SPRUHAN ENGINEERING, P.C.

STORMWATER REPORT

1092-1094 CHESTNUT ST, NEWTON, MA

Prepared By: Spruhan Engineering, P.C.
February 2, 2021; Revised 6/17/2021

Contents

1.0 Introduction

Spruhan Engineering, P.C. has prepared this Storm water Report for the proposed development located at 1092-1094 Chestnut St, Newton, Massachusetts.

The proposed development consists of an addition to the existing dwelling and the construction of a new dwelling on the rear of the lot, paved driveway, permeable pavers walkways and landscaped area. The purpose of this report is to demonstrate that the proposed conditions do not create any increased flowrate or runoff from the site. This is achieved by the installation of two drainage systems.

2.0 Existing Conditions

The existing property is located at, 1092-1094 Chestnut St, Newton, Massachusetts. The site is bounded by residential dwellings on the sides and rear. The property is located in Chestnut St between Eliot St and Pennsylvania Ave. The existing house roof area is 1,469 S.F., the existing paved driveway and walkway area is 1,255 S.F, the existing imperious area is 206.7 S.F. and the existing landscaped area on the lot is 17,360 S.F.

2.1 Existing Topography and Drainage Infrastructure.

In general, the property slopes from East (rear) to West (front) ranging between approximately 8.5%. As there is no drainage system currently installed, all storm water scours across the surface at grade.

3.1 Project Description

The development consists of an addition to the existing dwelling and a new dwelling at the rear of the lot, a paved driveway, permeable pavers walkways and landscaped areas. The total, existing and proposed roof will have an area of 4,898 S.F, the paved driveway will have an area of 3,025 S.F., the permeable pavers walkways will have an area of 708 S.F., the unconnected impervious will have an area of 933 S.F. and the remaining landscaped portion will have a footprint of 10,667 S.F.

3.2 Storm Water Runoff

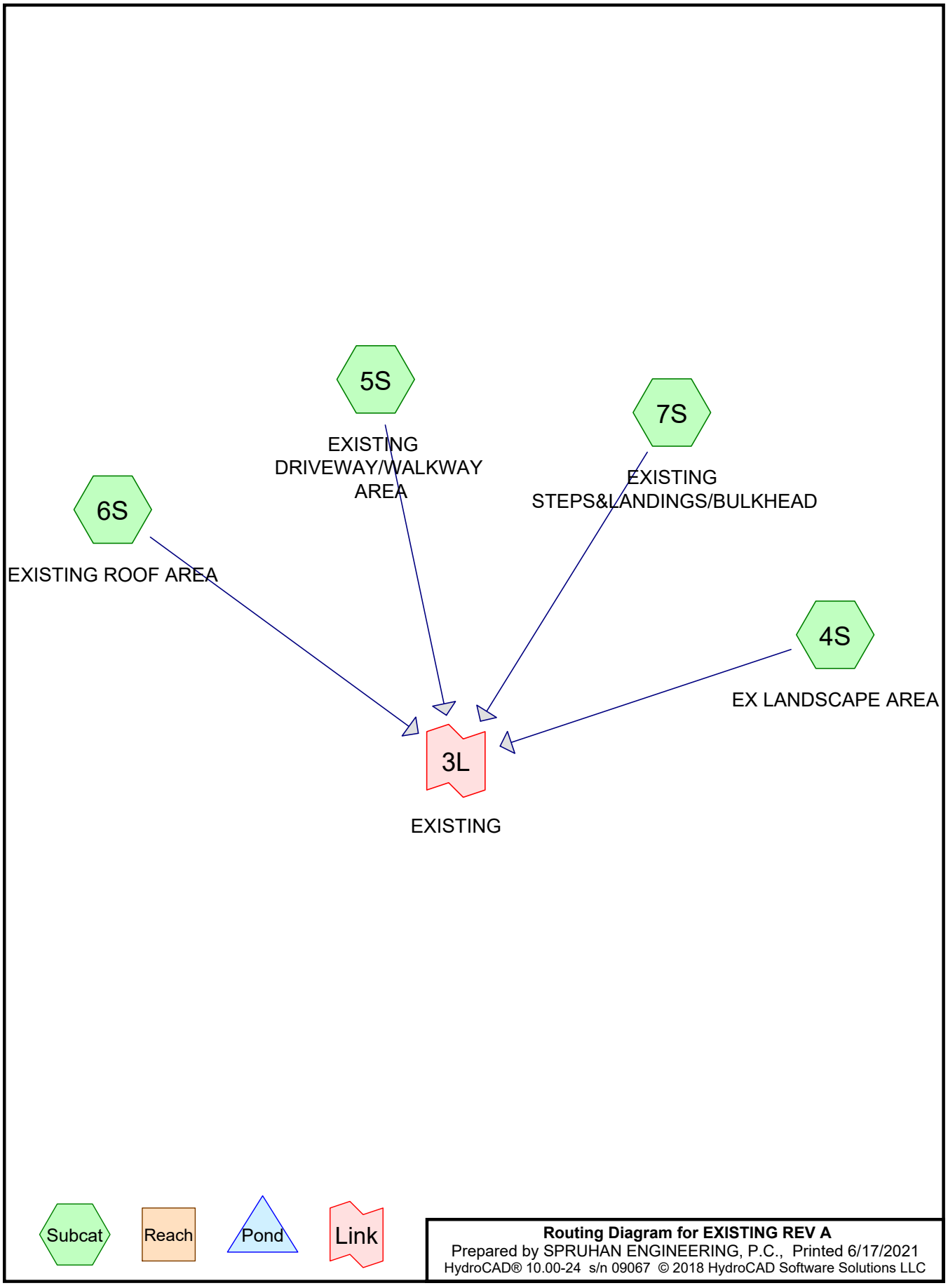
HydroCAD was used to model the site for the existing and proposed conditions for the 2-year, 10-year, 25-year, and 100-year type III storm events based on Atlas-14 Rain information for Middlesex County Central Area. HydroCAD calculations can be seen in Appendix A. The following table shows a summary of the existing and proposed conditions on the site as they relate to flowrate and volume of storm water runoff for each of the storm events.

3.3 Infiltration system

Three infiltration system were proposed to control the runoff rate from the post construction site. This systems consists of 3/4" – 1 1/2" drain gravel. They are 23 'x 37'x 1.5', 14.5' x 45' x 1.5' and 11' x 45' x 2.5'.

	Summary Table			
	Runoff Flow Rate		Volume of Runoff	
	EXISTING	PROPOSED	EXISTING	PROPOSED
2 Year Storm	0.22 cfs	0.21 cfs	908 cf	873 cf
10 Year Storm	0.42 cfs	0.38 cfs	1,852 cf	1,633 cf
25 Year Storm	0.64 cfs	0.54 cfs	2,508 cf	2,138 cf
100 Year Storm	1.76 cfs	1.33 cfs	5,880 cf	4,900 cf

Appendix A – HydroCAD Calculations



Routing Diagram for EXISTING REV A
Prepared by SPRUHAN ENGINEERING, P.C., Printed 6/17/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
17,360	49	50-75% Grass cover, Fair, HSG A (4S)
1,255	98	Paved parking, HSG A (5S)
1,469	98	Roofs, HSG A (6S)
207	98	Unconnected pavement, HSG A (7S)
20,291	**56**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
20,291	HSG A	4S, 5S, 6S, 7S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
20,291		**TOTAL AREA**

Summary for Subcatchment 4S: EX LANDSCAPE AREA

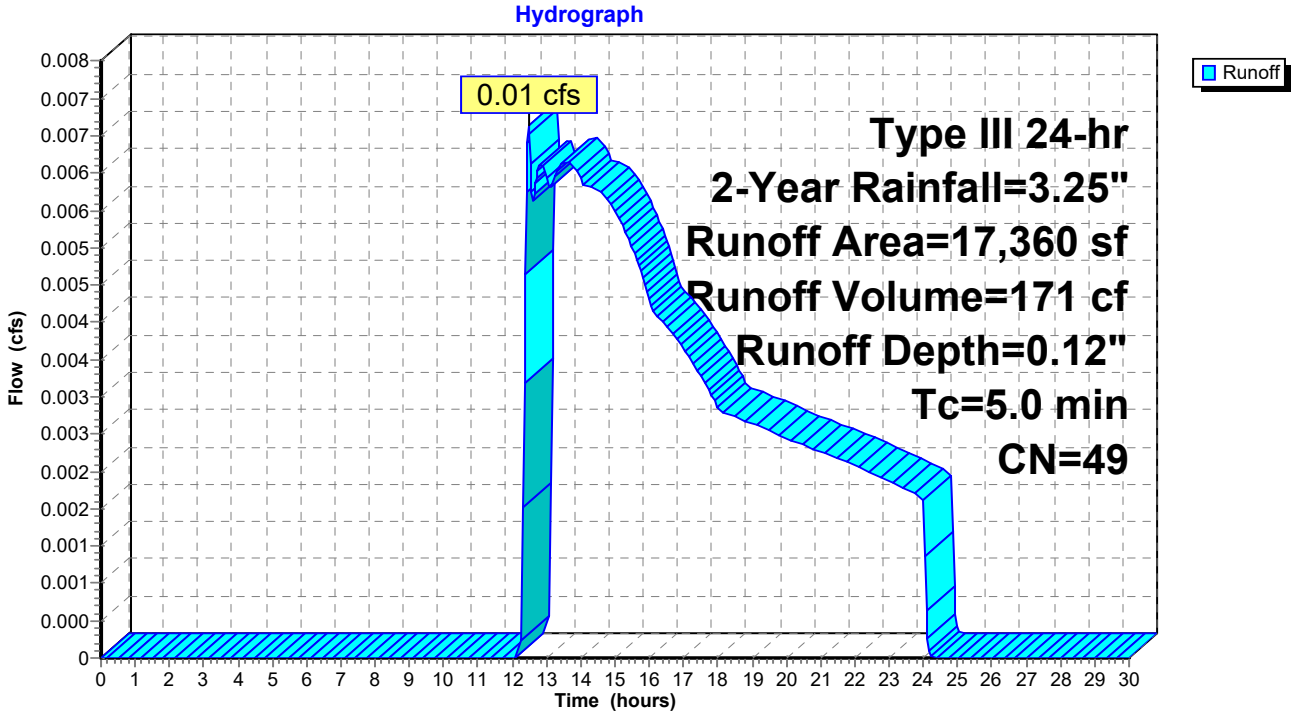
Runoff = 0.01 cfs @ 12.48 hrs, Volume= 171 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
17,360	49	50-75% Grass cover, Fair, HSG A
17,360		100.00% Pervious Area

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

Subcatchment 4S: EX LANDSCAPE AREA



Summary for Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA

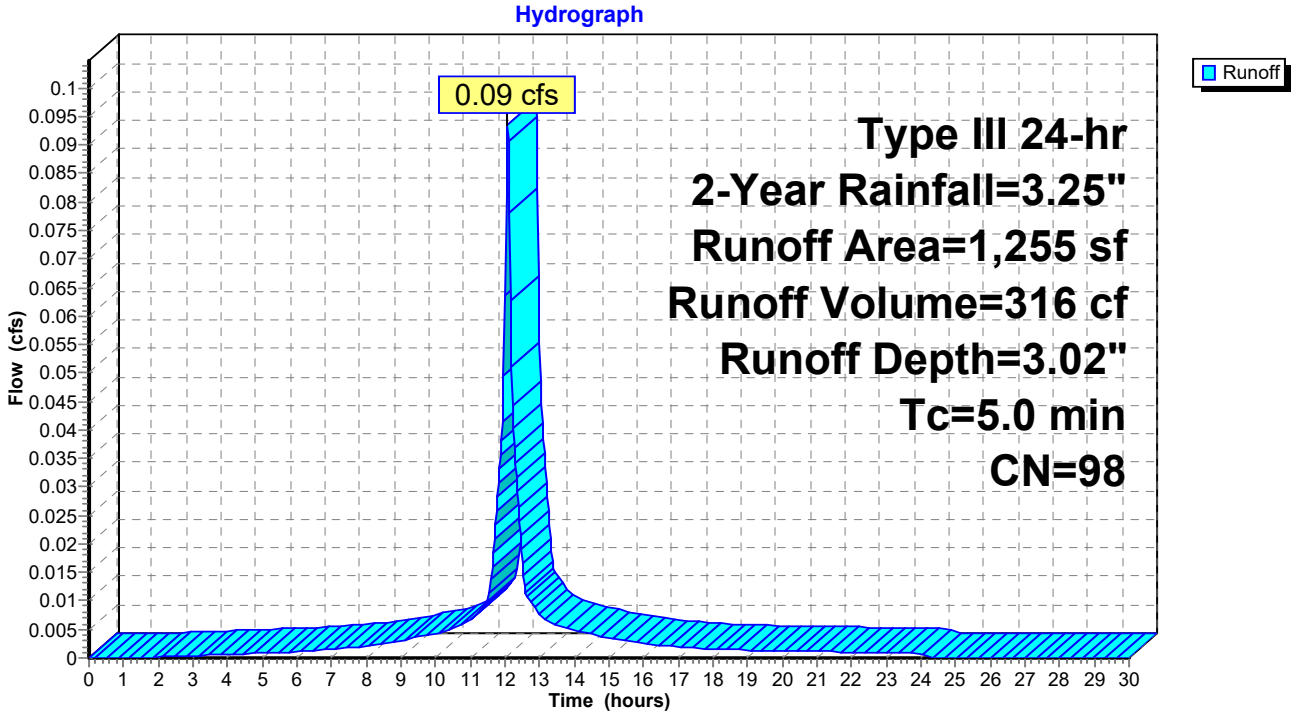
Runoff = 0.09 cfs @ 12.07 hrs, Volume= 316 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
1,255	98	Paved parking, HSG A
1,255		100.00% Impervious Area

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

Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA



Summary for Subcatchment 6S: EXISTING ROOF AREA

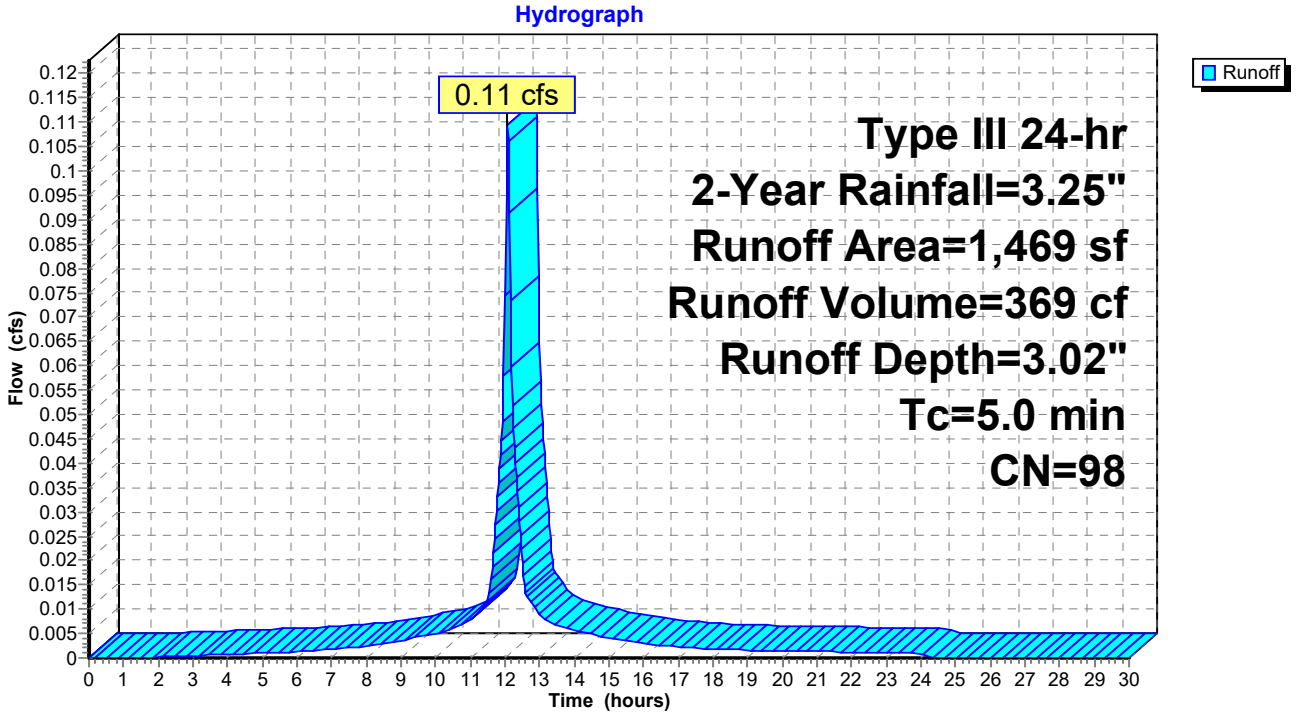
Runoff = 0.11 cfs @ 12.07 hrs, Volume= 369 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
1,469	98	Roofs, HSG A
1,469		100.00% Impervious Area

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

Subcatchment 6S: EXISTING ROOF AREA



Summary for Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

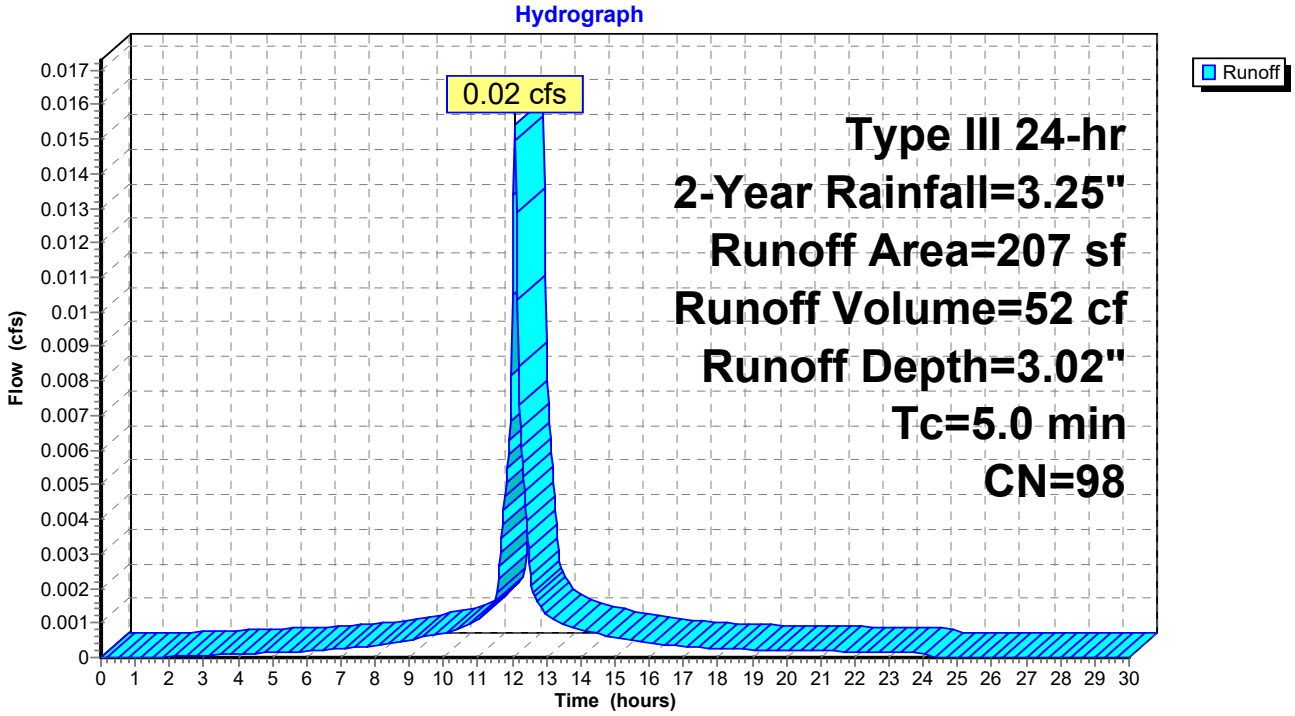
Runoff = 0.02 cfs @ 12.07 hrs, Volume= 52 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
207	98	Unconnected pavement, HSG A
207		100.00% Impervious Area
207		100.00% Unconnected

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

Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

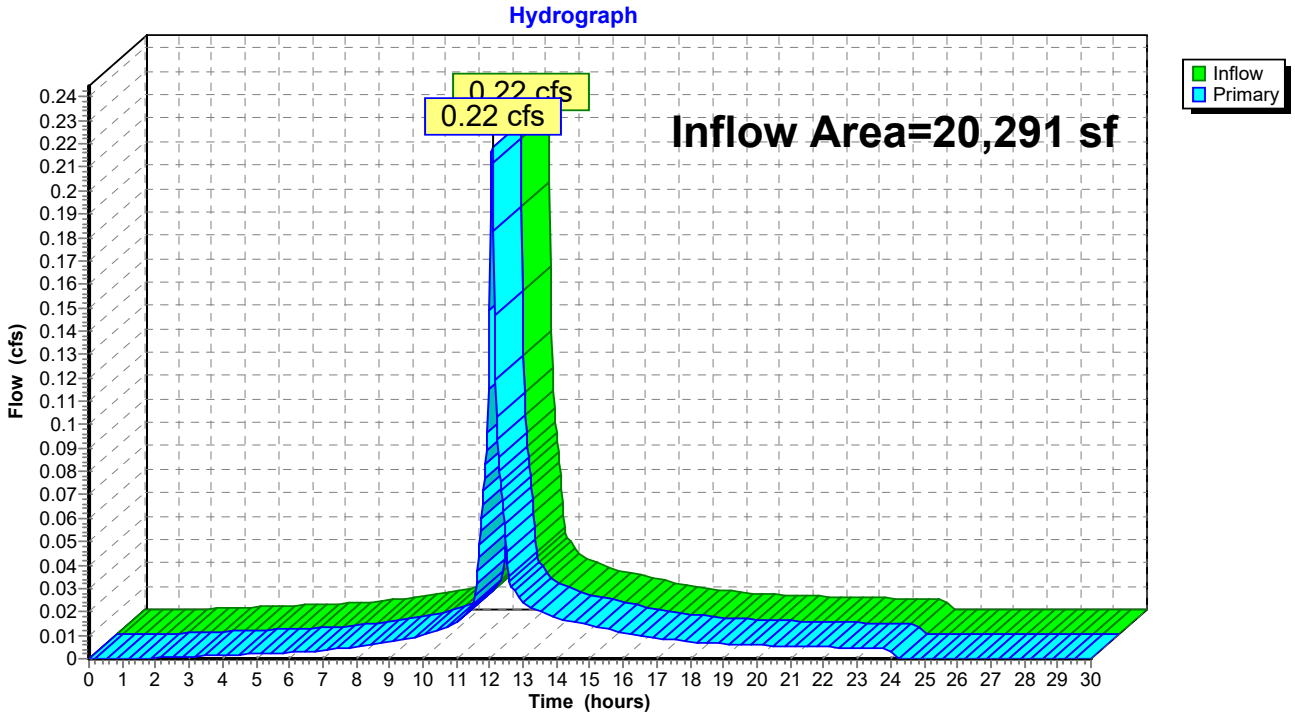


Summary for Link 3L: EXISTING

Inflow Area = 20,291 sf, 14.44% Impervious, Inflow Depth = 0.54" for 2-Year event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 908 cf
Primary = 0.22 cfs @ 12.07 hrs, Volume= 908 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 3L: EXISTING



Summary for Subcatchment 4S: EX LANDSCAPE AREA

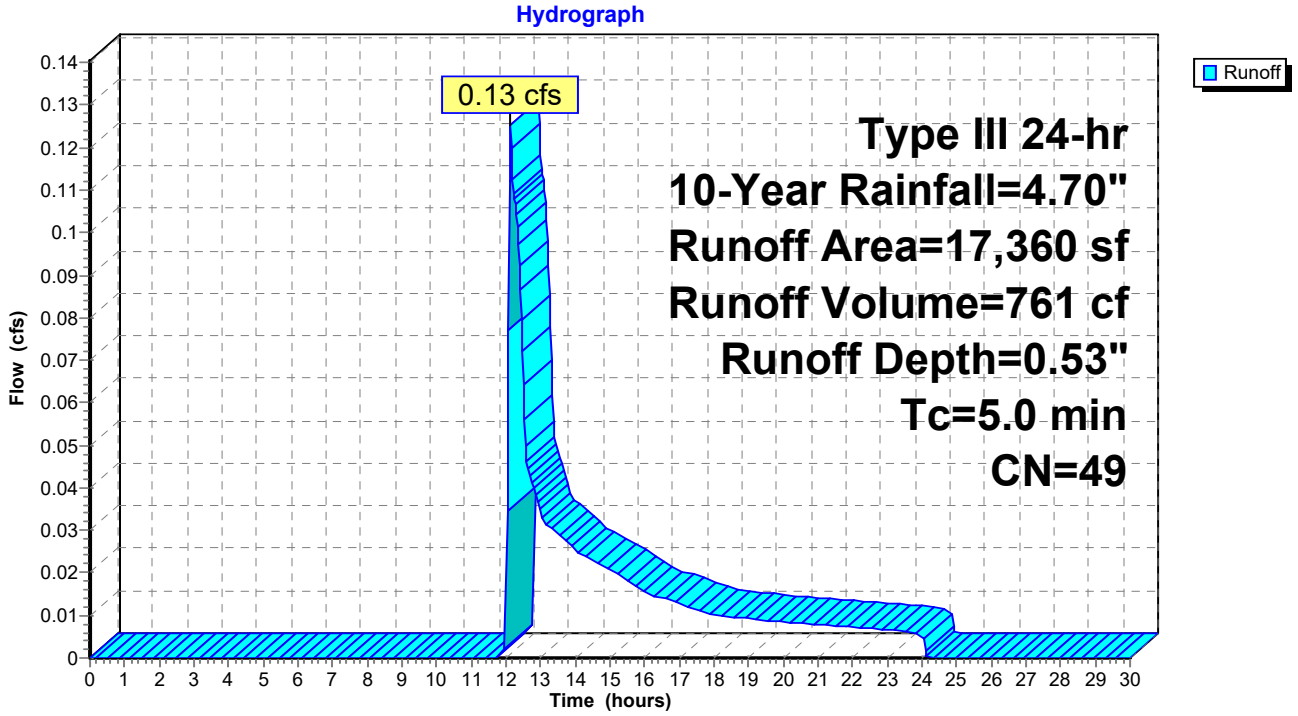
Runoff = 0.13 cfs @ 12.13 hrs, Volume= 761 cf, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
17,360	49	50-75% Grass cover, Fair, HSG A
17,360		100.00% Pervious Area

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

Subcatchment 4S: EX LANDSCAPE AREA



Summary for Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA

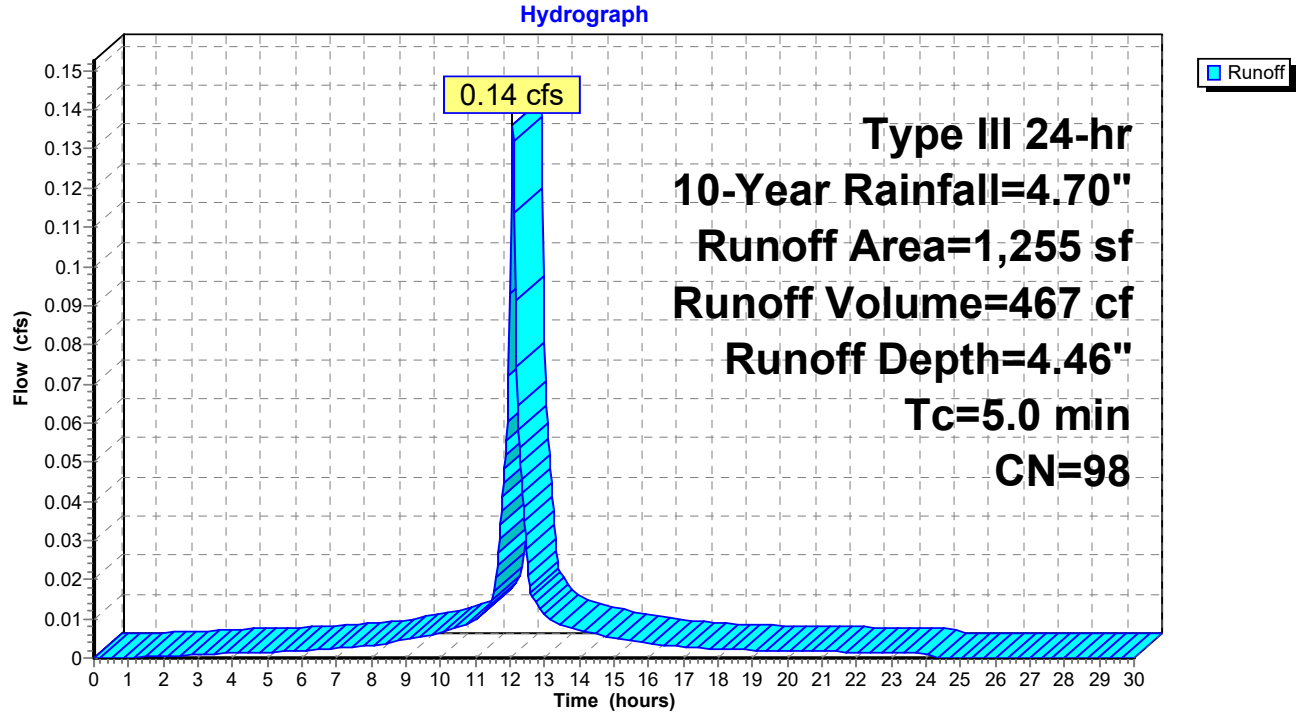
Runoff = 0.14 cfs @ 12.07 hrs, Volume= 467 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
1,255	98	Paved parking, HSG A
1,255		100.00% Impervious Area

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

Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA



Summary for Subcatchment 6S: EXISTING ROOF AREA

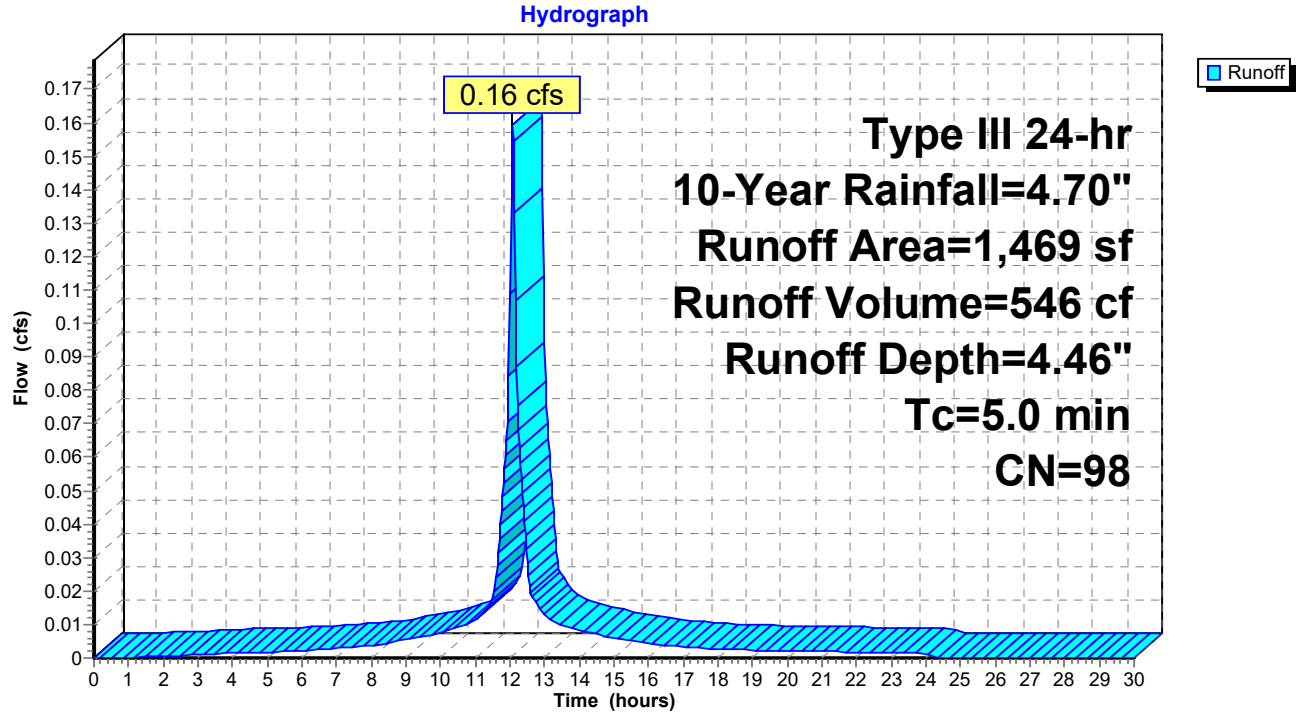
Runoff = 0.16 cfs @ 12.07 hrs, Volume= 546 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
1,469	98	Roofs, HSG A
1,469		100.00% Impervious Area

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

Subcatchment 6S: EXISTING ROOF AREA



Summary for Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

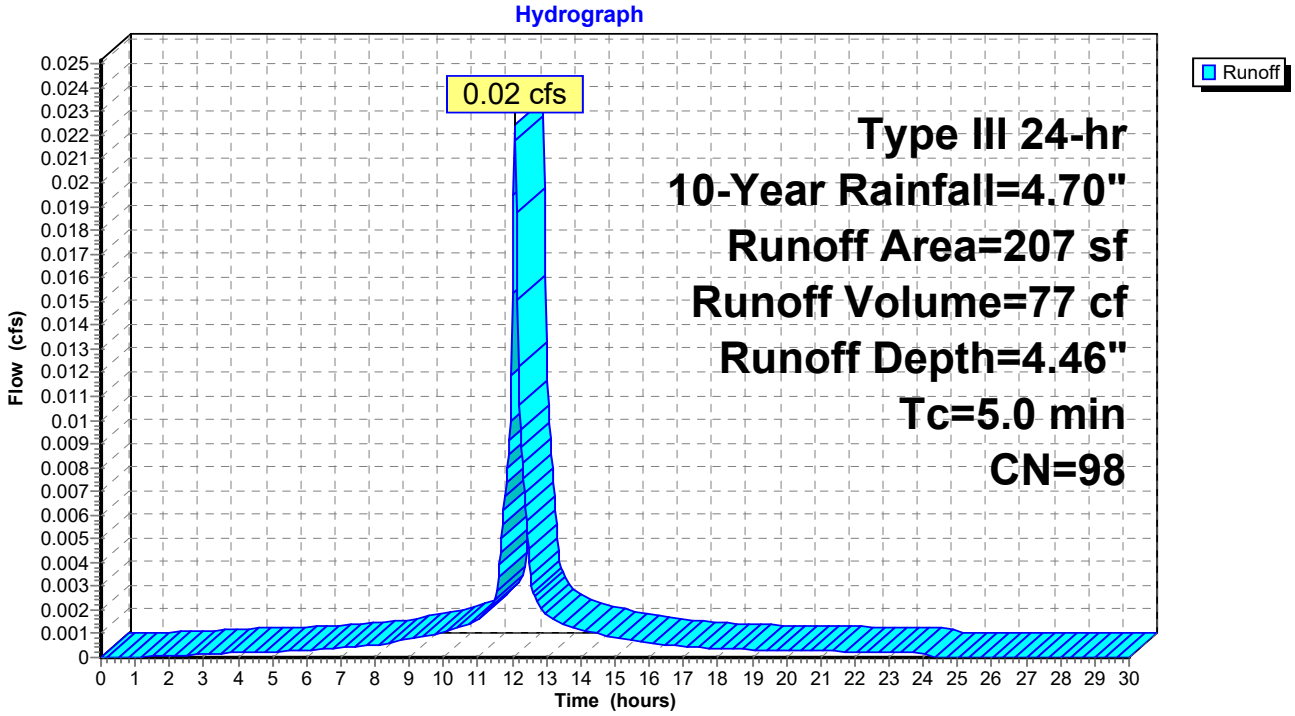
Runoff = 0.02 cfs @ 12.07 hrs, Volume= 77 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
207	98	Unconnected pavement, HSG A
207		100.00% Impervious Area
207		100.00% Unconnected

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

Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

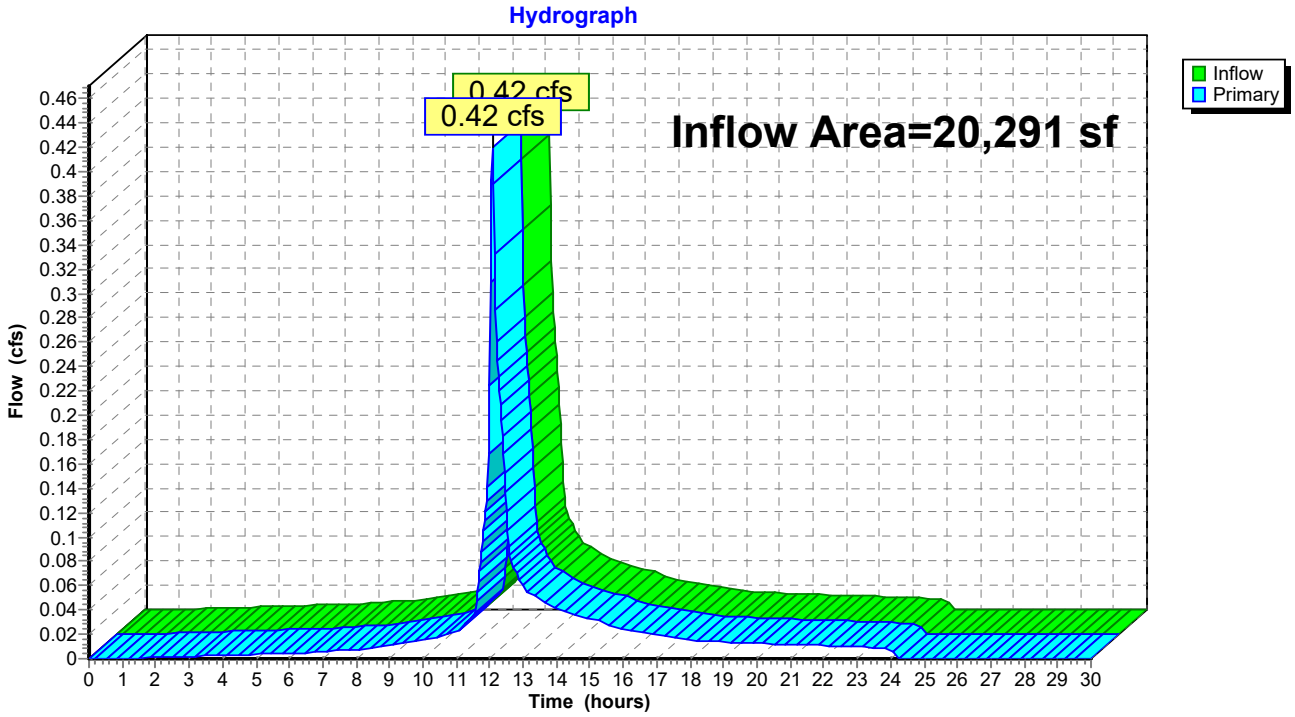


Summary for Link 3L: EXISTING

Inflow Area = 20,291 sf, 14.44% Impervious, Inflow Depth = 1.10" for 10-Year event
Inflow = 0.42 cfs @ 12.09 hrs, Volume= 1,852 cf
Primary = 0.42 cfs @ 12.09 hrs, Volume= 1,852 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 3L: EXISTING



Summary for Subcatchment 4S: EX LANDSCAPE AREA

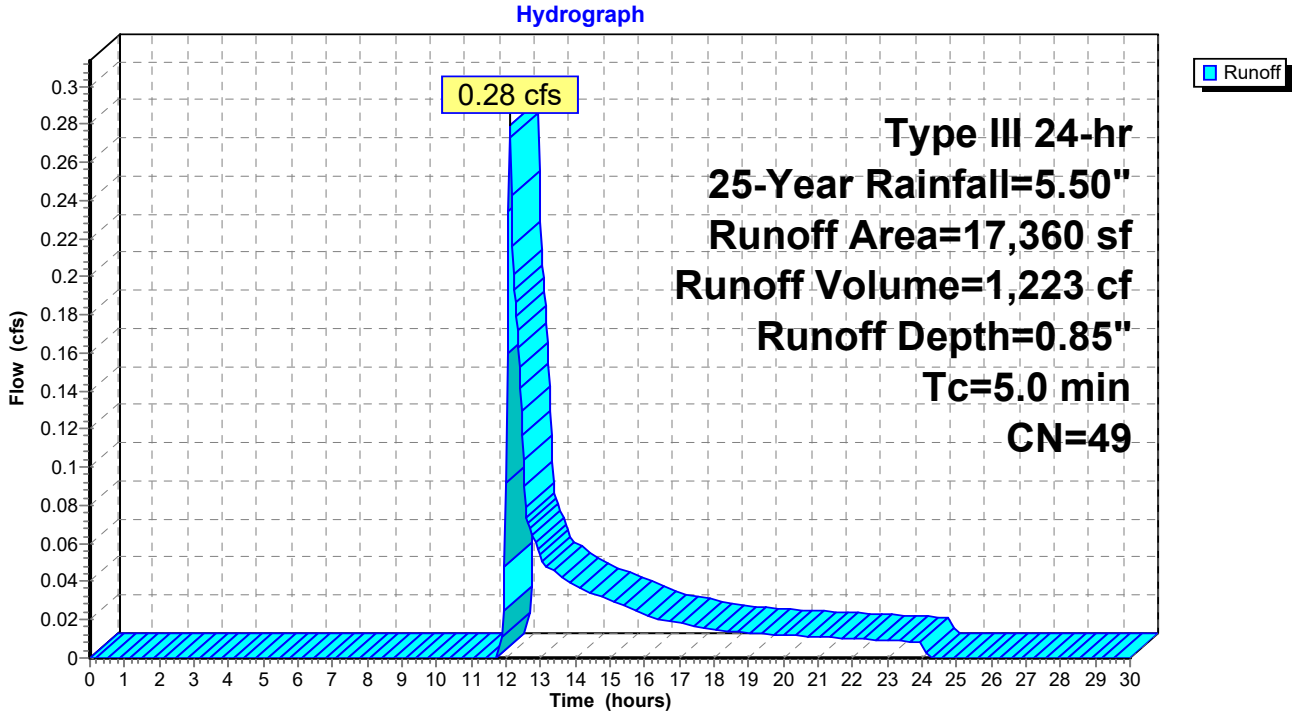
Runoff = 0.28 cfs @ 12.10 hrs, Volume= 1,223 cf, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
17,360	49	50-75% Grass cover, Fair, HSG A
17,360		100.00% Pervious Area

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

Subcatchment 4S: EX LANDSCAPE AREA



Summary for Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA

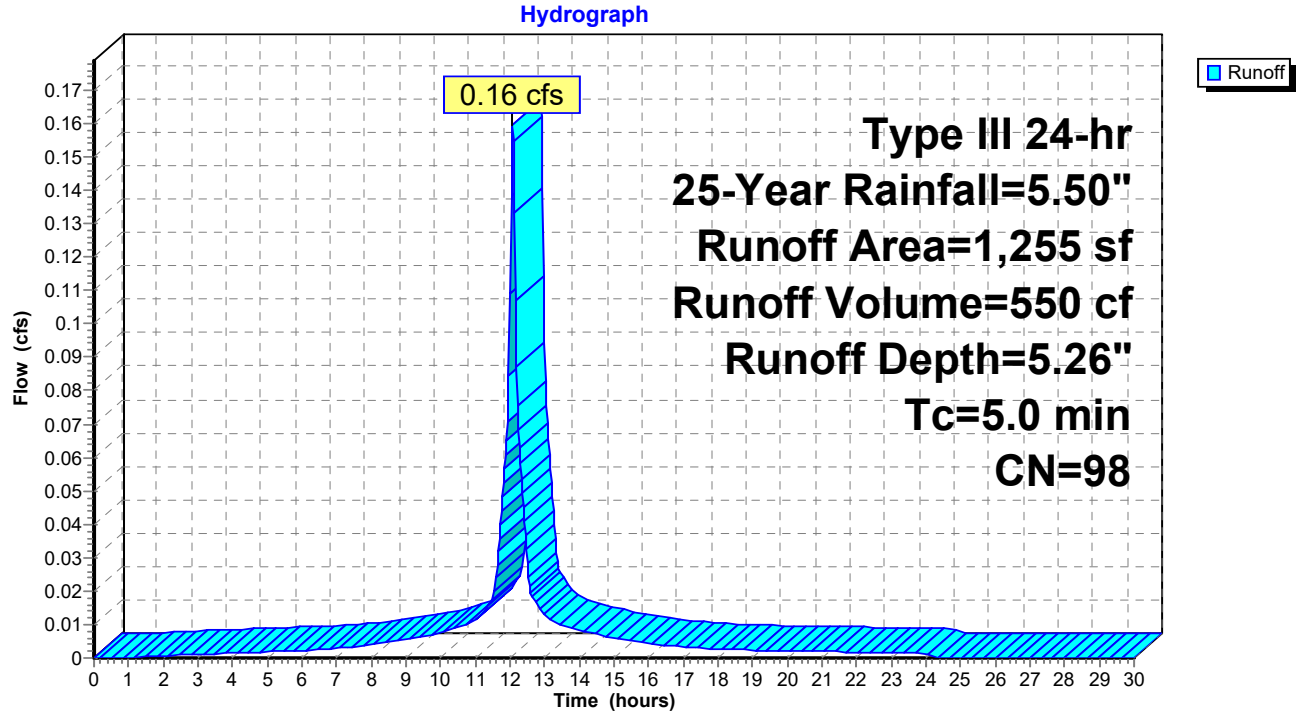
Runoff = 0.16 cfs @ 12.07 hrs, Volume= 550 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
1,255	98	Paved parking, HSG A
1,255		100.00% Impervious Area

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

Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA



Summary for Subcatchment 6S: EXISTING ROOF AREA

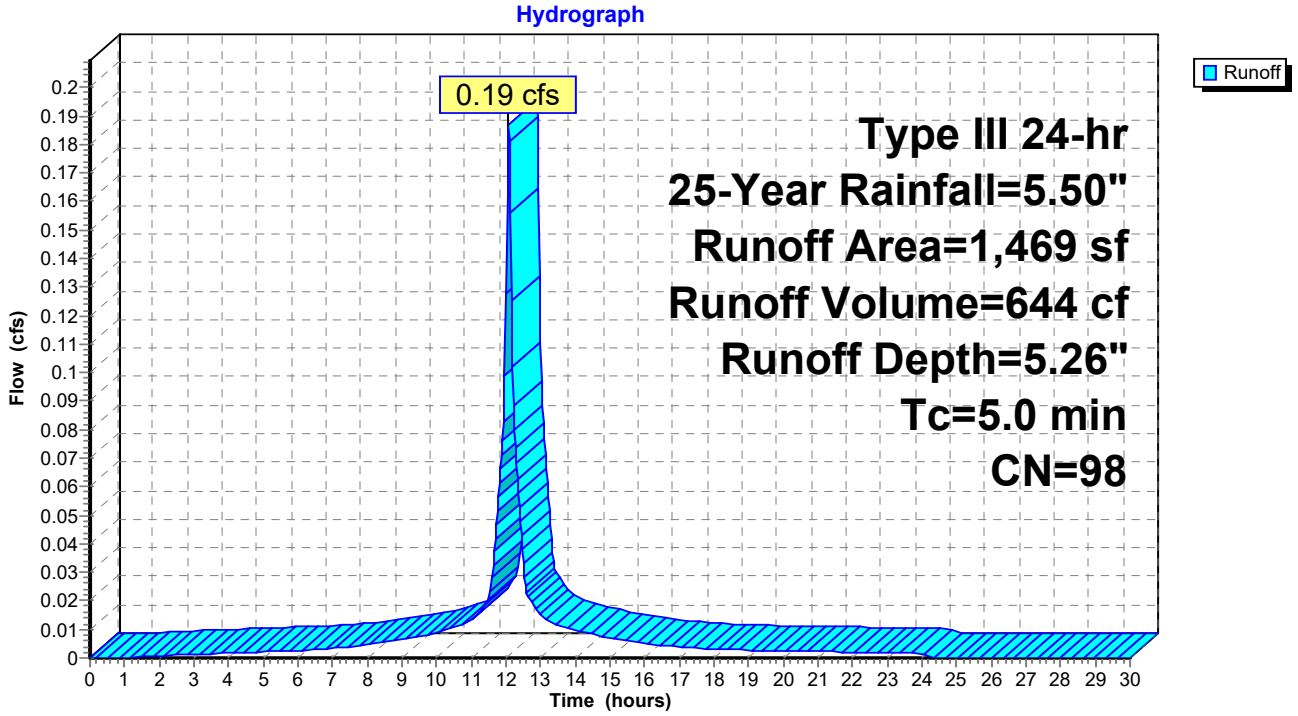
Runoff = 0.19 cfs @ 12.07 hrs, Volume= 644 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
1,469	98	Roofs, HSG A
1,469		100.00% Impervious Area

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

Subcatchment 6S: EXISTING ROOF AREA



Summary for Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

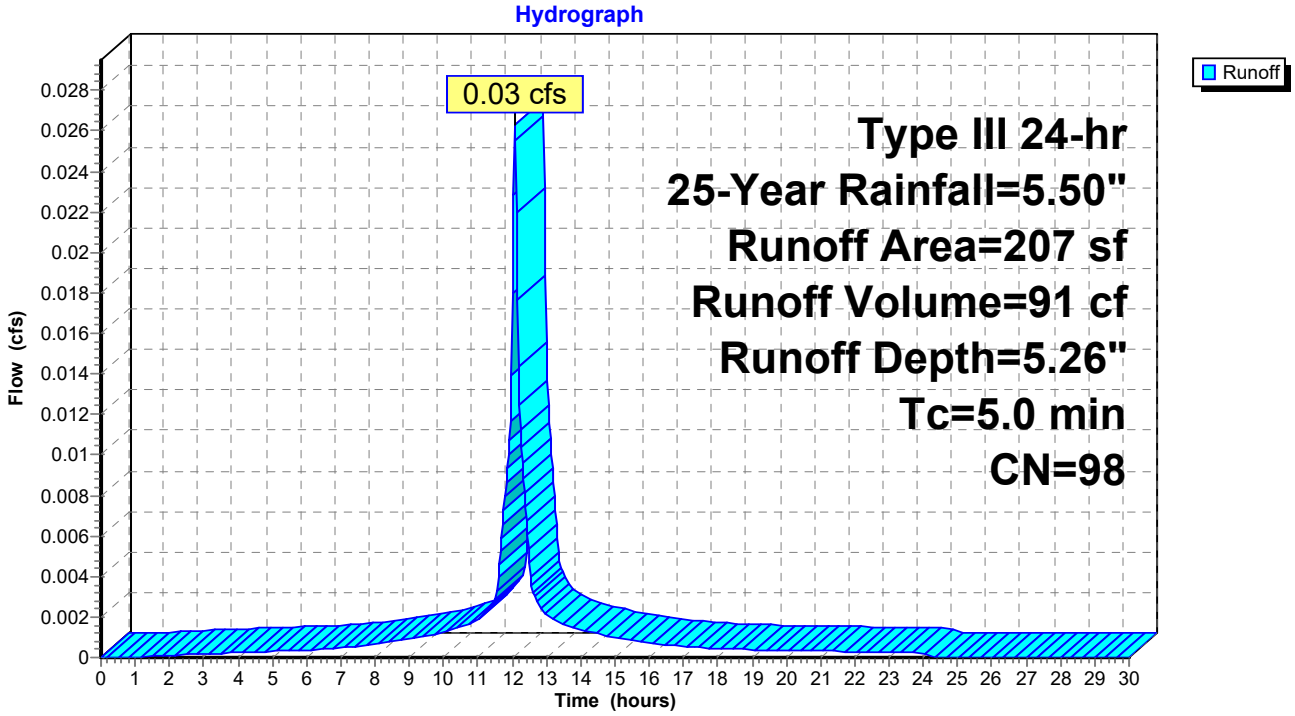
Runoff = 0.03 cfs @ 12.07 hrs, Volume= 91 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
207	98	Unconnected pavement, HSG A
207		100.00% Impervious Area
207		100.00% Unconnected

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

Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

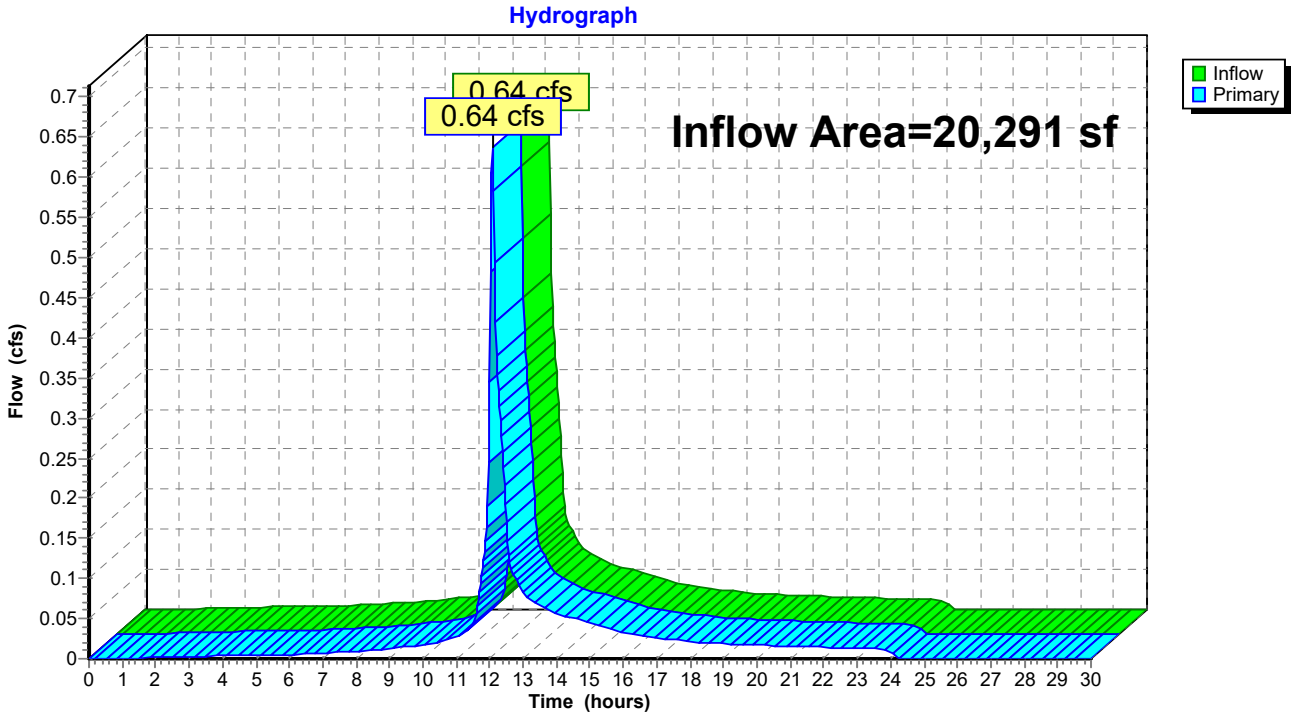


Summary for Link 3L: EXISTING

Inflow Area = 20,291 sf, 14.44% Impervious, Inflow Depth = 1.48" for 25-Year event
Inflow = 0.64 cfs @ 12.09 hrs, Volume= 2,508 cf
Primary = 0.64 cfs @ 12.09 hrs, Volume= 2,508 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 3L: EXISTING



Summary for Subcatchment 4S: EX LANDSCAPE AREA

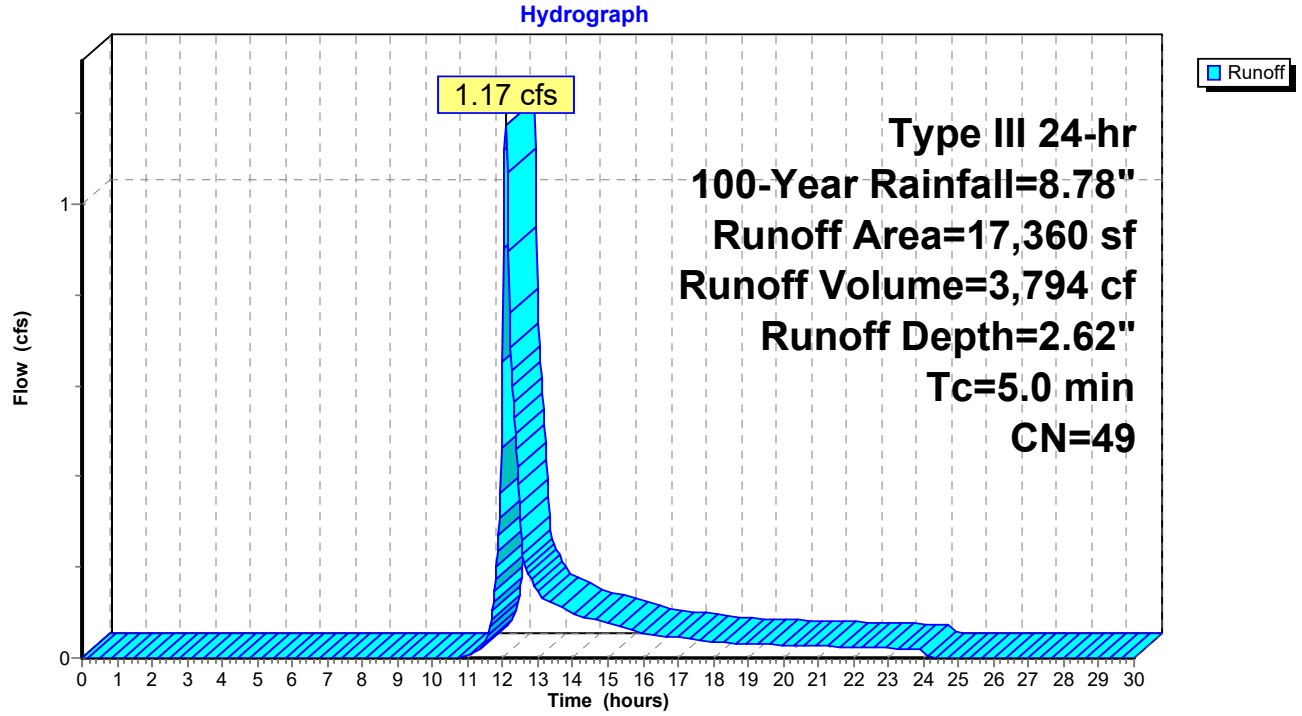
Runoff = 1.17 cfs @ 12.08 hrs, Volume= 3,794 cf, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
17,360	49	50-75% Grass cover, Fair, HSG A
17,360		100.00% Pervious Area

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

Subcatchment 4S: EX LANDSCAPE AREA



Summary for Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA

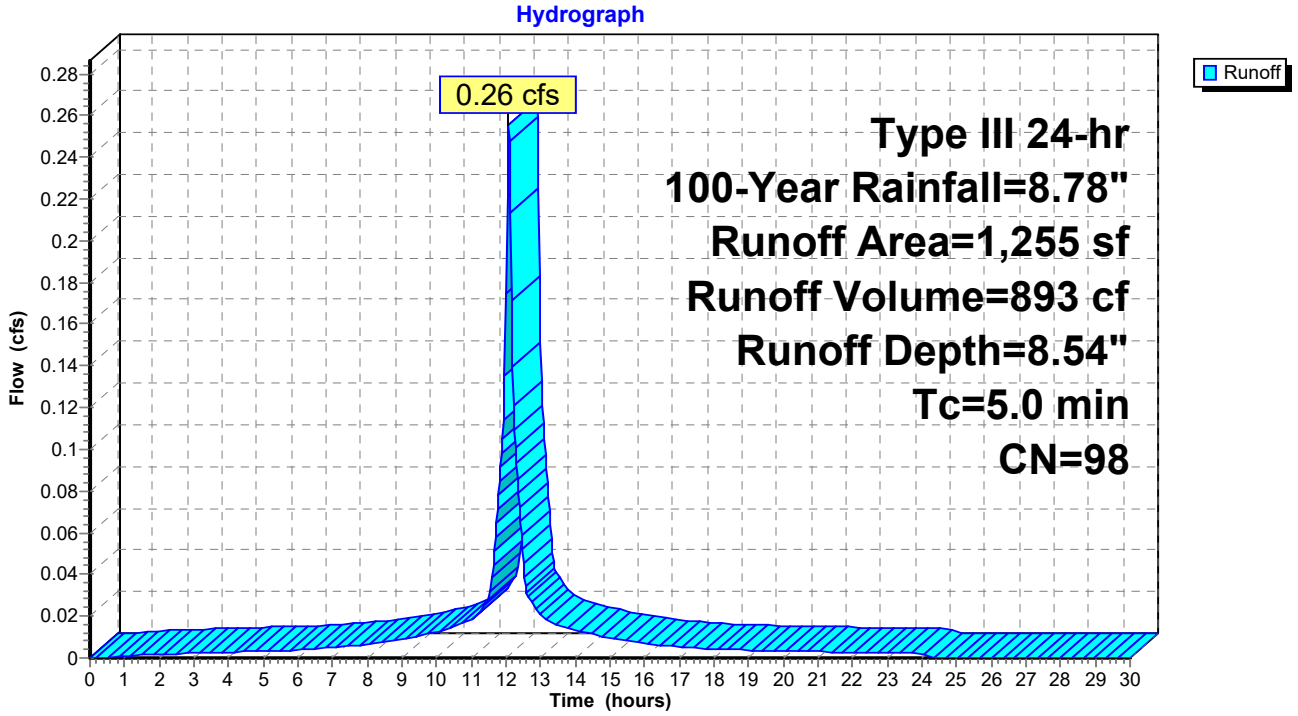
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 893 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
1,255	98	Paved parking, HSG A
1,255		100.00% Impervious Area

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

Subcatchment 5S: EXISTING DRIVEWAY/WALKWAY AREA



Summary for Subcatchment 6S: EXISTING ROOF AREA

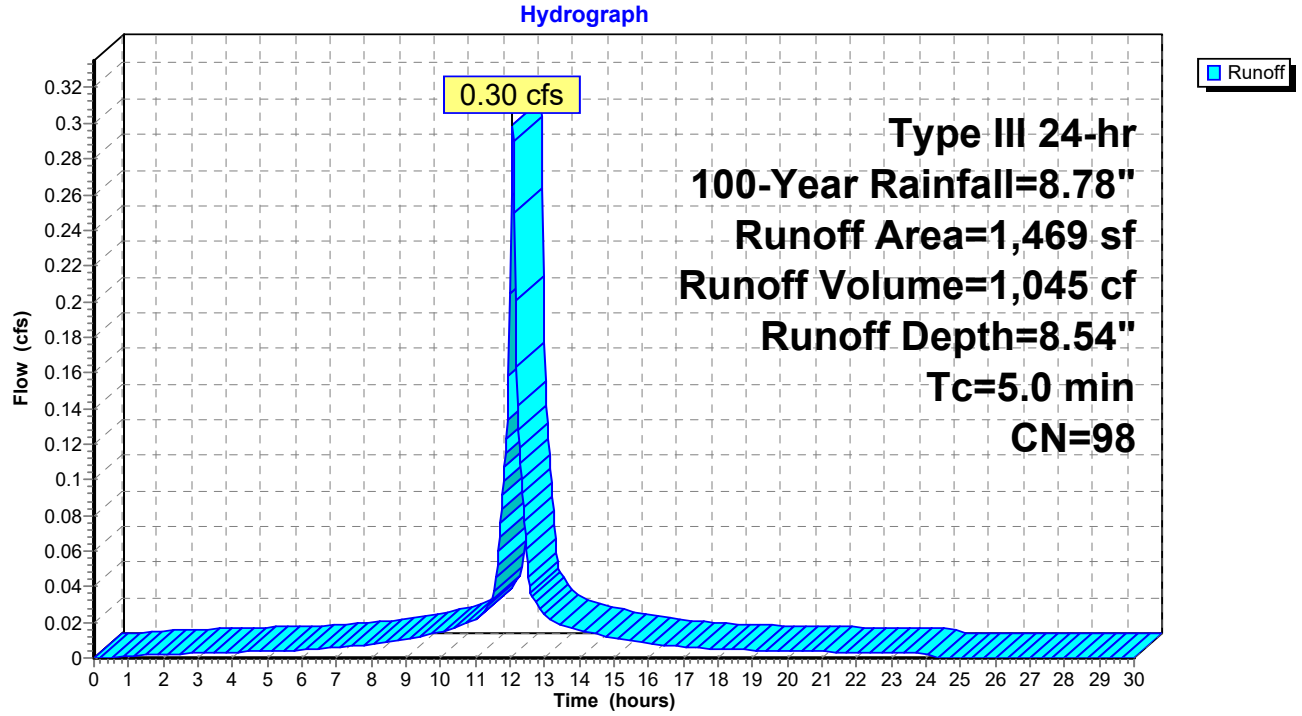
Runoff = 0.30 cfs @ 12.07 hrs, Volume= 1,045 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
1,469	98	Roofs, HSG A
1,469		100.00% Impervious Area

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

Subcatchment 6S: EXISTING ROOF AREA



Summary for Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

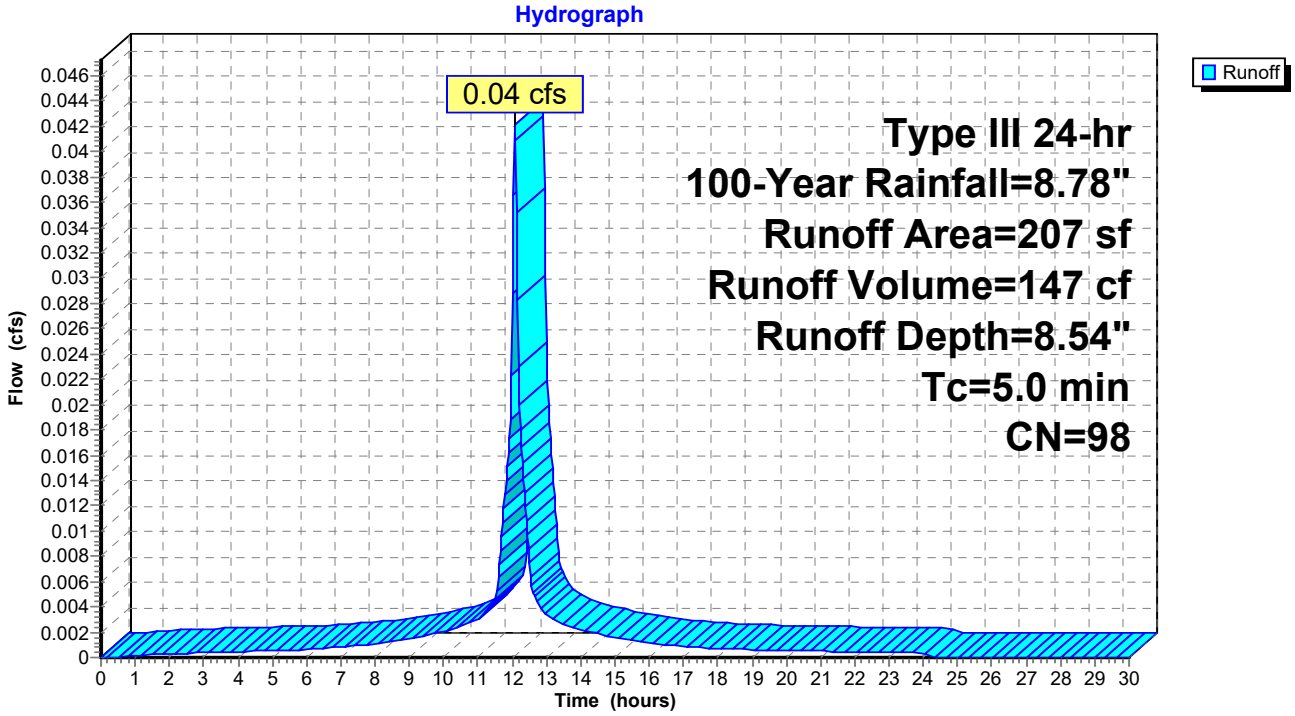
Runoff = 0.04 cfs @ 12.07 hrs, Volume= 147 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
207	98	Unconnected pavement, HSG A
207		100.00% Impervious Area
207		100.00% Unconnected

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

Subcatchment 7S: EXISTING STEPS&LANDINGS/BULKHEAD

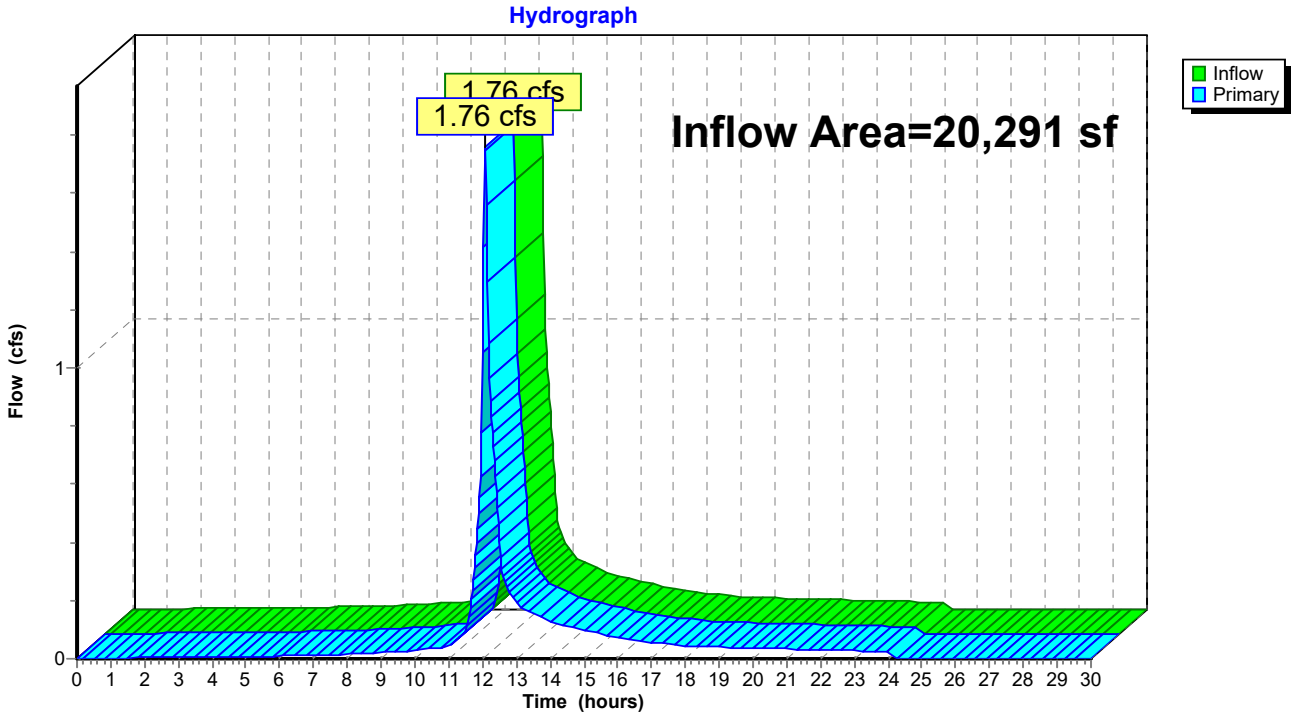


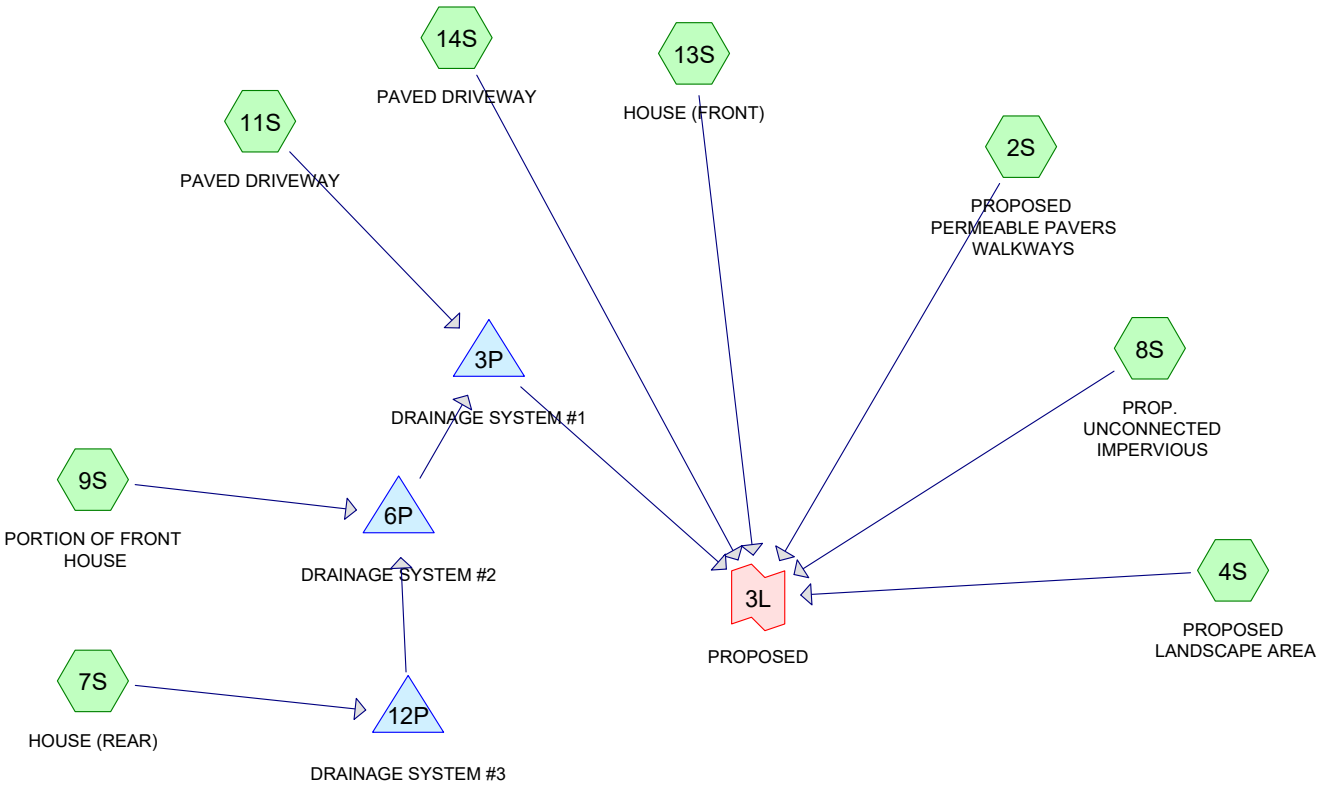
Summary for Link 3L: EXISTING

Inflow Area = 20,291 sf, 14.44% Impervious, Inflow Depth = 3.48" for 100-Year event
Inflow = 1.76 cfs @ 12.08 hrs, Volume= 5,880 cf
Primary = 1.76 cfs @ 12.08 hrs, Volume= 5,880 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs

Link 3L: EXISTING





Subcat Reach Pond Link

Routing Diagram for PROPOSED REV A
Prepared by SPRUHAN ENGINEERING, P.C., Printed 6/17/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
10,710	49	50-75% Grass cover, Fair, HSG A (4S)
2,869	98	Driveway (11S, 14S)
767	85	Permeable Pavers (2S)
4,943	98	Roofs, HSG A (7S, 9S, 13S)
1,002	98	Unconnected pavement, HSG A (8S)
20,291	**72**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
16,655	HSG A	4S, 7S, 8S, 9S, 13S
0	HSG B	
0	HSG C	
0	HSG D	
3,636	Other	2S, 11S, 14S
20,291		**TOTAL AREA**

Summary for Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS

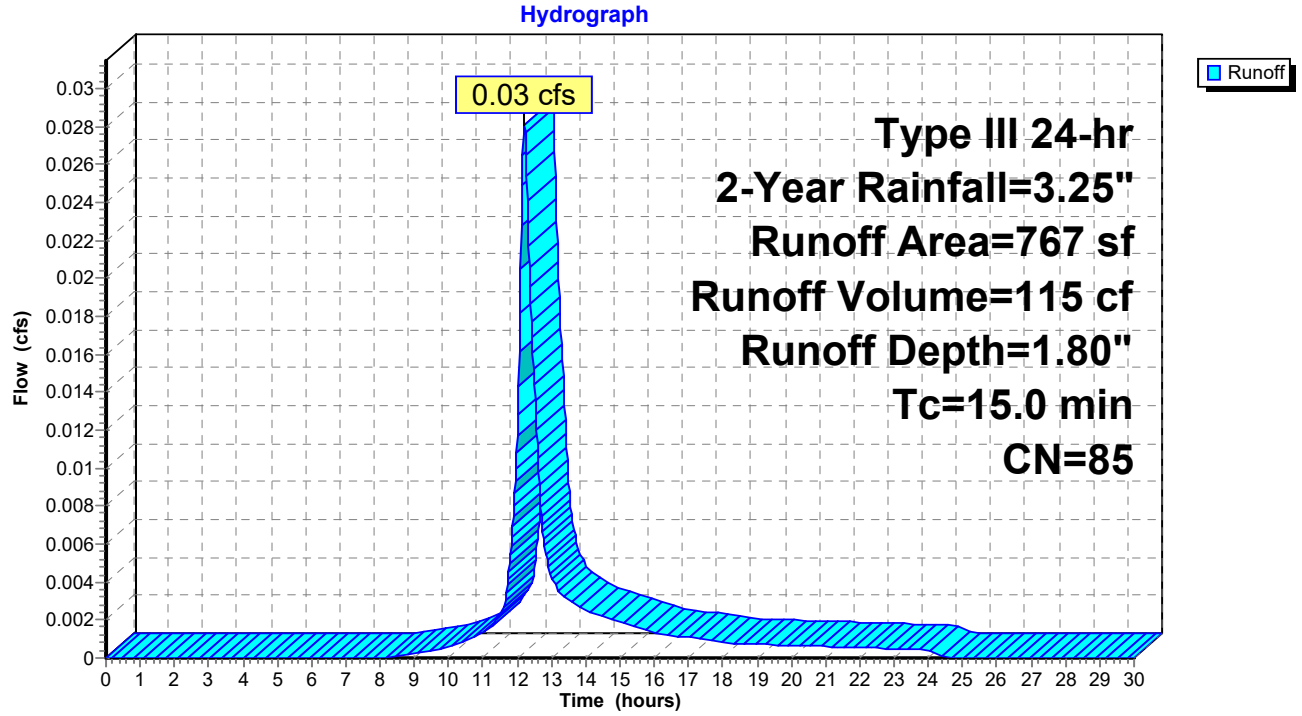
Runoff = 0.03 cfs @ 12.21 hrs, Volume= 115 cf, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

	Area (sf)	CN	Description
*	767	85	Permeable Pavers
	767		100.00% Pervious Area

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

Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS



Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

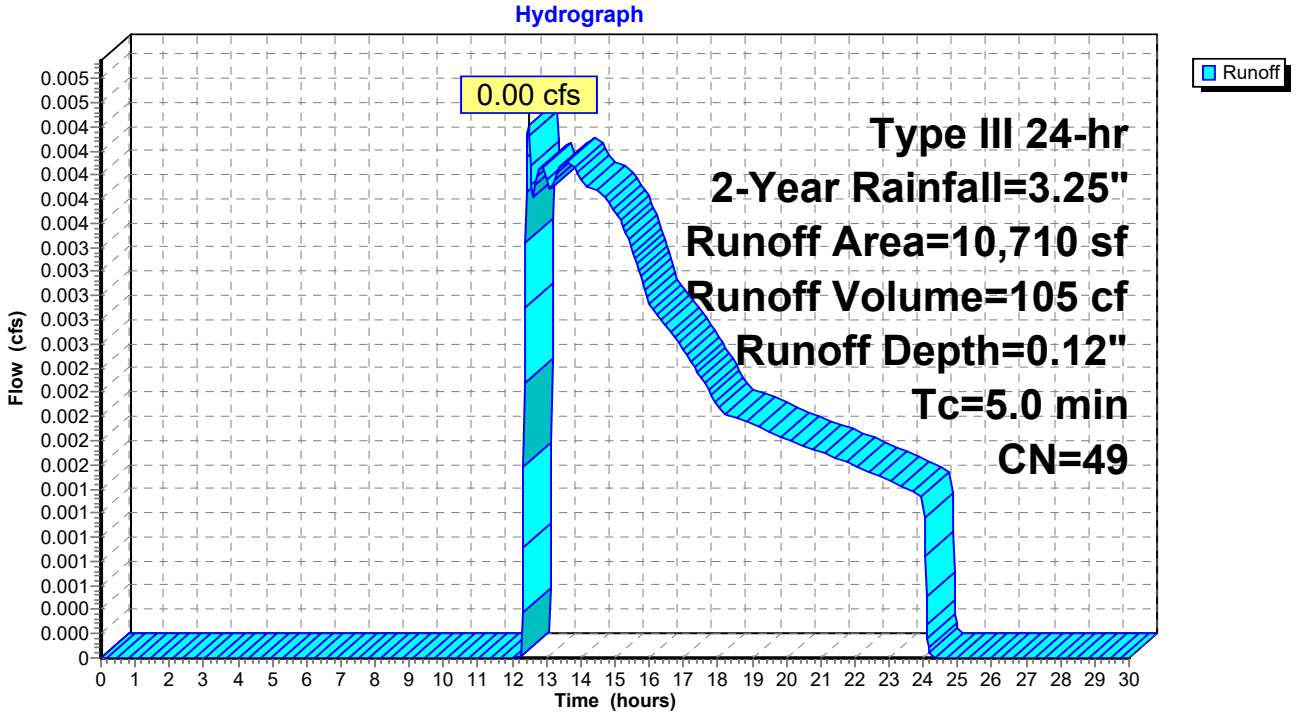
Runoff = 0.00 cfs @ 12.48 hrs, Volume= 105 cf, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
10,710	49	50-75% Grass cover, Fair, HSG A
10,710		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED LANDSCAPE AREA



Summary for Subcatchment 7S: HOUSE (REAR)

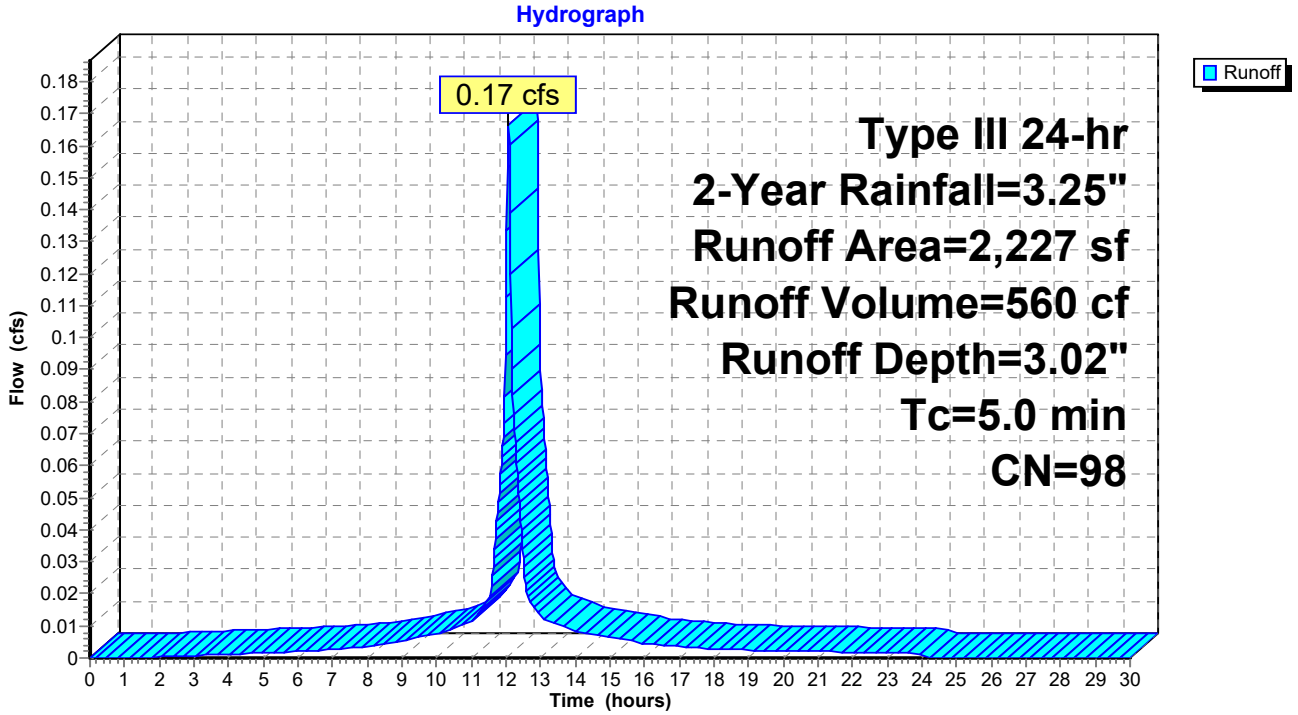
Runoff = 0.17 cfs @ 12.07 hrs, Volume= 560 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
2,227	98	Roofs, HSG A
2,227		100.00% Impervious Area

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

Subcatchment 7S: HOUSE (REAR)



Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

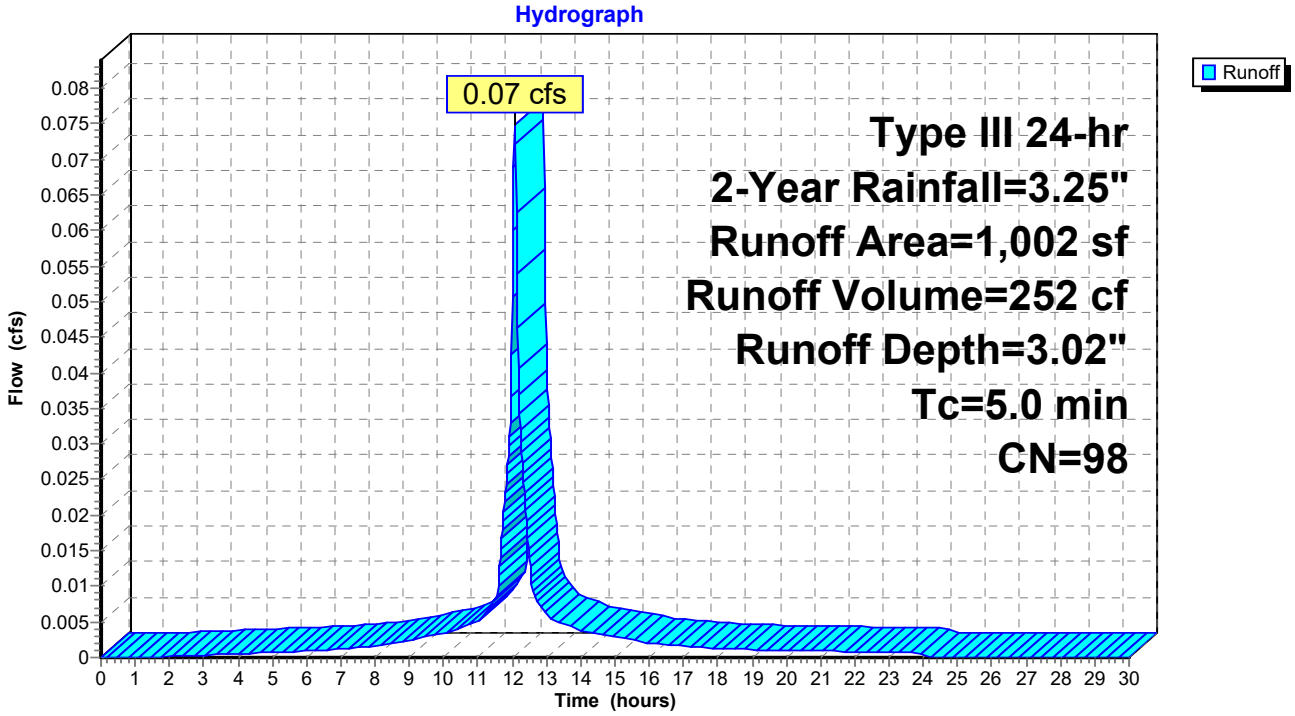
Runoff = 0.07 cfs @ 12.07 hrs, Volume= 252 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
1,002	98	Unconnected pavement, HSG A
1,002		100.00% Impervious Area
1,002		100.00% Unconnected

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

Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



Summary for Subcatchment 9S: PORTION OF FRONT HOUSE

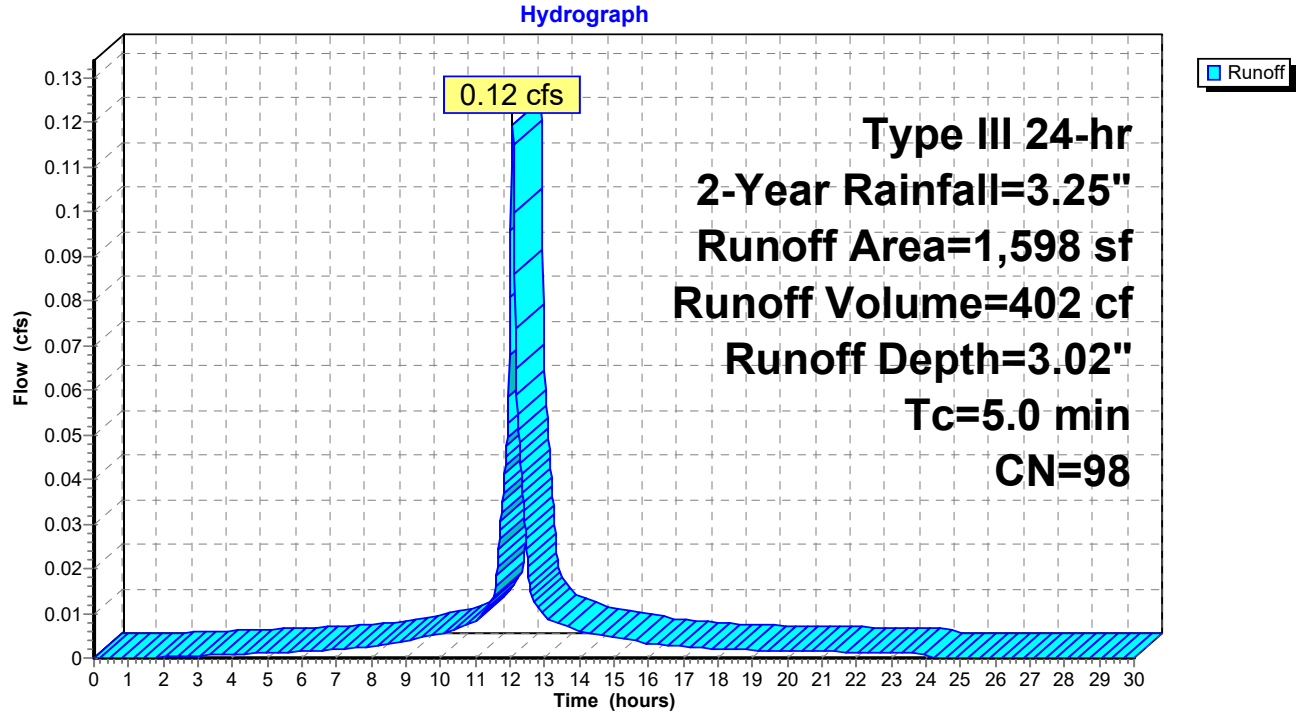
Runoff = 0.12 cfs @ 12.07 hrs, Volume= 402 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
1,598	98	Roofs, HSG A
1,598		100.00% Impervious Area

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

Subcatchment 9S: PORTION OF FRONT HOUSE



Summary for Subcatchment 11S: PAVED DRIVEWAY

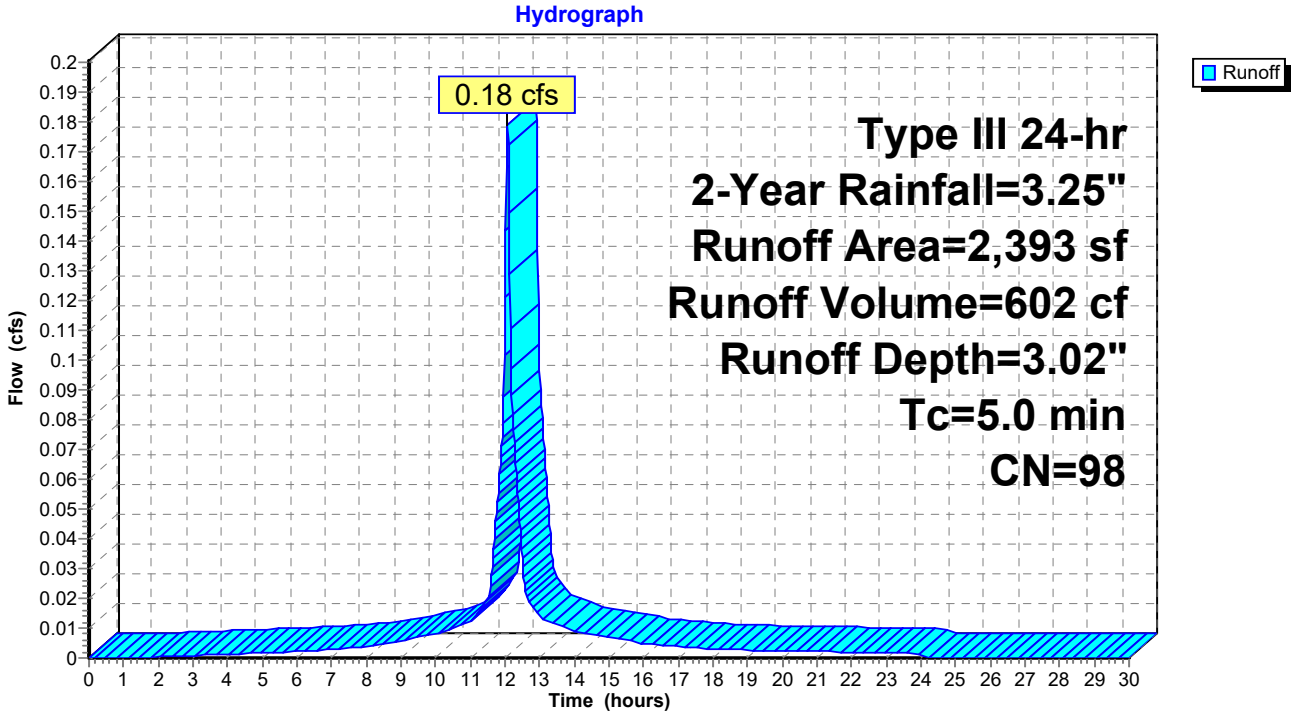
Runoff = 0.18 cfs @ 12.07 hrs, Volume= 602 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

	Area (sf)	CN	Description
*	2,393	98	Driveway
	2,393		100.00% Impervious Area

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

Subcatchment 11S: PAVED DRIVEWAY



Summary for Subcatchment 13S: HOUSE (FRONT)

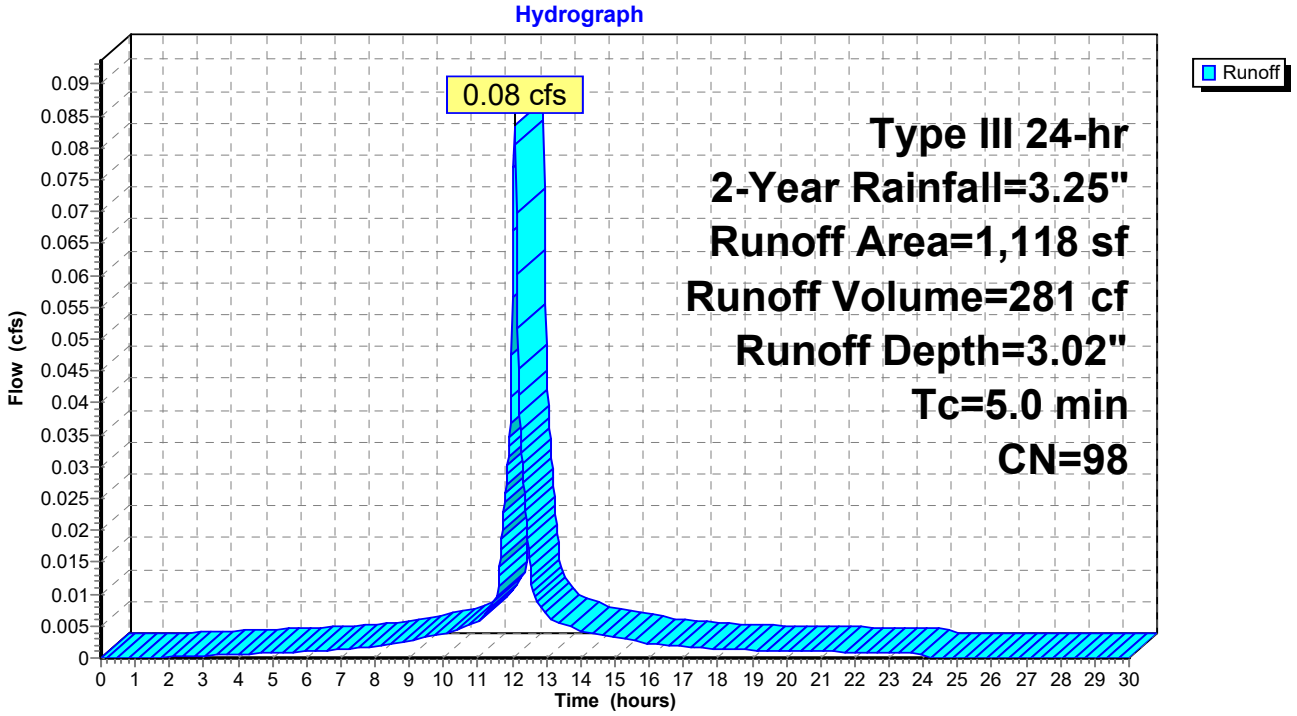
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 281 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

Area (sf)	CN	Description
1,118	98	Roofs, HSG A
1,118		100.00% Impervious Area

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

Subcatchment 13S: HOUSE (FRONT)



Summary for Subcatchment 14S: PAVED DRIVEWAY

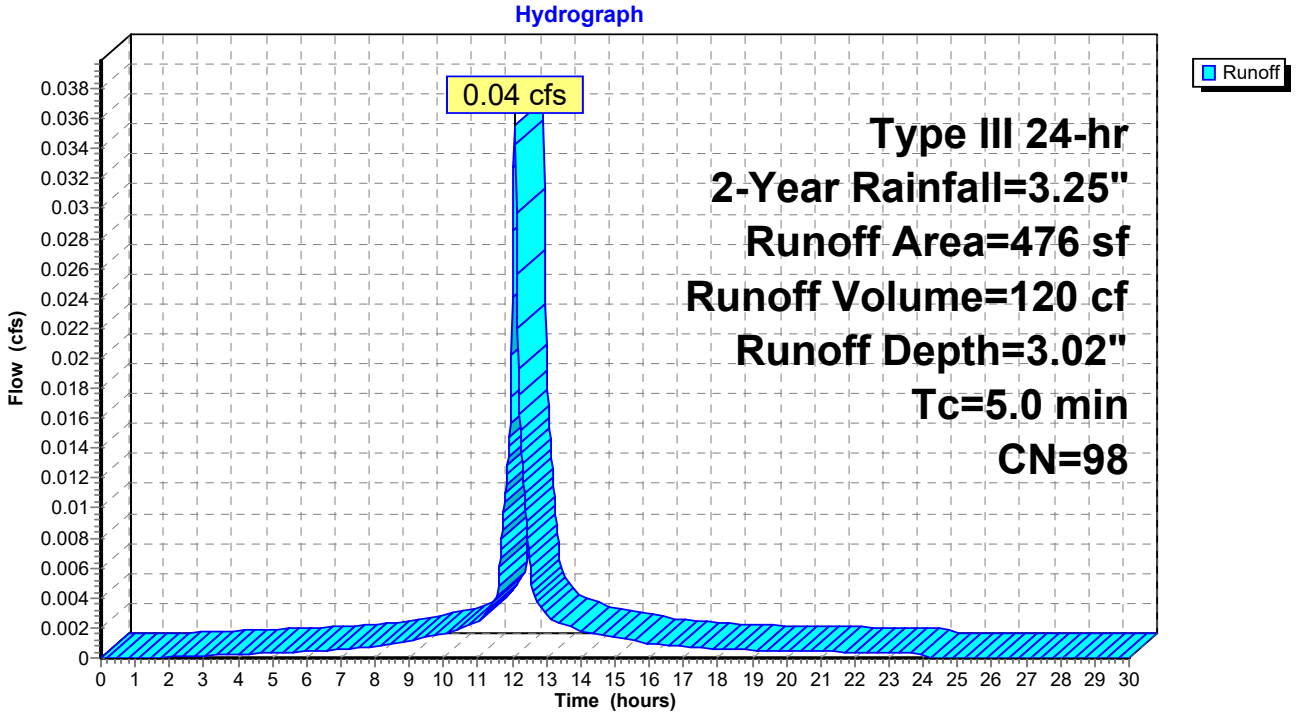
Runoff = 0.04 cfs @ 12.07 hrs, Volume= 120 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.25"

	Area (sf)	CN	Description
*	476	98	Driveway
	476		100.00% Impervious Area

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

Subcatchment 14S: PAVED DRIVEWAY



Summary for Pond 3P: DRAINAGE SYSTEM #1

Inflow Area = 6,218 sf,100.00% Impervious, Inflow Depth = 1.16" for 2-Year event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 602 cf
Outflow = 0.05 cfs @ 12.40 hrs, Volume= 602 cf, Atten= 72%, Lag= 19.5 min
Discarded = 0.05 cfs @ 12.40 hrs, Volume= 602 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 113.36' @ 12.40 hrs Surf.Area= 851 sf Storage= 108 cf

Plug-Flow detention time= 11.7 min calculated for 602 cf (100% of inflow)
Center-of-Mass det. time= 11.6 min (766.8 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	447 cf	**23.00'W x 37.00'L x 1.50'H Prismatoid** 1,277 cf Overall x 35.0% Voids
#2	114.50'	15 cf	**Ponding** Listed below -Impervious
		462 cf	Total Available Storage

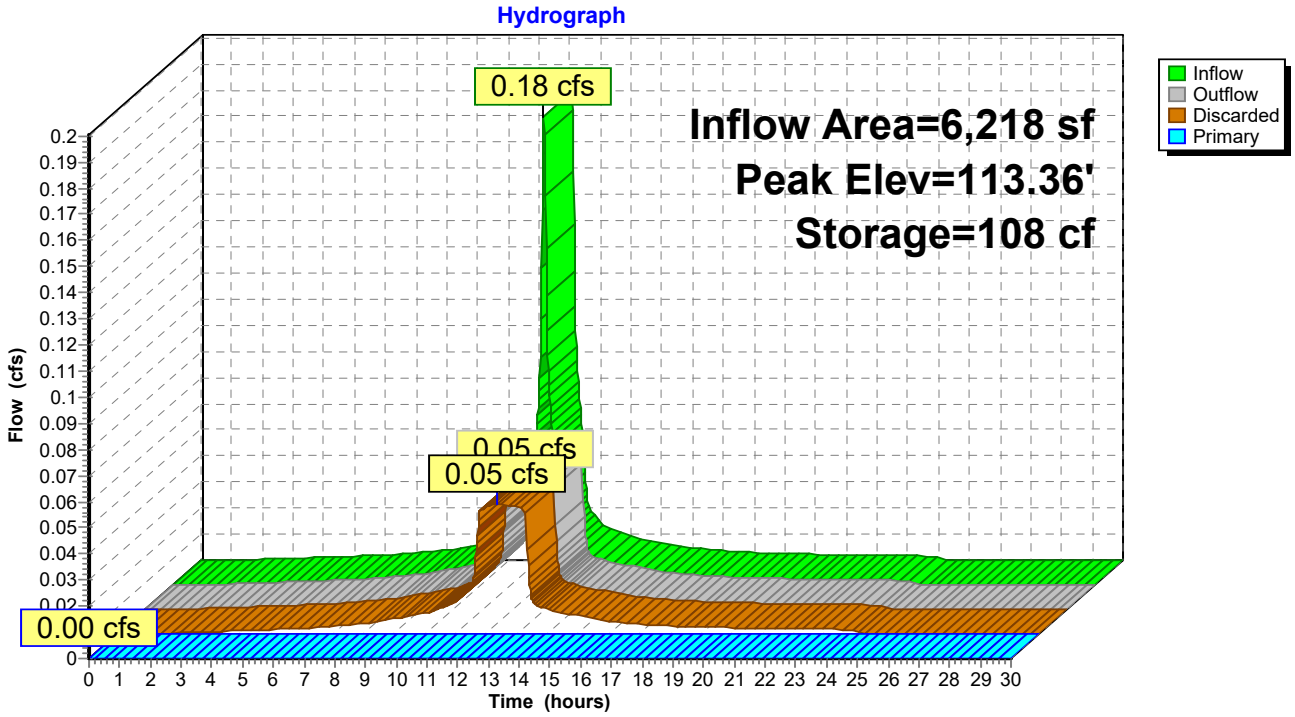
Elevation (feet)	Cum.Store (cubic-feet)
114.50	0
116.00	5
116.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	114.40'	**6.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

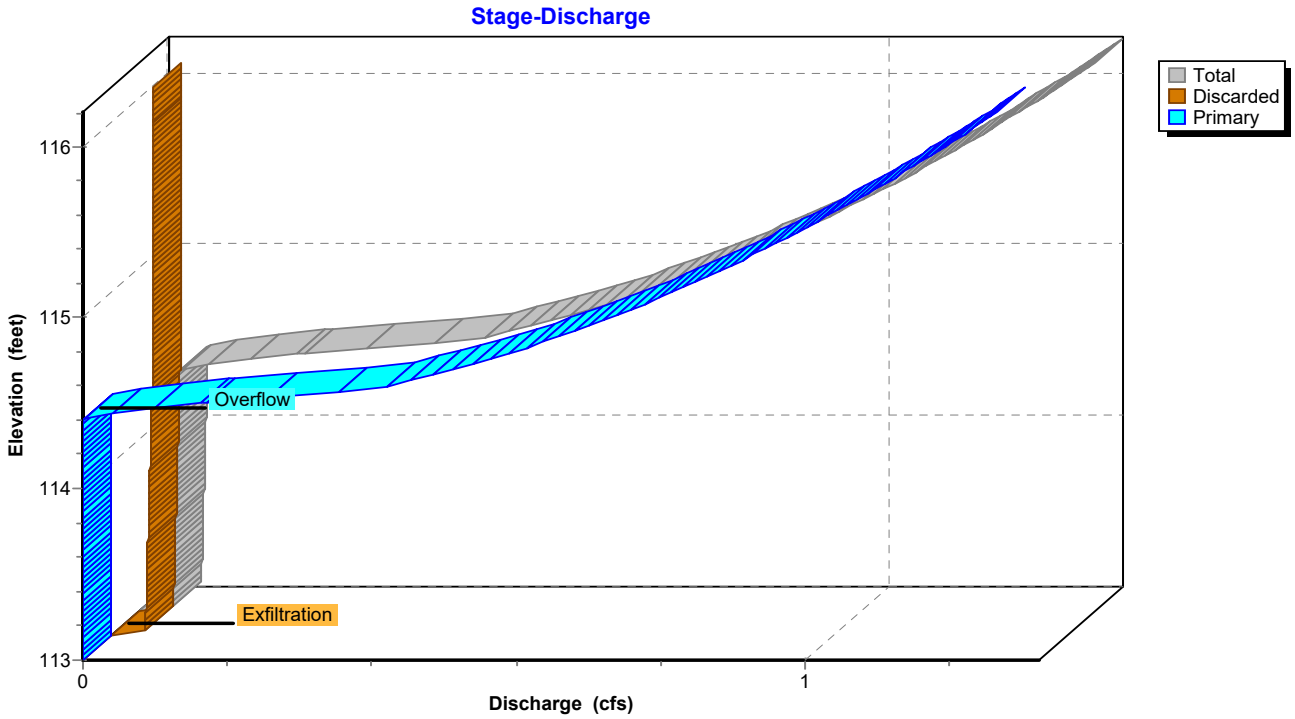
Discarded OutFlow Max=0.05 cfs @ 12.40 hrs HW=113.36' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
↑**2=Overflow** (Controls 0.00 cfs)

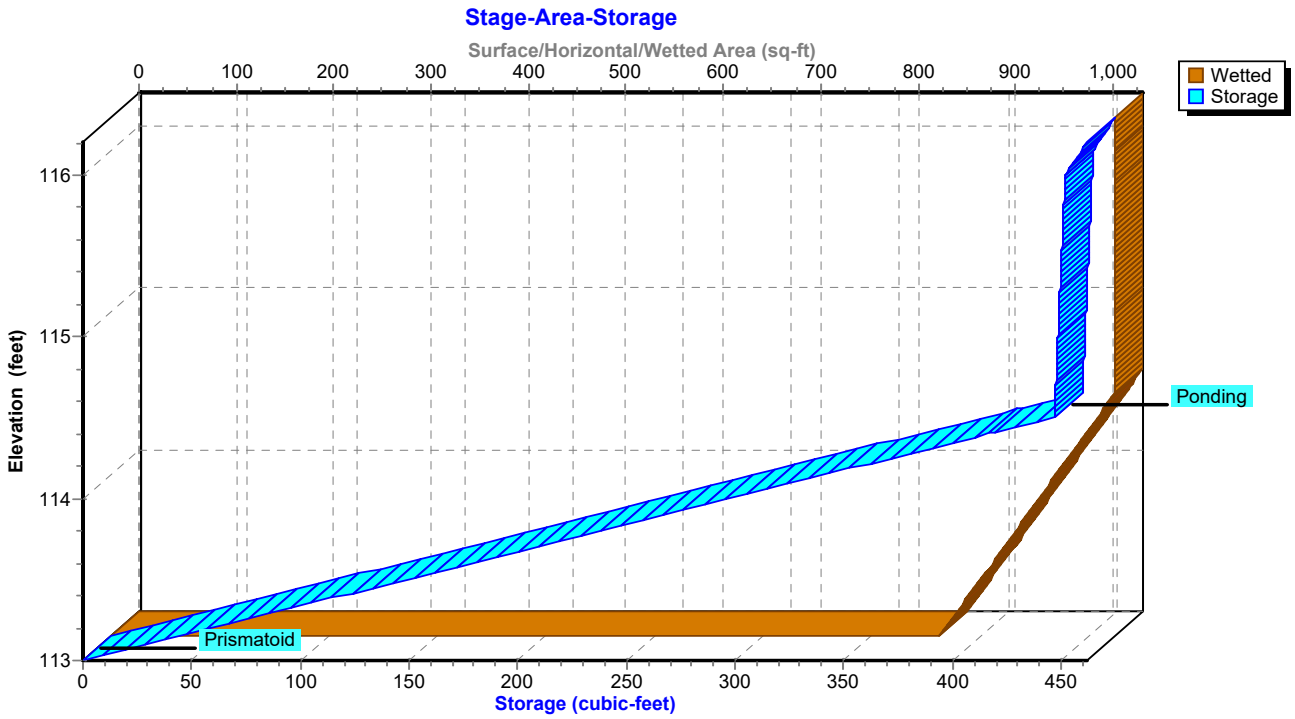
Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Summary for Pond 6P: DRAINAGE SYSTEM #2

Inflow Area = 3,825 sf,100.00% Impervious, Inflow Depth = 1.26" for 2-Year event
Inflow = 0.12 cfs @ 12.07 hrs, Volume= 402 cf
Outflow = 0.04 cfs @ 12.35 hrs, Volume= 402 cf, Atten= 68%, Lag= 16.7 min
Discarded = 0.04 cfs @ 12.35 hrs, Volume= 402 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 116.77' @ 12.35 hrs Surf.Area= 653 sf Storage= 62 cf

Plug-Flow detention time= 8.6 min calculated for 402 cf (100% of inflow)
Center-of-Mass det. time= 8.6 min (763.7 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	343 cf	**14.50'W x 45.00'L x 1.50'H Prismatoid** 979 cf Overall x 35.0% Voids
#2	118.00'	15 cf	**Ponding** Listed below -Impervious
		358 cf	Total Available Storage

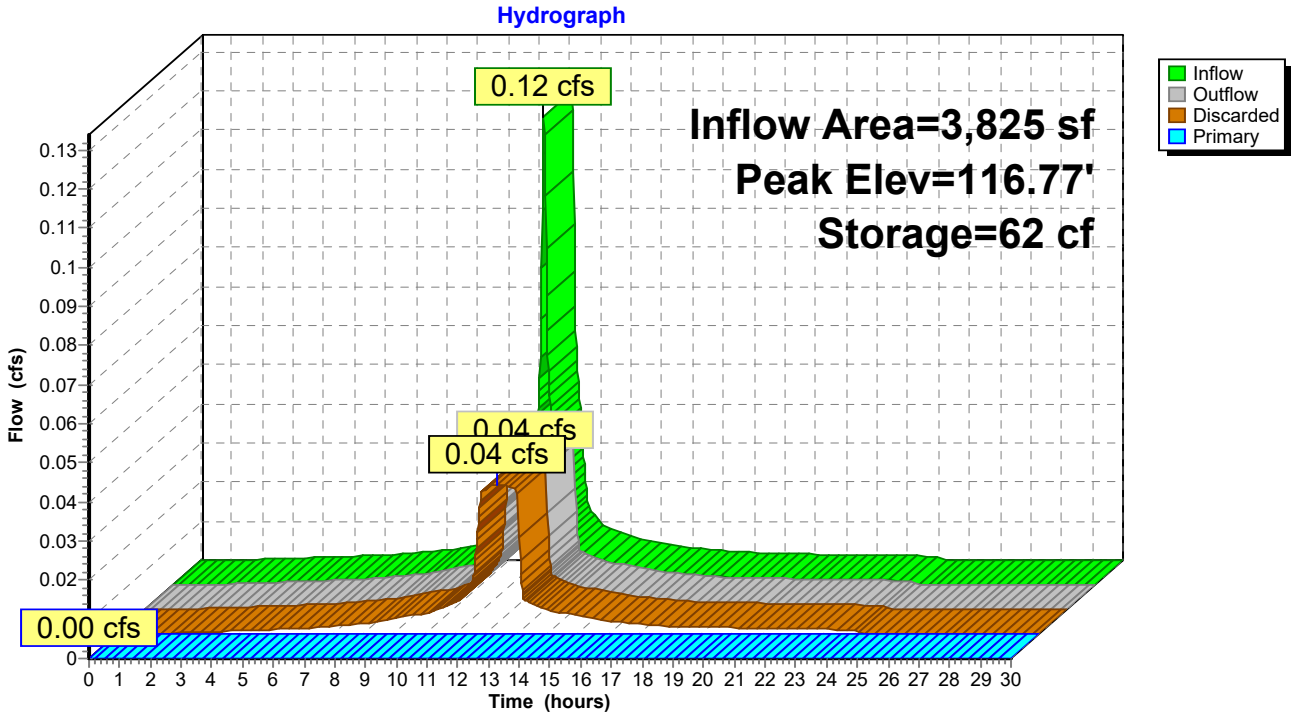
Elevation (feet)	Cum.Store (cubic-feet)
118.00	0
119.00	5
119.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	117.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

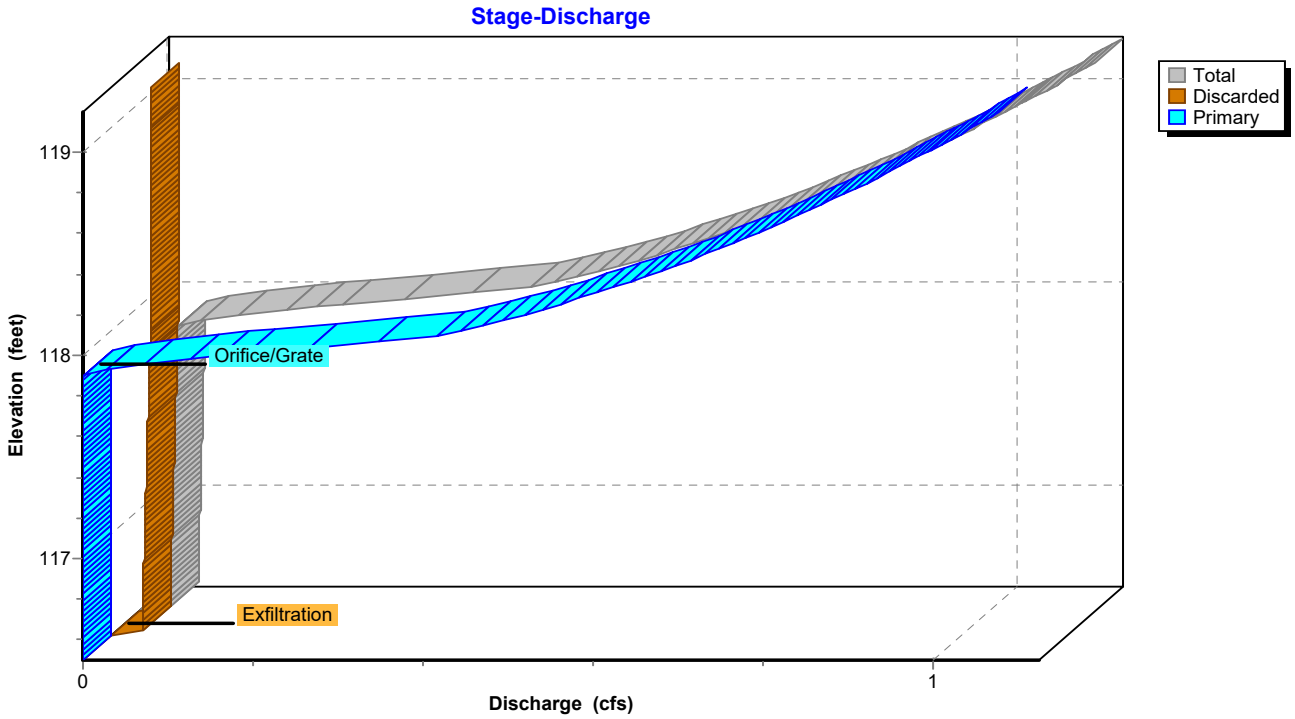
Discarded OutFlow Max=0.04 cfs @ 12.35 hrs HW=116.77' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

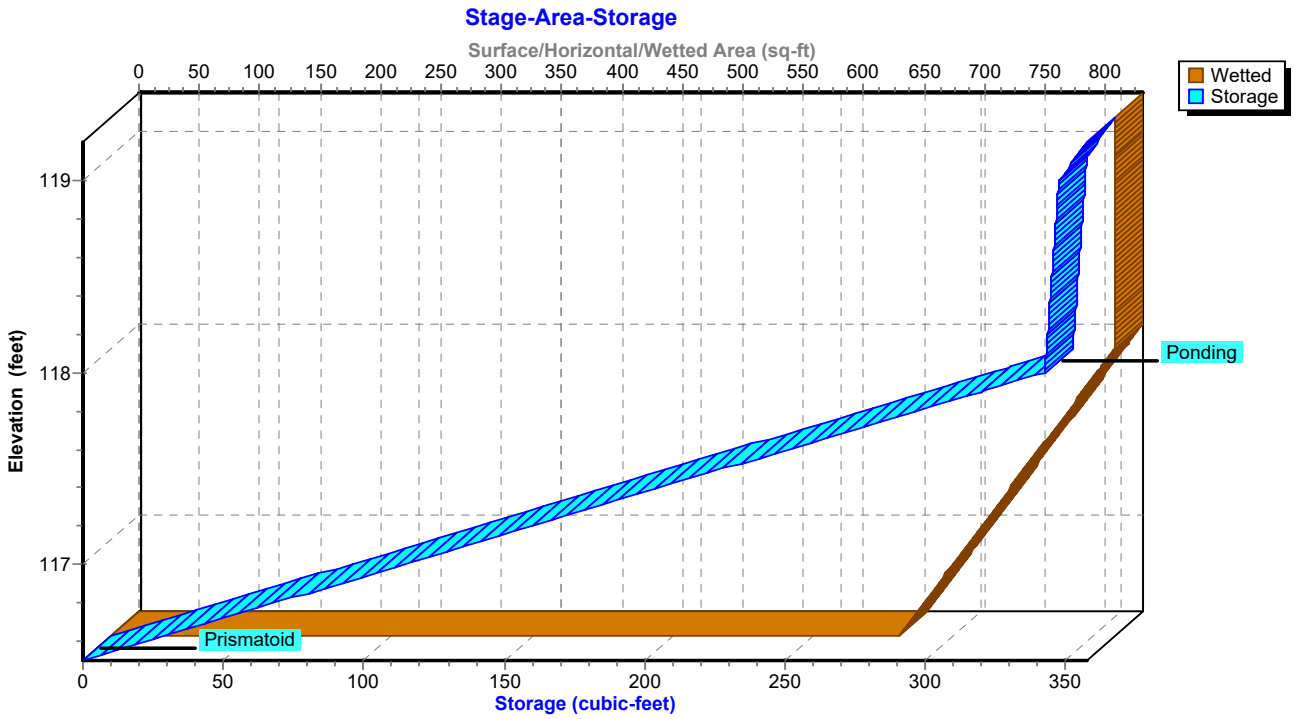
Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Summary for Pond 12P: DRAINAGE SYSTEM #3

Inflow Area = 2,227 sf,100.00% Impervious, Inflow Depth = 3.02" for 2-Year event
Inflow = 0.17 cfs @ 12.07 hrs, Volume= 560 cf
Outflow = 0.03 cfs @ 12.49 hrs, Volume= 560 cf, Atten= 80%, Lag= 25.2 min
Discarded = 0.03 cfs @ 12.49 hrs, Volume= 560 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 117.30' @ 12.49 hrs Surf.Area= 495 sf Storage= 139 cf

Plug-Flow detention time= 24.9 min calculated for 560 cf (100% of inflow)
Center-of-Mass det. time= 24.9 min (780.0 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	433 cf	**11.00'W x 45.00'L x 2.50'H Prismatoid** 1,238 cf Overall x 35.0% Voids
#2	119.00'	15 cf	**Ponding** Listed below -Impervious
		448 cf	Total Available Storage

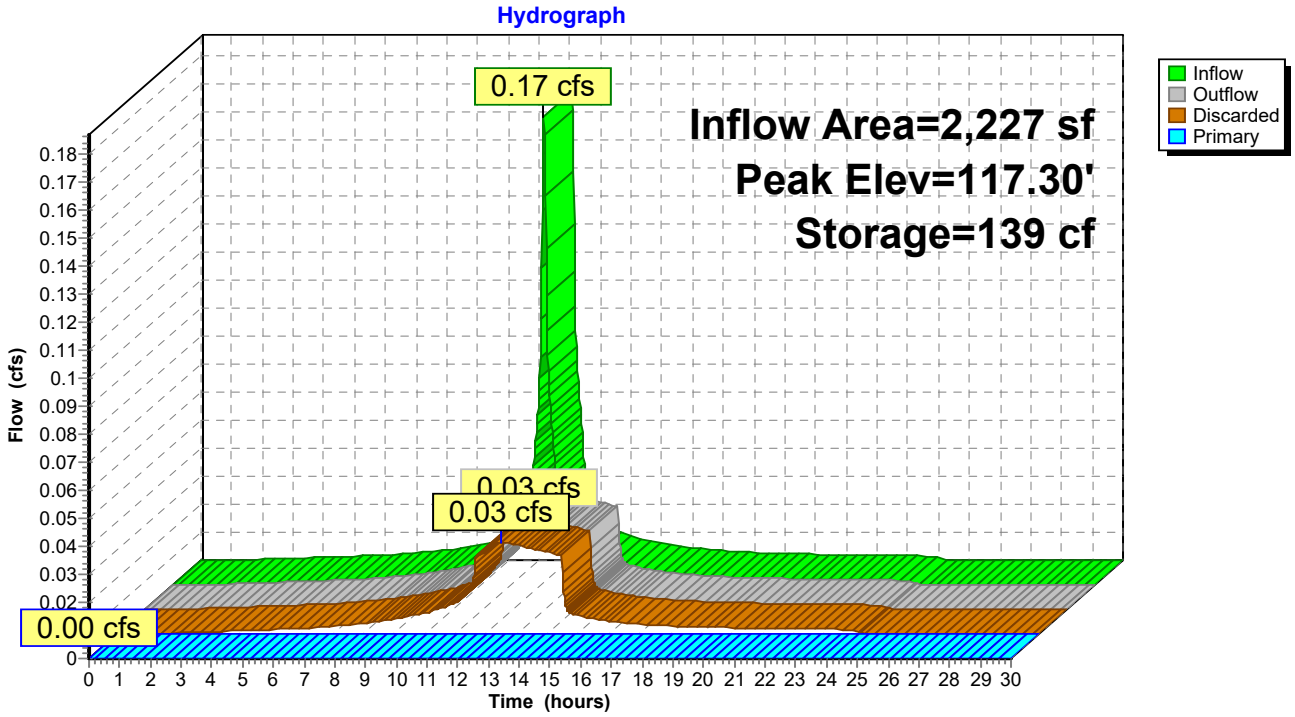
Elevation (feet)	Cum.Store (cubic-feet)
119.00	0
120.00	5
120.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	118.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

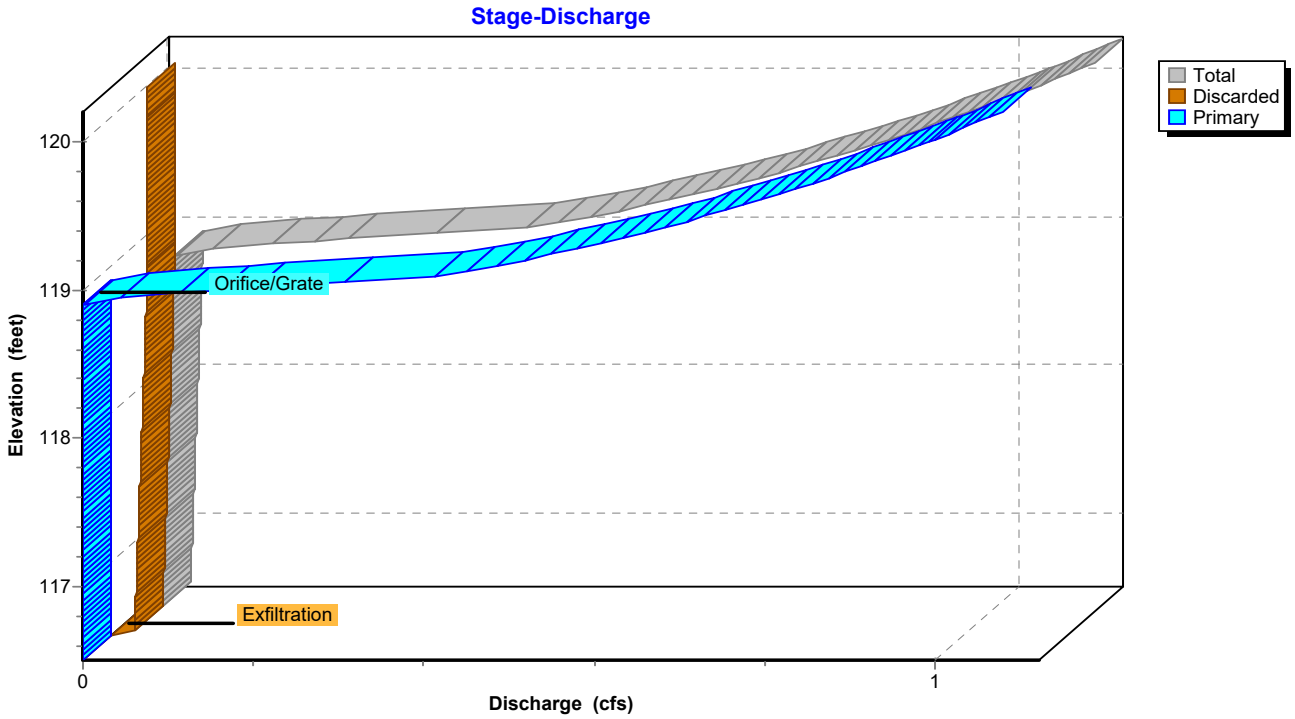
Discarded OutFlow Max=0.03 cfs @ 12.49 hrs HW=117.30' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

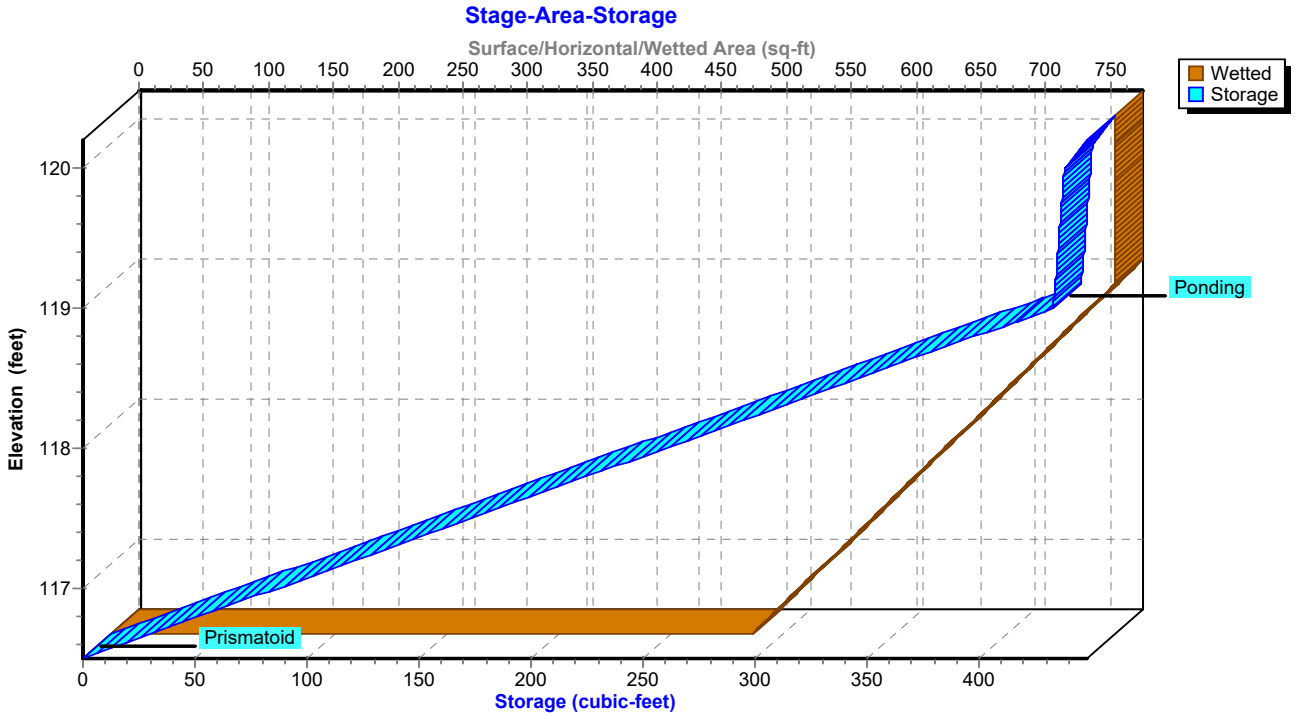
Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3

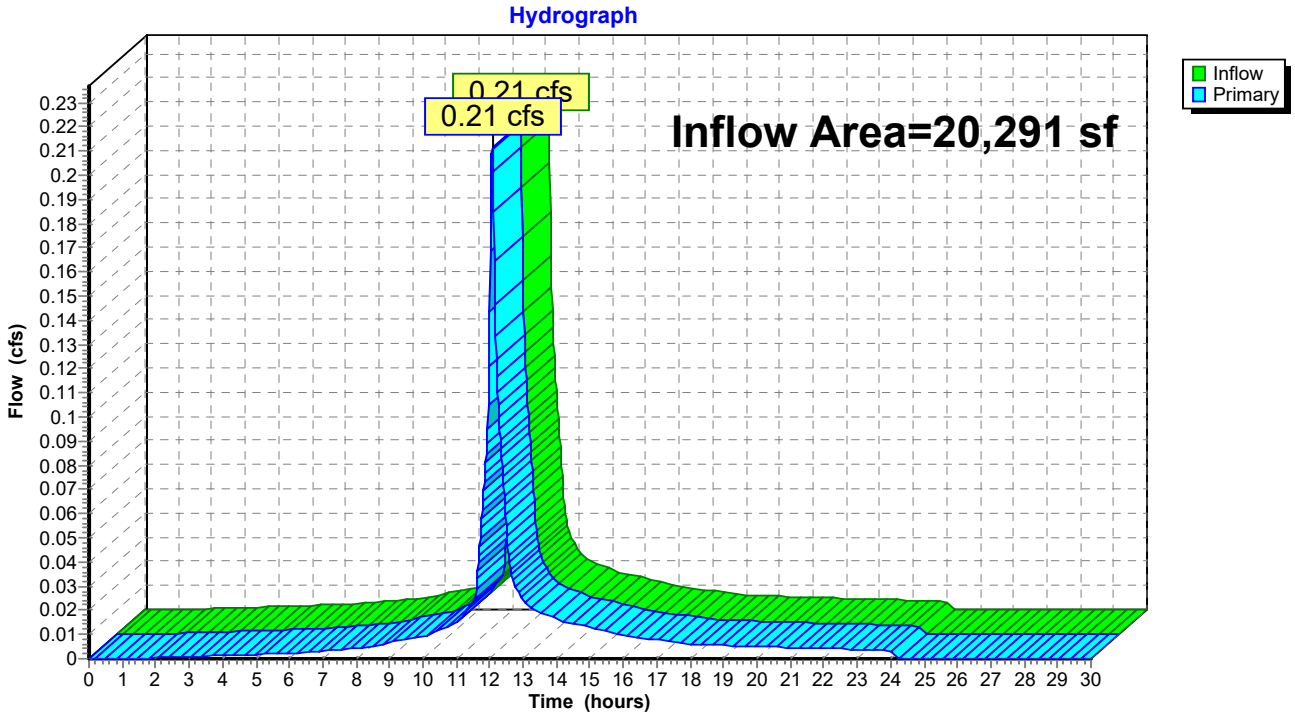


Summary for Link 3L: PROPOSED

Inflow Area = 20,291 sf, 43.44% Impervious, Inflow Depth = 0.52" for 2-Year event
Inflow = 0.21 cfs @ 12.07 hrs, Volume= 873 cf
Primary = 0.21 cfs @ 12.07 hrs, Volume= 873 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link 3L: PROPOSED



Summary for Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS

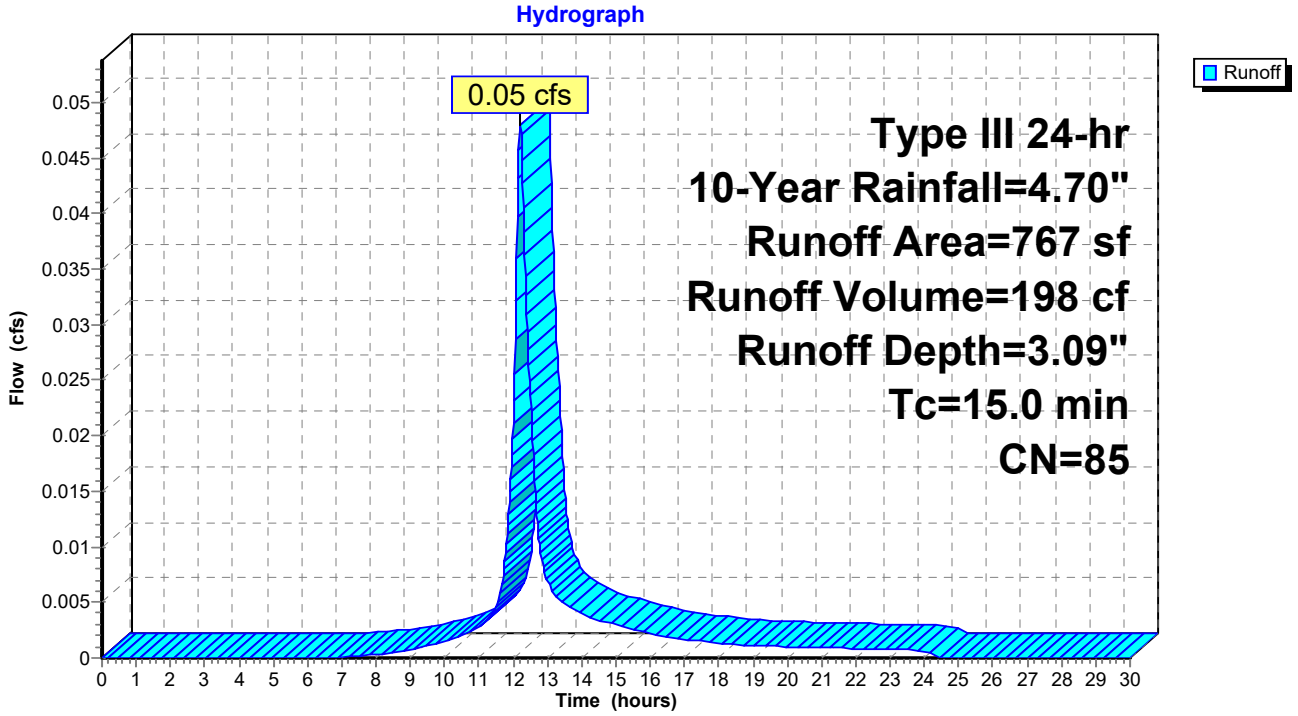
Runoff = 0.05 cfs @ 12.20 hrs, Volume= 198 cf, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	767	85	Permeable Pavers
	767		100.00% Pervious Area

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

Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS



Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

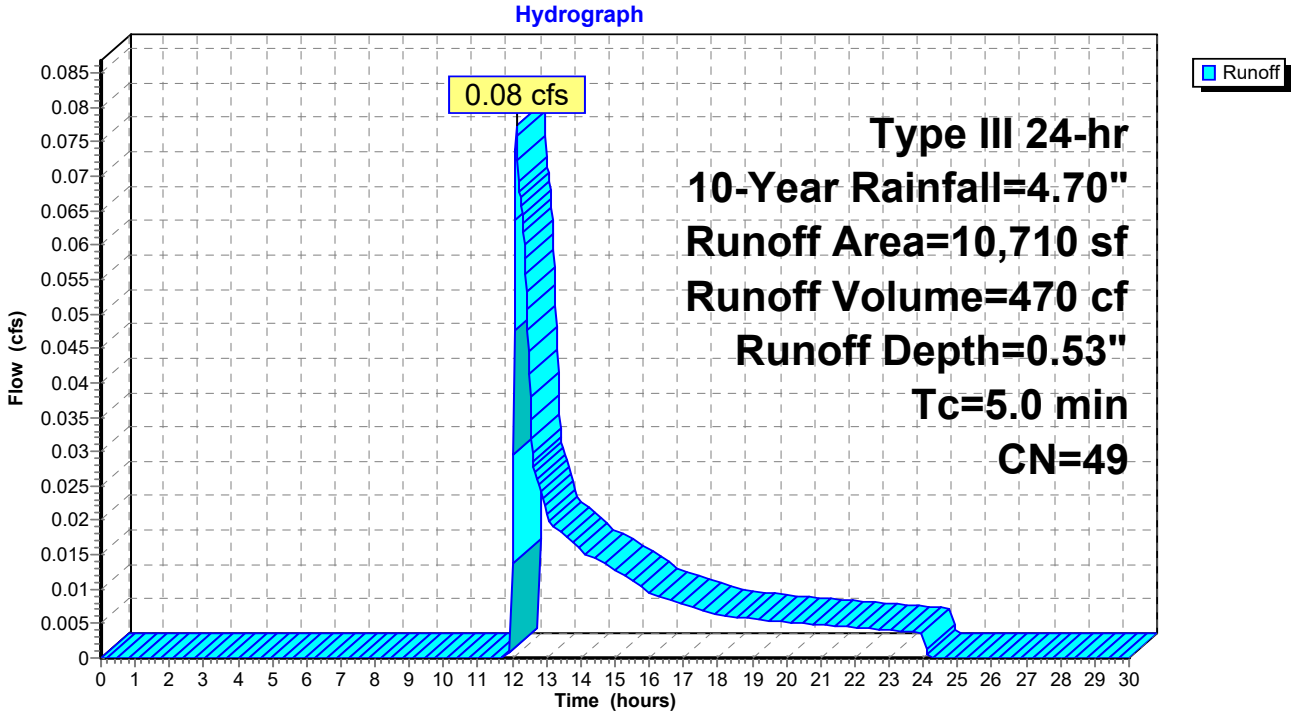
Runoff = 0.08 cfs @ 12.12 hrs, Volume= 470 cf, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
10,710	49	50-75% Grass cover, Fair, HSG A
10,710		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED LANDSCAPE AREA



Summary for Subcatchment 7S: HOUSE (REAR)

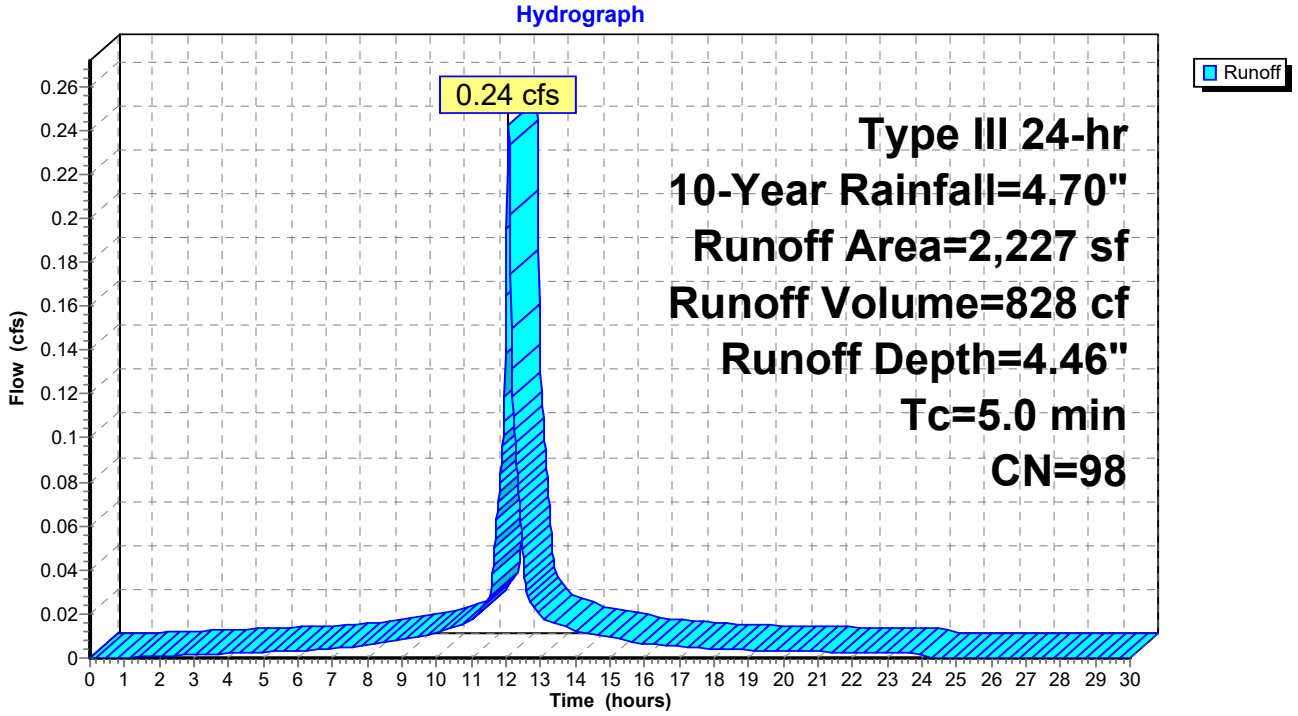
Runoff = 0.24 cfs @ 12.07 hrs, Volume= 828 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
2,227	98	Roofs, HSG A
2,227		100.00% Impervious Area

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

Subcatchment 7S: HOUSE (REAR)



Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

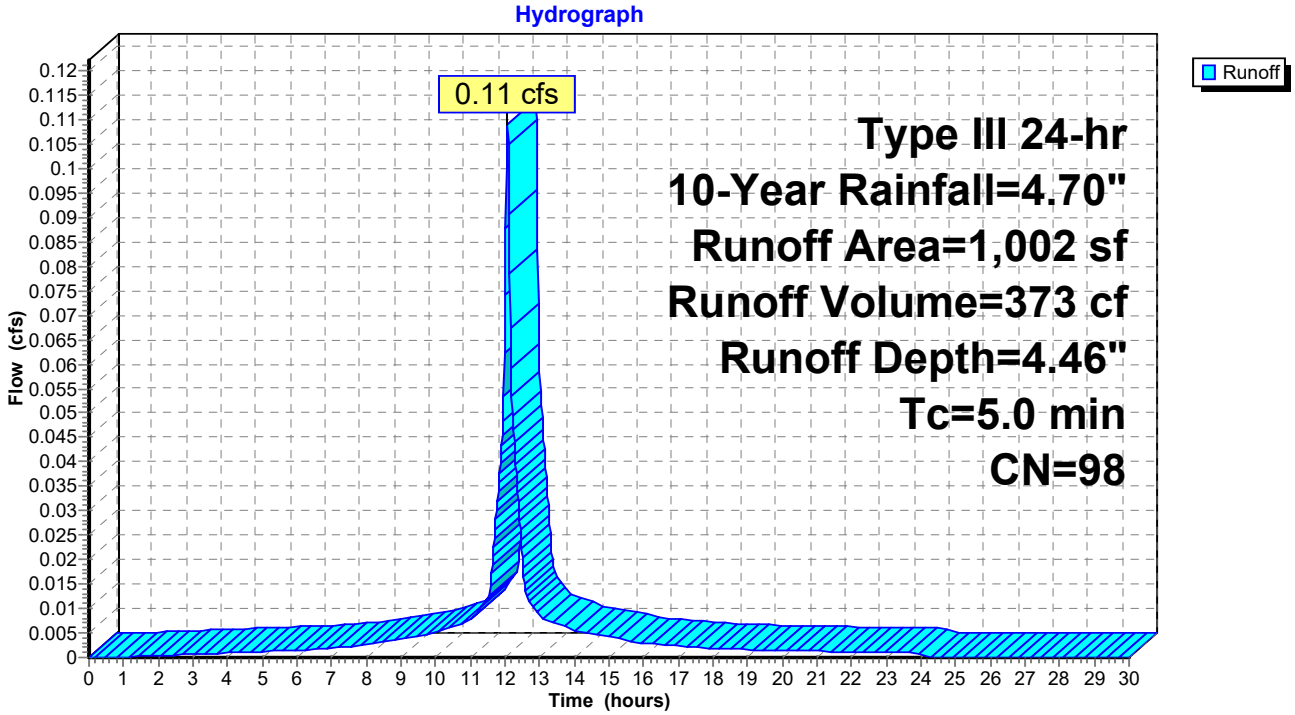
Runoff = 0.11 cfs @ 12.07 hrs, Volume= 373 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
1,002	98	Unconnected pavement, HSG A
1,002		100.00% Impervious Area
1,002		100.00% Unconnected

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

Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



Summary for Subcatchment 9S: PORTION OF FRONT HOUSE

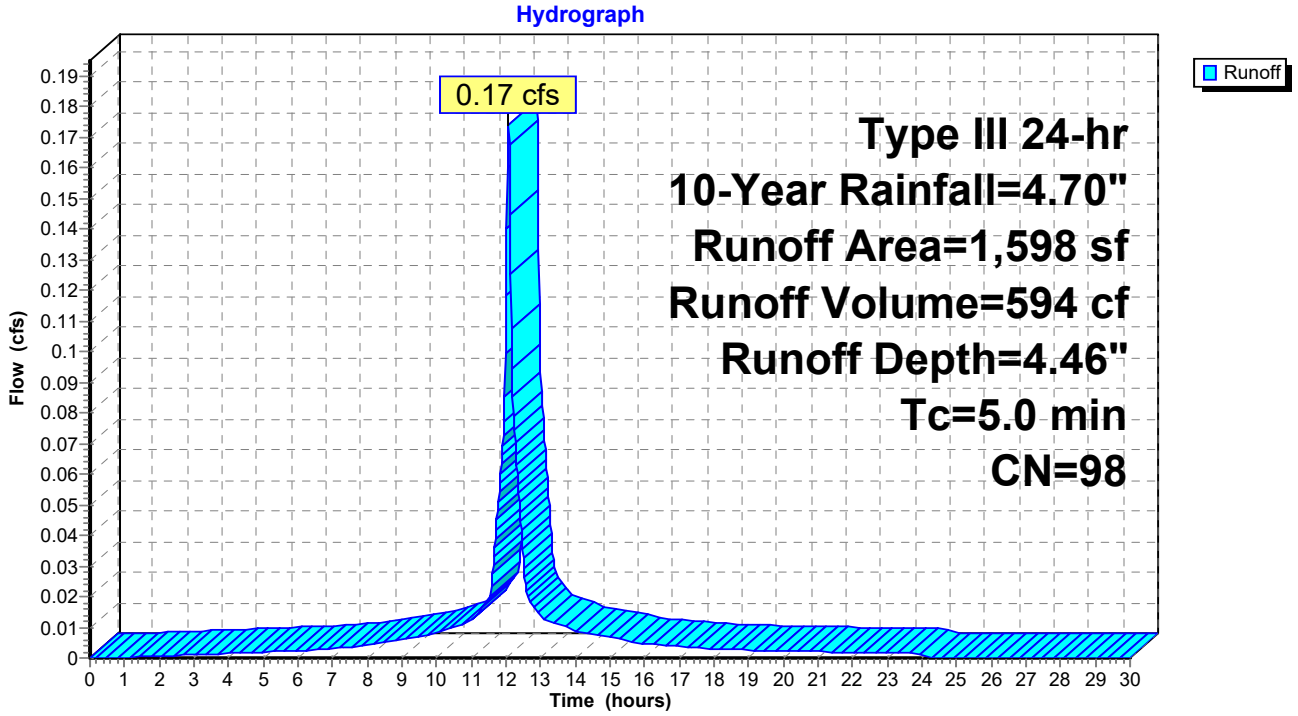
Runoff = 0.17 cfs @ 12.07 hrs, Volume= 594 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
1,598	98	Roofs, HSG A
1,598		100.00% Impervious Area

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

Subcatchment 9S: PORTION OF FRONT HOUSE



Summary for Subcatchment 11S: PAVED DRIVEWAY

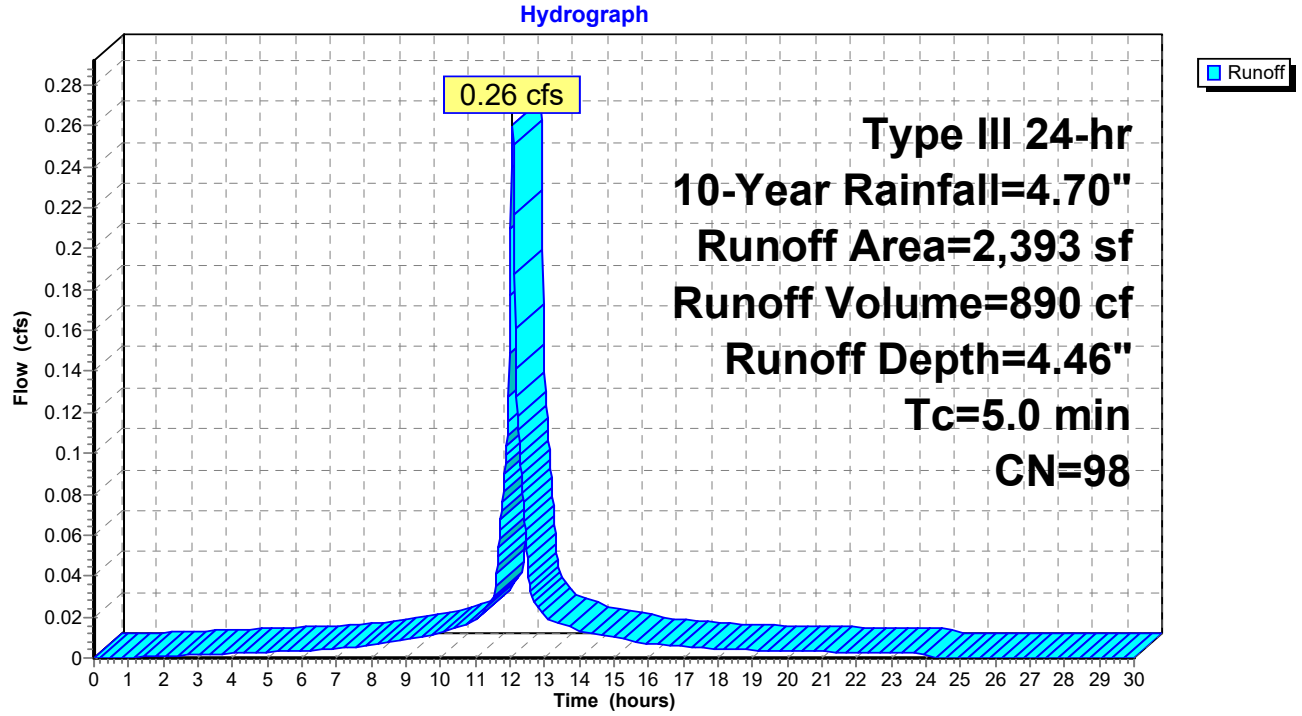
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 890 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	2,393	98	Driveway
	2,393		100.00% Impervious Area

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

Subcatchment 11S: PAVED DRIVEWAY



Summary for Subcatchment 13S: HOUSE (FRONT)

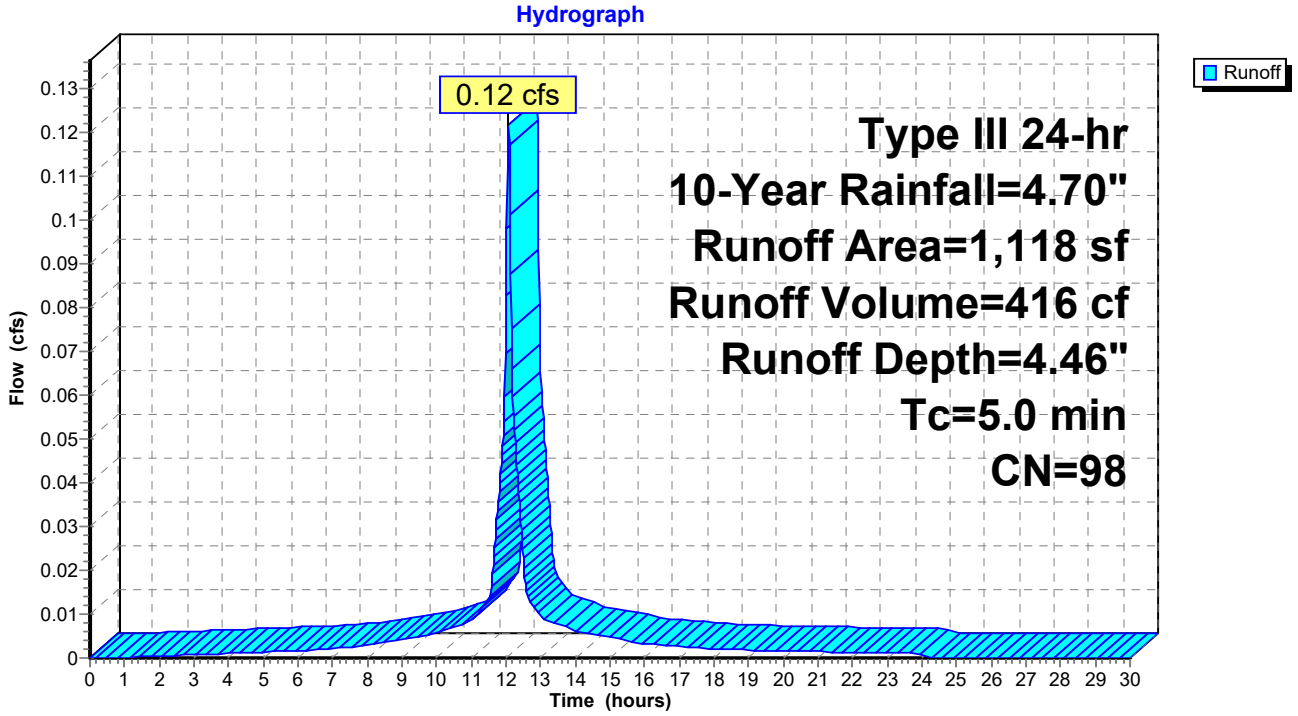
Runoff = 0.12 cfs @ 12.07 hrs, Volume= 416 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
1,118	98	Roofs, HSG A
1,118		100.00% Impervious Area

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

Subcatchment 13S: HOUSE (FRONT)



Summary for Subcatchment 14S: PAVED DRIVEWAY

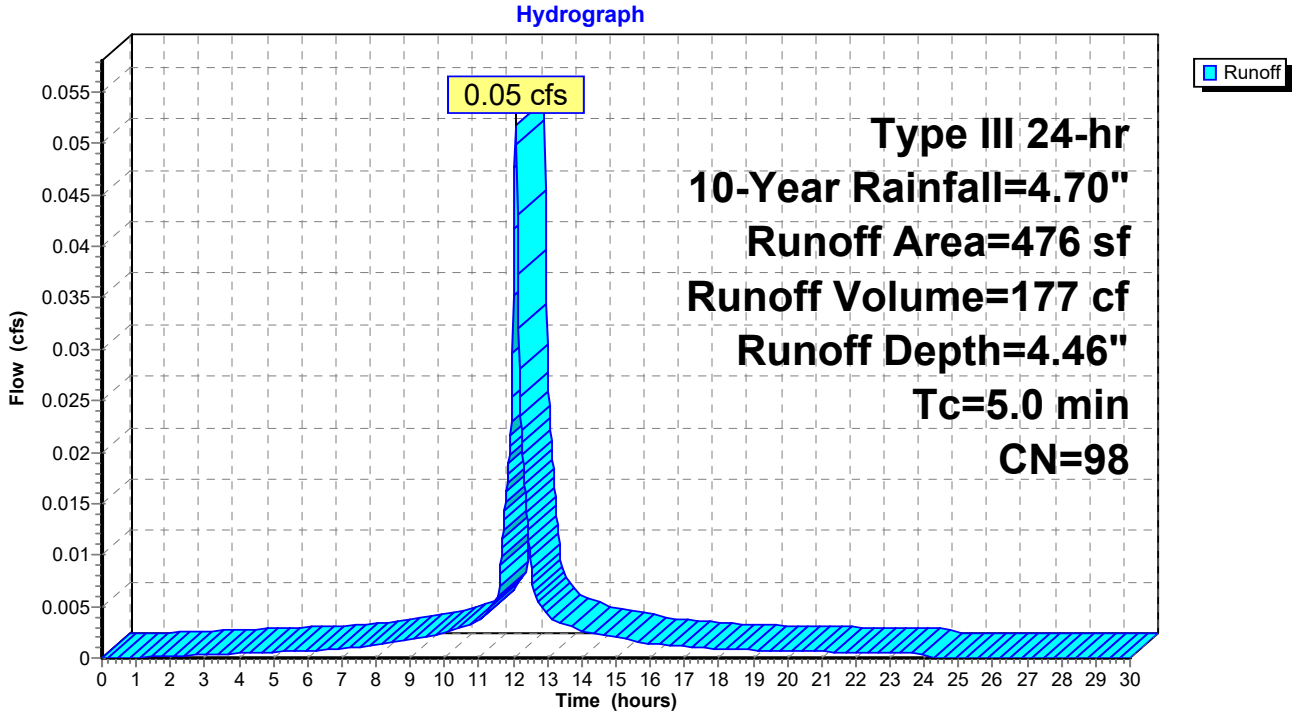
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 177 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	476	98	Driveway
	476		100.00% Impervious Area

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

Subcatchment 14S: PAVED DRIVEWAY



Summary for Pond 3P: DRAINAGE SYSTEM #1

Inflow Area = 6,218 sf,100.00% Impervious, Inflow Depth = 1.72" for 10-Year event
Inflow = 0.26 cfs @ 12.07 hrs, Volume= 890 cf
Outflow = 0.05 cfs @ 12.48 hrs, Volume= 890 cf, Atten= 80%, Lag= 24.8 min
Discarded = 0.05 cfs @ 12.48 hrs, Volume= 890 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 113.70' @ 12.48 hrs Surf.Area= 851 sf Storage= 209 cf

Plug-Flow detention time= 22.1 min calculated for 890 cf (100% of inflow)
Center-of-Mass det. time= 22.1 min (770.2 - 748.1)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	447 cf	**23.00'W x 37.00'L x 1.50'H Prismatoid** 1,277 cf Overall x 35.0% Voids
#2	114.50'	15 cf	**Ponding** Listed below -Impervious
		462 cf	Total Available Storage

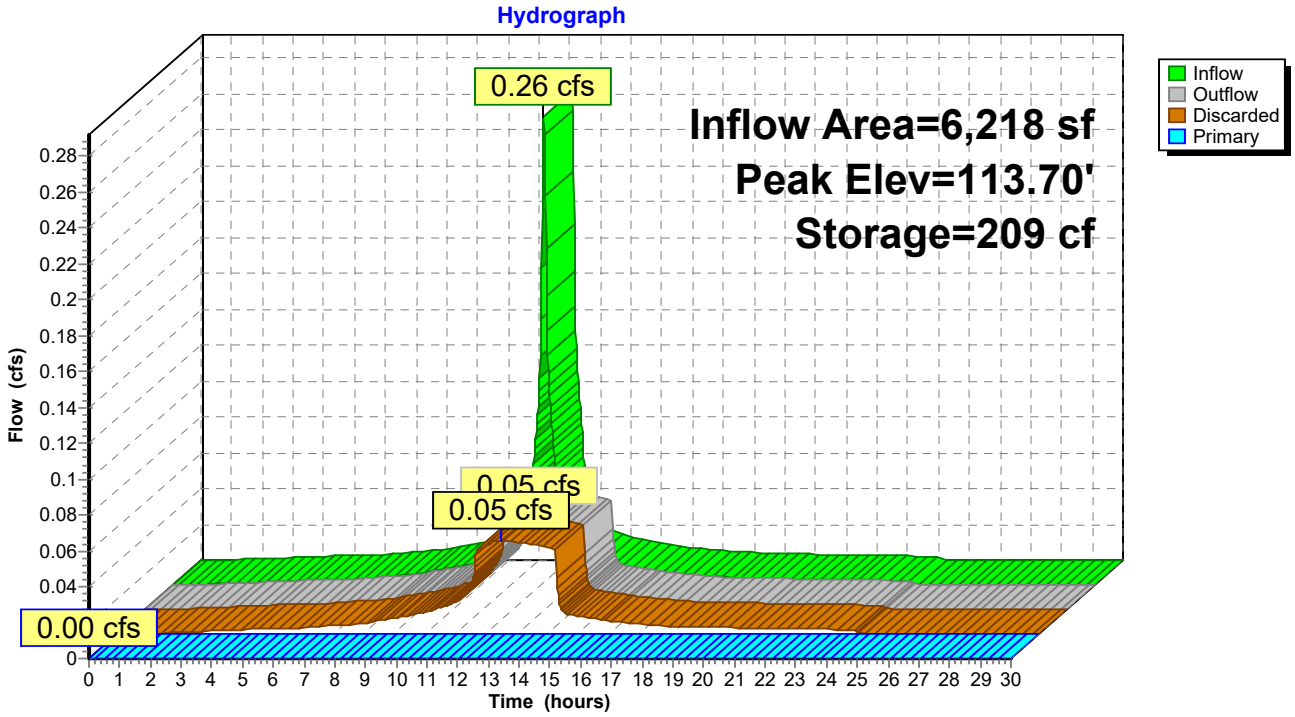
Elevation (feet)	Cum.Store (cubic-feet)
114.50	0
116.00	5
116.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	114.40'	**6.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

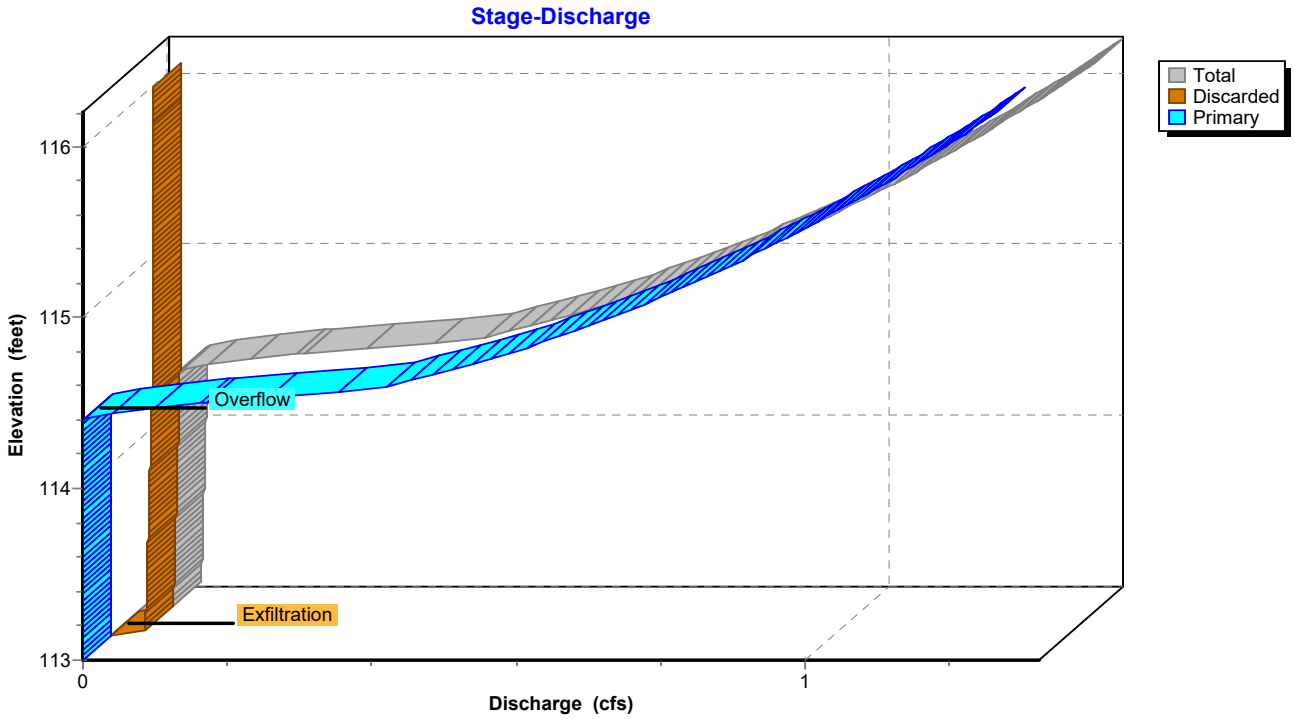
Discarded OutFlow Max=0.05 cfs @ 12.48 hrs HW=113.70' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
↑**2=Overflow** (Controls 0.00 cfs)

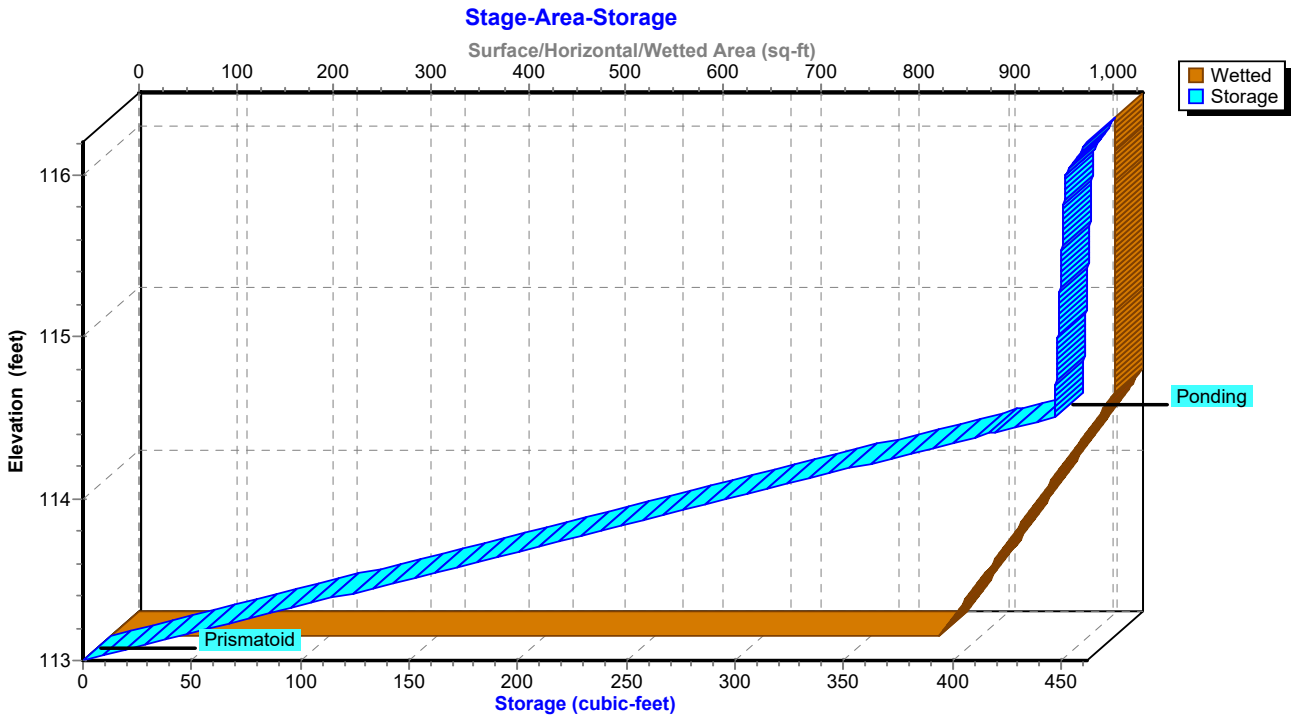
Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Summary for Pond 6P: DRAINAGE SYSTEM #2

Inflow Area = 3,825 sf,100.00% Impervious, Inflow Depth = 1.86" for 10-Year event
Inflow = 0.17 cfs @ 12.07 hrs, Volume= 594 cf
Outflow = 0.04 cfs @ 12.45 hrs, Volume= 594 cf, Atten= 77%, Lag= 22.8 min
Discarded = 0.04 cfs @ 12.45 hrs, Volume= 594 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 117.05' @ 12.45 hrs Surf.Area= 653 sf Storage= 125 cf

Plug-Flow detention time= 16.6 min calculated for 594 cf (100% of inflow)
Center-of-Mass det. time= 16.5 min (764.7 - 748.1)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	343 cf	**14.50'W x 45.00'L x 1.50'H Prismatoid** 979 cf Overall x 35.0% Voids
#2	118.00'	15 cf	**Ponding** Listed below -Impervious
		358 cf	Total Available Storage

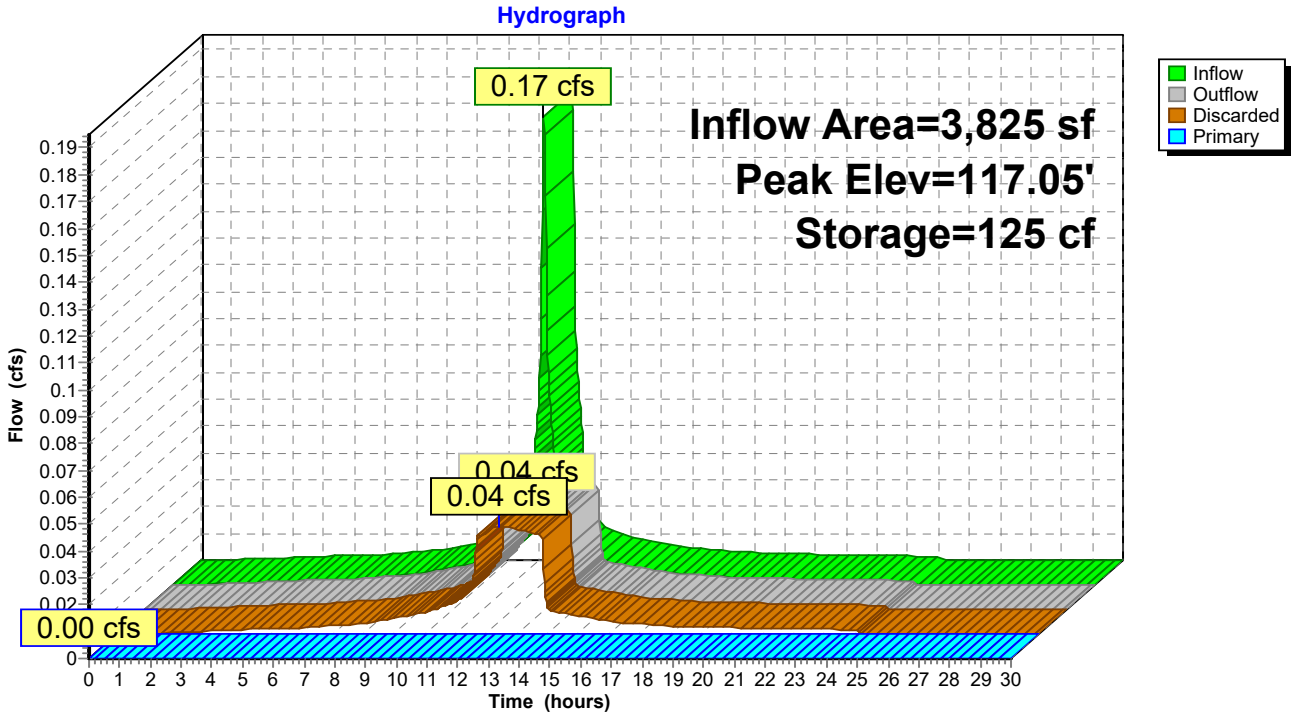
Elevation (feet)	Cum.Store (cubic-feet)
118.00	0
119.00	5
119.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	117.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

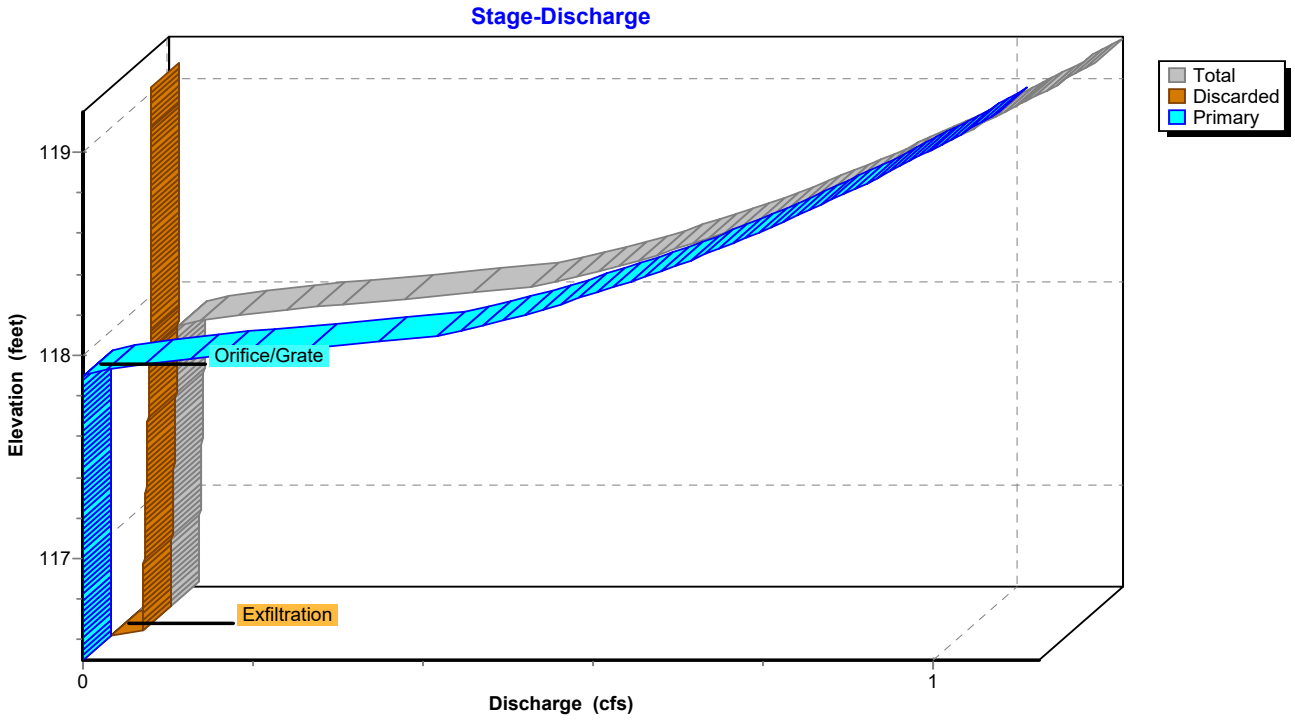
Discarded OutFlow Max=0.04 cfs @ 12.45 hrs HW=117.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

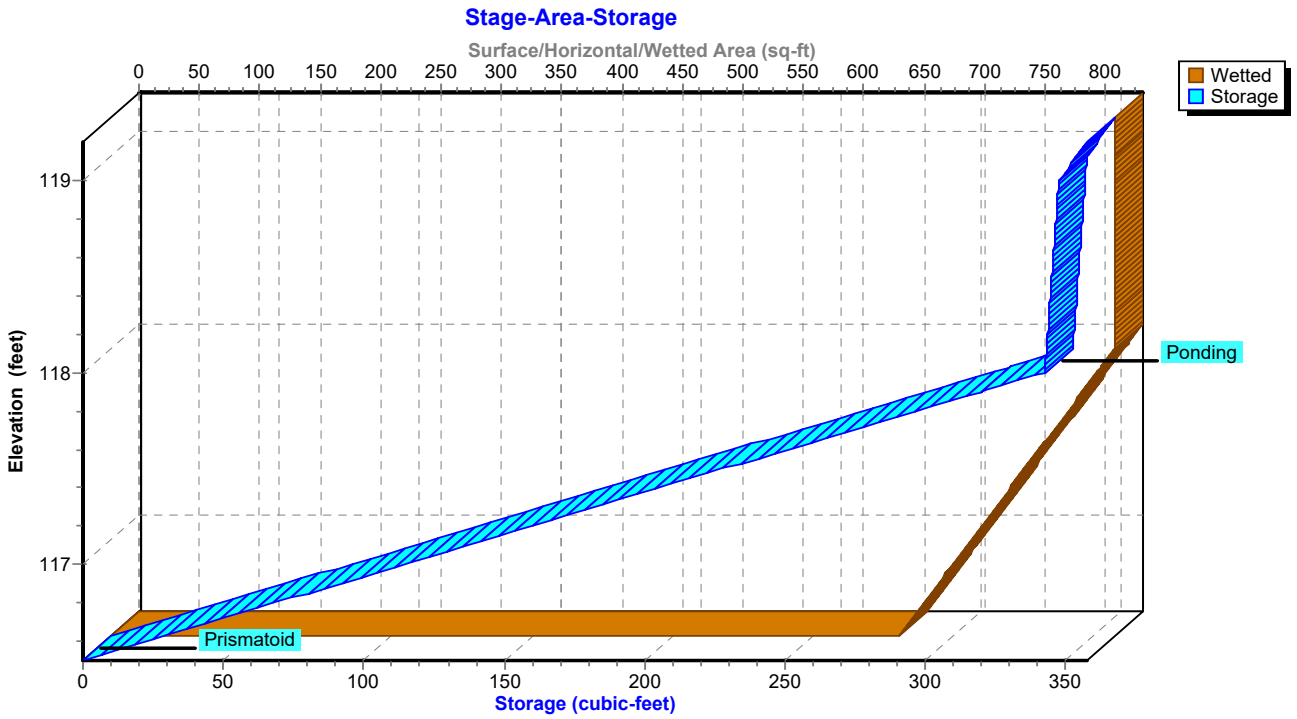
Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Summary for Pond 12P: DRAINAGE SYSTEM #3

Inflow Area = 2,227 sf,100.00% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 0.24 cfs @ 12.07 hrs, Volume= 828 cf
Outflow = 0.04 cfs @ 12.54 hrs, Volume= 828 cf, Atten= 85%, Lag= 28.4 min
Discarded = 0.04 cfs @ 12.54 hrs, Volume= 828 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 117.88' @ 12.54 hrs Surf.Area= 495 sf Storage= 240 cf

Plug-Flow detention time= 42.5 min calculated for 828 cf (100% of inflow)
Center-of-Mass det. time= 42.5 min (790.6 - 748.1)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	433 cf	**11.00'W x 45.00'L x 2.50'H Prismatoid** 1,238 cf Overall x 35.0% Voids
#2	119.00'	15 cf	**Ponding** Listed below -Impervious
		448 cf	Total Available Storage

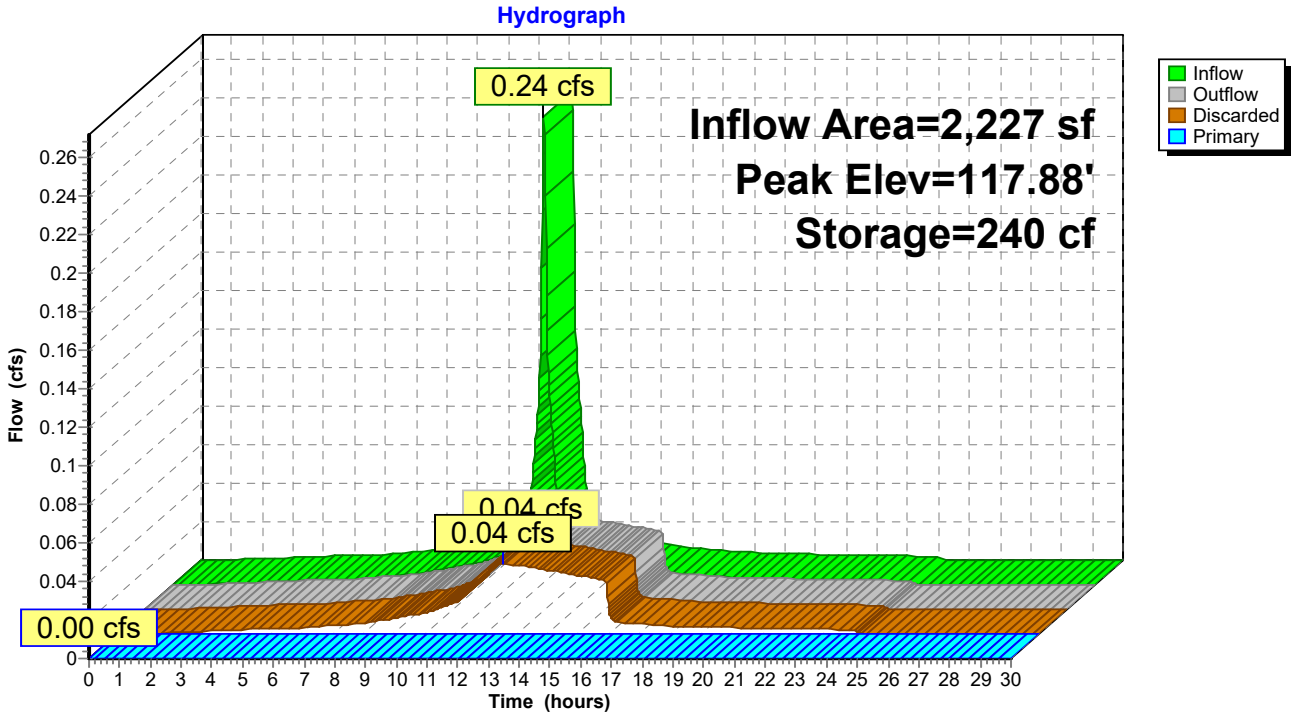
Elevation (feet)	Cum.Store (cubic-feet)
119.00	0
120.00	5
120.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	118.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

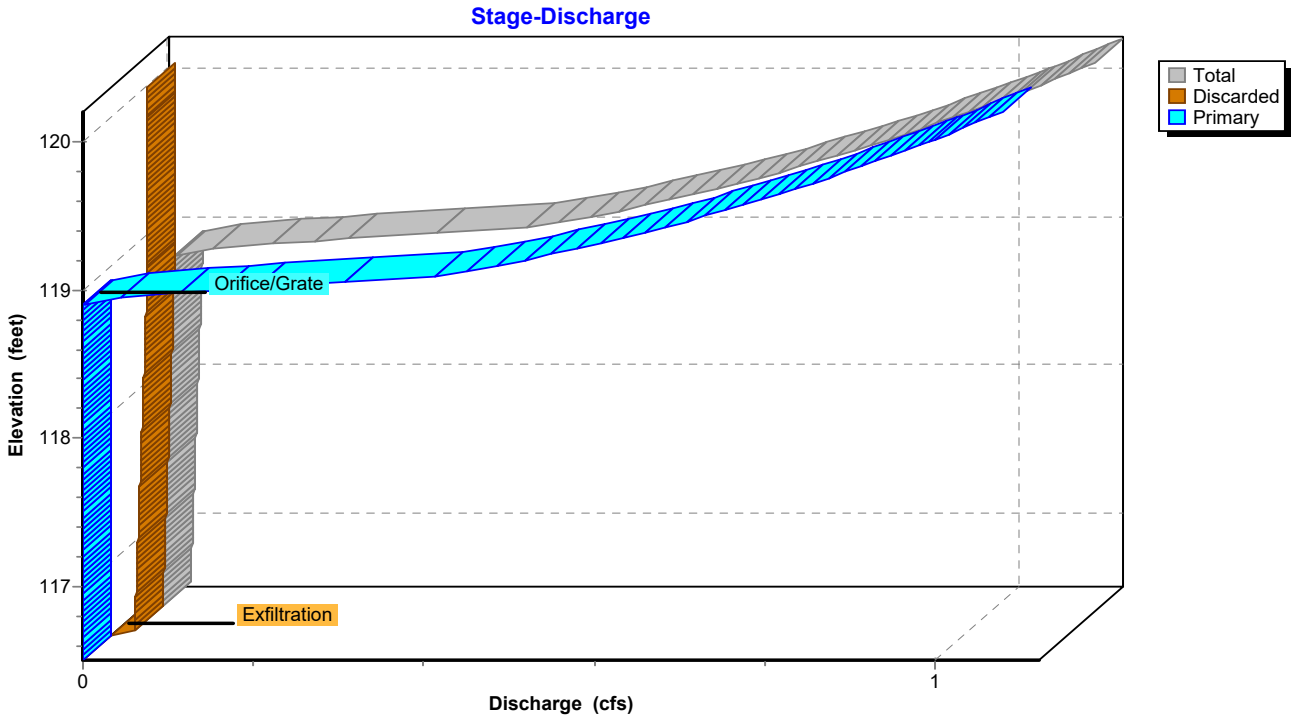
Discarded OutFlow Max=0.04 cfs @ 12.54 hrs HW=117.88' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

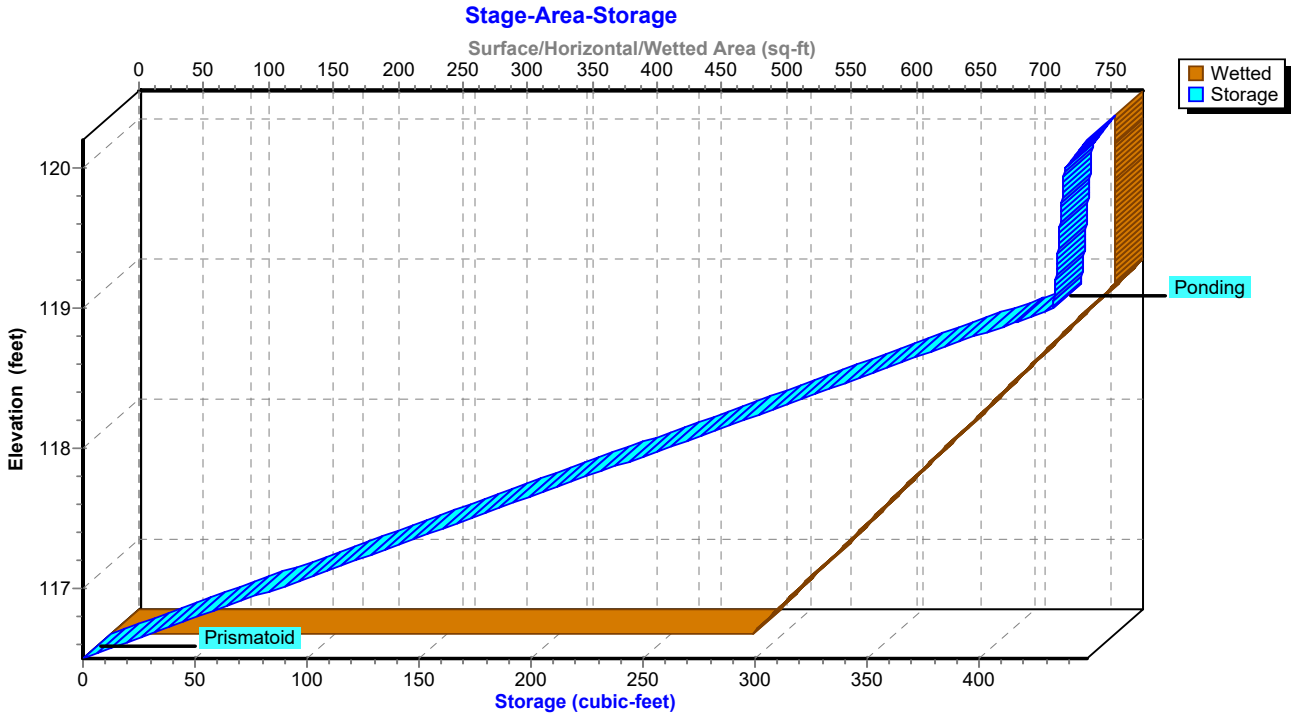
Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3

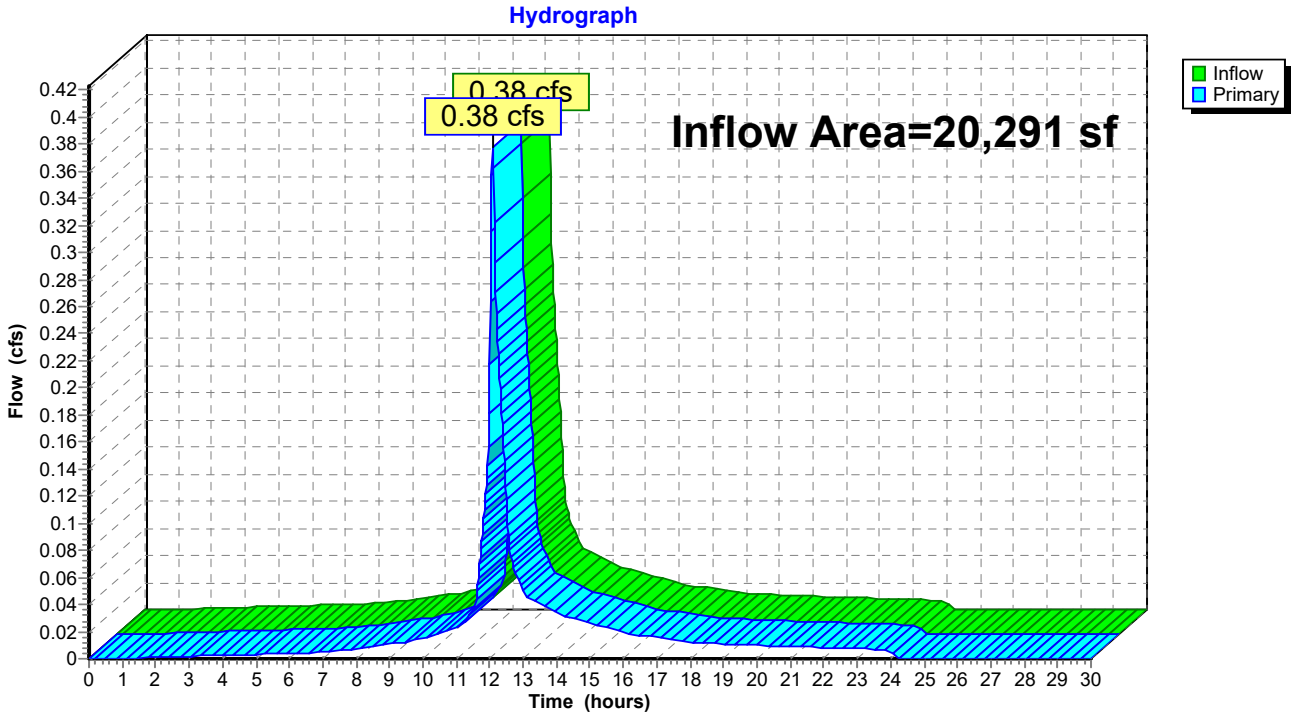


Summary for Link 3L: PROPOSED

Inflow Area = 20,291 sf, 43.44% Impervious, Inflow Depth = 0.97" for 10-Year event
Inflow = 0.38 cfs @ 12.09 hrs, Volume= 1,633 cf
Primary = 0.38 cfs @ 12.09 hrs, Volume= 1,633 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link 3L: PROPOSED



Summary for Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS

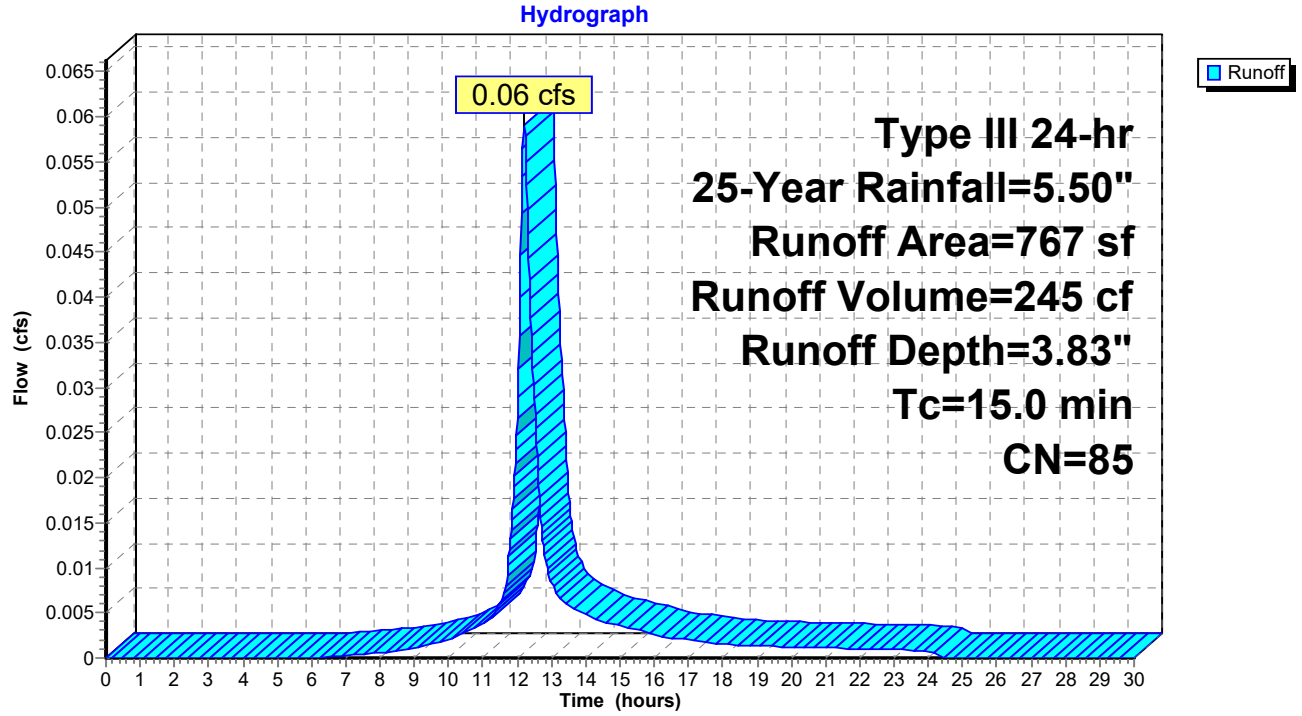
Runoff = 0.06 cfs @ 12.20 hrs, Volume= 245 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	767	85	Permeable Pavers
	767		100.00% Pervious Area

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

Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS



Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

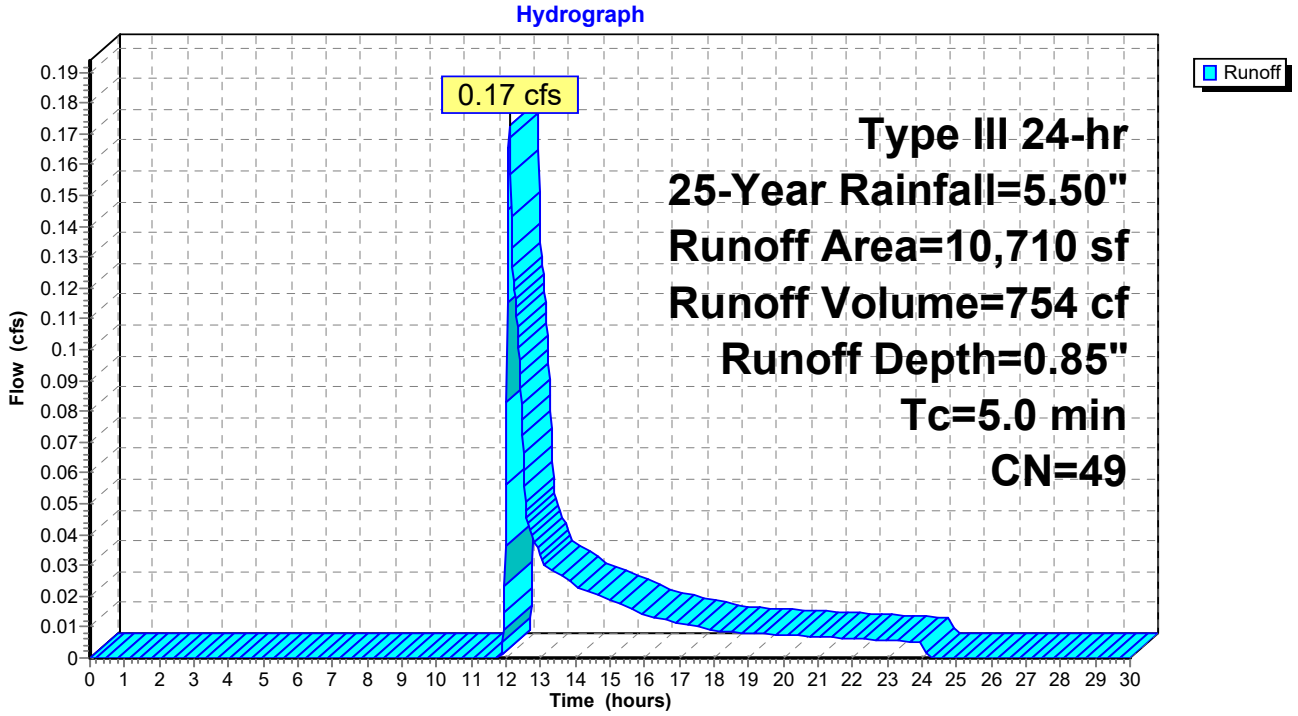
Runoff = 0.17 cfs @ 12.10 hrs, Volume= 754 cf, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
10,710	49	50-75% Grass cover, Fair, HSG A
10,710		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED LANDSCAPE AREA



Summary for Subcatchment 7S: HOUSE (REAR)

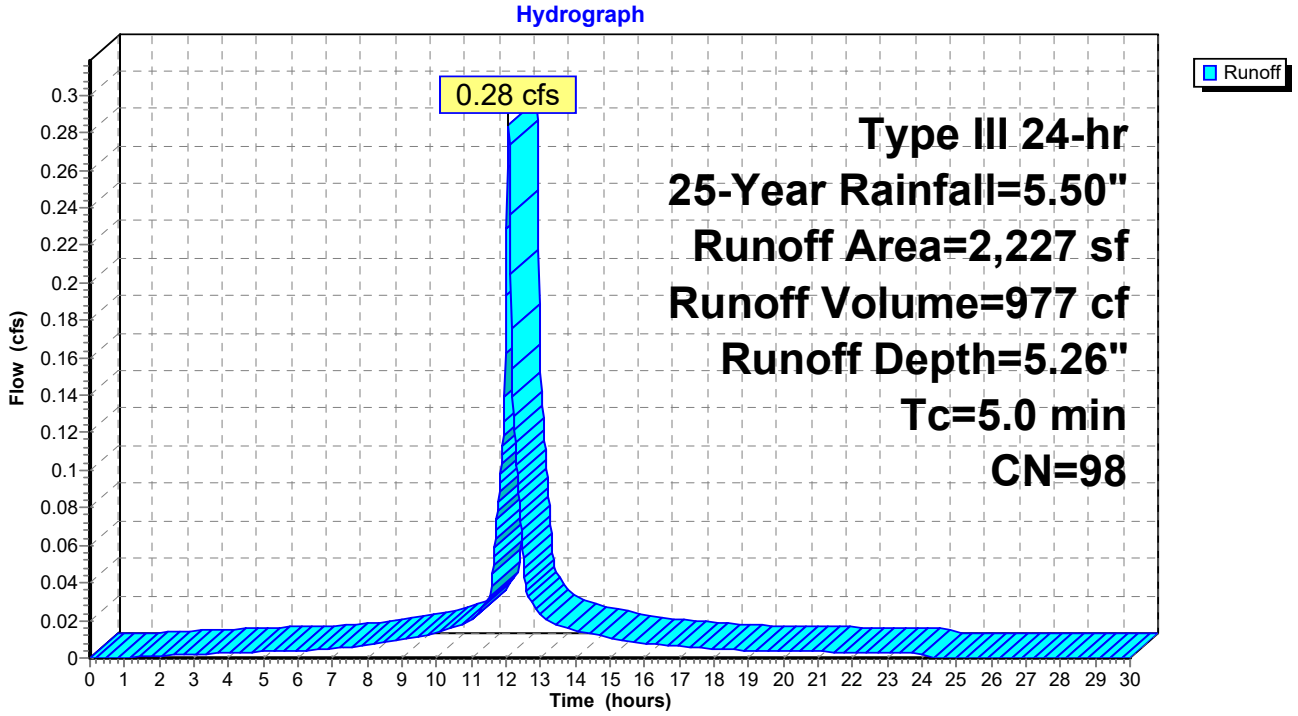
Runoff = 0.28 cfs @ 12.07 hrs, Volume= 977 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
2,227	98	Roofs, HSG A
2,227		100.00% Impervious Area

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

Subcatchment 7S: HOUSE (REAR)



Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

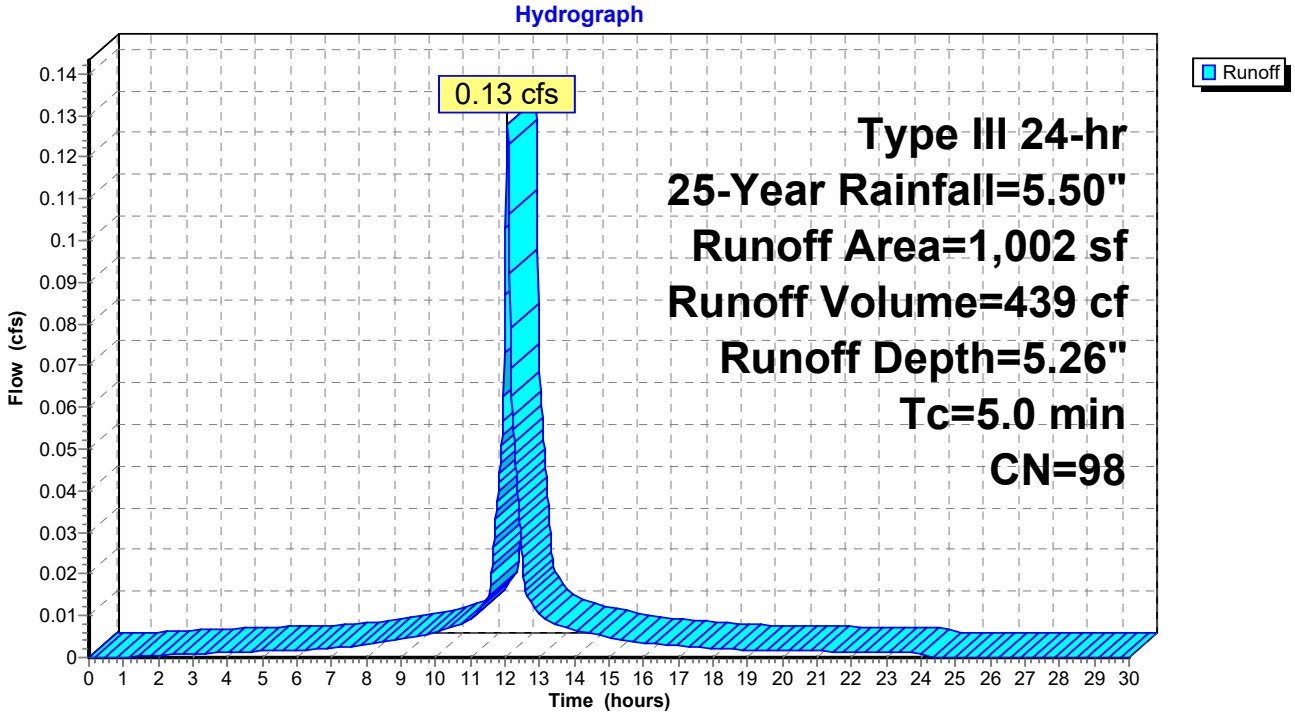
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 439 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
1,002	98	Unconnected pavement, HSG A
1,002		100.00% Impervious Area
1,002		100.00% Unconnected

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

Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



Summary for Subcatchment 9S: PORTION OF FRONT HOUSE

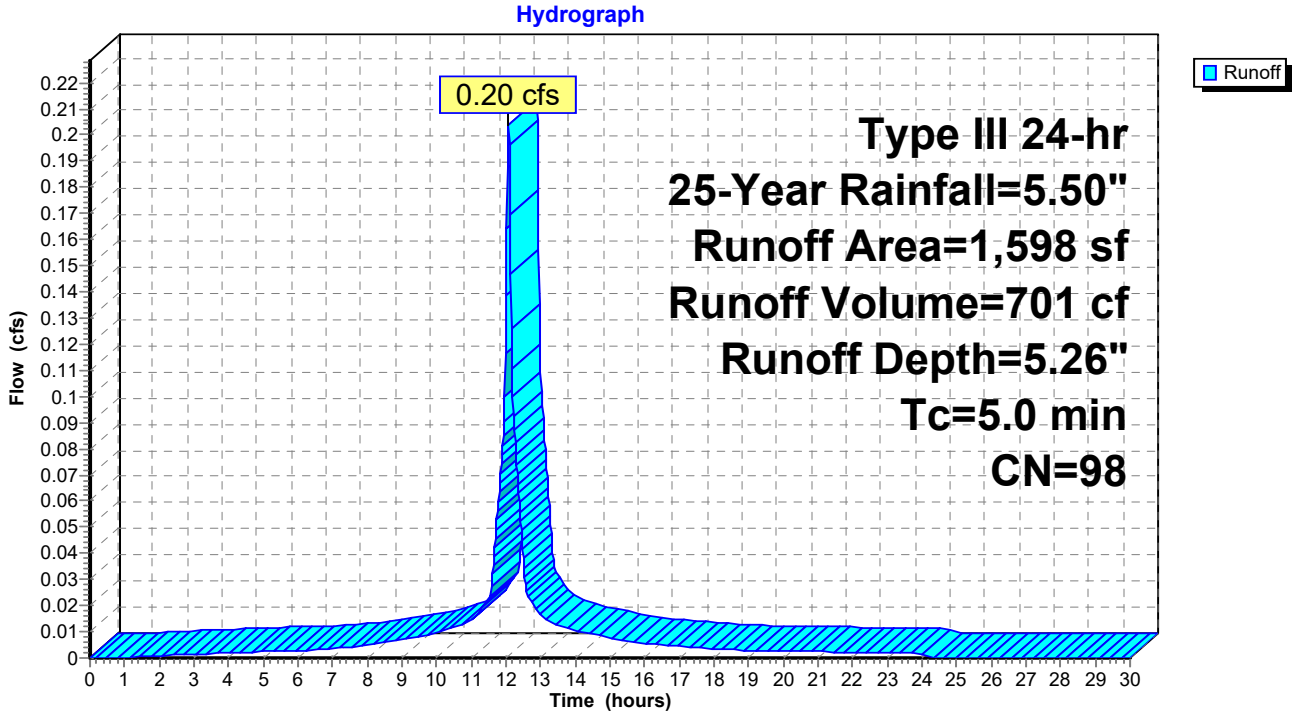
Runoff = 0.20 cfs @ 12.07 hrs, Volume= 701 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
1,598	98	Roofs, HSG A
1,598		100.00% Impervious Area

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

Subcatchment 9S: PORTION OF FRONT HOUSE



Summary for Subcatchment 11S: PAVED DRIVEWAY

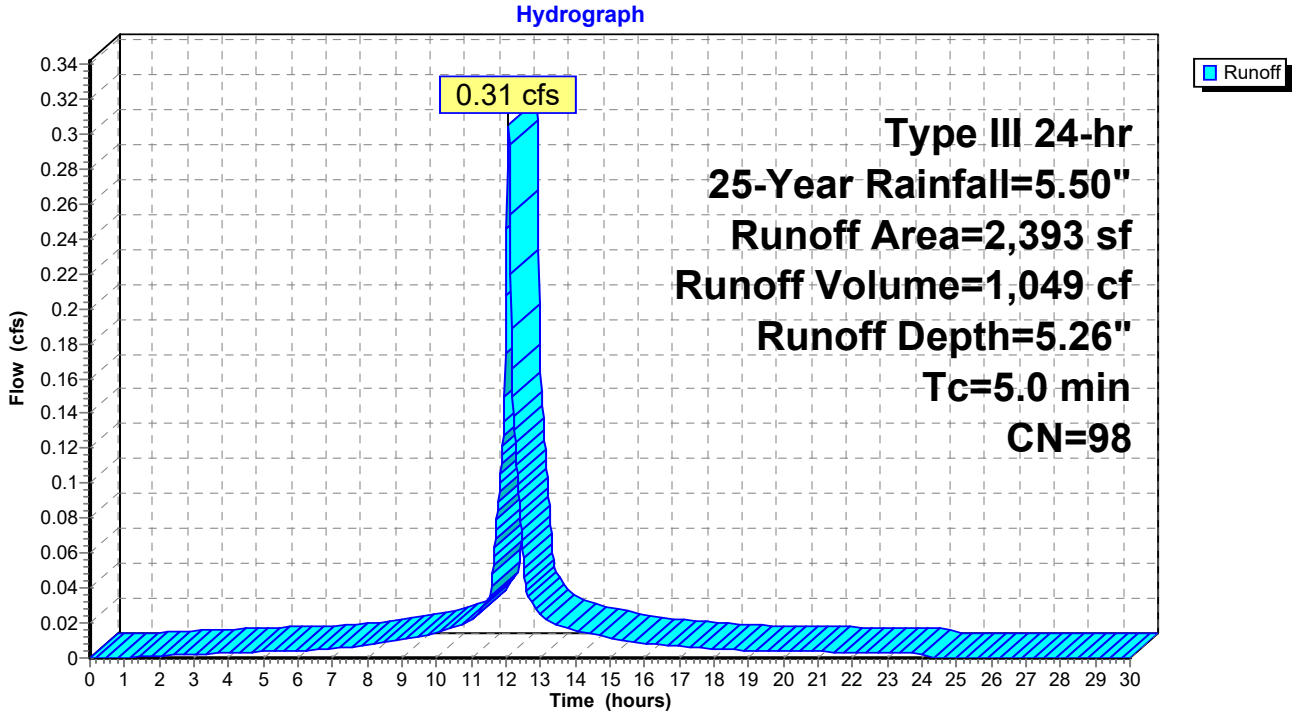
Runoff = 0.31 cfs @ 12.07 hrs, Volume= 1,049 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	2,393	98	Driveway
	2,393		100.00% Impervious Area

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

Subcatchment 11S: PAVED DRIVEWAY



Summary for Subcatchment 13S: HOUSE (FRONT)

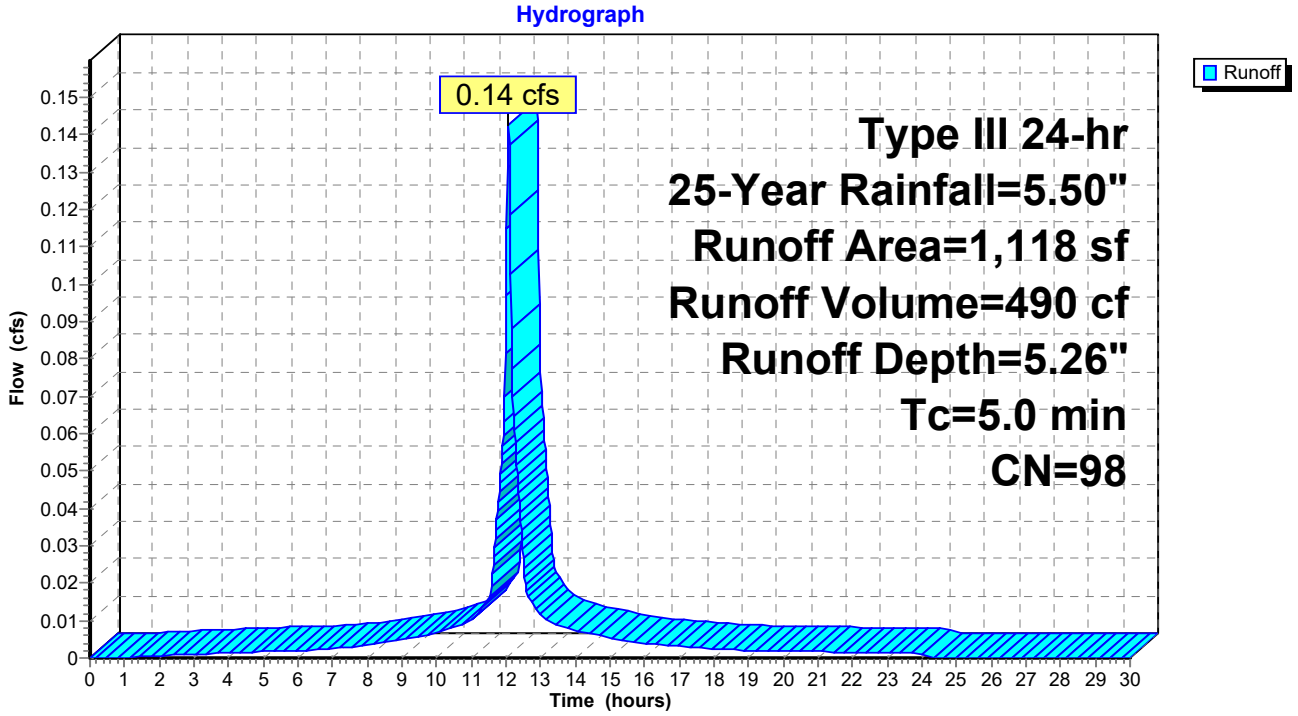
Runoff = 0.14 cfs @ 12.07 hrs, Volume= 490 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
1,118	98	Roofs, HSG A
1,118		100.00% Impervious Area

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

Subcatchment 13S: HOUSE (FRONT)



Summary for Subcatchment 14S: PAVED DRIVEWAY

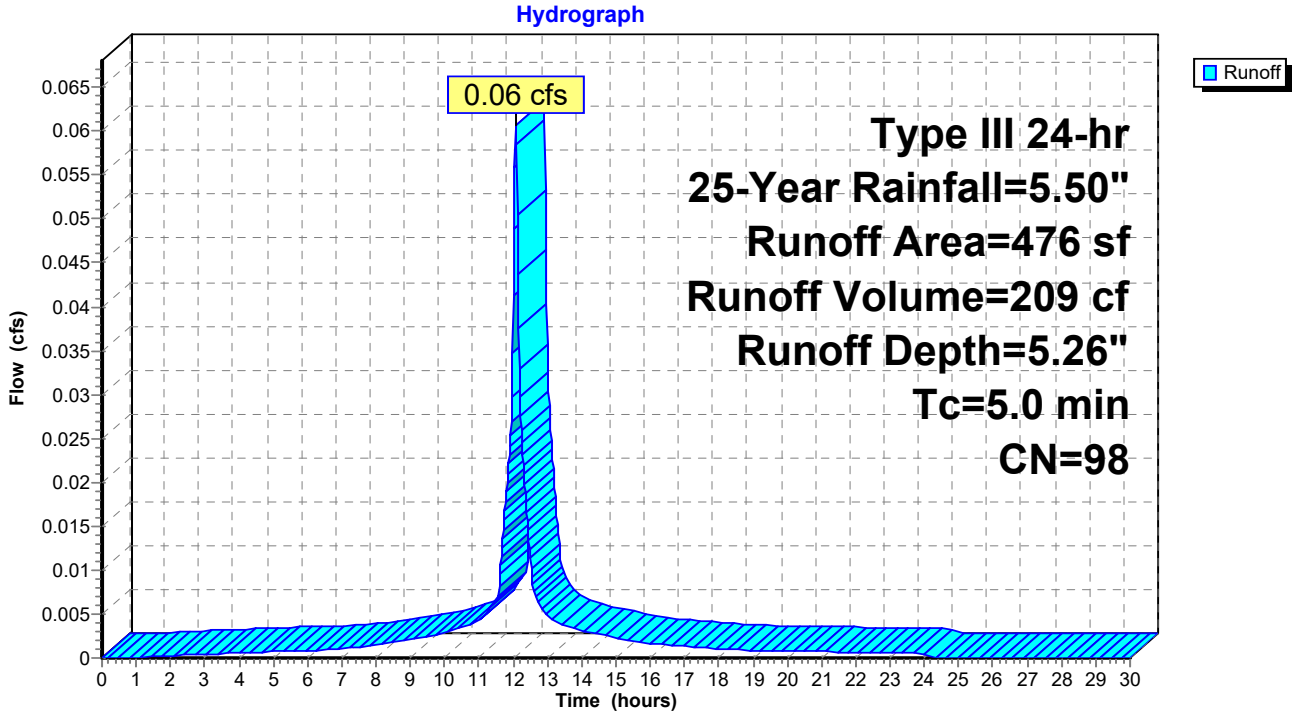
Runoff = 0.06 cfs @ 12.07 hrs, Volume= 209 cf, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	476	98	Driveway
	476		100.00% Impervious Area

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

Subcatchment 14S: PAVED DRIVEWAY



Summary for Pond 3P: DRAINAGE SYSTEM #1

Inflow Area = 6,218 sf,100.00% Impervious, Inflow Depth = 2.03" for 25-Year event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 1,049 cf
Outflow = 0.05 cfs @ 12.51 hrs, Volume= 1,049 cf, Atten= 82%, Lag= 26.5 min
Discarded = 0.05 cfs @ 12.51 hrs, Volume= 1,049 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 113.90' @ 12.51 hrs Surf.Area= 851 sf Storage= 269 cf

Plug-Flow detention time= 28.6 min calculated for 1,049 cf (100% of inflow)
Center-of-Mass det. time= 28.6 min (774.2 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	447 cf	**23.00'W x 37.00'L x 1.50'H Prismatoid** 1,277 cf Overall x 35.0% Voids
#2	114.50'	15 cf	**Ponding** Listed below -Impervious
		462 cf	Total Available Storage

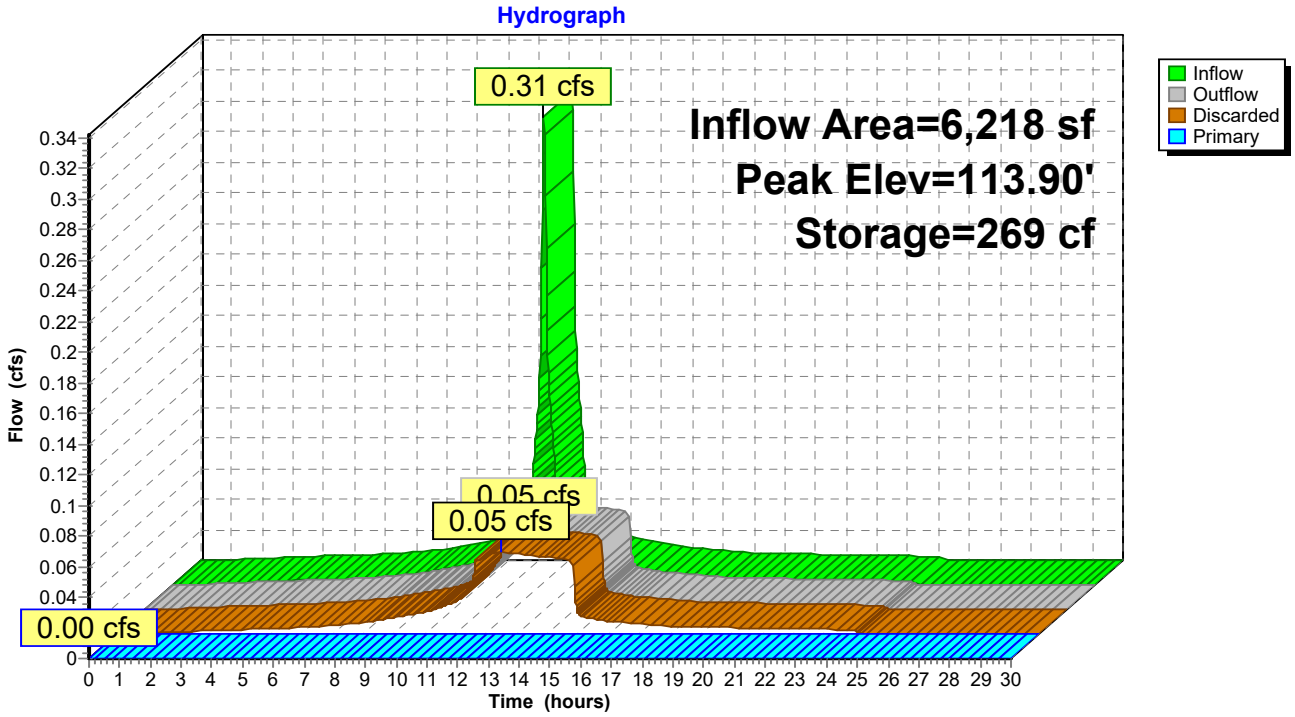
Elevation (feet)	Cum.Store (cubic-feet)
114.50	0
116.00	5
116.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	114.40'	**6.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

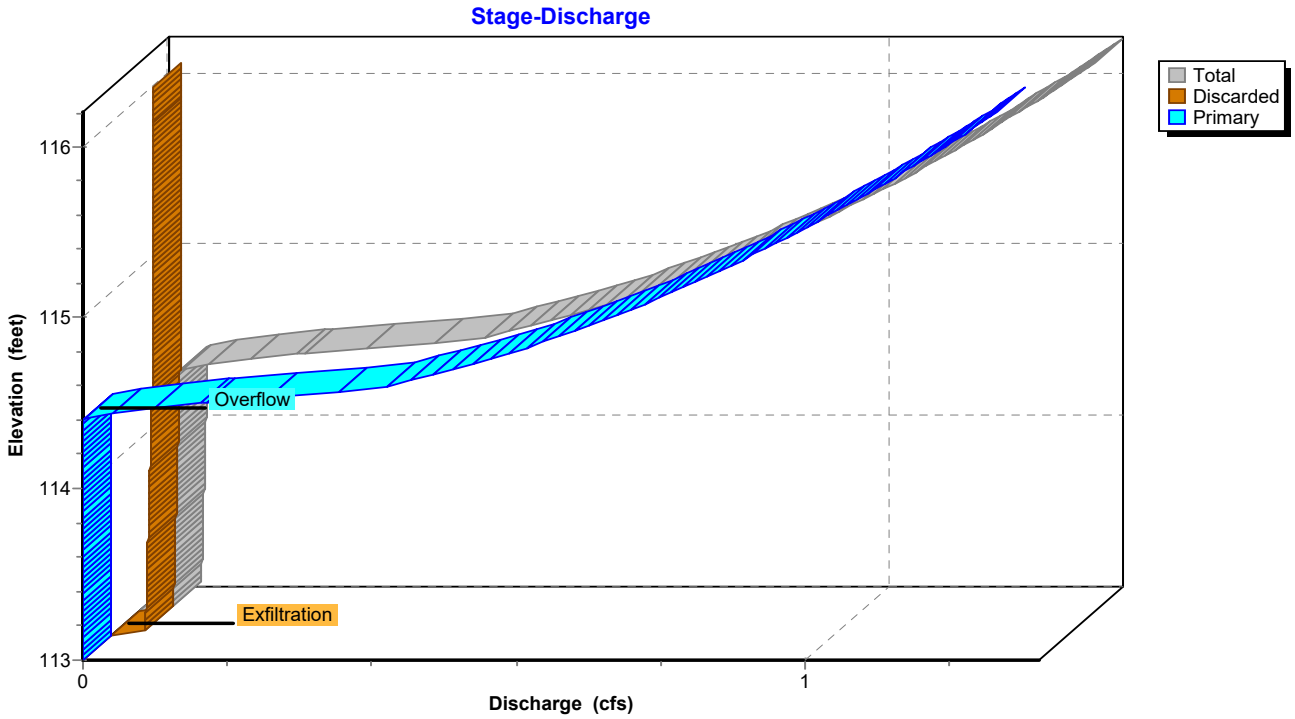
Discarded OutFlow Max=0.05 cfs @ 12.51 hrs HW=113.90' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
↑**2=Overflow** (Controls 0.00 cfs)

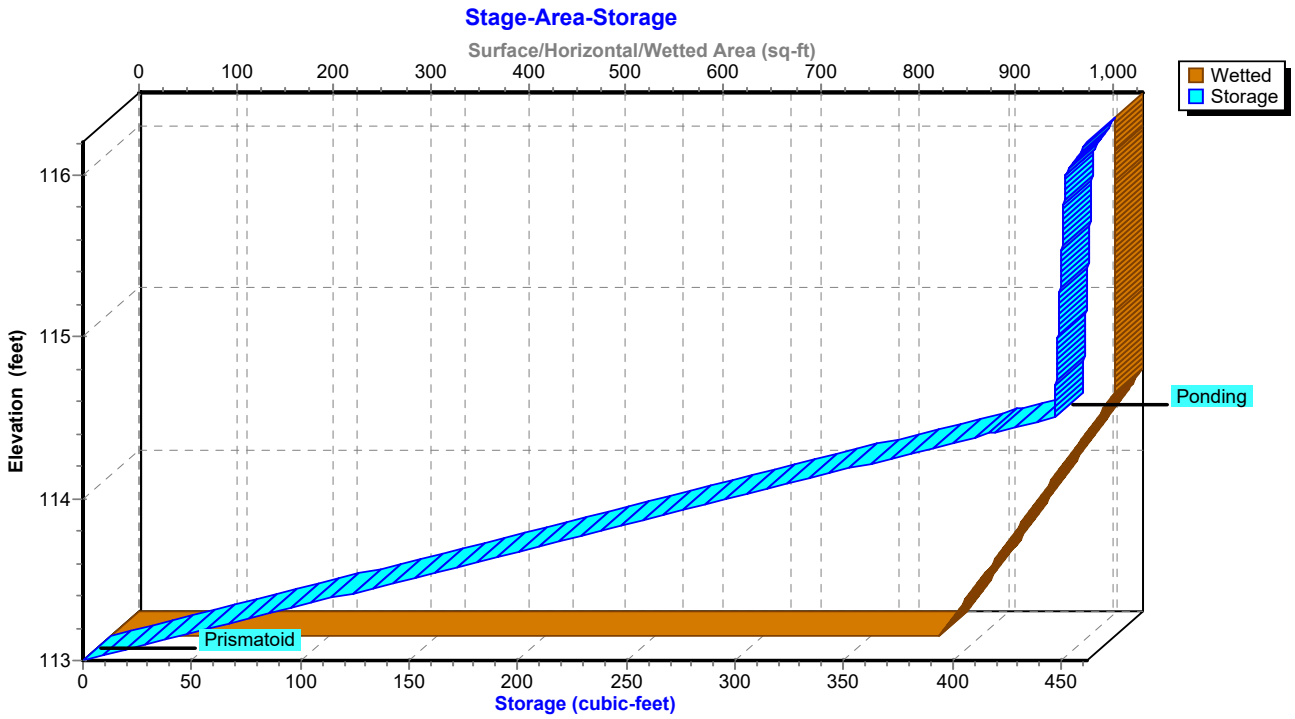
Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Summary for Pond 6P: DRAINAGE SYSTEM #2

Inflow Area = 3,825 sf,100.00% Impervious, Inflow Depth = 2.20" for 25-Year event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 701 cf
Outflow = 0.04 cfs @ 12.48 hrs, Volume= 701 cf, Atten= 80%, Lag= 24.7 min
Discarded = 0.04 cfs @ 12.48 hrs, Volume= 701 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 117.22' @ 12.48 hrs Surf.Area= 653 sf Storage= 163 cf

Plug-Flow detention time= 21.7 min calculated for 701 cf (100% of inflow)
Center-of-Mass det. time= 21.6 min (767.2 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	343 cf	**14.50'W x 45.00'L x 1.50'H Prismatoid** 979 cf Overall x 35.0% Voids
#2	118.00'	15 cf	**Ponding** Listed below -Impervious
		358 cf	Total Available Storage

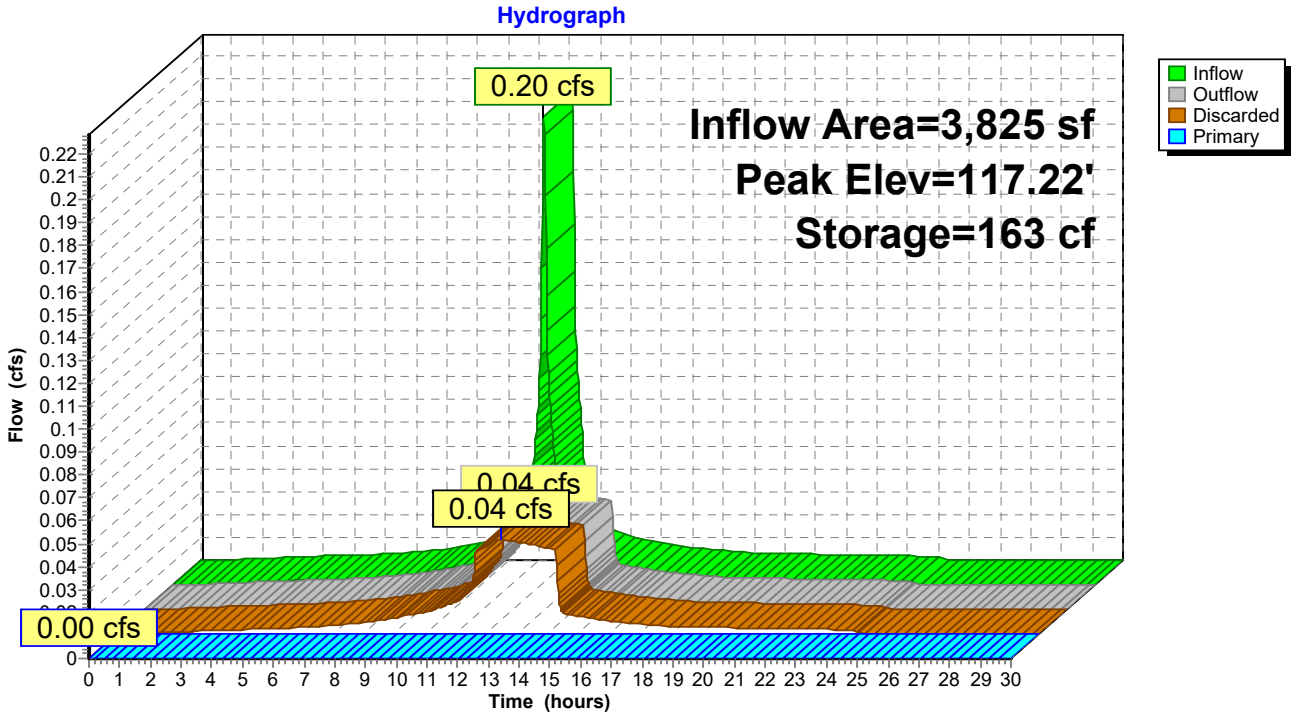
Elevation (feet)	Cum.Store (cubic-feet)
118.00	0
119.00	5
119.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	117.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

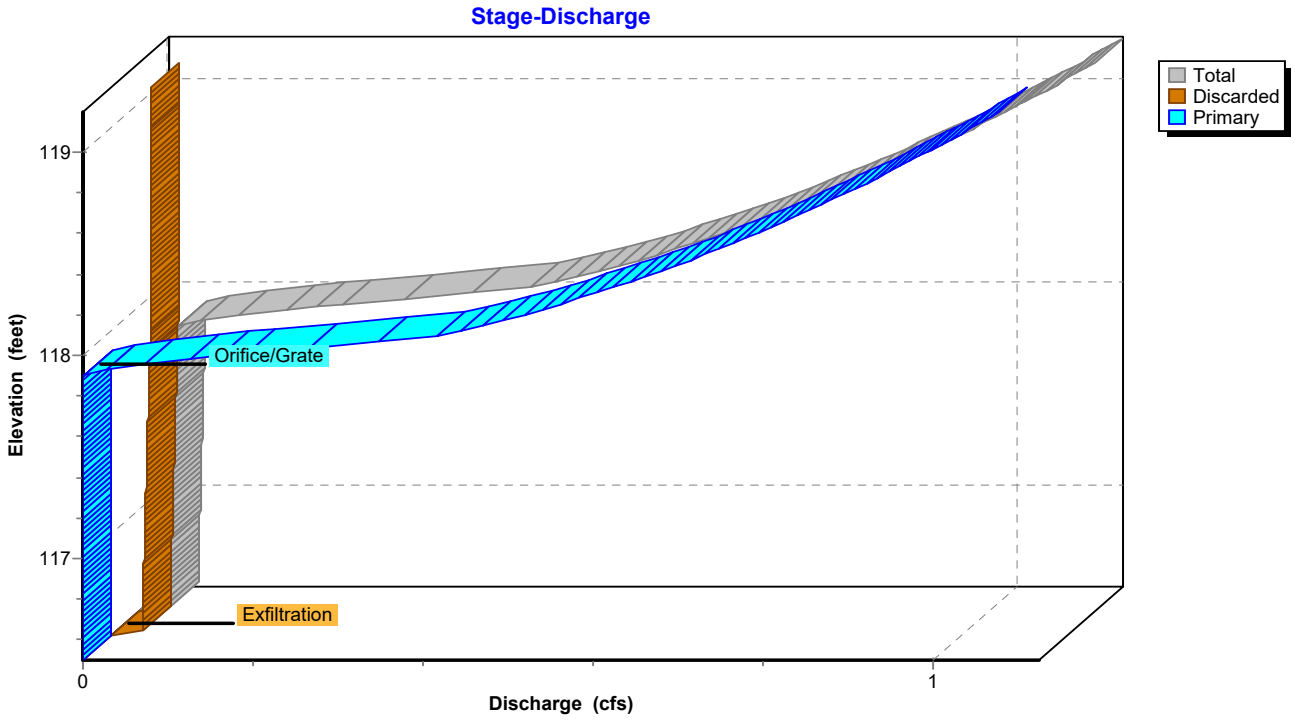
Discarded OutFlow Max=0.04 cfs @ 12.48 hrs HW=117.22' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

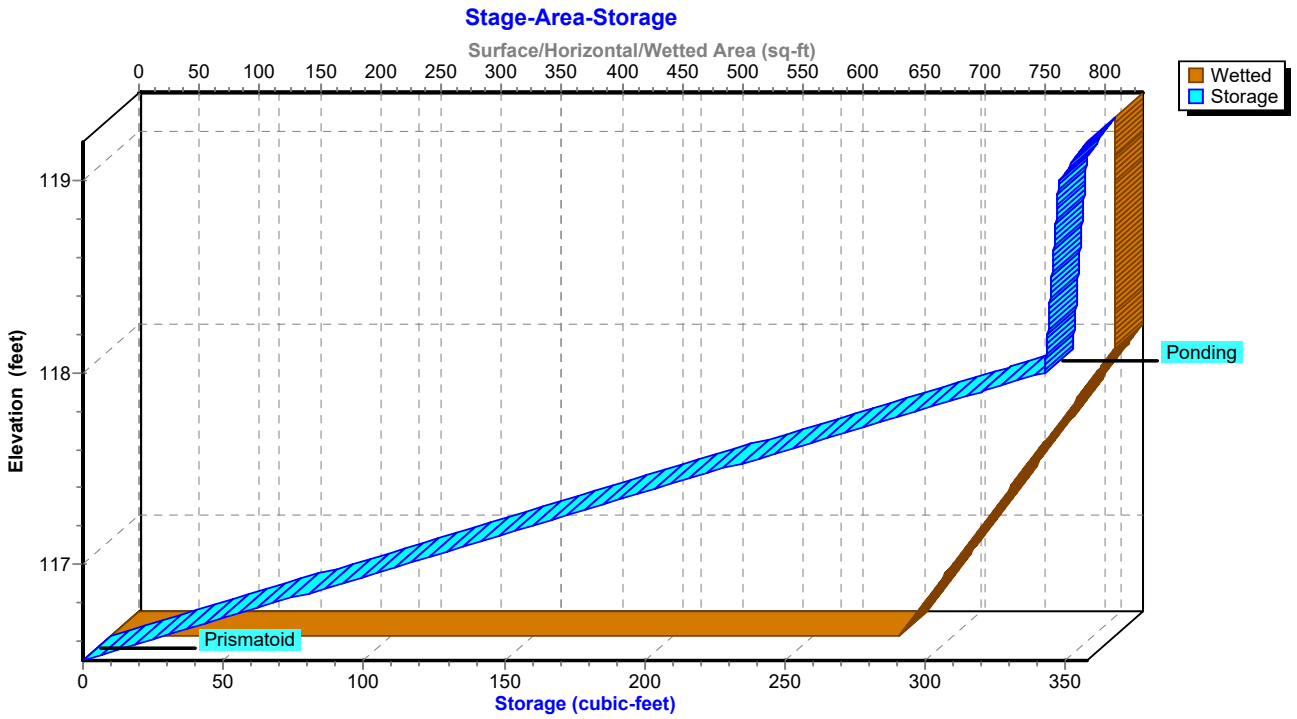
Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Summary for Pond 12P: DRAINAGE SYSTEM #3

Inflow Area = 2,227 sf,100.00% Impervious, Inflow Depth = 5.26" for 25-Year event
Inflow = 0.28 cfs @ 12.07 hrs, Volume= 977 cf
Outflow = 0.04 cfs @ 12.57 hrs, Volume= 977 cf, Atten= 87%, Lag= 29.8 min
Discarded = 0.04 cfs @ 12.57 hrs, Volume= 977 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 118.22' @ 12.57 hrs Surf.Area= 495 sf Storage= 298 cf

Plug-Flow detention time= 52.4 min calculated for 977 cf (100% of inflow)
Center-of-Mass det. time= 52.3 min (797.9 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	433 cf	**11.00'W x 45.00'L x 2.50'H Prismatoid** 1,238 cf Overall x 35.0% Voids
#2	119.00'	15 cf	**Ponding** Listed below -Impervious
		448 cf	Total Available Storage

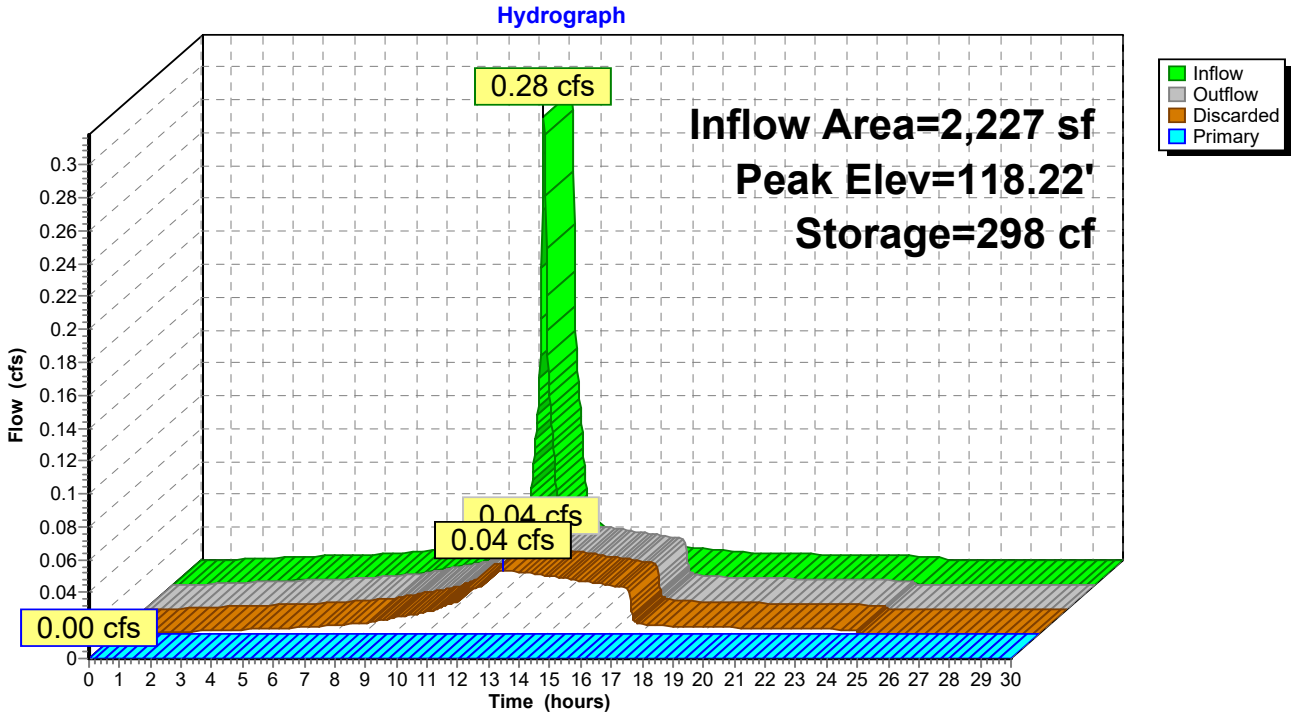
Elevation (feet)	Cum.Store (cubic-feet)
119.00	0
120.00	5
120.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	118.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

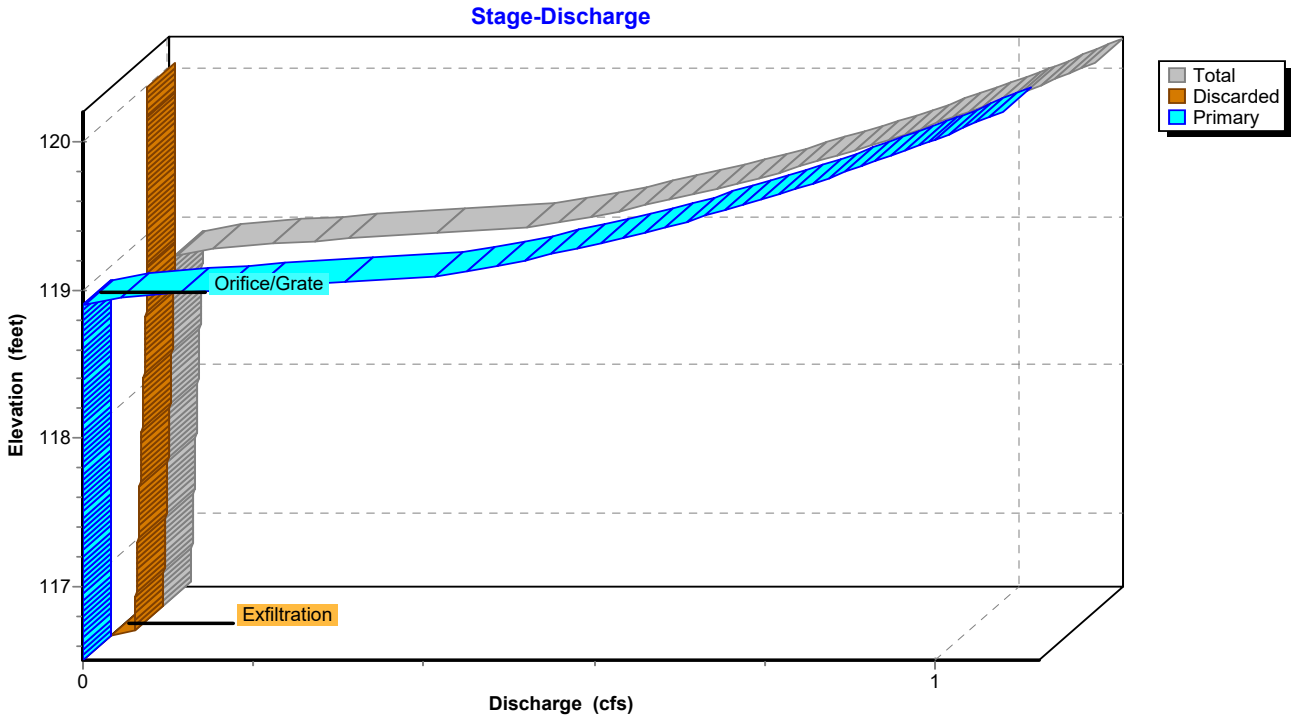
Discarded OutFlow Max=0.04 cfs @ 12.57 hrs HW=118.22' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=116.50' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

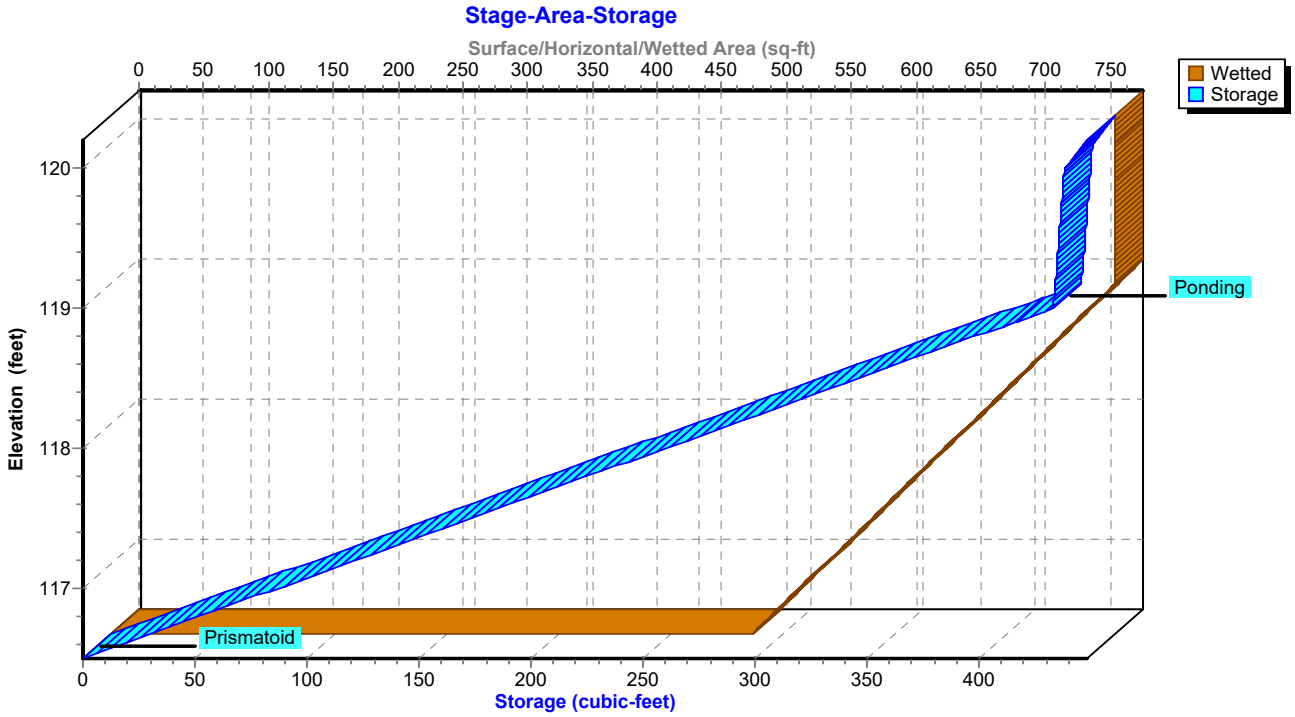
Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3

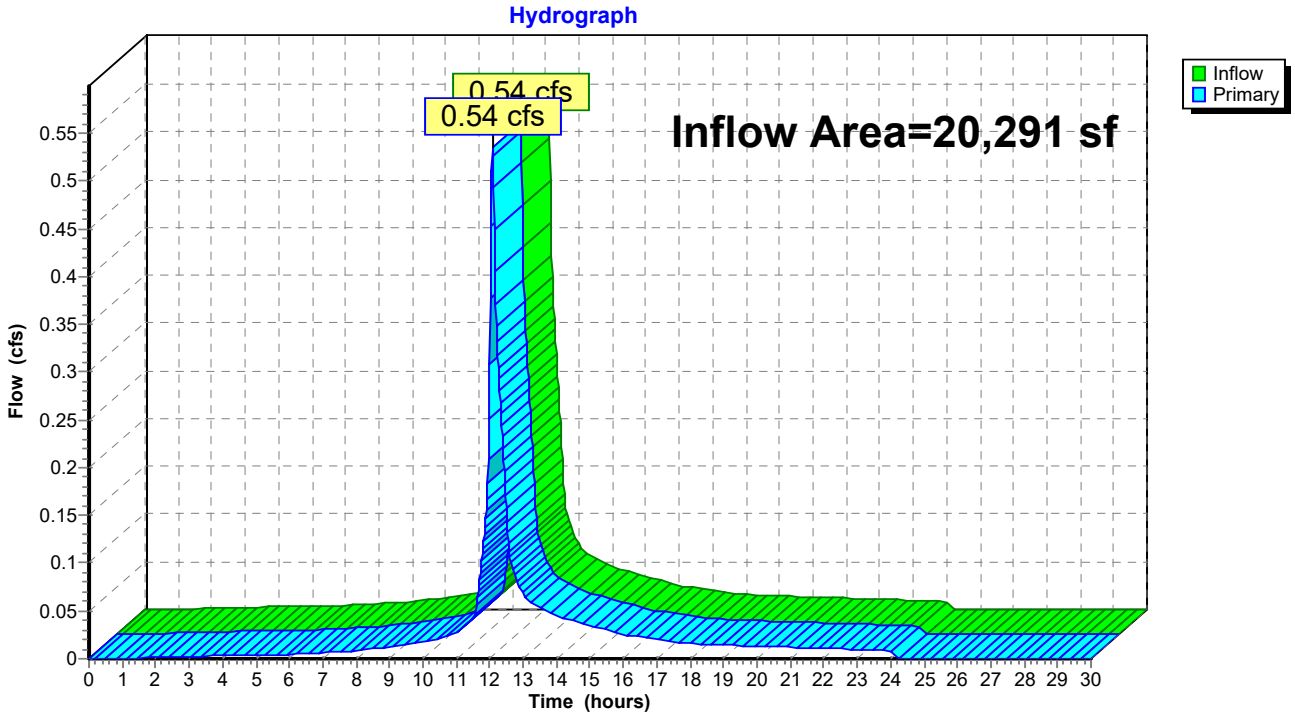


Summary for Link 3L: PROPOSED

Inflow Area = 20,291 sf, 43.44% Impervious, Inflow Depth = 1.26" for 25-Year event
Inflow = 0.54 cfs @ 12.08 hrs, Volume= 2,138 cf
Primary = 0.54 cfs @ 12.08 hrs, Volume= 2,138 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link 3L: PROPOSED



Summary for Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS

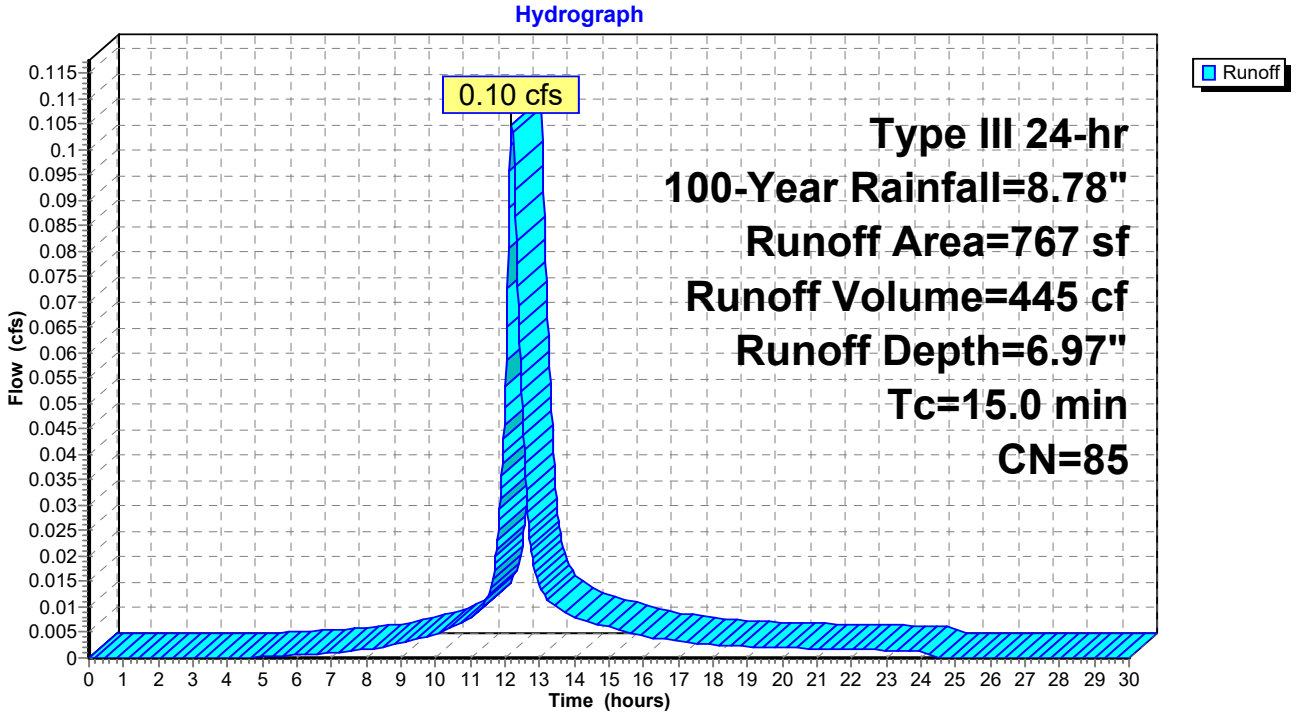
Runoff = 0.10 cfs @ 12.20 hrs, Volume= 445 cf, Depth= 6.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

	Area (sf)	CN	Description
*	767	85	Permeable Pavers
	767		100.00% Pervious Area

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

Subcatchment 2S: PROPOSED PERMEABLE PAVERS WALKWAYS



Summary for Subcatchment 4S: PROPOSED LANDSCAPE AREA

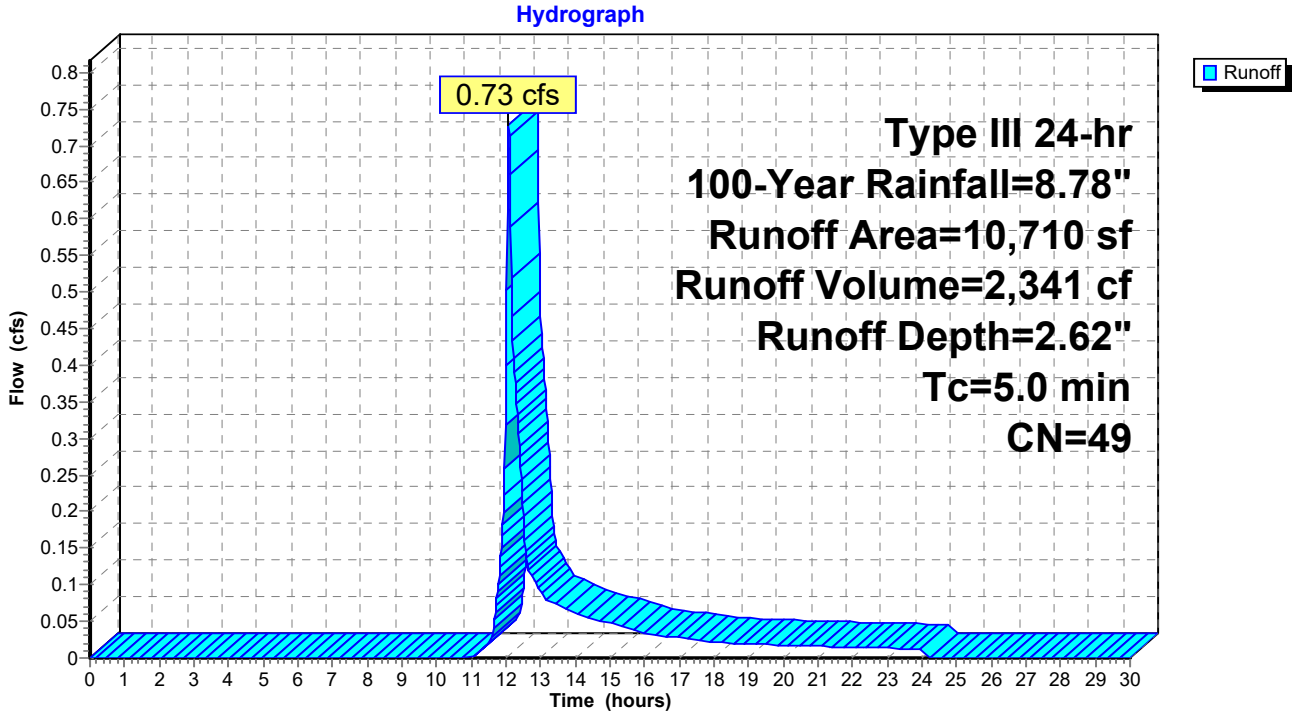
Runoff = 0.73 cfs @ 12.08 hrs, Volume= 2,341 cf, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
10,710	49	50-75% Grass cover, Fair, HSG A
10,710		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED LANDSCAPE AREA



Summary for Subcatchment 7S: HOUSE (REAR)

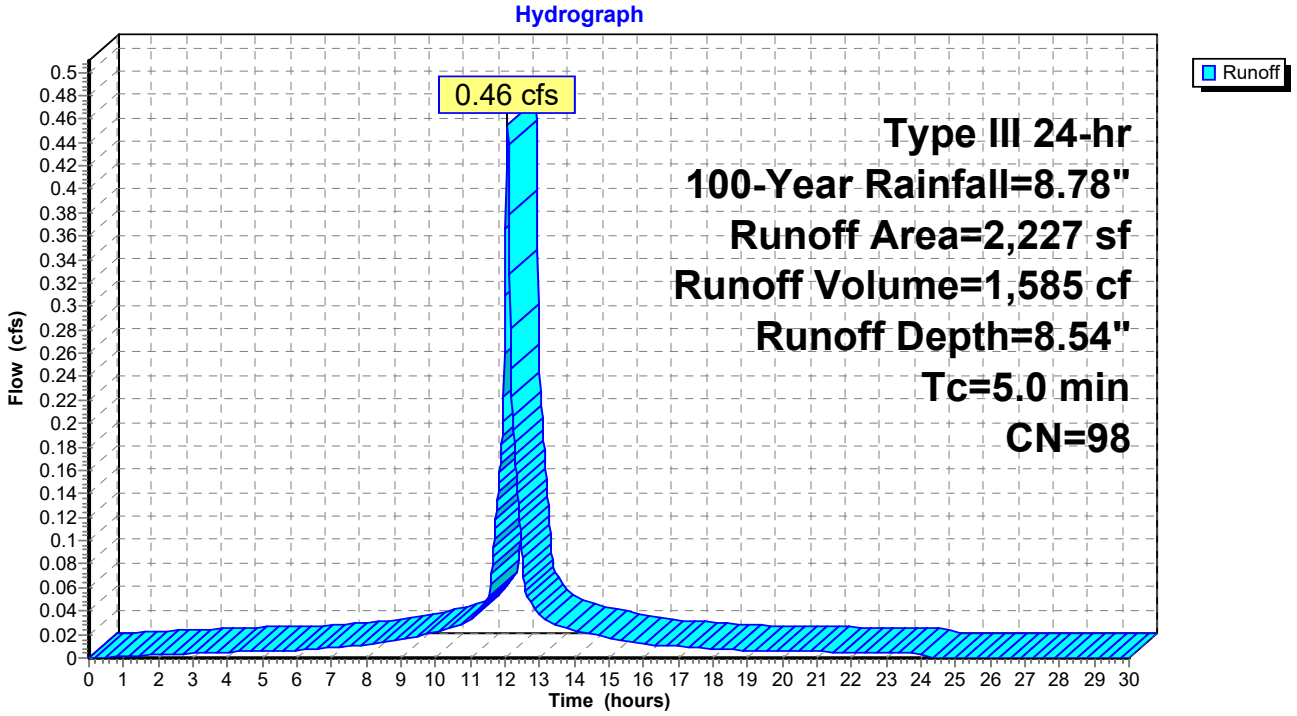
Runoff = 0.46 cfs @ 12.07 hrs, Volume= 1,585 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
2,227	98	Roofs, HSG A
2,227		100.00% Impervious Area

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

Subcatchment 7S: HOUSE (REAR)



Summary for Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS

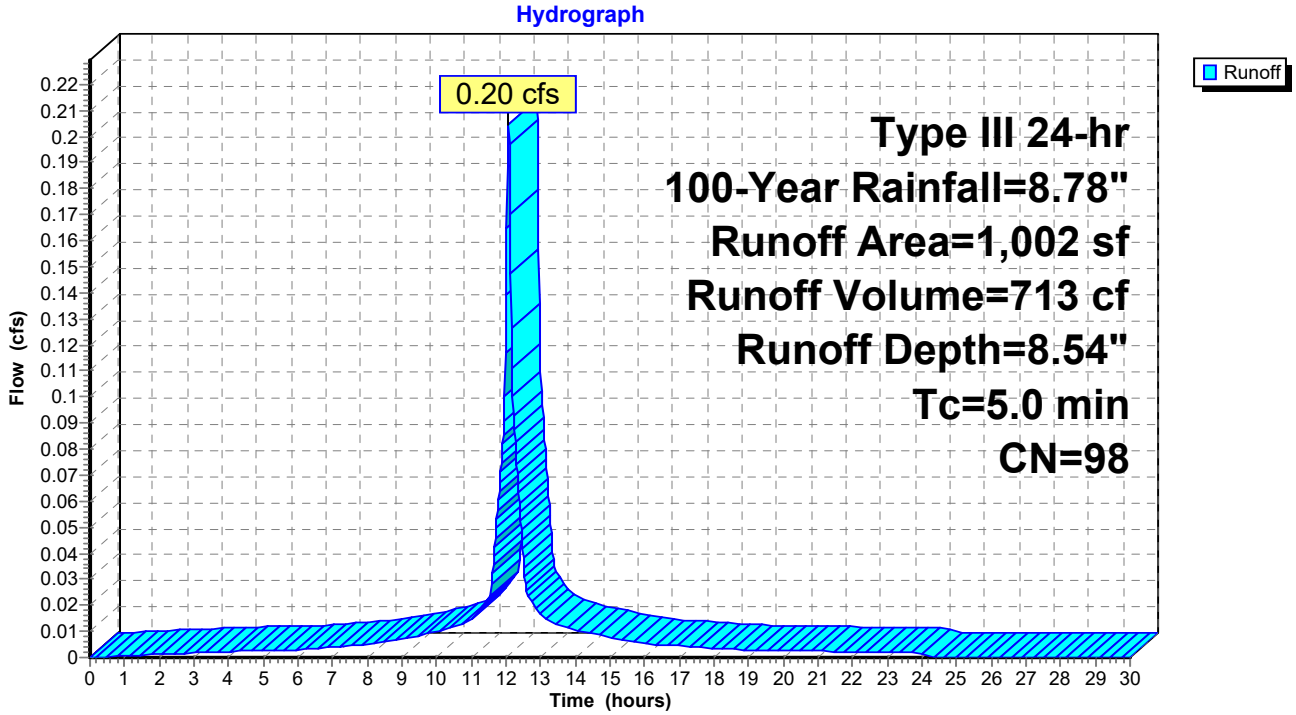
Runoff = 0.20 cfs @ 12.07 hrs, Volume= 713 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
1,002	98	Unconnected pavement, HSG A
1,002		100.00% Impervious Area
1,002		100.00% Unconnected

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

Subcatchment 8S: PROP. UNCONNECTED IMPERVIOUS



Summary for Subcatchment 9S: PORTION OF FRONT HOUSE

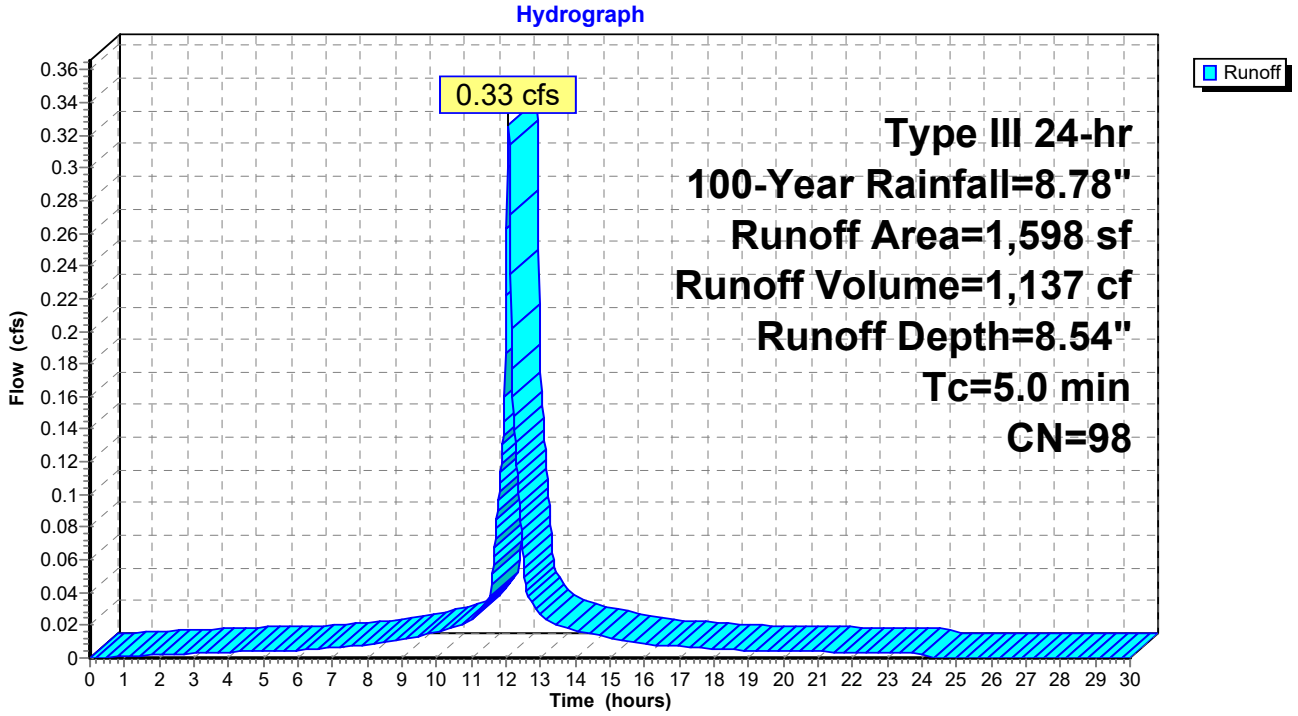
Runoff = 0.33 cfs @ 12.07 hrs, Volume= 1,137 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
1,598	98	Roofs, HSG A
1,598		100.00% Impervious Area

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

Subcatchment 9S: PORTION OF FRONT HOUSE



Summary for Subcatchment 11S: PAVED DRIVEWAY

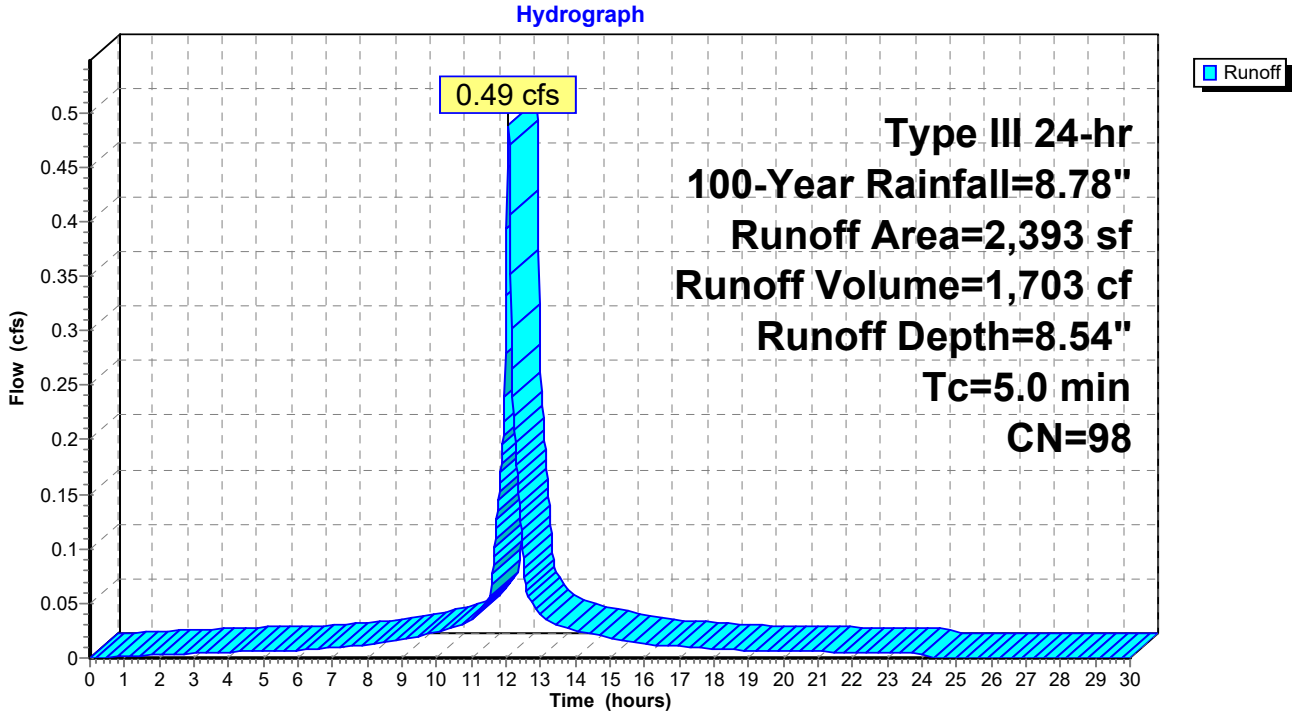
Runoff = 0.49 cfs @ 12.07 hrs, Volume= 1,703 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

	Area (sf)	CN	Description
*	2,393	98	Driveway
	2,393		100.00% Impervious Area

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

Subcatchment 11S: PAVED DRIVEWAY



Summary for Subcatchment 13S: HOUSE (FRONT)

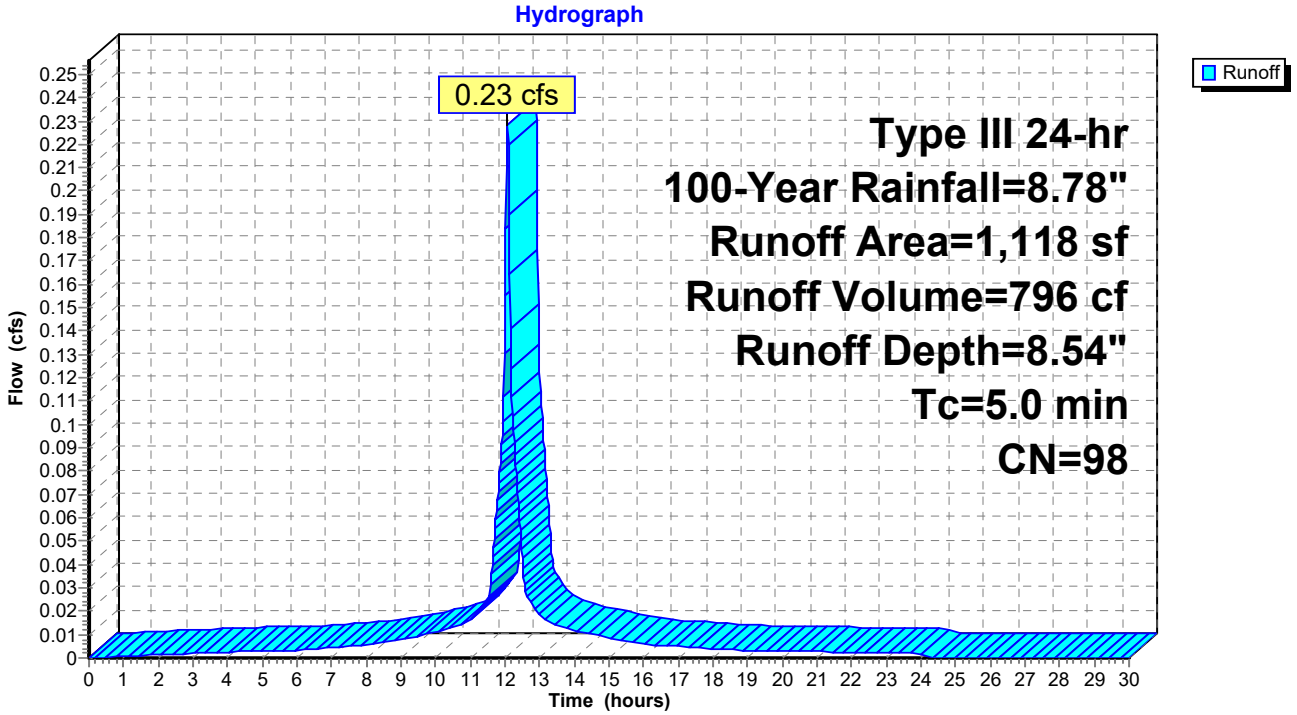
Runoff = 0.23 cfs @ 12.07 hrs, Volume= 796 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
1,118	98	Roofs, HSG A
1,118		100.00% Impervious Area

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

Subcatchment 13S: HOUSE (FRONT)



Summary for Subcatchment 14S: PAVED DRIVEWAY

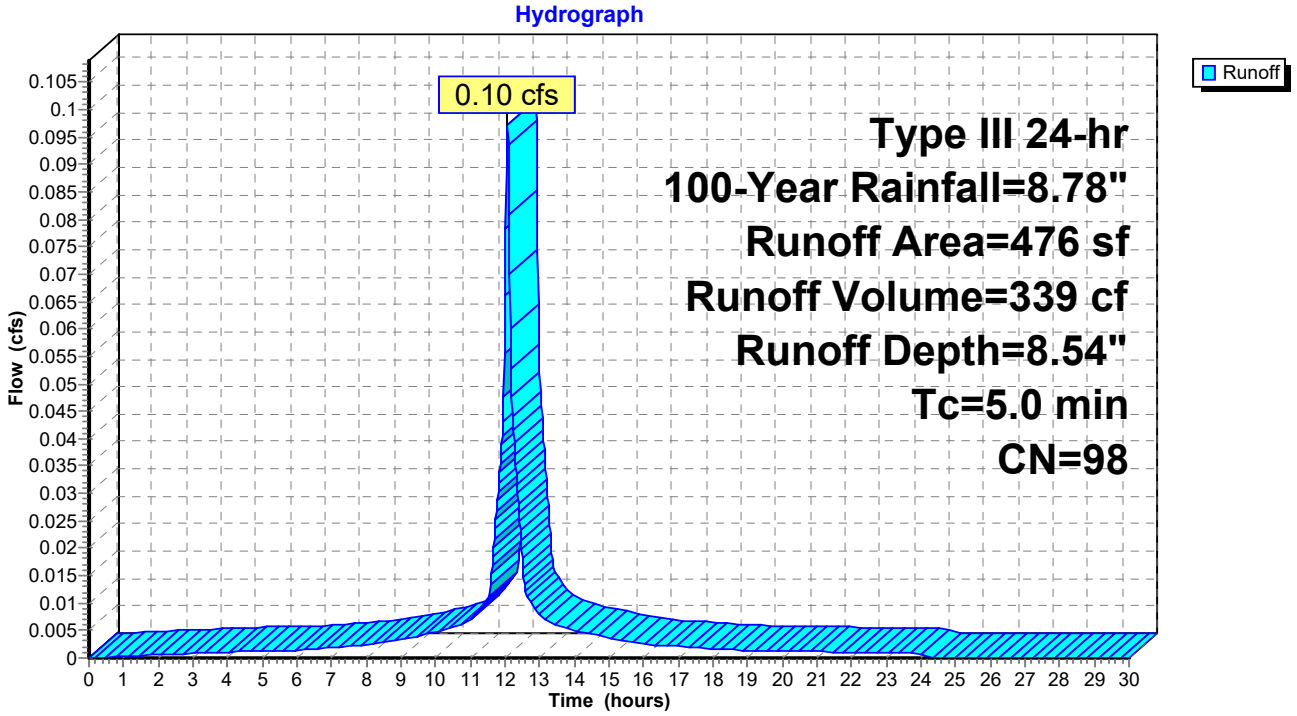
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 339 cf, Depth= 8.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

	Area (sf)	CN	Description
*	476	98	Driveway
	476		100.00% Impervious Area

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

Subcatchment 14S: PAVED DRIVEWAY



Summary for Pond 3P: DRAINAGE SYSTEM #1

Inflow Area = 6,218 sf,100.00% Impervious, Inflow Depth = 3.57" for 100-Year event
Inflow = 0.49 cfs @ 12.07 hrs, Volume= 1,848 cf
Outflow = 0.42 cfs @ 12.31 hrs, Volume= 1,864 cf, Atten= 15%, Lag= 14.4 min
Discarded = 0.06 cfs @ 12.30 hrs, Volume= 1,598 cf
Primary = 0.36 cfs @ 12.31 hrs, Volume= 266 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 114.57' @ 12.31 hrs Surf.Area= 851 sf Storage= 447 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 40.7 min (780.3 - 739.6)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	447 cf	**23.00'W x 37.00'L x 1.50'H Prismatoid** 1,277 cf Overall x 35.0% Voids
#2	114.50'	15 cf	**Ponding** Listed below -Impervious
		462 cf	Total Available Storage

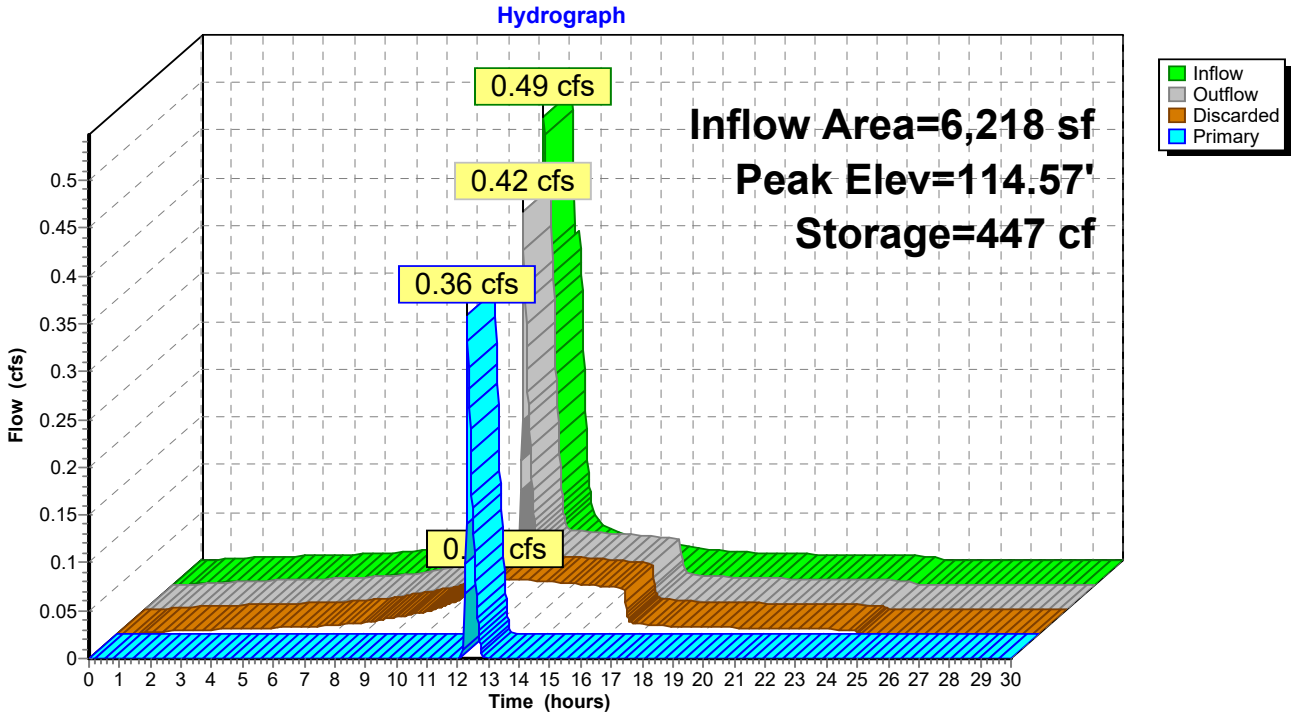
Elevation (feet)	Cum.Store (cubic-feet)
114.50	0
116.00	5
116.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	114.40'	**6.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

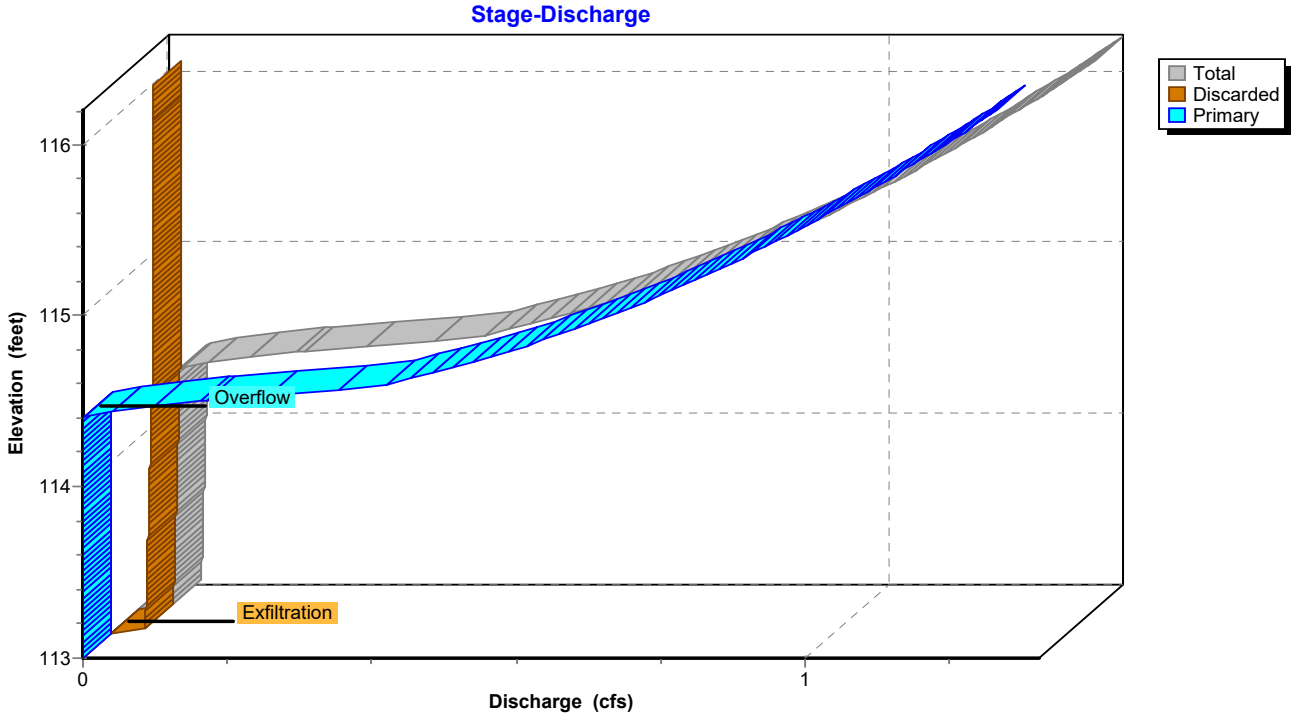
Discarded OutFlow Max=0.06 cfs @ 12.30 hrs HW=114.56' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.33 cfs @ 12.31 hrs HW=114.56' (Free Discharge)
2=Overflow (Weir Controls 0.33 cfs @ 1.31 fps)

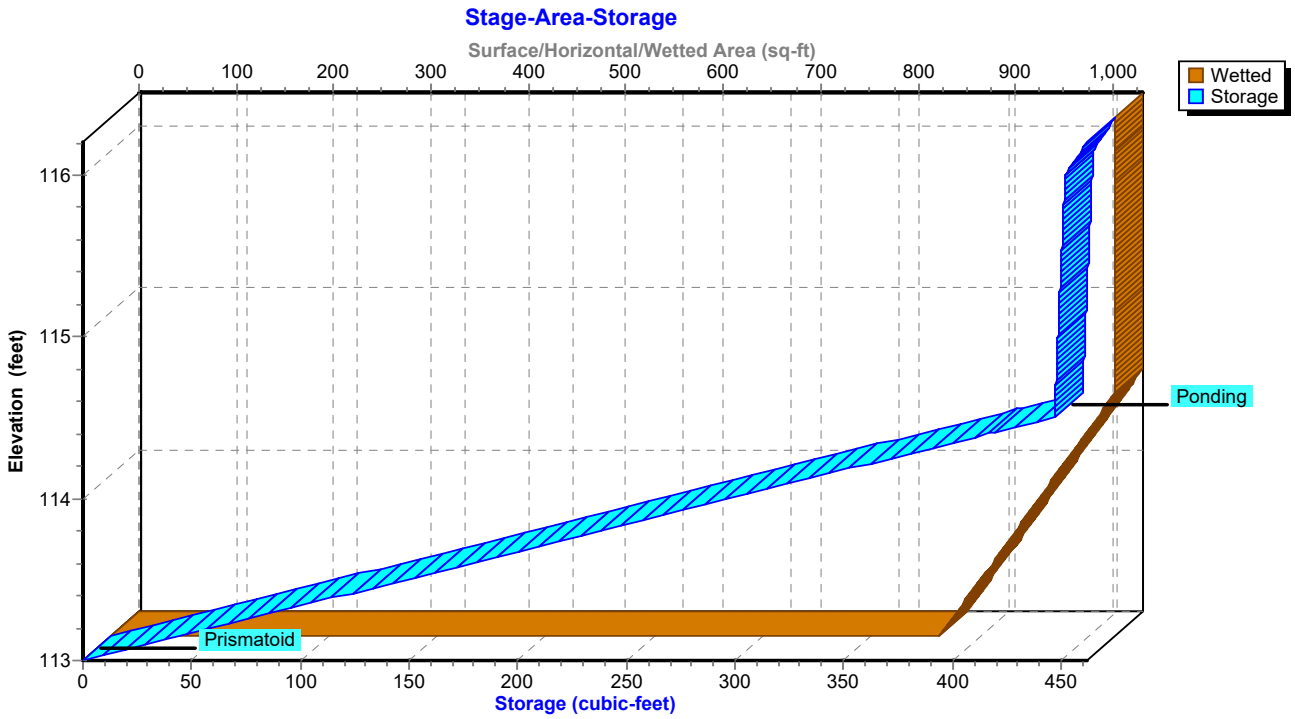
Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Pond 3P: DRAINAGE SYSTEM #1



Summary for Pond 6P: DRAINAGE SYSTEM #2

Inflow Area = 3,825 sf,100.00% Impervious, Inflow Depth = 4.03" for 100-Year event
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 1,286 cf
Outflow = 0.22 cfs @ 12.32 hrs, Volume= 1,283 cf, Atten= 32%, Lag= 15.2 min
Discarded = 0.05 cfs @ 12.32 hrs, Volume= 1,138 cf
Primary = 0.18 cfs @ 12.32 hrs, Volume= 145 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 118.01' @ 12.32 hrs Surf.Area= 653 sf Storage= 343 cf

Plug-Flow detention time= 41.3 min calculated for 1,283 cf (100% of inflow)
Center-of-Mass det. time= 40.0 min (779.4 - 739.4)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	343 cf	**14.50'W x 45.00'L x 1.50'H Prismatoid** 979 cf Overall x 35.0% Voids
#2	118.00'	15 cf	**Ponding** Listed below -Impervious
		358 cf	Total Available Storage

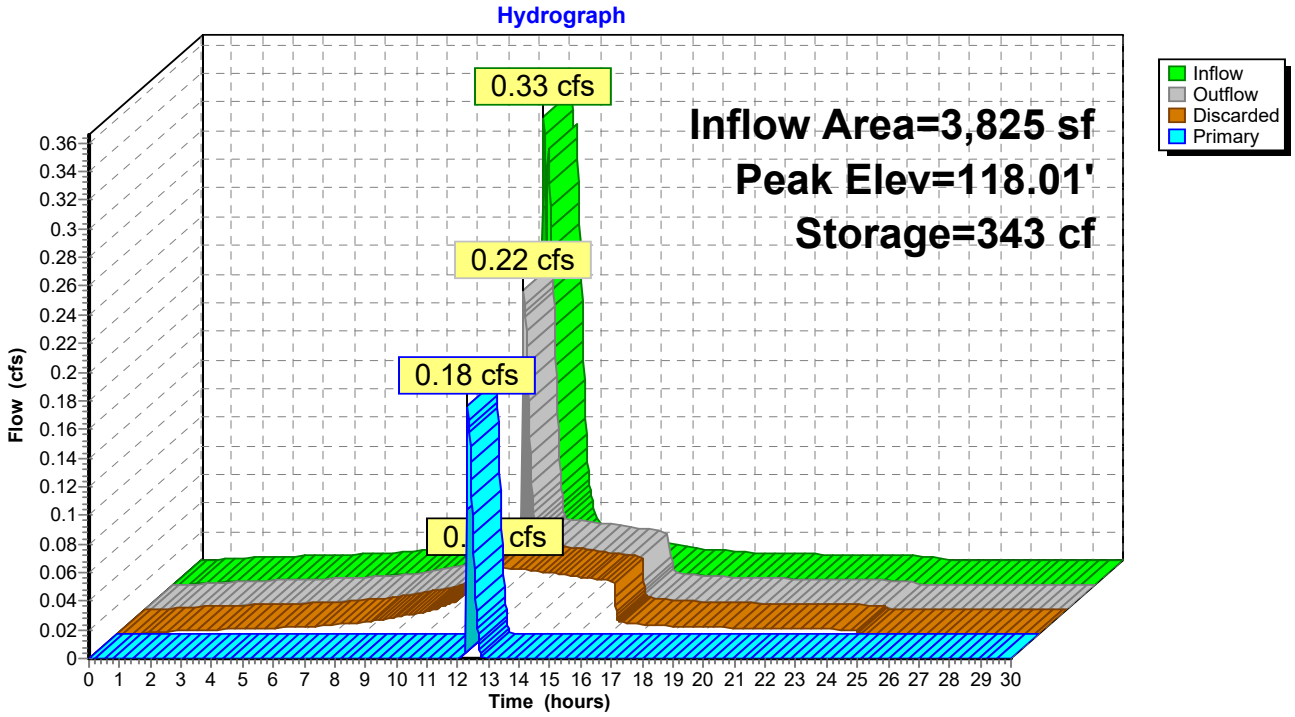
Elevation (feet)	Cum.Store (cubic-feet)
118.00	0
119.00	5
119.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	117.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

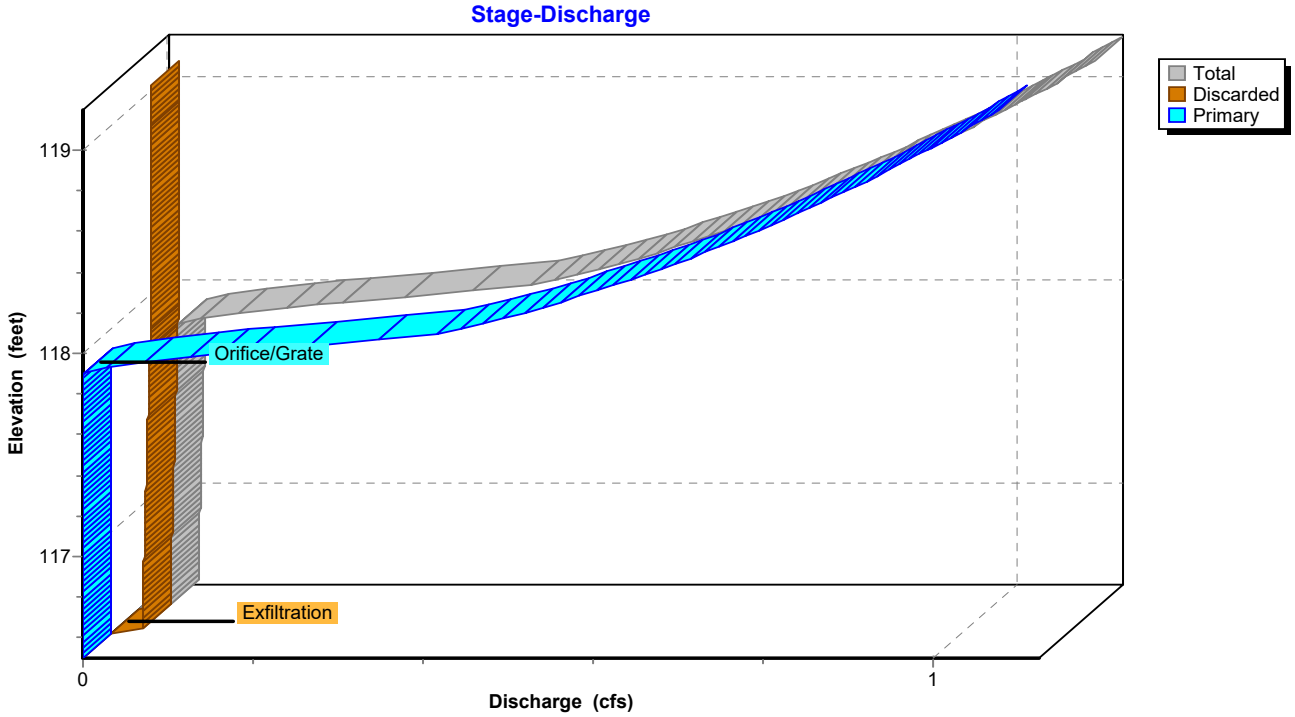
Discarded OutFlow Max=0.05 cfs @ 12.32 hrs HW=118.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.17 cfs @ 12.32 hrs HW=118.00' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.17 cfs @ 1.06 fps)

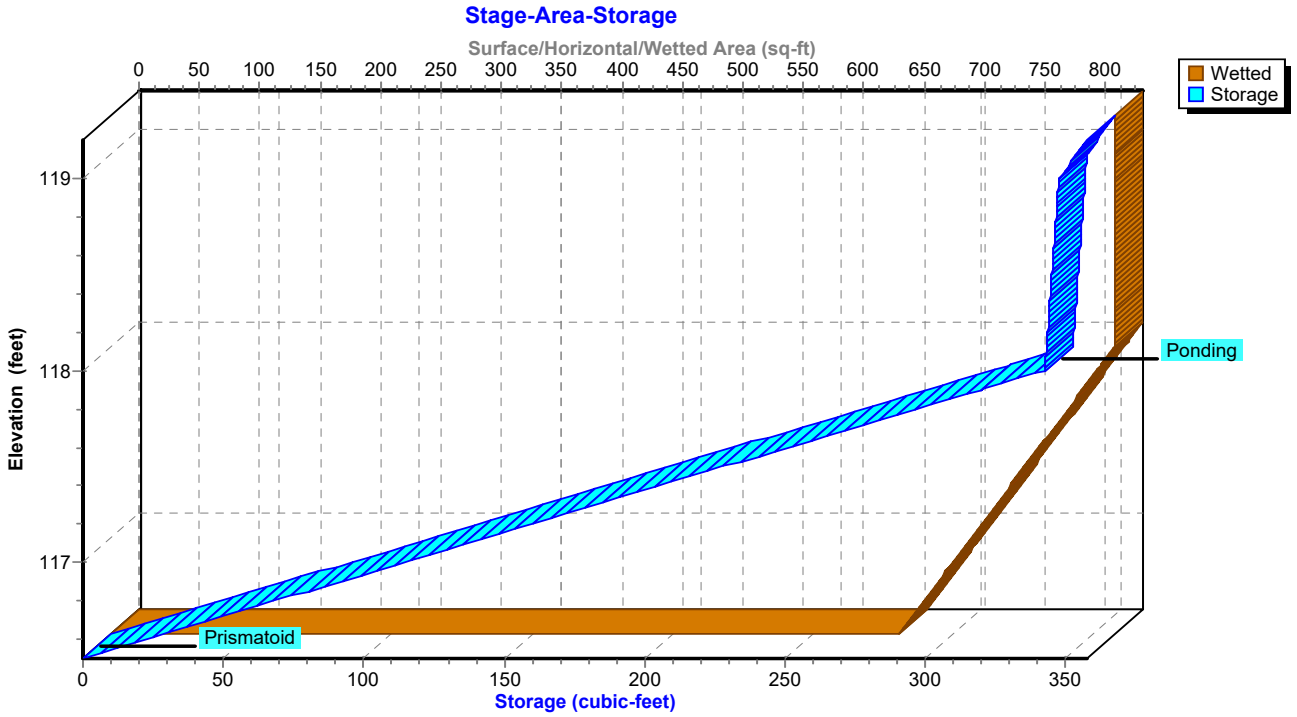
Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Pond 6P: DRAINAGE SYSTEM #2



Summary for Pond 12P: DRAINAGE SYSTEM #3

Inflow Area = 2,227 sf,100.00% Impervious, Inflow Depth = 8.54" for 100-Year event
Inflow = 0.46 cfs @ 12.07 hrs, Volume= 1,585 cf
Outflow = 0.20 cfs @ 12.23 hrs, Volume= 1,585 cf, Atten= 56%, Lag= 9.6 min
Discarded = 0.04 cfs @ 12.23 hrs, Volume= 1,437 cf
Primary = 0.16 cfs @ 12.23 hrs, Volume= 148 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 119.00' @ 12.23 hrs Surf.Area= 495 sf Storage= 433 cf

Plug-Flow detention time= 66.4 min calculated for 1,584 cf (100% of inflow)
Center-of-Mass det. time= 66.4 min (805.6 - 739.2)

Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	433 cf	**11.00'W x 45.00'L x 2.50'H Prismatoid** 1,238 cf Overall x 35.0% Voids
#2	119.00'	15 cf	**Ponding** Listed below -Impervious
		448 cf	Total Available Storage

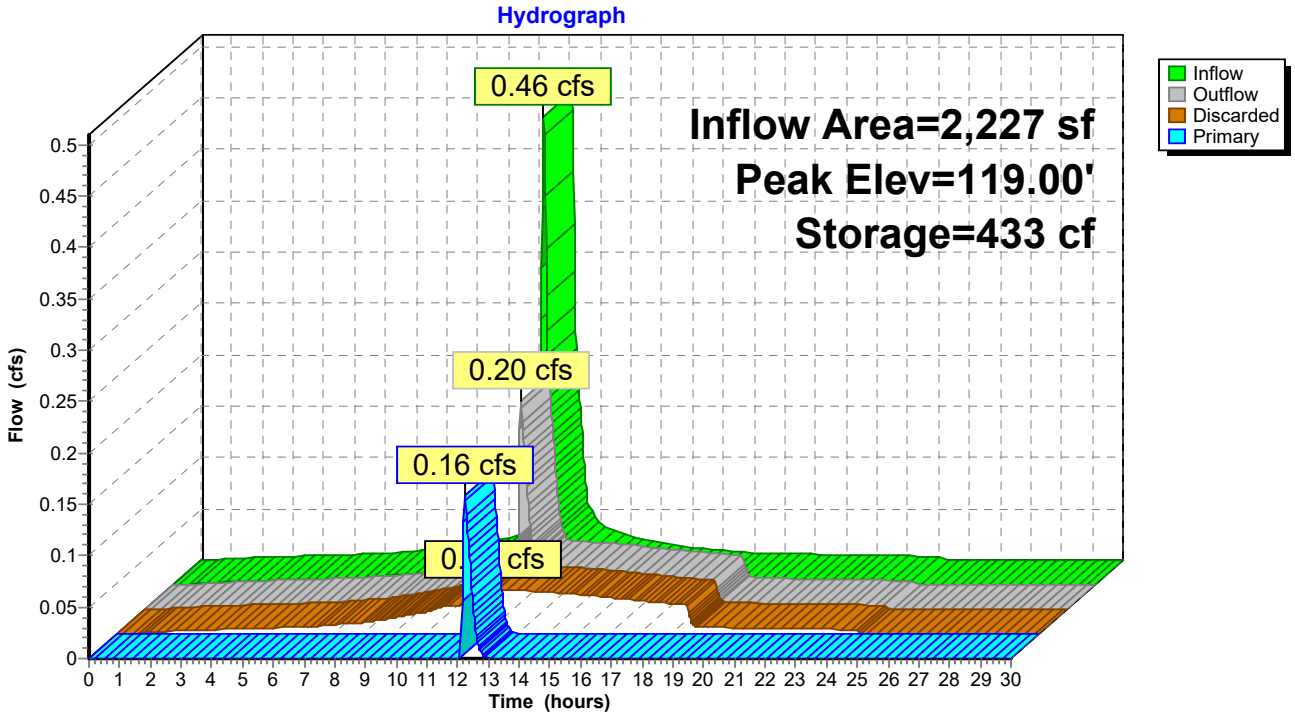
Elevation (feet)	Cum.Store (cubic-feet)
119.00	0
120.00	5
120.20	15

Device	Routing	Invert	Outlet Devices
#1	Discarded	116.50'	**2.410 in/hr Exfiltration over Wetted area**
#2	Primary	118.90'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

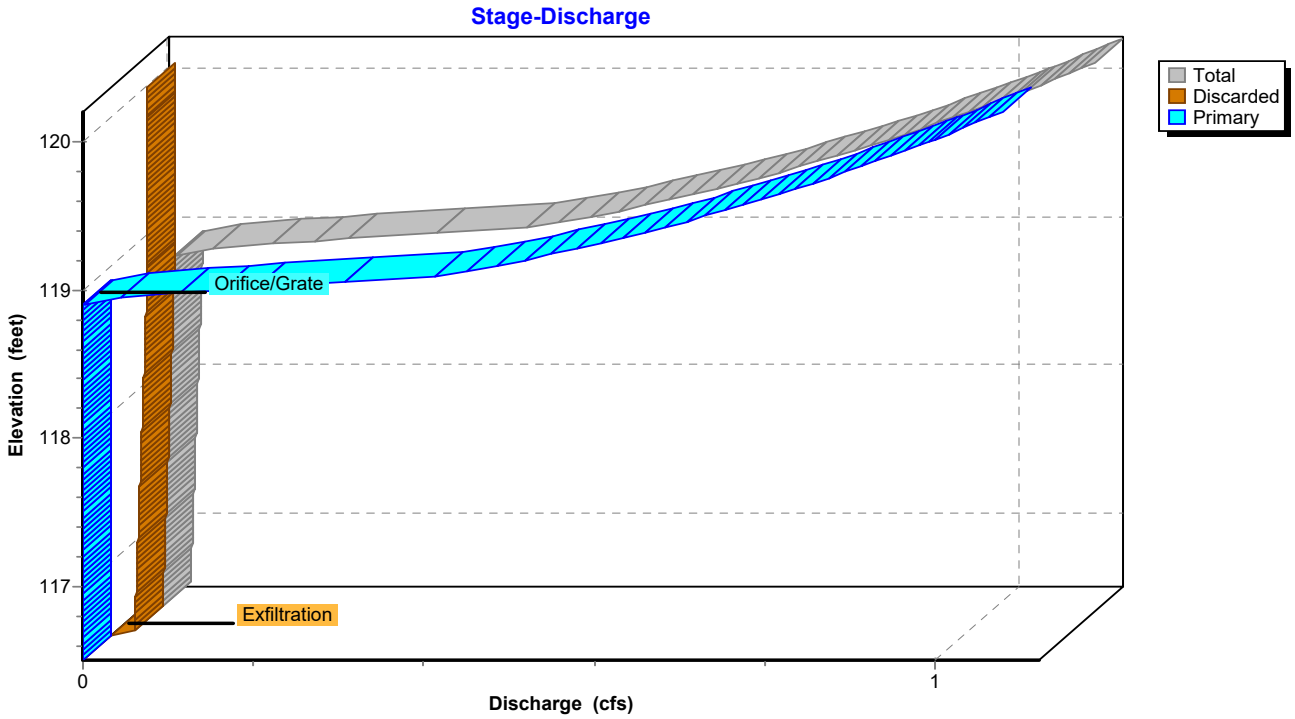
Discarded OutFlow Max=0.04 cfs @ 12.23 hrs HW=119.00' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.16 cfs @ 12.23 hrs HW=119.00' (Free Discharge)
↑**2=Orifice/Grate** (Weir Controls 0.16 cfs @ 1.02 fps)

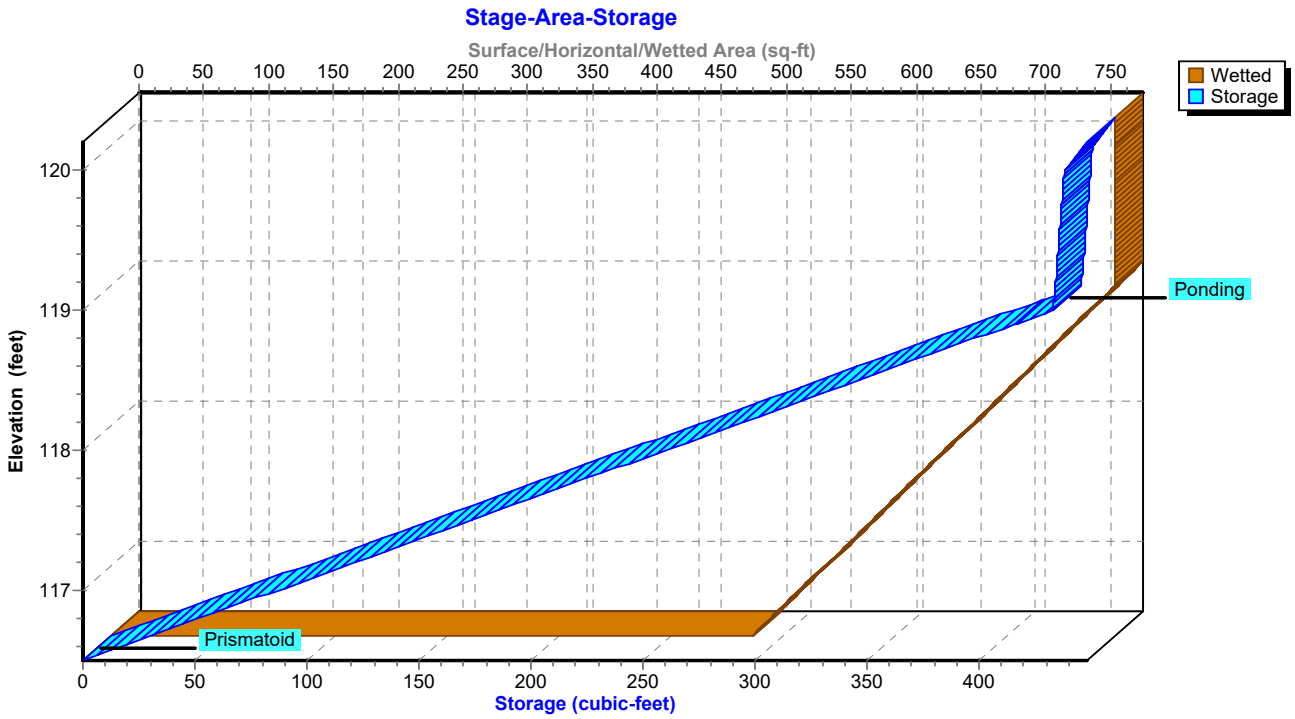
Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3



Pond 12P: DRAINAGE SYSTEM #3



Summary for Link 3L: PROPOSED

Inflow Area = 20,291 sf, 43.44% Impervious, Inflow Depth = 2.90" for 100-Year event
Inflow = 1.33 cfs @ 12.08 hrs, Volume= 4,900 cf
Primary = 1.33 cfs @ 12.08 hrs, Volume= 4,900 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link 3L: PROPOSED