STORMWATER MANAGEMENT ANALYSIS

FOR

21-27 HANCOCK STREET, NEWBURYPORT, MA

Prepared for:
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24 Graf Road
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Prepared by:
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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. Therefor 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 43.2% 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. It should also be noted that 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 a 4% decrease in impervious area.

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.
- 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' of crushed stone. Once the perforated pipe and stone fill with runoff, and the stormwater fills with runoff, it will overtop via a broad created weir along the raingarden edge. Any overflow from the raingarden will be directed via a 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 below within the crushed stone. This is 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 25' x 2' and an infiltration rate of 17 in/hr (determined in the field), the stone area would exfiltrate approximately 0.02 CFS (cubic feet per second) which would only have a marginal impact on the rates within the model.

Design Point 2 – Eastern Abutters

- 30S – This subcatchment consists of the driveway that drains to a 300 gallon drywell, along with the adjacent lawn area and walkway. This drywell includes an overflow via the rim that releases any excess flow.
- 40S – This subcatchment includes all of the lawn area and roof area on the eastern portion of the property that drains directly across down the topography to the northern corner of the property.
- 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.

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. It should be noted that they are all below six minutes for this site, which is below the recommended by the HydroCAD program, but has been requested in this review. 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*	0.49	*0.00*	0.00	*1.10*	0.49
	Volume (cf)	*2,838*	1,259	*116*	0	*2,955*	1,259
10 Yr	Rate (cfs)	*2.04*	1.24	*0.13*	0.12	*2.07*	1.28
	Volume (cf)	*5,315*	3,296	*747*	200	*6,062*	3,496
25 Yr	Rate (cfs)	*2.80*	2.01	*0.41*	0.20	*3.06*	2.21
	Volume (cf)	*7,371*	5,229	*1,529*	538	*8,900*	5,767
100 Yr	Rate (cfs)	*4.37*	3.77	*1.22*	1.05	*5.32*	4.59
	Volume (cf)	*11,789*	9,800	*3,706*	1,753	*15,495*	11,553

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

PIPE MATERIALS:

(TO BE CONFIRMED WITH MECHANICAL ENGINEER)

SEWER: PVC ASTM D3034-SDR 35. (SIZE AS NOTED)

WATER: DOMESTIC: CONCRETE LINED DUCTILE IRON PIPE (SIZE AS NOTED)

FIRE: CONCRETE LINED DUCTILE IRON PIPE (SIZE AS NOTED)

ALL WATER LINES SHALL HAVE A MINIMUM OF 5 FEET OF COVER.

PROPOSED 20' WIDE DRIVEWAY

20 FT WIDE PAVED PRIVATE ROAD

20' SETBACK

25' SETBACK

GARAGE ENTRY

2-STORY 2-FAMILY HOME

PROPOSED 20' WIDE DRIVEWAY

2-STORY 2-FAMILY HOME

CAP 4" D.I. PIPE

1" DOMESTIC SERVICE

1" FIRE SERVICE

WATER VALVE

6" SEWER INV.=28.54

SMH 2 RIM=29.70 D1 2-INV(6")=27.60 INV(8")=27.50

6" SEWER S=0.02

6" SEWER INV.=28.16

6" SEWER INV.=27.90

6" SEWER INV.=27.80

CONCRETE ENCASEMENT FOR CROSSINGS UNDER SEWER

BITUMINOUS CONCRETE PAVEMENT

4' WIDE BRICK SIDEWALK

PROPOSED 4' BRICK SIDEWALK

MEET EXISTING CONCRETE

1" CURB STOP (TYP.-8)

END CURB R = 12'

WCR

MATCH EXSITING GRANITE CURB

PROPOSED NEW GRANITE CURB

EXIST. 8" WATER

TRENCH (TYP.)

4" WATER CONNECTION

SMH 3 RIM=32.9 D1 INV(8")=26.62 INV(MAIN)=26.52

DIG A TEST PIT AT THE CROSSOVER OF WATER & SEWER WHEN THE PROJECT START TO DETERMINE THE ELEVATION OF THE WATER LINE AND REPORT ANY POSSIBLE CONFLICT

EXIST. 8" VC SEWER

PROPOSED 4 FT WIDE BRICK SIDEWALK

PROPOSED 4' TRANISTION CURB

RESET GRANITE CURB

BITUMINOUS CONCRETE APRON

6' SOLID CEDAR WOOD FENCE

BEGIN FENCE

PROPOSED 12' WIDE DRIVEWAY

PROPOSED LANDSCAPE BUFFER

MATCH EXISTING SIDEWALK

PROPOSED D-STONE CURB

END FENCE

WOOD FENCE

WIRE FENCE

WOOD RAMP

SHED

STONE AND MORTAR RETAINING WALL

LOADING DOCK

BITUMINOUS PAVED DRIVE (OVERGROWN AND BURIED IN DEBRIS)

PROXIMATE LOC OF BRUSH (PAVEMENT EXTENDS BEYOND)

EDGE OF PAVEMENT

ASSUMED EDGE OF PAVEMENT (UNDER CONTAINER)

STORAGE CONTAINER

BITUMINOUS PATH

BITUMINOUS PAVED DRIVE (OVERGROWN AND BURIED IN DEBRIS)

WOOD FRAME SINGLE FAMILY

BRICK

GRASS

WOOD FENCE R = 5'

LOT 1 PLAN RECORDED IN BOOK 2342 PAGE 600

LOT 3 PLAN RECORDED IN BOOK 2342 PAGE 600

LOT 4 PLAN RECORDED IN BOOK 2342 PAGE 600

LOT 5 PLAN RECORDED IN BOOK 2342 PAGE 600

LOT 7 PLAN RECORDED IN BOOK 2342 PAGE 600

LOT 8 PLAN RECORDED IN BOOK 2342 PAGE 600

HANCOCK STREET (PUBLIC VARIABLE WIDTH – PAVEMENT WIDTH 21'±)

25' ROW

"CLIPPER CITY RAIL TRAIL" N/F CITY OF NEWBURYPORT BOOK 25956 PAGE 191

N/F PHYLLIS RYAN MAP 25 LOT 44 BOOK 33816 PAGE 418

29 HANCOCK

"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.

CLERK DATE

SCALE: 1" = 10'

NORTH

MERIDIAN OF THE MASSACHUSETTS COORDINATE SYSTEM

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."

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DEVELOPER:
CASWELL DEVELOPMENT
24 GRAF ROAD
NEWBURYPORT MA

ARCHITECT:
GRAF ARCHITECTS
2 LIBERTY STREET
NEWBURYPORT MA

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

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

PROJECT INFO

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

STAMP:

SITE LAYOUT & UTILITIES PLAN

SHEET NAME:

C1

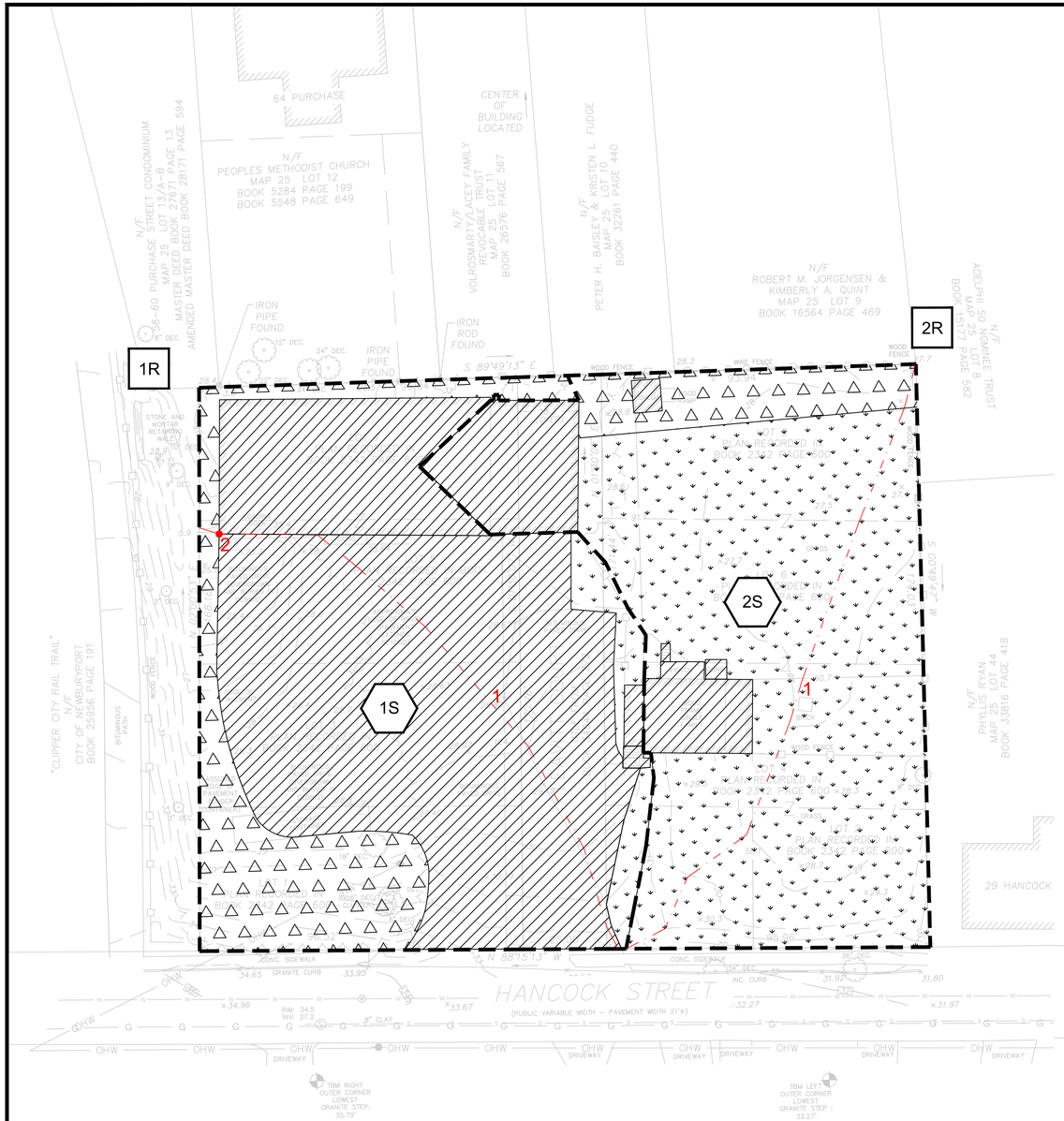
SHT NO:

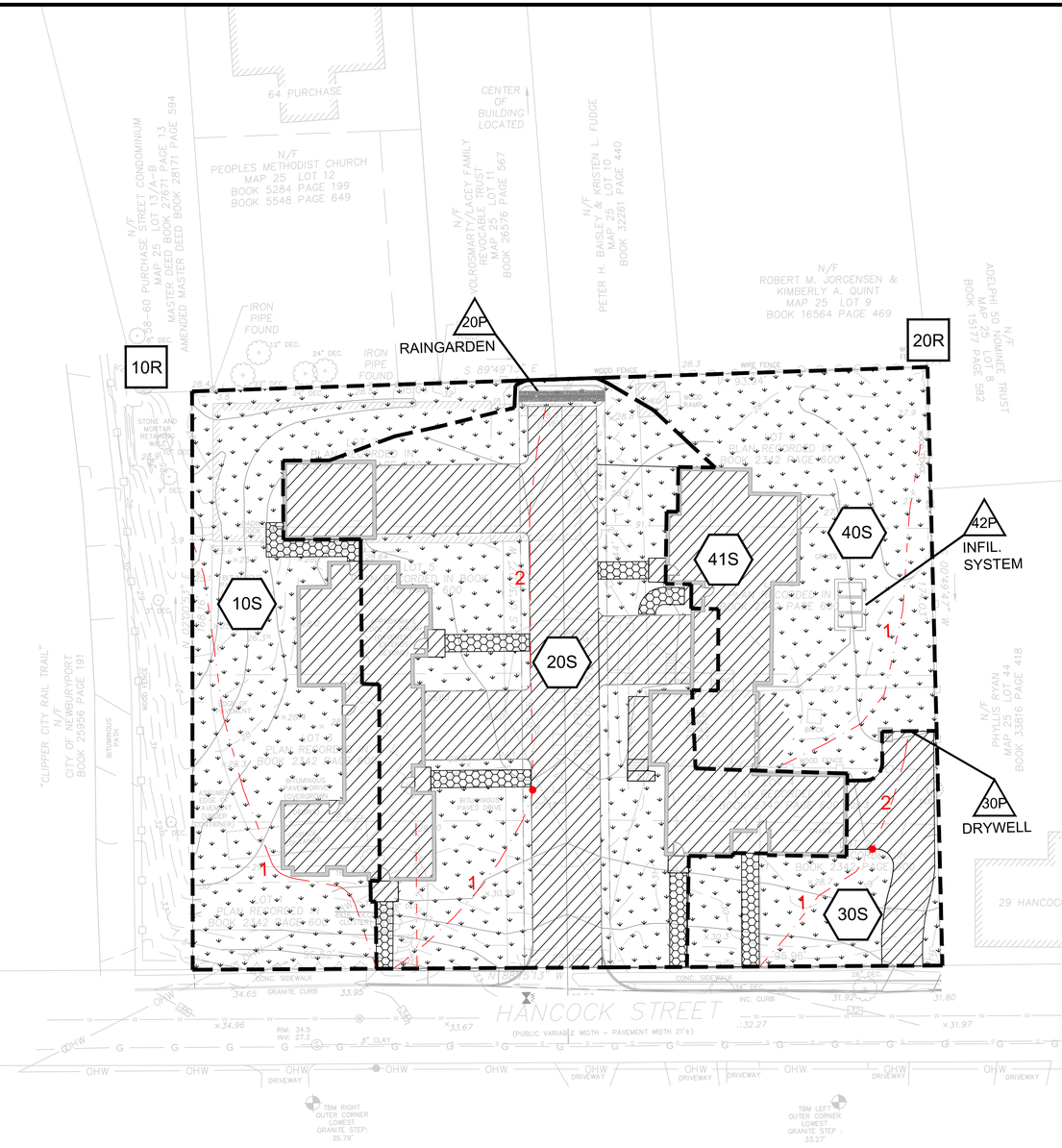
DR BY: GS
CHK BY: SS
PROJ NO: PLAN
DATE: 12/14/2020
SCALE: 1"=10'

P:\2020 Projects\2020-087 Leavitt Ct Newburyport\Dwg_ENGINEERING\20-087_LAYT_MATL.dwg

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

NORTH

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NEWBURYPORT, MA.

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:

DR BY: MCH
CHK BY: SBS
PROJ NO: 20-067
DATE: 12/9/2020
SCALE: 1"=20'

P:\2020 Projects\2020-087 Leavitt Ct Newburyport_Drainage\20-087 DR.dwg

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

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

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 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 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.

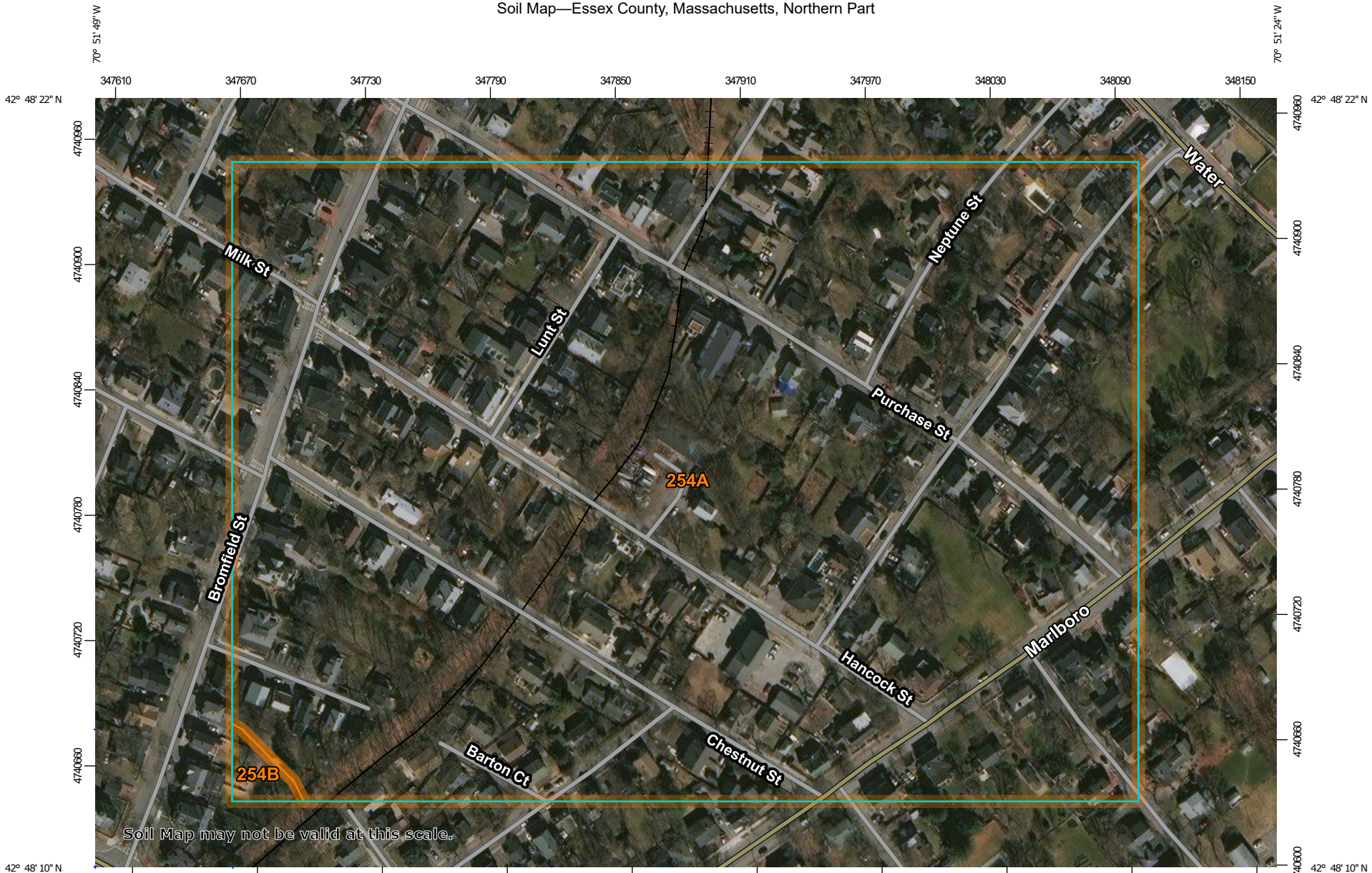
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

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

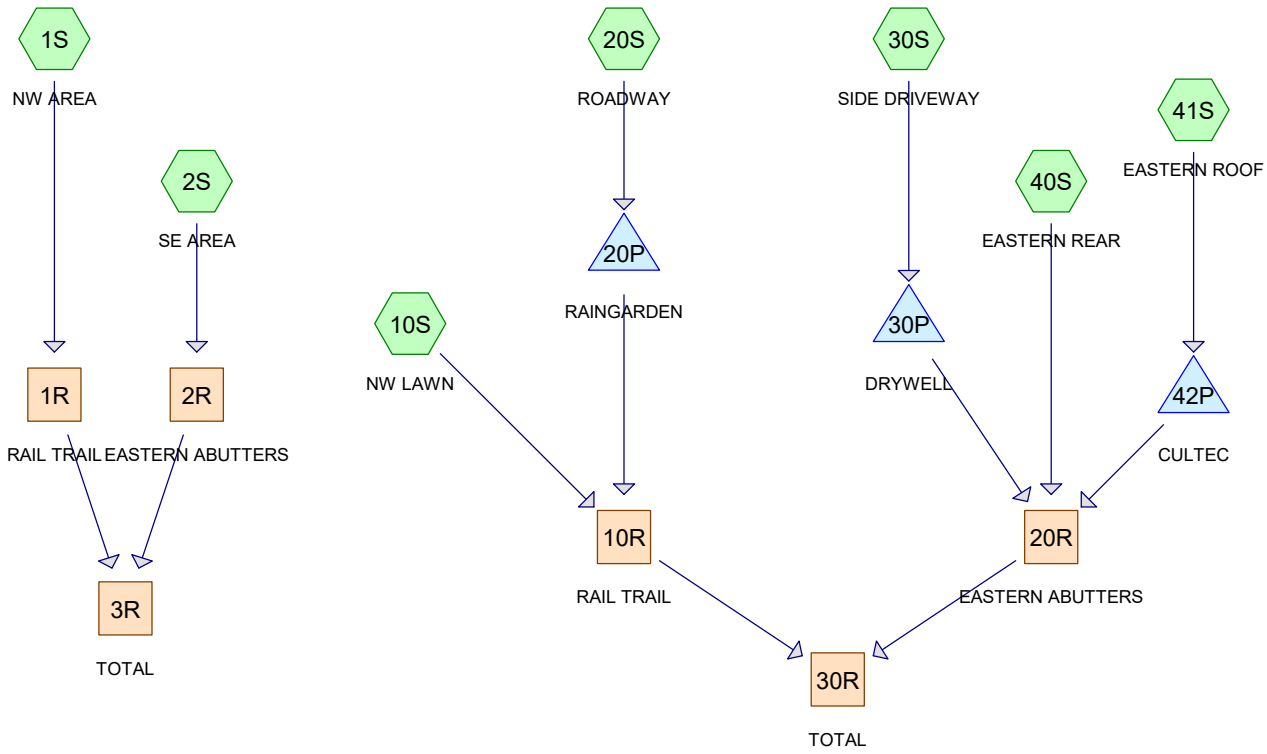
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

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%**

Appendix E

EXISTING AND PROPOSED HYDROLOGY



Subcat Reach Pond Link

Routing Diagram for 20-087 DR
Prepared by Design Consultants, Inc., Printed 4/7/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
35,415	39	>75% Grass cover, Good, HSG A (1S, 2S, 10S, 20S, 30S, 40S)
18,653	98	Paved parking, HSG A (1S, 2S, 20S, 30S)
167	55	Permable pavers (10S)
644	55	Permeable pavers (20S)
166	55	Permeablea pavers (30S)
13,225	98	Roofs, HSG A (1S, 2S, 10S, 20S, 41S)
229	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
72,913	HSG A	1S, 2S, 10S, 20S, 30S, 40S, 41S
0	HSG B	
0	HSG C	
0	HSG D	
977	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
35,415	0	0	0	0	35,415	>75% Grass cover, Good	
18,653	0	0	0	0	18,653	Paved parking	
0	0	0	0	167	167	Permable pavers	
0	0	0	0	644	644	Permeable pavers	
0	0	0	0	166	166	Permeablea pavers	
13,225	0	0	0	0	13,225	Roofs	
229	0	0	0	0	229	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=8,603 sf 18.59% Impervious Runoff Depth>0.12"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.00 cfs 85 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>0.95"
Flow Length=179' Tc=1.3 min CN=73 Runoff=0.48 cfs 1,338 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>0.46"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.03 cfs 116 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth>0.00"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,395 sf 100.00% Impervious Runoff Depth>2.92"
Tc=1.0 min CN=98 Runoff=0.20 cfs 582 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=0.49 cfs 1,259 cf
Outflow=0.49 cfs 1,259 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 30R: TOTAL Inflow=0.49 cfs 1,259 cf
Outflow=0.49 cfs 1,259 cf

Pond 20P: RAINGARDEN Peak Elev=28.47' Storage=82 cf Inflow=0.48 cfs 1,338 cf
Discarded=0.00 cfs 83 cf Primary=0.49 cfs 1,174 cf Outflow=0.50 cfs 1,257 cf

Pond 30P: DRYWELL Peak Elev=26.36' Storage=22 cf Inflow=0.03 cfs 116 cf
Discarded=0.01 cfs 116 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 116 cf

Pond 42P: CULTEC Peak Elev=25.39' Storage=60 cf Inflow=0.20 cfs 582 cf
Discarded=0.07 cfs 582 cf Primary=0.00 cfs 0 cf Outflow=0.07 cfs 582 cf

Summary for Subcatchment 1S: NW AREA

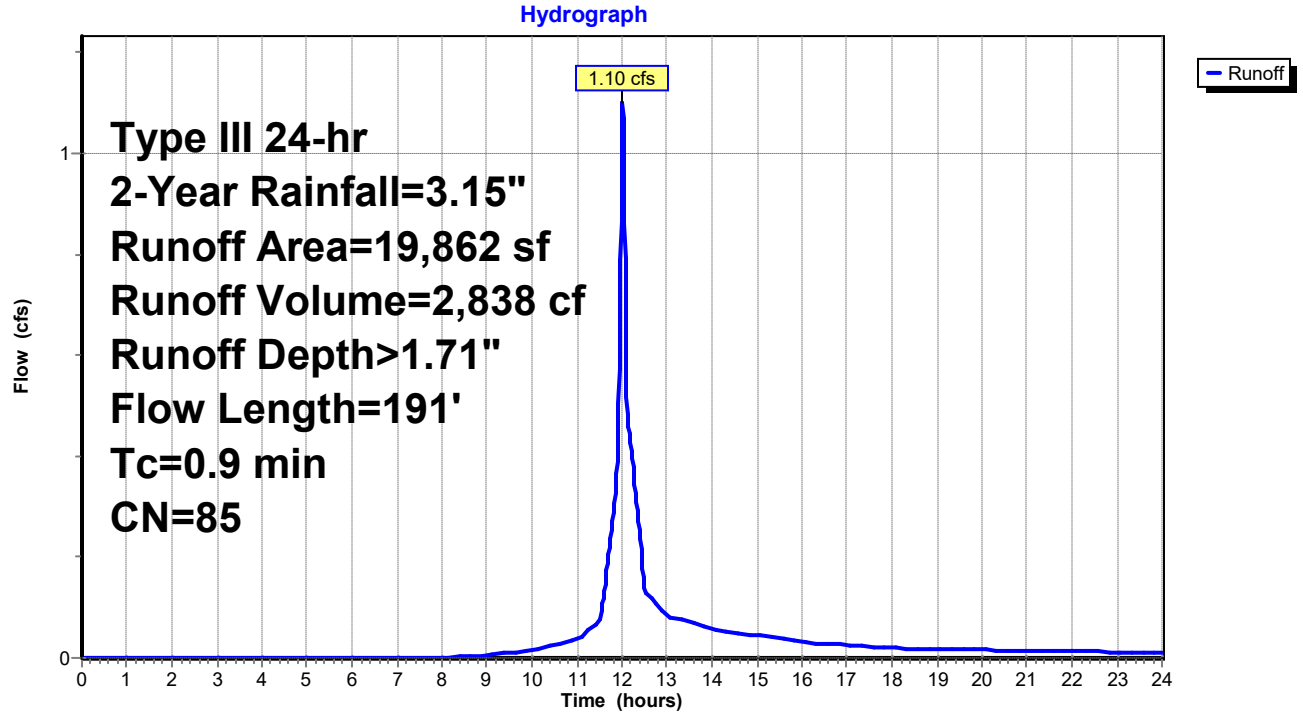
Runoff = 1.10 cfs @ 12.01 hrs, Volume= 2,838 cf, Depth> 1.71"

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

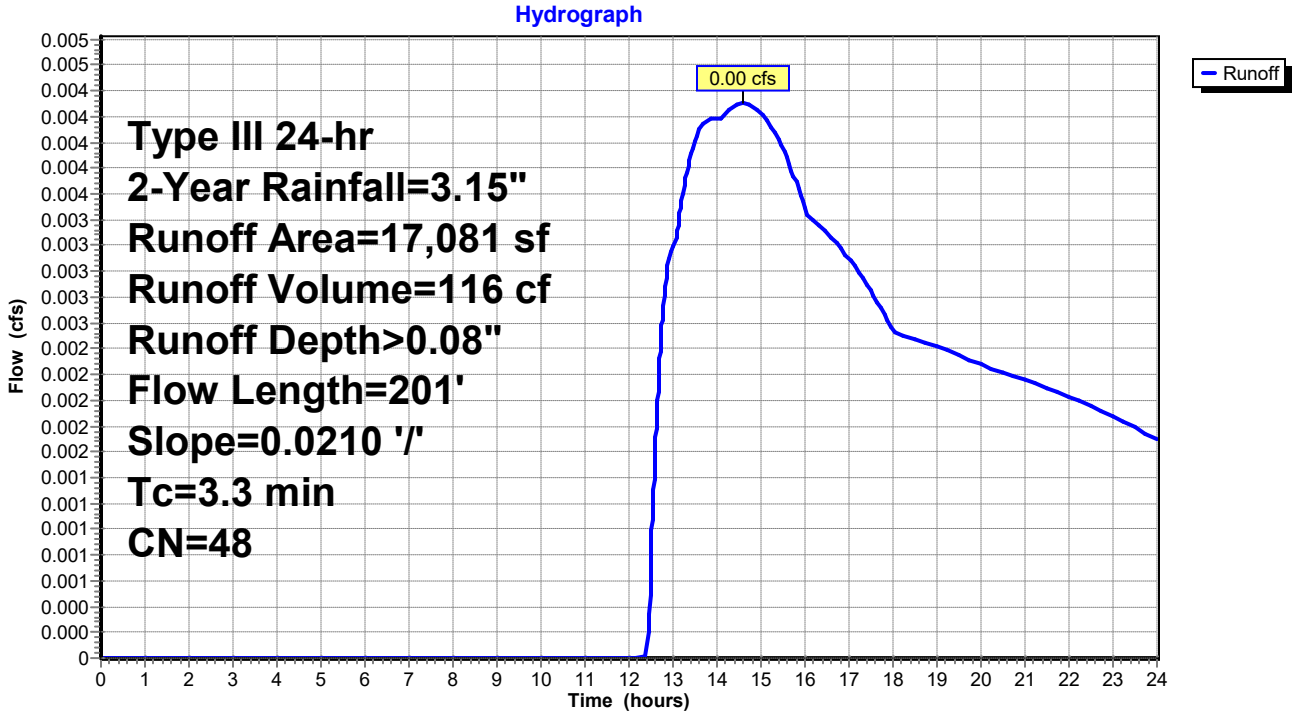
Runoff = 0.00 cfs @ 14.60 hrs, Volume= 116 cf, Depth> 0.08"

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

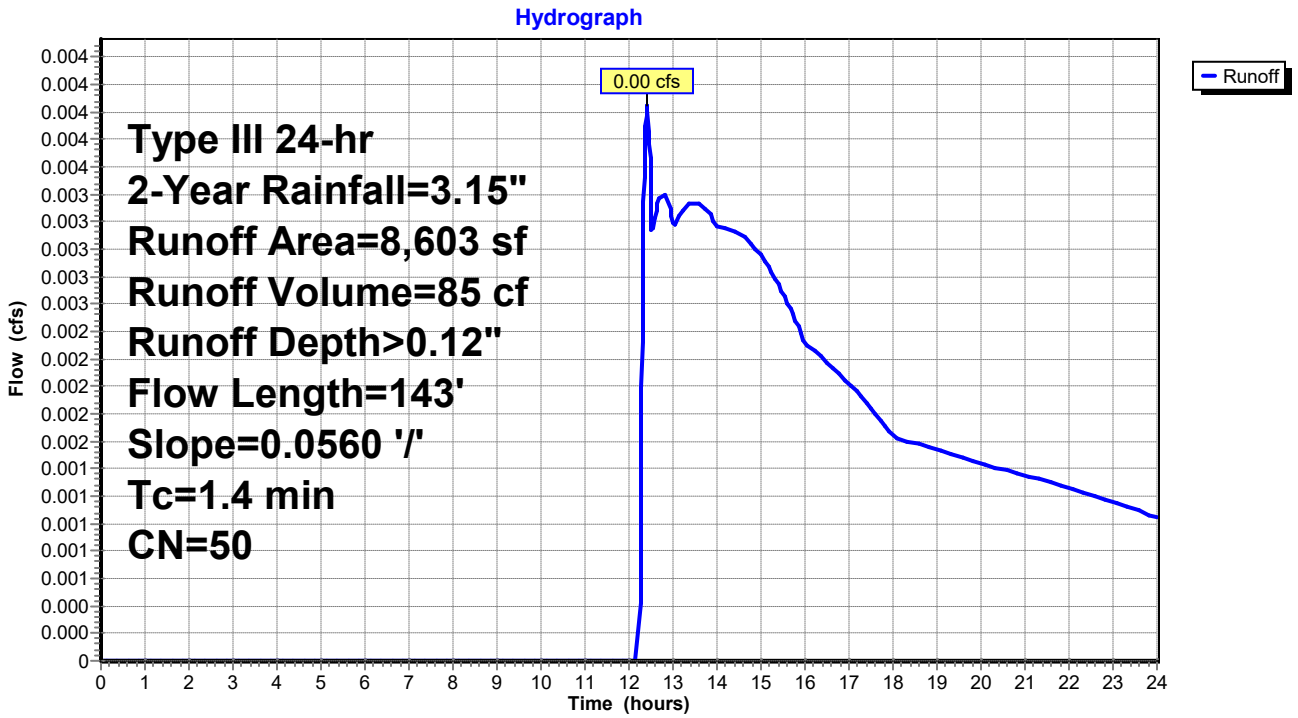
Runoff = 0.00 cfs @ 12.42 hrs, Volume= 85 cf, Depth> 0.12"

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
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% 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

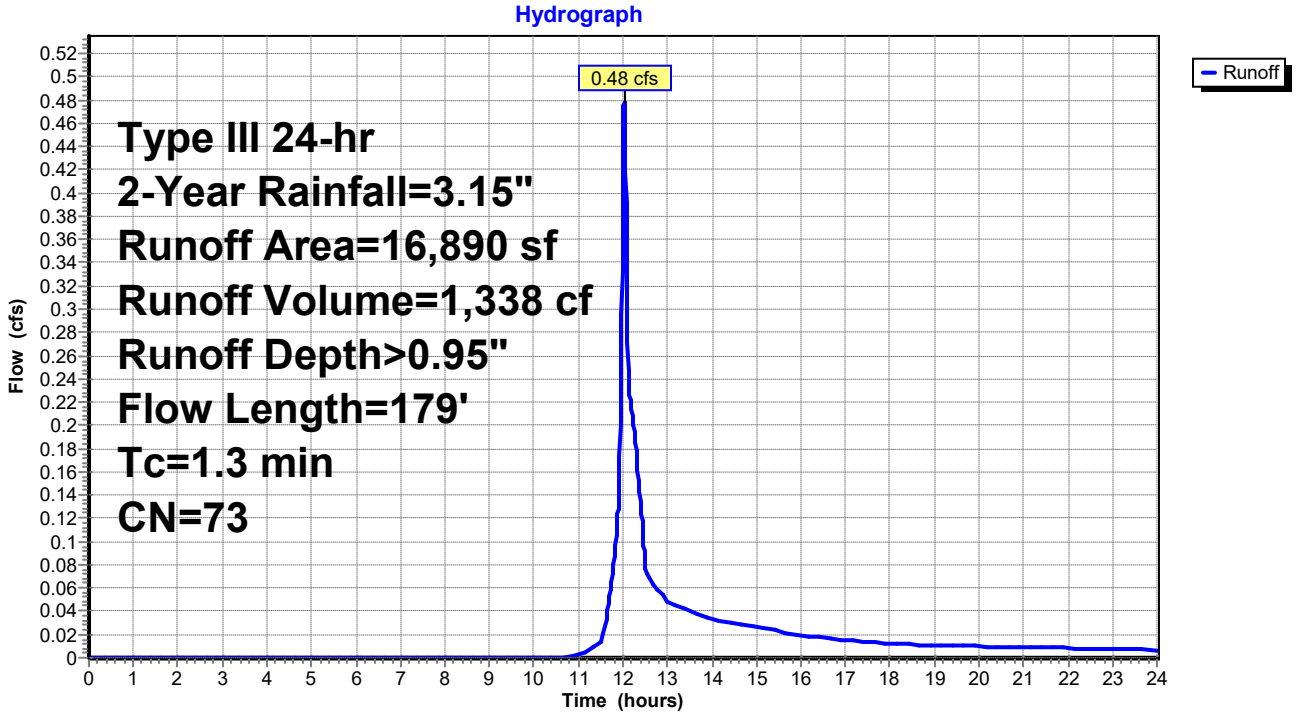
Runoff = 0.48 cfs @ 12.02 hrs, Volume= 1,338 cf, Depth> 0.95"

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
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% 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

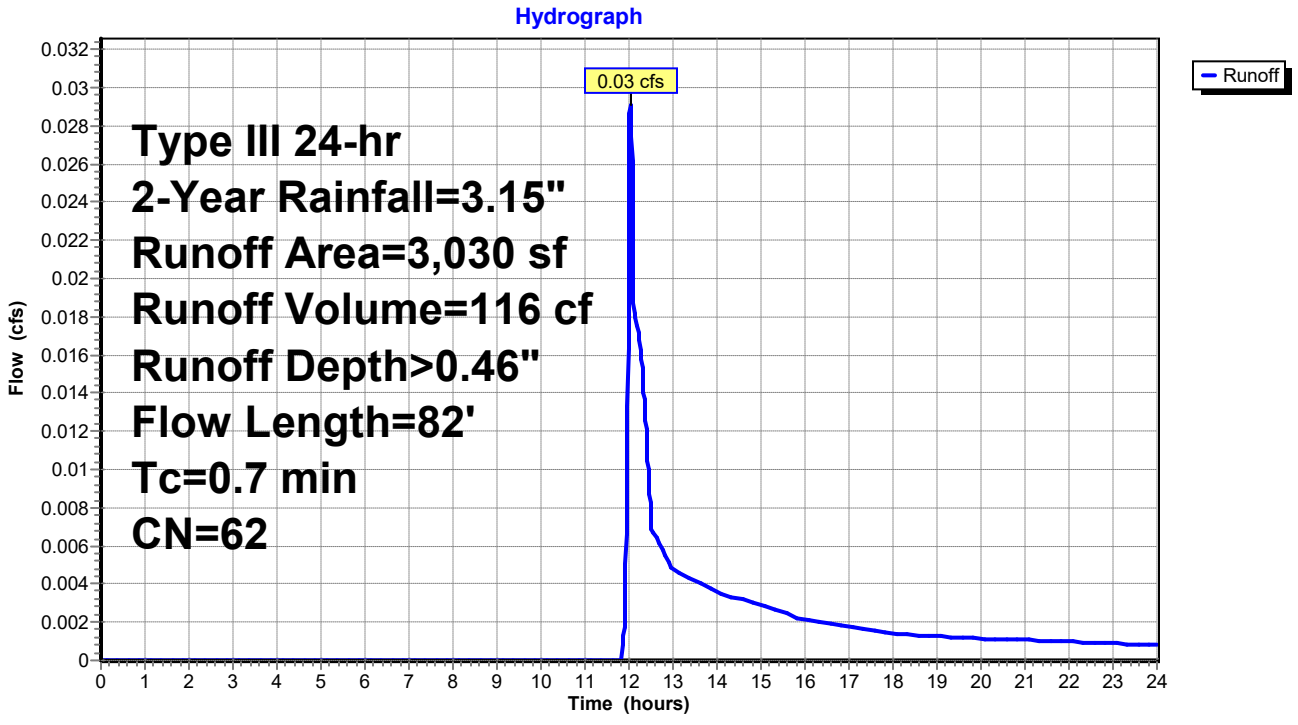
Runoff = 0.03 cfs @ 12.03 hrs, Volume= 116 cf, Depth> 0.46"

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
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% 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

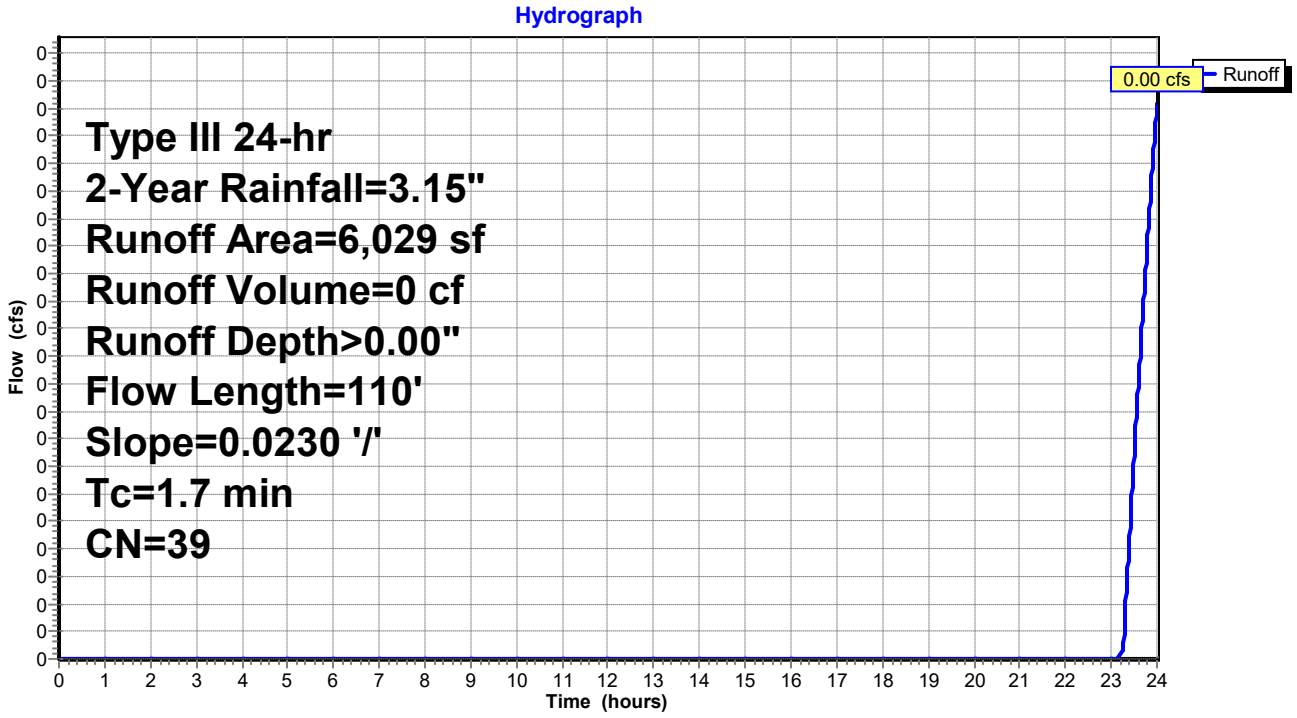
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth> 0.00"

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
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious 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

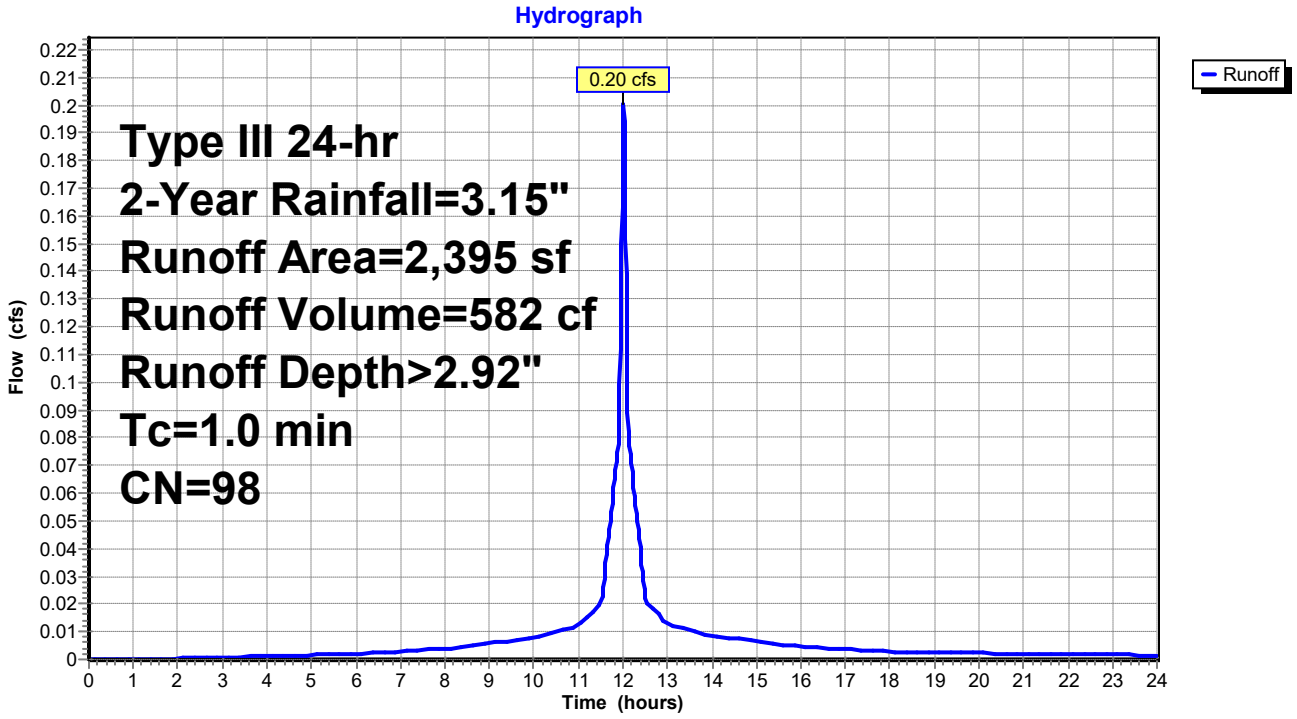
Runoff = 0.20 cfs @ 12.01 hrs, Volume= 582 cf, Depth> 2.92"

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
2,395	98	Roofs, HSG A
2,395		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

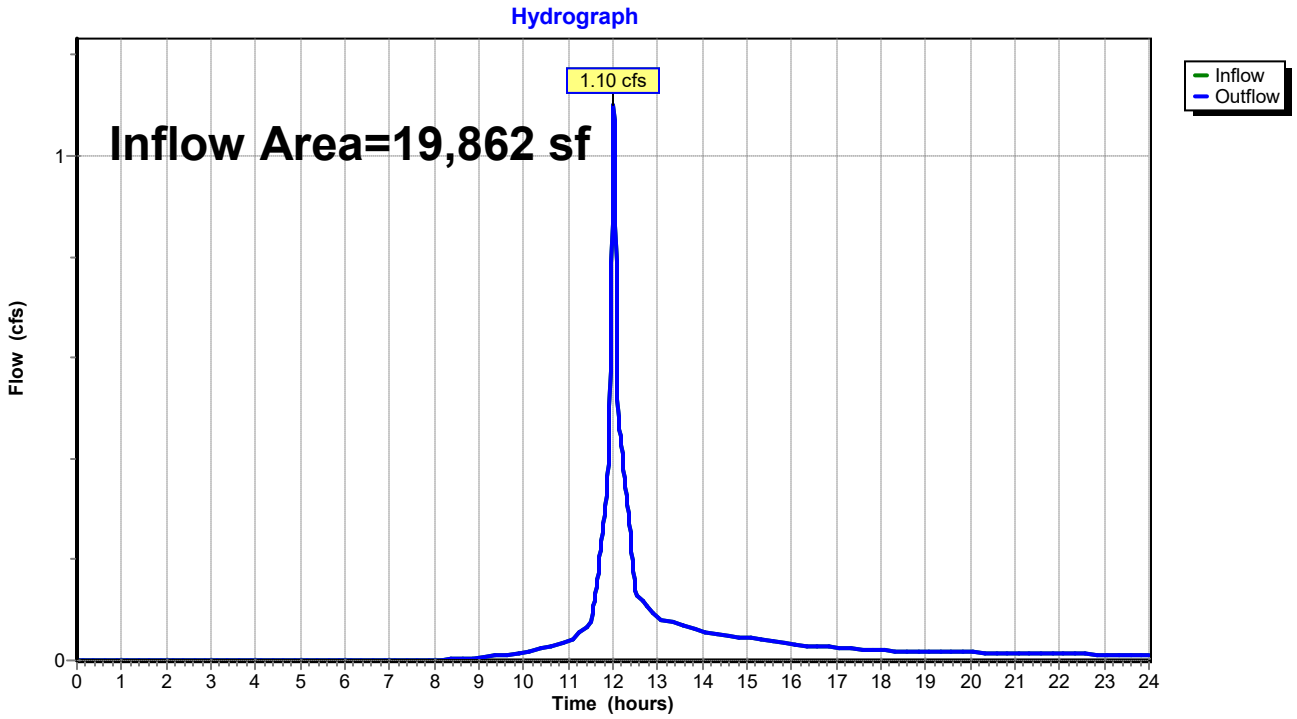


Summary for Reach 1R: RAIL TRAIL

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

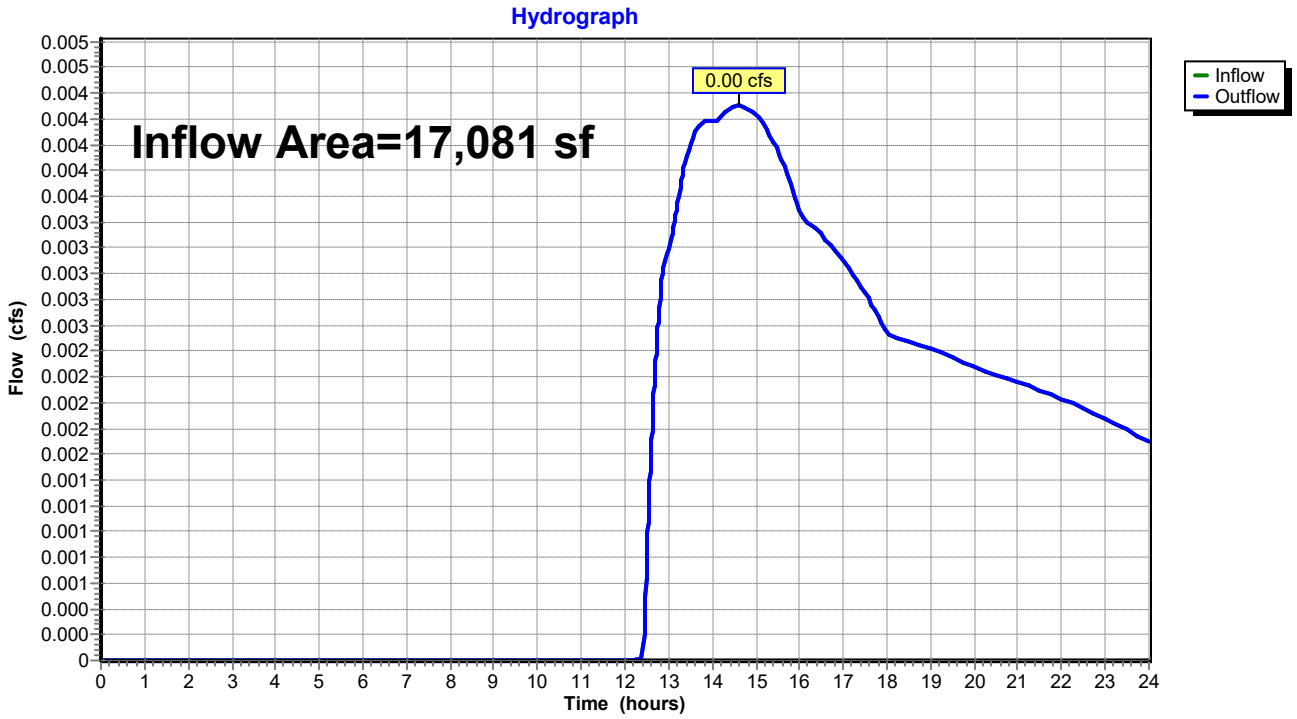


Summary for Reach 2R: EASTERN ABUTTERS

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

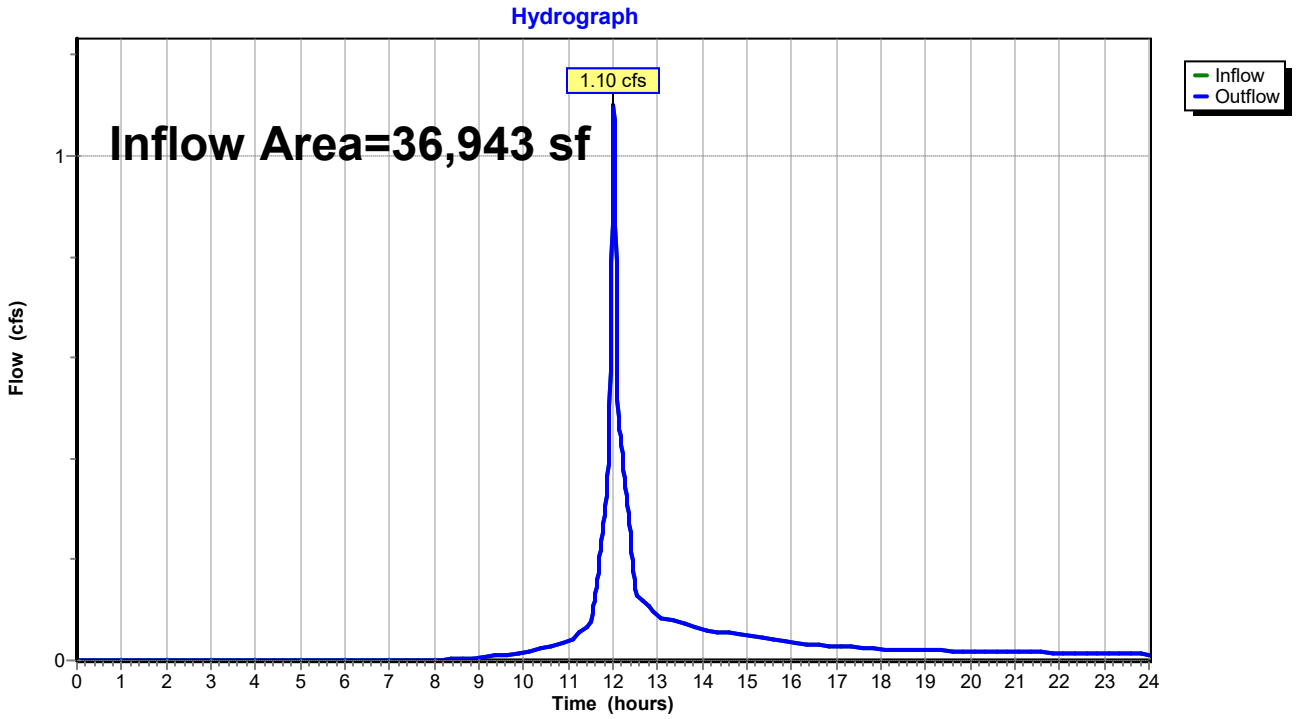


Summary for Reach 3R: TOTAL

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

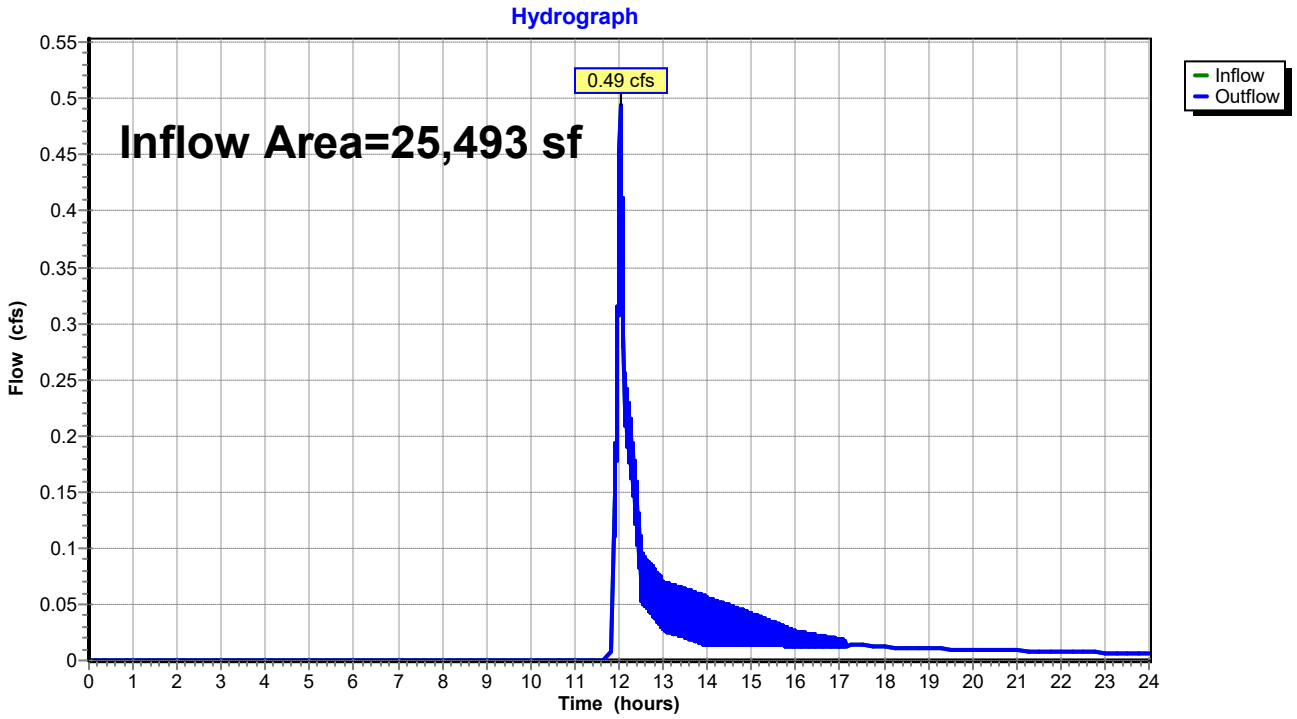


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 0.59" for 2-Year event
Inflow = 0.49 cfs @ 12.03 hrs, Volume= 1,259 cf
Outflow = 0.49 cfs @ 12.03 hrs, Volume= 1,259 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

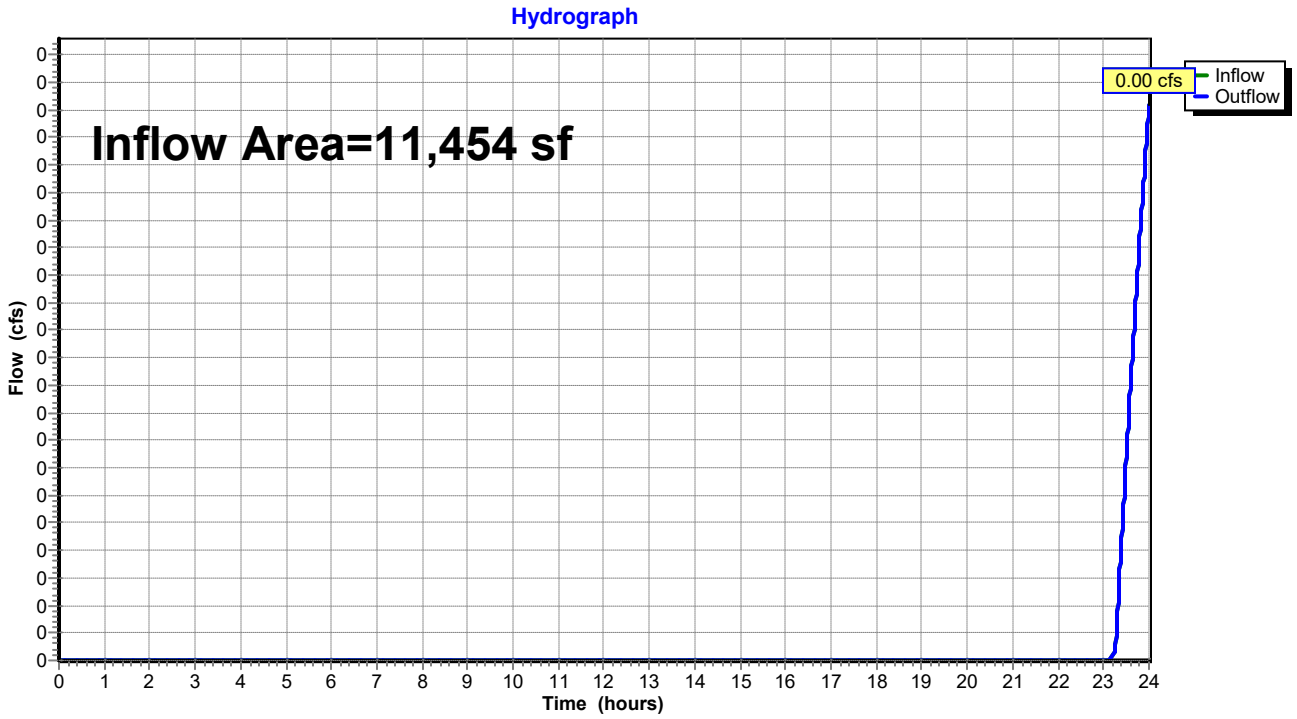


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,454 sf, 30.90% Impervious, Inflow Depth > 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0 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

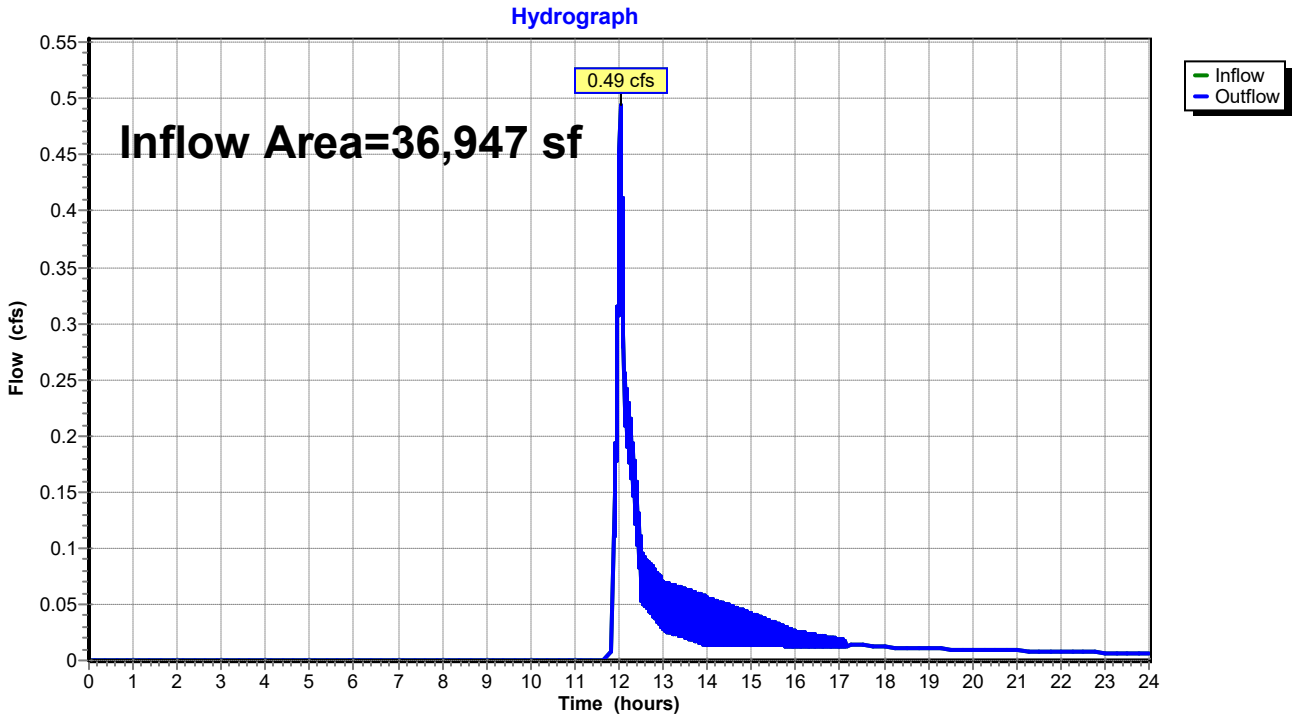


Summary for Reach 30R: TOTAL

Inflow Area = 36,947 sf, 39.52% Impervious, Inflow Depth > 0.41" for 2-Year event
Inflow = 0.49 cfs @ 12.03 hrs, Volume= 1,259 cf
Outflow = 0.49 cfs @ 12.03 hrs, Volume= 1,259 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 = 16,890 sf, 56.04% Impervious, Inflow Depth > 0.95" for 2-Year event
Inflow = 0.48 cfs @ 12.02 hrs, Volume= 1,338 cf
Outflow = 0.50 cfs @ 12.03 hrs, Volume= 1,257 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 11.88 hrs, Volume= 83 cf
Primary = 0.49 cfs @ 12.03 hrs, Volume= 1,174 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.47' @ 12.03 hrs Surf.Area= 150 sf Storage= 82 cf

Plug-Flow detention time= 42.2 min calculated for 1,257 cf (94% of inflow)
Center-of-Mass det. time= 10.7 min (872.6 - 861.9)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	82 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

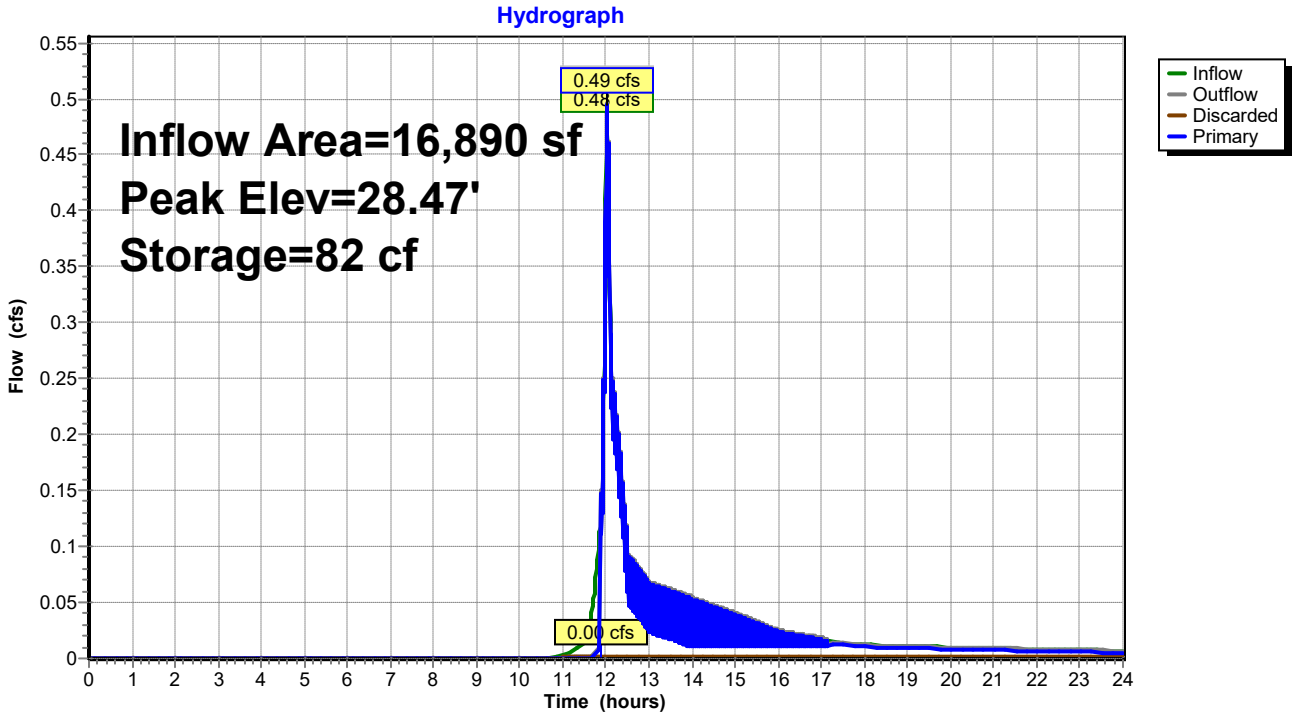
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	95	0	0
28.35	150	82	82

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.34'	**4.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 11.88 hrs HW=28.38' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.49 cfs @ 12.03 hrs HW=28.47' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.49 cfs @ 0.96 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 0.46" for 2-Year event
Inflow = 0.03 cfs @ 12.03 hrs, Volume= 116 cf
Outflow = 0.01 cfs @ 11.96 hrs, Volume= 116 cf, Atten= 79%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.96 hrs, Volume= 116 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= 26.36' @ 12.72 hrs Surf.Area= 14 sf Storage= 22 cf

Plug-Flow detention time= 25.4 min calculated for 116 cf (100% of inflow)
Center-of-Mass det. time= 25.0 min (931.5 - 906.4)

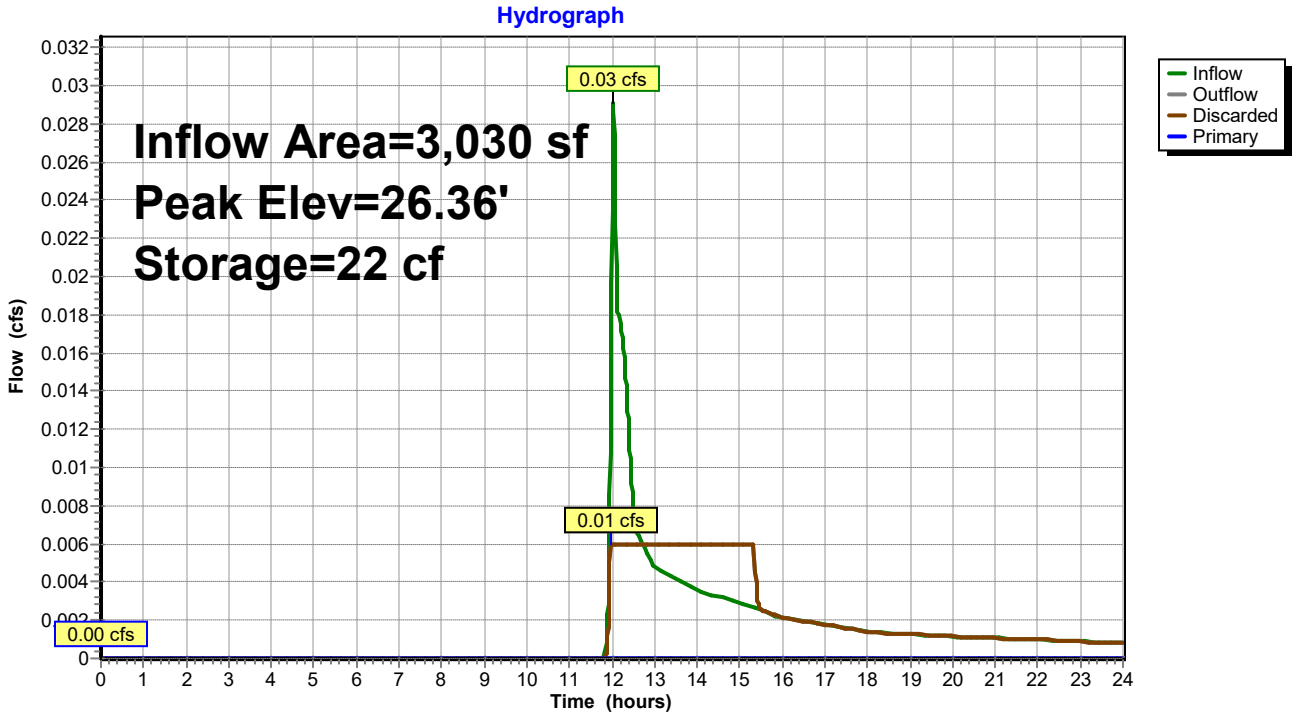
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.96 hrs HW=24.86' (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)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,395 sf,100.00% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 0.20 cfs @ 12.01 hrs, Volume= 582 cf
Outflow = 0.07 cfs @ 11.86 hrs, Volume= 582 cf, Atten= 65%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.86 hrs, Volume= 582 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= 25.39' @ 12.19 hrs Surf.Area= 168 sf Storage= 60 cf

Plug-Flow detention time= 3.5 min calculated for 582 cf (100% of inflow)
Center-of-Mass det. time= 3.5 min (755.5 - 752.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 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 3 rows
		419 cf	Total Available Storage

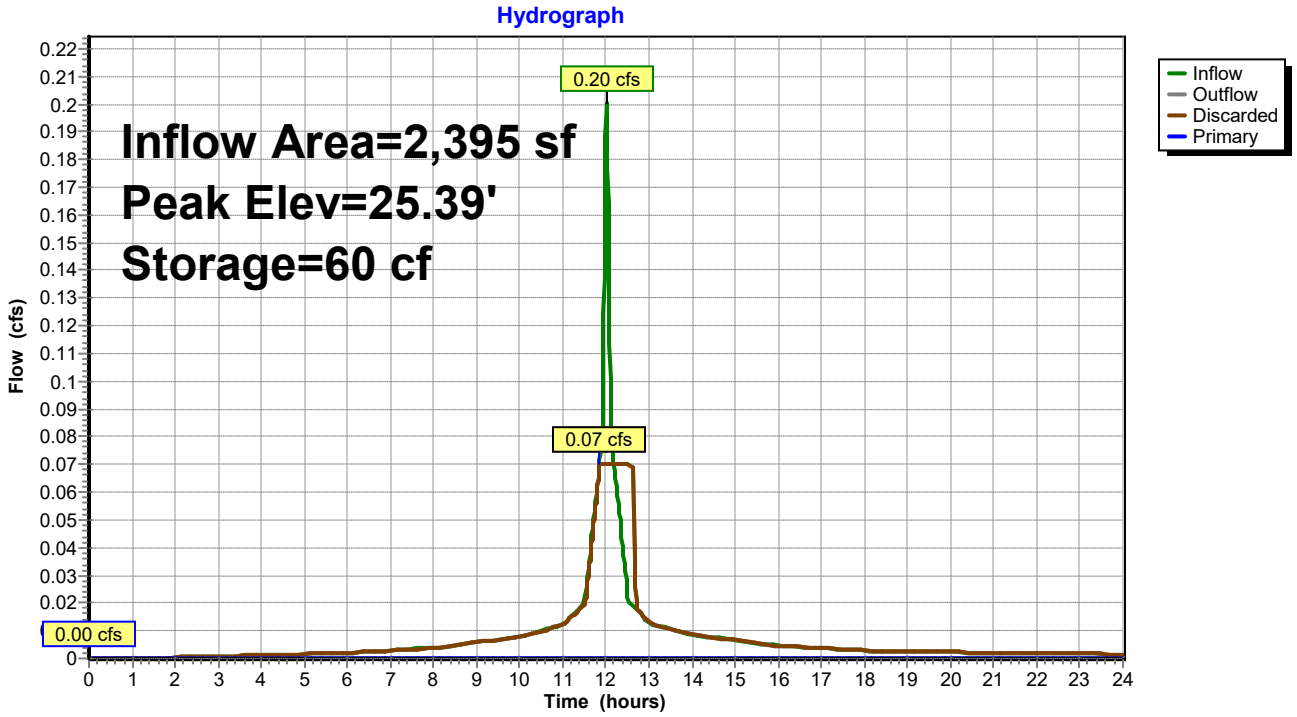
Storage Group A created with Chamber Wizard

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=0.07 cfs @ 11.86 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.07 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=8,603 sf 18.59% Impervious Runoff Depth>0.62"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.10 cfs 447 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>2.15"
Flow Length=179' Tc=1.3 min CN=73 Runoff=1.15 cfs 3,023 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>1.33"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.12 cfs 337 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth>0.17"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.00 cfs 84 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,395 sf 100.00% Impervious Runoff Depth>4.59"
Tc=1.0 min CN=98 Runoff=0.31 cfs 917 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=1.24 cfs 3,296 cf
Outflow=1.24 cfs 3,296 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.12 cfs 200 cf
Outflow=0.12 cfs 200 cf

Reach 30R: TOTAL Inflow=1.28 cfs 3,496 cf
Outflow=1.28 cfs 3,496 cf

Pond 20P: RAINGARDEN Peak Elev=28.56' Storage=82 cf Inflow=1.15 cfs 3,023 cf
Discarded=0.00 cfs 92 cf Primary=1.15 cfs 2,848 cf Outflow=1.15 cfs 2,941 cf

Pond 30P: DRYWELL Peak Elev=28.01' Storage=46 cf Inflow=0.12 cfs 337 cf
Discarded=0.01 cfs 220 cf Primary=0.12 cfs 116 cf Outflow=0.12 cfs 337 cf

Pond 42P: CULTEC Peak Elev=26.24' Storage=160 cf Inflow=0.31 cfs 917 cf
Discarded=0.07 cfs 917 cf Primary=0.00 cfs 0 cf Outflow=0.07 cfs 917 cf

Summary for Subcatchment 1S: NW AREA

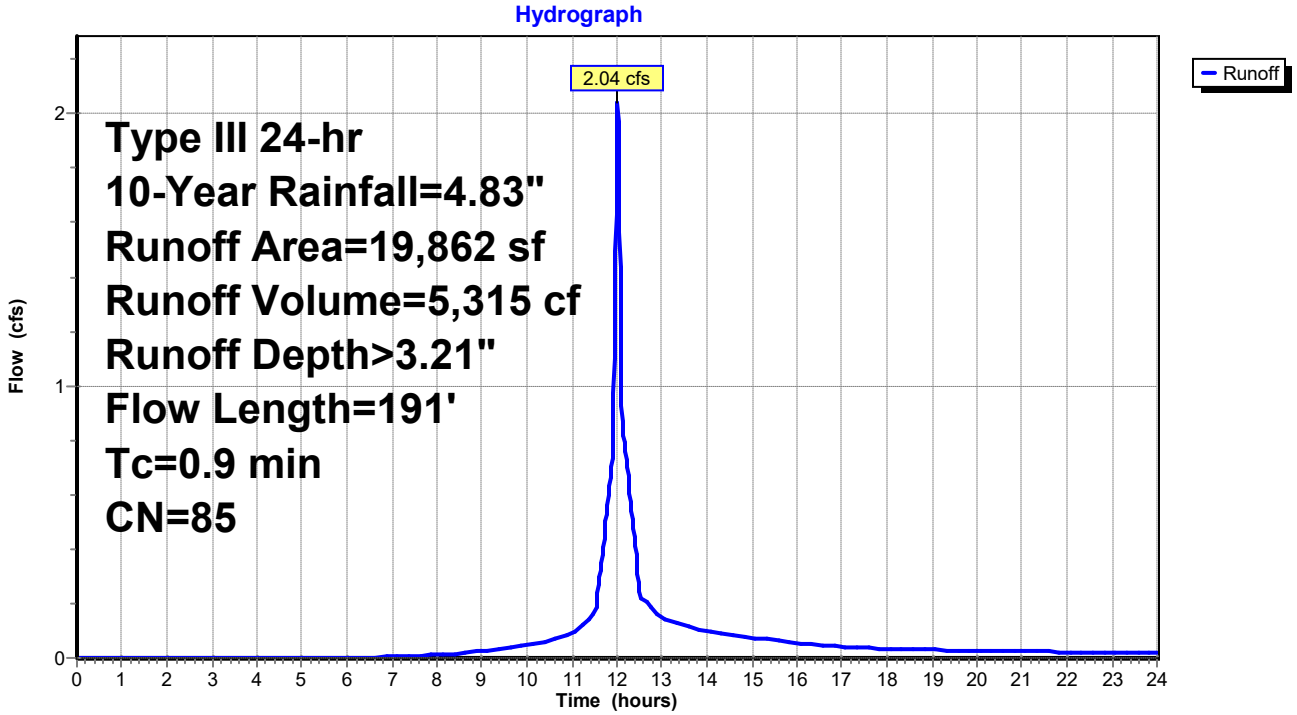
Runoff = 2.04 cfs @ 12.01 hrs, Volume= 5,315 cf, Depth> 3.21"

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

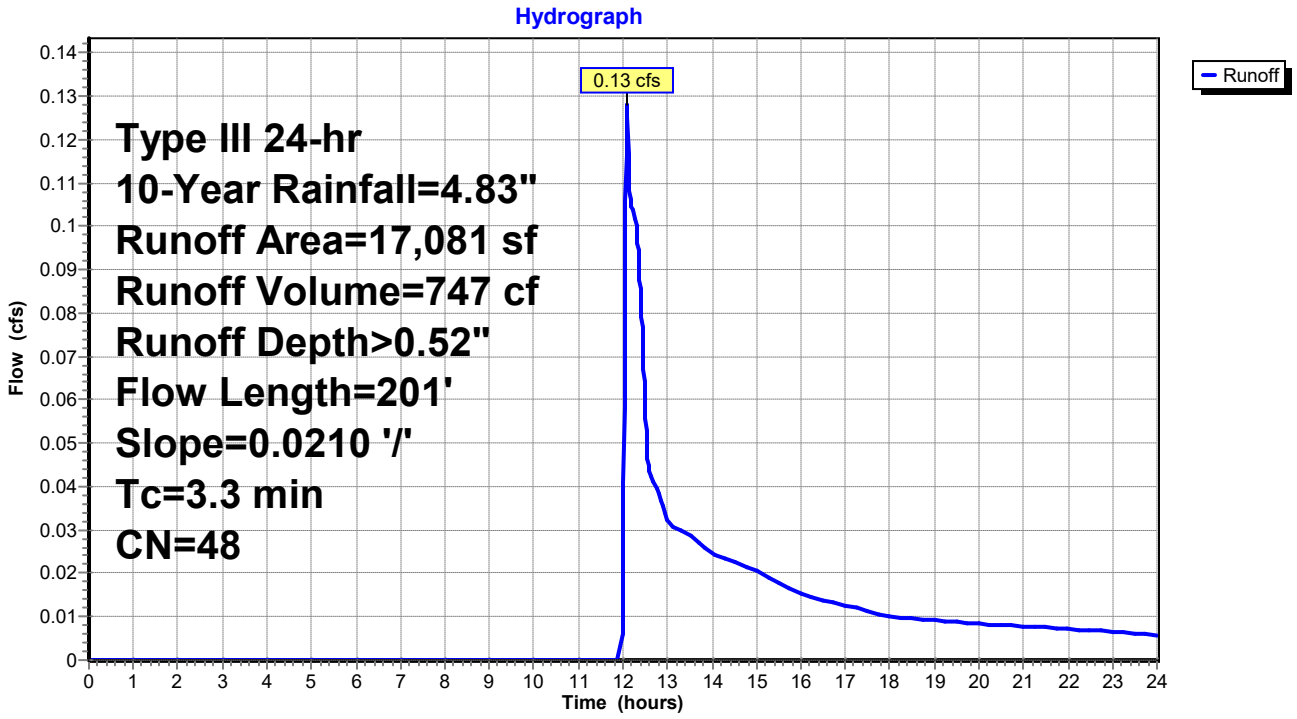
Runoff = 0.13 cfs @ 12.10 hrs, Volume= 747 cf, Depth> 0.52"

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

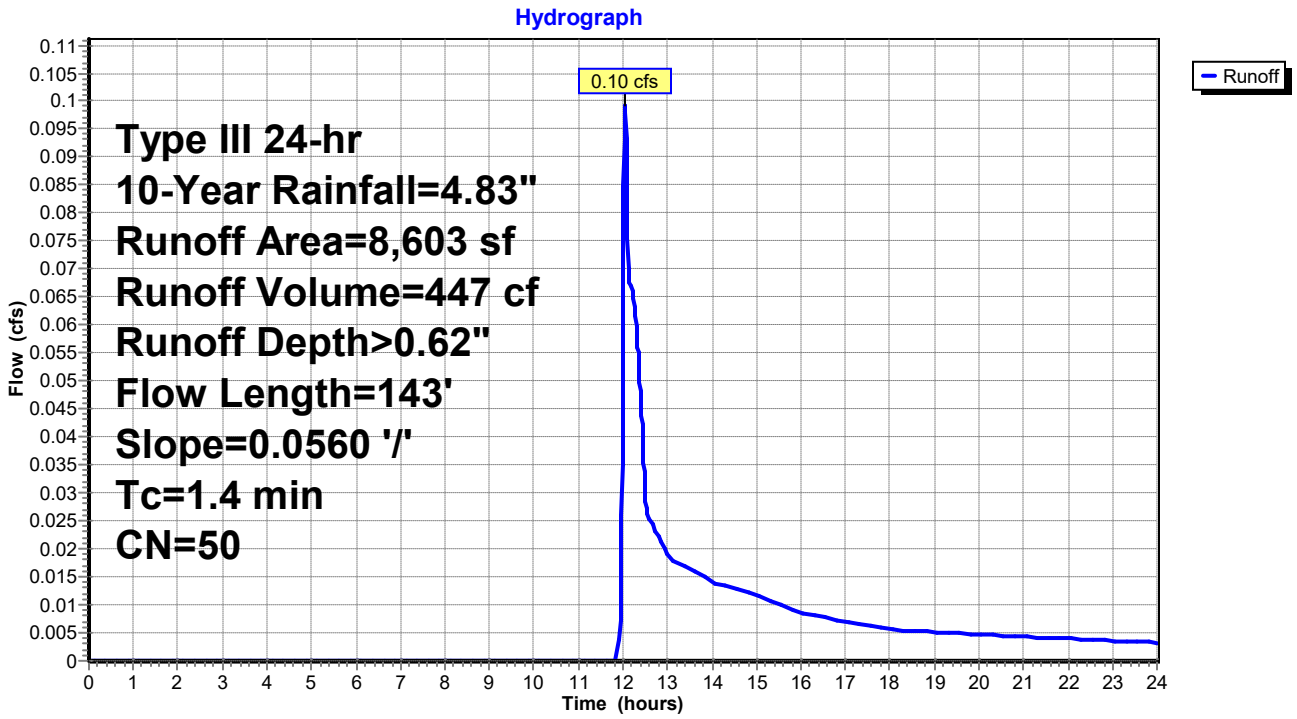
Runoff = 0.10 cfs @ 12.05 hrs, Volume= 447 cf, Depth> 0.62"

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
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% 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

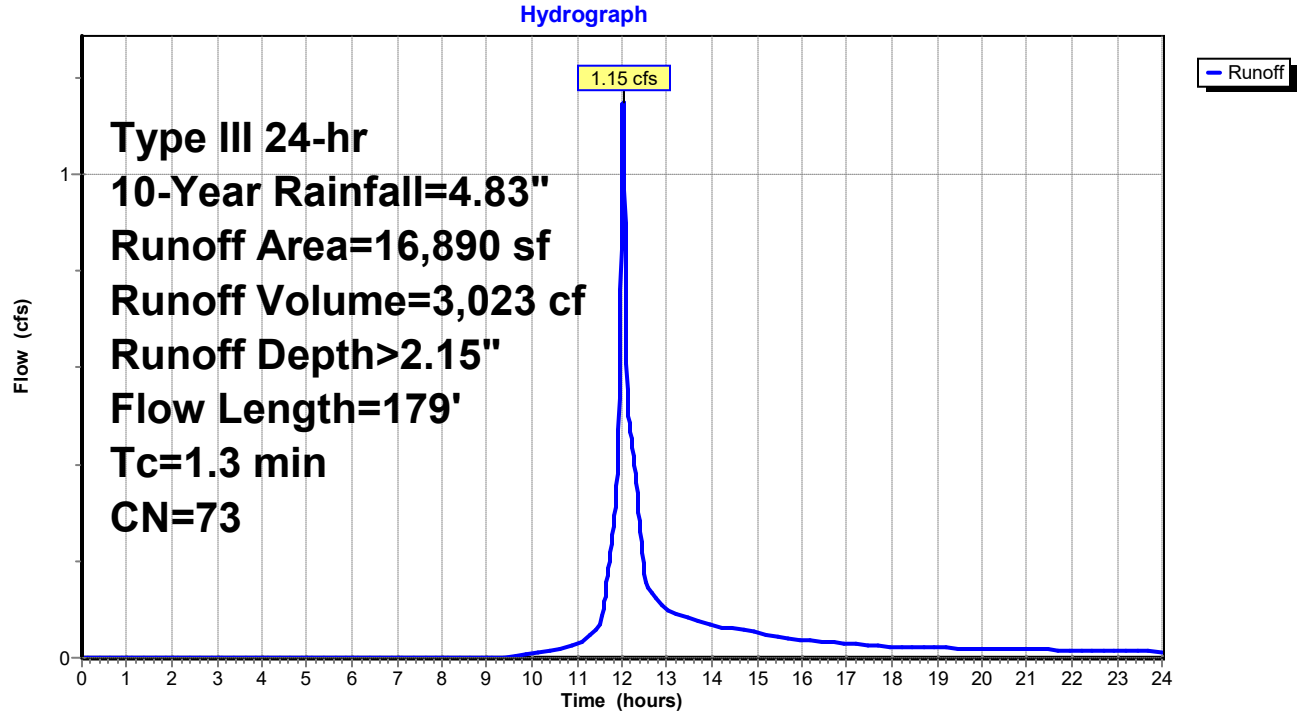
Runoff = 1.15 cfs @ 12.02 hrs, Volume= 3,023 cf, Depth> 2.15"

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
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% 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

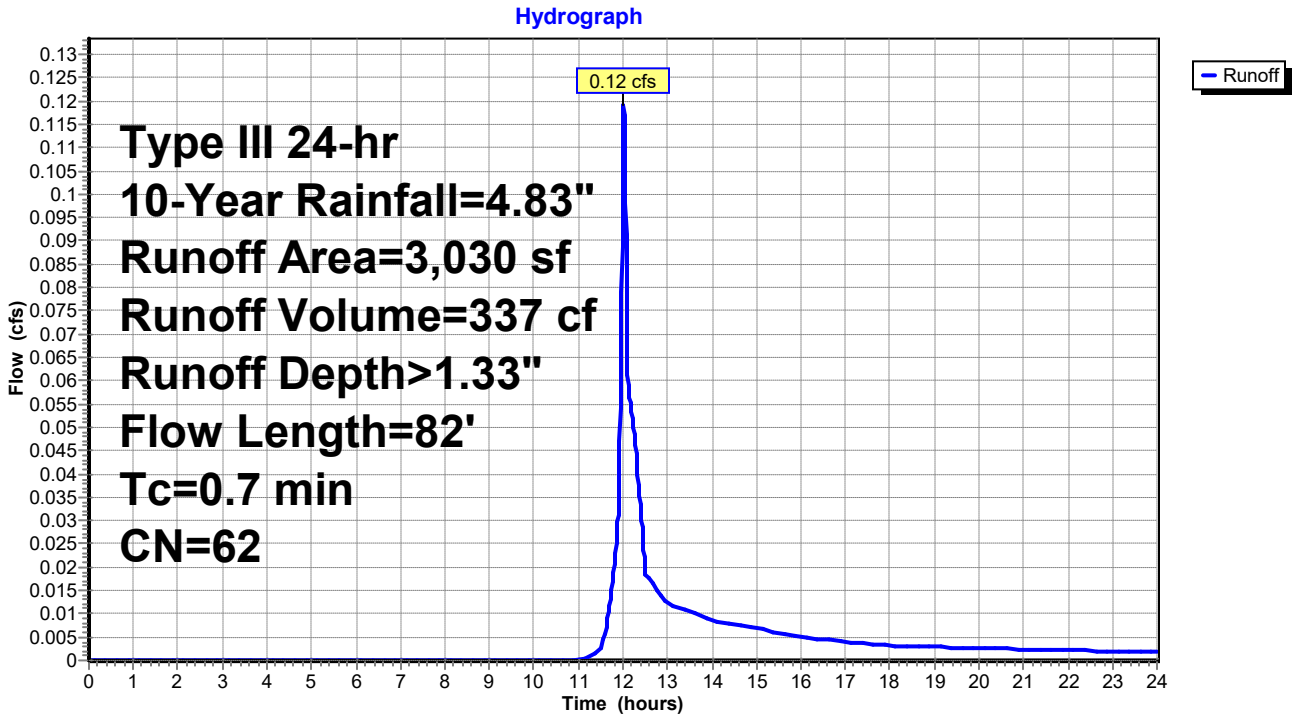
Runoff = 0.12 cfs @ 12.02 hrs, Volume= 337 cf, Depth> 1.33"

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
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% 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

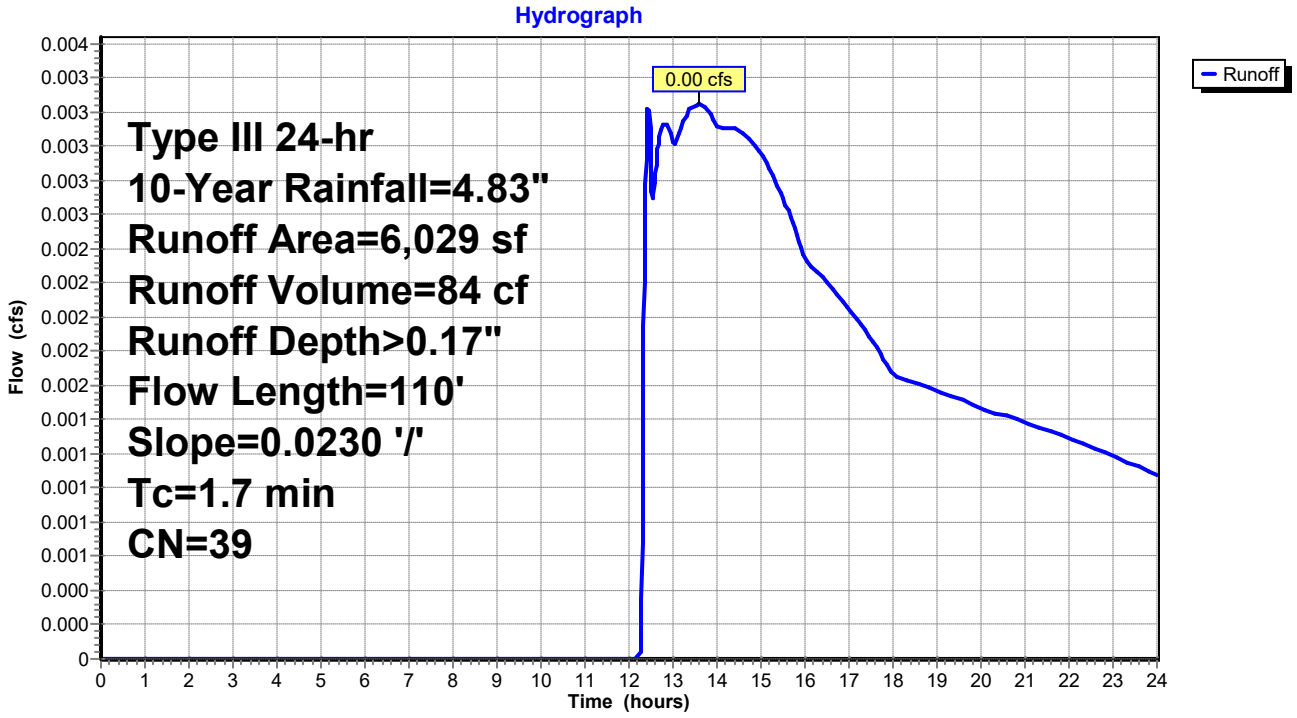
Runoff = 0.00 cfs @ 13.59 hrs, Volume= 84 cf, Depth> 0.17"

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
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious 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

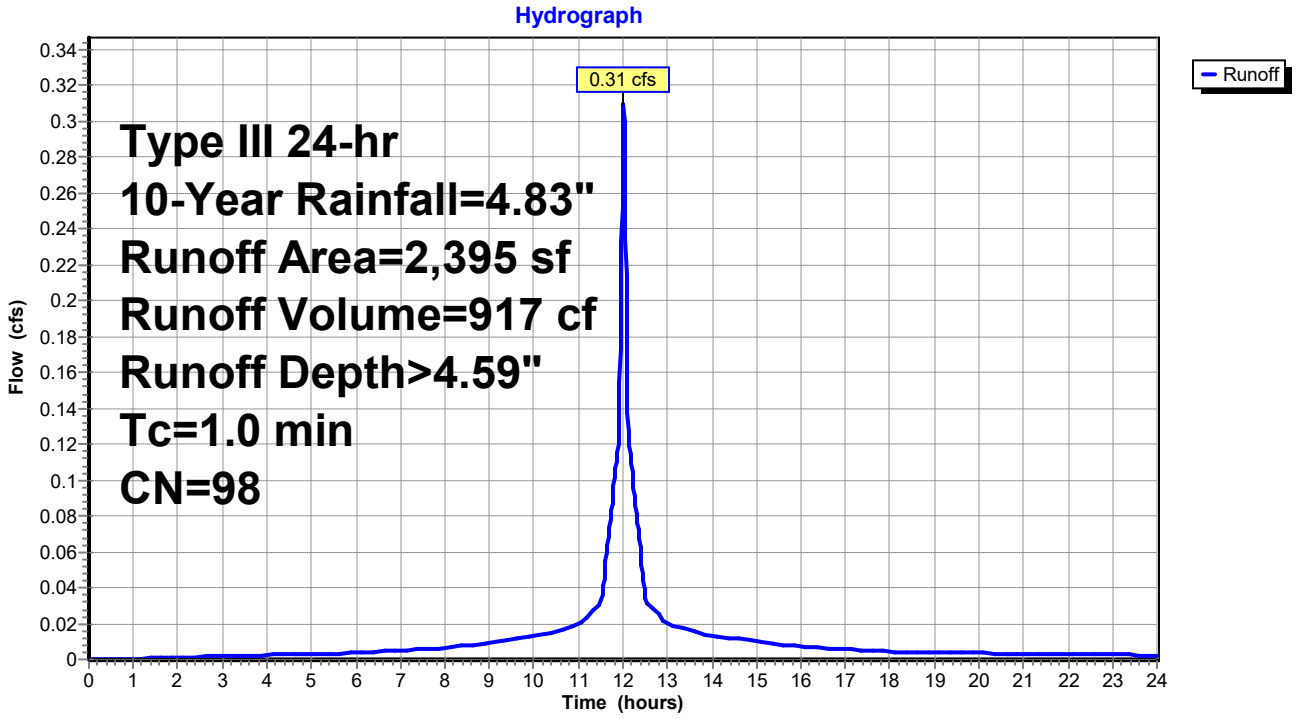
Runoff = 0.31 cfs @ 12.01 hrs, Volume= 917 cf, Depth> 4.59"

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
2,395	98	Roofs, HSG A
2,395		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

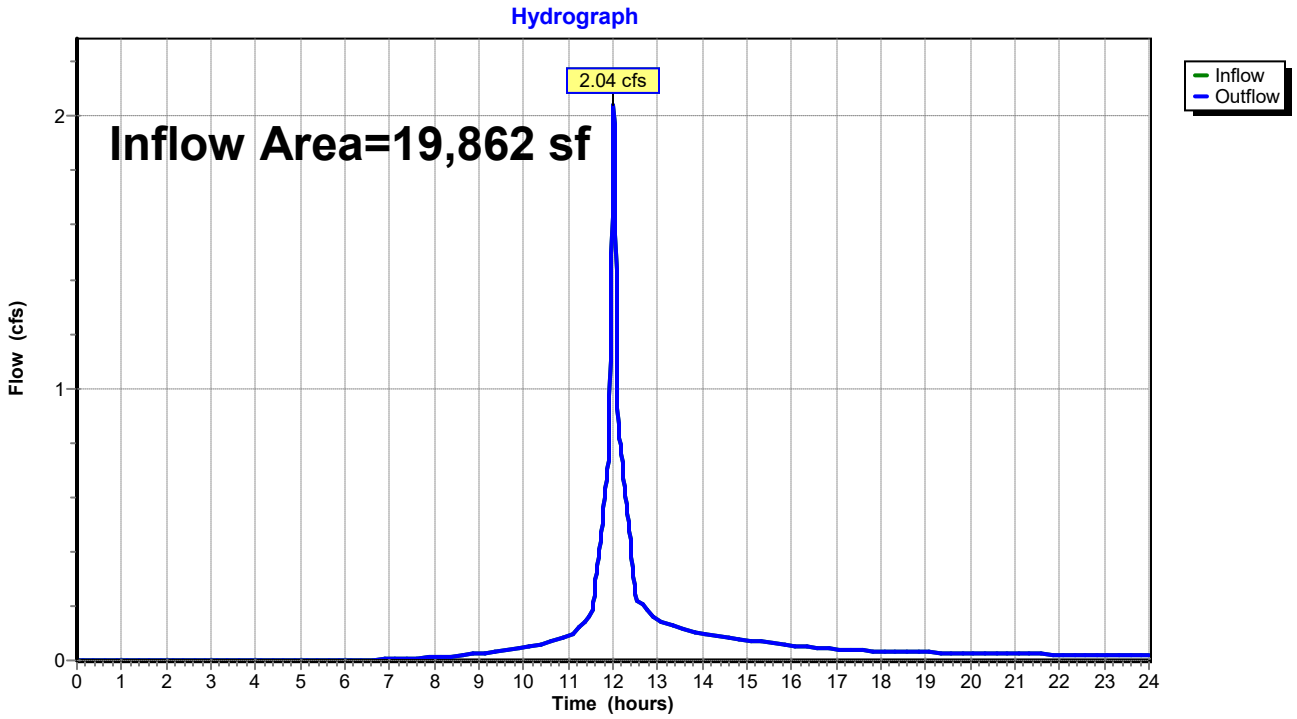


Summary for Reach 1R: RAIL TRAIL

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

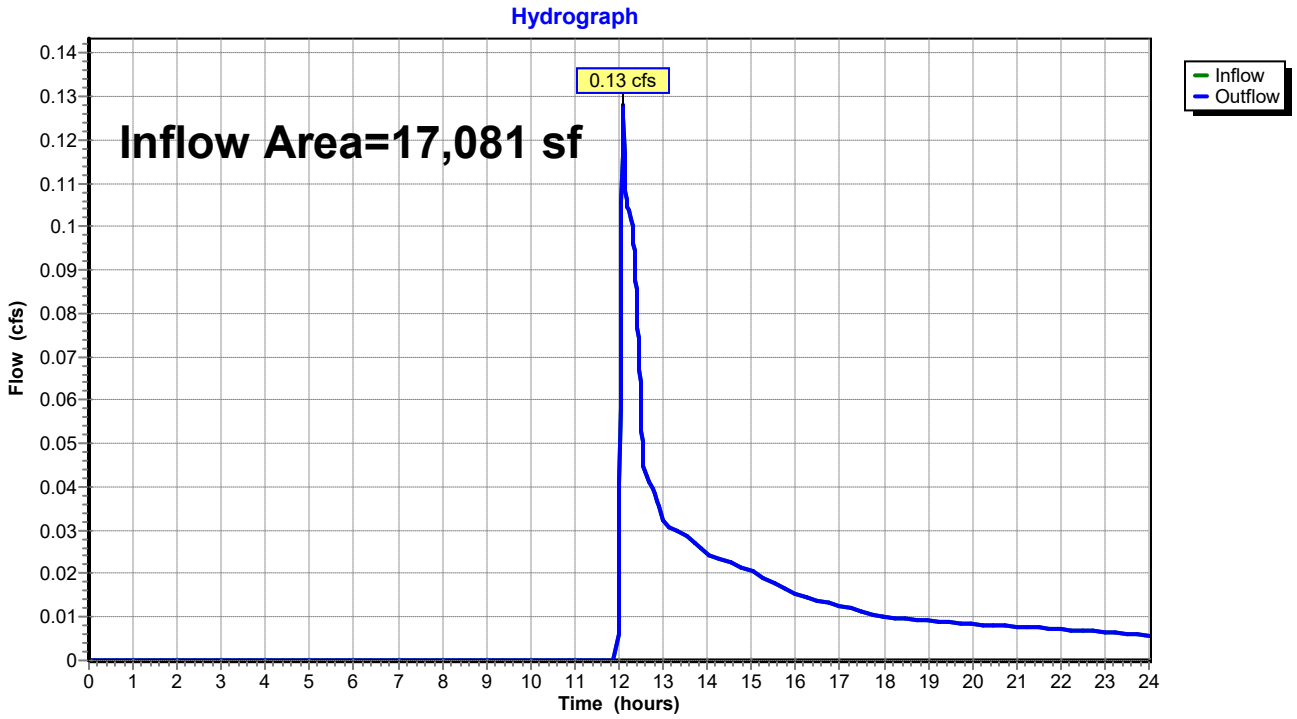


Summary for Reach 2R: EASTERN ABUTTERS

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

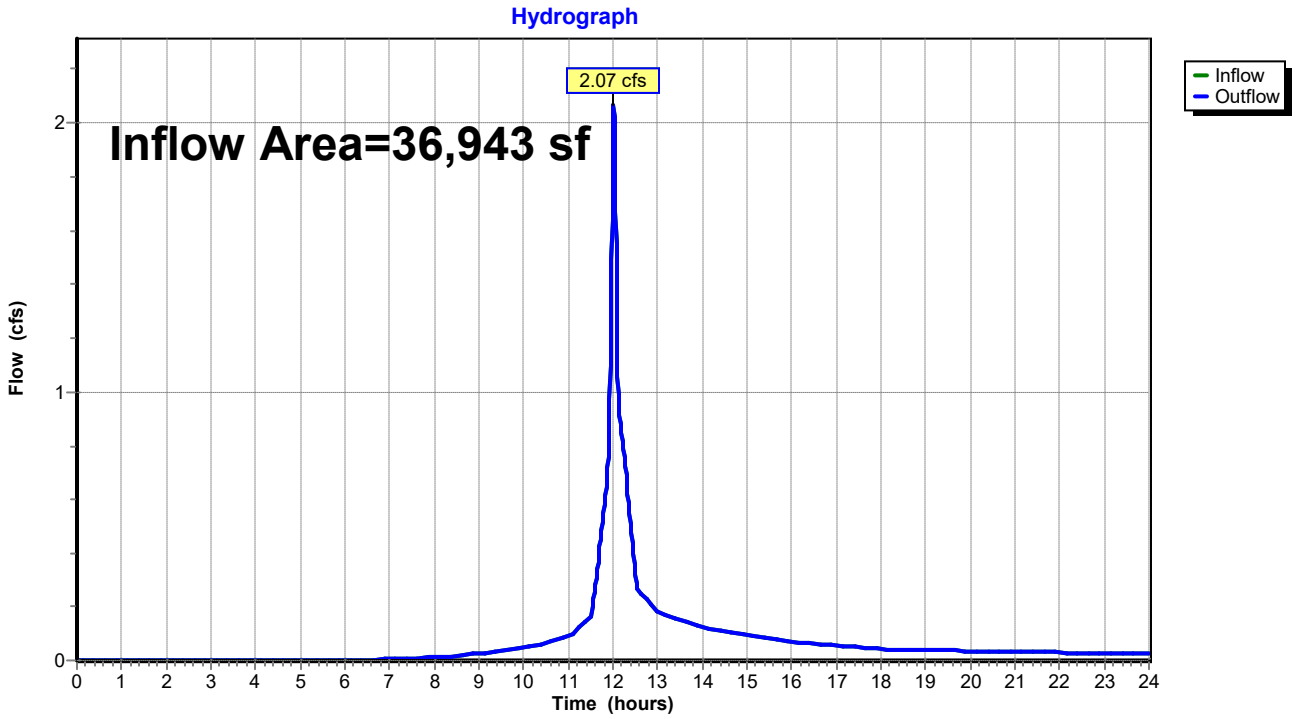


Summary for Reach 3R: TOTAL

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

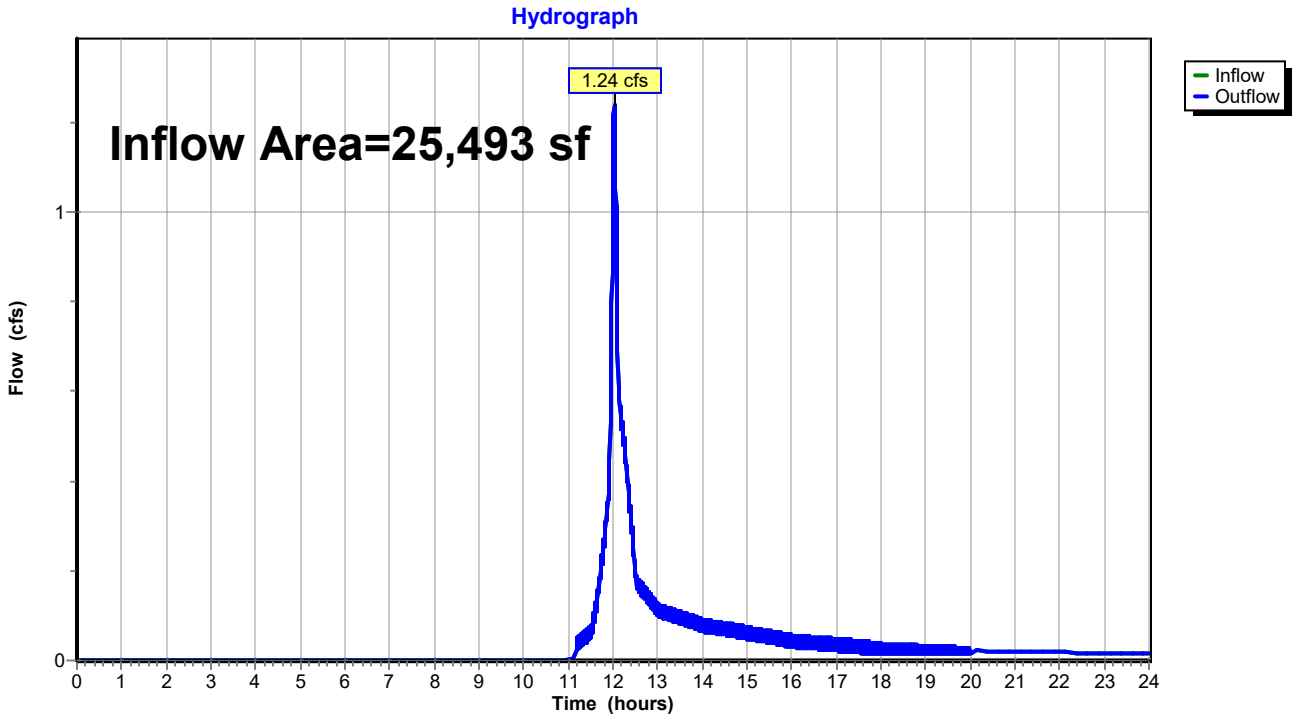


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 1.55" for 10-Year event
Inflow = 1.24 cfs @ 12.03 hrs, Volume= 3,296 cf
Outflow = 1.24 cfs @ 12.03 hrs, Volume= 3,296 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

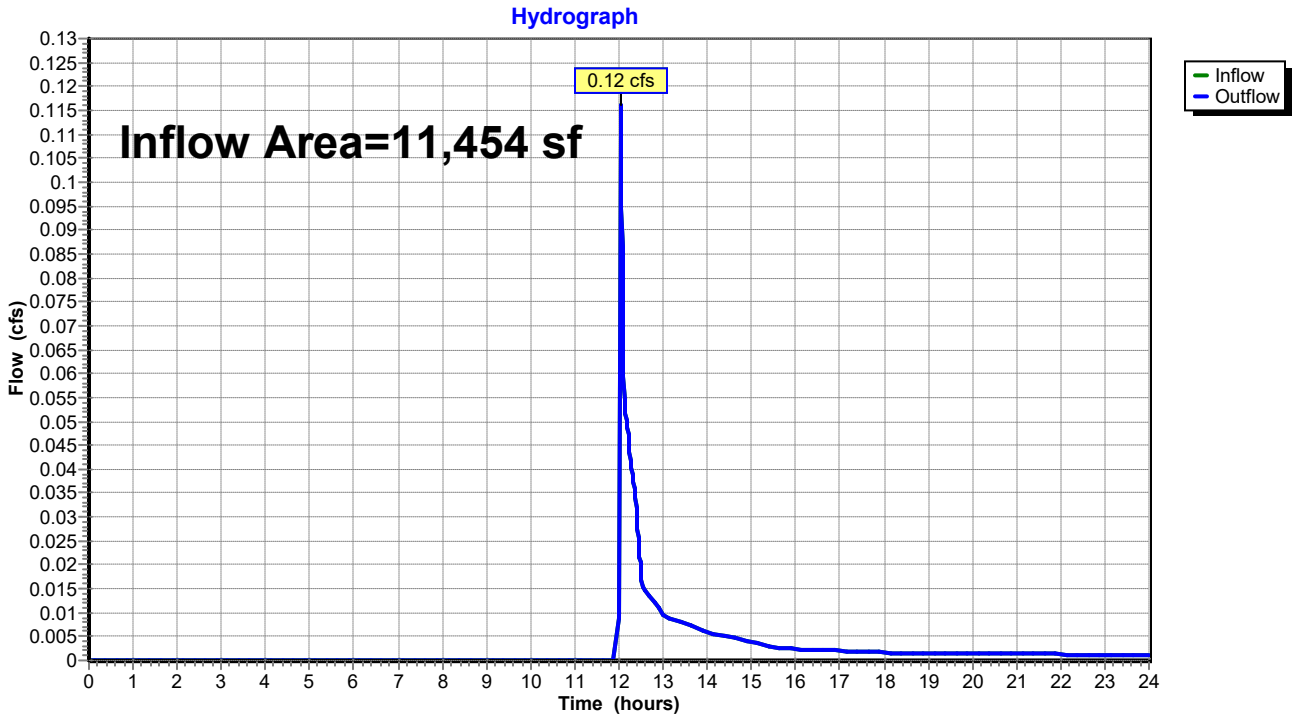


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,454 sf, 30.90% Impervious, Inflow Depth > 0.21" for 10-Year event
Inflow = 0.12 cfs @ 12.04 hrs, Volume= 200 cf
Outflow = 0.12 cfs @ 12.04 hrs, Volume= 200 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

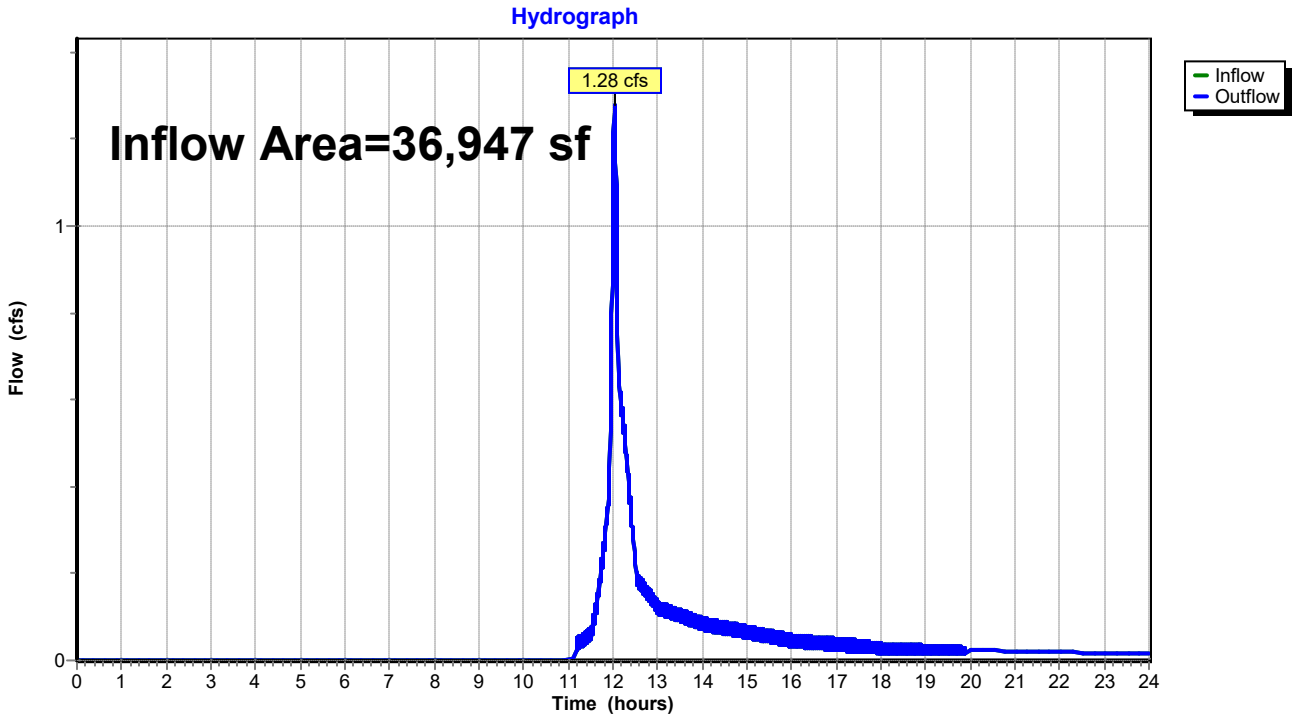


Summary for Reach 30R: TOTAL

Inflow Area = 36,947 sf, 39.52% Impervious, Inflow Depth > 1.14" for 10-Year event
Inflow = 1.28 cfs @ 12.04 hrs, Volume= 3,496 cf
Outflow = 1.28 cfs @ 12.04 hrs, Volume= 3,496 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 = 16,890 sf, 56.04% Impervious, Inflow Depth > 2.15" for 10-Year event
Inflow = 1.15 cfs @ 12.02 hrs, Volume= 3,023 cf
Outflow = 1.15 cfs @ 12.03 hrs, Volume= 2,941 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.00 cfs @ 11.17 hrs, Volume= 92 cf
Primary = 1.15 cfs @ 12.03 hrs, Volume= 2,848 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.56' @ 12.03 hrs Surf.Area= 150 sf Storage= 82 cf

Plug-Flow detention time= 20.9 min calculated for 2,939 cf (97% of inflow)
Center-of-Mass det. time= 5.6 min (842.8 - 837.2)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	82 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

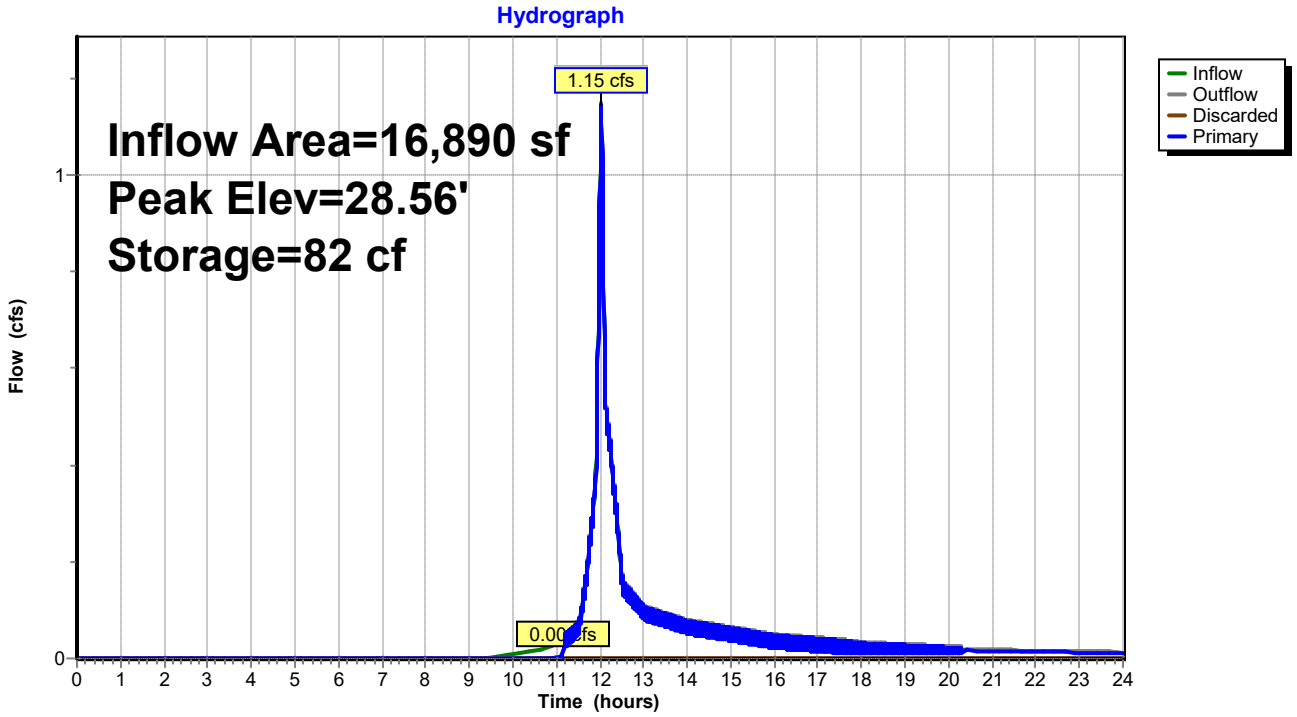
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	95	0	0
28.35	150	82	82

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.34'	**4.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 11.17 hrs HW=28.37' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.14 cfs @ 12.03 hrs HW=28.56' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.14 cfs @ 1.27 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 1.33" for 10-Year event
Inflow = 0.12 cfs @ 12.02 hrs, Volume= 337 cf
Outflow = 0.12 cfs @ 12.04 hrs, Volume= 337 cf, Atten= 0%, Lag= 1.7 min
Discarded = 0.01 cfs @ 11.64 hrs, Volume= 220 cf
Primary = 0.12 cfs @ 12.04 hrs, Volume= 116 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.01' @ 12.04 hrs Surf.Area= 14 sf Storage= 46 cf

Plug-Flow detention time= 50.9 min calculated for 337 cf (100% of inflow)
Center-of-Mass det. time= 50.6 min (917.4 - 866.8)

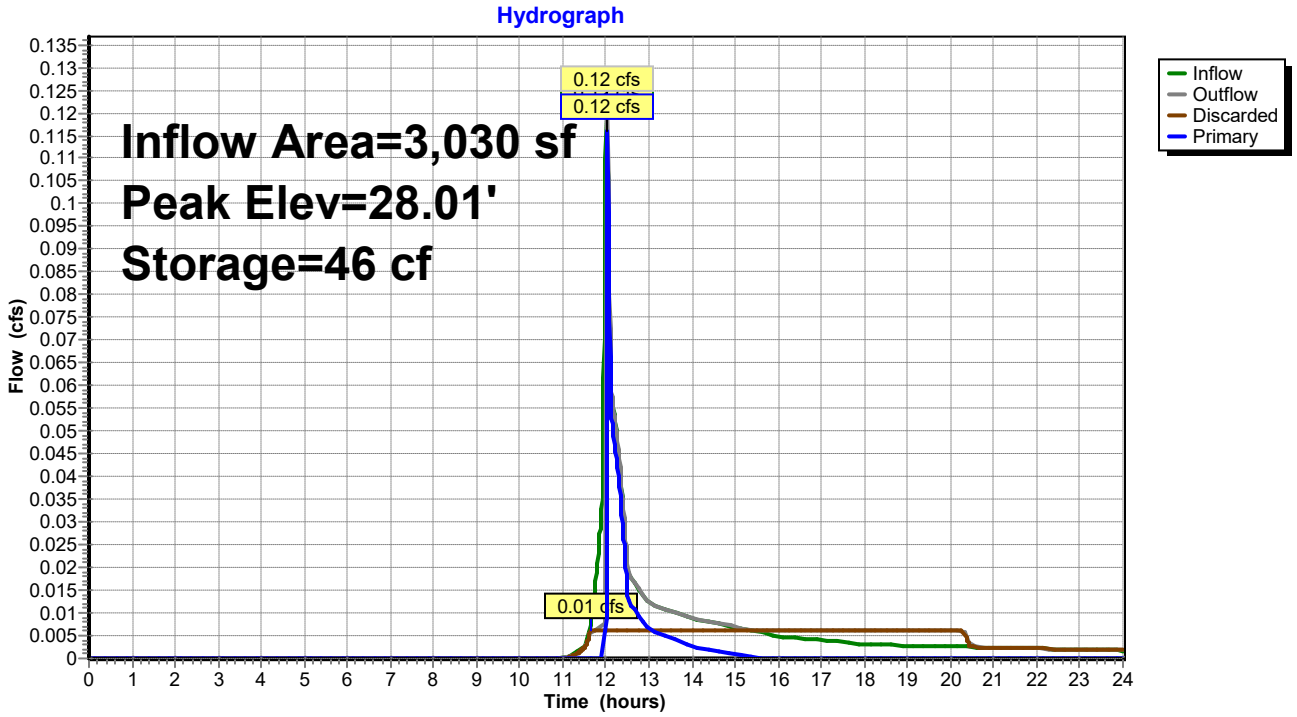
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.64 hrs HW=24.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.10 cfs @ 12.04 hrs HW=28.01' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.49 fps)
└**3=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.35 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,395 sf,100.00% Impervious, Inflow Depth > 4.59" for 10-Year event
Inflow = 0.31 cfs @ 12.01 hrs, Volume= 917 cf
Outflow = 0.07 cfs @ 11.70 hrs, Volume= 917 cf, Atten= 77%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.70 hrs, Volume= 917 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= 26.24' @ 12.35 hrs Surf.Area= 168 sf Storage= 160 cf

Plug-Flow detention time= 10.1 min calculated for 917 cf (100% of inflow)
Center-of-Mass det. time= 10.1 min (754.0 - 743.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 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 3 rows
		419 cf	Total Available Storage

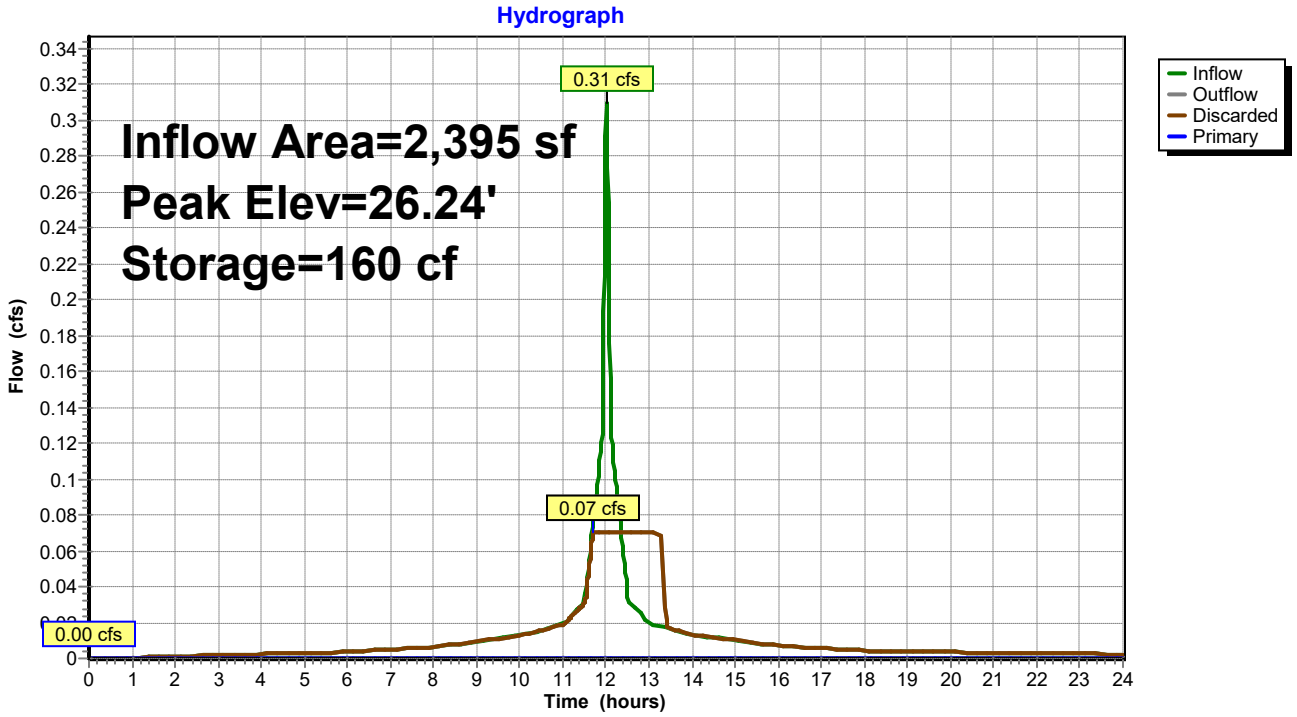
Storage Group A created with Chamber Wizard

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=0.07 cfs @ 11.70 hrs HW=24.55' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.07 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=8,603 sf 18.59% Impervious Runoff Depth>1.22"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.27 cfs 876 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>3.22"
Flow Length=179' Tc=1.3 min CN=73 Runoff=1.74 cfs 4,534 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>2.20"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.21 cfs 556 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth>0.49"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.03 cfs 247 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,395 sf 100.00% Impervious Runoff Depth>5.92"
Tc=1.0 min CN=98 Runoff=0.40 cfs 1,182 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=2.01 cfs 5,229 cf
Outflow=2.01 cfs 5,229 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.20 cfs 538 cf
Outflow=0.20 cfs 538 cf

Reach 30R: TOTAL Inflow=2.21 cfs 5,767 cf
Outflow=2.21 cfs 5,767 cf

Pond 20P: RAINGARDEN Peak Elev=28.64' Storage=82 cf Inflow=1.74 cfs 4,534 cf
Discarded=0.00 cfs 98 cf Primary=1.75 cfs 4,354 cf Outflow=1.75 cfs 4,452 cf

Pond 30P: DRYWELL Peak Elev=28.04' Storage=46 cf Inflow=0.21 cfs 556 cf
Discarded=0.01 cfs 269 cf Primary=0.20 cfs 286 cf Outflow=0.21 cfs 555 cf

Pond 42P: CULTEC Peak Elev=27.00' Storage=252 cf Inflow=0.40 cfs 1,182 cf
Discarded=0.07 cfs 1,177 cf Primary=0.02 cfs 4 cf Outflow=0.09 cfs 1,182 cf

Summary for Subcatchment 1S: NW AREA

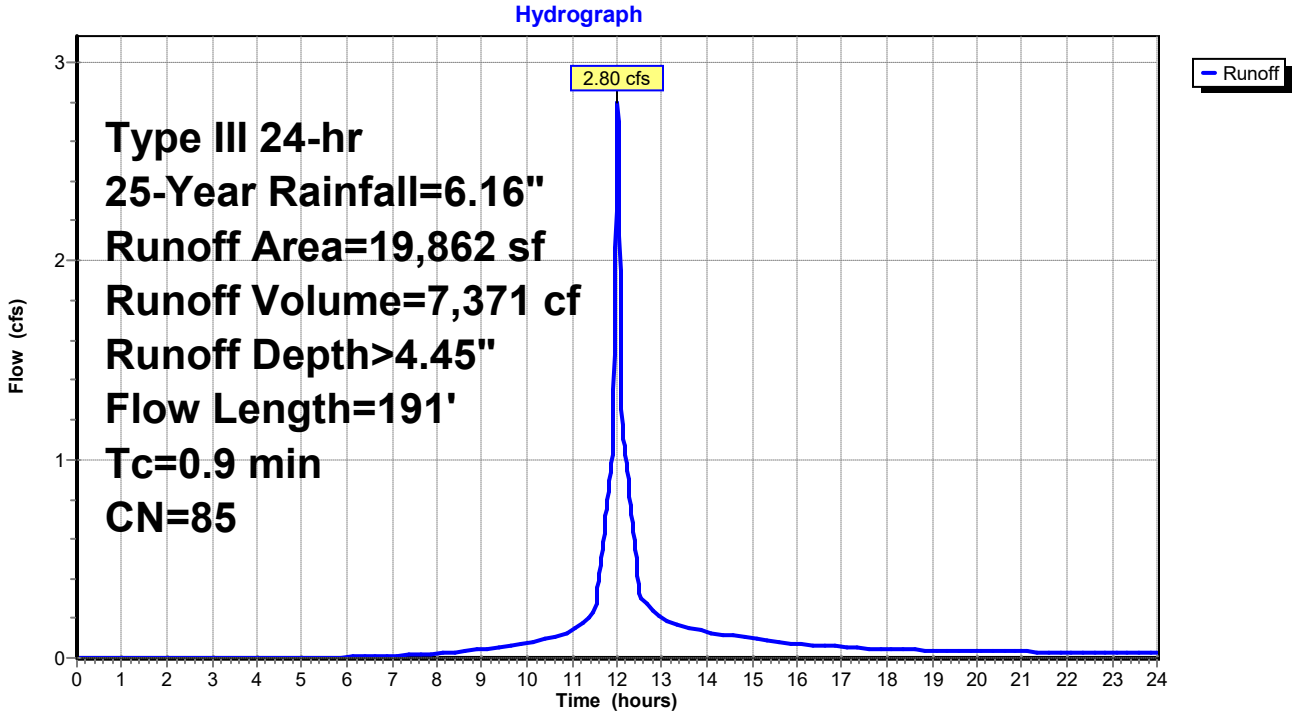
Runoff = 2.80 cfs @ 12.01 hrs, Volume= 7,371 cf, Depth> 4.45"

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

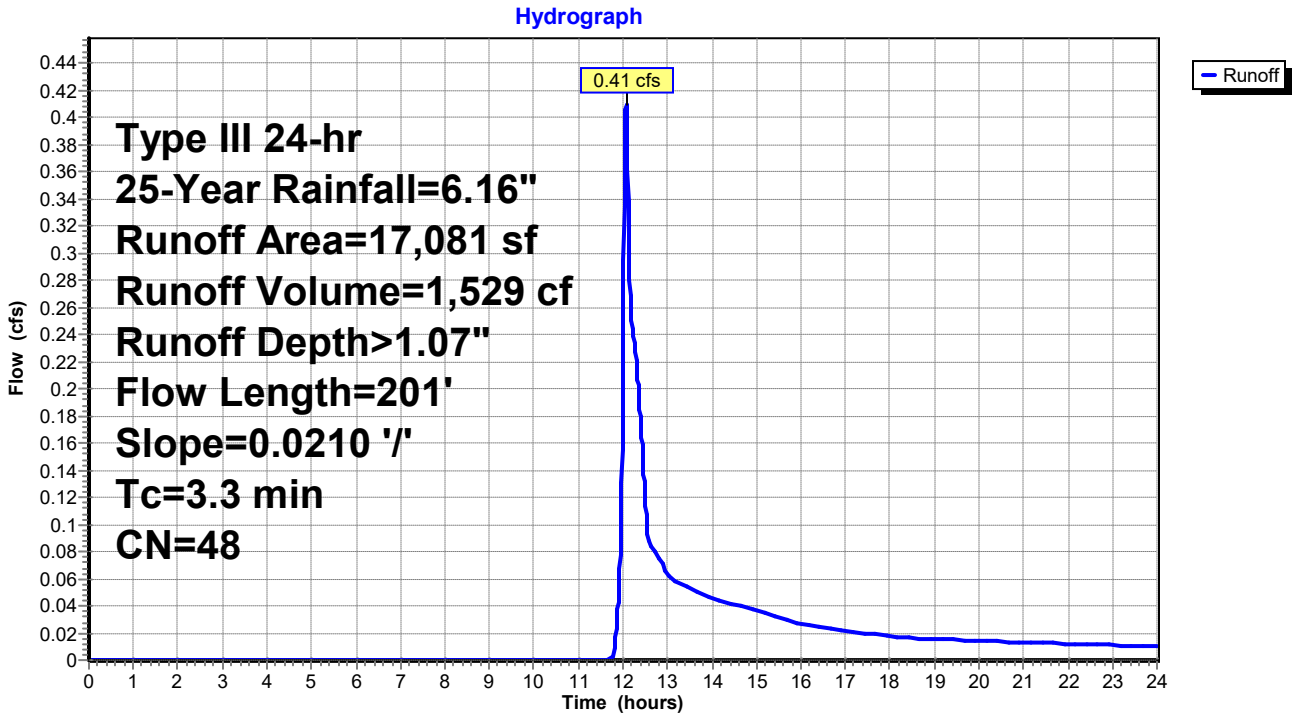
Runoff = 0.41 cfs @ 12.07 hrs, Volume= 1,529 cf, Depth> 1.07"

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

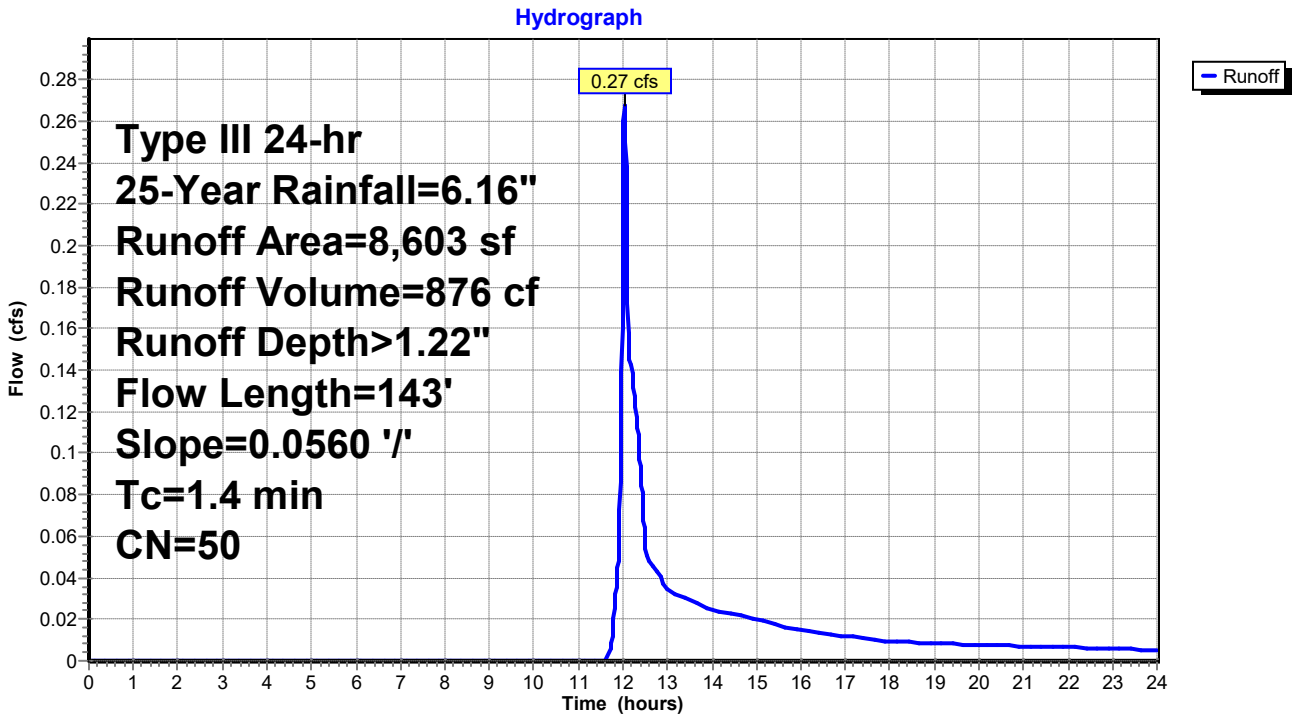
Runoff = 0.27 cfs @ 12.03 hrs, Volume= 876 cf, Depth> 1.22"

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
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% 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

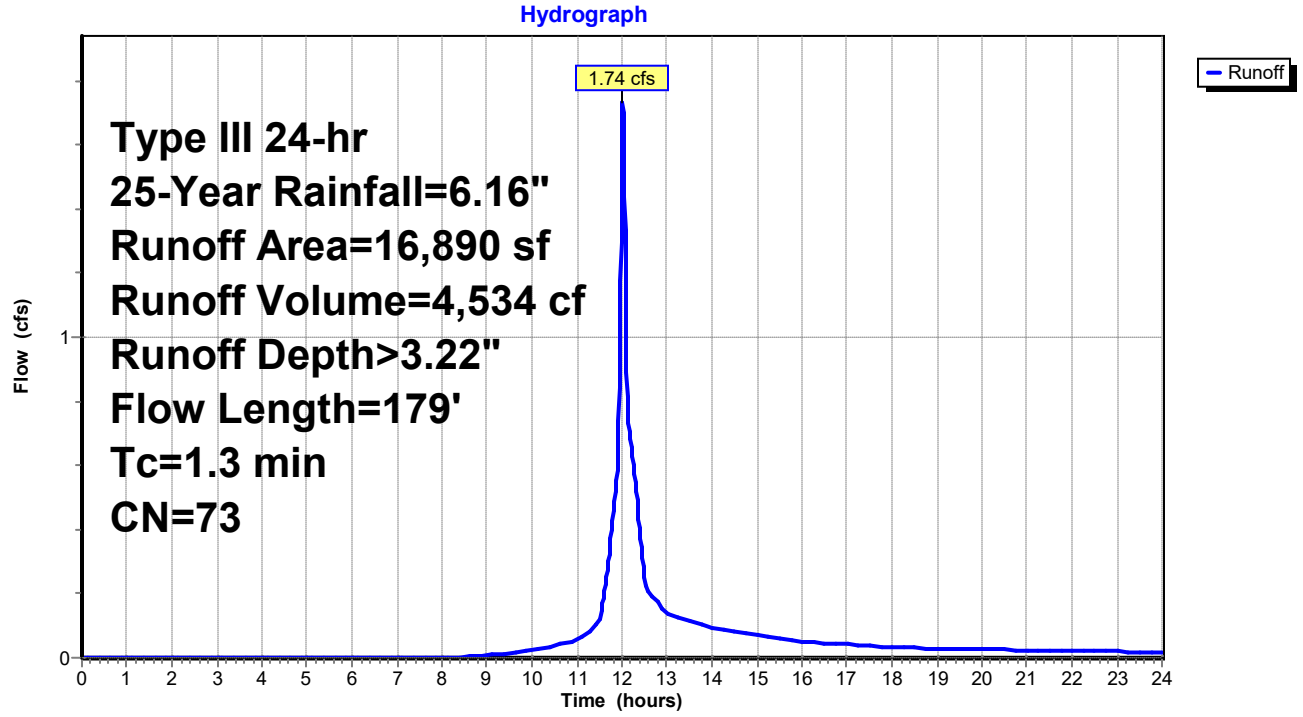
Runoff = 1.74 cfs @ 12.02 hrs, Volume= 4,534 cf, Depth> 3.22"

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
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% 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

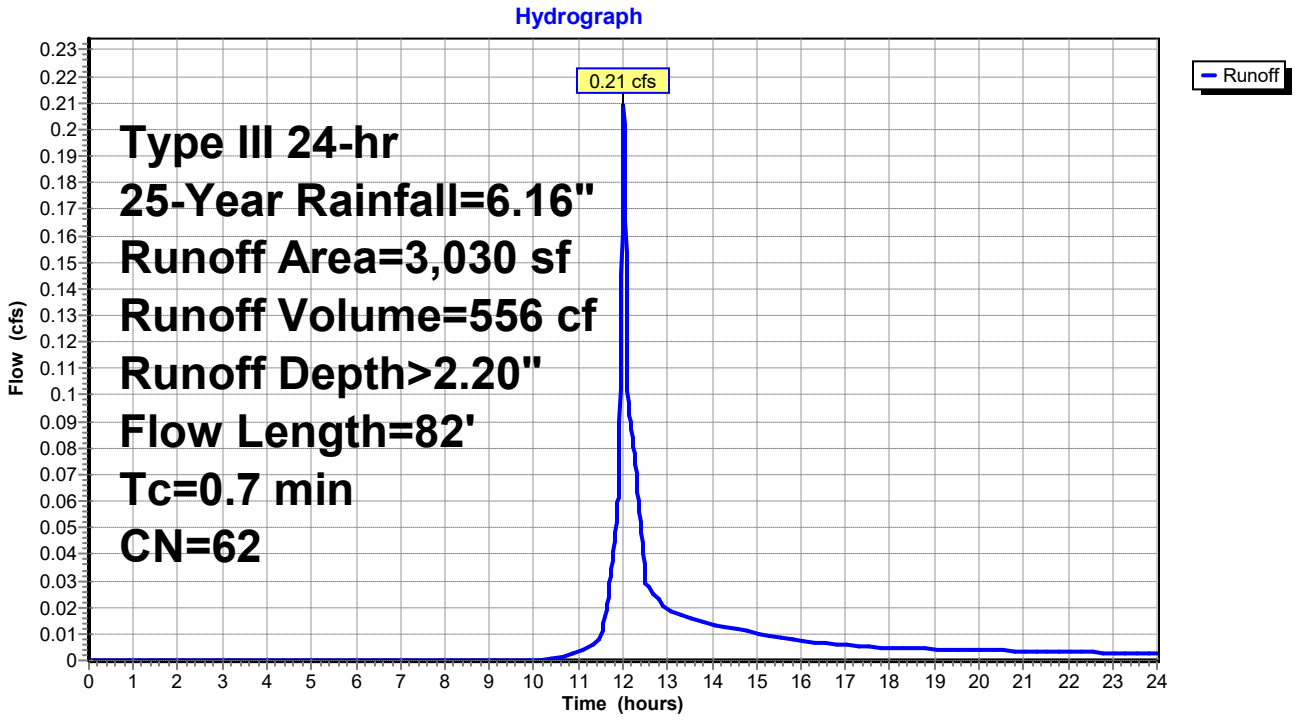
Runoff = 0.21 cfs @ 12.01 hrs, Volume= 556 cf, Depth> 2.20"

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
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% 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

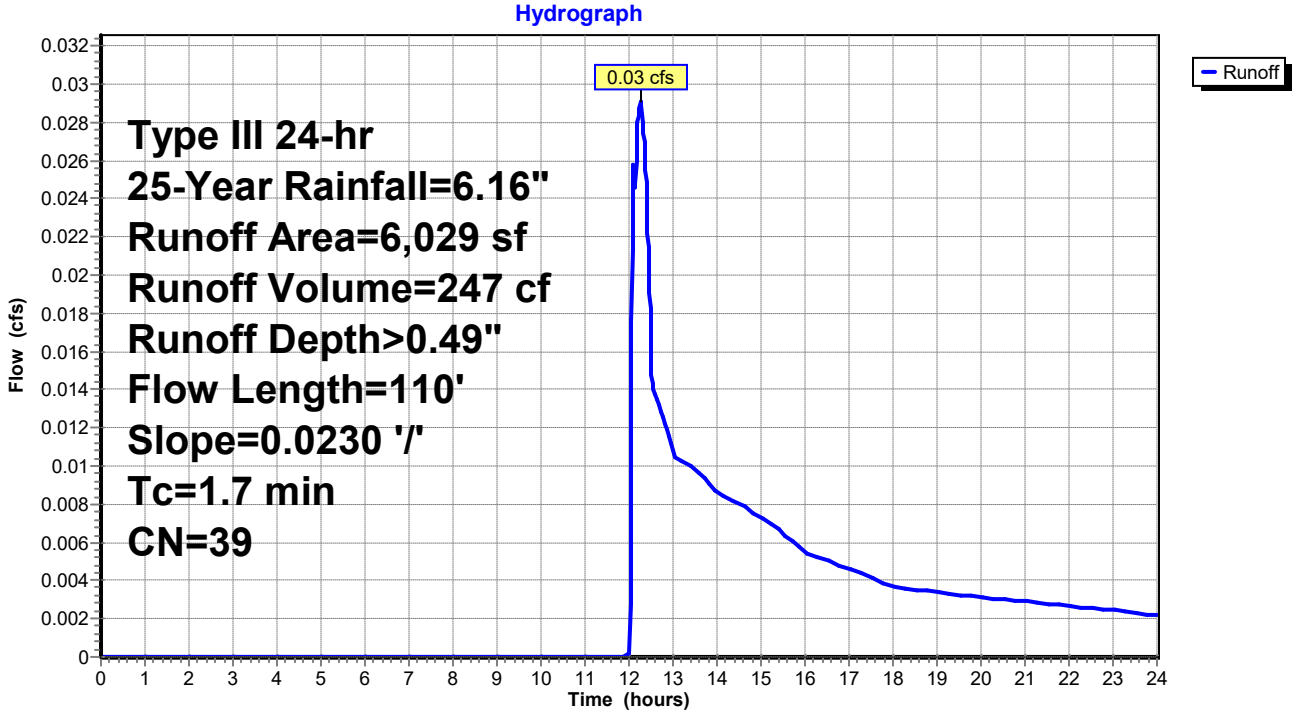
Runoff = 0.03 cfs @ 12.26 hrs, Volume= 247 cf, Depth> 0.49"

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
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious 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

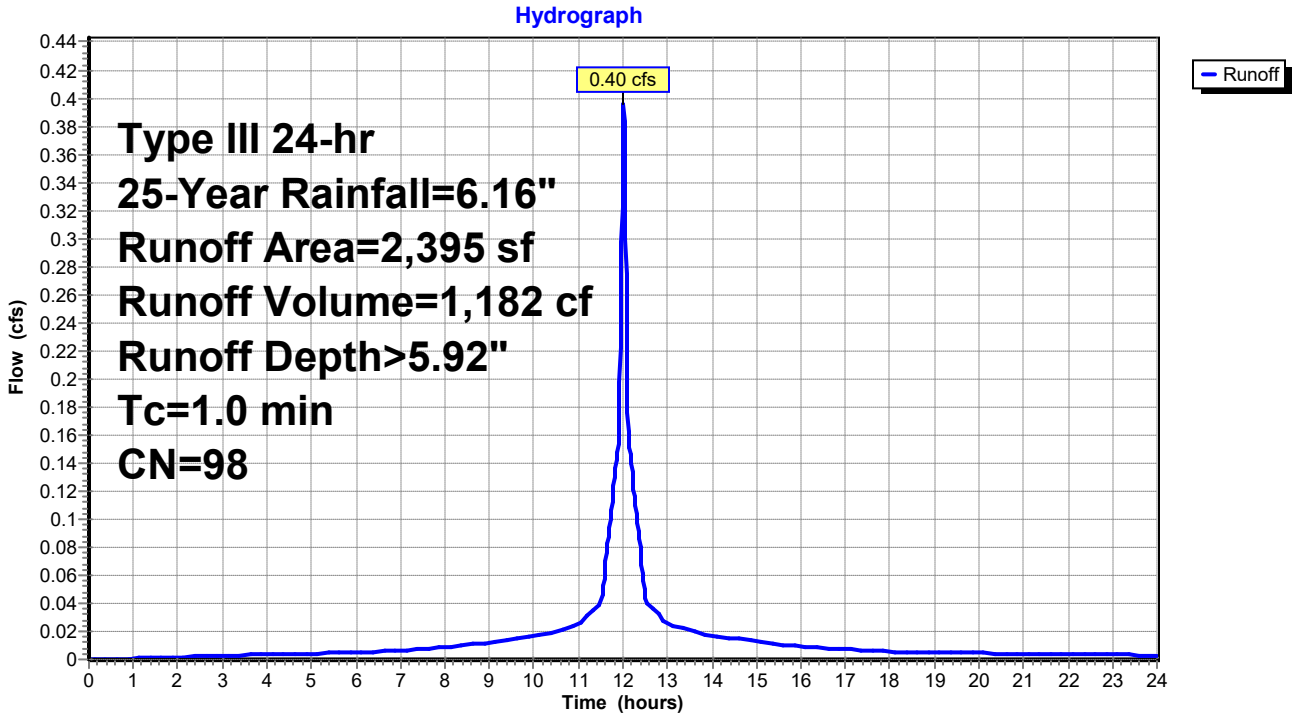
Runoff = 0.40 cfs @ 12.01 hrs, Volume= 1,182 cf, Depth> 5.92"

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
2,395	98	Roofs, HSG A
2,395		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

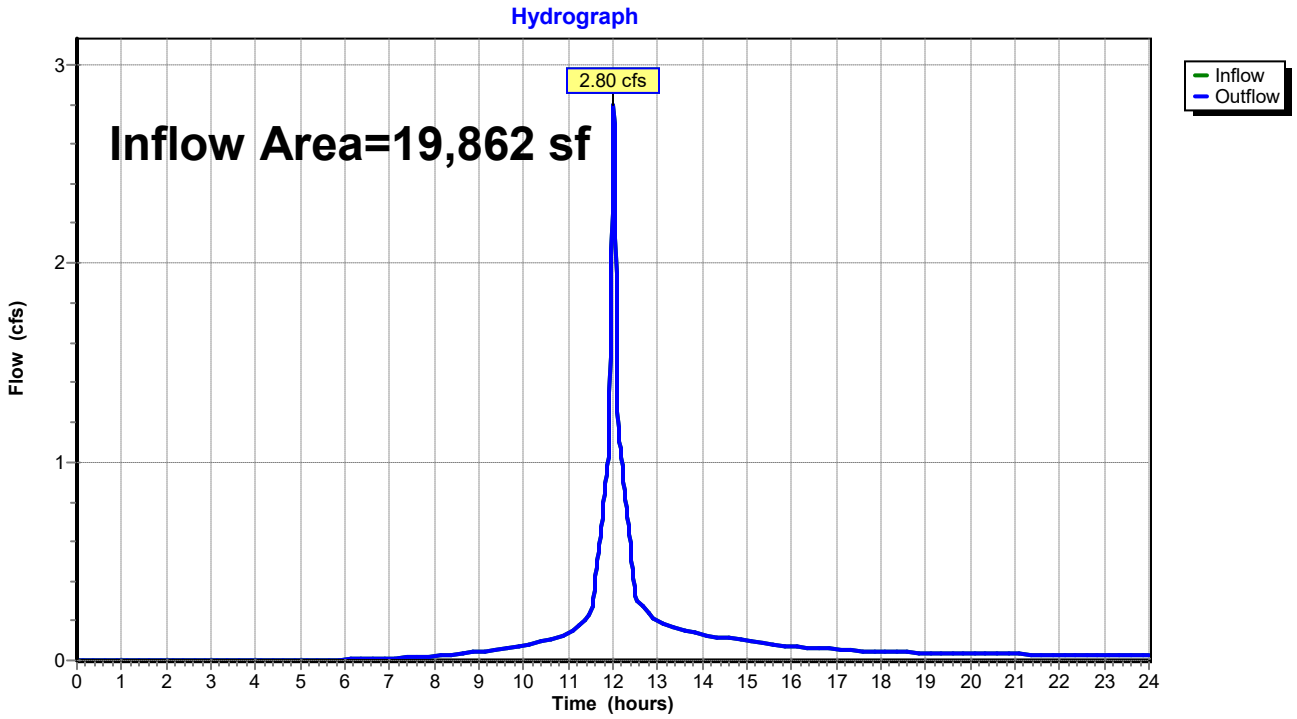


Summary for Reach 1R: RAIL TRAIL

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

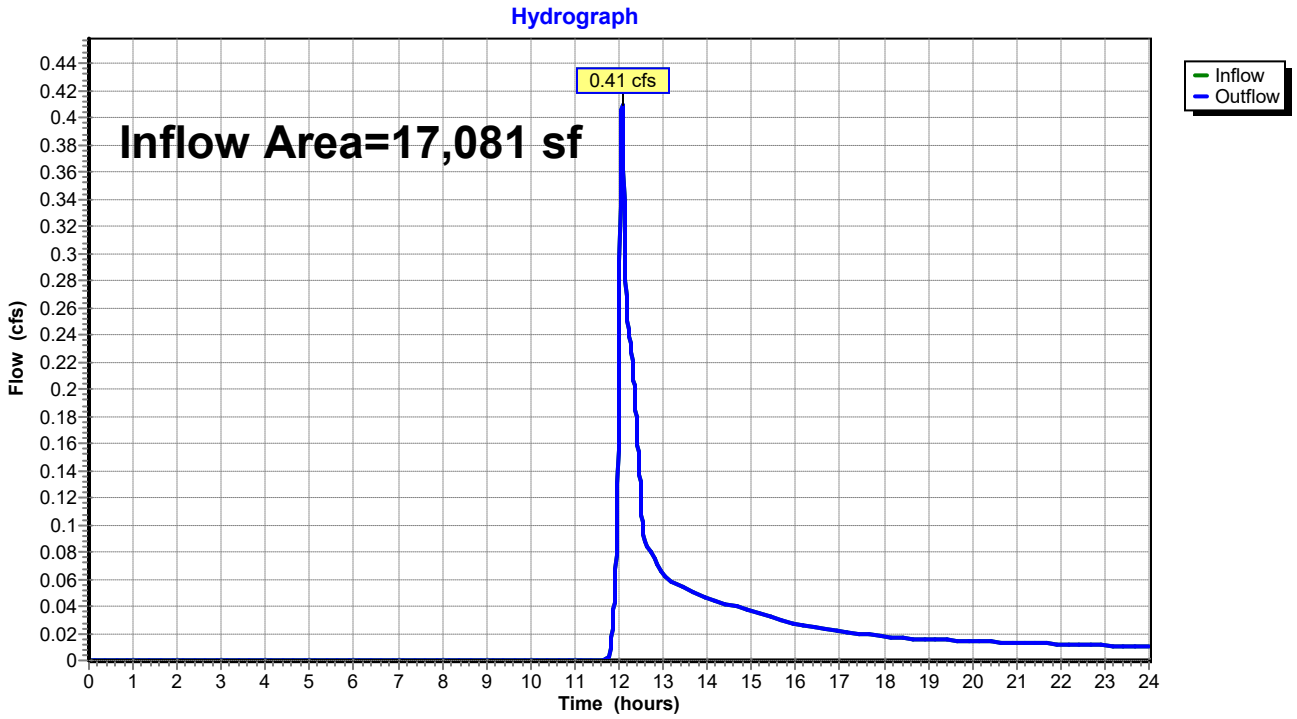


Summary for Reach 2R: EASTERN ABUTTERS

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

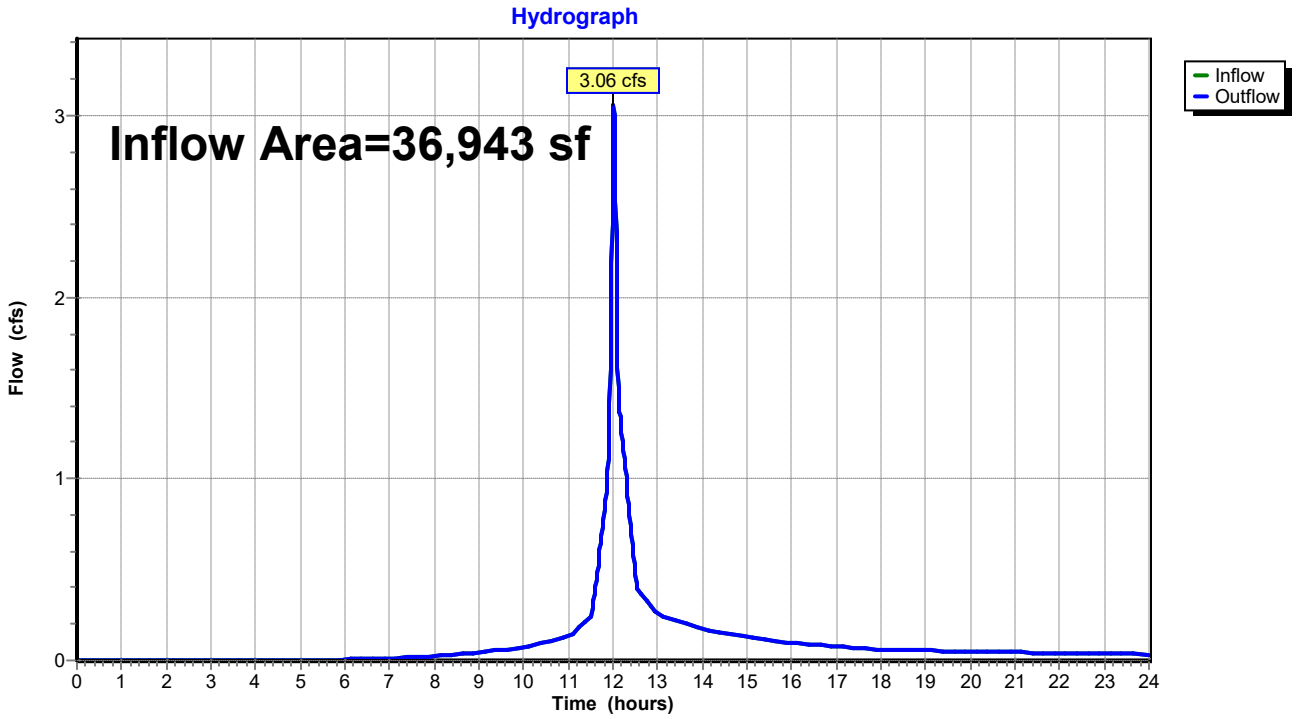


Summary for Reach 3R: TOTAL

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

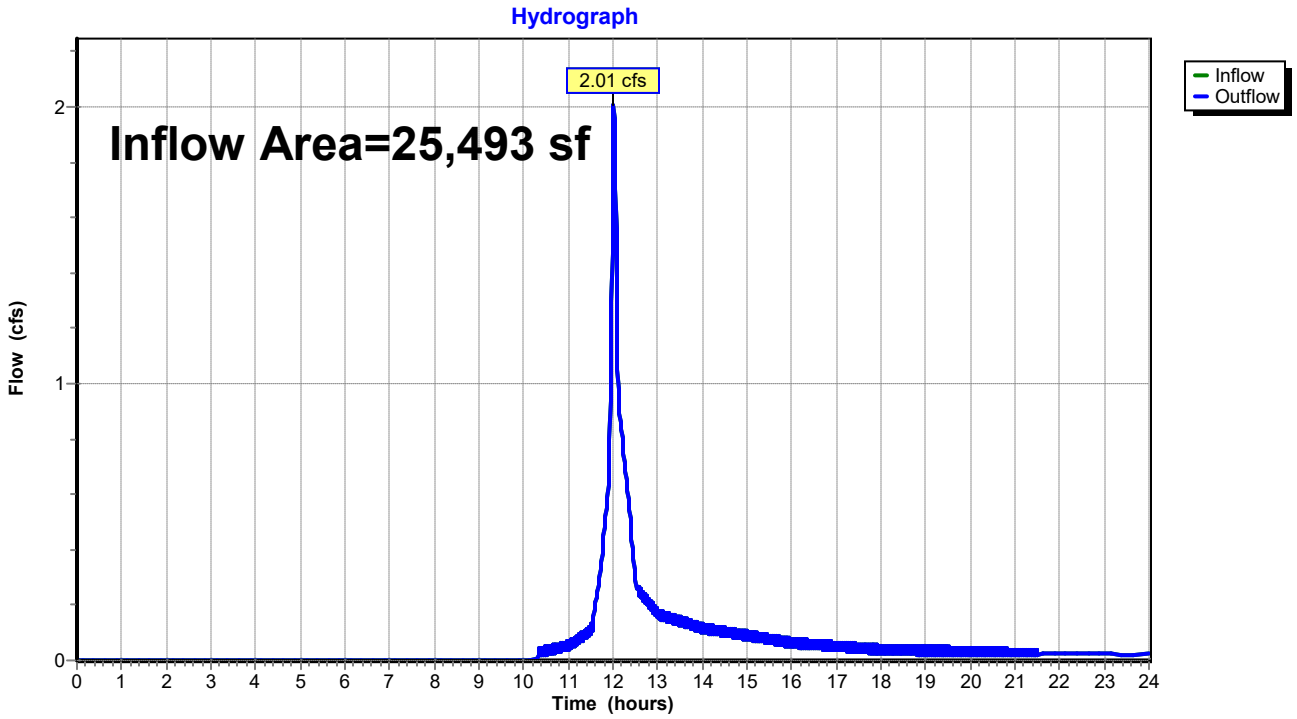


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 2.46" for 25-Year event
Inflow = 2.01 cfs @ 12.02 hrs, Volume= 5,229 cf
Outflow = 2.01 cfs @ 12.02 hrs, Volume= 5,229 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

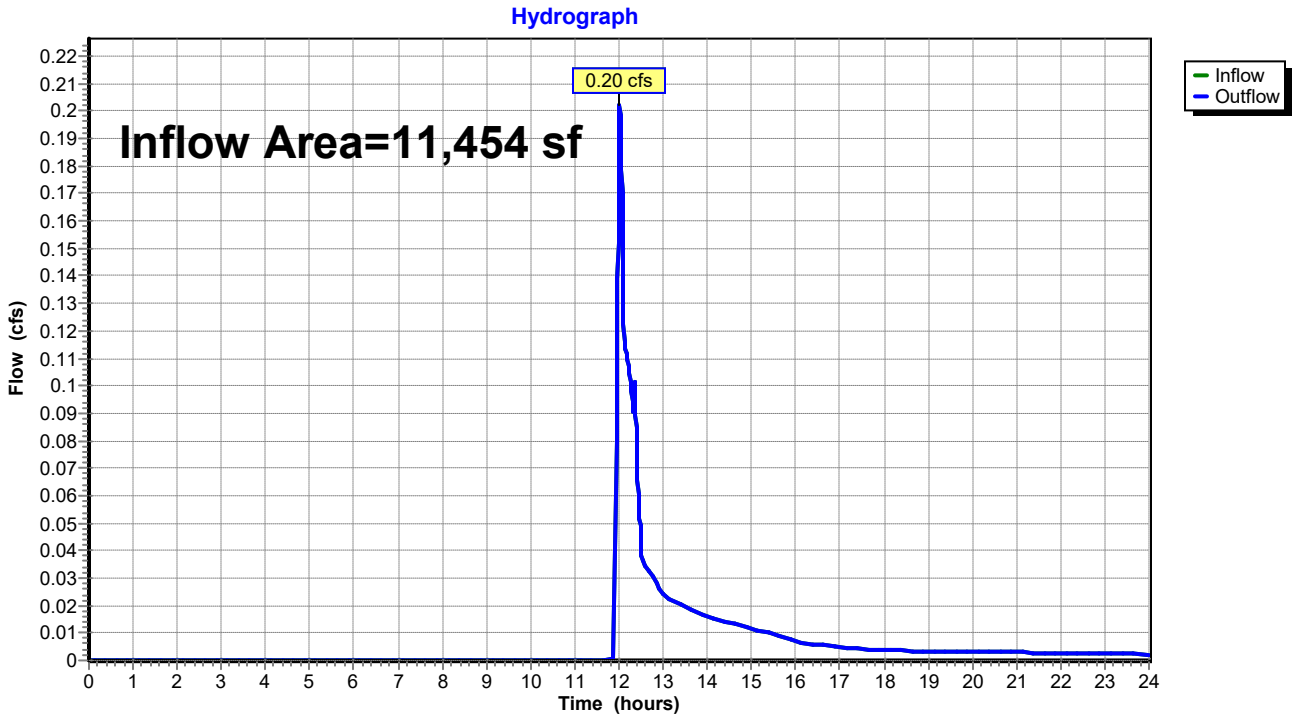


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,454 sf, 30.90% Impervious, Inflow Depth > 0.56" for 25-Year event
Inflow = 0.20 cfs @ 12.02 hrs, Volume= 538 cf
Outflow = 0.20 cfs @ 12.02 hrs, Volume= 538 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

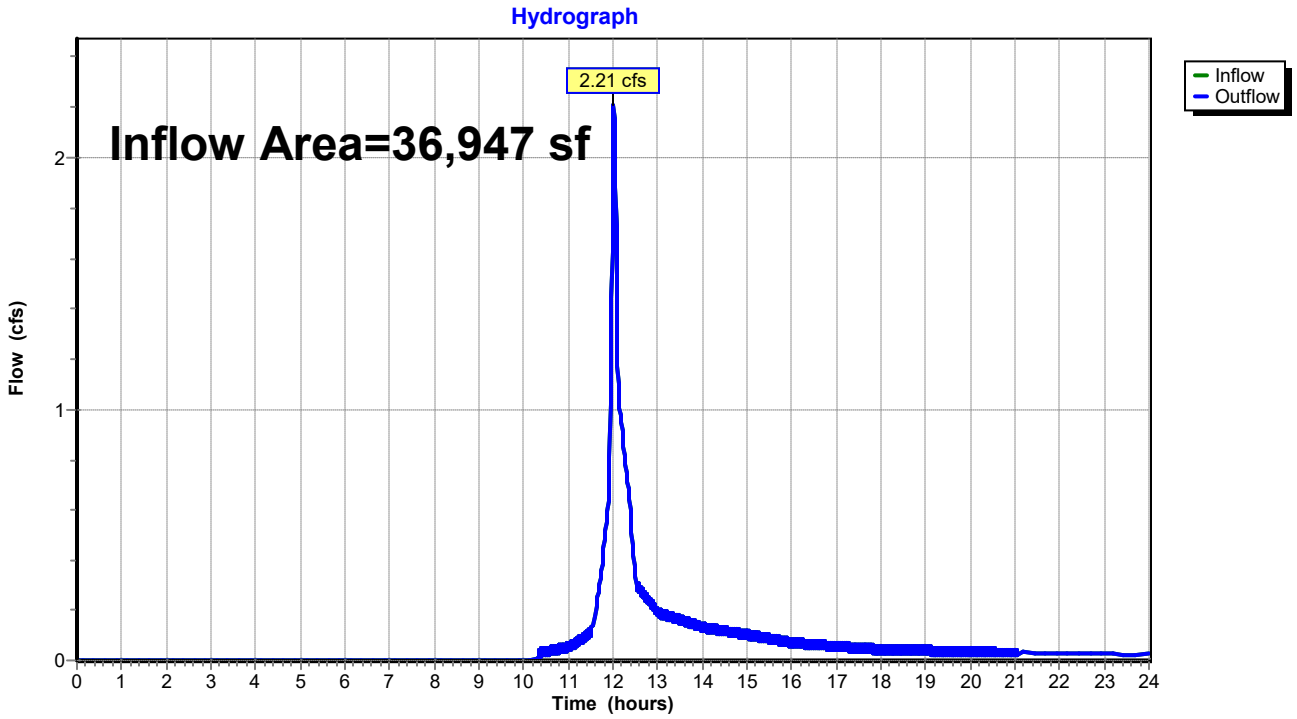


Summary for Reach 30R: TOTAL

Inflow Area = 36,947 sf, 39.52% Impervious, Inflow Depth > 1.87" for 25-Year event
Inflow = 2.21 cfs @ 12.02 hrs, Volume= 5,767 cf
Outflow = 2.21 cfs @ 12.02 hrs, Volume= 5,767 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 = 16,890 sf, 56.04% Impervious, Inflow Depth > 3.22" for 25-Year event
Inflow = 1.74 cfs @ 12.02 hrs, Volume= 4,534 cf
Outflow = 1.75 cfs @ 12.02 hrs, Volume= 4,452 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 10.33 hrs, Volume= 98 cf
Primary = 1.75 cfs @ 12.02 hrs, Volume= 4,354 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.64' @ 12.02 hrs Surf.Area= 150 sf Storage= 82 cf

Plug-Flow detention time= 15.1 min calculated for 4,452 cf (98% of inflow)
Center-of-Mass det. time= 4.5 min (829.9 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	82 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

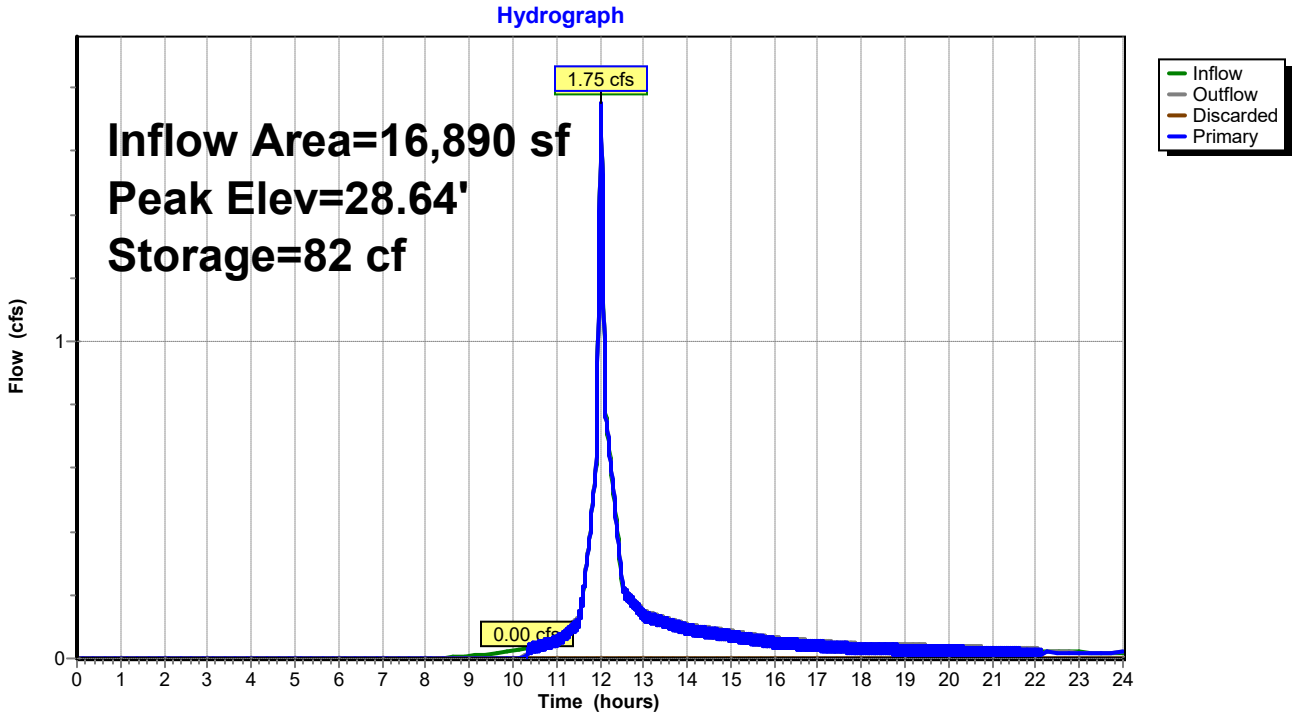
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	95	0	0
28.35	150	82	82

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.34'	**4.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 10.33 hrs HW=28.35' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.74 cfs @ 12.02 hrs HW=28.64' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.74 cfs @ 1.47 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 2.20" for 25-Year event
Inflow = 0.21 cfs @ 12.01 hrs, Volume= 556 cf
Outflow = 0.21 cfs @ 12.02 hrs, Volume= 555 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 11.34 hrs, Volume= 269 cf
Primary = 0.20 cfs @ 12.02 hrs, Volume= 286 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.04' @ 12.02 hrs Surf.Area= 14 sf Storage= 46 cf

Plug-Flow detention time= 41.6 min calculated for 555 cf (100% of inflow)
Center-of-Mass det. time= 41.4 min (892.4 - 851.1)

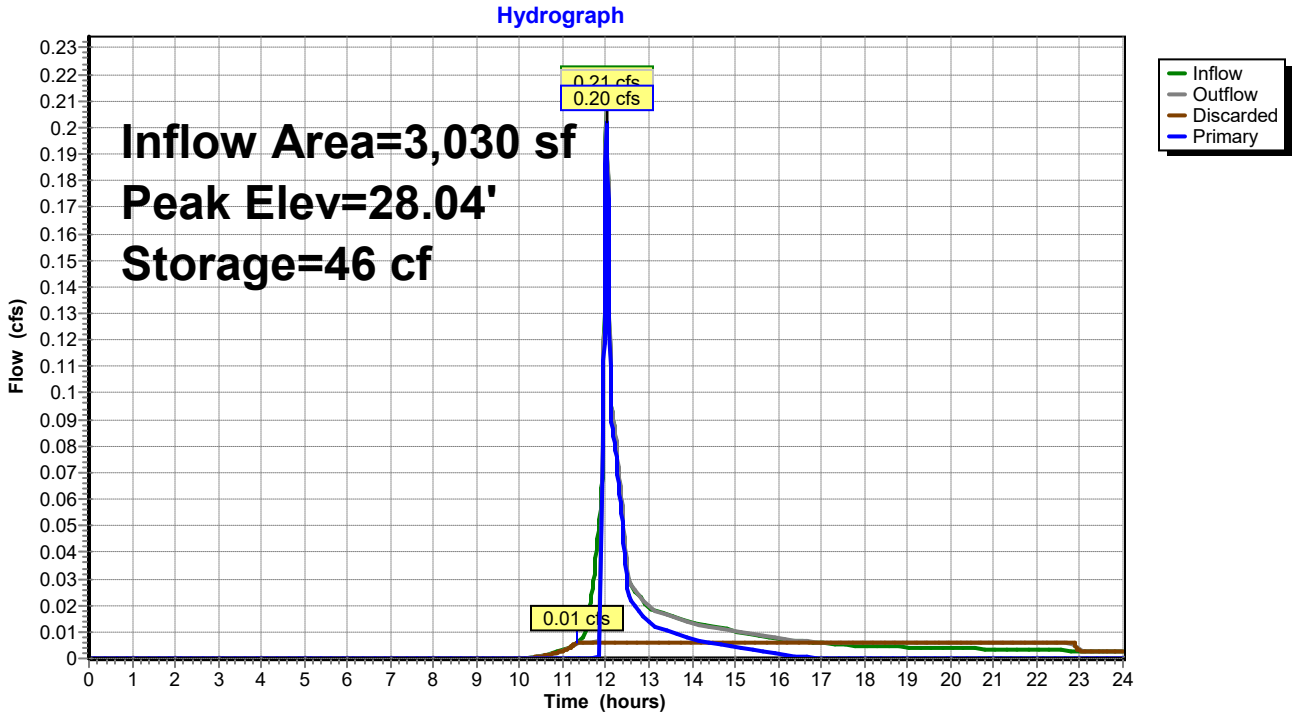
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.34 hrs HW=24.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.19 cfs @ 12.02 hrs HW=28.04' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.12 cfs @ 1.61 fps)
└**3=Orifice/Grate** (Weir Controls 0.08 cfs @ 0.68 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,395 sf,100.00% Impervious, Inflow Depth > 5.92" for 25-Year event
Inflow = 0.40 cfs @ 12.01 hrs, Volume= 1,182 cf
Outflow = 0.09 cfs @ 12.36 hrs, Volume= 1,182 cf, Atten= 78%, Lag= 20.4 min
Discarded = 0.07 cfs @ 11.63 hrs, Volume= 1,177 cf
Primary = 0.02 cfs @ 12.36 hrs, Volume= 4 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 27.00' @ 12.36 hrs Surf.Area= 168 sf Storage= 252 cf

Plug-Flow detention time= 17.0 min calculated for 1,182 cf (100% of inflow)
Center-of-Mass det. time= 17.0 min (757.0 - 740.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 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 3 rows
		419 cf	Total Available Storage

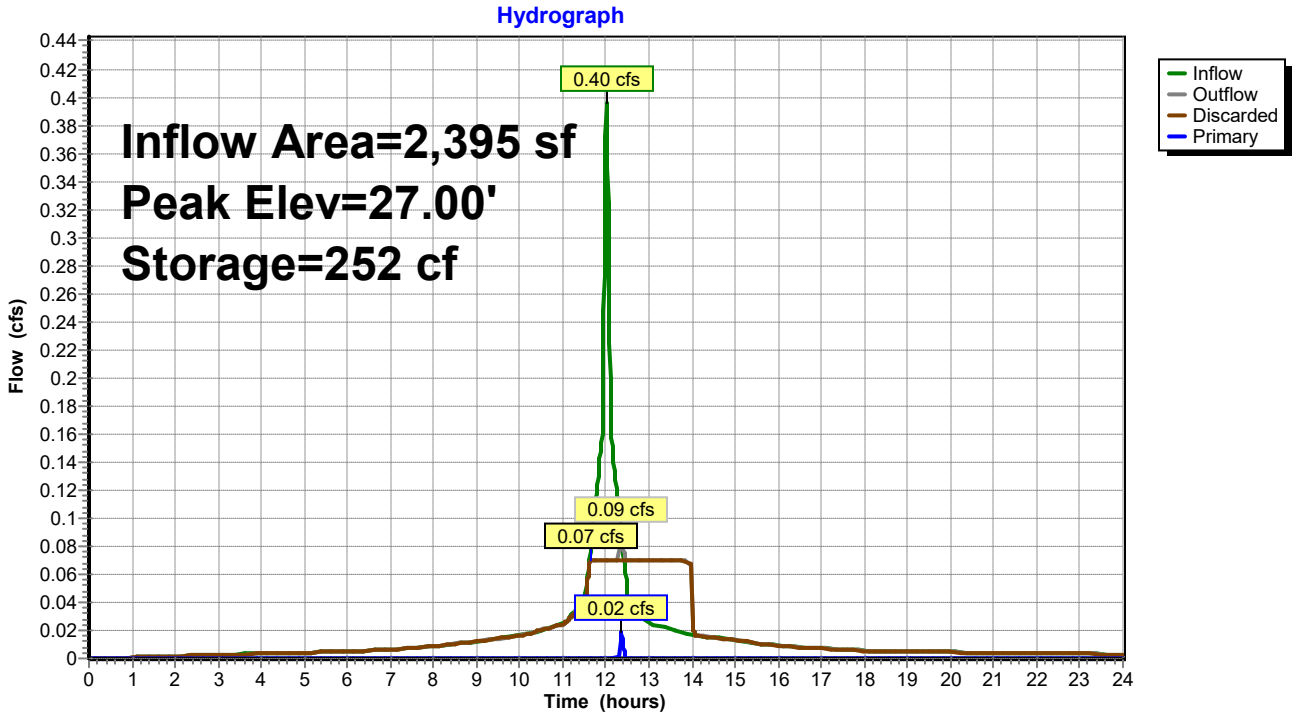
Storage Group A created with Chamber Wizard

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=0.07 cfs @ 11.63 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.02 cfs @ 12.36 hrs HW=27.00' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.02 cfs @ 0.35 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=8,603 sf 18.59% Impervious Runoff Depth>2.84"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.73 cfs 2,038 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>5.65"
Flow Length=179' Tc=1.3 min CN=73 Runoff=3.03 cfs 7,953 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>4.30"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.42 cfs 1,085 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth>1.57"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.22 cfs 791 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,395 sf 100.00% Impervious Runoff Depth>8.70"
Tc=1.0 min CN=98 Runoff=0.58 cfs 1,736 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=3.77 cfs 9,800 cf
Outflow=3.77 cfs 9,800 cf

Reach 20R: EASTERN ABUTTERS Inflow=1.05 cfs 1,753 cf
Outflow=1.05 cfs 1,753 cf

Reach 30R: TOTAL Inflow=4.59 cfs 11,553 cf
Outflow=4.59 cfs 11,553 cf

Pond 20P: RAINGARDEN Peak Elev=28.77' Storage=82 cf Inflow=3.03 cfs 7,953 cf
Discarded=0.00 cfs 108 cf Primary=3.04 cfs 7,763 cf Outflow=3.04 cfs 7,871 cf

Pond 30P: DRYWELL Peak Elev=28.09' Storage=47 cf Inflow=0.42 cfs 1,085 cf
Discarded=0.01 cfs 309 cf Primary=0.42 cfs 743 cf Outflow=0.42 cfs 1,052 cf

Pond 42P: CULTEC Peak Elev=27.10' Storage=263 cf Inflow=0.58 cfs 1,736 cf
Discarded=0.07 cfs 1,516 cf Primary=0.46 cfs 220 cf Outflow=0.53 cfs 1,736 cf

Summary for Subcatchment 1S: NW AREA

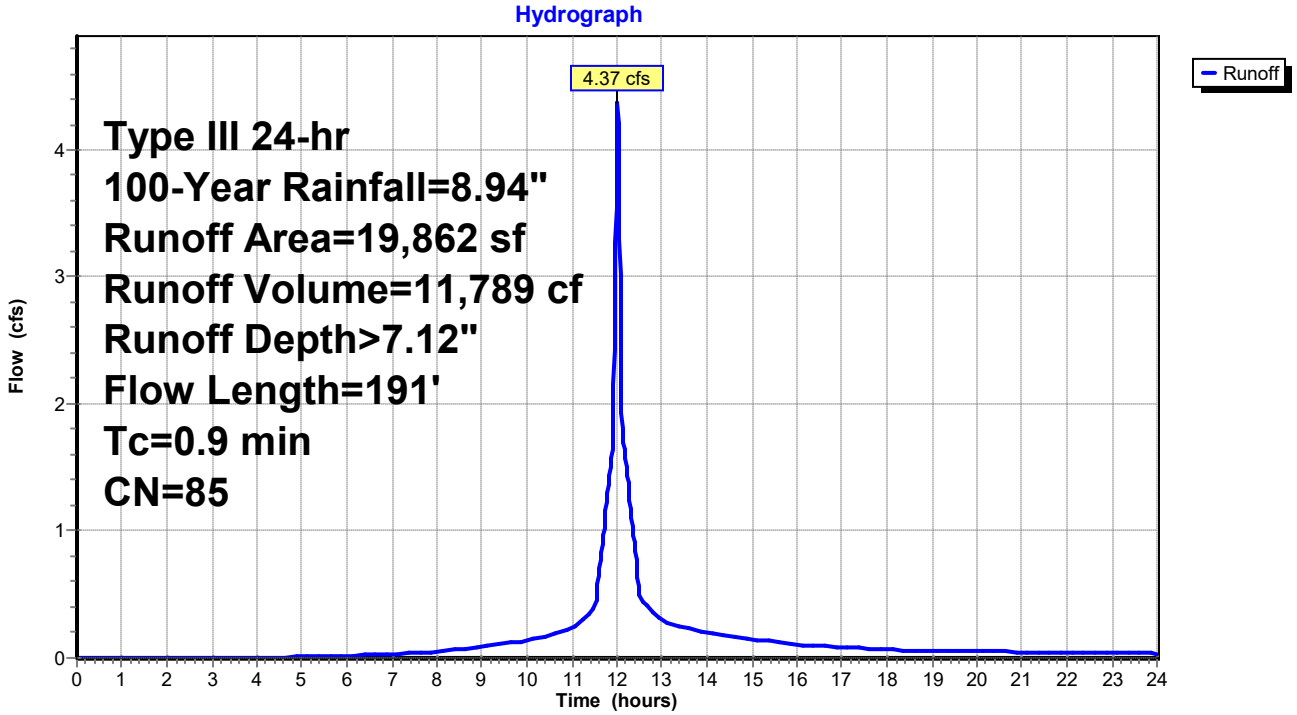
Runoff = 4.37 cfs @ 12.01 hrs, Volume= 11,789 cf, Depth> 7.12"

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

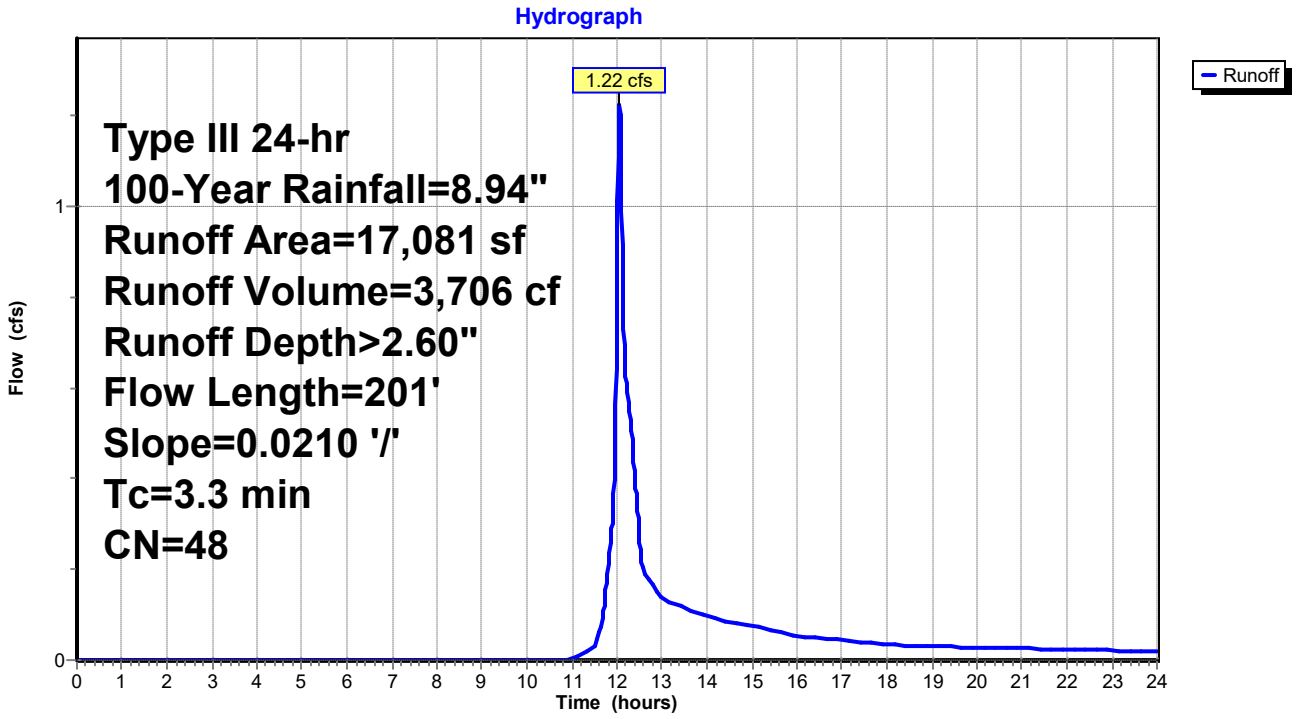
Runoff = 1.22 cfs @ 12.06 hrs, Volume= 3,706 cf, Depth> 2.60"

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

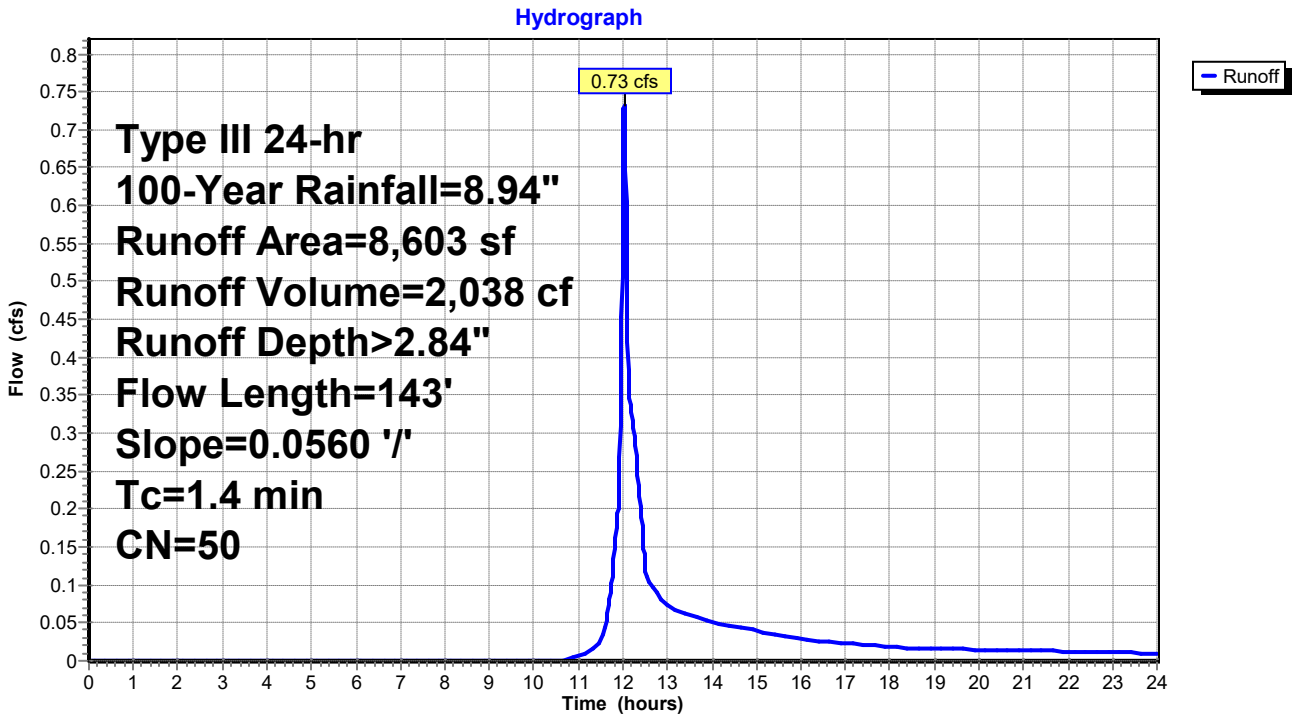
Runoff = 0.73 cfs @ 12.03 hrs, Volume= 2,038 cf, Depth> 2.84"

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
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% 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

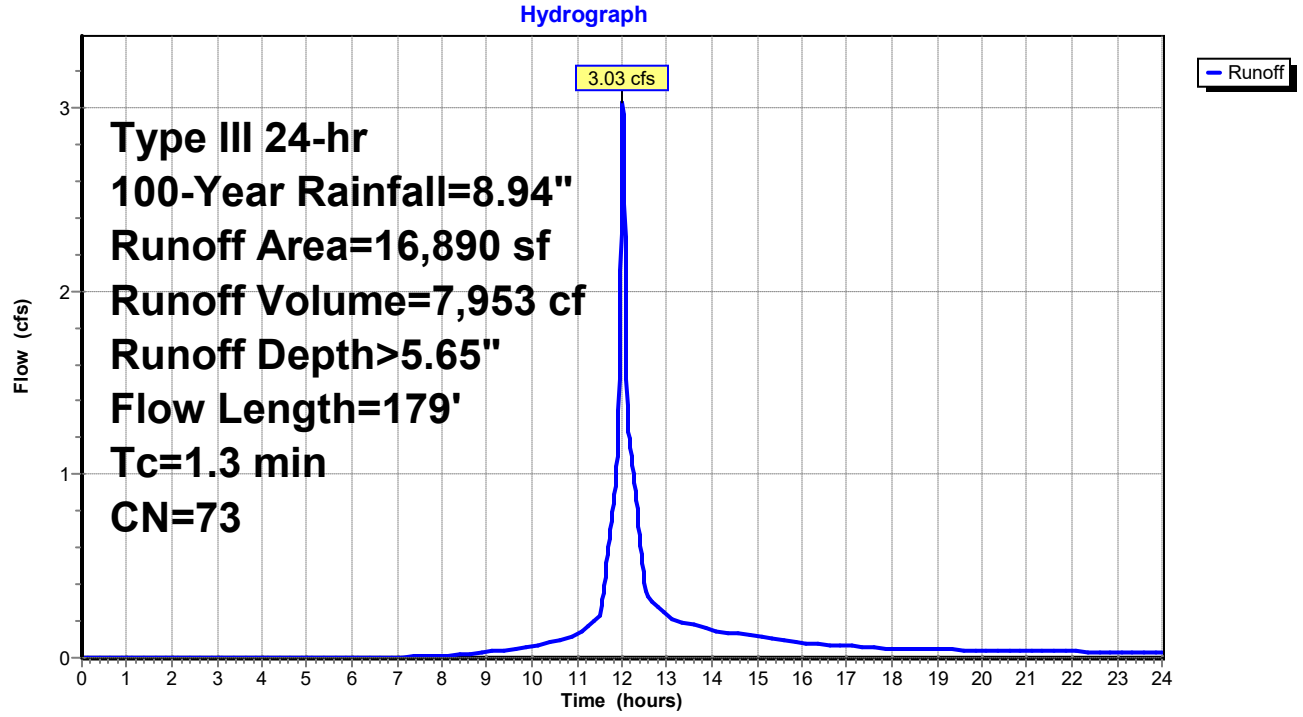
Runoff = 3.03 cfs @ 12.02 hrs, Volume= 7,953 cf, Depth> 5.65"

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
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% 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

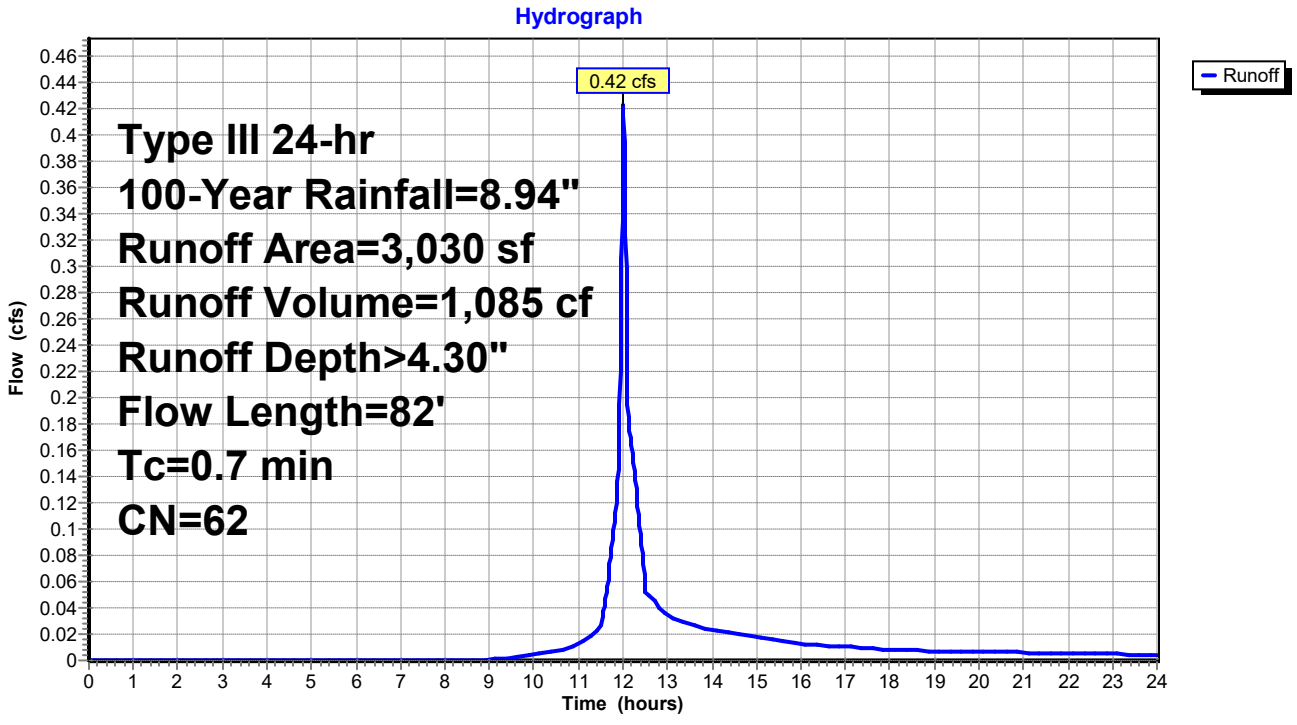
Runoff = 0.42 cfs @ 12.01 hrs, Volume= 1,085 cf, Depth> 4.30"

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
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% 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

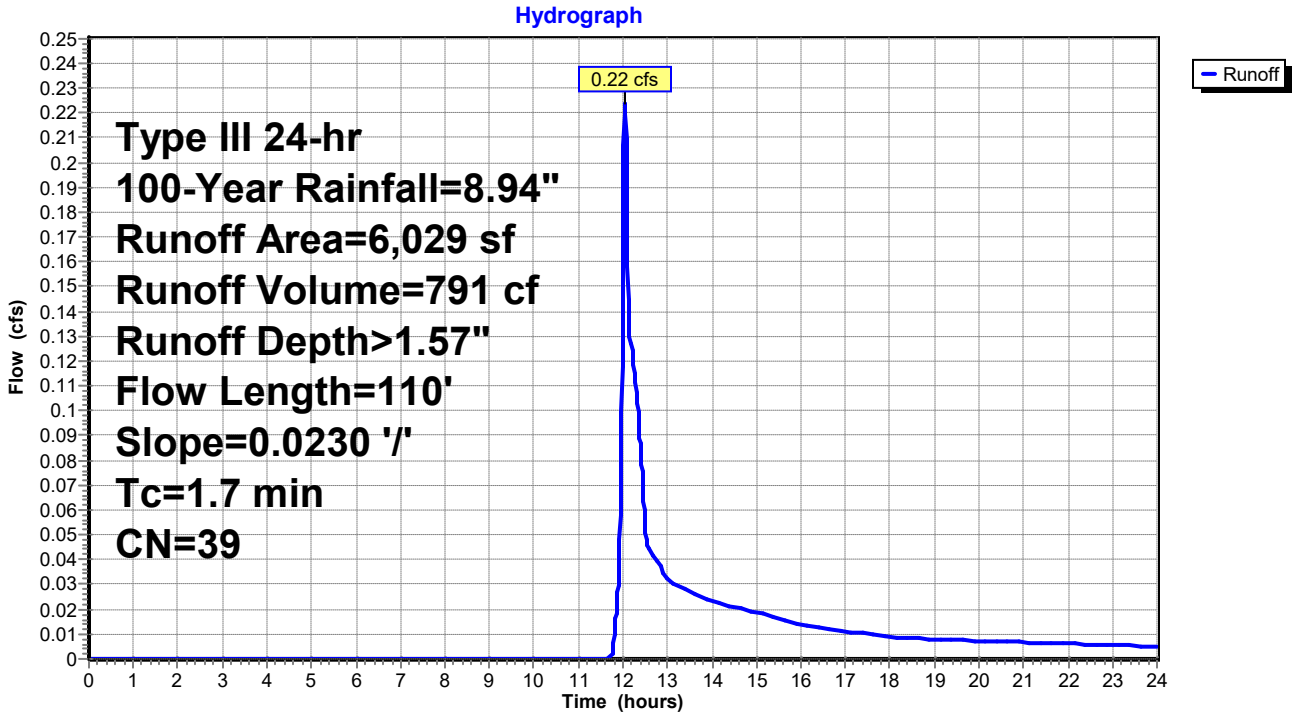
Runoff = 0.22 cfs @ 12.04 hrs, Volume= 791 cf, Depth> 1.57"

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
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious 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

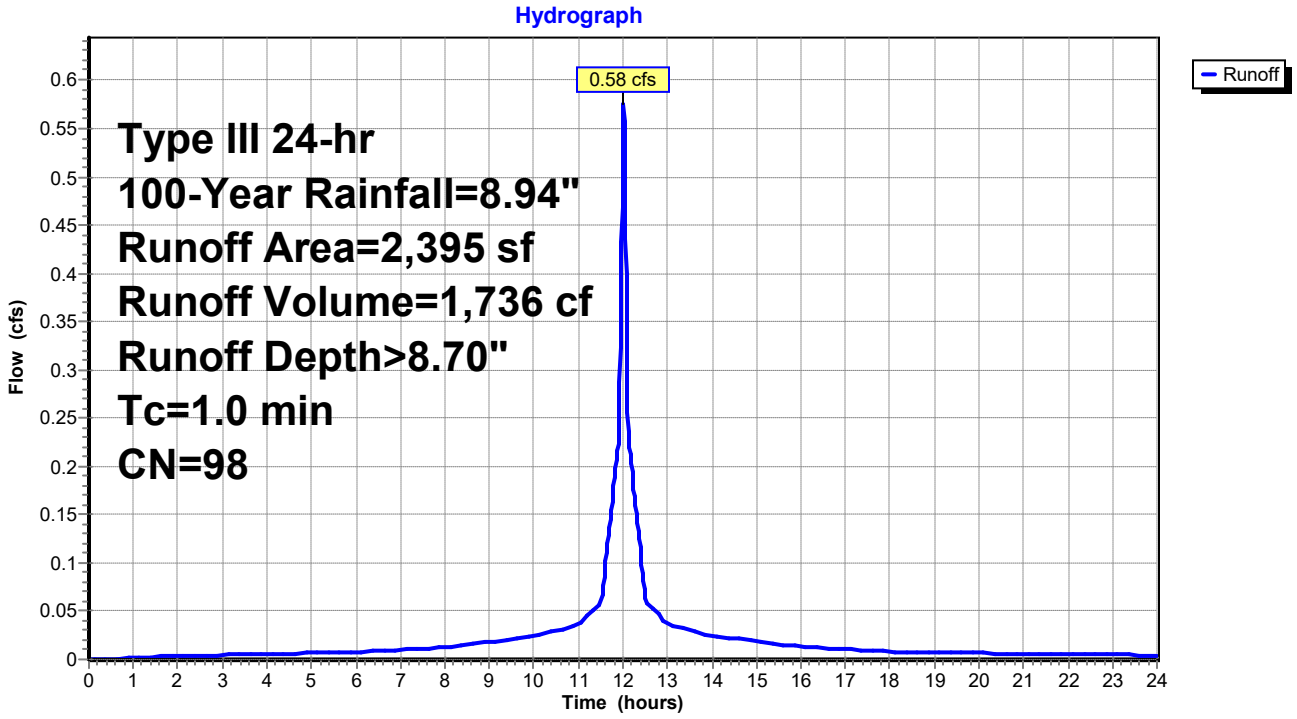
Runoff = 0.58 cfs @ 12.01 hrs, Volume= 1,736 cf, Depth> 8.70"

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
2,395	98	Roofs, HSG A
2,395		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

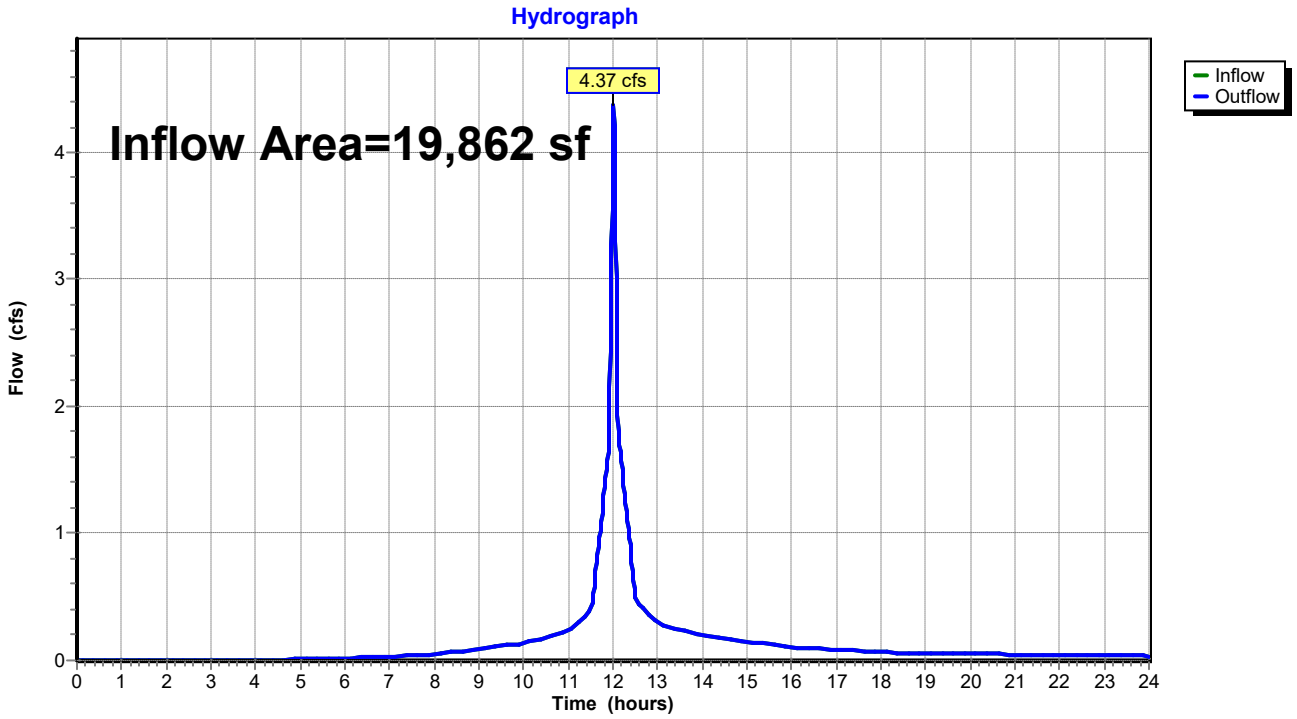


Summary for Reach 1R: RAIL TRAIL

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

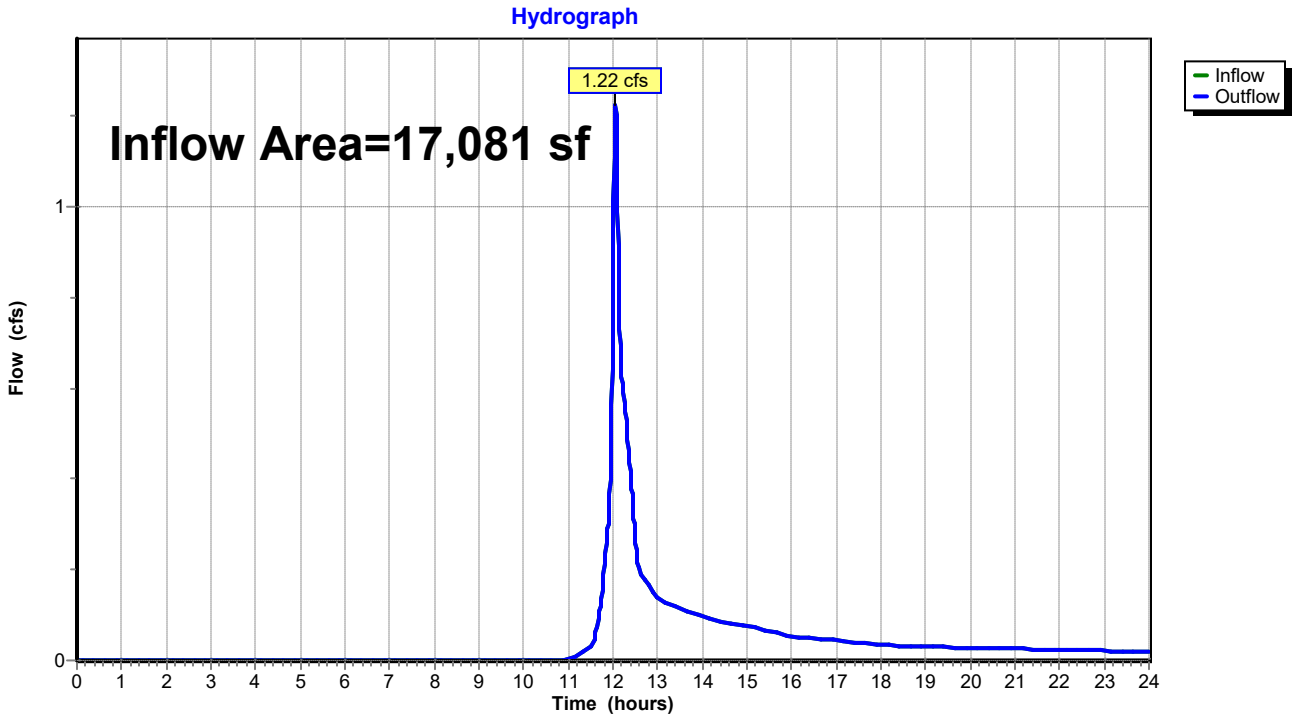


Summary for Reach 2R: EASTERN ABUTTERS

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

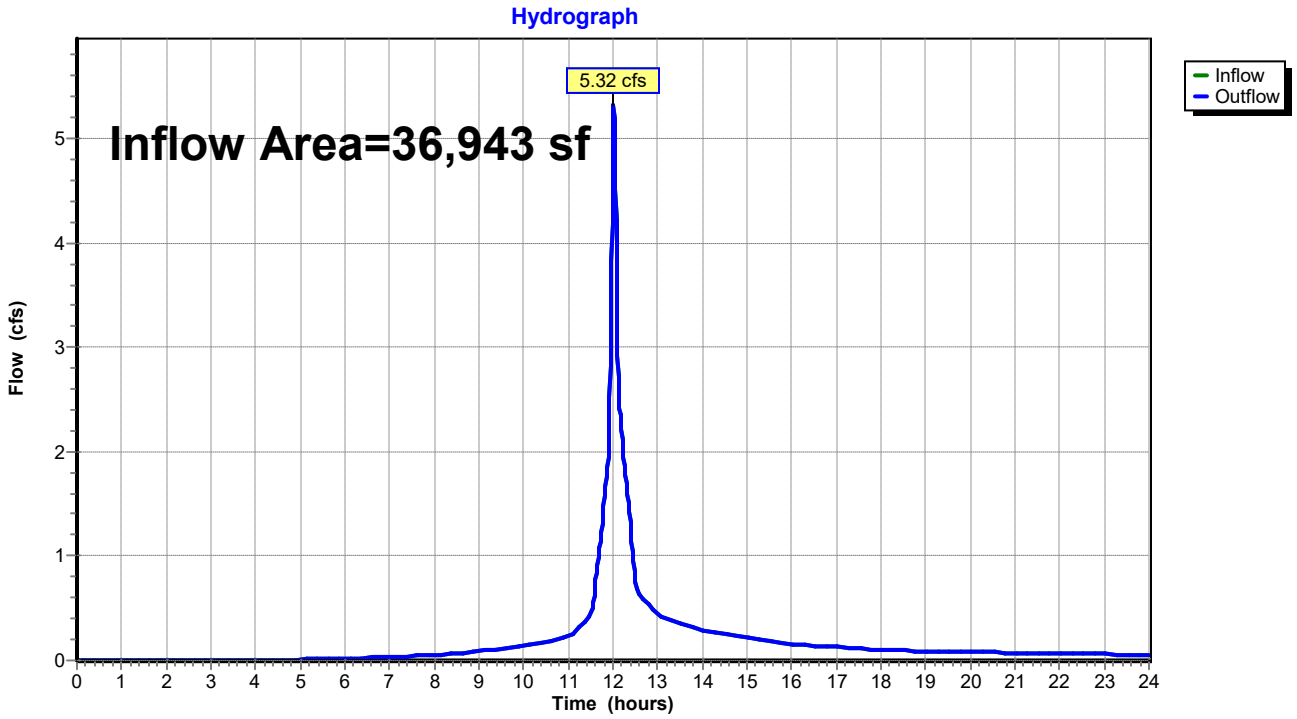


Summary for Reach 3R: TOTAL

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

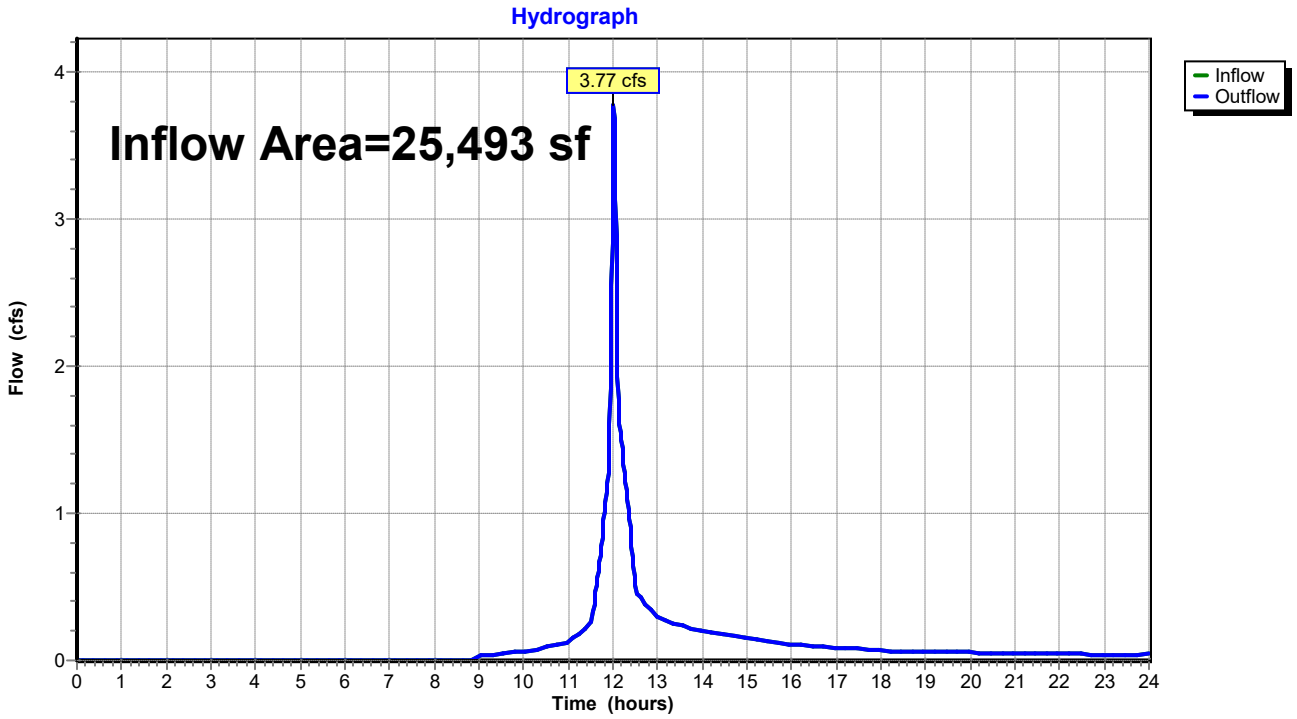


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 4.61" for 100-Year event
Inflow = 3.77 cfs @ 12.02 hrs, Volume= 9,800 cf
Outflow = 3.77 cfs @ 12.02 hrs, Volume= 9,800 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

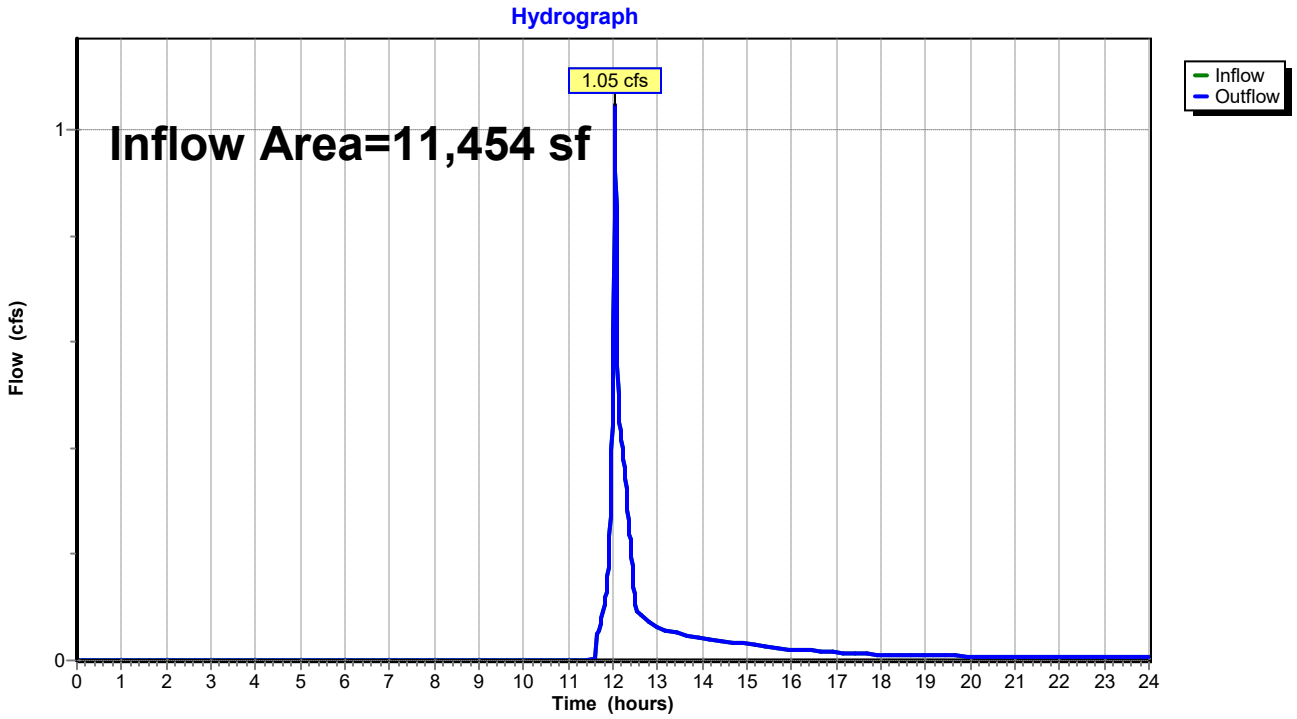


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,454 sf, 30.90% Impervious, Inflow Depth > 1.84" for 100-Year event
Inflow = 1.05 cfs @ 12.04 hrs, Volume= 1,753 cf
Outflow = 1.05 cfs @ 12.04 hrs, Volume= 1,753 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

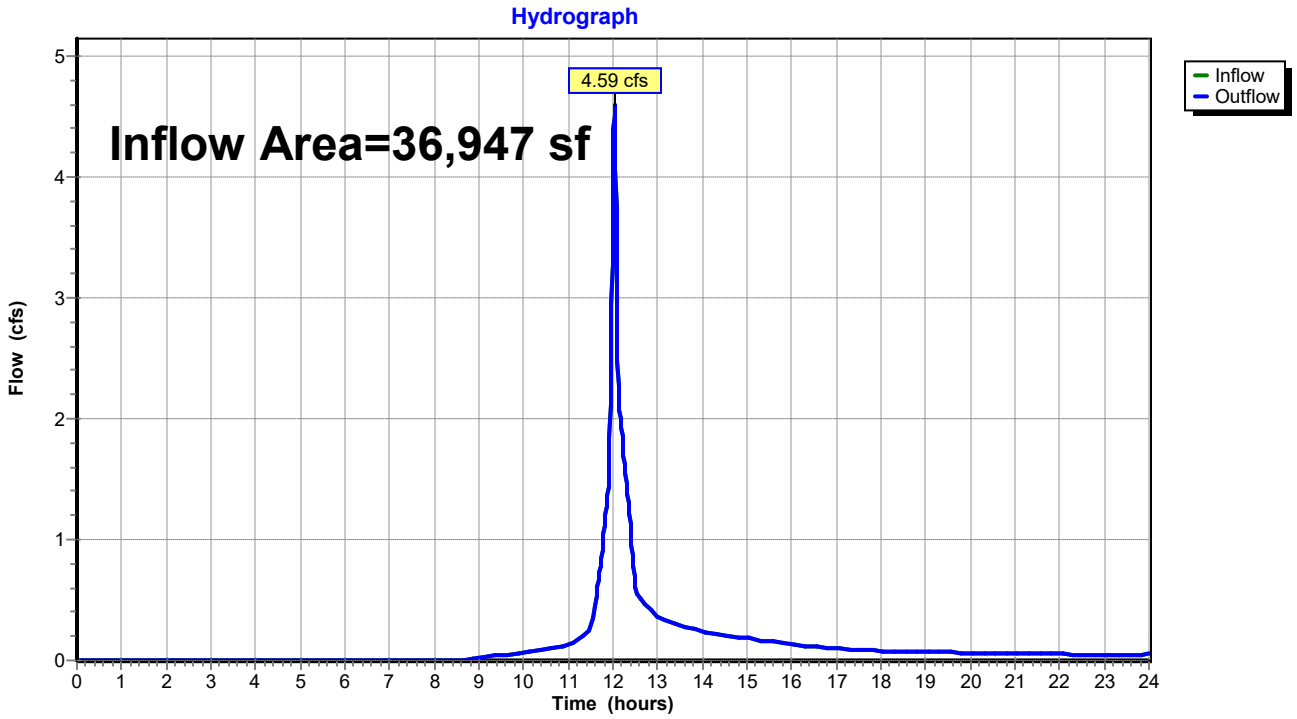


Summary for Reach 30R: TOTAL

Inflow Area = 36,947 sf, 39.52% Impervious, Inflow Depth > 3.75" for 100-Year event
Inflow = 4.59 cfs @ 12.04 hrs, Volume= 11,553 cf
Outflow = 4.59 cfs @ 12.04 hrs, Volume= 11,553 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 = 16,890 sf, 56.04% Impervious, Inflow Depth > 5.65" for 100-Year event
Inflow = 3.03 cfs @ 12.02 hrs, Volume= 7,953 cf
Outflow = 3.04 cfs @ 12.02 hrs, Volume= 7,871 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 8.92 hrs, Volume= 108 cf
Primary = 3.04 cfs @ 12.02 hrs, Volume= 7,763 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.77' @ 12.02 hrs Surf.Area= 150 sf Storage= 82 cf

Plug-Flow detention time= 9.6 min calculated for 7,871 cf (99% of inflow)
Center-of-Mass det. time= 3.3 min (812.6 - 809.4)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	82 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

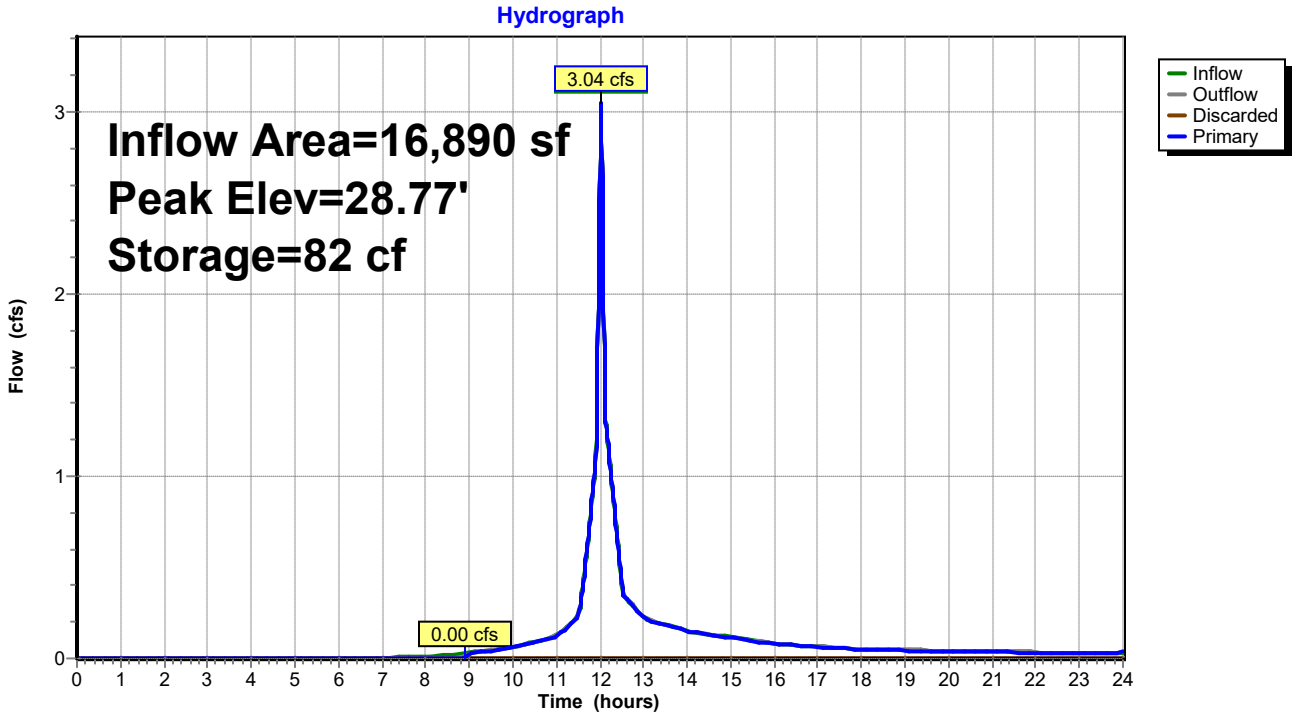
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.68	95	0	0
28.35	150	82	82

Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**0.520 in/hr Exfiltration over Surface area**
#2	Primary	28.34'	**4.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 8.92 hrs HW=28.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=3.04 cfs @ 12.02 hrs HW=28.77' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 3.04 cfs @ 1.78 fps)

Pond 20P: RAINGARDEN



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 4.30" for 100-Year event
Inflow = 0.42 cfs @ 12.01 hrs, Volume= 1,085 cf
Outflow = 0.42 cfs @ 12.01 hrs, Volume= 1,052 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 10.34 hrs, Volume= 309 cf
Primary = 0.42 cfs @ 12.01 hrs, Volume= 743 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 28.09' @ 12.01 hrs Surf.Area= 14 sf Storage= 47 cf

Plug-Flow detention time= 29.3 min calculated for 1,052 cf (97% of inflow)
Center-of-Mass det. time= 11.8 min (843.0 - 831.3)

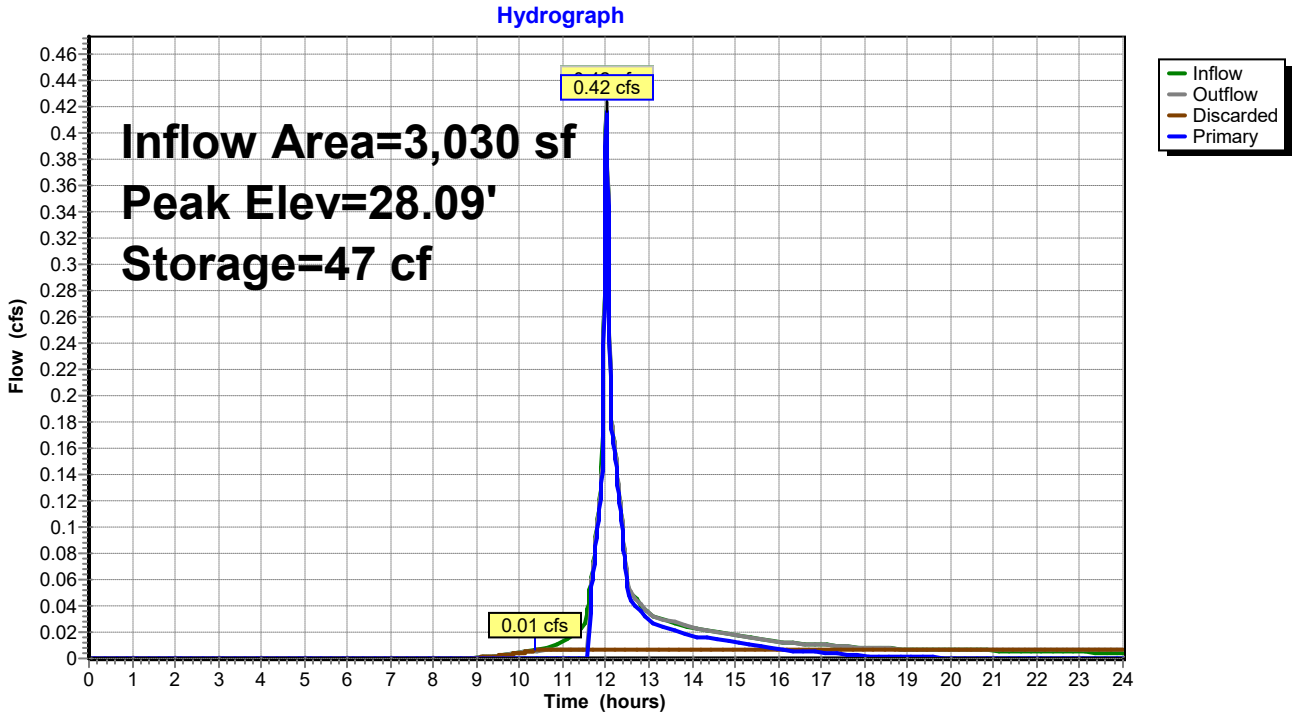
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**18.000 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 10.34 hrs HW=24.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.41 cfs @ 12.01 hrs HW=28.09' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 1.78 fps)
└**3=Orifice/Grate** (Weir Controls 0.24 cfs @ 1.00 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,395 sf,100.00% Impervious, Inflow Depth > 8.70" for 100-Year event
Inflow = 0.58 cfs @ 12.01 hrs, Volume= 1,736 cf
Outflow = 0.53 cfs @ 12.04 hrs, Volume= 1,736 cf, Atten= 8%, Lag= 1.8 min
Discarded = 0.07 cfs @ 11.56 hrs, Volume= 1,516 cf
Primary = 0.46 cfs @ 12.04 hrs, Volume= 220 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 27.10' @ 12.04 hrs Surf.Area= 168 sf Storage= 263 cf

Plug-Flow detention time= 15.3 min calculated for 1,736 cf (100% of inflow)
Center-of-Mass det. time= 15.2 min (750.4 - 735.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 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 3 rows
		419 cf	Total Available Storage

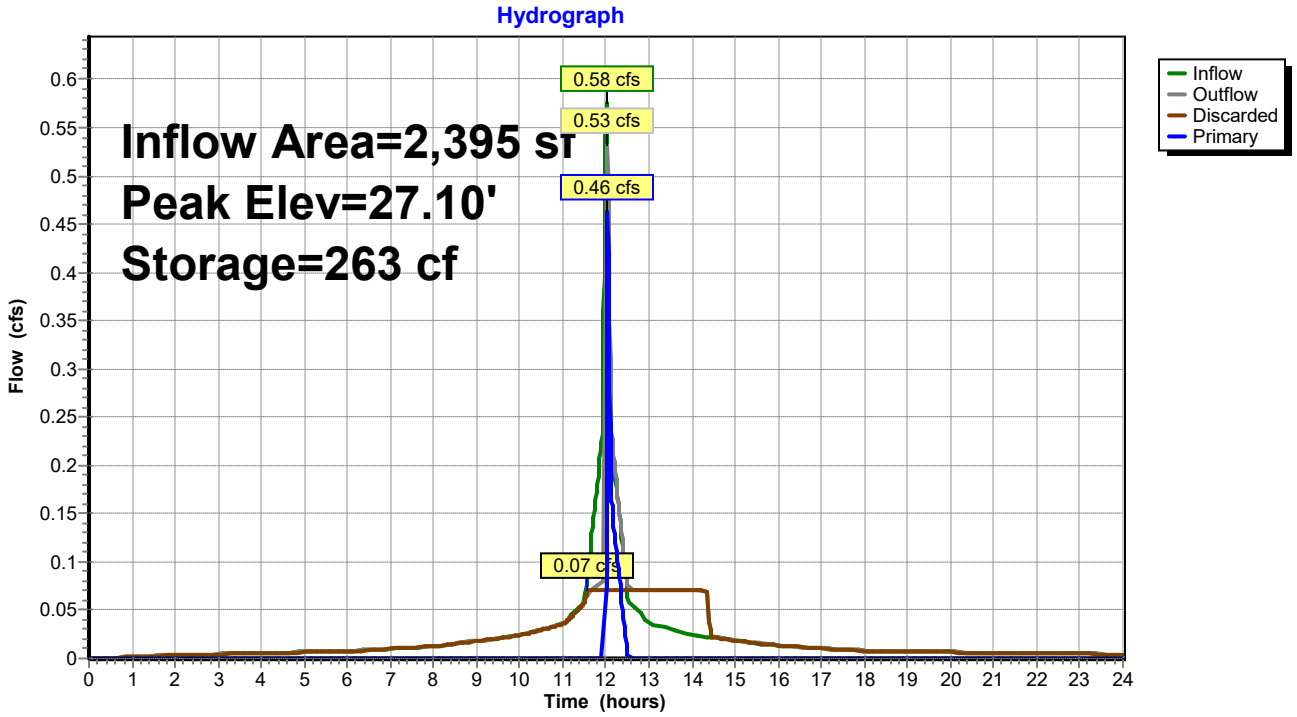
Storage Group A created with Chamber Wizard

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=0.07 cfs @ 11.56 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.43 cfs @ 12.04 hrs HW=27.09' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.43 cfs @ 1.05 fps)

Pond 42P: CULTEC



Appendix F

OPERATION & MAINTENANCE PLAN

Operation & Maintenance Plan (Permanent BMPs)

FOR

21-27 Hancock Street, Newburyport, MA

Date: February, 2021

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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 $1,200/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 a 24" manhole cover with a frame. Removing the manhole cover will provide access to the Chamber 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 row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream structure. CCTV inspection of this row can be deployed through this access port to determine if any sediment has accumulated in the inlet row.

Inspection & Maintenance of Chamber Outfall and Level Spreader: When infiltration chambers are inspected, the chambers outfall and level spreader should be inspected for evidence of any standing water, debris or accumulation of sediment. The area around the level spreader and outfall should additionally be inspected for excessive erosion or scouring that could indicate any need for changes.

4. Rain Gardens

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

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: