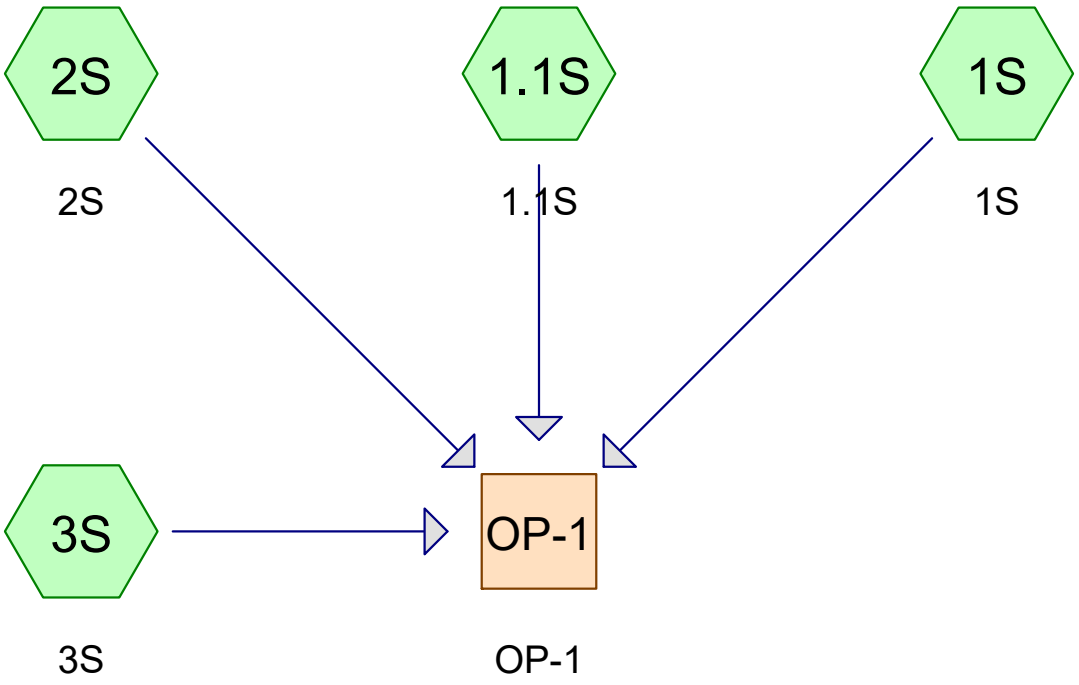
WATER: 40' S.H.W.: 38' ROOTS:
LEDGE: HARDPAN:
PERCOLATION RATE: MIN./IN. AT DEPTH
DATE:
INSPECTED BY: T.E.C. WITNESSED BY:

TEST PIT NO.: 4
DATE:

~ DEPTH ~	~~ DESCRIPTION ~~

WATER: S.H.W.: ROOTS:
LEDGE: HARDPAN:
PERCOLATION RATE: MIN./IN. AT DEPTH
DATE:
INSPECTED BY: T.E.C. WITNESSED BY:

Section 1.0: Pre-Developed Conditions



Subcat Reach Pond Link

Routing Diagram for 03077EX00B
Prepared by MERIDIAN LAND SERVICES, Printed 5/13/2022
HydroCAD® 10.10-7a s/n 00595 © 2021 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.804	39	>75% Grass cover, Good HSG A (1S, 2S)
0.252	61	>75% Grass cover, Good HSG B (1S)
0.007	74	>75% Grass cover, Good HSG C (1S, 2S)
0.175	96	Gravel surface, HSG A (1.1S, 1S)
0.111	96	Gravel surface, HSG B (1.1S, 1S)
0.010	96	Gravel surface, HSG C (1.1S, 1S)
0.088	98	Roofs HSG A (1S)
0.083	98	Water Surface HSG A (2S)
0.061	98	Water Surface HSG C (3S)
8.263	30	Woods, Good HSG A (1.1S, 1S, 2S)
1.193	55	Woods, Good HSG B (1.1S, 1S)
2.720	70	Woods, Good HSG C (1.1S, 1S, 2S, 3S)
13.767	**44**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
9.413	HSG A	1.1S, 1S, 2S
1.556	HSG B	1.1S, 1S
2.798	HSG C	1.1S, 1S, 2S, 3S
0.000	HSG D	
0.000	Other	
13.767		**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1.1S: 1.1S Runoff Area=5.619 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=373' Slope=0.1279 '/' Tc=12.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 1S: 1S Runoff Area=4.662 ac 1.89% Impervious Runoff Depth=0.00"
Flow Length=716' Slope=0.1442 '/' Tc=19.6 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: 2S Runoff Area=1.456 ac 5.71% Impervious Runoff Depth=0.01"
Flow Length=1,361' Slope=0.1289 '/' Tc=30.3 min CN=43 Runoff=0.00 cfs 0.001 af

Subcatchment 3S: 3S Runoff Area=2.030 ac 2.99% Impervious Runoff Depth=0.77"
Flow Length=410' Slope=0.0369 '/' Tc=10.5 min CN=71 Runoff=1.38 cfs 0.130 af

Reach OP-1: OP-1 Inflow=1.38 cfs 0.131 af
Outflow=1.38 cfs 0.131 af

Total Runoff Area = 13.767 ac Runoff Volume = 0.131 af Average Runoff Depth = 0.11"
98.32% Pervious = 13.535 ac 1.68% Impervious = 0.232 ac

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1.1S: 1.1S Runoff Area=5.619 ac 0.00% Impervious Runoff Depth=0.10"
Flow Length=373' Slope=0.1279 '/' Tc=12.0 min CN=39 Runoff=0.08 cfs 0.048 af

Subcatchment 1S: 1S Runoff Area=4.662 ac 1.89% Impervious Runoff Depth=0.08"
Flow Length=716' Slope=0.1442 '/' Tc=19.6 min CN=38 Runoff=0.05 cfs 0.031 af

Subcatchment 2S: 2S Runoff Area=1.456 ac 5.71% Impervious Runoff Depth=0.21"
Flow Length=1,361' Slope=0.1289 '/' Tc=30.3 min CN=43 Runoff=0.06 cfs 0.026 af

Subcatchment 3S: 3S Runoff Area=2.030 ac 2.99% Impervious Runoff Depth=1.71"
Flow Length=410' Slope=0.0369 '/' Tc=10.5 min CN=71 Runoff=3.40 cfs 0.289 af

Reach OP-1: OP-1 Inflow=3.40 cfs 0.395 af
Outflow=3.40 cfs 0.395 af

Total Runoff Area = 13.767 ac Runoff Volume = 0.395 af Average Runoff Depth = 0.34"
98.32% Pervious = 13.535 ac 1.68% Impervious = 0.232 ac

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1.1S: 1.1S Runoff Area=5.619 ac 0.00% Impervious Runoff Depth=0.33"
Flow Length=373' Slope=0.1279 '/' Tc=12.0 min CN=39 Runoff=0.57 cfs 0.156 af

Subcatchment 1S: 1S Runoff Area=4.662 ac 1.89% Impervious Runoff Depth=0.29"
Flow Length=716' Slope=0.1442 '/' Tc=19.6 min CN=38 Runoff=0.30 cfs 0.112 af

Subcatchment 2S: 2S Runoff Area=1.456 ac 5.71% Impervious Runoff Depth=0.53"
Flow Length=1,361' Slope=0.1289 '/' Tc=30.3 min CN=43 Runoff=0.27 cfs 0.064 af

Subcatchment 3S: 3S Runoff Area=2.030 ac 2.99% Impervious Runoff Depth=2.56"
Flow Length=410' Slope=0.0369 '/' Tc=10.5 min CN=71 Runoff=5.20 cfs 0.434 af

Reach OP-1: OP-1 Inflow=5.23 cfs 0.765 af
Outflow=5.23 cfs 0.765 af

Total Runoff Area = 13.767 ac Runoff Volume = 0.765 af Average Runoff Depth = 0.67"
98.32% Pervious = 13.535 ac 1.68% Impervious = 0.232 ac

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1.1S: 1.1S Runoff Area=5.619 ac 0.00% Impervious Runoff Depth=0.63"
Flow Length=373' Slope=0.1279 '/' Tc=12.0 min CN=39 Runoff=1.60 cfs 0.297 af

Subcatchment 1S: 1S Runoff Area=4.662 ac 1.89% Impervious Runoff Depth=0.57"
Flow Length=716' Slope=0.1442 '/' Tc=19.6 min CN=38 Runoff=1.00 cfs 0.221 af

Subcatchment 2S: 2S Runoff Area=1.456 ac 5.71% Impervious Runoff Depth=0.91"
Flow Length=1,361' Slope=0.1289 '/' Tc=30.3 min CN=43 Runoff=0.60 cfs 0.111 af

Subcatchment 3S: 3S Runoff Area=2.030 ac 2.99% Impervious Runoff Depth=3.40"
Flow Length=410' Slope=0.0369 '/' Tc=10.5 min CN=71 Runoff=6.94 cfs 0.575 af

Reach OP-1: OP-1 Inflow=7.96 cfs 1.203 af
Outflow=7.96 cfs 1.203 af

Total Runoff Area = 13.767 ac Runoff Volume = 1.203 af Average Runoff Depth = 1.05"
98.32% Pervious = 13.535 ac 1.68% Impervious = 0.232 ac

Section 1.1: Pre-Developed Conditions
10-year Storm – Full Summary

Summary for Subcatchment 1.1S: 1.1S

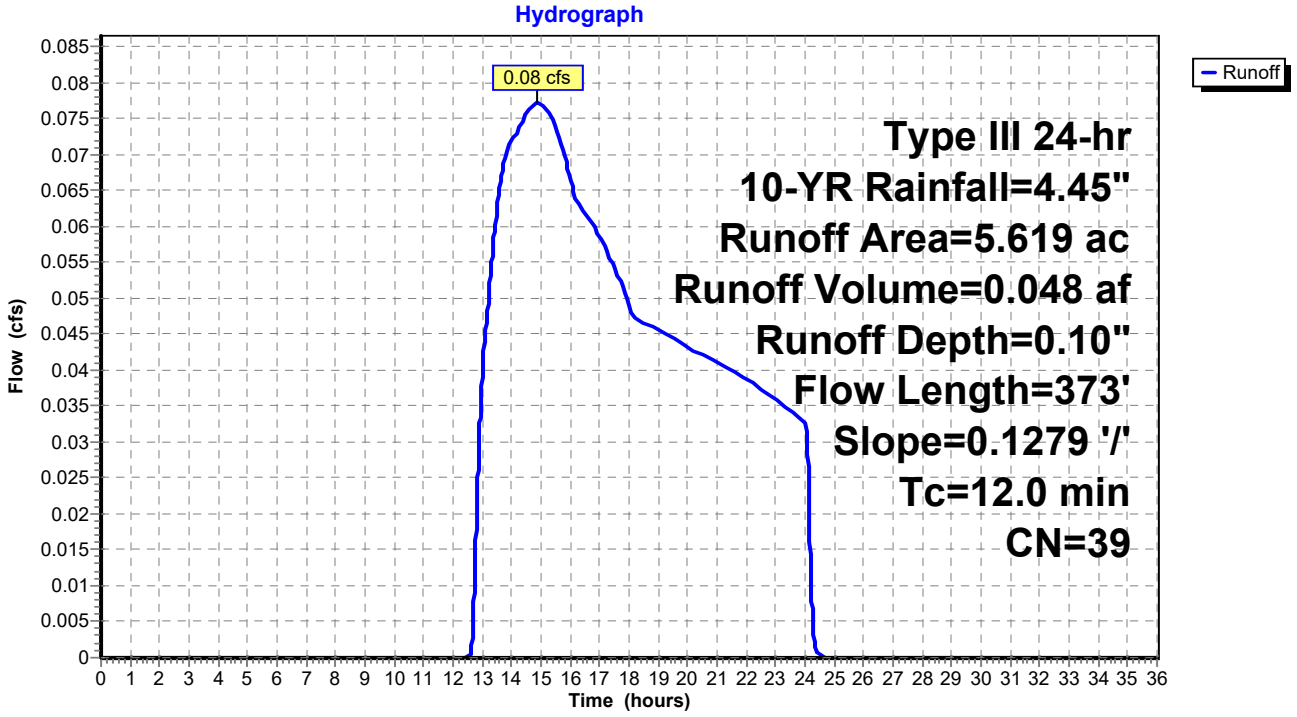
Runoff = 0.08 cfs @ 14.84 hrs, Volume= 0.048 af, Depth= 0.10"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
0.004	96	Gravel surface, HSG C
0.024	96	Gravel surface, HSG B
0.877	55	Woods, Good HSG B
0.463	70	Woods, Good HSG C
4.134	30	Woods, Good HSG A
0.117	96	Gravel surface, HSG A
5.619	39	Weighted Average
5.619		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	373	0.1279	0.52		**Lag/CN Method,**

Subcatchment 1.1S: 1.1S



Summary for Subcatchment 1S: 1S

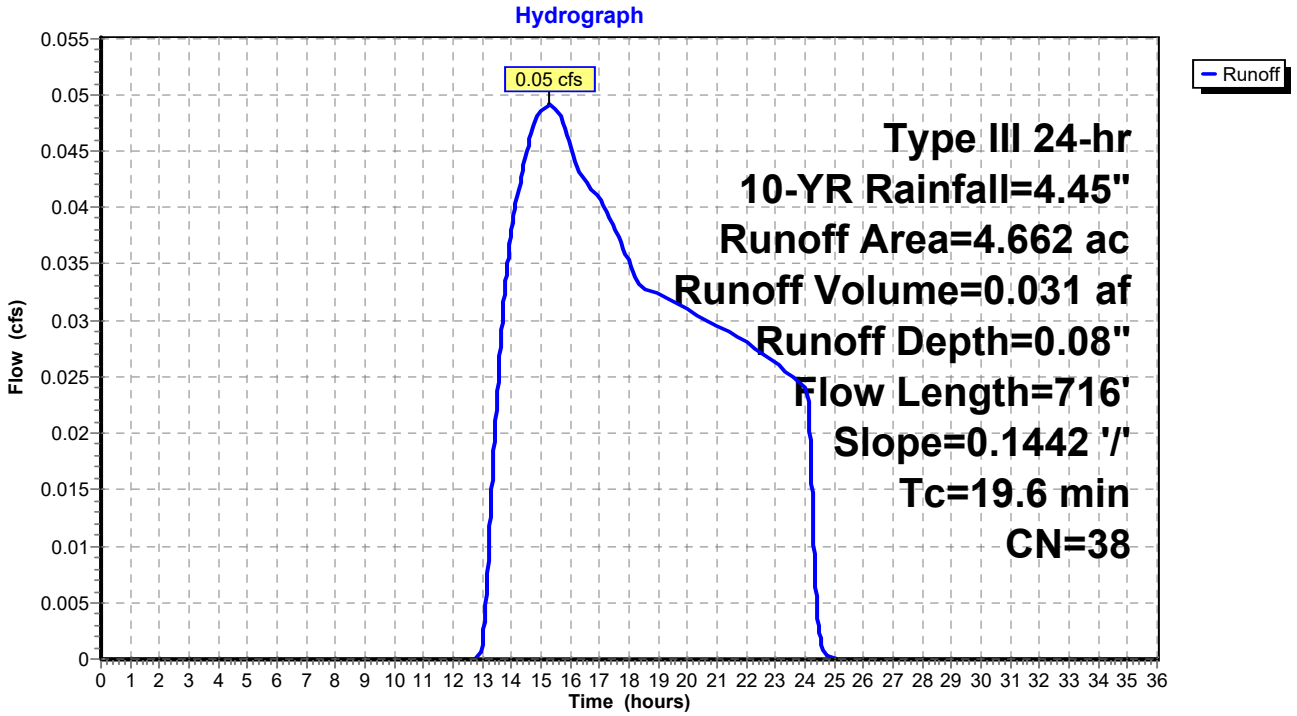
Runoff = 0.05 cfs @ 15.27 hrs, Volume= 0.031 af, Depth= 0.08"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
0.006	96	Gravel surface, HSG C
0.087	96	Gravel surface, HSG B
0.098	70	Woods, Good HSG C
0.316	55	Woods, Good HSG B
3.603	30	Woods, Good HSG A
0.058	96	Gravel surface, HSG A
0.088	98	Roofs HSG A
0.147	39	>75% Grass cover, Good HSG A
0.252	61	>75% Grass cover, Good HSG B
0.007	74	>75% Grass cover, Good HSG C
4.662	38	Weighted Average
4.574		98.11% Pervious Area
0.088		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6	716	0.1442	0.61		**Lag/CN Method,**

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

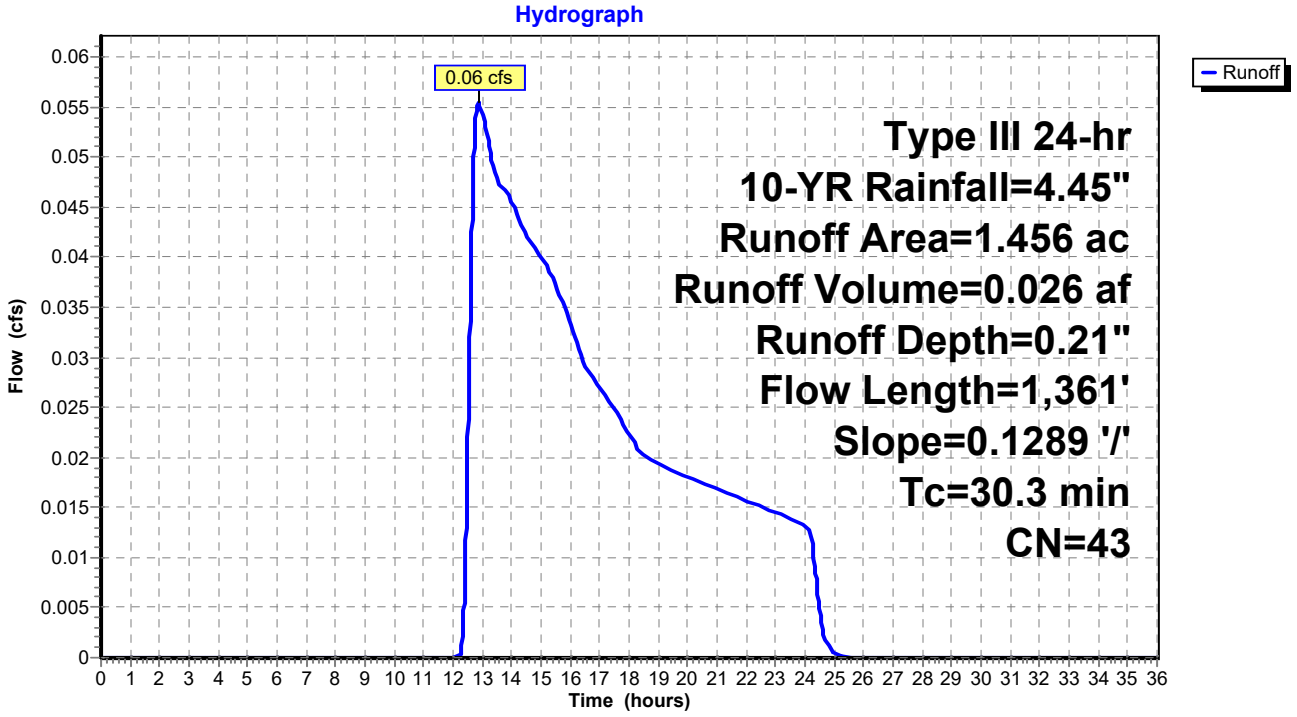
Runoff = 0.06 cfs @ 12.89 hrs, Volume= 0.026 af, Depth= 0.21"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
0.526	30	Woods, Good HSG A
0.190	70	Woods, Good HSG C
0.083	98	Water Surface HSG A
0.657	39	>75% Grass cover, Good HSG A
0.000	74	>75% Grass cover, Good HSG C
1.456	43	Weighted Average
1.373		94.29% Pervious Area
0.083		5.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.3	1,361	0.1289	0.75		**Lag/CN Method,**

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

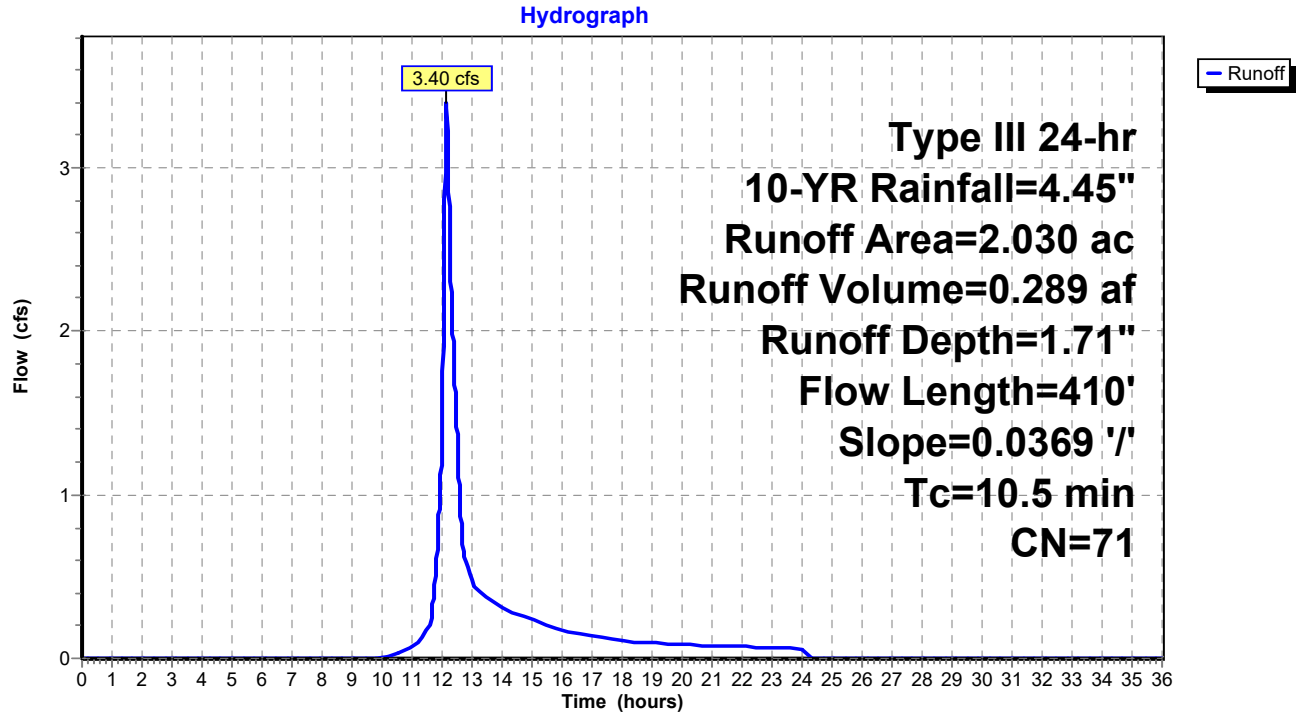
Runoff = 3.40 cfs @ 12.15 hrs, Volume= 0.289 af, Depth= 1.71"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
1.969	70	Woods, Good HSG C
0.061	98	Water Surface HSG C
2.030	71	Weighted Average
1.969		97.01% Pervious Area
0.061		2.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	410	0.0369	0.65		**Lag/CN Method,**

Subcatchment 3S: 3S



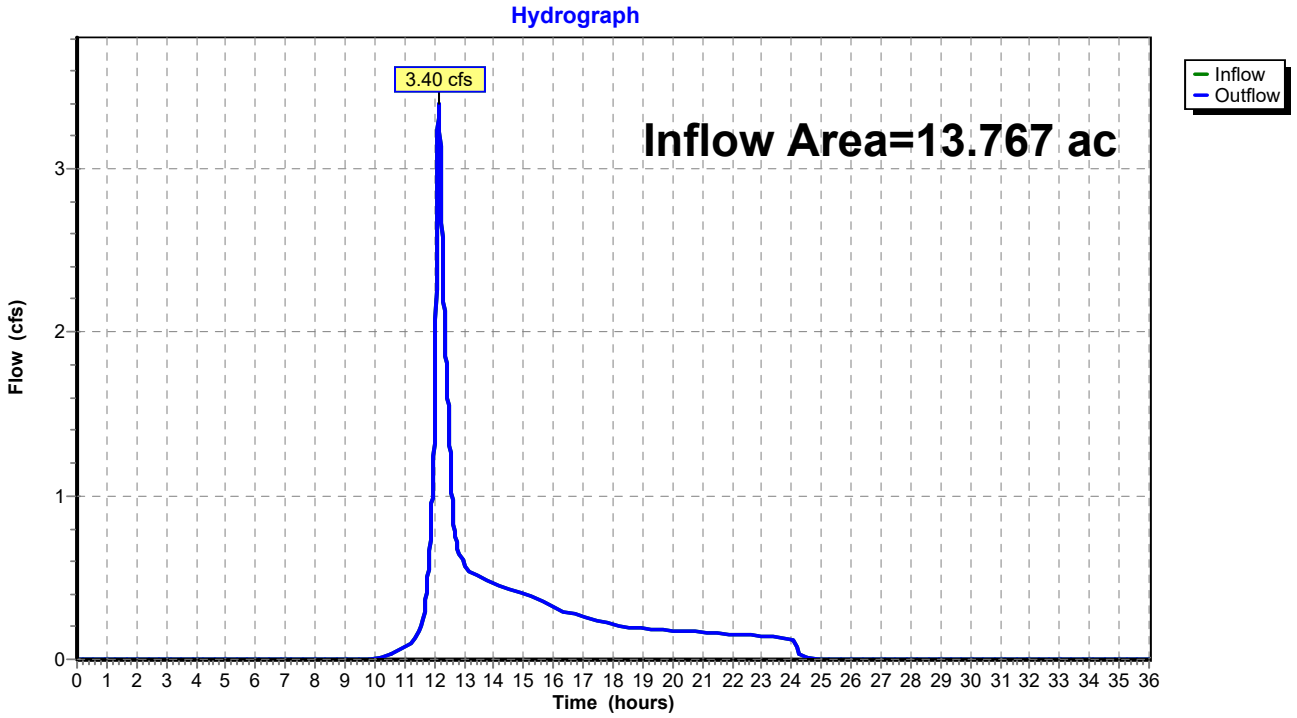
Summary for Reach OP-1: OP-1

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

Inflow Area = 13.767 ac, 1.68% Impervious, Inflow Depth = 0.34" for 10-YR event
Inflow = 3.40 cfs @ 12.15 hrs, Volume= 0.395 af
Outflow = 3.40 cfs @ 12.15 hrs, Volume= 0.395 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach OP-1: OP-1



Section 1.2: Pre-Developed Conditions
25-year Storm – Full Summary

Summary for Subcatchment 1.1S: 1.1S

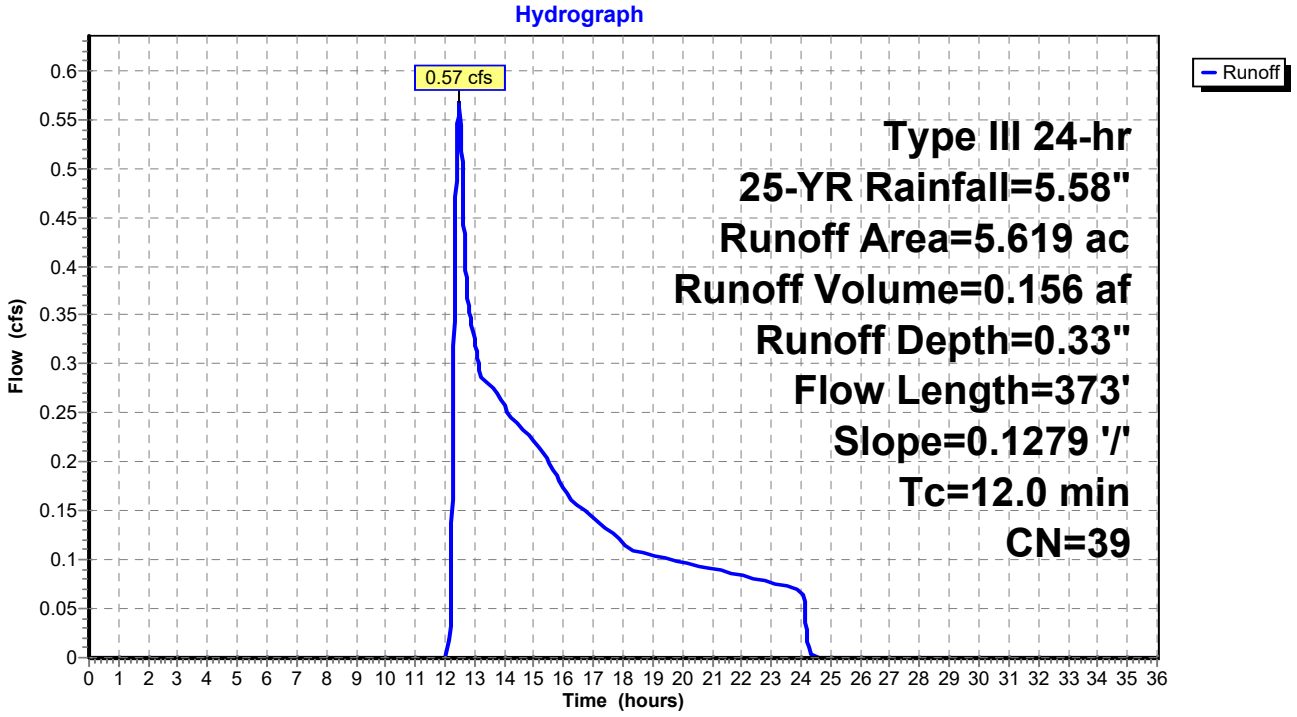
Runoff = 0.57 cfs @ 12.49 hrs, Volume= 0.156 af, Depth= 0.33"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
0.004	96	Gravel surface, HSG C
0.024	96	Gravel surface, HSG B
0.877	55	Woods, Good HSG B
0.463	70	Woods, Good HSG C
4.134	30	Woods, Good HSG A
0.117	96	Gravel surface, HSG A
5.619	39	Weighted Average
5.619		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	373	0.1279	0.52		**Lag/CN Method,**

Subcatchment 1.1S: 1.1S



Summary for Subcatchment 1S: 1S

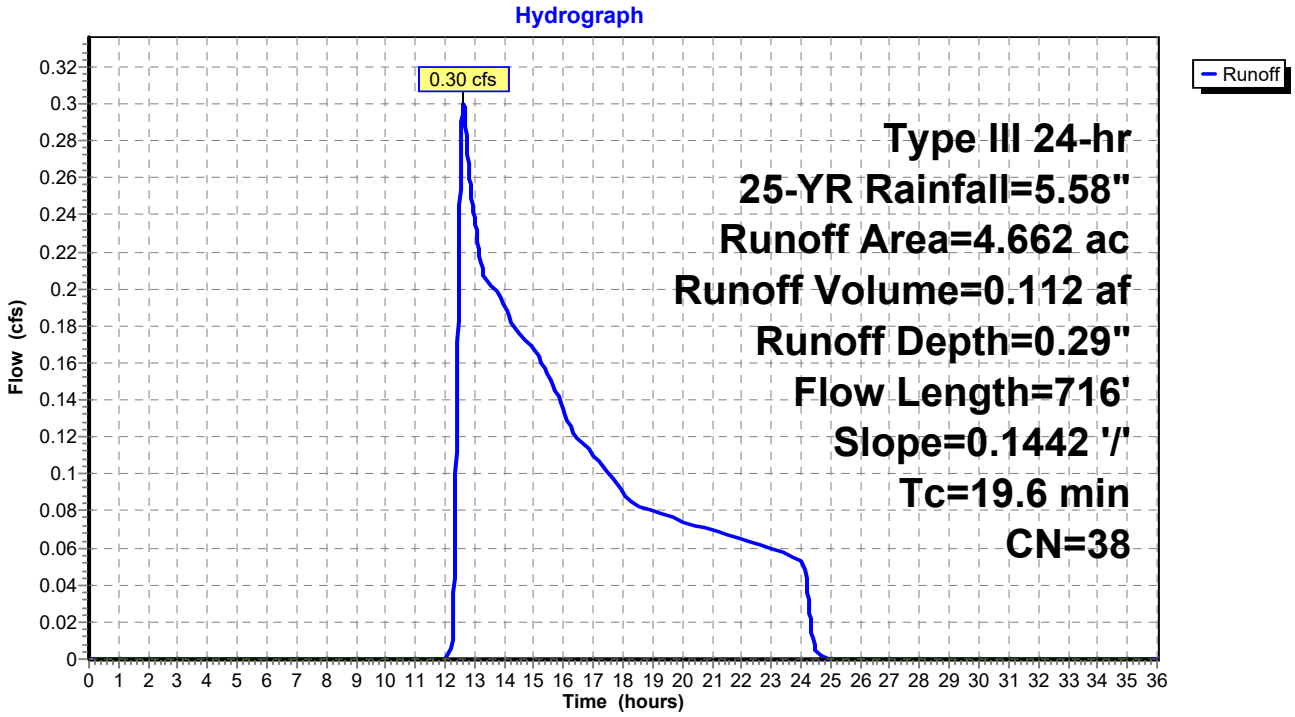
Runoff = 0.30 cfs @ 12.63 hrs, Volume= 0.112 af, Depth= 0.29"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
0.006	96	Gravel surface, HSG C
0.087	96	Gravel surface, HSG B
0.098	70	Woods, Good HSG C
0.316	55	Woods, Good HSG B
3.603	30	Woods, Good HSG A
0.058	96	Gravel surface, HSG A
0.088	98	Roofs HSG A
0.147	39	>75% Grass cover, Good HSG A
0.252	61	>75% Grass cover, Good HSG B
0.007	74	>75% Grass cover, Good HSG C
4.662	38	Weighted Average
4.574		98.11% Pervious Area
0.088		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.6	716	0.1442	0.61		**Lag/CN Method,**

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

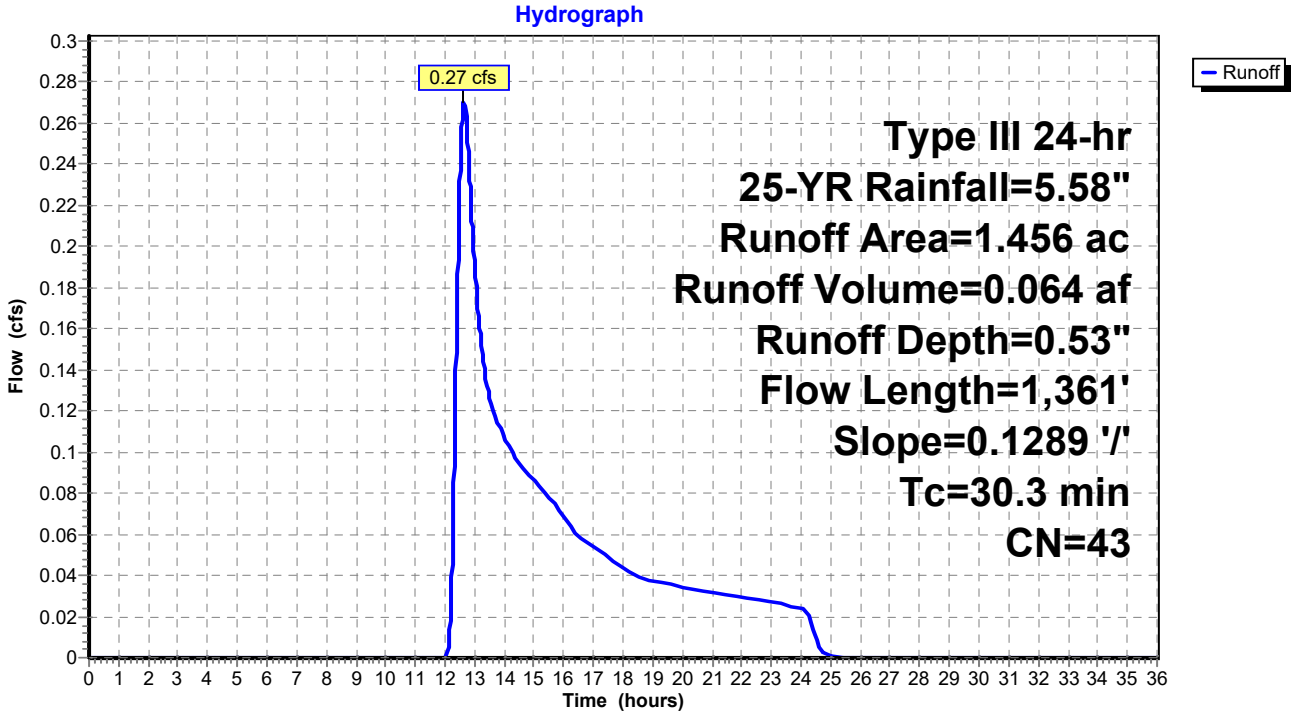
Runoff = 0.27 cfs @ 12.63 hrs, Volume= 0.064 af, Depth= 0.53"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
0.526	30	Woods, Good HSG A
0.190	70	Woods, Good HSG C
0.083	98	Water Surface HSG A
0.657	39	>75% Grass cover, Good HSG A
0.000	74	>75% Grass cover, Good HSG C
1.456	43	Weighted Average
1.373		94.29% Pervious Area
0.083		5.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.3	1,361	0.1289	0.75		**Lag/CN Method,**

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

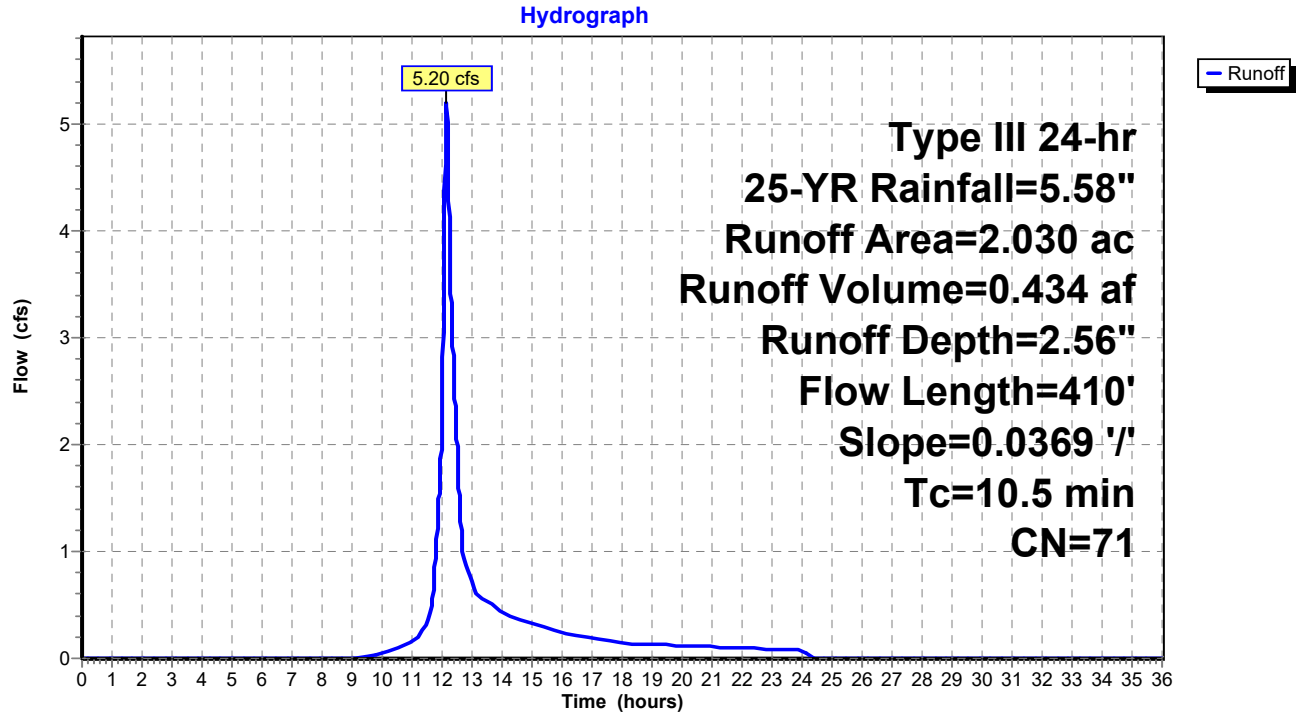
Runoff = 5.20 cfs @ 12.15 hrs, Volume= 0.434 af, Depth= 2.56"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
1.969	70	Woods, Good HSG C
0.061	98	Water Surface HSG C
2.030	71	Weighted Average
1.969		97.01% Pervious Area
0.061		2.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	410	0.0369	0.65		**Lag/CN Method,**

Subcatchment 3S: 3S



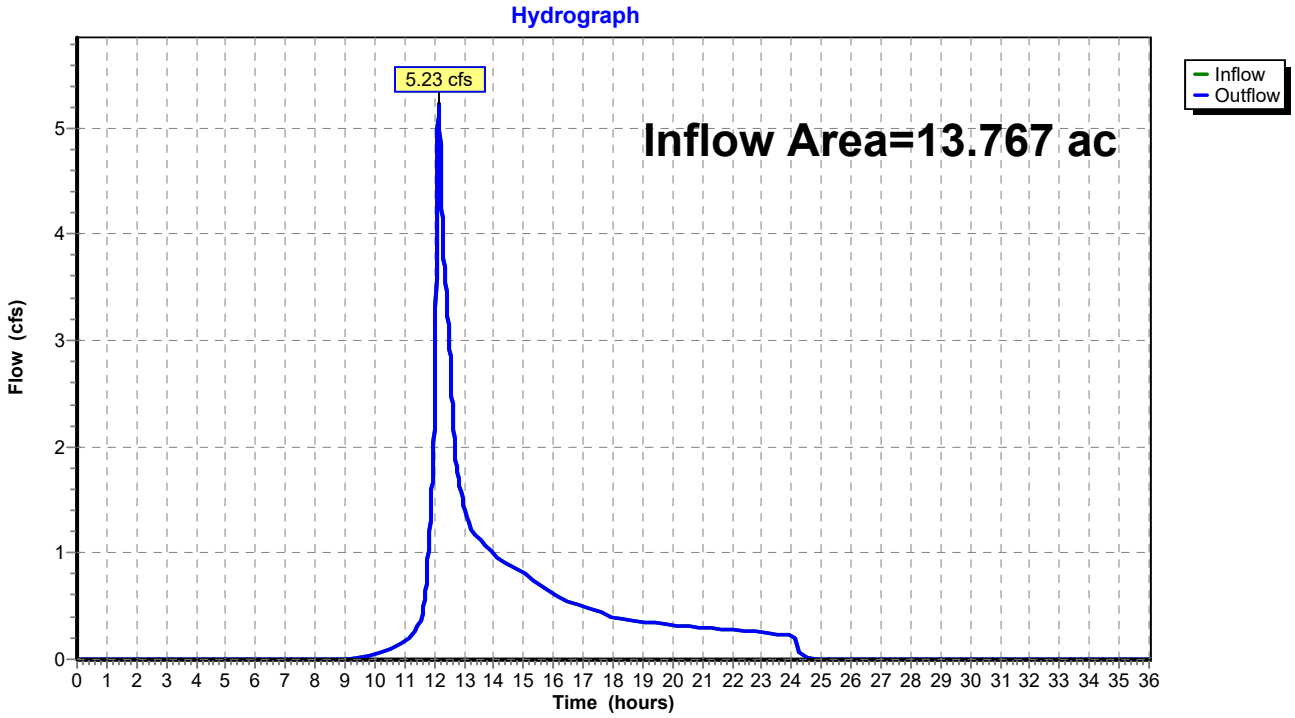
Summary for Reach OP-1: OP-1

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

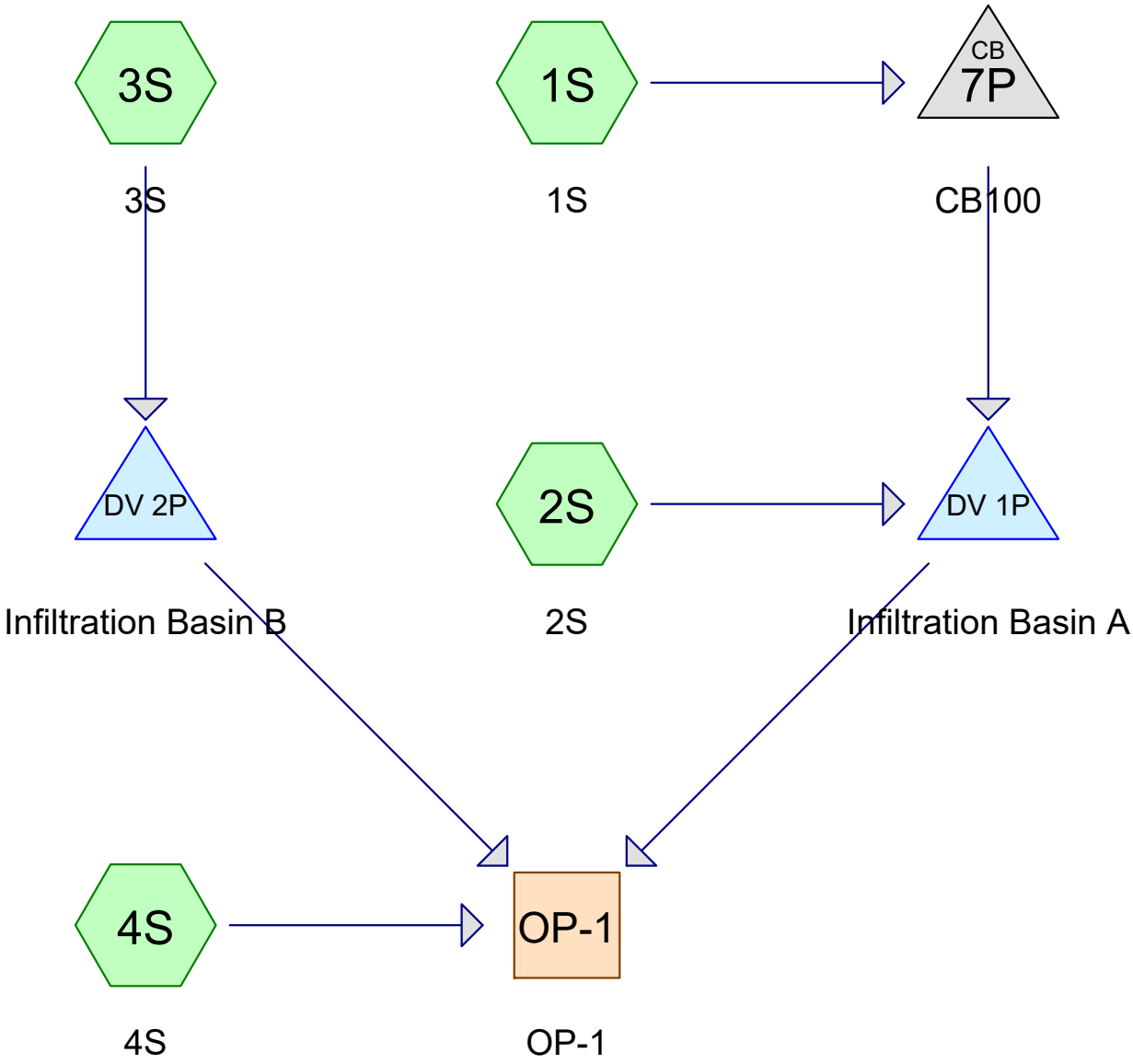
Inflow Area = 13.767 ac, 1.68% Impervious, Inflow Depth = 0.67" for 25-YR event
Inflow = 5.23 cfs @ 12.15 hrs, Volume= 0.765 af
Outflow = 5.23 cfs @ 12.15 hrs, Volume= 0.765 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach OP-1: OP-1



Section 2.0: Post-Developed Conditions



Subcat Reach Pond Link

Routing Diagram for 03077DV00B
Prepared by MERIDIAN LAND SERVICES, Printed 5/13/2022
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Rainfall Events Listing

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	3.01	2
2	10-YR	Type III 24-hr		Default	24.00	1	4.45	2
3	25-YR	Type III 24-hr		Default	24.00	1	5.58	2
4	50-YR	Type III 24-hr		Default	24.00	1	6.61	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.138	39	>75% Grass cover, Good HSG A (1S, 2S, 3S, 4S)
0.519	61	>75% Grass cover, Good HSG B (1S, 2S, 3S, 4S)
0.039	74	>75% Grass cover, Good HSG C (4S)
0.131	76	Gravel roads HSG A (3S, 4S)
1.093	98	Paved parking HSG A (1S, 2S, 3S)
0.063	98	Paved parking HSG B (1S, 2S)
1.029	98	Roofs HSG A (1S, 2S, 3S, 4S)
0.083	98	Water Surface HSG A (4S)
0.061	98	Water Surface HSG C (4S)
2.939	30	Woods, Good HSG A (1S, 4S)
0.974	55	Woods, Good HSG B (4S)
2.698	70	Woods, Good HSG C (4S)
13.767	**56**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
9.413	HSG A	1S, 2S, 3S, 4S
1.557	HSG B	1S, 2S, 3S, 4S
2.798	HSG C	4S
0.000	HSG D	
0.000	Other	
13.767		**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1S: 1S Runoff Area=2.676 ac 28.52% Impervious Runoff Depth=0.20"
Flow Length=433' Slope=0.1122 '/' Tc=9.5 min CN=55 Runoff=0.18 cfs 0.044 af

Subcatchment 2S: 2S Runoff Area=1.733 ac 40.07% Impervious Runoff Depth=0.44"
Flow Length=449' Slope=0.0510 '/' Tc=11.9 min CN=63 Runoff=0.47 cfs 0.063 af

Subcatchment 3S: 3S Runoff Area=1.103 ac 52.35% Impervious Runoff Depth=0.72"
Flow Length=319' Slope=0.0594 '/' Tc=7.0 min CN=70 Runoff=0.78 cfs 0.066 af

Subcatchment 4S: 4S Runoff Area=8.255 ac 3.56% Impervious Runoff Depth=0.13"
Flow Length=1,786' Slope=0.1191 '/' Tc=31.0 min CN=52 Runoff=0.17 cfs 0.090 af

Reach OP-1: OP-1 Inflow=0.17 cfs 0.090 af
Outflow=0.17 cfs 0.090 af

Pond 7P: CB100 Peak Elev=237.93' Inflow=0.18 cfs 0.044 af
15.0" Round Culvert n=0.013 L=36.0' S=0.0056 '/' Outflow=0.18 cfs 0.044 af

Pond DV 1P: Infiltration Basin A Peak Elev=237.05' Storage=272 cf Inflow=0.59 cfs 0.107 af
Discarded=0.40 cfs 0.107 af Primary=0.00 cfs 0.000 af Outflow=0.40 cfs 0.107 af

Pond DV 2P: Infiltration Basin B Peak Elev=236.45' Storage=791 cf Inflow=0.78 cfs 0.066 af
Discarded=0.13 cfs 0.066 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.066 af

Total Runoff Area = 13.767 ac Runoff Volume = 0.263 af Average Runoff Depth = 0.23"
83.08% Pervious = 11.438 ac 16.92% Impervious = 2.329 ac

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1S: 1S Runoff Area=2.676 ac 28.52% Impervious Runoff Depth=0.72"
Flow Length=433' Slope=0.1122 '/' Tc=9.5 min CN=55 Runoff=1.41 cfs 0.161 af

Subcatchment 2S: 2S Runoff Area=1.733 ac 40.07% Impervious Runoff Depth=1.17"
Flow Length=449' Slope=0.0510 '/' Tc=11.9 min CN=63 Runoff=1.75 cfs 0.169 af

Subcatchment 3S: 3S Runoff Area=1.103 ac 52.35% Impervious Runoff Depth=1.64"
Flow Length=319' Slope=0.0594 '/' Tc=7.0 min CN=70 Runoff=1.98 cfs 0.151 af

Subcatchment 4S: 4S Runoff Area=8.255 ac 3.56% Impervious Runoff Depth=0.57"
Flow Length=1,786' Slope=0.1191 '/' Tc=31.0 min CN=52 Runoff=2.02 cfs 0.394 af

Reach OP-1: OP-1 Inflow=2.02 cfs 0.394 af
Outflow=2.02 cfs 0.394 af

Pond 7P: CB100 Peak Elev=238.40' Inflow=1.41 cfs 0.161 af
15.0" Round Culvert n=0.013 L=36.0' S=0.0056 '/' Outflow=1.41 cfs 0.161 af

Pond DV 1P: Infiltration Basin A Peak Elev=237.70' Storage=4,394 cf Inflow=3.15 cfs 0.330 af
Discarded=0.48 cfs 0.330 af Primary=0.00 cfs 0.000 af Outflow=0.48 cfs 0.330 af

Pond DV 2P: Infiltration Basin B Peak Elev=237.29' Storage=2,684 cf Inflow=1.98 cfs 0.151 af
Discarded=0.18 cfs 0.151 af Primary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.151 af

Total Runoff Area = 13.767 ac Runoff Volume = 0.875 af Average Runoff Depth = 0.76"
83.08% Pervious = 11.438 ac 16.92% Impervious = 2.329 ac

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1S: 1S Runoff Area=2.676 ac 28.52% Impervious Runoff Depth=1.28"
Flow Length=433' Slope=0.1122 '/' Tc=9.5 min CN=55 Runoff=3.04 cfs 0.286 af

Subcatchment 2S: 2S Runoff Area=1.733 ac 40.07% Impervious Runoff Depth=1.89"
Flow Length=449' Slope=0.0510 '/' Tc=11.9 min CN=63 Runoff=3.00 cfs 0.273 af

Subcatchment 3S: 3S Runoff Area=1.103 ac 52.35% Impervious Runoff Depth=2.48"
Flow Length=319' Slope=0.0594 '/' Tc=7.0 min CN=70 Runoff=3.06 cfs 0.228 af

Subcatchment 4S: 4S Runoff Area=8.255 ac 3.56% Impervious Runoff Depth=1.08"
Flow Length=1,786' Slope=0.1191 '/' Tc=31.0 min CN=52 Runoff=4.67 cfs 0.740 af

Reach OP-1: OP-1 Inflow=4.67 cfs 0.740 af
Outflow=4.67 cfs 0.740 af

Pond 7P: CB100 Peak Elev=238.82' Inflow=3.04 cfs 0.286 af
15.0" Round Culvert n=0.013 L=36.0' S=0.0056 '/' Outflow=3.04 cfs 0.286 af

Pond DV 1P: Infiltration Basin A Peak Elev=238.43' Storage=10,047 cf Inflow=6.01 cfs 0.559 af
Discarded=0.59 cfs 0.559 af Primary=0.00 cfs 0.000 af Outflow=0.59 cfs 0.559 af

Pond DV 2P: Infiltration Basin B Peak Elev=237.95' Storage=4,589 cf Inflow=3.06 cfs 0.228 af
Discarded=0.22 cfs 0.228 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.228 af

Total Runoff Area = 13.767 ac Runoff Volume = 1.526 af Average Runoff Depth = 1.33"
83.08% Pervious = 11.438 ac 16.92% Impervious = 2.329 ac

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1S: 1S Runoff Area=2.676 ac 28.52% Impervious Runoff Depth=1.88"
Flow Length=433' Slope=0.1122 '/' Tc=9.5 min CN=55 Runoff=4.79 cfs 0.419 af

Subcatchment 2S: 2S Runoff Area=1.733 ac 40.07% Impervious Runoff Depth=2.61"
Flow Length=449' Slope=0.0510 '/' Tc=11.9 min CN=63 Runoff=4.26 cfs 0.377 af

Subcatchment 3S: 3S Runoff Area=1.103 ac 52.35% Impervious Runoff Depth=3.30"
Flow Length=319' Slope=0.0594 '/' Tc=7.0 min CN=70 Runoff=4.11 cfs 0.303 af

Subcatchment 4S: 4S Runoff Area=8.255 ac 3.56% Impervious Runoff Depth=1.62"
Flow Length=1,786' Slope=0.1191 '/' Tc=31.0 min CN=52 Runoff=7.71 cfs 1.116 af

Reach OP-1: OP-1 Inflow=7.71 cfs 1.116 af
Outflow=7.71 cfs 1.116 af

Pond 7P: CB100 Peak Elev=239.40' Inflow=4.79 cfs 0.419 af
15.0" Round Culvert n=0.013 L=36.0' S=0.0056 '/' Outflow=4.79 cfs 0.419 af

Pond DV 1P: Infiltration Basin A Peak Elev=239.13' Storage=16,437 cf Inflow=8.99 cfs 0.797 af
Discarded=0.69 cfs 0.797 af Primary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.797 af

Pond DV 2P: Infiltration Basin B Peak Elev=238.52' Storage=6,557 cf Inflow=4.11 cfs 0.303 af
Discarded=0.26 cfs 0.303 af Primary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.303 af

Total Runoff Area = 13.767 ac Runoff Volume = 2.215 af Average Runoff Depth = 1.93"
83.08% Pervious = 11.438 ac 16.92% Impervious = 2.329 ac

Section 2.1: Post-Developed Conditions
10-year Storm – Full Summary

Summary for Subcatchment 1S: 1S

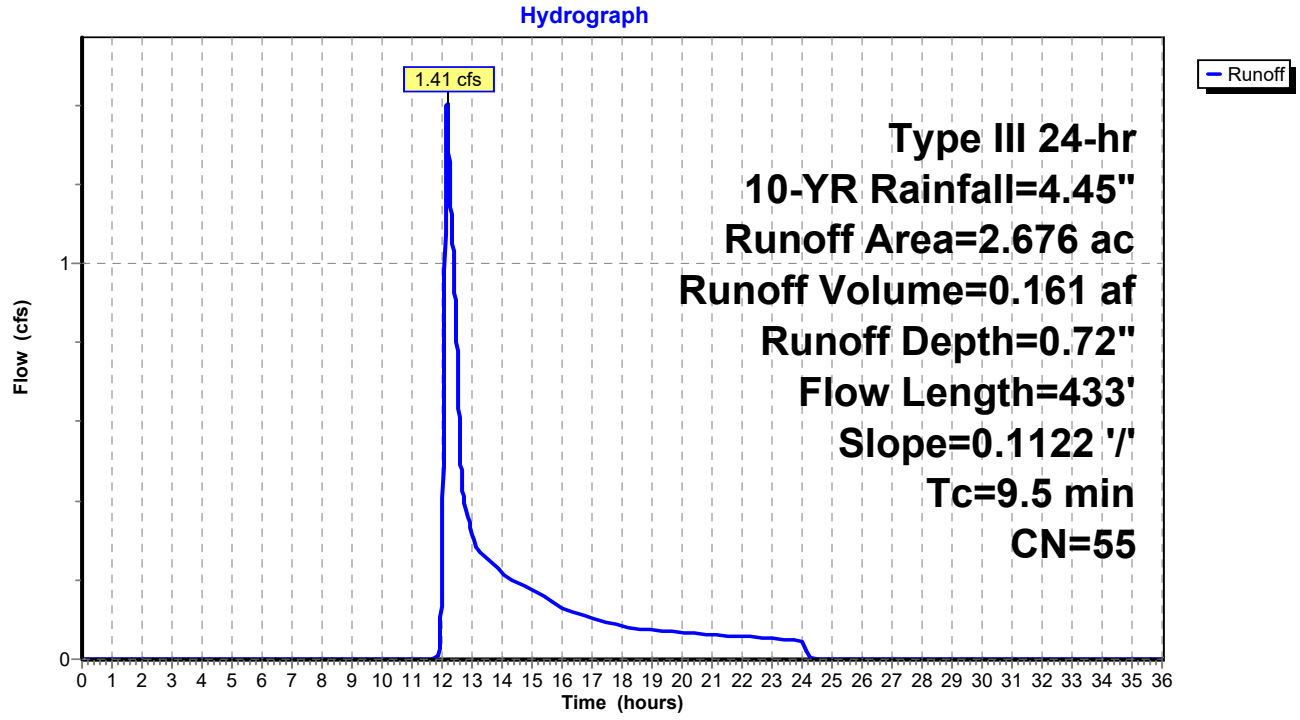
Runoff = 1.41 cfs @ 12.17 hrs, Volume= 0.161 af, Depth= 0.72"
Routed to Pond 7P : CB100

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
0.431	98	Paved parking HSG A
0.362	30	Woods, Good HSG A
0.036	98	Paved parking HSG B
0.296	98	Roofs HSG A
1.487	39	>75% Grass cover, Good HSG A
0.064	61	>75% Grass cover, Good HSG B
2.676	55	Weighted Average
1.913		71.48% Pervious Area
0.763		28.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	433	0.1122	0.76		**Lag/CN Method,**

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

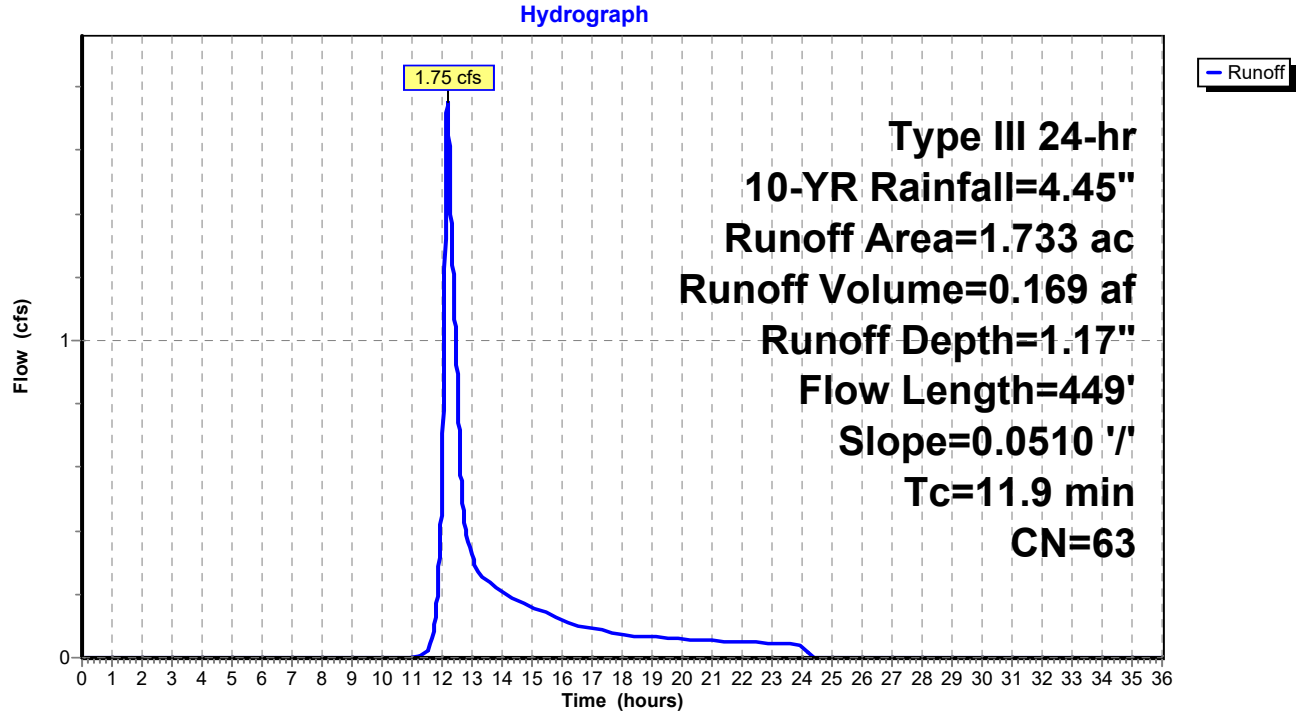
Runoff = 1.75 cfs @ 12.18 hrs, Volume= 0.169 af, Depth= 1.17"
Routed to Pond DV 1P : Infiltration Basin A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
0.436	98	Paved parking HSG A
0.027	98	Paved parking HSG B
0.231	98	Roofs HSG A
0.986	39	>75% Grass cover, Good HSG A
0.052	61	>75% Grass cover, Good HSG B
1.733	63	Weighted Average
1.039		59.93% Pervious Area
0.695		40.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	449	0.0510	0.63		**Lag/CN Method,**

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

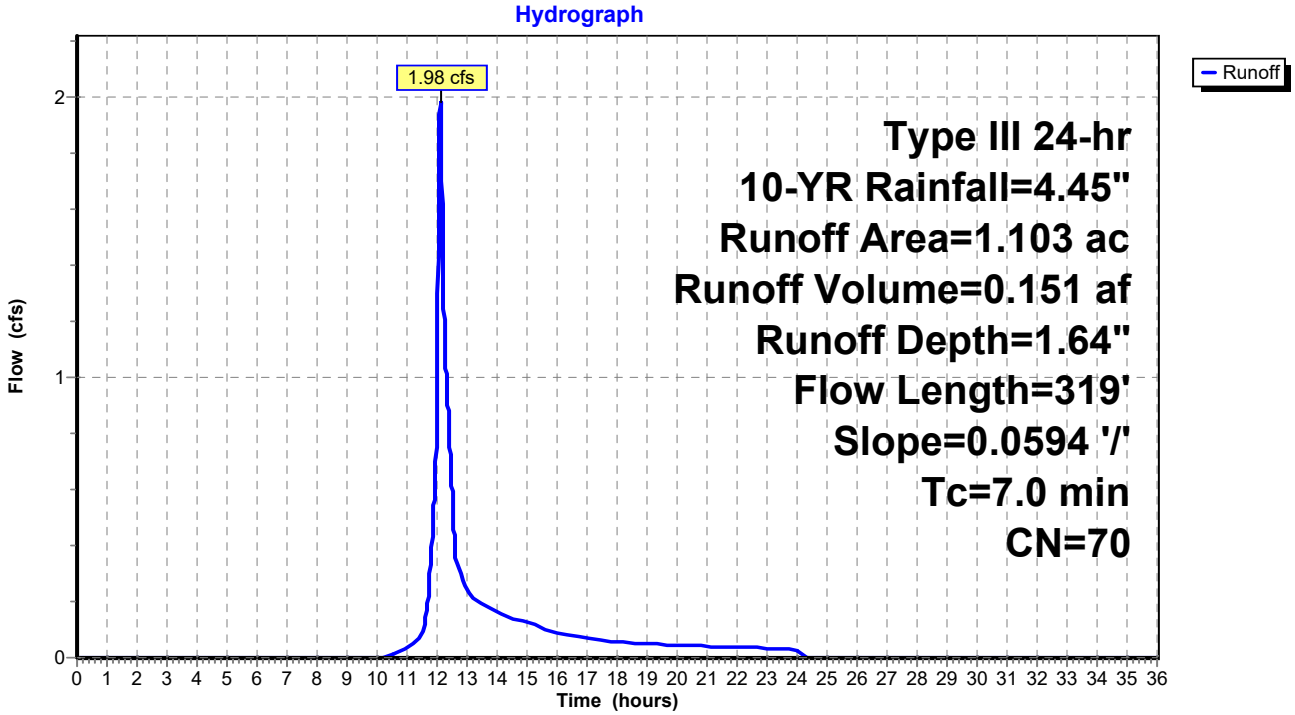
Runoff = 1.98 cfs @ 12.11 hrs, Volume= 0.151 af, Depth= 1.64"
Routed to Pond DV 2P : Infiltration Basin B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
0.225	98	Paved parking HSG A
0.001	76	Gravel roads HSG A
0.352	98	Roofs HSG A
0.520	39	>75% Grass cover, Good HSG A
0.005	61	>75% Grass cover, Good HSG B
1.103	70	Weighted Average
0.526		47.65% Pervious Area
0.577		52.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	319	0.0594	0.76		**Lag/CN Method,**

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

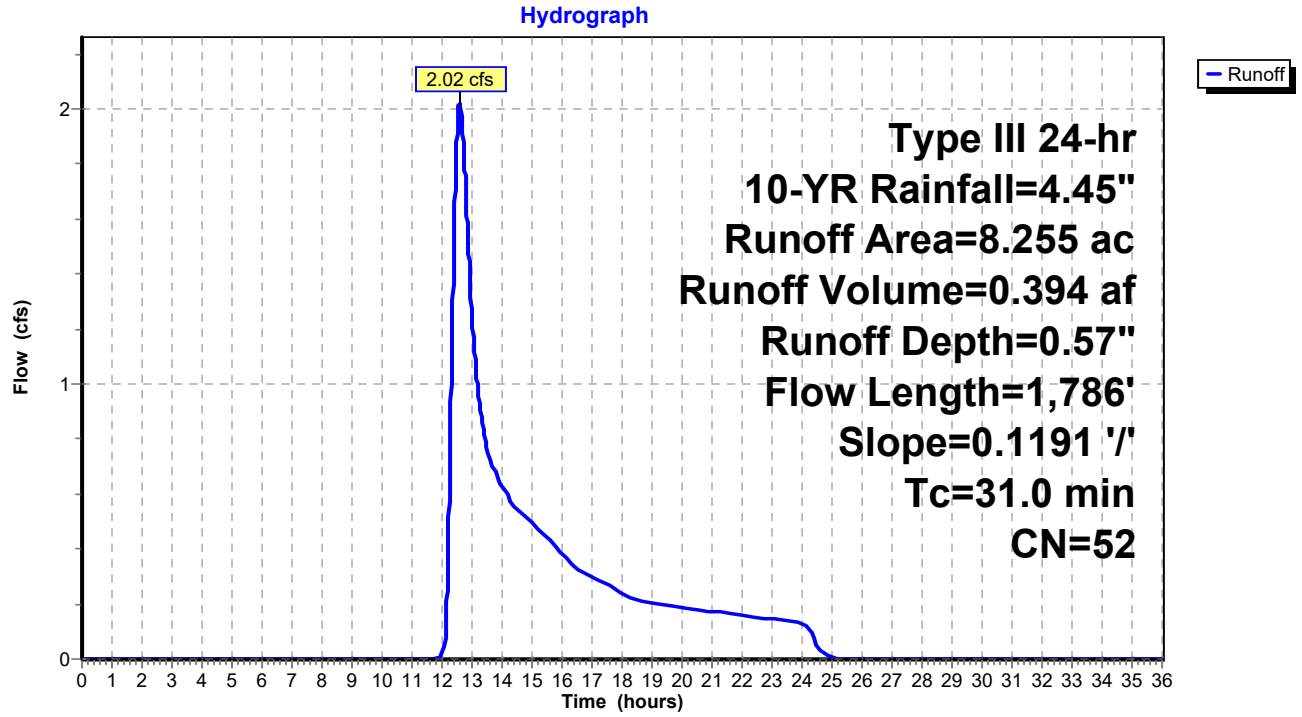
Runoff = 2.02 cfs @ 12.58 hrs, Volume= 0.394 af, Depth= 0.57"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.45"

Area (ac)	CN	Description
0.974	55	Woods, Good HSG B
2.698	70	Woods, Good HSG C
2.577	30	Woods, Good HSG A
0.083	98	Water Surface HSG A
0.061	98	Water Surface HSG C
0.130	76	Gravel roads HSG A
0.150	98	Roofs HSG A
1.145	39	>75% Grass cover, Good HSG A
0.397	61	>75% Grass cover, Good HSG B
0.039	74	>75% Grass cover, Good HSG C
8.255	52	Weighted Average
7.961		96.44% Pervious Area
0.294		3.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.0	1,786	0.1191	0.96		**Lag/CN Method,**

Subcatchment 4S: 4S



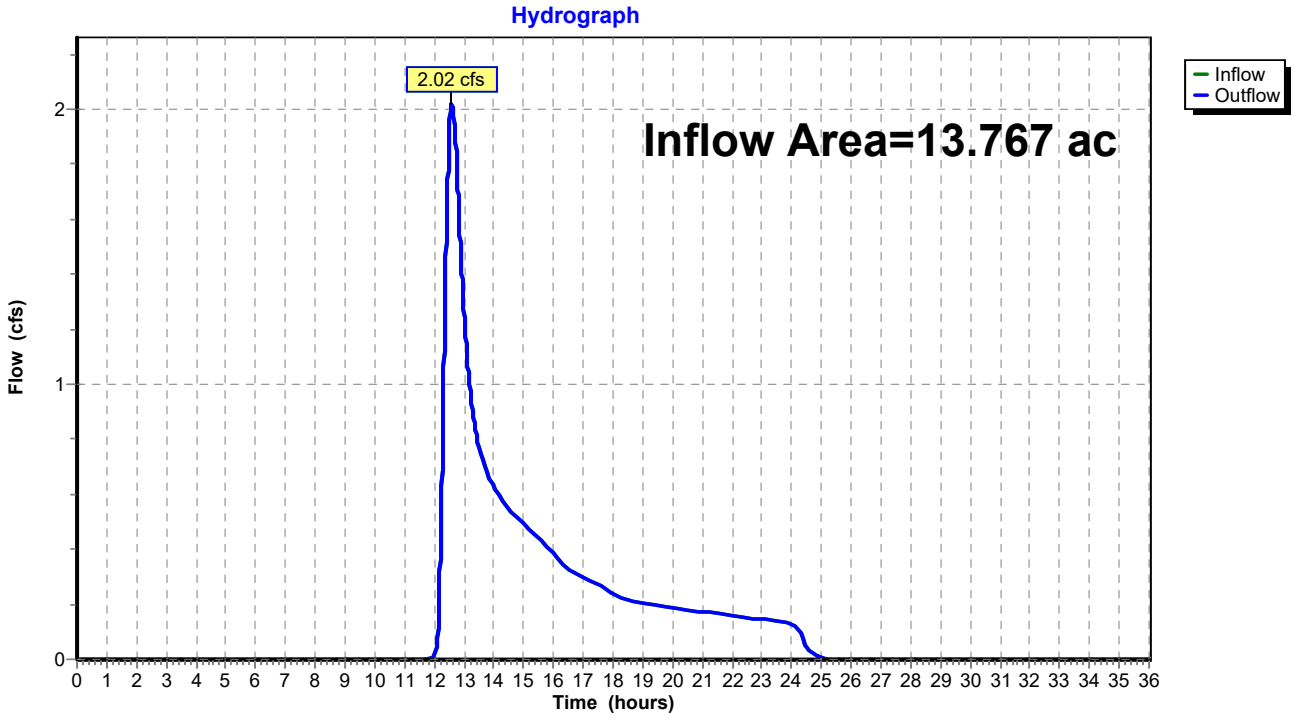
Summary for Reach OP-1: OP-1

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

Inflow Area = 13.767 ac, 16.92% Impervious, Inflow Depth = 0.34" for 10-YR event
Inflow = 2.02 cfs @ 12.58 hrs, Volume= 0.394 af
Outflow = 2.02 cfs @ 12.58 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach OP-1: OP-1



Summary for Pond 7P: CB100

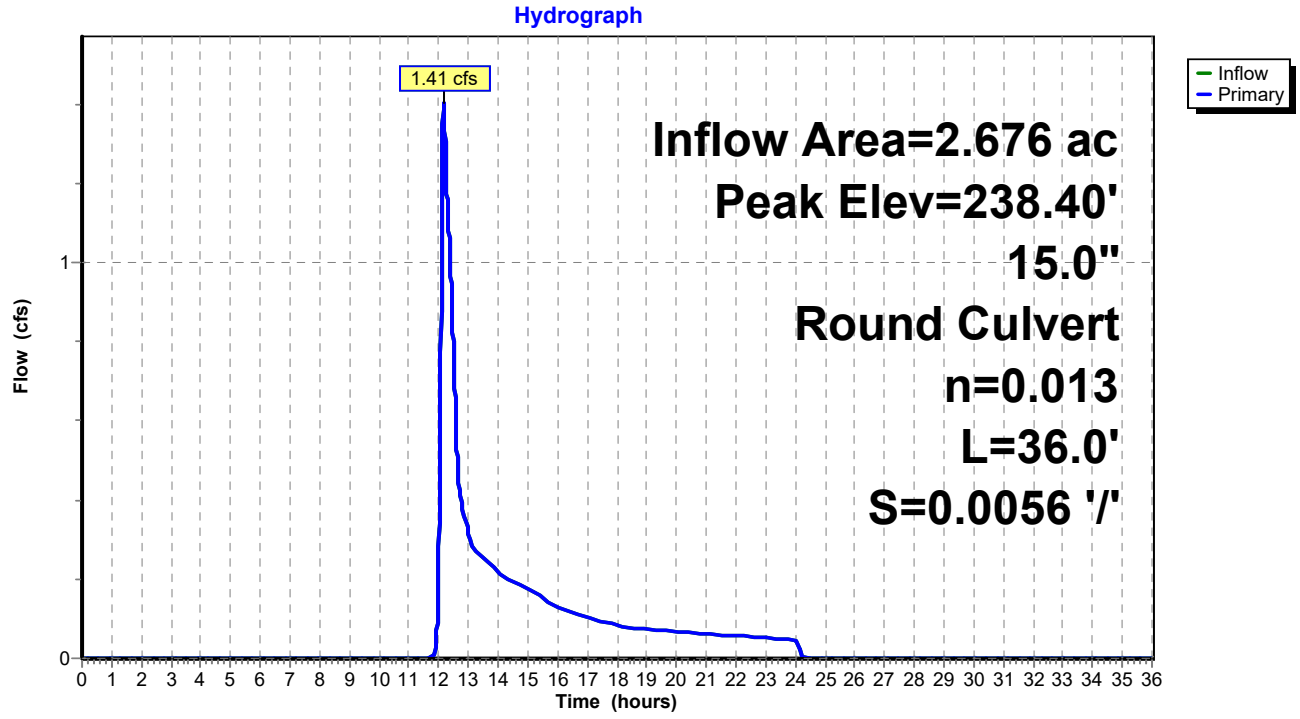
Inflow Area = 2.676 ac, 28.52% Impervious, Inflow Depth = 0.72" for 10-YR event
Inflow = 1.41 cfs @ 12.17 hrs, Volume= 0.161 af
Outflow = 1.41 cfs @ 12.17 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min
Primary = 1.41 cfs @ 12.17 hrs, Volume= 0.161 af
Routed to Pond DV 1P : Infiltration Basin A

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 238.40' @ 12.17 hrs
Flood Elev= 241.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.70'	**15.0" Round Culvert** L= 36.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.70' / 237.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.40 cfs @ 12.17 hrs HW=238.40' TW=237.19' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 1.40 cfs @ 2.89 fps)

Pond 7P: CB100



Summary for Pond DV 1P: Infiltration Basin A

Inflow Area = 4.410 ac, 33.06% Impervious, Inflow Depth = 0.90" for 10-YR event
Inflow = 3.15 cfs @ 12.18 hrs, Volume= 0.330 af
Outflow = 0.48 cfs @ 13.60 hrs, Volume= 0.330 af, Atten= 85%, Lag= 85.5 min
Discarded = 0.48 cfs @ 13.60 hrs, Volume= 0.330 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach OP-1 : OP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 237.70' @ 13.60 hrs Surf.Area= 6,978 sf Storage= 4,394 cf
Flood Elev= 241.00' Surf.Area= 14,250 sf Storage= 38,894 cf

Plug-Flow detention time= 89.3 min calculated for 0.330 af (100% of inflow)
Center-of-Mass det. time= 89.3 min (982.9 - 893.7)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	38,894 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

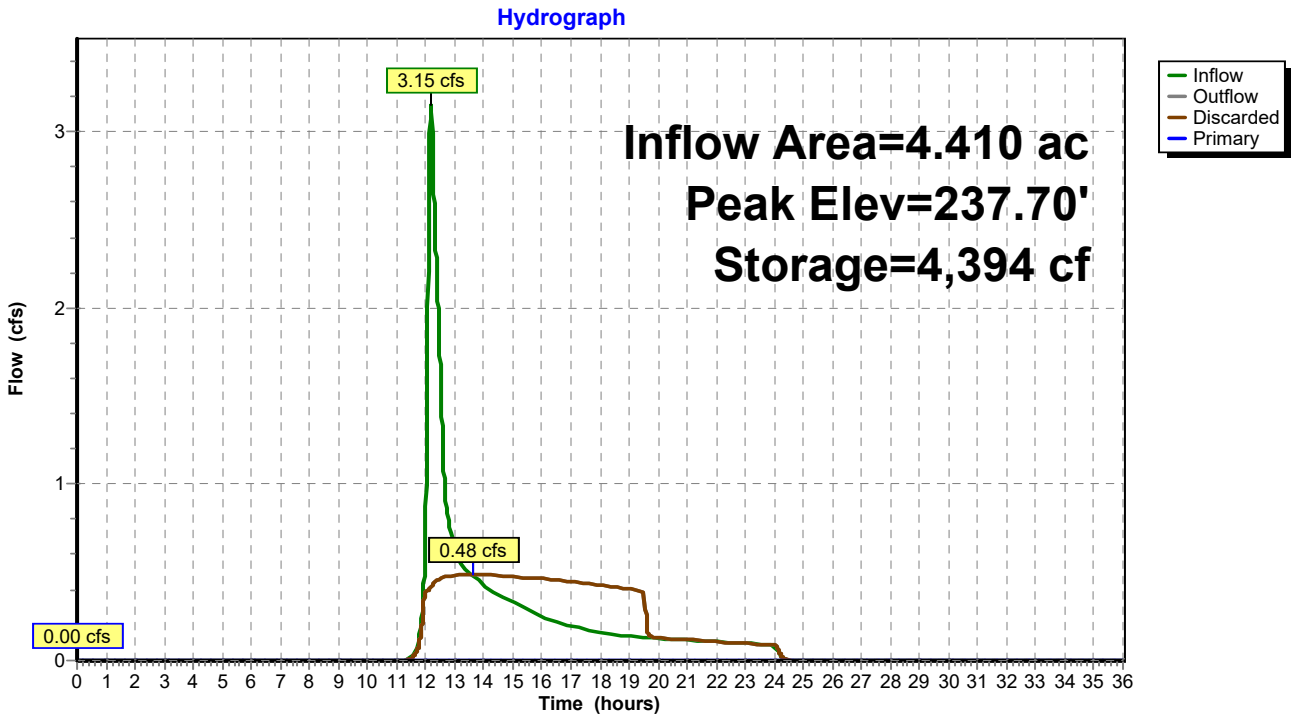
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.00	5,626	356.9	0	0	5,626
238.00	7,606	396.5	6,591	6,591	8,030
240.00	11,830	466.6	19,281	25,872	12,921
241.00	14,250	502.0	13,021	38,894	15,693

Device	Routing	Invert	Outlet Devices
#1	Discarded	237.00'	**3.000 in/hr Exfiltration (Hinckley) over Surface area** Phase-In= 0.01'
#2	Primary	240.00'	**10.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.48 cfs @ 13.60 hrs HW=237.70' (Free Discharge)
↑**1=Exfiltration (Hinckley)** (Exfiltration Controls 0.48 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.00' TW=0.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DV 1P: Infiltration Basin A



Summary for Pond DV 2P: Infiltration Basin B

Inflow Area = 1.103 ac, 52.35% Impervious, Inflow Depth = 1.64" for 10-YR event
Inflow = 1.98 cfs @ 12.11 hrs, Volume= 0.151 af
Outflow = 0.18 cfs @ 13.70 hrs, Volume= 0.151 af, Atten= 91%, Lag= 95.5 min
Discarded = 0.18 cfs @ 13.70 hrs, Volume= 0.151 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach OP-1 : OP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 237.29' @ 13.70 hrs Surf.Area= 2,592 sf Storage= 2,684 cf
Flood Elev= 240.00' Surf.Area= 5,329 sf Storage= 13,219 cf

Plug-Flow detention time= 162.3 min calculated for 0.151 af (100% of inflow)
Center-of-Mass det. time= 162.2 min (1,017.3 - 855.1)

Volume	Invert	Avail.Storage	Storage Description
#1	236.00'	13,219 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

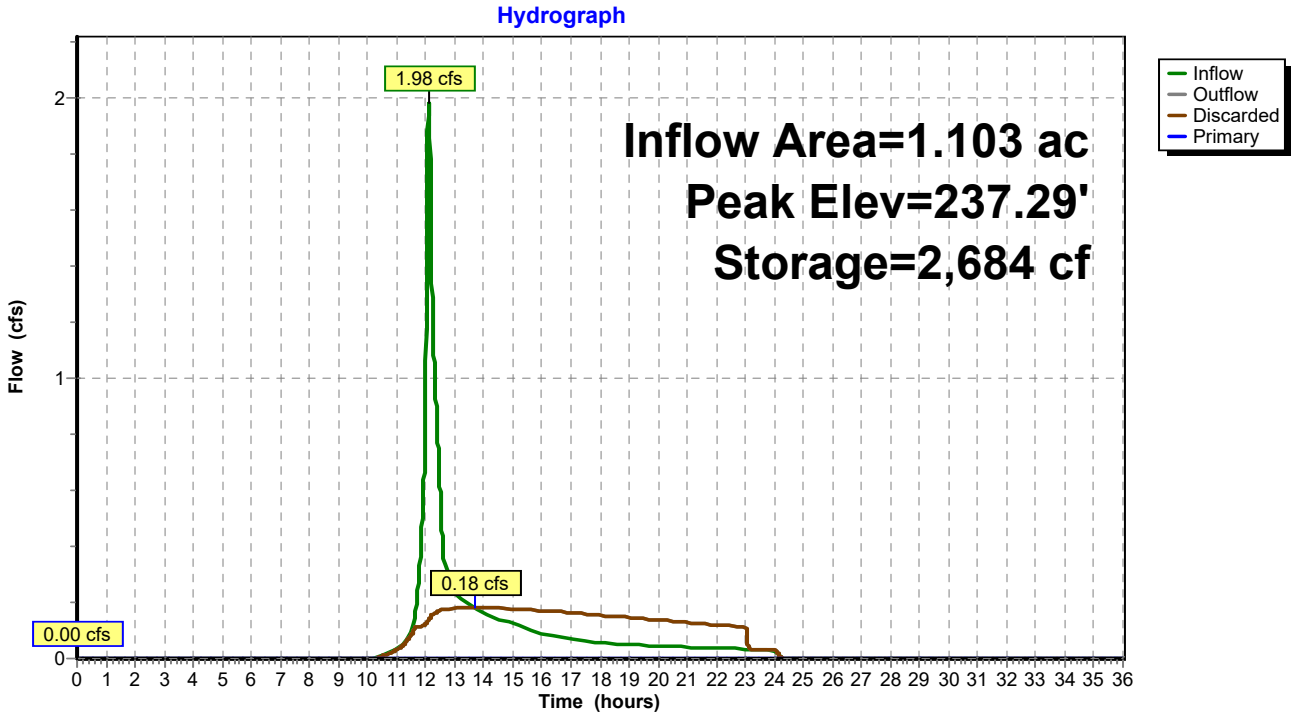
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
236.00	1,598	224.9	0	0	1,598
238.00	3,237	316.7	4,740	4,740	5,591
240.00	5,329	380.2	8,480	13,219	9,181

Device	Routing	Invert	Outlet Devices
#1	Discarded	236.00'	**3.000 in/hr Exfiltration (Hinckley) over Surface area** Phase-In= 0.01'
#2	Primary	239.00'	**5.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.18 cfs @ 13.70 hrs HW=237.29' (Free Discharge)
1=Exfiltration (Hinckley) (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=236.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond DV 2P: Infiltration Basin B



Section 2.2: Post-Developed Conditions
25-year Storm – Full Summary

Summary for Subcatchment 1S: 1S

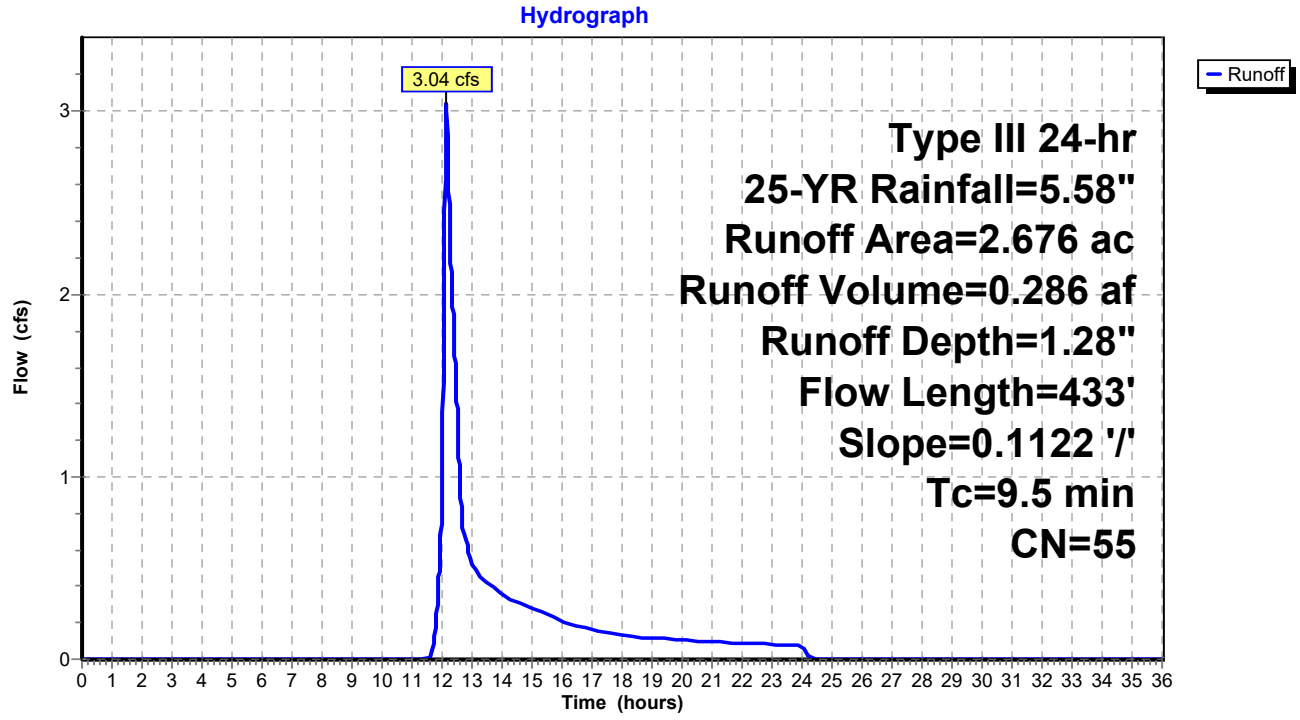
Runoff = 3.04 cfs @ 12.15 hrs, Volume= 0.286 af, Depth= 1.28"
Routed to Pond 7P : CB100

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
0.431	98	Paved parking HSG A
0.362	30	Woods, Good HSG A
0.036	98	Paved parking HSG B
0.296	98	Roofs HSG A
1.487	39	>75% Grass cover, Good HSG A
0.064	61	>75% Grass cover, Good HSG B
2.676	55	Weighted Average
1.913		71.48% Pervious Area
0.763		28.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	433	0.1122	0.76		**Lag/CN Method,**

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

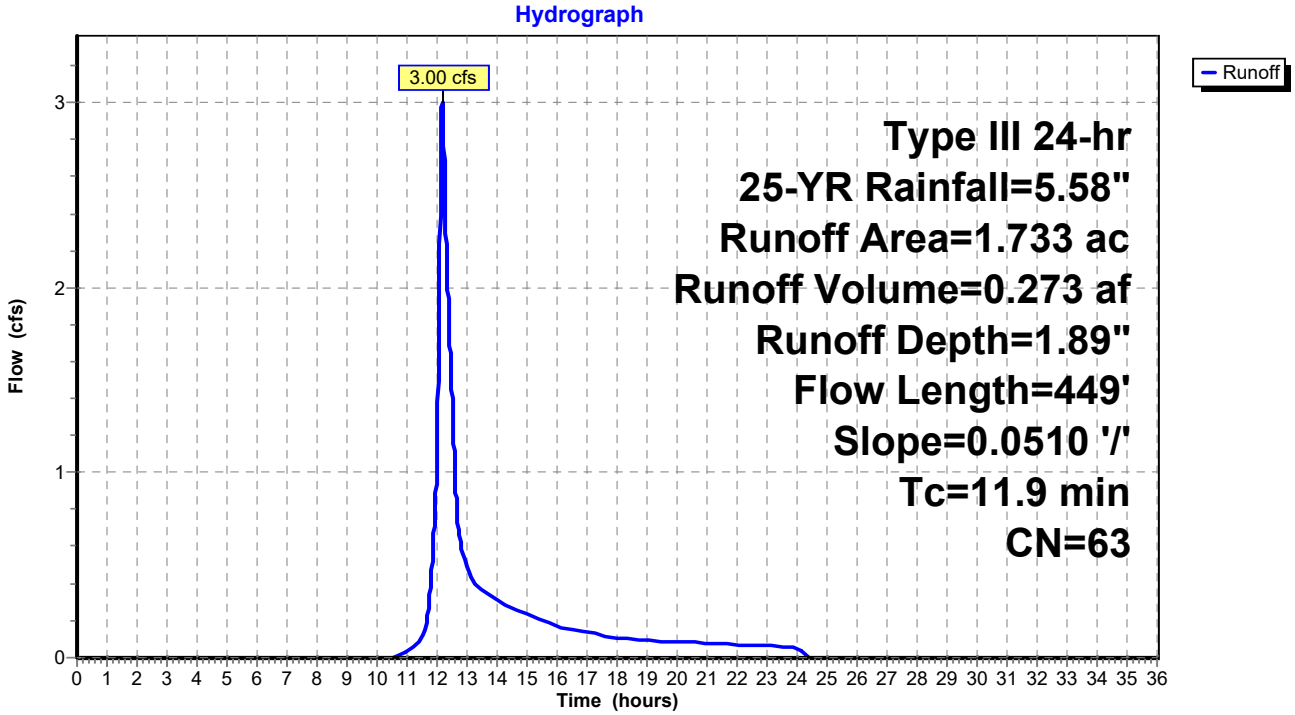
Runoff = 3.00 cfs @ 12.18 hrs, Volume= 0.273 af, Depth= 1.89"
Routed to Pond DV 1P : Infiltration Basin A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
0.436	98	Paved parking HSG A
0.027	98	Paved parking HSG B
0.231	98	Roofs HSG A
0.986	39	>75% Grass cover, Good HSG A
0.052	61	>75% Grass cover, Good HSG B
1.733	63	Weighted Average
1.039		59.93% Pervious Area
0.695		40.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	449	0.0510	0.63		**Lag/CN Method,**

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S

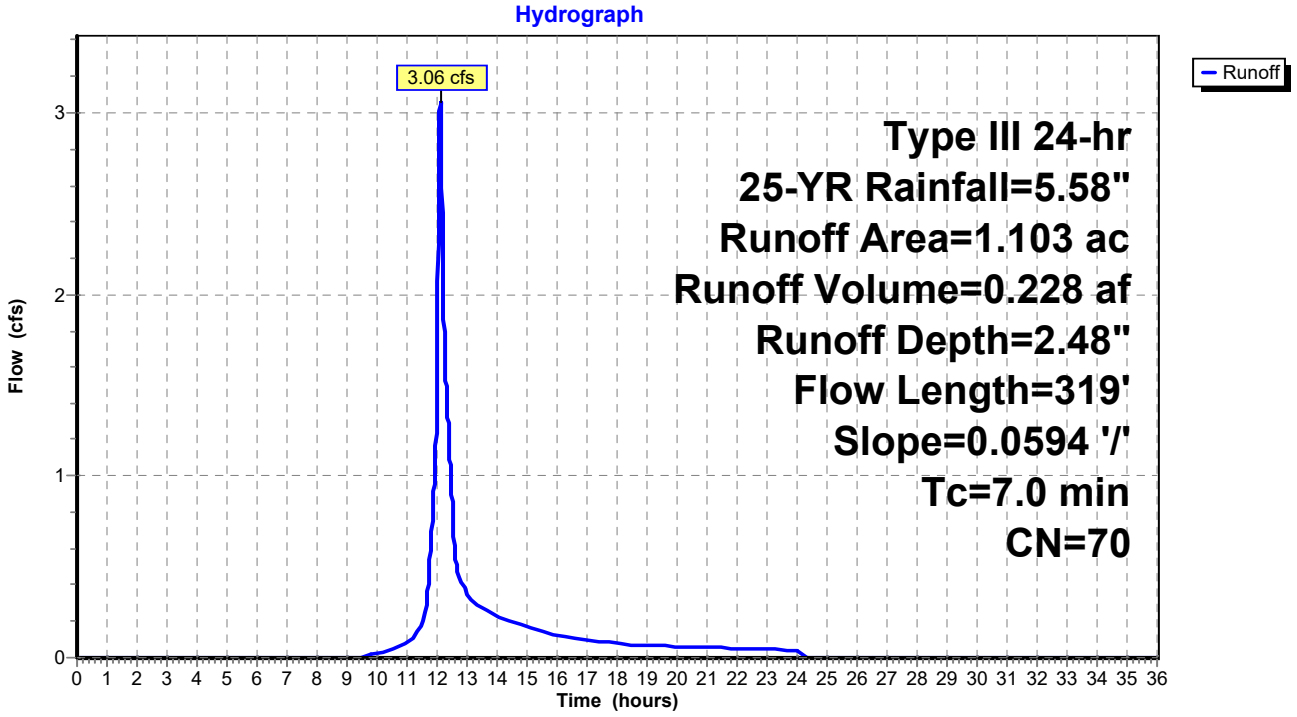
Runoff = 3.06 cfs @ 12.10 hrs, Volume= 0.228 af, Depth= 2.48"
Routed to Pond DV 2P : Infiltration Basin B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
0.225	98	Paved parking HSG A
0.001	76	Gravel roads HSG A
0.352	98	Roofs HSG A
0.520	39	>75% Grass cover, Good HSG A
0.005	61	>75% Grass cover, Good HSG B
1.103	70	Weighted Average
0.526		47.65% Pervious Area
0.577		52.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	319	0.0594	0.76		**Lag/CN Method,**

Subcatchment 3S: 3S



Summary for Subcatchment 4S: 4S

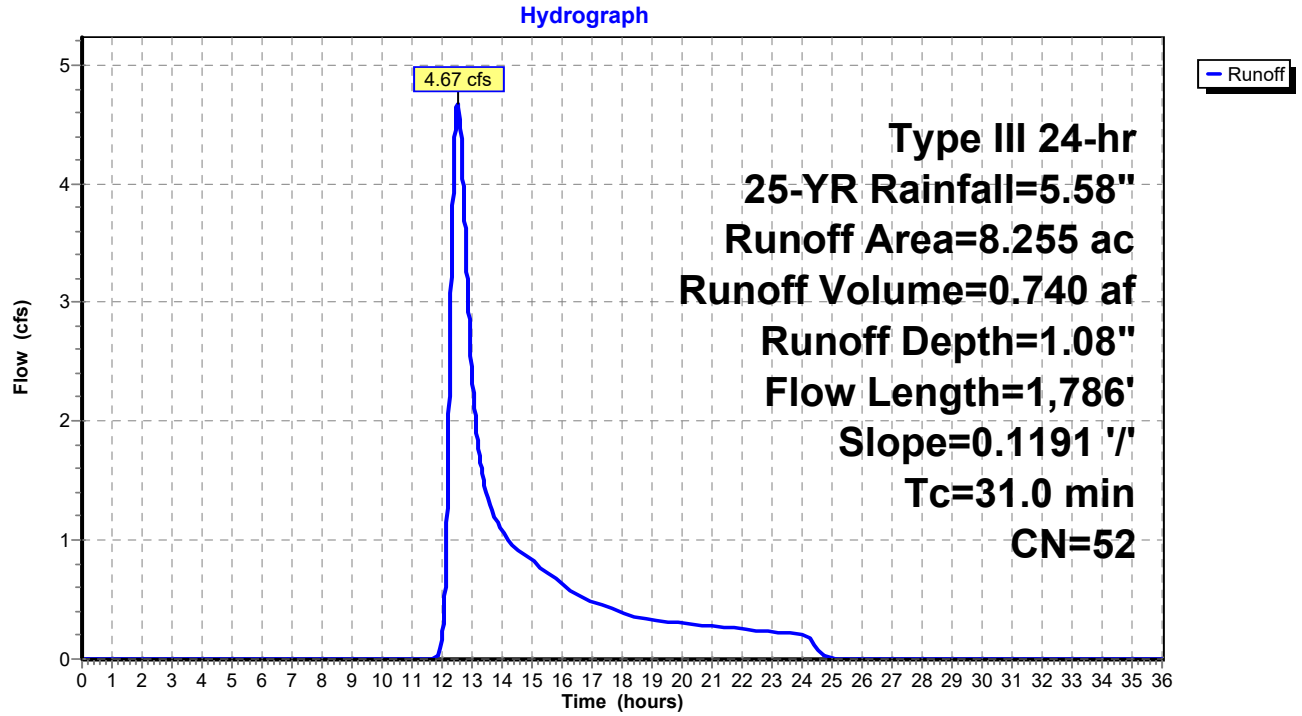
Runoff = 4.67 cfs @ 12.53 hrs, Volume= 0.740 af, Depth= 1.08"
Routed to Reach OP-1 : OP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.58"

Area (ac)	CN	Description
0.974	55	Woods, Good HSG B
2.698	70	Woods, Good HSG C
2.577	30	Woods, Good HSG A
0.083	98	Water Surface HSG A
0.061	98	Water Surface HSG C
0.130	76	Gravel roads HSG A
0.150	98	Roofs HSG A
1.145	39	>75% Grass cover, Good HSG A
0.397	61	>75% Grass cover, Good HSG B
0.039	74	>75% Grass cover, Good HSG C
8.255	52	Weighted Average
7.961		96.44% Pervious Area
0.294		3.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.0	1,786	0.1191	0.96		**Lag/CN Method,**

Subcatchment 4S: 4S



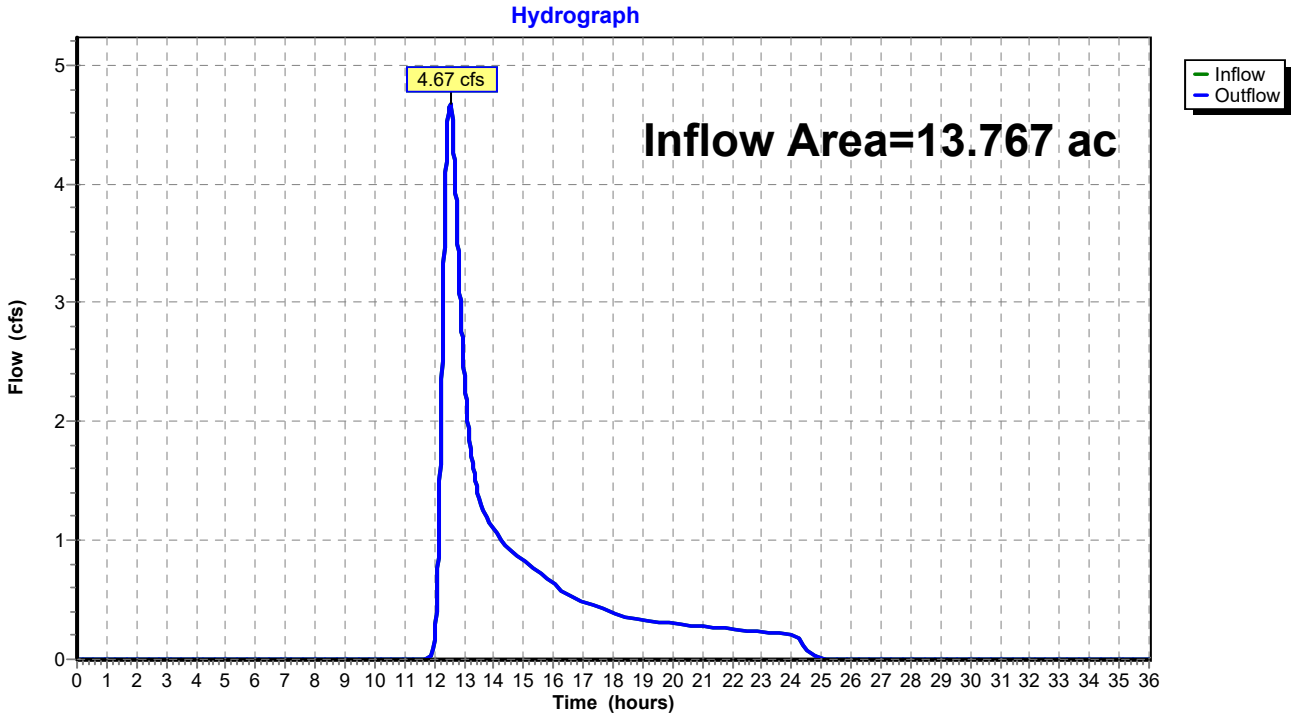
Summary for Reach OP-1: OP-1

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

Inflow Area = 13.767 ac, 16.92% Impervious, Inflow Depth = 0.64" for 25-YR event
Inflow = 4.67 cfs @ 12.53 hrs, Volume= 0.740 af
Outflow = 4.67 cfs @ 12.53 hrs, Volume= 0.740 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach OP-1: OP-1



Summary for Pond 7P: CB100

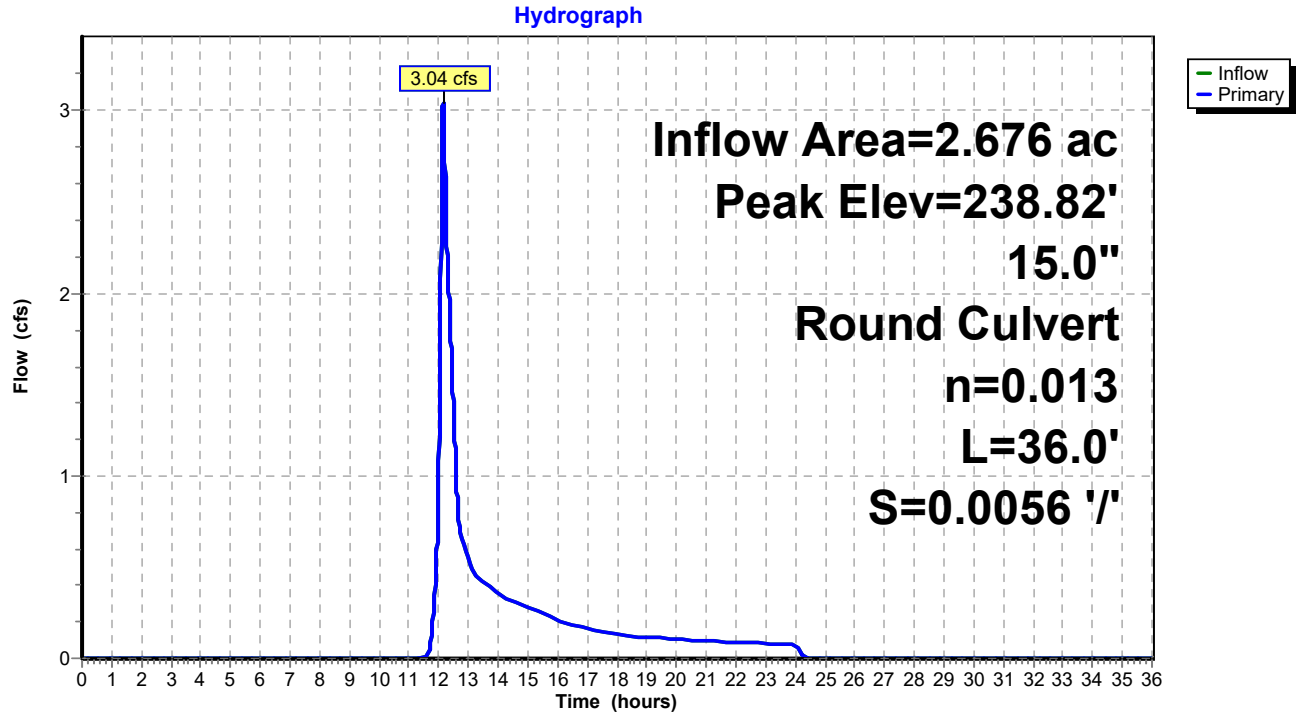
Inflow Area = 2.676 ac, 28.52% Impervious, Inflow Depth = 1.28" for 25-YR event
Inflow = 3.04 cfs @ 12.15 hrs, Volume= 0.286 af
Outflow = 3.04 cfs @ 12.15 hrs, Volume= 0.286 af, Atten= 0%, Lag= 0.0 min
Primary = 3.04 cfs @ 12.15 hrs, Volume= 0.286 af
Routed to Pond DV 1P : Infiltration Basin A

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 238.82' @ 12.15 hrs
Flood Elev= 241.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.70'	**15.0" Round Culvert** L= 36.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.70' / 237.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.04 cfs @ 12.15 hrs HW=238.82' TW=237.44' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.04 cfs @ 3.46 fps)

Pond 7P: CB100



Summary for Pond DV 1P: Infiltration Basin A

Inflow Area = 4.410 ac, 33.06% Impervious, Inflow Depth = 1.52" for 25-YR event
Inflow = 6.01 cfs @ 12.16 hrs, Volume= 0.559 af
Outflow = 0.59 cfs @ 14.45 hrs, Volume= 0.559 af, Atten= 90%, Lag= 137.0 min
Discarded = 0.59 cfs @ 14.45 hrs, Volume= 0.559 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach OP-1 : OP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 238.43' @ 14.45 hrs Surf.Area= 8,438 sf Storage= 10,047 cf
Flood Elev= 241.00' Surf.Area= 14,250 sf Storage= 38,894 cf

Plug-Flow detention time= 195.2 min calculated for 0.559 af (100% of inflow)
Center-of-Mass det. time= 195.1 min (1,070.9 - 875.8)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	38,894 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

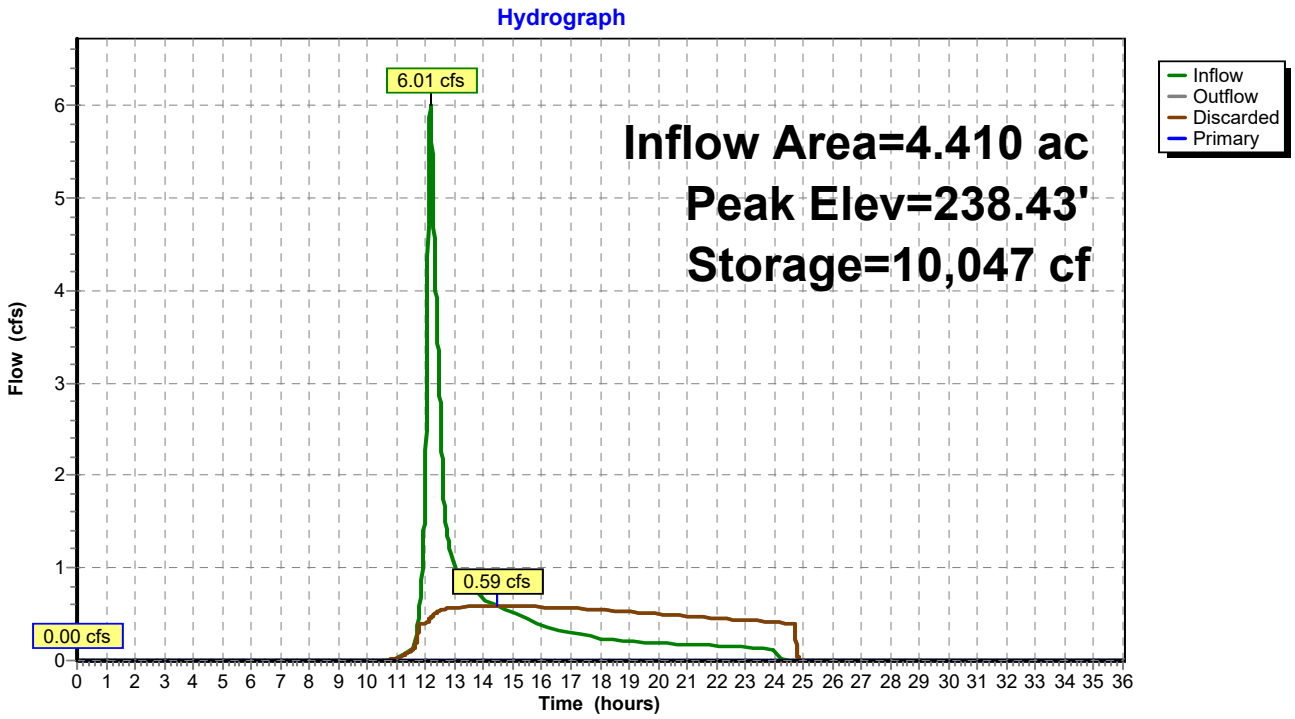
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.00	5,626	356.9	0	0	5,626
238.00	7,606	396.5	6,591	6,591	8,030
240.00	11,830	466.6	19,281	25,872	12,921
241.00	14,250	502.0	13,021	38,894	15,693

Device	Routing	Invert	Outlet Devices
#1	Discarded	237.00'	**3.000 in/hr Exfiltration (Hinckley) over Surface area** Phase-In= 0.01'
#2	Primary	240.00'	**10.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.59 cfs @ 14.45 hrs HW=238.43' (Free Discharge)
↑**1=Exfiltration (Hinckley)** (Exfiltration Controls 0.59 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.00' TW=0.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DV 1P: Infiltration Basin A



Summary for Pond DV 2P: Infiltration Basin B

Inflow Area = 1.103 ac, 52.35% Impervious, Inflow Depth = 2.48" for 25-YR event
Inflow = 3.06 cfs @ 12.10 hrs, Volume= 0.228 af
Outflow = 0.22 cfs @ 14.05 hrs, Volume= 0.228 af, Atten= 93%, Lag= 116.7 min
Discarded = 0.22 cfs @ 14.05 hrs, Volume= 0.228 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach OP-1 : OP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 237.95' @ 14.05 hrs Surf.Area= 3,192 sf Storage= 4,589 cf
Flood Elev= 240.00' Surf.Area= 5,329 sf Storage= 13,219 cf

Plug-Flow detention time= 239.6 min calculated for 0.227 af (100% of inflow)
Center-of-Mass det. time= 239.6 min (1,082.4 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	236.00'	13,219 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

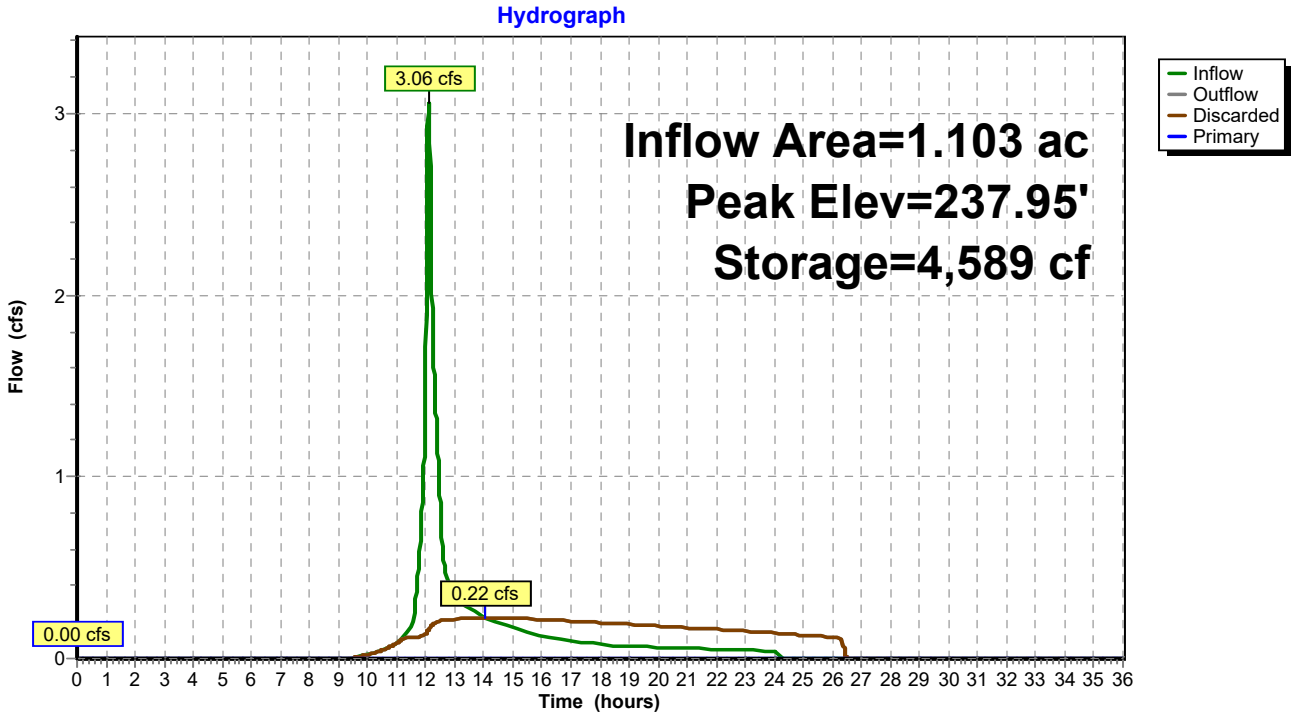
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
236.00	1,598	224.9	0	0	1,598
238.00	3,237	316.7	4,740	4,740	5,591
240.00	5,329	380.2	8,480	13,219	9,181

Device	Routing	Invert	Outlet Devices
#1	Discarded	236.00'	**3.000 in/hr Exfiltration (Hinckley) over Surface area** Phase-In= 0.01'
#2	Primary	239.00'	**5.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.22 cfs @ 14.05 hrs HW=237.95' (Free Discharge)
1=Exfiltration (Hinckley) (Exfiltration Controls 0.22 cfs)

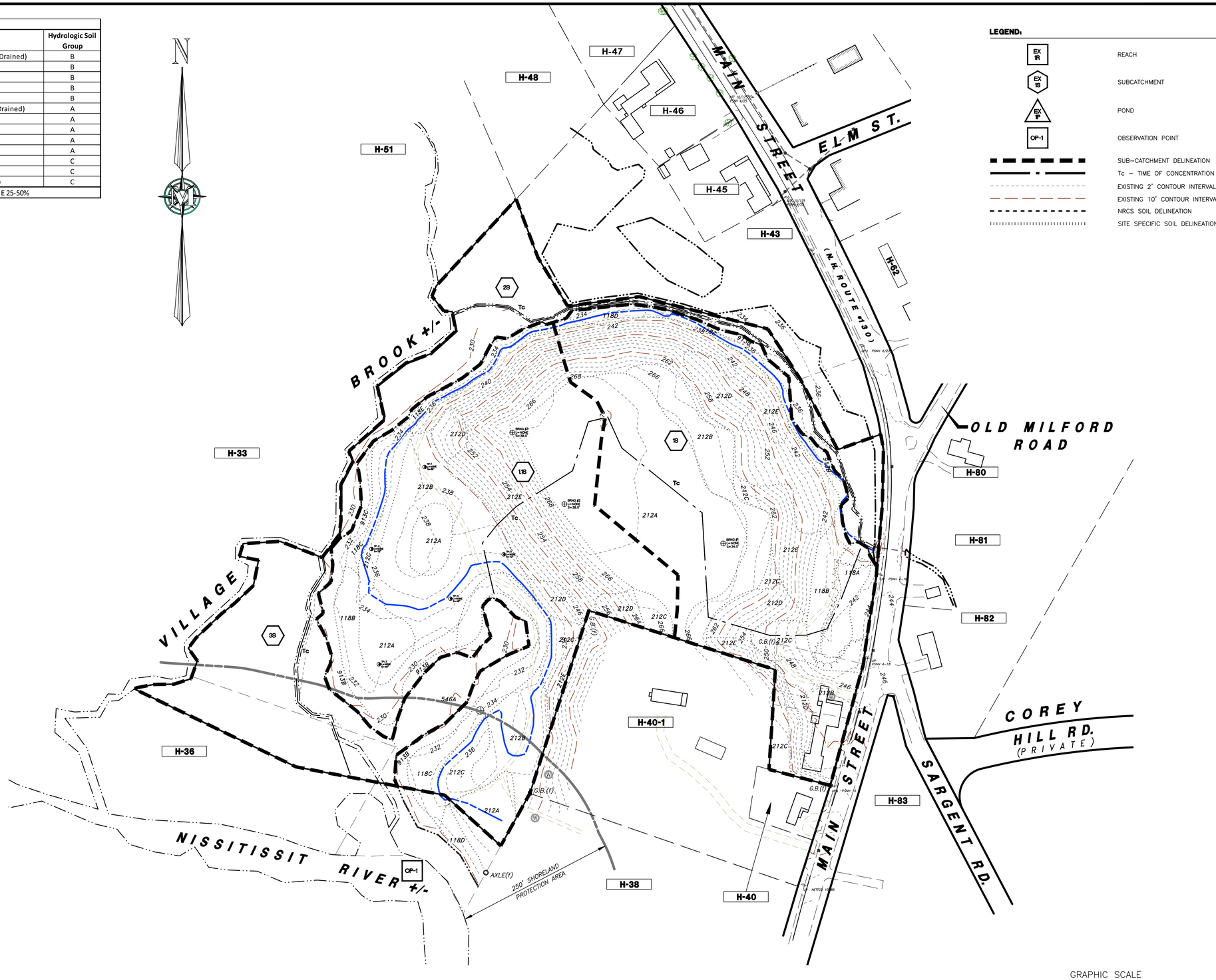
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=236.00' TW=0.00' (Dynamic Tailwater)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond DV 2P: Infiltration Basin B



Section 3.0: Drainage Area Plans

Site Specific Soil Map Key		
Soil ID and Slope phase	**Description**	**Hydrologic Soil Group**
118A	Sudbury Fine Sandy Loam (Moderately Well Drained)	B
118B	Sudbury Fine Sandy Loam	B
118C	Sudbury Fine Sandy Loam	B
118D	Sudbury Fine Sandy Loam	B
118E	Sudbury Fine Sandy Loam	B
212A	Hinckley Gravelly Loamy Sand (Excessively Drained)	A
212B	Hinckley Gravelly Loamy Sand	A
212C	Hinckley Gravelly Loamy Sand	A
212D	Hinckley Gravelly Loamy Sand	A
212E	Hinckley Gravelly Loamy Sand	A
913B	Sudbury Fine Sandy Loam	C
913C	Sudbury Fine Sandy Loam	C
546A	Walpole andy Loam (Poorly Drained)	C
Slope Phases: A 0-3%, B 3-8%, C 8-15%, D 15-25%, E 25-50%		



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FAX 603-673-1564

REV.	DATE	DESCRIPTION	DR	CK
A	5/13/22	TOWN PB SUBMISSION	TRY	TRY

HOUSING FOR OLDER PERSONS DEVELOPMENT
DRAINAGE AREA PLAN
PRE-DEVELOPED CONDITIONS

JANUARY 18, 2022

JAY CHRYSTAL
23 MAIN STREET
TAX MAP H PARCEL 42
BROOKLINE, NEW HAMPSHIRE

SCALE: 1" = 80'

DRN-1
SHEET

FILE: 3077P05A.dwg
PROJECT 03077.05
SHEET NO. 1 OF 2

Plotted: 5/13/2022 10:15 AM By: TRY
H:\MLS\03077\3077.05\0_Drawings\ENG\3077P05A.dwg

Site Specific Soil Map Key		
Soil ID and Slope phase	**Description**	**Hydrologic Soil Group**
118A	Sudbury Fine Sandy Loam (Moderately Well Drained)	B
118B	Sudbury Fine Sandy Loam	B
118C	Sudbury Fine Sandy Loam	B
118D	Sudbury Fine Sandy Loam	B
118E	Sudbury Fine Sandy Loam	B
212A	Hinckley Gravelly Loamy Sand (Excessively Drained)	A
212B	Hinckley Gravelly Loamy Sand	A
212C	Hinckley Gravelly Loamy Sand	A
212D	Hinckley Gravelly Loamy Sand	A
212E	Hinckley Gravelly Loamy Sand	A
913B	Sudbury Fine Sandy Loam	C
913C	Sudbury Fine Sandy Loam	C
546A	Walpole andy Loam (Poorly Drained)	C
Slope Phases: A 0-3%, B 3-8%, C 8-15%, D 15-25%, E 25-50%		

LEGEND:

- 1R — REACH
- 1S — SUBCATCHMENT
- 1P — POND
- OP-1 — OBSERVATION POINT
- SUB–CATCHMENT DELINEATION
- Tc – TIME OF CONCENTRATION PATH
- EXISTING 2' CONTOUR INTERVAL
- EXISTING 10' CONTOUR INTERVAL
- NRCS SOIL DELINEATION
- SITE SPECIFIC SOIL DELINEATION

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31 OLD NASHUA ROAD, AMHERST, NH 03031
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REV.	DATE	DESCRIPTION	DR	CK
A	5/13/22	TOWN PB SUBMISSION	TRY	TRY
B	---	---	---	---
C	---	---	---	---
D	---	---	---	---
E	---	---	---	---
F	---	---	---	---
G	---	---	---	---
H	---	---	---	---
I	---	---	---	---

HOUSING FOR OLDER PERSONS DEVELOPMENT
DRAINAGE AREA PLAN
POST-DEVELOPED CONDITIONS

JANUARY 18, 2022

JAY CHRYSTAL
23 MAIN STREET
TAX MAP H PARCEL 42
BROOKLINE, NEW HAMPSHIRE

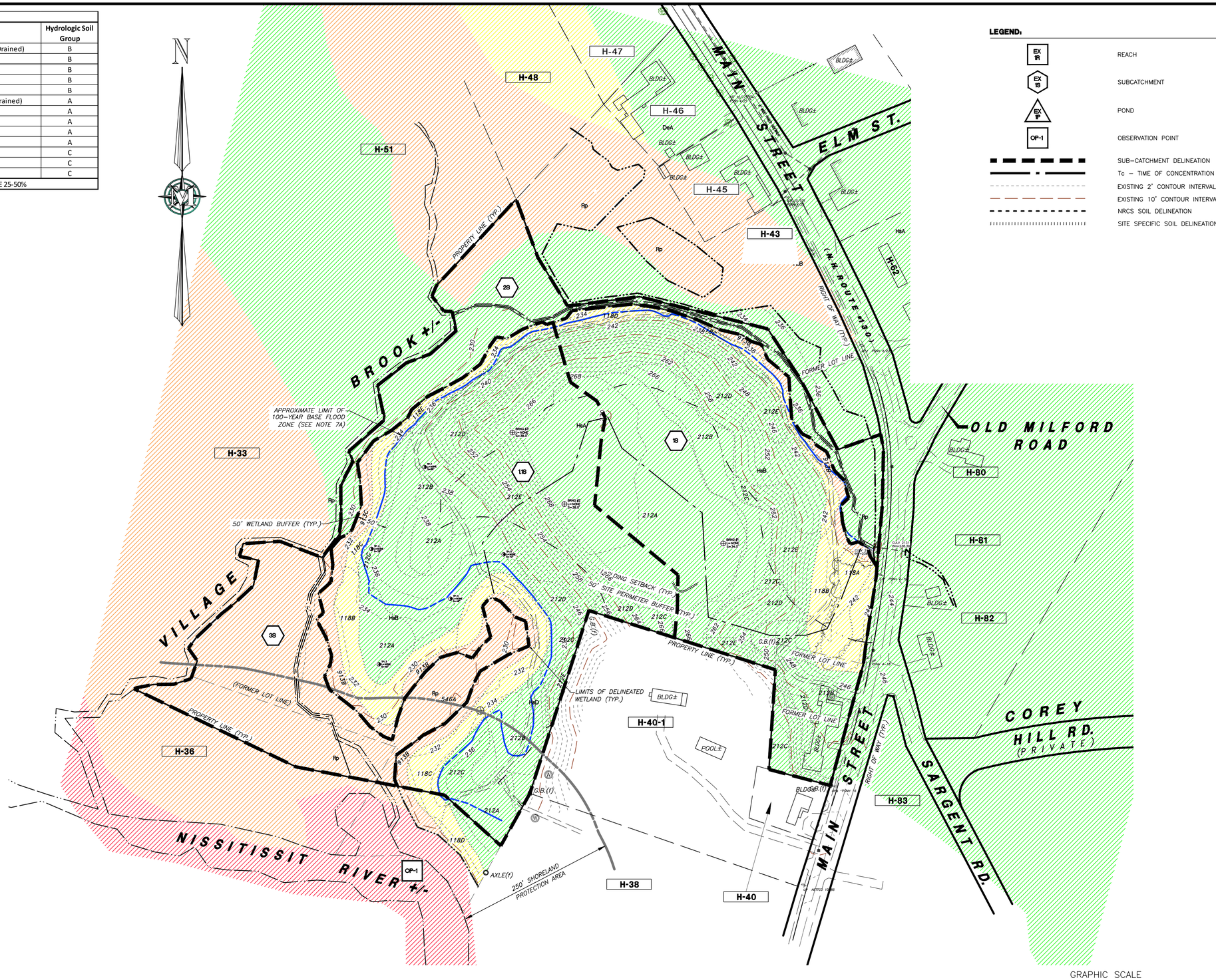
SCALE: 1" = 80'

DRN-2
SHEET

FILE: 3077P05A.dwg
PROJECT 03077.05
SHEET NO. 2 OF 2

Plotted: 5/13/2022 10:15 AM By: TRY
H:\MLS\03077\3077.05\0_Drawings\ENG\3077P05A.dwg

Site Specific Soil Map Key		
Soil ID and Slope phase	**Description**	**Hydrologic Soil Group**
118A	Sudbury Fine Sandy Loam (Moderately Well Drained)	B
118B	Sudbury Fine Sandy Loam	B
118C	Sudbury Fine Sandy Loam	B
118D	Sudbury Fine Sandy Loam	B
118E	Sudbury Fine Sandy Loam	B
212A	Hinckley Gravelly Loamy Sand (Excessively Drained)	A
212B	Hinckley Gravelly Loamy Sand	A
212C	Hinckley Gravelly Loamy Sand	A
212D	Hinckley Gravelly Loamy Sand	A
212E	Hinckley Gravelly Loamy Sand	A
913B	Sudbury Fine Sandy Loam	C
913C	Sudbury Fine Sandy Loam	C
546A	Walpole andy Loam (Poorly Drained)	C
Slope Phases: A 0-3%, B 3-8%, C 8-15%, D 15-25%, E 25-50%		



LEGEND:

- EX 1R — REACH
- EX 1S — SUBCATCHMENT
- EX 1P — POND
- OP-1 — OBSERVATION POINT
- SUB-CATCHMENT DELINEATION
- Tc – TIME OF CONCENTRATION PATH
- EXISTING 2' CONTOUR INTERVAL
- EXISTING 10' CONTOUR INTERVAL
- NRCS SOIL DELINEATION
- SITE SPECIFIC SOIL DELINEATION

GRAPHIC SCALE
80 40 0 80 160 240
IMPERIAL: 1:80 (IN:FT)

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31 OLD NASHUA ROAD, AMHERST, NH 03031
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TEL 603-673-1441
FAX 603-673-1454

REV.	DATE	DESCRIPTION		
A	5/13/22	TOWN PB SUBMISSION	TRY	TRY
B	---	---	---	---
C	---	---	---	---
D	---	---	---	---
E	---	---	---	---
F	---	---	---	---
G	---	---	---	---
H	---	---	---	---
I	---	---	---	---

HOUSING FOR OLDER PERSONS DEVELOPMENT
HYDROLOGIC SOIL PLAN
PRE-DEVELOPED CONDITIONS
MARCH 10, 2022

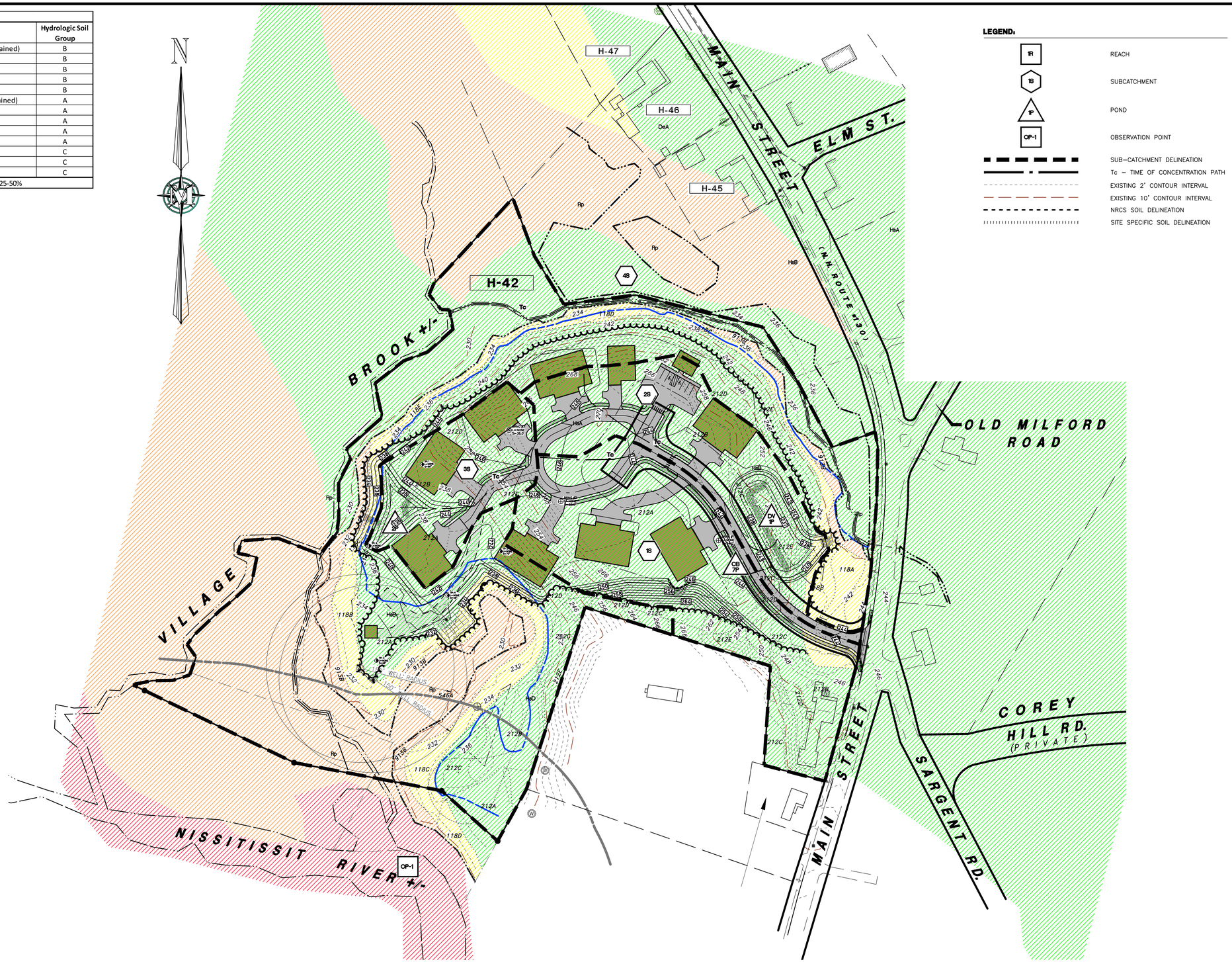
JAY CHRYSTAL
23 MAIN STREET
TAX MAP H PARCEL 42
BROOKLINE, NEW HAMPSHIRE
SCALE: 1" = 80'

HSG-1
SHEET

FILE: 3077P05A.dwg
PROJECT 03077.05
SHEET NO. 1 OF 2

Plotted: 5/13/2022 10:14 AM By: TRY
H:\MLS\03077\3077.05\D_Drawings\ENG\3077P05A.dwg

Site Specific Soil Map Key		
Soil ID and Slope phase	**Description**	**Hydrologic Soil Group**
118A	Sudbury Fine Sandy Loam (Moderately Well Drained)	B
118B	Sudbury Fine Sandy Loam	B
118C	Sudbury Fine Sandy Loam	B
118D	Sudbury Fine Sandy Loam	B
118E	Sudbury Fine Sandy Loam	B
212A	Hinckley Gravelly Loamy Sand (Excessively Drained)	A
212B	Hinckley Gravelly Loamy Sand	A
212C	Hinckley Gravelly Loamy Sand	A
212D	Hinckley Gravelly Loamy Sand	A
212E	Hinckley Gravelly Loamy Sand	A
913B	Sudbury Fine Sandy Loam	C
913C	Sudbury Fine Sandy Loam	C
546A	Walpole andy Loam (Poorly Drained)	C
Slope Phases: A 0-3%, B 3-8%, C 8-15%, D 15-25%, E 25-50%		



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FAX 603-673-1534

REV.	DATE	DESCRIPTION	DR	CK
A	5/13/22	TOWN PB SUBMISSION	TRY	TRY

HOUSING FOR OLDER PERSONS DEVELOPMENT
HYDROLOGIC SOIL PLAN
POST-DEVELOPED CONDITIONS
MARCH 10, 2022

JAY CHRYSTAL
23 MAIN STREET
TAX MAP H PARCEL 42
BROOKLINE, NEW HAMPSHIRE
SCALE: 1" = 80'

HSG-2
SHEET
FILE: 3077P05A.dwg
PROJECT 03077.05
SHEET NO. 2 OF 2

Plotted: 5/13/2022 10:14 AM By: TRY
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