

EcoTec, Inc.

ENVIRONMENTAL CONSULTING SERVICES

102 Grove Street
Worcester, MA 01605-2629
508-752-9666 – Fax: 508-752-9494

BY EMAIL AND BY HAND

November 21, 2023

Melrose Conservation Commission
Melrose City Hall
562 Main Street
Melrose, MA 02176

Re: Request to Amend the Order of Conditions – 31 Cranmore Lane, Melrose (DEP File # 217-0227)

Dear Commission Members:

On behalf of Quang-De Nguyen, the owner of the property located at 31 Cranmore Lane, Melrose, EcoTec hereby submits this request to amend the Order of Conditions issued on July 21, 2023, under DEP File No. 217-0227. The Order of Conditions is still valid until July 21, 2026. Please find enclosed a check in the amount of \$50.00, to cover the filing fee under the Ordinance for a request to amend the Order of Conditions.

Under this request to amend the Order of Conditions, the applicant is requesting that the Commission holds a public hearing to discuss proposed minor revisions to the approved project and to amend the Order of Conditions to include the revised project plans.

The original approved project consists of the construction of a pool with an associated patio and stormwater management system. The proposed work under this Order of Conditions has commenced. The revised proposal is depicted on the enclosed plans entitled “31 Cranmore Lane, Melrose, Massachusetts, Civil Plan Sheets 1 and 2” prepared by Spruhan Engineering” dated November 15, 2023, which is included in the filing materials. The Site Plan includes a revision with a proposed additional patio area and an enlarged stormwater management system to accommodate the increased proposed impervious surface area. The additional area of patio is partially located within the 100-foot buffer zone to the wetland on the property, with the closest area of additional patio located greater than 80 feet from the wetland. The additional patio area runs parallel to the wetland buffer line and is no closer to the wetland resource area than the originally proposed patio. The stormwater management system has been enlarged by one additional stormwater chamber within the infiltration system, which is located approximately 50 feet from the wetland.

This Request to Amend the Order of Conditions submittal is comprised of:

1. This cover letter;
2. Copy of Filing fee check;
3. Abutter Notification Form, Certified List of Abutters, and Affidavit of Service;
4. Revised Stormwater Report by Spruhan Engineering, dated November 15, 2023; and
5. Two (2) copies of the plan set referenced above.

Melrose Conservation Commission

November 21, 2023

Page 2 of 2

EcoTec is notifying abutters via certificate of mailing in anticipation of the requested public hearing regarding this matter. Additionally, one (1) copy of this Request to Amend packet will be submitted via email to the DEP Northeastern Regional Office. We are looking forward to discussing the requested amendment with the Commission. If you have any questions, please feel free to contact us at any time.

Sincerely,

A handwritten signature in cursive script that reads "Kate O'Donnell".

Kate O'Donnell, WPIT
Environmental Scientist
Cc: DEP-NERO

Notification of Abutters Under the
Massachusetts Wetlands Protection Act and the City of Melrose Wetlands Ordinance

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

- A. The name of the applicant is Quang-De Nguyen.
- B. The applicant has filed a Request with the Conservation Commission for the municipality of Melrose seeking permission to Amend the Order of Conditions issued under DEP File No. 217-0227 to allow for a patio expansion within the 100-foot Buffer Zone to an Area Subject to Protection Under the Wetlands Protection Act (General Laws Chapter 131, Section 40) and the City of Melrose Wetlands Ordinance.
- C. The address where the planned activity will take place is 31 Cranmore Lane, Melrose, MA.
- D. Copies of the Request to Amend may be examined at the Melrose Conservation Commission office during their normal business hours. For more information, call the Conservation Commission at 781-979-4312. Copies of the Notice of Intent may also be examined and obtained by making an appointment at EcoTec, Inc., 102 Grove Street, Worcester, MA, during regular business hours.
- E. For more information call or email Kate O'Donnell of EcoTec at (508) 752-9666 x228 or kodonnell@ecotecinc.com to make an appointment to review the filing materials. This is the applicant's representative.
- F. Information regarding the date, time and place of the public hearing may be obtained from EcoTec, Inc., by calling this telephone number (508) 752-9666 during regular business hours. Or the Melrose Conservation Commission at 781-979-4312.

NOTE: Notice of the public hearing, including the date, time and place will be published at least five (5) days in advance in the Melrose Free Press.

NOTE: Notice of the public hearing, including the date, time and place will be posted in the City or Town Hall not less than forty-eight (48) hours in advance.

NOTE: You also may contact your local Conservation Commission or the nearest Department of Environmental Protection Regional Office for more information about this application or the Wetlands Protection Act. To contact DEP, call:

Northeast Region: 978-694-3200

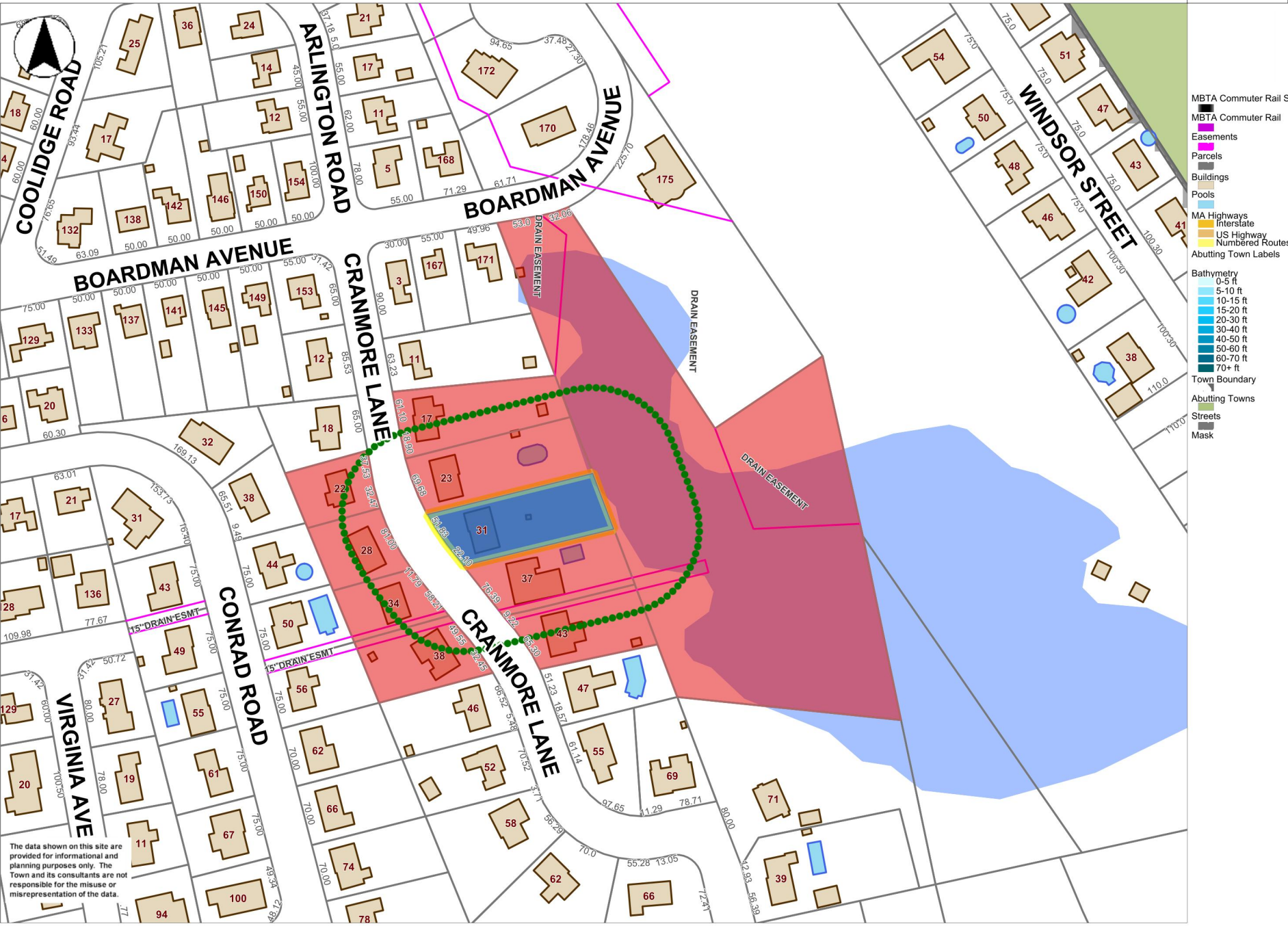
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E13 0 103	ABBOTT JEFFREY	ABBOTT LINDA	38 CRANMORE LANE
E13 0 104	LYNCH,DAVID E	KERRY A LYNCH HWTE	34 CRANMORE LN
E13 0 105	KEYWORTH IAN	HORTON AMY	28 CRANMORE LANE
E13 0 106	BRADY, SEAN M.	CHRISTINE M. BRADY, HWTE	22 CRANMORE LN
E13 0 97	HEALY, KEVIN P.	WENDY M. HEALY, HWTE	17 CRANMORE LN
E13 0 98	ROWE, KAREN M.	MARK P. ROWE, TE	23 CRANMORE LN
E13 0 99	QUANG-DE NGUYEN	HELEN LOUISE EVANS	31 CRANMORE LANE
F13 0 1	FAUCI, LOUIS J.	CARA B. FAUCI, HWTE	37 CRANMORE LANE
F13 0 2	GRAFTON, JAMES M+SHAUNEEN D TR	GRAFTON FAM. REV. TRUST	43 CRANMORE LANE
E14 0 125F	HUTCHINSON, MARK B	LINDA H BULMAN TRS	193 GREEN ST

City Of Melrose Board Of Assessor's Certified Abutter's List

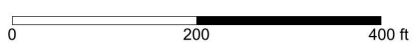


10/26/2023

abutters_address2	abutters_town	abutters_state	abutters_zip	abutters_bookpage
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	MELROSE	MA	02176	23422-502
	MELROSE	MA	02176	80119-163
	MELROSE	MA	02176	62834-546
	MELROSE	MA	02176	65870-350
	MELROSE	MA	02176	67696-560
	MELROSE	MA	02176	80648-311
	MELROSE	MA	02176	72852-114
	MELROSE	MA	02176	62445-60
	MELROSE	MA	02176	1284-50



The data shown on this site are provided for informational and planning purposes only. The Town and its consultants are not responsible for the misuse or misrepresentation of the data.



Printed on 10/26/2023 at 03:00 PM

Map of 31 Cranmore Lane

- MBTA Commuter Rail Station
- MBTA Commuter Rail
- Easements
- Parcels
- Buildings
- Pools
- MA Highways
- Interstate
- US Highway
- Numbered Routes
- Abutting Town Labels
- Bathymetry
- 0-5 ft
- 5-10 ft
- 10-15 ft
- 15-20 ft
- 20-30 ft
- 30-40 ft
- 40-50 ft
- 50-60 ft
- 60-70 ft
- 70+ ft
- Town Boundary
- Abutting Towns
- Streets
- Mask

AFFIDAVIT OF SERVICE

Under the Massachusetts Wetlands Protection Act

I, Kate O'Donnell, WPIT, hereby certify under the pains and penalties of perjury that on November 21, 2023, I gave notification to abutters in compliance with the Melrose Wetland Ordinance and the Massachusetts Wetlands Protection Act in connection with the following matter:

A Request for Amended Order of Conditions filed under the Melrose Wetland Ordinance and the Massachusetts Wetlands Protection Act by Quang-De Nguyen, with the Melrose Conservation Commission on November 21, 2023 for property located at 31 Cranmore Lane, Melrose, Massachusetts.

The form of the notification and a list of the abutters to whom it was given and their addresses, are provided with this Affidavit of Service.



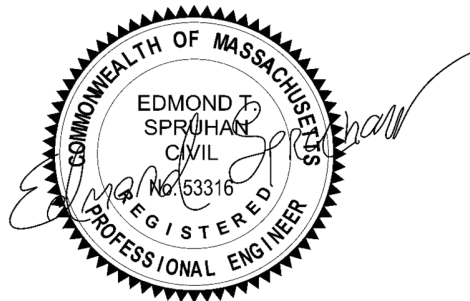
Kate O'Donnell, WPIT, EcoTec, Inc.

____11/21/2023_____
Date

SPRUHAN ENGINEERING, P.C.

STORMWATER REPORT

31 CRANMORE LANE, MELROSE, MA



Prepared By: Spruhan Engineering, P.C.
November 15, 2023
Revised: November 15, 2023

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1.0 Introduction

Spruhan Engineering, P.C. has prepared this Storm water Report for the proposed development located at 31 Cranmore LN, Melrose, Massachusetts.

The proposed development includes a residential dwelling, paved driveway/parking, walkways, patios, and landscaped areas. The purpose of this report is to demonstrate that the proposed conditions do not create any increased flow rate or runoff from the site. This is achieved by proposing an infiltration system.

2.0 Existing Conditions

The existing property is located at 31 Cranmore LN, Melrose, Massachusetts. The site is bounded by residential dwellings on the sides. The existing roof area is 1,395.19 S.F., the existing paved area (Driveway & walkway) is 872.85 S.F., the existing impervious areas (Deck, Porch, retaining wall, Shed, Landing & Steps) are 664.32 S.F., and the remaining landscaped areas are 10,317.64 S.F.

3.0 Proposed Conditions

3.1 Project Description

The development consists of a pool and patio (pavers). The existing roof to remaining will have an area of 1,395.19, the proposed pool patio will have an area of 2,199.47 S.F, the unconnected impervious will have an area of 708.88 S.F., the pool will have an area of 925.0 S.F. and the remaining landscaped portion will have a footprint of 7,148.64 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 flow rate and volume of stormwater runoff for each of the storm events.

3.3 Infiltration system

An infiltration system is proposed to control the runoff from the proposed pool patio. The system consists of 4 subsurface Stormtech plastic chambers with a 6-inch crushed stone bed below.

The system is 11' x 28'x 4'.

<u>Summary Table (HydroCAD results)</u>				
Storm Event	Runoff rate		Volume of runoff	
	Existing	Proposed	Existing	Proposed
2-Year	0.43 cfs	0.37 cfs	1,461 cf	1,253 cf
10-Year	0.93 cfs	0.76 cfs	2,995 cf	2,464 cf
25-Year	1.28 cfs	1.03 cfs	4,063 cf	3,326 cf
100-Year	1.84 cfs	1.45 cfs	5,792 cf	5,013 cf

3.4 Groundwater recharge calculations.

System #1:

$$Time = \frac{rv}{(k)(Bottom\ Area)}$$

$$Time = \frac{616\ cf}{(1.02\ in/hr)\left(\frac{1ft}{12in}\right)(308\ Sf)} = 23.59\ Hr$$

4.0 Soil Information

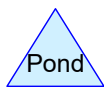
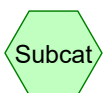
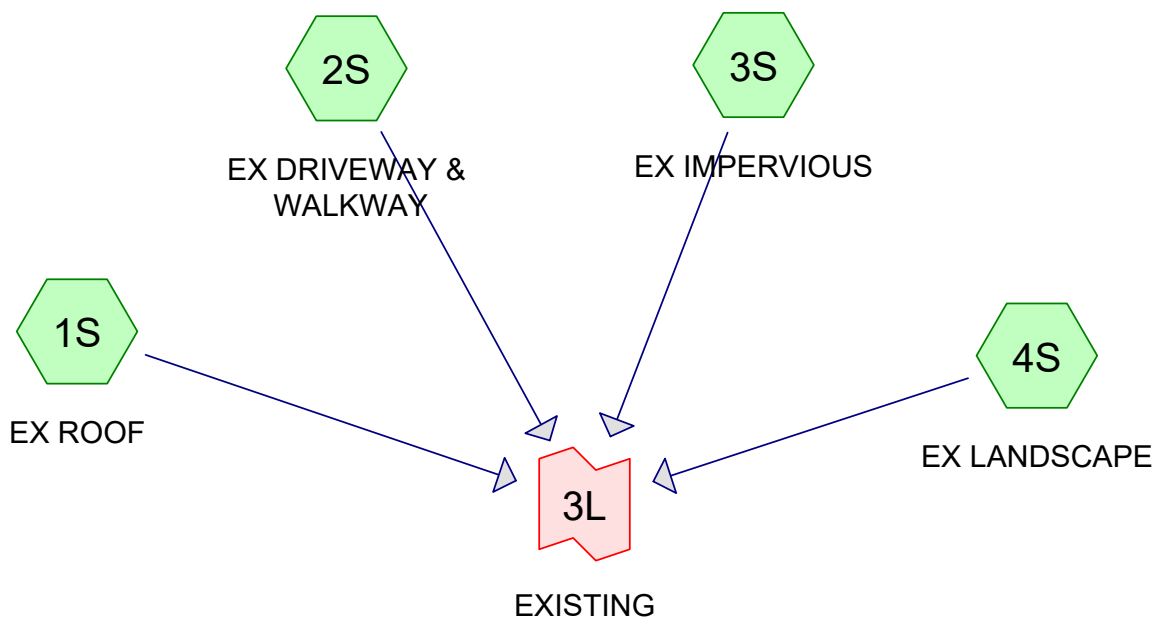
The NRCS Web Soil Survey shows one map unit inside our area of interest. Is listed next and the percentages of Area of Interest in the Map unit Legend Table:

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	0.2	52.8%
655	Udorthents, wet substratum	0.2	47.2%
Totals for Area of Interest		0.4	100.0%

Map unit 51A refers to coarse sand, this soil has a Hydrological soil group “A”, this information is shown in Appendix B, in the Map unit descriptions.

Also, a test pit was performed on the site and the hole log shows Sandy Loam was found, which has the NRCS “A” properties, and these properties were applied to the HydroCAD software calcs. Further detailed information is described in Appendix B.

Appendix A – HydroCAD Calculations



EXISTING

Prepared by SPRUHAN ENGINEERING

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Page 2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
10,318	69	50-75% Grass cover, Fair, HSG B (4S)
664	98	Deck/Porch/Retainaing wall/ Shed/ Landing & Steps) (3S)
873	98	Driveway & Walkway (2S)
1,395	98	Roofs, HSG B (1S)
13,250	75	TOTAL AREA

EXISTING

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
11,713	HSG B	1S, 4S
0	HSG C	
0	HSG D	
1,537	Other	2S, 3S
13,250		TOTAL AREA

EXISTING

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

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX ROOF Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.11 cfs 355 cf

Subcatchment 2S: EX DRIVEWAY & Runoff Area=873 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.07 cfs 222 cf

Subcatchment 3S: EX IMPERVIOUS Runoff Area=664 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.05 cfs 169 cf

Subcatchment 4S: EX LANDSCAPE Runoff Area=10,318 sf 0.00% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=69 Runoff=0.21 cfs 714 cf

Link 3L: EXISTING Inflow=0.43 cfs 1,461 cf
Primary=0.43 cfs 1,461 cf

Total Runoff Area = 13,250 sf Runoff Volume = 1,461 cf Average Runoff Depth = 1.32"
77.87% Pervious = 10,318 sf 22.13% Impervious = 2,932 sf

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

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Summary for Subcatchment 1S: EX ROOF

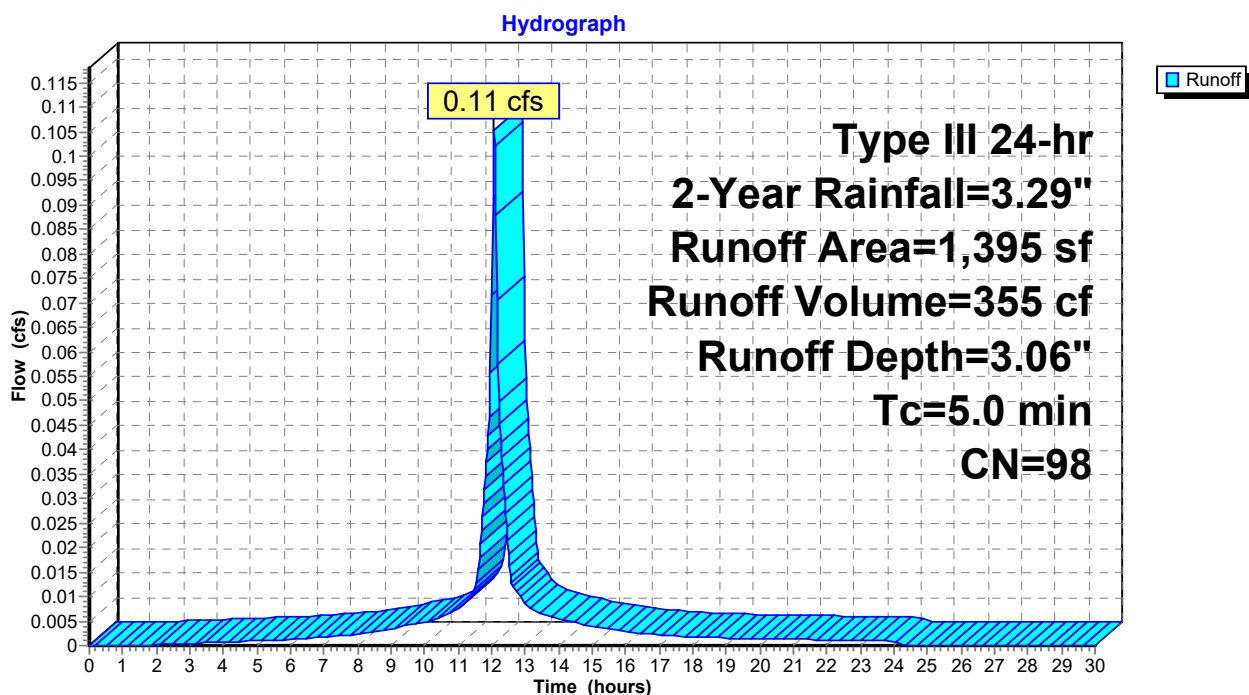
Runoff = 0.11 cfs @ 12.07 hrs, Volume= 355 cf, Depth= 3.06"

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=3.29"

Area (sf)	CN	Description
1,395	98	Roofs, HSG B
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX ROOF



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

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Summary for Subcatchment 2S: EX DRIVEWAY & WALKWAY

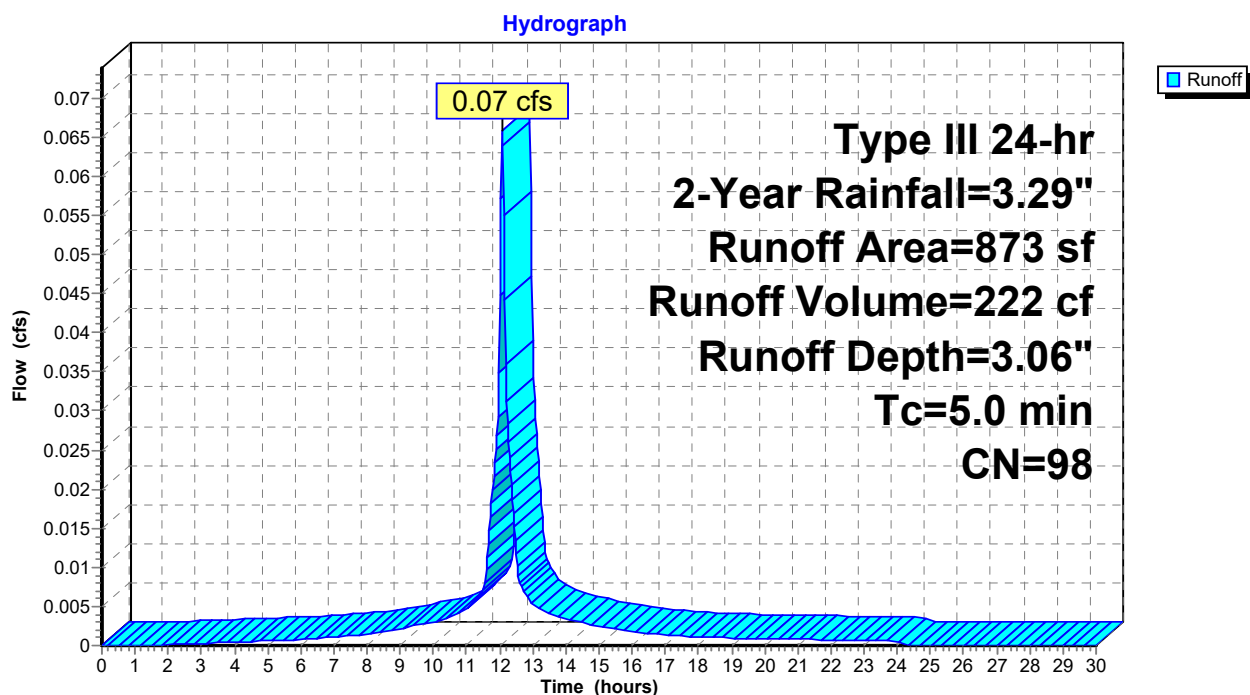
Runoff = 0.07 cfs @ 12.07 hrs, Volume= 222 cf, Depth= 3.06"

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=3.29"

Area (sf)	CN	Description
* 873	98	Driveway & Walkway
873		100.00% Impervious Area

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

Subcatchment 2S: EX DRIVEWAY & WALKWAY



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

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Summary for Subcatchment 3S: EX IMPERVIOUS

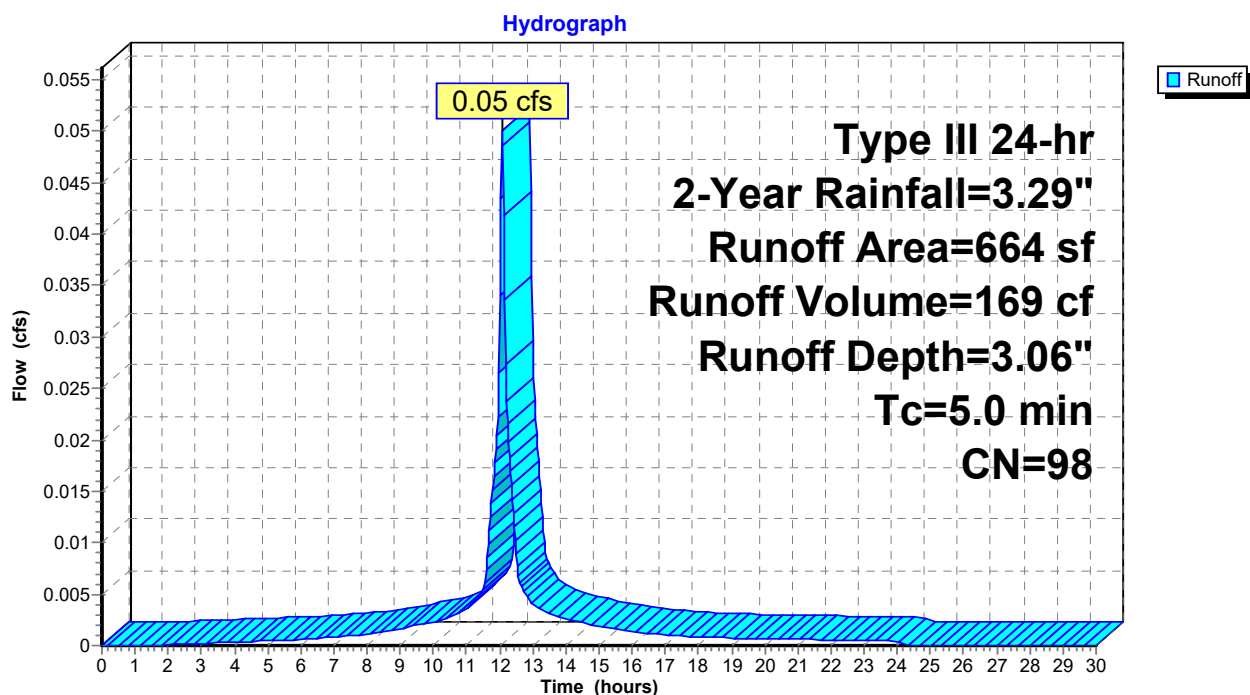
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 169 cf, Depth= 3.06"

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=3.29"

Area (sf)	CN	Description
* 664	98	Deck/Porch/Retainaing wall/ Shed/ Landing & Steps)
664		100.00% Impervious Area

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

Subcatchment 3S: EX IMPERVIOUS



EXISTING

Prepared by SPRUHAN ENGINEERING

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

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Summary for Subcatchment 4S: EX LANDSCAPE

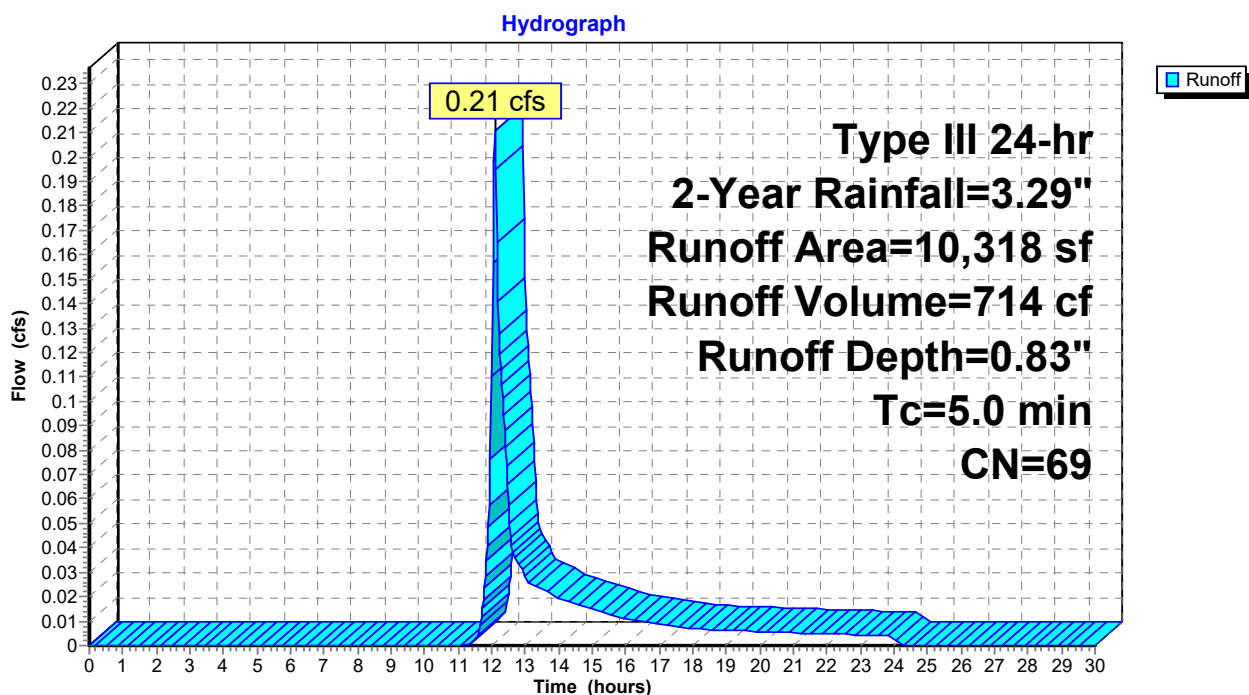
Runoff = 0.21 cfs @ 12.09 hrs, Volume= 714 cf, Depth= 0.83"

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=3.29"

Area (sf)	CN	Description
10,318	69	50-75% Grass cover, Fair, HSG B
10,318		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



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

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Page 9

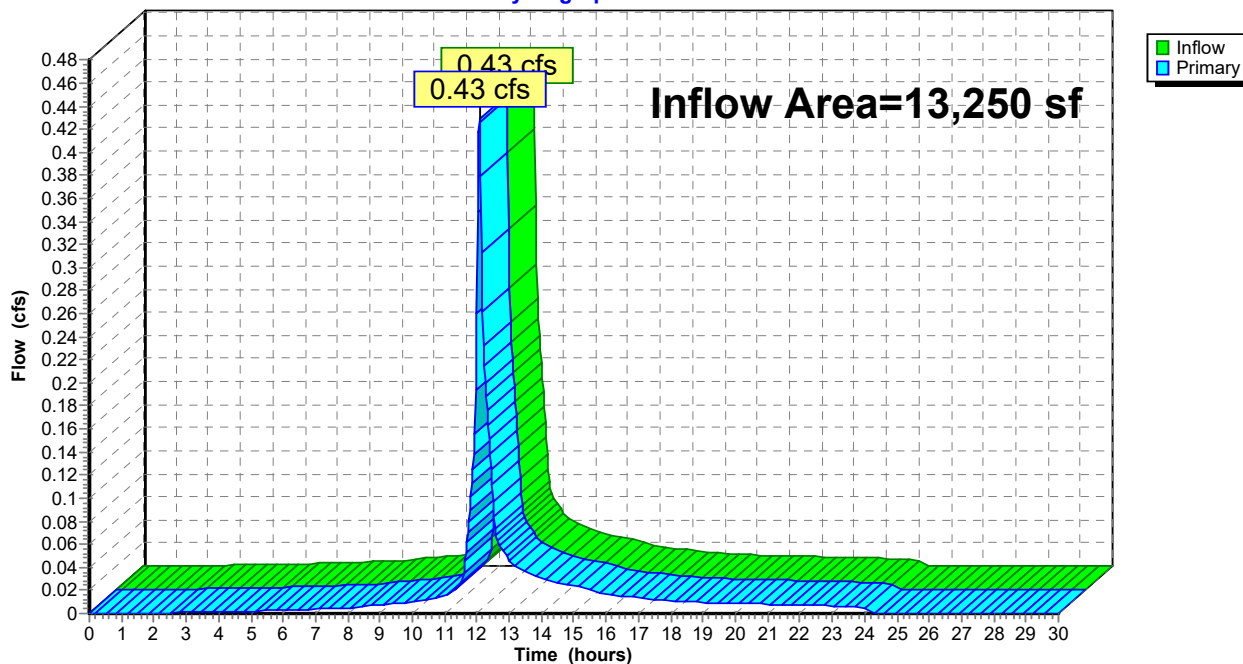
Summary for Link 3L: EXISTING

Inflow Area = 13,250 sf, 22.13% Impervious, Inflow Depth = 1.32" for 2-Year event
Inflow = 0.43 cfs @ 12.08 hrs, Volume= 1,461 cf
Primary = 0.43 cfs @ 12.08 hrs, Volume= 1,461 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: EXISTING

Hydrograph



EXISTING

Type III 24-hr 10-Year Rainfall=5.17"

Prepared by SPRUHAN ENGINEERING

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX ROOF Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=4.93"
Tc=5.0 min CN=98 Runoff=0.17 cfs 573 cf

Subcatchment 2S: EX DRIVEWAY & Runoff Area=873 sf 100.00% Impervious Runoff Depth=4.93"
Tc=5.0 min CN=98 Runoff=0.10 cfs 359 cf

Subcatchment 3S: EX IMPERVIOUS Runoff Area=664 sf 100.00% Impervious Runoff Depth=4.93"
Tc=5.0 min CN=98 Runoff=0.08 cfs 273 cf

Subcatchment 4S: EX LANDSCAPE Runoff Area=10,318 sf 0.00% Impervious Runoff Depth=2.08"
Tc=5.0 min CN=69 Runoff=0.58 cfs 1,790 cf

Link 3L: EXISTING Inflow=0.93 cfs 2,995 cf
Primary=0.93 cfs 2,995 cf

Total Runoff Area = 13,250 sf Runoff Volume = 2,995 cf Average Runoff Depth = 2.71"
77.87% Pervious = 10,318 sf 22.13% Impervious = 2,932 sf

EXISTING

Prepared by SPRUHAN ENGINEERING

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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Subcatchment 1S: EX ROOF

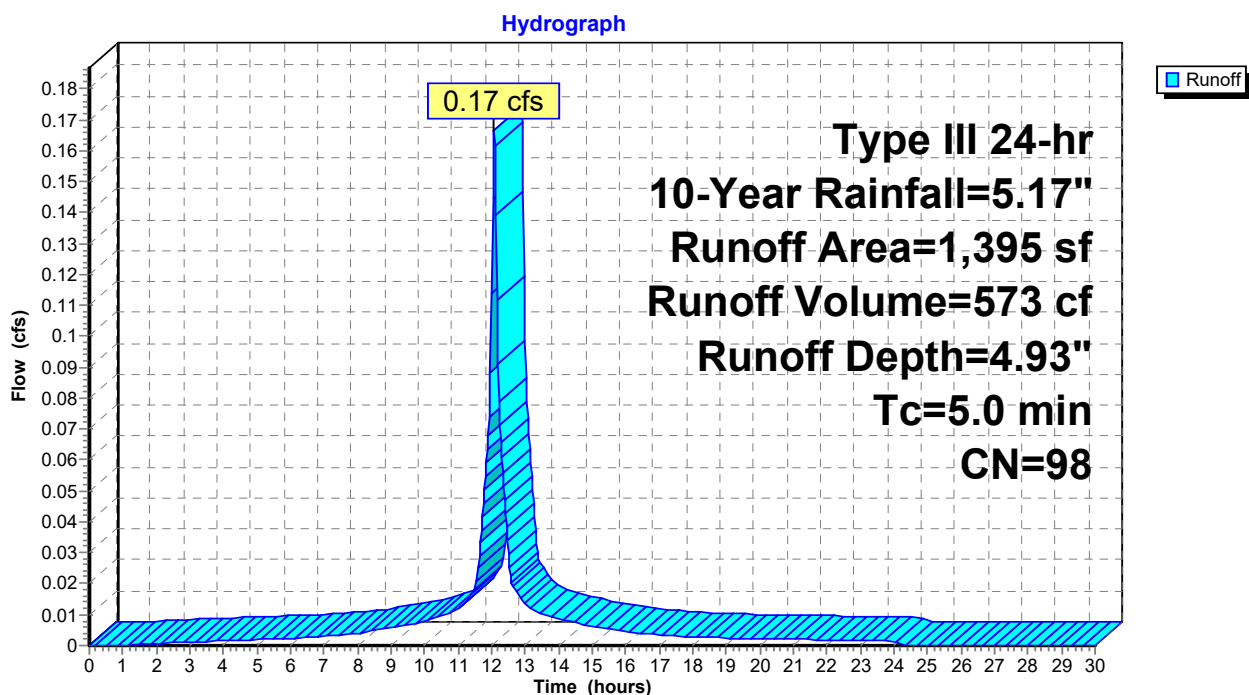
Runoff = 0.17 cfs @ 12.07 hrs, Volume= 573 cf, Depth= 4.93"

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=5.17"

Area (sf)	CN	Description
1,395	98	Roofs, HSG B
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX ROOF



EXISTING

Prepared by SPRUHAN ENGINEERING

HydroCAD® 10.00-25 s/n 09067 © 2019 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=5.17"

Printed 6/27/2023

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Summary for Subcatchment 2S: EX DRIVEWAY & WALKWAY

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 359 cf, Depth= 4.93"

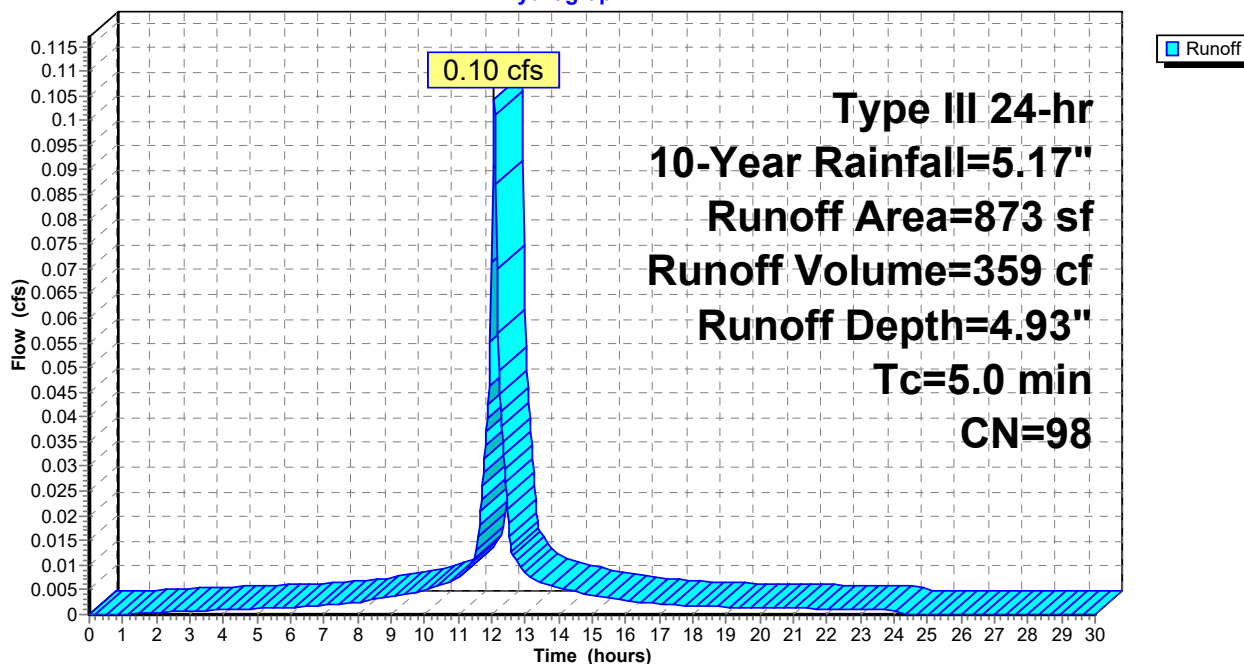
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.17"

Area (sf)	CN	Description
* 873	98	Driveway & Walkway
873		100.00% Impervious Area

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

Subcatchment 2S: EX DRIVEWAY & WALKWAY

Hydrograph



EXISTING

Prepared by SPRUHAN ENGINEERING

HydroCAD® 10.00-25 s/n 09067 © 2019 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=5.17"

Printed 6/27/2023

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Summary for Subcatchment 3S: EX IMPERVIOUS

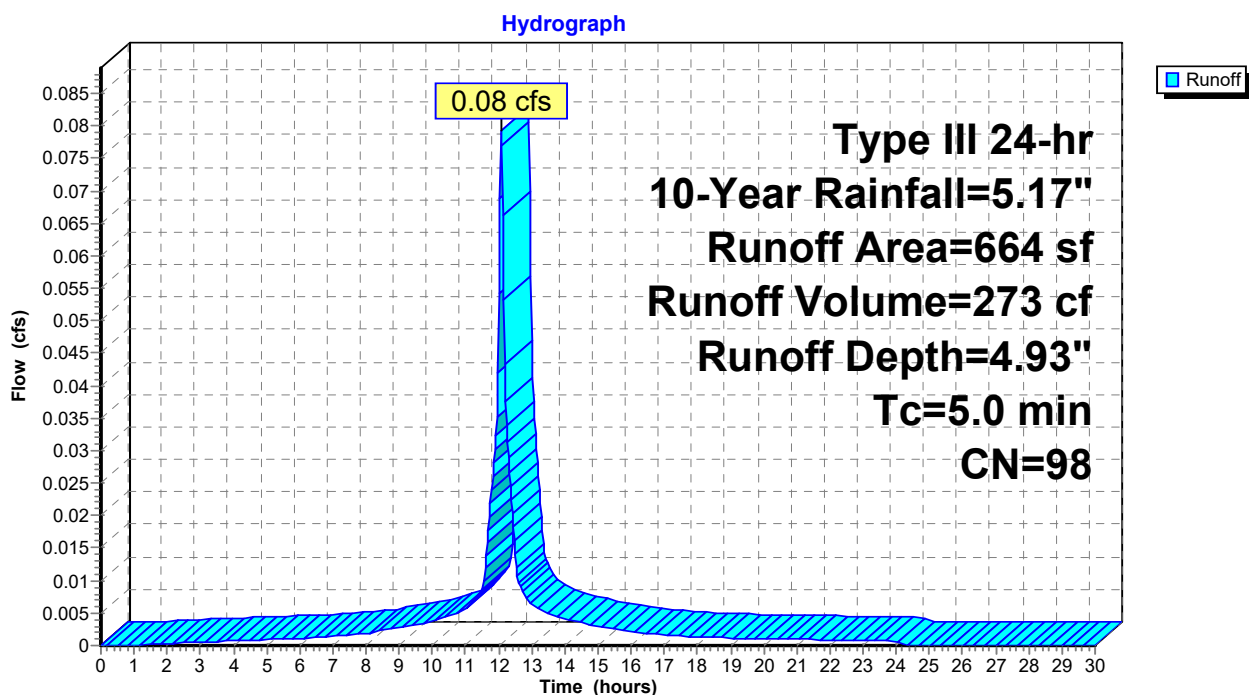
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 273 cf, Depth= 4.93"

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=5.17"

Area (sf)	CN	Description
* 664	98	Deck/Porch/Retainaing wall/ Shed/ Landing & Steps)
664		100.00% Impervious Area

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

Subcatchment 3S: EX IMPERVIOUS



EXISTING

Prepared by SPRUHAN ENGINEERING

HydroCAD® 10.00-25 s/n 09067 © 2019 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=5.17"

Printed 6/27/2023

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Summary for Subcatchment 4S: EX LANDSCAPE

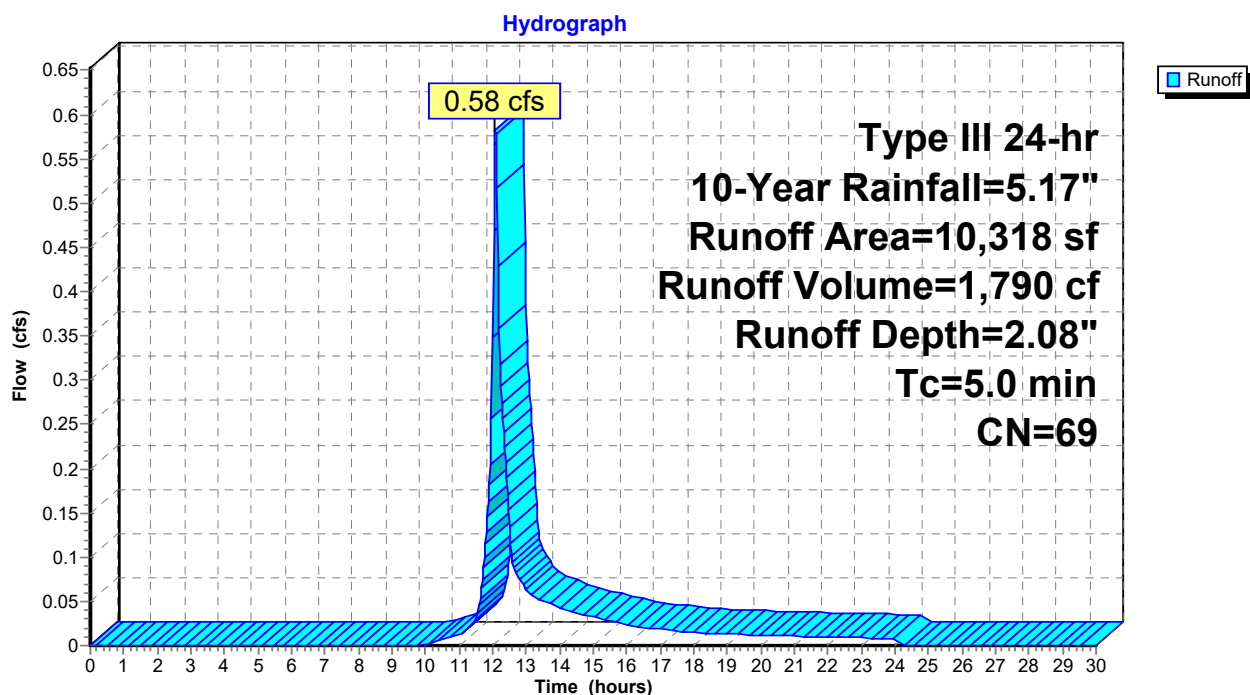
Runoff = 0.58 cfs @ 12.08 hrs, Volume= 1,790 cf, Depth= 2.08"

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=5.17"

Area (sf)	CN	Description
10,318	69	50-75% Grass cover, Fair, HSG B
10,318		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



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Type III 24-hr 10-Year Rainfall=5.17"

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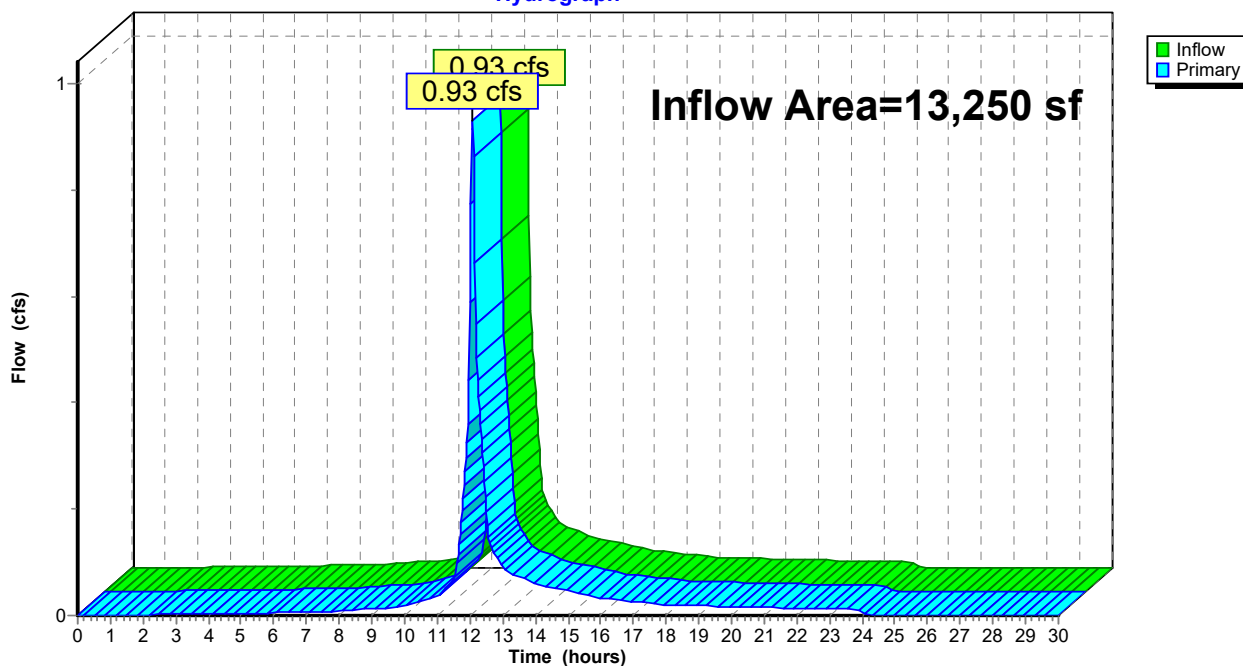
Summary for Link 3L: EXISTING

Inflow Area = 13,250 sf, 22.13% Impervious, Inflow Depth = 2.71" for 10-Year event
Inflow = 0.93 cfs @ 12.08 hrs, Volume= 2,995 cf
Primary = 0.93 cfs @ 12.08 hrs, Volume= 2,995 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: EXISTING

Hydrograph



EXISTING

Type III 24-hr 25-Year Rainfall=6.35"

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX ROOF	Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=6.11" Tc=5.0 min CN=98 Runoff=0.21 cfs 710 cf
Subcatchment 2S: EX DRIVEWAY &	Runoff Area=873 sf 100.00% Impervious Runoff Depth=6.11" Tc=5.0 min CN=98 Runoff=0.13 cfs 445 cf
Subcatchment 3S: EX IMPERVIOUS	Runoff Area=664 sf 100.00% Impervious Runoff Depth=6.11" Tc=5.0 min CN=98 Runoff=0.10 cfs 338 cf
Subcatchment 4S: EX LANDSCAPE	Runoff Area=10,318 sf 0.00% Impervious Runoff Depth=2.99" Tc=5.0 min CN=69 Runoff=0.85 cfs 2,570 cf
Link 3L: EXISTING	Inflow=1.28 cfs 4,063 cf Primary=1.28 cfs 4,063 cf

Total Runoff Area = 13,250 sf Runoff Volume = 4,063 cf Average Runoff Depth = 3.68"
77.87% Pervious = 10,318 sf 22.13% Impervious = 2,932 sf

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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 1S: EX ROOF

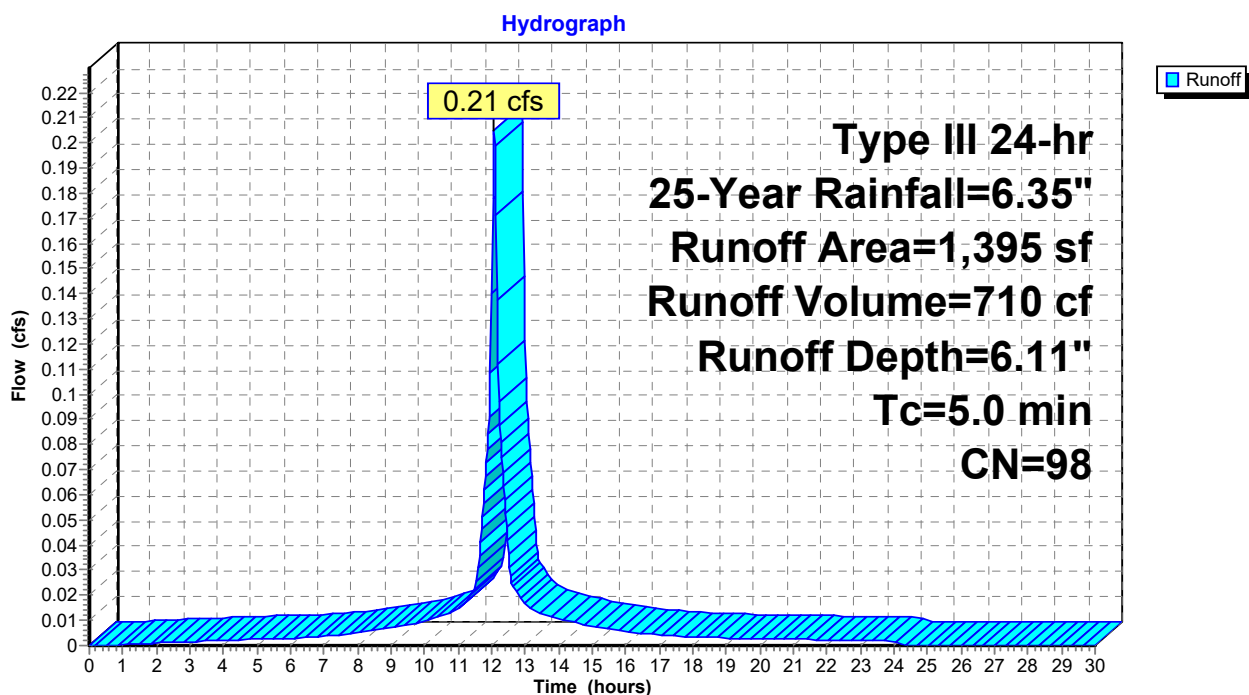
Runoff = 0.21 cfs @ 12.07 hrs, Volume= 710 cf, Depth= 6.11"

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=6.35"

Area (sf)	CN	Description
1,395	98	Roofs, HSG B
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX ROOF



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 2S: EX DRIVEWAY & WALKWAY

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 445 cf, Depth= 6.11"

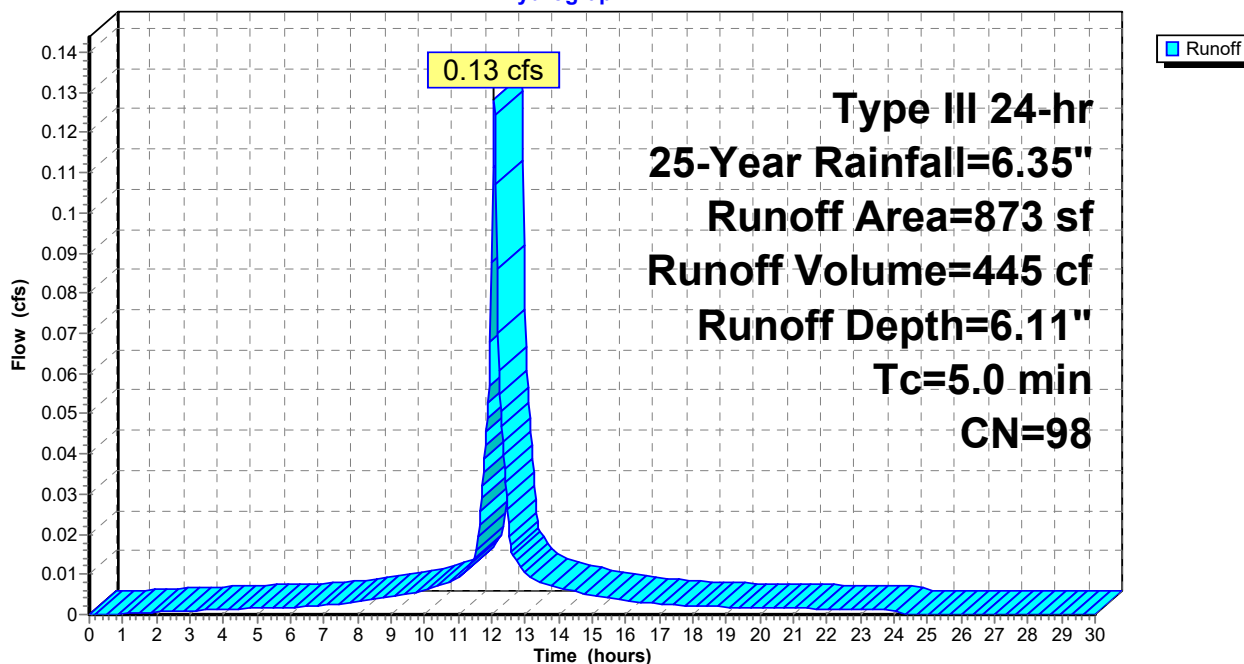
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.35"

Area (sf)	CN	Description
* 873	98	Driveway & Walkway
873		100.00% Impervious Area

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

Subcatchment 2S: EX DRIVEWAY & WALKWAY

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 3S: EX IMPERVIOUS

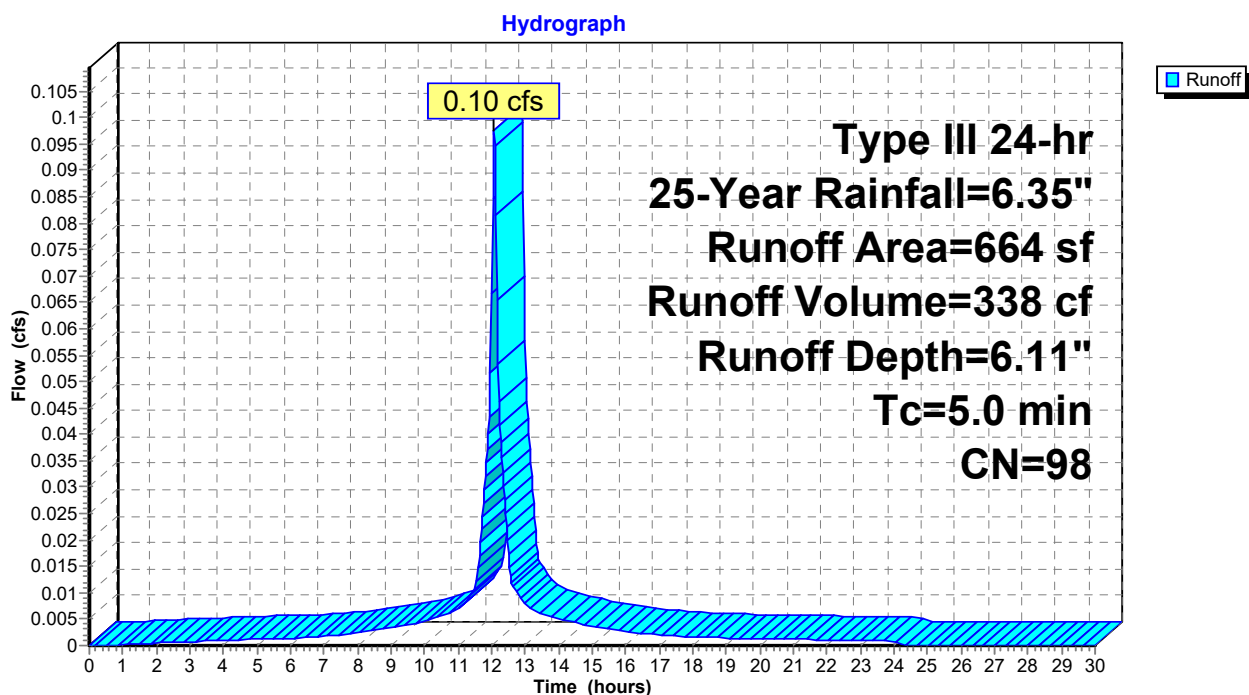
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 338 cf, Depth= 6.11"

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=6.35"

Area (sf)	CN	Description
* 664	98	Deck/Porch/Retainaing wall/ Shed/ Landing & Steps)
664		100.00% Impervious Area

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

Subcatchment 3S: EX IMPERVIOUS



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 4S: EX LANDSCAPE

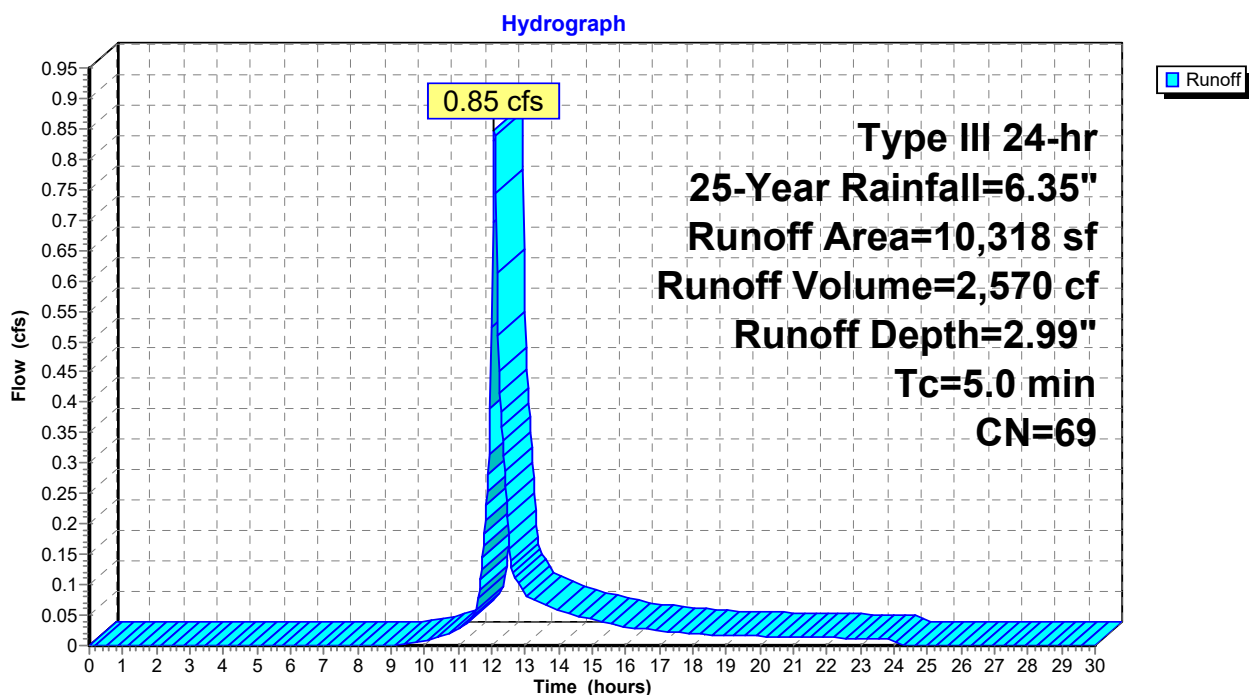
Runoff = 0.85 cfs @ 12.08 hrs, Volume= 2,570 cf, Depth= 2.99"

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=6.35"

Area (sf)	CN	Description
10,318	69	50-75% Grass cover, Fair, HSG B
10,318		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



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Type III 24-hr 25-Year Rainfall=6.35"

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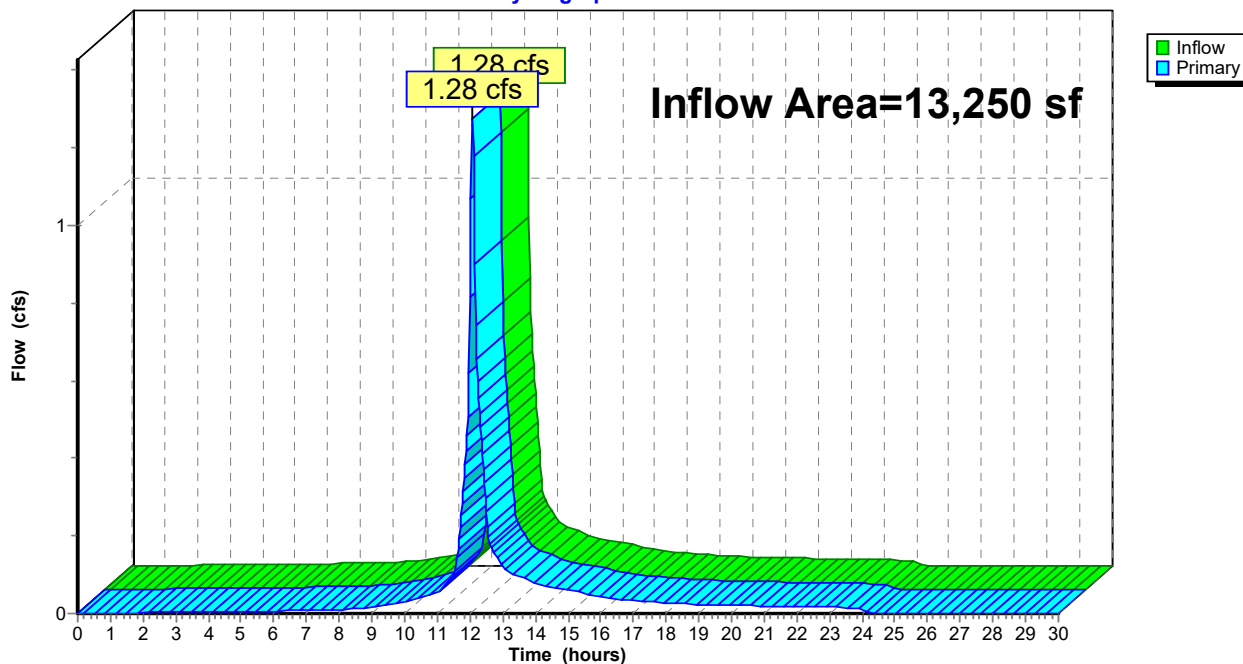
Summary for Link 3L: EXISTING

Inflow Area = 13,250 sf, 22.13% Impervious, Inflow Depth = 3.68" for 25-Year event
Inflow = 1.28 cfs @ 12.08 hrs, Volume= 4,063 cf
Primary = 1.28 cfs @ 12.08 hrs, Volume= 4,063 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: EXISTING

Hydrograph



EXISTING

Type III 24-hr 100-Year Rainfall=8.16"

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX ROOF	Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=7.92" Tc=5.0 min CN=98 Runoff=0.26 cfs 921 cf
Subcatchment 2S: EX DRIVEWAY &	Runoff Area=873 sf 100.00% Impervious Runoff Depth=7.92" Tc=5.0 min CN=98 Runoff=0.17 cfs 576 cf
Subcatchment 3S: EX IMPERVIOUS	Runoff Area=664 sf 100.00% Impervious Runoff Depth=7.92" Tc=5.0 min CN=98 Runoff=0.13 cfs 438 cf
Subcatchment 4S: EX LANDSCAPE	Runoff Area=10,318 sf 0.00% Impervious Runoff Depth=4.49" Tc=5.0 min CN=69 Runoff=1.28 cfs 3,857 cf
Link 3L: EXISTING	Inflow=1.84 cfs 5,792 cf Primary=1.84 cfs 5,792 cf

Total Runoff Area = 13,250 sf Runoff Volume = 5,792 cf Average Runoff Depth = 5.25"
77.87% Pervious = 10,318 sf 22.13% Impervious = 2,932 sf

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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 1S: EX ROOF

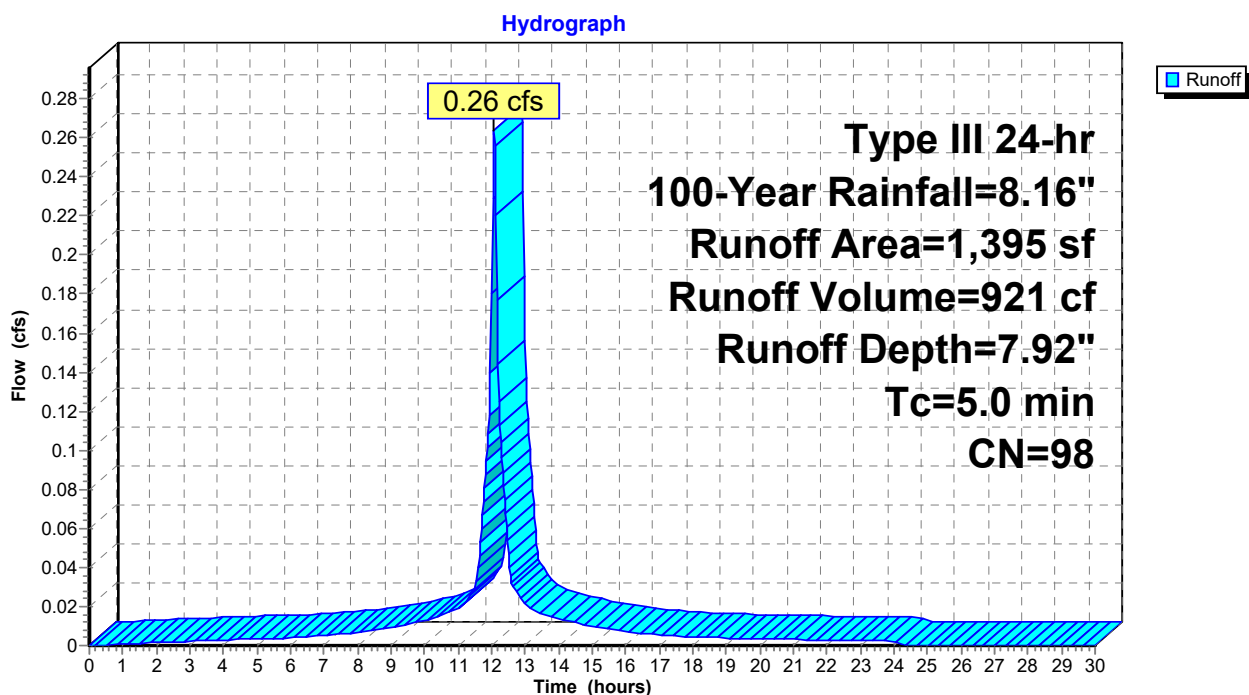
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 921 cf, Depth= 7.92"

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=8.16"

Area (sf)	CN	Description
1,395	98	Roofs, HSG B
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX ROOF



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 2S: EX DRIVEWAY & WALKWAY

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 576 cf, Depth= 7.92"

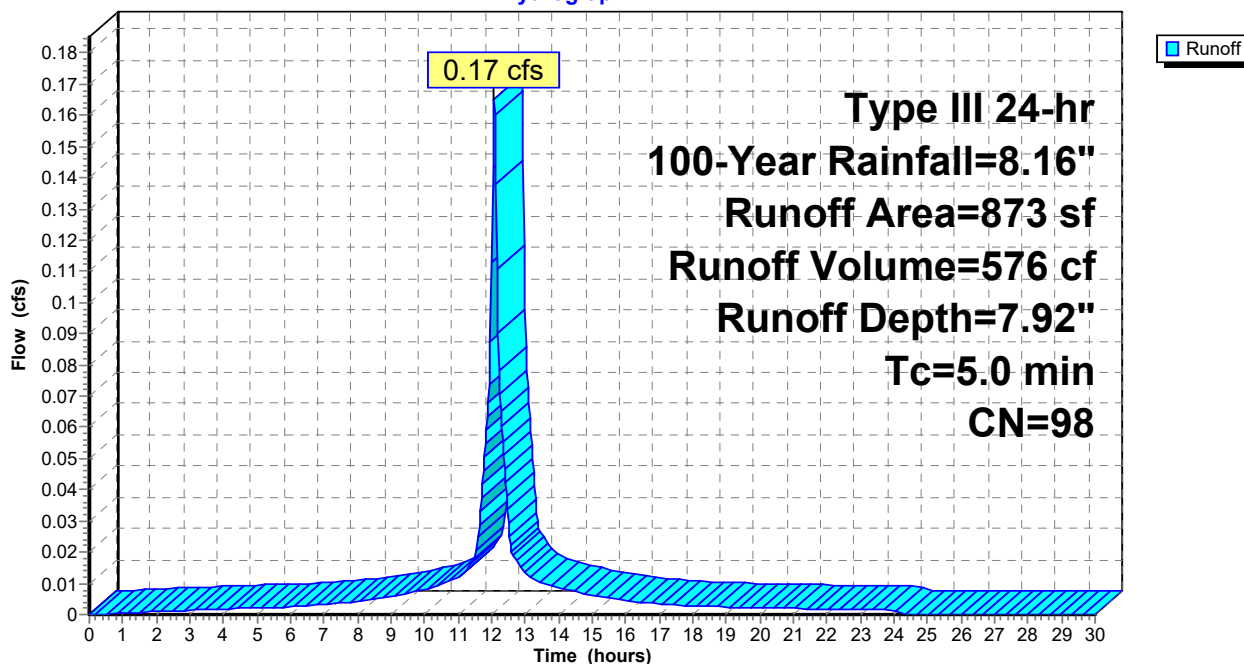
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.16"

Area (sf)	CN	Description
* 873	98	Driveway & Walkway
873		100.00% Impervious Area

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

Subcatchment 2S: EX DRIVEWAY & WALKWAY

Hydrograph



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 3S: EX IMPERVIOUS

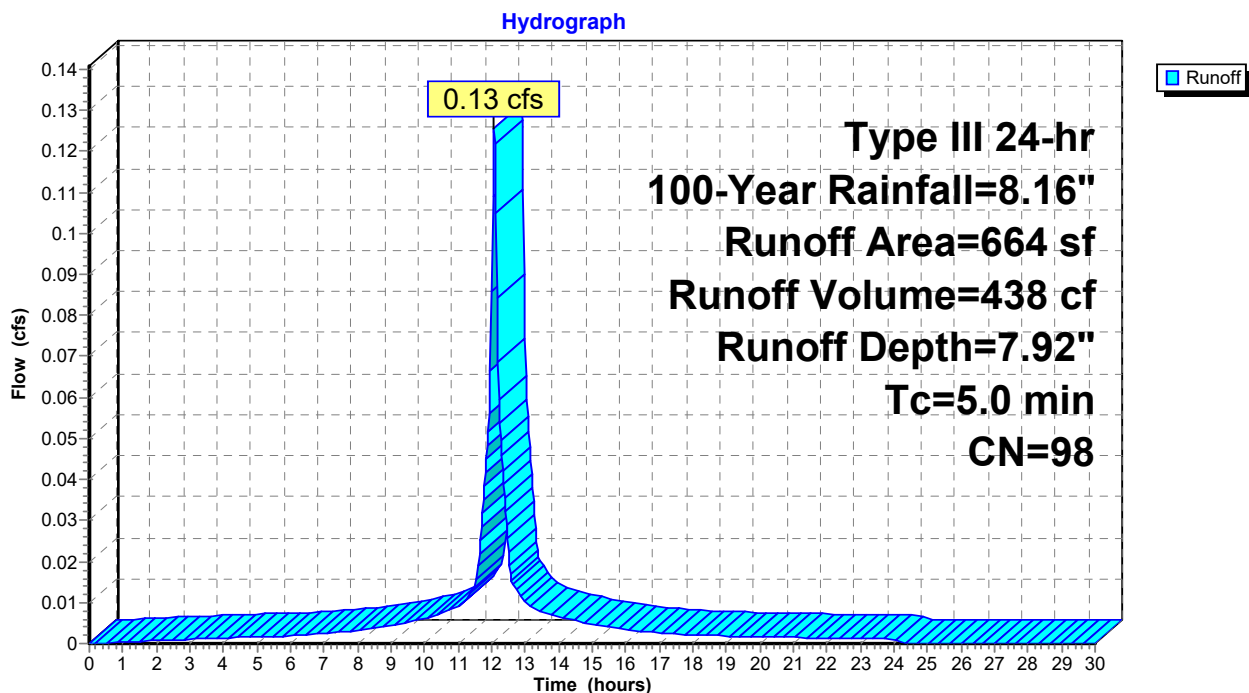
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 438 cf, Depth= 7.92"

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=8.16"

Area (sf)	CN	Description
* 664	98	Deck/Porch/Retainaing wall/ Shed/ Landing & Steps)
664		100.00% Impervious Area

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

Subcatchment 3S: EX IMPERVIOUS



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 4S: EX LANDSCAPE

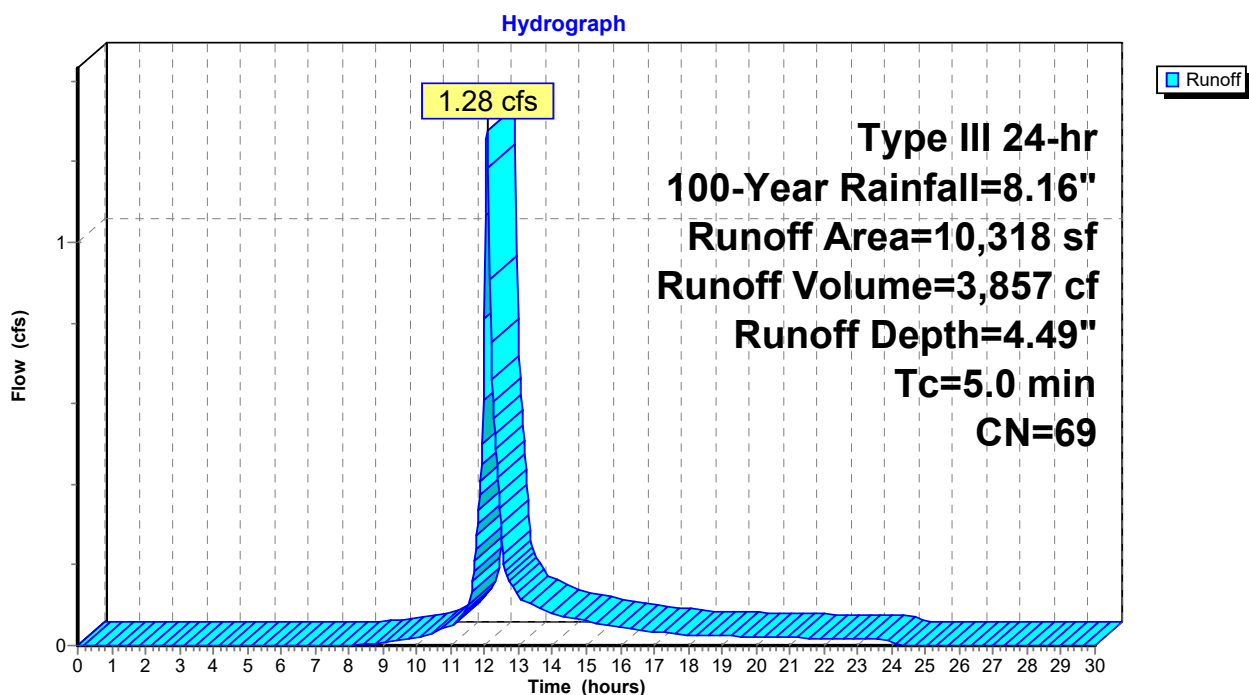
Runoff = 1.28 cfs @ 12.08 hrs, Volume= 3,857 cf, Depth= 4.49"

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=8.16"

Area (sf)	CN	Description
10,318	69	50-75% Grass cover, Fair, HSG B
10,318		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



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Type III 24-hr 100-Year Rainfall=8.16"

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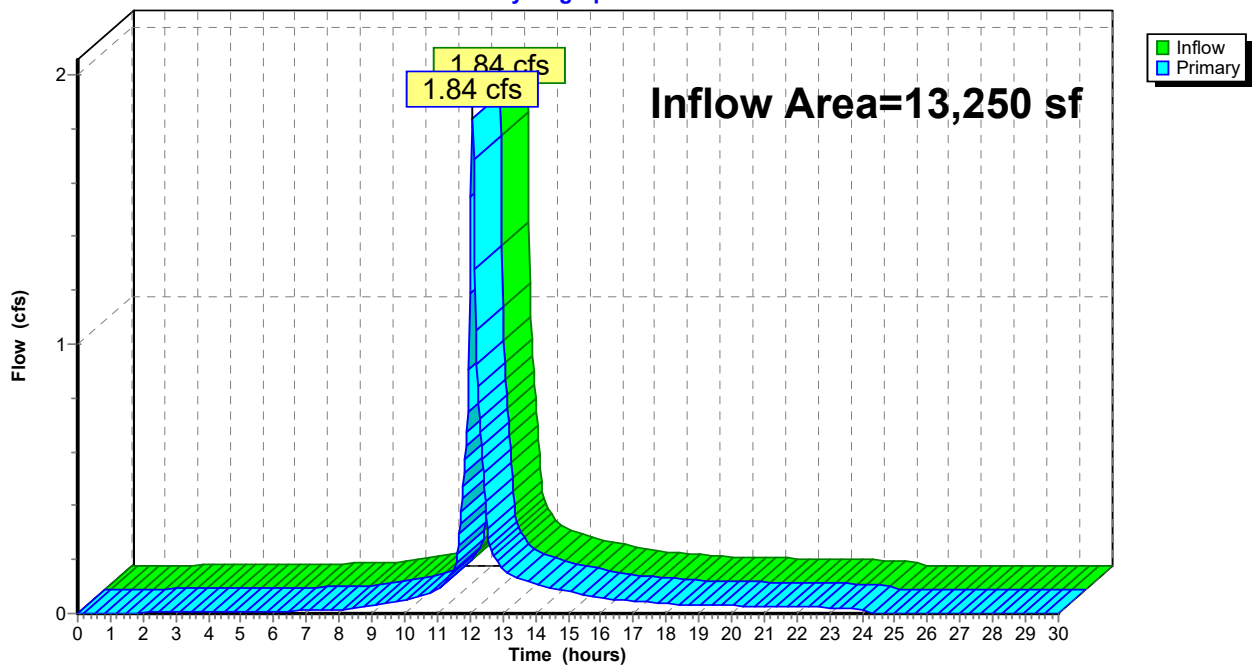
Summary for Link 3L: EXISTING

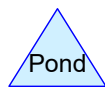
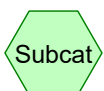
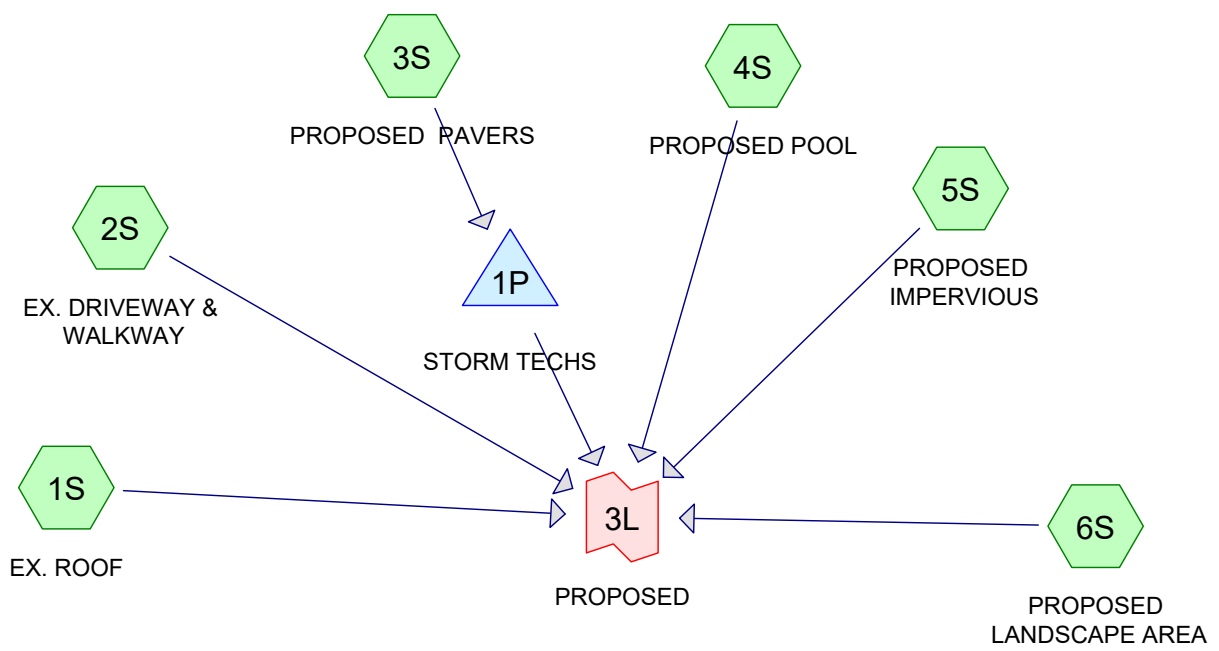
Inflow Area = 13,250 sf, 22.13% Impervious, Inflow Depth = 5.25" for 100-Year event
Inflow = 1.84 cfs @ 12.07 hrs, Volume= 5,792 cf
Primary = 1.84 cfs @ 12.07 hrs, Volume= 5,792 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: EXISTING

Hydrograph





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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
7,149	69	50-75% Grass cover, Fair, HSG B (6S)
709	98	Deck/Porch/Retaining Wall/Landing & Steps (5S)
873	98	Paved parking, HSG A (2S)
2,199	98	Pavers (3S)
925	1	Pool (4S)
1,395	98	Roofs, HSG A (1S)
13,250	76	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
2,268	HSG A	1S, 2S
7,149	HSG B	6S
0	HSG C	
0	HSG D	
3,833	Other	3S, 4S, 5S
13,250		TOTAL AREA

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

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX. ROOF Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=3.06"
 Tc=5.0 min CN=98 Runoff=0.11 cfs 355 cf

Subcatchment 2S: EX. DRIVEWAY & Runoff Area=873 sf 100.00% Impervious Runoff Depth=3.06"
 Tc=5.0 min CN=98 Runoff=0.07 cfs 222 cf

Subcatchment 3S: PROPOSED Runoff Area=2,199 sf 100.00% Impervious Runoff Depth=3.06"
 Tc=5.0 min CN=98 Runoff=0.17 cfs 560 cf

Subcatchment 4S: PROPOSED POOL Runoff Area=925 sf 0.00% Impervious Runoff Depth=0.00"
 Tc=5.0 min CN=1 Runoff=0.00 cfs 0 cf

Subcatchment 5S: PROPOSED Runoff Area=709 sf 100.00% Impervious Runoff Depth=3.06"
 Tc=5.0 min CN=98 Runoff=0.05 cfs 181 cf

Subcatchment 6S: PROPOSED Runoff Area=7,149 sf 0.00% Impervious Runoff Depth=0.83"
 Tc=5.0 min CN=69 Runoff=0.15 cfs 495 cf

Pond 1P: STORM TECHS Peak Elev=70.66' Storage=247 cf Inflow=0.17 cfs 560 cf
 Discarded=0.01 cfs 560 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 560 cf

Link 3L: PROPOSED Inflow=0.37 cfs 1,253 cf
 Primary=0.37 cfs 1,253 cf

Total Runoff Area = 13,250 sf Runoff Volume = 1,814 cf Average Runoff Depth = 1.64"
60.94% Pervious = 8,074 sf 39.06% Impervious = 5,176 sf

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

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Summary for Subcatchment 1S: EX. ROOF

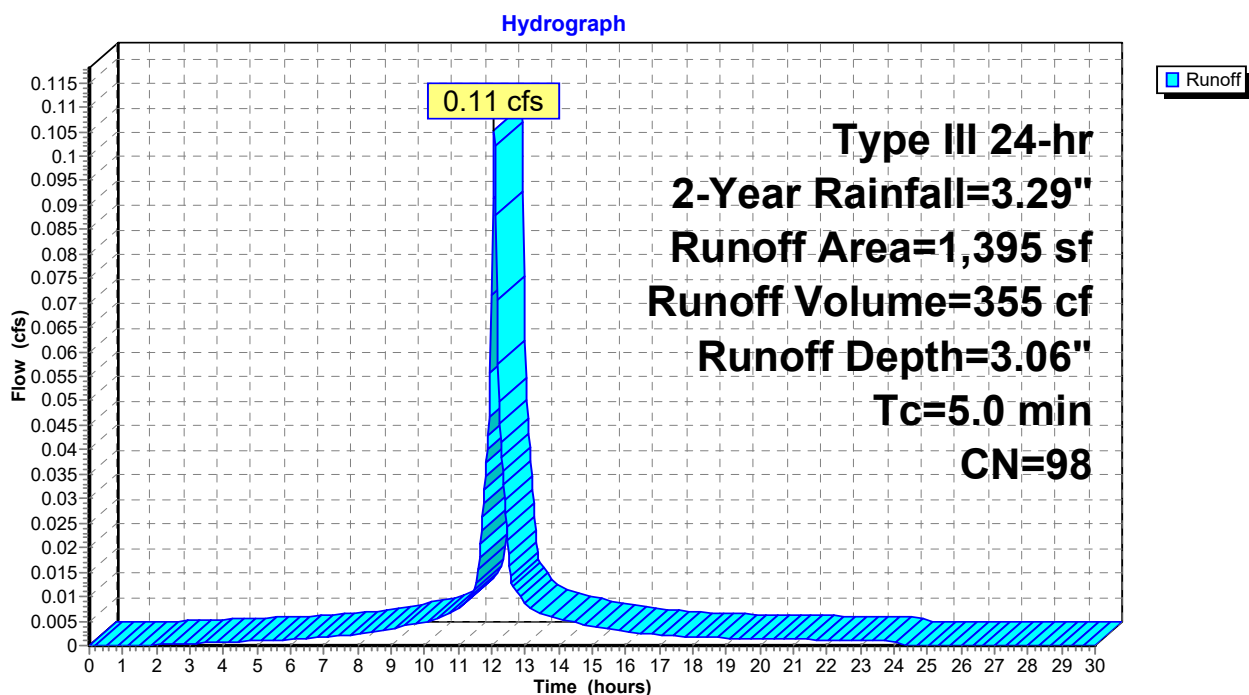
Runoff = 0.11 cfs @ 12.07 hrs, Volume= 355 cf, Depth= 3.06"

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=3.29"

Area (sf)	CN	Description
1,395	98	Roofs, HSG A
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX. ROOF



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

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Summary for Subcatchment 2S: EX. DRIVEWAY & WALKWAY

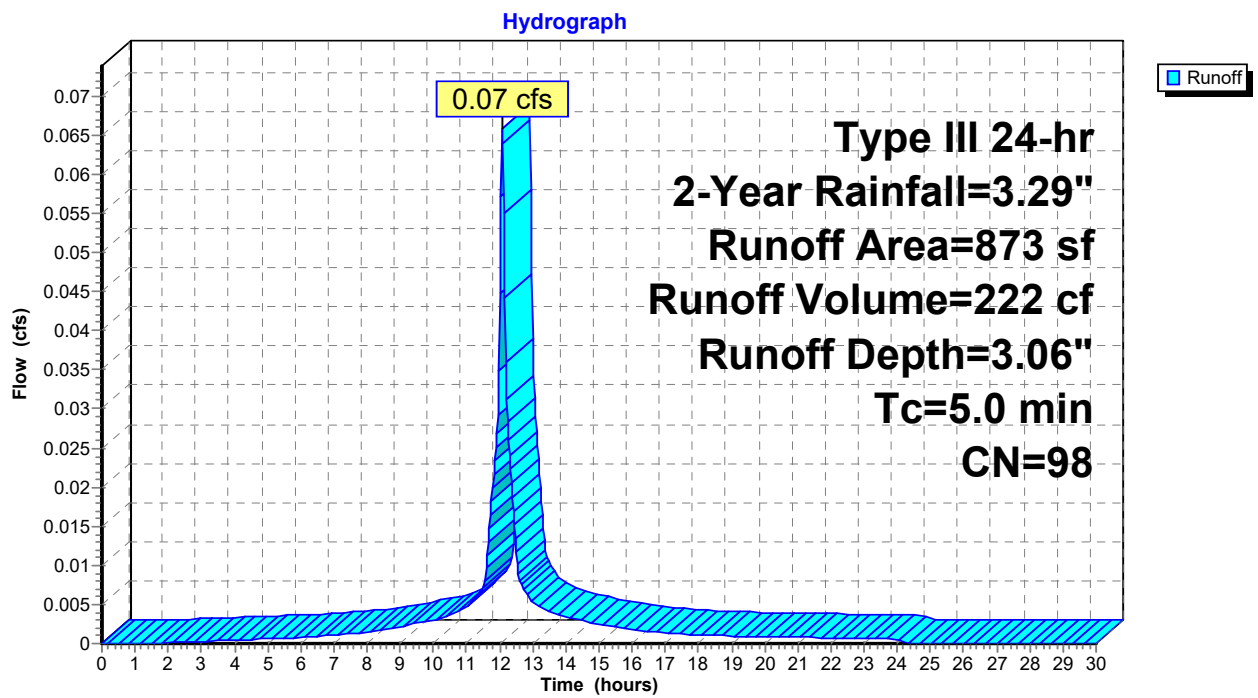
Runoff = 0.07 cfs @ 12.07 hrs, Volume= 222 cf, Depth= 3.06"

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=3.29"

Area (sf)	CN	Description
873	98	Paved parking, HSG A
873		100.00% Impervious Area

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

Subcatchment 2S: EX. DRIVEWAY & WALKWAY



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

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Summary for Subcatchment 3S: PROPOSED PAVERS

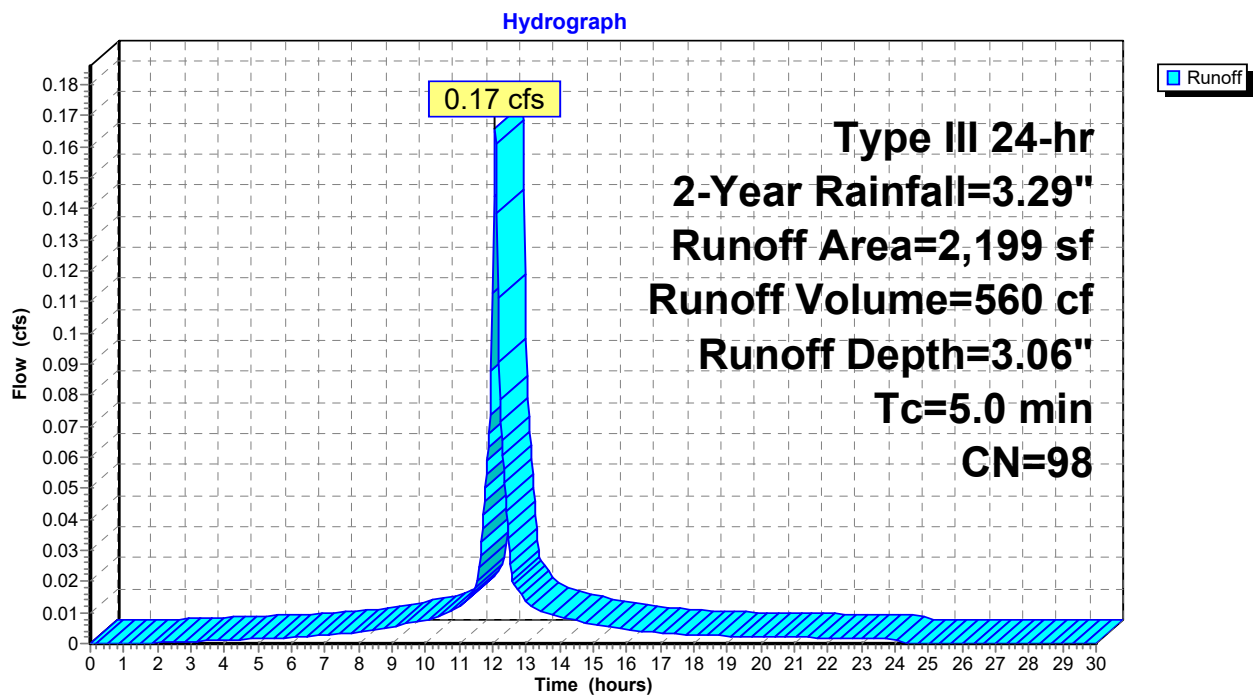
Runoff = 0.17 cfs @ 12.07 hrs, Volume= 560 cf, Depth= 3.06"

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=3.29"

Area (sf)	CN	Description
* 2,199	98	Pavers
2,199		100.00% Impervious Area

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

Subcatchment 3S: PROPOSED PAVERS



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

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Summary for Subcatchment 4S: PROPOSED POOL

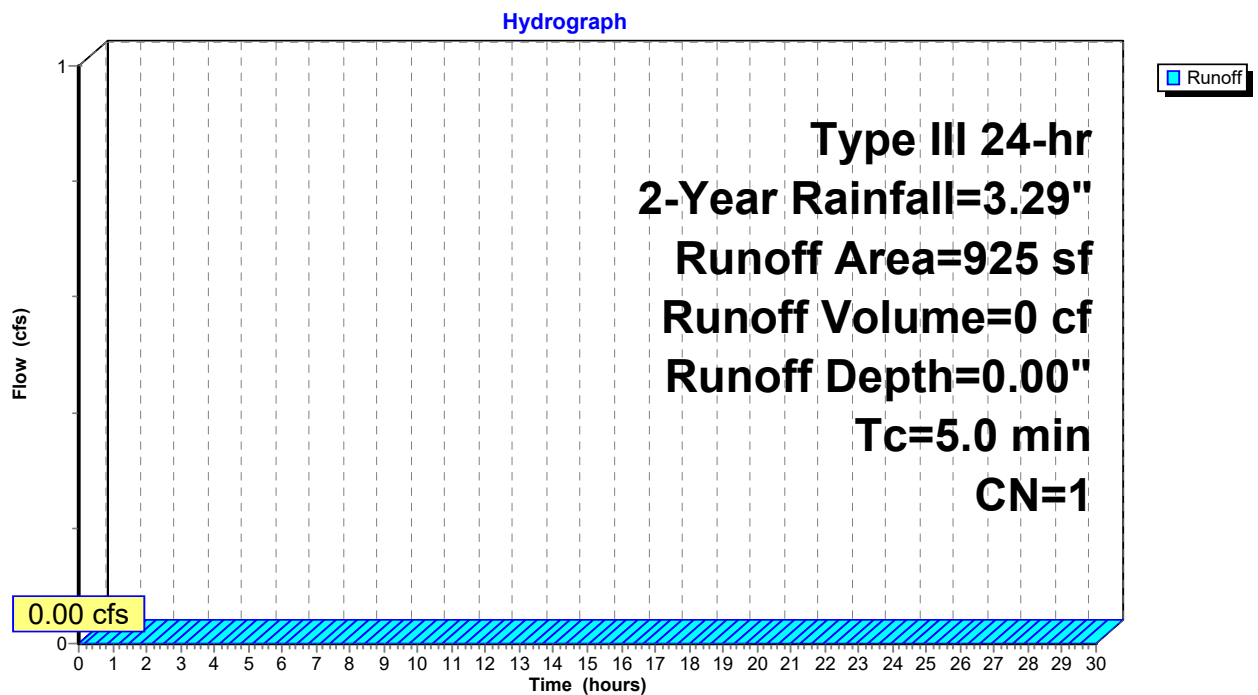
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

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=3.29"

Area (sf)	CN	Description
* 925	1	Pool
925		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED POOL



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

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Summary for Subcatchment 5S: PROPOSED IMPERVIOUS

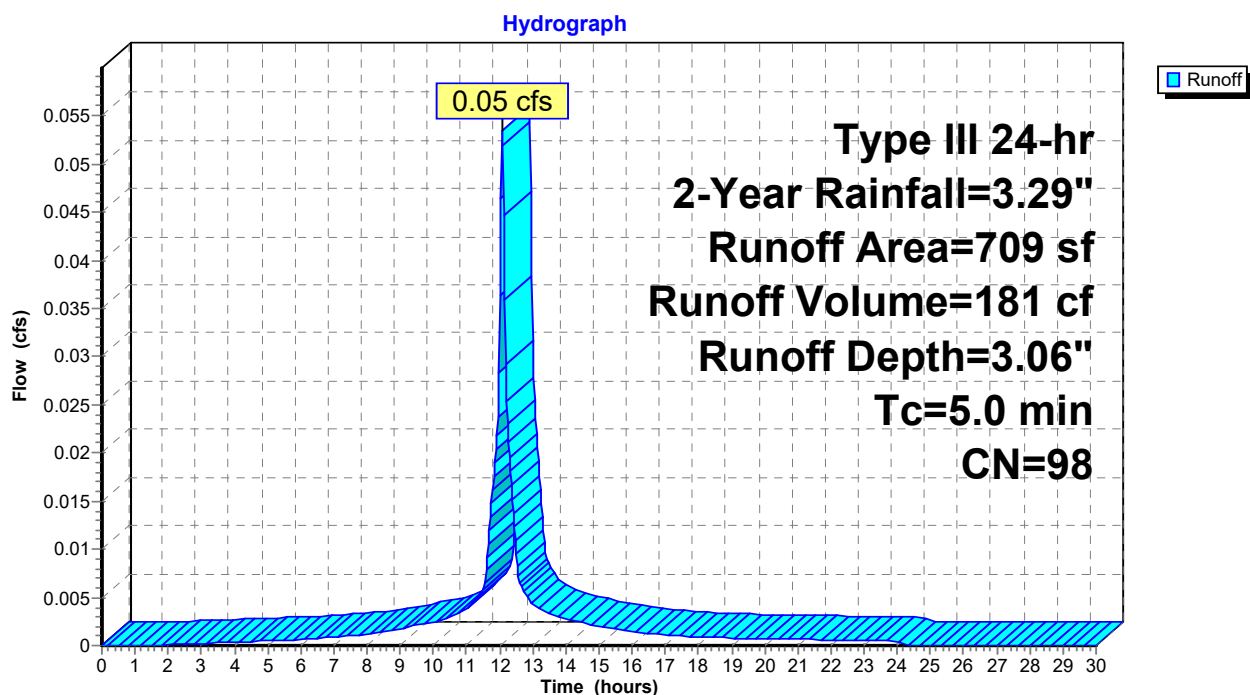
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 181 cf, Depth= 3.06"

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=3.29"

Area (sf)	CN	Description
* 709	98	Deck/Porch/Retaining Wall/Landing & Steps
709		100.00% Impervious Area

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

Subcatchment 5S: PROPOSED IMPERVIOUS



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

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Summary for Subcatchment 6S: PROPOSED LANDSCAPE AREA

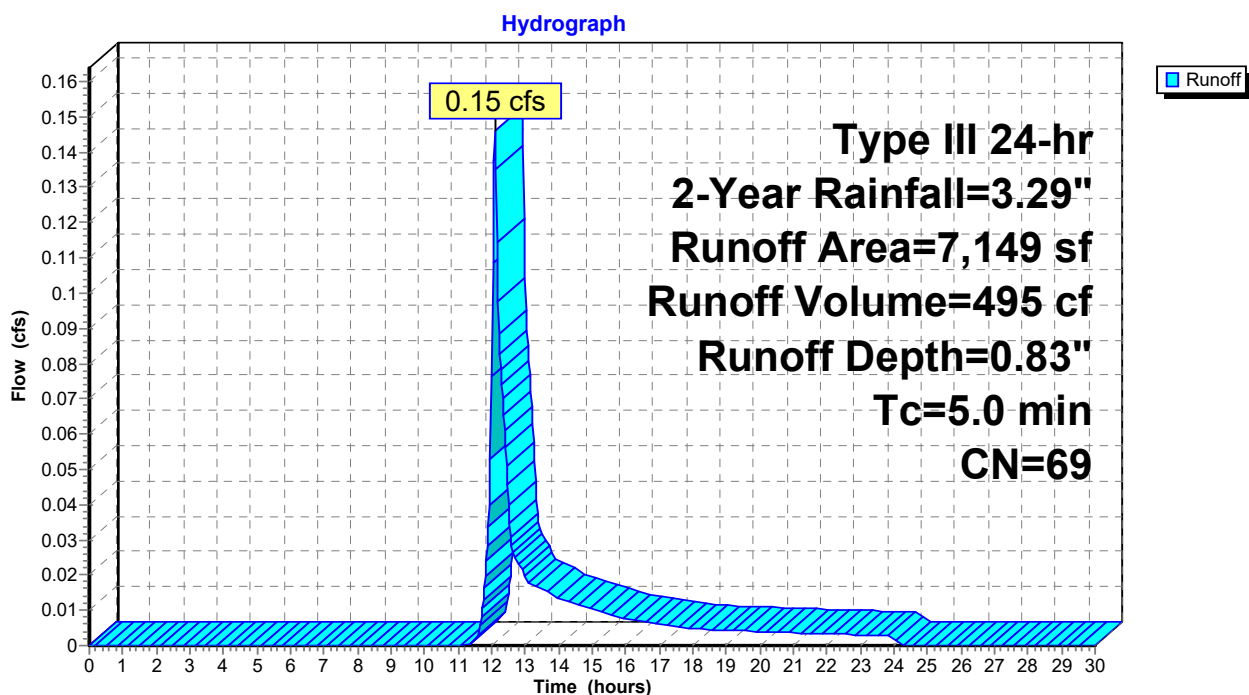
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 495 cf, Depth= 0.83"

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=3.29"

Area (sf)	CN	Description
7,149	69	50-75% Grass cover, Fair, HSG B
7,149		100.00% Pervious Area

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

Subcatchment 6S: PROPOSED LANDSCAPE AREA



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

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Summary for Pond 1P: STORM TECHS

Inflow Area = 2,199 sf, 100.00% Impervious, Inflow Depth = 3.06" for 2-Year event
 Inflow = 0.17 cfs @ 12.07 hrs, Volume= 560 cf
 Outflow = 0.01 cfs @ 13.52 hrs, Volume= 560 cf, Atten= 94%, Lag= 87.0 min
 Discarded = 0.01 cfs @ 13.52 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= 0.03 hrs / 3

Peak Elev= 70.66' @ 13.52 hrs Surf.Area= 310 sf Storage= 247 cf

Plug-Flow detention time= 212.4 min calculated for 560 cf (100% of inflow)

Center-of-Mass det. time= 212.3 min (967.2 - 754.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	69.00'	422 cf	28.00'W x 11.07'L x 4.00'H Field A 1,240 cf Overall - 184 cf Embedded = 1,056 cf x 40.0% Voids
#2A	70.00'	184 cf	ADS_StormTech SC-740 +Cap x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 4 Rows
#3	73.00'	10 cf	Ponding Listed below -Impervious
		616 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
73.00	0
74.00	5
74.20	10

Device	Routing	Invert	Outlet Devices
#1	Discarded	69.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	72.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 13.52 hrs HW=70.66' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=69.00' (Free Discharge)↑**2=Orifice/Grate** (Controls 0.00 cfs)

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

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Pond 1P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length

4 Rows x 51.0" Wide + 18.0" Spacing x 3 + 39.0" Side Stone x 2 = 28.00' Base Width

12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

1,239.8 cf Field - 183.8 cf Chambers = 1,056.1 cf Stone x 40.0% Voids = 422.4 cf Stone Storage

Chamber Storage + Stone Storage = 606.2 cf = 0.014 af

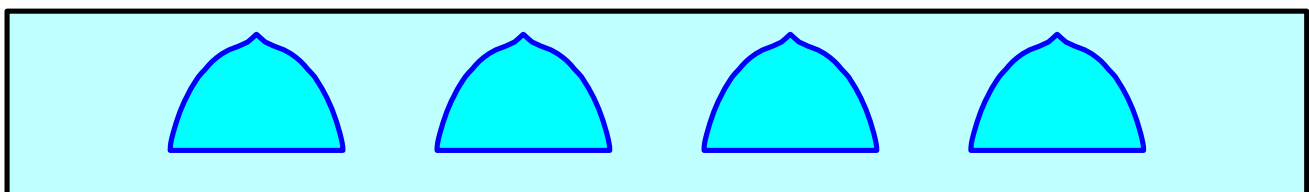
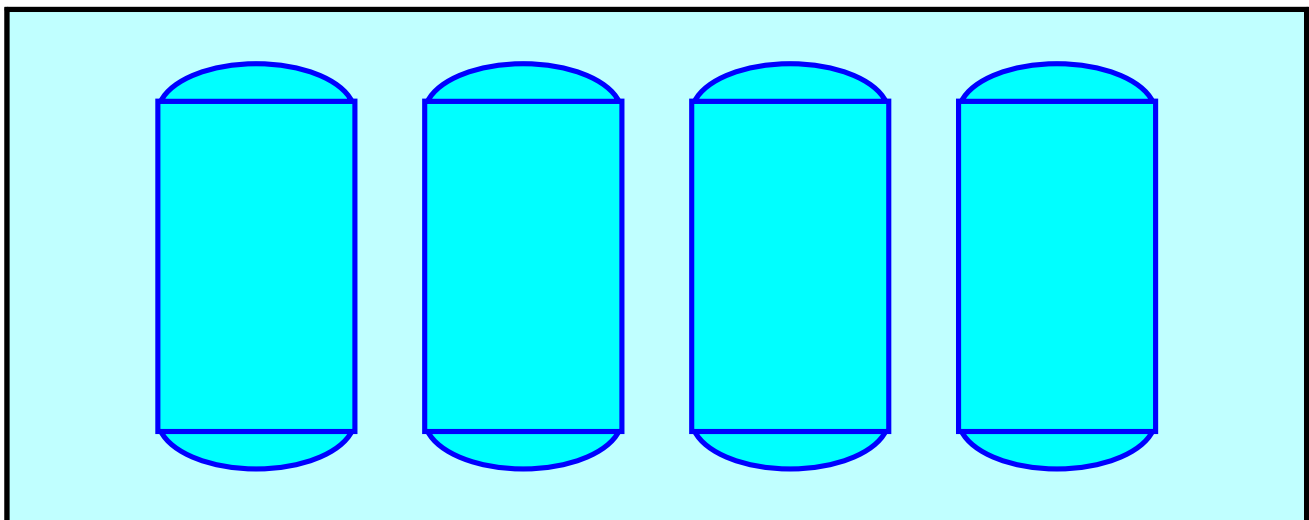
Overall Storage Efficiency = 48.9%

Overall System Size = 11.07' x 28.00' x 4.00'

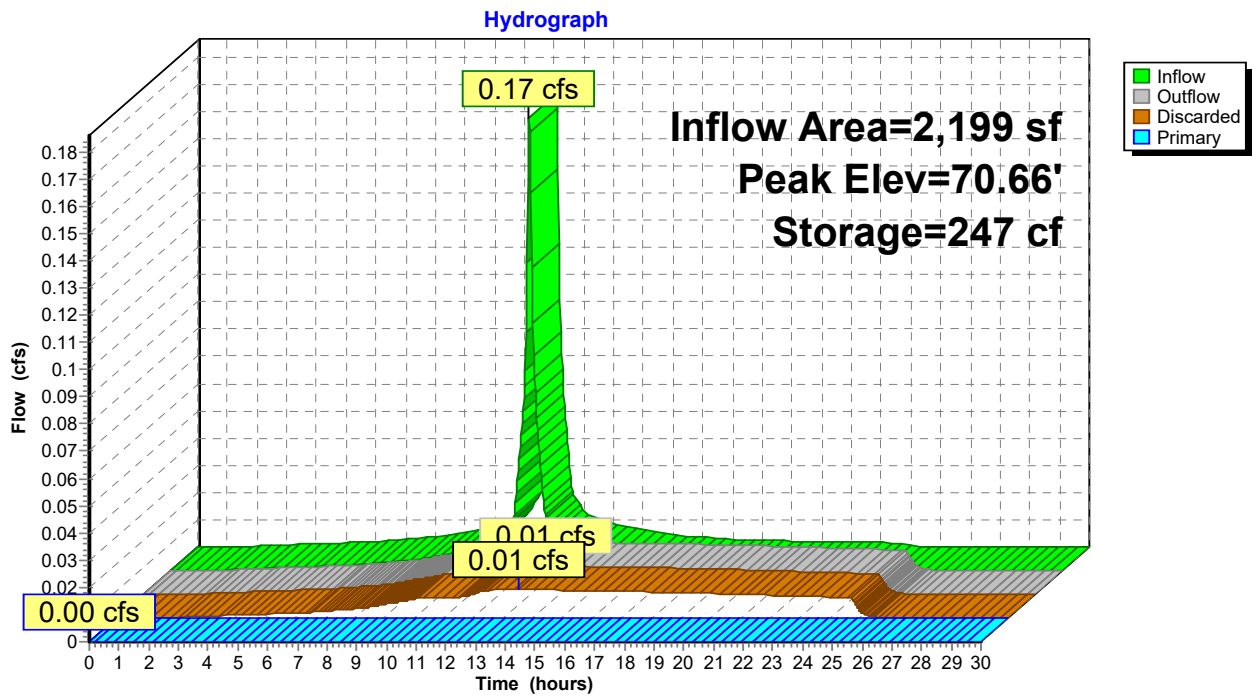
4 Chambers

45.9 cy Field

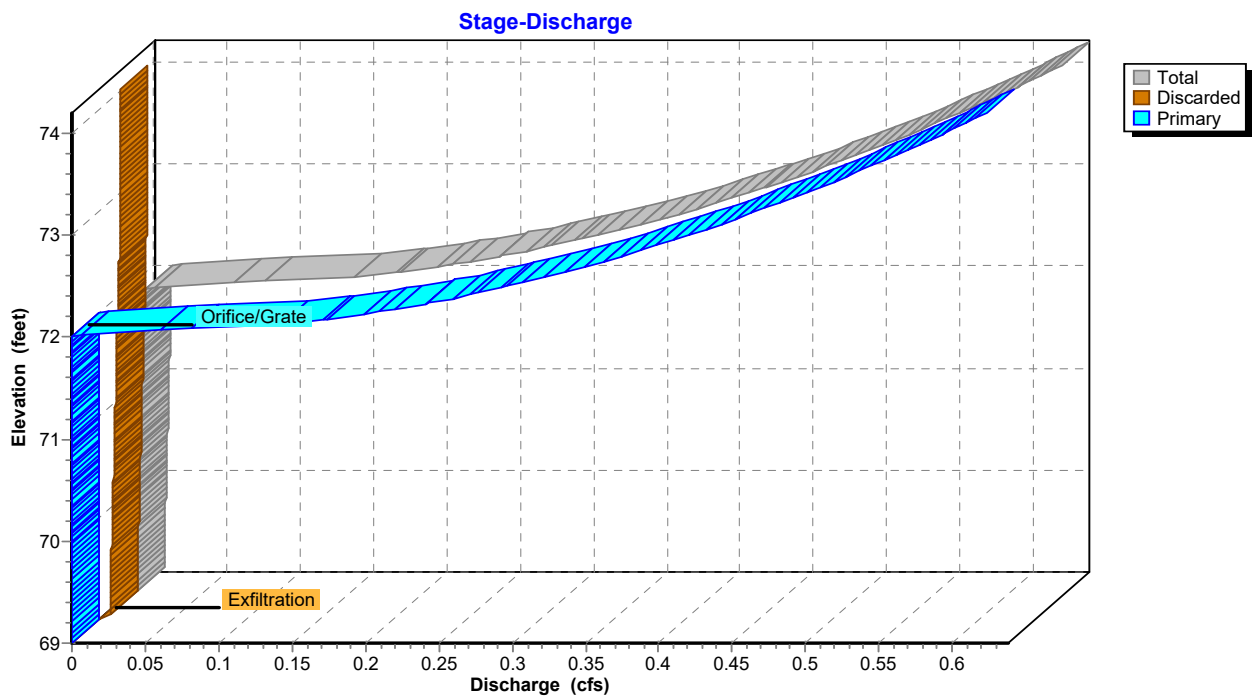
39.1 cy Stone



Pond 1P: STORM TECHS



Pond 1P: STORM TECHS



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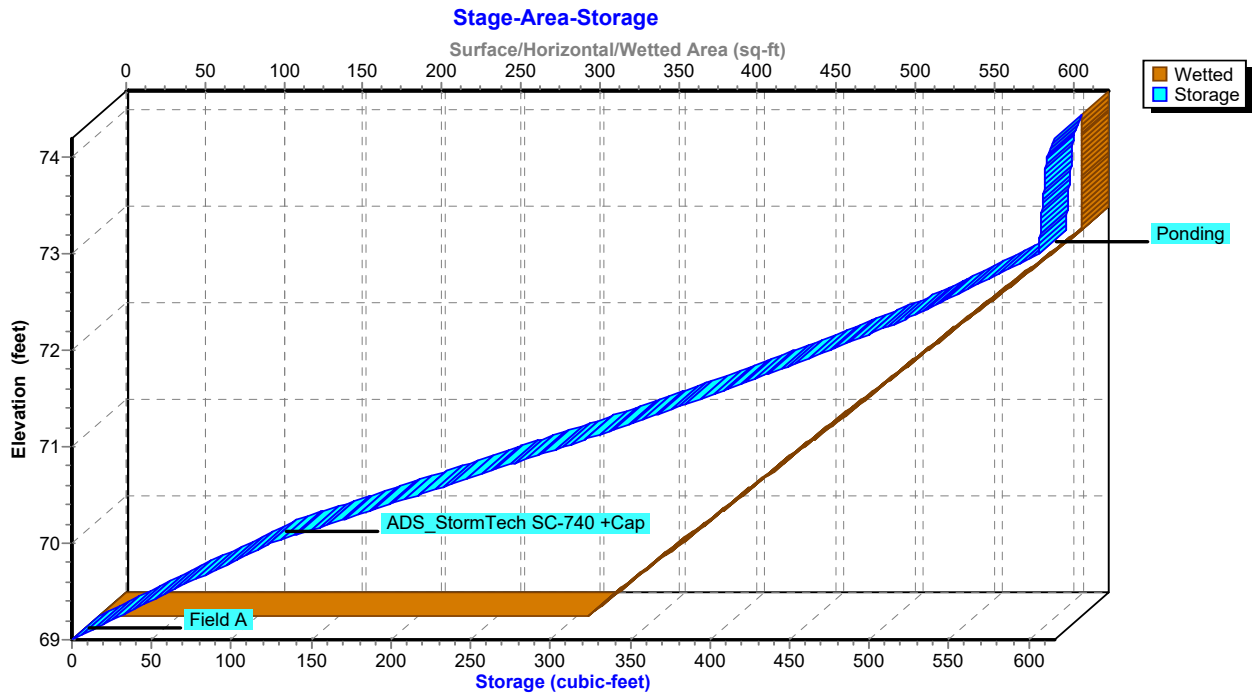
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Type III 24-hr 2-Year Rainfall=3.29"

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Pond 1P: STORM TECHS



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

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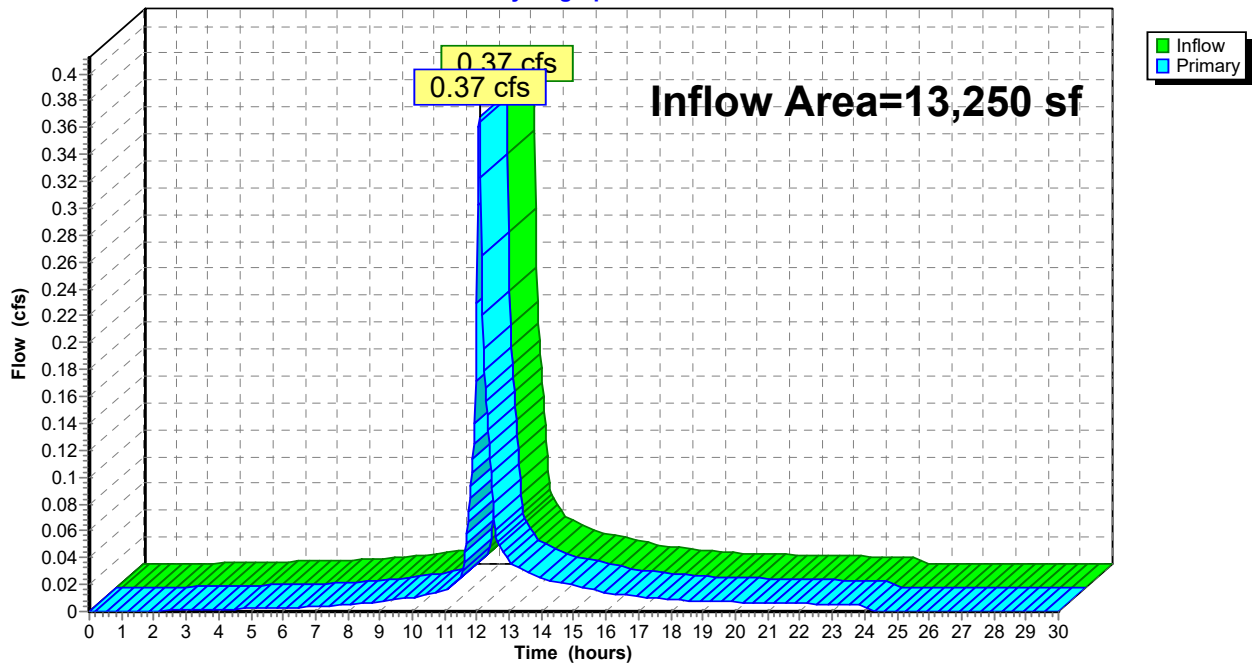
Summary for Link 3L: PROPOSED

Inflow Area = 13,250 sf, 39.06% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.37 cfs @ 12.08 hrs, Volume= 1,253 cf
Primary = 0.37 cfs @ 12.08 hrs, Volume= 1,253 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: PROPOSED

Hydrograph



PROPOSED

Type III 24-hr 10-Year Rainfall=5.17"

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX. ROOF Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=4.93"
 Tc=5.0 min CN=98 Runoff=0.17 cfs 573 cf

Subcatchment 2S: EX. DRIVEWAY & Runoff Area=873 sf 100.00% Impervious Runoff Depth=4.93"
 Tc=5.0 min CN=98 Runoff=0.10 cfs 359 cf

Subcatchment 3S: PROPOSED Runoff Area=2,199 sf 100.00% Impervious Runoff Depth=4.93"
 Tc=5.0 min CN=98 Runoff=0.26 cfs 904 cf

Subcatchment 4S: PROPOSED POOL Runoff Area=925 sf 0.00% Impervious Runoff Depth=0.00"
 Tc=5.0 min CN=1 Runoff=0.00 cfs 0 cf

Subcatchment 5S: PROPOSED Runoff Area=709 sf 100.00% Impervious Runoff Depth=4.93"
 Tc=5.0 min CN=98 Runoff=0.08 cfs 291 cf

Subcatchment 6S: PROPOSED Runoff Area=7,149 sf 0.00% Impervious Runoff Depth=2.08"
 Tc=5.0 min CN=69 Runoff=0.40 cfs 1,240 cf

Pond 1P: STORM TECHS Peak Elev=71.88' Storage=457 cf Inflow=0.26 cfs 904 cf
 Discarded=0.01 cfs 876 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 876 cf

Link 3L: PROPOSED Inflow=0.76 cfs 2,464 cf
 Primary=0.76 cfs 2,464 cf

Total Runoff Area = 13,250 sf Runoff Volume = 3,368 cf Average Runoff Depth = 3.05"
60.94% Pervious = 8,074 sf 39.06% Impervious = 5,176 sf

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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Subcatchment 1S: EX. ROOF

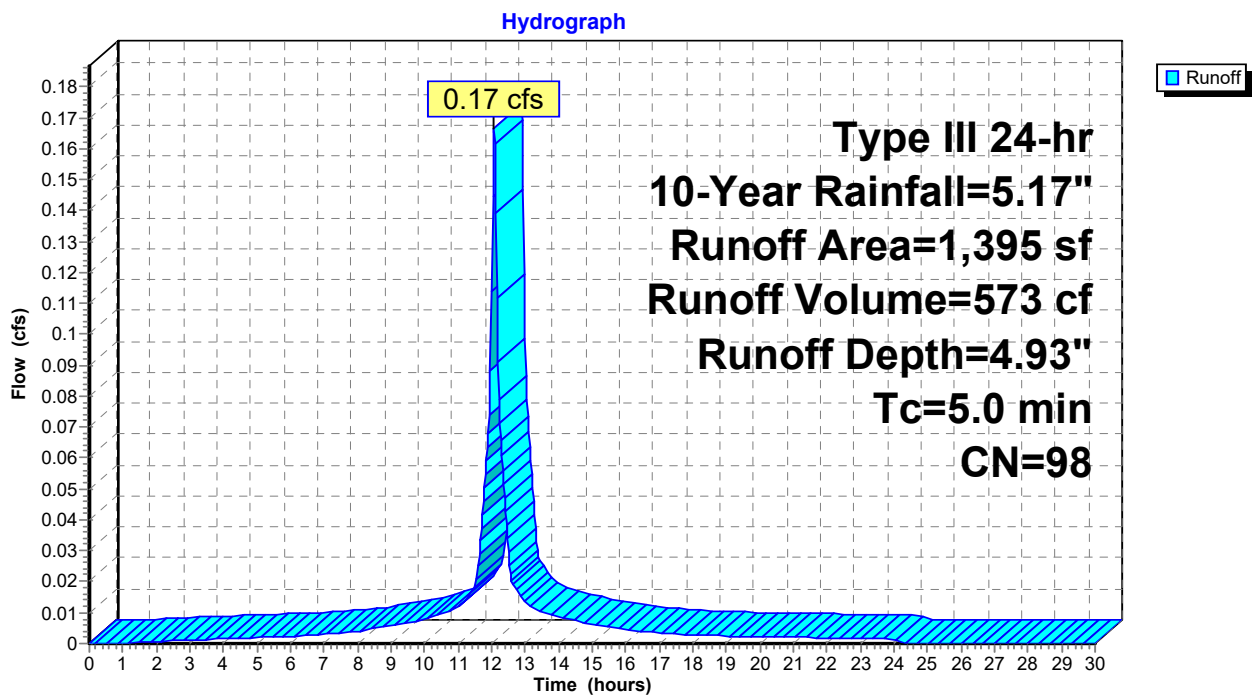
Runoff = 0.17 cfs @ 12.07 hrs, Volume= 573 cf, Depth= 4.93"

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=5.17"

Area (sf)	CN	Description
1,395	98	Roofs, HSG A
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX. ROOF



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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Subcatchment 2S: EX. DRIVEWAY & WALKWAY

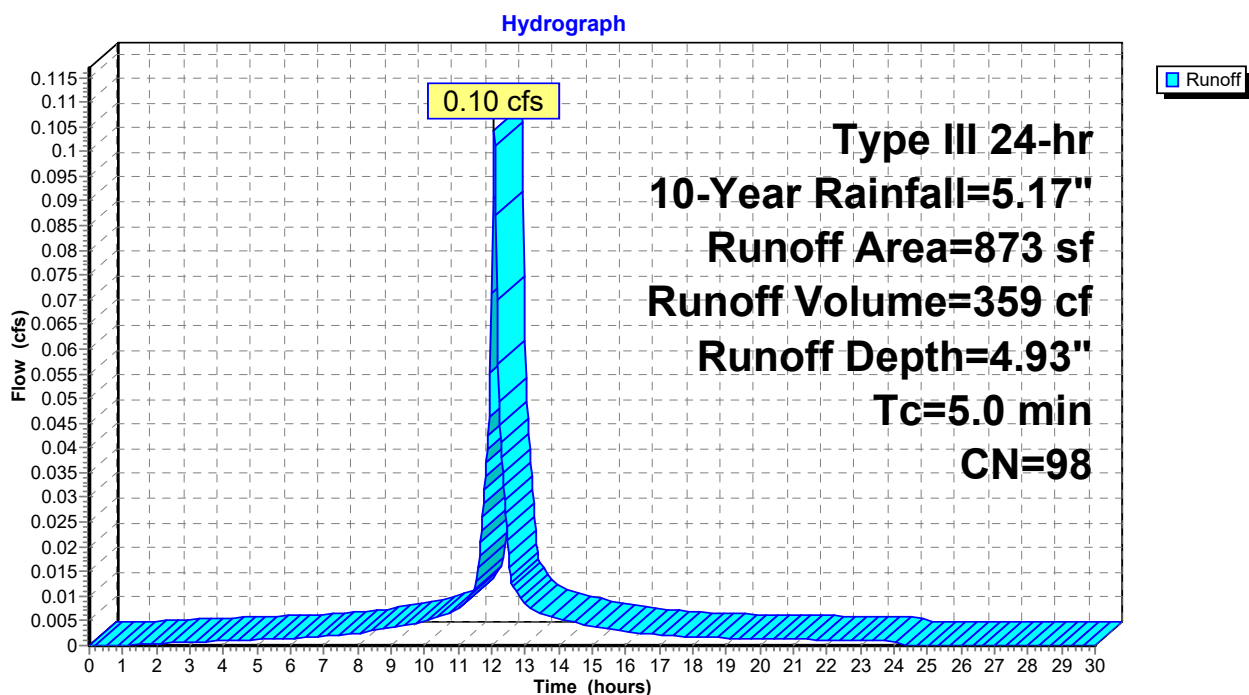
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 359 cf, Depth= 4.93"

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=5.17"

Area (sf)	CN	Description
873	98	Paved parking, HSG A
873		100.00% Impervious Area

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

Subcatchment 2S: EX. DRIVEWAY & WALKWAY



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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Subcatchment 3S: PROPOSED PAVERS

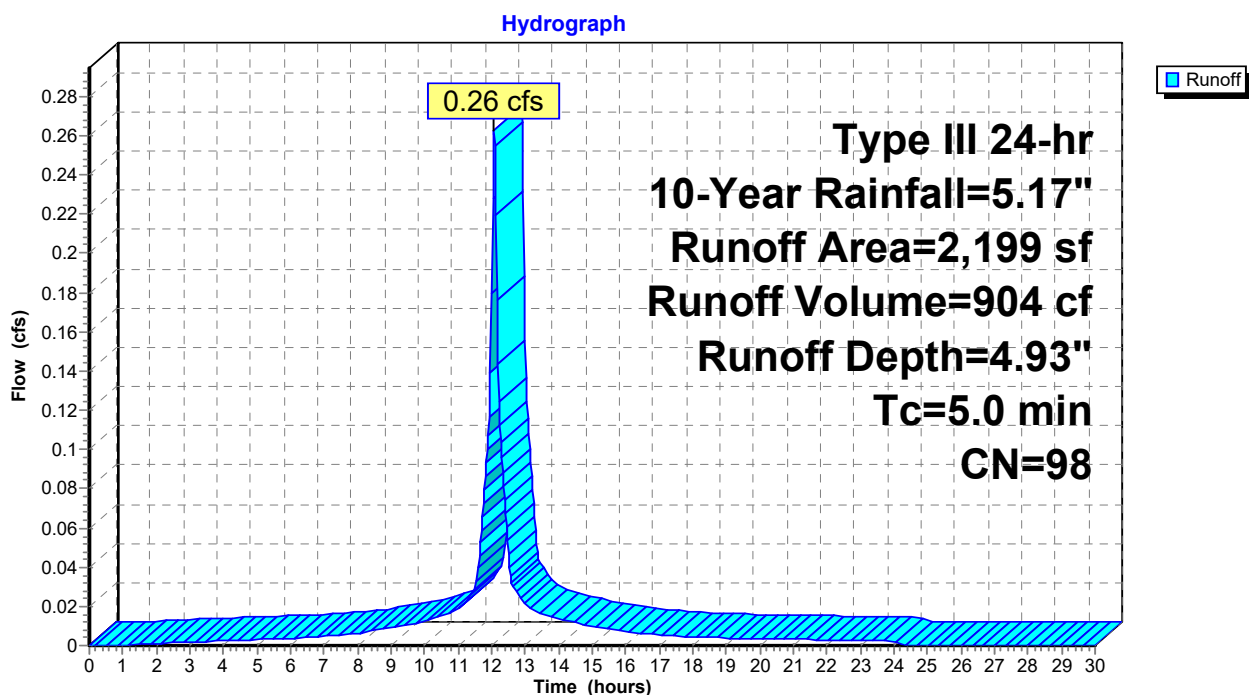
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 904 cf, Depth= 4.93"

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=5.17"

Area (sf)	CN	Description
* 2,199	98	Pavers
2,199		100.00% Impervious Area

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

Subcatchment 3S: PROPOSED PAVERS



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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Subcatchment 4S: PROPOSED POOL

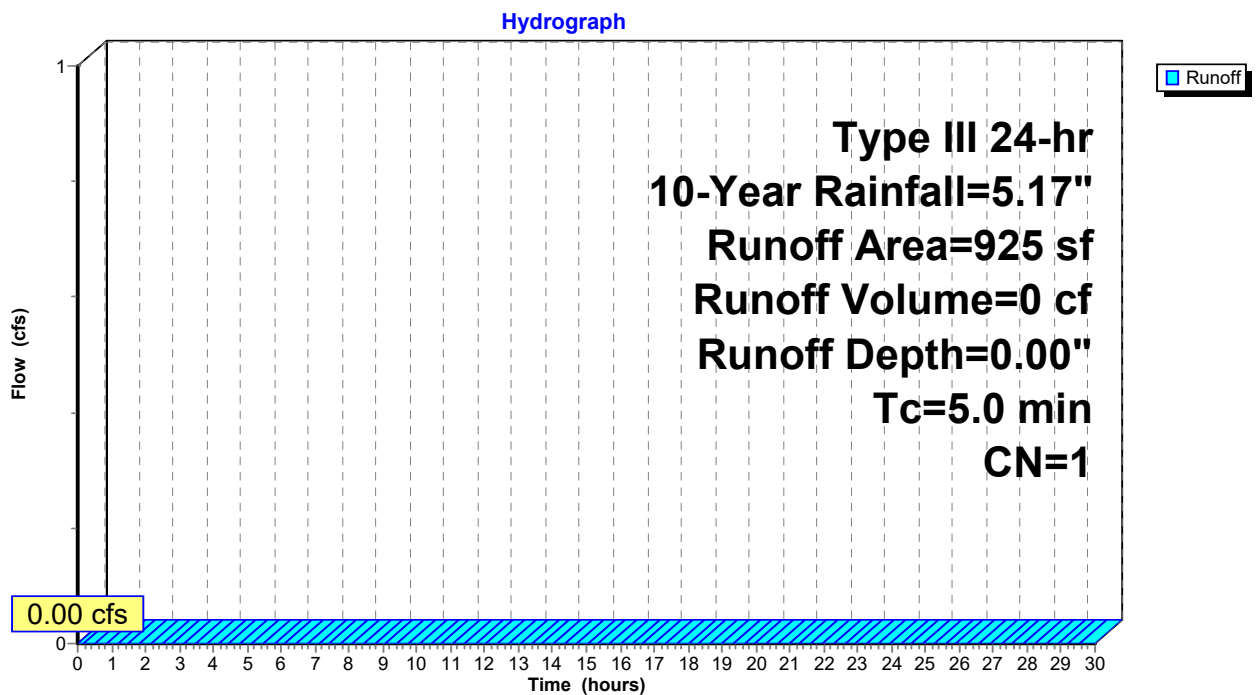
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

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=5.17"

Area (sf)	CN	Description
* 925	1	Pool
925		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED POOL



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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Subcatchment 5S: PROPOSED IMPERVIOUS

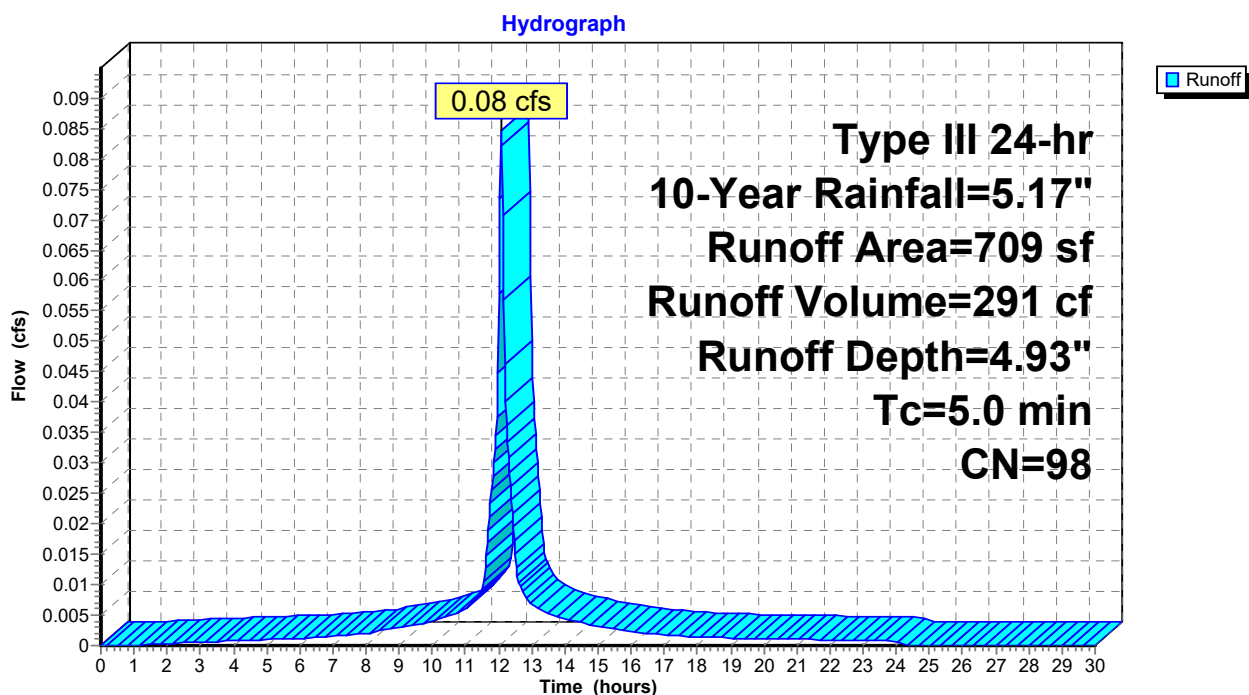
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 291 cf, Depth= 4.93"

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=5.17"

Area (sf)	CN	Description
* 709	98	Deck/Porch/Retaining Wall/Landing & Steps
709		100.00% Impervious Area

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

Subcatchment 5S: PROPOSED IMPERVIOUS



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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Subcatchment 6S: PROPOSED LANDSCAPE AREA

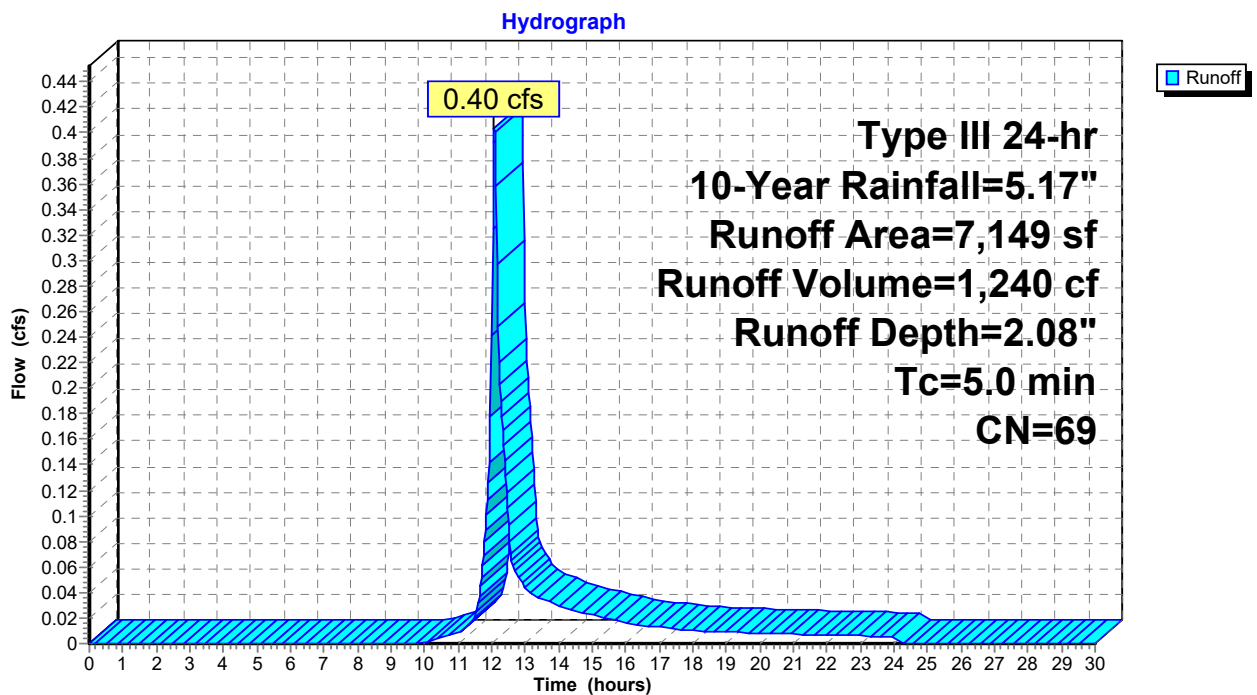
Runoff = 0.40 cfs @ 12.08 hrs, Volume= 1,240 cf, Depth= 2.08"

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=5.17"

Area (sf)	CN	Description
7,149	69	50-75% Grass cover, Fair, HSG B
7,149		100.00% Pervious Area

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

Subcatchment 6S: PROPOSED LANDSCAPE AREA



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Type III 24-hr 10-Year Rainfall=5.17"

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Summary for Pond 1P: STORM TECHS

Inflow Area = 2,199 sf, 100.00% Impervious, Inflow Depth = 4.93" for 10-Year event
 Inflow = 0.26 cfs @ 12.07 hrs, Volume= 904 cf
 Outflow = 0.01 cfs @ 14.16 hrs, Volume= 876 cf, Atten= 95%, Lag= 125.1 min
 Discarded = 0.01 cfs @ 14.16 hrs, Volume= 876 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
 Peak Elev= 71.88' @ 14.16 hrs Surf.Area= 310 sf Storage= 457 cf

Plug-Flow detention time= 348.4 min calculated for 876 cf (97% of inflow)
 Center-of-Mass det. time= 329.0 min (1,075.5 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	69.00'	422 cf	28.00'W x 11.07'L x 4.00'H Field A 1,240 cf Overall - 184 cf Embedded = 1,056 cf x 40.0% Voids
#2A	70.00'	184 cf	ADS_StormTech SC-740 +Cap x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 4 Rows
#3	73.00'	10 cf	Ponding Listed below -Impervious
		616 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
73.00	0
74.00	5
74.20	10

Device	Routing	Invert	Outlet Devices
#1	Discarded	69.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	72.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 14.16 hrs HW=71.88' (Free Discharge)
 ↖1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=69.00' (Free Discharge)
 ↖2=Orifice/Grate (Controls 0.00 cfs)

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Type III 24-hr 10-Year Rainfall=5.17"

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Pond 1P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length

4 Rows x 51.0" Wide + 18.0" Spacing x 3 + 39.0" Side Stone x 2 = 28.00' Base Width

12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

1,239.8 cf Field - 183.8 cf Chambers = 1,056.1 cf Stone x 40.0% Voids = 422.4 cf Stone Storage

Chamber Storage + Stone Storage = 606.2 cf = 0.014 af

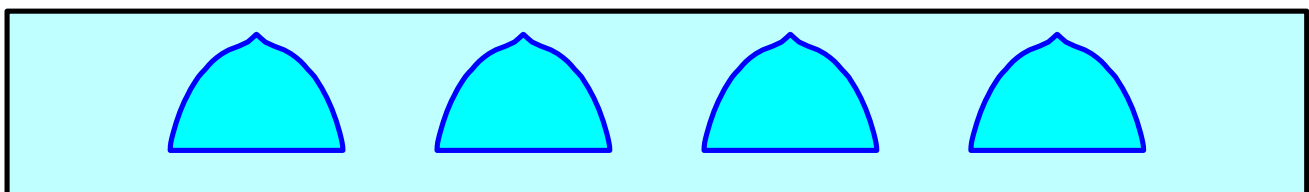
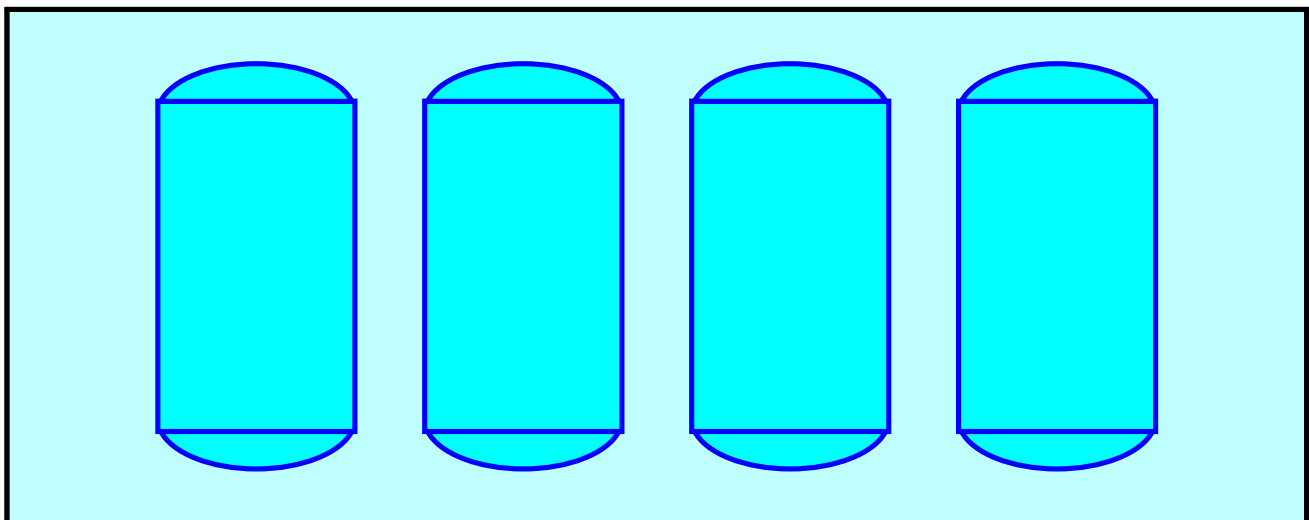
Overall Storage Efficiency = 48.9%

Overall System Size = 11.07' x 28.00' x 4.00'

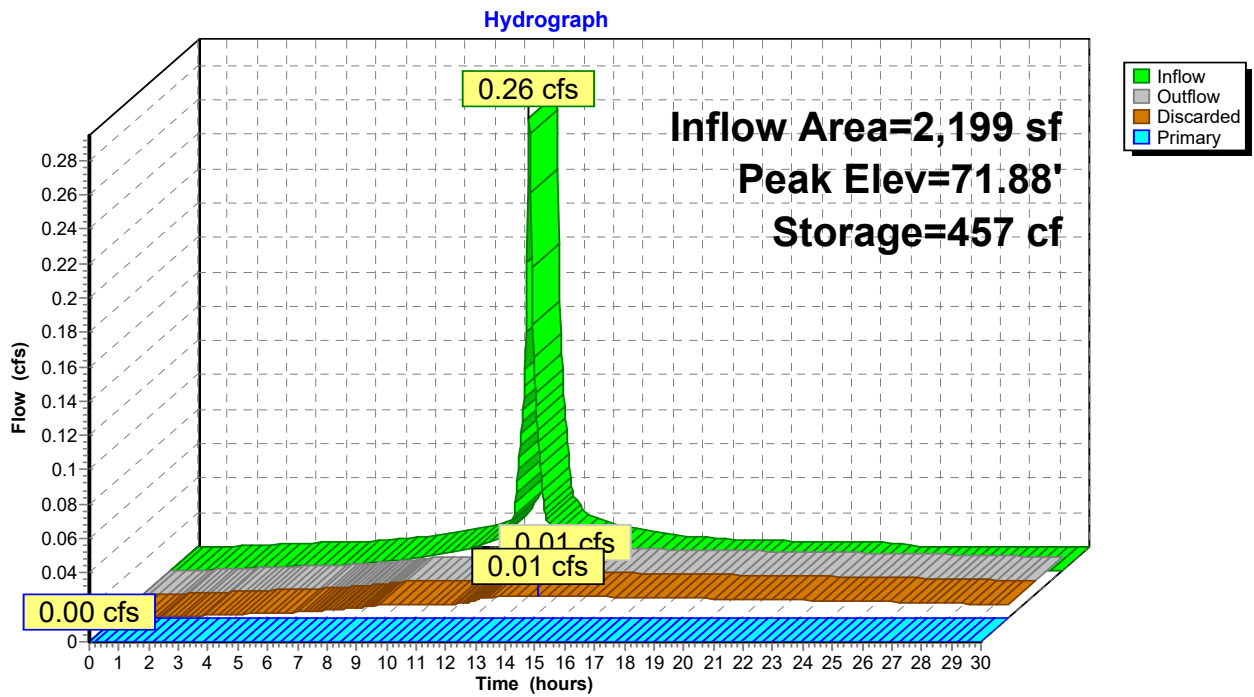
4 Chambers

45.9 cy Field

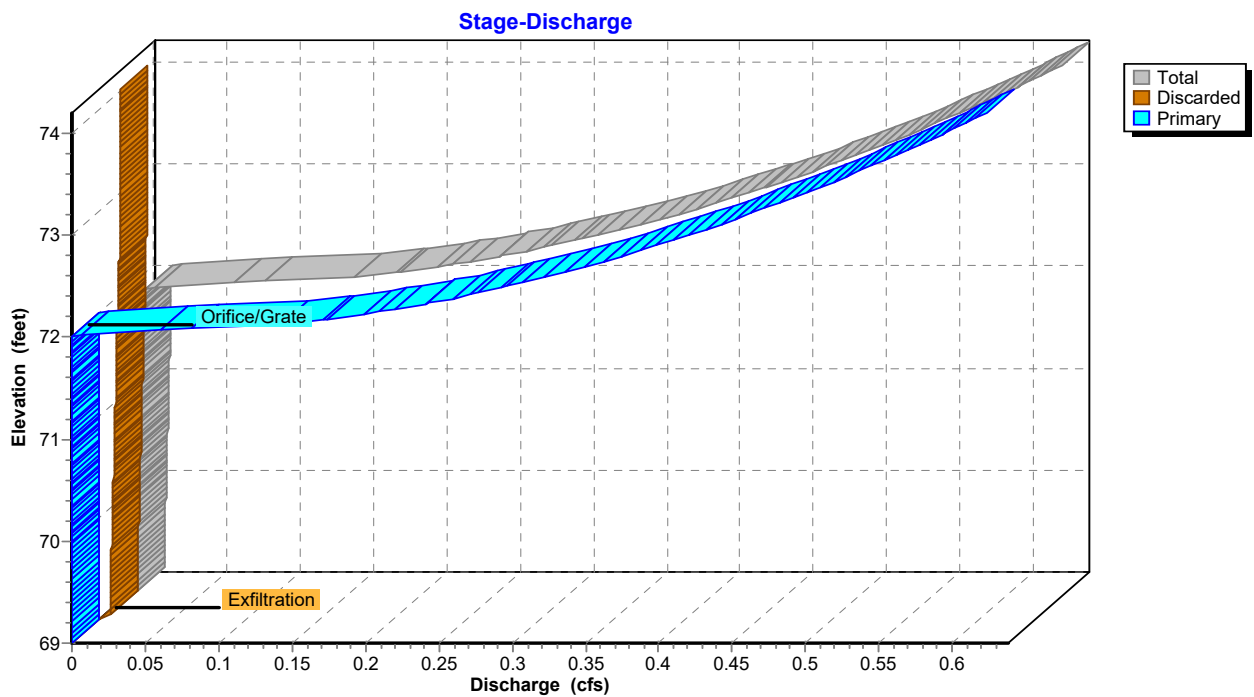
39.1 cy Stone



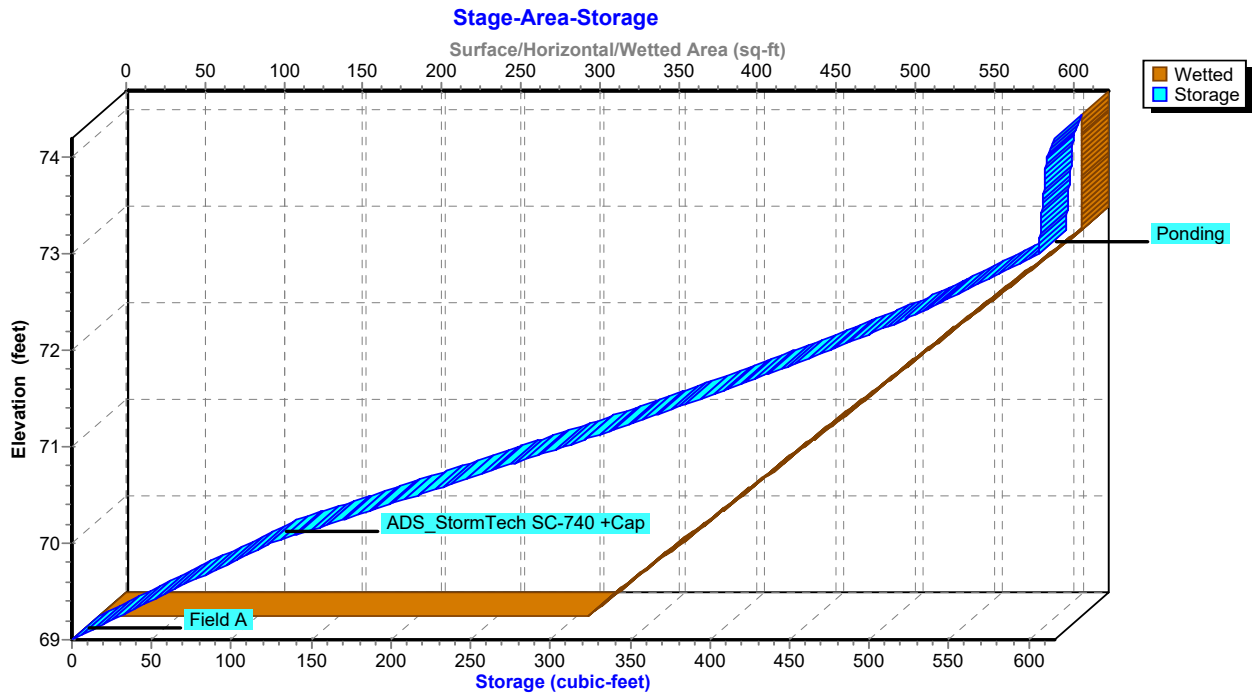
Pond 1P: STORM TECHS



Pond 1P: STORM TECHS



Pond 1P: STORM TECHS



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Type III 24-hr 10-Year Rainfall=5.17"

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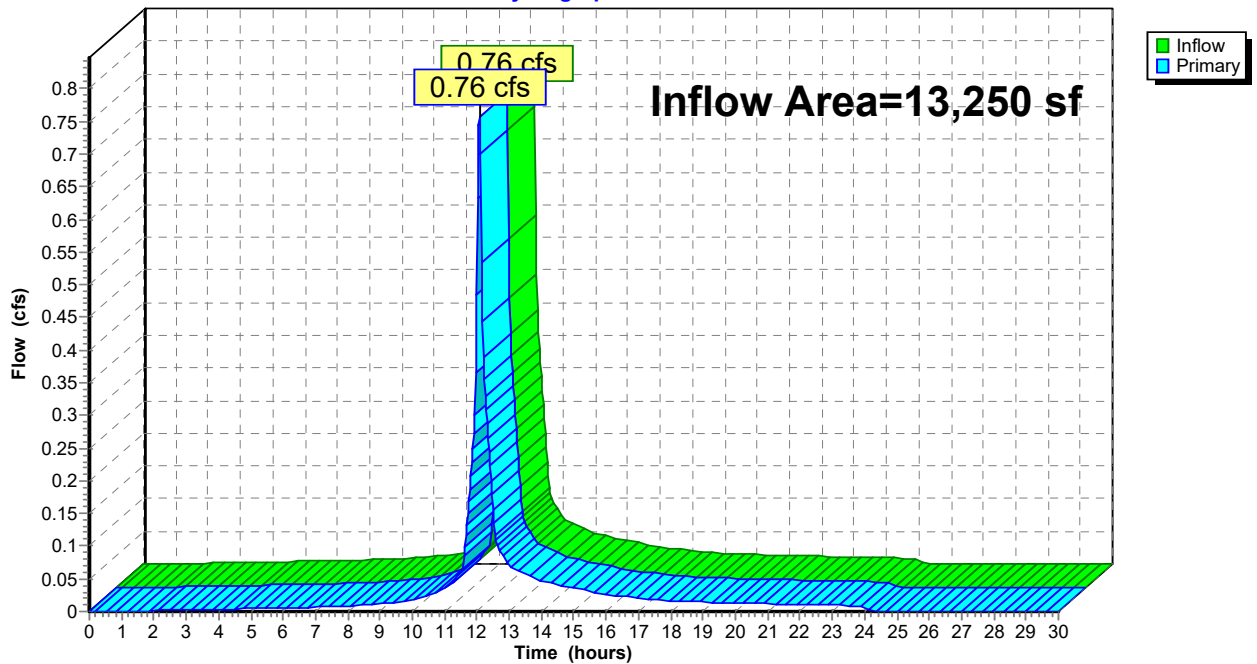
Summary for Link 3L: PROPOSED

Inflow Area = 13,250 sf, 39.06% Impervious, Inflow Depth = 2.23" for 10-Year event
Inflow = 0.76 cfs @ 12.08 hrs, Volume= 2,464 cf
Primary = 0.76 cfs @ 12.08 hrs, Volume= 2,464 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: PROPOSED

Hydrograph



PROPOSED

Type III 24-hr 25-Year Rainfall=6.35"

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX. ROOF Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=6.11"
 Tc=5.0 min CN=98 Runoff=0.21 cfs 710 cf

Subcatchment 2S: EX. DRIVEWAY & Runoff Area=873 sf 100.00% Impervious Runoff Depth=6.11"
 Tc=5.0 min CN=98 Runoff=0.13 cfs 445 cf

Subcatchment 3S: PROPOSED Runoff Area=2,199 sf 100.00% Impervious Runoff Depth=6.11"
 Tc=5.0 min CN=98 Runoff=0.32 cfs 1,120 cf

Subcatchment 4S: PROPOSED POOL Runoff Area=925 sf 0.00% Impervious Runoff Depth=0.00"
 Tc=5.0 min CN=1 Runoff=0.00 cfs 0 cf

Subcatchment 5S: PROPOSED Runoff Area=709 sf 100.00% Impervious Runoff Depth=6.11"
 Tc=5.0 min CN=98 Runoff=0.10 cfs 361 cf

Subcatchment 6S: PROPOSED Runoff Area=7,149 sf 0.00% Impervious Runoff Depth=2.99"
 Tc=5.0 min CN=69 Runoff=0.59 cfs 1,780 cf

Pond 1P: STORM TECHS Peak Elev=72.08' Storage=488 cf Inflow=0.32 cfs 1,120 cf
 Discarded=0.01 cfs 930 cf Primary=0.08 cfs 130 cf Outflow=0.09 cfs 1,059 cf

Link 3L: PROPOSED Inflow=1.03 cfs 3,426 cf
 Primary=1.03 cfs 3,426 cf

Total Runoff Area = 13,250 sf Runoff Volume = 4,416 cf Average Runoff Depth = 4.00"
60.94% Pervious = 8,074 sf 39.06% Impervious = 5,176 sf

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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 1S: EX. ROOF

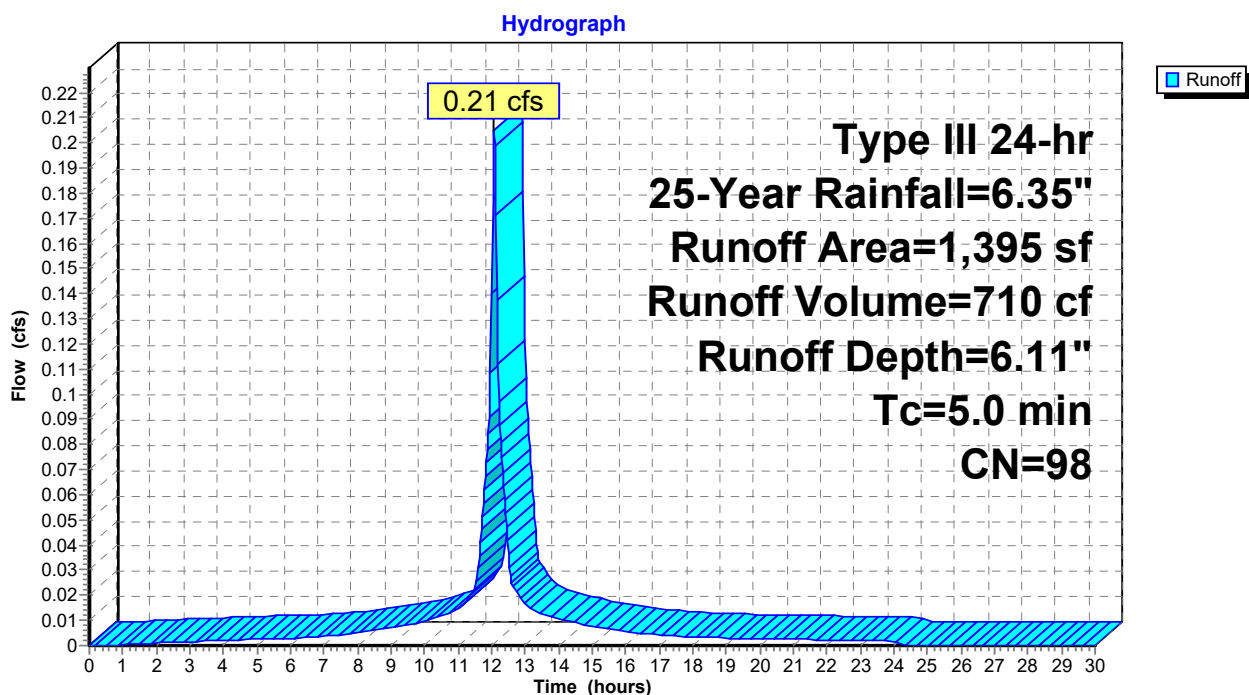
Runoff = 0.21 cfs @ 12.07 hrs, Volume= 710 cf, Depth= 6.11"

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=6.35"

Area (sf)	CN	Description
1,395	98	Roofs, HSG A
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX. ROOF



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 2S: EX. DRIVEWAY & WALKWAY

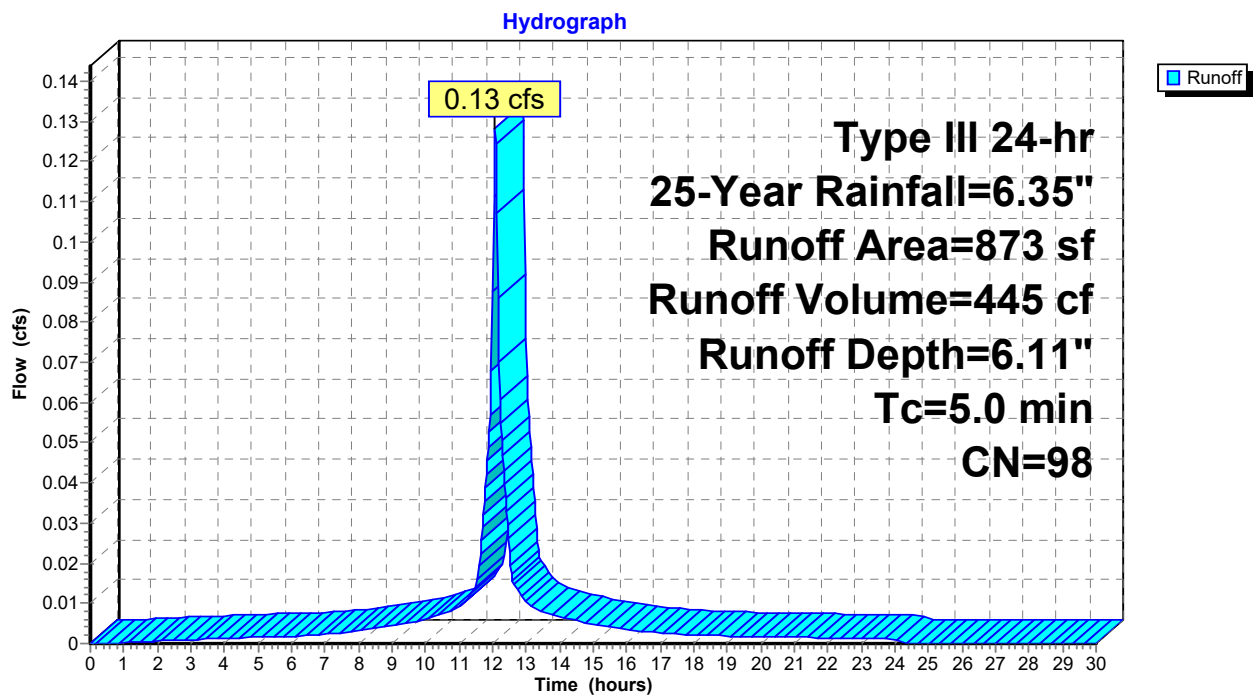
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 445 cf, Depth= 6.11"

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=6.35"

Area (sf)	CN	Description
873	98	Paved parking, HSG A
873		100.00% Impervious Area

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

Subcatchment 2S: EX. DRIVEWAY & WALKWAY



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 3S: PROPOSED PAVERS

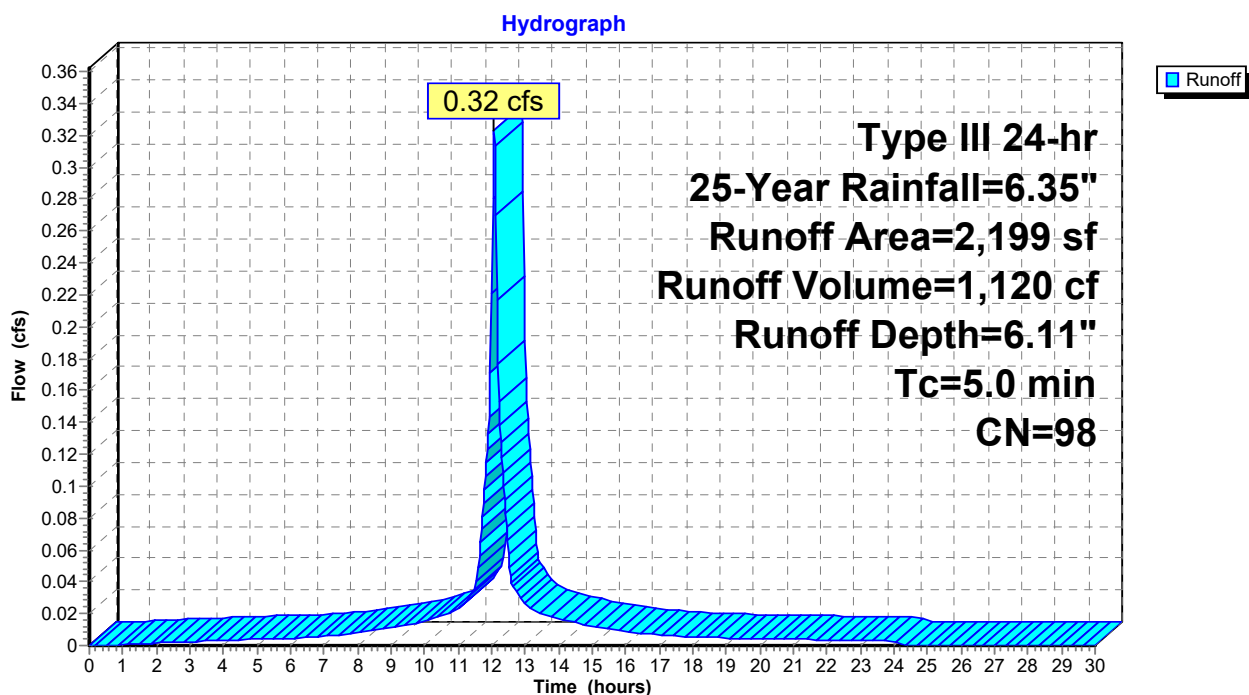
Runoff = 0.32 cfs @ 12.07 hrs, Volume= 1,120 cf, Depth= 6.11"

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=6.35"

Area (sf)	CN	Description
* 2,199	98	Pavers
2,199		100.00% Impervious Area

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

Subcatchment 3S: PROPOSED PAVERS



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 4S: PROPOSED POOL

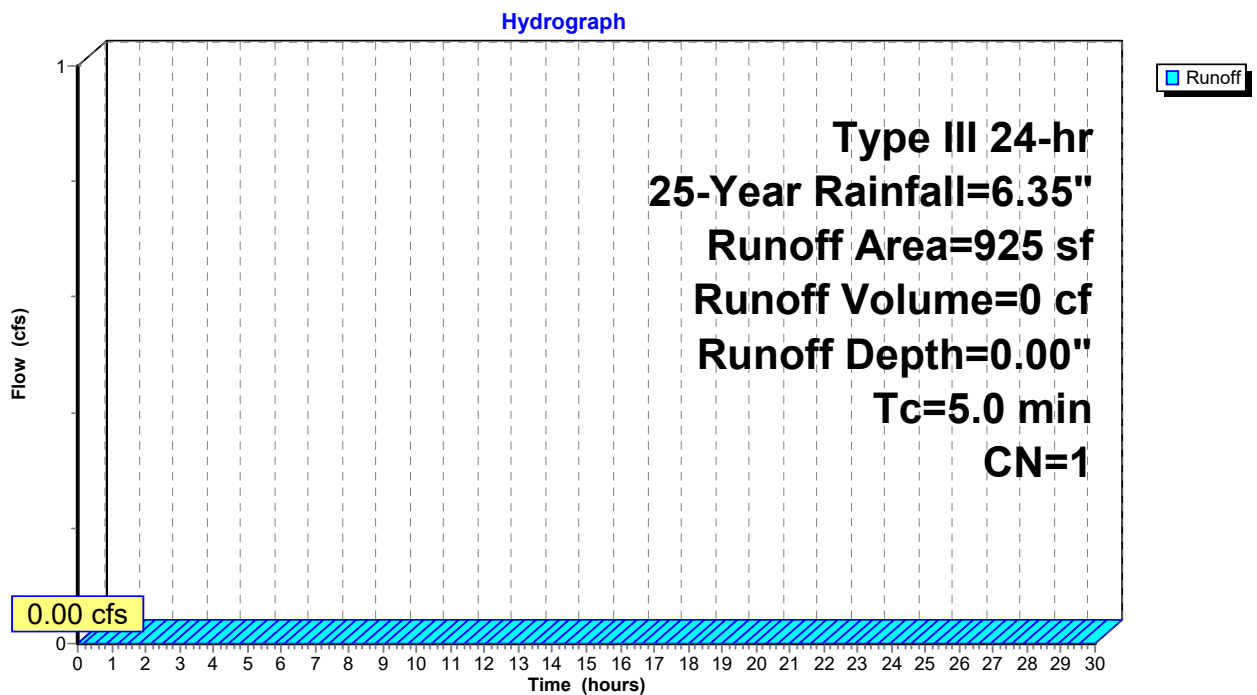
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

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=6.35"

Area (sf)	CN	Description
* 925	1	Pool
925		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED POOL



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 5S: PROPOSED IMPERVIOUS

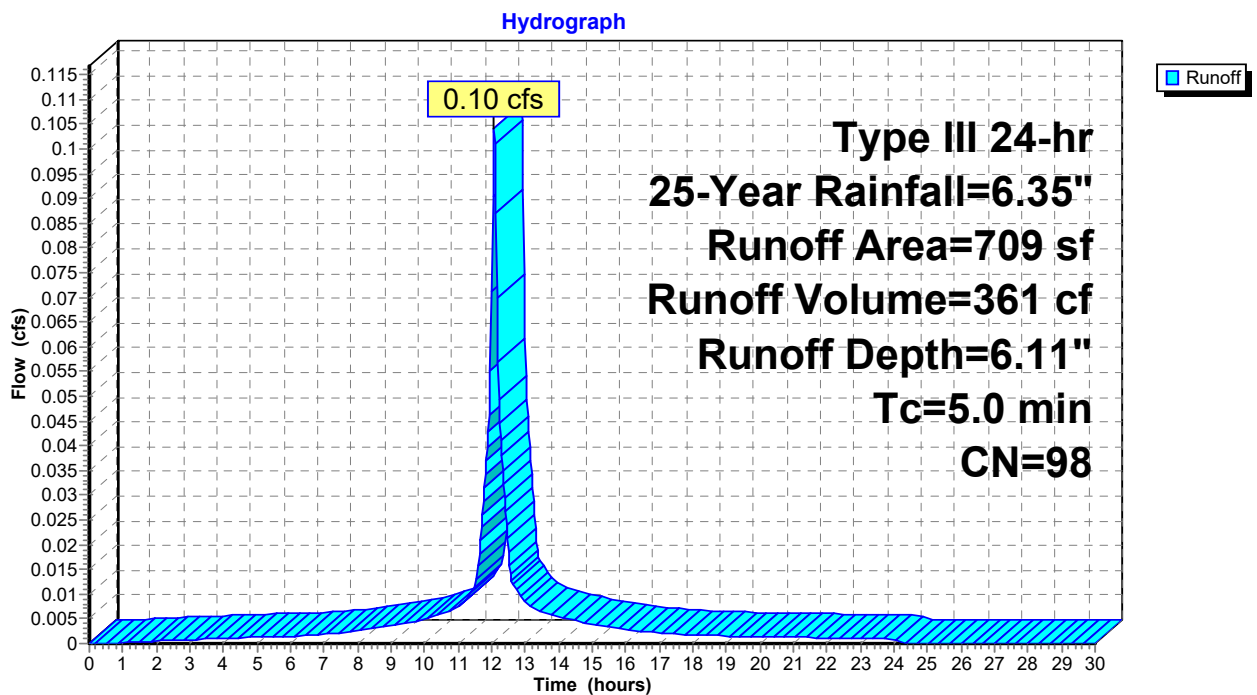
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 361 cf, Depth= 6.11"

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=6.35"

Area (sf)	CN	Description
* 709	98	Deck/Porch/Retaining Wall/Landing & Steps
709		100.00% Impervious Area

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

Subcatchment 5S: PROPOSED IMPERVIOUS



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Subcatchment 6S: PROPOSED LANDSCAPE AREA

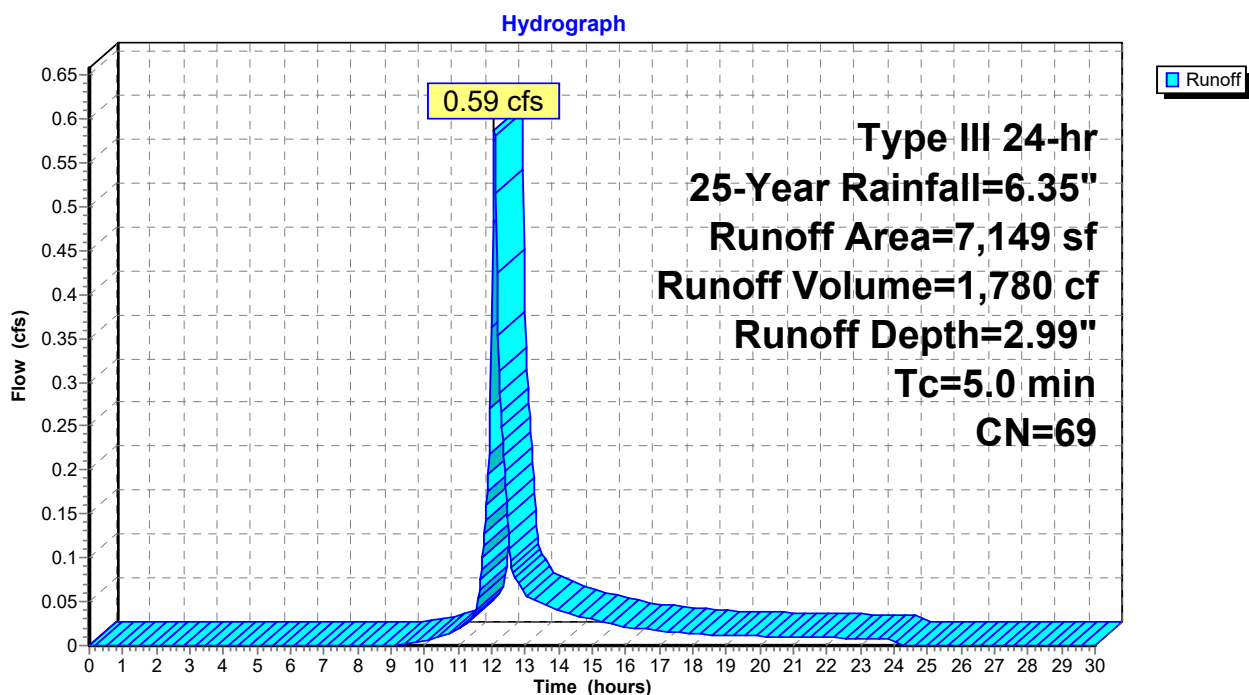
Runoff = 0.59 cfs @ 12.08 hrs, Volume= 1,780 cf, Depth= 2.99"

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=6.35"

Area (sf)	CN	Description
7,149	69	50-75% Grass cover, Fair, HSG B
7,149		100.00% Pervious Area

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

Subcatchment 6S: PROPOSED LANDSCAPE AREA



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Type III 24-hr 25-Year Rainfall=6.35"

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Summary for Pond 1P: STORM TECHS

Inflow Area = 2,199 sf, 100.00% Impervious, Inflow Depth = 6.11" for 25-Year event
 Inflow = 0.32 cfs @ 12.07 hrs, Volume= 1,120 cf
 Outflow = 0.09 cfs @ 12.39 hrs, Volume= 1,059 cf, Atten= 71%, Lag= 18.9 min
 Discarded = 0.01 cfs @ 12.39 hrs, Volume= 930 cf
 Primary = 0.08 cfs @ 12.39 hrs, Volume= 130 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
 Peak Elev= 72.08' @ 12.39 hrs Surf.Area= 310 sf Storage= 488 cf

Plug-Flow detention time= 312.9 min calculated for 1,058 cf (94% of inflow)
 Center-of-Mass det. time= 281.8 min (1,025.2 - 743.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	69.00'	422 cf	28.00'W x 11.07'L x 4.00'H Field A 1,240 cf Overall - 184 cf Embedded = 1,056 cf x 40.0% Voids
#2A	70.00'	184 cf	ADS_StormTech SC-740 +Cap x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 4 Rows
#3	73.00'	10 cf	Ponding Listed below -Impervious
		616 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
73.00	0
74.00	5
74.20	10

Device	Routing	Invert	Outlet Devices
#1	Discarded	69.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	72.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.39 hrs HW=72.08' (Free Discharge)
 ↖1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.08 cfs @ 12.39 hrs HW=72.08' (Free Discharge)
 ↖2=Orifice/Grate (Weir Controls 0.08 cfs @ 0.94 fps)

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Type III 24-hr 25-Year Rainfall=6.35"

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Pond 1P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length

4 Rows x 51.0" Wide + 18.0" Spacing x 3 + 39.0" Side Stone x 2 = 28.00' Base Width

12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

1,239.8 cf Field - 183.8 cf Chambers = 1,056.1 cf Stone x 40.0% Voids = 422.4 cf Stone Storage

Chamber Storage + Stone Storage = 606.2 cf = 0.014 af

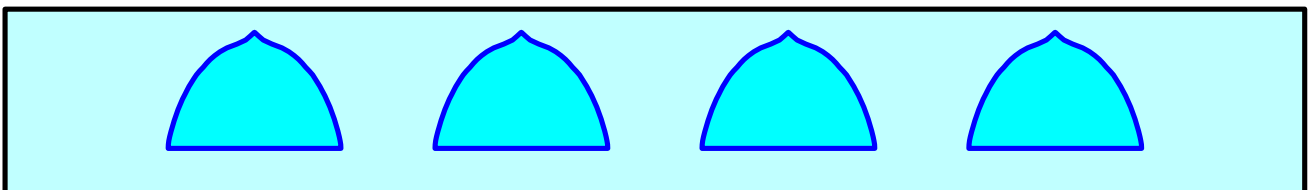
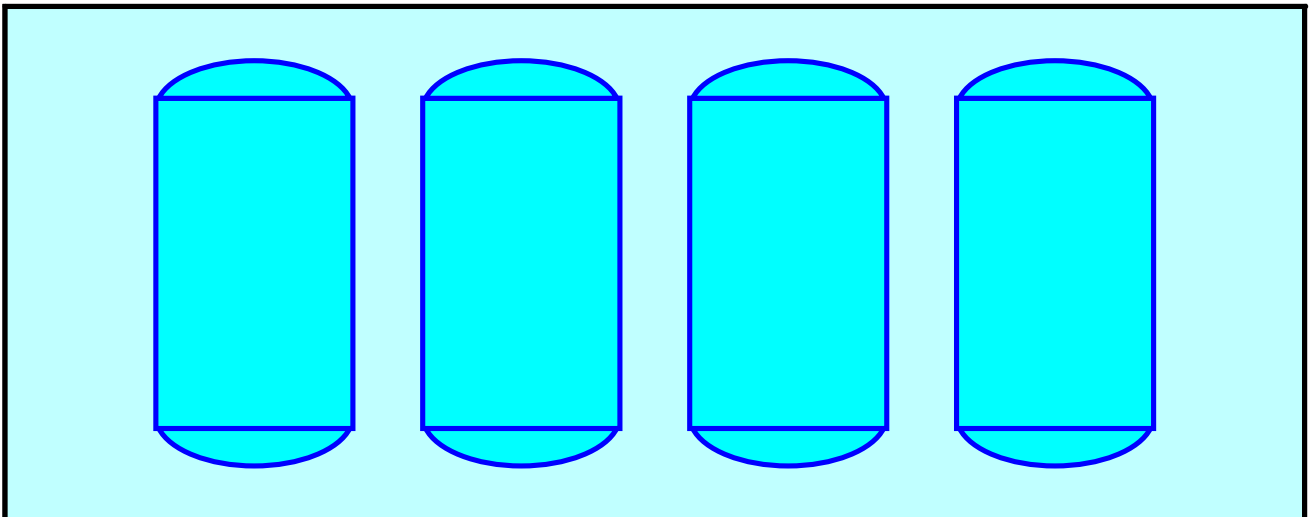
Overall Storage Efficiency = 48.9%

Overall System Size = 11.07' x 28.00' x 4.00'

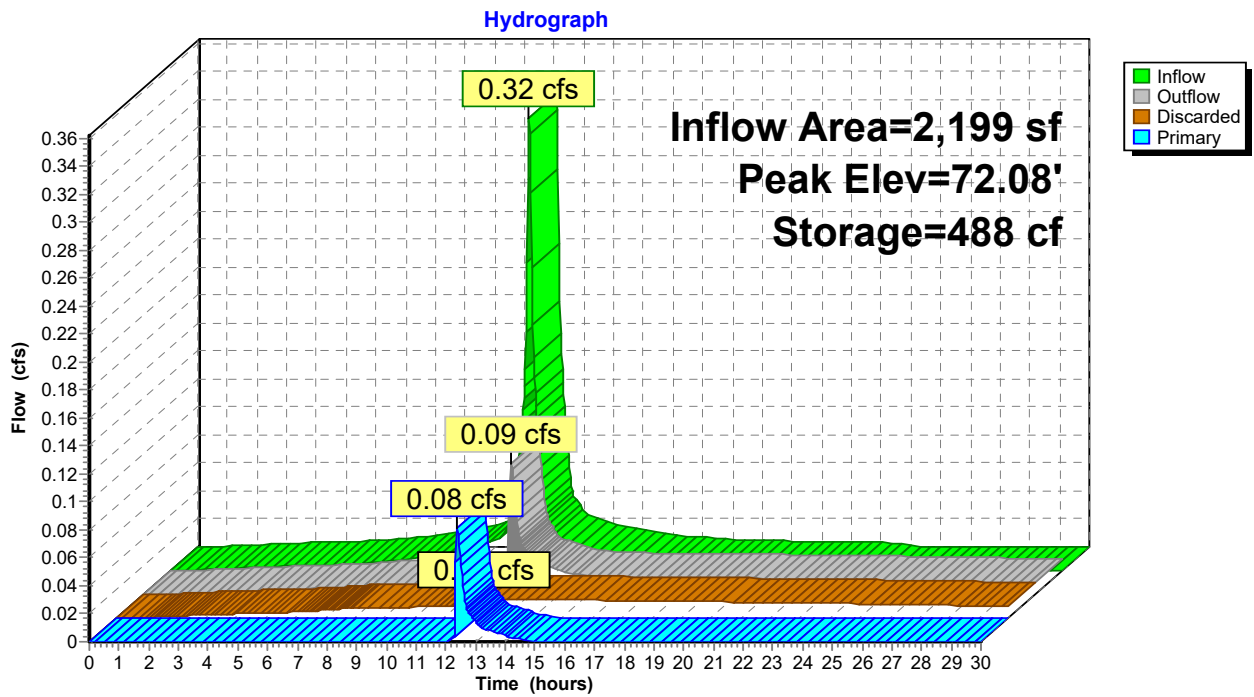
4 Chambers

45.9 cy Field

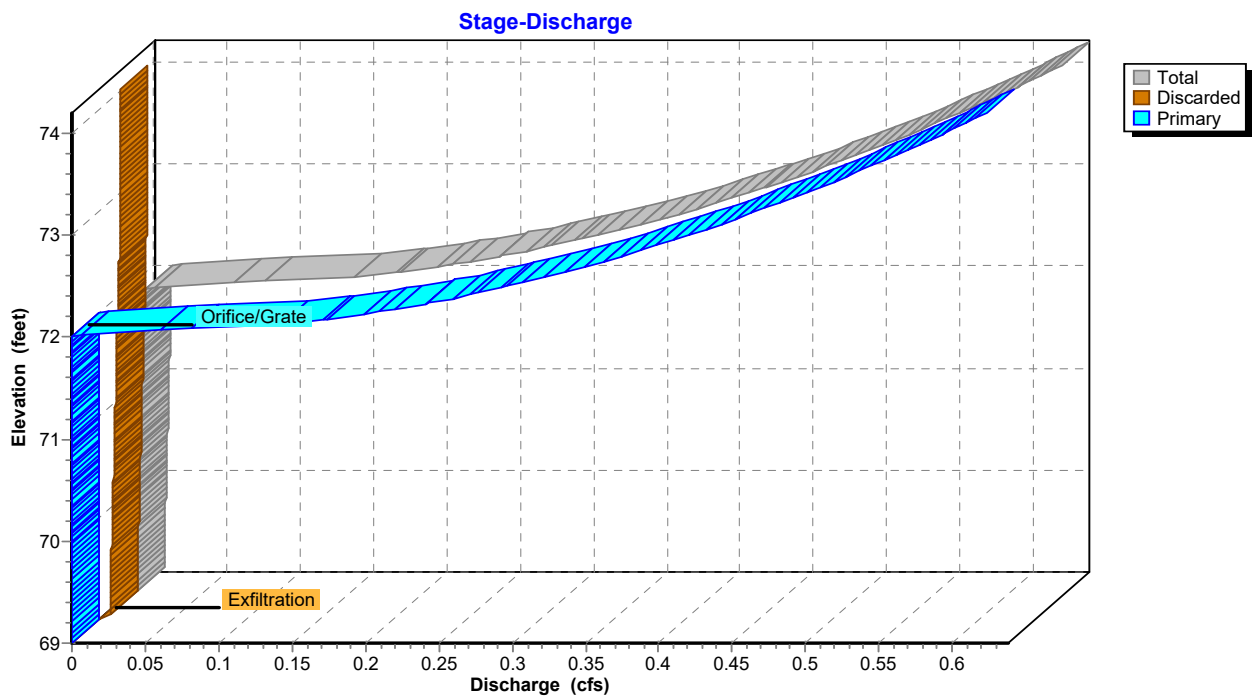
39.1 cy Stone



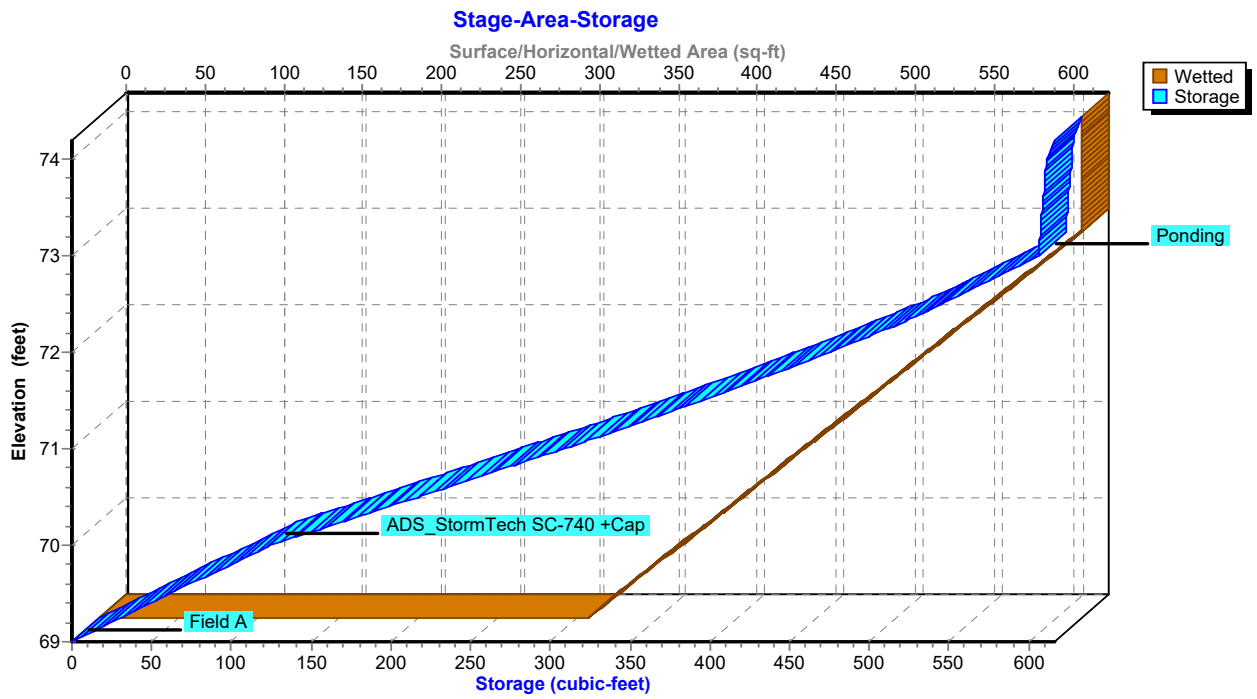
Pond 1P: STORM TECHS



Pond 1P: STORM TECHS



Pond 1P: STORM TECHS



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Type III 24-hr 25-Year Rainfall=6.35"

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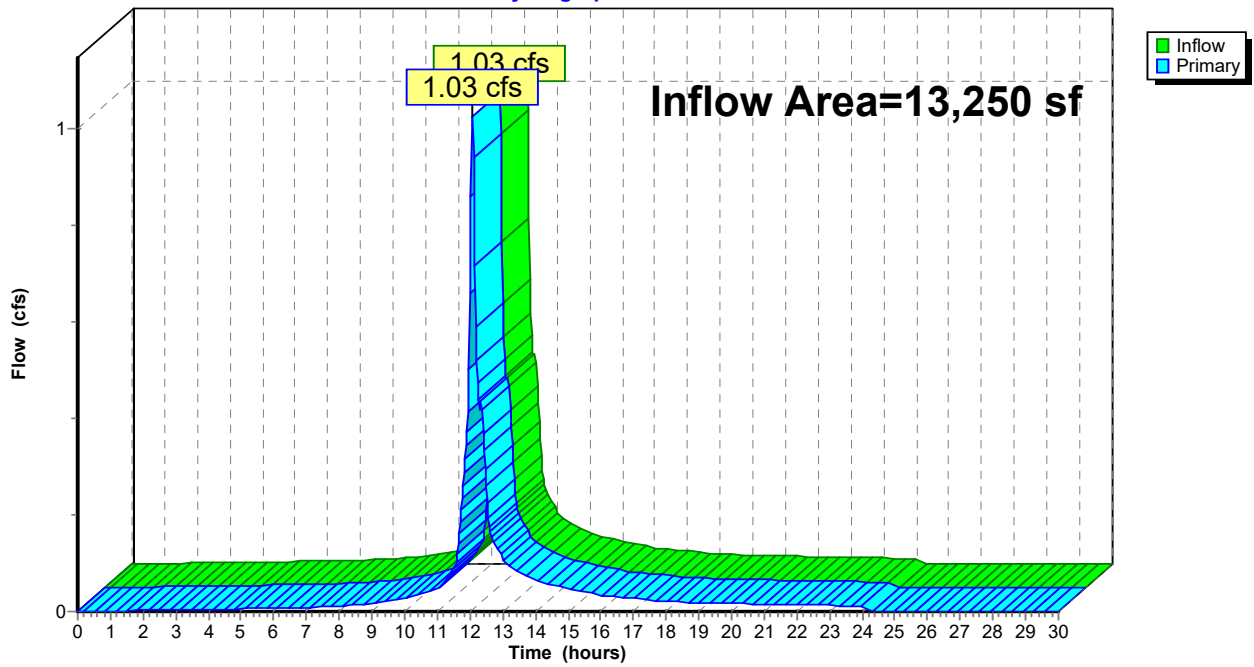
Summary for Link 3L: PROPOSED

Inflow Area = 13,250 sf, 39.06% Impervious, Inflow Depth = 3.10" for 25-Year event
Inflow = 1.03 cfs @ 12.07 hrs, Volume= 3,426 cf
Primary = 1.03 cfs @ 12.07 hrs, Volume= 3,426 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: PROPOSED

Hydrograph



PROPOSED

Type III 24-hr 100-Year Rainfall=8.16"

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Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 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 1S: EX. ROOF	Runoff Area=1,395 sf 100.00% Impervious Runoff Depth=7.92" Tc=5.0 min CN=98 Runoff=0.26 cfs 921 cf
Subcatchment 2S: EX. DRIVEWAY &	Runoff Area=873 sf 100.00% Impervious Runoff Depth=7.92" Tc=5.0 min CN=98 Runoff=0.17 cfs 576 cf
Subcatchment 3S: PROPOSED	Runoff Area=2,199 sf 100.00% Impervious Runoff Depth=7.92" Tc=5.0 min CN=98 Runoff=0.42 cfs 1,451 cf
Subcatchment 4S: PROPOSED POOL	Runoff Area=925 sf 0.00% Impervious Runoff Depth=0.00" Tc=5.0 min CN=1 Runoff=0.00 cfs 0 cf
Subcatchment 5S: PROPOSED	Runoff Area=709 sf 100.00% Impervious Runoff Depth=7.92" Tc=5.0 min CN=98 Runoff=0.13 cfs 468 cf
Subcatchment 6S: PROPOSED	Runoff Area=7,149 sf 0.00% Impervious Runoff Depth=4.49" Tc=5.0 min CN=69 Runoff=0.89 cfs 2,672 cf
Pond 1P: STORM TECHS	Peak Elev=72.29' Storage=517 cf Inflow=0.42 cfs 1,451 cf Discarded=0.01 cfs 983 cf Primary=0.23 cfs 376 cf Outflow=0.24 cfs 1,359 cf
Link 3L: PROPOSED	Inflow=1.45 cfs 5,013 cf Primary=1.45 cfs 5,013 cf

Total Runoff Area = 13,250 sf Runoff Volume = 6,089 cf Average Runoff Depth = 5.51"
60.94% Pervious = 8,074 sf 39.06% Impervious = 5,176 sf

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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 1S: EX. ROOF

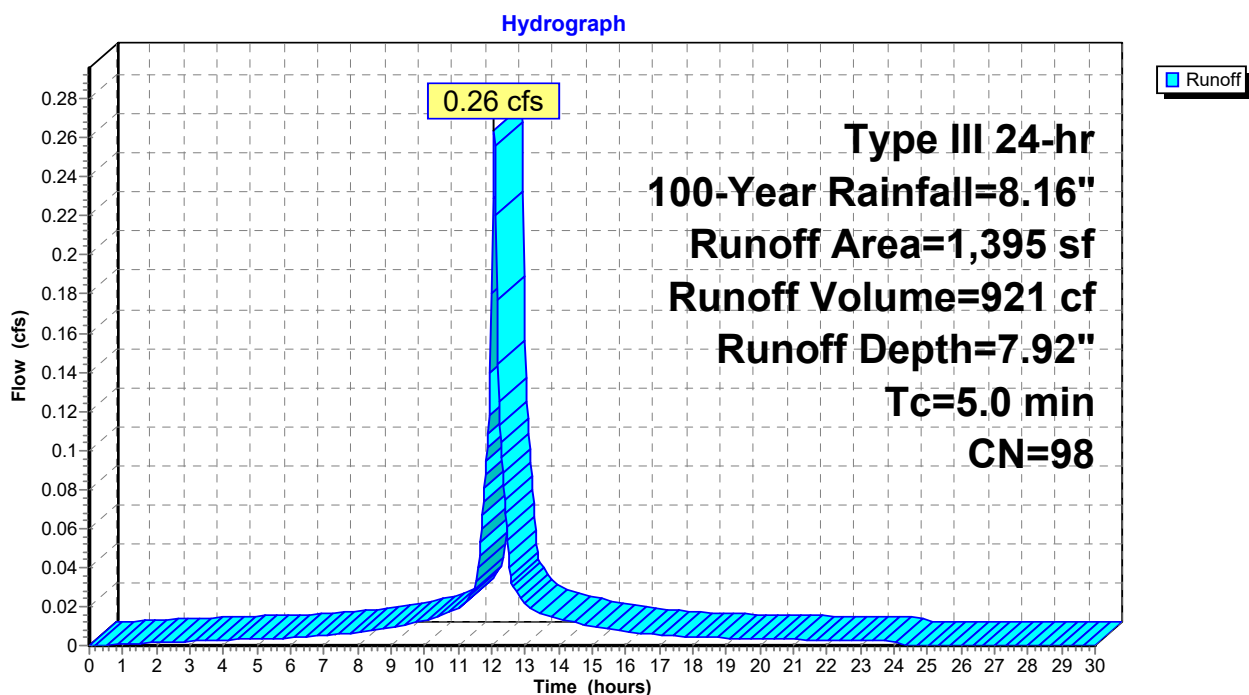
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 921 cf, Depth= 7.92"

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=8.16"

Area (sf)	CN	Description
1,395	98	Roofs, HSG A
1,395		100.00% Impervious Area

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

Subcatchment 1S: EX. ROOF



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 2S: EX. DRIVEWAY & WALKWAY

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 576 cf, Depth= 7.92"

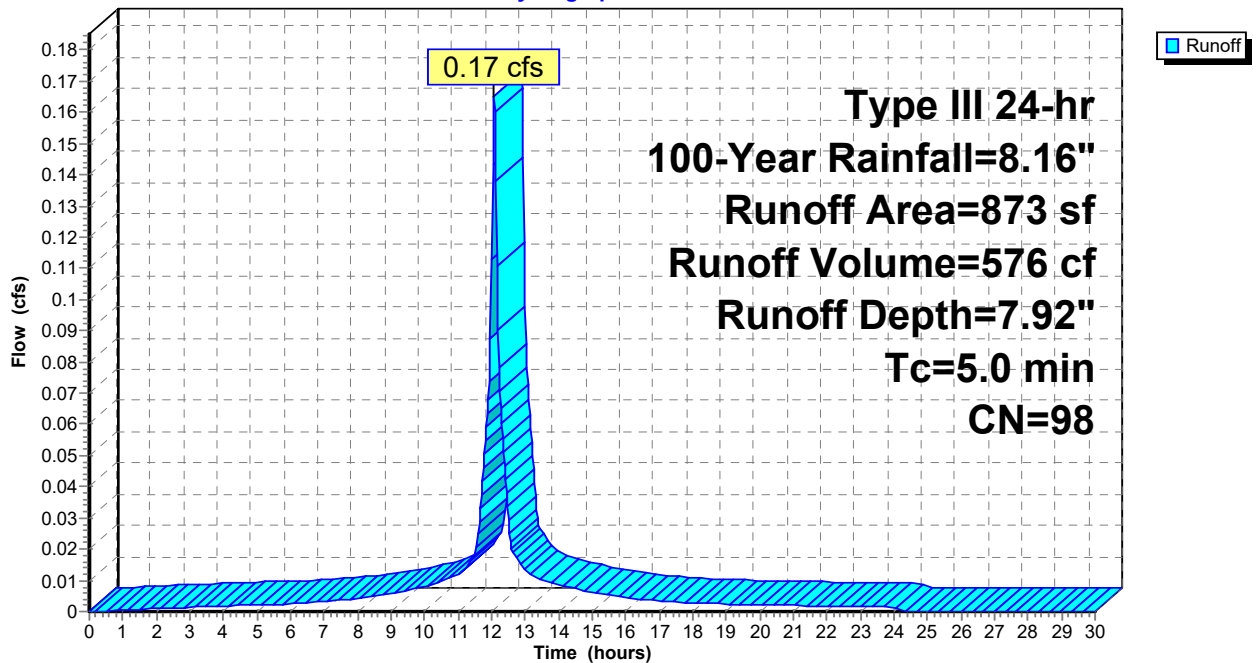
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.16"

Area (sf)	CN	Description
873	98	Paved parking, HSG A
873		100.00% Impervious Area

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

Subcatchment 2S: EX. DRIVEWAY & WALKWAY

Hydrograph



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 3S: PROPOSED PAVERS

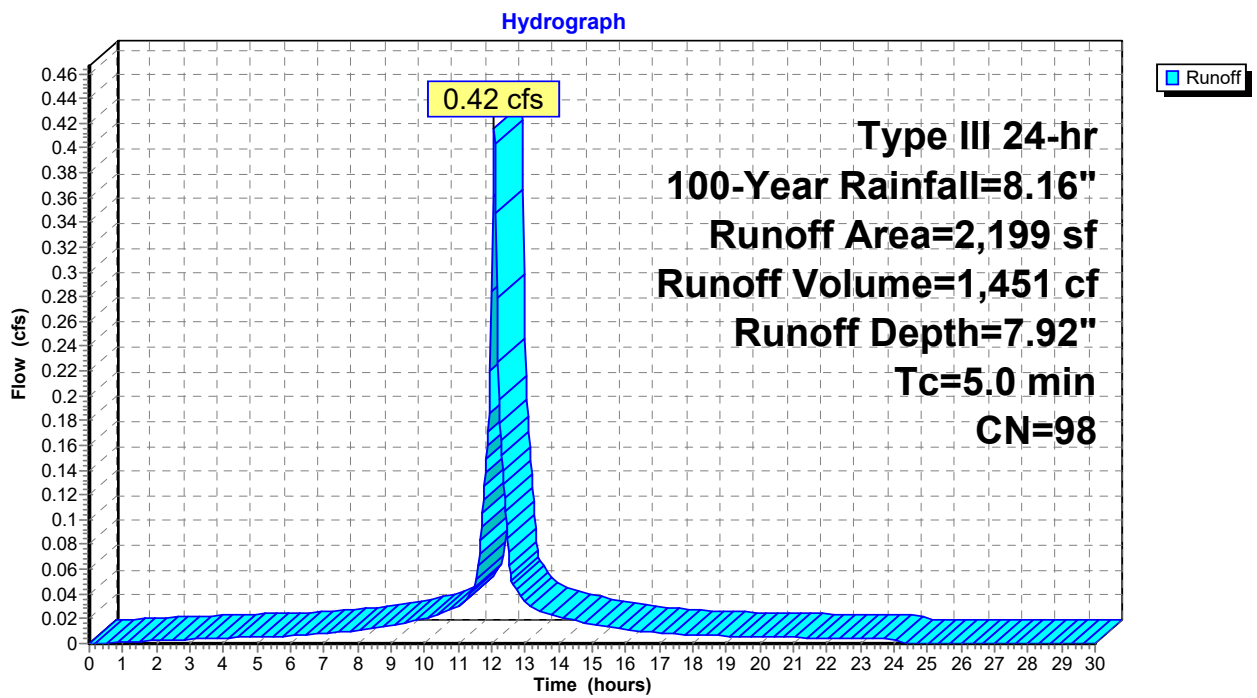
Runoff = 0.42 cfs @ 12.07 hrs, Volume= 1,451 cf, Depth= 7.92"

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=8.16"

Area (sf)	CN	Description
* 2,199	98	Pavers
2,199		100.00% Impervious Area

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

Subcatchment 3S: PROPOSED PAVERS



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 4S: PROPOSED POOL

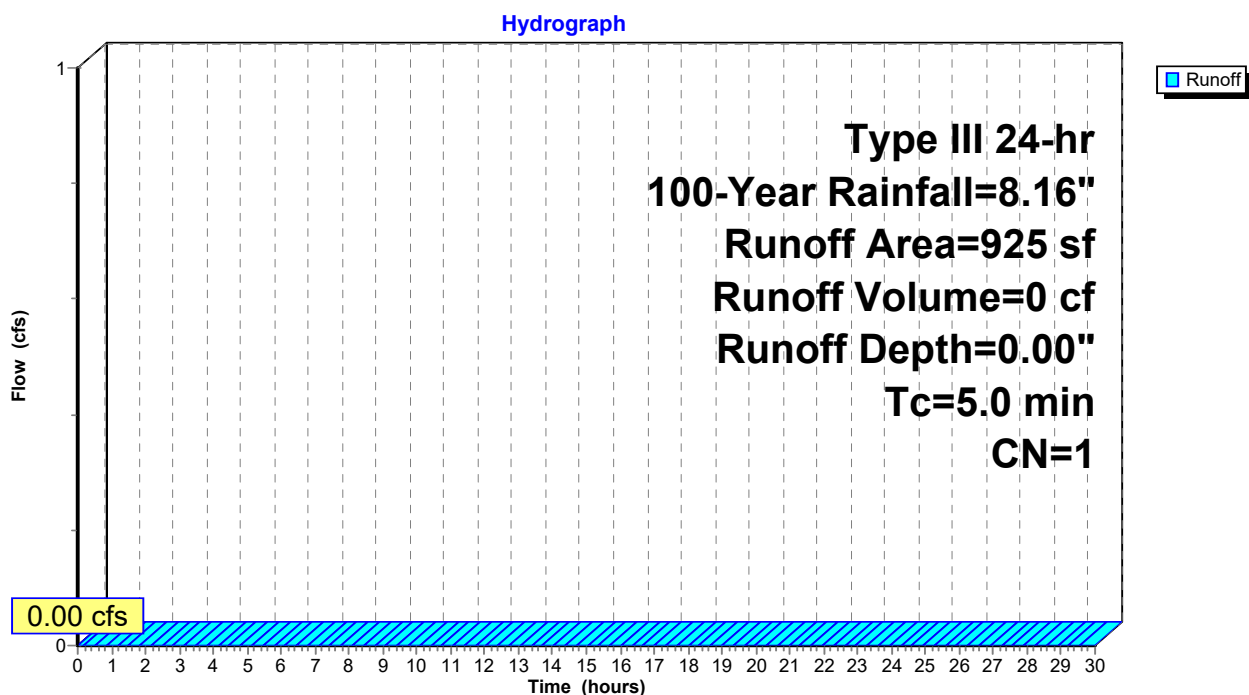
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

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=8.16"

Area (sf)	CN	Description
* 925	1	Pool
925		100.00% Pervious Area

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

Subcatchment 4S: PROPOSED POOL



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 5S: PROPOSED IMPERVIOUS

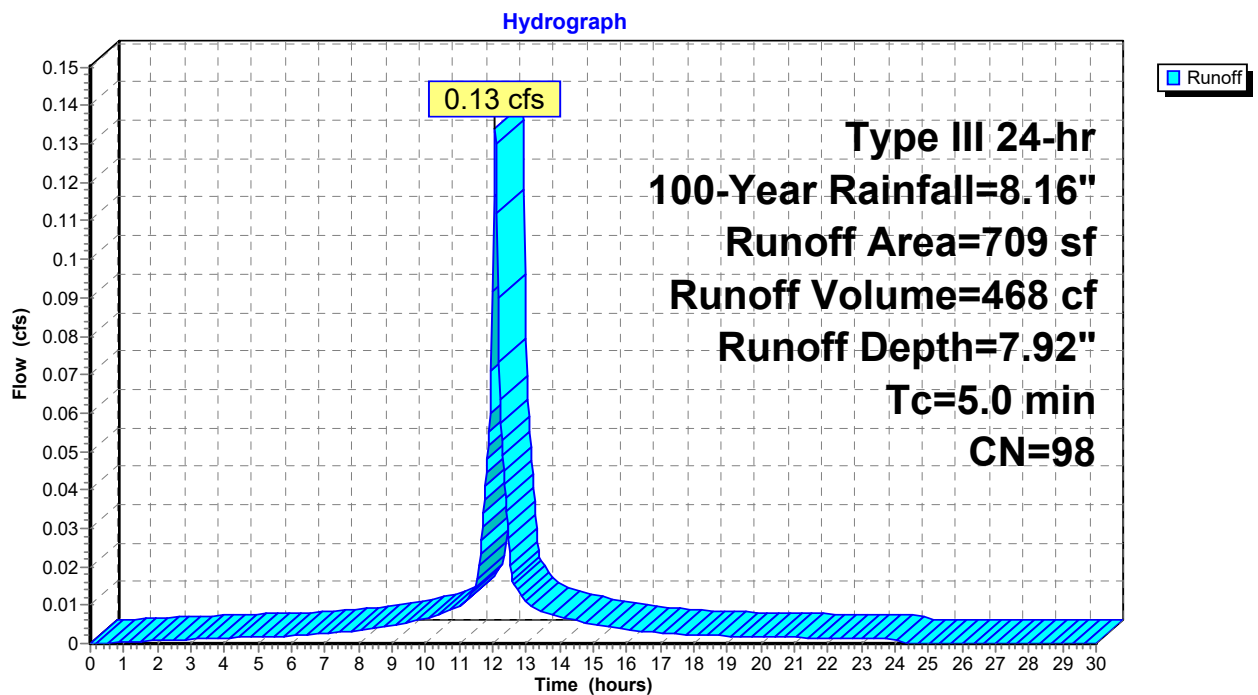
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 468 cf, Depth= 7.92"

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=8.16"

Area (sf)	CN	Description
* 709	98	Deck/Porch/Retaining Wall/Landing & Steps
709		100.00% Impervious Area

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

Subcatchment 5S: PROPOSED IMPERVIOUS



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Subcatchment 6S: PROPOSED LANDSCAPE AREA

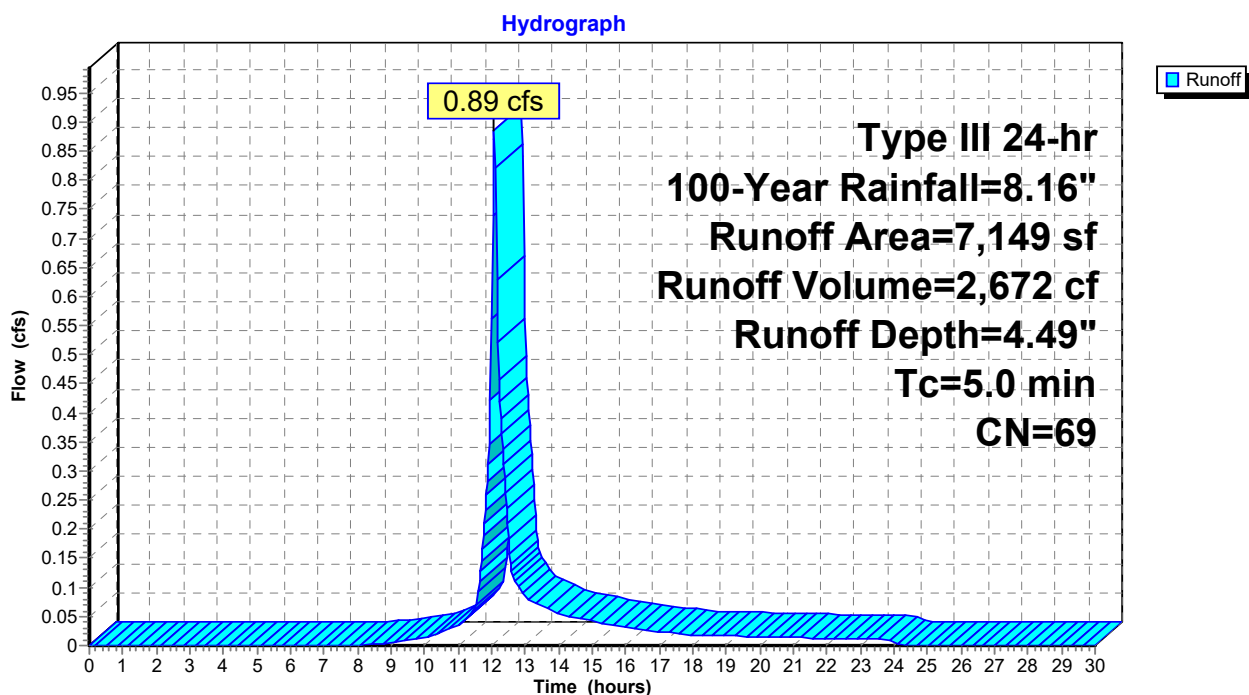
Runoff = 0.89 cfs @ 12.08 hrs, Volume= 2,672 cf, Depth= 4.49"

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=8.16"

Area (sf)	CN	Description
7,149	69	50-75% Grass cover, Fair, HSG B
7,149		100.00% Pervious Area

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

Subcatchment 6S: PROPOSED LANDSCAPE AREA



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Type III 24-hr 100-Year Rainfall=8.16"

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Summary for Pond 1P: STORM TECHS

Inflow Area = 2,199 sf, 100.00% Impervious, Inflow Depth = 7.92" for 100-Year event
 Inflow = 0.42 cfs @ 12.07 hrs, Volume= 1,451 cf
 Outflow = 0.24 cfs @ 12.18 hrs, Volume= 1,359 cf, Atten= 43%, Lag= 6.4 min
 Discarded = 0.01 cfs @ 12.18 hrs, Volume= 983 cf
 Primary = 0.23 cfs @ 12.18 hrs, Volume= 376 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
 Peak Elev= 72.29' @ 12.18 hrs Surf.Area= 310 sf Storage= 517 cf

Plug-Flow detention time= 258.3 min calculated for 1,358 cf (94% of inflow)
 Center-of-Mass det. time= 222.8 min (962.9 - 740.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	69.00'	422 cf	28.00'W x 11.07'L x 4.00'H Field A 1,240 cf Overall - 184 cf Embedded = 1,056 cf x 40.0% Voids
#2A	70.00'	184 cf	ADS_StormTech SC-740 +Cap x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 4 Rows
#3	73.00'	10 cf	Ponding Listed below -Impervious
		616 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Cum.Store (cubic-feet)
73.00	0
74.00	5
74.20	10

Device	Routing	Invert	Outlet Devices
#1	Discarded	69.00'	1.020 in/hr Exfiltration over Wetted area
#2	Primary	72.00'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.18 hrs HW=72.29' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.22 cfs @ 12.18 hrs HW=72.29' (Free Discharge)
 ↑2=Orifice/Grate (Orifice Controls 0.22 cfs @ 2.58 fps)

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Type III 24-hr 100-Year Rainfall=8.16"

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Pond 1P: STORM TECHS - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 18.0" Spacing = 69.0" C-C Row Spacing

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +14.0" End Stone x 2 = 11.07' Base Length

4 Rows x 51.0" Wide + 18.0" Spacing x 3 + 39.0" Side Stone x 2 = 28.00' Base Width

12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

4 Chambers x 45.9 cf = 183.8 cf Chamber Storage

1,239.8 cf Field - 183.8 cf Chambers = 1,056.1 cf Stone x 40.0% Voids = 422.4 cf Stone Storage

Chamber Storage + Stone Storage = 606.2 cf = 0.014 af

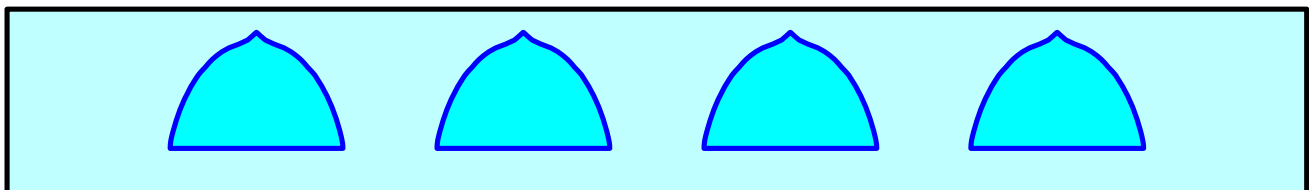
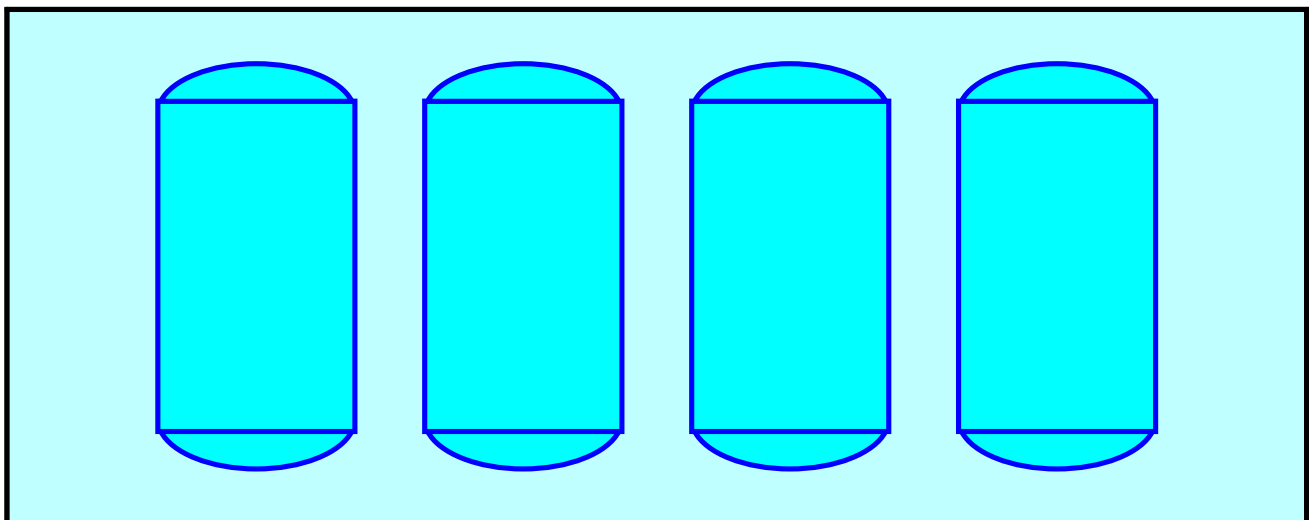
Overall Storage Efficiency = 48.9%

Overall System Size = 11.07' x 28.00' x 4.00'

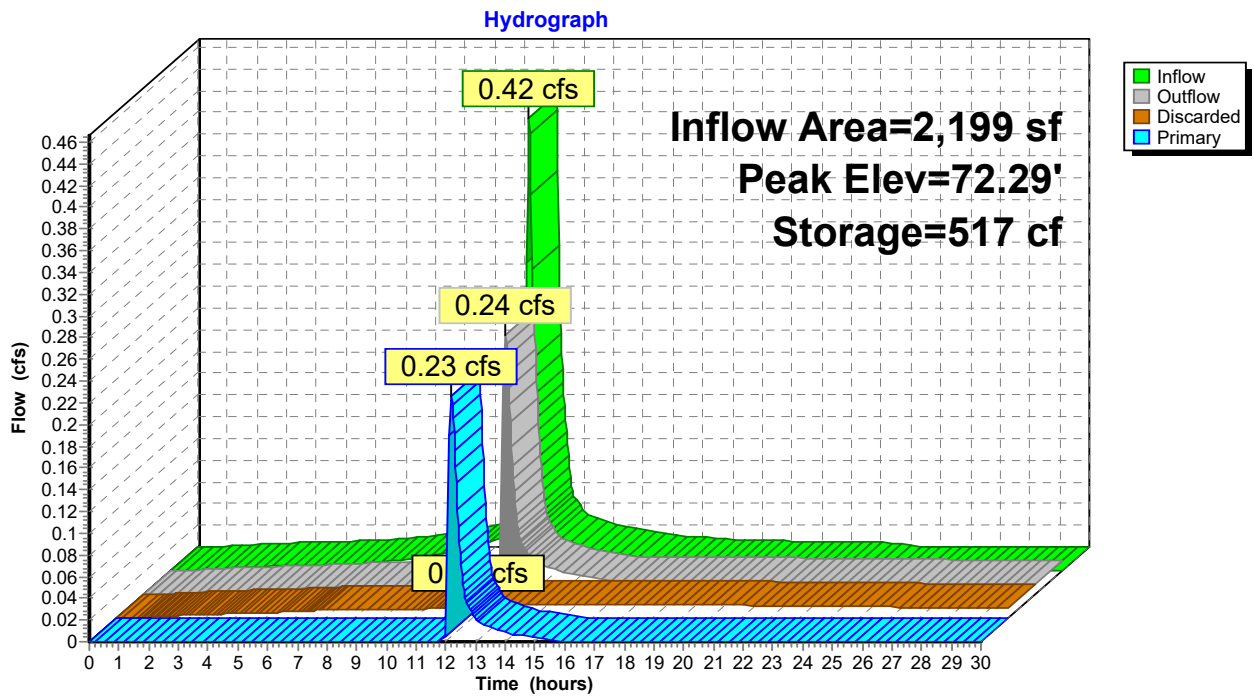
4 Chambers

45.9 cy Field

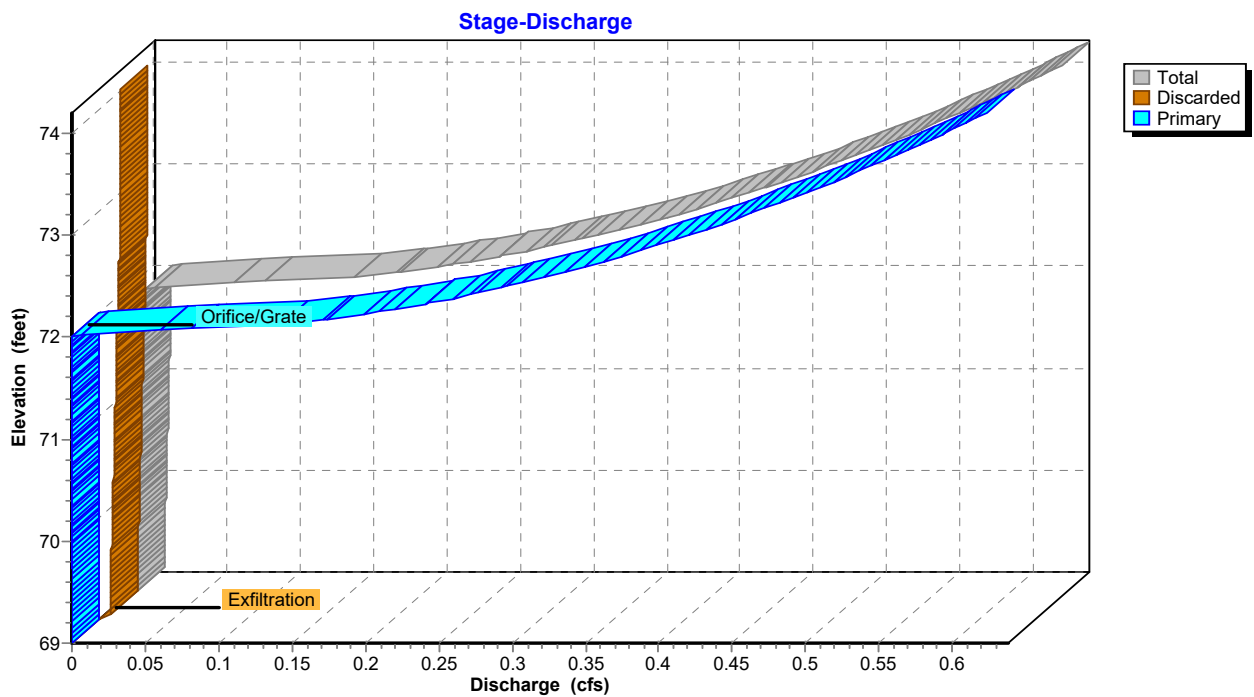
39.1 cy Stone



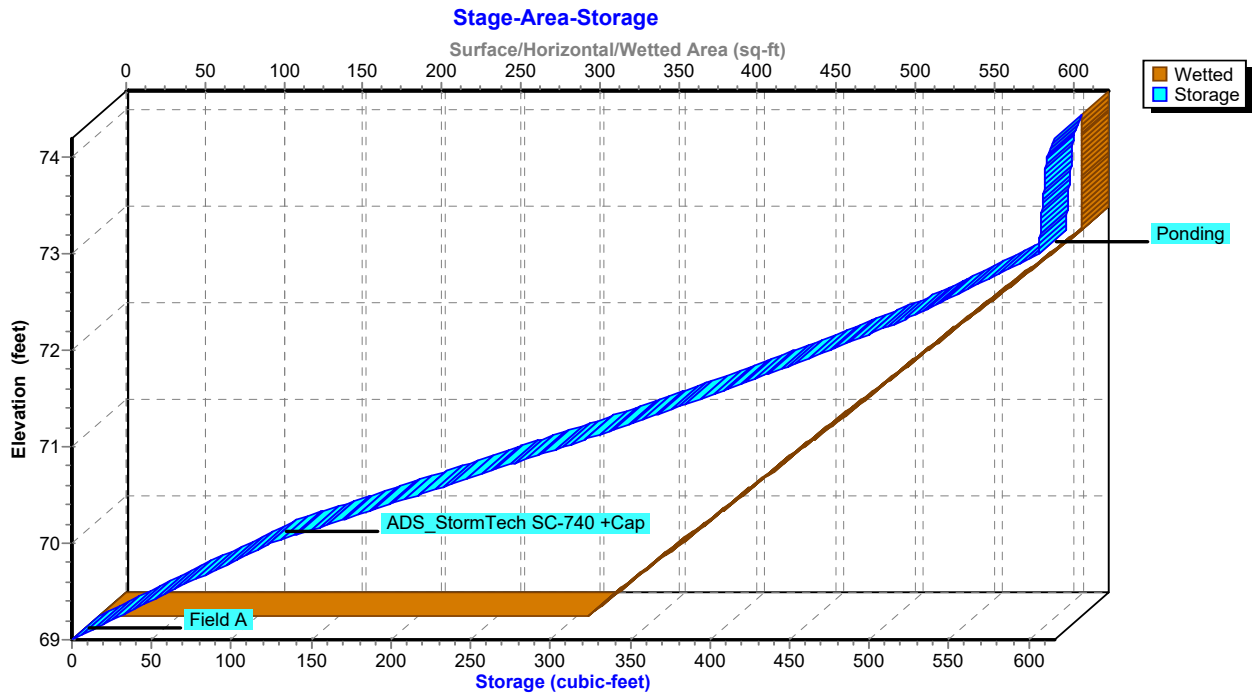
Pond 1P: STORM TECHS



Pond 1P: STORM TECHS



Pond 1P: STORM TECHS



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Type III 24-hr 100-Year Rainfall=8.16"

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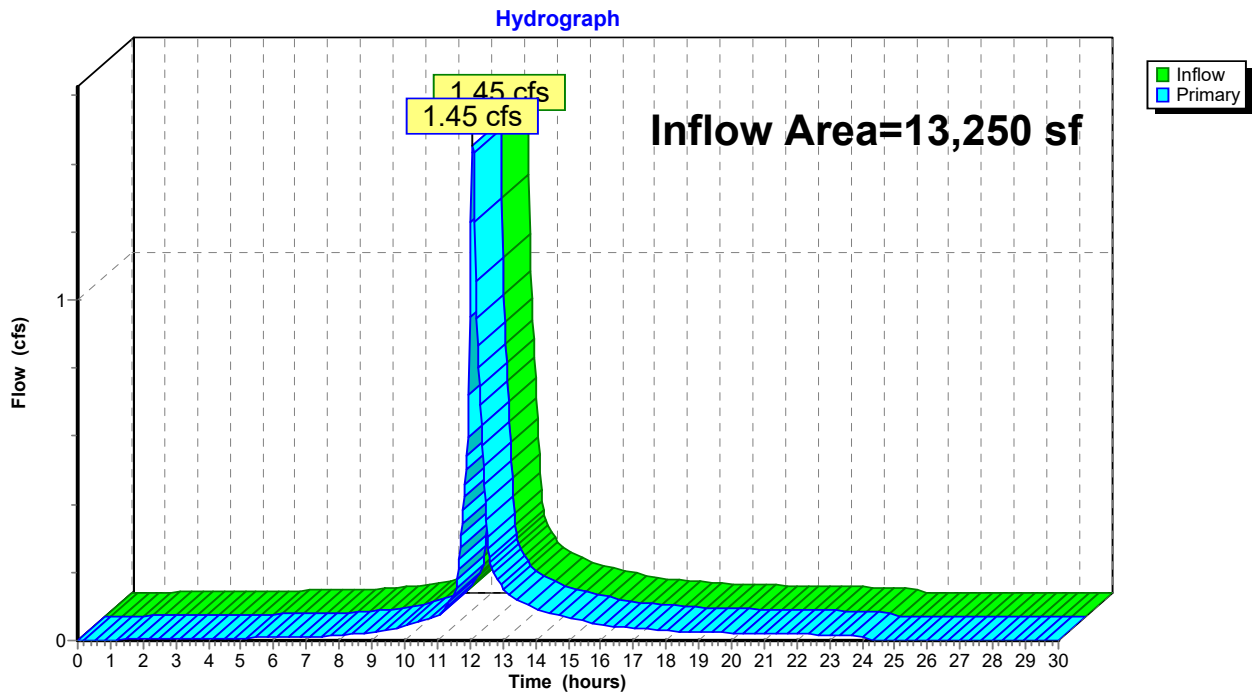
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Summary for Link 3L: PROPOSED

Inflow Area = 13,250 sf, 39.06% Impervious, Inflow Depth = 4.54" for 100-Year event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 5,013 cf
Primary = 1.45 cfs @ 12.09 hrs, Volume= 5,013 cf, Atten= 0%, Lag= 0.0 min

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

Link 3L: PROPOSED

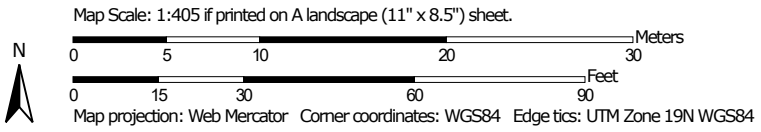


Appendix B – Soils Information

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
 Survey Area Data: Version 22, Sep 9, 2022

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	0.2	52.8%
655	Udortheents, wet substratum	0.2	47.2%
Totals for Area of Interest		0.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

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onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, Massachusetts

51A—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Bogs, swamps

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Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

655—Udorthents, wet substratum

Map Unit Setting

National map unit symbol: vr1n
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, wet substratum, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Wet Substratum

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Urban land

Percent of map unit: 8 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Freetown

Percent of map unit: 4 percent
Landform: Depressions, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Depressions, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes