STORMWATER MANAGEMENT ANALYSIS

FOR

21-27 HANCOCK STREET, NEWBURYPORT, MA

Prepared for:
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Prepared by:
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REVISED: May 12, 2021

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TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

Caswell Development is proposing to redevelop the site located at 21 and 27 Hancock Street, Newburyport, MA with the construction of two 2-family townhomes. The following report addresses the hydrologic calculations and stormwater management design proposed at the site.

2.0 EXISTING CONDITION

The limit of work for the project is the parcels of land shown in the Town of Newburyport's Assessor's Database as Map 25, Parcels 42 and 43. These two parcels are identified as 27 Hancock Street and 21-25 Hancock Street, with Leavitt Court, currently a "paper street" running between the two parcels and currently providing access to the single-family home located at 27 Hancock Street. The 21-25 Hancock Street parcel is approximately 16,228 SF of area and the 27 Hancock Street parcel is approximately 16,400 SF. Therefore the total area of the two parcels is 0.49 acres (32,628 SF). The total subject site, including the Leavitt Court area is 0.85 acres (36,954 SF).

The 27 Hancock Street parcel currently consists of a single-family home surrounded by a paved driveway, lawn area, landscaping and some wooded area. The 21-25 Hancock Street parcel currently consists of a large automobile garage with three garage bays, also with paved driveway access, some surrounding lawn area and plenty of surrounding wooded area in the rear. The existing site is 47.4% impervious.

2.1 Existing Hydrology

For the design purposes of this study, due to limits of available survey information, the drainage areas have been defined by the parcel boundaries. Within these parcel boundaries, there are two design discharge points located at the site, consisting of two catchment areas within the property, neither of which currently have any sort of a present stormwater system.

The first design discharge point is located in the northern corner of the site, where it abuts the Clipper City Rail Trail. The second design discharge point is at the east corner of the site where it drains to neighboring property. The two catchment areas are divided by a highpoint the runs through the center of the site, dividing it into two drainage areas.

Design Point 1, located at the connection with the rail trail property, drains into a small ravine-like area as it flows offsite. The area that drains to Design Point 2, drains across as somewhat low sloping grass area in the rear of the property as it flows offsite and enters the neighbor's yard.

2.2 FEMA Flood Insurance Rate Map

According to the FEMA Flood Insurance Rate Map Number 25009C0136G, with an effective date of July 16, 2014, the site is located within a Zone X, which is "areas determined to be outside the 0.2% annual chance floodplain." (*See Appendix C: FEMA Flood Insurance Rate Map*)

2.3 Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the soils across the entire site is classified as Merrimac Fine Sandy Loam, 0 to 3 percent slopes. This soil classification is recognized as part of Hydrologic Soil Group A, which was used for the purposes of hydrologic calculations across the entire site. Additionally, soils infiltration tests were done on the

site in March, 2021 and infiltration rates at the raingarden, drywell and Cultec locations were found to be between 17-18 in/hr. (*See Appendix D: Soils Information*)

3.0 PROPOSED CONDITION

The project proposes the redevelopment of the site at 21-27 Hancock Street with the construction of two 2-family townhomes, each with driveway access from either directly off Hancock Street or from Leavitt Court, which is proposed to be constructed as a paved 20' wide roadway. There will also be a side driveway proposed for access to one of the townhomes. The proposed site will include 7,924 SF of roof area, along with 6,456 SF of paved roadway and driveway area. The rest of the site will consist of landscaping/lawn or wooded area. The proposed site is 39.5% impervious. This is an 8.3% decrease in impervious area. This alone reduces the stormwater flow off the property. In the interest of controlling runoff to ensure there is no impact to the abutting properties we have provided on site stormwater mitigation including a rain garden and infiltration pipe imbedded in stone for the new private drive. A drywell and infiltration chambers are provided to handle the driveway off Hancock Street and roof area of the two units on the easterly side of the property.

3.1 Proposed Hydrology

In the proposed design, there are still two design points, both of which are in the same locations as discussed above in the existing hydrology. These design points and their drainage areas are addressed below:

Design Point 1 – Rail Trail

- 10S – This subcatchment consists of the lawn area, and the rear section of the roof area that drains to the northern corner where it flows to the Clipper City Rail Trail. The subcatchment also includes roof area that is directed via downspouts/spreaders.
- 20S – This subcatchment consists of the proposed roadway surface and the center lawn and landscaping area, as well as the roof areas that drain toward the inner section of the site. This drainage area flows to a raingarden at the rear of the roadway. This raingarden is proposed to be 8" deep and will include a 6" overflow outlet that will drain to a 12" perforated pipe set below the raingarden. This 12" pipe will be set in 2' x 2' x 40' of crushed stone. Once the perforated pipe and stone is filled with runoff, and then the raingarden fills with runoff, it will overtop via a 6' wide overflow weir (See Sheet D1 – Civil Details) along the raingarden edge. Any overflow from the raingarden will be directed via a grass swale to the northern corner of the property to Design Point 1.
  It should be noted that the drainage calculations of this design only include the raingarden in the model and not the perforated pipe/crushed stone system below. It was done this wat to avoid any excess complexity that the perforated pipe/stone system set below the raingarden would pose to the model, leading to possible inaccuracies in flow rates. Based on the stone area's bottom width of 40' x 2' and an infiltration rate of 17 in/hr (determined in the field), the stone area would exfiltrate approximately 0.03--05 CFS (cubic feet per second) which would only have a marginal impact on the discarded rates within the model.

Design Point 2 – Eastern Abutters

- 30S – This subcatchment consists of the driveway and some lawn and walkway area that drains to a 300 gallon drywell. This drywell includes an overflow via the rim that releases any excess flow further "downstream" joining the flow across subcatchment 40S toward Design Point 2.

- 40S – This subcatchment includes all of the lawn area on the eastern portion of the property that drains directly down the topography to the eastern property boundary.
- 41S – This subcatchment consists solely of the portion of the roof that would drain directly to the eastern abutters. The runoff from this roof surface (shown on the Drainage Area Plan – C401) is directed, via gutters and downspouts, to an infiltration system consisting of three Cultec R-330XLHD recharge chambers that will hold and infiltrate the roof runoff. Any excess will be directed via and overflow weir to Design Point 2 along with the rest of the runoff from subcatchment 40S.

See hydrologic model below for summarized hydrologic calculations of offsite flow rates and volumes for the two separate design points and the totals. See Appendix B: Existing and Proposed Drainage Areas for detailed layouts of the above discussed drainage areas.

4.0 HYDROLOGIC MODEL

The hydrologic model was developed in HydroCAD. Both existing and proposed conditions are modeled for the 2-year, 10-year, 25-year, and 100-year 24-hour storm events. HydroCAD allows for variable rainfall intensity throughout the storm duration, peaking near the middle of the Type III, 24-hour storm. The drainage areas' time of concentration (t_c) has been calculated for each catchment area. For Design Point 1 we have not included the discharge from the overflow standpipe with infiltration pipe. We were having issues including this feature in the model. This is minimal regarding the rate of stormwater mitigation with between 0.03 and 0.05 cfs of rate reductions not accounted for in the model. This rate is based upon using the infiltration rate or 17" per hour as determined in the double ring infiltrometer test. Complete calculations, performed using the HydroCAD software, are included in the appendix.

Table 4.1: Hydrological Calculation Summary

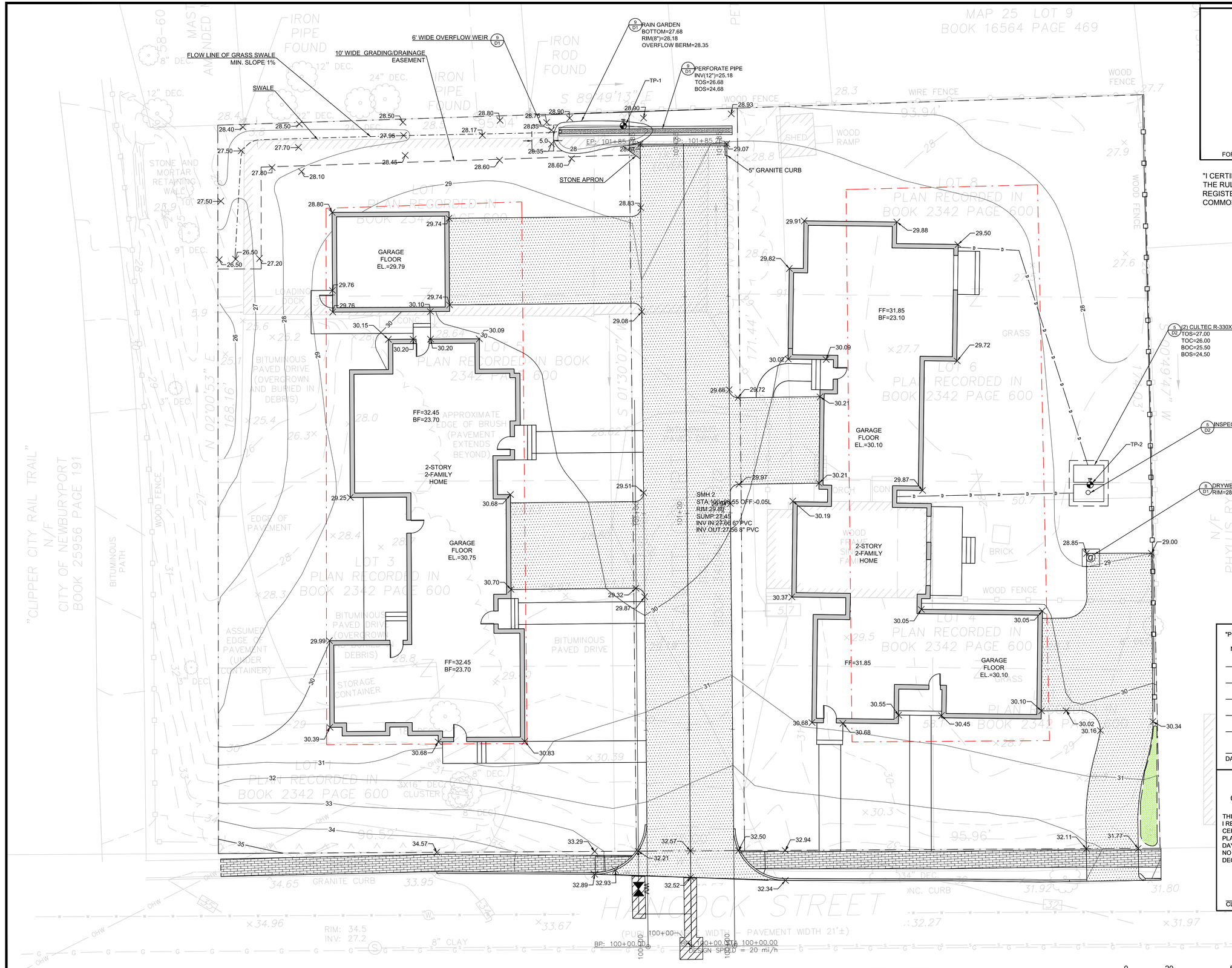
		Design Point 1		**Design Point 2**		**Total**	
Rainfall Event		*Existing*	**Proposed**	*Existing*	**Proposed**	*Existing*	**Proposed**
2 Yr	Rate (cfs)	*1.10*	0.52	*0.00*	0.00	*1.10*	0.52
	Volume (cf)	*2,838*	1,394	*116*	3	*2,955*	1,397
10 Yr	Rate (cfs)	*2.04*	1.29	*0.13*	0.12	*2.07*	1.38
	Volume (cf)	*5,315*	3,459	*747*	257	*6,062*	3,716
25 Yr	Rate (cfs)	*2.80*	2.04	*0.41*	0.23	*3.06*	2.27
	Volume (cf)	*7,371*	5,397	*1,529*	679	*8,900*	6,076
100 Yr	Rate (cfs)	*4.37*	3.79	*1.22*	1.14	*5.32*	4.92
	Volume (cf)	*11,789*	9,947	*3,706*	1,998	*15,495*	11,945

5.0 CONCLUSION

Based on DCI's analysis of the existing and proposed conditions, the proposed site conditions meet the stormwater management criteria set. Design point runoff volumes have been decreased for the 2-year, 10-year, 25-year and 100-year storm events. Peak flow rates are decreased for the 2-year and 10-year, 25-year and 100-year storm event. DCI concludes that the proposed redevelopment at 21-27 Hancock Street, Newburyport, MA adheres to all applicable stormwater management policies.

Appendix A

SITE PLANS



FOR REGISTRY OF DEEDS USE ONLY

"I CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS."

"PLANNING BOARD APPROVAL UNDER SUBDIVISION CONTROL LAW "
NEWBURYPORT PLANNING BOARD

DATE

CITY OF NEWBURYPORT
OFFICE OF THE CITY CLERK

THIS IS TO CERTIFY THAT ON / / , I RECEIVED FROM THE PLANNING BOARD CERTIFICATION OF ITS APPROVAL OF THIS PLAN AND THAT DURING THE (20) TWENTY DAYS NEXT FOLLOWING, I HAVE RECEIVED NO NOTICE OF ANY APPEAL FROM SAID DECISION.

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CASWELL DEVELOPMENT
24 GRAF ROAD
NEWBURYPORT MA

ARCHITECT:
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PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

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3	PB/PEER REVIEW	04/14/2021
2	PEER REVIEW	03/31/2021
1	PLAN UPDATE	03/19/2021

STAMP:

GRADING & DRAINAGE PLAN

SHEET NAME:

C2

SHT NO:

DR BY: GS
CHK BY: SS
PROJ NO: 20-087
DATE: 02/17/2021
SCALE: 1"=10'

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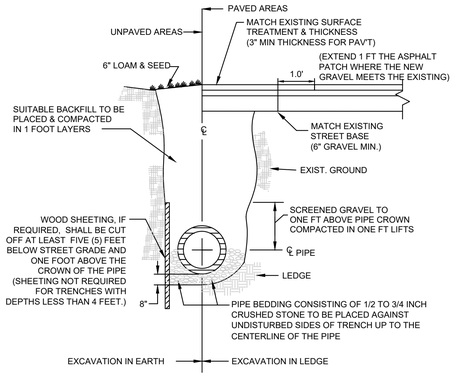

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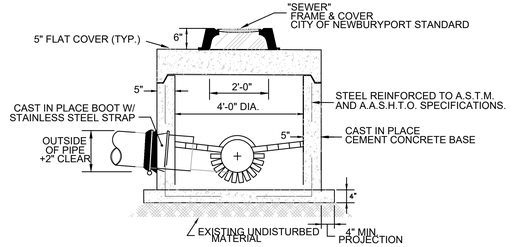

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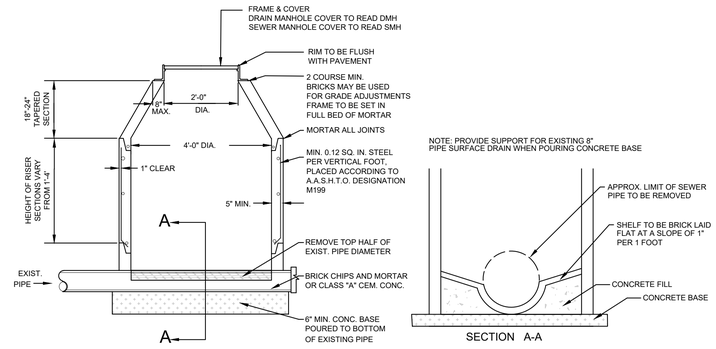

3 MANHOLE OVER EXISTING PIPE
NOT TO SCALE

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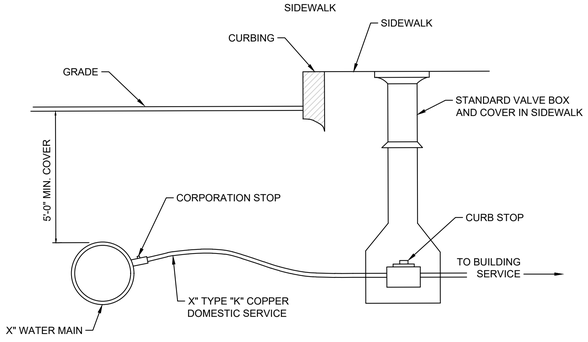

4 COPPER WATER SERVICE CONNECTION
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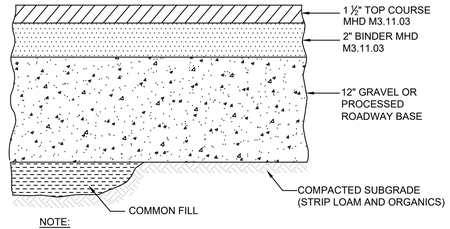

NOTE:
1. SEE SITE LAYOUT PLAN FOR PAVEMENT WIDTH AND LOCATION.
2. SEE GRADING PLAN FOR PAVEMENT SLOPE AND CROSS-SLOPE.

5 BITUMINOUS CONCRETE PAVEMENT
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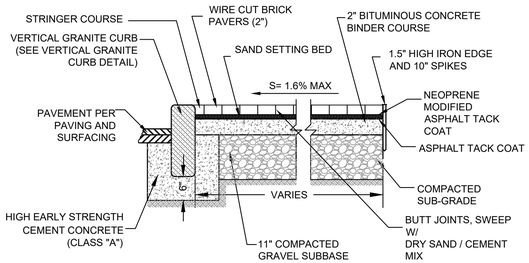

6 BRICK SIDEWALK
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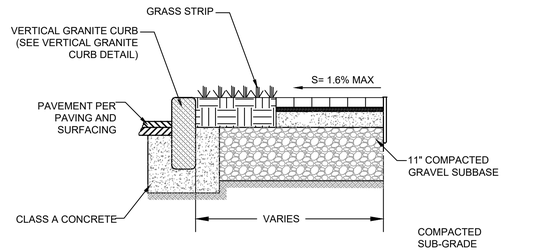

7 BRICK SIDEWALK & GRASS STRIP
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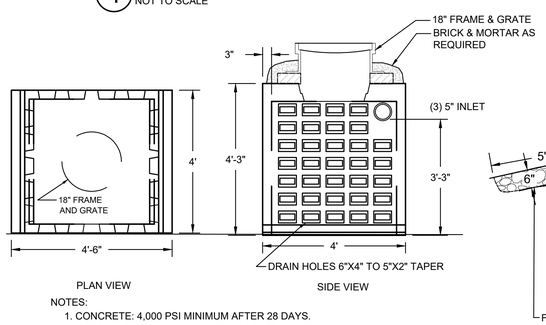
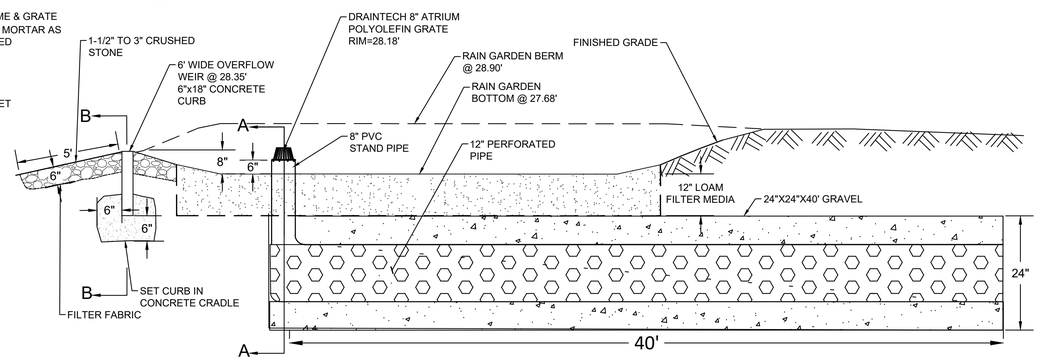


NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGNED FOR AASHTO HS-20 LOADING, 1 TO 3 FT COVER.

8 DRY WELL 300 GALLON
NOT TO SCALE



9 RAIN GARDEN
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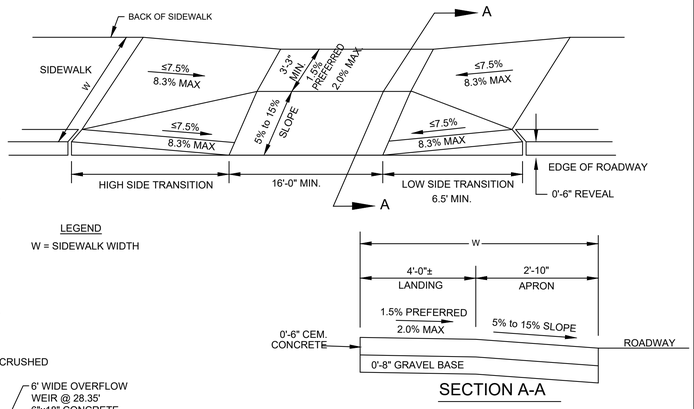

10 DRIVEWAY WITH TIPDOWNS
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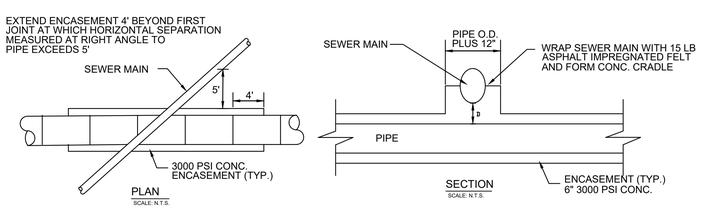

11 CONCRETE ENCASEMENT DETAIL
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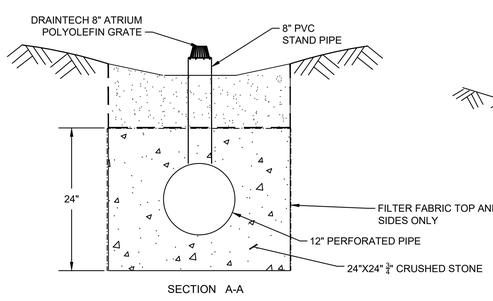
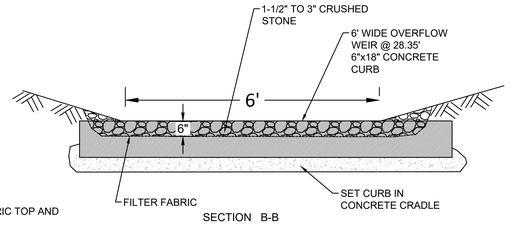


SECTION A-A



SECTION B-B

CITY OF NEWBURYPORT
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SURVEYOR
WINTER GEC
44 MERRIMAC ST. UNIT 312
NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

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STAMP:

CONSTRUCTION DETAILS

SHEET NAME:

D1

SHT NO:

DR BY: MCH
CHK BY: SBS
PROJ NO: 20-087
DATE: 02/17/2021
SCALE: NOT TO SCALE

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Appendix B

EXISTING & PROPOSED DRAINAGE AREAS

EXISTING

PROPOSED

LEGEND

- IMPERVIOUS AREA
- WOODED AREA
- LANDSCAPE
- PERMEABLE PAVERS
- 1S — SUBCATCHMENT
- 1P — POND
- 1R — DESIGN POINT
- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION

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PROJECT INFO

REV	DESCRIPTION	DATE
2	PEER REVIEW	03/31/2021
1	PLAN UPDATE	03/19/2021

STAMP:

DRAINAGE AREA PLAN

SHEET NAME:

C401

SHT NO:

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PROJ NO:	20-067
DATE:	12/9/2020
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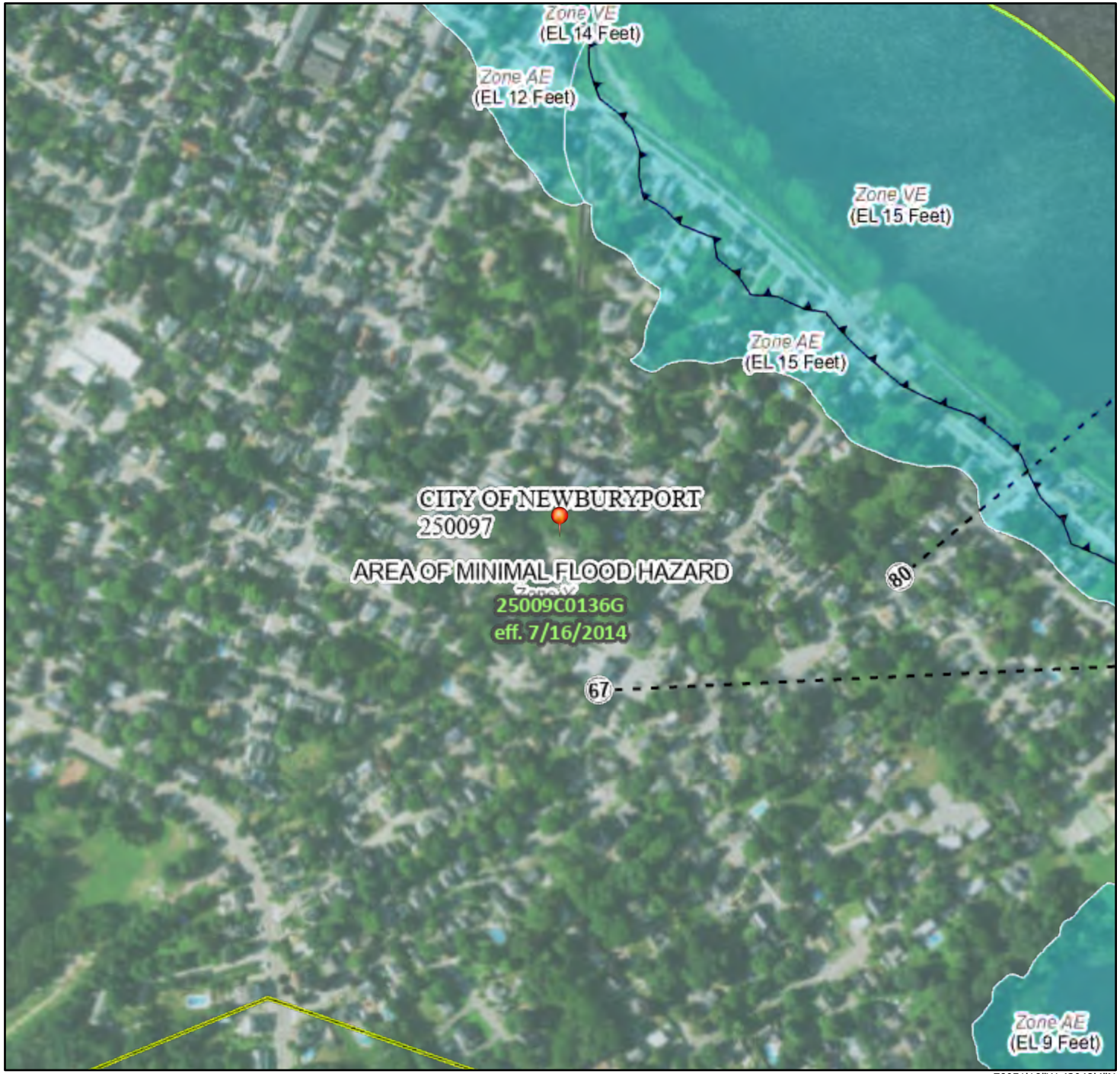
Appendix C

FEMA FLOOD INSURANCE RATE MAP

National Flood Hazard Layer FIRMette

FEMA

70°51'56"W 42°48'30"N



70°51'19"W 42°48'4"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

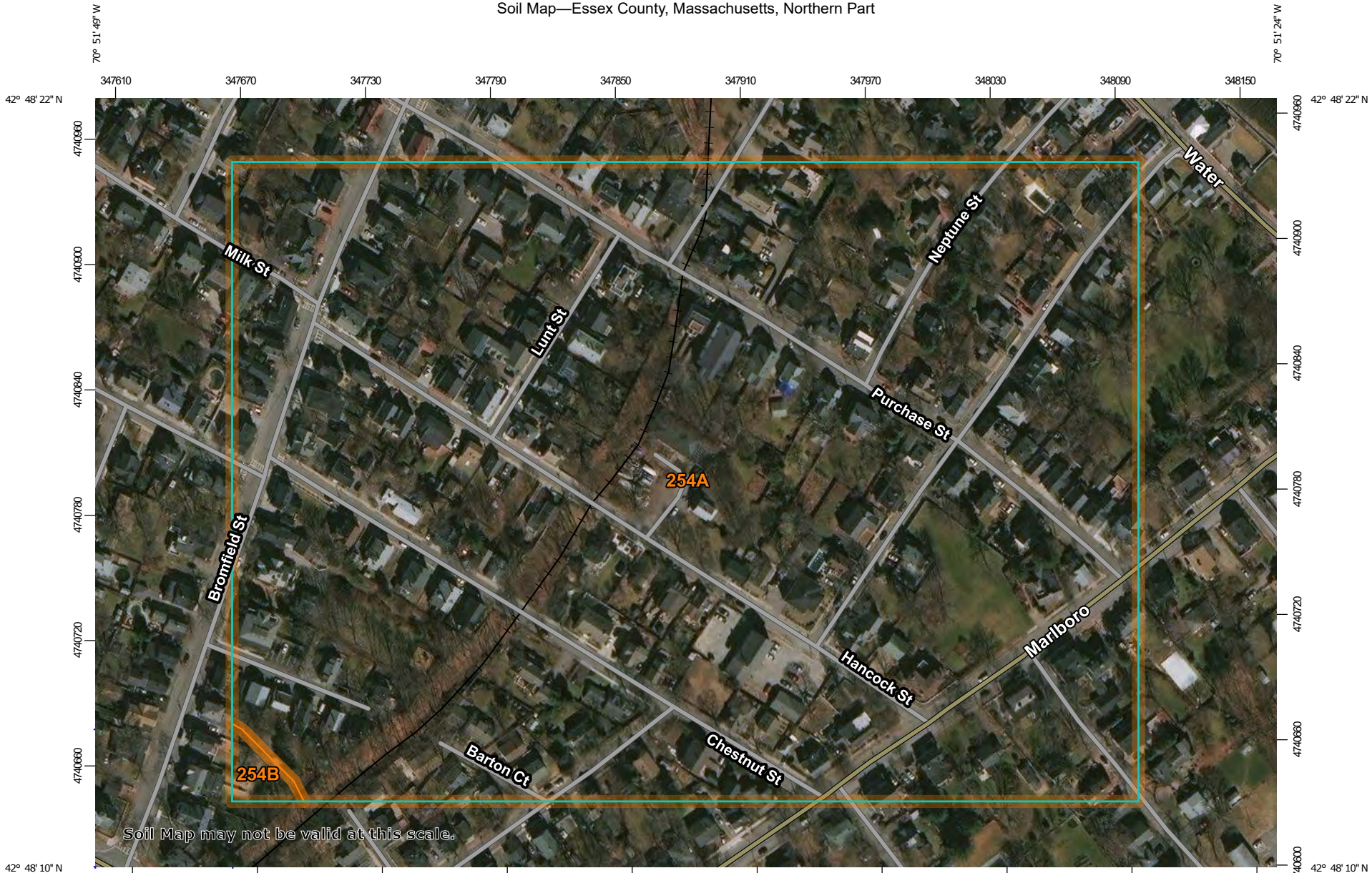
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/29/2021 at 2:47 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix D

SOILS INFORMATION



Map Scale: 1:2,590 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil 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 1:15,800.

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: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 16, Jun 9, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Sep 12, 2016

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
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	32.9	99.4%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	0.2	0.6%
Totals for Area of Interest		**33.1**	**100.0%**

DOUBLE RING INFILTROMITER TEST

NEWBURYPORT, MASSACHUSETTS

21-27 Hancock Street, Massachusetts

Percolation Test	Dbl ring inf.test (TP-1)	Dbl ring inf. test (TP-2)
Depth of test:	30”	30”
Start presoak:	5 min	5 min
Time at 4”→	0:00	0:00
Time at 3”→	01:38	1:25
Time at 2”→	3:30	3:20
Time at 1”→	5:20	5:00
Total time 4” to 1”→	5.33 minutes	5.00 minutes
Rate (inch/hr)	1.77min/inch or 33.8"/hr use half measured rate 17"/Hr.	1.67min/inch or 35.9"/hr use half measured rate 18"/Hr

4/2/2021

Date of soil testing

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 (Hole #) 4/2/21 (Date) 8:10am (Time) sunny 55 deg (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: Residential (e.g., woodland, agricultural field, vacant lot, etc.) | Lawn (Vegetation) | lawn/loam (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0.5% (Slope (%))

Description of Location: Next to garage at rain garden location

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS) _____

3. Distances from: Open Water Body n/a feet | Drainage Way n/a feet | Wetlands n/a feet
Property Line 15 feet | Drinking Water Well n/a feet | Other n/a feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	FSL	10 YR 3/2								
18	B	FLS	10YR 5/6								
92	C	LS	2.5Y 5/4								

Additional Notes: Soil testing for drainge (no mottling observed)

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 (Hole #) 4/2/21 (Date) 8:30am (Time) sunny 55 deg (Weather) _____ (Latitude) _____ (Longitude:)

1. Land Use: Residential (e.g., woodland, agricultural field, vacant lot, etc.) | Lawn (Vegetation) | lawn/loam (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0.5% (Slope (%))

Description of Location: Back yard at drywell/cultec location

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS) _____

3. Distances from: Open Water Body n/a feet | Drainage Way n/a feet | Wetlands n/a feet | Property Line 20 feet | Drinking Water Well n/a feet | Other n/a feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

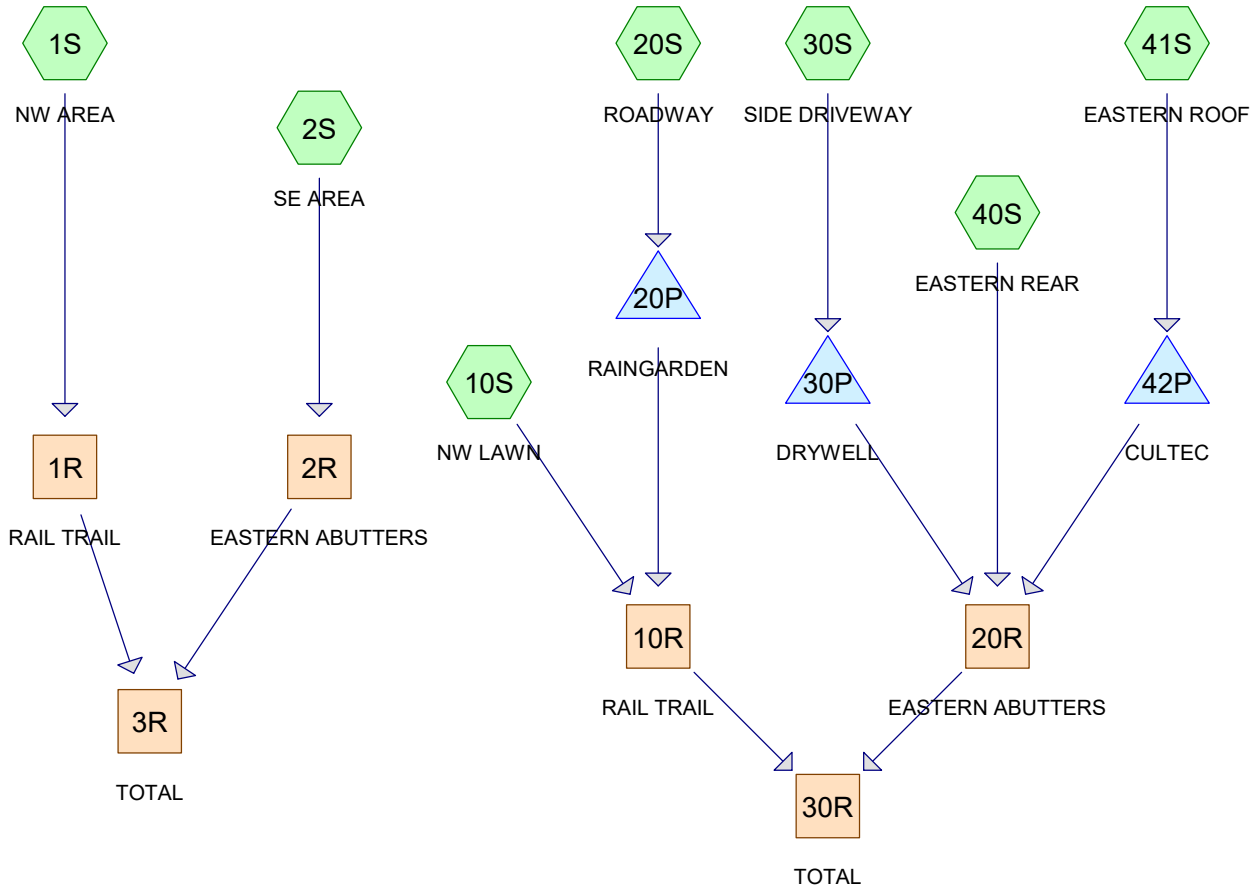
Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-14	A	FSL	10 YR 3/2								
22	B	FLS	10YR 5/6								
94	C	S	2.5Y 5/4								Fine/Med Sand

Additional Notes: Soil testing for drainge (no mottling observed)

Appendix E

EXISTING AND PROPOSED HYDROLOGY



Subcat Reach Pond Link

Routing Diagram for 20-087 DR
Prepared by Design Consultants, Inc., Printed 5/12/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
35,566	39	>75% Grass cover, Good, HSG A (1S, 2S, 10S, 20S, 30S, 40S)
18,557	98	Paved parking, HSG A (1S, 2S, 20S, 30S)
167	55	Permable pavers (10S)
633	55	Permeable pavers (20S)
156	55	Permeablea pavers (30S)
13,248	98	Roofs, HSG A (1S, 2S, 10S, 20S, 40S, 41S)
230	98	Unconnected pavement, HSG A (20S)
5,391	43	Woods/grass comb., Fair, HSG A (1S, 2S)

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
72,992	HSG A	1S, 2S, 10S, 20S, 30S, 40S, 41S
0	HSG B	
0	HSG C	
0	HSG D	
956	Other	10S, 20S, 30S

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
35,566	0	0	0	0	35,566	>75% Grass cover, Good	
18,557	0	0	0	0	18,557	Paved parking	
0	0	0	0	167	167	Permable pavers	
0	0	0	0	633	633	Permeable pavers	
0	0	0	0	156	156	Permeablea pavers	
13,248	0	0	0	0	13,248	Roofs	
230	0	0	0	0	230	Unconnected pavement	
5,391	0	0	0	0	5,391	Woods/grass comb., Fair	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: NW AREA Runoff Area=19,862 sf 76.17% Impervious Runoff Depth>1.71"
Flow Length=191' Tc=0.9 min CN=85 Runoff=1.10 cfs 2,838 cf

Subcatchment 2S: SE AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>0.08"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=0.00 cfs 116 cf

Subcatchment 10S: NW LAWN Runoff Area=8,772 sf 18.30% Impervious Runoff Depth>0.12"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.00 cfs 87 cf

Subcatchment 20S: ROADWAY Runoff Area=16,341 sf 59.63% Impervious Runoff Depth>1.06"
Flow Length=179' Tc=1.3 min CN=75 Runoff=0.53 cfs 1,443 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=2,923 sf 39.92% Impervious Runoff Depth>0.50"
Flow Length=82' Tc=0.7 min CN=63 Runoff=0.03 cfs 121 cf

Subcatchment 40S: EASTERN REAR Runoff Area=7,169 sf 3.00% Impervious Runoff Depth>0.01"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=41 Runoff=0.00 cfs 3 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=1,800 sf 100.00% Impervious Runoff Depth>2.92"
Tc=1.0 min CN=98 Runoff=0.15 cfs 438 cf

Reach 1R: RAIL TRAIL Inflow=1.10 cfs 2,838 cf
Outflow=1.10 cfs 2,838 cf

Reach 2R: EASTERN ABUTTERS Inflow=0.00 cfs 116 cf
Outflow=0.00 cfs 116 cf

Reach 3R: TOTAL Inflow=1.10 cfs 2,955 cf
Outflow=1.10 cfs 2,955 cf

Reach 10R: RAIL TRAIL Inflow=0.52 cfs 1,394 cf
Outflow=0.52 cfs 1,394 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.00 cfs 3 cf
Outflow=0.00 cfs 3 cf

Reach 30R: TOTAL Inflow=0.52 cfs 1,397 cf
Outflow=0.52 cfs 1,397 cf

Pond 20P: RAINGARDEN Peak Elev=28.46' Storage=79 cf Inflow=0.53 cfs 1,443 cf
Discarded=0.00 cfs 70 cf Primary=0.52 cfs 1,307 cf Outflow=0.52 cfs 1,377 cf

Pond 30P: DRYWELL Peak Elev=26.57' Storage=25 cf Inflow=0.03 cfs 121 cf
Discarded=0.01 cfs 121 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 121 cf

Pond 42P: CULTEC Peak Elev=25.53' Storage=50 cf Inflow=0.15 cfs 438 cf
Discarded=0.05 cfs 438 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 438 cf

Summary for Subcatchment 1S: NW AREA

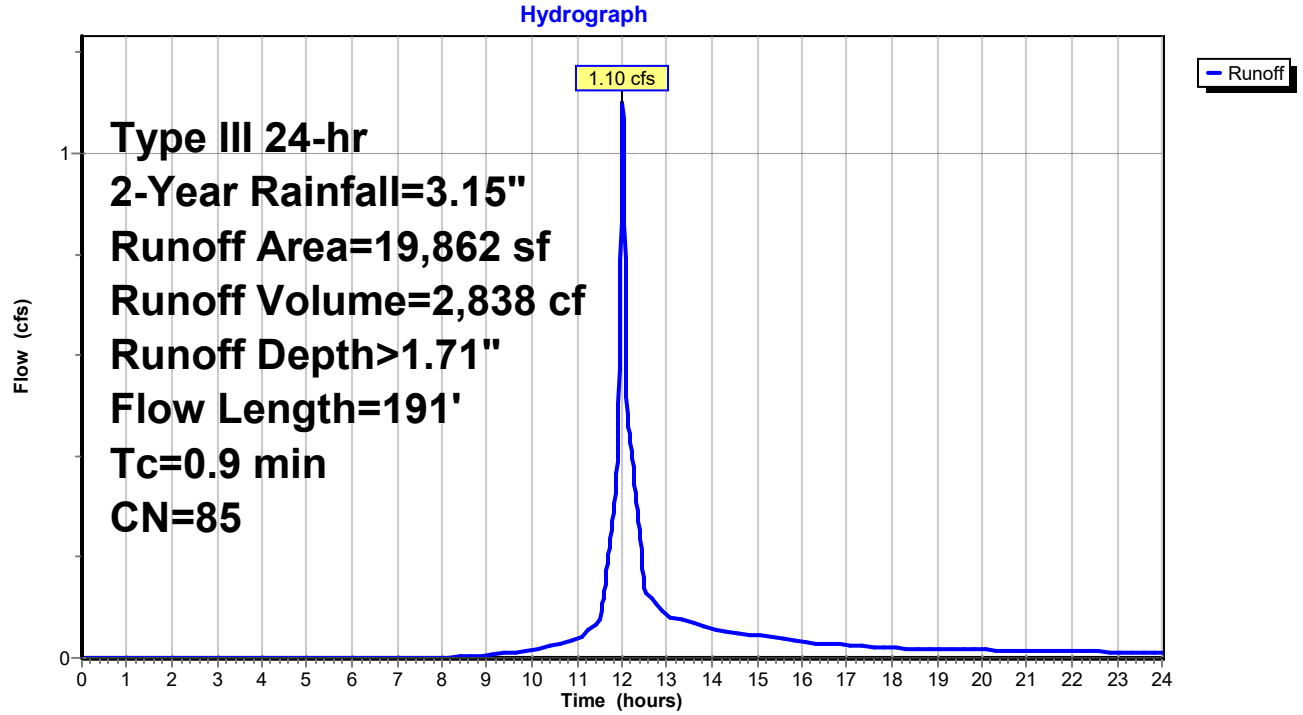
Runoff = 1.10 cfs @ 12.01 hrs, Volume= 2,838 cf, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
12,146	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
3,870	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,862	85	Weighted Average
4,734		23.83% Pervious Area
15,128		76.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NW AREA



Summary for Subcatchment 2S: SE AREA

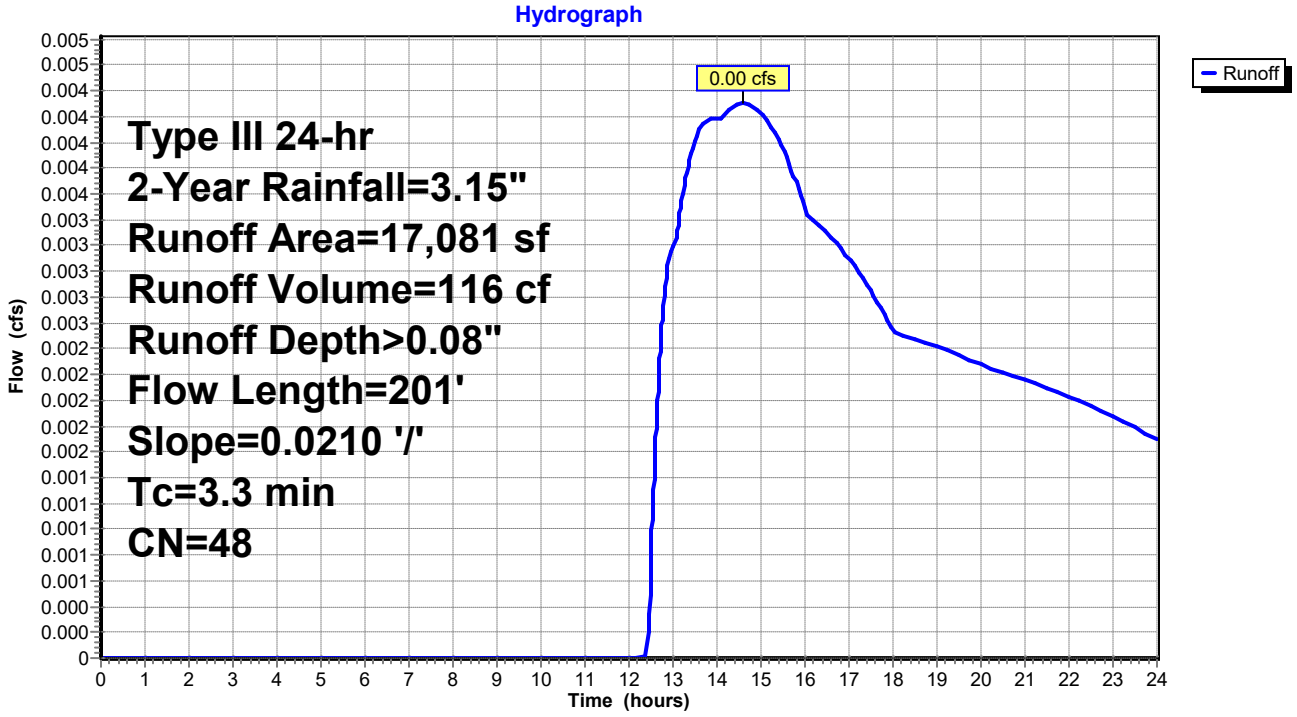
Runoff = 0.00 cfs @ 14.60 hrs, Volume= 116 cf, Depth> 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SE AREA



Summary for Subcatchment 10S: NW LAWN

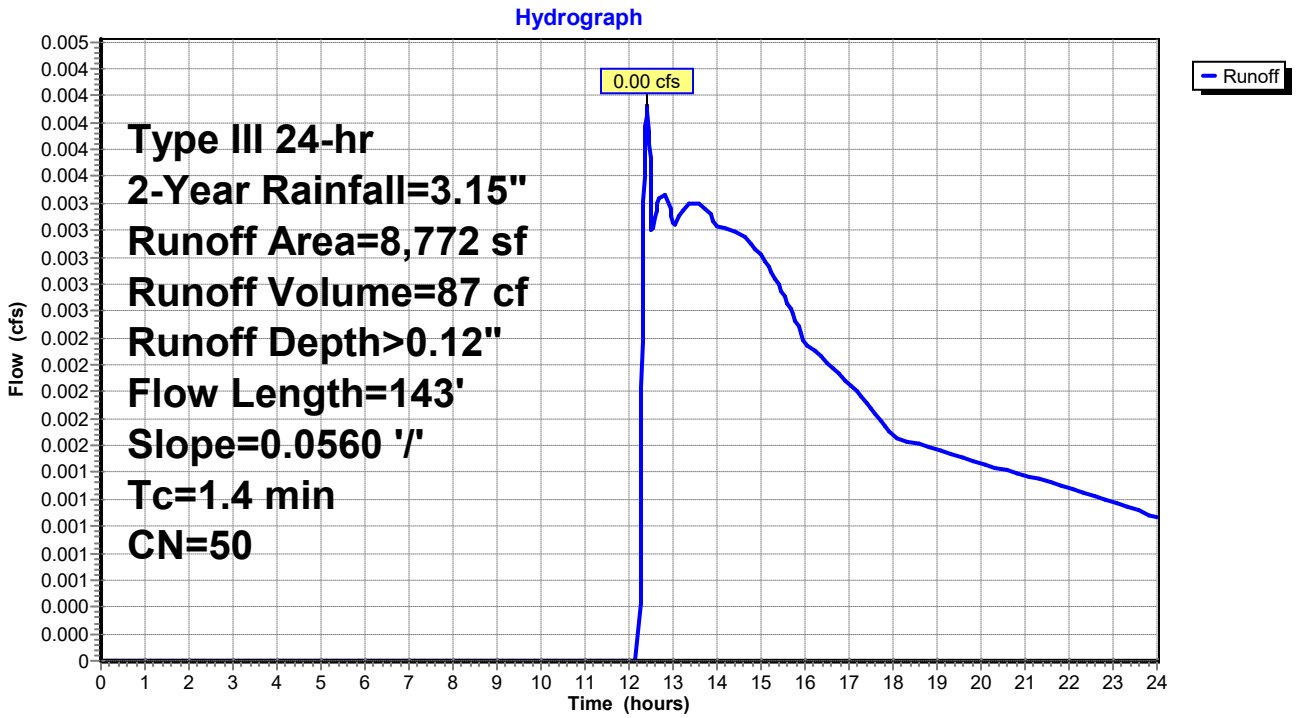
Runoff = 0.00 cfs @ 12.42 hrs, Volume= 87 cf, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
	7,000	39	>75% Grass cover, Good, HSG A
	1,605	98	Roofs, HSG A
*	167	55	Permable pavers
	8,772	50	Weighted Average
	7,167		81.70% Pervious Area
	1,605		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

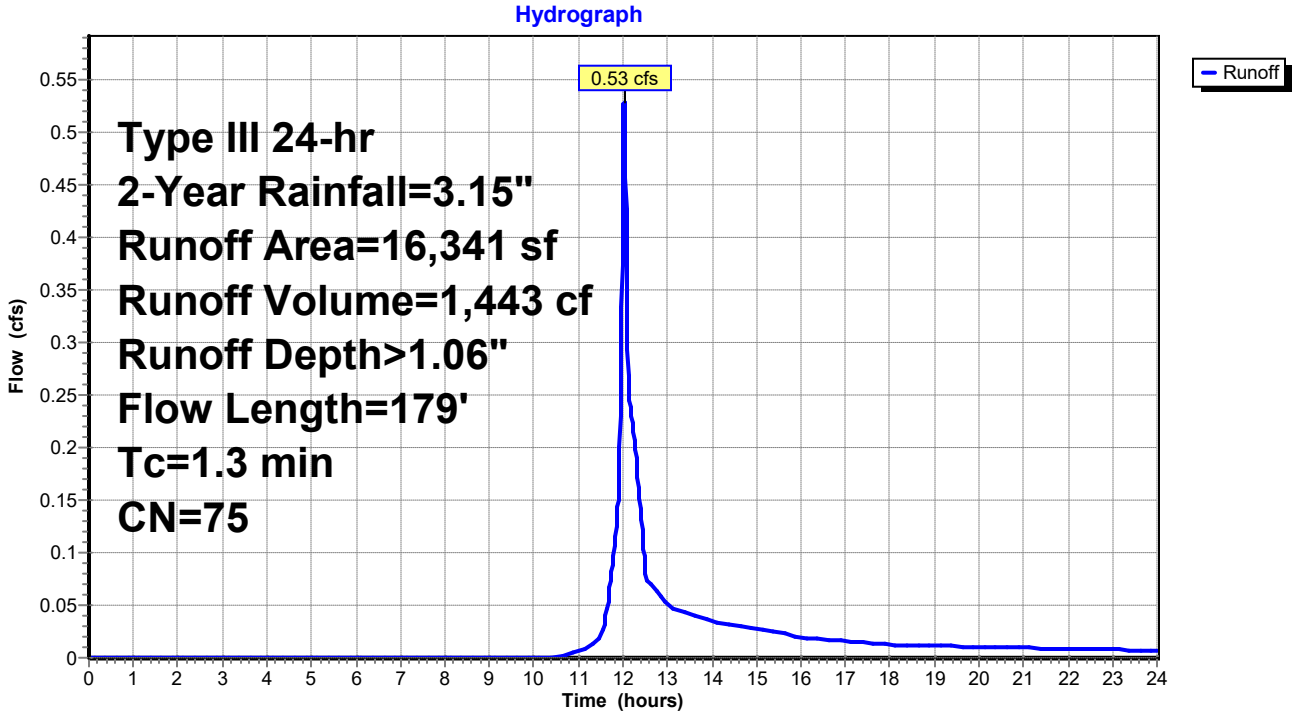
Runoff = 0.53 cfs @ 12.02 hrs, Volume= 1,443 cf, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
	5,192	98	Paved parking, HSG A
	230	98	Unconnected pavement, HSG A
	5,964	39	>75% Grass cover, Good, HSG A
	4,322	98	Roofs, HSG A
*	633	55	Permeable pavers
	16,341	75	Weighted Average
	6,597		40.37% Pervious Area
	9,744		59.63% Impervious Area
	230		2.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

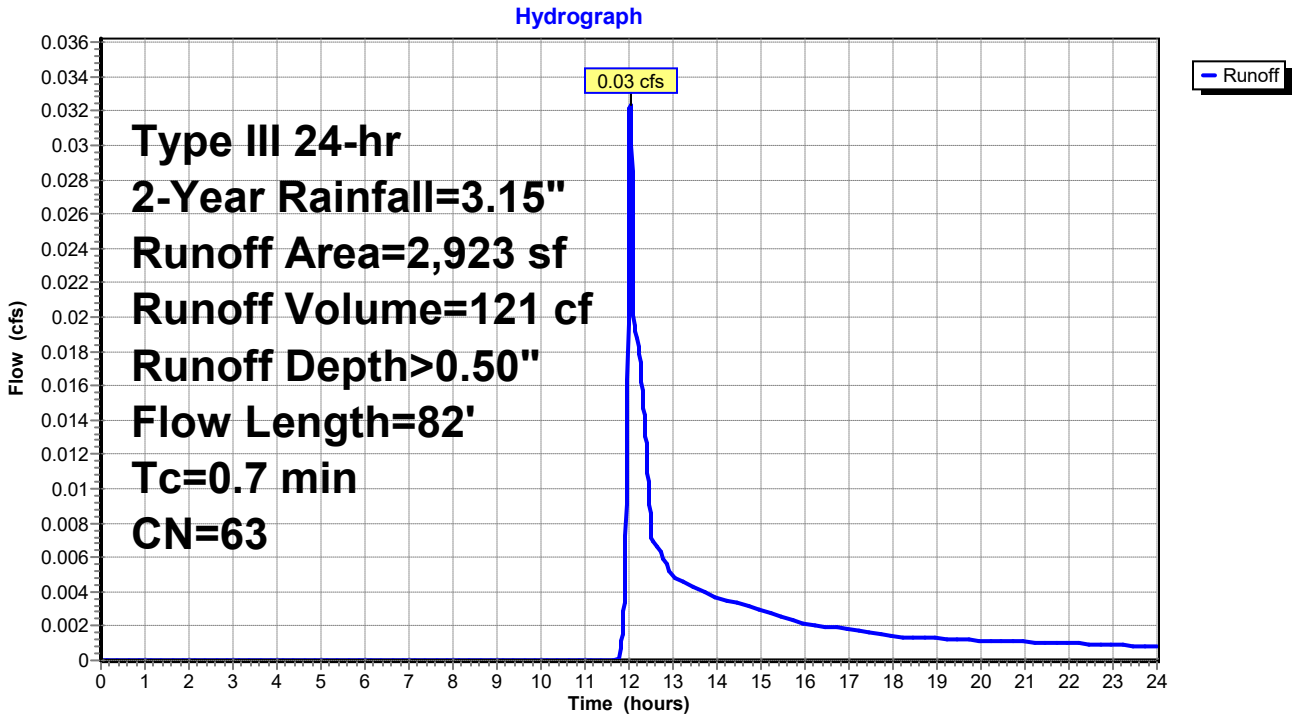
Runoff = 0.03 cfs @ 12.03 hrs, Volume= 121 cf, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
	1,167	98	Paved parking, HSG A
	1,600	39	>75% Grass cover, Good, HSG A
*	156	55	Permeablea pavers
	2,923	63	Weighted Average
	1,756		60.08% Pervious Area
	1,167		39.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

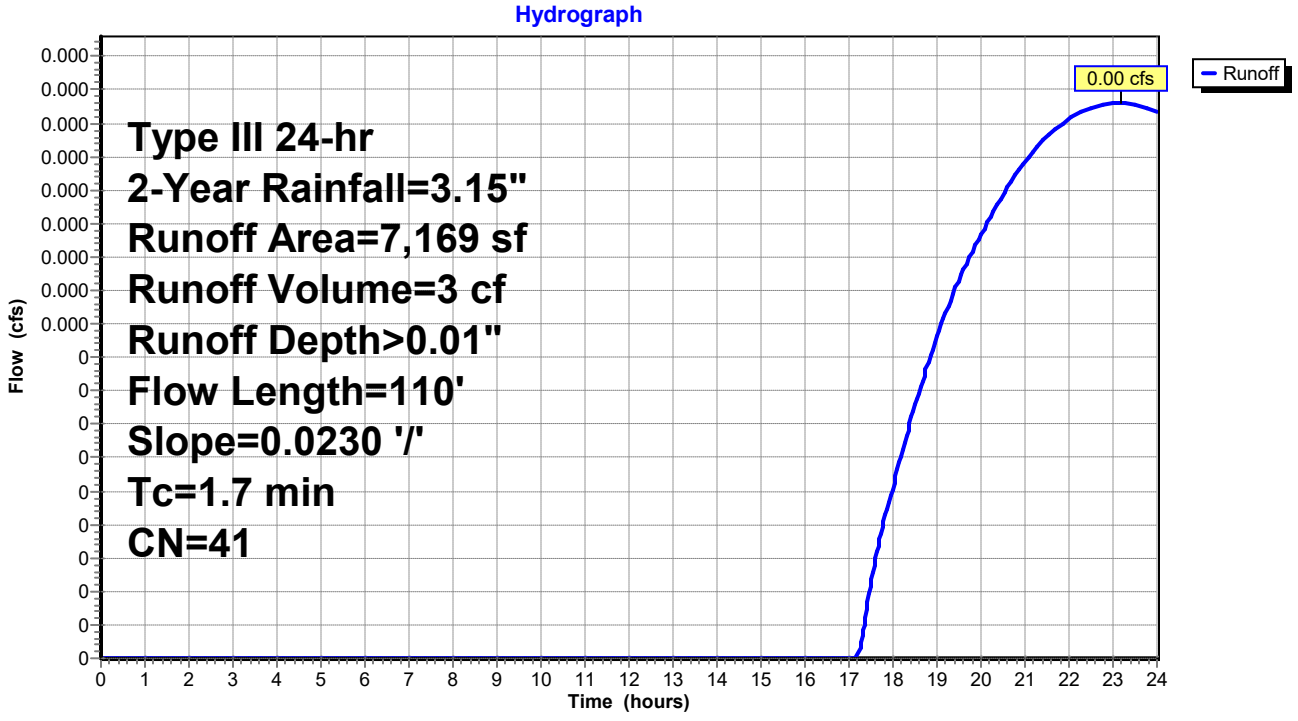
Runoff = 0.00 cfs @ 23.16 hrs, Volume= 3 cf, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
6,954	39	>75% Grass cover, Good, HSG A
215	98	Roofs, HSG A
7,169	41	Weighted Average
6,954		97.00% Pervious Area
215		3.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

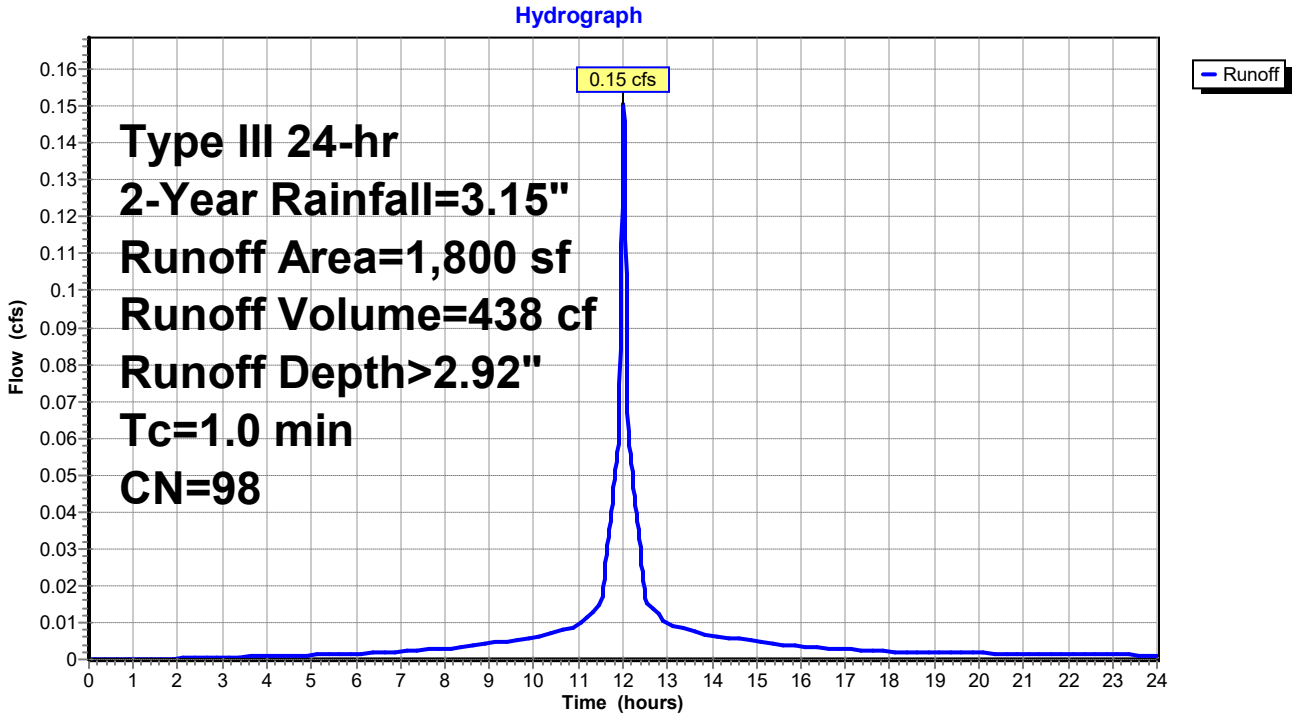
Runoff = 0.15 cfs @ 12.01 hrs, Volume= 438 cf, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
1,800	98	Roofs, HSG A
1,800		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

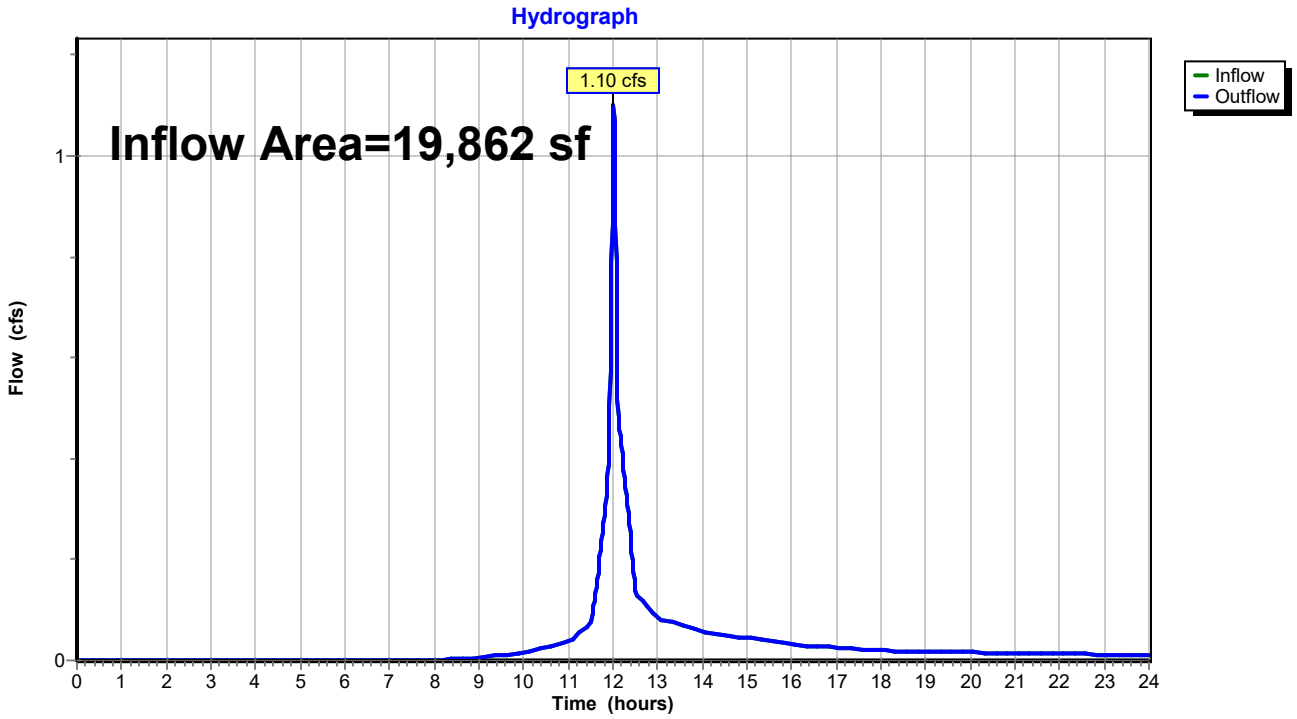


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,862 sf, 76.17% Impervious, Inflow Depth > 1.71" for 2-Year event
Inflow = 1.10 cfs @ 12.01 hrs, Volume= 2,838 cf
Outflow = 1.10 cfs @ 12.01 hrs, Volume= 2,838 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: RAIL TRAIL

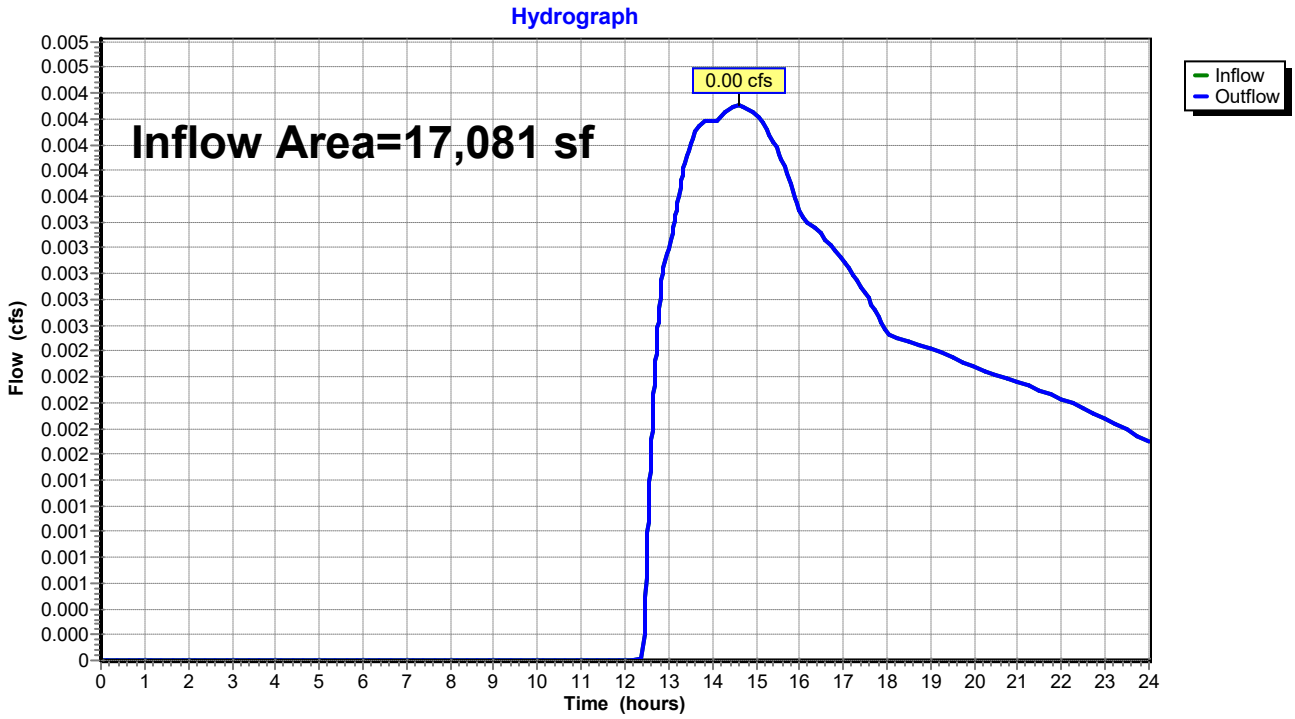


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 0.08" for 2-Year event
Inflow = 0.00 cfs @ 14.60 hrs, Volume= 116 cf
Outflow = 0.00 cfs @ 14.60 hrs, Volume= 116 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: EASTERN ABUTTERS

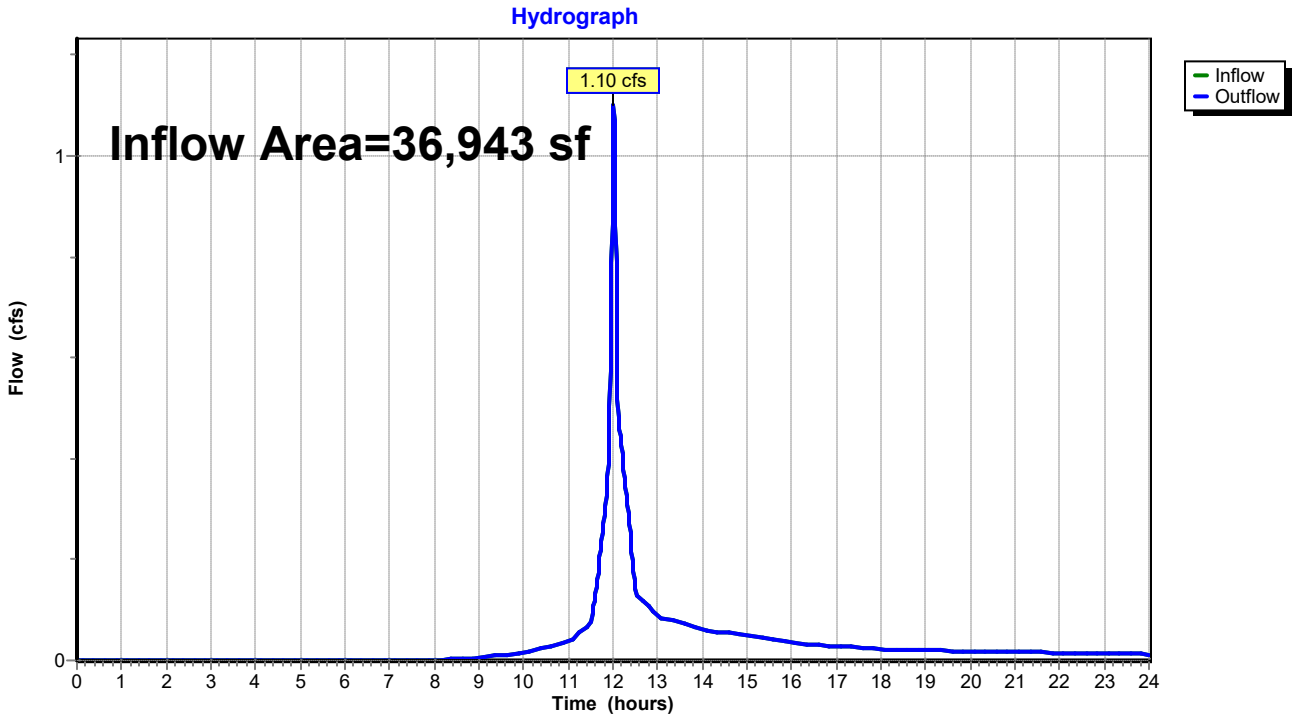


Summary for Reach 3R: TOTAL

Inflow Area = 36,943 sf, 47.38% Impervious, Inflow Depth > 0.96" for 2-Year event
Inflow = 1.10 cfs @ 12.01 hrs, Volume= 2,955 cf
Outflow = 1.10 cfs @ 12.01 hrs, Volume= 2,955 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL

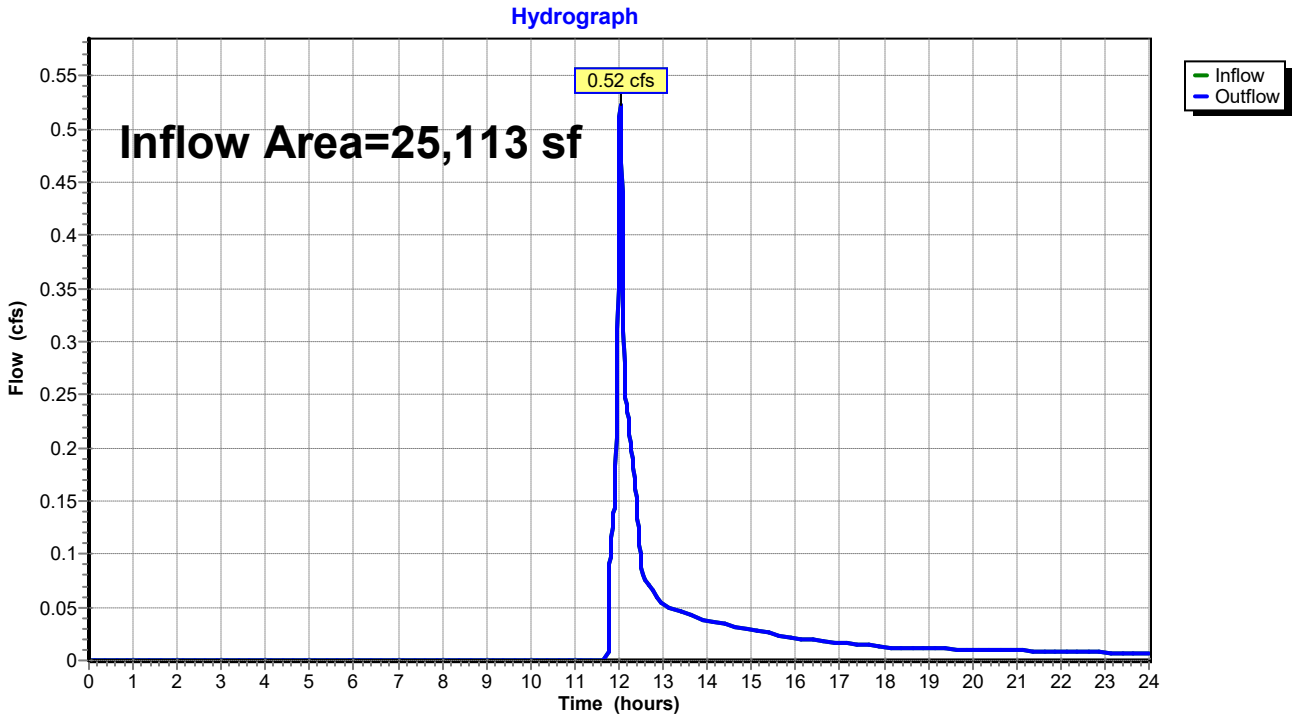


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,113 sf, 45.19% Impervious, Inflow Depth > 0.67" for 2-Year event
Inflow = 0.52 cfs @ 12.03 hrs, Volume= 1,394 cf
Outflow = 0.52 cfs @ 12.03 hrs, Volume= 1,394 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 10R: RAIL TRAIL

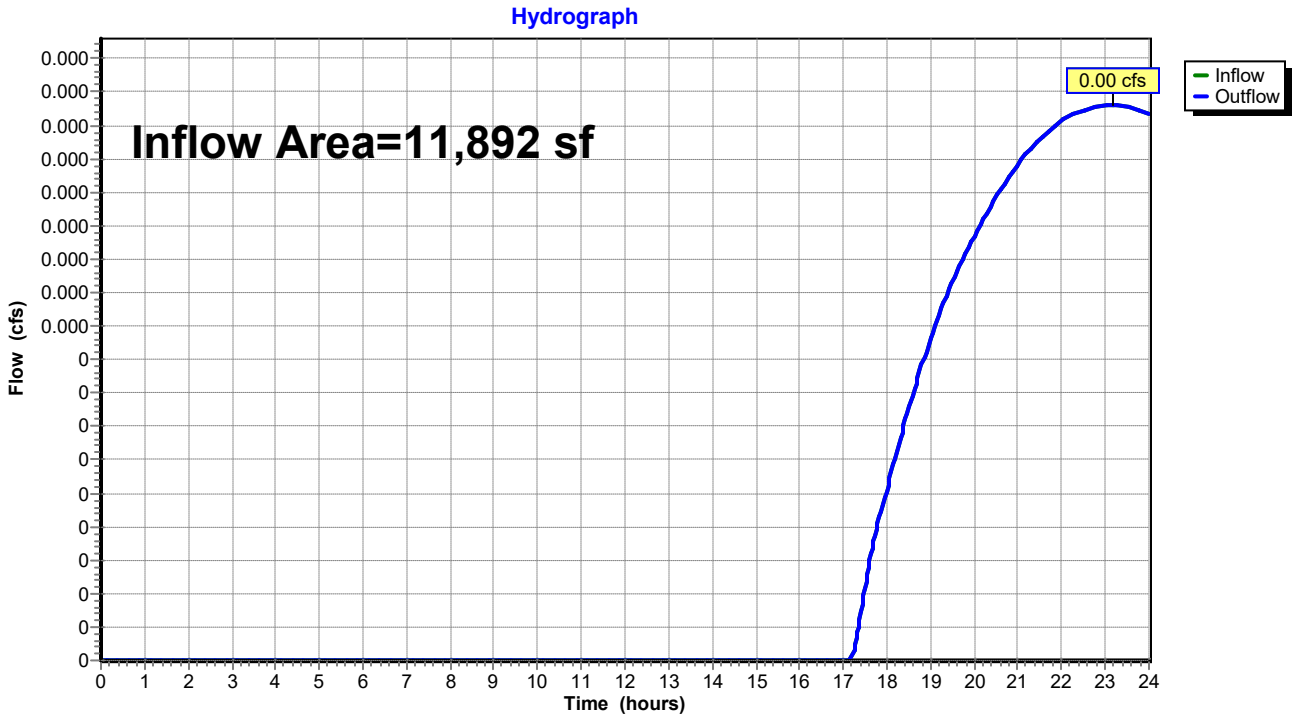


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,892 sf, 26.76% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 23.16 hrs, Volume= 3 cf
Outflow = 0.00 cfs @ 23.16 hrs, Volume= 3 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 20R: EASTERN ABUTTERS

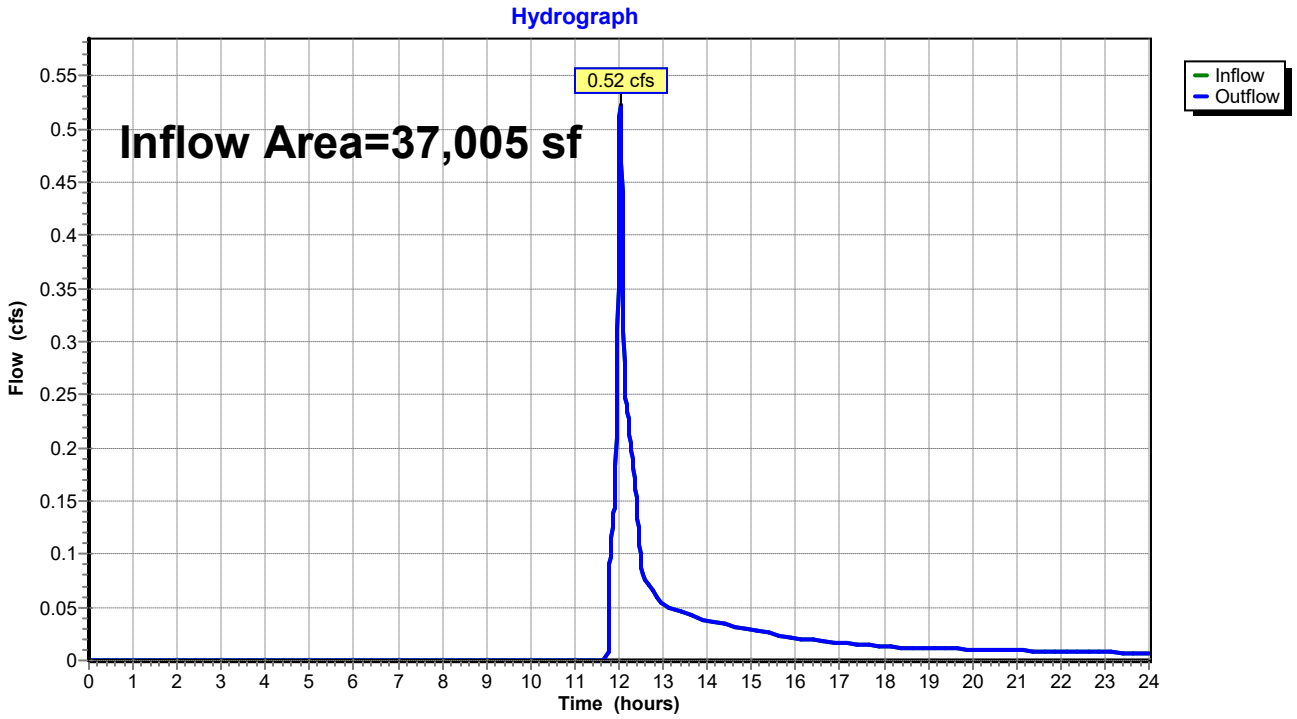


Summary for Reach 30R: TOTAL

Inflow Area = 37,005 sf, 39.27% Impervious, Inflow Depth > 0.45" for 2-Year event
Inflow = 0.52 cfs @ 12.03 hrs, Volume= 1,397 cf
Outflow = 0.52 cfs @ 12.03 hrs, Volume= 1,397 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,341 sf, 59.63% Impervious, Inflow Depth > 1.06" for 2-Year event
Inflow = 0.53 cfs @ 12.02 hrs, Volume= 1,443 cf
Outflow = 0.52 cfs @ 12.03 hrs, Volume= 1,377 cf, Atten= 1%, Lag= 0.4 min
Discarded = 0.00 cfs @ 12.03 hrs, Volume= 70 cf
Primary = 0.52 cfs @ 12.03 hrs, Volume= 1,307 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.46' @ 12.03 hrs Surf.Area= 131 sf Storage= 79 cf

Plug-Flow detention time= 32.9 min calculated for 1,377 cf (95% of inflow)
Center-of-Mass det. time= 8.4 min (863.7 - 855.3)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	121 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

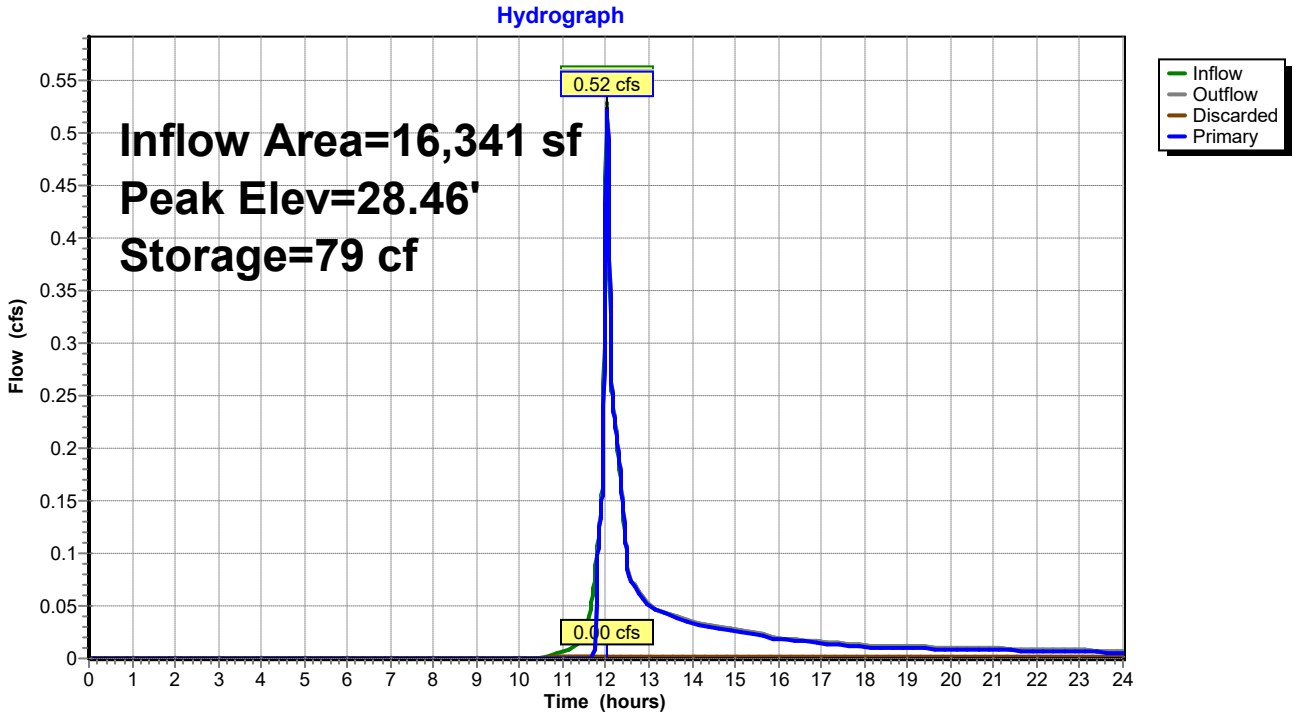
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	75	0	0
28.00	95	27	27
28.75	155	94	121

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.35'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.00 cfs @ 12.03 hrs HW=28.46' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.52 cfs @ 12.03 hrs HW=28.46' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.52 cfs @ 0.82 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 2,923 sf, 39.92% Impervious, Inflow Depth > 0.50" for 2-Year event
Inflow = 0.03 cfs @ 12.03 hrs, Volume= 121 cf
Outflow = 0.01 cfs @ 11.95 hrs, Volume= 121 cf, Atten= 81%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.95 hrs, Volume= 121 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 26.57' @ 12.77 hrs Surf.Area= 14 sf Storage= 25 cf

Plug-Flow detention time= 30.3 min calculated for 121 cf (100% of inflow)
Center-of-Mass det. time= 29.9 min (931.3 - 901.3)

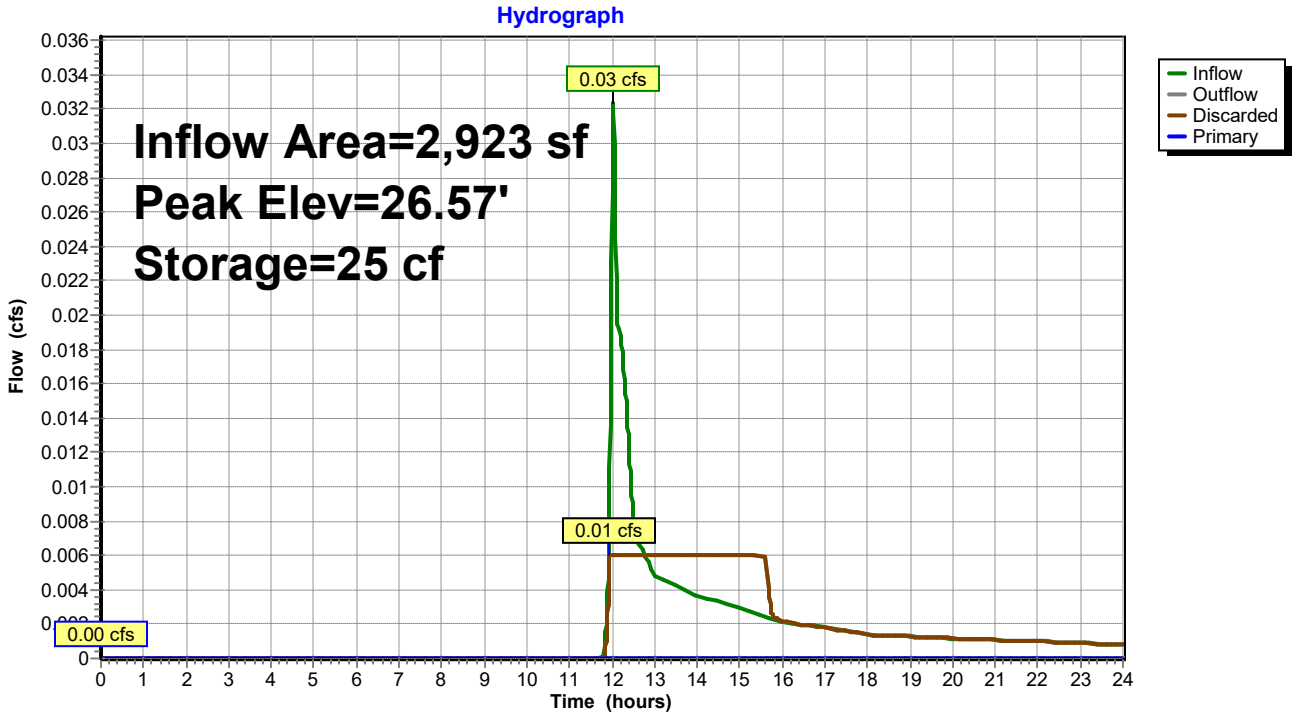
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.95 hrs HW=24.87' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.82' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 1,800 sf,100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 0.15 cfs @ 12.01 hrs, Volume= 438 cf
Outflow = 0.05 cfs @ 11.83 hrs, Volume= 438 cf, Atten= 68%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.83 hrs, Volume= 438 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 25.53' @ 12.22 hrs Surf.Area= 117 sf Storage= 50 cf

Plug-Flow detention time= 4.3 min calculated for 438 cf (100% of inflow)
Center-of-Mass det. time= 4.2 min (756.2 - 752.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	162 cf	**11.17'W x 10.50'L x 4.54'H Field A** 533 cf Overall - 127 cf Embedded = 406 cf x 40.0% Voids
#2A	25.50'	127 cf	**Cultec R-330XLHD** x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		289 cf	Total Available Storage

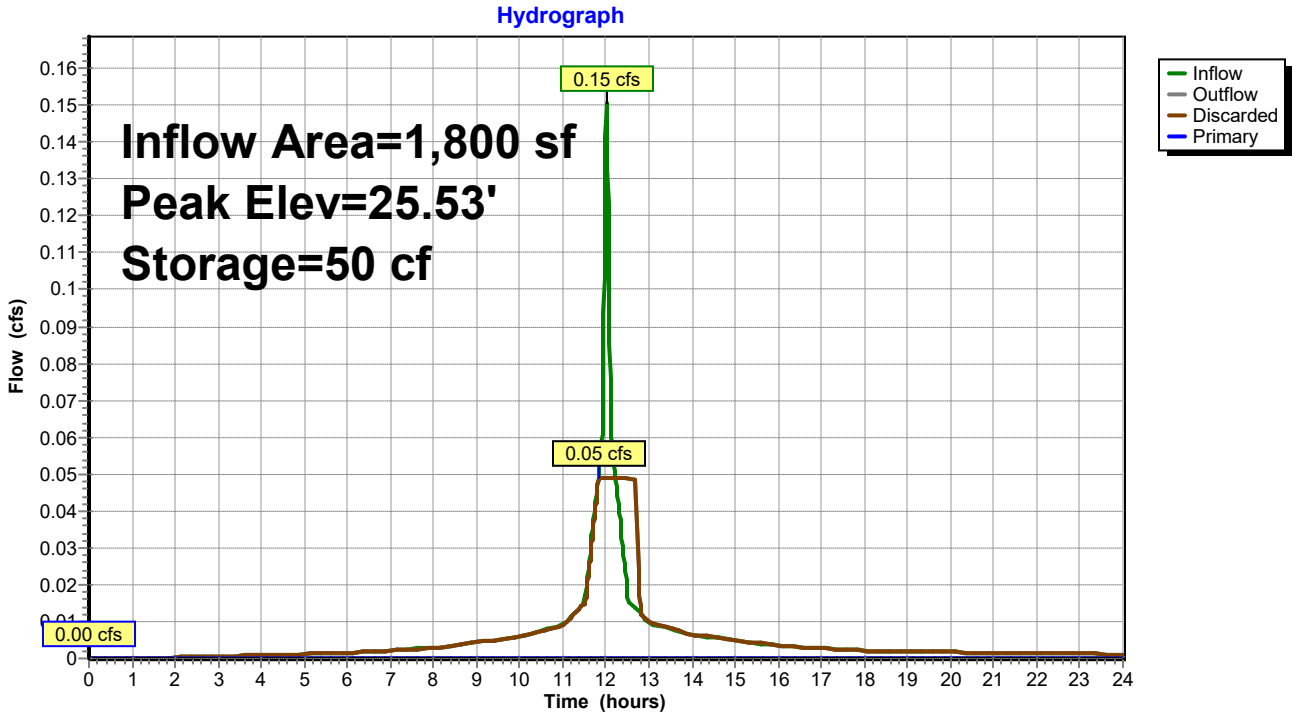
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**18.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.83 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.50' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 42P: CULTEC



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: NW AREA Runoff Area=19,862 sf 76.17% Impervious Runoff Depth>3.21"
Flow Length=191' Tc=0.9 min CN=85 Runoff=2.04 cfs 5,315 cf

Subcatchment 2S: SE AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>0.52"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=0.13 cfs 747 cf

Subcatchment 10S: NW LAWN Runoff Area=8,772 sf 18.30% Impervious Runoff Depth>0.62"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.10 cfs 456 cf

Subcatchment 20S: ROADWAY Runoff Area=16,341 sf 59.63% Impervious Runoff Depth>2.31"
Flow Length=179' Tc=1.3 min CN=75 Runoff=1.20 cfs 3,148 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=2,923 sf 39.92% Impervious Runoff Depth>1.40"
Flow Length=82' Tc=0.7 min CN=63 Runoff=0.12 cfs 342 cf

Subcatchment 40S: EASTERN REAR Runoff Area=7,169 sf 3.00% Impervious Runoff Depth>0.23"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=41 Runoff=0.01 cfs 139 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=1,800 sf 100.00% Impervious Runoff Depth>4.59"
Tc=1.0 min CN=98 Runoff=0.23 cfs 689 cf

Reach 1R: RAIL TRAIL Inflow=2.04 cfs 5,315 cf
Outflow=2.04 cfs 5,315 cf

Reach 2R: EASTERN ABUTTERS Inflow=0.13 cfs 747 cf
Outflow=0.13 cfs 747 cf

Reach 3R: TOTAL Inflow=2.07 cfs 6,062 cf
Outflow=2.07 cfs 6,062 cf

Reach 10R: RAIL TRAIL Inflow=1.29 cfs 3,459 cf
Outflow=1.29 cfs 3,459 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.12 cfs 257 cf
Outflow=0.12 cfs 257 cf

Reach 30R: TOTAL Inflow=1.38 cfs 3,716 cf
Outflow=1.38 cfs 3,716 cf

Pond 20P: RAINGARDEN Peak Elev=28.53' Storage=89 cf Inflow=1.20 cfs 3,148 cf
Discarded=0.00 cfs 78 cf Primary=1.19 cfs 3,003 cf Outflow=1.19 cfs 3,082 cf

Pond 30P: DRYWELL Peak Elev=28.06' Storage=47 cf Inflow=0.12 cfs 342 cf
Discarded=0.01 cfs 224 cf Primary=0.12 cfs 118 cf Outflow=0.13 cfs 341 cf

Pond 42P: CULTEC Peak Elev=26.47' Storage=130 cf Inflow=0.23 cfs 689 cf
Discarded=0.05 cfs 689 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 689 cf

Summary for Subcatchment 1S: NW AREA

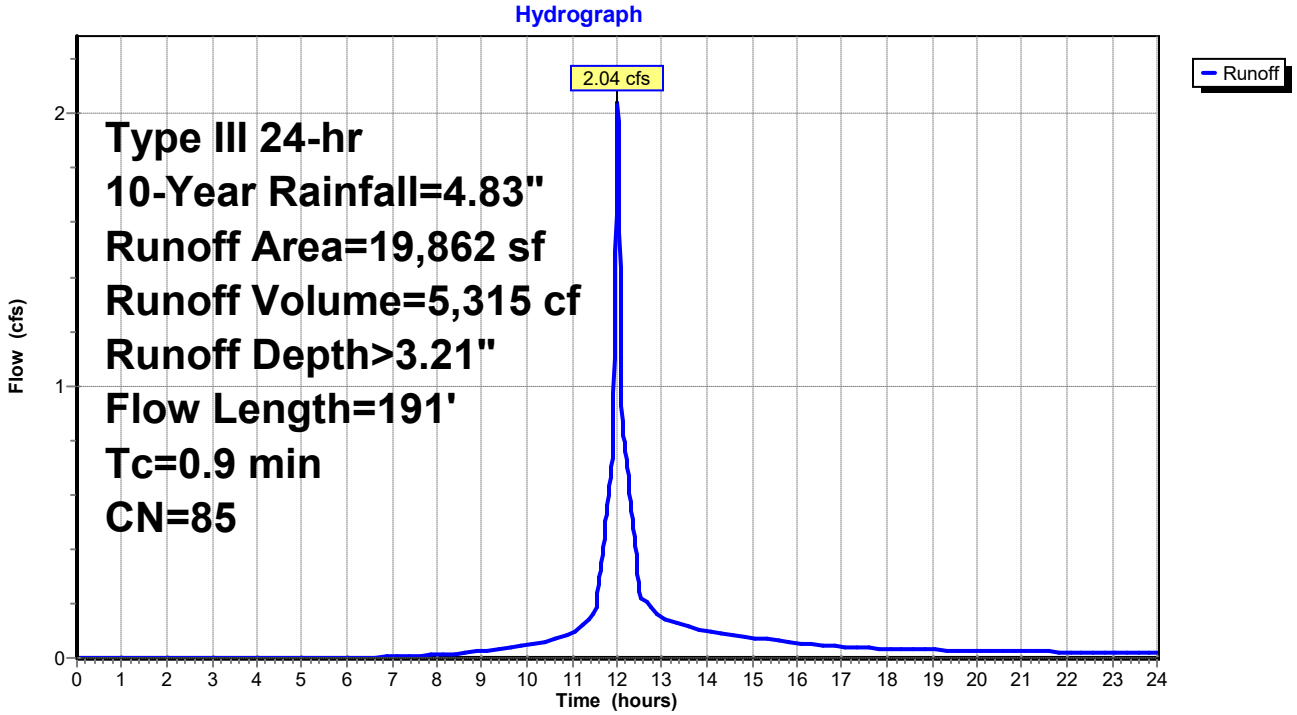
Runoff = 2.04 cfs @ 12.01 hrs, Volume= 5,315 cf, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
12,146	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
3,870	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,862	85	Weighted Average
4,734		23.83% Pervious Area
15,128		76.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NW AREA



Summary for Subcatchment 2S: SE AREA

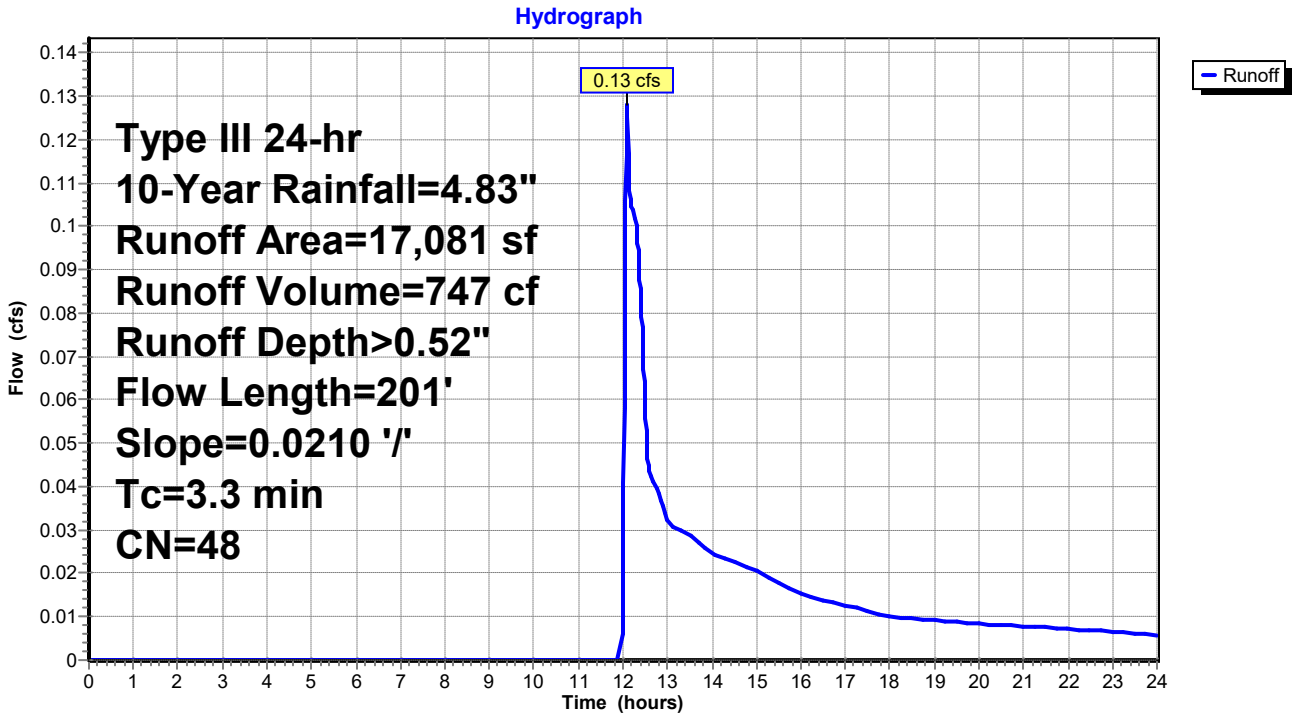
Runoff = 0.13 cfs @ 12.10 hrs, Volume= 747 cf, Depth> 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SE AREA



Summary for Subcatchment 10S: NW LAWN

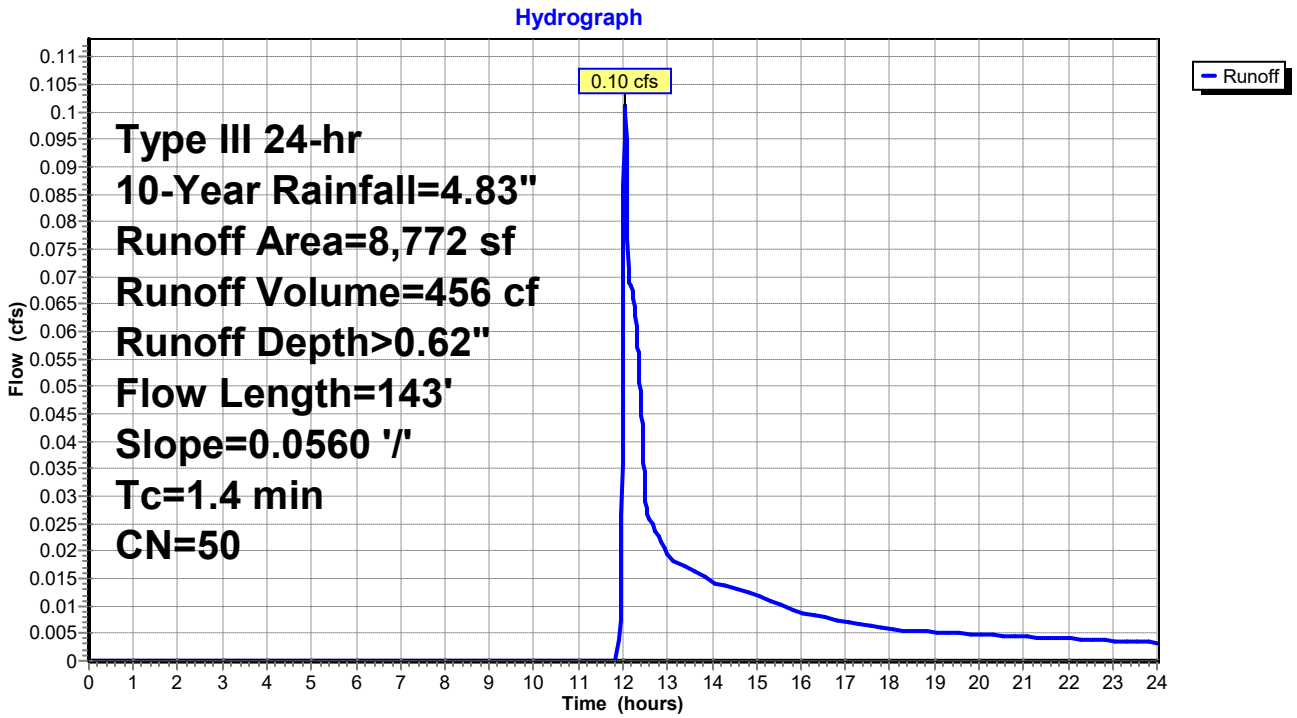
Runoff = 0.10 cfs @ 12.05 hrs, Volume= 456 cf, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
	7,000	39	>75% Grass cover, Good, HSG A
	1,605	98	Roofs, HSG A
*	167	55	Permable pavers
	8,772	50	Weighted Average
	7,167		81.70% Pervious Area
	1,605		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

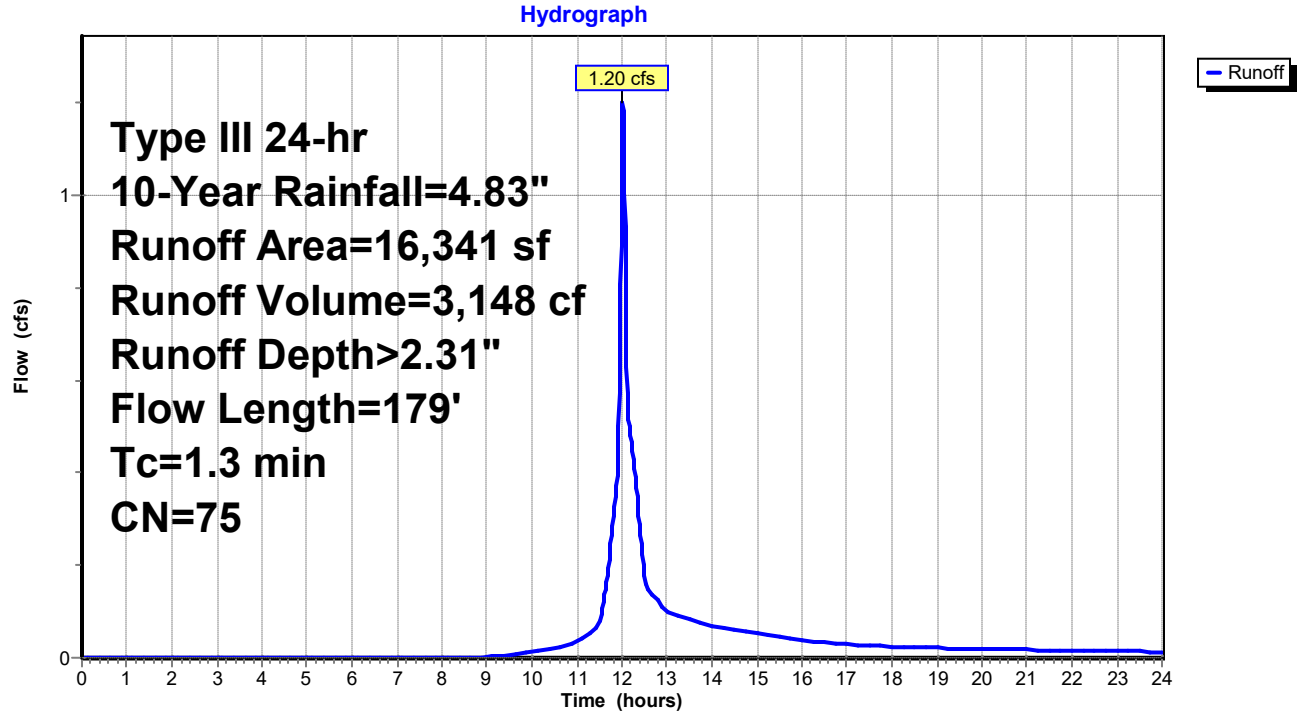
Runoff = 1.20 cfs @ 12.02 hrs, Volume= 3,148 cf, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
	5,192	98	Paved parking, HSG A
	230	98	Unconnected pavement, HSG A
	5,964	39	>75% Grass cover, Good, HSG A
	4,322	98	Roofs, HSG A
*	633	55	Permeable pavers
	16,341	75	Weighted Average
	6,597		40.37% Pervious Area
	9,744		59.63% Impervious Area
	230		2.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

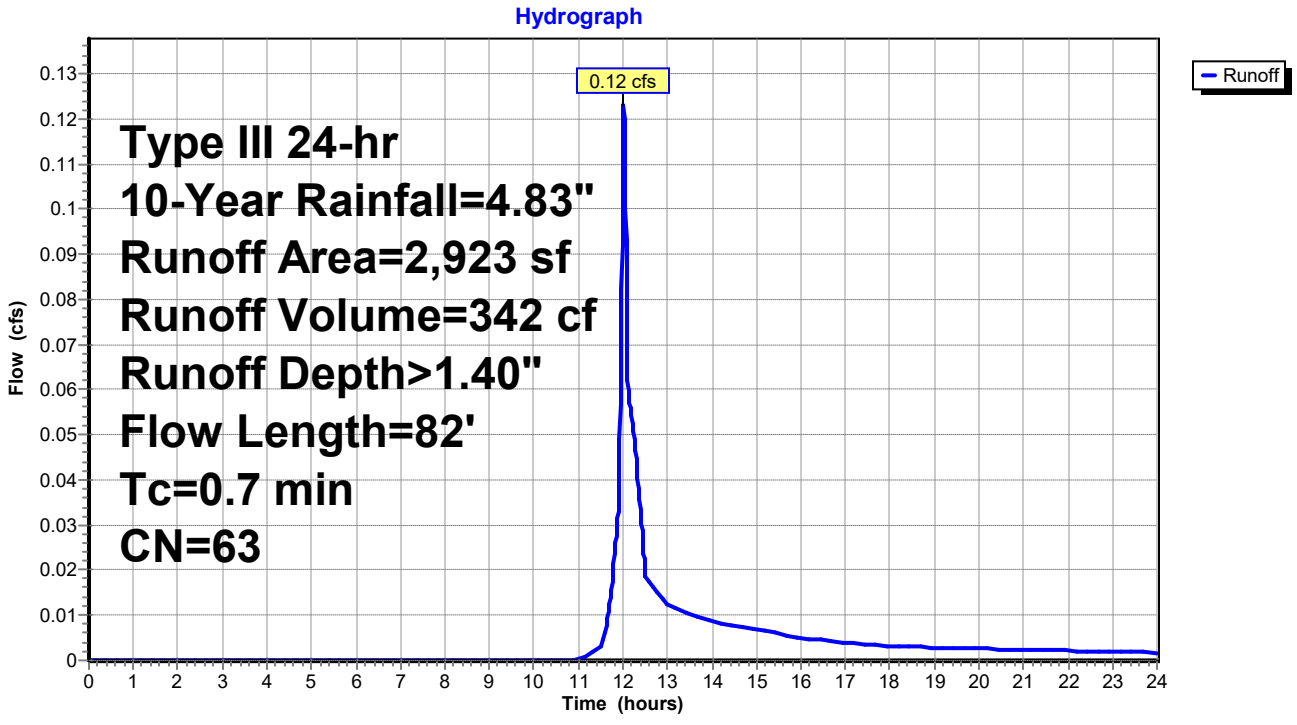
Runoff = 0.12 cfs @ 12.01 hrs, Volume= 342 cf, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
	1,167	98	Paved parking, HSG A
	1,600	39	>75% Grass cover, Good, HSG A
*	156	55	Permeablea pavers
	2,923	63	Weighted Average
	1,756		60.08% Pervious Area
	1,167		39.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

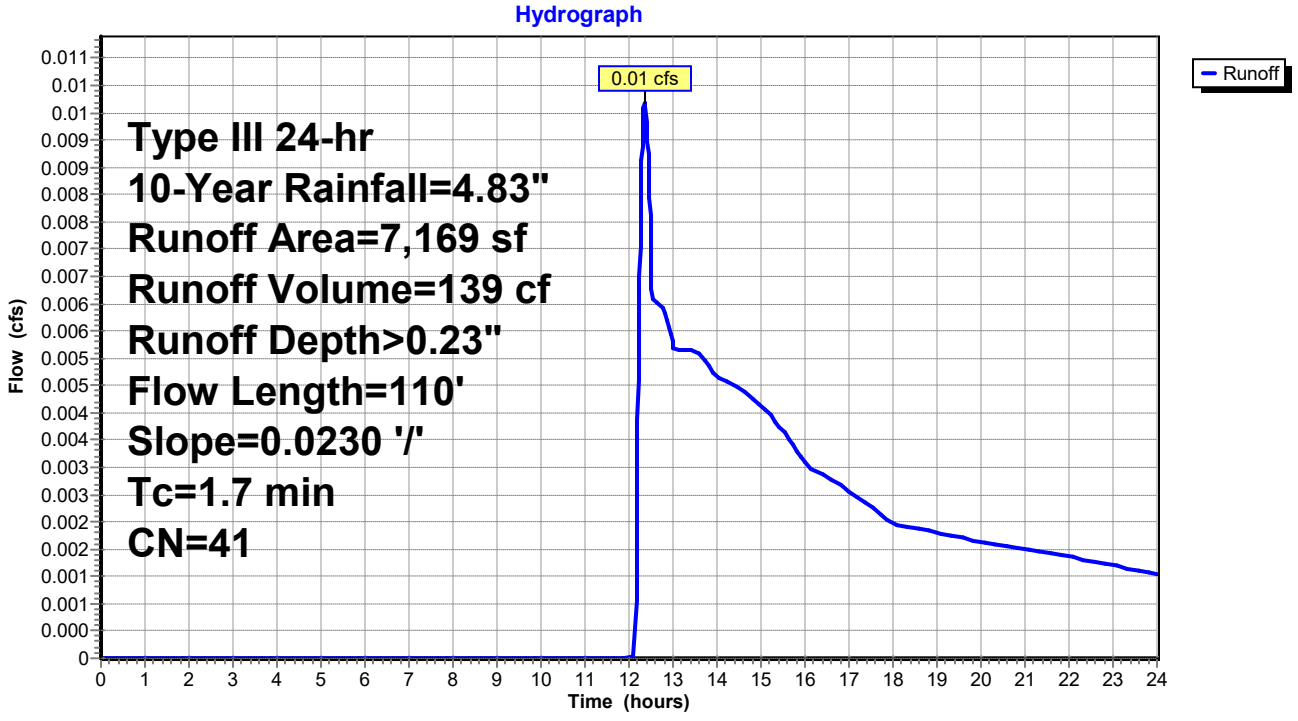
Runoff = 0.01 cfs @ 12.36 hrs, Volume= 139 cf, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
6,954	39	>75% Grass cover, Good, HSG A
215	98	Roofs, HSG A
7,169	41	Weighted Average
6,954		97.00% Pervious Area
215		3.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

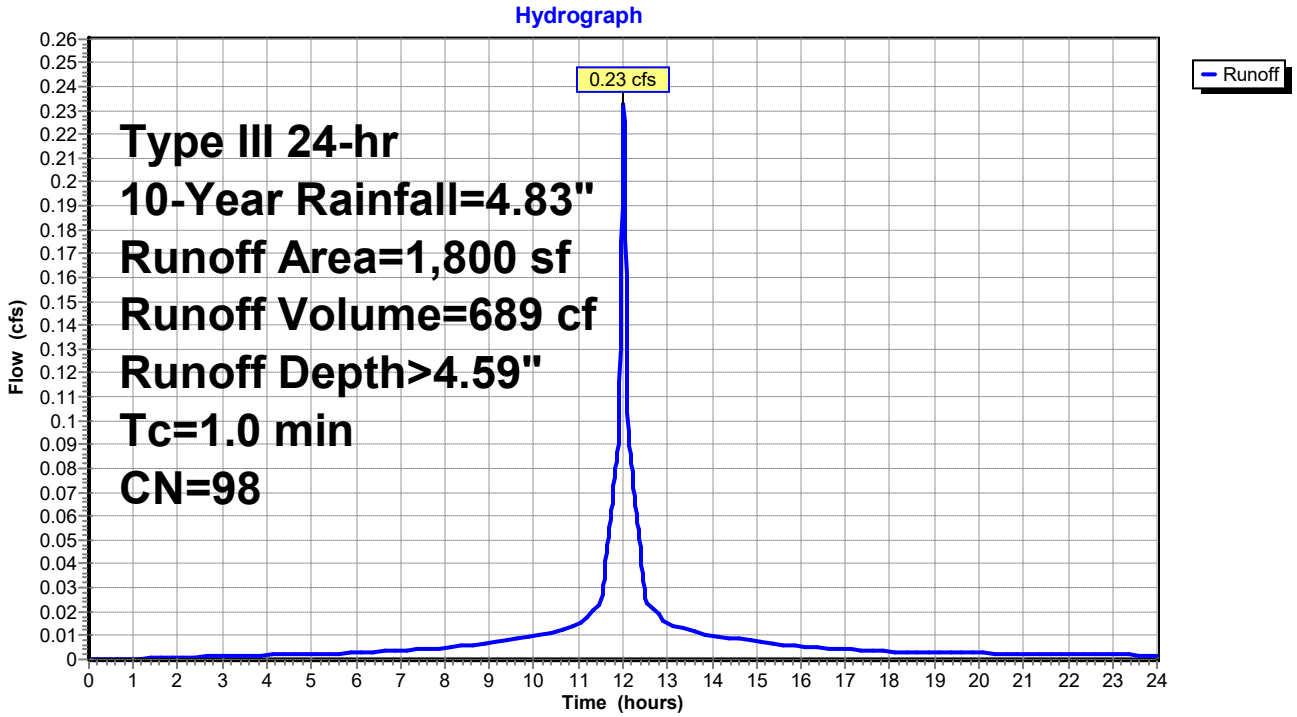
Runoff = 0.23 cfs @ 12.01 hrs, Volume= 689 cf, Depth> 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
1,800	98	Roofs, HSG A
1,800		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

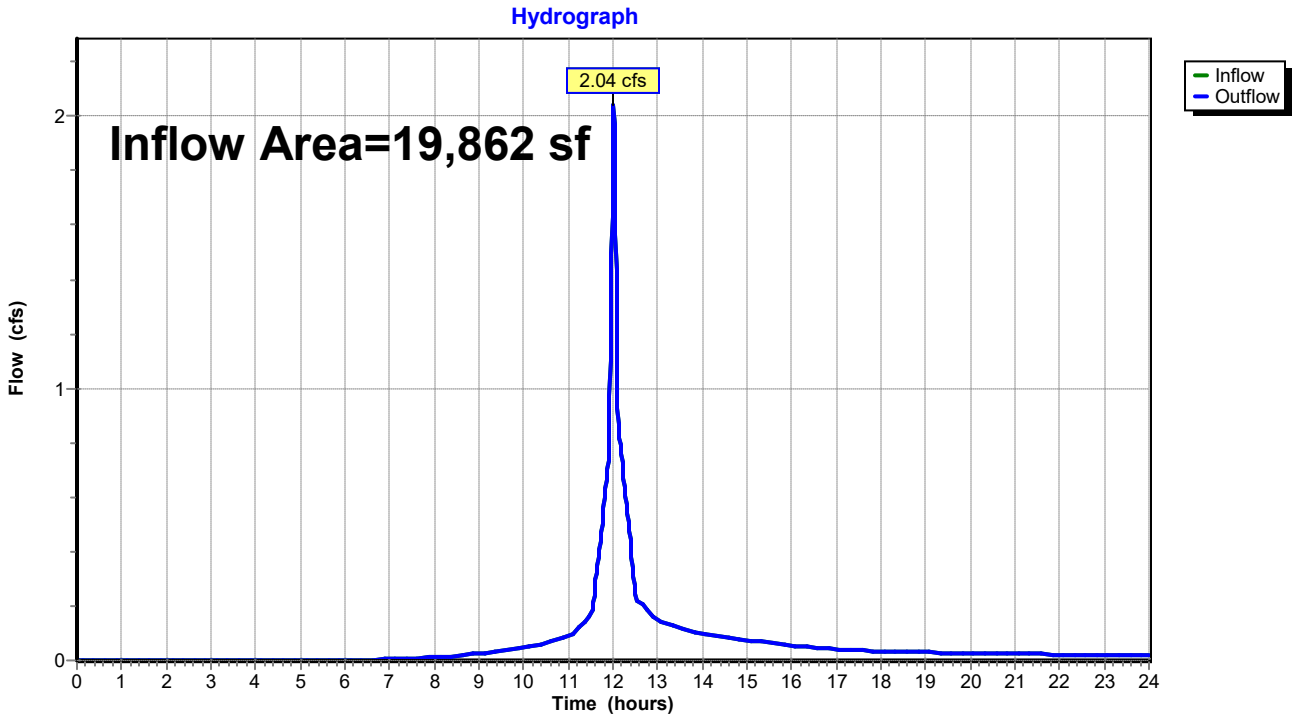


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,862 sf, 76.17% Impervious, Inflow Depth > 3.21" for 10-Year event
Inflow = 2.04 cfs @ 12.01 hrs, Volume= 5,315 cf
Outflow = 2.04 cfs @ 12.01 hrs, Volume= 5,315 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: RAIL TRAIL

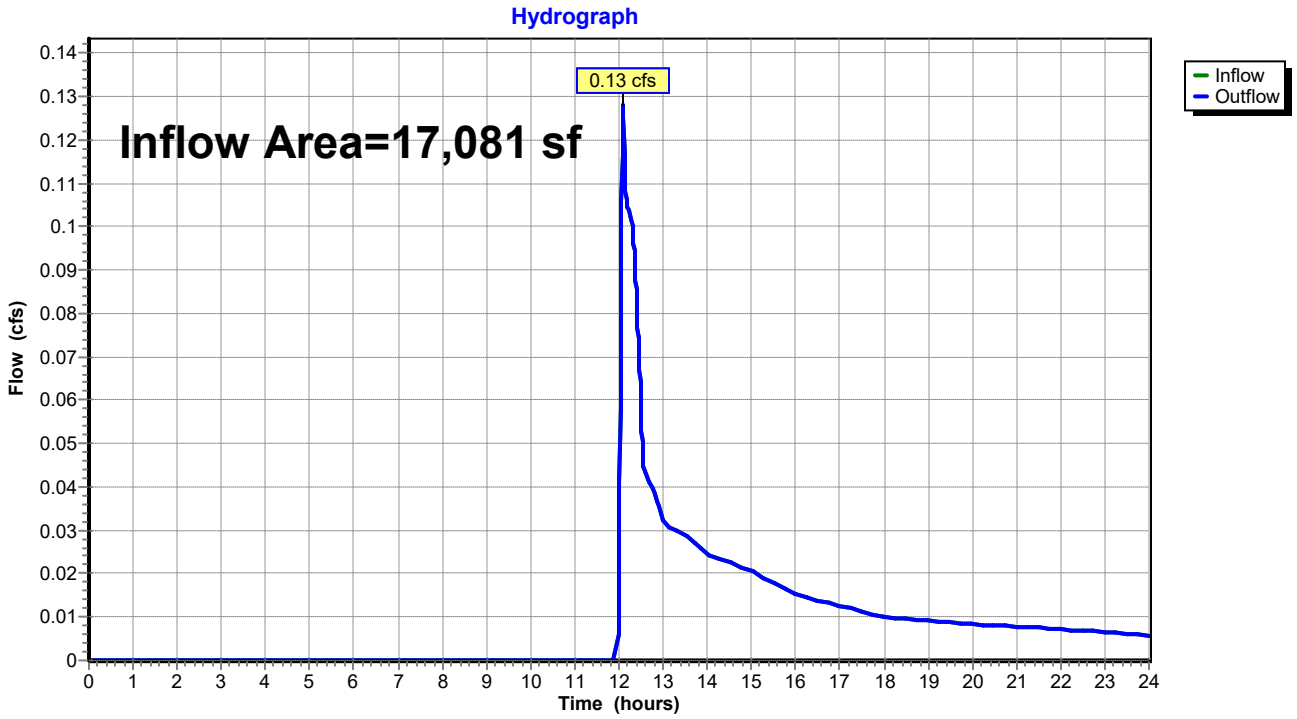


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 0.52" for 10-Year event
Inflow = 0.13 cfs @ 12.10 hrs, Volume= 747 cf
Outflow = 0.13 cfs @ 12.10 hrs, Volume= 747 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: EASTERN ABUTTERS

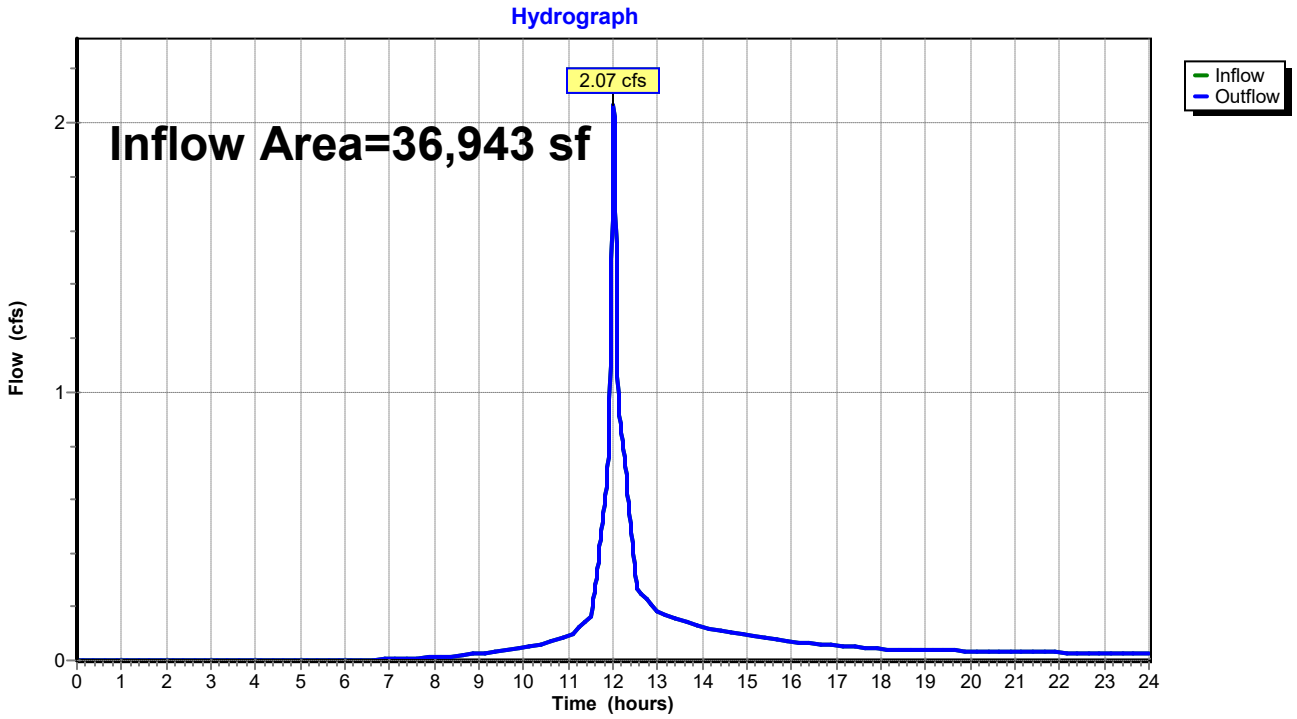


Summary for Reach 3R: TOTAL

Inflow Area = 36,943 sf, 47.38% Impervious, Inflow Depth > 1.97" for 10-Year event
Inflow = 2.07 cfs @ 12.02 hrs, Volume= 6,062 cf
Outflow = 2.07 cfs @ 12.02 hrs, Volume= 6,062 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL

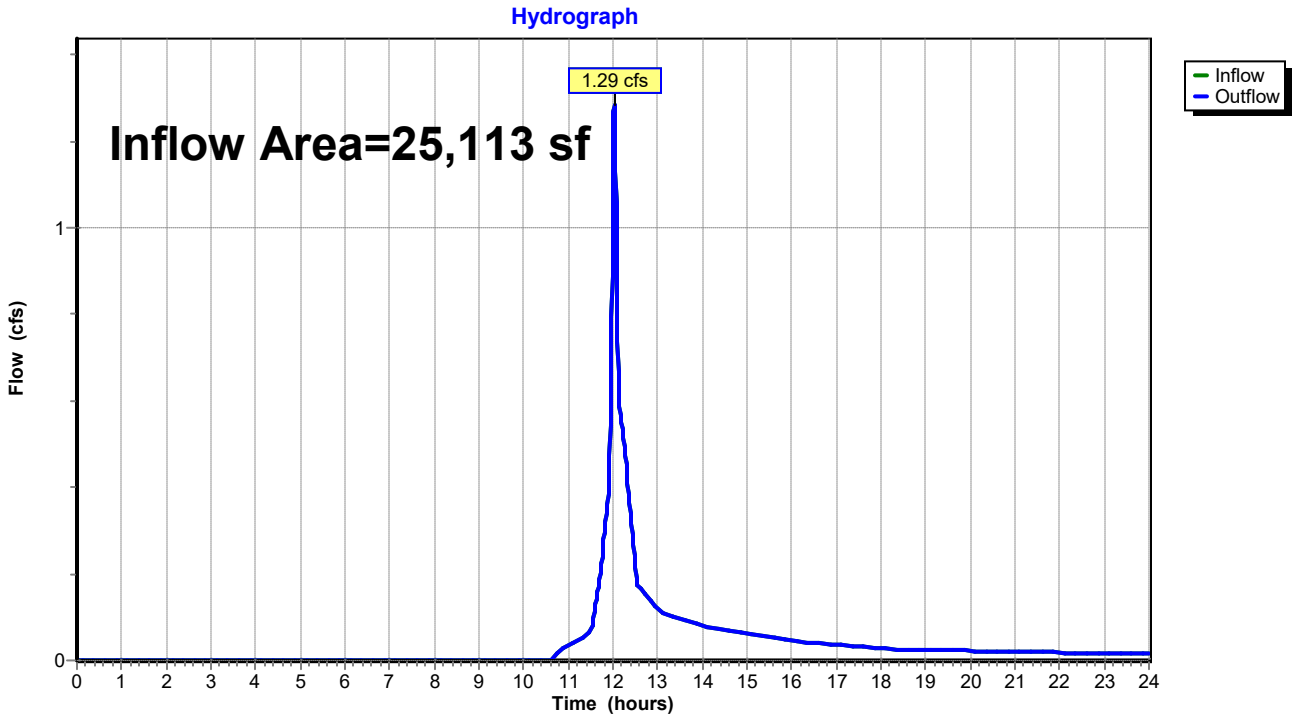


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,113 sf, 45.19% Impervious, Inflow Depth > 1.65" for 10-Year event
Inflow = 1.29 cfs @ 12.03 hrs, Volume= 3,459 cf
Outflow = 1.29 cfs @ 12.03 hrs, Volume= 3,459 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 10R: RAIL TRAIL

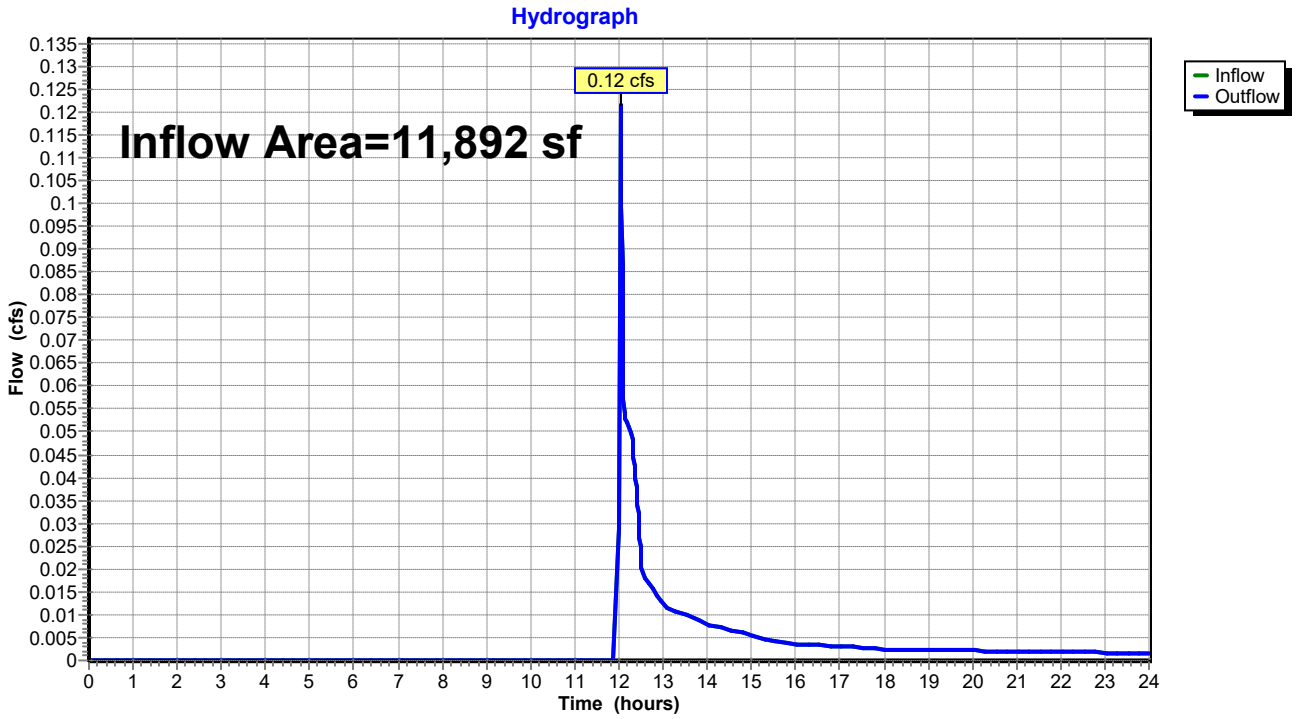


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,892 sf, 26.76% Impervious, Inflow Depth > 0.26" for 10-Year event
Inflow = 0.12 cfs @ 12.04 hrs, Volume= 257 cf
Outflow = 0.12 cfs @ 12.04 hrs, Volume= 257 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 20R: EASTERN ABUTTERS

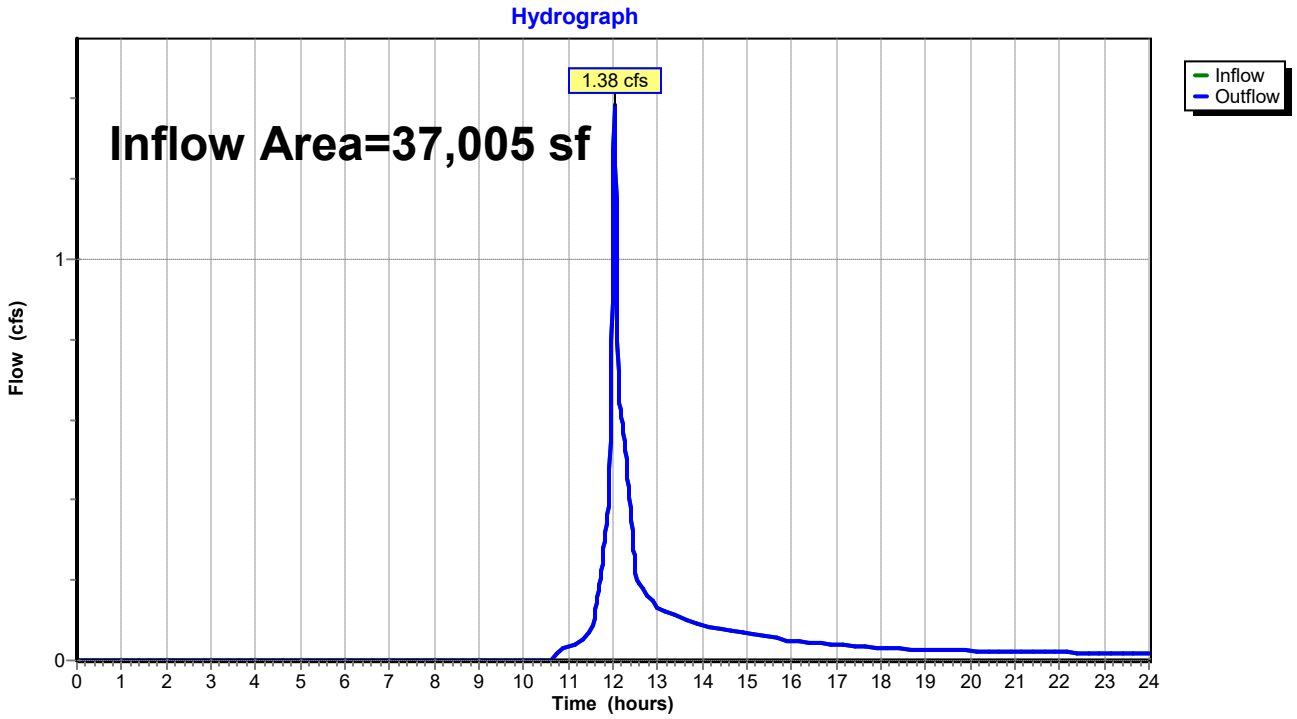


Summary for Reach 30R: TOTAL

Inflow Area = 37,005 sf, 39.27% Impervious, Inflow Depth > 1.21" for 10-Year event
Inflow = 1.38 cfs @ 12.04 hrs, Volume= 3,716 cf
Outflow = 1.38 cfs @ 12.04 hrs, Volume= 3,716 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,341 sf, 59.63% Impervious, Inflow Depth > 2.31" for 10-Year event
Inflow = 1.20 cfs @ 12.02 hrs, Volume= 3,148 cf
Outflow = 1.19 cfs @ 12.03 hrs, Volume= 3,082 cf, Atten= 1%, Lag= 0.3 min
Discarded = 0.00 cfs @ 12.03 hrs, Volume= 78 cf
Primary = 1.19 cfs @ 12.03 hrs, Volume= 3,003 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.53' @ 12.03 hrs Surf.Area= 138 sf Storage= 89 cf

Plug-Flow detention time= 17.3 min calculated for 3,082 cf (98% of inflow)
Center-of-Mass det. time= 5.2 min (837.2 - 832.1)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	121 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

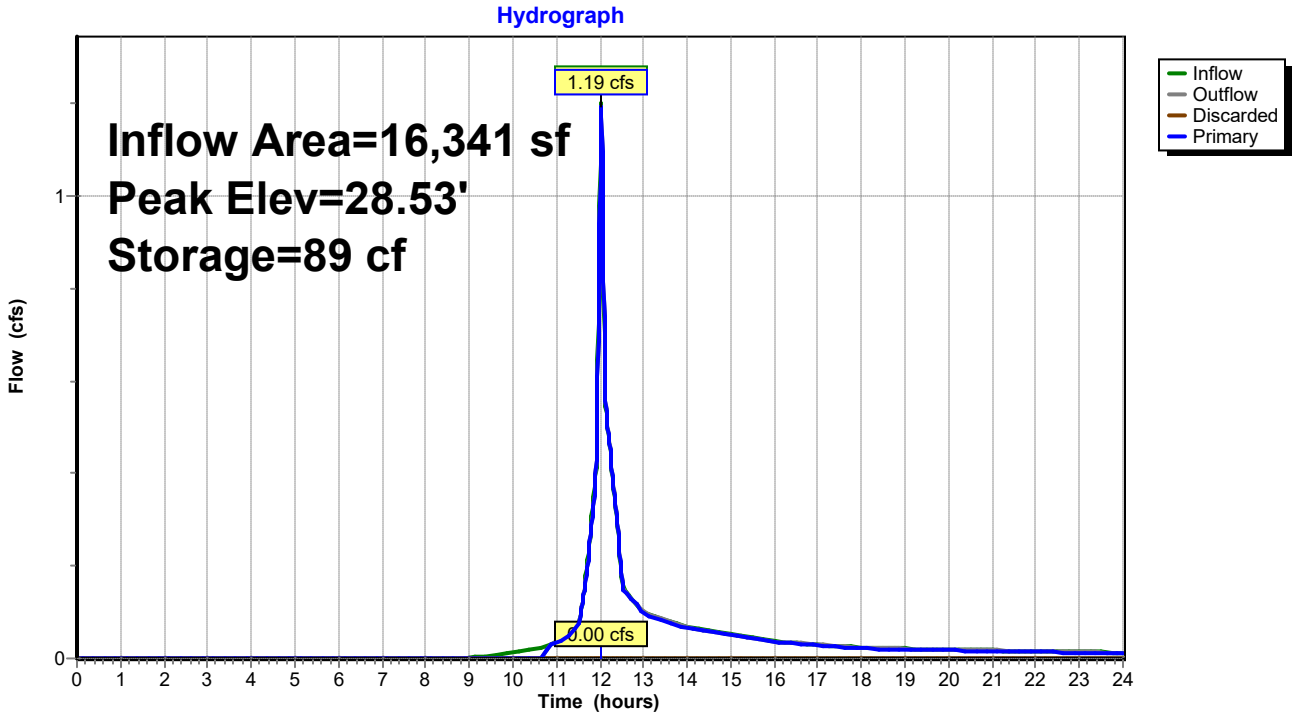
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	75	0	0
28.00	95	27	27
28.75	155	94	121

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.35'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.00 cfs @ 12.03 hrs HW=28.53' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.19 cfs @ 12.03 hrs HW=28.53' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.19 cfs @ 1.08 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 2,923 sf, 39.92% Impervious, Inflow Depth > 1.40" for 10-Year event
Inflow = 0.12 cfs @ 12.01 hrs, Volume= 342 cf
Outflow = 0.13 cfs @ 12.04 hrs, Volume= 341 cf, Atten= 0%, Lag= 1.6 min
Discarded = 0.01 cfs @ 11.61 hrs, Volume= 224 cf
Primary = 0.12 cfs @ 12.04 hrs, Volume= 118 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.06' @ 12.04 hrs Surf.Area= 14 sf Storage= 47 cf

Plug-Flow detention time= 53.7 min calculated for 341 cf (100% of inflow)
Center-of-Mass det. time= 53.4 min (917.2 - 863.8)

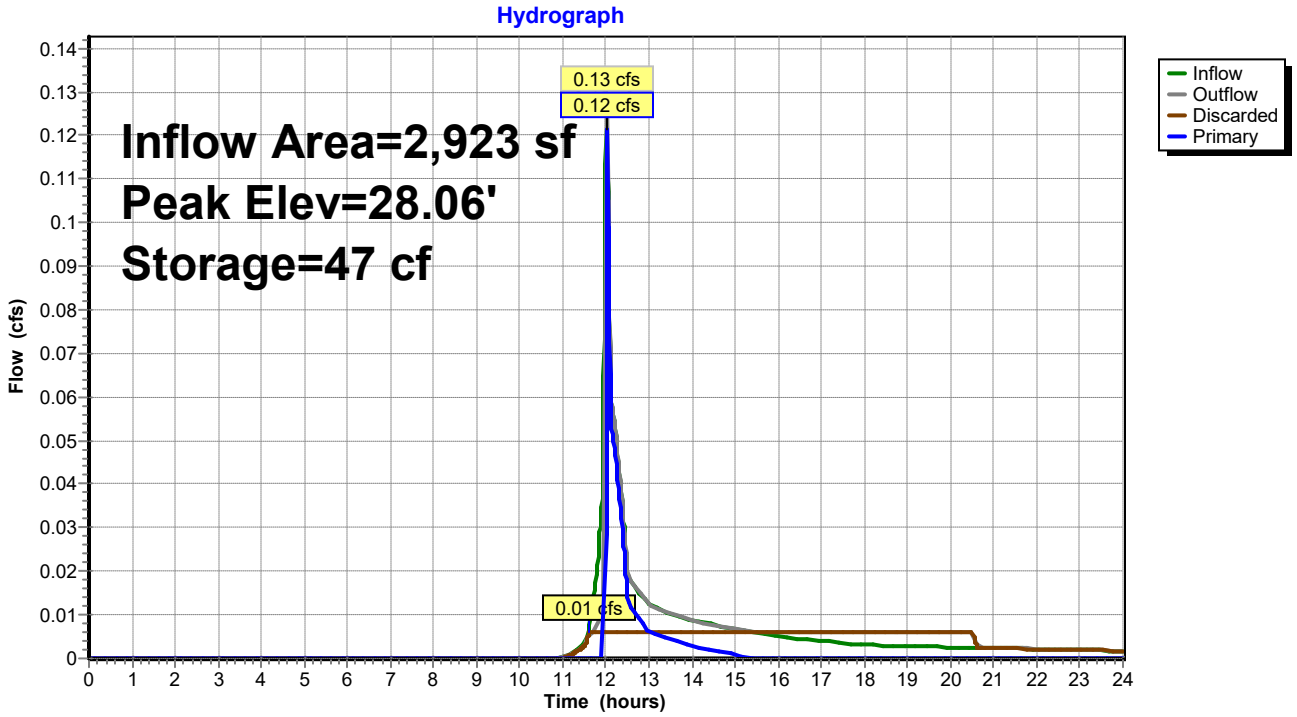
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.61 hrs HW=24.86' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.12 cfs @ 12.04 hrs HW=28.06' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.12 cfs @ 0.78 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 1,800 sf,100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
Inflow = 0.23 cfs @ 12.01 hrs, Volume= 689 cf
Outflow = 0.05 cfs @ 11.68 hrs, Volume= 689 cf, Atten= 79%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.68 hrs, Volume= 689 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 26.47' @ 12.37 hrs Surf.Area= 117 sf Storage= 130 cf

Plug-Flow detention time= 12.0 min calculated for 689 cf (100% of inflow)
Center-of-Mass det. time= 11.9 min (755.8 - 743.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	162 cf	**11.17'W x 10.50'L x 4.54'H Field A** 533 cf Overall - 127 cf Embedded = 406 cf x 40.0% Voids
#2A	25.50'	127 cf	**Cultec R-330XLHD** x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		289 cf	Total Available Storage

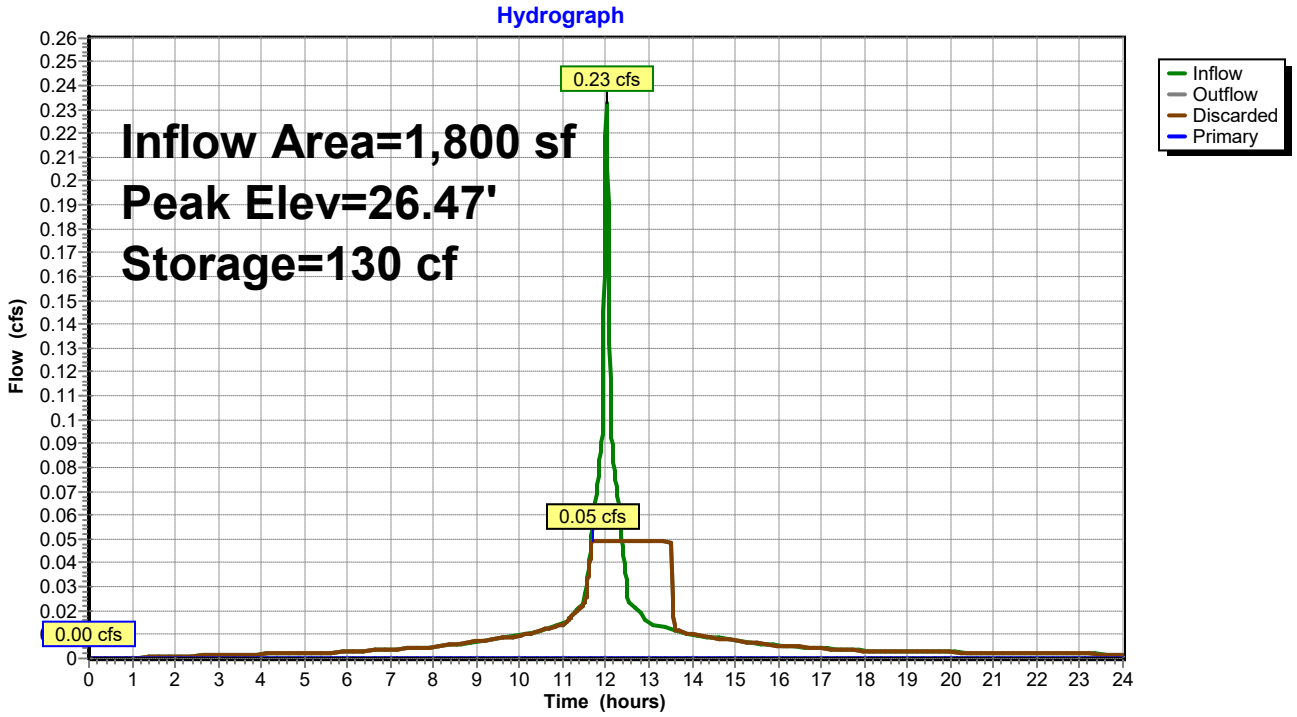
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**18.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.68 hrs HW=24.55' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.50' (Free Discharge)
↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 42P: CULTEC



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: NW AREA Runoff Area=19,862 sf 76.17% Impervious Runoff Depth>4.45"
Flow Length=191' Tc=0.9 min CN=85 Runoff=2.80 cfs 7,371 cf

Subcatchment 2S: SE AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>1.07"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=0.41 cfs 1,529 cf

Subcatchment 10S: NW LAWN Runoff Area=8,772 sf 18.30% Impervious Runoff Depth>1.22"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.27 cfs 893 cf

Subcatchment 20S: ROADWAY Runoff Area=16,341 sf 59.63% Impervious Runoff Depth>3.42"
Flow Length=179' Tc=1.3 min CN=75 Runoff=1.78 cfs 4,655 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=2,923 sf 39.92% Impervious Runoff Depth>2.29"
Flow Length=82' Tc=0.7 min CN=63 Runoff=0.21 cfs 557 cf

Subcatchment 40S: EASTERN REAR Runoff Area=7,169 sf 3.00% Impervious Runoff Depth>0.61"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=41 Runoff=0.06 cfs 364 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=1,800 sf 100.00% Impervious Runoff Depth>5.92"
Tc=1.0 min CN=98 Runoff=0.30 cfs 888 cf

Reach 1R: RAIL TRAIL Inflow=2.80 cfs 7,371 cf
Outflow=2.80 cfs 7,371 cf

Reach 2R: EASTERN ABUTTERS Inflow=0.41 cfs 1,529 cf
Outflow=0.41 cfs 1,529 cf

Reach 3R: TOTAL Inflow=3.06 cfs 8,900 cf
Outflow=3.06 cfs 8,900 cf

Reach 10R: RAIL TRAIL Inflow=2.04 cfs 5,397 cf
Outflow=2.04 cfs 5,397 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.23 cfs 679 cf
Outflow=0.23 cfs 679 cf

Reach 30R: TOTAL Inflow=2.27 cfs 6,076 cf
Outflow=2.27 cfs 6,076 cf

Pond 20P: RAINGARDEN Peak Elev=28.59' Storage=97 cf Inflow=1.78 cfs 4,655 cf
Discarded=0.00 cfs 84 cf Primary=1.77 cfs 4,504 cf Outflow=1.78 cfs 4,588 cf

Pond 30P: DRYWELL Peak Elev=28.08' Storage=47 cf Inflow=0.21 cfs 557 cf
Discarded=0.01 cfs 272 cf Primary=0.20 cfs 285 cf Outflow=0.21 cfs 557 cf

Pond 42P: CULTEC Peak Elev=27.01' Storage=174 cf Inflow=0.30 cfs 888 cf
Discarded=0.05 cfs 858 cf Primary=0.06 cfs 30 cf Outflow=0.11 cfs 888 cf

Summary for Subcatchment 1S: NW AREA

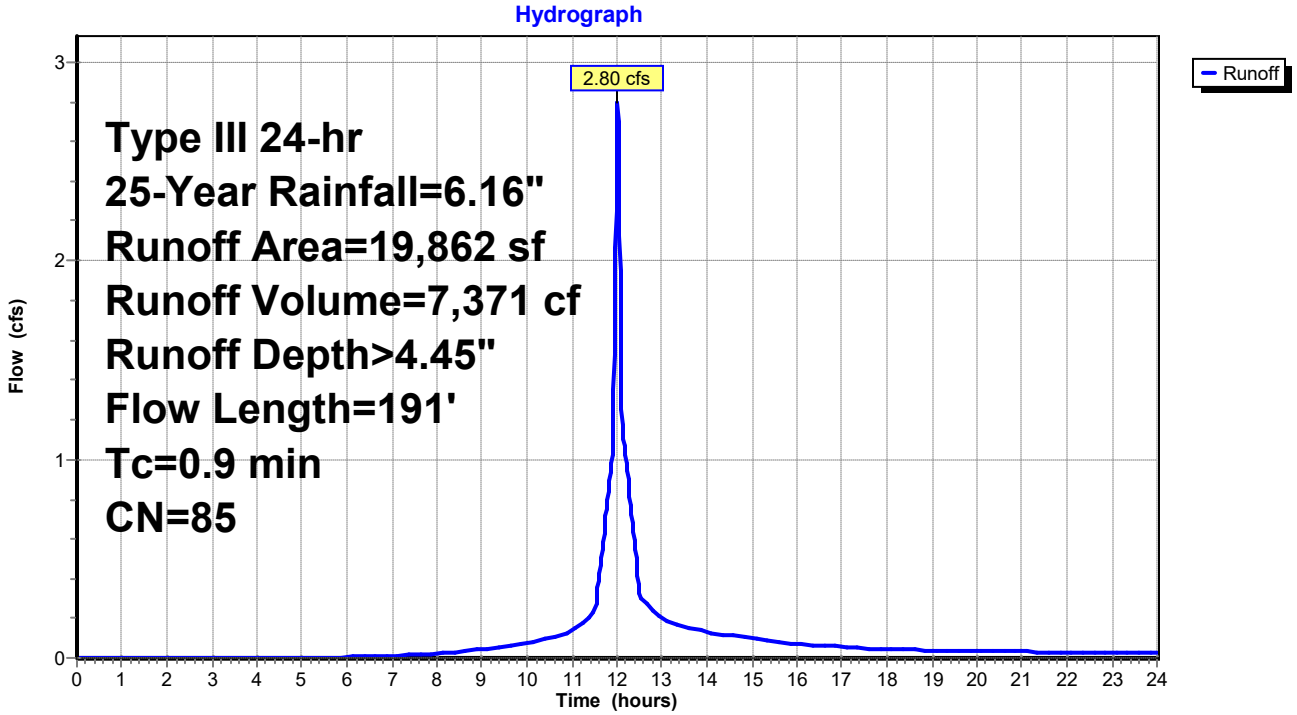
Runoff = 2.80 cfs @ 12.01 hrs, Volume= 7,371 cf, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
12,146	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
3,870	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,862	85	Weighted Average
4,734		23.83% Pervious Area
15,128		76.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NW AREA



Summary for Subcatchment 2S: SE AREA

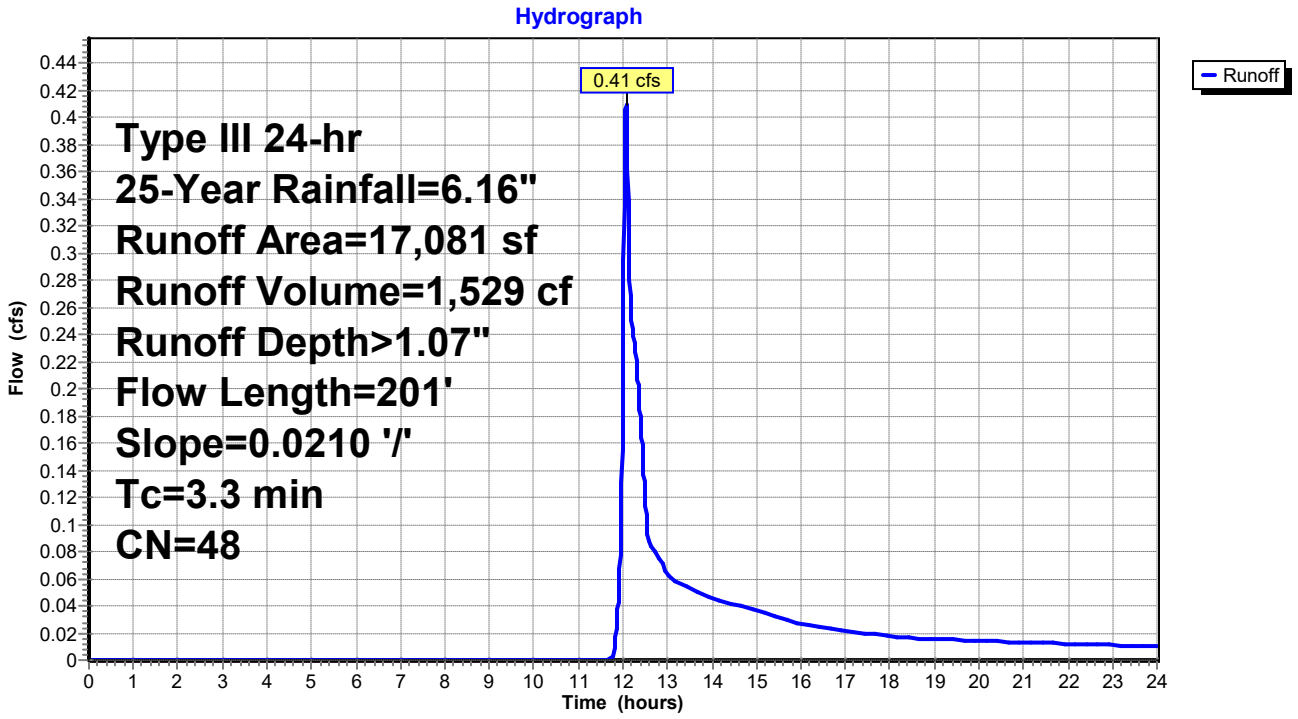
Runoff = 0.41 cfs @ 12.07 hrs, Volume= 1,529 cf, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SE AREA



Summary for Subcatchment 10S: NW LAWN

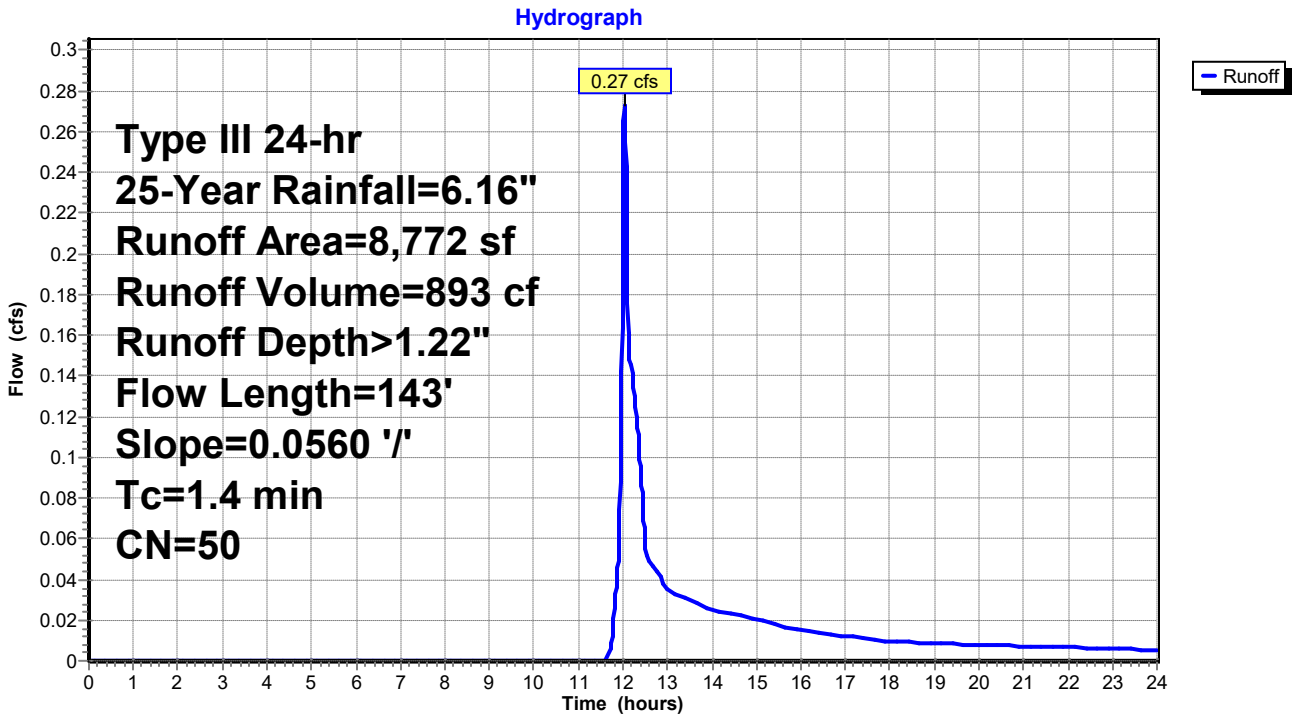
Runoff = 0.27 cfs @ 12.03 hrs, Volume= 893 cf, Depth> 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
	7,000	39	>75% Grass cover, Good, HSG A
	1,605	98	Roofs, HSG A
*	167	55	Permable pavers
	8,772	50	Weighted Average
	7,167		81.70% Pervious Area
	1,605		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

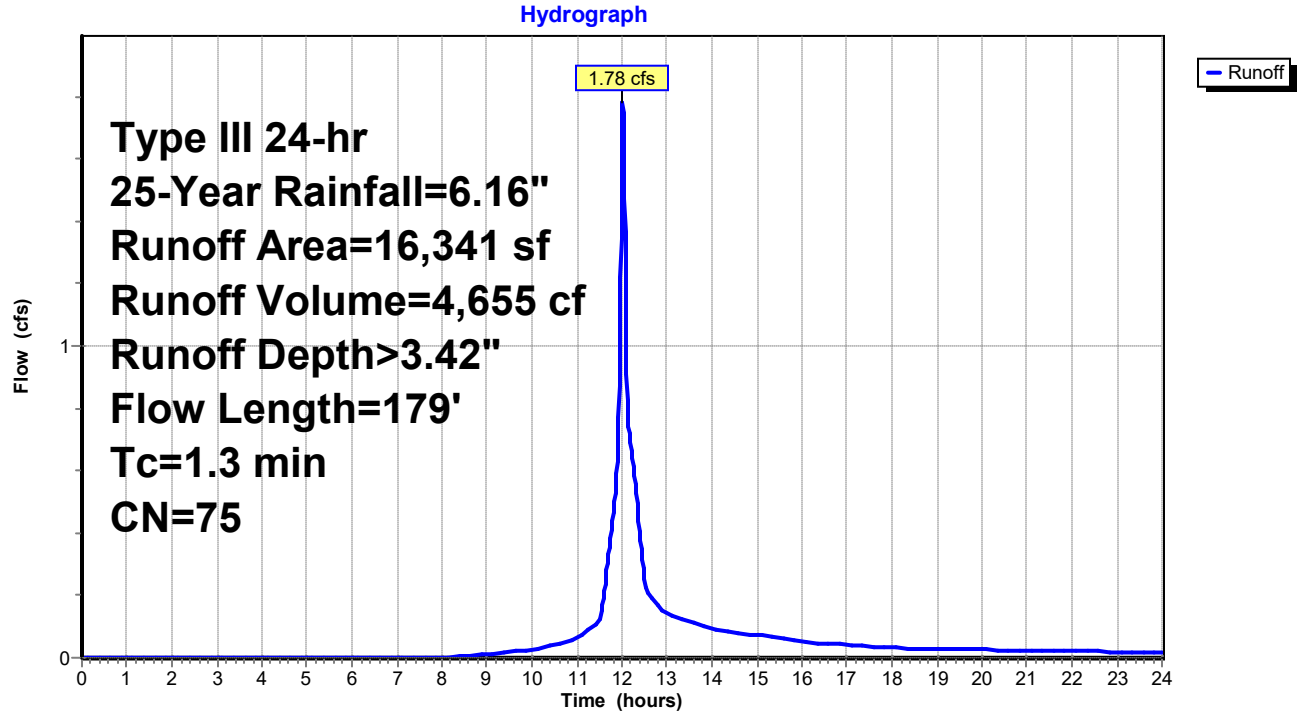
Runoff = 1.78 cfs @ 12.02 hrs, Volume= 4,655 cf, Depth> 3.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
	5,192	98	Paved parking, HSG A
	230	98	Unconnected pavement, HSG A
	5,964	39	>75% Grass cover, Good, HSG A
	4,322	98	Roofs, HSG A
*	633	55	Permeable pavers
	16,341	75	Weighted Average
	6,597		40.37% Pervious Area
	9,744		59.63% Impervious Area
	230		2.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

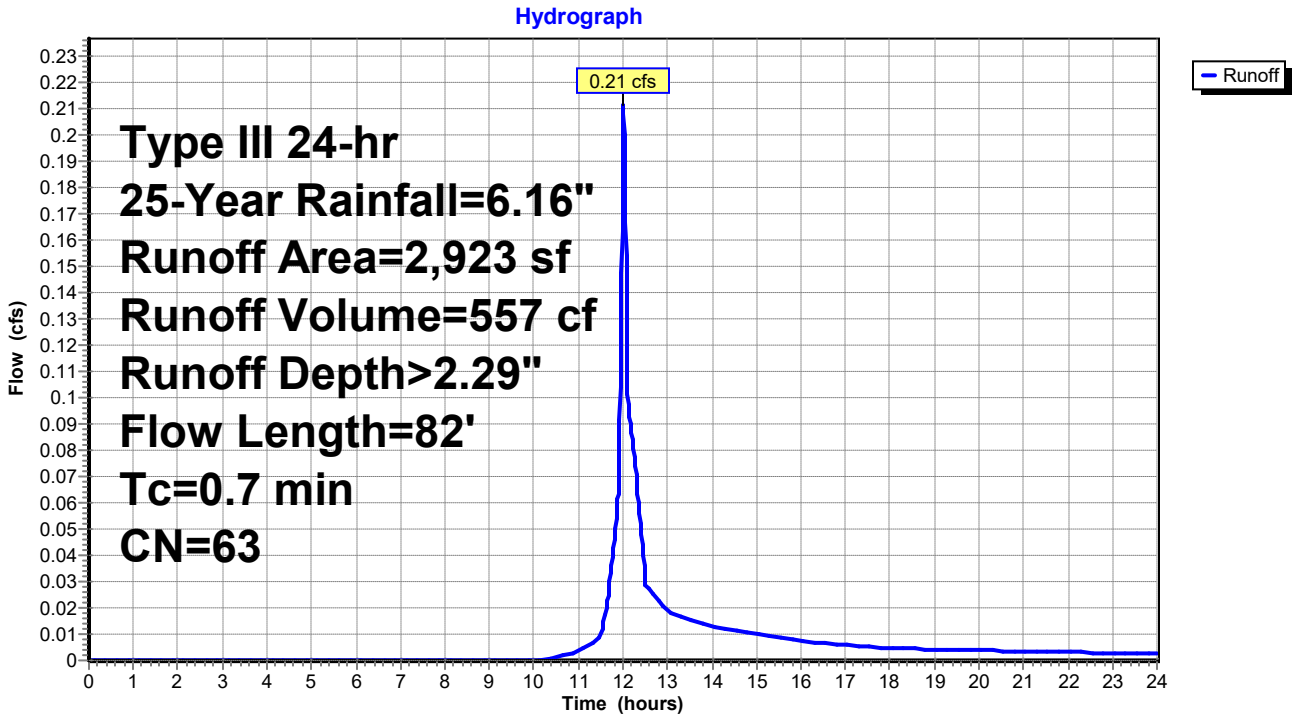
Runoff = 0.21 cfs @ 12.01 hrs, Volume= 557 cf, Depth> 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
	1,167	98	Paved parking, HSG A
	1,600	39	>75% Grass cover, Good, HSG A
*	156	55	Permeablea pavers
	2,923	63	Weighted Average
	1,756		60.08% Pervious Area
	1,167		39.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

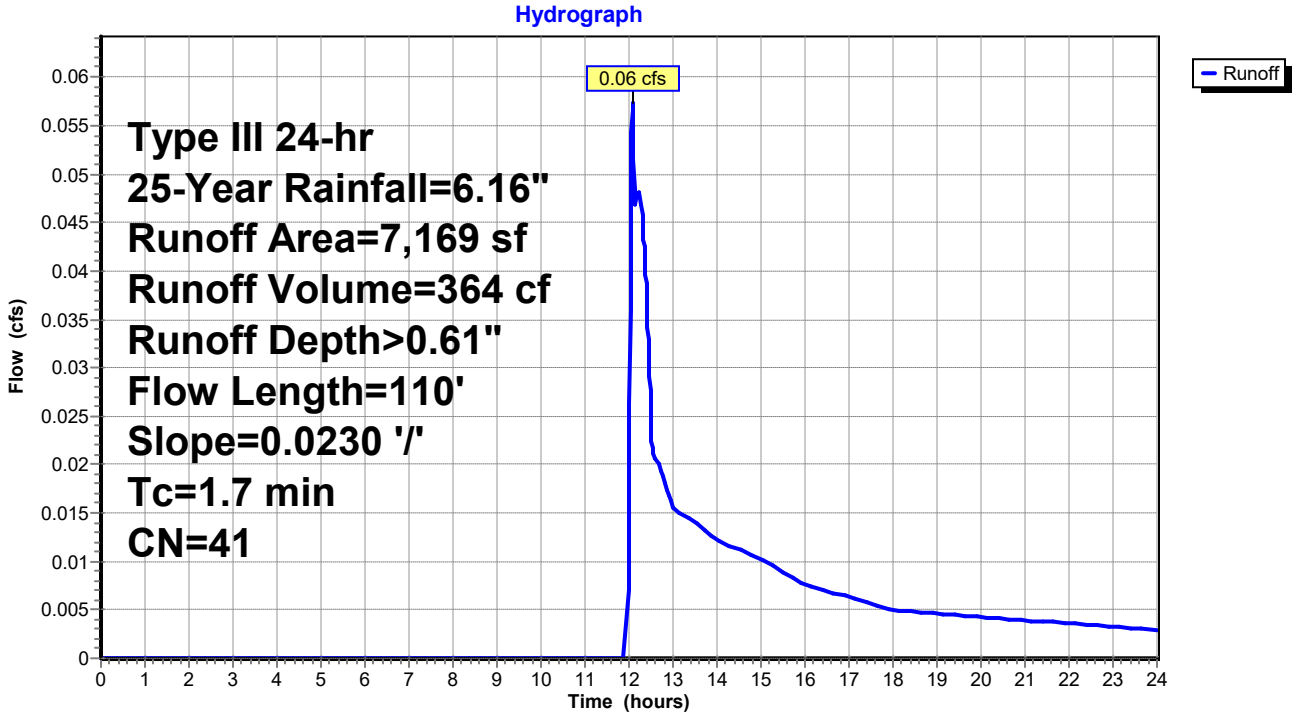
Runoff = 0.06 cfs @ 12.08 hrs, Volume= 364 cf, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
6,954	39	>75% Grass cover, Good, HSG A
215	98	Roofs, HSG A
7,169	41	Weighted Average
6,954		97.00% Pervious Area
215		3.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

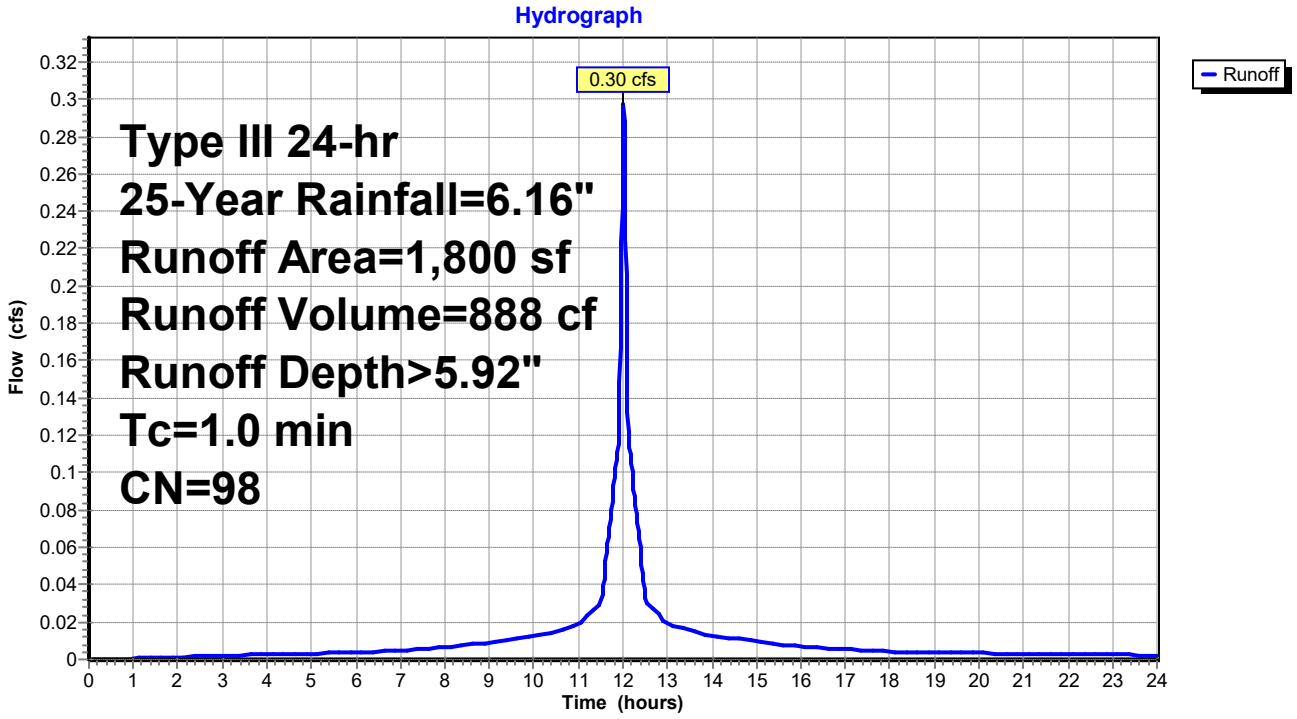
Runoff = 0.30 cfs @ 12.01 hrs, Volume= 888 cf, Depth> 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
1,800	98	Roofs, HSG A
1,800		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

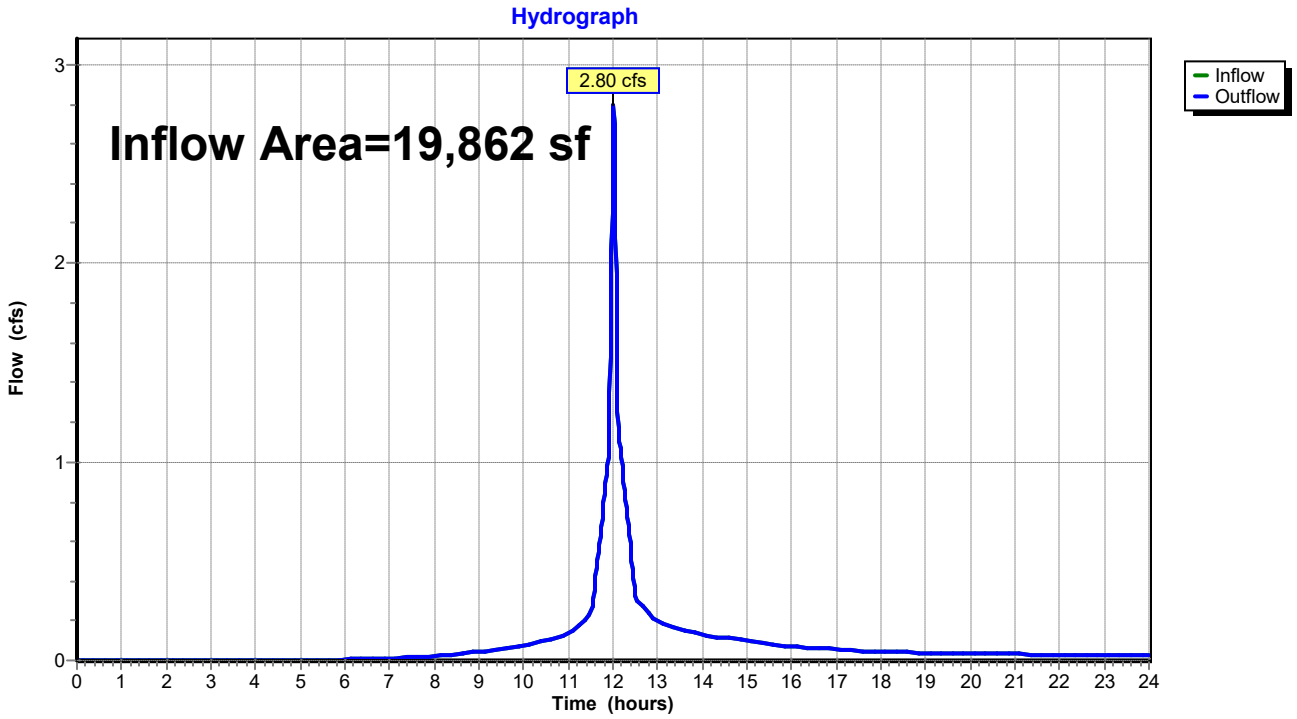


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,862 sf, 76.17% Impervious, Inflow Depth > 4.45" for 25-Year event
Inflow = 2.80 cfs @ 12.01 hrs, Volume= 7,371 cf
Outflow = 2.80 cfs @ 12.01 hrs, Volume= 7,371 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: RAIL TRAIL

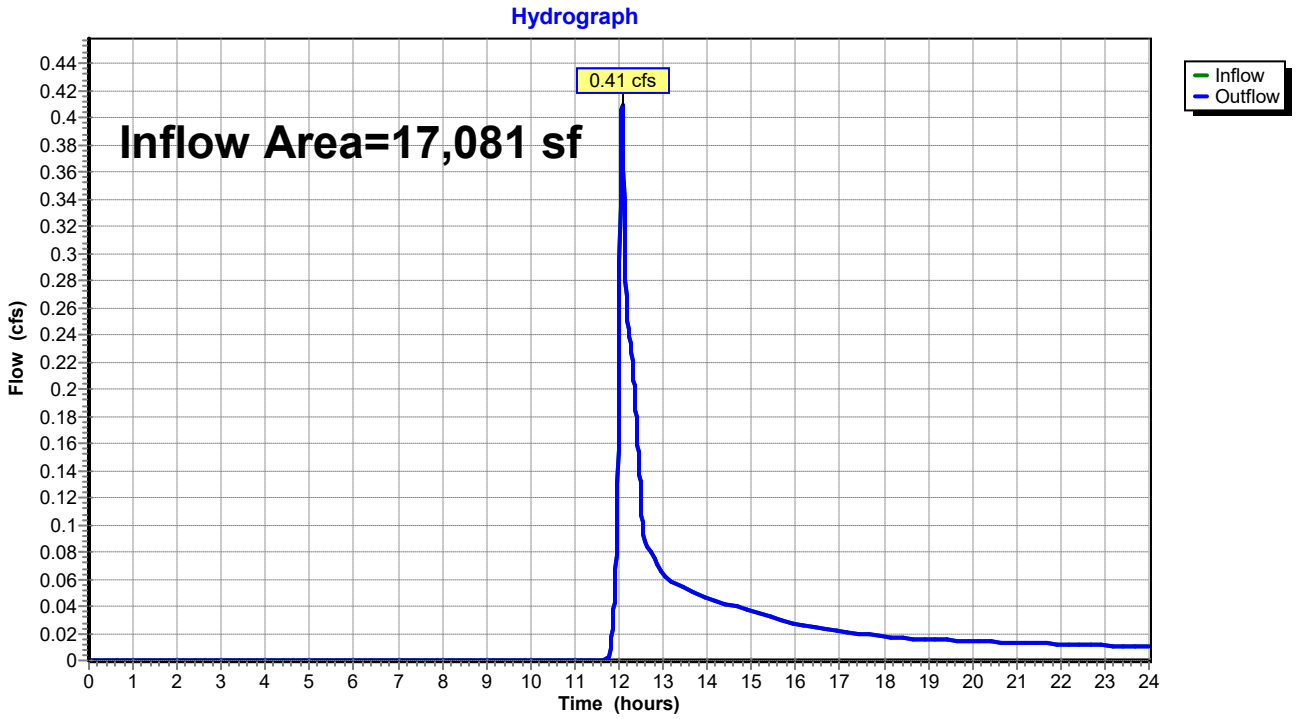


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 1.07" for 25-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 1,529 cf
Outflow = 0.41 cfs @ 12.07 hrs, Volume= 1,529 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: EASTERN ABUTTERS

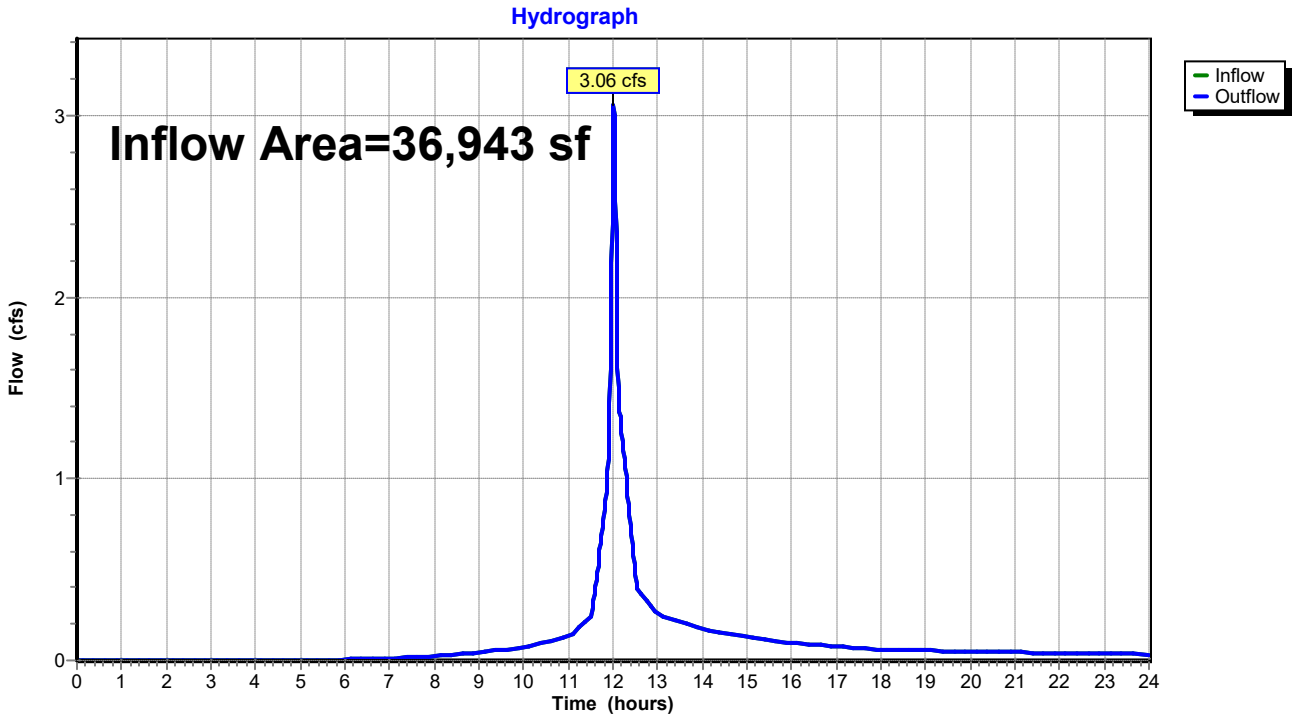


Summary for Reach 3R: TOTAL

Inflow Area = 36,943 sf, 47.38% Impervious, Inflow Depth > 2.89" for 25-Year event
Inflow = 3.06 cfs @ 12.02 hrs, Volume= 8,900 cf
Outflow = 3.06 cfs @ 12.02 hrs, Volume= 8,900 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL

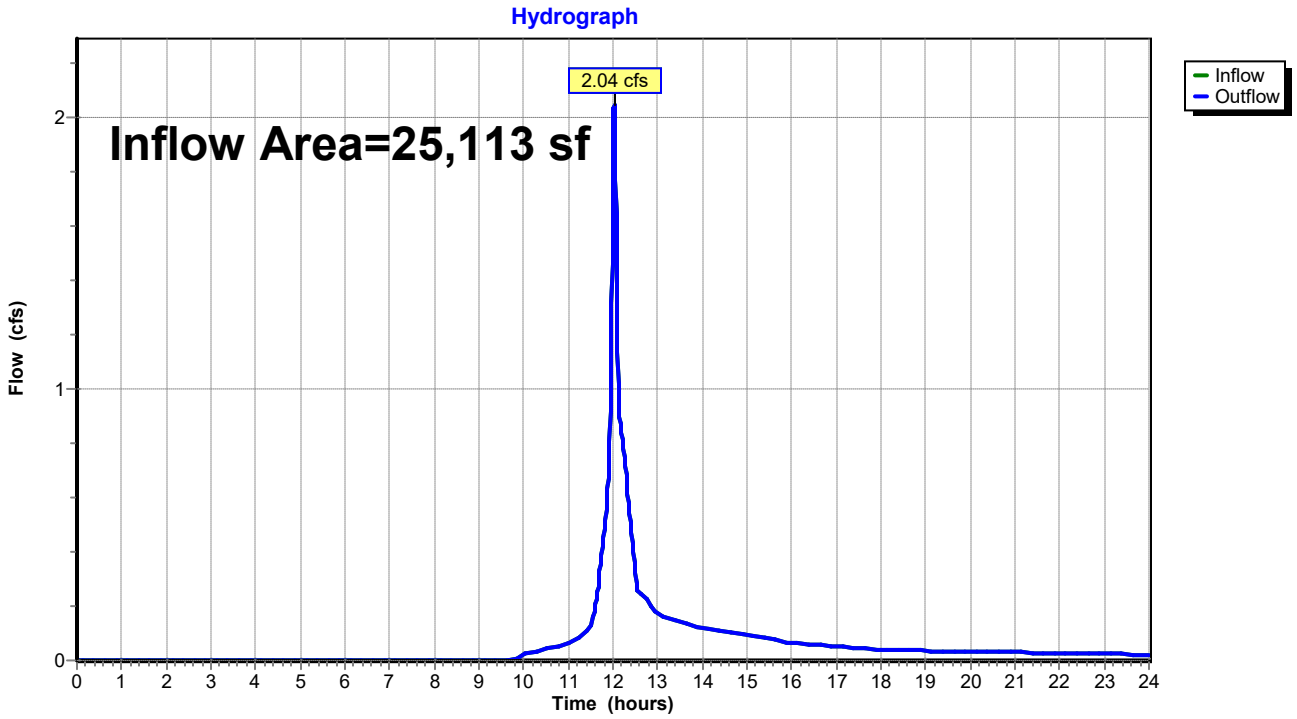


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,113 sf, 45.19% Impervious, Inflow Depth > 2.58" for 25-Year event
Inflow = 2.04 cfs @ 12.03 hrs, Volume= 5,397 cf
Outflow = 2.04 cfs @ 12.03 hrs, Volume= 5,397 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 10R: RAIL TRAIL

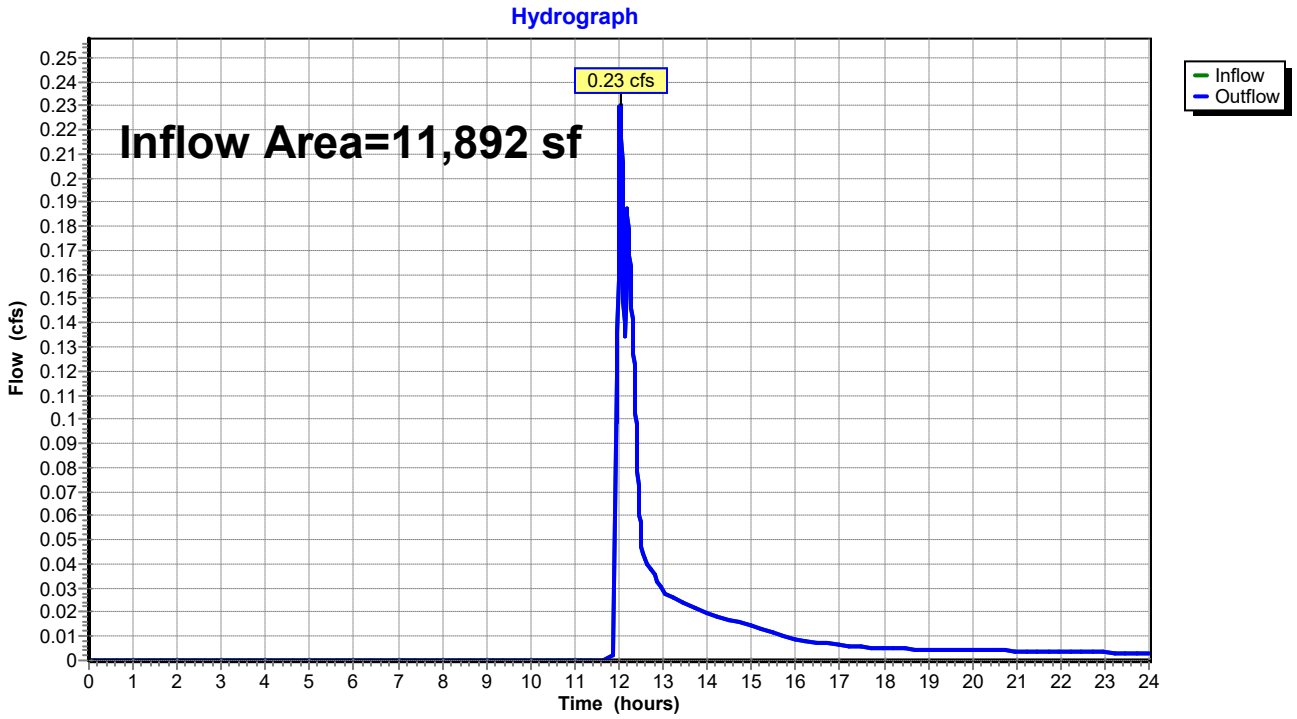


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,892 sf, 26.76% Impervious, Inflow Depth > 0.69" for 25-Year event
Inflow = 0.23 cfs @ 12.03 hrs, Volume= 679 cf
Outflow = 0.23 cfs @ 12.03 hrs, Volume= 679 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 20R: EASTERN ABUTTERS

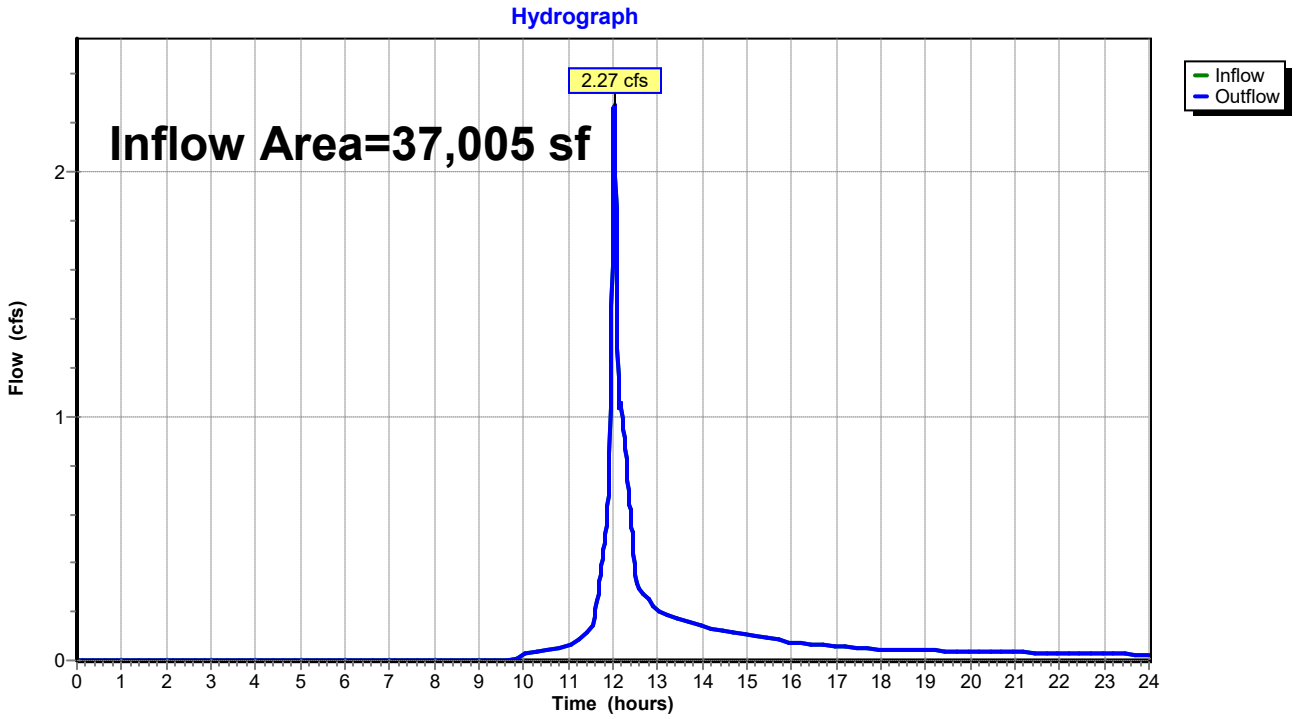


Summary for Reach 30R: TOTAL

Inflow Area = 37,005 sf, 39.27% Impervious, Inflow Depth > 1.97" for 25-Year event
Inflow = 2.27 cfs @ 12.03 hrs, Volume= 6,076 cf
Outflow = 2.27 cfs @ 12.03 hrs, Volume= 6,076 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,341 sf, 59.63% Impervious, Inflow Depth > 3.42" for 25-Year event
Inflow = 1.78 cfs @ 12.02 hrs, Volume= 4,655 cf
Outflow = 1.78 cfs @ 12.02 hrs, Volume= 4,588 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.00 cfs @ 12.02 hrs, Volume= 84 cf
Primary = 1.77 cfs @ 12.02 hrs, Volume= 4,504 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.59' @ 12.02 hrs Surf.Area= 142 sf Storage= 97 cf

Plug-Flow detention time= 12.7 min calculated for 4,588 cf (99% of inflow)
Center-of-Mass det. time= 4.2 min (825.0 - 820.8)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	121 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

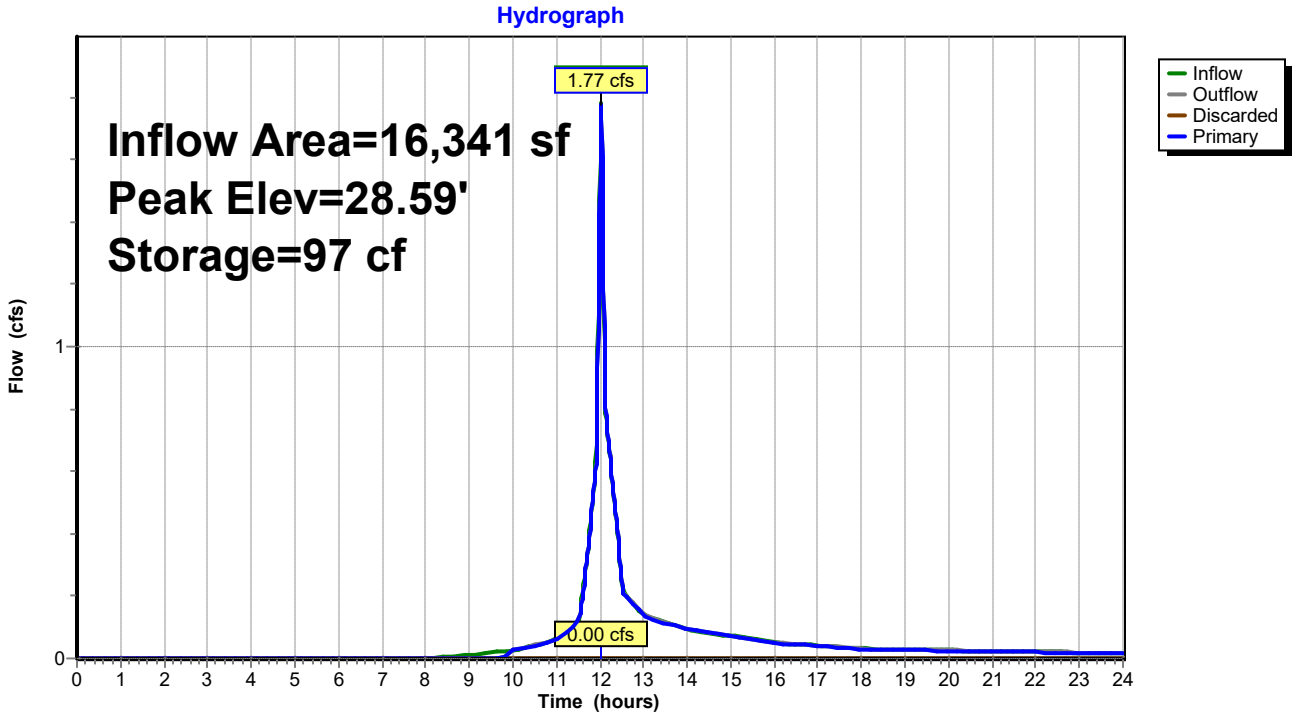
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	75	0	0
28.00	95	27	27
28.75	155	94	121

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.35'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.00 cfs @ 12.02 hrs HW=28.59' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.76 cfs @ 12.02 hrs HW=28.59' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.76 cfs @ 1.24 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 2,923 sf, 39.92% Impervious, Inflow Depth > 2.29" for 25-Year event
Inflow = 0.21 cfs @ 12.01 hrs, Volume= 557 cf
Outflow = 0.21 cfs @ 12.02 hrs, Volume= 557 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 11.29 hrs, Volume= 272 cf
Primary = 0.20 cfs @ 12.02 hrs, Volume= 285 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.08' @ 12.02 hrs Surf.Area= 14 sf Storage= 47 cf

Plug-Flow detention time= 43.9 min calculated for 557 cf (100% of inflow)
Center-of-Mass det. time= 43.6 min (892.2 - 848.6)

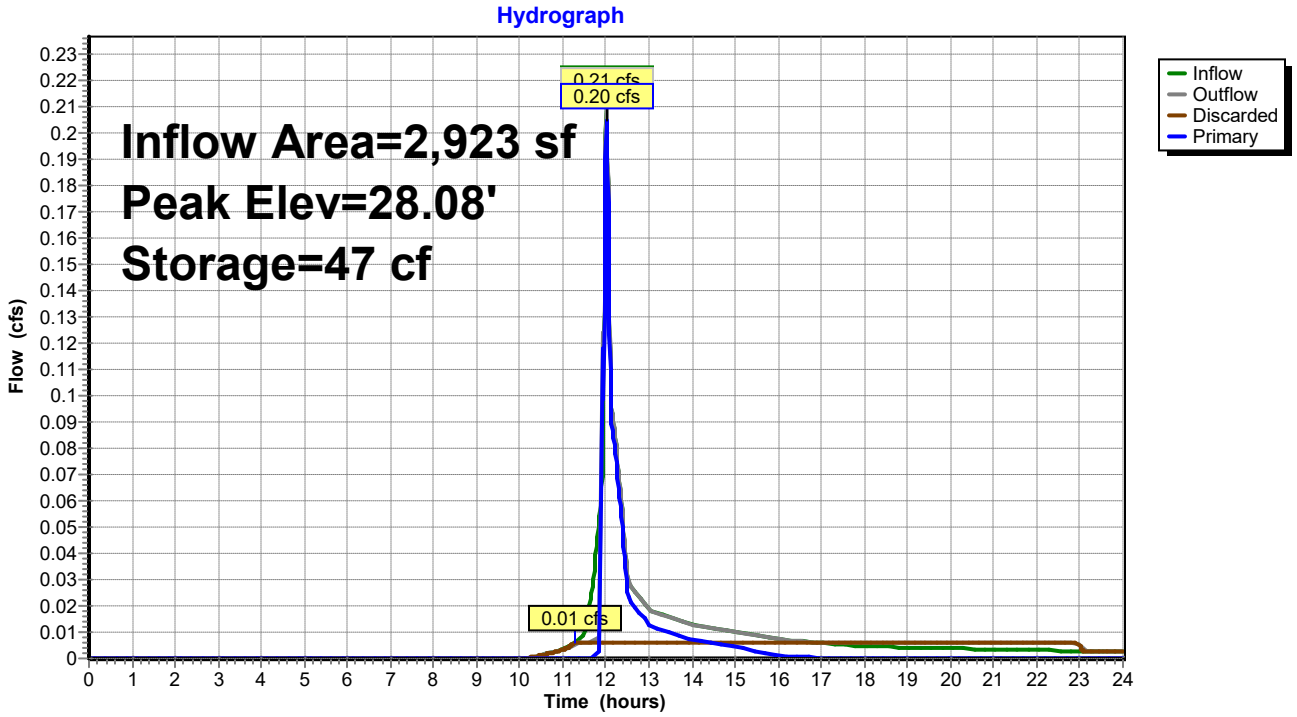
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.29 hrs HW=24.86' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.20 cfs @ 12.02 hrs HW=28.08' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.20 cfs @ 0.93 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 1,800 sf,100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
Inflow = 0.30 cfs @ 12.01 hrs, Volume= 888 cf
Outflow = 0.11 cfs @ 12.18 hrs, Volume= 888 cf, Atten= 65%, Lag= 9.9 min
Discarded = 0.05 cfs @ 11.62 hrs, Volume= 858 cf
Primary = 0.06 cfs @ 12.18 hrs, Volume= 30 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 27.01' @ 12.18 hrs Surf.Area= 117 sf Storage= 174 cf

Plug-Flow detention time= 16.4 min calculated for 888 cf (100% of inflow)
Center-of-Mass det. time= 16.4 min (756.4 - 740.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	162 cf	**11.17'W x 10.50'L x 4.54'H Field A** 533 cf Overall - 127 cf Embedded = 406 cf x 40.0% Voids
#2A	25.50'	127 cf	**Cultec R-330XLHD** x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		289 cf	Total Available Storage

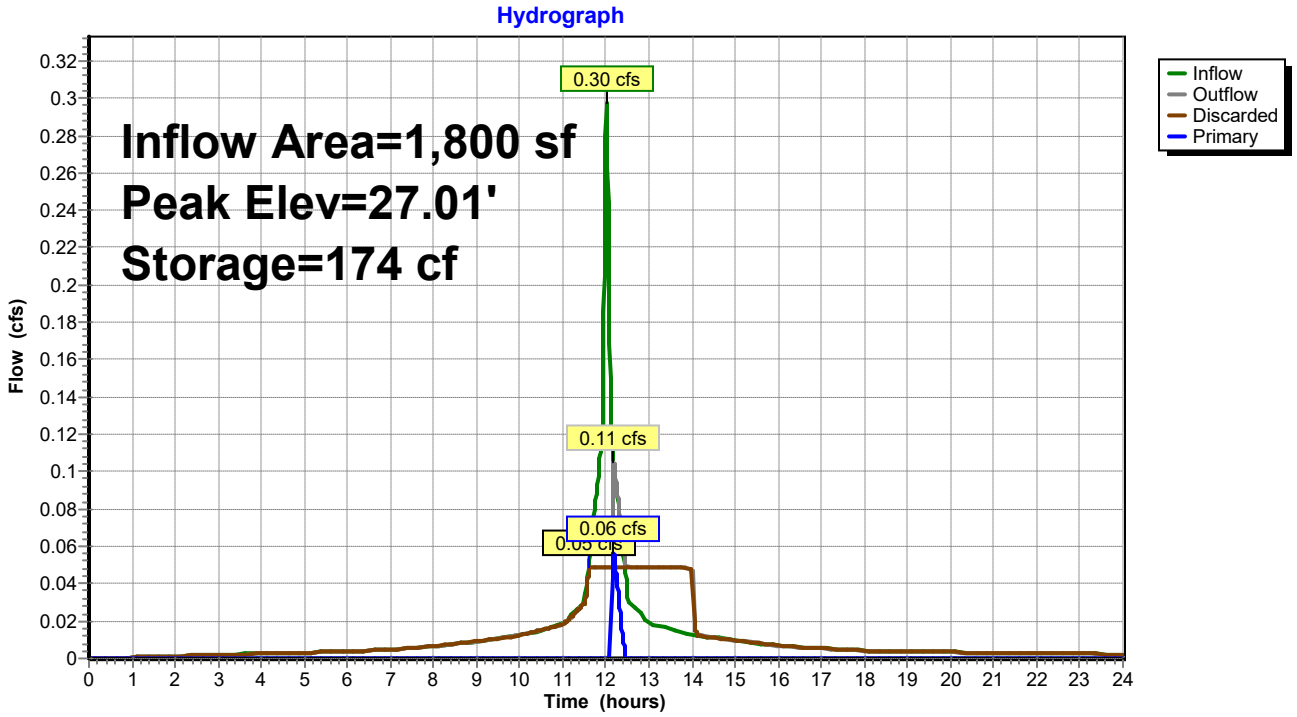
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**18.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.62 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.04 cfs @ 12.18 hrs HW=27.01' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.04 cfs @ 0.49 fps)

Pond 42P: CULTEC



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: NW AREA Runoff Area=19,862 sf 76.17% Impervious Runoff Depth>7.12"
Flow Length=191' Tc=0.9 min CN=85 Runoff=4.37 cfs 11,789 cf

Subcatchment 2S: SE AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>2.60"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=1.22 cfs 3,706 cf

Subcatchment 10S: NW LAWN Runoff Area=8,772 sf 18.30% Impervious Runoff Depth>2.84"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.75 cfs 2,078 cf

Subcatchment 20S: ROADWAY Runoff Area=16,341 sf 59.63% Impervious Runoff Depth>5.90"
Flow Length=179' Tc=1.3 min CN=75 Runoff=3.05 cfs 8,029 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=2,923 sf 39.92% Impervious Runoff Depth>4.42"
Flow Length=82' Tc=0.7 min CN=63 Runoff=0.42 cfs 1,077 cf

Subcatchment 40S: EASTERN REAR Runoff Area=7,169 sf 3.00% Impervious Runoff Depth>1.80"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=41 Runoff=0.33 cfs 1,073 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=1,800 sf 100.00% Impervious Runoff Depth>8.70"
Tc=1.0 min CN=98 Runoff=0.43 cfs 1,305 cf

Reach 1R: RAIL TRAIL Inflow=4.37 cfs 11,789 cf
Outflow=4.37 cfs 11,789 cf

Reach 2R: EASTERN ABUTTERS Inflow=1.22 cfs 3,706 cf
Outflow=1.22 cfs 3,706 cf

Reach 3R: TOTAL Inflow=5.32 cfs 15,495 cf
Outflow=5.32 cfs 15,495 cf

Reach 10R: RAIL TRAIL Inflow=3.79 cfs 9,947 cf
Outflow=3.79 cfs 9,947 cf

Reach 20R: EASTERN ABUTTERS Inflow=1.14 cfs 1,998 cf
Outflow=1.14 cfs 1,998 cf

Reach 30R: TOTAL Inflow=4.92 cfs 11,945 cf
Outflow=4.92 cfs 11,945 cf

Pond 20P: RAINGARDEN Peak Elev=28.69' Storage=111 cf Inflow=3.05 cfs 8,029 cf
Discarded=0.00 cfs 93 cf Primary=3.04 cfs 7,869 cf Outflow=3.04 cfs 7,962 cf

Pond 30P: DRYWELL Peak Elev=28.13' Storage=48 cf Inflow=0.42 cfs 1,077 cf
Discarded=0.01 cfs 311 cf Primary=0.41 cfs 731 cf Outflow=0.42 cfs 1,042 cf

Pond 42P: CULTEC Peak Elev=27.09' Storage=180 cf Inflow=0.43 cfs 1,305 cf
Discarded=0.05 cfs 1,111 cf Primary=0.42 cfs 194 cf Outflow=0.47 cfs 1,305 cf

Summary for Subcatchment 1S: NW AREA

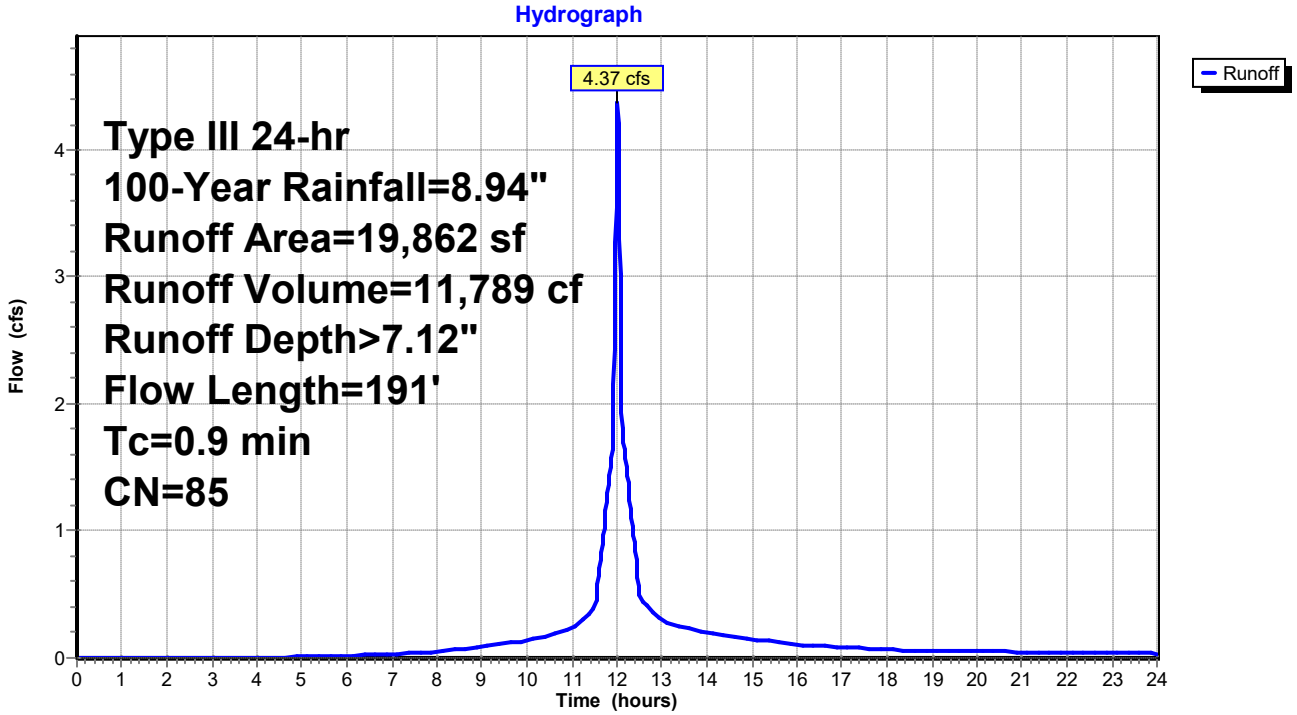
Runoff = 4.37 cfs @ 12.01 hrs, Volume= 11,789 cf, Depth> 7.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
12,146	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
3,870	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,862	85	Weighted Average
4,734		23.83% Pervious Area
15,128		76.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NW AREA



Summary for Subcatchment 2S: SE AREA

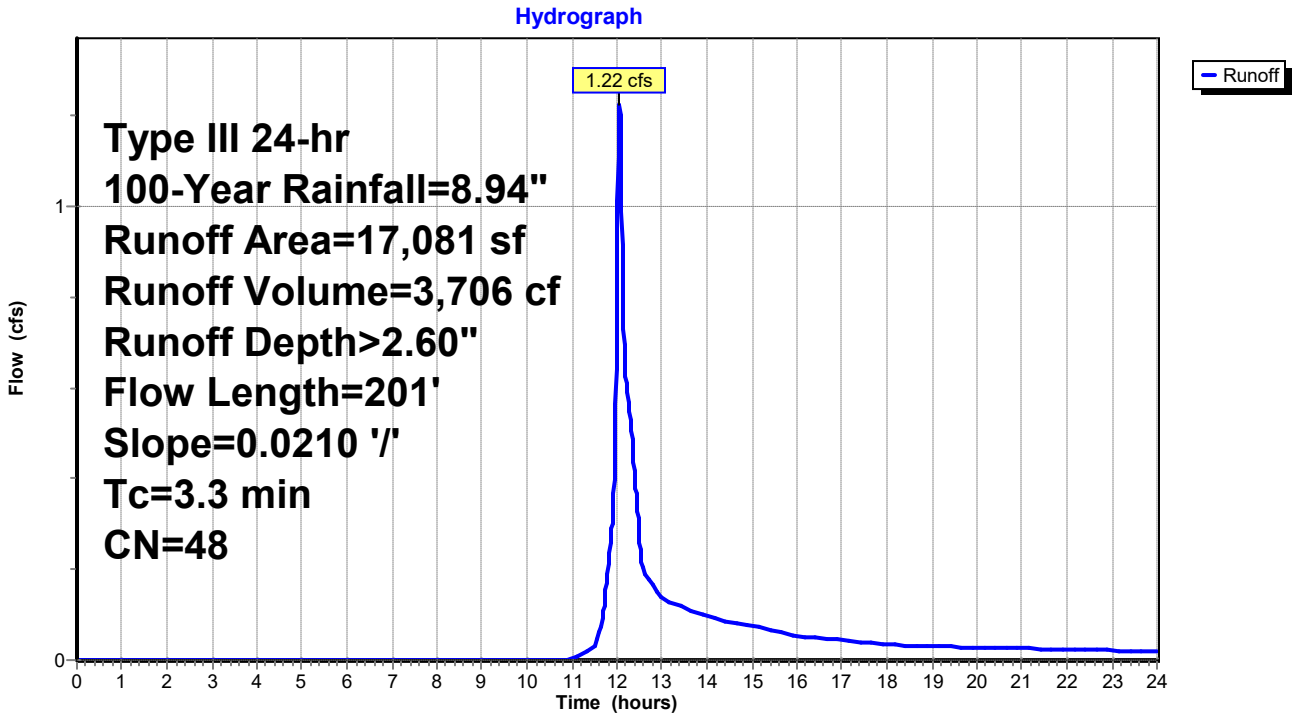
Runoff = 1.22 cfs @ 12.06 hrs, Volume= 3,706 cf, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SE AREA



Summary for Subcatchment 10S: NW LAWN

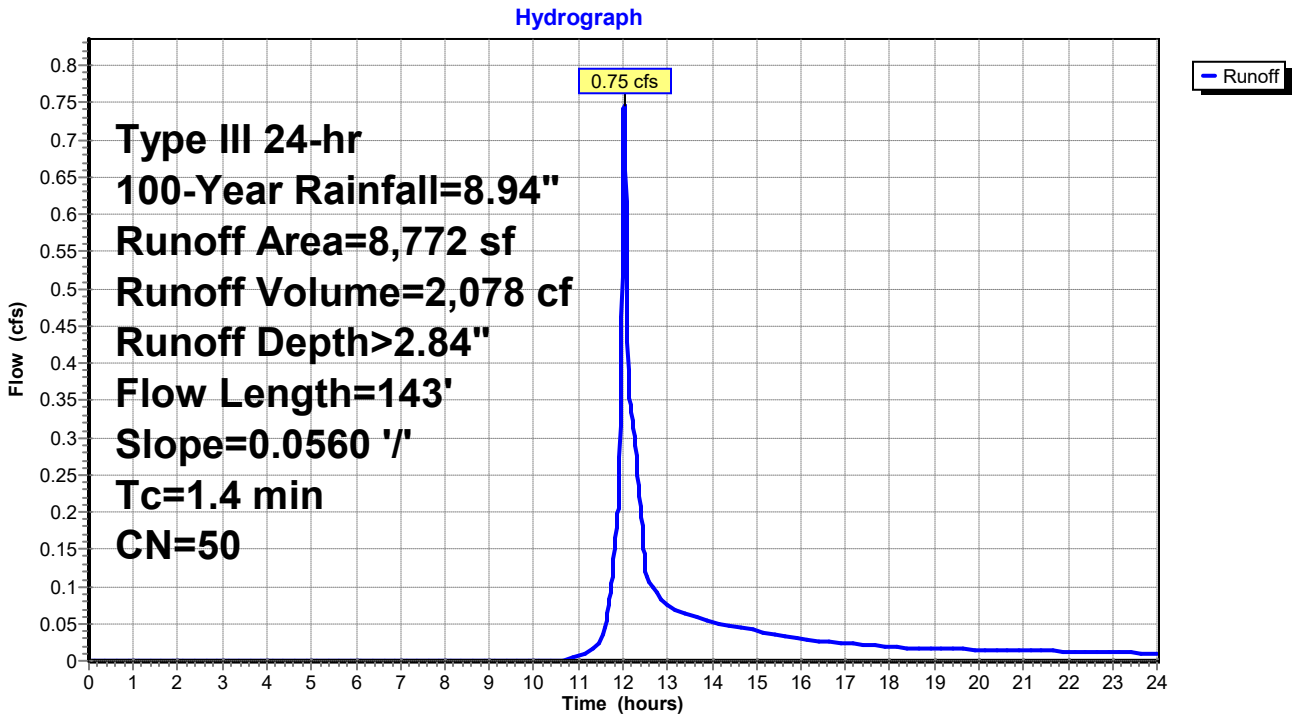
Runoff = 0.75 cfs @ 12.03 hrs, Volume= 2,078 cf, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
	7,000	39	>75% Grass cover, Good, HSG A
	1,605	98	Roofs, HSG A
*	167	55	Permable pavers
	8,772	50	Weighted Average
	7,167		81.70% Pervious Area
	1,605		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

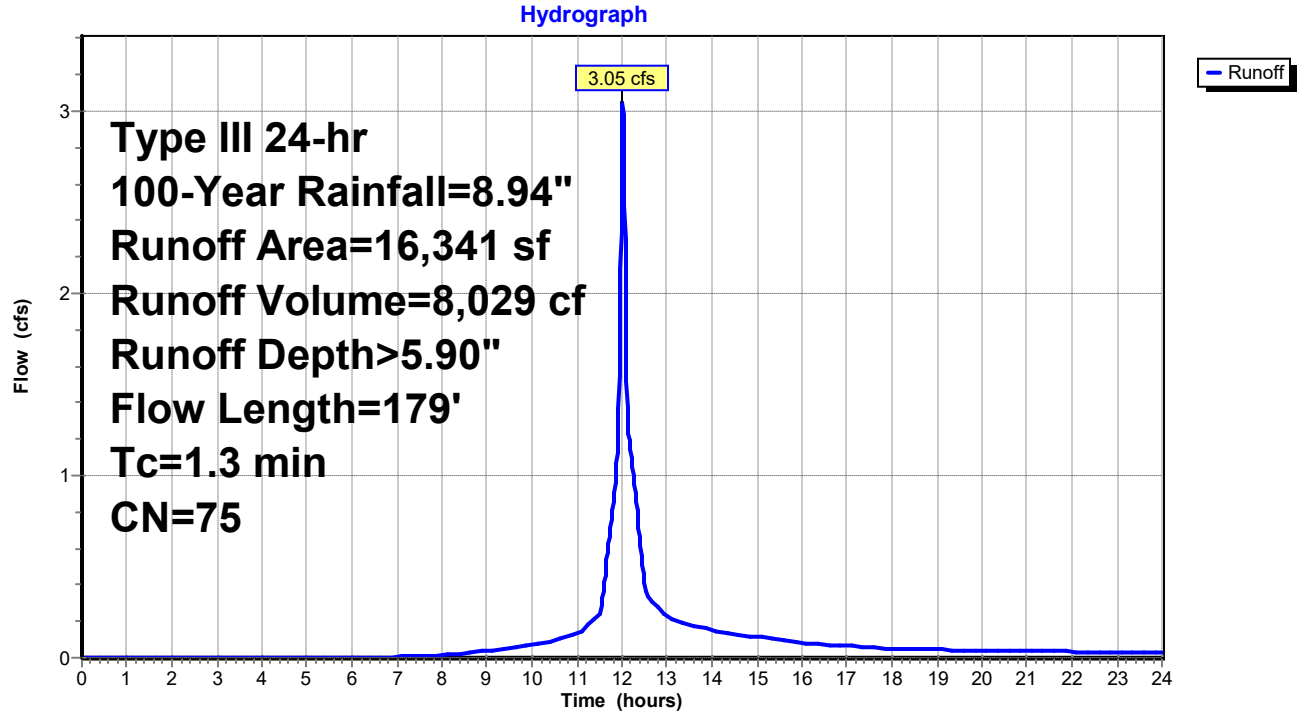
Runoff = 3.05 cfs @ 12.02 hrs, Volume= 8,029 cf, Depth> 5.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
	5,192	98	Paved parking, HSG A
	230	98	Unconnected pavement, HSG A
	5,964	39	>75% Grass cover, Good, HSG A
	4,322	98	Roofs, HSG A
*	633	55	Permeable pavers
	16,341	75	Weighted Average
	6,597		40.37% Pervious Area
	9,744		59.63% Impervious Area
	230		2.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

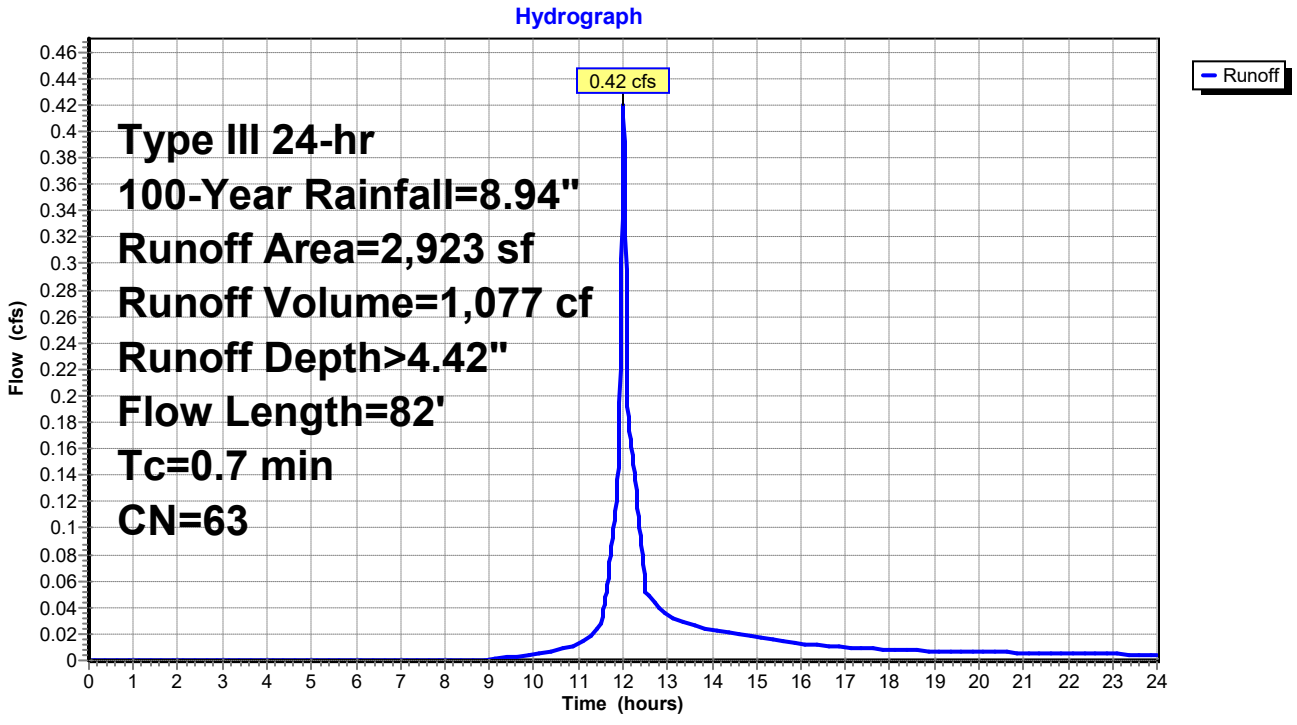
Runoff = 0.42 cfs @ 12.01 hrs, Volume= 1,077 cf, Depth> 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
	1,167	98	Paved parking, HSG A
	1,600	39	>75% Grass cover, Good, HSG A
*	156	55	Permeablea pavers
	2,923	63	Weighted Average
	1,756		60.08% Pervious Area
	1,167		39.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

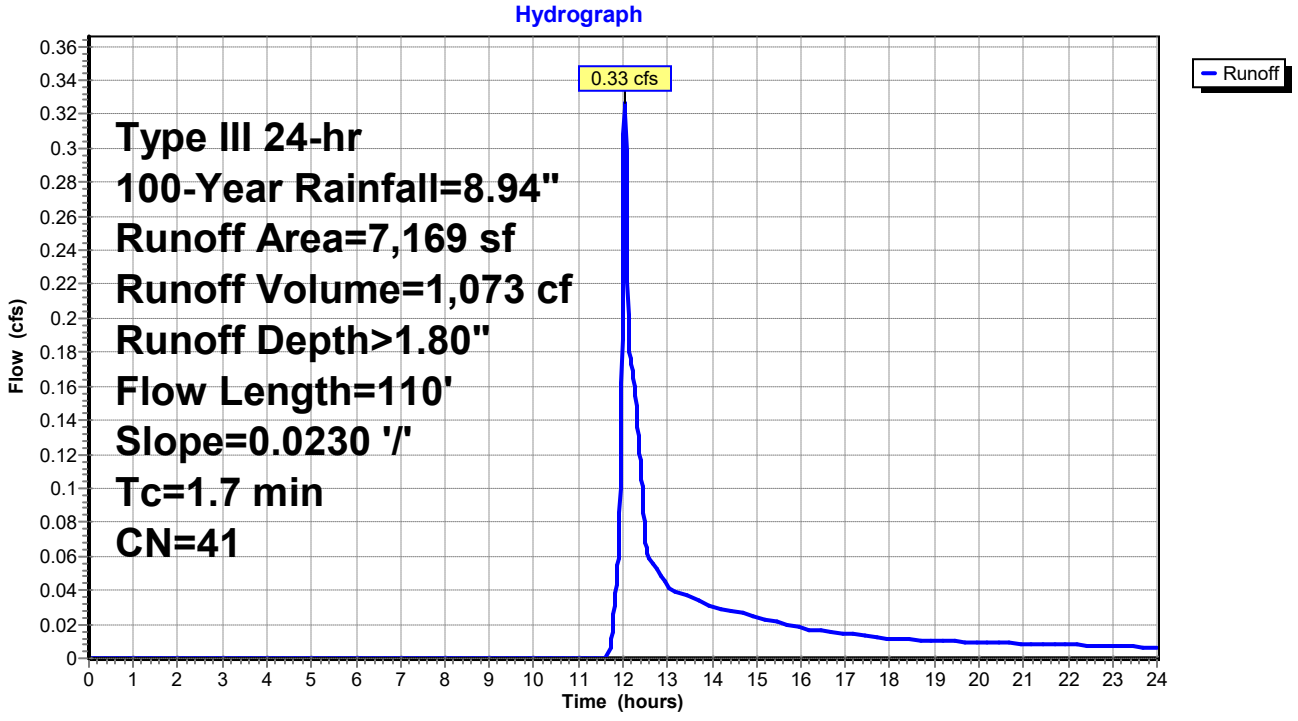
Runoff = 0.33 cfs @ 12.04 hrs, Volume= 1,073 cf, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
6,954	39	>75% Grass cover, Good, HSG A
215	98	Roofs, HSG A
7,169	41	Weighted Average
6,954		97.00% Pervious Area
215		3.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

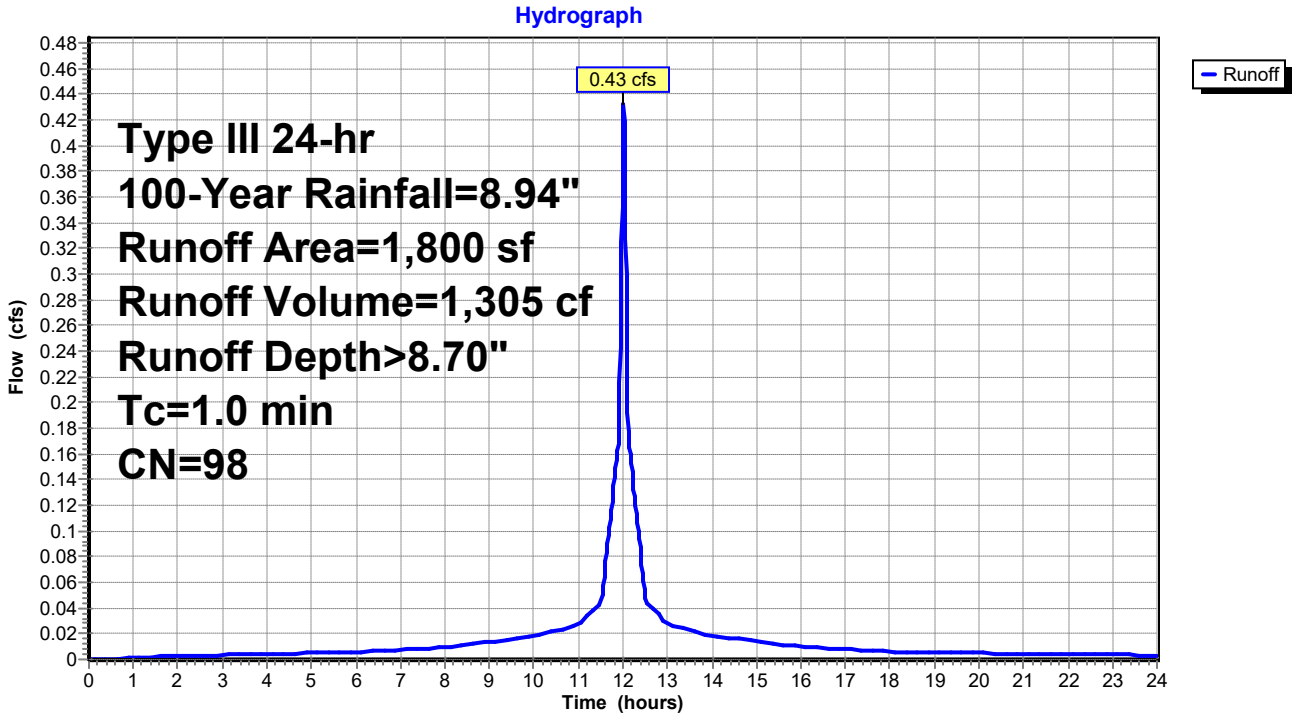
Runoff = 0.43 cfs @ 12.01 hrs, Volume= 1,305 cf, Depth> 8.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
1,800	98	Roofs, HSG A
1,800		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

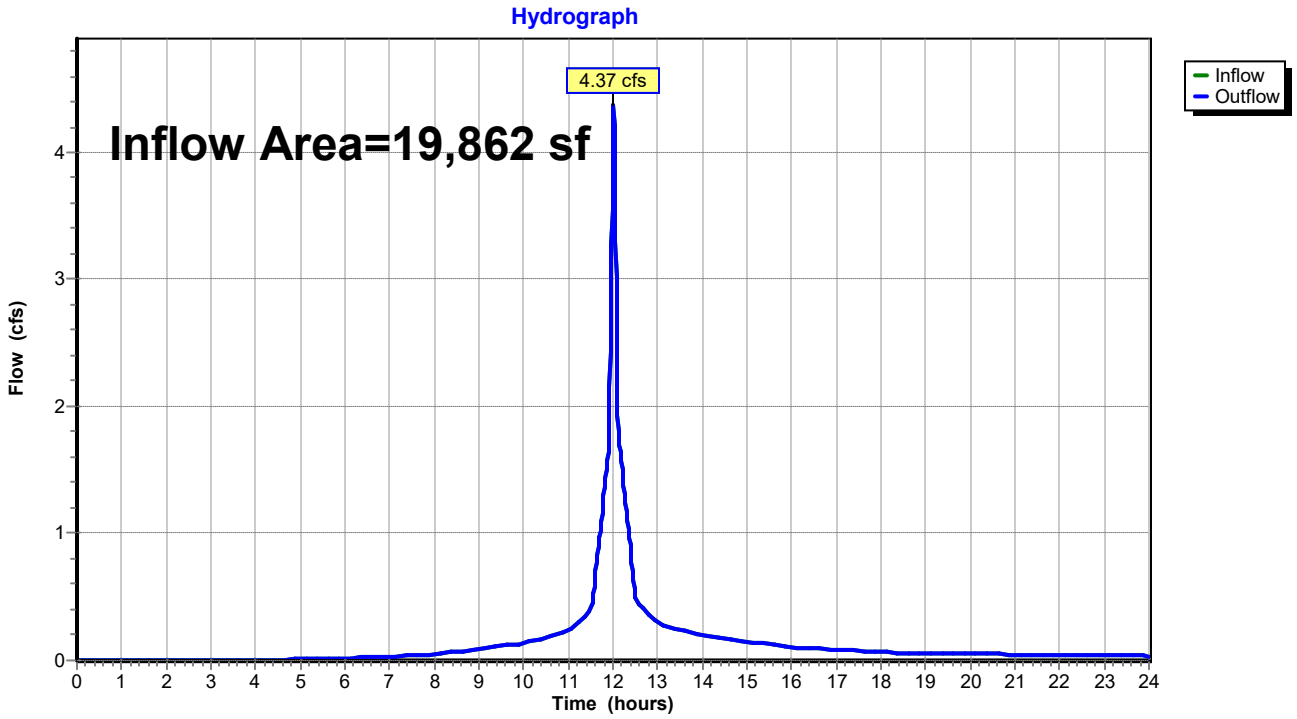


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,862 sf, 76.17% Impervious, Inflow Depth > 7.12" for 100-Year event
Inflow = 4.37 cfs @ 12.01 hrs, Volume= 11,789 cf
Outflow = 4.37 cfs @ 12.01 hrs, Volume= 11,789 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: RAIL TRAIL

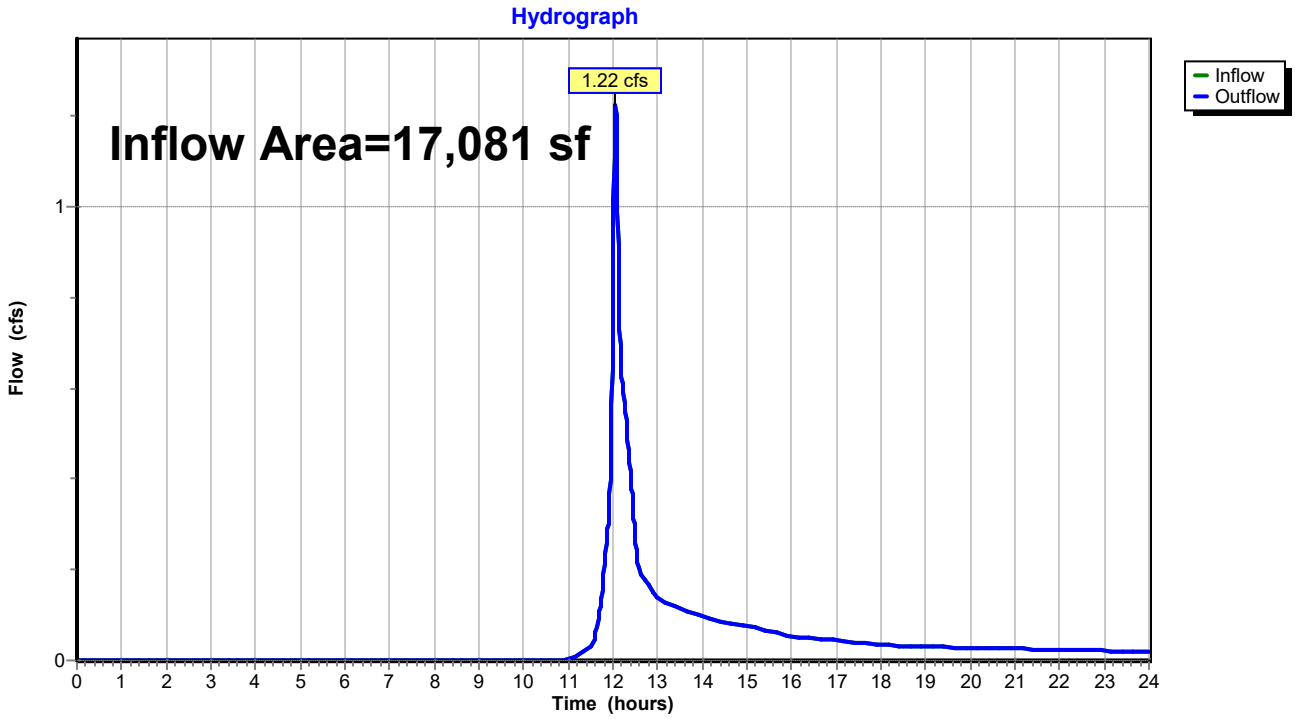


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 2.60" for 100-Year event
Inflow = 1.22 cfs @ 12.06 hrs, Volume= 3,706 cf
Outflow = 1.22 cfs @ 12.06 hrs, Volume= 3,706 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: EASTERN ABUTTERS

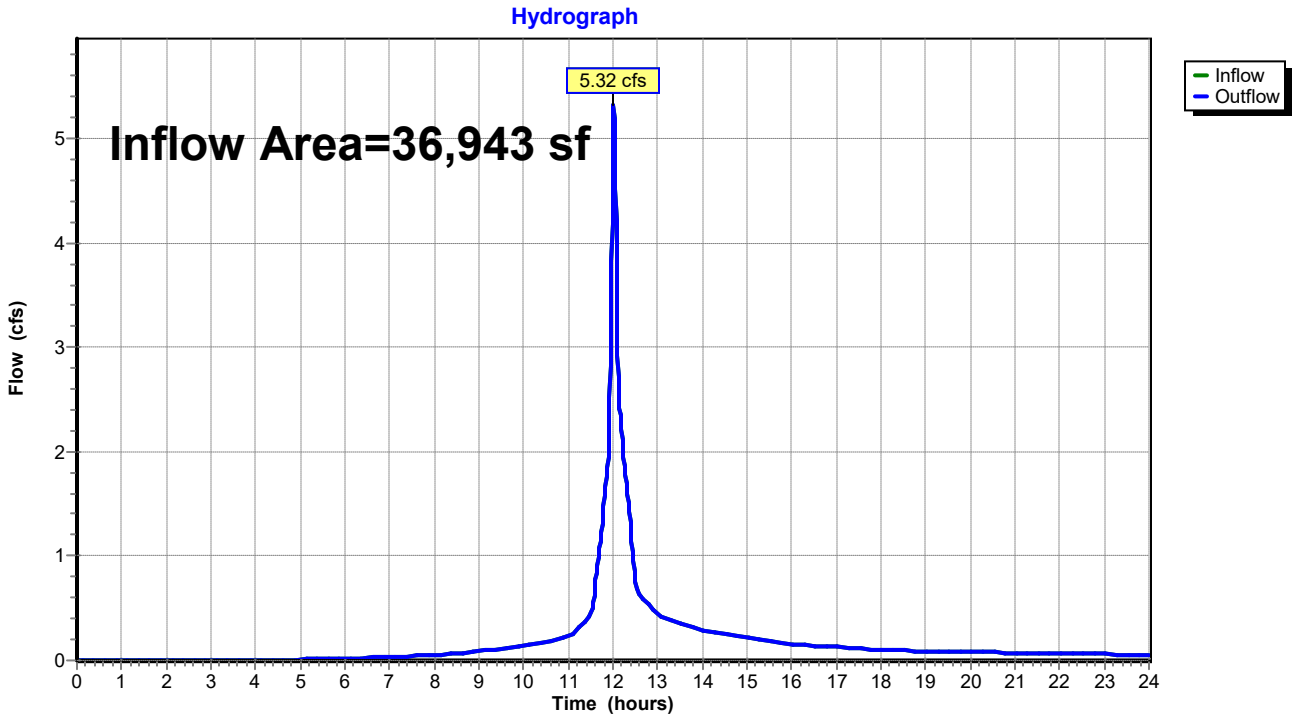


Summary for Reach 3R: TOTAL

Inflow Area = 36,943 sf, 47.38% Impervious, Inflow Depth > 5.03" for 100-Year event
Inflow = 5.32 cfs @ 12.02 hrs, Volume= 15,495 cf
Outflow = 5.32 cfs @ 12.02 hrs, Volume= 15,495 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 3R: TOTAL

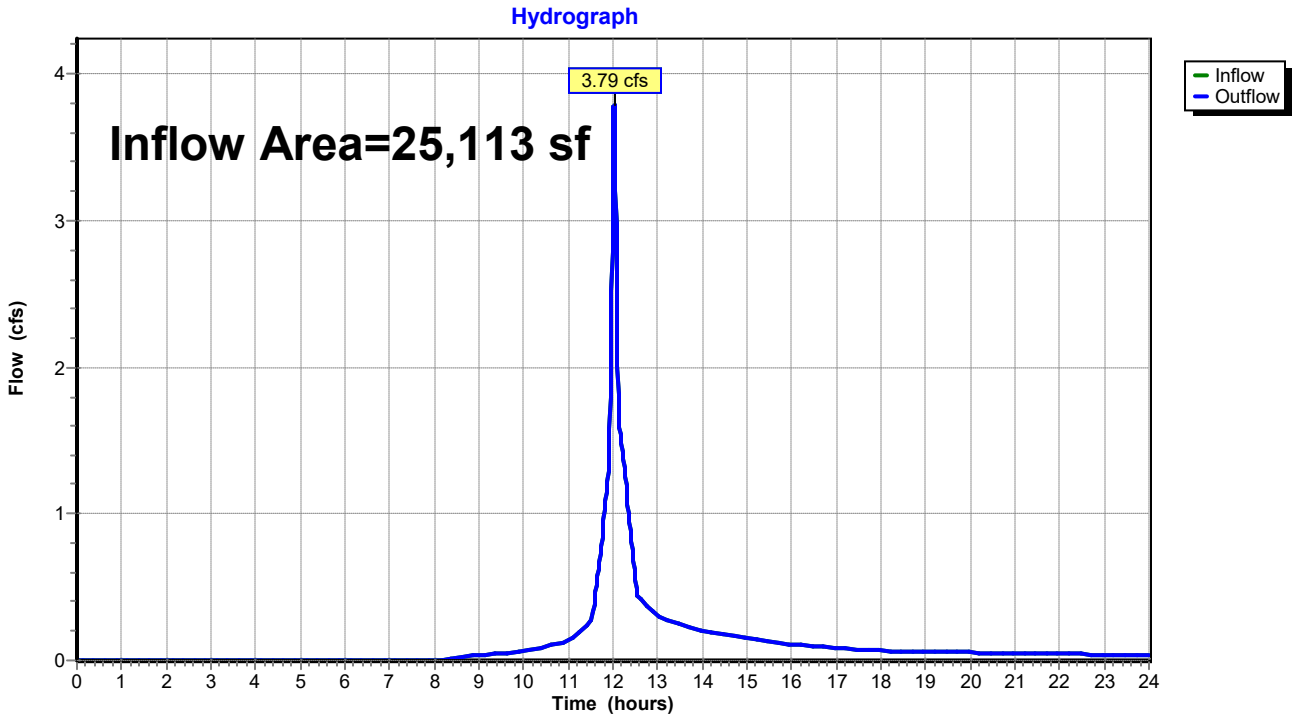


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,113 sf, 45.19% Impervious, Inflow Depth > 4.75" for 100-Year event
Inflow = 3.79 cfs @ 12.02 hrs, Volume= 9,947 cf
Outflow = 3.79 cfs @ 12.02 hrs, Volume= 9,947 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 10R: RAIL TRAIL

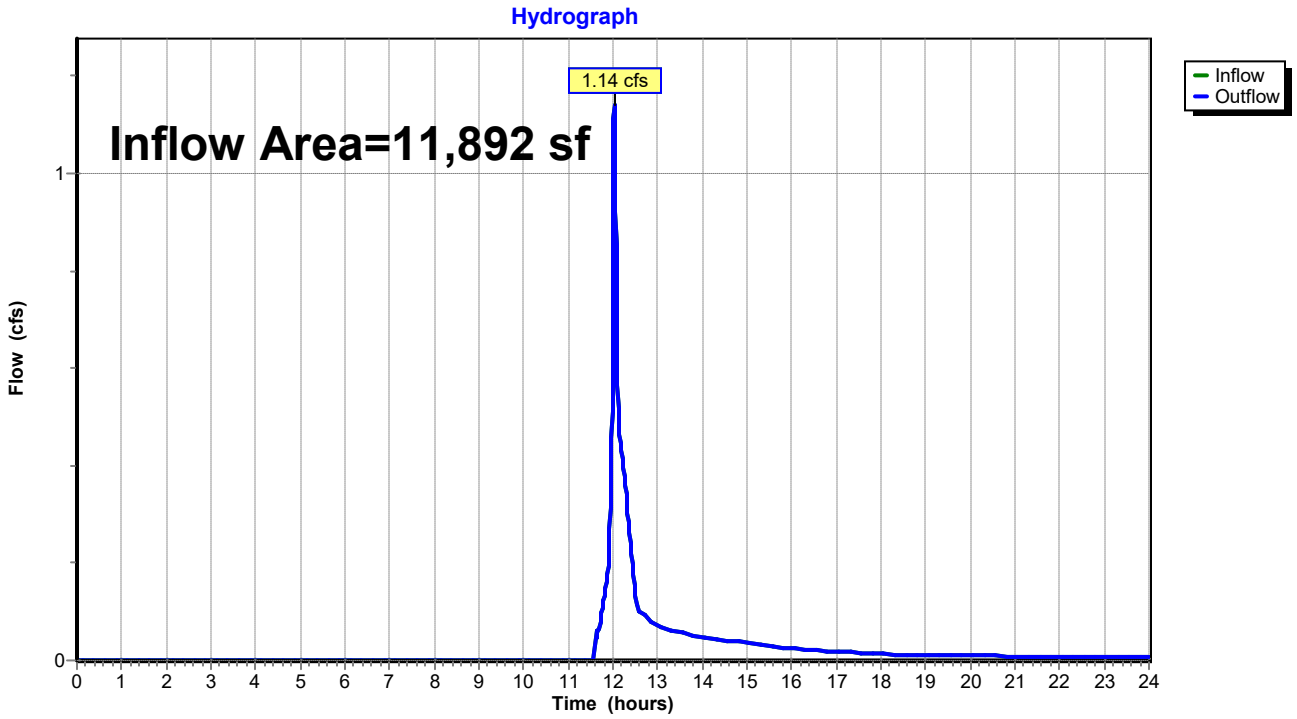


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,892 sf, 26.76% Impervious, Inflow Depth > 2.02" for 100-Year event
Inflow = 1.14 cfs @ 12.02 hrs, Volume= 1,998 cf
Outflow = 1.14 cfs @ 12.02 hrs, Volume= 1,998 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 20R: EASTERN ABUTTERS

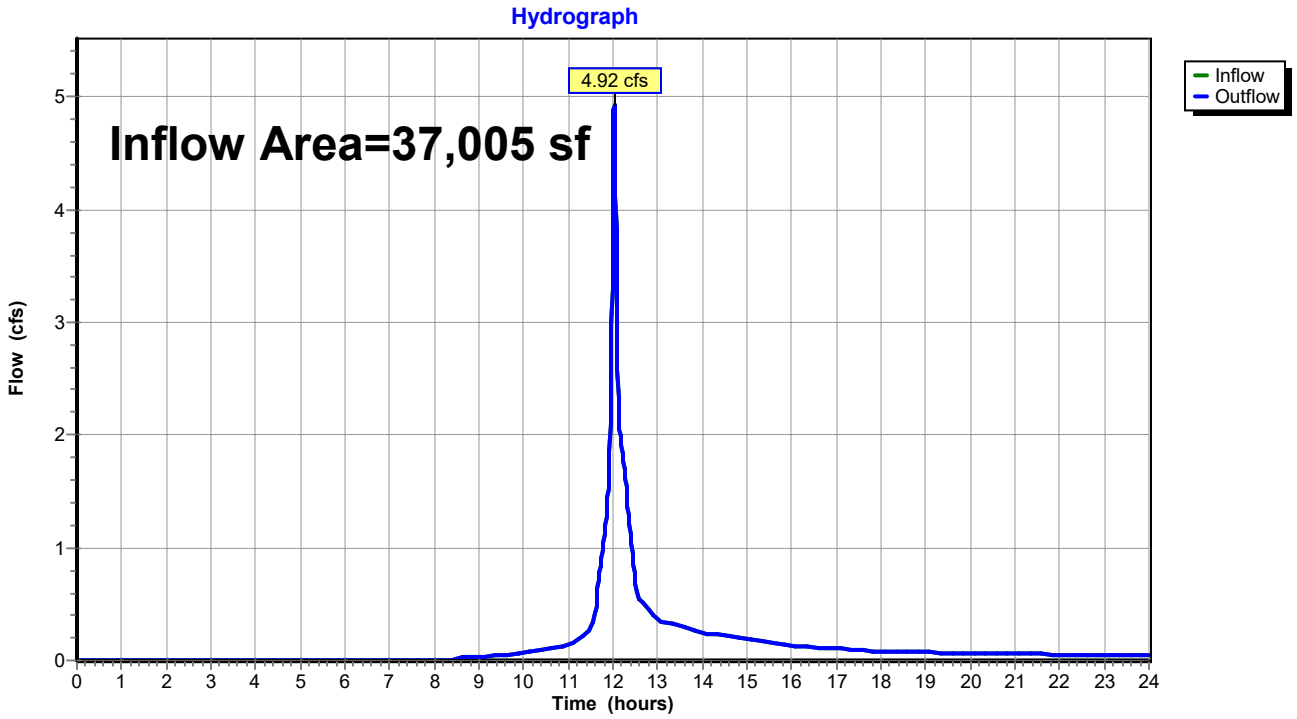


Summary for Reach 30R: TOTAL

Inflow Area = 37,005 sf, 39.27% Impervious, Inflow Depth > 3.87" for 100-Year event
Inflow = 4.92 cfs @ 12.02 hrs, Volume= 11,945 cf
Outflow = 4.92 cfs @ 12.02 hrs, Volume= 11,945 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,341 sf, 59.63% Impervious, Inflow Depth > 5.90" for 100-Year event
Inflow = 3.05 cfs @ 12.02 hrs, Volume= 8,029 cf
Outflow = 3.04 cfs @ 12.02 hrs, Volume= 7,962 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.00 cfs @ 12.02 hrs, Volume= 93 cf
Primary = 3.04 cfs @ 12.02 hrs, Volume= 7,869 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.69' @ 12.02 hrs Surf.Area= 150 sf Storage= 111 cf

Plug-Flow detention time= 8.4 min calculated for 7,962 cf (99% of inflow)
Center-of-Mass det. time= 3.2 min (808.4 - 805.2)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	121 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

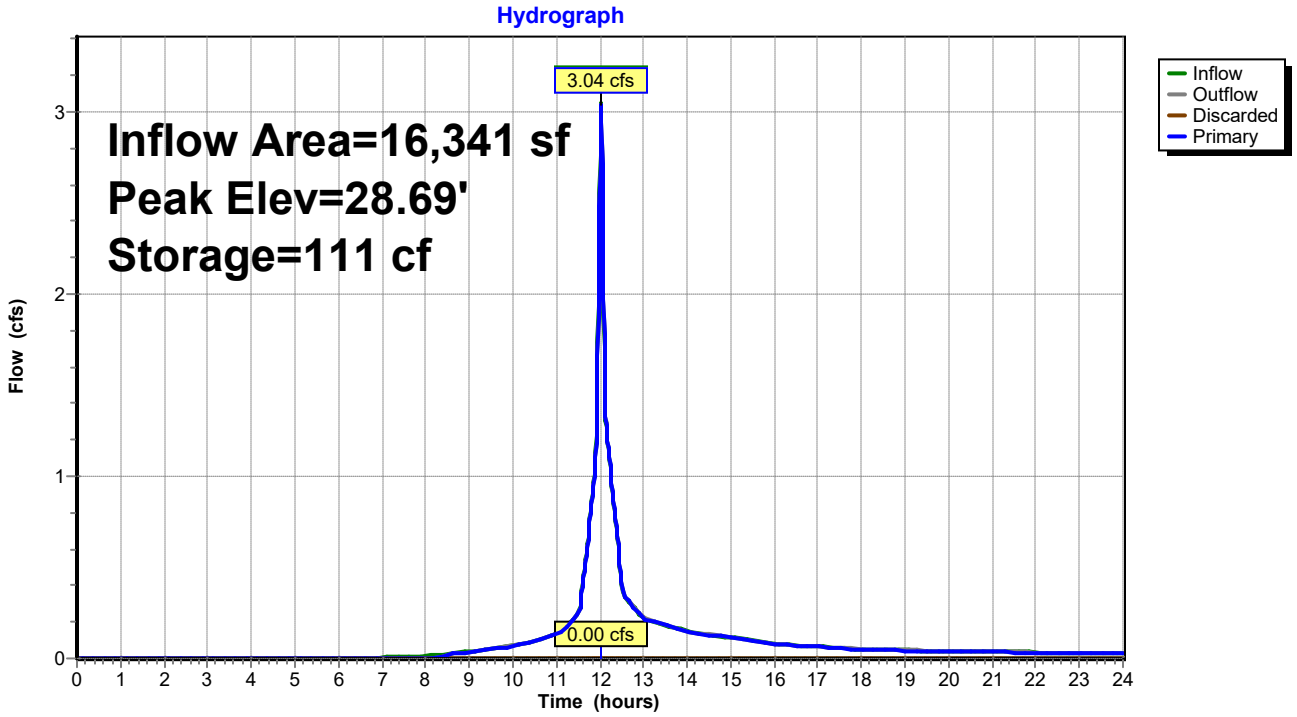
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	75	0	0
28.00	95	27	27
28.75	155	94	121

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.35'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.00 cfs @ 12.02 hrs HW=28.69' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=3.02 cfs @ 12.02 hrs HW=28.69' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 3.02 cfs @ 1.50 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 2,923 sf, 39.92% Impervious, Inflow Depth > 4.42" for 100-Year event
Inflow = 0.42 cfs @ 12.01 hrs, Volume= 1,077 cf
Outflow = 0.42 cfs @ 12.01 hrs, Volume= 1,042 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 10.27 hrs, Volume= 311 cf
Primary = 0.41 cfs @ 12.01 hrs, Volume= 731 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.13' @ 12.01 hrs Surf.Area= 14 sf Storage= 48 cf

Plug-Flow detention time= 30.8 min calculated for 1,042 cf (97% of inflow)
Center-of-Mass det. time= 12.5 min (841.7 - 829.2)

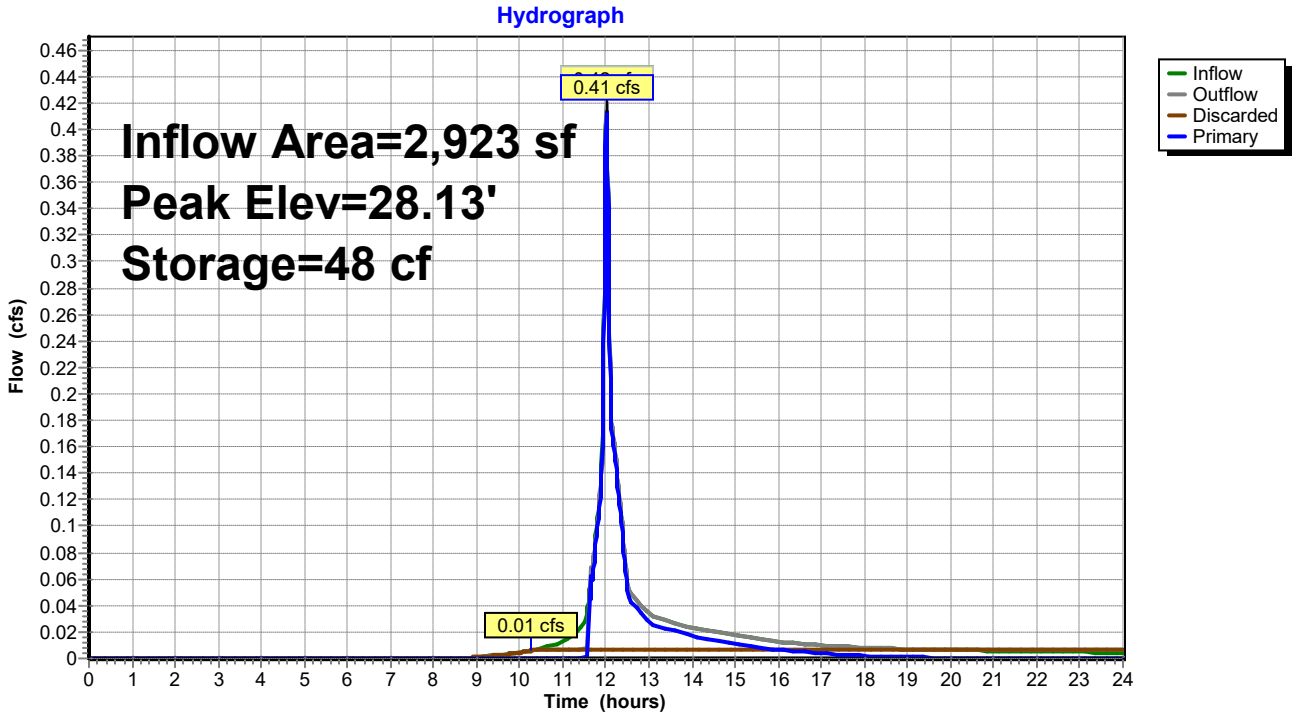
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 10.27 hrs HW=24.86' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.41 cfs @ 12.01 hrs HW=28.13' (Free Discharge)
↑**2=Orifice/Grate** (Weir Controls 0.41 cfs @ 1.18 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 1,800 sf,100.00% Impervious, Inflow Depth > 8.70" for 100-Year event
Inflow = 0.43 cfs @ 12.01 hrs, Volume= 1,305 cf
Outflow = 0.47 cfs @ 12.02 hrs, Volume= 1,305 cf, Atten= 0%, Lag= 0.6 min
Discarded = 0.05 cfs @ 11.55 hrs, Volume= 1,111 cf
Primary = 0.42 cfs @ 12.02 hrs, Volume= 194 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 27.09' @ 12.02 hrs Surf.Area= 117 sf Storage= 180 cf

Plug-Flow detention time= 14.7 min calculated for 1,304 cf (100% of inflow)
Center-of-Mass det. time= 14.6 min (749.8 - 735.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	162 cf	**11.17'W x 10.50'L x 4.54'H Field A** 533 cf Overall - 127 cf Embedded = 406 cf x 40.0% Voids
#2A	25.50'	127 cf	**Cultec R-330XLHD** x 2 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		289 cf	Total Available Storage

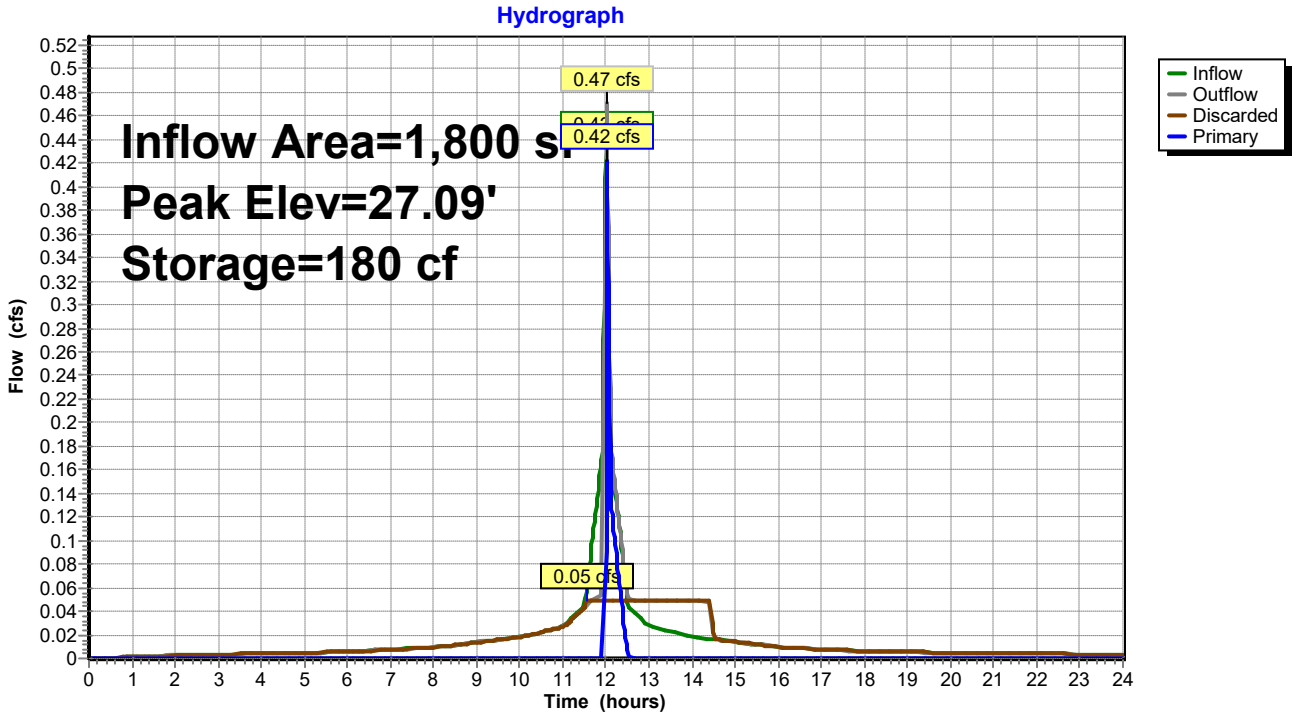
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**18.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.55 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.38 cfs @ 12.02 hrs HW=27.08' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.38 cfs @ 1.01 fps)

Pond 42P: CULTEC



Appendix F

OPERATION & MAINTENANCE PLAN

Operation & Maintenance Plan (Permanent BMPs)

FOR

21-27 Hancock Street, Newburyport, MA

Date: February, 2021
Rev. April 14, 2021

Owner/Operator: Jay Caswell
Caswell Development
24 Graf Road
Newburyport, MA

Inspection and Maintenance Schedule

Facility personnel will inspect the stormwater management system on a routine basis not less than once per month for the first six (6) months of operation and annually thereafter. The estimated cost for this inspection and maintenance schedule is $800/yr. Refer to project design and as-built plans for stormwater systems and landscaped area locations. Inspection and maintenance shall be performed as follows:

1. Landscaped Areas:

Landscaped areas shall be inspected and maintained on a regular basis. Areas that may be subject to erosion will be stabilized and reseeded immediately. Inspect soil and repair eroded areas monthly. Re-plant void areas as needed. Remove litter and debris monthly. Remove and replace dead vegetation twice per year in spring and fall. Replace soil media if ponding is witnessed more than 48 hours after rainfall event.

2. Roof Drains:

Inspections: The downspout inlets on the roof of the building will need periodic maintenance to ensure proper function. The required interval for this maintenance will vary by season; however, downspout inlets should be inspected for debris before the rainy season. When trees and other deciduous vegetation shed leaves that drop into the gutters, this will inhibit the flow of water and possibly clog downspouts. The leaves and/or debris must be removed in order for the system to work as designed.

Maintenance: Debris, such as leaves and trash, shall be removed by hand. Sediments shall be swept and collected or vacuumed.

3. Infiltration Chambers:

Inspections: During first year visually inspect after each major storm (>1.5") and again 72 hours later to verify exfiltration is occurring as designed. Note if water remains in basin after 72 hours. After first year visually inspect twice per year. Infiltration Systems shall be inspected for accumulation of silt, sediment, standing water, or debris on an annual basis. Debris and sediment shall be removed. Inspect overflow outlet of chambers and level spreader at gravel basin. Basin should be inspected for excessive erosion or any additional necessary changes. Down gradient of gravel basin and level spreader should also be inspected for excess erosion.

Inspection & Maintenance procedure is as follows: The inspection port is an 8" bolted plastic cover. Removing the inspection cover will provide access to the Chamber below. From the surface, confirm the chamber is drained to stone bottom. The chambers should drain with 48 hours of any rain event. If water evident after 48 hours the stone base and any surrounding clogged soil should be replaced and the chambers reinstalled.

Rain Garden

Inspections & Maintenance:
Following construction, inspect site following rain events. Add/replace vegetation in any eroded areas. Water to promote plant growth and survival, especially during the first two years and during dry spells.

Monthly:

- prune and weed swale to maintain appearance
- remove accumulated trash and debris
- replace mulch as needed

Annually:

- Inspect inflow area for sediment accumulation. Remove accumulated sediment or debris.
- Inspect site for erosion as well as sediment and mulch which have been moved around in the garden. Add/replace vegetation in any eroded areas.
- Inspect rain garden for dead or dying vegetation. Replace vegetation as needed.
- Test planting bed for pH. If the pH is below 5.2, limestone should be applied. If the pH is above 8.0, iron sulfate and sulfur should be applied.

Every 2 to 3 years:

- Remove and replace mulch

4. Dry Well:

Inspections: During first year visually inspect after each major storm (>1.5") and again 72 hours later to verify exfiltration is occurring as designed. Note if water remains in basin after 72 hours. After first year visually inspect twice per year. Infiltration Systems shall be inspected for

accumulation of silt, sediment, standing water, or debris on an annual basis. Debris and sediment shall be removed.

Inspection & Maintenance procedure is as follows:

The inspection port is a 24" by 24" grate and frame. When the grate is removed, this will provide access to the inside of the dry well below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment, if any, in this infiltration chamber. If the depth of sediment is in excess of 3 inches (76 mm), then this chamber should be cleaned with a vacuum truck, or by hand if possible.

Stormwater System Inspection Report

General Information			
Location: 21-27 Hancock Street, Newburyport			
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Purpose of Inspection			
Weather Information			
Has it rained since the last inspection? ❑Yes ❑No			
Weather at time of this inspection?			

Site-Specific Stormwater Devices: (See above for inspection frequency)

	Description	Installed and Operating Properly?	Corrective Action Needed	Date for Corrective Action/Responsible Person
1		❑Yes ❑No		
2		❑Yes ❑No		
3		❑Yes ❑No		
4		❑Yes ❑No		
5		❑Yes ❑No		
6		❑Yes ❑No		
7		❑Yes ❑No		
8		❑Yes ❑No		

Overall Site Issues

	Description		Corrective Action	Date for Corrective Action/Responsible Person
1	Are all slopes properly stabilized?	❑Yes ❑No		
2	Are natural resource areas (e.g., streams, wetlands, etc.) being subjected to erosion?	❑Yes ❑No		
3	Are discharge points free of sediment deposits?	❑Yes ❑No		

Certification Statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name:

Signature:

Date: