Tauper Land Survey, Inc.
Professional Engineering & Land Surveying

STORMWATER SUBMITTAL

176 Podunk Road
Sturbridge, Massachusetts

Prepared For:

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March 29, 2024

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WATERSHED DESCRIPTION

The 40,932 square foot watershed being analyzed is located within the limits of the Town of Sturbridge, Worcester County, Massachusetts and is located on property at 176 Podunk Road. The watershed consists of wooded uplands and is bounded on the east by Podunk Road, a public paved way, on the north by an existing graveled access road and on the east by a bordering vegetated wetland associated with an intermittent stream. The applicants are proposing to construct a three bay garage for their personal use in association with their existing residence.

The proposed project is exempt from meeting the requirements of Massachusetts DEP Stormwater Management Standards; however, due to its proximity to wetlands, and being located upstream from an existing culvert, we have taken a conservative approach to manage stormwater runoff both in terms of recharge and attenuation.

STORMWATER PLAN DESCRIPTION

The purpose of this stormwater submittal is to evaluate the existing versus post development watershed discharges. We have analyzed the 2, 10, and 100-year watershed discharges to support no increase in proposed downstream discharges. We accomplished this by analyzing the pre and post-development conditions for each event using HydroCad®10.20, which utilizes the Soil Conservation Service's TR-20 and TR-55 methodologies, and storing the excess runoff from the proposed conditions in underground and/or above grade storage systems on-site and releasing the water at a rate that would mimic the existing conditions.

STORMWATER RUNOFF REQUIREMENTS

Existing Conditions Analysis

The existing drainage area was obtained by reviewing the existing topographic information and is designated E1. We have analyzed the existing site a single watershed.

The Soil Conservation Service TR-55 methodology can be used to determine the basin time of concentrations (Tc). For this analysis any time of concentration calculation yielding a time less than 6 minutes was assumed to be 6 minutes. Tc values for this analysis are summarized in Table 1.

Soil data provided by the Natural Resources Conservation Service was used to determine the hydrologic soil group of the watershed. For this site, the soils are in Hydrologic Group "C". The curve number calculations are included in summarized in Table 1.

TABLE 1 - Existing TR-20 Hydrologic Model Sub-basin Characteristics for 2, 10, and 100-year Storms

Sub-basin	Area (sq. ft.)	CN	Tc (minutes)	Remarks
E1	40,932	70	15.4	The existing culvert

Sub-basin	Peak Discharge (cfs) 2-yr	10-yr	100-yr	Remarks
E1	0.50	1.33	2.63	Existing Culvert

The TR-20 hydrologic models used to simulate the 2, 10, and 100-year storm events for the existing watersheds are located in Appendix 2. The appropriate TP-40 rainfall distribution was used in conjunction with the Worcester (South) rainfall depths for the 2, 10, and 100-year, 24-hour recurrence intervals to produce direct runoff hydrographs.

Proposed TR-20 Analysis

The proposed drainage areas are depicted on Appendix 3. We have analyzed the proposed site as a single watershed. The watershed sub-catchments characteristics are summarized in Table 2 and delineated in Appendix 3.

The Soil Conservation Service TR-55 methodology can be used to determine the basin time of concentrations. In this analysis a time of concentration less than 6.0 minutes were assumed to be 6.0 minutes and are summarized in Table 2. Conservatively all Tc values are assumed to be 6.0 minutes in the post development analysis.

The soil survey of Southern Worcester County was used to determine the hydrologic soil groups for the site. The proposed land use will be single family residential. The proposed drainage areas are summarized in Table 2 and delineated in Appendix 3.

TABLE 2 - Proposed TR-20 Hydrologic Model Sub-basin Characteristics for 2, 10, and 100-year Storms

Sub-basin	Area (sq. ft.)	CN	Tc (minutes)	Remarks
P1.1	12,632	73	6.0	Direct Entry
P1.2	936	90	6.0	Direct Entry
P1.3	11,772	82	6.0	Direct Entry
P2	2,768	98	6.0	Direct Entry
P3	12,854	70	6.0	Direct Entry

Sub-basin	Peak Discharge (cfs) 2-yr	10-yr	100-yr	Remarks
P1.1	0.31	0.71	1.79	To Pond 1P
P1.2	0.05	0.09	0.17	To Pond 2P
P1.3	0.48	0.91	1.95	To Pond 3P
P2	0.19	0.29	0.53	To Pond 1P
P3	0.26	0.64	1.70	To 5R – Ex. Culvert

The TR-20 hydrologic models used to simulate the 2, 10, and 100-year storm events for the proposed watersheds are located in Appendix 3. The appropriate TP-40 rainfall distribution was

used in conjunction with the Worcester (South) rainfall depths for the 2, 10, and 100-year, 24-hour recurrence intervals to produce direct runoff hydrographs.

STORMWATER RUNOFF STORAGE REQUIREMENTS

The watershed plan storage and discharge for the site is summarized in Table 3. The site storage relationships are contained within the TR-20 analysis and the discharge relationships are calculated in Appendix 3.

The development of the site is based upon providing open detention basins and swales. The existing and proposed peak discharges for the 2, 10, and 100-year storms are listed in Table 3. Table 4 shows no increase in peak flows caused by the proposed site improvements.

TABLE 3 - Existing and Proposed Watershed Peak Discharge

Sub-basin	Existing Peak Discharge (cfs) 2-yr	10-yr	100-yr	Proposed Peak Discharge (cfs) 2-yr	10-yr	100-yr	Remarks
Ex/ Post	0.50	1.33	2.63	0.48	1.30	2.57	Ex. Culvert

TABLE 4 - Net Watershed Peak Discharge

Sub-basin	Net Peak Discharge (cfs) 2-yr	10-yr	100-yr	Remarks
Pre vs Post	-0.02	-0.02	-0.06	Ex. Culvert

Typically, culverts are designed for a storm event other than those provided, therefore the results of the 5, 25 and 50-year events are provided in Table 5 to show no increase in flow is predicted to the existing culvert for these additional events.

TABLE 5

Sub-basin	Existing Peak Discharge (cfs) 5-yr	25-yr	50-yr	Proposed Peak Discharge (cfs) 5-yr	25-yr	50-yr	Remarks
Ex/ Post	1.03	1.83	2.22	1.02 (-0.01)	1.78 (-0.05)	2.17 (-0.05)	Ex. Culvert

CONCLUSION

Based upon the information and calculations presented in this Stormwater Submittal; the proposed 2, 10, and 100-year peak discharges for the total watershed resulting from the development of the proposed site mimic the 2, 10, and 100-year peak discharge from the total watershed existing condition. No increase in runoff is predicted in the 2, 5, 10, 25, 50 or 100-year storm events to the existing culvert under the driveway; hence, no increase in offsite runoff is predicted.

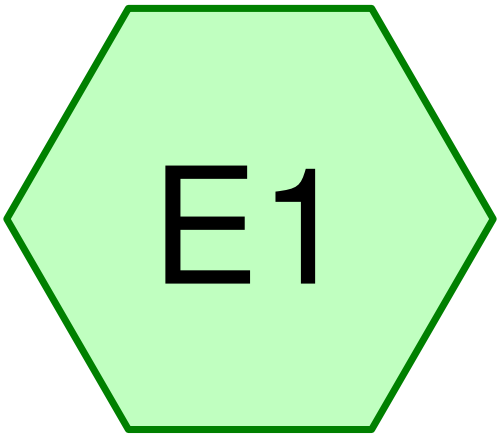
APPENDIX 1

No New Untreated Discharges

No new untreated discharges are proposed. All outlets have been provided with rip-rap outlet protection to prevent erosion and scour into any adjacent wetland resource areas.

APPENDIX 2

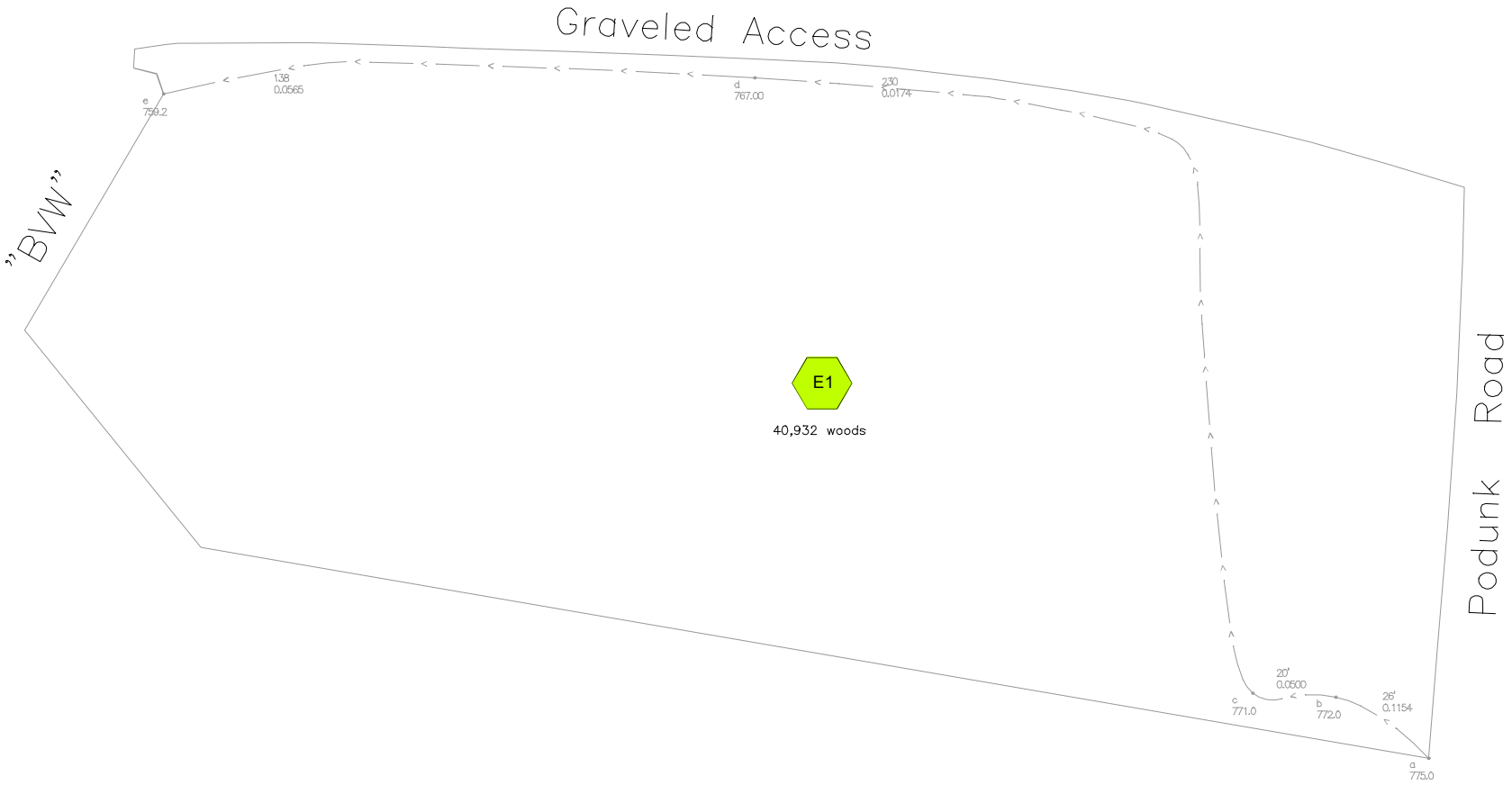
Peak Discharge Rates
HydroCad Analysis of the Existing 2, 5, 10, 25, 50, & 100-year Events



Existing

Subcat Reach Pond Link

Routing Diagram for 24-100 BUELL Final
Prepared by Tauper Land Survey, Inc


Graveled Access
"BVW"
Podunk Road
E1
40,932 woods
e
759.2
138
0.0565
d
767.00
230
0.0174
20'
0.0500
c
771.0
b
772.0
26'
0.1154
a
775.0

Time span=5.00-72.00 hrs, dt=0.05 hrs, 1341 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Existing Runoff Area=40,932 sf 0.00% Impervious Runoff Depth=0.71"
Flow Length=414' Tc=15.4 min CN=70 Runoff=0.50 cfs 0.056 af

Total Runoff Area = 0.940 ac Runoff Volume = 0.056 af Average Runoff Depth = 0.71"
100.00% Pervious = 0.940 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment E1: Existing

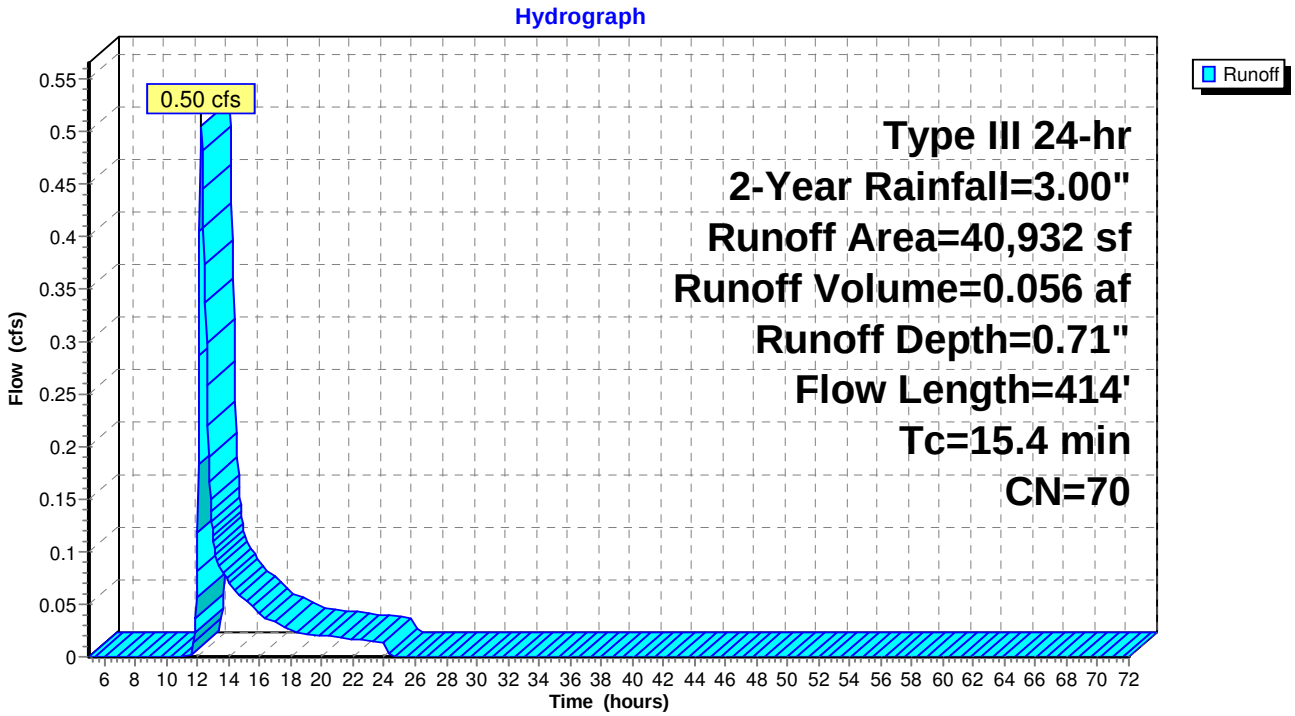
Runoff = 0.50 cfs @ 12.25 hrs, Volume= 0.056 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
40,932	70	Woods, Good, HSG C
40,932		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	26	0.1154	0.12		**Sheet Flow, a-b** Woods: Light underbrush n= 0.400 P2= 3.22"
4.1	20	0.0500	0.08		**Sheet Flow, b-c** Woods: Light underbrush n= 0.400 P2= 3.22"
5.8	230	0.0174	0.66		**Shallow Concentrated Flow, c-d** Woodland Kv= 5.0 fps
1.9	138	0.0565	1.19		**Shallow Concentrated Flow, d-e** Woodland Kv= 5.0 fps
15.4	414	Total			

Subcatchment E1: Existing



Summary for Subcatchment E1: Existing

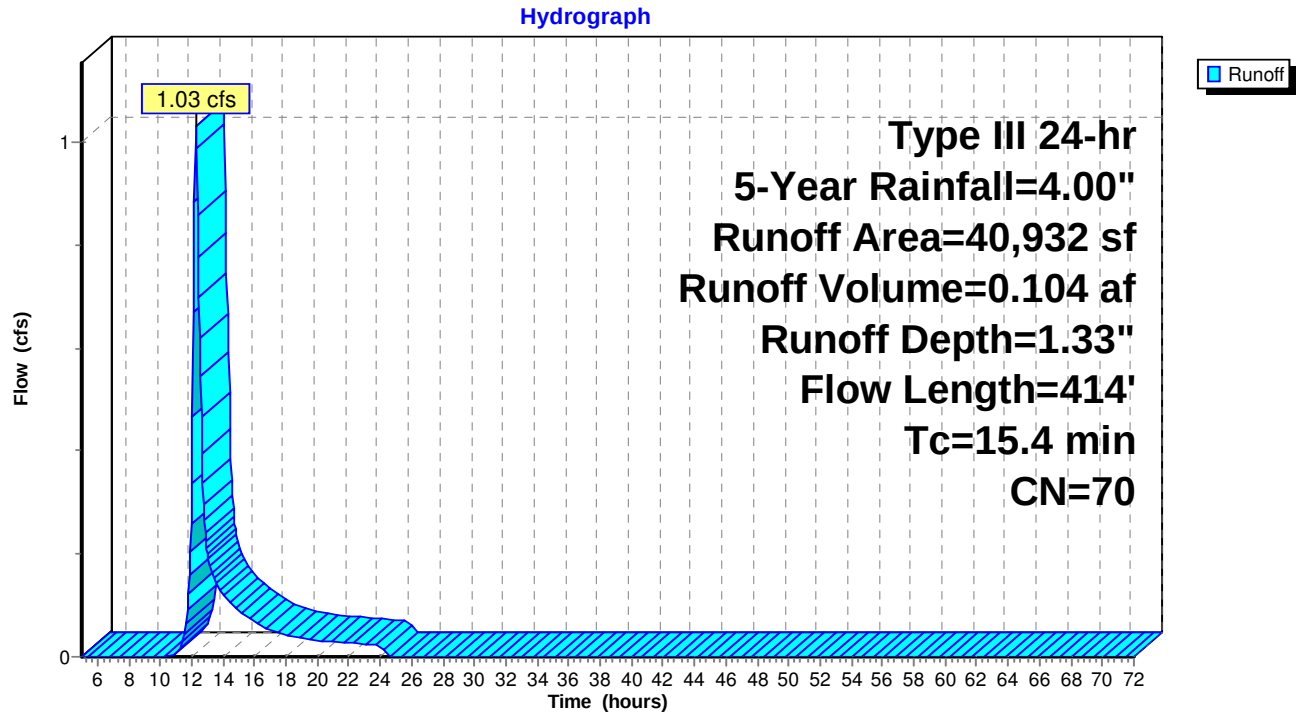
Runoff = 1.03 cfs @ 12.23 hrs, Volume= 0.104 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.00"

Area (sf)	CN	Description
40,932	70	Woods, Good, HSG C
40,932		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	26	0.1154	0.12		**Sheet Flow, a-b** Woods: Light underbrush n= 0.400 P2= 3.22"
4.1	20	0.0500	0.08		**Sheet Flow, b-c** Woods: Light underbrush n= 0.400 P2= 3.22"
5.8	230	0.0174	0.66		**Shallow Concentrated Flow, c-d** Woodland Kv= 5.0 fps
1.9	138	0.0565	1.19		**Shallow Concentrated Flow, d-e** Woodland Kv= 5.0 fps
15.4	414	Total			

Subcatchment E1: Existing



Summary for Subcatchment E1: Existing

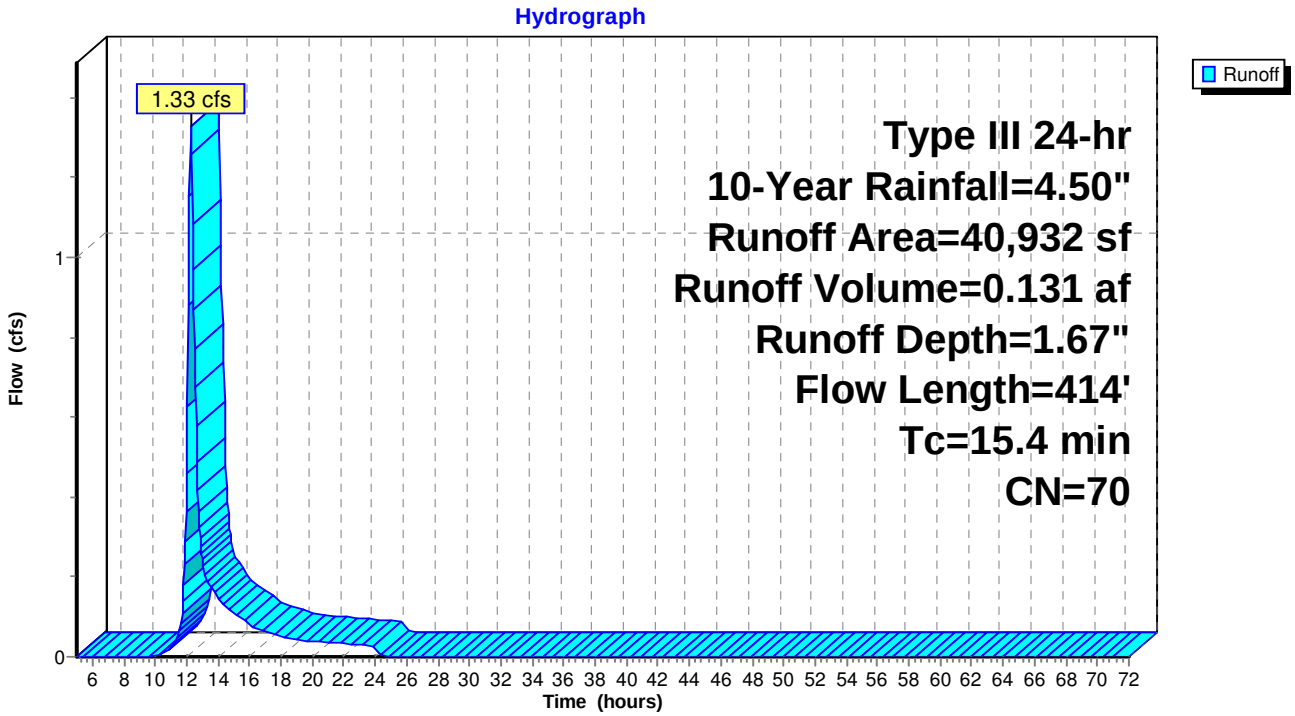
Runoff = 1.33 cfs @ 12.22 hrs, Volume= 0.131 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
40,932	70	Woods, Good, HSG C
40,932		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	26	0.1154	0.12		**Sheet Flow, a-b** Woods: Light underbrush n= 0.400 P2= 3.22"
4.1	20	0.0500	0.08		**Sheet Flow, b-c** Woods: Light underbrush n= 0.400 P2= 3.22"
5.8	230	0.0174	0.66		**Shallow Concentrated Flow, c-d** Woodland Kv= 5.0 fps
1.9	138	0.0565	1.19		**Shallow Concentrated Flow, d-e** Woodland Kv= 5.0 fps
15.4	414	Total			

Subcatchment E1: Existing



Summary for Subcatchment E1: Existing

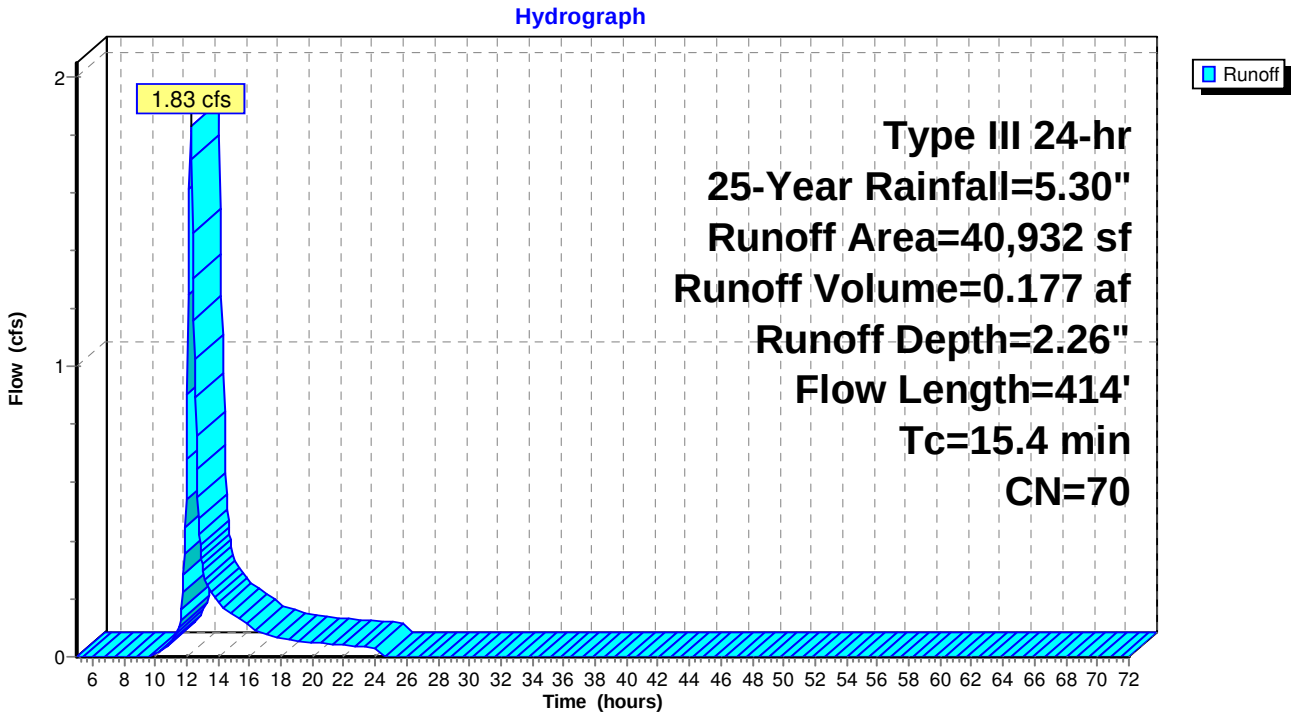
Runoff = 1.83 cfs @ 12.22 hrs, Volume= 0.177 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
40,932	70	Woods, Good, HSG C
40,932		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	26	0.1154	0.12		**Sheet Flow, a-b** Woods: Light underbrush n= 0.400 P2= 3.22"
4.1	20	0.0500	0.08		**Sheet Flow, b-c** Woods: Light underbrush n= 0.400 P2= 3.22"
5.8	230	0.0174	0.66		**Shallow Concentrated Flow, c-d** Woodland Kv= 5.0 fps
1.9	138	0.0565	1.19		**Shallow Concentrated Flow, d-e** Woodland Kv= 5.0 fps
15.4	414	Total			

Subcatchment E1: Existing



Summary for Subcatchment E1: Existing

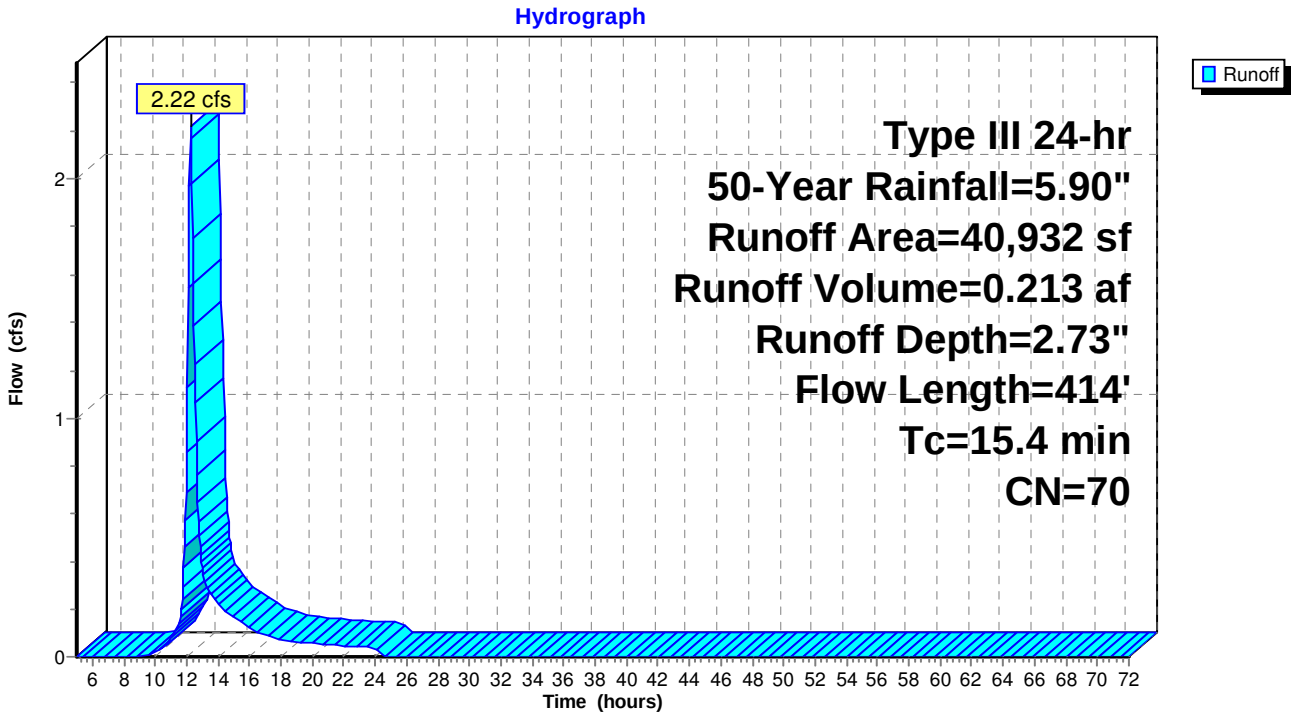
Runoff = 2.22 cfs @ 12.22 hrs, Volume= 0.213 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
40,932	70	Woods, Good, HSG C
40,932		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	26	0.1154	0.12		**Sheet Flow, a-b** Woods: Light underbrush n= 0.400 P2= 3.22"
4.1	20	0.0500	0.08		**Sheet Flow, b-c** Woods: Light underbrush n= 0.400 P2= 3.22"
5.8	230	0.0174	0.66		**Shallow Concentrated Flow, c-d** Woodland Kv= 5.0 fps
1.9	138	0.0565	1.19		**Shallow Concentrated Flow, d-e** Woodland Kv= 5.0 fps
15.4	414	Total			

Subcatchment E1: Existing



Summary for Subcatchment E1: Existing

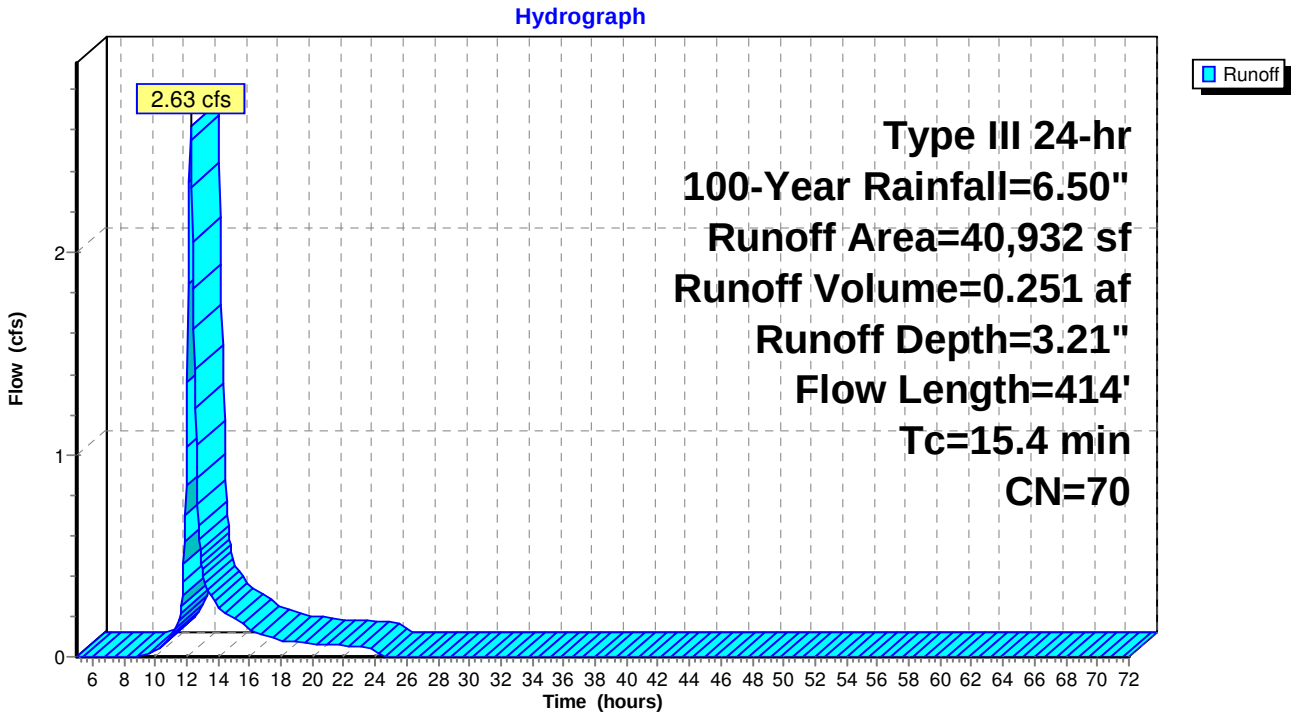
Runoff = 2.63 cfs @ 12.22 hrs, Volume= 0.251 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
40,932	70	Woods, Good, HSG C
40,932		100.00% Pervious Area

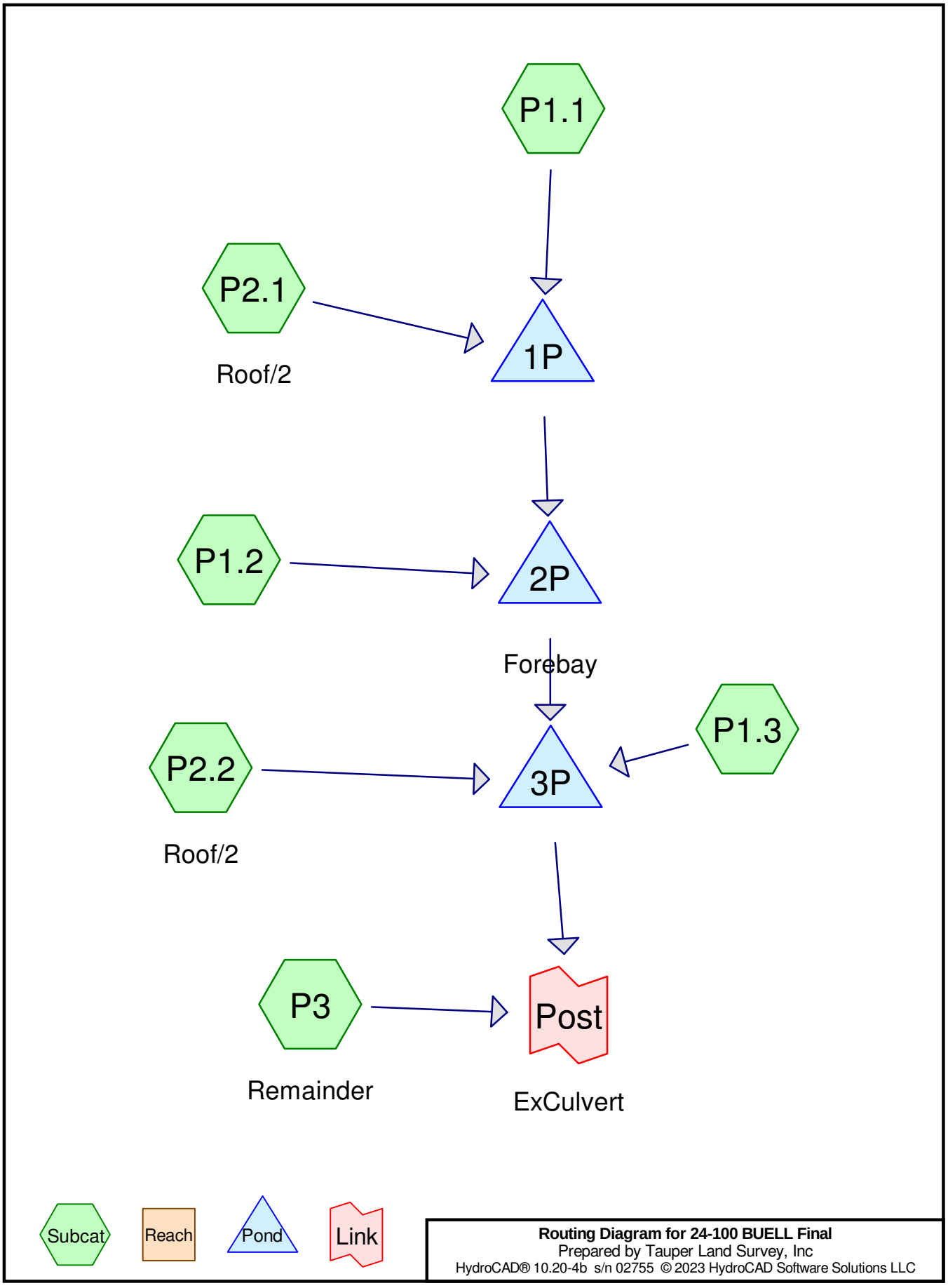
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	26	0.1154	0.12		**Sheet Flow, a-b** Woods: Light underbrush n= 0.400 P2= 3.22"
4.1	20	0.0500	0.08		**Sheet Flow, b-c** Woods: Light underbrush n= 0.400 P2= 3.22"
5.8	230	0.0174	0.66		**Shallow Concentrated Flow, c-d** Woodland Kv= 5.0 fps
1.9	138	0.0565	1.19		**Shallow Concentrated Flow, d-e** Woodland Kv= 5.0 fps
15.4	414	Total			

Subcatchment E1: Existing

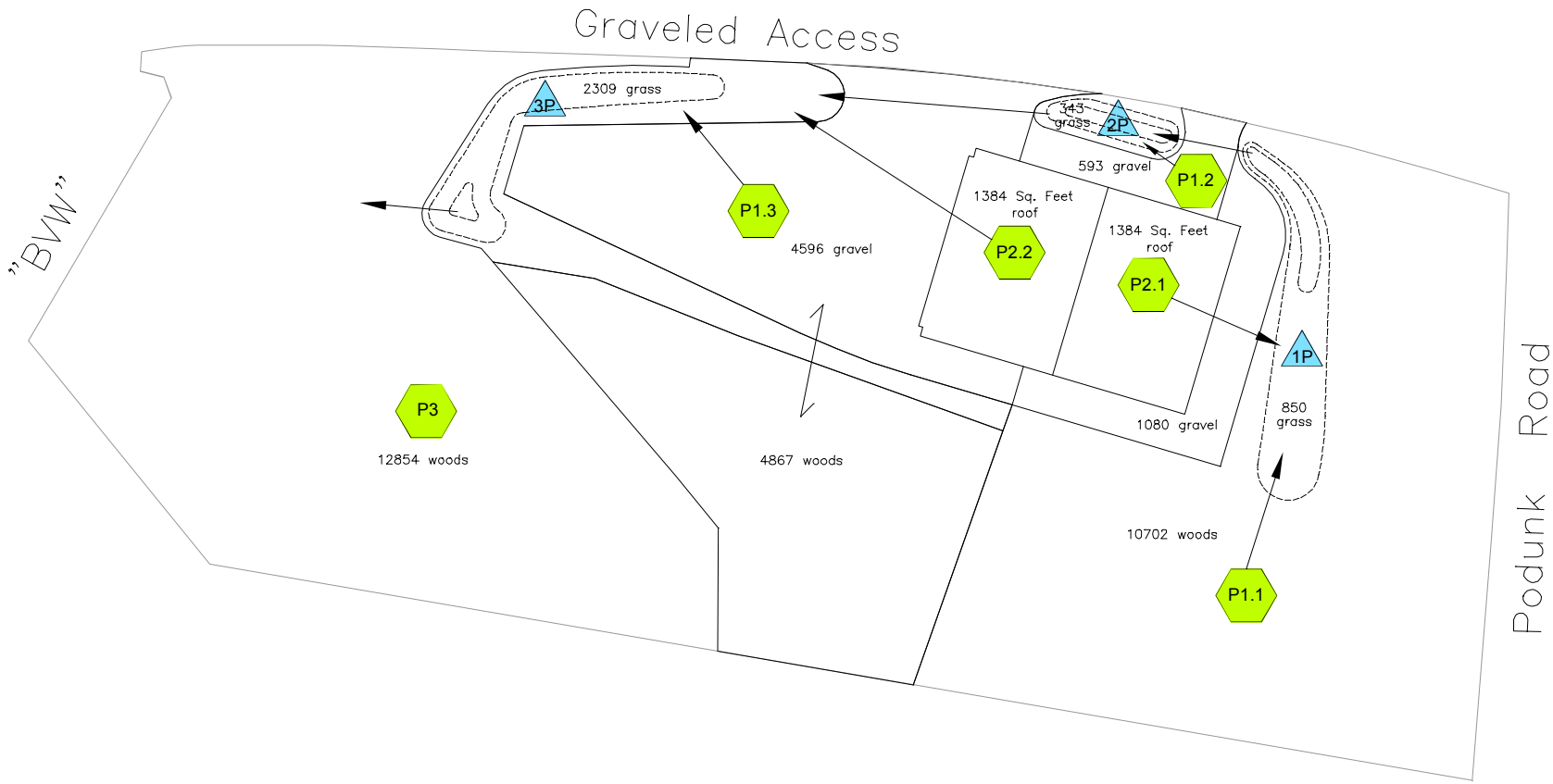


APPENDIX 3

Peak Discharge Rates
HydroCad Analysis of the Proposed 2, 5, 10, 25, 50, & 100-year Events



Routing Diagram for 24-100 BUELL Final
Prepared by Tauper Land Survey, Inc
HydroCAD® 10.20-4b s/n 02755 © 2023 HydroCAD Software Solutions LLC


Graveled Access
"BVW"
Podunk Road
3P
2309 grass
2P
343 grass
593 gravel
P1.2
1384 Sq. Feet roof
1384 Sq. Feet roof
P1.3
4596 gravel
P2.2
P2.1
1P
850 grass
P3
12854 woods
4867 woods
1080 gravel
10702 woods
P1.1

Time span=5.00-72.00 hrs, dt=0.05 hrs, 1341 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1.1: Runoff Area=12,632 sf 0.00% Impervious Runoff Depth=0.86"
Tc=6.0 min CN=73 Runoff=0.26 cfs 0.021 af

Subcatchment P1.2: Runoff Area=936 sf 0.00% Impervious Runoff Depth=1.98"
Tc=0.0 min CN=90 Runoff=0.06 cfs 0.004 af

Subcatchment P1.3: Runoff Area=11,772 sf 0.00% Impervious Runoff Depth=1.38"
Tc=0.0 min CN=82 Runoff=0.50 cfs 0.031 af

Subcatchment P2.1: Roof/2 Runoff Area=1,384 sf 100.00% Impervious Runoff Depth>2.72"
Tc=6.0 min CN=98 Runoff=0.09 cfs 0.007 af

Subcatchment P2.2: Roof/2 Runoff Area=1,384 sf 100.00% Impervious Runoff Depth>2.72"
Tc=6.0 min CN=98 Runoff=0.09 cfs 0.007 af

Subcatchment P3: Remainder Runoff Area=12,854 sf 0.00% Impervious Runoff Depth=0.71"
Tc=0.0 min CN=70 Runoff=0.25 cfs 0.018 af

Pond 1P: Peak Elev=768.01' Storage=219 cf Inflow=0.35 cfs 0.028 af
Discarded=0.01 cfs 0.013 af Primary=0.23 cfs 0.015 af Outflow=0.24 cfs 0.028 af

Pond 2P: Forebay Peak Elev=767.28' Storage=50 cf Inflow=0.25 cfs 0.018 af
Discarded=0.00 cfs 0.002 af Primary=0.24 cfs 0.016 af Outflow=0.25 cfs 0.018 af

Pond 3P: Peak Elev=764.97' Storage=383 cf Inflow=0.61 cfs 0.055 af
Discarded=0.01 cfs 0.005 af Primary=0.38 cfs 0.049 af Outflow=0.39 cfs 0.055 af

Link Post: ExCulvert Inflow=0.48 cfs 0.067 af
Primary=0.48 cfs 0.067 af

Total Runoff Area = 0.940 ac Runoff Volume = 0.087 af Average Runoff Depth = 1.11"
93.24% Pervious = 0.877 ac 6.76% Impervious = 0.064 ac

Summary for Subcatchment P1.1:

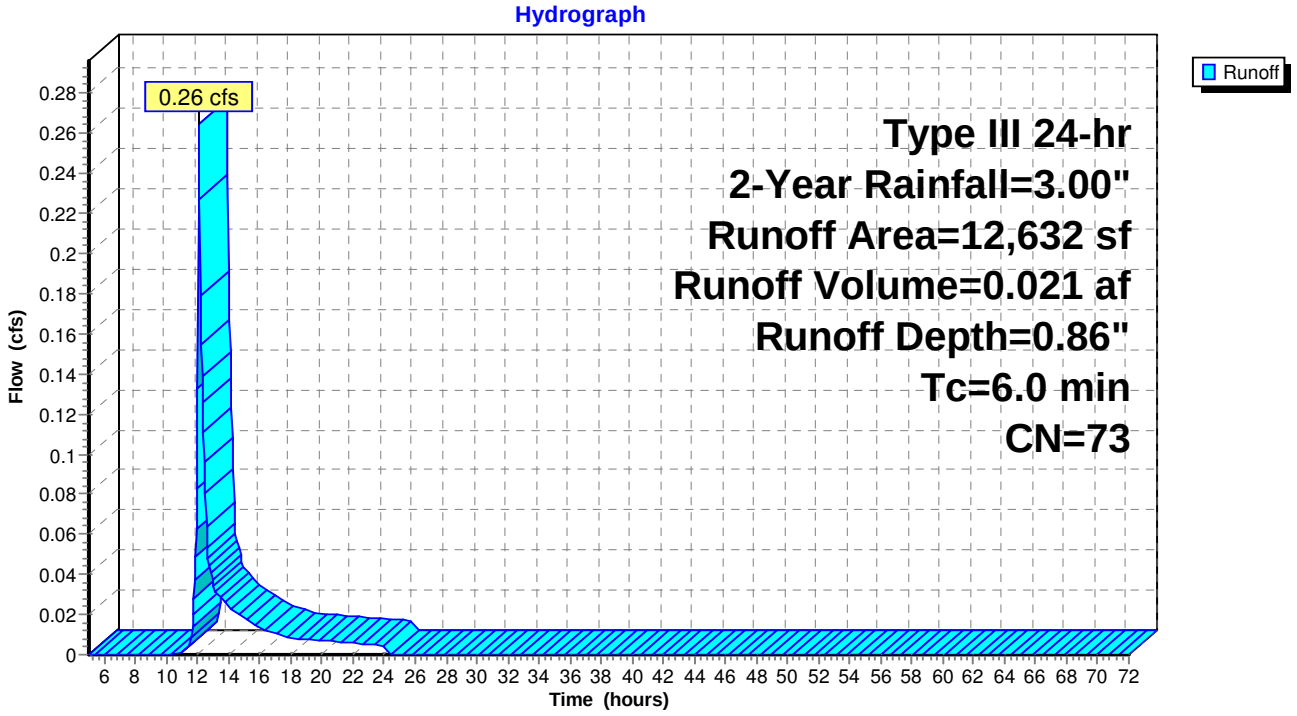
Runoff = 0.26 cfs @ 12.10 hrs, Volume= 0.021 af, Depth= 0.86"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

	Area (sf)	CN	Description
	1,080	96	Gravel surface, HSG C
*	850	79	50-75% Grass cover, Fair, HSG C
	10,702	70	Woods, Good, HSG C
	12,632	73	Weighted Average
	12,632		100.00% Pervious Area

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

Subcatchment P1.1:



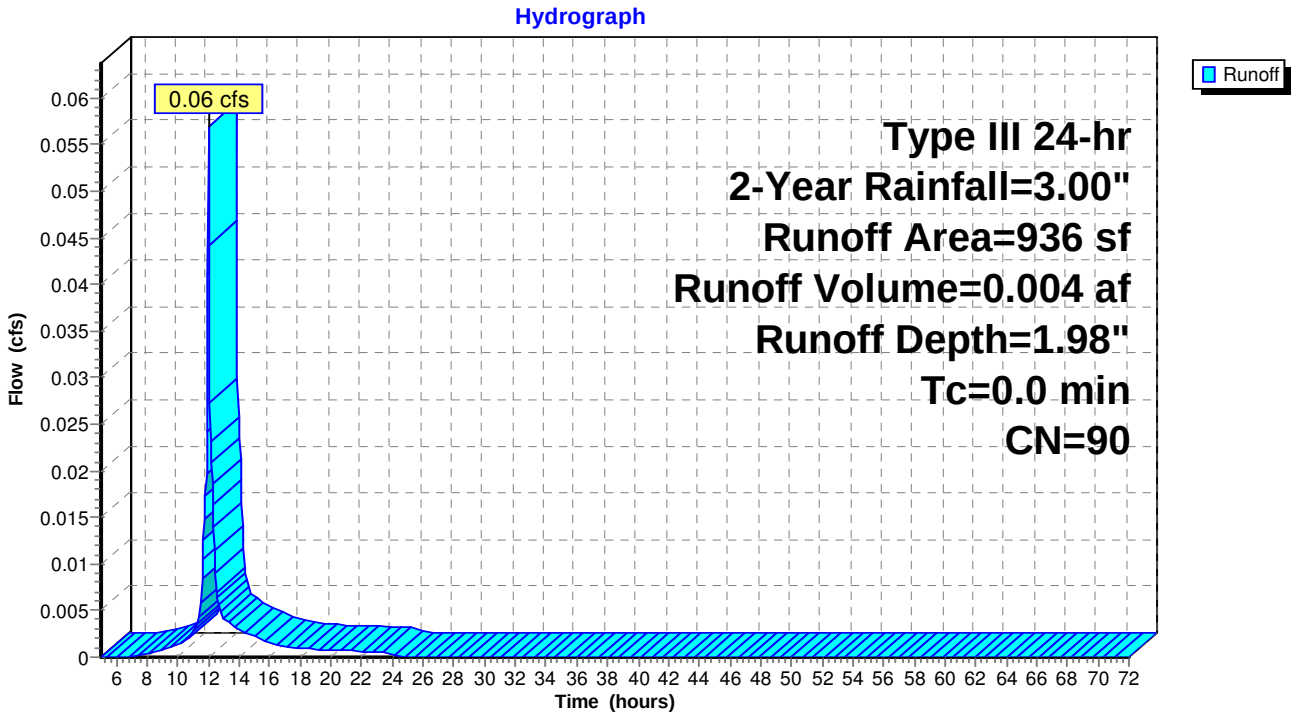
Summary for Subcatchment P1.2:

Runoff = 0.06 cfs @ 12.00 hrs, Volume= 0.004 af, Depth= 1.98"
Routed to Pond 2P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
343	79	50-75% Grass cover, Fair, HSG C
593	96	Gravel surface, HSG C
936	90	Weighted Average
936		100.00% Pervious Area

Subcatchment P1.2:



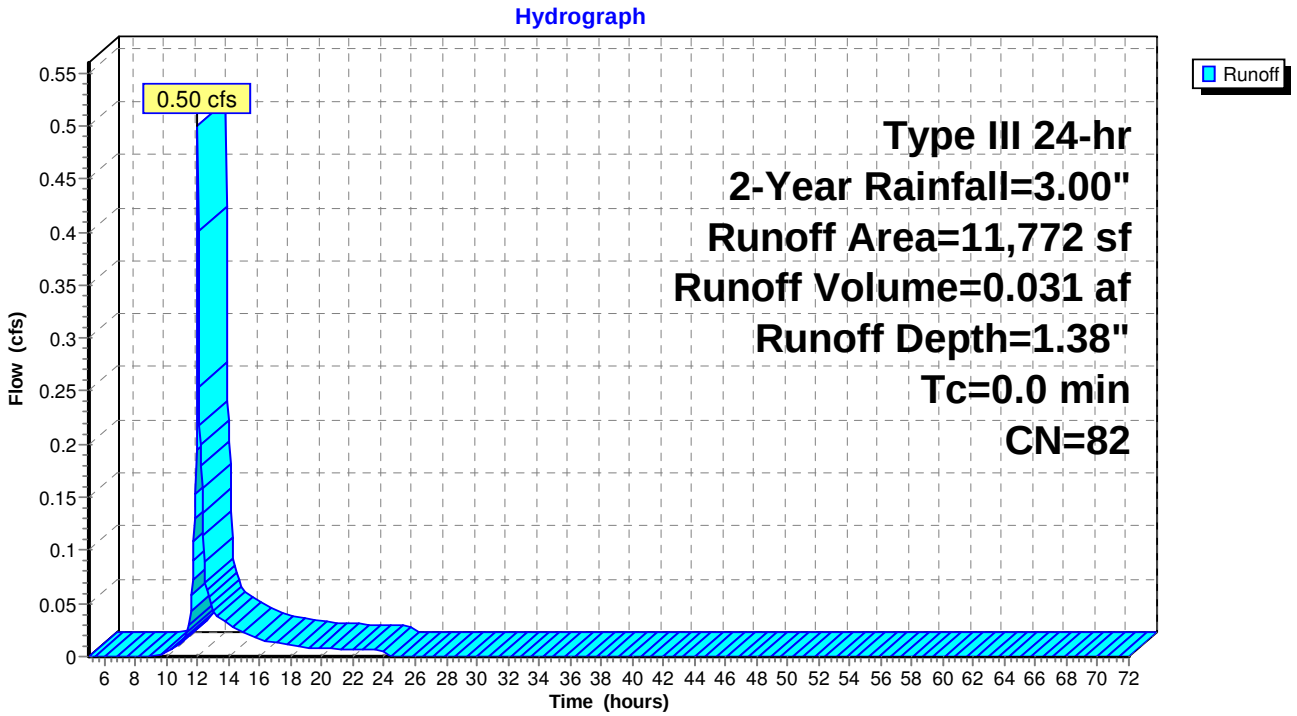
Summary for Subcatchment P1.3:

Runoff = 0.50 cfs @ 12.01 hrs, Volume= 0.031 af, Depth= 1.38"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
2,309	79	50-75% Grass cover, Fair, HSG C
4,596	96	Gravel surface, HSG C
4,867	70	Woods, Good, HSG C
11,772	82	Weighted Average
11,772		100.00% Pervious Area

Subcatchment P1.3:



Summary for Subcatchment P2.1: Roof/2

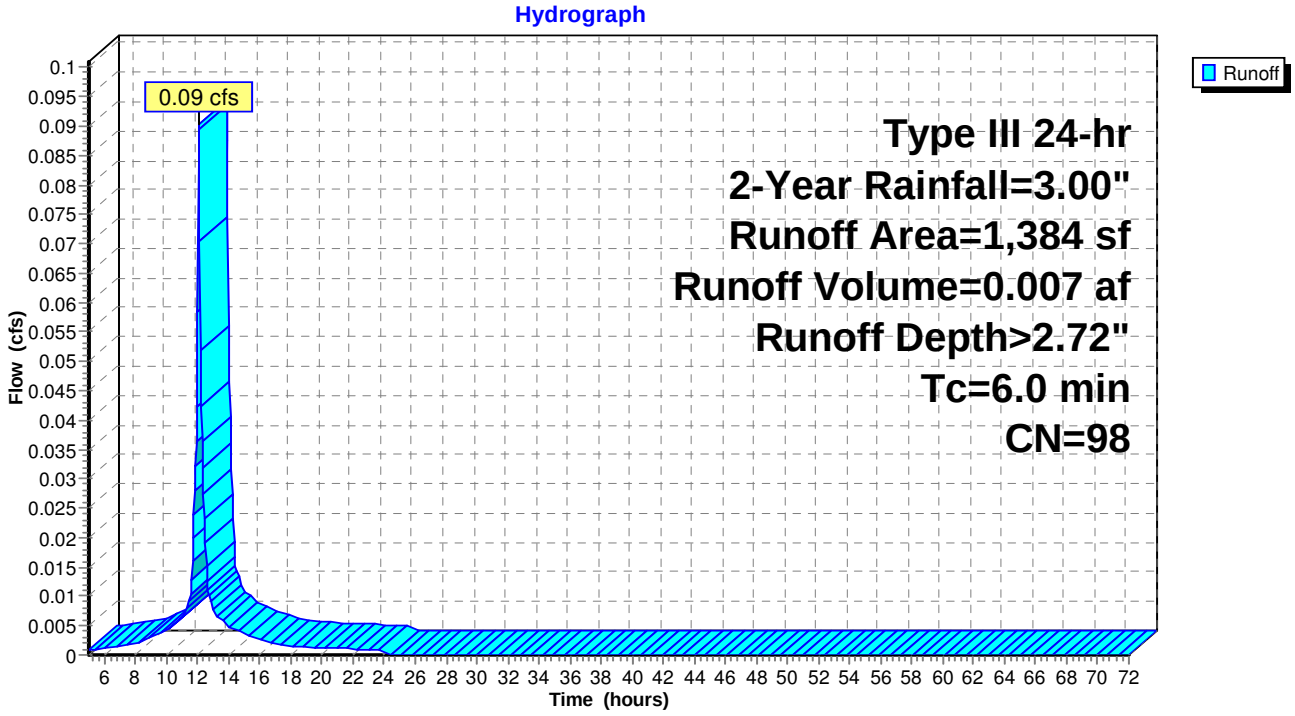
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Depth> 2.72"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.1: Roof/2



Summary for Subcatchment P2.2: Roof/2

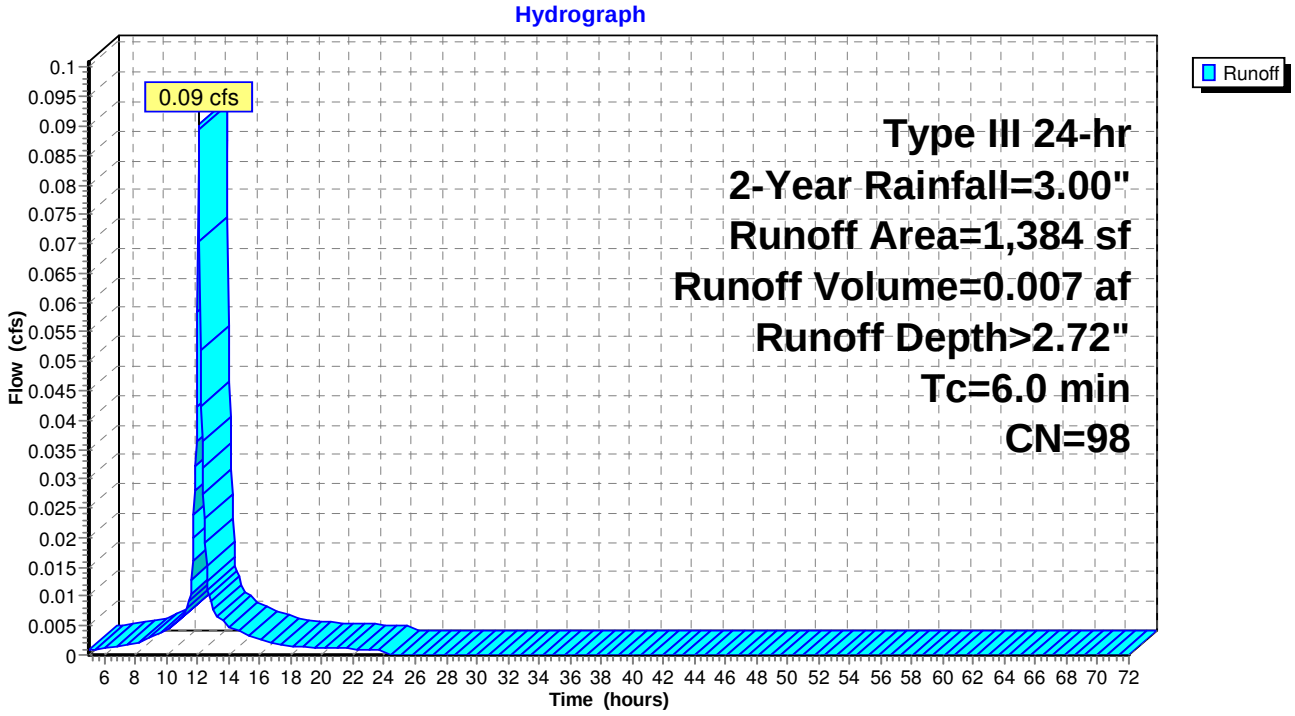
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Depth> 2.72"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.2: Roof/2



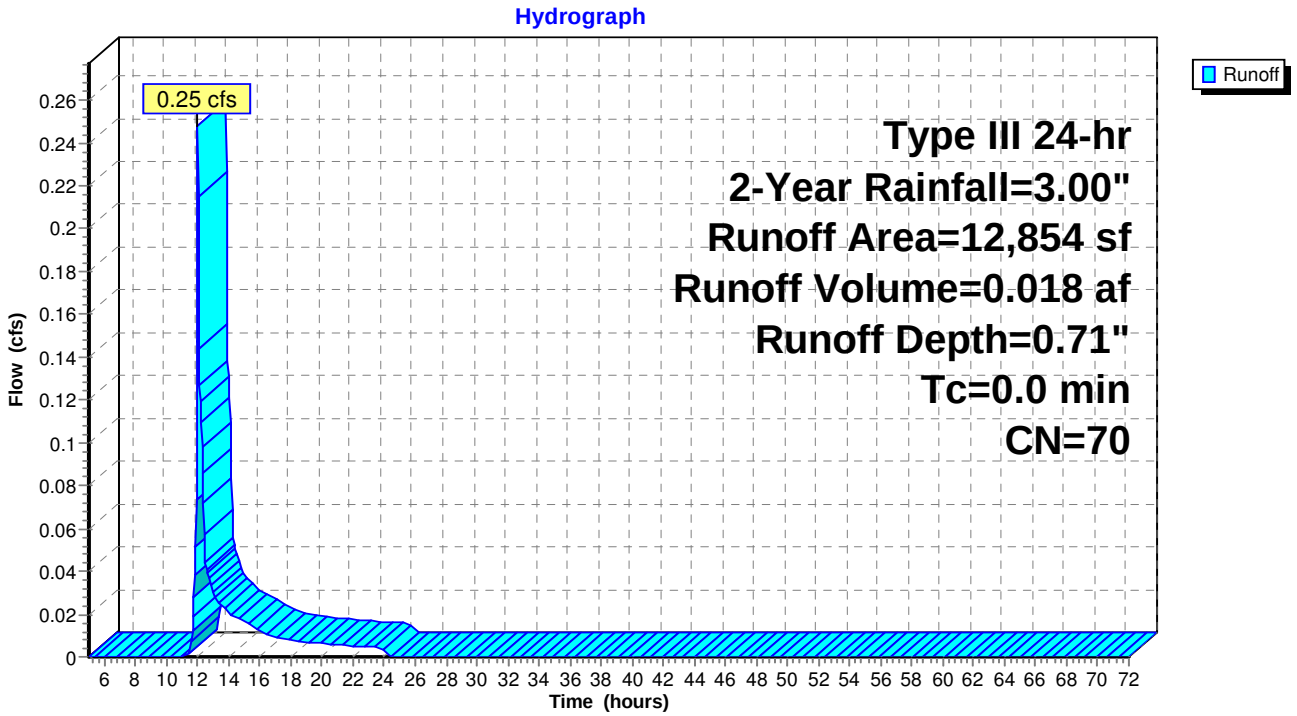
Summary for Subcatchment P3: Remainder

Runoff = 0.25 cfs @ 12.01 hrs, Volume= 0.018 af, Depth= 0.71"
Routed to Link Post : ExCulvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.00"

Area (sf)	CN	Description
12,854	70	Woods, Good, HSG C
12,854		100.00% Pervious Area

Subcatchment P3: Remainder



Summary for Pond 1P:

Inflow Area = 0.322 ac, 9.87% Impervious, Inflow Depth > 1.04" for 2-Year event
Inflow = 0.35 cfs @ 12.10 hrs, Volume= 0.028 af
Outflow = 0.24 cfs @ 12.21 hrs, Volume= 0.028 af, Atten= 33%, Lag= 6.6 min
Discarded = 0.01 cfs @ 12.21 hrs, Volume= 0.013 af
Primary = 0.23 cfs @ 12.21 hrs, Volume= 0.015 af
Routed to Pond 2P : Forebay

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 768.01' @ 12.21 hrs Surf.Area= 527 sf Storage= 219 cf

Plug-Flow detention time= 65.7 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 65.7 min (908.9 - 843.2)

Volume	Invert	Avail.Storage	Storage Description
#1	767.50'	1,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

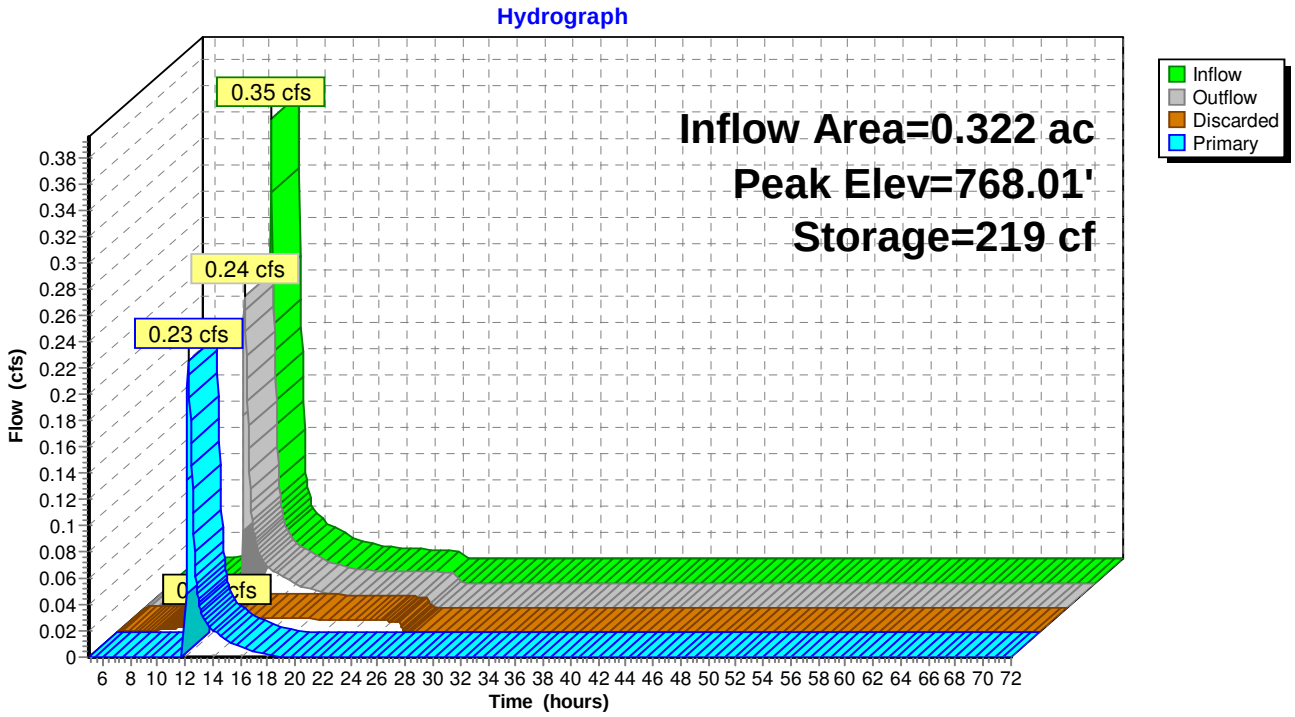
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
767.50	329	0	0
768.00	519	212	212
769.00	1,057	788	1,000

Device	Routing	Invert	Outlet Devices
#1	Primary	767.75'	**8.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.75' / 767.25' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	767.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.21 hrs HW=768.01' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.22 cfs @ 12.21 hrs HW=768.01' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.22 cfs @ 1.75 fps)

Pond 1P:


Hydrograph
Inflow Area=0.322 ac
Peak Elev=768.01'
Storage=219 cf
0.35 cfs
0.24 cfs
0.23 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond 2P: Forebay

Inflow Area = 0.343 ac, 9.26% Impervious, Inflow Depth = 0.64" for 2-Year event
Inflow = 0.25 cfs @ 12.20 hrs, Volume= 0.018 af
Outflow = 0.25 cfs @ 12.22 hrs, Volume= 0.018 af, Atten= 0%, Lag= 1.2 min
Discarded = 0.00 cfs @ 12.22 hrs, Volume= 0.002 af
Primary = 0.24 cfs @ 12.22 hrs, Volume= 0.016 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 767.28' @ 12.22 hrs Surf.Area= 97 sf Storage= 50 cf

Plug-Flow detention time= 23.2 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 22.4 min (815.4 - 792.9)

Volume	Invert	Avail.Storage	Storage Description
#1	766.50'	348 cf	**Custom Stage Data (Prismatic)** Listed below

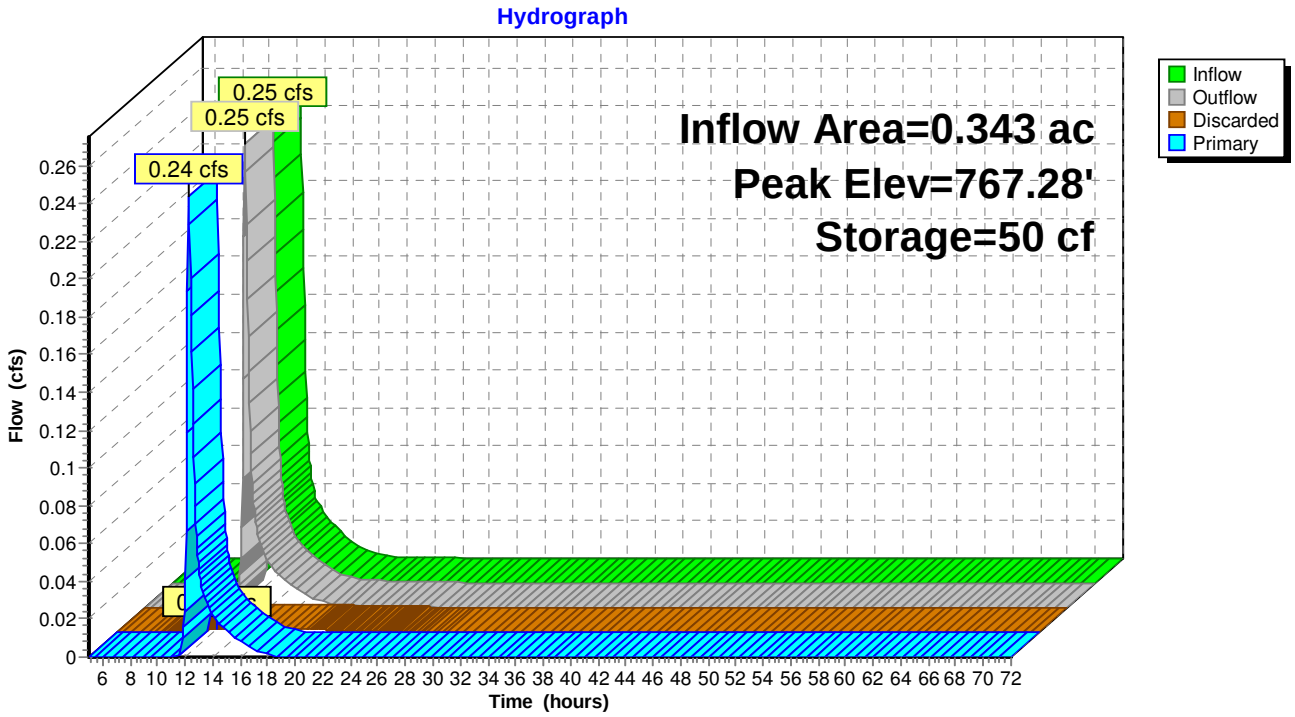
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
766.50	0	0	0
767.00	72	18	18
768.00	161	117	135
769.00	265	213	348

Device	Routing	Invert	Outlet Devices
#1	Primary	767.00'	**8.0" Round Culvert** L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.00' / 766.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	766.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.22 hrs HW=767.27' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.24 cfs @ 12.22 hrs HW=767.27' (Free Discharge)
1=Culvert (Inlet Controls 0.24 cfs @ 1.78 fps)

Pond 2P: Forebay



Summary for Pond 3P:

Inflow Area = 0.645 ac, 9.85% Impervious, Inflow Depth > 1.01" for 2-Year event
Inflow = 0.61 cfs @ 12.02 hrs, Volume= 0.055 af
Outflow = 0.39 cfs @ 12.33 hrs, Volume= 0.055 af, Atten= 35%, Lag= 18.7 min
Discarded = 0.01 cfs @ 12.33 hrs, Volume= 0.005 af
Primary = 0.38 cfs @ 12.33 hrs, Volume= 0.049 af
Routed to Link Post : ExCulvert

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 764.97' @ 12.33 hrs Surf.Area= 429 sf Storage= 383 cf

Plug-Flow detention time= 30.9 min calculated for 0.055 af (100% of inflow)
Center-of-Mass det. time= 31.2 min (842.2 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1	762.75'	1,341 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

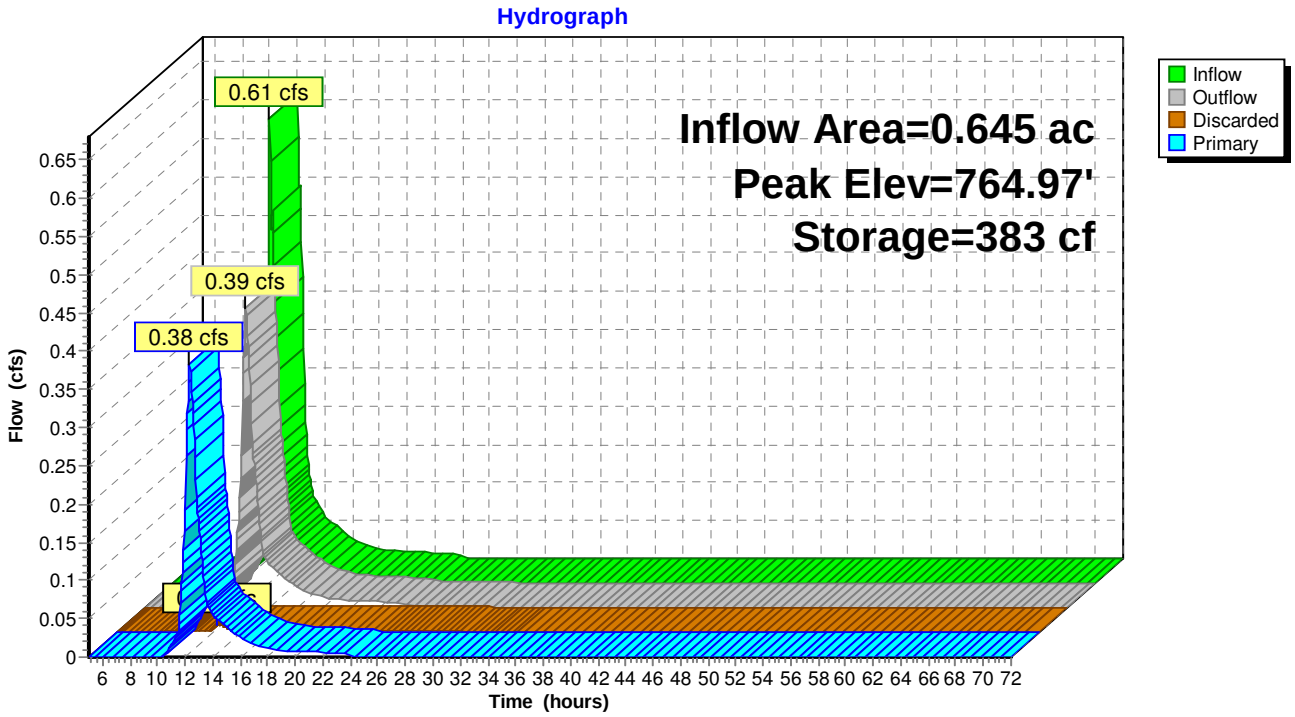
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
762.75	1	0	0
763.00	36	5	5
764.00	154	95	100
765.00	437	296	395
766.00	1,455	946	1,341

Device	Routing	Invert	Outlet Devices
#1	Discarded	762.75'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	763.60'	**8.0" Round Culvert** L= 15.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 763.60' / 763.00' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#3	Device 2	763.25'	**2.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	764.45'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	764.90'	**2.7" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 2	765.20'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 2	765.40'	**3.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.33 hrs HW=764.97' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.38 cfs @ 12.33 hrs HW=764.97' (Free Discharge)
└**2=Culvert** (Passes 0.38 cfs of 1.71 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.25 cfs @ 5.63 fps)
  ├**4=Orifice/Grate** (Orifice Controls 0.11 cfs @ 3.10 fps)
  ├**5=Orifice/Grate** (Orifice Controls 0.03 cfs @ 0.90 fps)
  ├**6=Orifice/Grate** (Controls 0.00 cfs)
  └**7=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P:

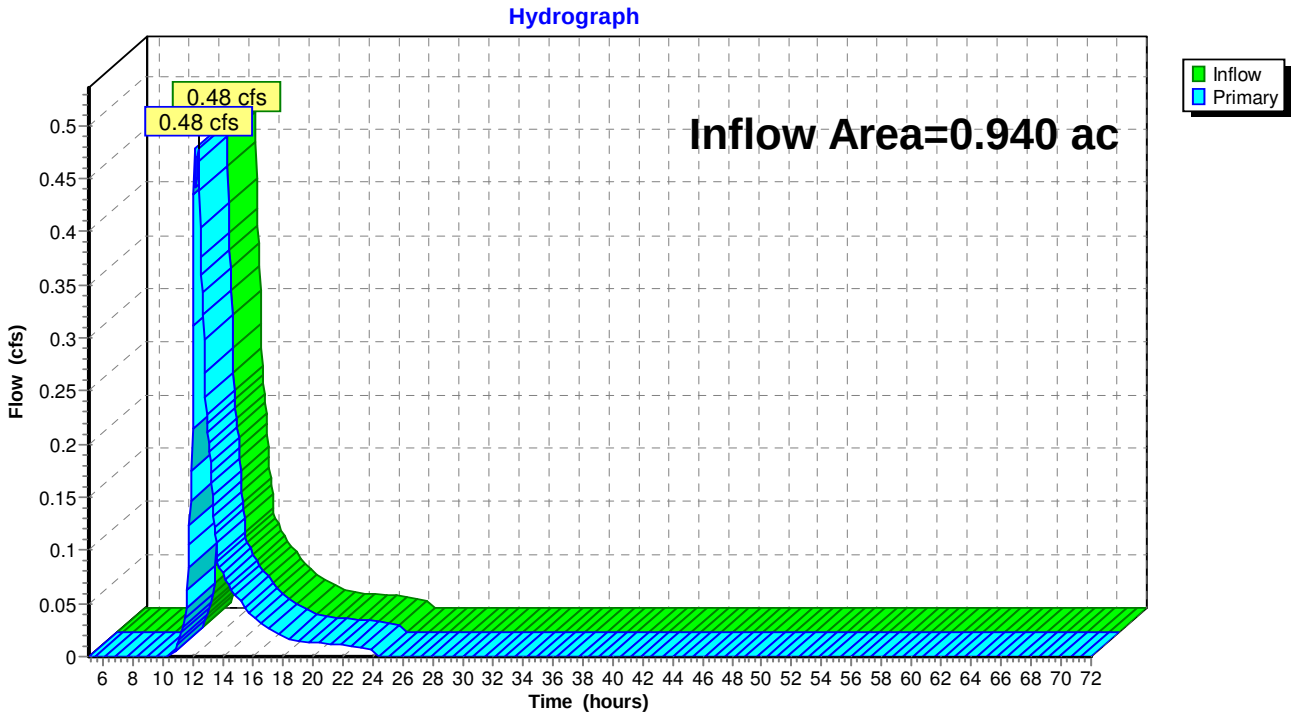

Hydrograph
Inflow Area=0.645 ac
Peak Elev=764.97'
Storage=383 cf
0.61 cfs
0.39 cfs
0.38 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Link Post: ExCulvert

Inflow Area = 0.940 ac, 6.76% Impervious, Inflow Depth = 0.85" for 2-Year event
Inflow = 0.48 cfs @ 12.30 hrs, Volume= 0.067 af
Primary = 0.48 cfs @ 12.30 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs

Link Post: ExCulvert



Summary for Subcatchment P1.1:

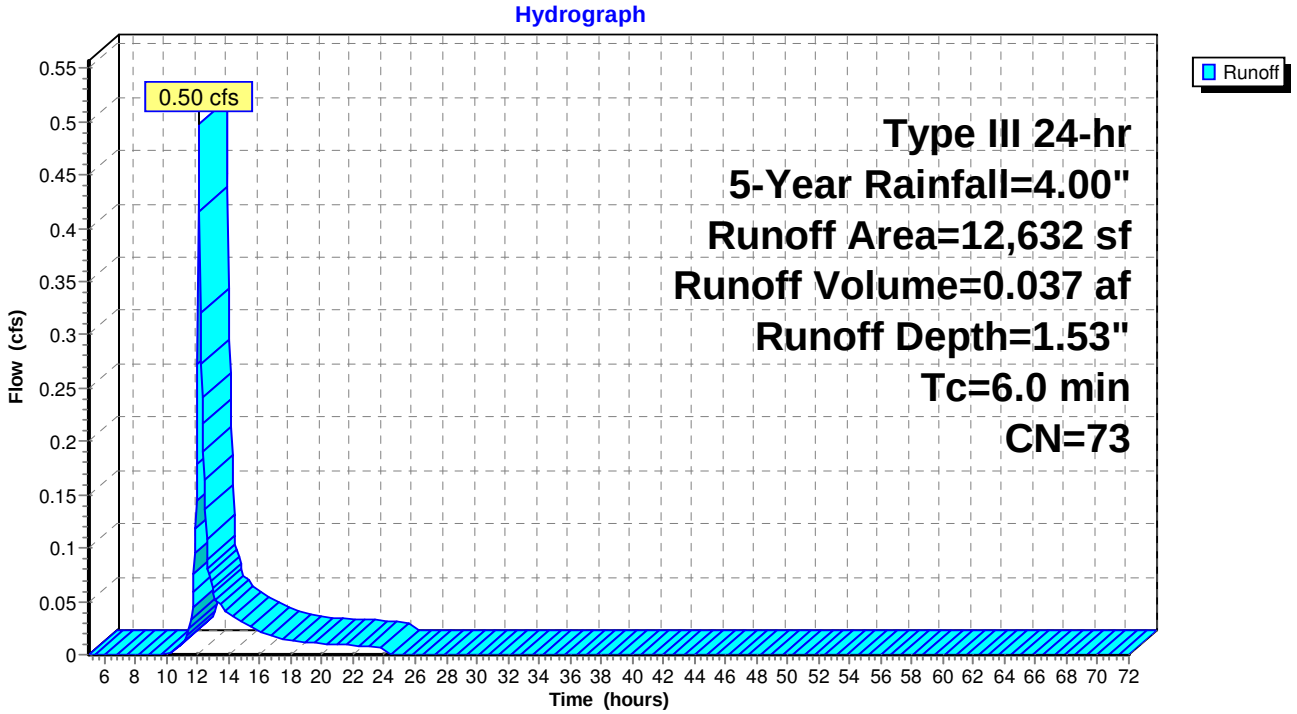
Runoff = 0.50 cfs @ 12.10 hrs, Volume= 0.037 af, Depth= 1.53"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.00"

	Area (sf)	CN	Description
	1,080	96	Gravel surface, HSG C
*	850	79	50-75% Grass cover, Fair, HSG C
	10,702	70	Woods, Good, HSG C
	12,632	73	Weighted Average
	12,632		100.00% Pervious Area

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

Subcatchment P1.1:



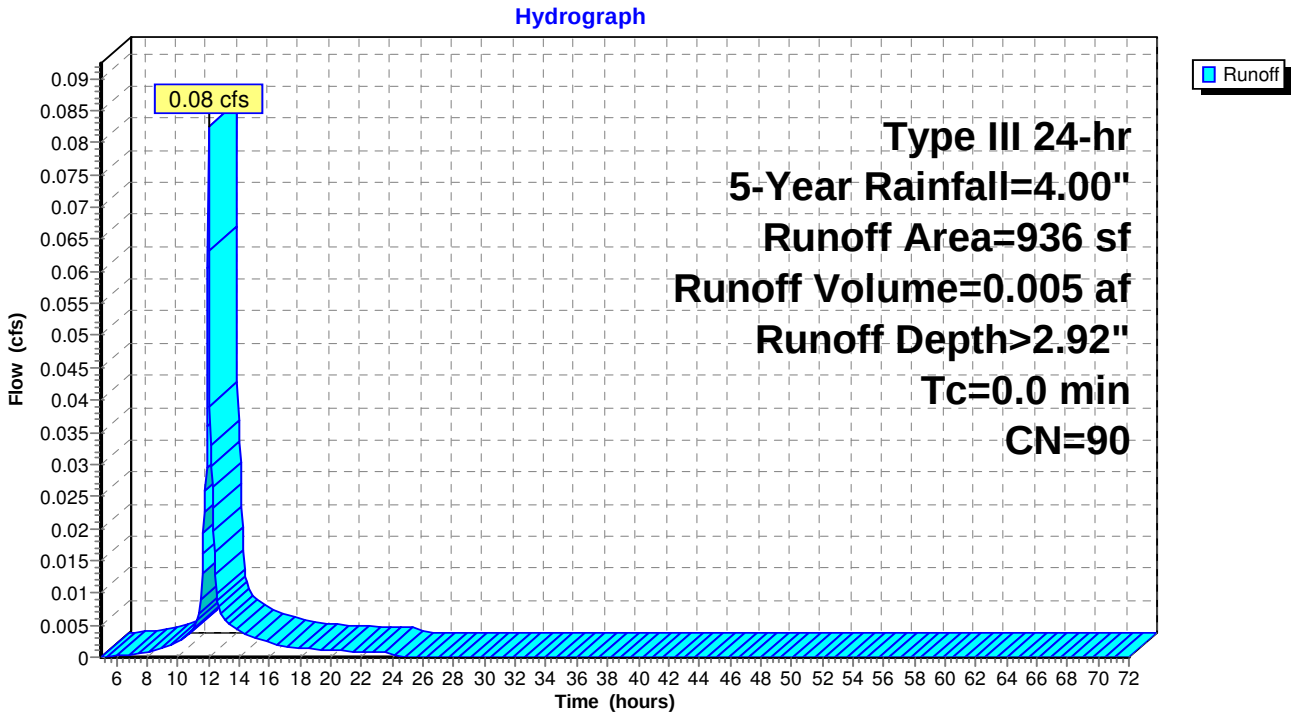
Summary for Subcatchment P1.2:

Runoff = 0.08 cfs @ 12.00 hrs, Volume= 0.005 af, Depth> 2.92"
Routed to Pond 2P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.00"

Area (sf)	CN	Description
343	79	50-75% Grass cover, Fair, HSG C
593	96	Gravel surface, HSG C
936	90	Weighted Average
936		100.00% Pervious Area

Subcatchment P1.2:



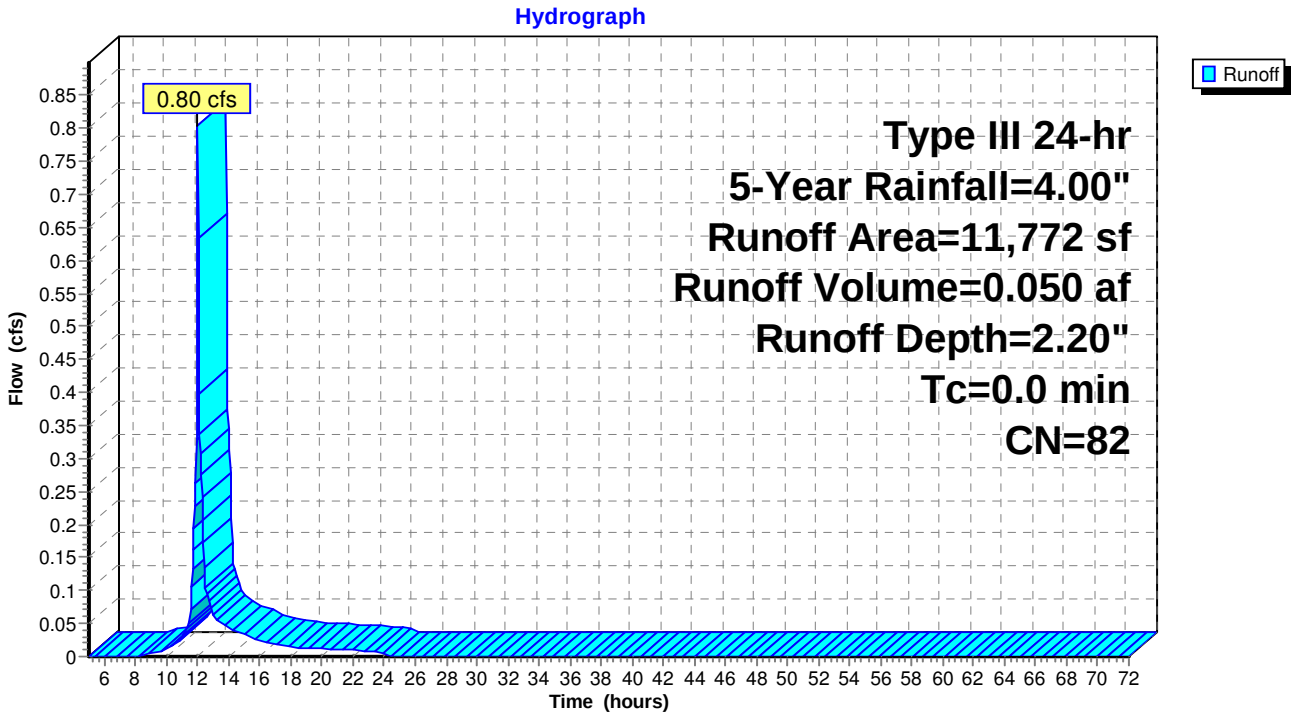
Summary for Subcatchment P1.3:

Runoff = 0.80 cfs @ 12.00 hrs, Volume= 0.050 af, Depth= 2.20"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.00"

Area (sf)	CN	Description
2,309	79	50-75% Grass cover, Fair, HSG C
4,596	96	Gravel surface, HSG C
4,867	70	Woods, Good, HSG C
11,772	82	Weighted Average
11,772		100.00% Pervious Area

Subcatchment P1.3:



Summary for Subcatchment P2.1: Roof/2

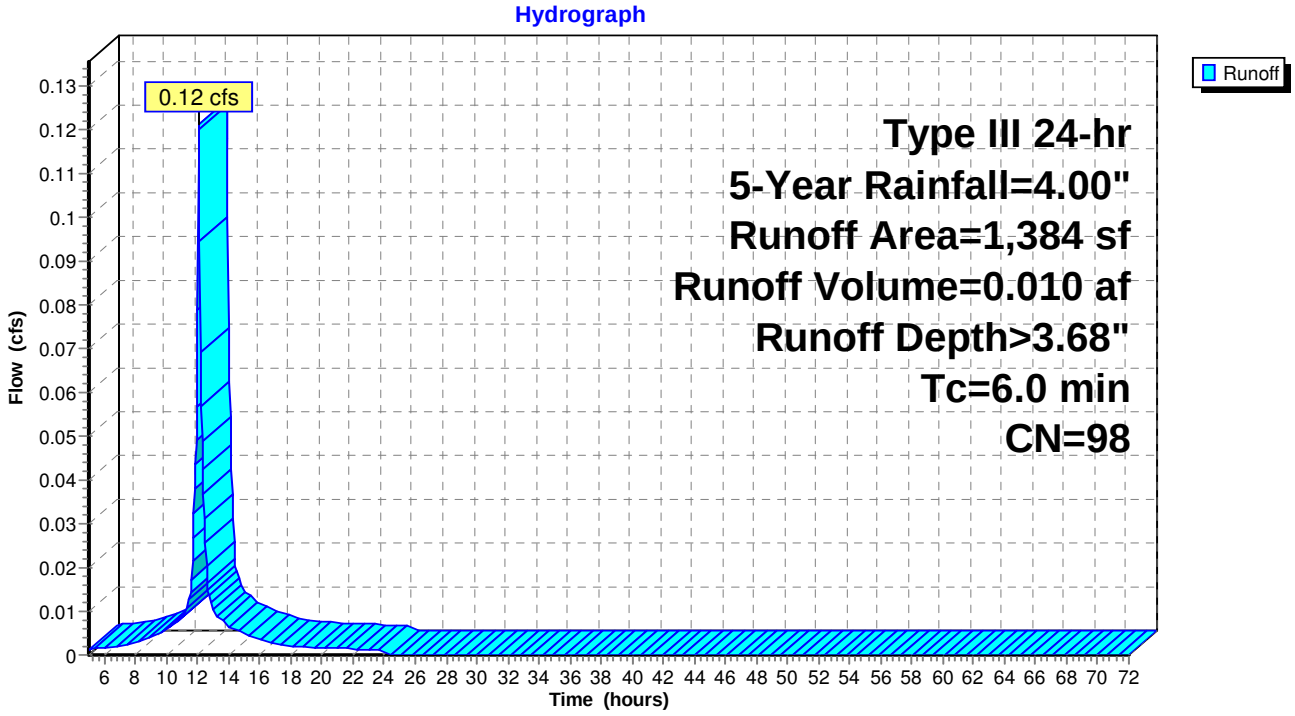
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.010 af, Depth> 3.68"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.00"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.1: Roof/2



Summary for Subcatchment P2.2: Roof/2

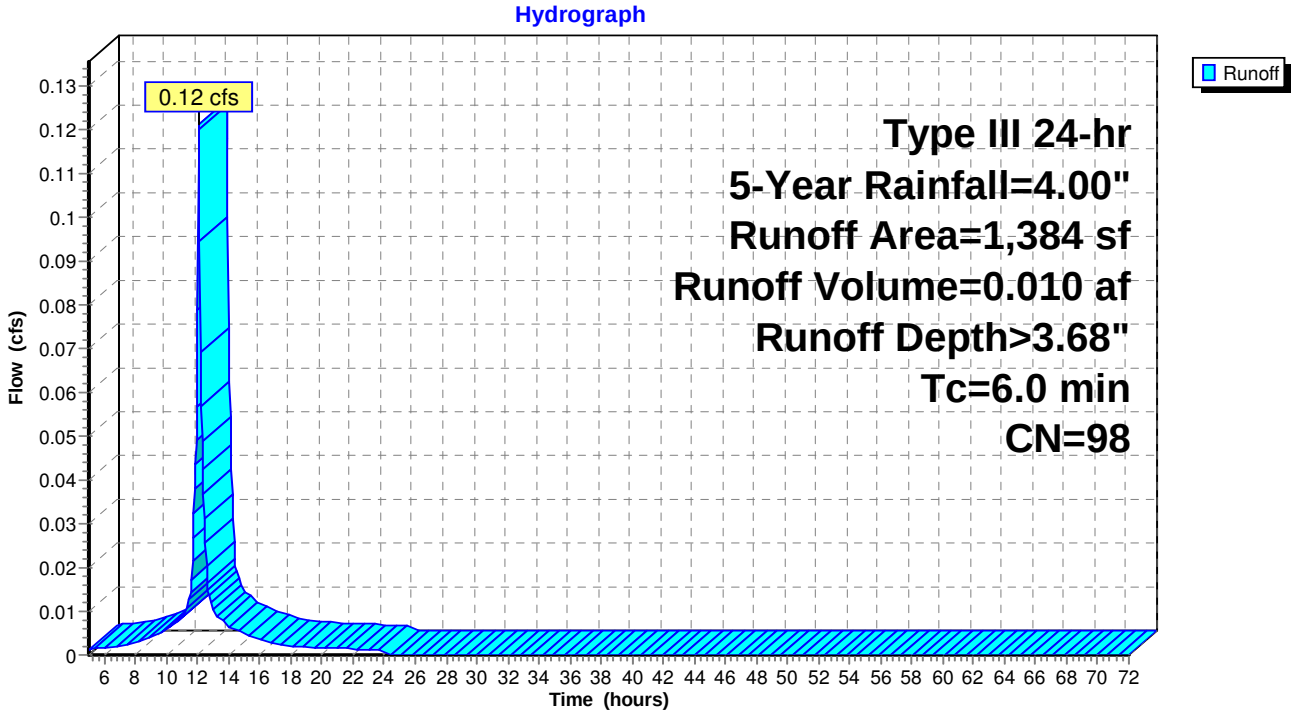
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.010 af, Depth> 3.68"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.00"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.2: Roof/2



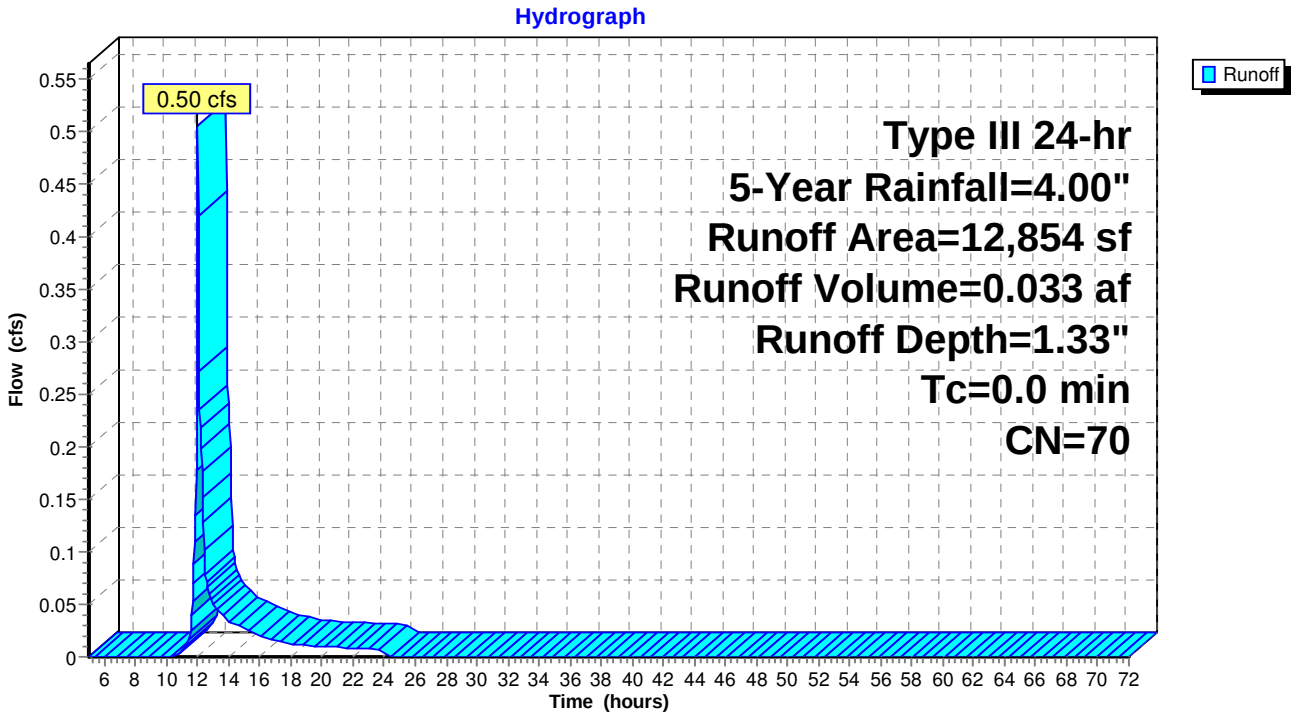
Summary for Subcatchment P3: Remainder

Runoff = 0.50 cfs @ 12.01 hrs, Volume= 0.033 af, Depth= 1.33"
Routed to Link Post : ExCulvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-Year Rainfall=4.00"

Area (sf)	CN	Description
12,854	70	Woods, Good, HSG C
12,854		100.00% Pervious Area

Subcatchment P3: Remainder



Summary for Pond 1P:

Inflow Area = 0.322 ac, 9.87% Impervious, Inflow Depth > 1.74" for 5-Year event
Inflow = 0.62 cfs @ 12.10 hrs, Volume= 0.047 af
Outflow = 0.49 cfs @ 12.16 hrs, Volume= 0.047 af, Atten= 20%, Lag= 4.1 min
Discarded = 0.01 cfs @ 12.16 hrs, Volume= 0.015 af
Primary = 0.48 cfs @ 12.16 hrs, Volume= 0.031 af
Routed to Pond 2P : Forebay

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 768.15' @ 12.16 hrs Surf.Area= 602 sf Storage= 298 cf

Plug-Flow detention time= 50.3 min calculated for 0.047 af (100% of inflow)
Center-of-Mass det. time= 50.3 min (883.8 - 833.5)

Volume	Invert	Avail.Storage	Storage Description
#1	767.50'	1,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

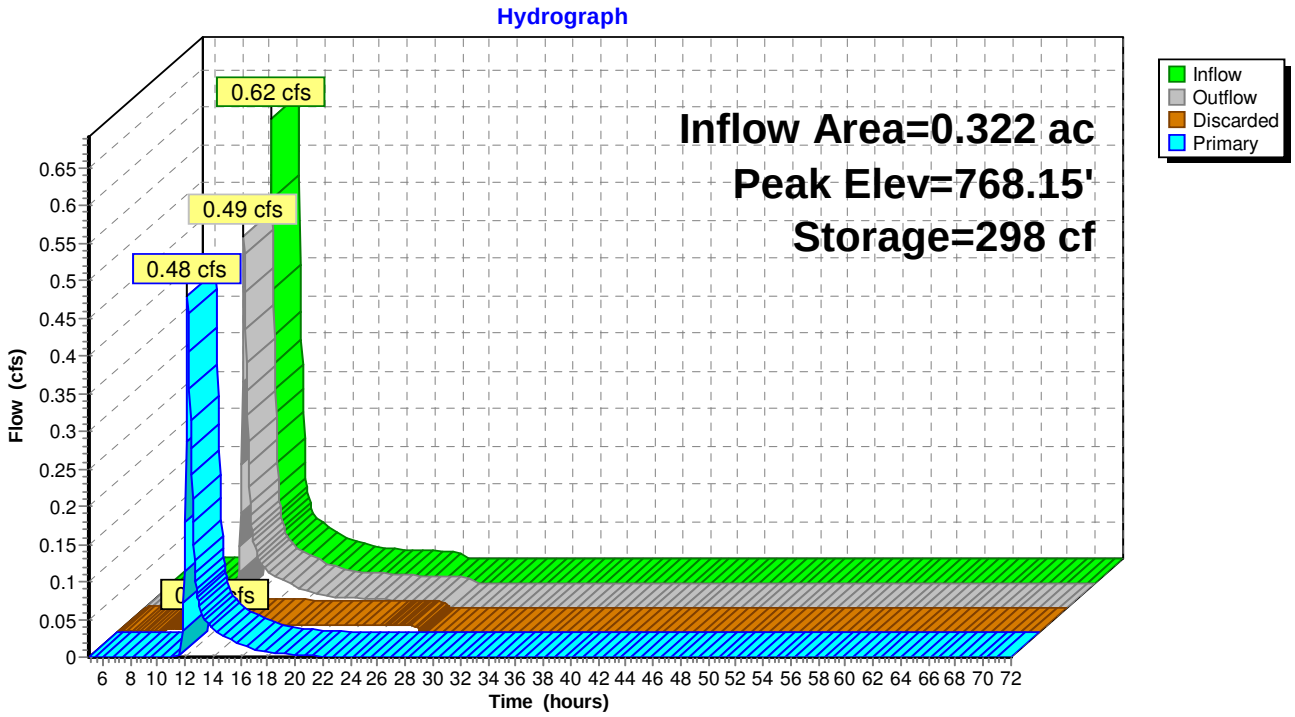
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
767.50	329	0	0
768.00	519	212	212
769.00	1,057	788	1,000

Device	Routing	Invert	Outlet Devices
#1	Primary	767.75'	**8.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.75' / 767.25' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	767.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.16 hrs HW=768.15' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.47 cfs @ 12.16 hrs HW=768.15' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.47 cfs @ 2.15 fps)

Pond 1P:


Hydrograph
Inflow Area=0.322 ac
Peak Elev=768.15'
Storage=298 cf
0.62 cfs
0.49 cfs
0.48 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond 2P: Forebay

Inflow Area = 0.343 ac, 9.26% Impervious, Inflow Depth = 1.28" for 5-Year event
Inflow = 0.51 cfs @ 12.16 hrs, Volume= 0.037 af
Outflow = 0.50 cfs @ 12.18 hrs, Volume= 0.037 af, Atten= 1%, Lag= 1.1 min
Discarded = 0.00 cfs @ 12.18 hrs, Volume= 0.002 af
Primary = 0.50 cfs @ 12.18 hrs, Volume= 0.034 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 767.41' @ 12.18 hrs Surf.Area= 109 sf Storage= 66 cf

Plug-Flow detention time= 15.7 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 14.9 min (814.4 - 799.5)

Volume	Invert	Avail.Storage	Storage Description
#1	766.50'	348 cf	**Custom Stage Data (Prismatic)** Listed below

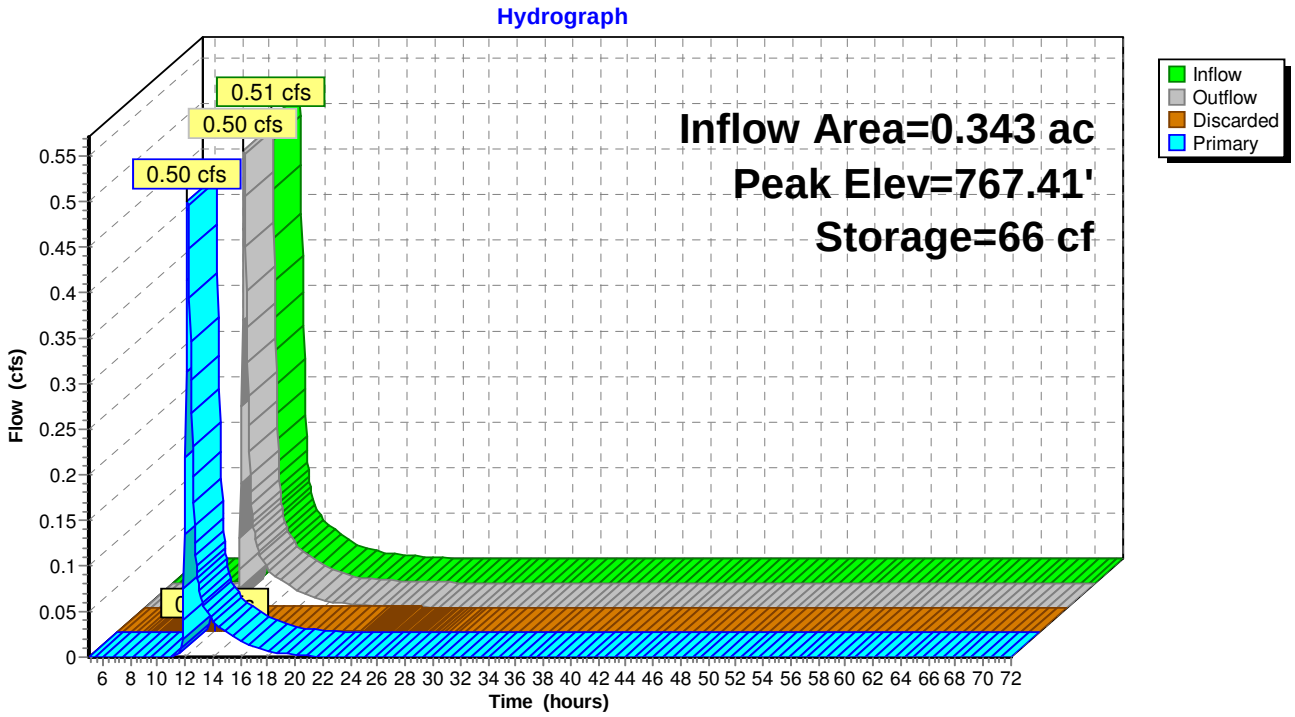
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
766.50	0	0	0
767.00	72	18	18
768.00	161	117	135
769.00	265	213	348

Device	Routing	Invert	Outlet Devices
#1	Primary	767.00'	**8.0" Round Culvert** L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.00' / 766.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	766.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.18 hrs HW=767.41' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.49 cfs @ 12.18 hrs HW=767.41' (Free Discharge)
1=Culvert (Inlet Controls 0.49 cfs @ 2.18 fps)

Pond 2P: Forebay



Summary for Pond 3P:

Inflow Area = 0.645 ac, 9.85% Impervious, Inflow Depth > 1.74" for 5-Year event
Inflow = 1.13 cfs @ 12.02 hrs, Volume= 0.094 af
Outflow = 0.80 cfs @ 12.24 hrs, Volume= 0.094 af, Atten= 29%, Lag= 13.4 min
Discarded = 0.02 cfs @ 12.24 hrs, Volume= 0.006 af
Primary = 0.78 cfs @ 12.24 hrs, Volume= 0.088 af
Routed to Link Post : ExCulvert

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 765.33' @ 12.24 hrs Surf.Area= 776 sf Storage= 597 cf

Plug-Flow detention time= 22.3 min calculated for 0.093 af (100% of inflow)
Center-of-Mass det. time= 22.7 min (827.9 - 805.2)

Volume	Invert	Avail.Storage	Storage Description
#1	762.75'	1,341 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

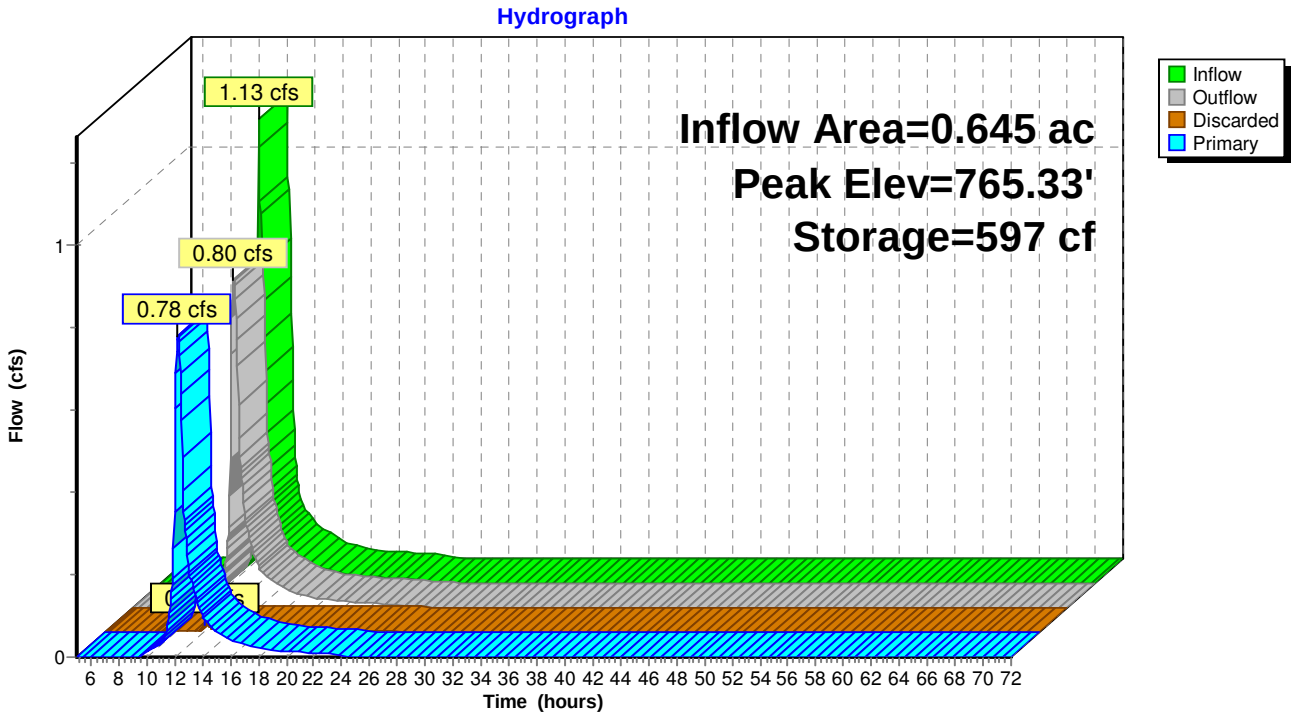
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
762.75	1	0	0
763.00	36	5	5
764.00	154	95	100
765.00	437	296	395
766.00	1,455	946	1,341

Device	Routing	Invert	Outlet Devices
#1	Discarded	762.75'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	763.60'	**8.0" Round Culvert** L= 15.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 763.60' / 763.00' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#3	Device 2	763.25'	**2.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	764.45'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	764.90'	**2.7" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 2	765.20'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 2	765.40'	**3.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.24 hrs HW=765.33' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.78 cfs @ 12.24 hrs HW=765.33' (Free Discharge)
└**2=Culvert** (Passes 0.78 cfs of 1.99 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.28 cfs @ 6.34 fps)
  ├**4=Orifice/Grate** (Orifice Controls 0.14 cfs @ 4.25 fps)
  ├**5=Orifice/Grate** (Orifice Controls 0.32 cfs @ 2.72 fps)
  ├**6=Orifice/Grate** (Orifice Controls 0.03 cfs @ 1.24 fps)
  └**7=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P:

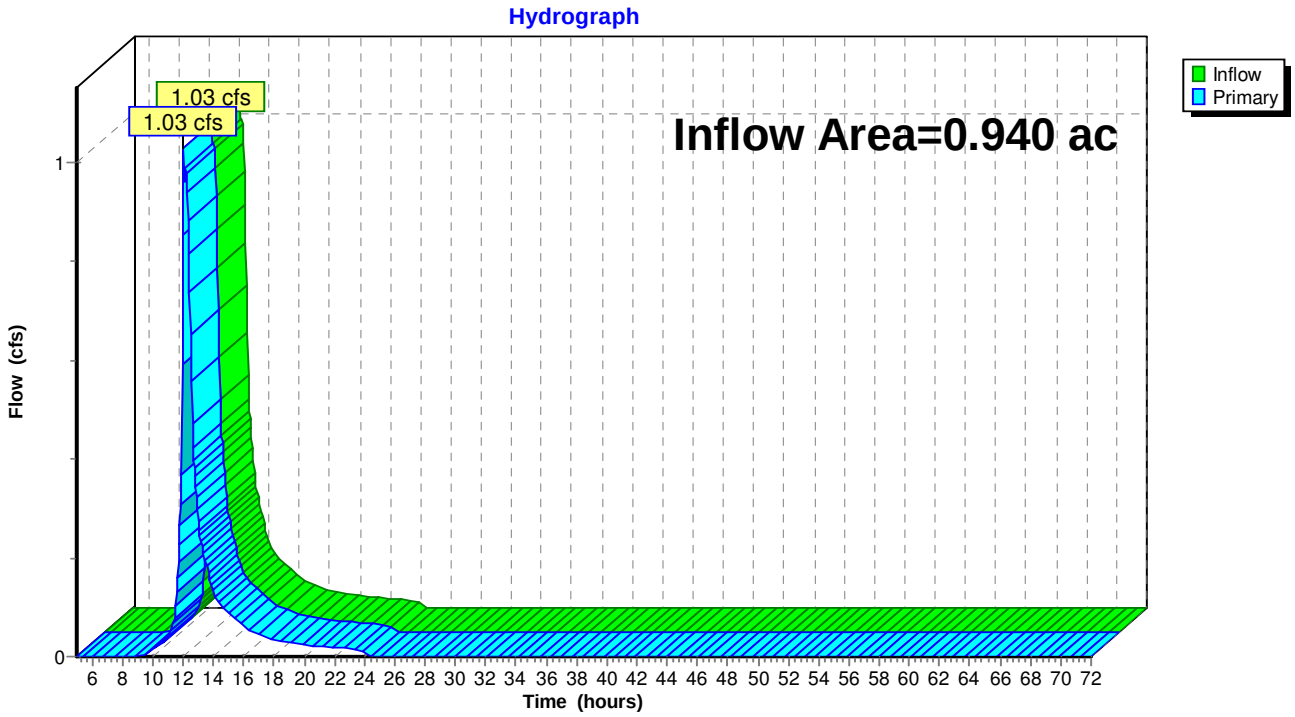

Hydrograph
Inflow Area=0.645 ac
Peak Elev=765.33'
Storage=597 cf
1.13 cfs
0.80 cfs
0.78 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Link Post: ExCulvert

Inflow Area = 0.940 ac, 6.76% Impervious, Inflow Depth = 1.53" for 5-Year event
Inflow = 1.03 cfs @ 12.06 hrs, Volume= 0.120 af
Primary = 1.03 cfs @ 12.06 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs

Link Post: ExCulvert



Summary for Subcatchment P1.1:

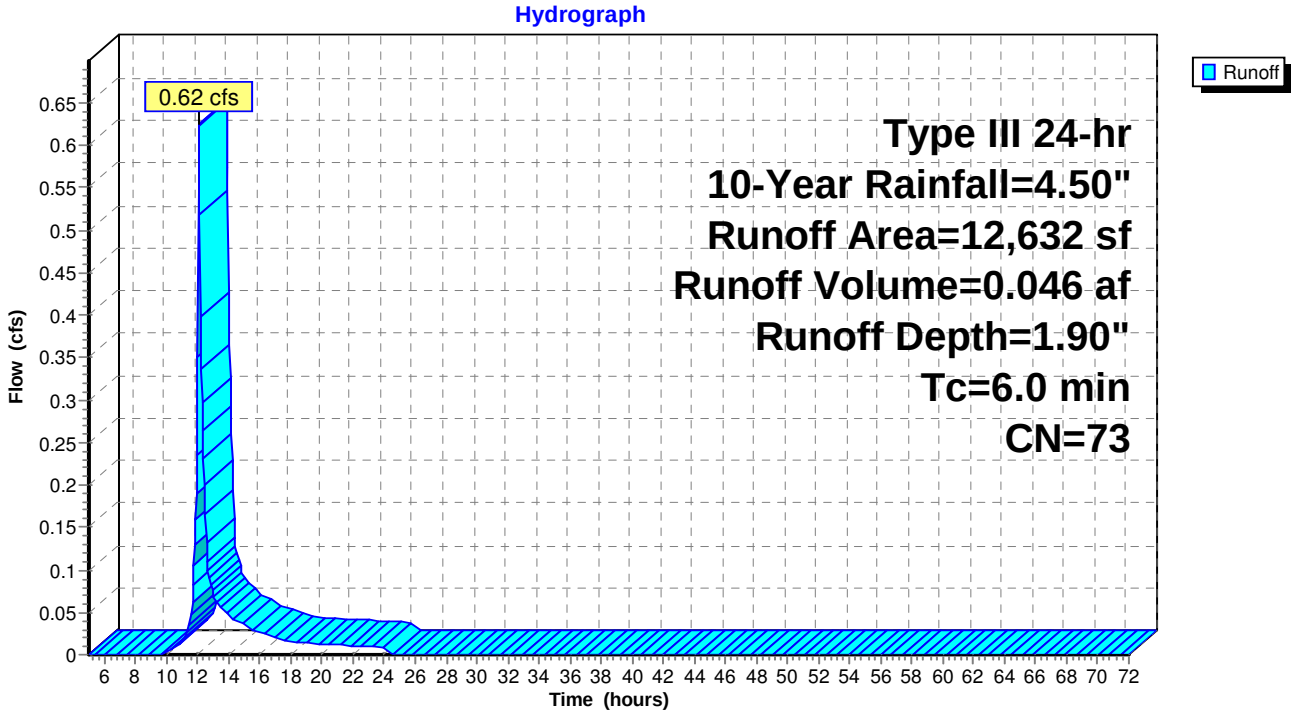
Runoff = 0.62 cfs @ 12.10 hrs, Volume= 0.046 af, Depth= 1.90"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
	1,080	96	Gravel surface, HSG C
*	850	79	50-75% Grass cover, Fair, HSG C
	10,702	70	Woods, Good, HSG C
	12,632	73	Weighted Average
	12,632		100.00% Pervious Area

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

Subcatchment P1.1:



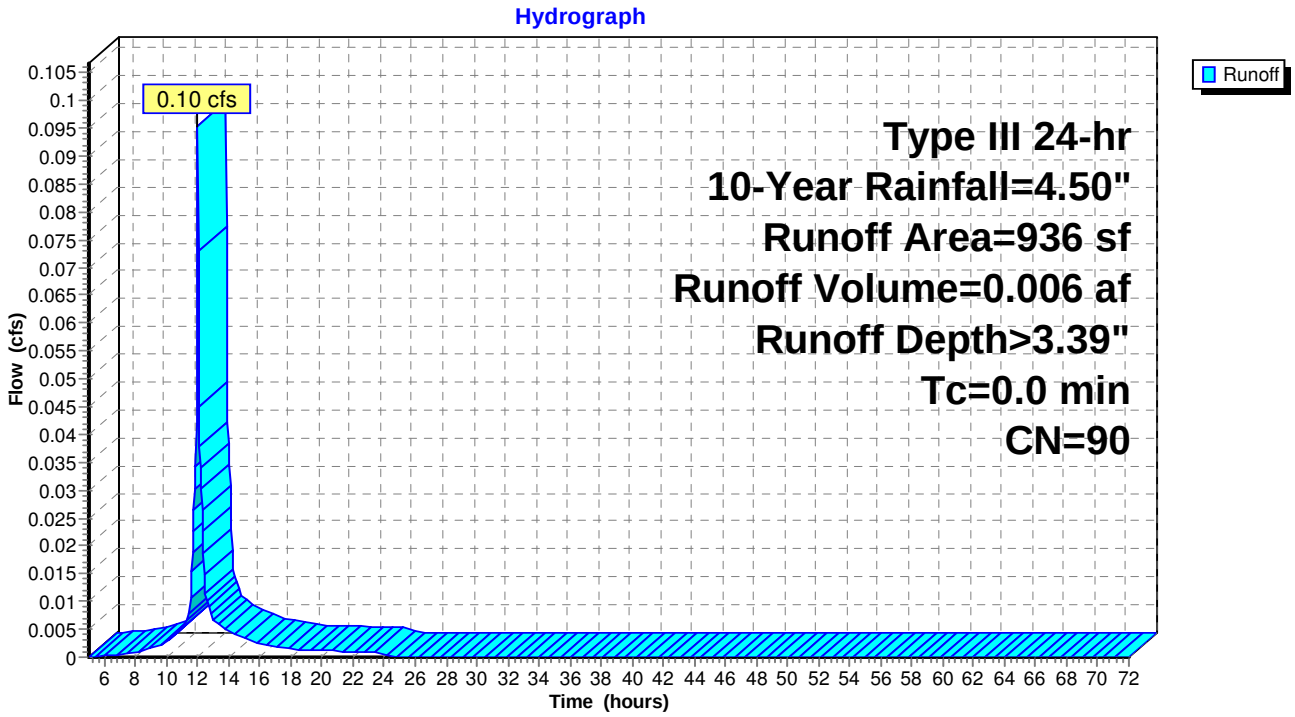
Summary for Subcatchment P1.2:

Runoff = 0.10 cfs @ 12.00 hrs, Volume= 0.006 af, Depth> 3.39"
Routed to Pond 2P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
343	79	50-75% Grass cover, Fair, HSG C
593	96	Gravel surface, HSG C
936	90	Weighted Average
936		100.00% Pervious Area

Subcatchment P1.2:



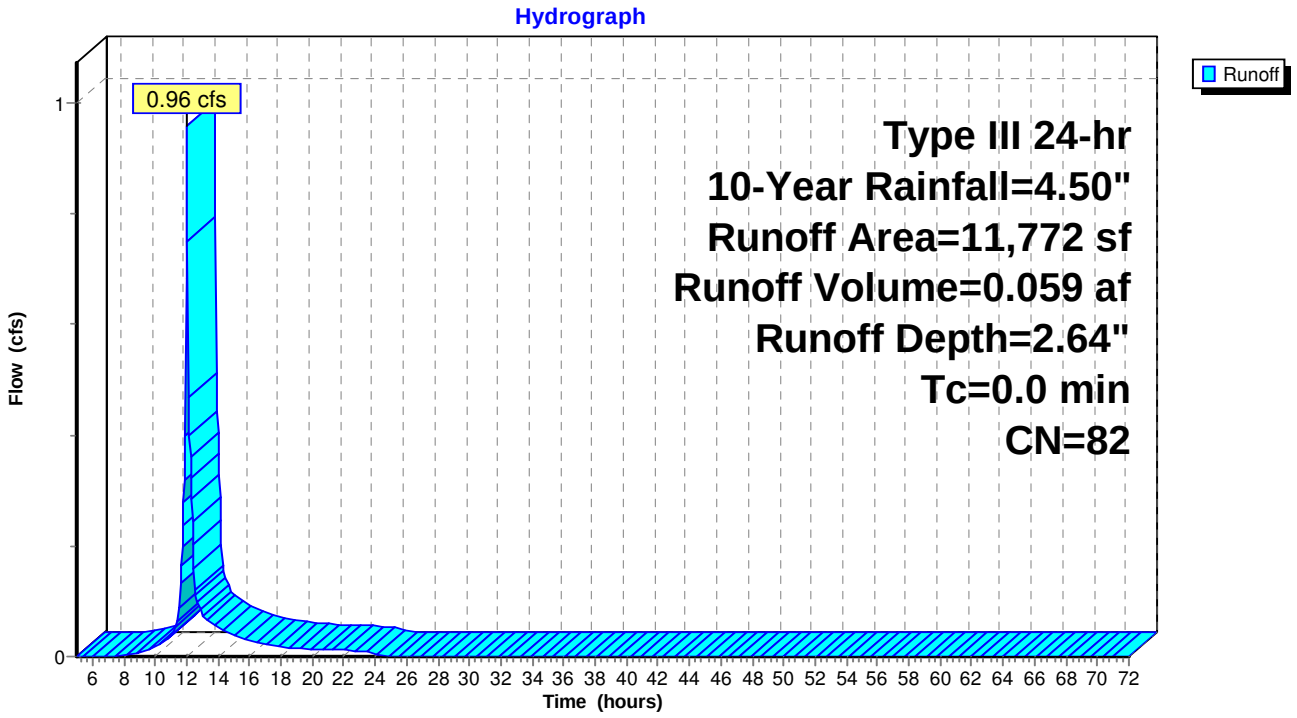
Summary for Subcatchment P1.3:

Runoff = 0.96 cfs @ 12.00 hrs, Volume= 0.059 af, Depth= 2.64"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
2,309	79	50-75% Grass cover, Fair, HSG C
4,596	96	Gravel surface, HSG C
4,867	70	Woods, Good, HSG C
11,772	82	Weighted Average
11,772		100.00% Pervious Area

Subcatchment P1.3:



Summary for Subcatchment P2.1: Roof/2

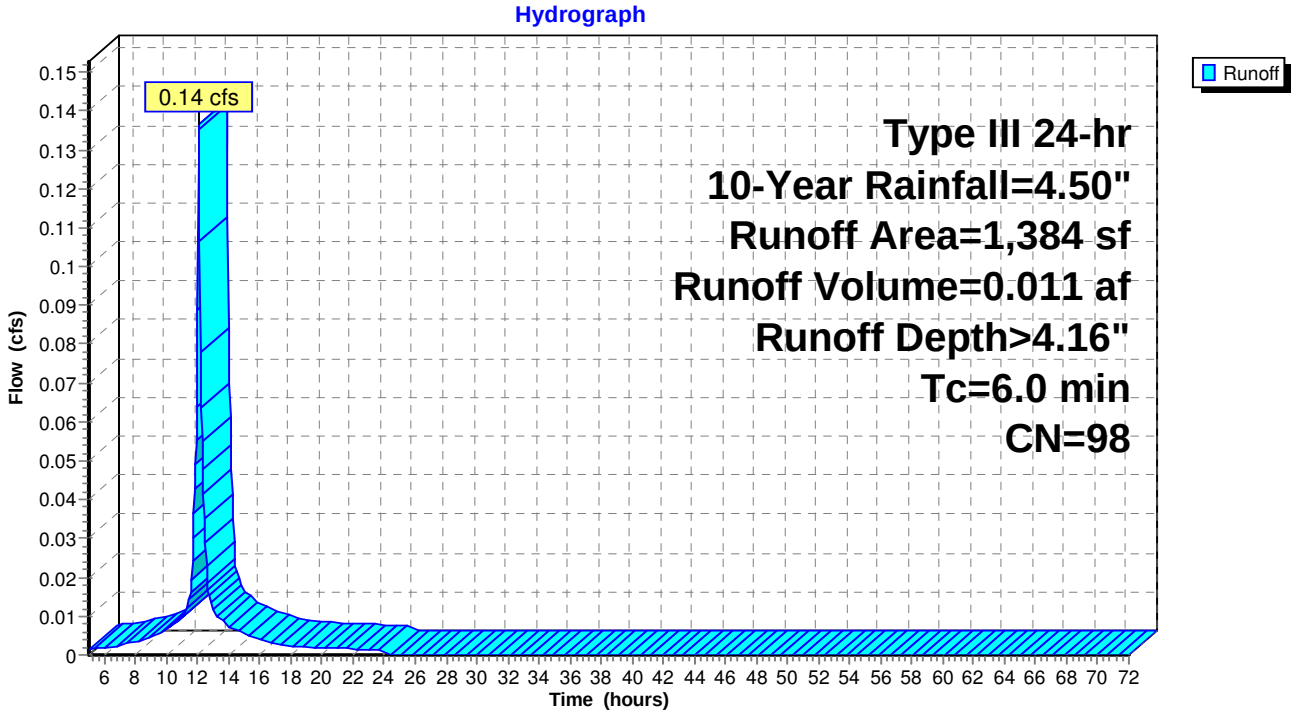
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 4.16"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.1: Roof/2



Summary for Subcatchment P2.2: Roof/2

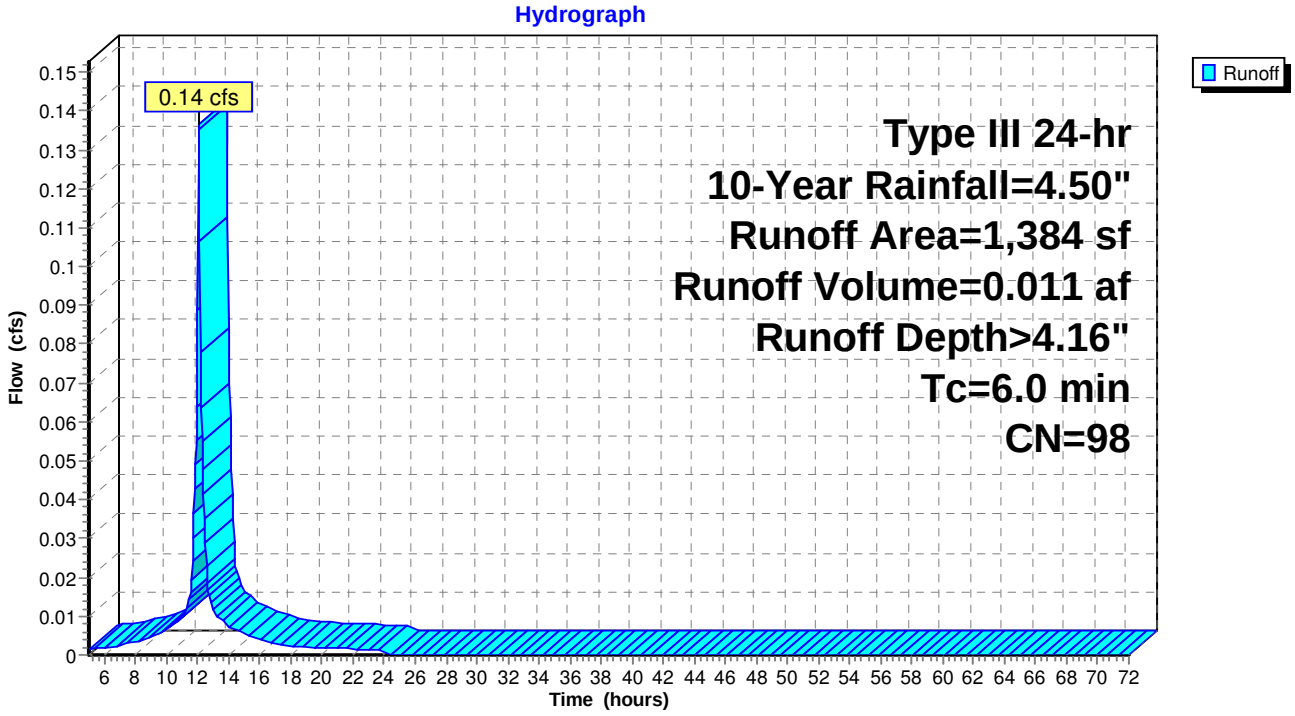
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 4.16"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.2: Roof/2



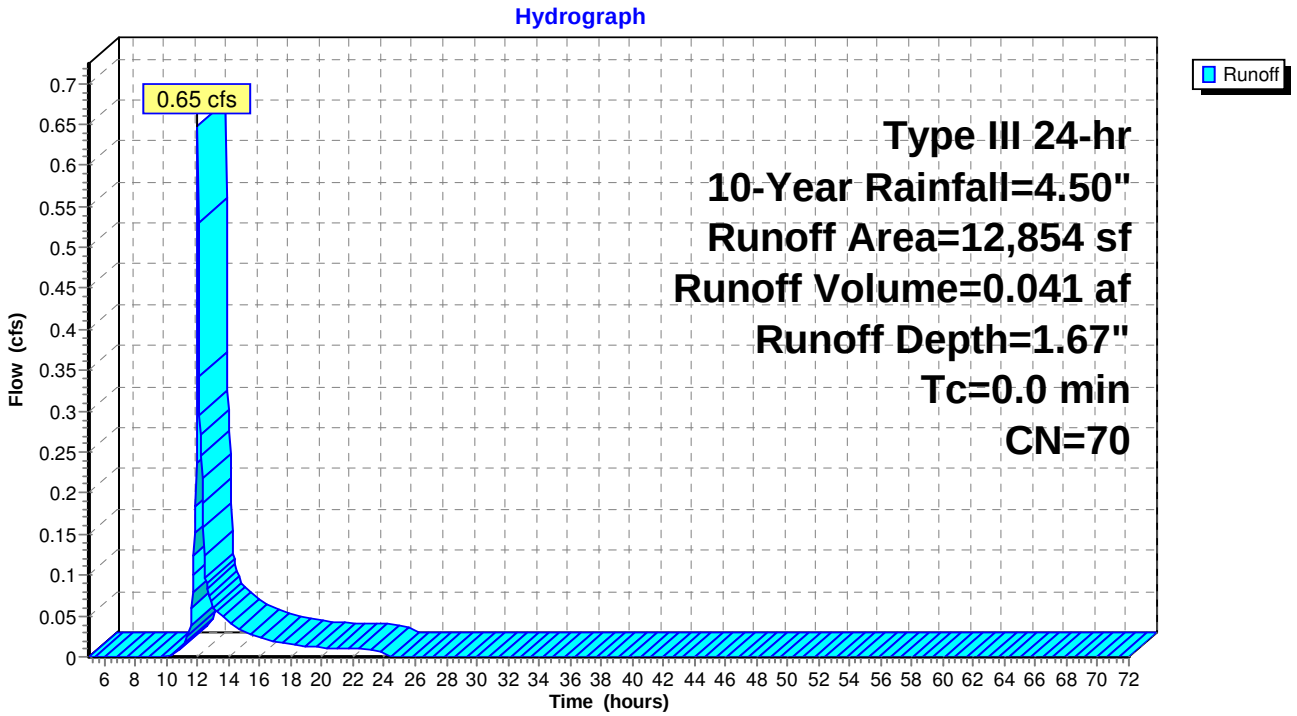
Summary for Subcatchment P3: Remainder

Runoff = 0.65 cfs @ 12.01 hrs, Volume= 0.041 af, Depth= 1.67"
Routed to Link Post : ExCulvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
12,854	70	Woods, Good, HSG C
12,854		100.00% Pervious Area

Subcatchment P3: Remainder



Summary for Pond 1P:

Inflow Area = 0.322 ac, 9.87% Impervious, Inflow Depth > 2.12" for 10-Year event
Inflow = 0.76 cfs @ 12.09 hrs, Volume= 0.057 af
Outflow = 0.61 cfs @ 12.16 hrs, Volume= 0.057 af, Atten= 19%, Lag= 3.9 min
Discarded = 0.01 cfs @ 12.16 hrs, Volume= 0.016 af
Primary = 0.60 cfs @ 12.16 hrs, Volume= 0.041 af
Routed to Pond 2P : Forebay

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 768.21' @ 12.16 hrs Surf.Area= 634 sf Storage= 335 cf

Plug-Flow detention time= 44.3 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 44.4 min (873.9 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	767.50'	1,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

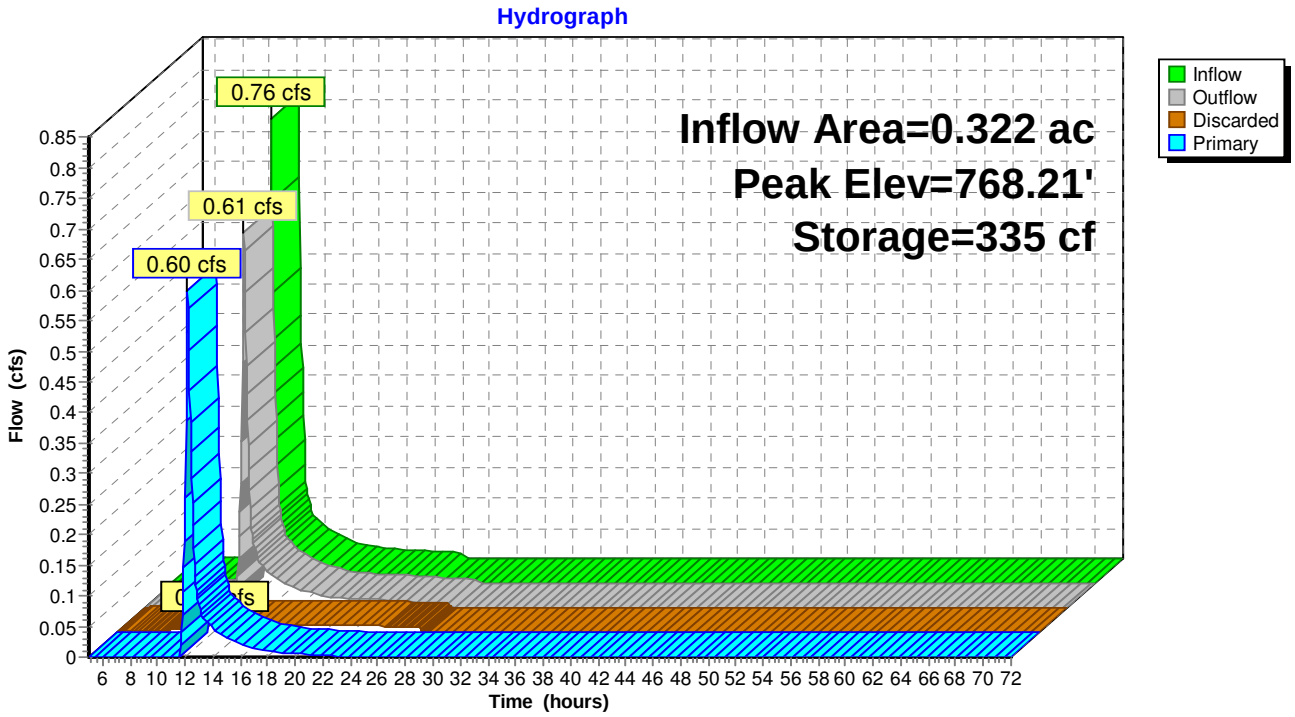
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
767.50	329	0	0
768.00	519	212	212
769.00	1,057	788	1,000

Device	Routing	Invert	Outlet Devices
#1	Primary	767.75'	**8.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.75' / 767.25' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	767.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.16 hrs HW=768.21' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.59 cfs @ 12.16 hrs HW=768.21' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.59 cfs @ 2.31 fps)

Pond 1P:


Hydrograph
Inflow Area=0.322 ac
Peak Elev=768.21'
Storage=335 cf
0.76 cfs
0.61 cfs
0.60 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond 2P: Forebay

Inflow Area = 0.343 ac, 9.26% Impervious, Inflow Depth > 1.65" for 10-Year event
Inflow = 0.64 cfs @ 12.16 hrs, Volume= 0.047 af
Outflow = 0.63 cfs @ 12.17 hrs, Volume= 0.047 af, Atten= 1%, Lag= 1.0 min
Discarded = 0.00 cfs @ 12.17 hrs, Volume= 0.003 af
Primary = 0.63 cfs @ 12.17 hrs, Volume= 0.044 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 767.48' @ 12.17 hrs Surf.Area= 114 sf Storage= 74 cf

Plug-Flow detention time= 12.4 min calculated for 0.047 af (100% of inflow)
Center-of-Mass det. time= 12.8 min (816.3 - 803.5)

Volume	Invert	Avail.Storage	Storage Description
#1	766.50'	348 cf	**Custom Stage Data (Prismatic)** Listed below

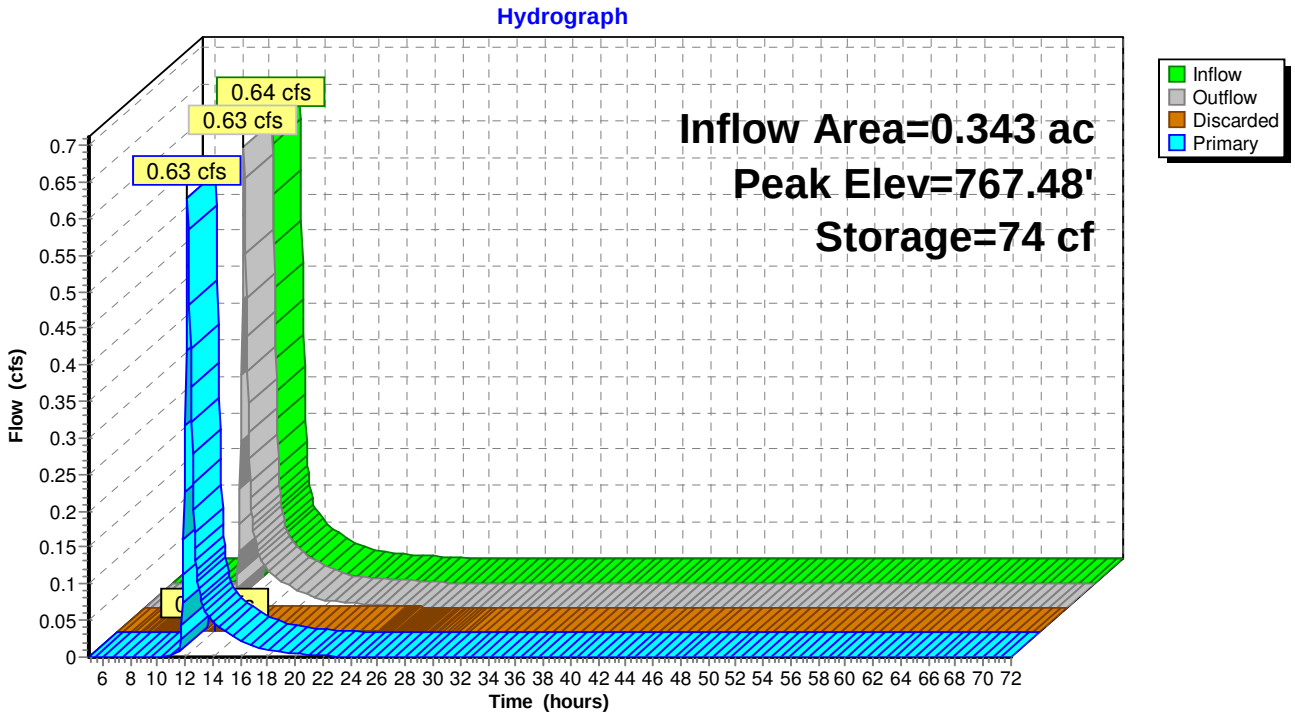
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
766.50	0	0	0
767.00	72	18	18
768.00	161	117	135
769.00	265	213	348

Device	Routing	Invert	Outlet Devices
#1	Primary	767.00'	**8.0" Round Culvert** L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.00' / 766.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	766.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.17 hrs HW=767.47' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.62 cfs @ 12.17 hrs HW=767.47' (Free Discharge)
1=Culvert (Inlet Controls 0.62 cfs @ 2.34 fps)

Pond 2P: Forebay



Summary for Pond 3P:

Inflow Area = 0.645 ac, 9.85% Impervious, Inflow Depth > 2.13" for 10-Year event
Inflow = 1.39 cfs @ 12.02 hrs, Volume= 0.115 af
Outflow = 0.99 cfs @ 12.23 hrs, Volume= 0.115 af, Atten= 29%, Lag= 12.7 min
Discarded = 0.02 cfs @ 12.23 hrs, Volume= 0.006 af
Primary = 0.97 cfs @ 12.23 hrs, Volume= 0.108 af
Routed to Link Post : ExCulvert

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 765.48' @ 12.23 hrs Surf.Area= 925 sf Storage= 722 cf

Plug-Flow detention time= 20.2 min calculated for 0.115 af (100% of inflow)
Center-of-Mass det. time= 20.5 min (824.9 - 804.4)

Volume	Invert	Avail.Storage	Storage Description
#1	762.75'	1,341 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

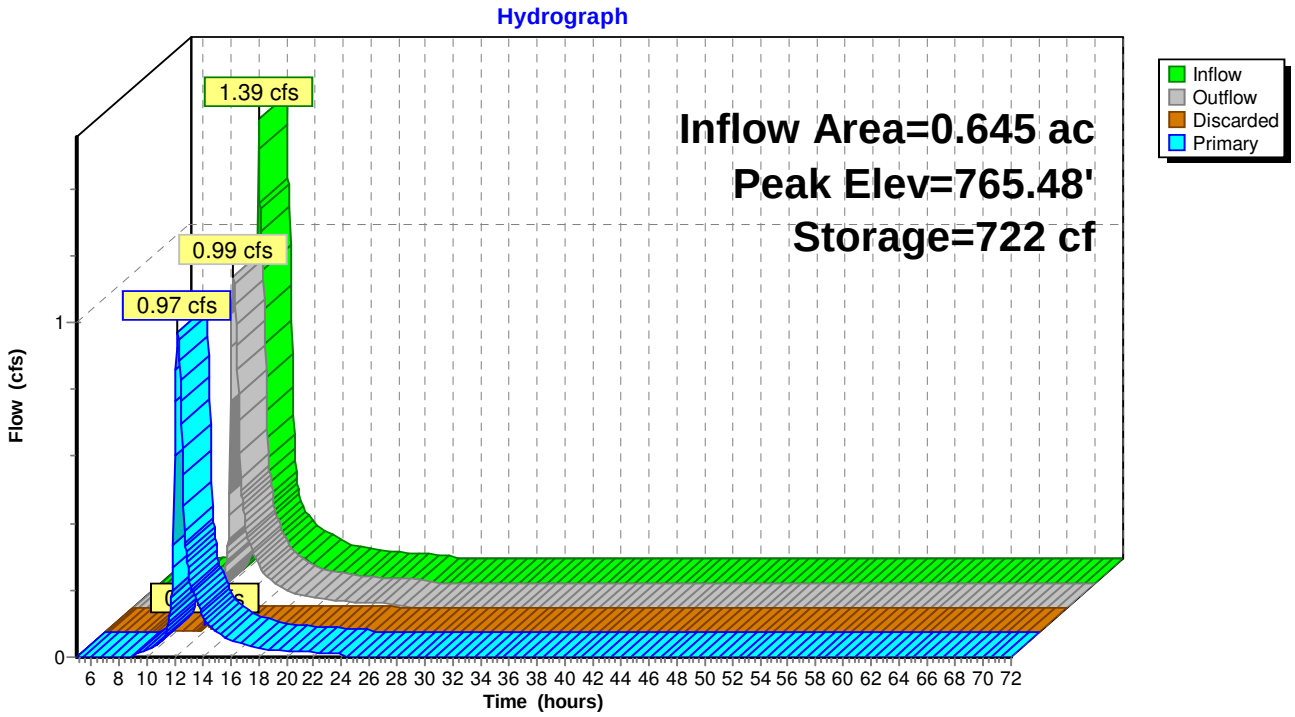
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
762.75	1	0	0
763.00	36	5	5
764.00	154	95	100
765.00	437	296	395
766.00	1,455	946	1,341

Device	Routing	Invert	Outlet Devices
#1	Discarded	762.75'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	763.60'	**8.0" Round Culvert** L= 15.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 763.60' / 763.00' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#3	Device 2	763.25'	**2.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	764.45'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	764.90'	**2.7" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 2	765.20'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 2	765.40'	**3.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.23 hrs HW=765.48' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.97 cfs @ 12.23 hrs HW=765.48' (Free Discharge)
└**2=Culvert** (Passes 0.97 cfs of 2.09 cfs potential flow)
- **3=Orifice/Grate** (Orifice Controls 0.29 cfs @ 6.60 fps)
- **4=Orifice/Grate** (Orifice Controls 0.16 cfs @ 4.63 fps)
- **5=Orifice/Grate** (Orifice Controls 0.39 cfs @ 3.28 fps)
- **6=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.88 fps)
- **7=Orifice/Grate** (Orifice Controls 0.04 cfs @ 0.94 fps)

Pond 3P:

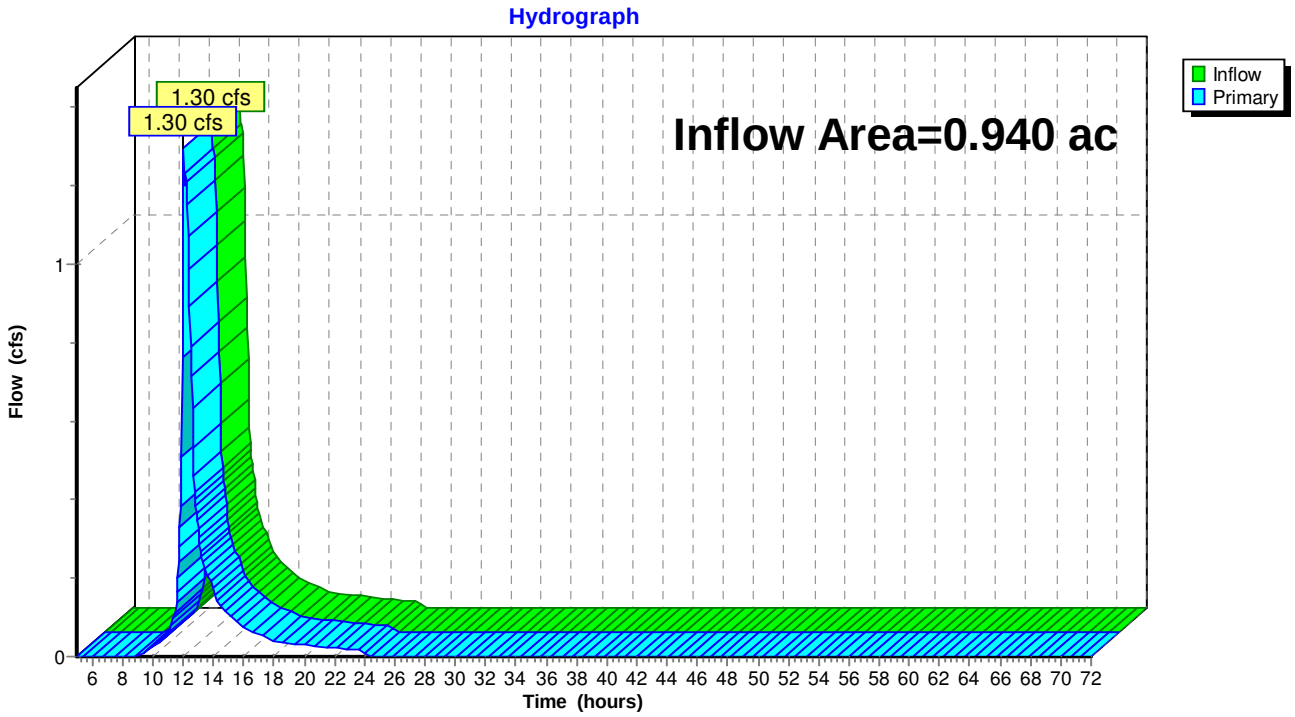

Hydrograph
Inflow Area=0.645 ac
Peak Elev=765.48'
Storage=722 cf
1.39 cfs
0.99 cfs
0.97 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
1
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Summary for Link Post: ExCulvert

Inflow Area = 0.940 ac, 6.76% Impervious, Inflow Depth = 1.91" for 10-Year event
Inflow = 1.30 cfs @ 12.04 hrs, Volume= 0.150 af
Primary = 1.30 cfs @ 12.04 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs

Link Post: ExCulvert



Summary for Subcatchment P1.1:

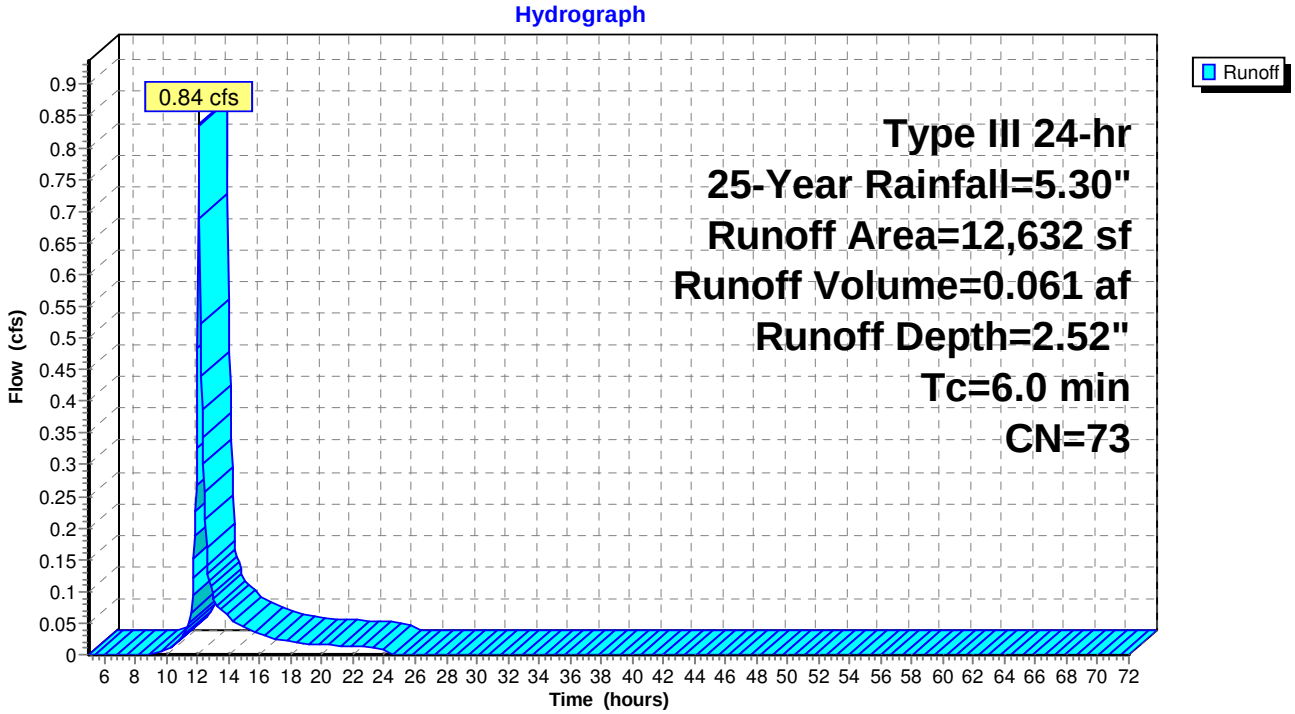
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 2.52"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

	Area (sf)	CN	Description
	1,080	96	Gravel surface, HSG C
*	850	79	50-75% Grass cover, Fair, HSG C
	10,702	70	Woods, Good, HSG C
	12,632	73	Weighted Average
	12,632		100.00% Pervious Area

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

Subcatchment P1.1:



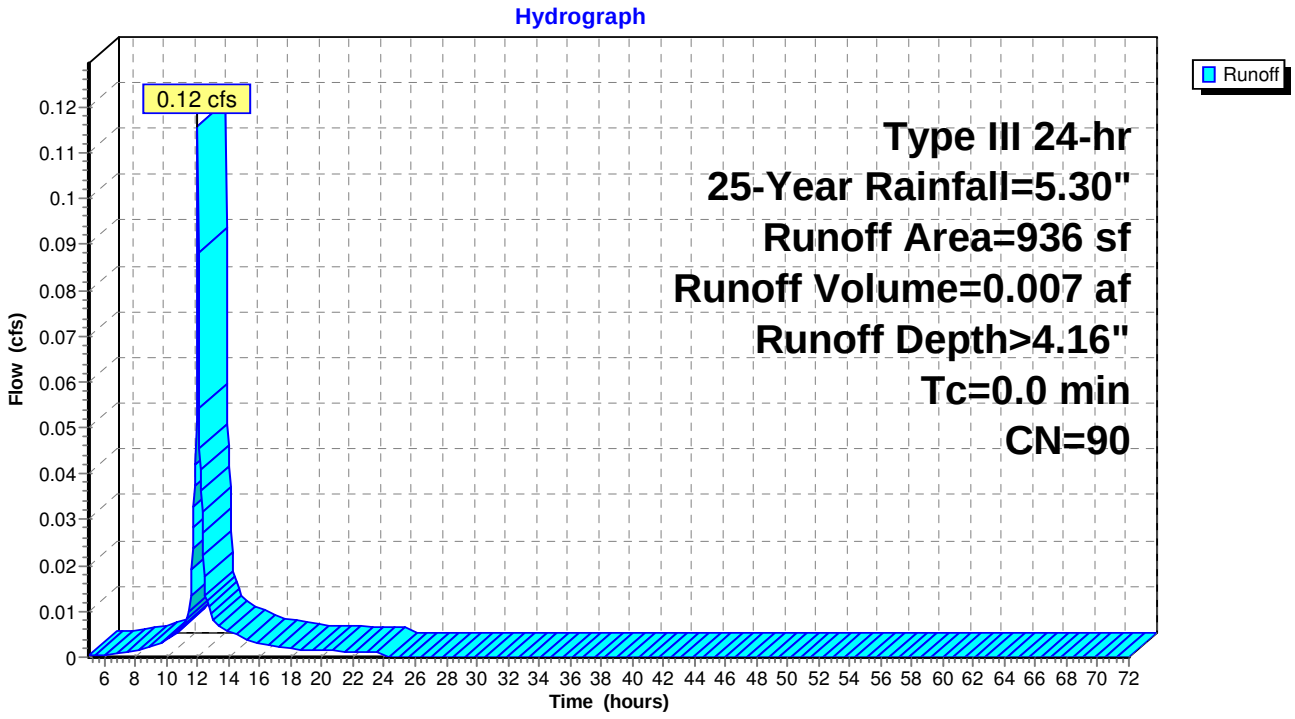
Summary for Subcatchment P1.2:

Runoff = 0.12 cfs @ 12.00 hrs, Volume= 0.007 af, Depth> 4.16"
Routed to Pond 2P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
343	79	50-75% Grass cover, Fair, HSG C
593	96	Gravel surface, HSG C
936	90	Weighted Average
936		100.00% Pervious Area

Subcatchment P1.2:



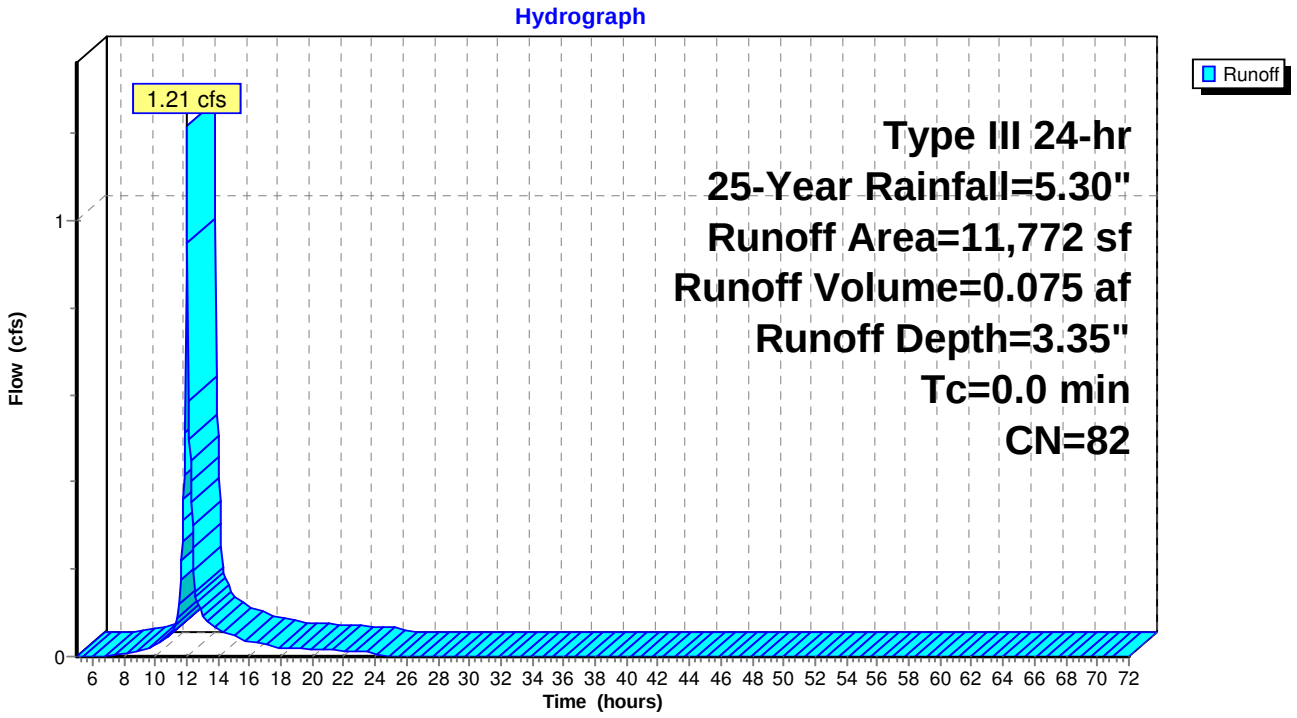
Summary for Subcatchment P1.3:

Runoff = 1.21 cfs @ 12.00 hrs, Volume= 0.075 af, Depth= 3.35"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
2,309	79	50-75% Grass cover, Fair, HSG C
4,596	96	Gravel surface, HSG C
4,867	70	Woods, Good, HSG C
11,772	82	Weighted Average
11,772		100.00% Pervious Area

Subcatchment P1.3:



Summary for Subcatchment P2.1: Roof/2

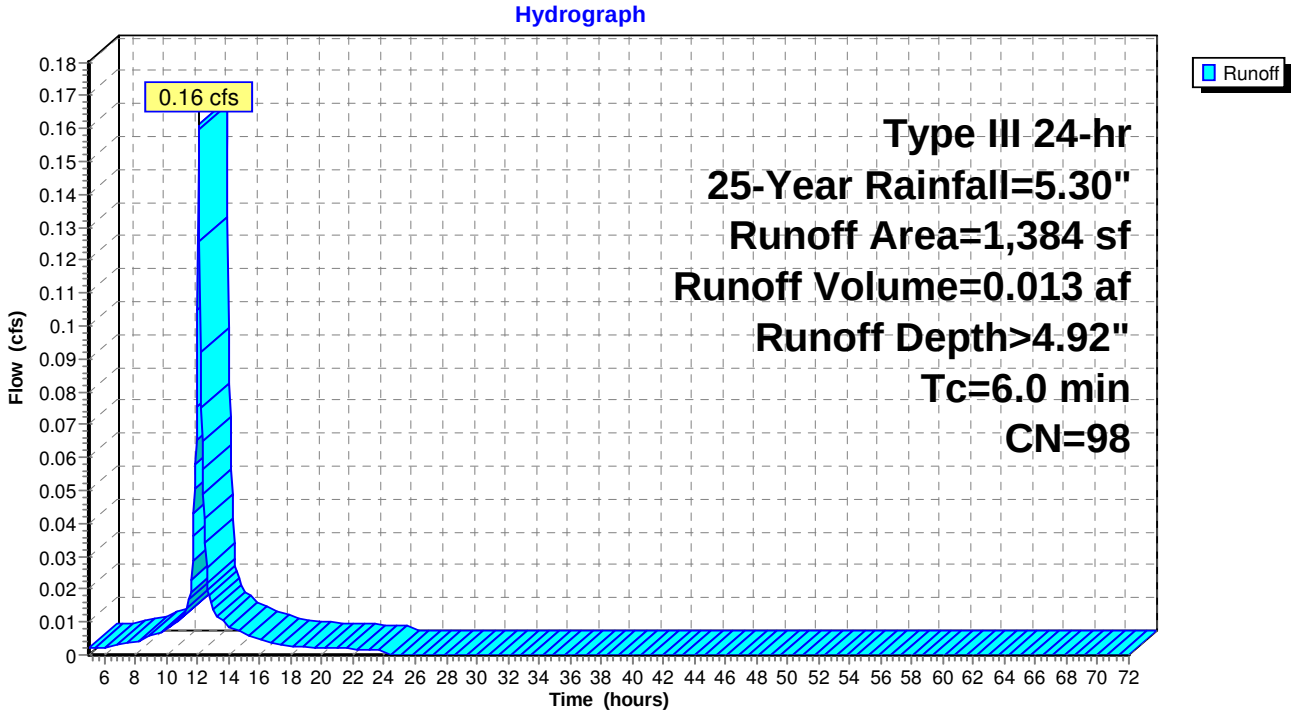
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Depth> 4.92"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.1: Roof/2



Summary for Subcatchment P2.2: Roof/2

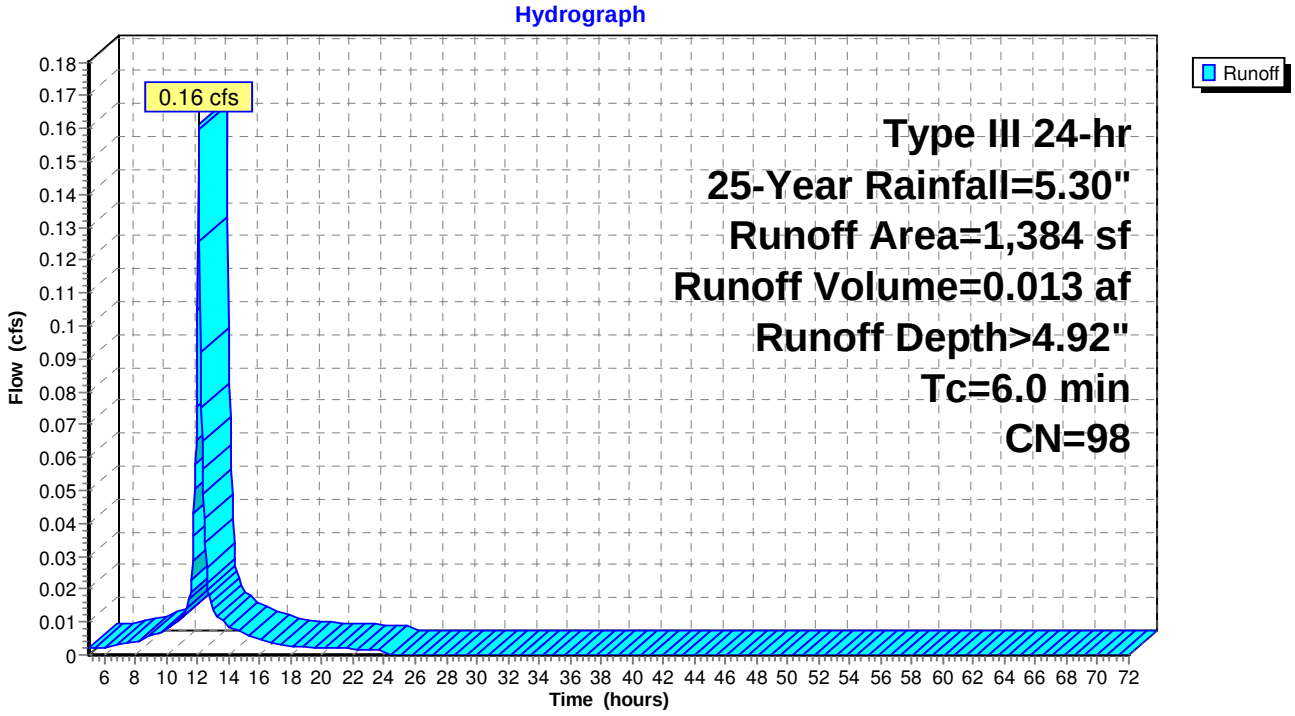
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Depth> 4.92"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.2: Roof/2



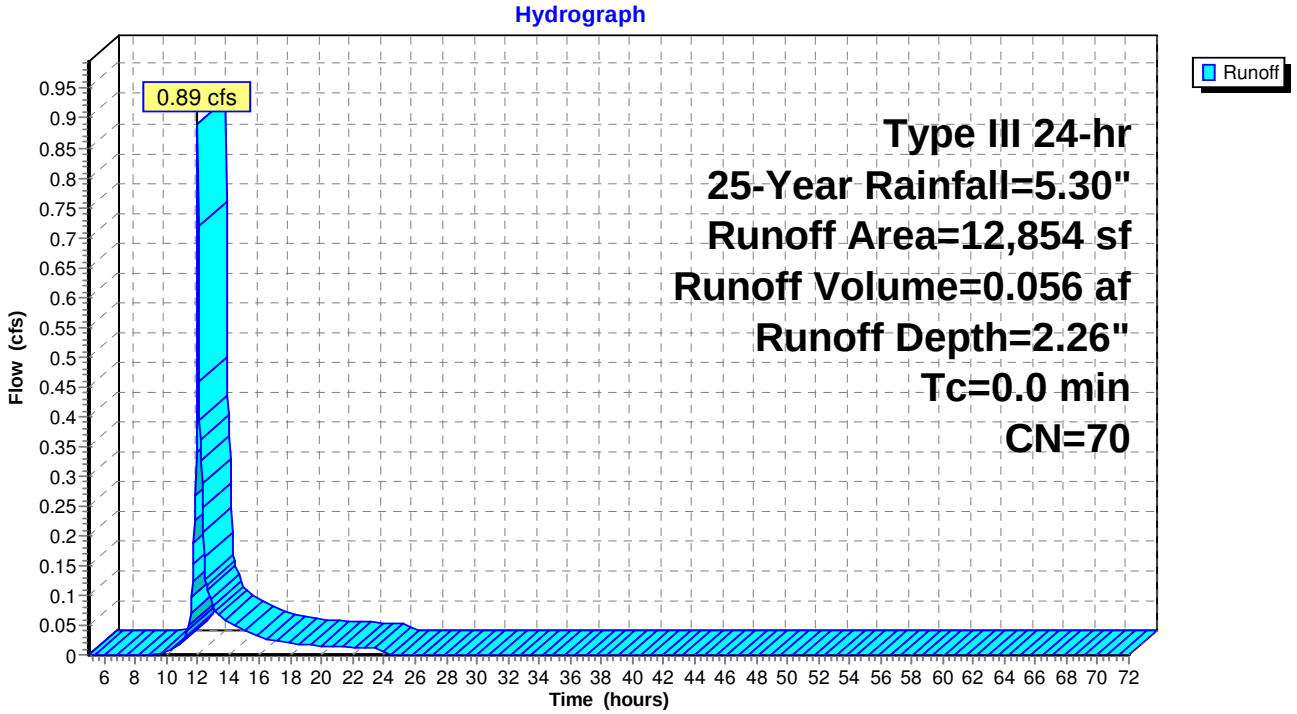
Summary for Subcatchment P3: Remainder

Runoff = 0.89 cfs @ 12.01 hrs, Volume= 0.056 af, Depth= 2.26"
Routed to Link Post : ExCulvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
12,854	70	Woods, Good, HSG C
12,854		100.00% Pervious Area

Subcatchment P3: Remainder



Summary for Pond 1P:

Inflow Area = 0.322 ac, 9.87% Impervious, Inflow Depth > 2.76" for 25-Year event
Inflow = 1.00 cfs @ 12.09 hrs, Volume= 0.074 af
Outflow = 0.80 cfs @ 12.16 hrs, Volume= 0.074 af, Atten= 19%, Lag= 3.9 min
Discarded = 0.02 cfs @ 12.16 hrs, Volume= 0.017 af
Primary = 0.79 cfs @ 12.16 hrs, Volume= 0.057 af
Routed to Pond 2P : Forebay

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 768.30' @ 12.16 hrs Surf.Area= 683 sf Storage= 395 cf

Plug-Flow detention time= 37.7 min calculated for 0.074 af (100% of inflow)
Center-of-Mass det. time= 37.6 min (861.5 - 823.9)

Volume	Invert	Avail.Storage	Storage Description
#1	767.50'	1,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

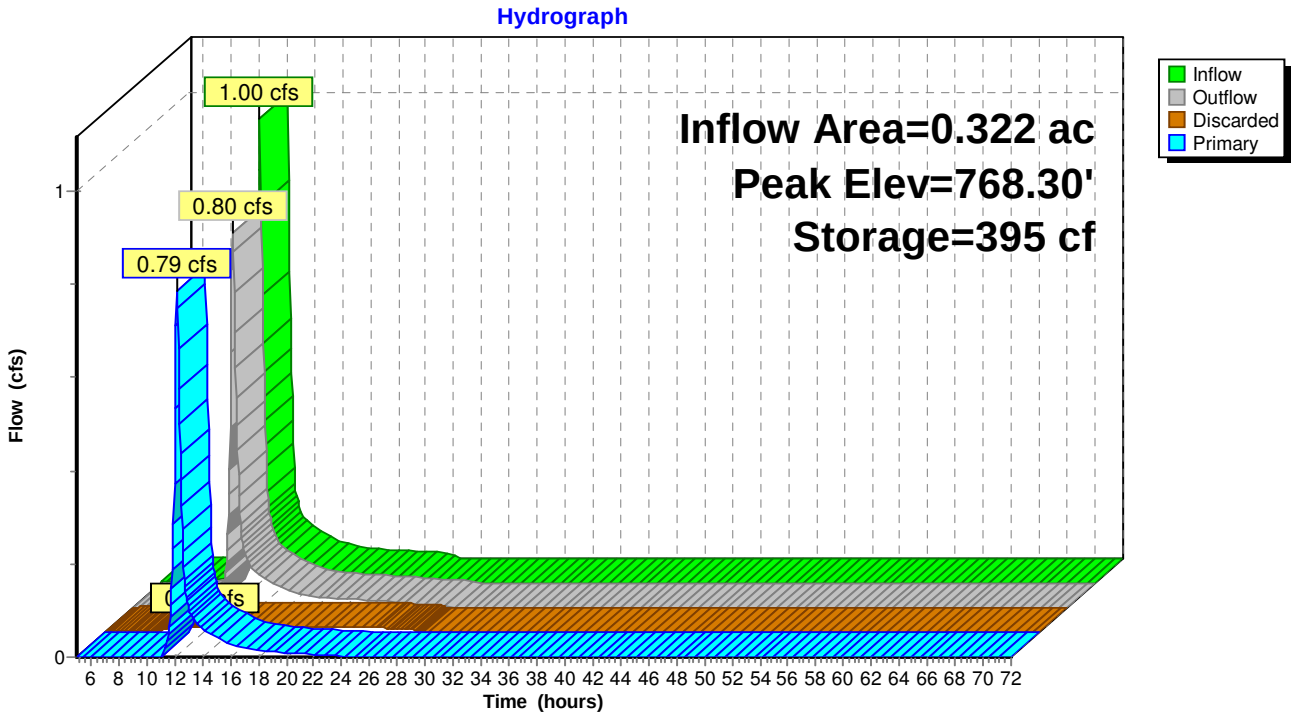
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
767.50	329	0	0
768.00	519	212	212
769.00	1,057	788	1,000

Device	Routing	Invert	Outlet Devices
#1	Primary	767.75'	**8.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.75' / 767.25' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	767.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.16 hrs HW=768.30' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.78 cfs @ 12.16 hrs HW=768.30' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.78 cfs @ 2.53 fps)

Pond 1P:


Hydrograph
Inflow
Outflow
Discarded
Primary
1.00 cfs
0.80 cfs
0.79 cfs
Inflow Area=0.322 ac
Peak Elev=768.30'
Storage=395 cf
Flow (cfs)
Time (hours)
0
1
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 2P: Forebay

Inflow Area = 0.343 ac, 9.26% Impervious, Inflow Depth > 2.27" for 25-Year event
Inflow = 0.83 cfs @ 12.16 hrs, Volume= 0.065 af
Outflow = 0.82 cfs @ 12.17 hrs, Volume= 0.065 af, Atten= 1%, Lag= 1.0 min
Discarded = 0.00 cfs @ 12.17 hrs, Volume= 0.003 af
Primary = 0.82 cfs @ 12.17 hrs, Volume= 0.062 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 767.57' @ 12.17 hrs Surf.Area= 123 sf Storage= 85 cf

Plug-Flow detention time= 11.2 min calculated for 0.065 af (100% of inflow)
Center-of-Mass det. time= 10.4 min (817.2 - 806.8)

Volume	Invert	Avail.Storage	Storage Description
#1	766.50'	348 cf	**Custom Stage Data (Prismatic)** Listed below

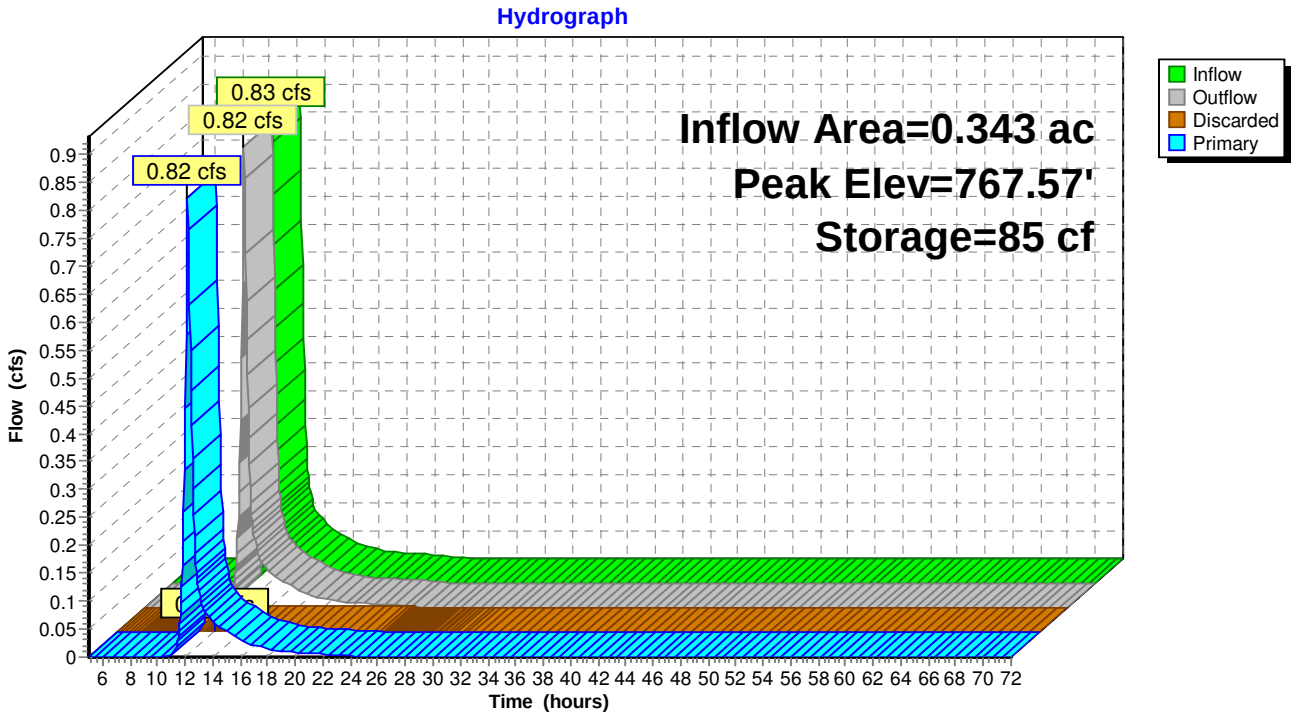
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
766.50	0	0	0
767.00	72	18	18
768.00	161	117	135
769.00	265	213	348

Device	Routing	Invert	Outlet Devices
#1	Primary	767.00'	**8.0" Round Culvert** L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.00' / 766.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	766.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.17 hrs HW=767.57' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.81 cfs @ 12.17 hrs HW=767.57' (Free Discharge)
1=Culvert (Inlet Controls 0.81 cfs @ 2.56 fps)

Pond 2P: Forebay



Summary for Pond 3P:

Inflow Area = 0.645 ac, 9.85% Impervious, Inflow Depth > 2.80" for 25-Year event
Inflow = 1.80 cfs @ 12.02 hrs, Volume= 0.150 af
Outflow = 1.33 cfs @ 12.21 hrs, Volume= 0.150 af, Atten= 26%, Lag= 11.4 min
Discarded = 0.03 cfs @ 12.21 hrs, Volume= 0.007 af
Primary = 1.30 cfs @ 12.21 hrs, Volume= 0.143 af
Routed to Link Post : ExCulvert

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 765.64' @ 12.21 hrs Surf.Area= 1,089 sf Storage= 884 cf

Plug-Flow detention time= 18.3 min calculated for 0.150 af (100% of inflow)
Center-of-Mass det. time= 18.2 min (821.2 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	762.75'	1,341 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

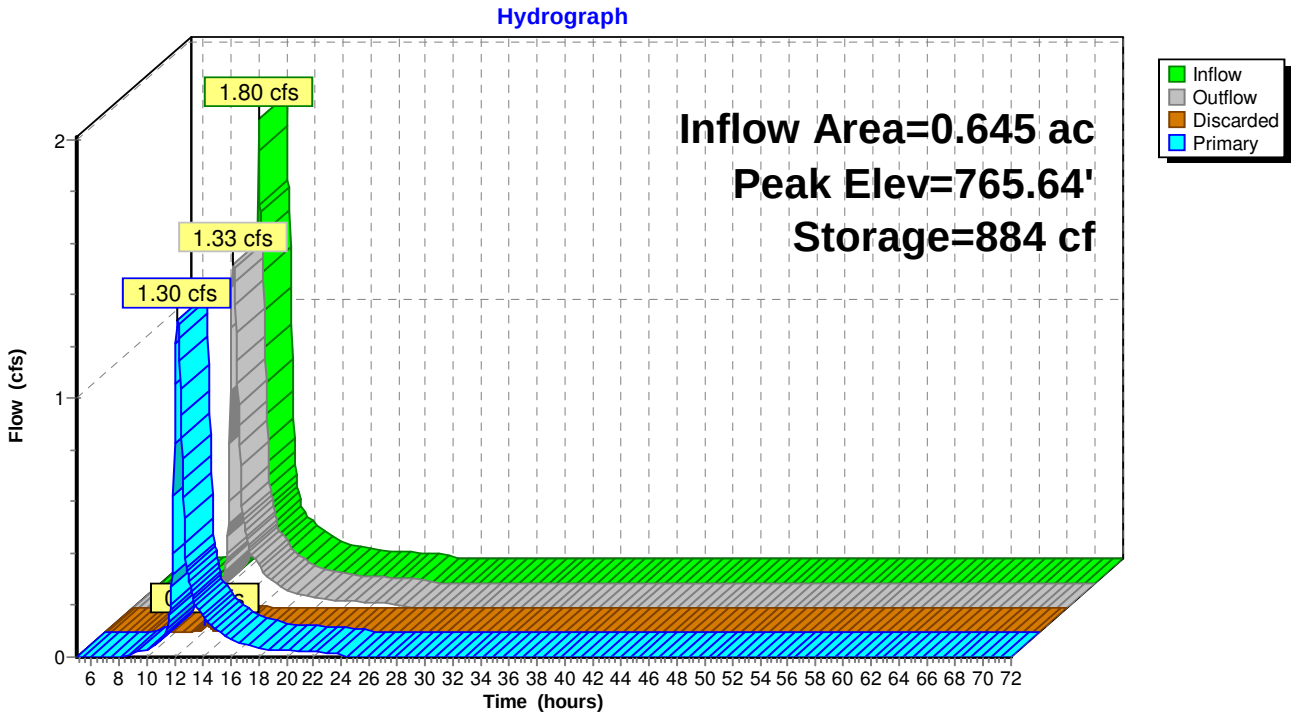
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
762.75	1	0	0
763.00	36	5	5
764.00	154	95	100
765.00	437	296	395
766.00	1,455	946	1,341

Device	Routing	Invert	Outlet Devices
#1	Discarded	762.75'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	763.60'	**8.0" Round Culvert** L= 15.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 763.60' / 763.00' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#3	Device 2	763.25'	**2.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	764.45'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	764.90'	**2.7" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 2	765.20'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 2	765.40'	**3.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.21 hrs HW=765.64' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.30 cfs @ 12.21 hrs HW=765.64' (Free Discharge)
└**2=Culvert** (Passes 1.30 cfs of 2.20 cfs potential flow)
- **3=Orifice/Grate** (Orifice Controls 0.30 cfs @ 6.88 fps)
- **4=Orifice/Grate** (Orifice Controls 0.17 cfs @ 5.02 fps)
- **5=Orifice/Grate** (Orifice Controls 0.45 cfs @ 3.81 fps)
- **6=Orifice/Grate** (Orifice Controls 0.13 cfs @ 2.70 fps)
- **7=Orifice/Grate** (Orifice Controls 0.24 cfs @ 1.66 fps)

Pond 3P:

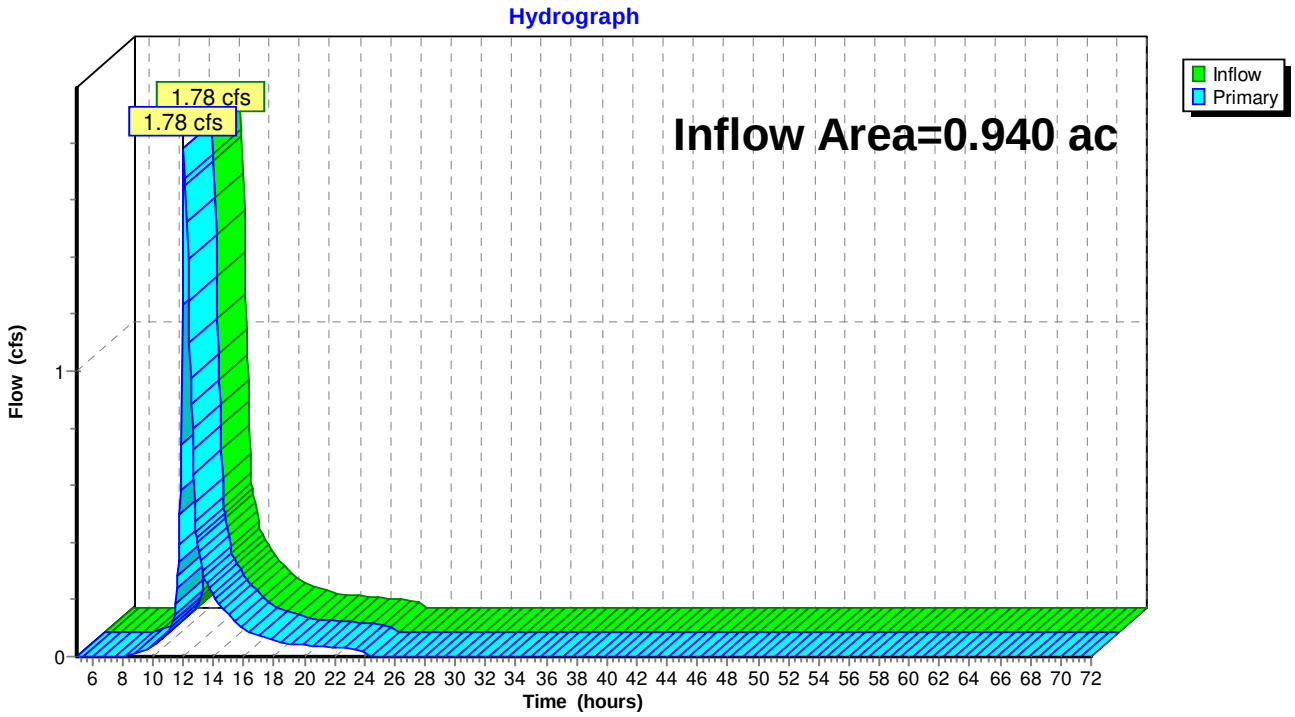

Hydrograph
Inflow
Outflow
Discarded
Primary
1.80 cfs
1.33 cfs
1.30 cfs
Inflow Area=0.645 ac
Peak Elev=765.64'
Storage=884 cf
Flow (cfs)
0
1
2
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Summary for Link Post: ExCulvert

Inflow Area = 0.940 ac, 6.76% Impervious, Inflow Depth = 2.54" for 25-Year event
Inflow = 1.78 cfs @ 12.04 hrs, Volume= 0.199 af
Primary = 1.78 cfs @ 12.04 hrs, Volume= 0.199 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs

Link Post: ExCulvert



Summary for Subcatchment P1.1:

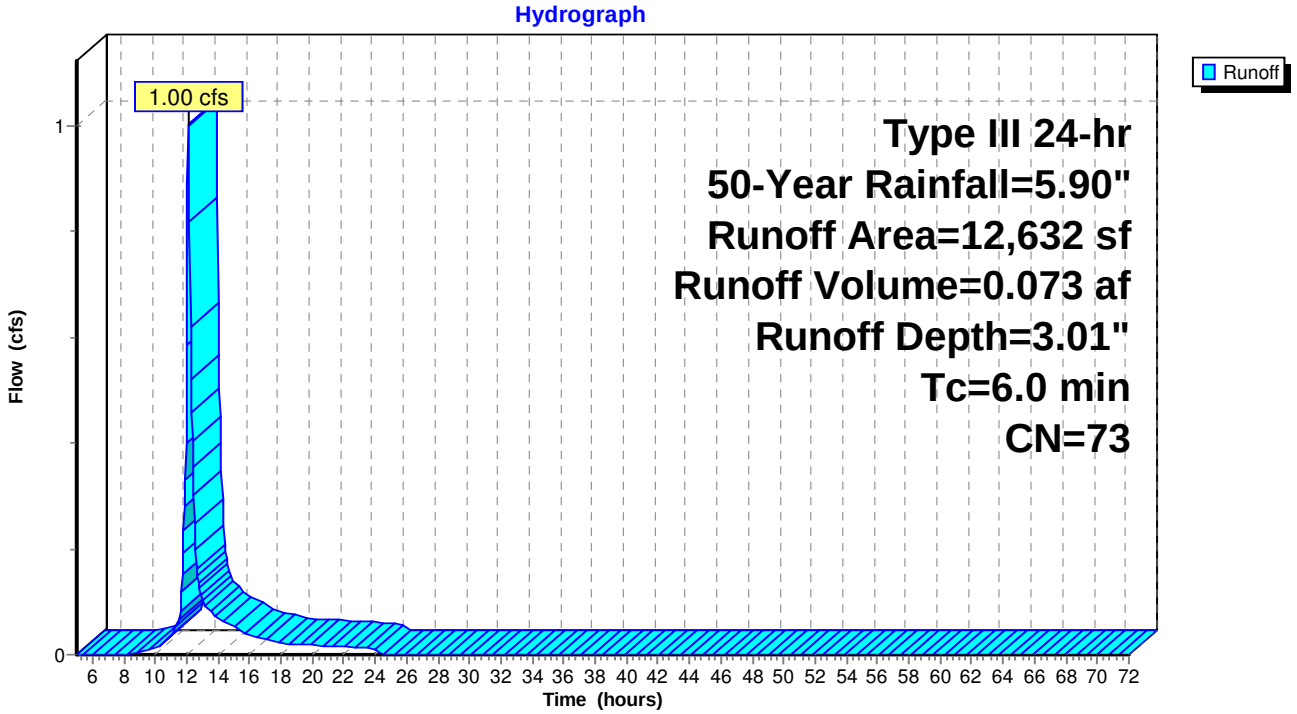
Runoff = 1.00 cfs @ 12.09 hrs, Volume= 0.073 af, Depth= 3.01"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

	Area (sf)	CN	Description
	1,080	96	Gravel surface, HSG C
*	850	79	50-75% Grass cover, Fair, HSG C
	10,702	70	Woods, Good, HSG C
	12,632	73	Weighted Average
	12,632		100.00% Pervious Area

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

Subcatchment P1.1:



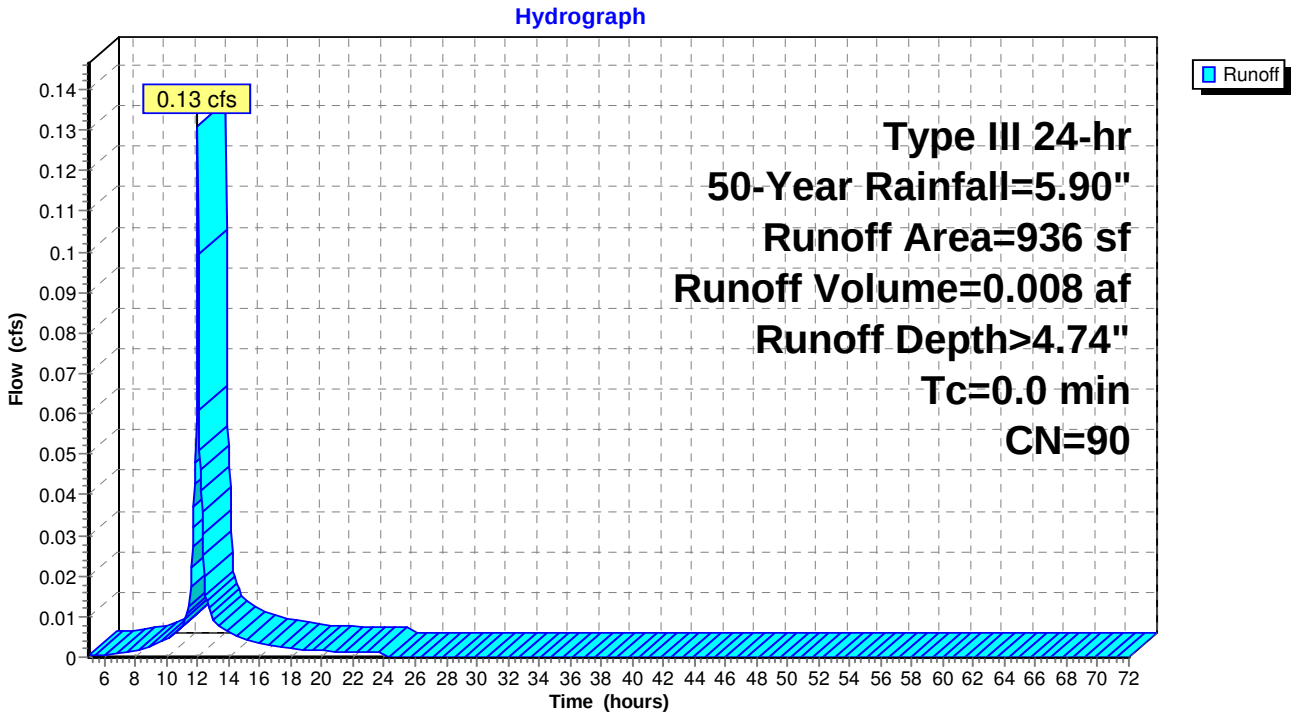
Summary for Subcatchment P1.2:

Runoff = 0.13 cfs @ 12.00 hrs, Volume= 0.008 af, Depth> 4.74"
Routed to Pond 2P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
343	79	50-75% Grass cover, Fair, HSG C
593	96	Gravel surface, HSG C
936	90	Weighted Average
936		100.00% Pervious Area

Subcatchment P1.2:



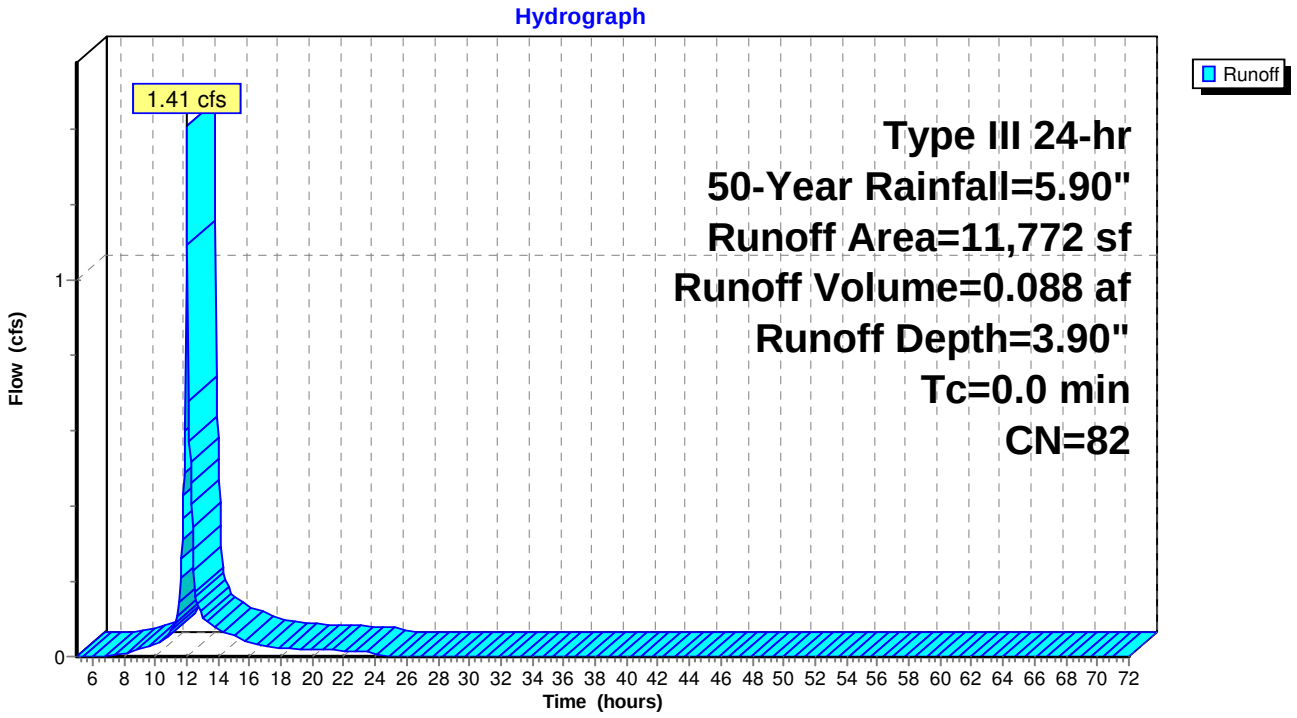
Summary for Subcatchment P1.3:

Runoff = 1.41 cfs @ 12.00 hrs, Volume= 0.088 af, Depth= 3.90"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
2,309	79	50-75% Grass cover, Fair, HSG C
4,596	96	Gravel surface, HSG C
4,867	70	Woods, Good, HSG C
11,772	82	Weighted Average
11,772		100.00% Pervious Area

Subcatchment P1.3:



Summary for Subcatchment P2.1: Roof/2

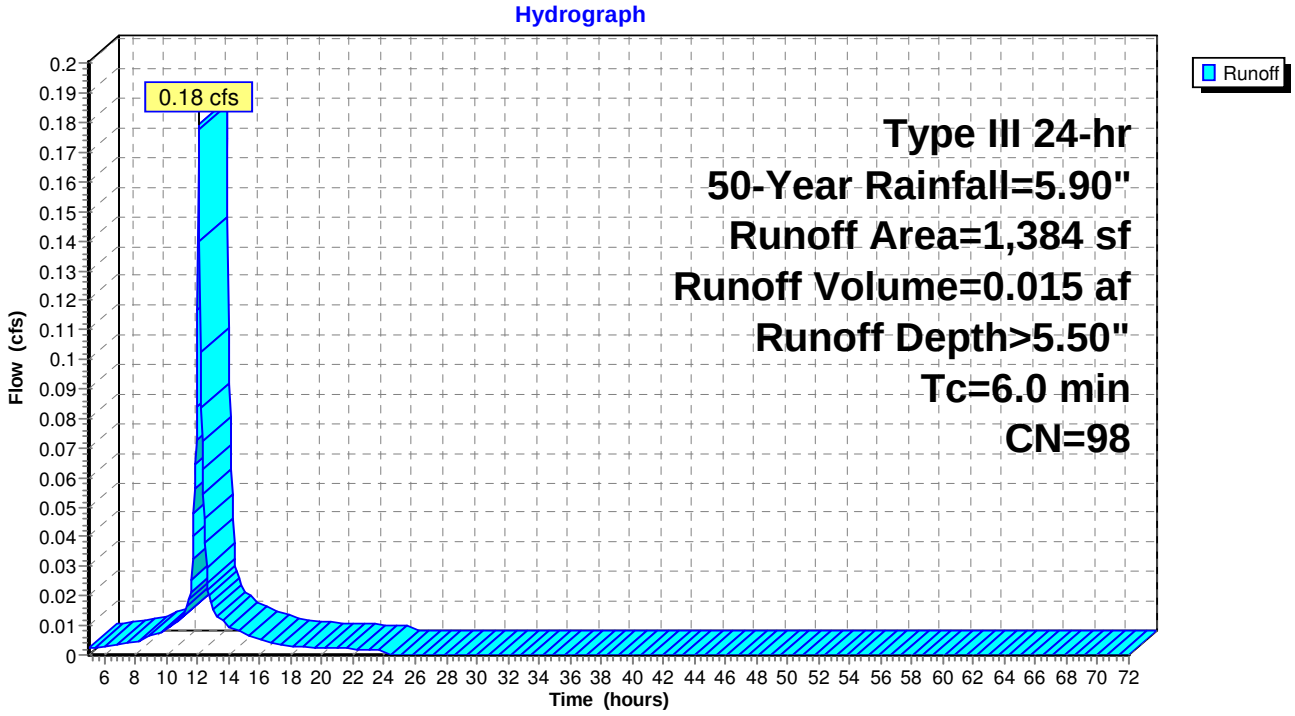
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 5.50"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.1: Roof/2



Summary for Subcatchment P2.2: Roof/2

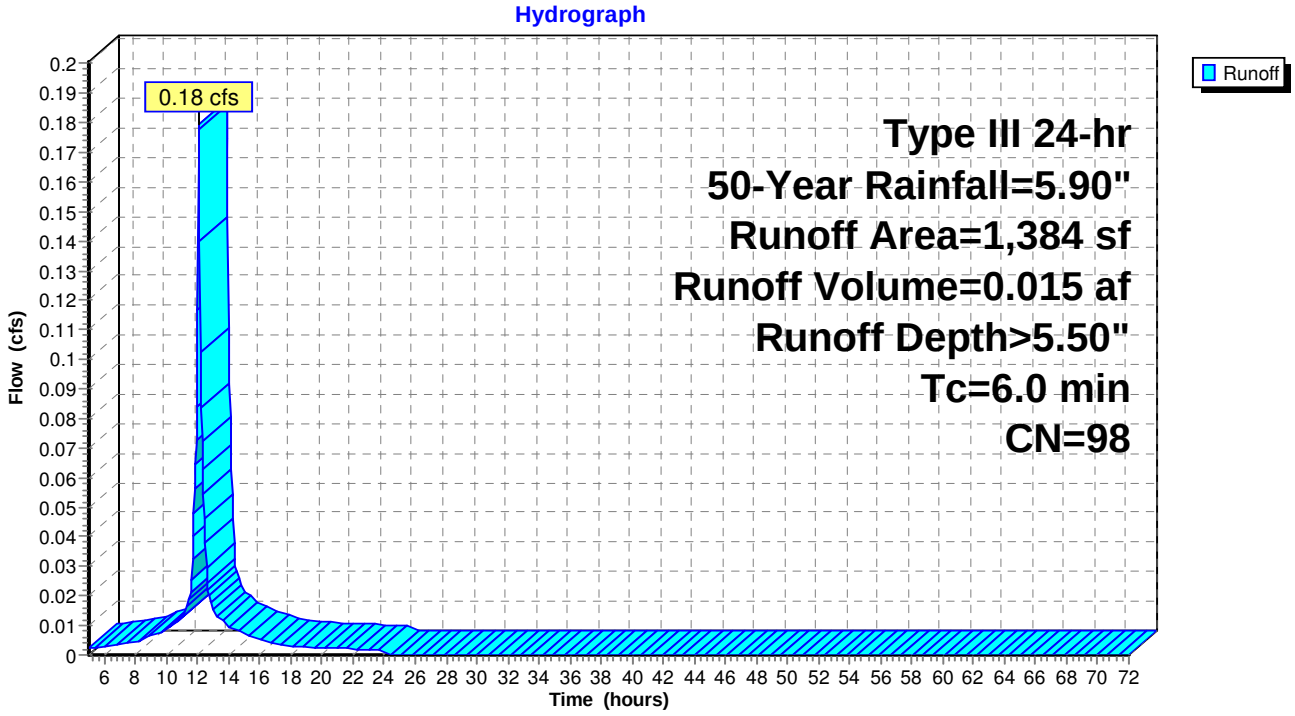
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 5.50"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.2: Roof/2



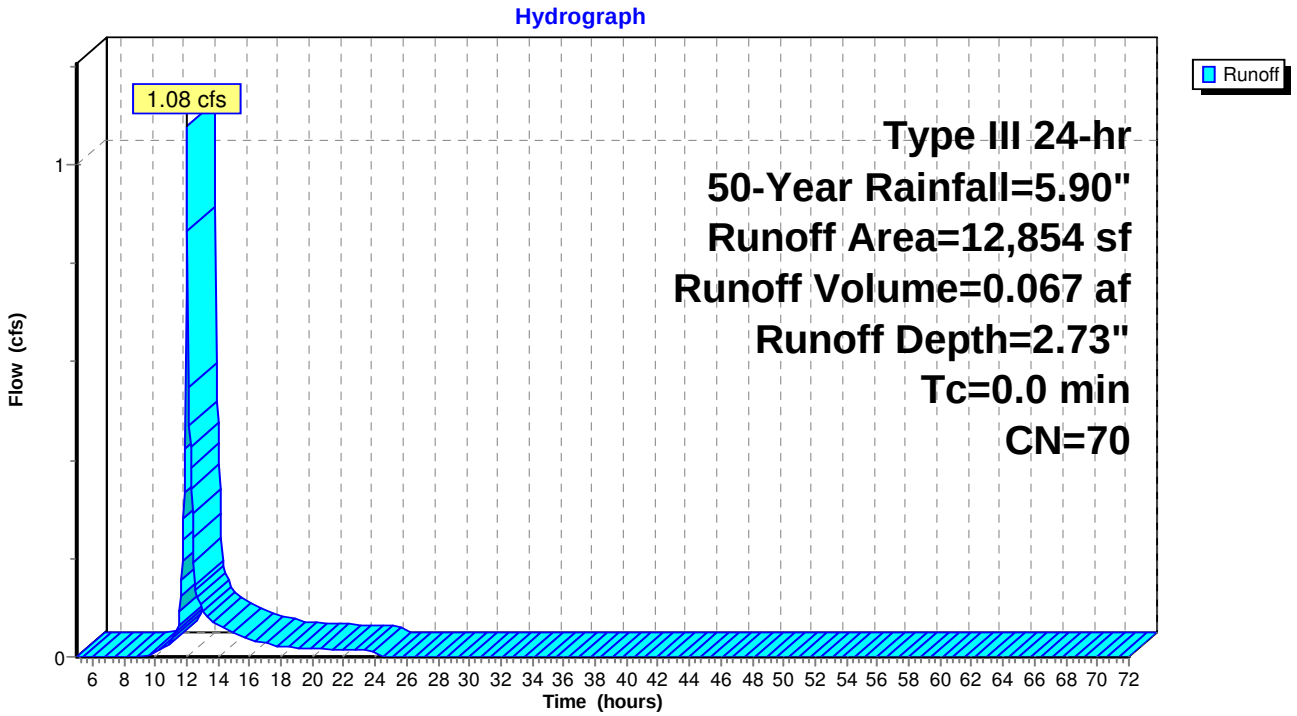
Summary for Subcatchment P3: Remainder

Runoff = 1.08 cfs @ 12.01 hrs, Volume= 0.067 af, Depth= 2.73"
Routed to Link Post : ExCulvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=5.90"

Area (sf)	CN	Description
12,854	70	Woods, Good, HSG C
12,854		100.00% Pervious Area

Subcatchment P3: Remainder



Summary for Pond 1P:

Inflow Area = 0.322 ac, 9.87% Impervious, Inflow Depth > 3.25" for 50-Year event
Inflow = 1.18 cfs @ 12.09 hrs, Volume= 0.087 af
Outflow = 0.93 cfs @ 12.16 hrs, Volume= 0.087 af, Atten= 21%, Lag= 4.1 min
Discarded = 0.02 cfs @ 12.16 hrs, Volume= 0.017 af
Primary = 0.92 cfs @ 12.16 hrs, Volume= 0.070 af
Routed to Pond 2P : Forebay

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 768.38' @ 12.16 hrs Surf.Area= 721 sf Storage= 445 cf

Plug-Flow detention time= 34.1 min calculated for 0.087 af (100% of inflow)
Center-of-Mass det. time= 33.9 min (854.1 - 820.2)

Volume	Invert	Avail.Storage	Storage Description
#1	767.50'	1,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

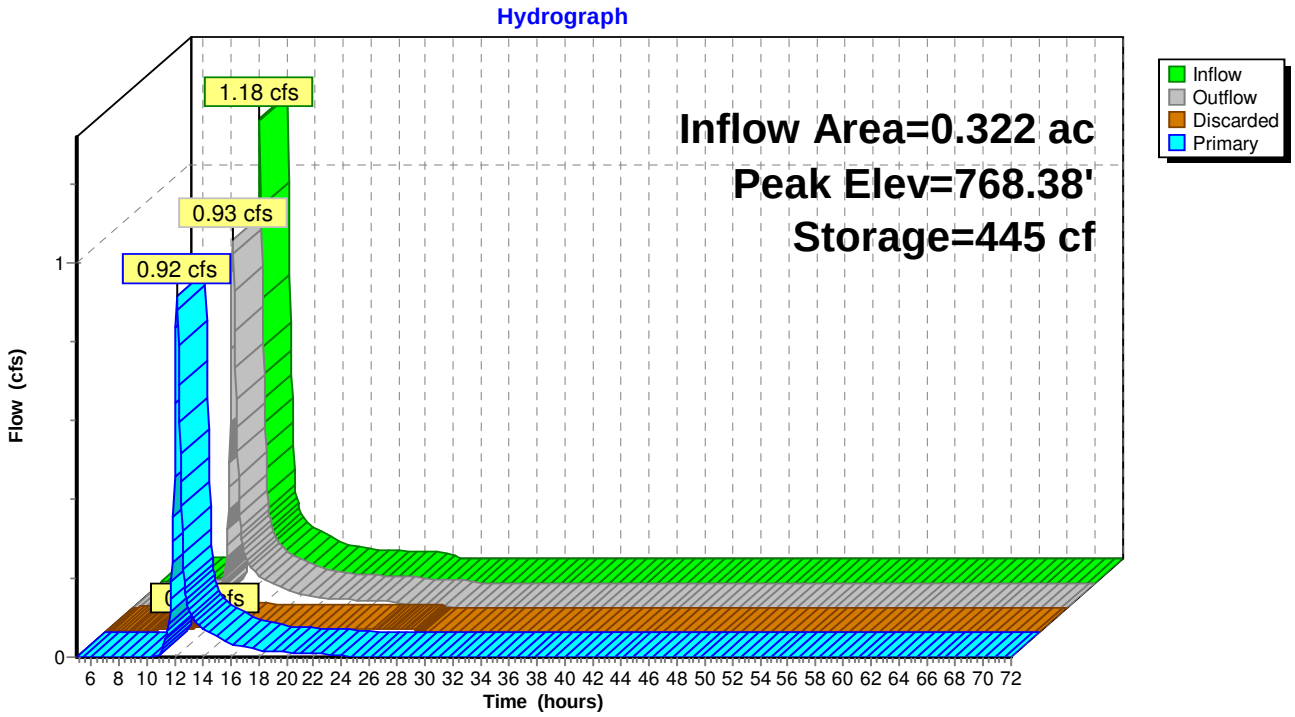
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
767.50	329	0	0
768.00	519	212	212
769.00	1,057	788	1,000

Device	Routing	Invert	Outlet Devices
#1	Primary	767.75'	**8.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.75' / 767.25' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	767.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.16 hrs HW=768.37' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.91 cfs @ 12.16 hrs HW=768.37' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.91 cfs @ 2.68 fps)

Pond 1P:


Hydrograph
Inflow Area=0.322 ac
Peak Elev=768.38'
Storage=445 cf
1.18 cfs
0.93 cfs
0.92 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 2P: Forebay

Inflow Area = 0.343 ac, 9.26% Impervious, Inflow Depth > 2.75" for 50-Year event
Inflow = 0.97 cfs @ 12.16 hrs, Volume= 0.079 af
Outflow = 0.96 cfs @ 12.18 hrs, Volume= 0.079 af, Atten= 1%, Lag= 1.2 min
Discarded = 0.00 cfs @ 12.18 hrs, Volume= 0.003 af
Primary = 0.95 cfs @ 12.18 hrs, Volume= 0.076 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 767.65' @ 12.18 hrs Surf.Area= 130 sf Storage= 94 cf

Plug-Flow detention time= 8.7 min calculated for 0.079 af (100% of inflow)
Center-of-Mass det. time= 9.1 min (816.7 - 807.6)

Volume	Invert	Avail.Storage	Storage Description
#1	766.50'	348 cf	**Custom Stage Data (Prismatic)** Listed below

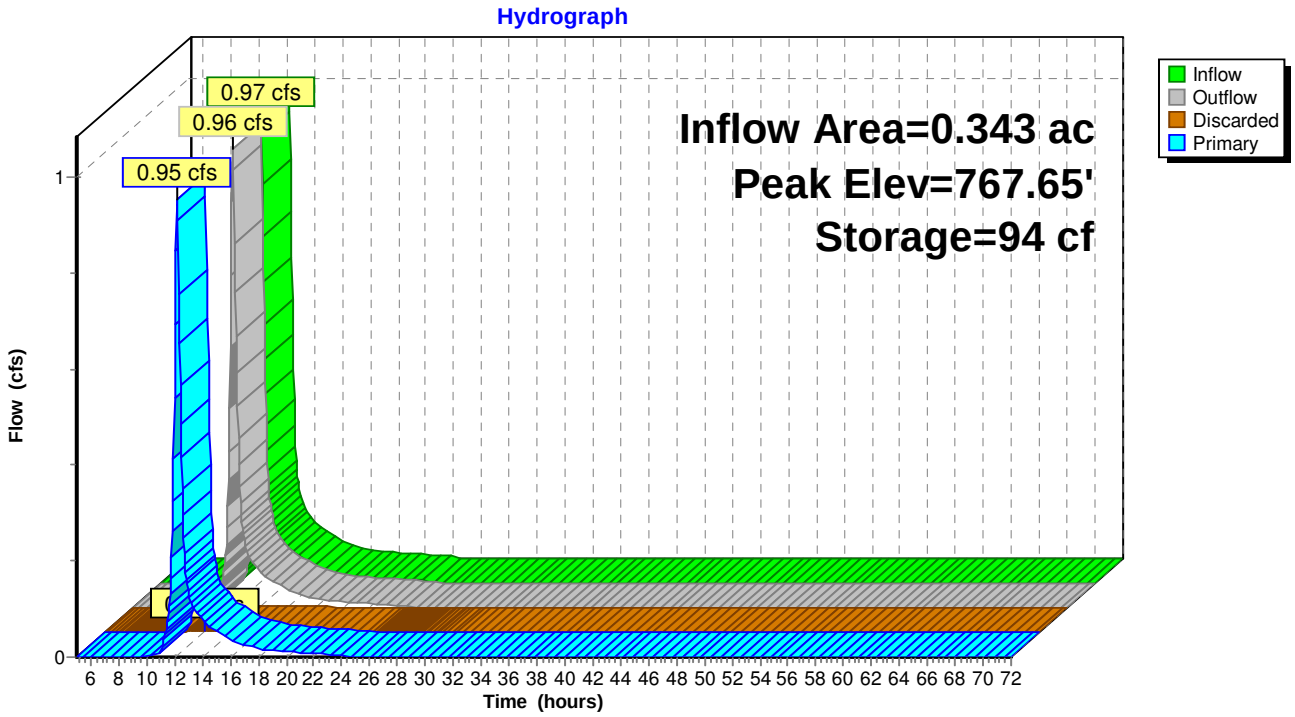
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
766.50	0	0	0
767.00	72	18	18
768.00	161	117	135
769.00	265	213	348

Device	Routing	Invert	Outlet Devices
#1	Primary	767.00'	**8.0" Round Culvert** L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.00' / 766.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	766.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.18 hrs HW=767.64' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.94 cfs @ 12.18 hrs HW=767.64' (Free Discharge)
1=Culvert (Inlet Controls 0.94 cfs @ 2.73 fps)

Pond 2P: Forebay



Summary for Pond 3P:

Inflow Area = 0.645 ac, 9.85% Impervious, Inflow Depth > 3.31" for 50-Year event
Inflow = 2.10 cfs @ 12.02 hrs, Volume= 0.178 af
Outflow = 1.51 cfs @ 12.22 hrs, Volume= 0.178 af, Atten= 28%, Lag= 12.0 min
Discarded = 0.03 cfs @ 12.22 hrs, Volume= 0.008 af
Primary = 1.48 cfs @ 12.22 hrs, Volume= 0.170 af
Routed to Link Post : ExCulvert

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 765.76' @ 12.22 hrs Surf.Area= 1,210 sf Storage= 1,021 cf

Plug-Flow detention time= 17.2 min calculated for 0.178 af (100% of inflow)
Center-of-Mass det. time= 17.1 min (818.9 - 801.8)

Volume	Invert	Avail.Storage	Storage Description
#1	762.75'	1,341 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

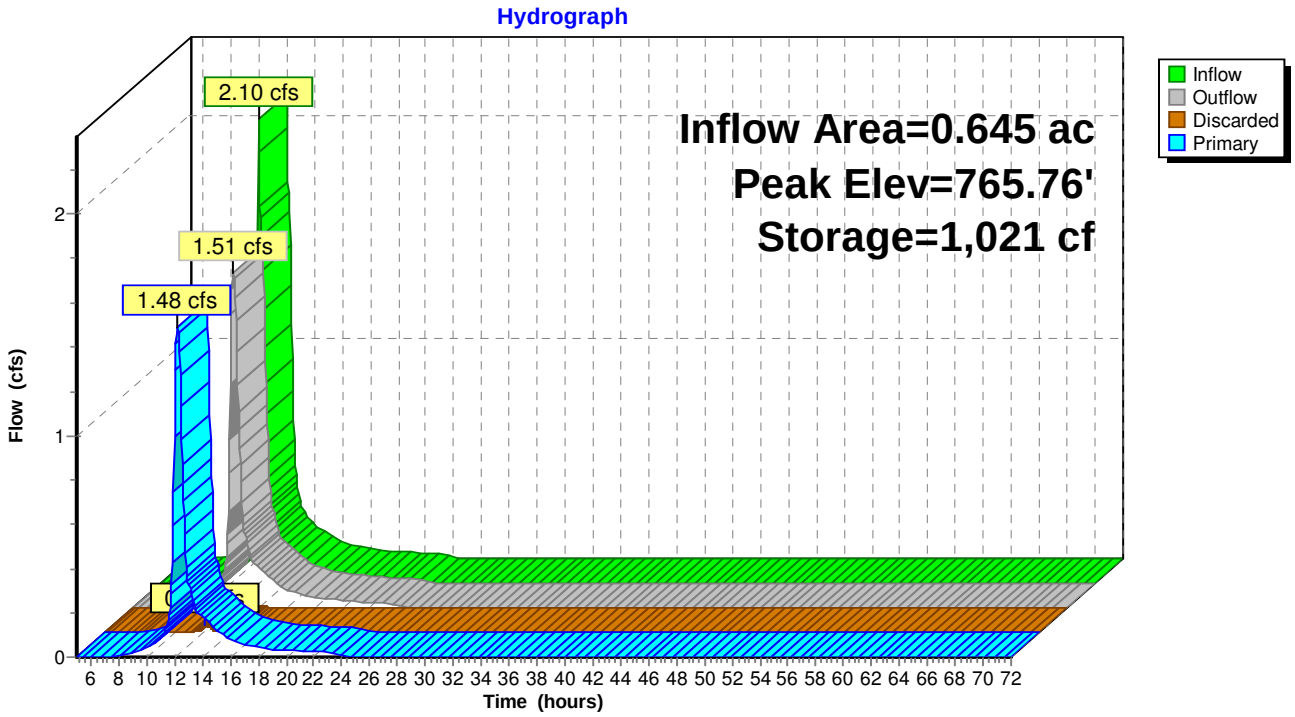
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
762.75	1	0	0
763.00	36	5	5
764.00	154	95	100
765.00	437	296	395
766.00	1,455	946	1,341

Device	Routing	Invert	Outlet Devices
#1	Discarded	762.75'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	763.60'	**8.0" Round Culvert** L= 15.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 763.60' / 763.00' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#3	Device 2	763.25'	**2.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	764.45'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	764.90'	**2.7" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 2	765.20'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 2	765.40'	**3.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.22 hrs HW=765.76' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.48 cfs @ 12.22 hrs HW=765.76' (Free Discharge)
└**2=Culvert** (Passes 1.48 cfs of 2.27 cfs potential flow)
- **3=Orifice/Grate** (Orifice Controls 0.31 cfs @ 7.07 fps)
- **4=Orifice/Grate** (Orifice Controls 0.18 cfs @ 5.28 fps)
- **5=Orifice/Grate** (Orifice Controls 0.50 cfs @ 4.16 fps)
- **6=Orifice/Grate** (Orifice Controls 0.16 cfs @ 3.17 fps)
- **7=Orifice/Grate** (Orifice Controls 0.34 cfs @ 2.32 fps)

Pond 3P:

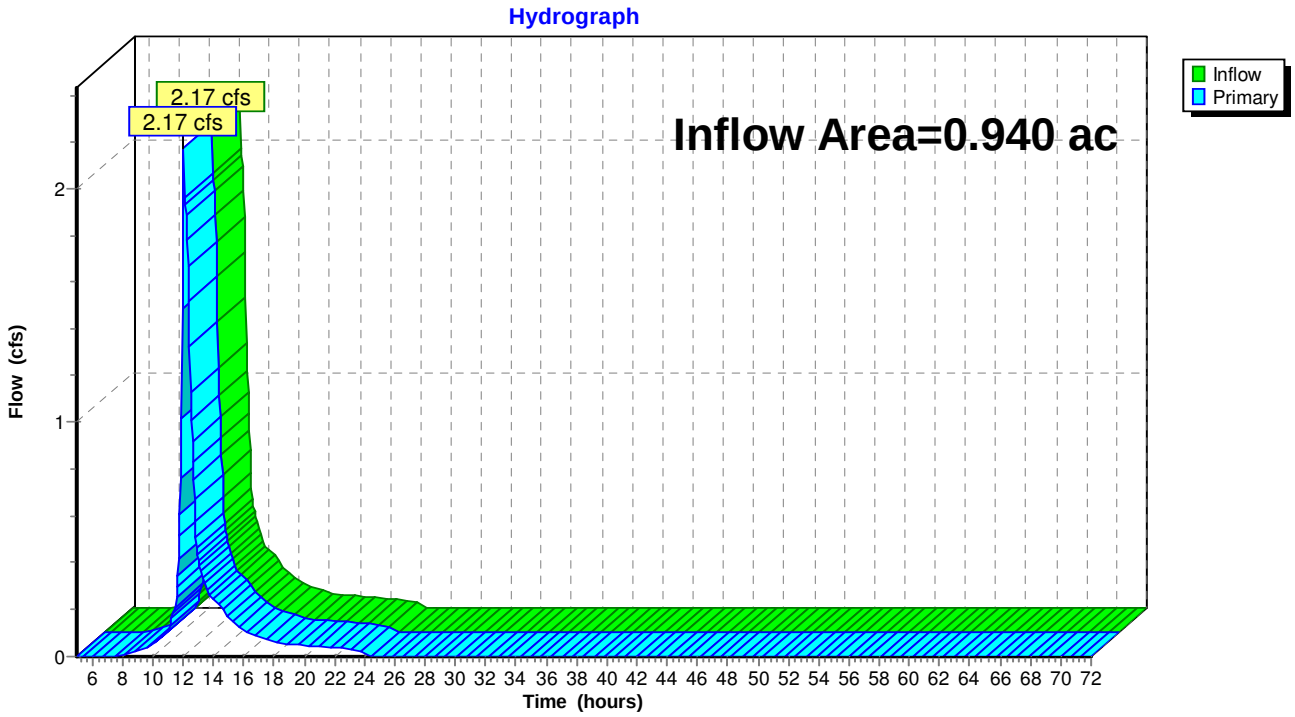

Hydrograph
Inflow Area=0.645 ac
Peak Elev=765.76'
Storage=1,021 cf
2.10 cfs
1.51 cfs
1.48 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Link Post: ExCulvert

Inflow Area = 0.940 ac, 6.76% Impervious, Inflow Depth = 3.03" for 50-Year event
Inflow = 2.17 cfs @ 12.04 hrs, Volume= 0.237 af
Primary = 2.17 cfs @ 12.04 hrs, Volume= 0.237 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs

Link Post: ExCulvert



Summary for Subcatchment P1.1:

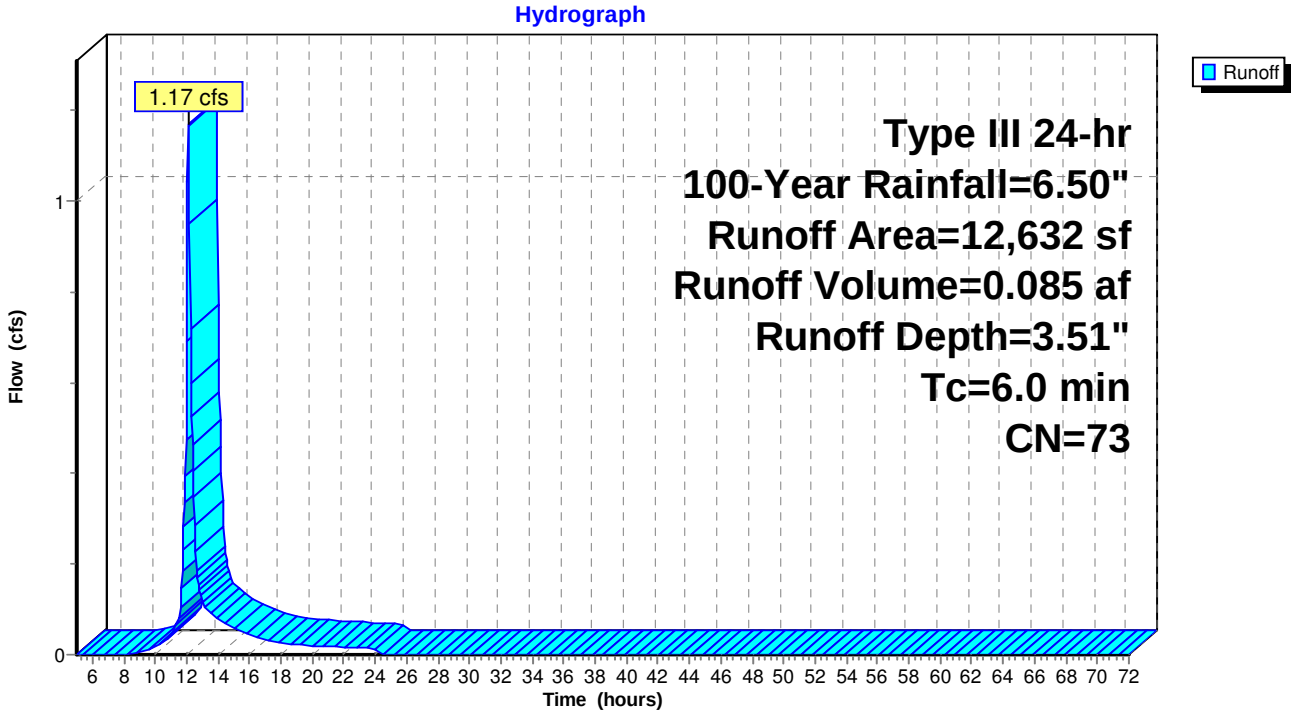
Runoff = 1.17 cfs @ 12.09 hrs, Volume= 0.085 af, Depth= 3.51"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

	Area (sf)	CN	Description
	1,080	96	Gravel surface, HSG C
*	850	79	50-75% Grass cover, Fair, HSG C
	10,702	70	Woods, Good, HSG C
	12,632	73	Weighted Average
	12,632		100.00% Pervious Area

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

Subcatchment P1.1:



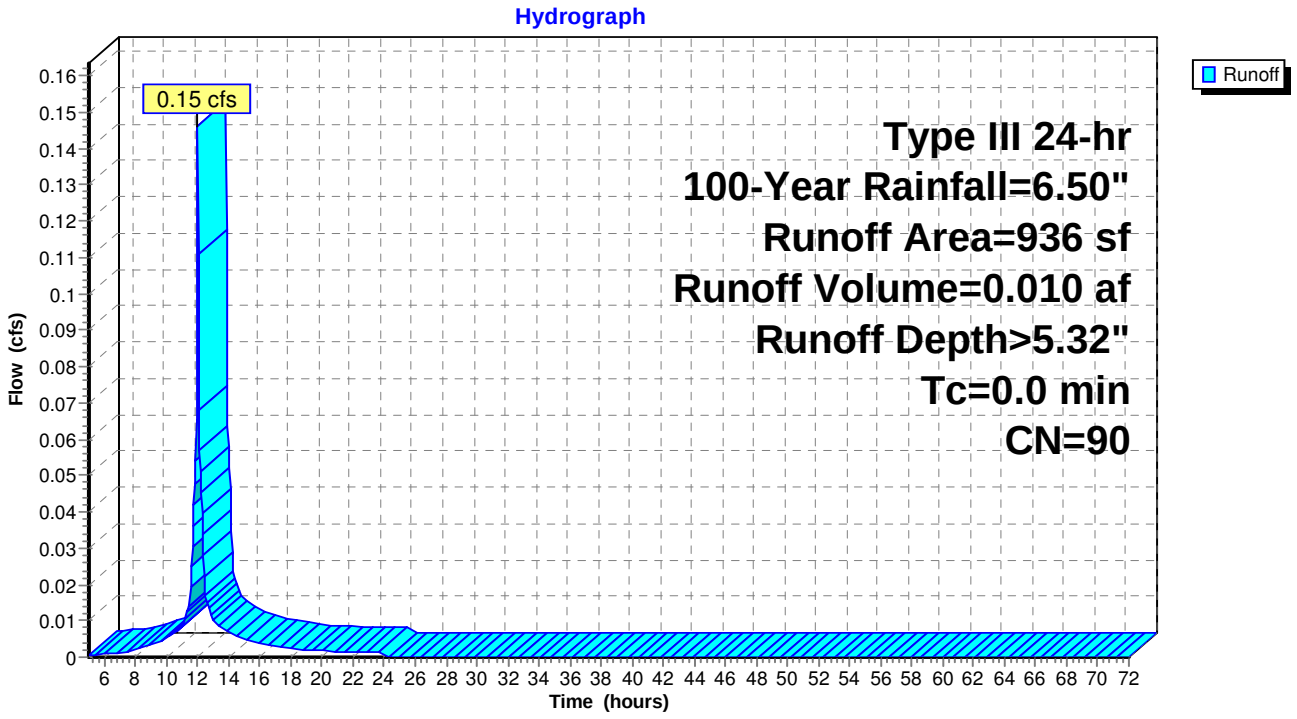
Summary for Subcatchment P1.2:

Runoff = 0.15 cfs @ 12.00 hrs, Volume= 0.010 af, Depth> 5.32"
Routed to Pond 2P : Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
343	79	50-75% Grass cover, Fair, HSG C
593	96	Gravel surface, HSG C
936	90	Weighted Average
936		100.00% Pervious Area

Subcatchment P1.2:



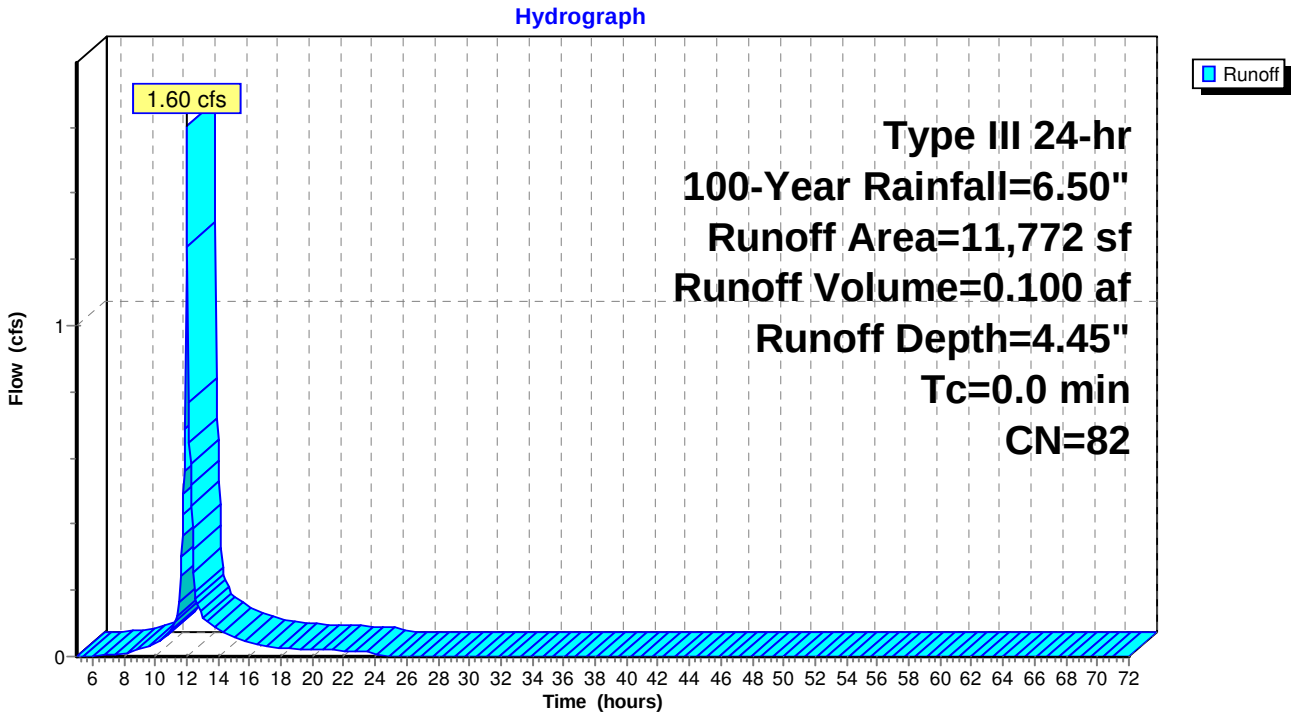
Summary for Subcatchment P1.3:

Runoff = 1.60 cfs @ 12.00 hrs, Volume= 0.100 af, Depth= 4.45"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
2,309	79	50-75% Grass cover, Fair, HSG C
4,596	96	Gravel surface, HSG C
4,867	70	Woods, Good, HSG C
11,772	82	Weighted Average
11,772		100.00% Pervious Area

Subcatchment P1.3:



Summary for Subcatchment P2.1: Roof/2

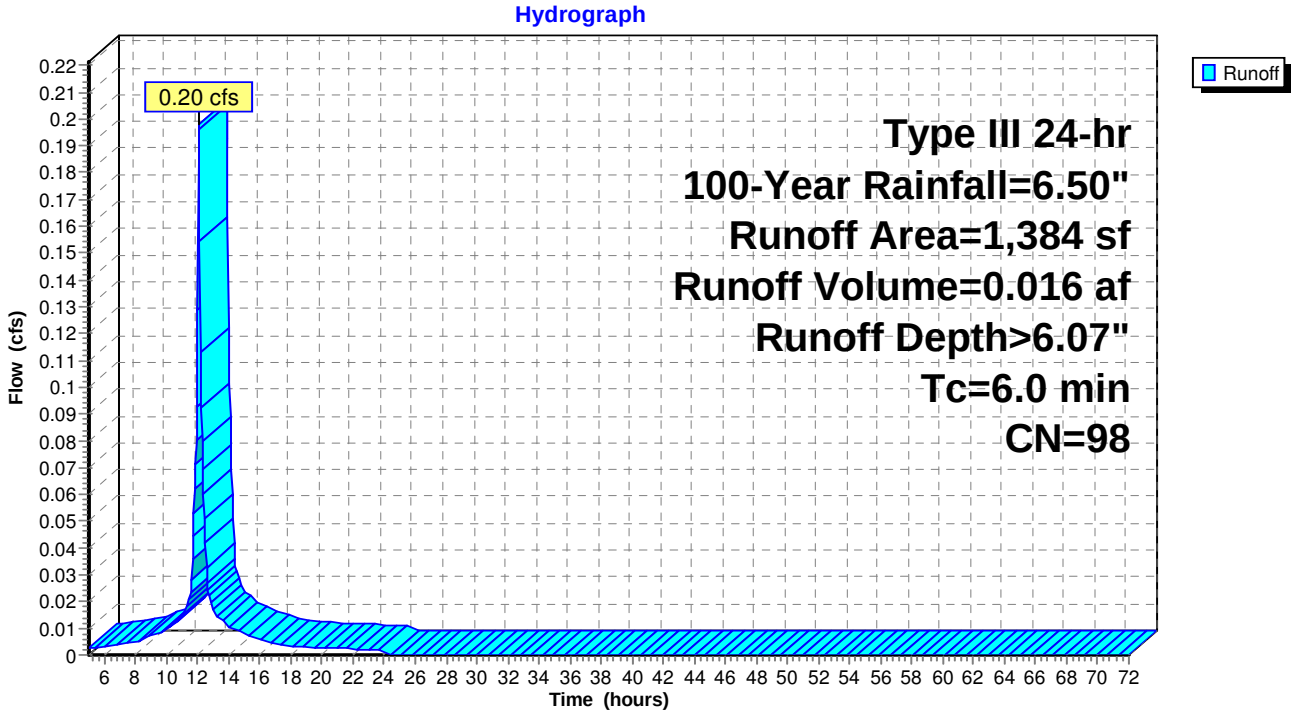
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.016 af, Depth> 6.07"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.1: Roof/2



Summary for Subcatchment P2.2: Roof/2

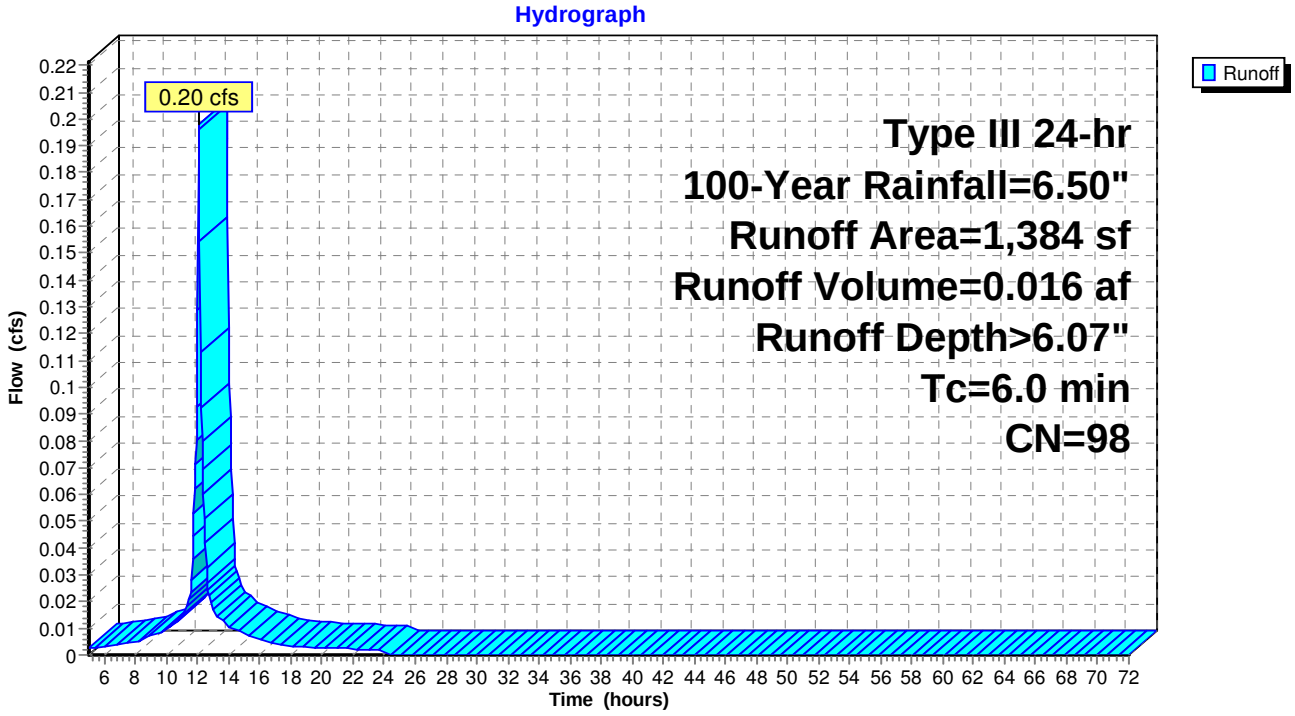
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.016 af, Depth> 6.07"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,384	98	Roofs, HSG C
1,384		100.00% Impervious Area

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

Subcatchment P2.2: Roof/2



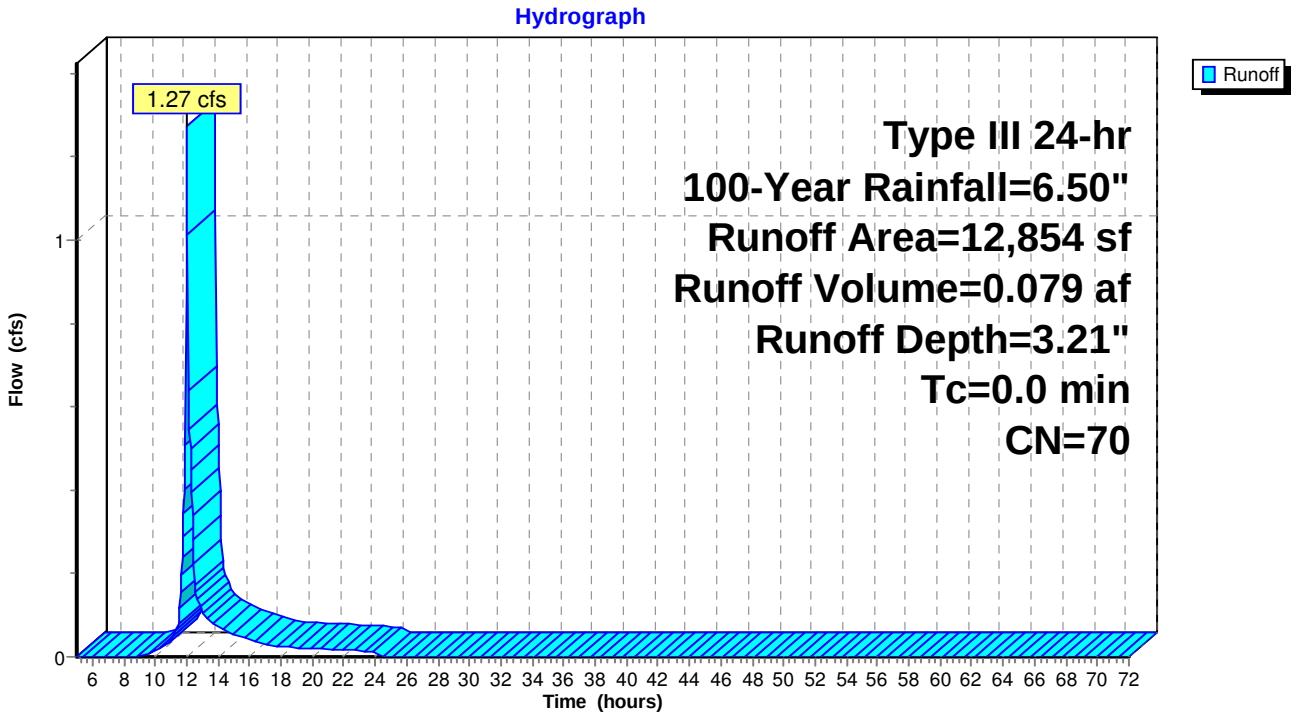
Summary for Subcatchment P3: Remainder

Runoff = 1.27 cfs @ 12.01 hrs, Volume= 0.079 af, Depth= 3.21"
Routed to Link Post : ExCulvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
12,854	70	Woods, Good, HSG C
12,854		100.00% Pervious Area

Subcatchment P3: Remainder



Summary for Pond 1P:

Inflow Area = 0.322 ac, 9.87% Impervious, Inflow Depth > 3.76" for 100-Year event
Inflow = 1.37 cfs @ 12.09 hrs, Volume= 0.101 af
Outflow = 1.04 cfs @ 12.16 hrs, Volume= 0.101 af, Atten= 24%, Lag= 4.3 min
Discarded = 0.02 cfs @ 12.16 hrs, Volume= 0.017 af
Primary = 1.02 cfs @ 12.16 hrs, Volume= 0.083 af
Routed to Pond 2P : Forebay

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 768.46' @ 12.16 hrs Surf.Area= 764 sf Storage= 504 cf

Plug-Flow detention time= 31.0 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 31.1 min (848.0 - 816.9)

Volume	Invert	Avail.Storage	Storage Description
#1	767.50'	1,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

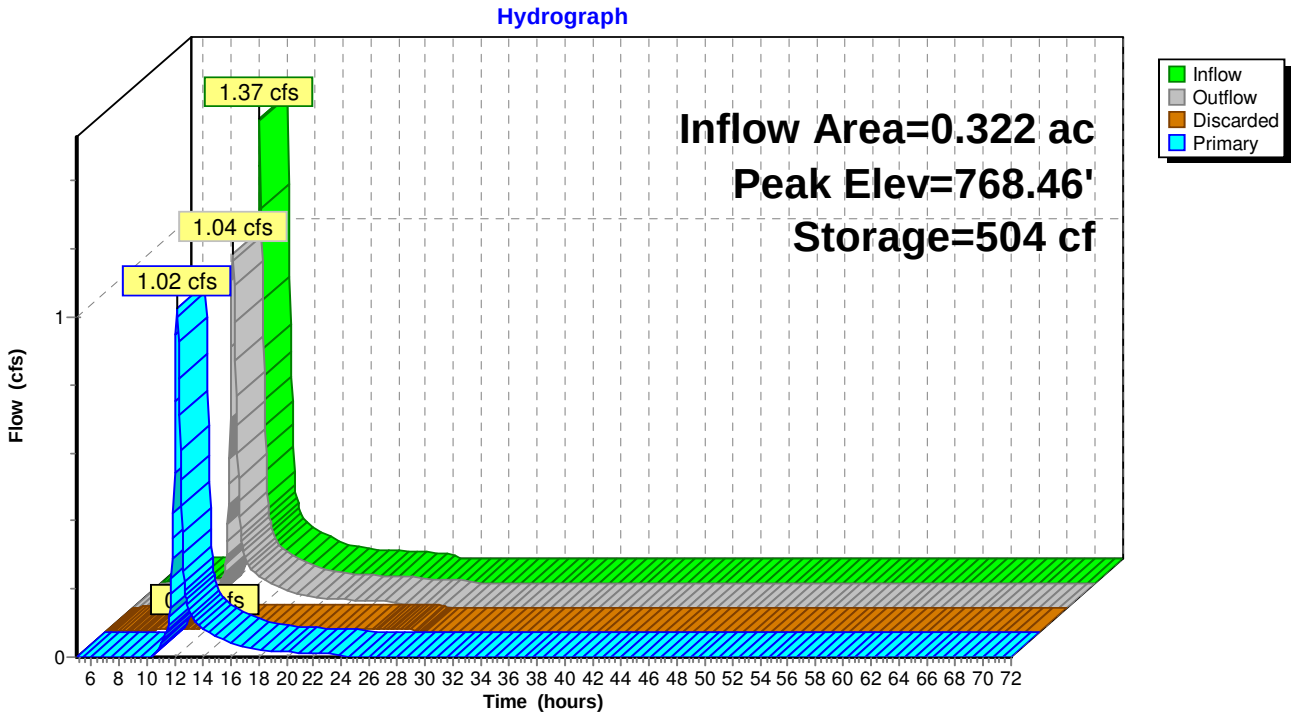
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
767.50	329	0	0
768.00	519	212	212
769.00	1,057	788	1,000

Device	Routing	Invert	Outlet Devices
#1	Primary	767.75'	**8.0" Round Culvert** L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.75' / 767.25' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	767.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.16 hrs HW=768.45' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.02 cfs @ 12.16 hrs HW=768.45' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 1.02 cfs @ 2.91 fps)

Pond 1P:


Hydrograph
Inflow Area=0.322 ac
Peak Elev=768.46'
Storage=504 cf
1.37 cfs
1.04 cfs
1.02 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 2P: Forebay

Inflow Area = 0.343 ac, 9.26% Impervious, Inflow Depth > 3.25" for 100-Year event
Inflow = 1.08 cfs @ 12.16 hrs, Volume= 0.093 af
Outflow = 1.07 cfs @ 12.19 hrs, Volume= 0.093 af, Atten= 1%, Lag= 1.6 min
Discarded = 0.00 cfs @ 12.19 hrs, Volume= 0.003 af
Primary = 1.06 cfs @ 12.19 hrs, Volume= 0.090 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 767.73' @ 12.19 hrs Surf.Area= 137 sf Storage= 104 cf

Plug-Flow detention time= 7.8 min calculated for 0.093 af (100% of inflow)
Center-of-Mass det. time= 8.1 min (815.7 - 807.6)

Volume	Invert	Avail.Storage	Storage Description
#1	766.50'	348 cf	**Custom Stage Data (Prismatic)** Listed below

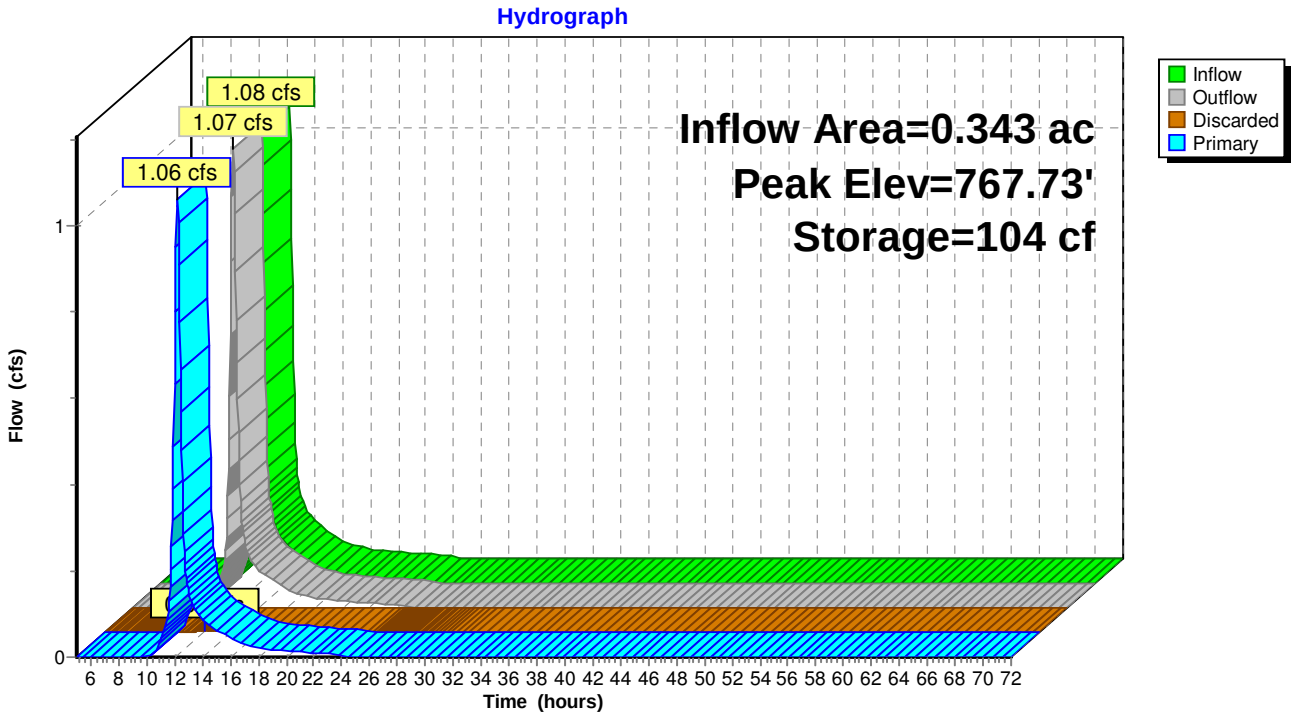
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
766.50	0	0	0
767.00	72	18	18
768.00	161	117	135
769.00	265	213	348

Device	Routing	Invert	Outlet Devices
#1	Primary	767.00'	**8.0" Round Culvert** L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 767.00' / 766.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#2	Discarded	766.50'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.19 hrs HW=767.73' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.06 cfs @ 12.19 hrs HW=767.73' (Free Discharge)
1=Culvert (Inlet Controls 1.06 cfs @ 3.03 fps)

Pond 2P: Forebay



Summary for Pond 3P:

Inflow Area = 0.645 ac, 9.85% Impervious, Inflow Depth > 3.83" for 100-Year event
Inflow = 2.40 cfs @ 12.02 hrs, Volume= 0.206 af
Outflow = 1.67 cfs @ 12.23 hrs, Volume= 0.206 af, Atten= 30%, Lag= 13.0 min
Discarded = 0.03 cfs @ 12.23 hrs, Volume= 0.008 af
Primary = 1.64 cfs @ 12.23 hrs, Volume= 0.198 af
Routed to Link Post : ExCulvert

Routing by Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 765.88' @ 12.23 hrs Surf.Area= 1,333 sf Storage= 1,174 cf

Plug-Flow detention time= 16.1 min calculated for 0.206 af (100% of inflow)
Center-of-Mass det. time= 16.4 min (816.8 - 800.4)

Volume	Invert	Avail.Storage	Storage Description
#1	762.75'	1,341 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

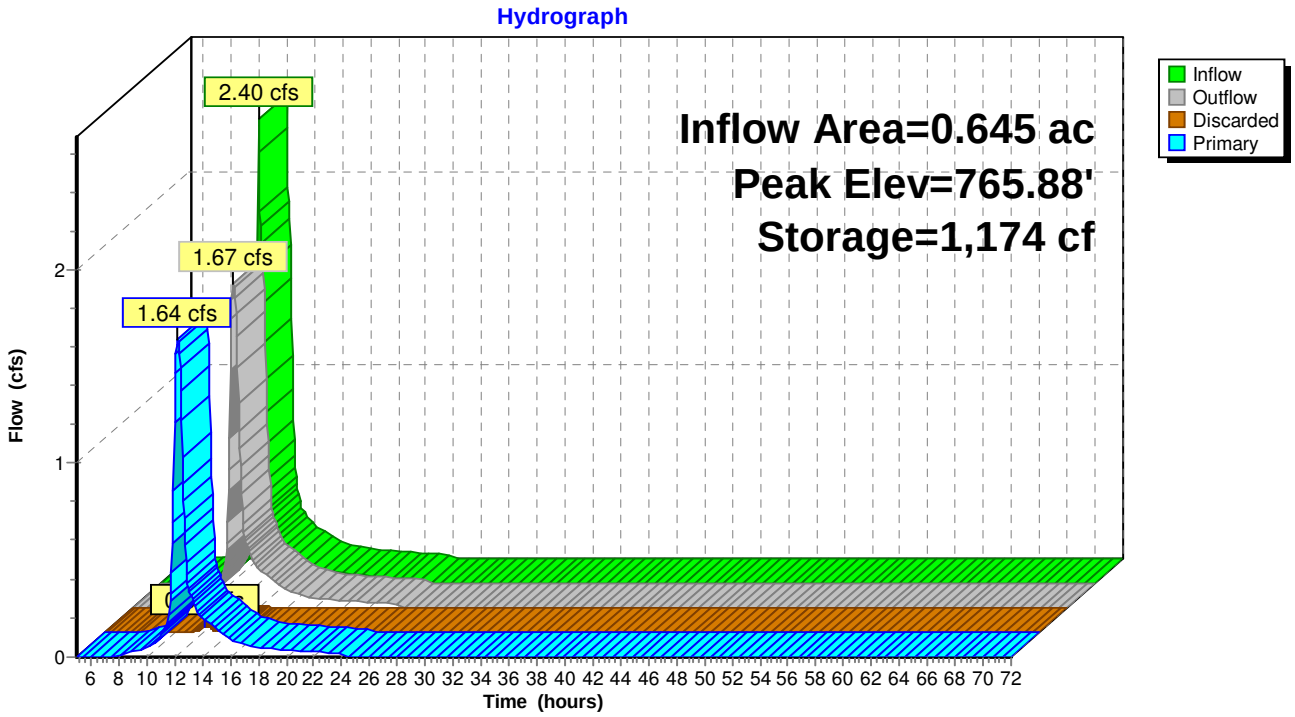
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
762.75	1	0	0
763.00	36	5	5
764.00	154	95	100
765.00	437	296	395
766.00	1,455	946	1,341

Device	Routing	Invert	Outlet Devices
#1	Discarded	762.75'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	763.60'	**8.0" Round Culvert** L= 15.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 763.60' / 763.00' S= 0.0400 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf
#3	Device 2	763.25'	**2.0" Vert. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 2	764.45'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	764.90'	**2.7" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads
#6	Device 2	765.20'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 2	765.40'	**3.0" Vert. Orifice/Grate X 3.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.23 hrs HW=765.88' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.64 cfs @ 12.23 hrs HW=765.88' (Free Discharge)
└**2=Culvert** (Passes 1.64 cfs of 2.34 cfs potential flow)
- **3=Orifice/Grate** (Orifice Controls 0.32 cfs @ 7.27 fps)
- **4=Orifice/Grate** (Orifice Controls 0.19 cfs @ 5.54 fps)
- **5=Orifice/Grate** (Orifice Controls 0.53 cfs @ 4.48 fps)
- **6=Orifice/Grate** (Orifice Controls 0.18 cfs @ 3.58 fps)
- **7=Orifice/Grate** (Orifice Controls 0.42 cfs @ 2.86 fps)

Pond 3P:

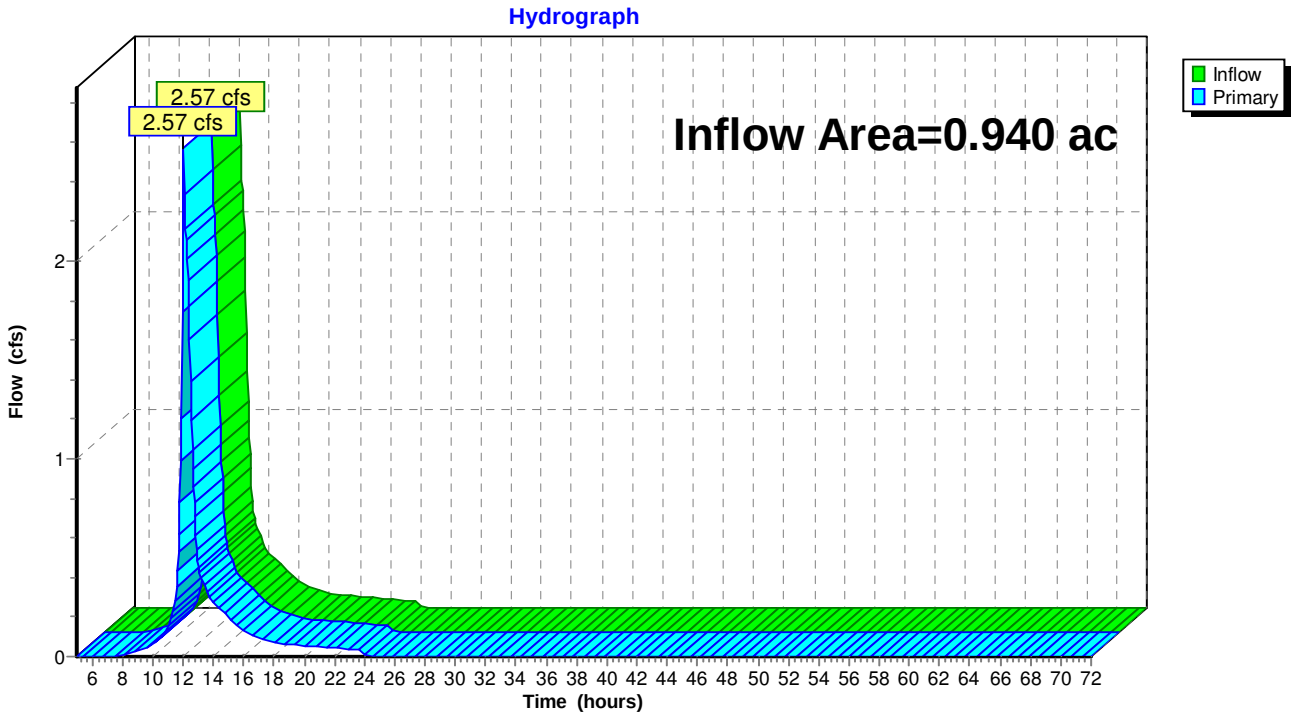

Hydrograph
Inflow Area=0.645 ac
Peak Elev=765.88'
Storage=1,174 cf
2.40 cfs
1.67 cfs
1.64 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Link Post: ExCulvert

Inflow Area = 0.940 ac, 6.76% Impervious, Inflow Depth = 3.53" for 100-Year event
Inflow = 2.57 cfs @ 12.02 hrs, Volume= 0.277 af
Primary = 2.57 cfs @ 12.02 hrs, Volume= 0.277 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-72.00 hrs, dt= 0.05 hrs

Link Post: ExCulvert



APPENDIX 4

Recharge to Groundwater

Recharge is accomplished through the use of direct roof runoff recharge and infiltration basins. Proposed improvements exceed minimum recharge volumes for Hydraulic Group C Soils. See summary table below:

Recharge Volume Summary

Soil Type	Recharge Factor (in. runoff)	Existing Impervious Area (sf)	Additional Impervious Area (sf)	Min. Recharge Volume (cf)
A	0.60	0	0	0
B	0.35	0	0	0
C	0.25	0	2768	58
D	0.10	0	0	0
Total Required				**58**

(0.25/12)(2768) = 57.7 c.f.

Standard #3 Only Applies to Additional Impervious

Provided Recharge Volume (cf)		
Lowest Outlet 767.75’	Pond 1P	94
Lowest Outlet 763.60’	Pond 3P	47
Total Provided		**141**

Stage-Area-Storage for Pond 1P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
767.50	329	0
767.52	337	7
767.54	344	13
767.56	352	20
767.58	359	28
767.60	367	35
767.62	375	42
767.64	382	50
767.66	390	58
767.68	397	65
767.70	405	73
767.72	413	82
767.74	420	90
767.76	428	98
767.78	435	107
767.80	443	116
767.82	451	125
767.84	458	134
767.86	466	143
767.88	473	152
767.90	481	162
767.92	489	172
767.94	496	182
767.96	504	192
767.98	511	202
768.00	519	212
768.02	530	222
768.04	541	233
768.06	551	244
768.08	562	255
768.10	573	267
768.12	584	278
768.14	594	290
768.16	605	302
768.18	616	314
768.20	627	327
768.22	637	339
768.24	648	352
768.26	659	365
768.28	670	378
768.30	680	392
768.32	691	406
768.34	702	420
768.36	713	434
768.38	723	448
768.40	734	463
768.42	745	477
768.44	756	492
768.46	766	508
768.48	777	523
768.50	788	539
768.52	799	555
768.54	810	571
768.56	820	587
768.58	831	604
768.60	842	620
768.62	853	637
768.64	863	654
768.66	874	672
768.68	885	689
768.70	896	707
768.72	906	725
768.74	917	743
768.76	928	762
768.78	939	780
768.80	949	799
768.82	960	818
768.84	971	838
768.86	982	857
768.88	992	877
768.90	1,003	897
768.92	1,014	917
768.94	1,025	938
768.96	1,035	958
768.98	1,046	979
769.00	**1,057**	**1,000**

Hydrograph for Pond 1P:

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	767.50	0.00	0.00	0.00
7.50	0.00	3	767.51	0.00	0.00	0.00
10.00	**0.03**	**54**	**767.65**	**0.01**	**0.01**	**0.00**
12.50	**0.33**	**287**	**768.14**	**0.46**	**0.01**	**0.44**
15.00	0.07	152	767.88	0.07	0.01	0.06
17.50	0.03	131	767.83	0.04	0.01	0.02
20.00	0.02	121	767.81	0.02	0.01	0.01
22.50	0.02	115	767.80	0.02	0.01	0.01
25.00	0.00	76	767.71	0.01	0.01	0.00
27.50	0.00	1	767.50	0.00	0.00	0.00
30.00	0.00	0	767.50	0.00	0.00	0.00
32.50	0.00	0	767.50	0.00	0.00	0.00
35.00	0.00	0	767.50	0.00	0.00	0.00
37.50	0.00	0	767.50	0.00	0.00	0.00
40.00	0.00	0	767.50	0.00	0.00	0.00
42.50	0.00	0	767.50	0.00	0.00	0.00
45.00	0.00	0	767.50	0.00	0.00	0.00
47.50	0.00	0	767.50	0.00	0.00	0.00
50.00	0.00	0	767.50	0.00	0.00	0.00
52.50	0.00	0	767.50	0.00	0.00	0.00
55.00	0.00	0	767.50	0.00	0.00	0.00
57.50	0.00	0	767.50	0.00	0.00	0.00
60.00	0.00	0	767.50	0.00	0.00	0.00
62.50	0.00	0	767.50	0.00	0.00	0.00
65.00	0.00	0	767.50	0.00	0.00	0.00
67.50	0.00	0	767.50	0.00	0.00	0.00
70.00	0.00	0	767.50	0.00	0.00	0.00

Stage-Area-Storage for Pond 3P:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
762.75	1	0
762.80	8	0
762.85	15	1
762.90	22	2
762.95	29	3
763.00	36	5
763.05	42	7
763.10	48	9
763.15	54	11
763.20	60	14
763.25	66	17
763.30	71	21
763.35	77	24
763.40	83	28
763.45	89	33
763.50	95	37
763.55	101	42
763.60	107	47
763.65	113	53
763.70	119	59
763.75	125	65
763.80	130	71
763.85	136	78
763.90	142	85
763.95	148	92
764.00	154	100
764.05	168	108
764.10	182	116
764.15	196	126
764.20	211	136
764.25	225	147
764.30	239	159
764.35	253	171
764.40	267	184
764.45	281	198
764.50	296	212
764.55	310	227
764.60	324	243
764.65	338	260
764.70	352	277
764.75	366	295
764.80	380	313
764.85	395	333
764.90	409	353
764.95	423	374
765.00	437	395
765.05	488	418
765.10	539	444
765.15	590	472
765.20	641	503
765.25	692	536
765.30	742	572
765.35	793	610
765.40	844	651
765.45	895	695
765.50	946	741
765.55	997	789
765.60	1,048	841
765.65	1,099	894
765.70	1,150	950
765.75	1,201	1,009
765.80	1,251	1,070
765.85	1,302	1,134
765.90	1,353	1,201
765.95	1,404	1,270
766.00	**1,455**	**1,341**

Hydrograph for Pond 3P:

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	762.80	0.00	0.00	0.00
7.50	0.01	39	763.51	0.00	0.00	0.00
10.00	**0.05**	**61**	**763.72**	**0.05**	**0.00**	**0.05**
12.50	**0.72**	**839**	**765.60**	**1.24**	**0.02**	**1.22**
15.00	0.13	112	764.08	0.15	0.00	0.14
17.50	0.06	62	763.73	0.06	0.00	0.06
20.00	0.04	59	763.70	0.04	0.00	0.04
22.50	0.03	57	763.68	0.03	0.00	0.03
25.00	0.00	44	763.56	0.00	0.00	0.00
27.50	0.00	24	763.35	0.00	0.00	0.00
30.00	0.00	11	763.14	0.00	0.00	0.00
32.50	0.00	2	762.92	0.00	0.00	0.00
35.00	0.00	0	762.75	0.00	0.00	0.00
37.50	0.00	0	762.75	0.00	0.00	0.00
40.00	0.00	0	762.75	0.00	0.00	0.00
42.50	0.00	0	762.75	0.00	0.00	0.00
45.00	0.00	0	762.75	0.00	0.00	0.00
47.50	0.00	0	762.75	0.00	0.00	0.00
50.00	0.00	0	762.75	0.00	0.00	0.00
52.50	0.00	0	762.75	0.00	0.00	0.00
55.00	0.00	0	762.75	0.00	0.00	0.00
57.50	0.00	0	762.75	0.00	0.00	0.00
60.00	0.00	0	762.75	0.00	0.00	0.00
62.50	0.00	0	762.75	0.00	0.00	0.00
65.00	0.00	0	762.75	0.00	0.00	0.00
67.50	0.00	0	762.75	0.00	0.00	0.00
70.00	0.00	0	762.75	0.00	0.00	0.00

Appendix 5

Water Quality

Over 80% TSS shall occur based on the BMP measurements provided. The pre-treatment train includes deep sump catch basin and a forebay; whereas, the treatment train consist of the deep sump catch basin and infiltration basin/trench designed to remove 80% of the total suspended solids of the contributing area.

TSS Removal: Pond 1P
Treatment = 100(1-(1-(1) (0.80)) = 80%

TSS Removal: Pond 3P
Pre-treatment =100(1-(1-(1) (0.25) - (1- 0.25)) (.50))) = 63%
Treatment = 100(1-(1-(1) (0.80)) = 80%

Required Retention/Treatment Volume: Post-construction impervious area: 2,768 sf (1/2") (1'/12") = 113 c.f.
Provided in "1P" (Infiltration Basin) = 94 c.f. below elevation 767.75
Provided in "2P" (Forebay to 3P) = 18 c.f. below elevation 767.00
Provided in "3P" (Infiltration Basin) = 47 c.f. below elevation 763.60

Cumulative Retention/Treatment Volume = 159 c.f.

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: 176 Podunk Road - Pond 1P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Basin	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 24-100

Prepared By: S. Bressette

Date: 3/28/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 176 Podunk Road - Pond 3P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Basin	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 24-100
Prepared By: S. Bressette
Date: 3/28/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: 176 Podunk Road - Pond 3P Pre-treatment

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Sediment Forebay	0.25	1.00	0.25	0.75
Grass Channel	0.50	0.75	0.38	0.38
	0.00	0.38	0.00	0.38
	0.00	0.38	0.00	0.38
	0.00	0.38	0.00	0.38

Total TSS Removal = 63%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 24-100

Prepared By: S. Bressette

Date: 3/28/2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

APPENDIX 6
Erosion and Sedimentation Control Plan

Narrative:
The project site is of less than ½-acre is located in the southeast corner of a 23-acre parcel of land located within the limits of the Town of Sturbridge, Worcester County, Massachusetts located at 176 Podunk Road. The project site consists of wooded uplands and is bounded on the east by Podunk Road, a public paved way, on the north by an existing graveled access road, on the east by a bordering vegetated wetland associated with an intermittent stream and on the south by overhead power and utility lines.

The proposed project is the construction of a three stall garage with appropriate ingress and egress for the owners' personal use associated with their existing single family home. The closest point of disturbance to the wetland resource area is the erosion control barrier at 51 feet. There is no disturbance proposed within the 50-foot buffer zone.

Sequence of Construction Activity:
1. Mobilize to site and lay down erosion control barrier where marked on the plan to protect down gradient wetland sources. Construct a temporary construction entrance using clean stones to keep site materials/mud from tracking into the graveled access road and paved roadways.

2. Remove trees and brush within the limit of clearing as specified on the site plan. Clear stumps and grub within the clearing area.

3. Install and rough grade driveway to the work site. Construct temporary shallow sediment traps in the areas sited for stormwater management BMP's first to mitigate any silt from reaching the wetland during construction. Install the foundation as shown on the plan. The house foundation will be located as part of the as-built plan.

4. Upon completion, final fill and grade for foundation and driveway. Loam and seed, mulch, or hydro-seed all disturbed areas.

5. Remove erosion control barriers and construction entrance when site work has been completed.

Vegetation Planning:
The disturbed soils are to be loamed and seeded or mulched.

Initial Inspection of Erosion and Sediment Control

DEP File Number: Date:

Contractor/Representative:

A. Paperwork

• *Does the project have an Order of Conditions?	Yes	No	N/A

B. Site Preparation

• *Has the contractor installed a temporary construction entrance(s) and are vehicles using it?	Yes	No	N/A
• *Is there a place for concrete wash-out, is it clearly marked and do concrete trucks appear to be using it?	Yes	No	N/A
• *Is the site largely free of construction trash? (cups, lunch sacks, material packaging, etc.)	Yes	No	N/A
• *Have perimeter sediment controls been installed?	Yes	No	N/A
• *Have pre-construction controls been installed per the plan been installed?	Yes	No	N/A
• *Have easily recognizable indications of the construction limits been installed? (fencing, staking, physical barriers)	Yes	No	N/A

*Must be “yes” or N/A in order for inspection to be “satisfactory”.

Note: The local Conservation Commission must inspect and approve of the initial erosion and sediment controls, as installed, prior to the start of construction.

Erosion and Sediment Control Inspection Report Form

Project Name and Location

Weather:	**Pollution Control Measures (BMP) Checklist:**
Rain in last 24 hrs (inches):	_____ Inlet Barrier (ie: filter bags) _____ Sediment Barriers(ie: wattles/silt fence) _____ Erosion Blankets, Mulch/Seed _____ Stabilized Construction Entrance _____ Diversion Berms _____ Seed / Sod Areas _____ Sediment Basins & Discharge _____ Borrow Areas _____ General Site Condition (trash, etc)
Owner/ Permittee:	
A. Current Construction/Active Areas:	

B. Problem Areas/Special Observations (*Note problem areas ONLY below*):

BMP	Location	Observations, Effectiveness, & Corrective Actions Ordered

C. Listing of Areas where construction operations have permanently or temporarily stopped; stabilization measures initiated.

D. Have items noted on last inspection been corrected? Yes No (if No, Explain)

BMP INSPECTION CHECKLIST

General Notes:

1). Site to be inspected weekly

2). Site to be inspected within 24 hours of the end of a storm with rain>0.5”

3). Deficiencies corrected within 7 calendar days of inspection

Key Elements:

1). Proper Installation

2). Operation

3). Maintenance

Inlet Barriers (ie: sandbags, filter bags, straw wattles)

- √ Is the structure deteriorating?
- √ Is sediment greater than half the height of the structure?
- √ Evidence of water/sediment getting around or under the barrier?
- √ Are there other structures that require inlet barriers?

Sediment Barriers (ie: silt fence/straw wattles)

- √ Are they trenched in or falling down?
- √ Evidence of sediment/water getting **around** or **under** barrier?
- √ Is sediment more than 1/3 height of the structure?
- √ Are there areas where more sediment barriers are required or need extension?

Stabilized Construction Entrance

- √ Is the gravel clean or getting filled with mud?
- √ Evidence of sediment being tracked off-site onto public streets?

Final or Temporary Stabilization Area

- √ Mulches/Grasses-are areas thinning or have been disturbed? Re-application required?
- √ Straw Blankets-are they deteriorating and need replacement?

Borrow Areas

- √ When on site or offsite borrow areas, which include contractor furnished, are to be excavated below ground elevations, an earth berm must be constructed around the borrow area to prevent runoff from entering excavation area

Sediment Basin

- √ Note the basin depth. Is the basin more than halfway full of sediment from the original design?
- √ Condition of basin side slopes
- √ Evidence of over topping embankment
- √ Condition of outfall

General Site Conditions

- √ Trash barrels-any evidence of trash lying around site
- √ Location of porta-potties
- √ Leaking vehicles
- √ Concrete Washouts Designated

APPENDIX 7
Operation and Maintenance Plan

This plan has been designed to address both the construction and post-development operation and maintenance of the Stormwater management controls for the proposed building. The plan addresses and identifies the following areas:

- Stormwater Management System Owner
- Party Responsible for Operation/Maintenance
- Schedule for Inspection and Maintenance
- Routine and Non-Routine Maintenance Tasks

Stormwater Management System Owner

The Owner will maintain ownership of the stormwater management system.

Party Responsible For Operation/Maintenance

The developer/general contractor will be responsible for the operation and maintenance of the stormwater management system until acceptance by the Owner. After acceptance, the Owner will be responsible for the operation and maintenance of the stormwater management system.

Schedule For Inspection And Maintenance

The inspection schedule and maintenance requirements for each structural BMP utilized in the site Stormwater management system are indicated below:

Grassed Swales: Grassed swales shall be mowed regularly and kept free of debris. Stressed vegetation shall be re-seeded when coverage is less than 80%. Inspection/removal of sediment accumulation shall be performed semi-annually.

Infiltration Trenches/Basins: Infiltration Trenches/Basins should be inspected at least once per year to ensure that the system is operating as intended. Inspections should be conducted during wet weather to determine if the system is flowing as intended and inlets are not being clogged.

Routine and Non-Routine Maintenance Tasks

Routine and non-routine maintenance tasks for each structural BMP utilized are outlined below:

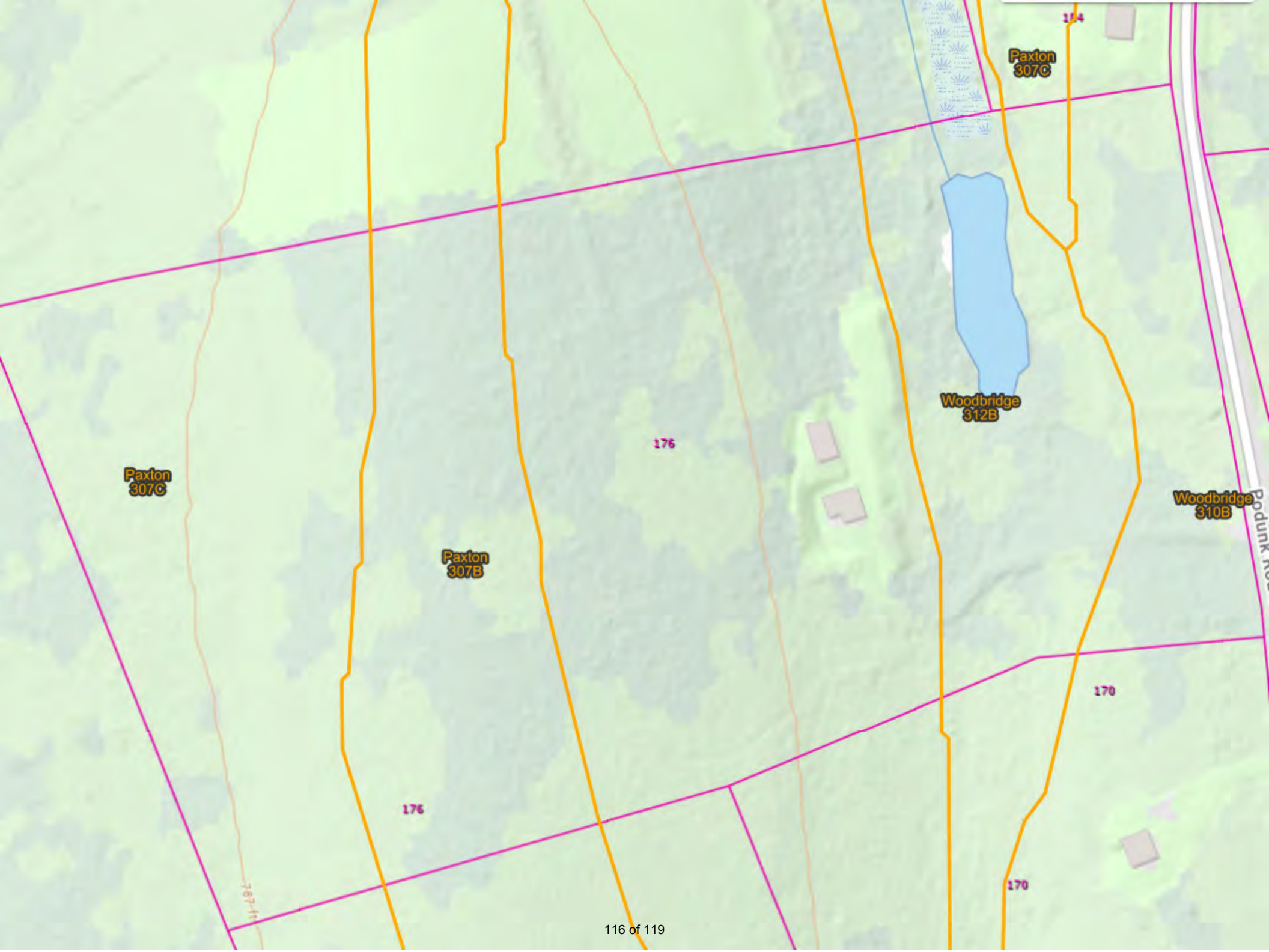
Infiltration Trenches: Remove and properly dispose of all sediment and hydrocarbons in accordance with local, state, and federal guidelines and regulations. Sediment should be removed from the basin as necessary, and at least once every 10 years.

MAINTENANCE AND INSPECTION LOG

Inspections for year _____

BMP	Action	Date	Comment	By
Subsurface Infiltration System	Inspect			
	Inspect			
	Inspect			
	Inspect			
	Other			
	Other			

APPENDIX 8
Soil Survey Data


Paxton
307C
Woodbridge
312B
176
Paxton
307C
Woodbridge
310B
Paxton
307B
170
176
170

LOCATION WOODBRIDGE CT+MA NH NY RI

Established Series
Rev. MFF-JTI-DHZ
05/2016

WOODBRIDGE SERIES

The Woodbridge series consists of moderately well drained loamy soils formed in lodgment till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to moderately steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 25 percent. Saturated hydraulic conductivity ranges from moderately high to high in the surface layer and subsoil and low or moderately low in the dense substratum. Mean annual temperature is about 9 degrees C., and mean annual precipitation is about 1168 mm.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Aquic Dystrudepts

TYPICAL PEDON: Woodbridge fine sandy loam - grass field, at an elevation of about 177 meters. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 18 cm; very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine and medium roots; few very dark brown (10YR 2/2) earthworm casts; 5 percent gravel; moderately acid; abrupt wavy boundary. (10 to 30 cm thick.)

Bw1--18 to 46 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; moderately acid; gradual wavy boundary.

Bw2--46 to 66 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; few very dark brown (10YR 2/2) earthworm casts; 10 percent gravel; few medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary.

Bw3--66 to 76 cm; light olive brown (2.5Y 5/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; clear wavy boundary. (Combined thickness of the Bw horizons is 31 to 94 cm.)

Cd1--76 to 109 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; 20 percent gravel; many medium prominent strong brown (7.5YR 5/8) masses of iron accumulation and light brownish gray (10YR 6/2) areas of iron depletion; moderately acid; gradual wavy boundary.

Cd2--109 to 165 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; weak thick plates of geogenic origin; very firm, brittle; few fine prominent very dark brown (10YR 2/2) coatings on plates; 25 percent gravel; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; moderately acid.

TYPE LOCATION: Tolland County, Connecticut; town of Mansfield, 0.75 mile south of the intersection of Connecticut Routes 275 and 195, and 0.25 mile east on the University of Connecticut Agronomy Farm, 800 feet north of the greenhouses near the corner of a brushy field. USGS Spring Hill, CT topographic quadrangle, Latitude 41 degrees, 47 minutes, 53.43 seconds N., Longitude 72 degrees, 13 minutes, 48.69 seconds W., WGS 1984.

RANGE IN CHARACTERISTICS: The thickness of the solum and depth to densic materials is 50 to 100 cm. Depth to bedrock is commonly more than 2 meters. Rock fragments commonly range from 0 to 35 percent. Except where the surface is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. Unless limed, reaction ranges from very strongly acid to slightly acid.

Some pedons have an O horizon.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. Dry value is 6 or more. Undisturbed pedons have a thin A horizon commonly with hue of 7.5YR or 10YR but the range includes 2.5Y, value of 2 or 3 and chroma of 1 or 2. The Ap or A horizon is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

Some pedons have a thin E horizon below the A horizon. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3.

The upper part of the Bw horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8. The lower part of the Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Iron depletions are within 60 cm. The Bw horizon is loam, fine sandy loam, or sandy loam with less than 65 percent silt plus very fine sand.

Some pedons have a thin BC horizon.

Some pedons have an E or E' horizon up to 8 cm thick below the B horizon. It has hue of 10YR to 5Y, value of 5 or 6, chroma of 2 or 3, and has redoximorphic features. Typically, it is coarser-textured than the overlying horizon.

Some pedons have a C horizon above the Cd horizon.

The Cd horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It commonly has redoximorphic features. Texture is loam, fine sandy loam, sandy loam, or coarse sandy loam in the fine-earth fraction. The structure is not pedogenetically derived, and appears in the form of medium to very thick plates, or it is massive. Consistence is firm or very firm.

COMPETING SERIES: These are the Chautauqua, North Meadow, Pittstown, Pompton, Rainbow, Sutton, Wapping, and Wilbraham series. Chautauqua, Pompton, Sutton, and Wapping soils do not have a dense substratum. North Meadow soils have a cap of human transported material 25 to 100 cm thick. Pittstown and Rainbow soils have more than 65 percent silt plus very fine sand in the solum. Wilbraham soils are poorly drained and developed from red parent materials (originating from reddish sandstone, shale, and conglomerate with some basalt).

GEOGRAPHIC SETTING: Woodbridge soils are nearly level to moderately steep and are on hills, drumlins, till plains, and ground moraines. Slope commonly is less than 8 percent, but the range includes 0 to 25 percent. The soils formed in acid till derived mostly from schist, gneiss, and granite. Mean annual temperature ranges from 7 to 13 degrees C and mean annual precipitation ranges from 940 to 1250 mm, and the growing season ranges from 115 to 180 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Rainbow, Sutton, and Wapping soils and the Bernardston, Broadbrook, Canton, Charlton, Chatfield, Georgia, Hollis, Leicester, Montauk, Paxton, Ridgebury, Scituate, and Whitman soils on nearby landscapes. The well drained Paxton, somewhat poorly and poorly drained Ridgebury, and the very poorly drained Whitman soils are associated in a drainage sequence. Bernardston and Broadbrook soils are well drained and are finer textured. Canton and Charlton soils are well drained and do not have a dense substratum. Chatfield and Hollis soils have bedrock within depths of 50 to 100 and 25 to 50 cm, respectively. Georgia soils are calcareous within 200 cm. Leicester soils are poorly drained and do not have a dense substratum. Montauk soils are well drained and are coarser textured. Scituate soils have a loamy sand substratum.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. The potential for surface runoff is moderate to very high. Saturated hydraulic conductivity is moderately high or high in the solum and low or moderately low in the dense substratum.

USE AND VEGETATION: Many areas are cleared and used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red, white, and black oak, hickory, white ash, sugar maple, red maple, eastern hemlock, and eastern white pine.

DISTRIBUTION AND EXTENT: Glaciated uplands of Connecticut, Massachusetts, New Hampshire, eastern New York, and Rhode Island. MLRAs 144A, 145, and 149B. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Essex County, Massachusetts, 1925.

REMARKS: Woodbridge soils were previously used in Maine. Soil temperature studies in Maine have resulted in the use of the frigid soil temperature regime for soils in areas formerly identified as mesic.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 18 cm (Ap horizon).
2. Cambic horizon - the zone from 18 to 76 cm (Bw horizons).
3. Aquic feature - low chroma areas of iron depletion within 60 cm (Bw2 horizon).
4. Densic materials - the zone from 76 to 165 cm (Cd1 and Cd2 horizons).
5) Particle-size control section - the zone from 18 to 76 cm (Bw horizons).

ADDITIONAL DATA: Full characterization data for pedons with User Pedon IDs of S2000CT013003, S1956NH017002, S1956NH017003, S1958CT013004, S1958MA015002, S1978NH011002, and S1991MA023007. Pedons analyzed by the NSSL, Lincoln, NE. The laboratory characterization data for these pedons and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/