STORMWATER MANAGEMENT REPORT

for

PROPOSED MEDICAL OFFICE BUILDING

Prepared for:

One Bay Urban Renewal, LLC
311 Bay Avenue
Borough of Glen Ridge & Township of Montclair
Essex County, New Jersey

Prepared by:

BOHLER ENGINEERING
NJ. Cert. of Authorization No. 24GA28161700

35 Technology Drive
Warren, NJ 07059
908-668-8300

Bradford A. Bohler, P.E.
New Jersey Professional Engineer License No. 47421

October 2017
Revised March 15, 2018

BENJ # J140578

Table of Contents

Appendices

1. Introduction

The intent of this study is to analyze the stormwater drainage conditions that will occur as a result of the redevelopment of a parcel of land that is located at 311 Bay Avenue. A portion of the parcel is located in the Borough of Glen Ridge (Block 106, Lot 15) and the remaining portion of the parcel is located in the Township of Montclair (Block 4215, Lot 1). Said lot shall hereby be referenced to as "the Site" and is marked on the USGS Map and Site Location Map within the Appendix of this report. The Site consists of approximately 3.5 +/- acres. The site is bound to the north by Roswell Terrace followed by residential developments, to the west by Walnut Crescent followed by residential developments, to the east by residential developments followed by Sherman Avenue, and to the south by Bay Avenue followed by Mountainside Hospital.

This Stormwater Management Report is based on a proposal to clear the majority of the subject site to construct a 3-story medical office building. When completed, the proposed medical office building will be approximately 45,735 sf (15,245 sf footprint), with parking, a stormwater management system and associated utility improvements. The impervious area will increase to approximately 66.8+/- % of the entire property, which is an increase from 49.2+/-% under existing conditions. The net impervious area increase is approximately 0.60 acre +/-.

The scope of this study focuses on all site improvements within the proposed +/- 4-acre limit of disturbance. Since more than one (1) acre of the Site will be disturbed during construction of these improvements, the project is classified as a "Major Development" per New Jersey Department of Environmental Protection (NJDEP) standards.

The following items shall be addressed within this report:

- Calculations for water quality utilizing the NJDEP 1.25"/2-hour water quality design storm.
- Stormwater Pollutant (TSS) Removal.
- Calculations for pre- and post-development storm events for the 2-, 10-, 25- and 100-year design storm peak runoff rate for the study area.
- Narrative of pre- and post-development conditions with calculations to substantiate derived runoff coefficients and times of concentration.
- Calculations for the proposed underground detention basin system including inflow hydrographs, outflow hydrographs, and a storage volume versus depth table.
- Calculations to substantiate the capacity of the proposed stormwater conveyance system.

- Pre- and post-development annual groundwater recharge analysis for the subject Site.

The primary design constraint for this project are based on the NJDEP Rules, Regulations and design standards, which have been adopted by the Township of Montclair and are summarized as follows:

- Provide water quality if an additional one-quarter acre of impervious surface is proposed within the development site.
- Provide water quantity reduction and the proposed peak runoff rate from the development to be less than that under the existing condition.
- Demonstrate that post-developed project site maintains 100% of the site's pre-developed average annual groundwater recharge volume.

2. Existing Site Conditions

Under existing conditions, the subject site was developed with a medical/education masonry building with associated parking fields, courtyard, landscaping and utilities. Based on the *ALTA/ACSM Land Title Survey by Control Point Associates*, the subject site has a high elevation of approximately 257+/- feet above msl near the central area of the property, and slopes down in three directions. Under existing conditions, portion of the stormwater runoff from the subject site drains towards the first low point (239 +/- msl) located at the southeastern property corner; portions of the stormwater runoff from the subject site drains towards the second low point (245 +/- msl) located at the northwestern property corner; with the remainder draining towards the third low point (247 +/- msl) located at the northeastern property corner. Accordingly, three (3) drainage sheds have been delineated on the "Existing Drainage Area Map".

EDA-1 is about 1.453 acres. Stormwater runoff from this area overland flows toward the southeastern property corner, and eventually drains to Bay Avenue, and is collected by the existing inlet located within the right-of-way.

EDA-2 is about 1.426 acres. Stormwater runoff from this area overland flows toward the northwestern property corner, and eventually drains to Roswell Terrace, and is collected by the existing inlet located within the right-of-way.

EDA-3 is about 0.590 acres. Stormwater runoff from this area overland flows toward the northeastern property corner, and eventually drains to Roswell Terrace.

3. Proposed Site Conditions

Under proposed conditions, a 3-story medical office building (approximately 45,735 sf) with associated improvements will be constructed. The proposed improvements include the construction of the building, parking, landscaping, and stormwater management facility with associated utility improvements. The stormwater management system consists of an underground detention basin and a underground infiltration basin. This basin system will meet the NJDEP standards for stormwater management.

Four (4) drainage sheds have been delineated on the "Proposed Drainage Area Map".

PDA-1a is about 2.032 acres and consists of the entire roof area of the proposed medical office building and eastern parking field. Stormwater from this drainage area will be collected by the proposed underground detention basin. A water quality unit is proposed to treat the water quality storm and to provide 80% TSS removal rate. For storm events with higher intensity, an outlet structure is proposed to regulate the outflow. The underground detention basin is designed to provide stormwater management up to the 100-year storm event. The front half of the roof area and the lawn area south of the building is conveyed to the underground detention basin. This 36" perforated HDPE pipe will infiltrate the NJDEP water quality storm to utilize the limited area of the site that has appropriate infiltration rates. Any storm larger than the NJDEP water quality storm will overtop a weir in the outlet structure and drain to the proposed underground detention basin. Infiltration rates and soil borings can be found in the "Preliminary Geotechnical Investigation & SWM Area Evaluation" by Whitestone Associates Inc. Dated February 5, 2018.

PDA-1b is about 0.08 acres and consists of a small portion of the site comprised mainly of the side slopes of the proposed development facing Bay Avenue. Stormwater from this drainage area will overland flow to Bay Avenue.

PDA-2 is about 1.156 acres and consists of the western parking field. When compared to existing conditions, both the drainage area and impervious area have been reduced, a water quality unit is proposed to treat the water quality storm from this area and to provide 50% TSS removal rate, as the proposed parking field is redeveloped from the existing parking field at the same location. Stormwater runoff from this area drains toward the northwestern property corner, and eventually drains to Roswell Terrace, and is collected by the existing inlet located within the right-of-way.

PDA-3 is about 0.20 acres and consists mainly of the undisturbed area of the subject site. When compared to existing conditions, the drainage area has been significantly reduced and impervious area has been eliminated. Stormwater runoff from this area overland flows toward the northeastern property corner, and eventually drains to Roswell Terrace similar to existing conditions.

4. Methodology

The calculations included within this report were performed using hydrologic software, HydroCAD (Version 9.00) by HydroCAD Software Solutions, LLC. The HydroCAD software was used to develop runoff hydrographs, and detention basin routings using the SCS TR-20 methodology. Time of concentration calculations for the pre and post-development calculations were generated utilizing the SCS Method.

Soil classifications for use with runoff curve numbers (CN) were taken from the NRCS Web Soil Survey (see Appendix C). Evaluation of these maps indicated that soils within the existing and proposed drainage areas consisted of hydrologic soil groups "D" as defined within the United State Soil Conservation Service Manual "Urban Hydrology for Small Watersheds" v. 1986.

Runoff CN values for the soil groups were assigned to various surfaces as follows:

Soil Group:	**A**	**B**	**C**	**D**
Ground Cover		**CN Values**		
Wooded Areas	30	55	70	77
Landscaped/Lawn (good condition)	39	61	74	80
Impervious/Building Areas	98	98	98	98

The time of concentration and travel time (Tc) calculations have been completed in accordance with Chapter 3 of the SCS Technical Release 55 Manual. Please note, since the subject site has been previously developed, a time of concentration of 6 min. is used under both the existing and proposed conditions.

The proposed underground detention basin coupled with the proposed water quality units will meet the requirements set forth by the NJDEP, Township/Borough regarding the peak runoff rate reduction and

TSS removal rate. For stormwater runoff on the pavement, inlets are proposed throughout the parking area, and stormwater conveyance system on site was sized based on 25-year storm event. The stormwater conveyance proposed on Bay Avenue was sized for 25-year storm event plus the 100-year storm discharge from the proposed underground basin.

The soils on site are classified as "Urban Land", as a result, there is no post-development annual recharge deficit. Therefore, the proposed development will meet the groundwater recharge requirement set forth by the NJDEP and Township/Borough.

The proposed underground basin bottom is set more than 1' higher than the tested Seasonal High Groundwater Table (SHGW) as required by the NJDEP. Please refer to the "Report of Geotechnical Investigation" prepared by Whitestone Associates, Inc.

The peak runoff rates from the proposed development are listed in the following table:

Peak Runoff Rate Comparison (EDA-1 vs. PDA-1a + PDA-1b)

(To Bay Avenue)

Per NJAC 7:8-5.4(a)3iii

Storm Event	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)	Proposed/Existing	Maximum Allowed	Meet requirement?
2-year	3.52	1.56	44%	50%	YES
10-year	6.08	4.58	75%	75%	YES
100-year	11.17	8.85	79%	80%	YES

Peak Runoff Rate Comparison (EDA-2 vs. PDA-2)

(To Northwestern Property Corner Facing Roswell Terrace)

Per NJAC 7:8-5.4(a)3i

Storm Event	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)	Peak Runoff Rate Prop.<=Exist.?
2-year	3.99	3.25	YES
10-year	6.51	5.29	YES
100-year	11.44	9.29	YES

Peak Runoff Rate Comparison (EDA-3 vs. PDA-3)

(To Northeastern Property Corner Facing Roswell Terrace)

Per NJAC 7:8-5.4(a)3i

Storm Event	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)	Peak Runoff Rate Prop.<=Exist.?
2-year	1.29	0.37	YES
10-year	2.33	0.72	YES
100-year	4.41	1.44	YES

5. Conclusions

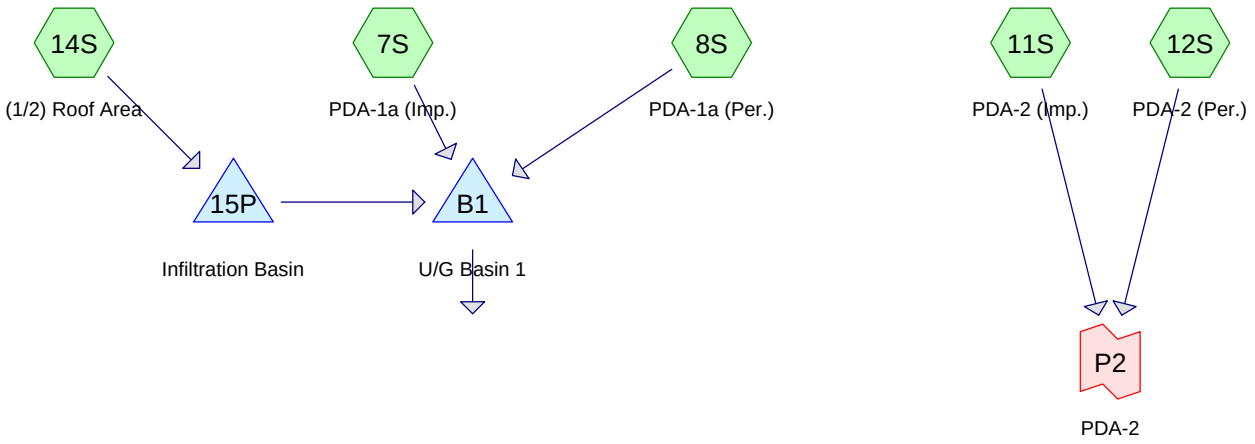
The proposed stormwater management system for the improvements associated with the Medical Office Building has been designed with provisions for safe and efficient control of stormwater runoff in a manner that will not adversely affect the surrounding areas. Since the proposed development has satisfied the NJDEP's water quality (TSS Removal), water quantity (peak runoff rate reduction) and ground water recharge requirements, it is evident that the proposed development will not have adverse impacts to existing conditions.

APPENDIX

A. PRE- vs. POST-DEVELOPMENT HYDROGRAPHS

- **Water Quality Storm Event**
- **2-Year Storm Event**
- **10-Year Storm Event**
- **25-Year Storm Event**
- **100-Year Storm Event**

Water Quality Storm Event



Subcat Reach Pond Link

Drainage Diagram for EX-PR_03-2018
Prepared by Bohler Engineering, Printed 3/15/2018

Summary for Subcatchment 7S: PDA-1a (Imp.)

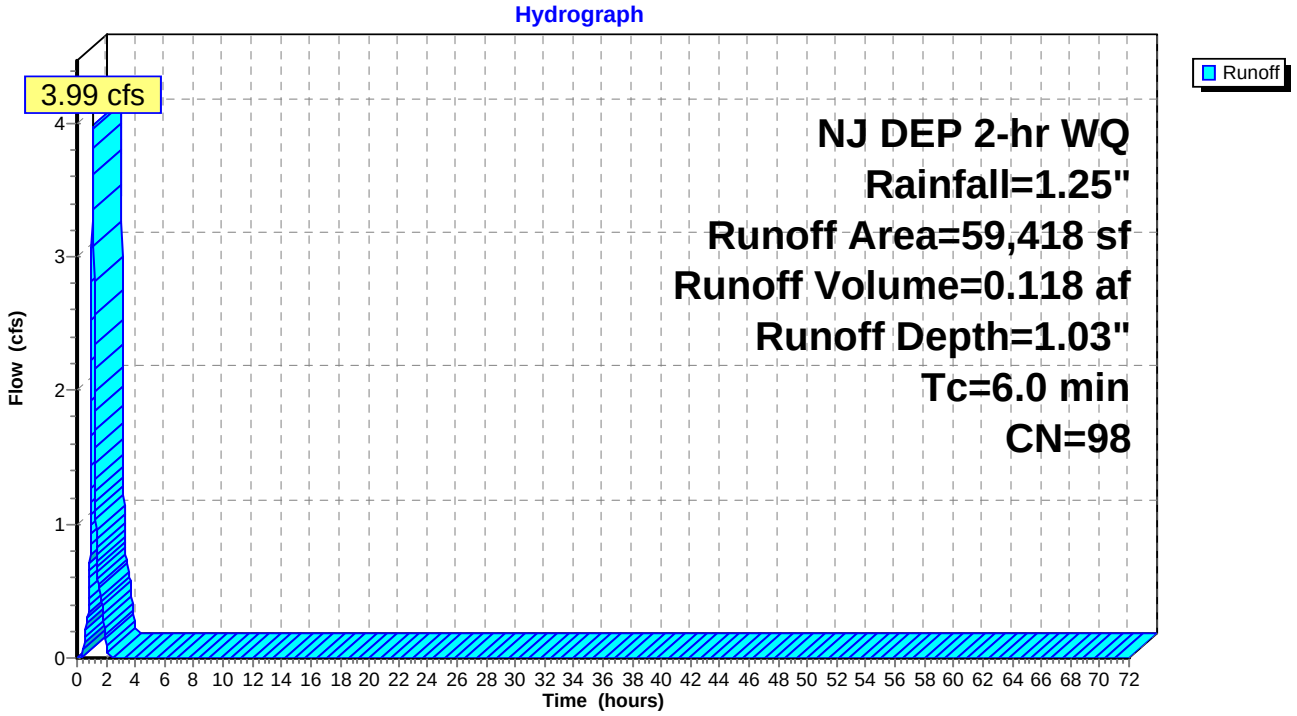
Runoff = 3.99 cfs @ 1.11 hrs, Volume= 0.118 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description
59,418	98	Paved parking, HSG D
59,418		100.00% Impervious Area

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

Subcatchment 7S: PDA-1a (Imp.)



Summary for Subcatchment 8S: PDA-1a (Per.)

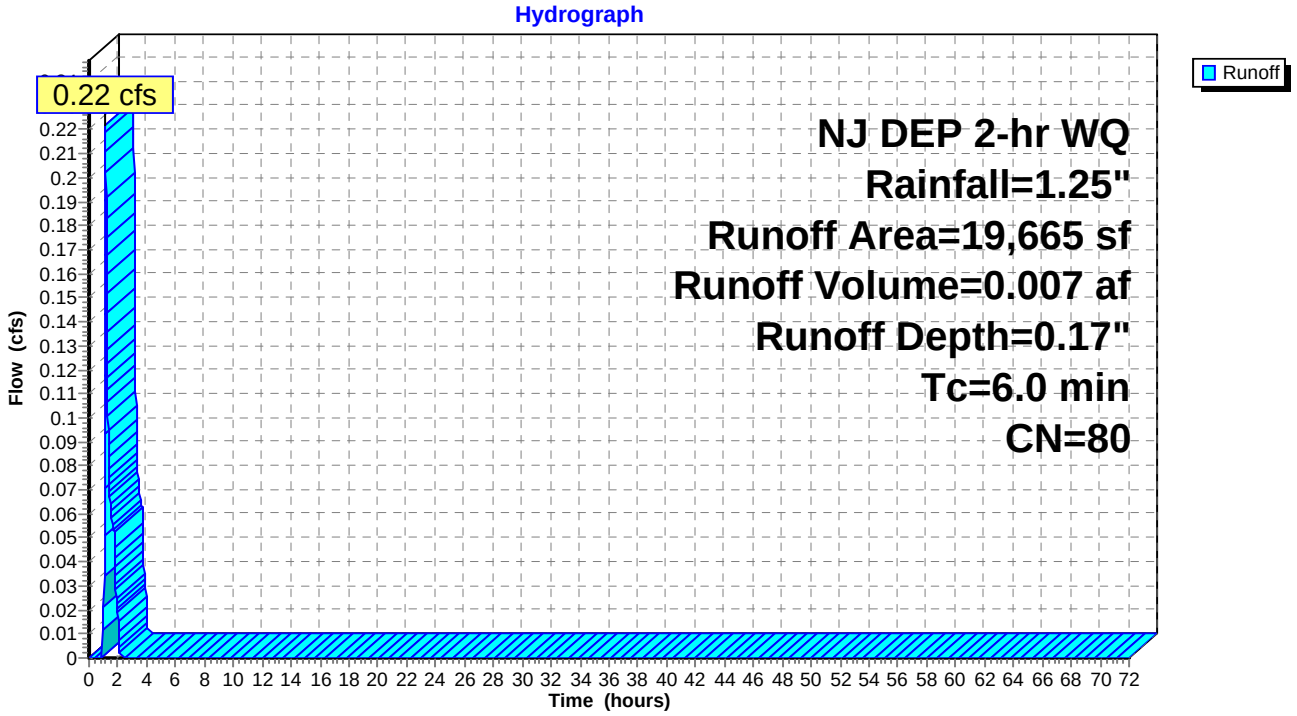
Runoff = 0.22 cfs @ 1.14 hrs, Volume= 0.007 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description
19,665	80	>75% Grass cover, Good, HSG D
19,665		100.00% Pervious Area

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

Subcatchment 8S: PDA-1a (Per.)



Summary for Subcatchment 11S: PDA-2 (Imp.)

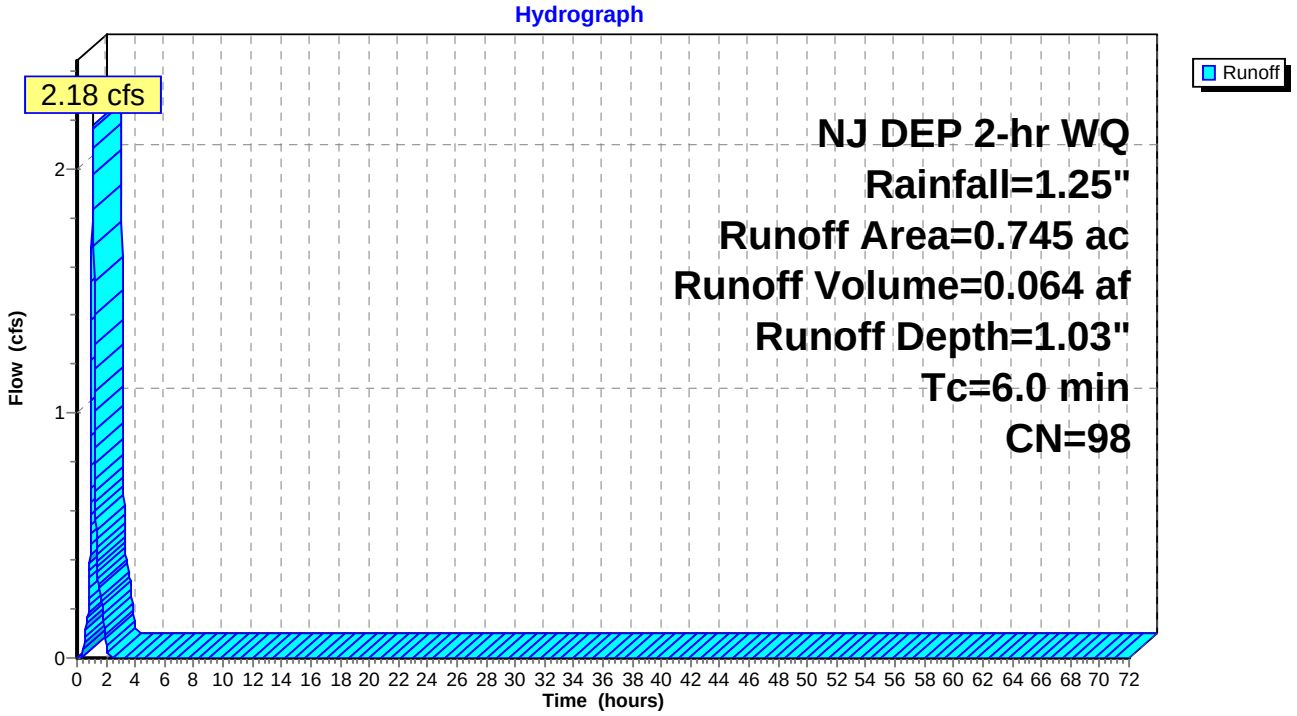
Runoff = 2.18 cfs @ 1.11 hrs, Volume= 0.064 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.745	98	Paved parking, HSG D
0.745		100.00% Impervious Area

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

Subcatchment 11S: PDA-2 (Imp.)



Summary for Subcatchment 12S: PDA-2 (Per.)

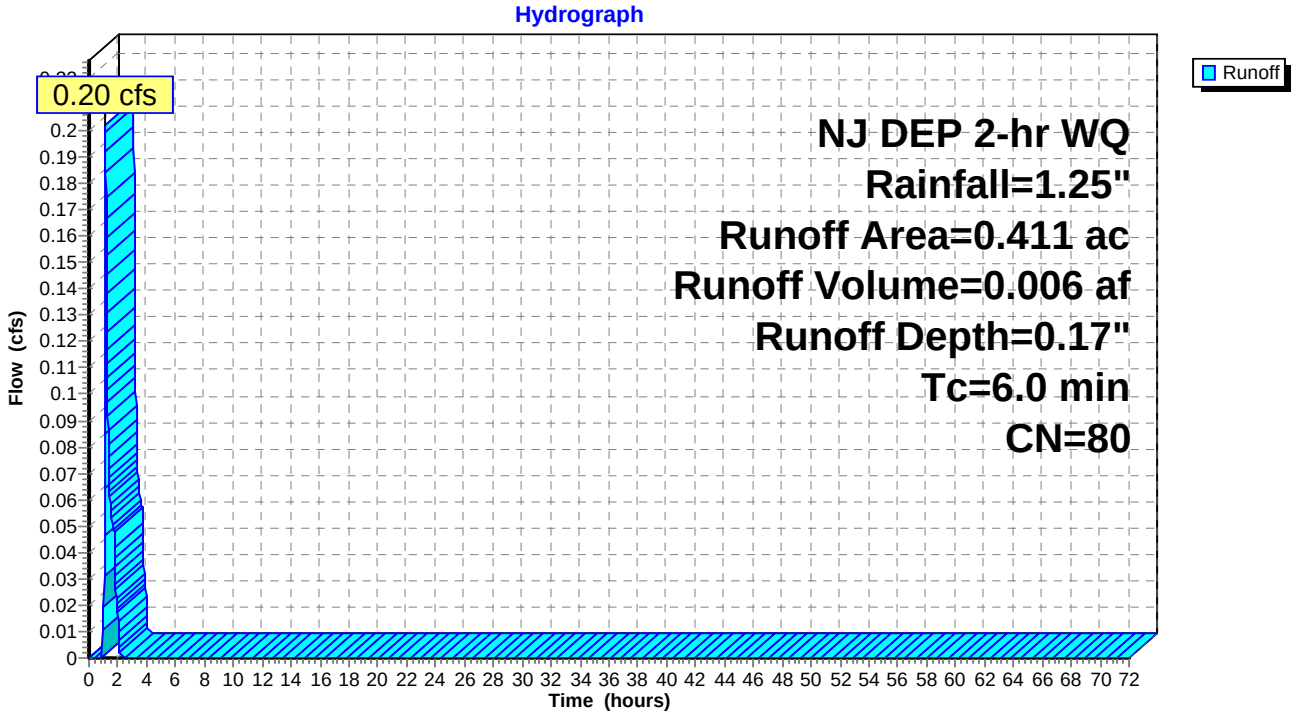
Runoff = 0.20 cfs @ 1.14 hrs, Volume= 0.006 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.411	80	>75% Grass cover, Good, HSG D
0.411		100.00% Pervious Area

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

Subcatchment 12S: PDA-2 (Per.)



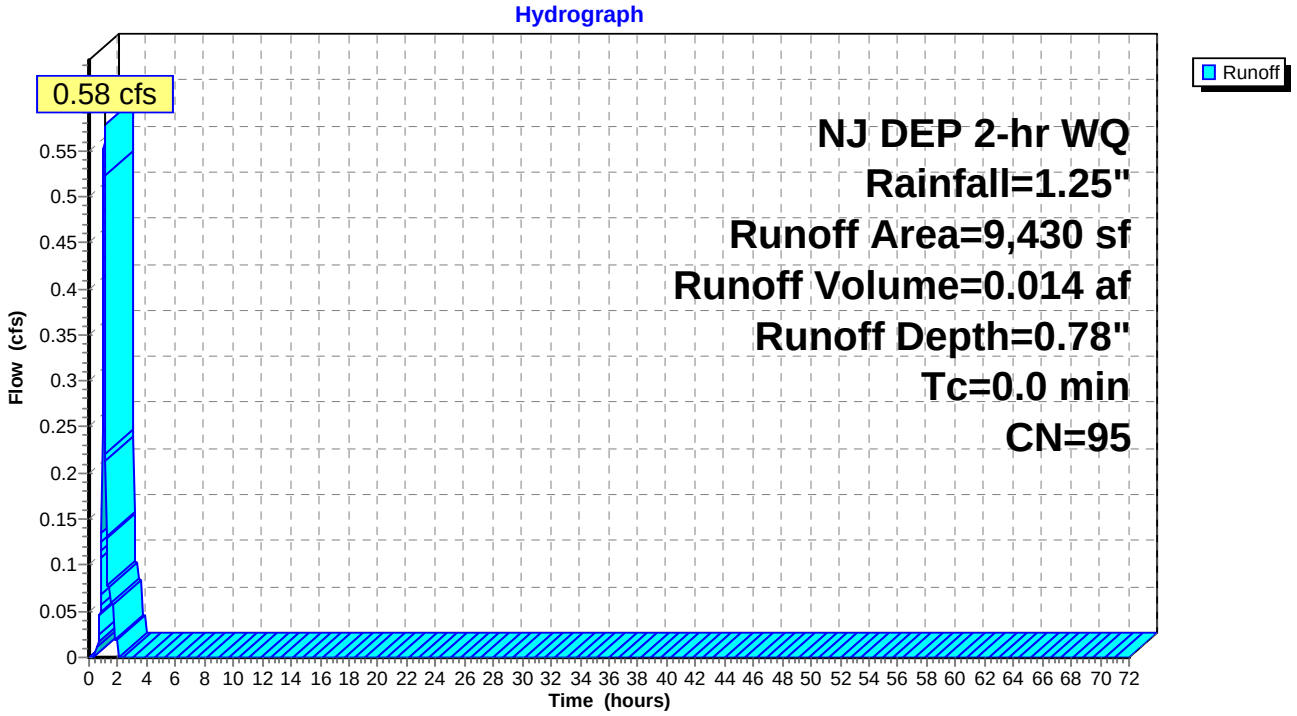
Summary for Subcatchment 14S: (1/2) Roof Area

Runoff = 0.58 cfs @ 1.07 hrs, Volume= 0.014 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)	CN	Description
8,056	98	Paved parking, HSG D
1,374	80	>75% Grass cover, Good, HSG D
9,430	95	Weighted Average
1,374		14.57% Pervious Area
8,056		85.43% Impervious Area

Subcatchment 14S: (1/2) Roof Area



Summary for Pond 15P: Infiltration Basin

Inflow Area = 0.216 ac, 85.43% Impervious, Inflow Depth = 0.78" for WQ event
Inflow = 0.58 cfs @ 1.07 hrs, Volume= 0.014 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 240.29' @ 2.01 hrs Surf.Area= 0.003 ac Storage= 0.014 af

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	237.50'	0.015 af	**36.0" D x 90.0'L Pipe Storage**

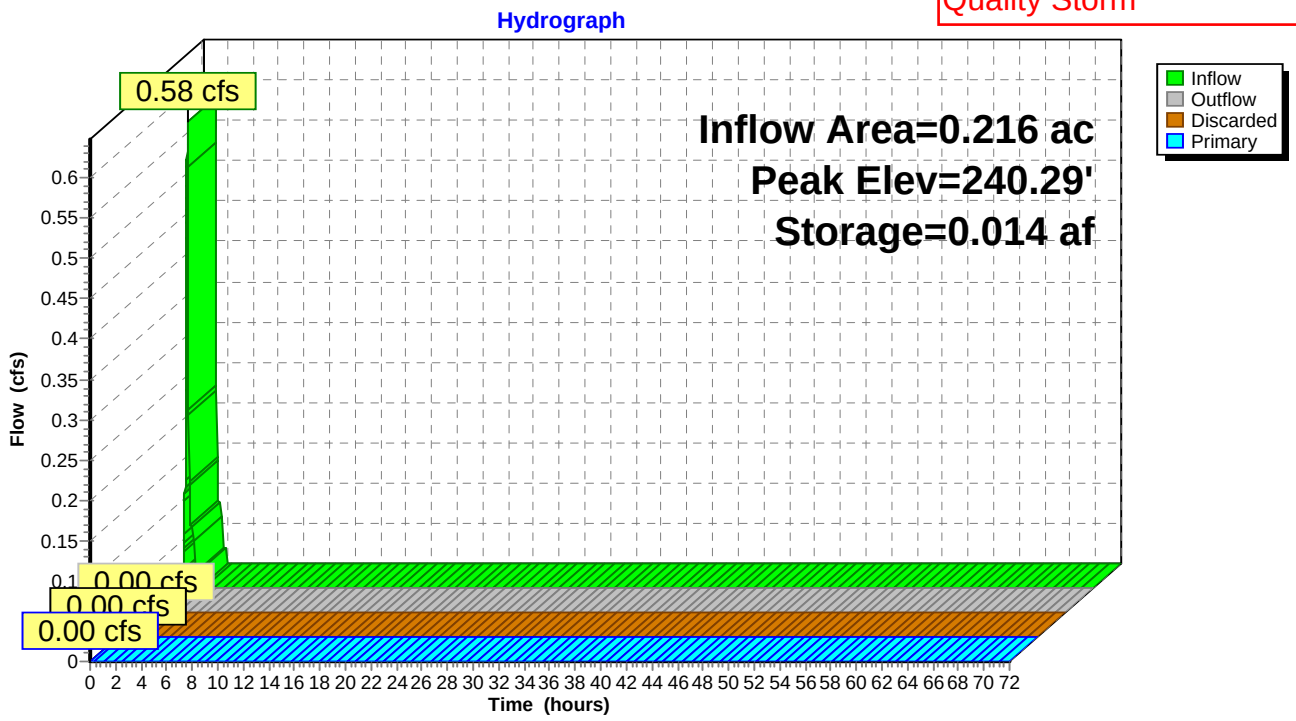
Device	Routing	Invert	Outlet Devices
#1	Primary	242.00'	**15.0" Round Culvert** L= 22.0' Ke= 0.500 Outlet Invert= 241.78' S= 0.0100 '/' Cc= 0.900 n= 0.010
#2	Discarded	237.50'	**0.450 in/hr Exfiltration X 0.00 over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.50' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.50' TW=237.00' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Infiltration Basin infiltrates the entirety of the NJDEP Water Quality Storm

Pond 15P: Infiltration Basin



Summary for Pond B1: U/G Basin 1

Inflow Area = 2.032 ac, 76.23% Impervious, Inflow Depth = 0.73" for WQ event
Inflow = 4.18 cfs @ 1.11 hrs, Volume= 0.124 af
Outflow = 1.18 cfs @ 1.30 hrs, Volume= 0.124 af, Atten= 72%, Lag= 11.1 min
Primary = 1.18 cfs @ 1.30 hrs, Volume= 0.124 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 237.73' @ 1.30 hrs Surf.Area= 0.105 ac Storage= 0.054 af

Plug-Flow detention time= 20.6 min calculated for 0.124 af (100% of inflow)
Center-of-Mass det. time= 20.6 min (91.5 - 70.9)

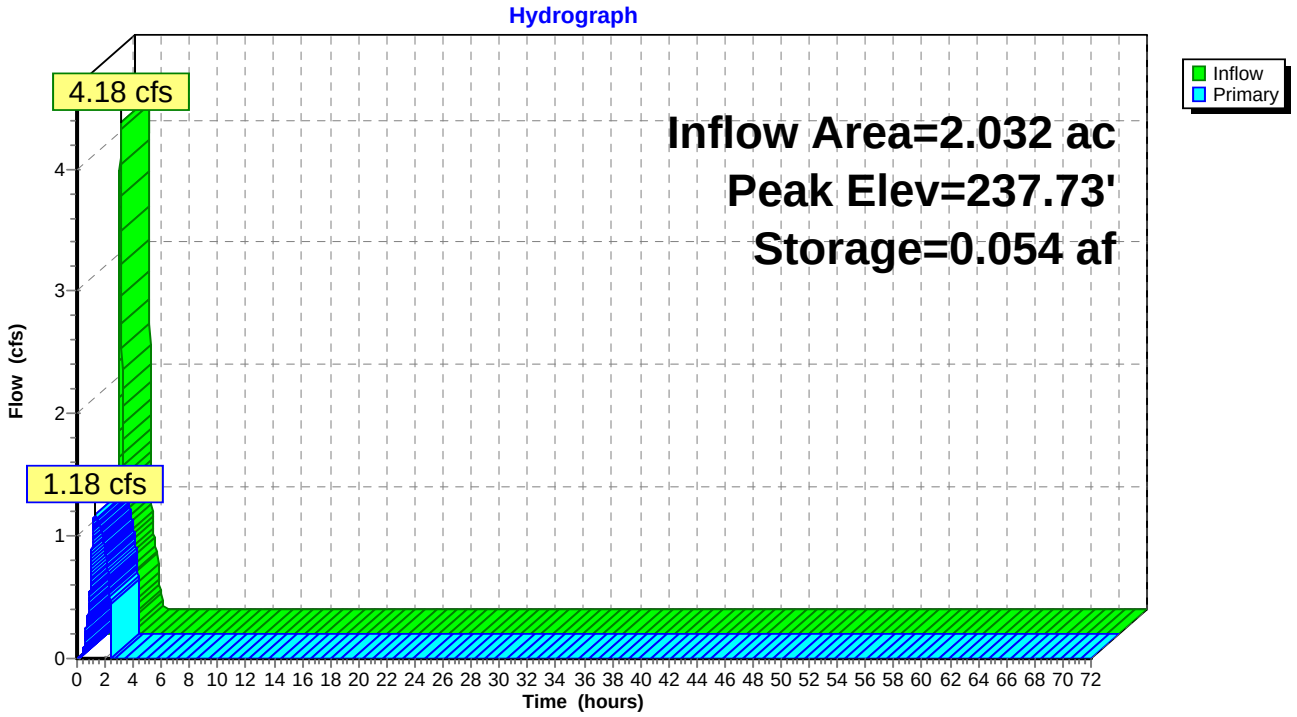
Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	0.277 af	**36.0" D x 213.0'L Pipe Storage** x 8
#2	237.00'	0.011 af	**36.0" D x 35.0'L Pipe Storage** x 2
		0.288 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	236.60'	**15.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 236.30' S= 0.0100 '/' Cc= 0.900 n= 0.011
#2	Device 1	236.60'	**7.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	238.30'	**42.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.18 cfs @ 1.30 hrs HW=237.73' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 1.18 cfs of 3.91 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 1.18 cfs @ 4.40 fps)
—**3=Orifice/Grate** (Controls 0.00 cfs)

Water quality storm will be treated by proposed water quality unit with 80% TSS removal rate.

Pond B1: U/G Basin 1

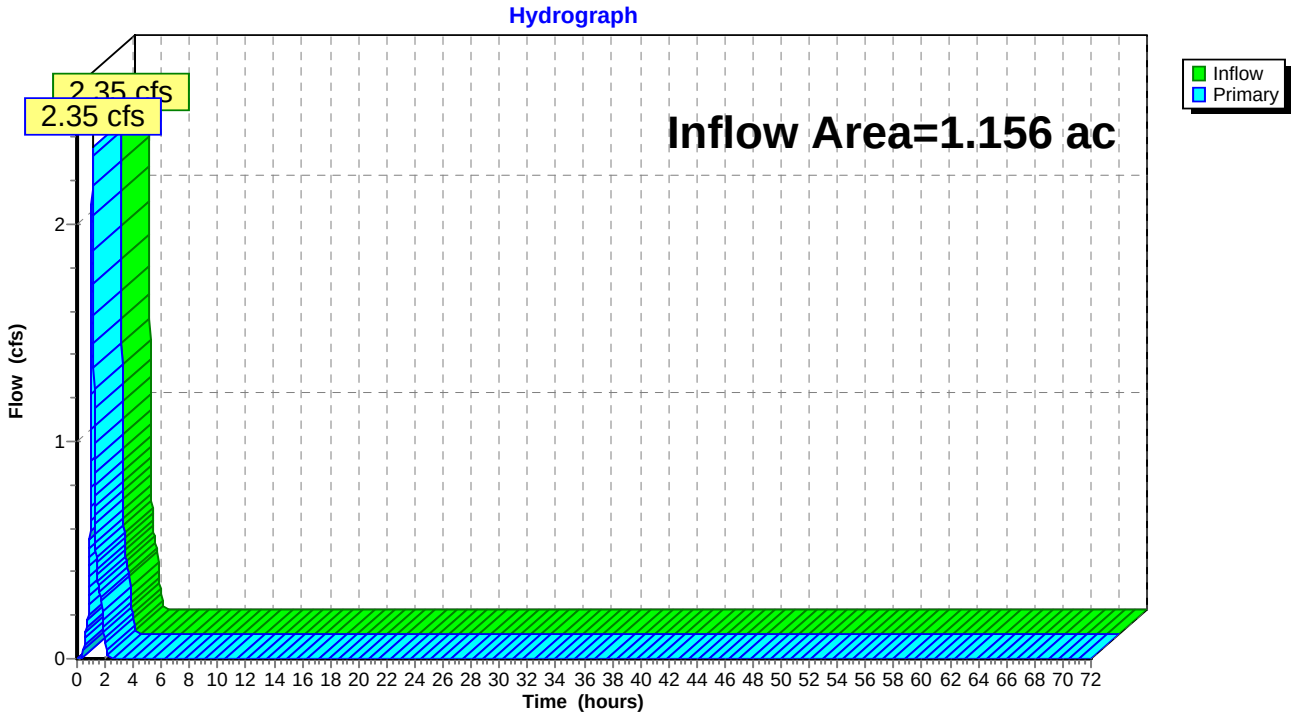


Summary for Link P2: PDA-2

Inflow Area = 1.156 ac, 64.45% Impervious, Inflow Depth = 0.73" for WQ event
Inflow = 2.35 cfs @ 1.11 hrs, Volume= 0.070 af
Primary = 2.35 cfs @ 1.11 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

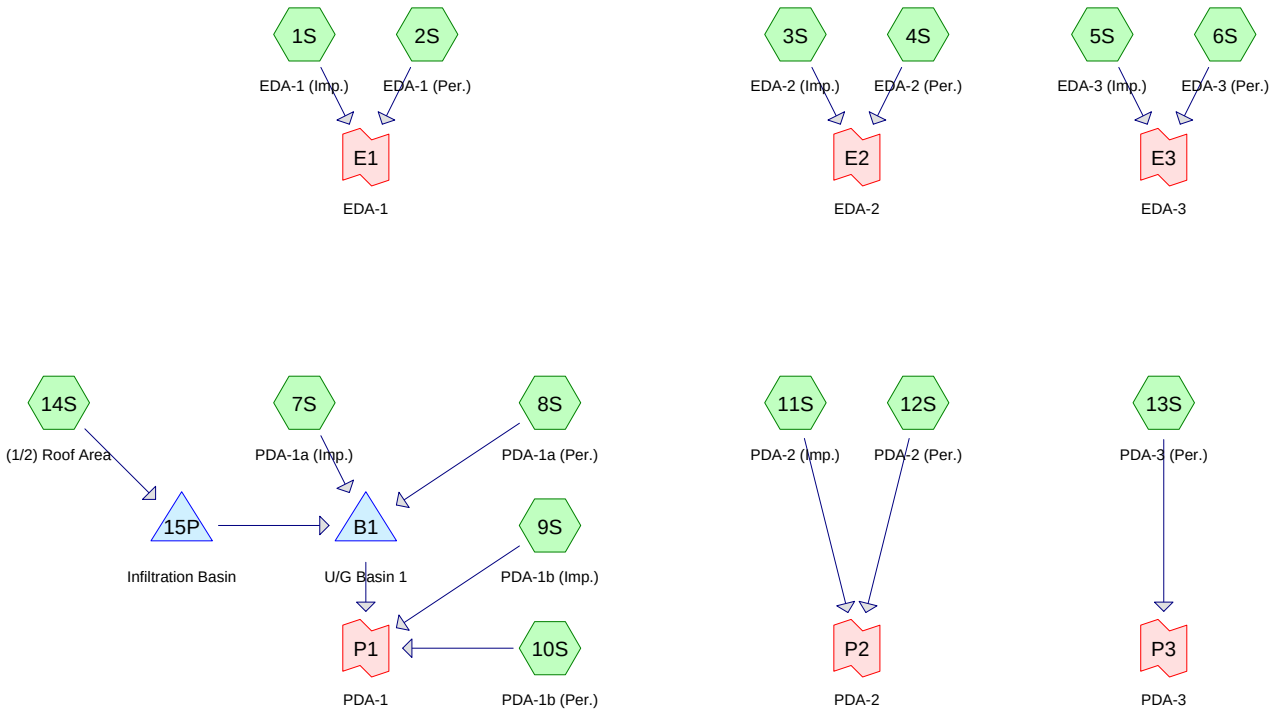
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P2: PDA-2



Water quality storm will be treated by proposed water quality unit with 50% TSS removal rate.

2-Year Storm Event



Subcat Reach Pond Link

Drainage Diagram for EX-PR_03-2018
Prepared by Bohler Engineering, Printed 3/15/2018

Summary for Subcatchment 1S: EDA-1 (Imp.)

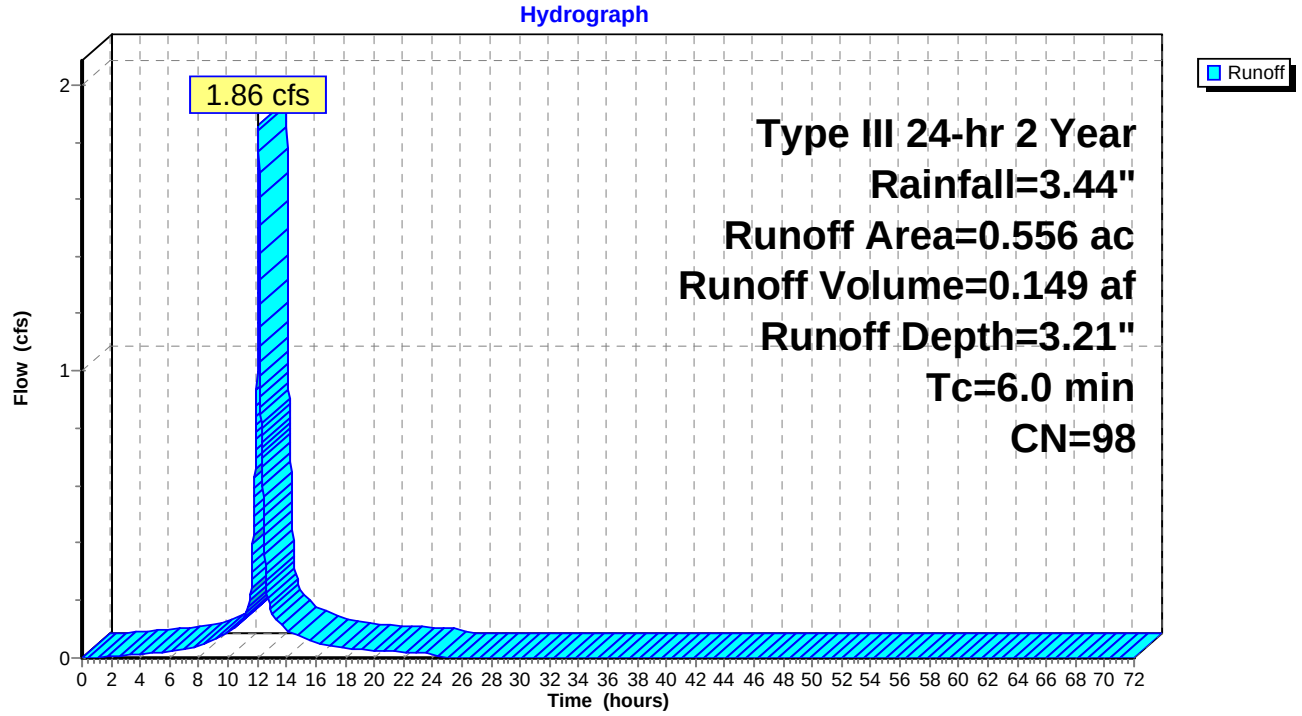
Runoff = 1.86 cfs @ 12.08 hrs, Volume= 0.149 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.556	98	Paved parking, HSG D
0.556		100.00% Impervious Area

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

Subcatchment 1S: EDA-1 (Imp.)



Summary for Subcatchment 2S: EDA-1 (Per.)

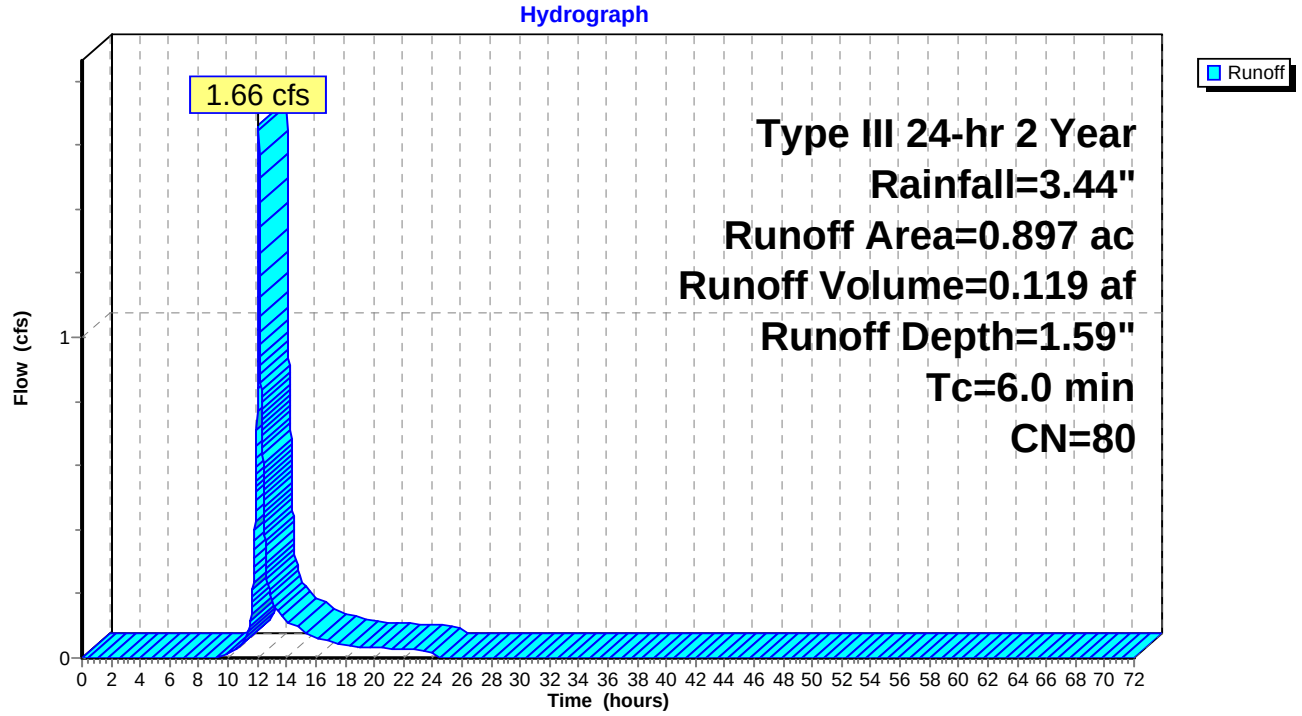
Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.119 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.897	80	>75% Grass cover, Good, HSG D
0.897		100.00% Pervious Area

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

Subcatchment 2S: EDA-1 (Per.)



Summary for Subcatchment 3S: EDA-2 (Imp.)

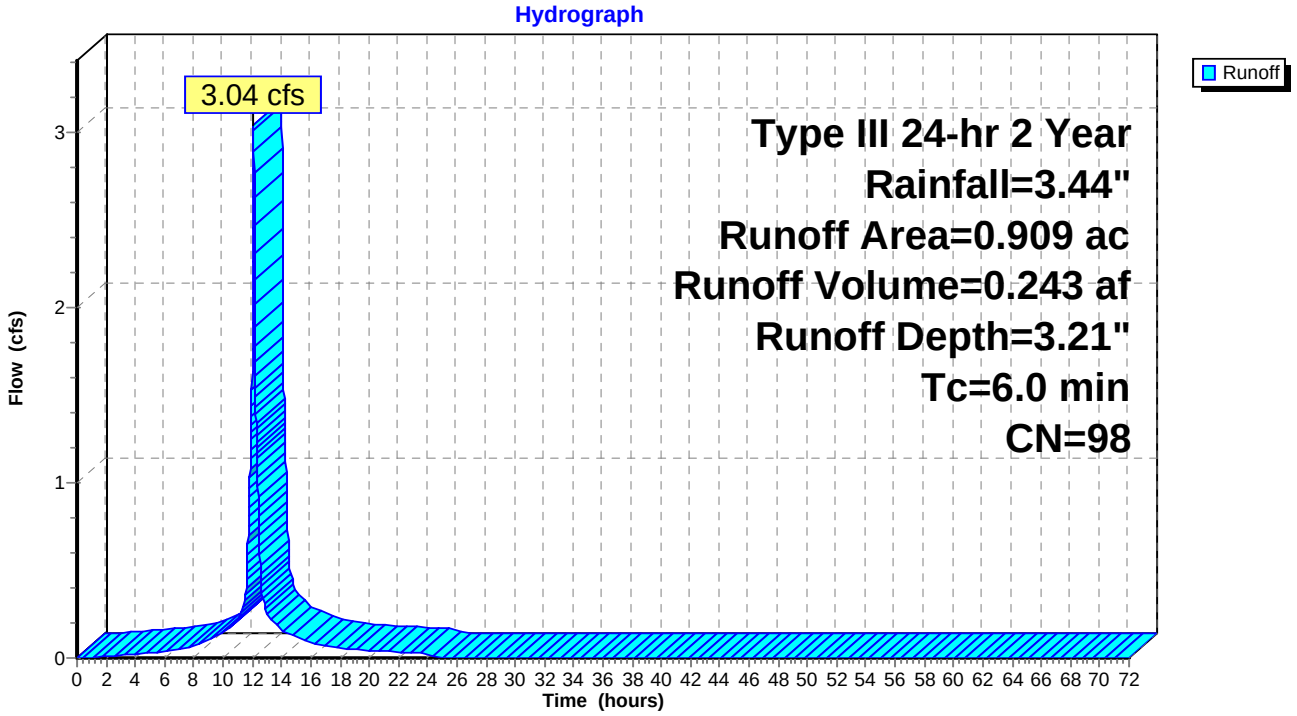
Runoff = 3.04 cfs @ 12.08 hrs, Volume= 0.243 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.909	98	Paved parking, HSG D
0.909		100.00% Impervious Area

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

Subcatchment 3S: EDA-2 (Imp.)



Summary for Subcatchment 4S: EDA-2 (Per.)

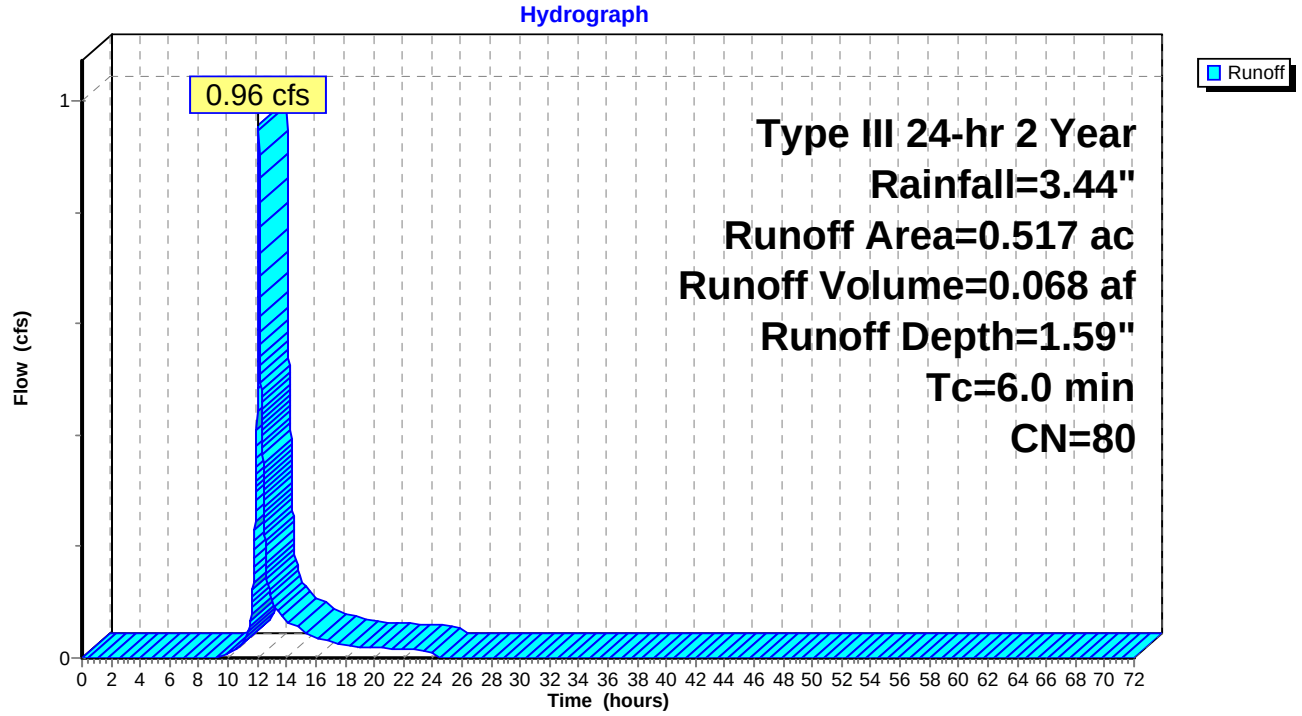
Runoff = 0.96 cfs @ 12.09 hrs, Volume= 0.068 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.517	80	>75% Grass cover, Good, HSG D
0.517		100.00% Pervious Area

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

Subcatchment 4S: EDA-2 (Per.)



Summary for Subcatchment 5S: EDA-3 (Imp.)

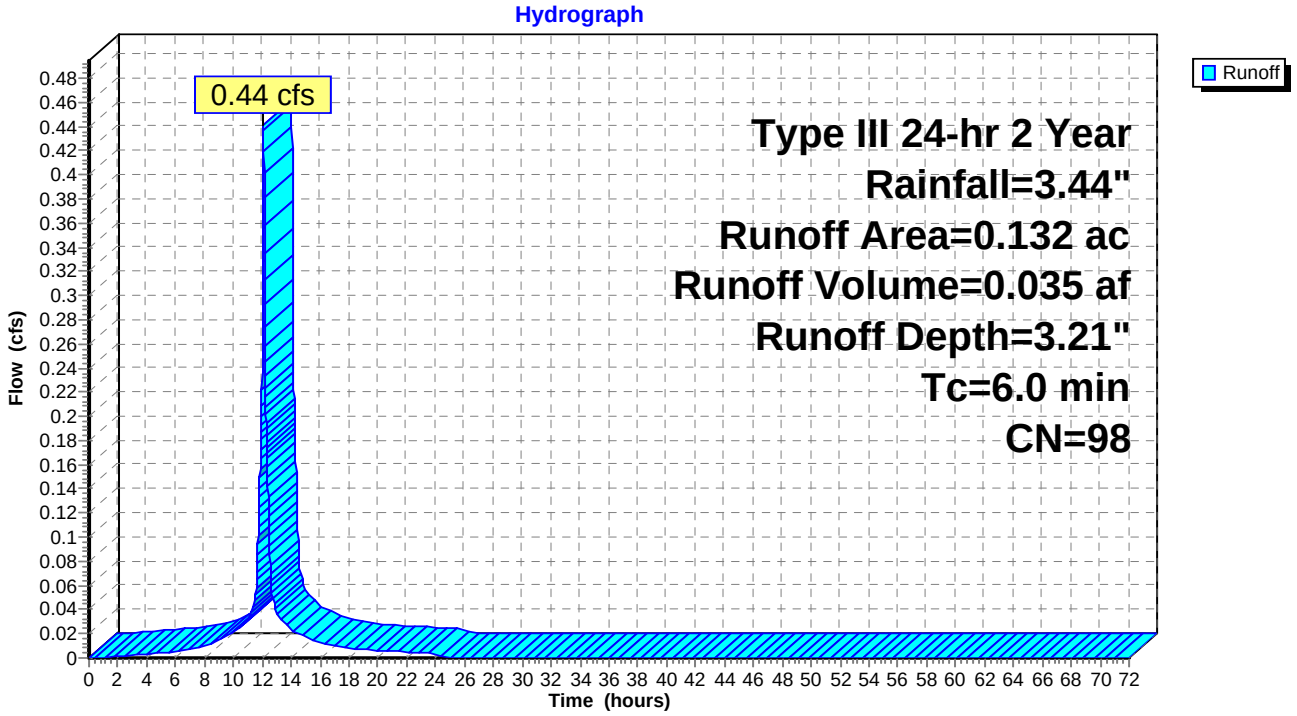
Runoff = 0.44 cfs @ 12.08 hrs, Volume= 0.035 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.132	98	Paved parking, HSG D
0.132		100.00% Impervious Area

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

Subcatchment 5S: EDA-3 (Imp.)



Summary for Subcatchment 6S: EDA-3 (Per.)

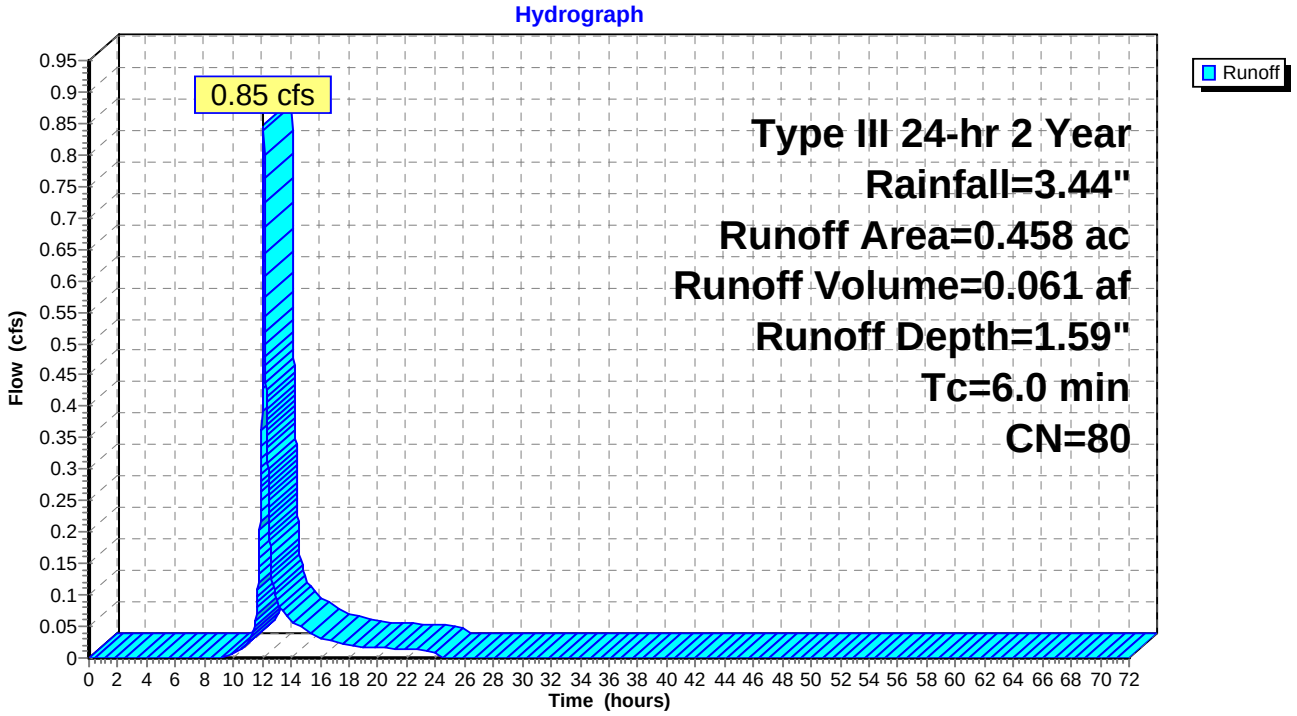
Runoff = 0.85 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.458	80	>75% Grass cover, Good, HSG D
0.458		100.00% Pervious Area

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

Subcatchment 6S: EDA-3 (Per.)



Summary for Subcatchment 7S: PDA-1a (Imp.)

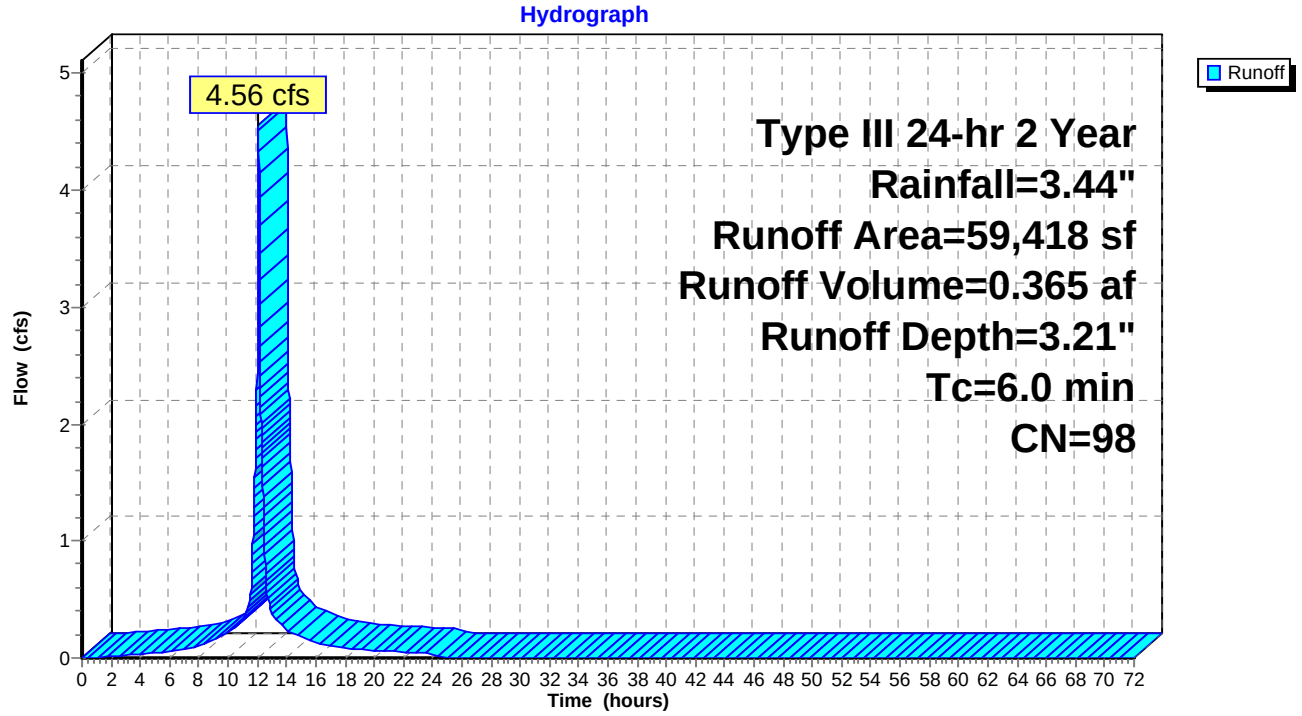
Runoff = 4.56 cfs @ 12.08 hrs, Volume= 0.365 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (sf)	CN	Description
59,418	98	Paved parking, HSG D
59,418		100.00% Impervious Area

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

Subcatchment 7S: PDA-1a (Imp.)



Summary for Subcatchment 8S: PDA-1a (Per.)

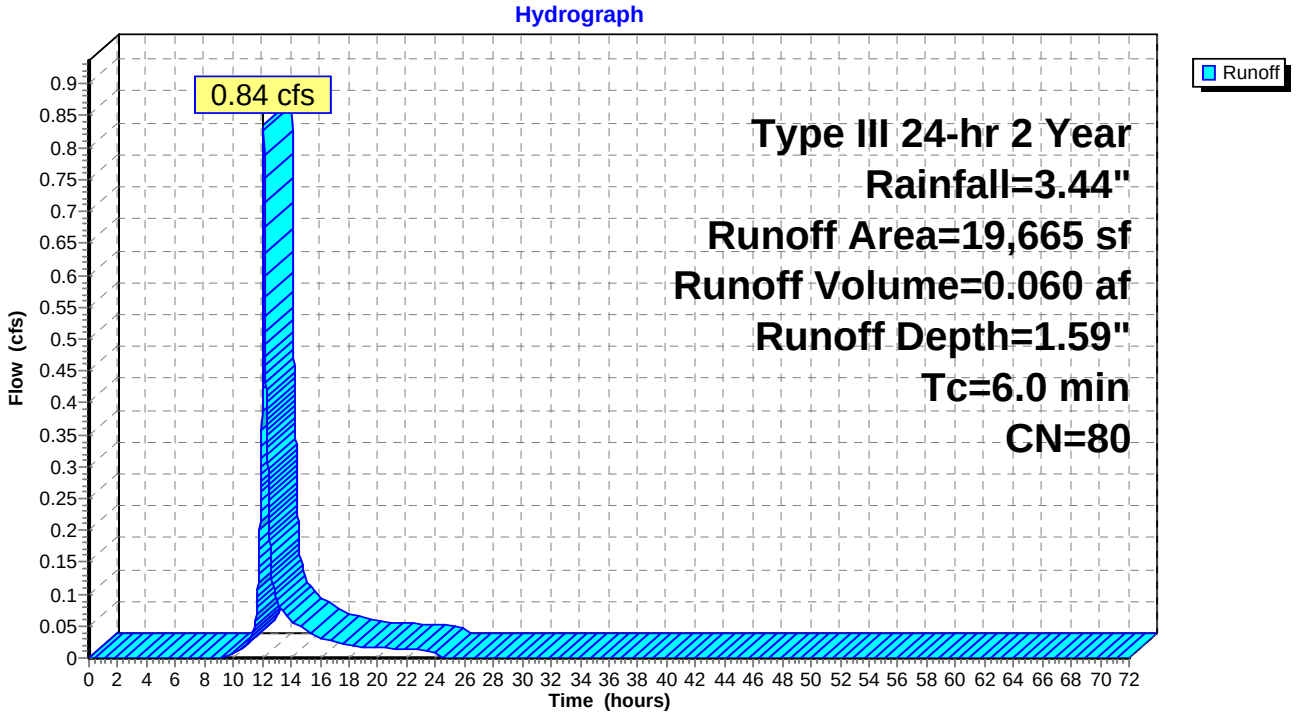
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.060 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (sf)	CN	Description
19,665	80	>75% Grass cover, Good, HSG D
19,665		100.00% Pervious Area

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

Subcatchment 8S: PDA-1a (Per.)



Summary for Subcatchment 9S: PDA-1b (Imp.)

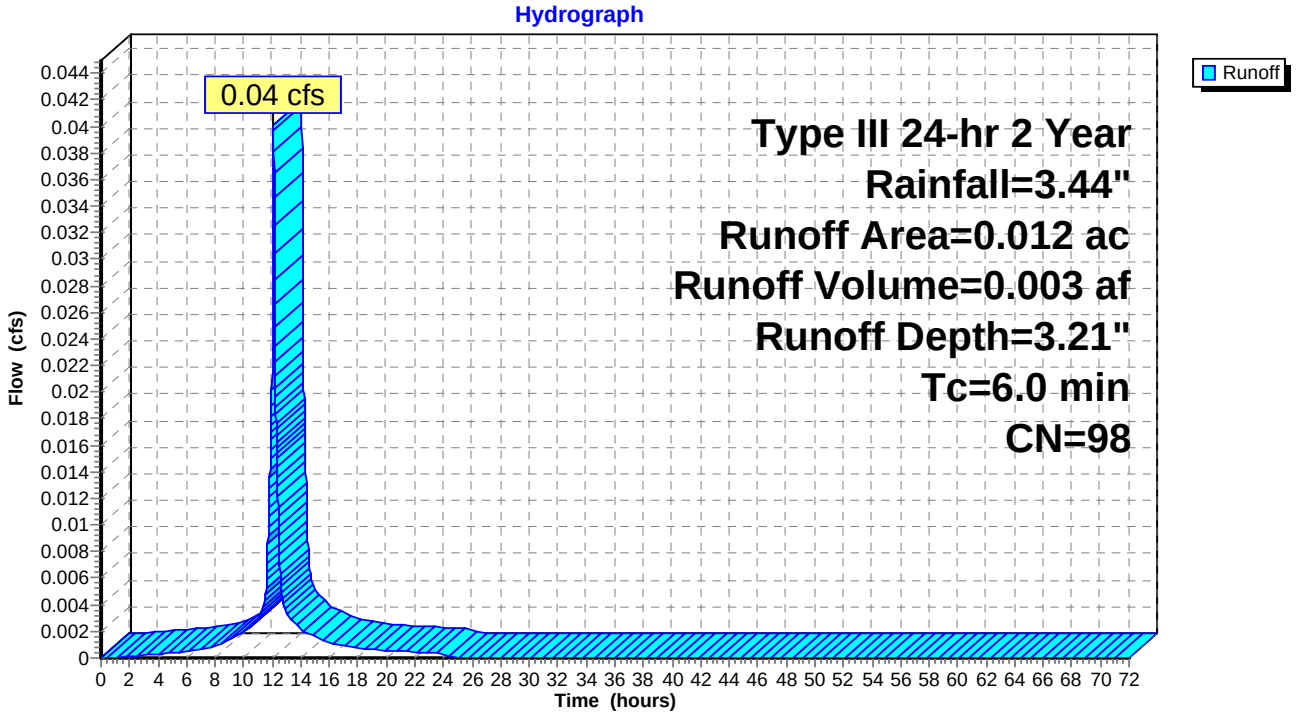
Runoff = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG D
0.012		100.00% Impervious Area

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

Subcatchment 9S: PDA-1b (Imp.)



Summary for Subcatchment 10S: PDA-1b (Per.)

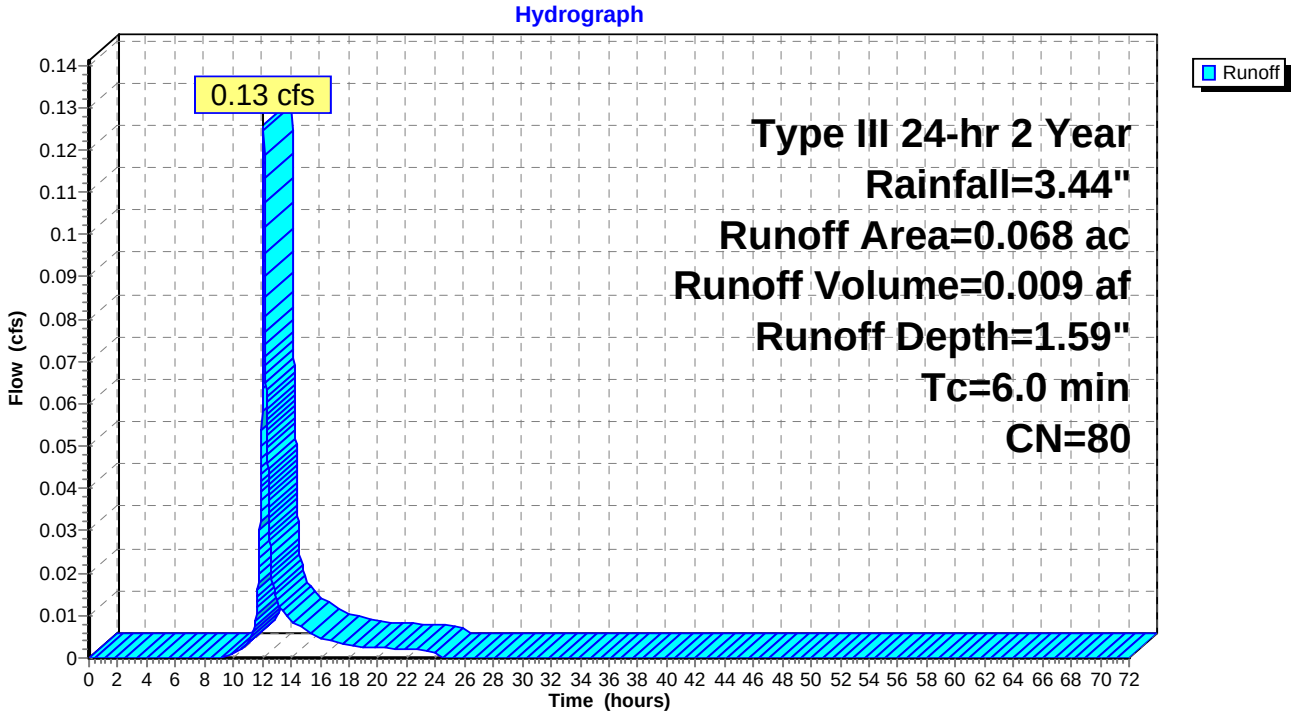
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.068	80	>75% Grass cover, Good, HSG D
0.068		100.00% Pervious Area

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

Subcatchment 10S: PDA-1b (Per.)



Summary for Subcatchment 11S: PDA-2 (Imp.)

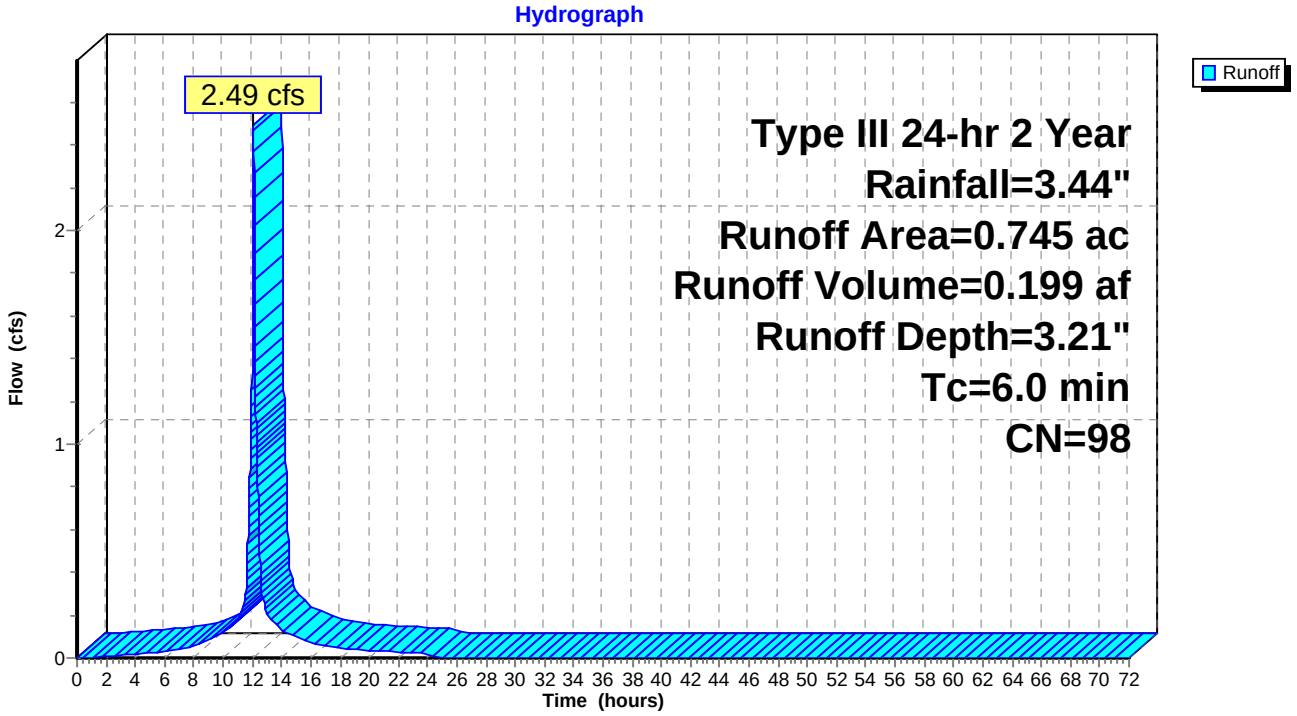
Runoff = 2.49 cfs @ 12.08 hrs, Volume= 0.199 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.745	98	Paved parking, HSG D
0.745		100.00% Impervious Area

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

Subcatchment 11S: PDA-2 (Imp.)



Summary for Subcatchment 12S: PDA-2 (Per.)

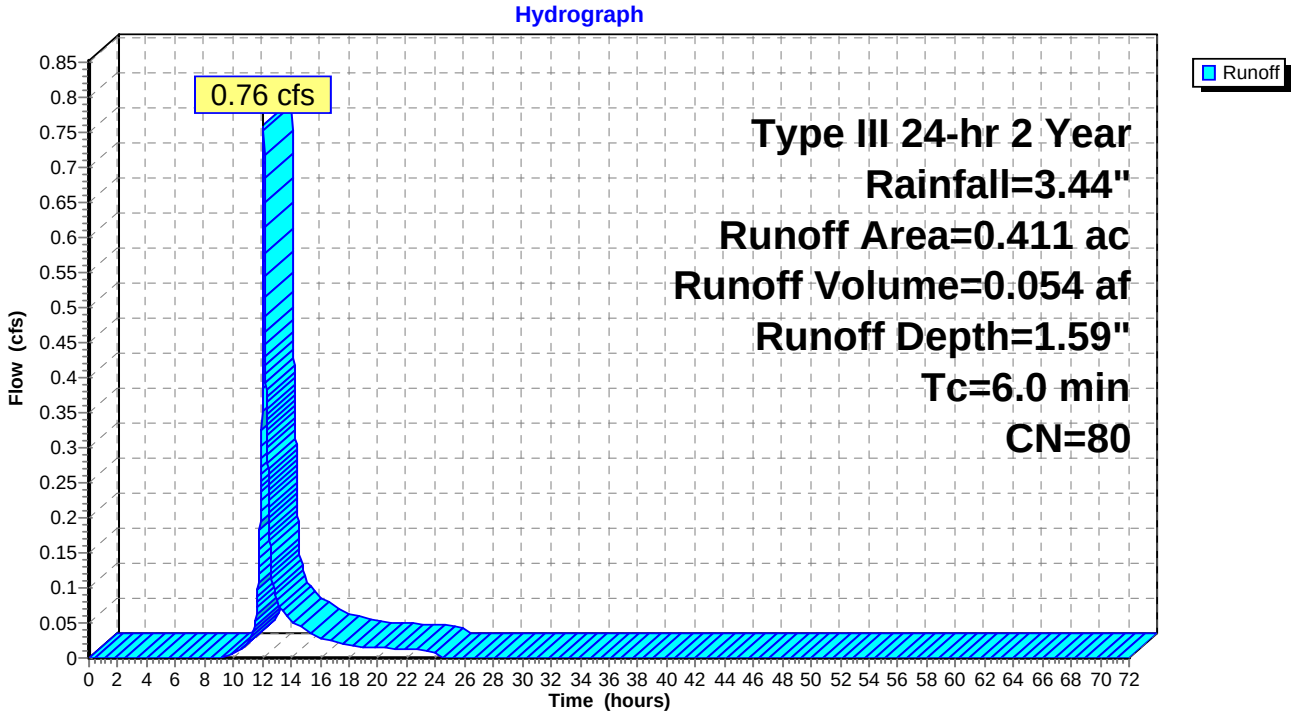
Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.054 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.411	80	>75% Grass cover, Good, HSG D
0.411		100.00% Pervious Area

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

Subcatchment 12S: PDA-2 (Per.)



Summary for Subcatchment 13S: PDA-3 (Per.)

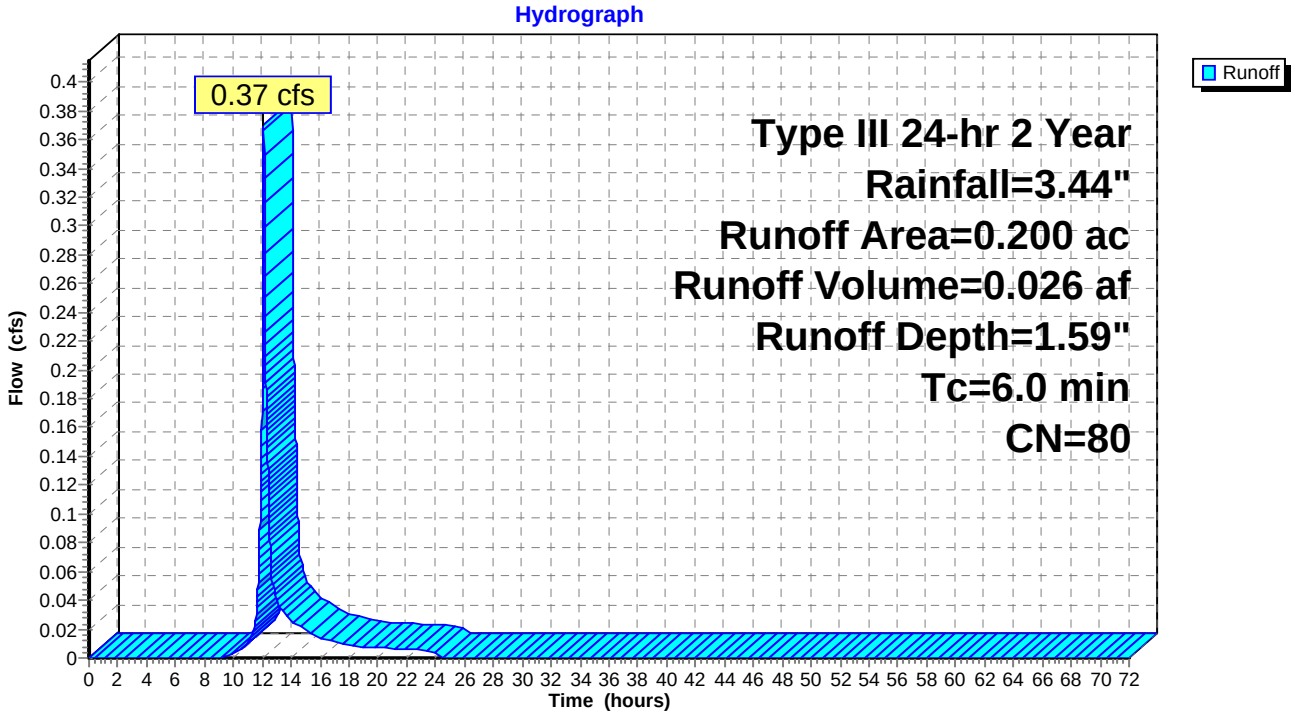
Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.026 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (ac)	CN	Description
0.200	80	>75% Grass cover, Good, HSG D
0.200		100.00% Pervious Area

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

Subcatchment 13S: PDA-3 (Per.)



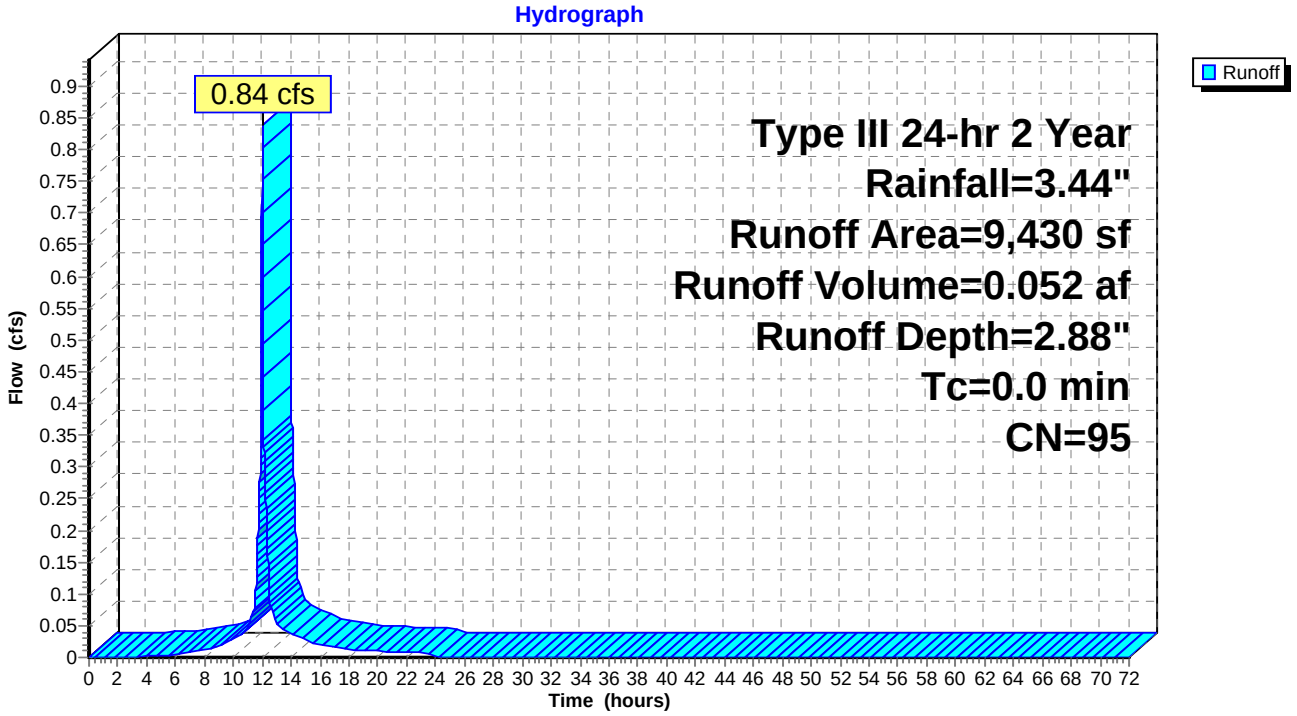
Summary for Subcatchment 14S: (1/2) Roof Area

Runoff = 0.84 cfs @ 12.00 hrs, Volume= 0.052 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.44"

Area (sf)	CN	Description
8,056	98	Paved parking, HSG D
1,374	80	>75% Grass cover, Good, HSG D
9,430	95	Weighted Average
1,374		14.57% Pervious Area
8,056		85.43% Impervious Area

Subcatchment 14S: (1/2) Roof Area



Summary for Pond 15P: Infiltration Basin

Inflow Area = 0.216 ac, 85.43% Impervious, Inflow Depth = 2.88" for 2 Year event
Inflow = 0.84 cfs @ 12.00 hrs, Volume= 0.052 af
Outflow = 0.82 cfs @ 12.01 hrs, Volume= 0.037 af, Atten= 2%, Lag= 0.6 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.82 cfs @ 12.01 hrs, Volume= 0.037 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 242.44' @ 12.01 hrs Surf.Area= 0.000 ac Storage= 0.015 af

Plug-Flow detention time= 152.9 min calculated for 0.037 af (72% of inflow)
Center-of-Mass det. time= 63.6 min (836.8 - 773.2)

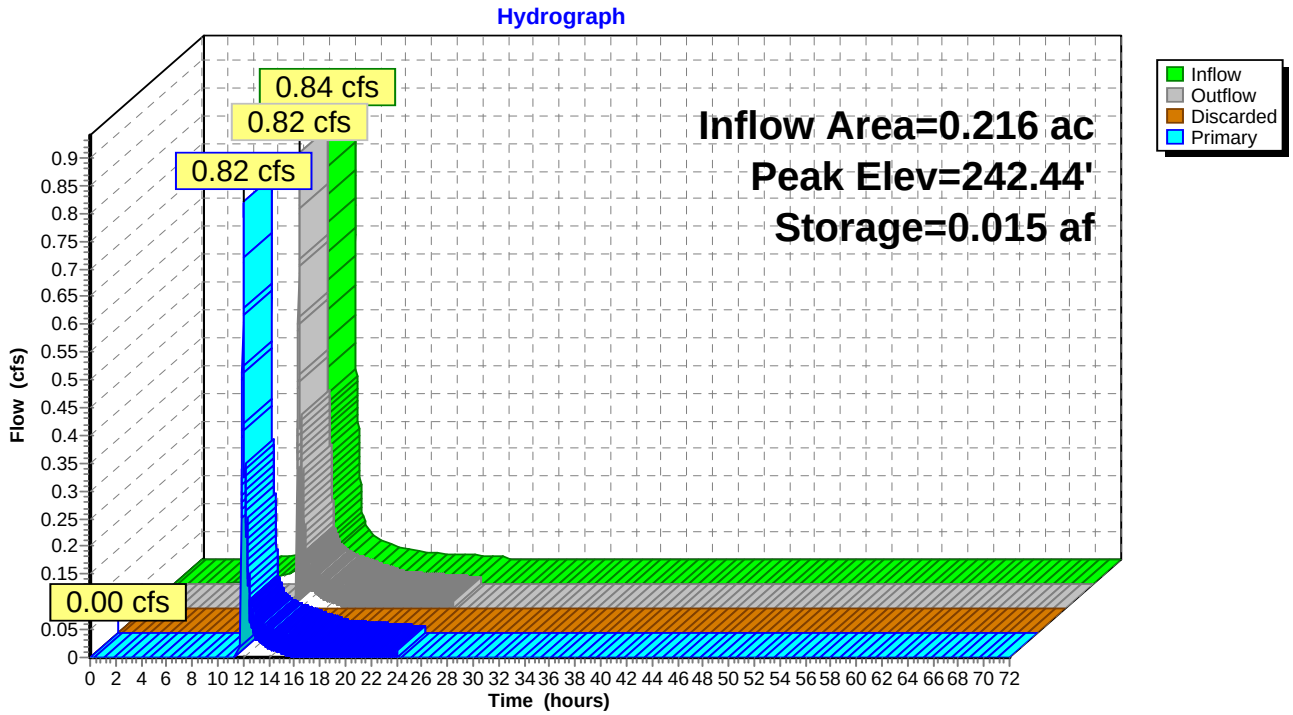
Volume	Invert	Avail.Storage	Storage Description
#1	237.50'	0.015 af	**36.0" D x 90.0'L Pipe Storage**

Device	Routing	Invert	Outlet Devices
#1	Primary	242.00'	**15.0" Round Culvert** L= 22.0' Ke= 0.500 Outlet Invert= 241.78' S= 0.0100 '/' Cc= 0.900 n= 0.010
#2	Discarded	237.50'	**0.450 in/hr Exfiltration X 0.00 over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.50' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.82 cfs @ 12.01 hrs HW=242.44' TW=237.59' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.82 cfs @ 3.19 fps)

Pond 15P: Infiltration Basin



Summary for Pond B1: U/G Basin 1

Inflow Area = 2.032 ac, 76.23% Impervious, Inflow Depth = 2.73" for 2 Year event
Inflow = 5.84 cfs @ 12.07 hrs, Volume= 0.462 af
Outflow = 1.50 cfs @ 12.45 hrs, Volume= 0.462 af, Atten= 74%, Lag= 22.8 min
Primary = 1.50 cfs @ 12.45 hrs, Volume= 0.462 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 238.26' @ 12.45 hrs Surf.Area= 0.121 ac Storage= 0.114 af

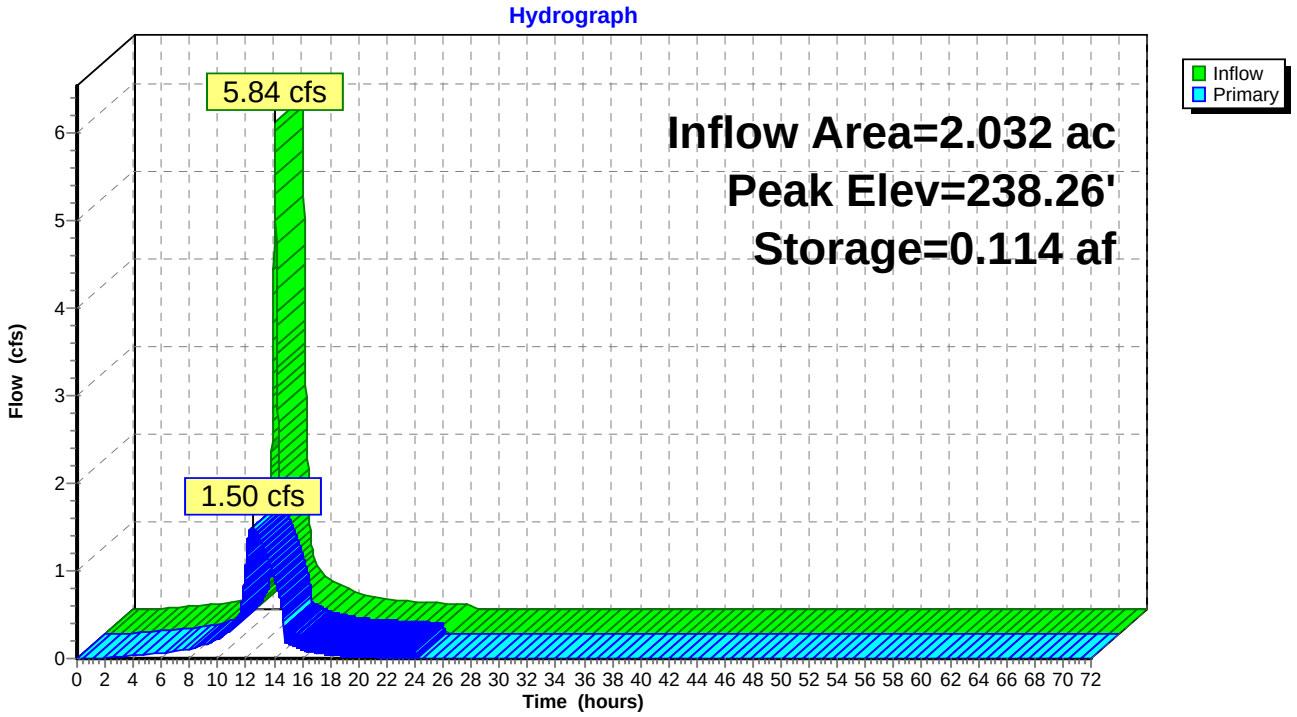
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 21.0 min (793.4 - 772.4)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	0.277 af	**36.0" D x 213.0'L Pipe Storage** x 8
#2	237.00'	0.011 af	**36.0" D x 35.0'L Pipe Storage** x 2
		0.288 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	236.60'	**15.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 236.30' S= 0.0100 '/' Cc= 0.900 n= 0.011
#2	Device 1	236.60'	**7.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	238.30'	**42.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.50 cfs @ 12.45 hrs HW=238.26' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 1.50 cfs of 5.93 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 1.50 cfs @ 5.62 fps)
3=Orifice/Grate (Controls 0.00 cfs)

Pond B1: U/G Basin 1

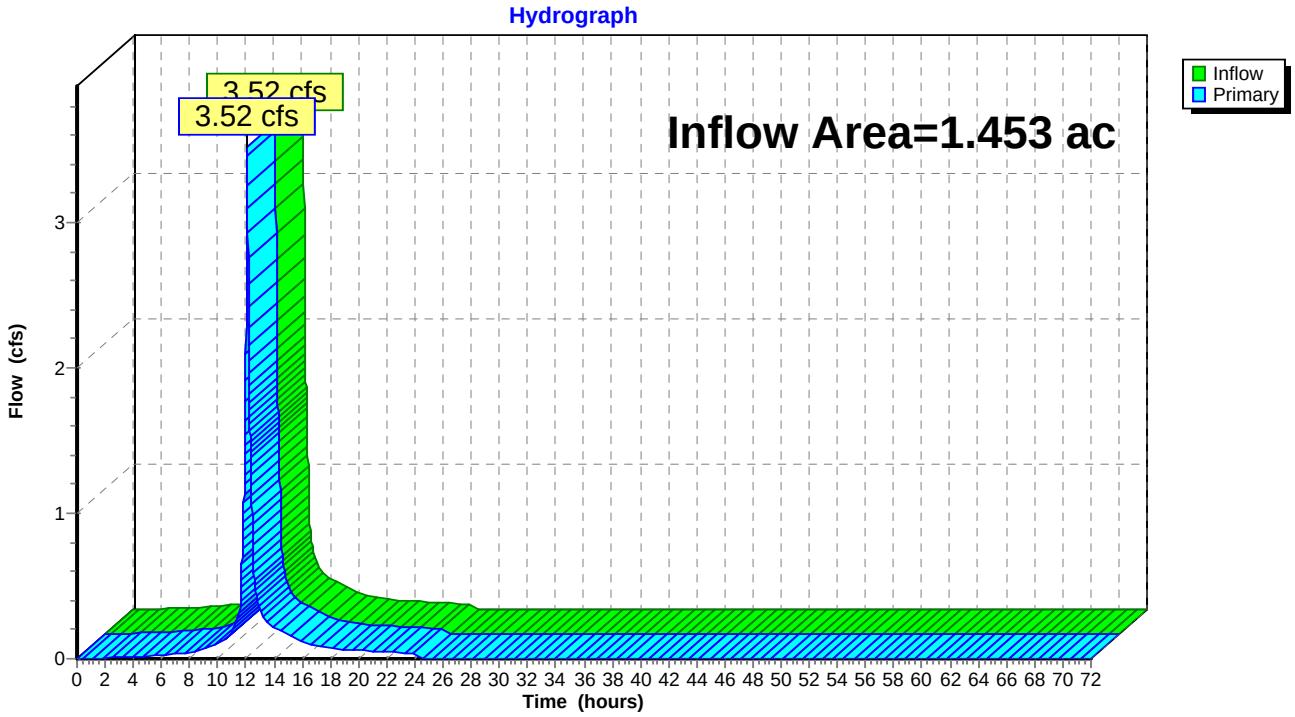


Summary for Link E1: EDA-1

Inflow Area = 1.453 ac, 38.27% Impervious, Inflow Depth = 2.21" for 2 Year event
Inflow = 3.52 cfs @ 12.09 hrs, Volume= 0.267 af
Primary = 3.52 cfs @ 12.09 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E1: EDA-1

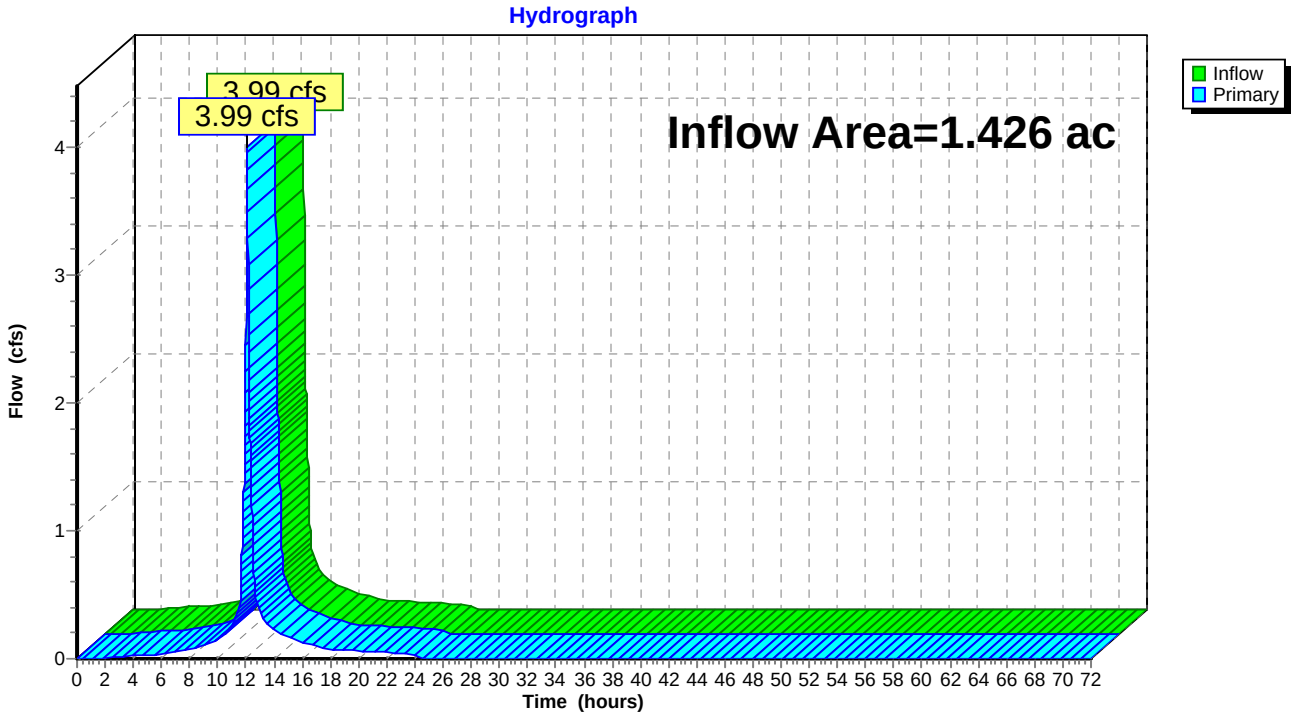


Summary for Link E2: EDA-2

Inflow Area = 1.426 ac, 63.74% Impervious, Inflow Depth = 2.62" for 2 Year event
Inflow = 3.99 cfs @ 12.09 hrs, Volume= 0.311 af
Primary = 3.99 cfs @ 12.09 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E2: EDA-2

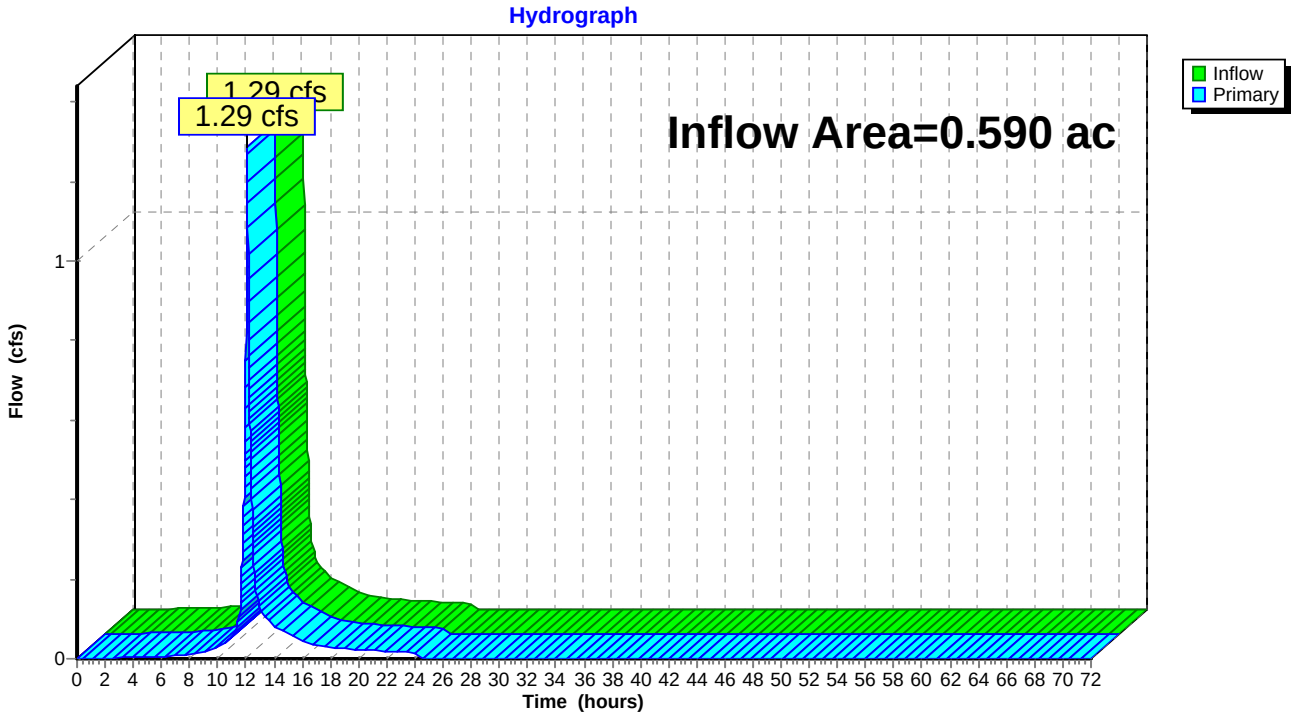


Summary for Link E3: EDA-3

Inflow Area = 0.590 ac, 22.37% Impervious, Inflow Depth = 1.95" for 2 Year event
Inflow = 1.29 cfs @ 12.09 hrs, Volume= 0.096 af
Primary = 1.29 cfs @ 12.09 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E3: EDA-3

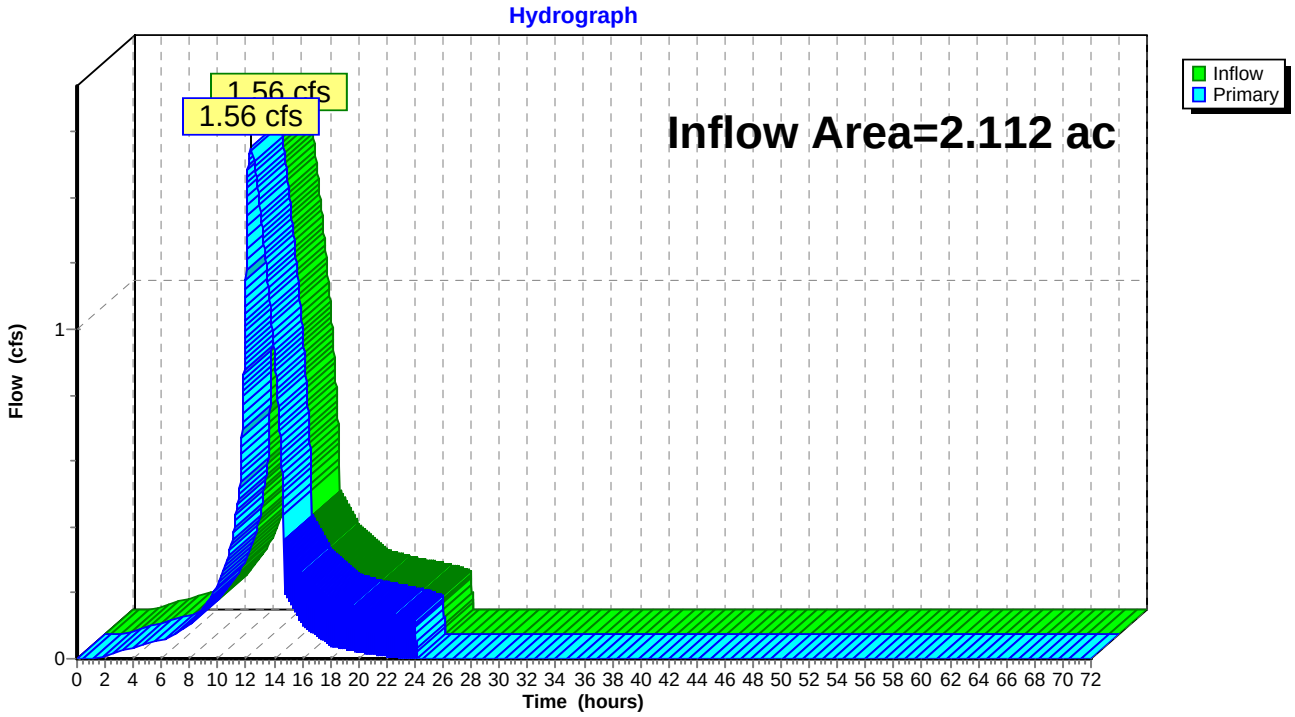


Summary for Link P1: PDA-1

Inflow Area = 2.112 ac, 73.91% Impervious, Inflow Depth = 2.69" for 2 Year event
Inflow = 1.56 cfs @ 12.38 hrs, Volume= 0.474 af
Primary = 1.56 cfs @ 12.38 hrs, Volume= 0.474 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P1: PDA-1

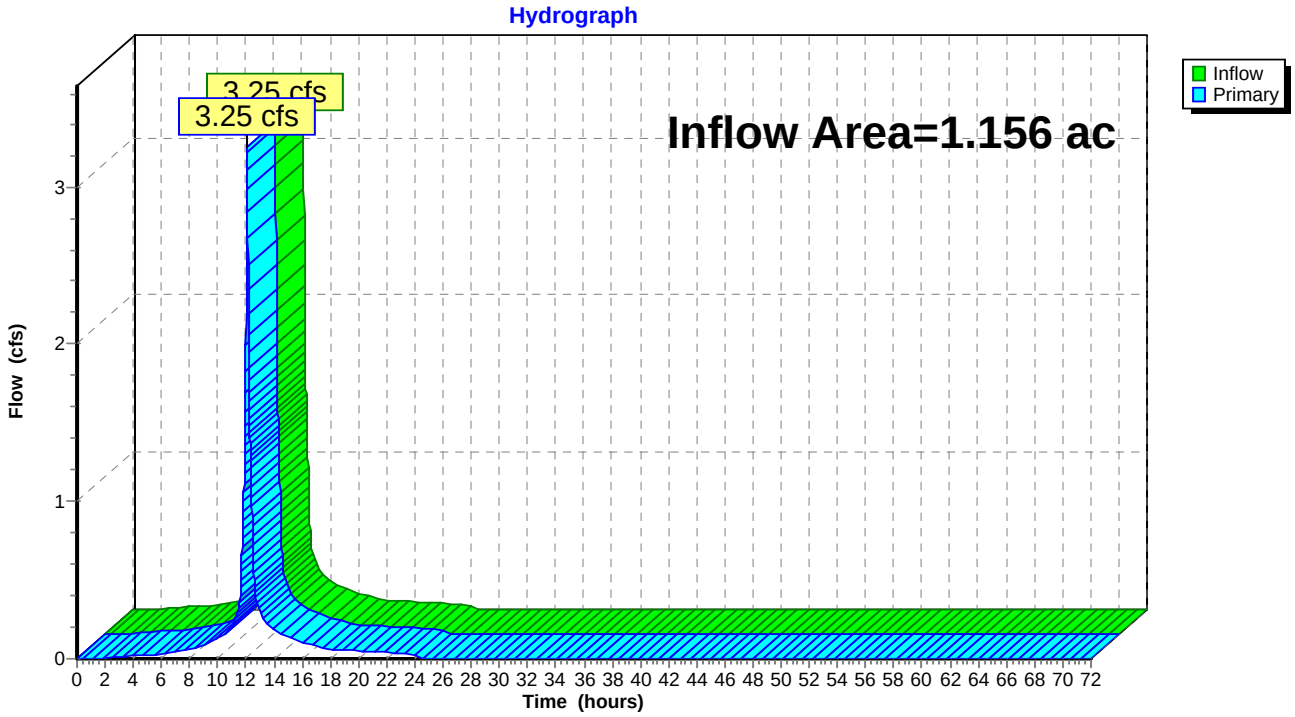


Summary for Link P2: PDA-2

Inflow Area = 1.156 ac, 64.45% Impervious, Inflow Depth = 2.63" for 2 Year event
Inflow = 3.25 cfs @ 12.09 hrs, Volume= 0.253 af
Primary = 3.25 cfs @ 12.09 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P2: PDA-2

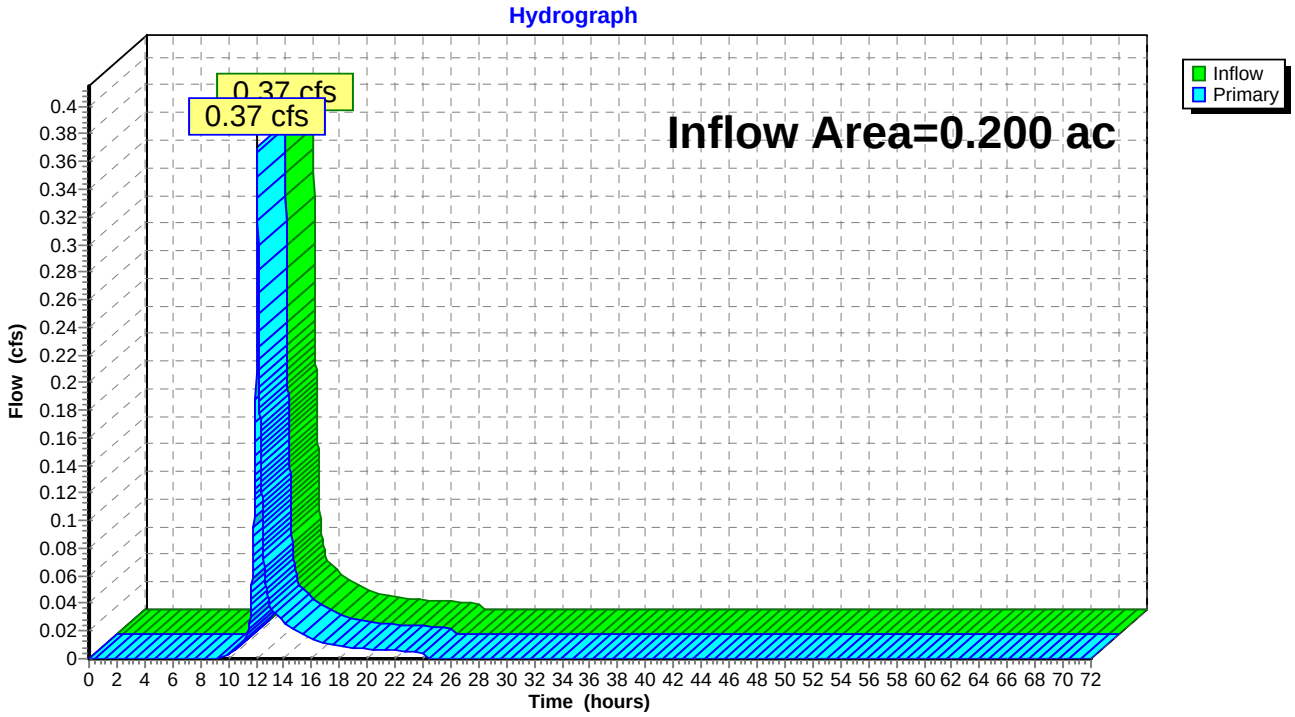


Summary for Link P3: PDA-3

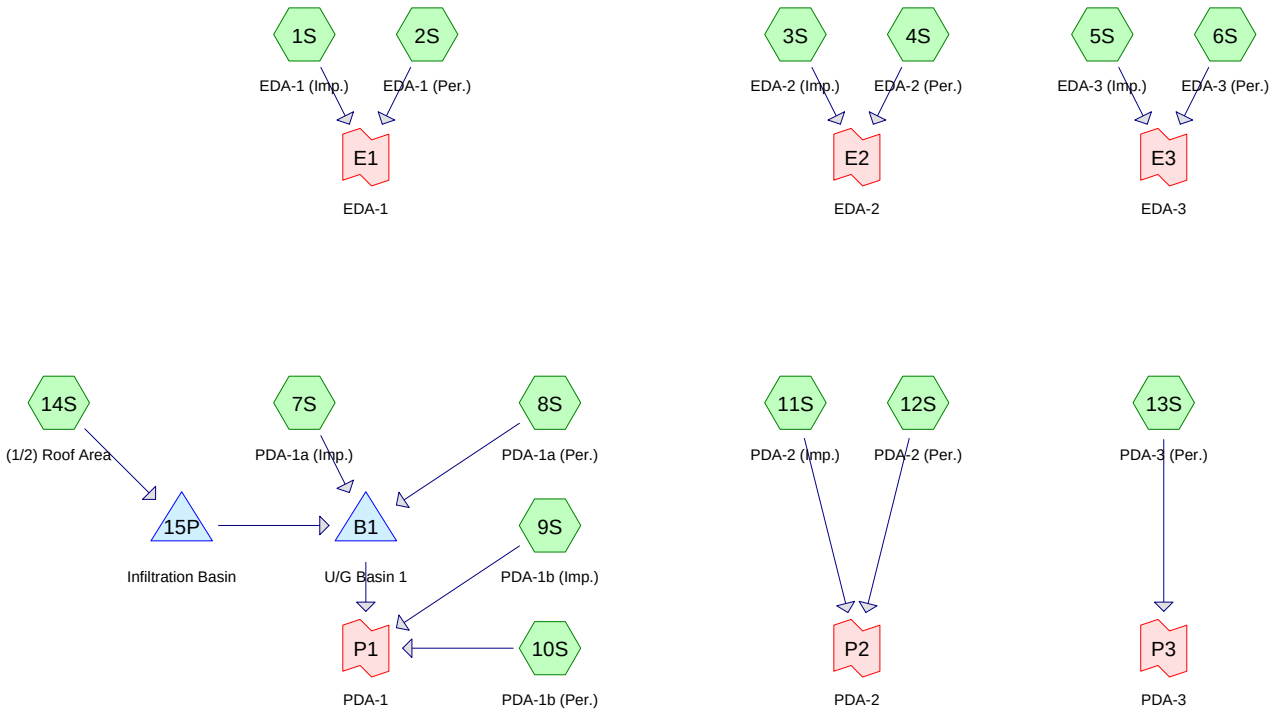
Inflow Area = 0.200 ac, 0.00% Impervious, Inflow Depth = 1.59" for 2 Year event
Inflow = 0.37 cfs @ 12.09 hrs, Volume= 0.026 af
Primary = 0.37 cfs @ 12.09 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P3: PDA-3



10-Year Storm Event



Subcat Reach Pond Link

Drainage Diagram for EX-PR_03-2018
Prepared by Bohler Engineering, Printed 3/15/2018

Summary for Subcatchment 1S: EDA-1 (Imp.)

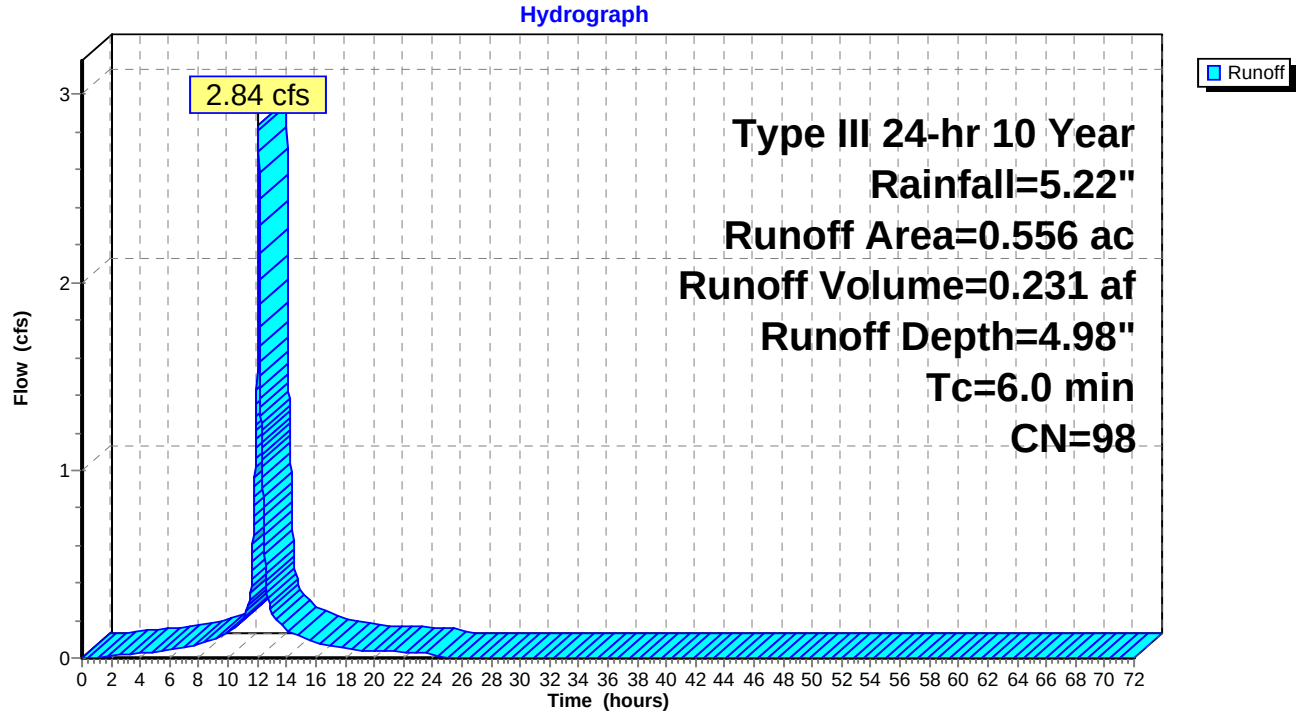
Runoff = 2.84 cfs @ 12.08 hrs, Volume= 0.231 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.556	98	Paved parking, HSG D
0.556		100.00% Impervious Area

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

Subcatchment 1S: EDA-1 (Imp.)



Summary for Subcatchment 2S: EDA-1 (Per.)

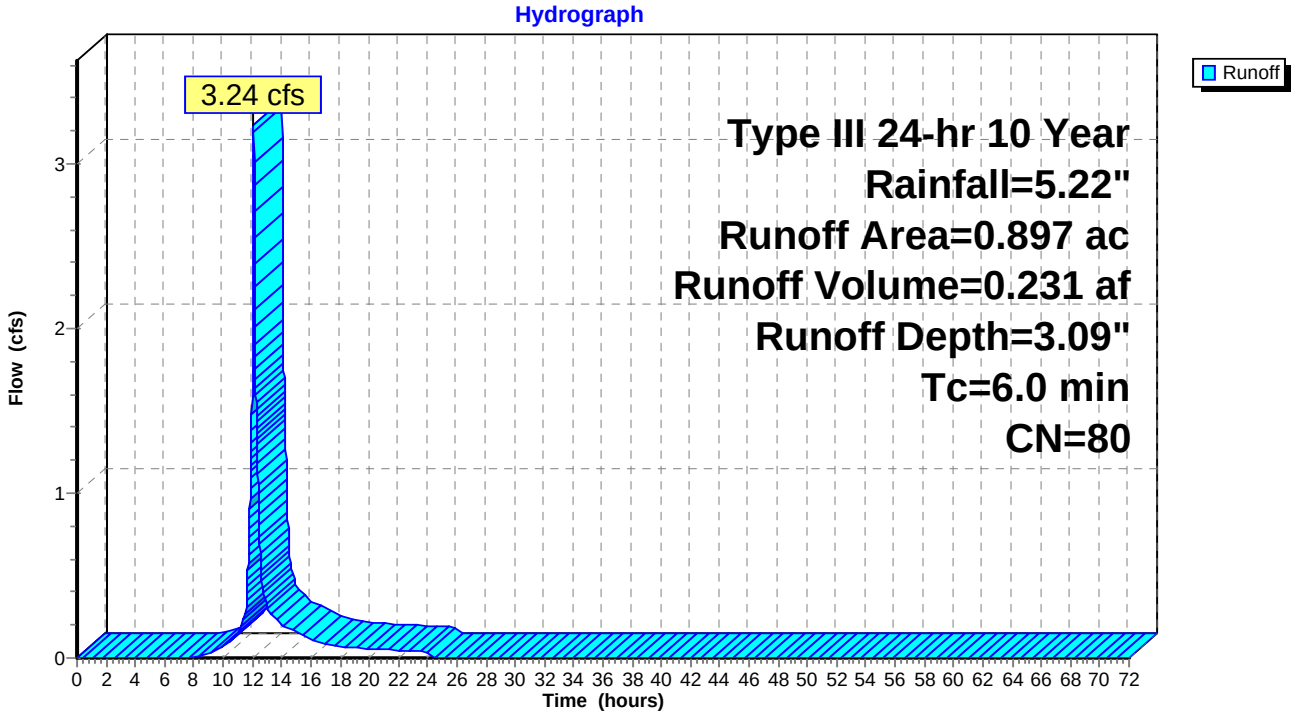
Runoff = 3.24 cfs @ 12.09 hrs, Volume= 0.231 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.897	80	>75% Grass cover, Good, HSG D
0.897		100.00% Pervious Area

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

Subcatchment 2S: EDA-1 (Per.)



Summary for Subcatchment 3S: EDA-2 (Imp.)

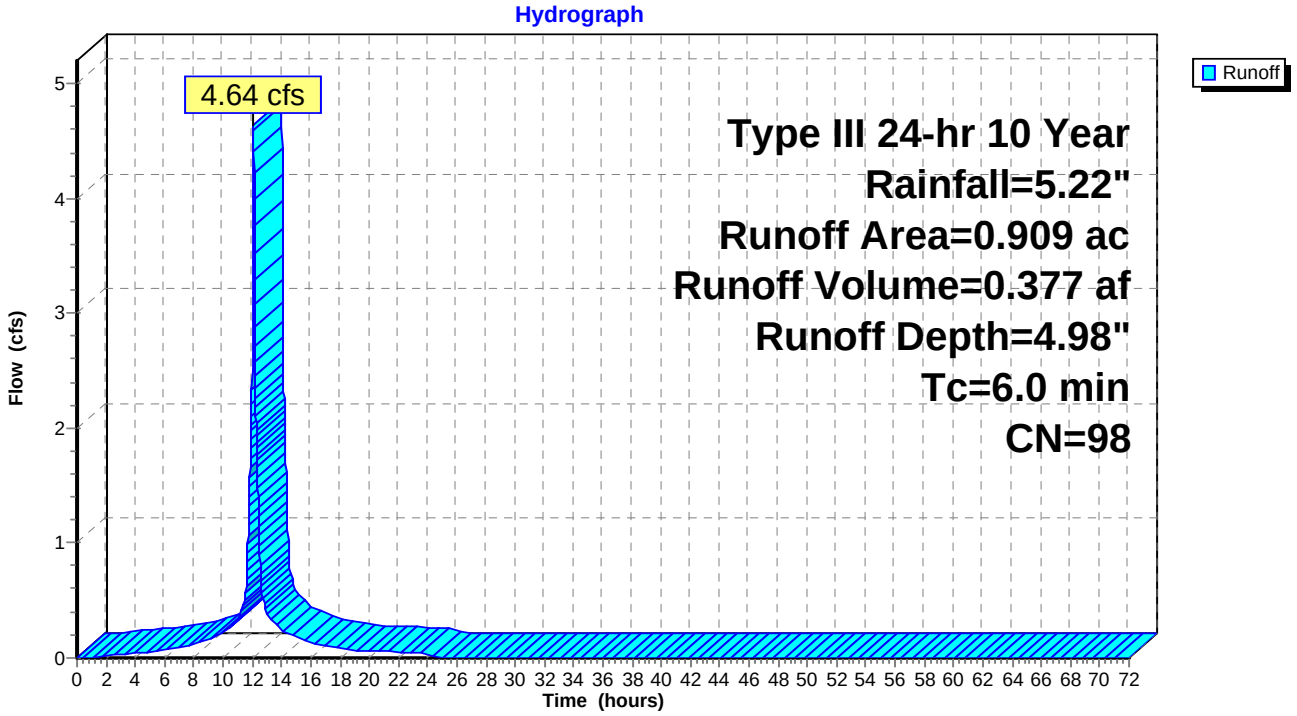
Runoff = 4.64 cfs @ 12.08 hrs, Volume= 0.377 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.909	98	Paved parking, HSG D
0.909		100.00% Impervious Area

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

Subcatchment 3S: EDA-2 (Imp.)



Summary for Subcatchment 4S: EDA-2 (Per.)

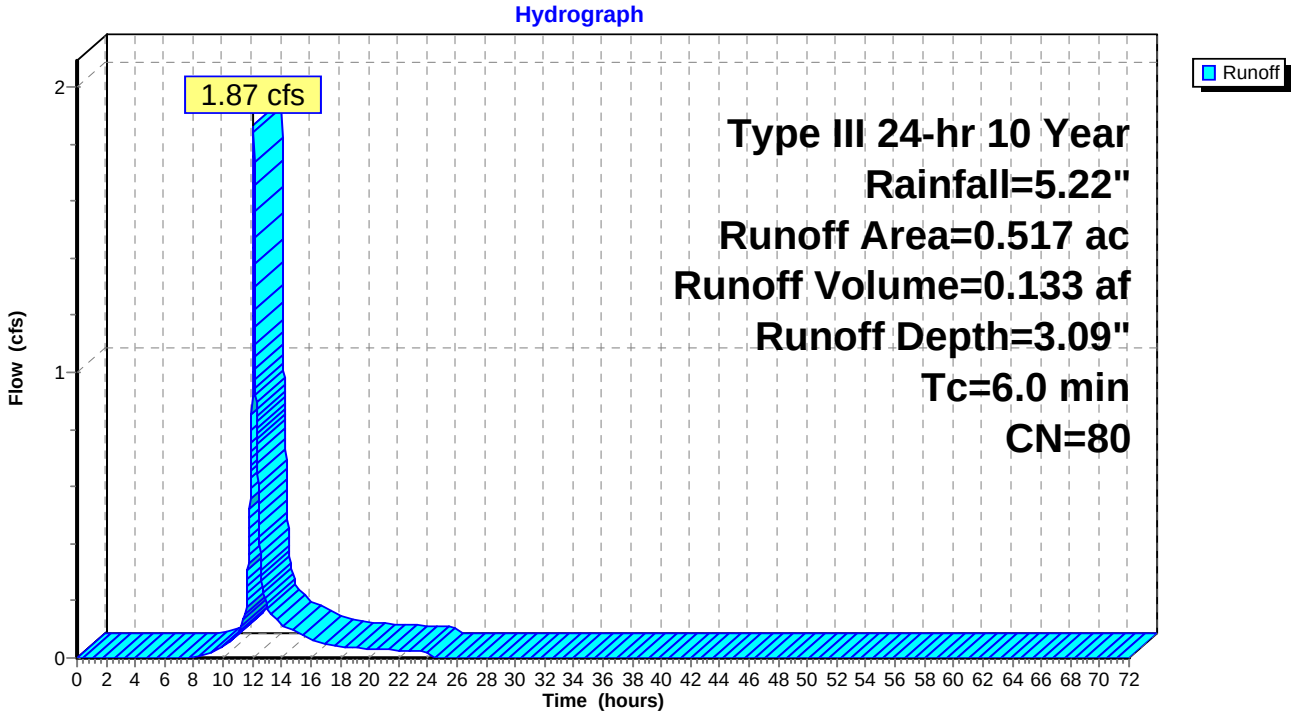
Runoff = 1.87 cfs @ 12.09 hrs, Volume= 0.133 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.517	80	>75% Grass cover, Good, HSG D
0.517		100.00% Pervious Area

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

Subcatchment 4S: EDA-2 (Per.)



Summary for Subcatchment 5S: EDA-3 (Imp.)

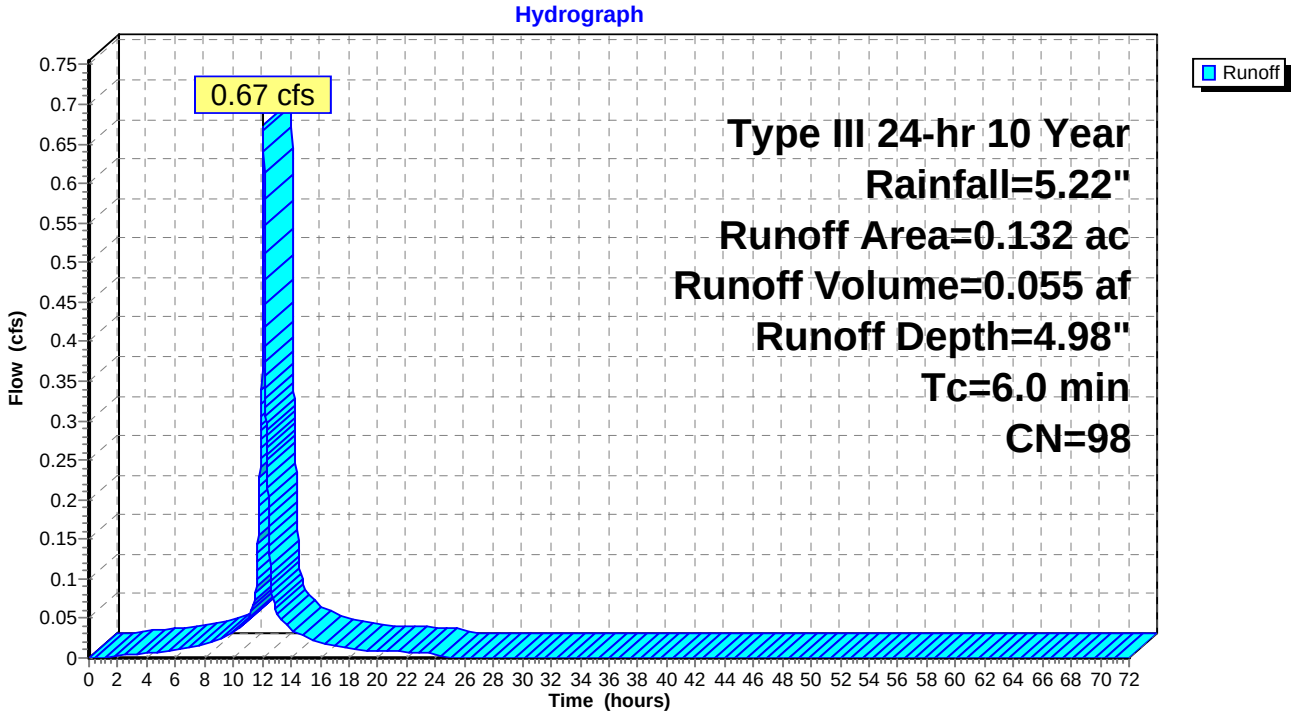
Runoff = 0.67 cfs @ 12.08 hrs, Volume= 0.055 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.132	98	Paved parking, HSG D
0.132		100.00% Impervious Area

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

Subcatchment 5S: EDA-3 (Imp.)



Summary for Subcatchment 6S: EDA-3 (Per.)

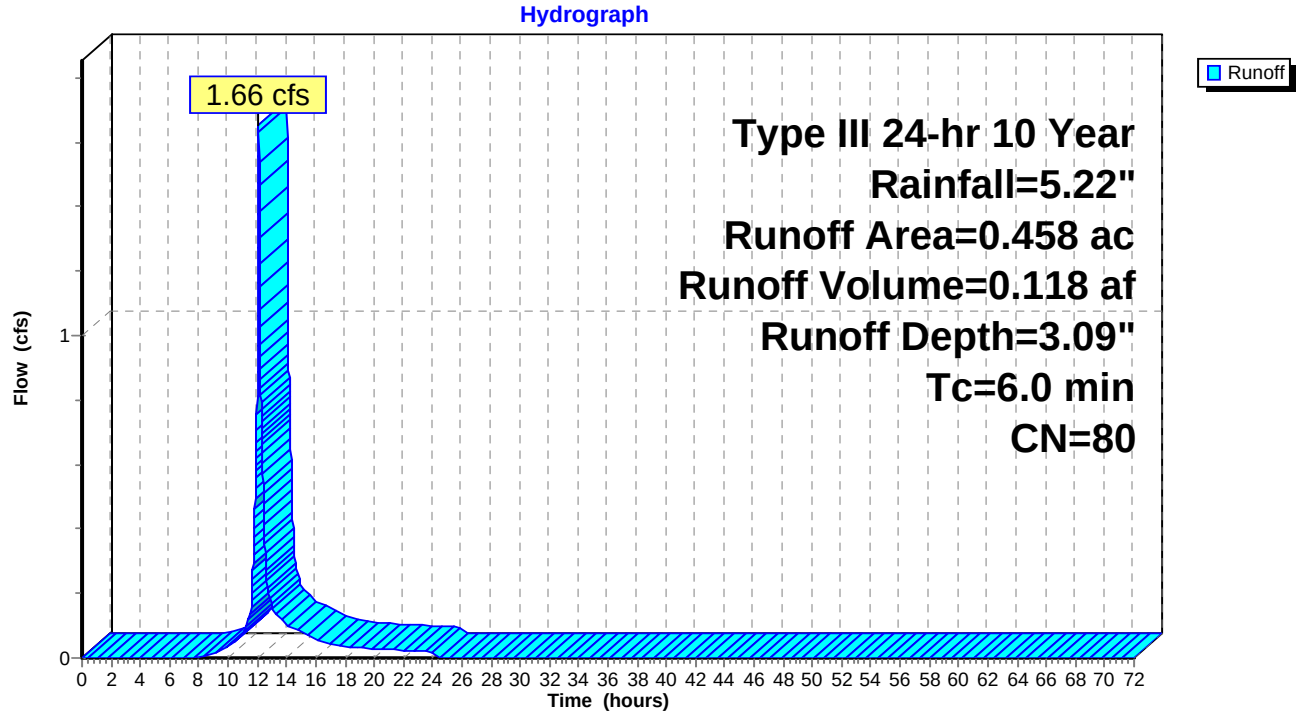
Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.118 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.458	80	>75% Grass cover, Good, HSG D
0.458		100.00% Pervious Area

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

Subcatchment 6S: EDA-3 (Per.)



Summary for Subcatchment 7S: PDA-1a (Imp.)

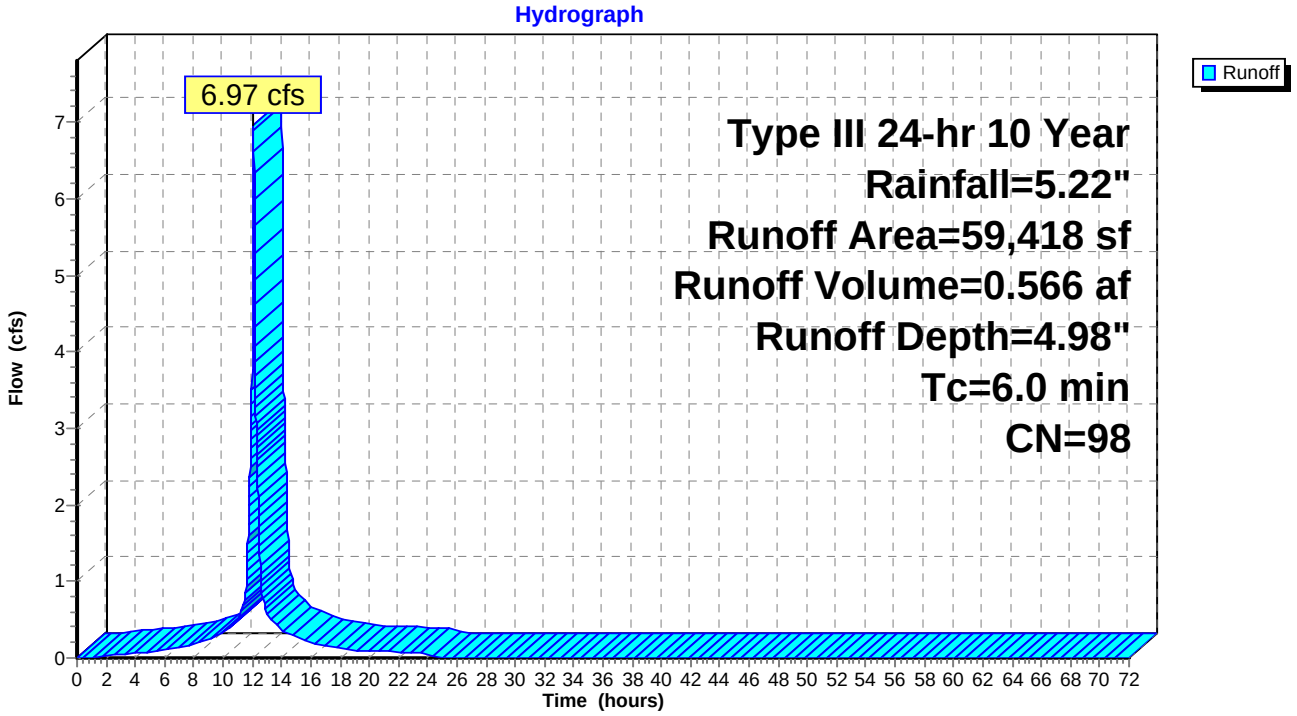
Runoff = 6.97 cfs @ 12.08 hrs, Volume= 0.566 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (sf)	CN	Description
59,418	98	Paved parking, HSG D
59,418		100.00% Impervious Area

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

Subcatchment 7S: PDA-1a (Imp.)



Summary for Subcatchment 8S: PDA-1a (Per.)

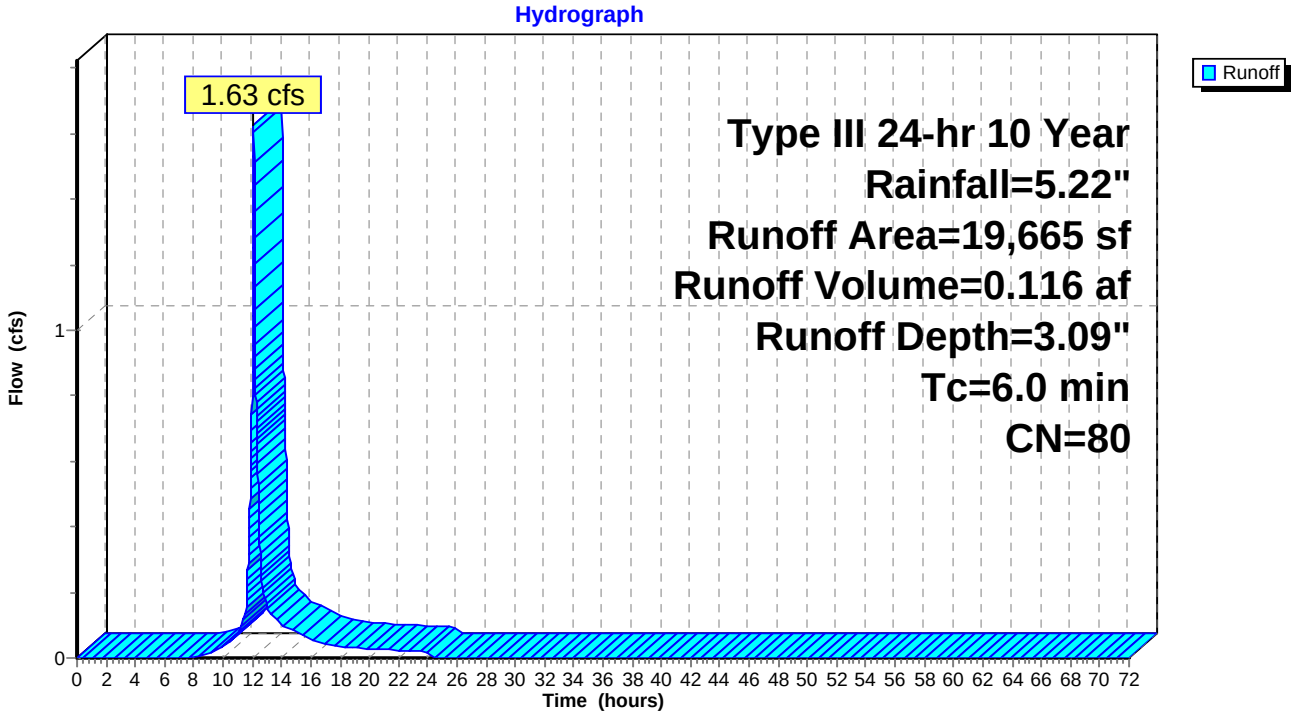
Runoff = 1.63 cfs @ 12.09 hrs, Volume= 0.116 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (sf)	CN	Description
19,665	80	>75% Grass cover, Good, HSG D
19,665		100.00% Pervious Area

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

Subcatchment 8S: PDA-1a (Per.)



Summary for Subcatchment 9S: PDA-1b (Imp.)

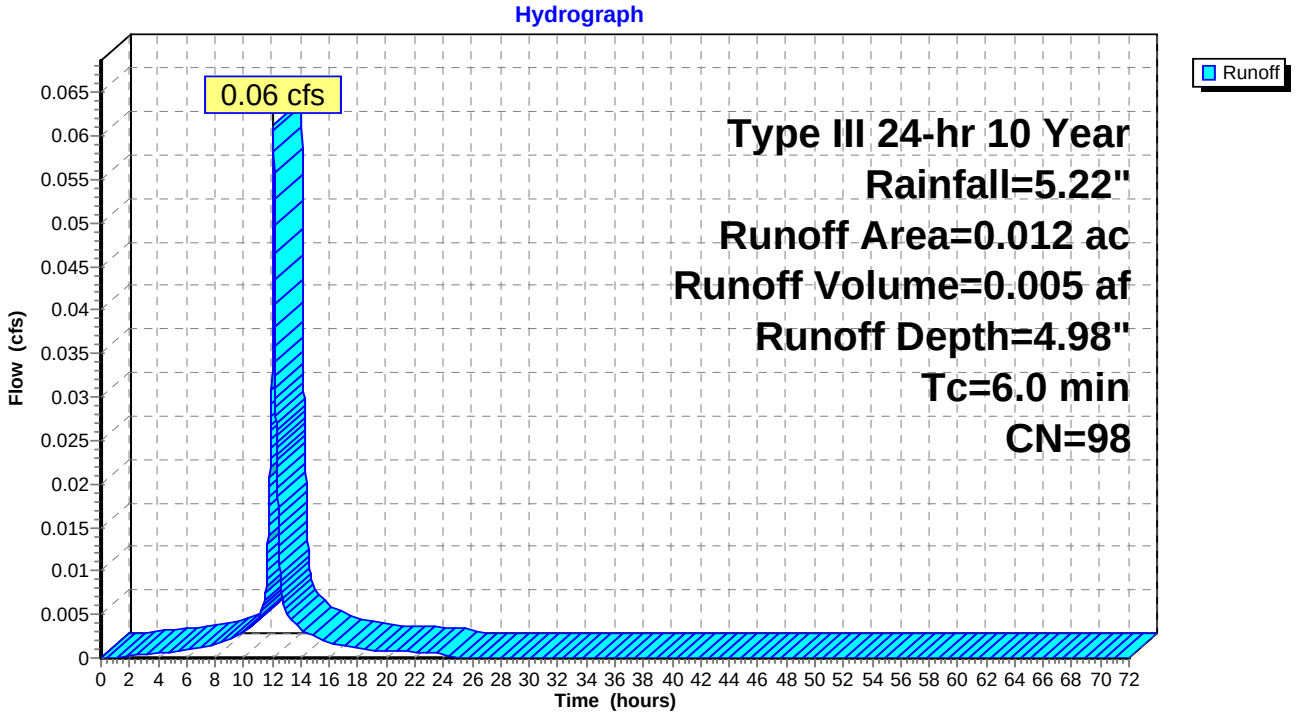
Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.005 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG D
0.012		100.00% Impervious Area

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

Subcatchment 9S: PDA-1b (Imp.)



Summary for Subcatchment 10S: PDA-1b (Per.)

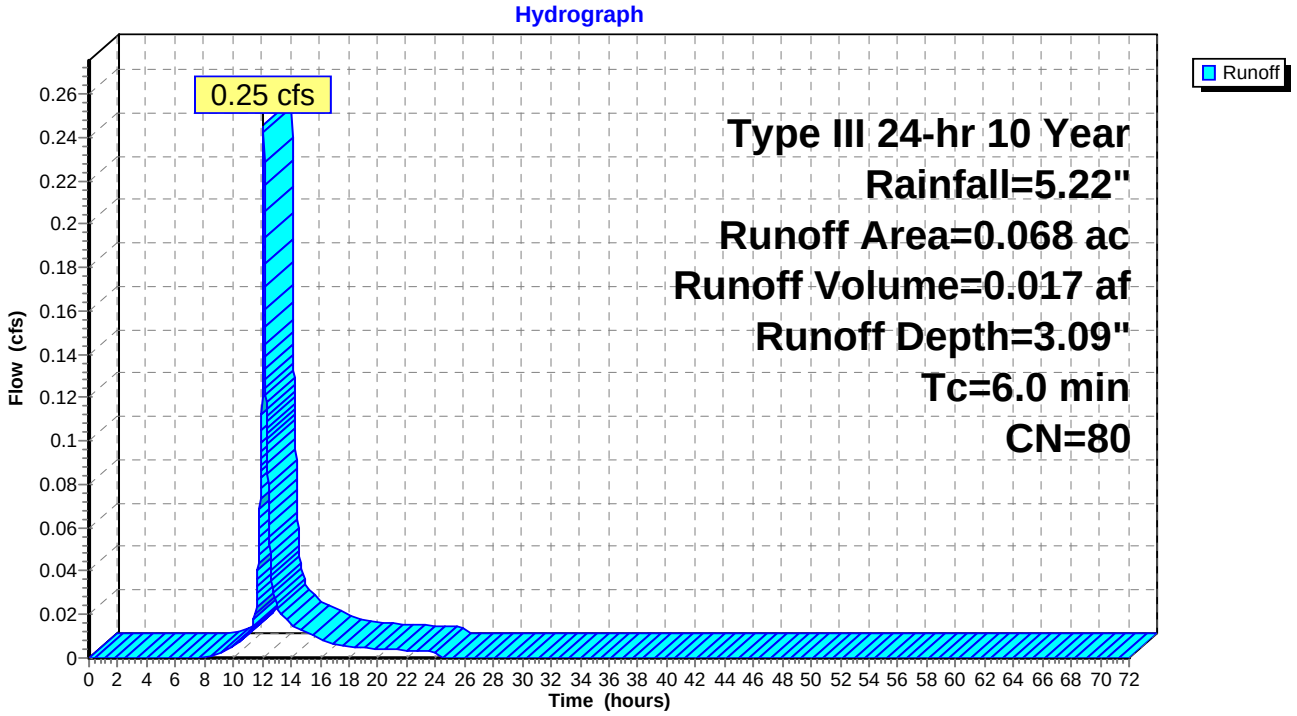
Runoff = 0.25 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.068	80	>75% Grass cover, Good, HSG D
0.068		100.00% Pervious Area

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

Subcatchment 10S: PDA-1b (Per.)



Summary for Subcatchment 11S: PDA-2 (Imp.)

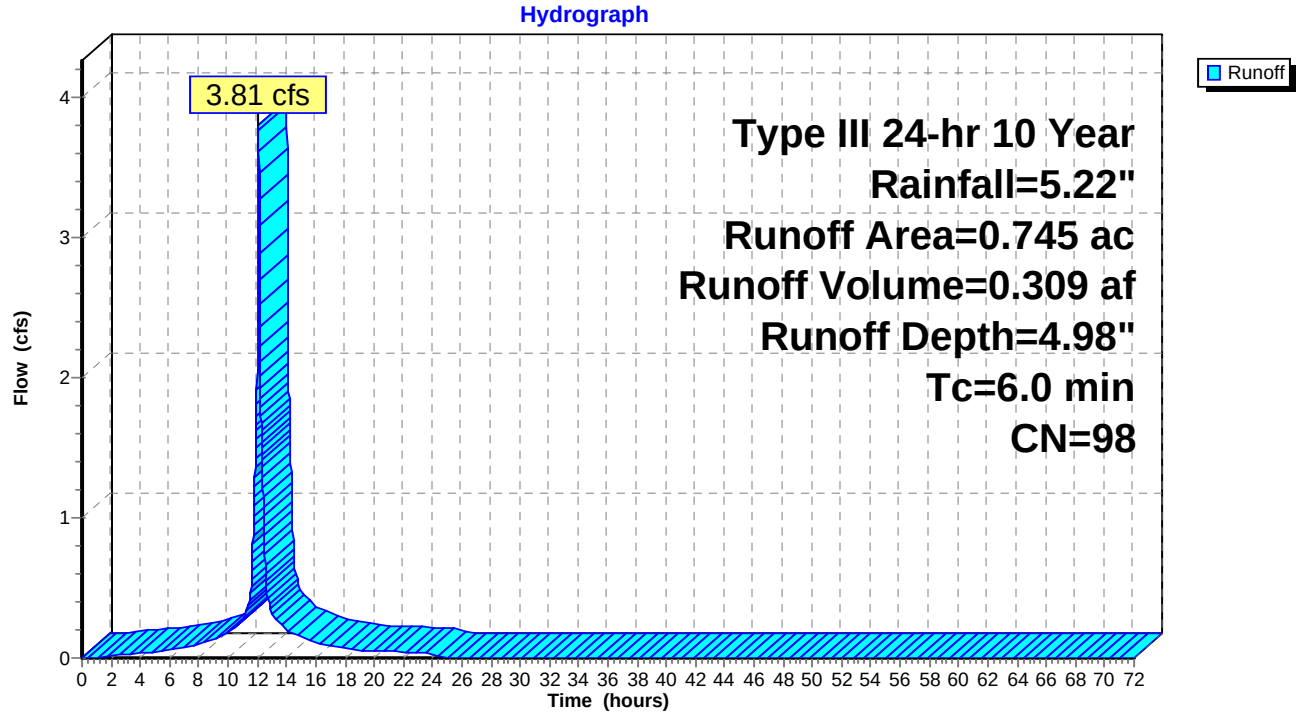
Runoff = 3.81 cfs @ 12.08 hrs, Volume= 0.309 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.745	98	Paved parking, HSG D
0.745		100.00% Impervious Area

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

Subcatchment 11S: PDA-2 (Imp.)



Summary for Subcatchment 12S: PDA-2 (Per.)

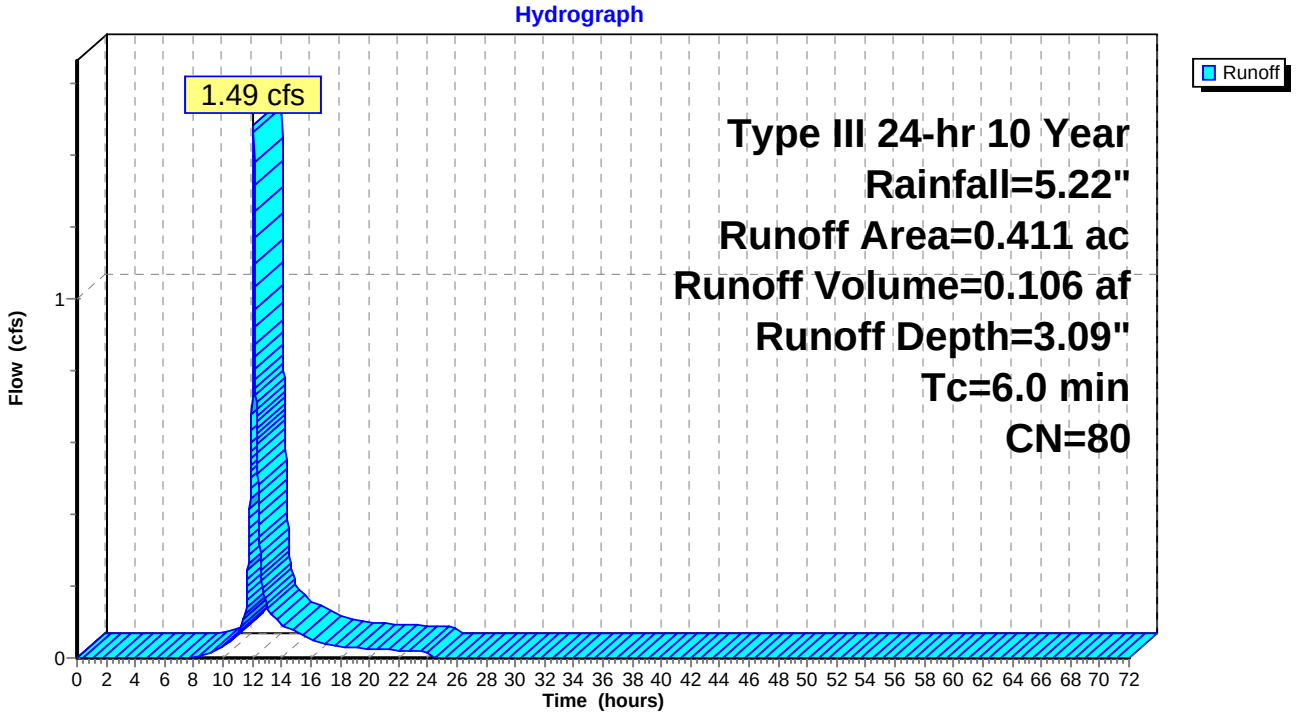
Runoff = 1.49 cfs @ 12.09 hrs, Volume= 0.106 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.411	80	>75% Grass cover, Good, HSG D
0.411		100.00% Pervious Area

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

Subcatchment 12S: PDA-2 (Per.)



Summary for Subcatchment 13S: PDA-3 (Per.)

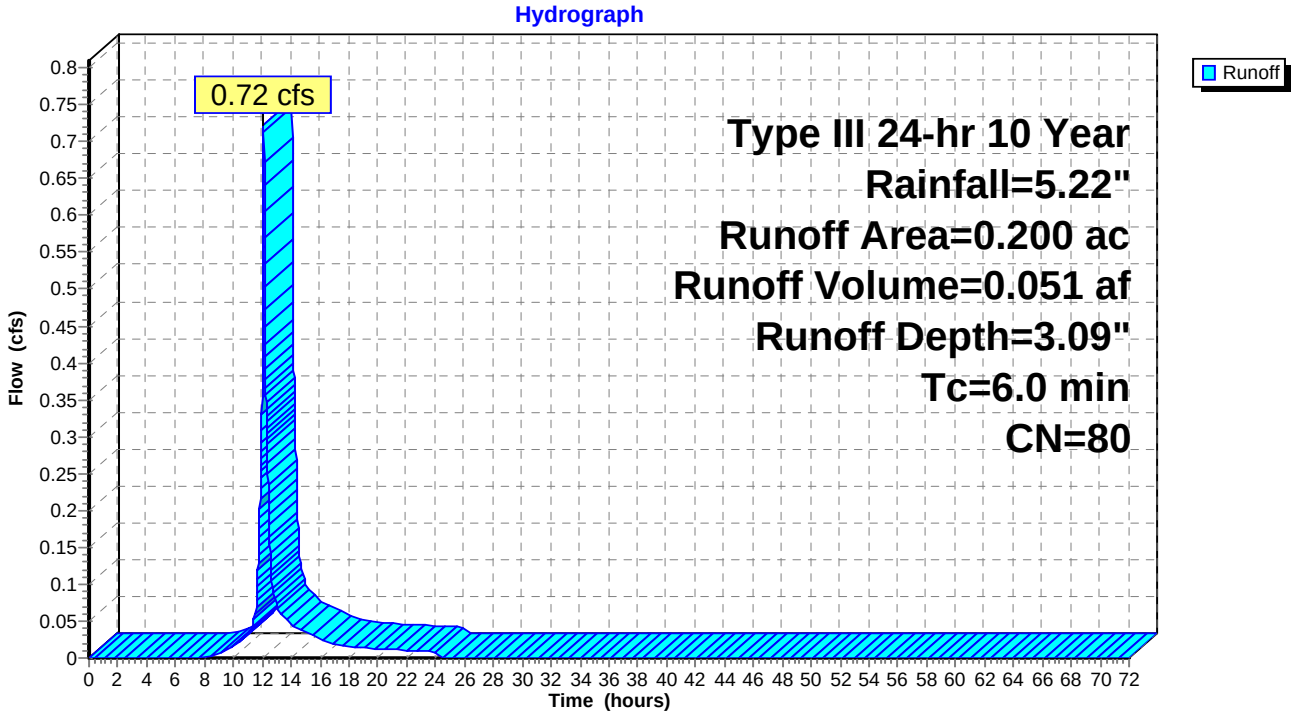
Runoff = 0.72 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (ac)	CN	Description
0.200	80	>75% Grass cover, Good, HSG D
0.200		100.00% Pervious Area

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

Subcatchment 13S: PDA-3 (Per.)



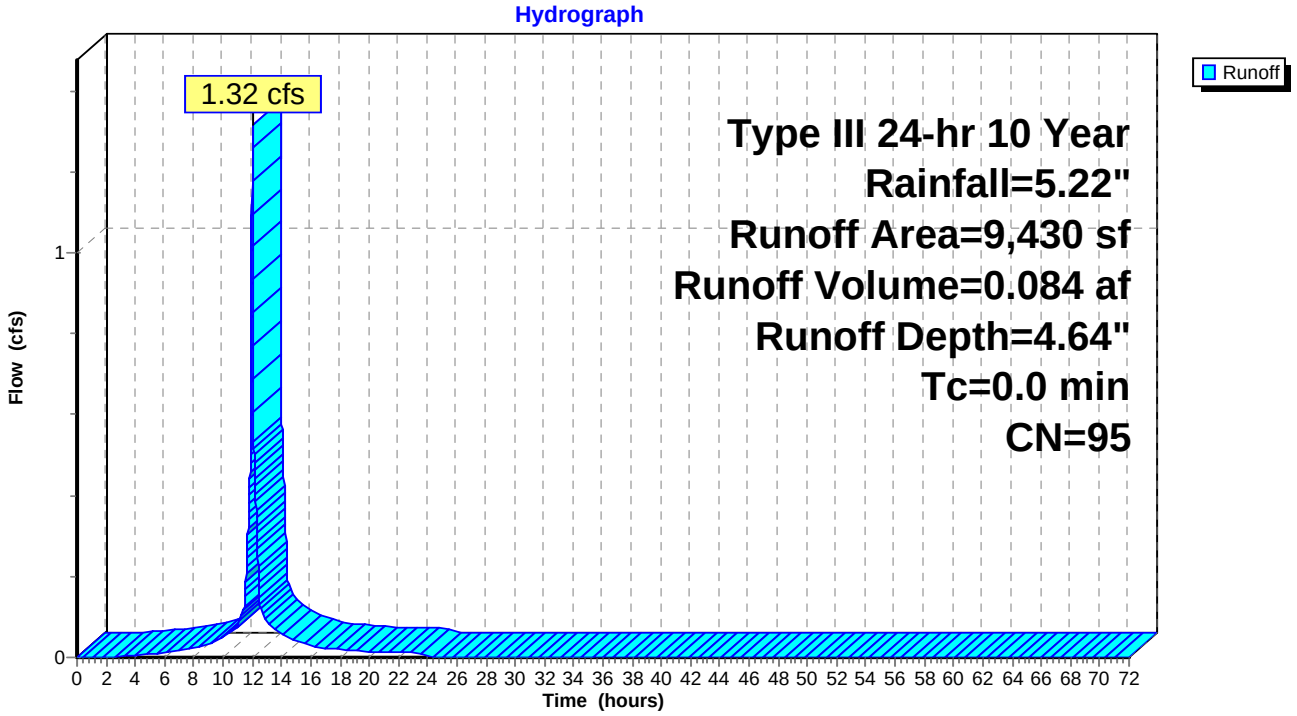
Summary for Subcatchment 14S: (1/2) Roof Area

Runoff = 1.32 cfs @ 12.00 hrs, Volume= 0.084 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.22"

Area (sf)	CN	Description
8,056	98	Paved parking, HSG D
1,374	80	>75% Grass cover, Good, HSG D
9,430	95	Weighted Average
1,374		14.57% Pervious Area
8,056		85.43% Impervious Area

Subcatchment 14S: (1/2) Roof Area



Summary for Pond 15P: Infiltration Basin

Inflow Area = 0.216 ac, 85.43% Impervious, Inflow Depth = 4.64" for 10 Year event
Inflow = 1.32 cfs @ 12.00 hrs, Volume= 0.084 af
Outflow = 1.37 cfs @ 12.00 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 1.37 cfs @ 12.00 hrs, Volume= 0.069 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 242.59' @ 12.00 hrs Surf.Area= 0.000 ac Storage= 0.015 af

Plug-Flow detention time= 120.7 min calculated for 0.069 af (83% of inflow)
Center-of-Mass det. time= 50.7 min (812.2 - 761.5)

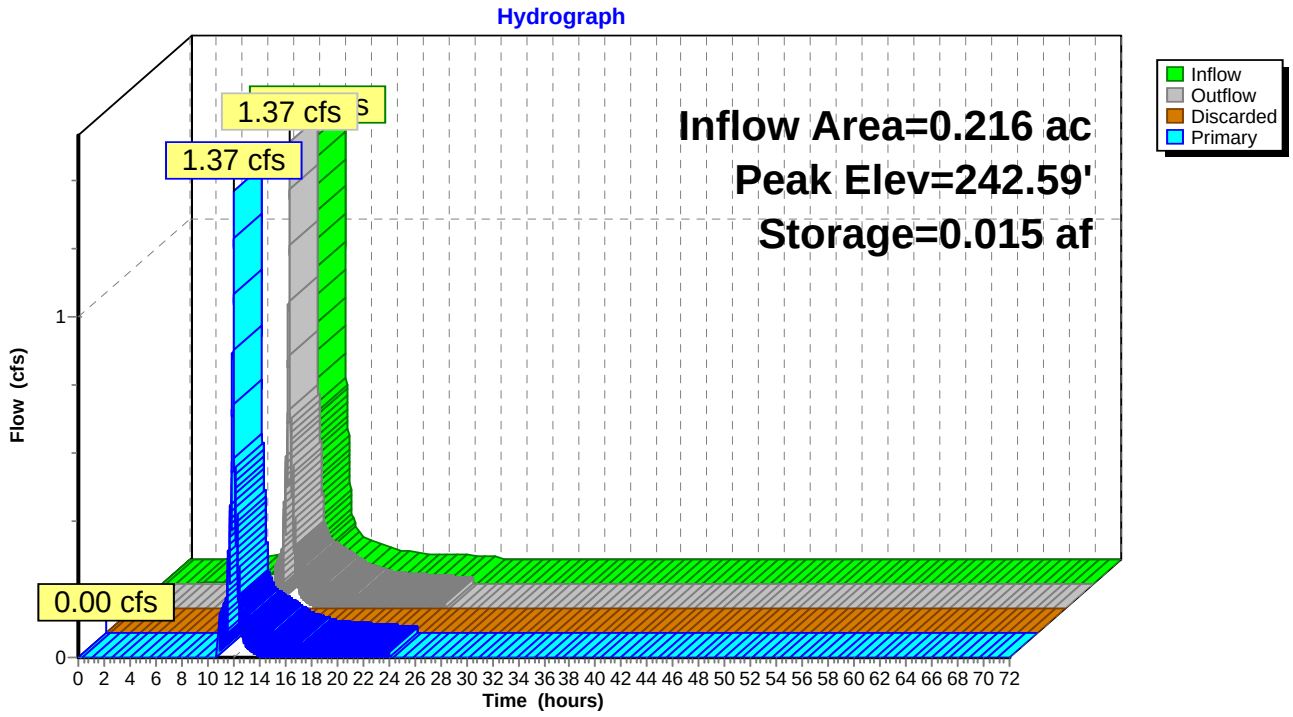
Volume	Invert	Avail.Storage	Storage Description
#1	237.50'	0.015 af	**36.0" D x 90.0'L Pipe Storage**

Device	Routing	Invert	Outlet Devices
#1	Primary	242.00'	**15.0" Round Culvert** L= 22.0' Ke= 0.500 Outlet Invert= 241.78' S= 0.0100 '/' Cc= 0.900 n= 0.010
#2	Discarded	237.50'	**0.450 in/hr Exfiltration X 0.00 over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.50' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=1.37 cfs @ 12.00 hrs HW=242.59' TW=237.99' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.37 cfs @ 3.51 fps)

Pond 15P: Infiltration Basin



Summary for Pond B1: U/G Basin 1

Inflow Area = 2.032 ac, 76.23% Impervious, Inflow Depth = 4.44" for 10 Year event
Inflow = 9.33 cfs @ 12.08 hrs, Volume= 0.752 af
Outflow = 4.43 cfs @ 12.24 hrs, Volume= 0.752 af, Atten= 53%, Lag= 9.9 min
Primary = 4.43 cfs @ 12.24 hrs, Volume= 0.752 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 238.71' @ 12.24 hrs Surf.Area= 0.121 ac Storage= 0.169 af

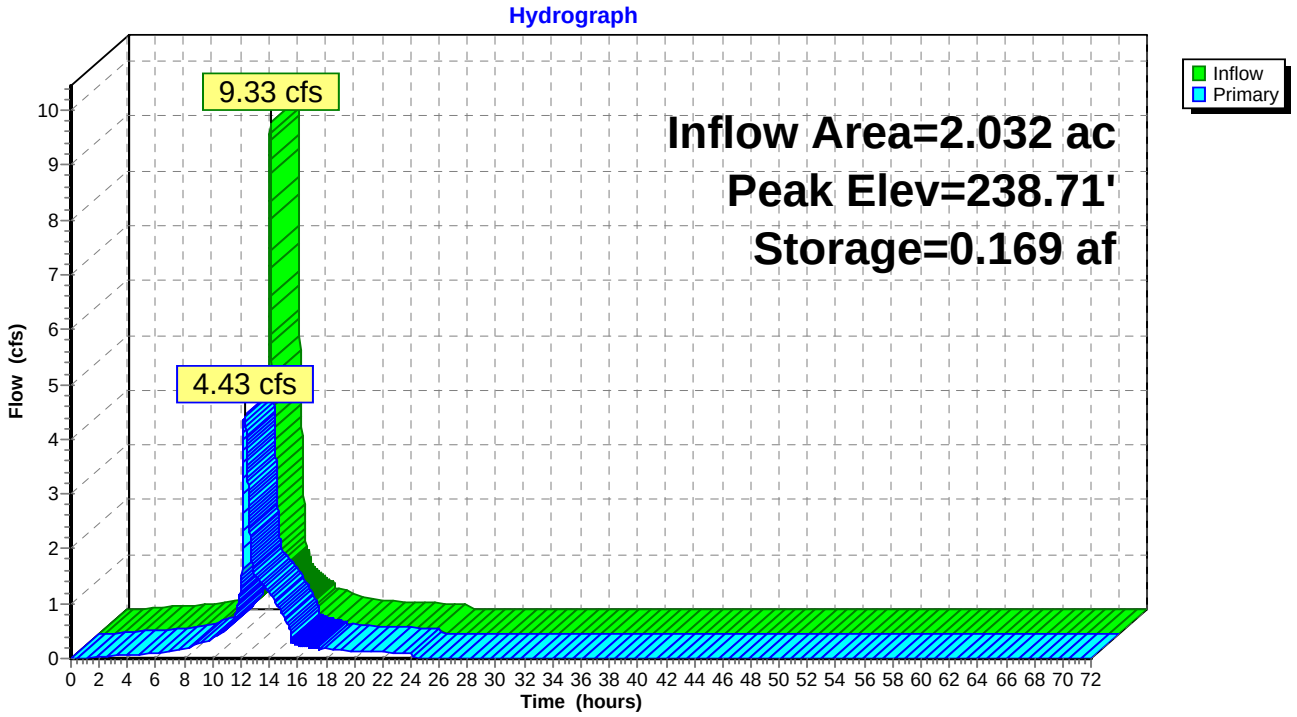
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 22.4 min (786.9 - 764.5)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	0.277 af	**36.0" D x 213.0'L Pipe Storage** x 8
#2	237.00'	0.011 af	**36.0" D x 35.0'L Pipe Storage** x 2
		0.288 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	236.60'	**15.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 236.30' S= 0.0100 '/' Cc= 0.900 n= 0.011
#2	Device 1	236.60'	**7.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	238.30'	**42.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=4.42 cfs @ 12.24 hrs HW=238.71' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 4.42 cfs of 7.19 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 1.73 cfs @ 6.49 fps)
3=Orifice/Grate (Orifice Controls 2.69 cfs @ 2.31 fps)

Pond B1: U/G Basin 1

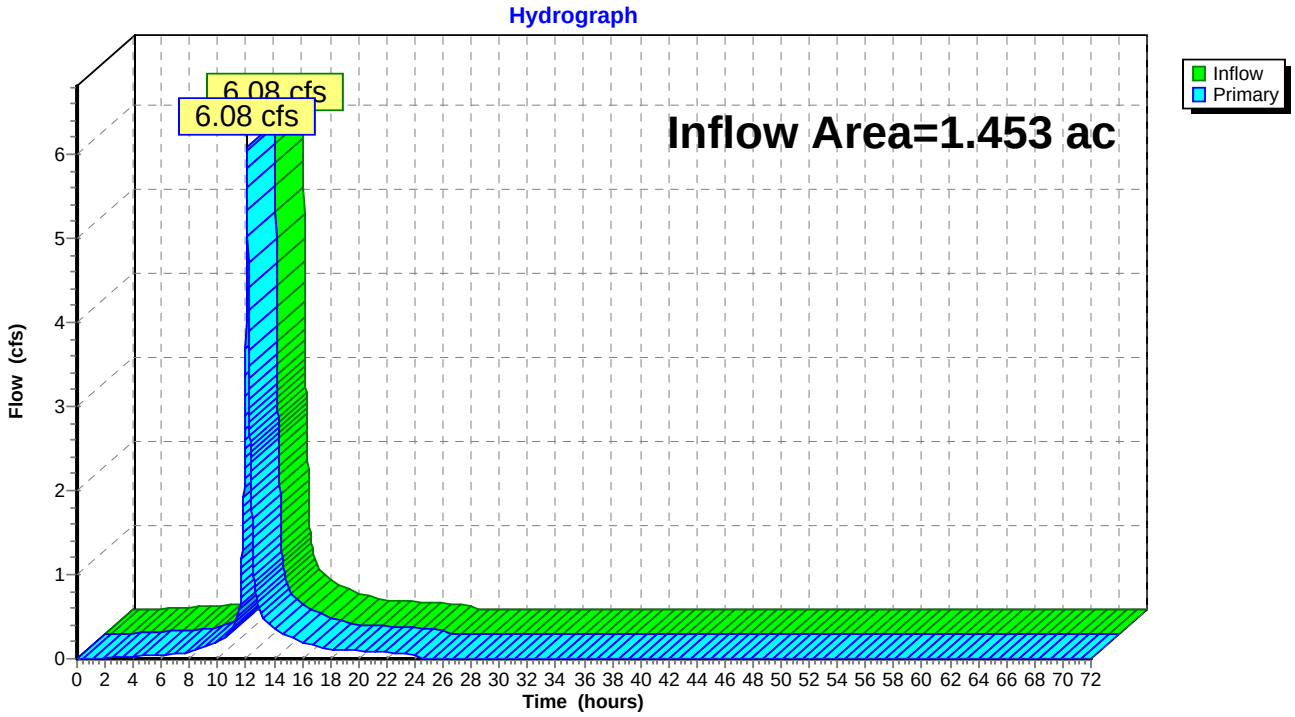


Summary for Link E1: EDA-1

Inflow Area = 1.453 ac, 38.27% Impervious, Inflow Depth = 3.81" for 10 Year event
Inflow = 6.08 cfs @ 12.09 hrs, Volume= 0.462 af
Primary = 6.08 cfs @ 12.09 hrs, Volume= 0.462 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E1: EDA-1

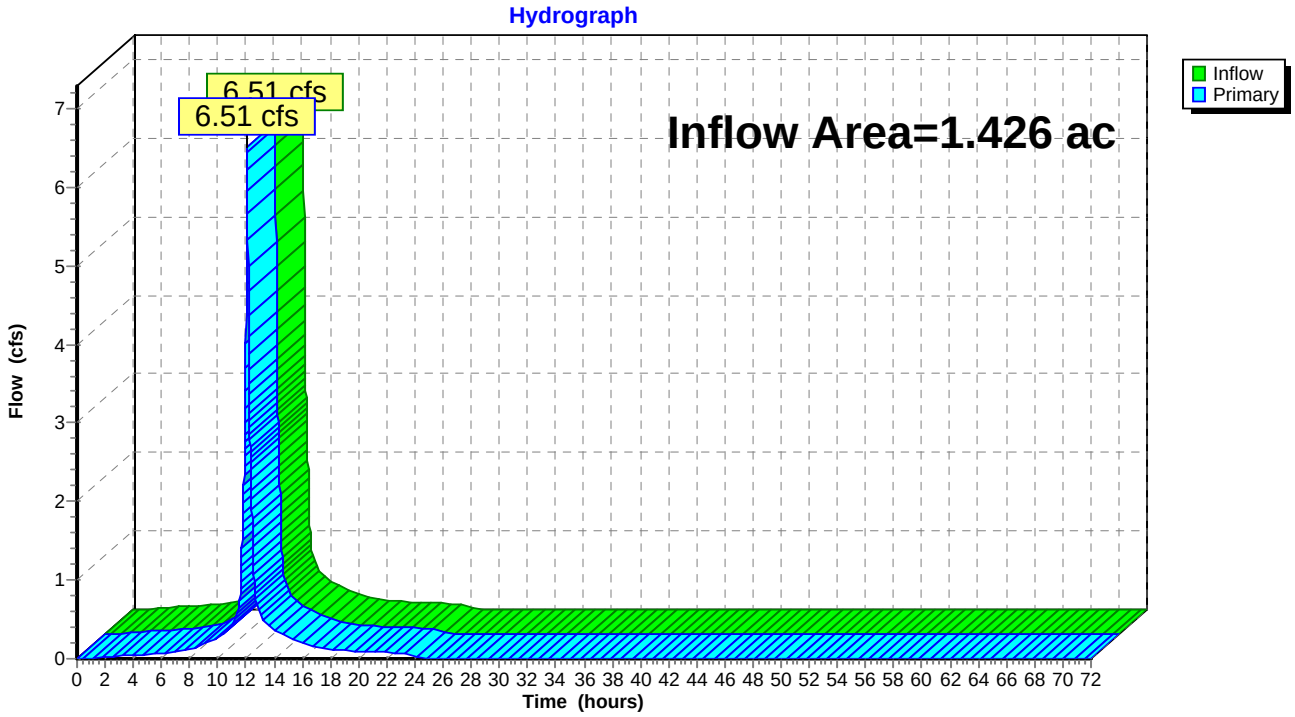


Summary for Link E2: EDA-2

Inflow Area = 1.426 ac, 63.74% Impervious, Inflow Depth = 4.30" for 10 Year event
Inflow = 6.51 cfs @ 12.08 hrs, Volume= 0.510 af
Primary = 6.51 cfs @ 12.08 hrs, Volume= 0.510 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E2: EDA-2

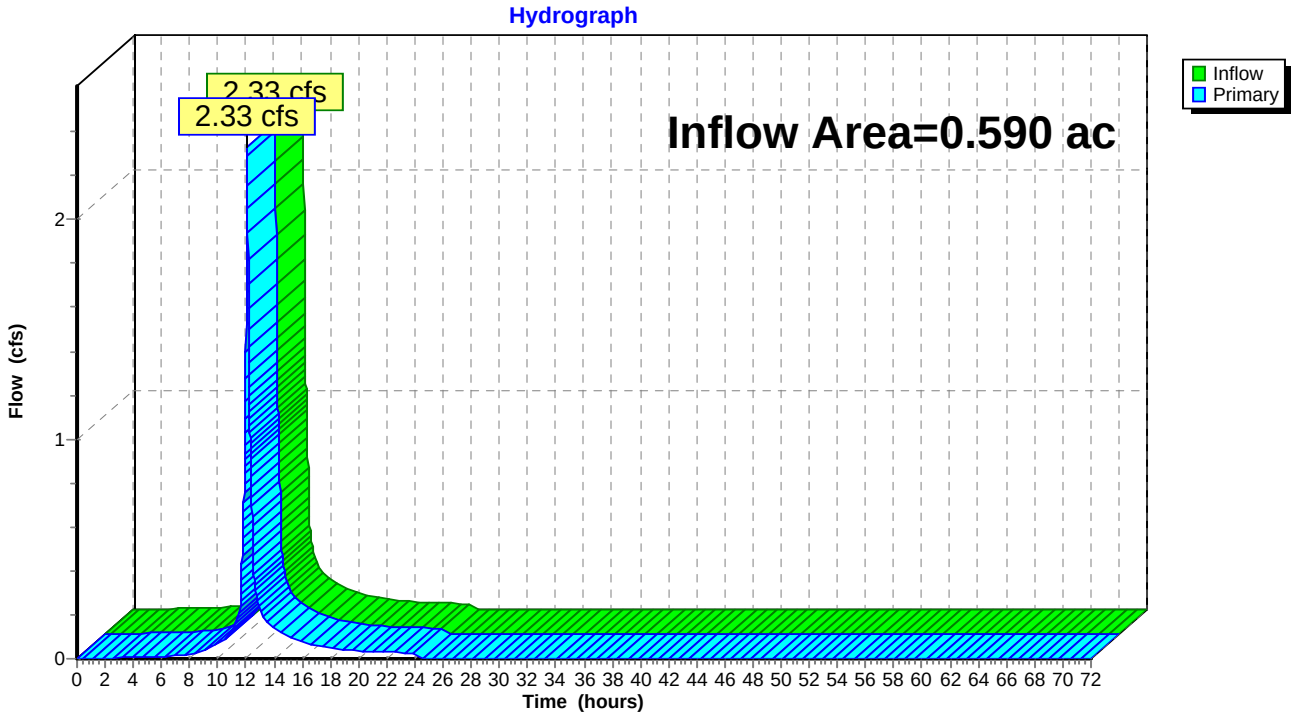


Summary for Link E3: EDA-3

Inflow Area = 0.590 ac, 22.37% Impervious, Inflow Depth = 3.51" for 10 Year event
Inflow = 2.33 cfs @ 12.09 hrs, Volume= 0.173 af
Primary = 2.33 cfs @ 12.09 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E3: EDA-3

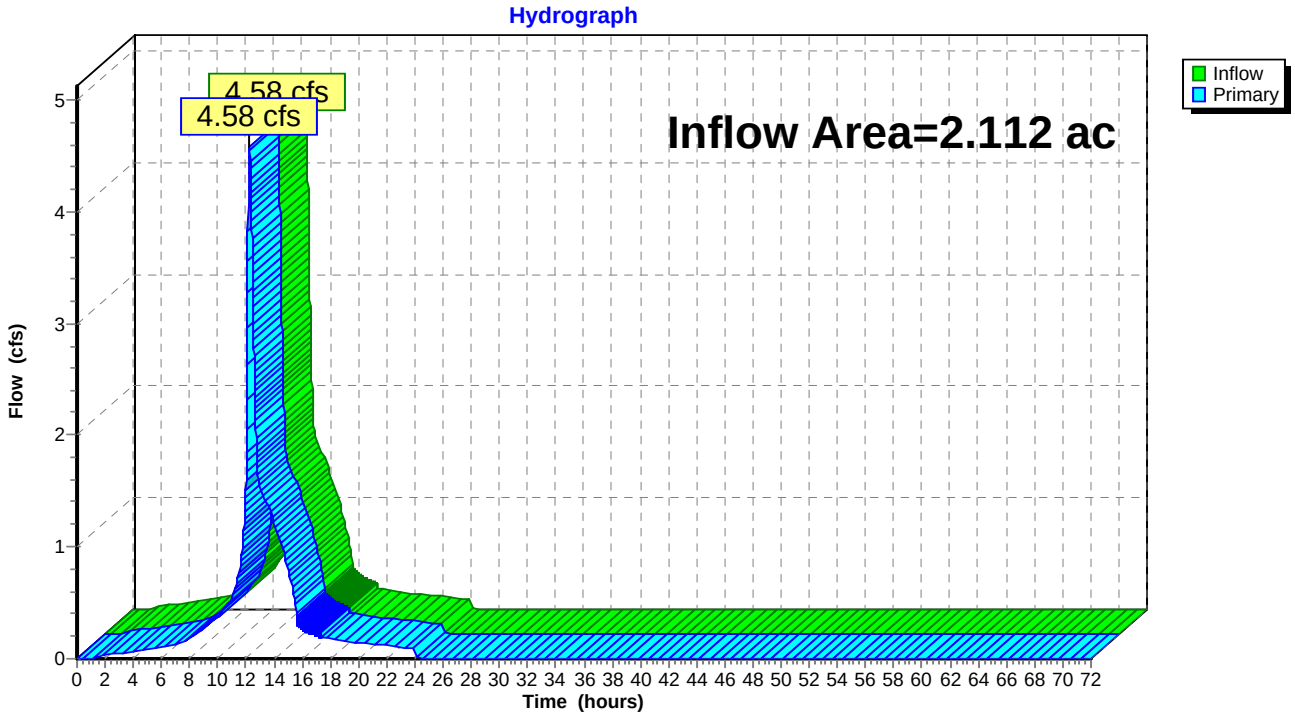


Summary for Link P1: PDA-1

Inflow Area = 2.112 ac, 73.91% Impervious, Inflow Depth = 4.40" for 10 Year event
Inflow = 4.58 cfs @ 12.24 hrs, Volume= 0.774 af
Primary = 4.58 cfs @ 12.24 hrs, Volume= 0.774 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P1: PDA-1

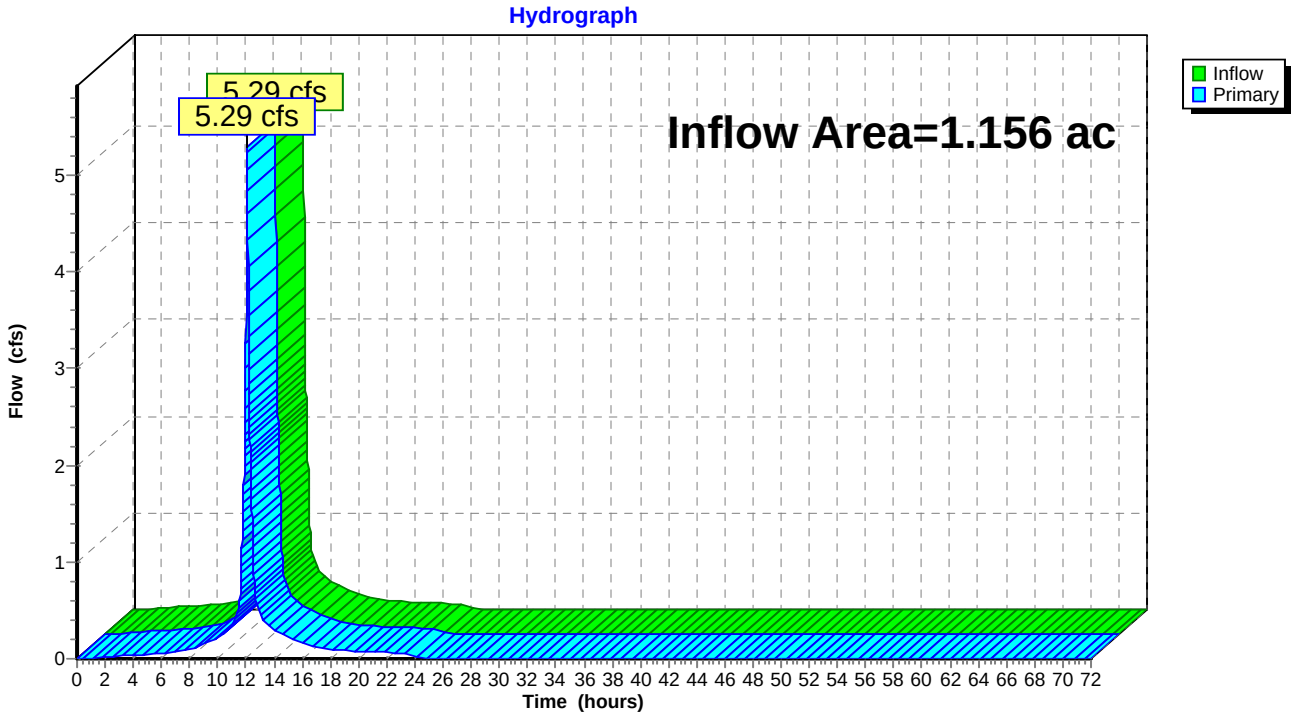


Summary for Link P2: PDA-2

Inflow Area = 1.156 ac, 64.45% Impervious, Inflow Depth = 4.31" for 10 Year event
Inflow = 5.29 cfs @ 12.08 hrs, Volume= 0.415 af
Primary = 5.29 cfs @ 12.08 hrs, Volume= 0.415 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P2: PDA-2

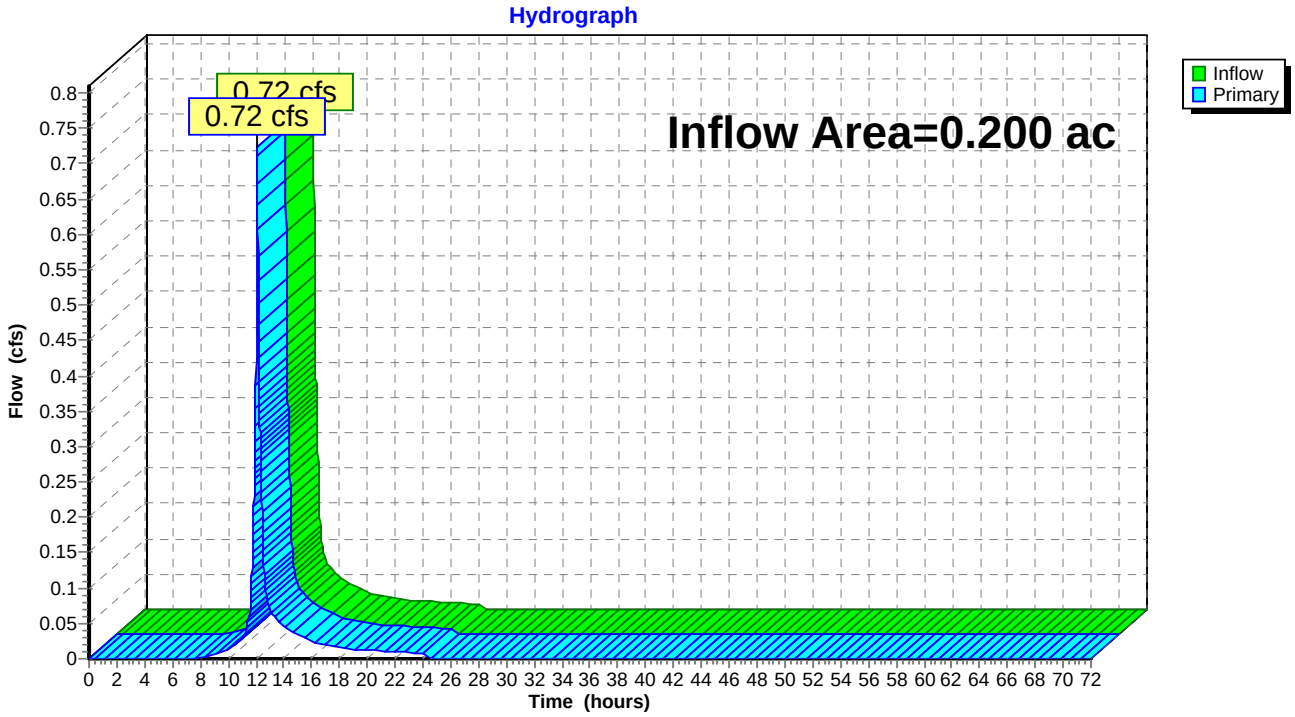


Summary for Link P3: PDA-3

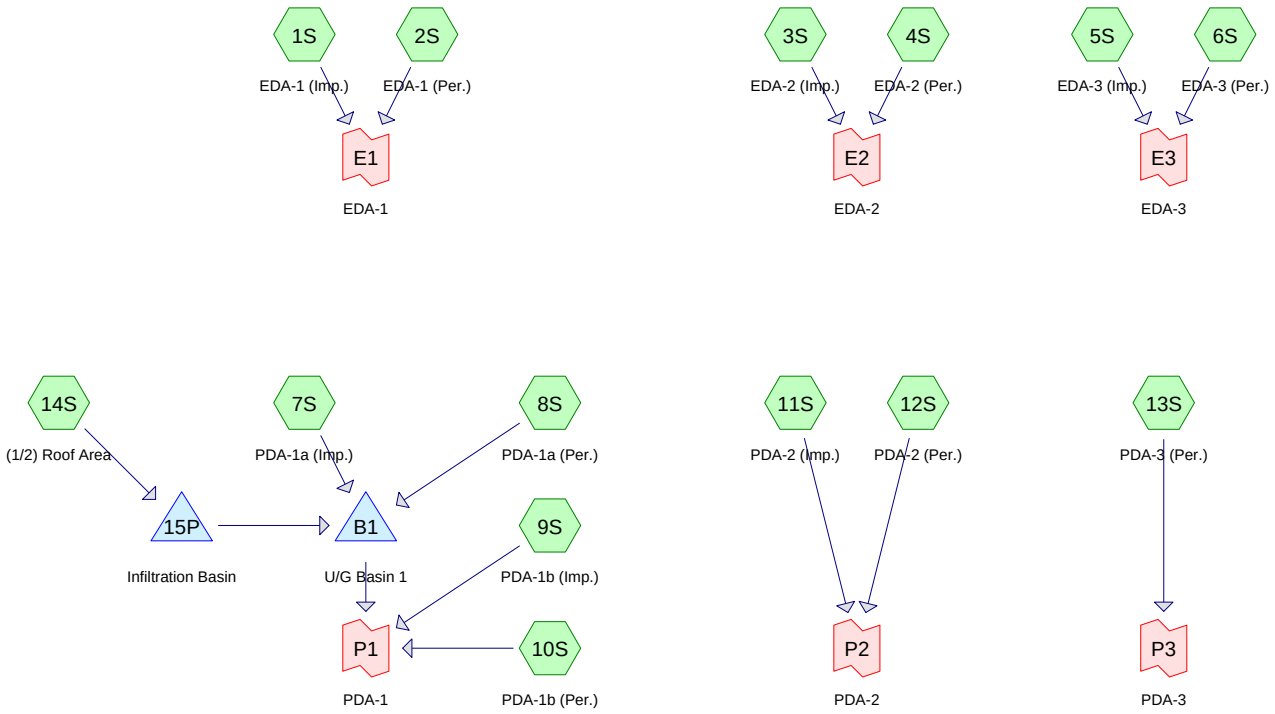
Inflow Area = 0.200 ac, 0.00% Impervious, Inflow Depth = 3.09" for 10 Year event
Inflow = 0.72 cfs @ 12.09 hrs, Volume= 0.051 af
Primary = 0.72 cfs @ 12.09 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P3: PDA-3



25-Year Storm Event



Subcat Reach Pond Link

Drainage Diagram for EX-PR_03-2018
Prepared by Bohler Engineering, Printed 3/15/2018

Summary for Subcatchment 1S: EDA-1 (Imp.)

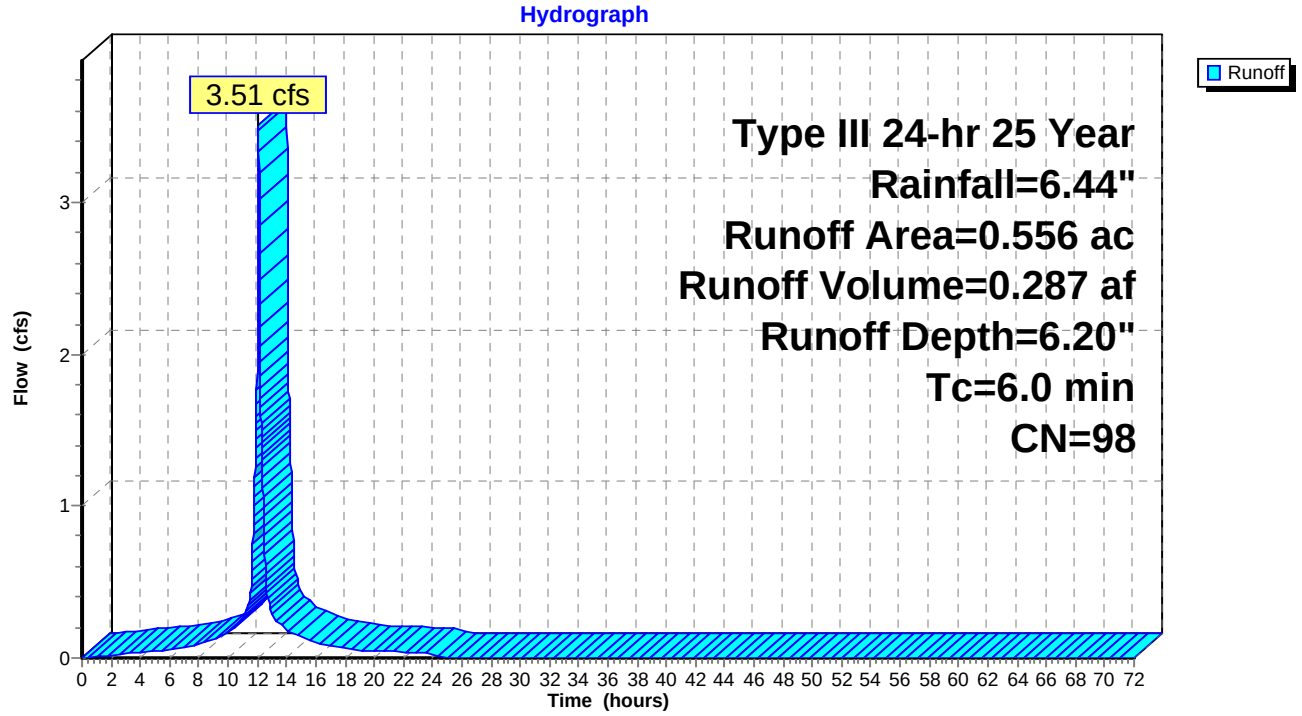
Runoff = 3.51 cfs @ 12.08 hrs, Volume= 0.287 af, Depth= 6.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.556	98	Paved parking, HSG D
0.556		100.00% Impervious Area

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

Subcatchment 1S: EDA-1 (Imp.)



Summary for Subcatchment 2S: EDA-1 (Per.)

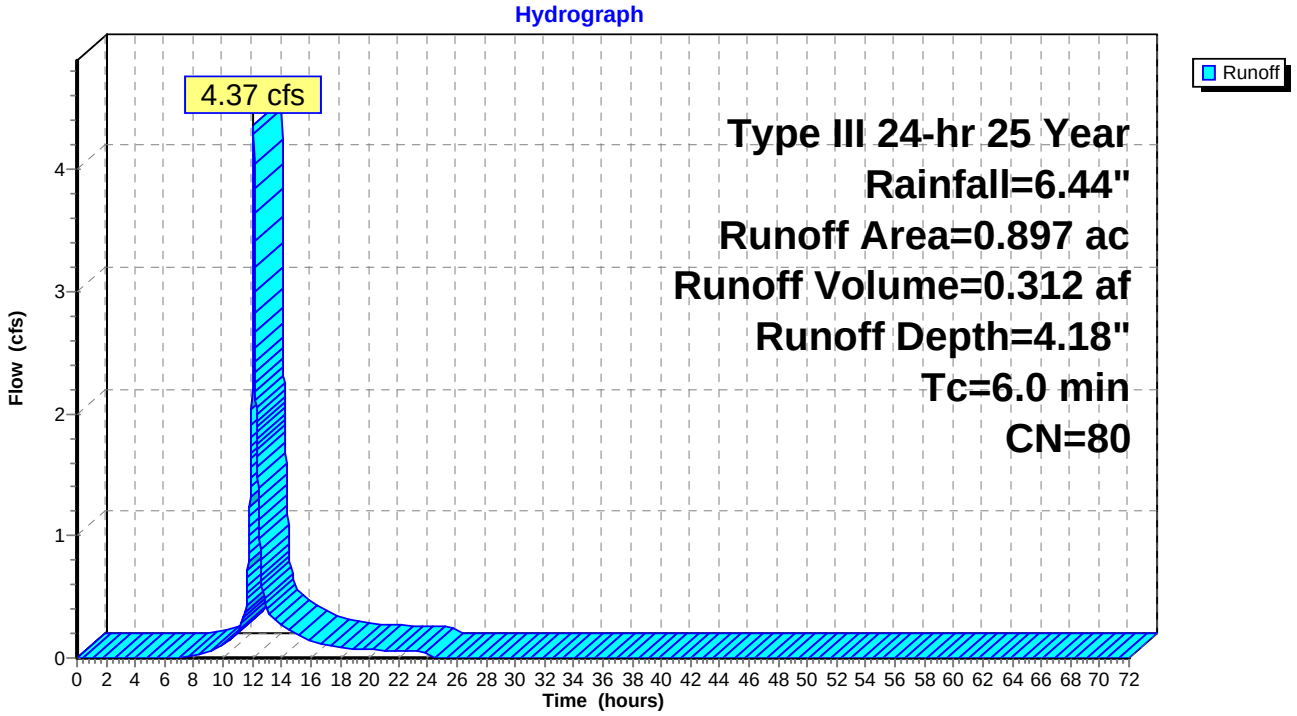
Runoff = 4.37 cfs @ 12.09 hrs, Volume= 0.312 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.897	80	>75% Grass cover, Good, HSG D
0.897		100.00% Pervious Area

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

Subcatchment 2S: EDA-1 (Per.)



Summary for Subcatchment 3S: EDA-2 (Imp.)

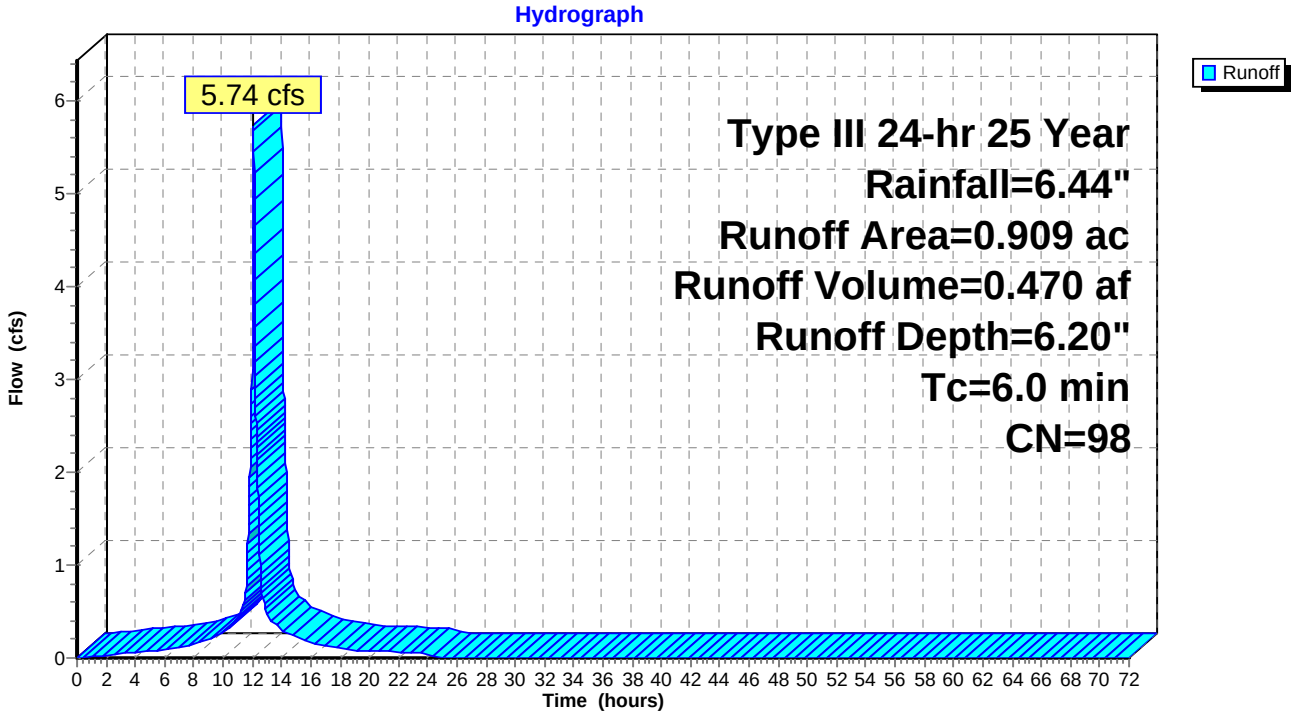
Runoff = 5.74 cfs @ 12.08 hrs, Volume= 0.470 af, Depth= 6.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.909	98	Paved parking, HSG D
0.909		100.00% Impervious Area

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

Subcatchment 3S: EDA-2 (Imp.)



Summary for Subcatchment 4S: EDA-2 (Per.)

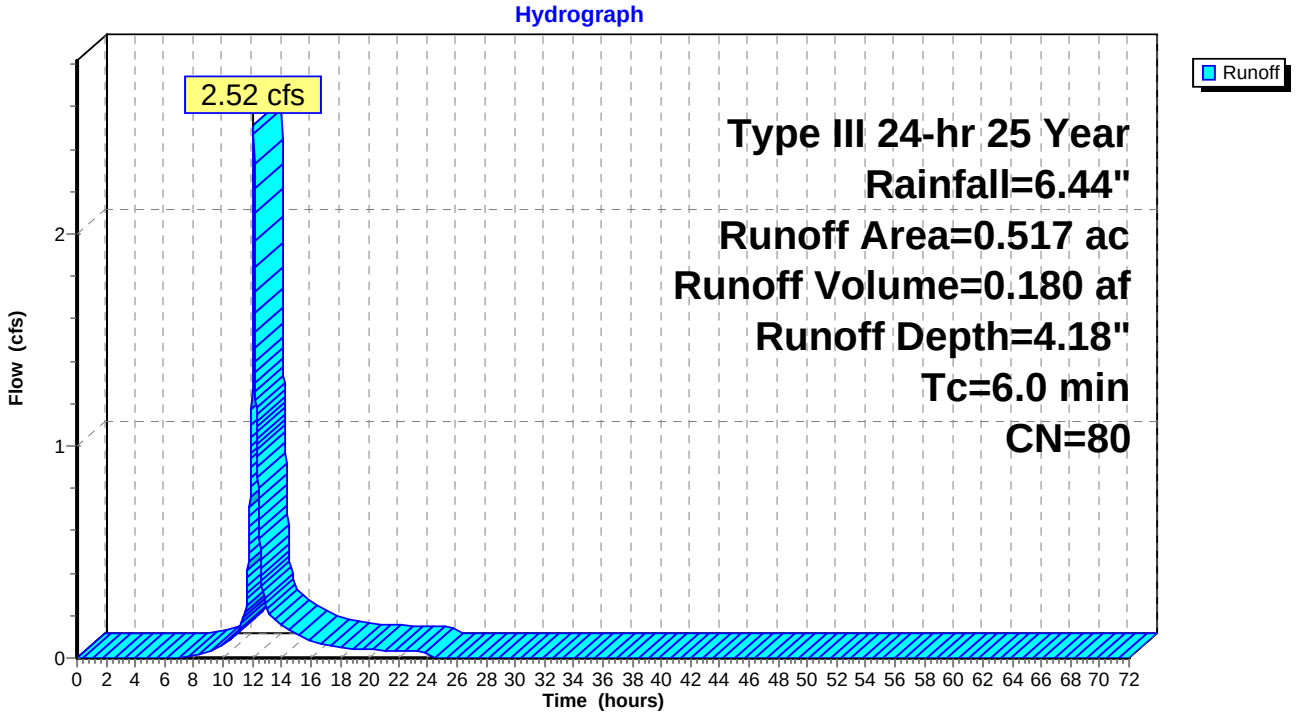
Runoff = 2.52 cfs @ 12.09 hrs, Volume= 0.180 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.517	80	>75% Grass cover, Good, HSG D
0.517		100.00% Pervious Area

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

Subcatchment 4S: EDA-2 (Per.)



Summary for Subcatchment 5S: EDA-3 (Imp.)

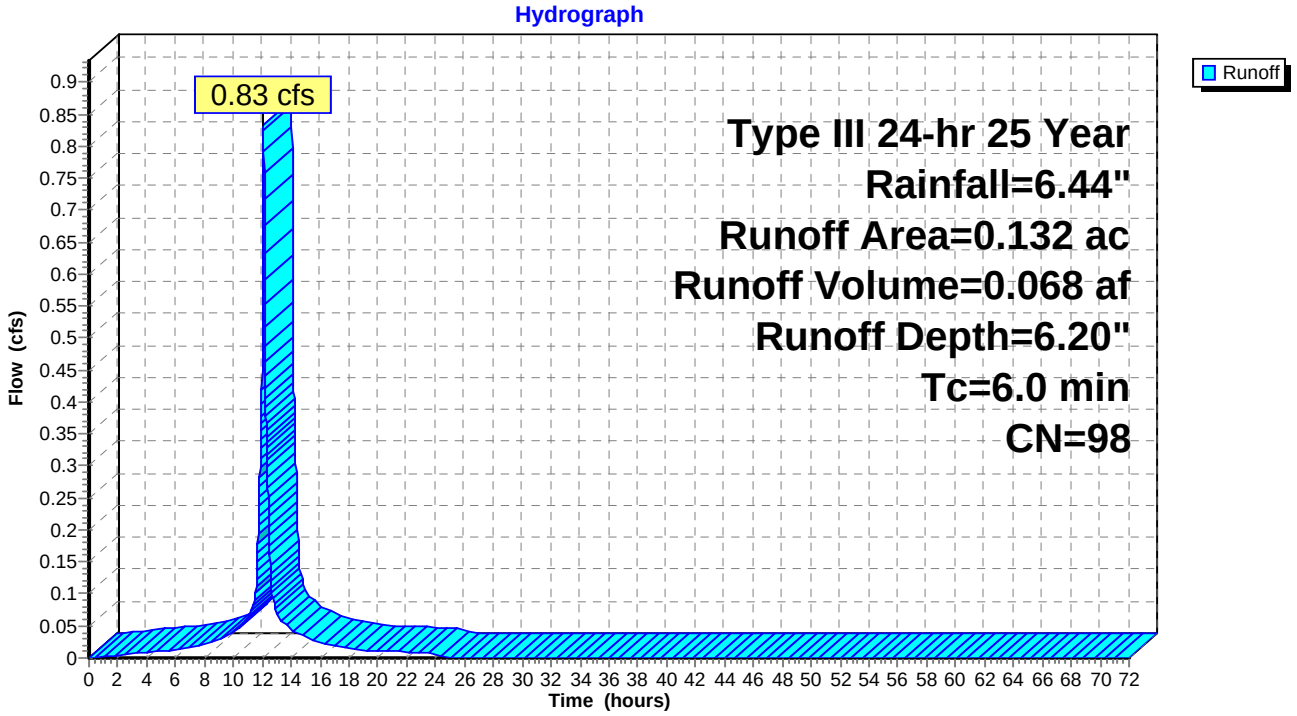
Runoff = 0.83 cfs @ 12.08 hrs, Volume= 0.068 af, Depth= 6.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.132	98	Paved parking, HSG D
0.132		100.00% Impervious Area

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

Subcatchment 5S: EDA-3 (Imp.)



Summary for Subcatchment 6S: EDA-3 (Per.)

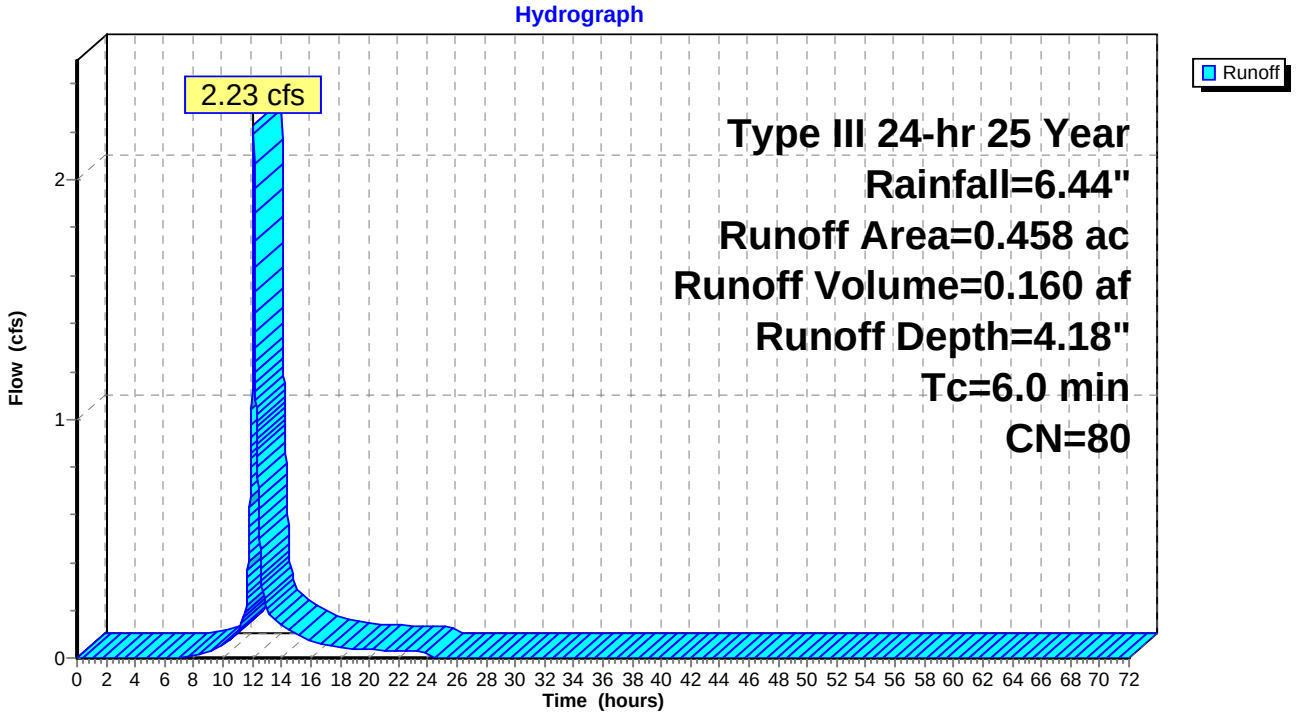
Runoff = 2.23 cfs @ 12.09 hrs, Volume= 0.160 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.458	80	>75% Grass cover, Good, HSG D
0.458		100.00% Pervious Area

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

Subcatchment 6S: EDA-3 (Per.)



Summary for Subcatchment 7S: PDA-1a (Imp.)

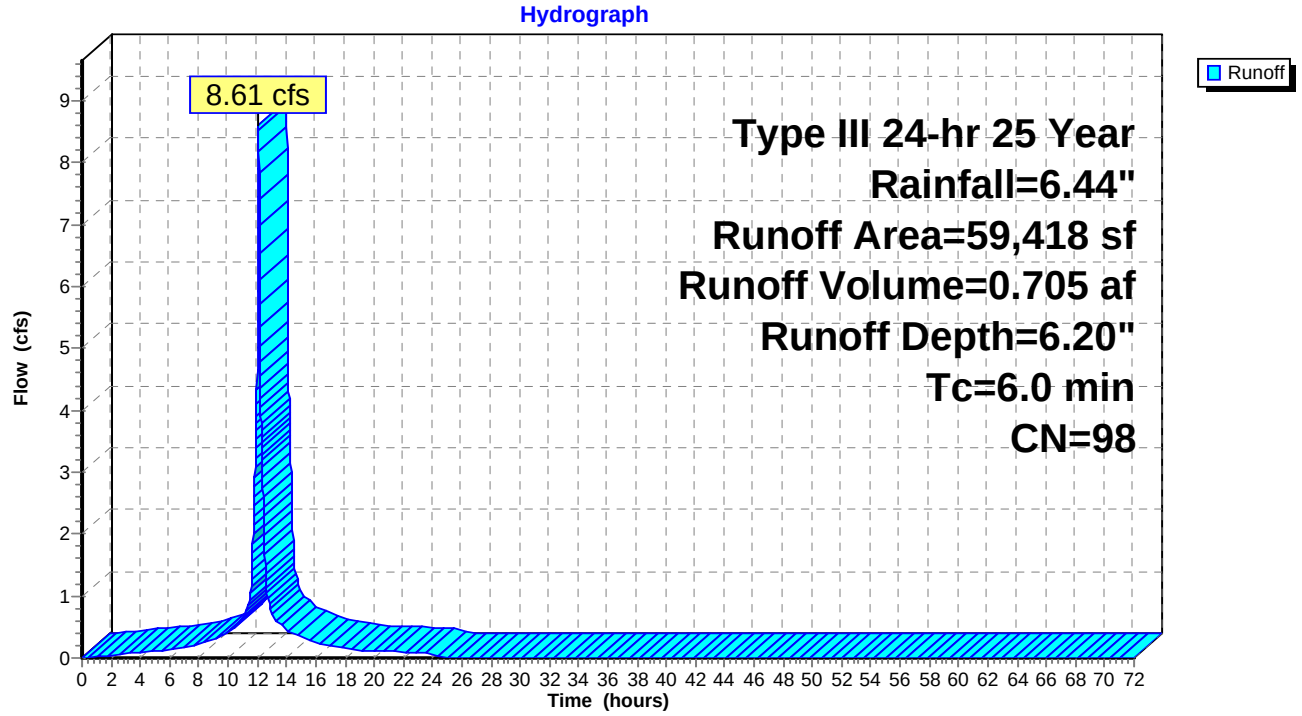
Runoff = 8.61 cfs @ 12.08 hrs, Volume= 0.705 af, Depth= 6.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (sf)	CN	Description
59,418	98	Paved parking, HSG D
59,418		100.00% Impervious Area

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

Subcatchment 7S: PDA-1a (Imp.)



Summary for Subcatchment 8S: PDA-1a (Per.)

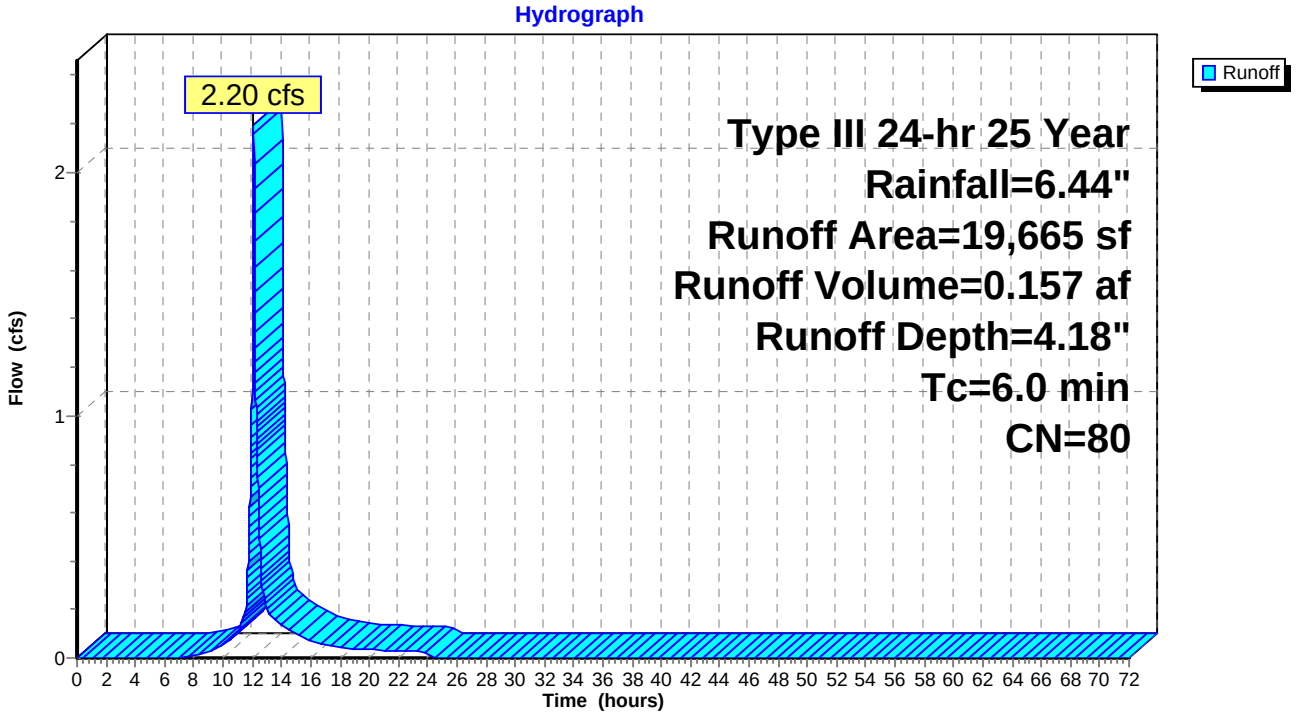
Runoff = 2.20 cfs @ 12.09 hrs, Volume= 0.157 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (sf)	CN	Description
19,665	80	>75% Grass cover, Good, HSG D
19,665		100.00% Pervious Area

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

Subcatchment 8S: PDA-1a (Per.)



Summary for Subcatchment 9S: PDA-1b (Imp.)

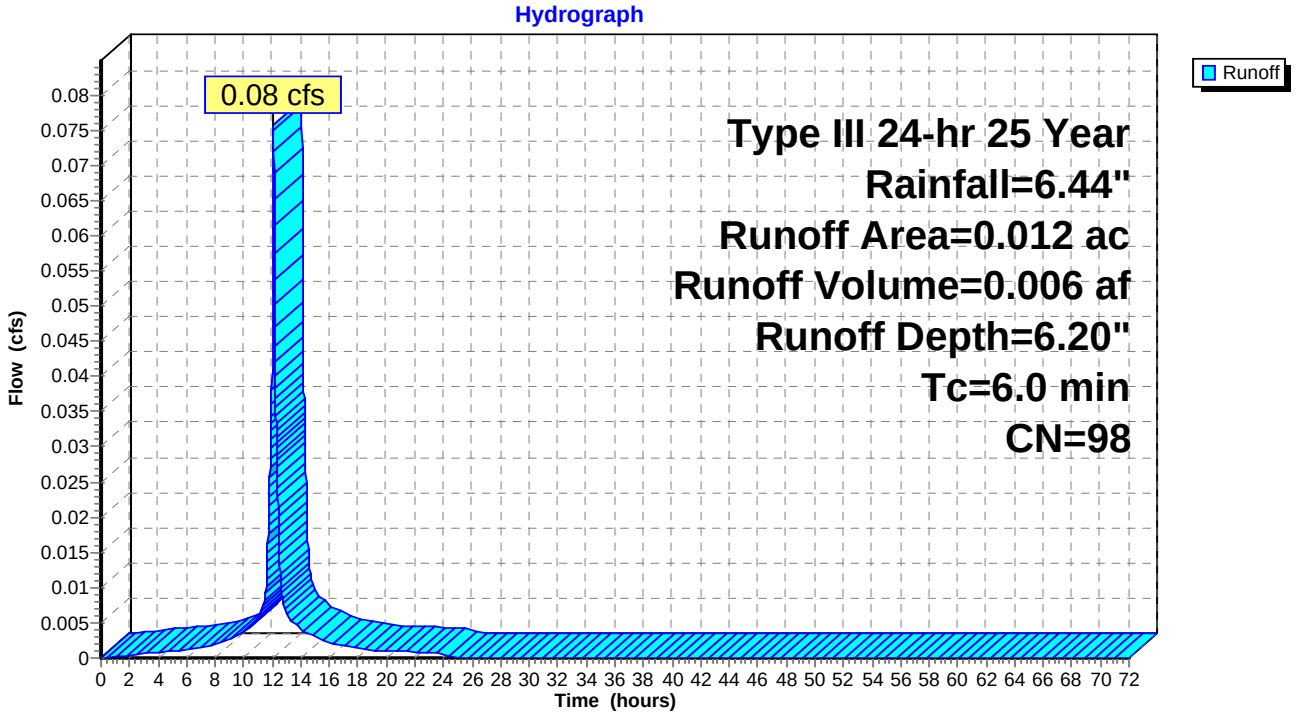
Runoff = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af, Depth= 6.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG D
0.012		100.00% Impervious Area

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

Subcatchment 9S: PDA-1b (Imp.)



Summary for Subcatchment 10S: PDA-1b (Per.)

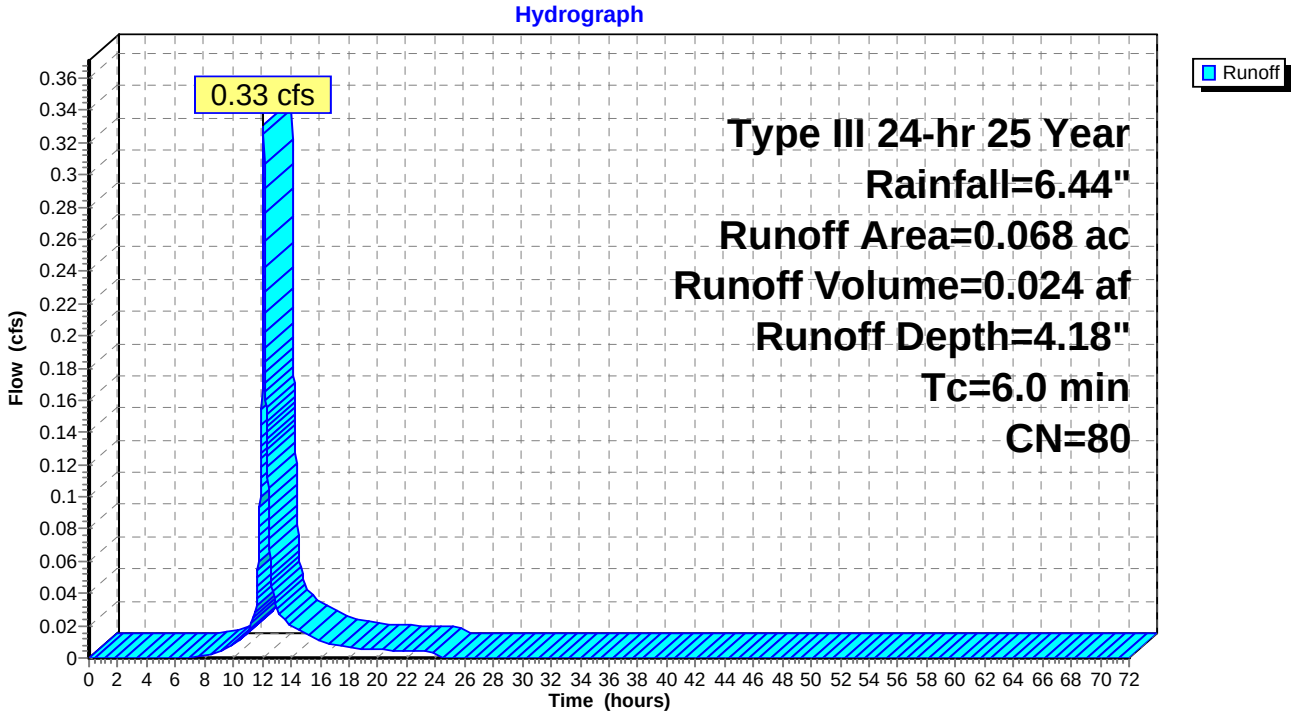
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.024 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.068	80	>75% Grass cover, Good, HSG D
0.068		100.00% Pervious Area

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

Subcatchment 10S: PDA-1b (Per.)



Summary for Subcatchment 11S: PDA-2 (Imp.)

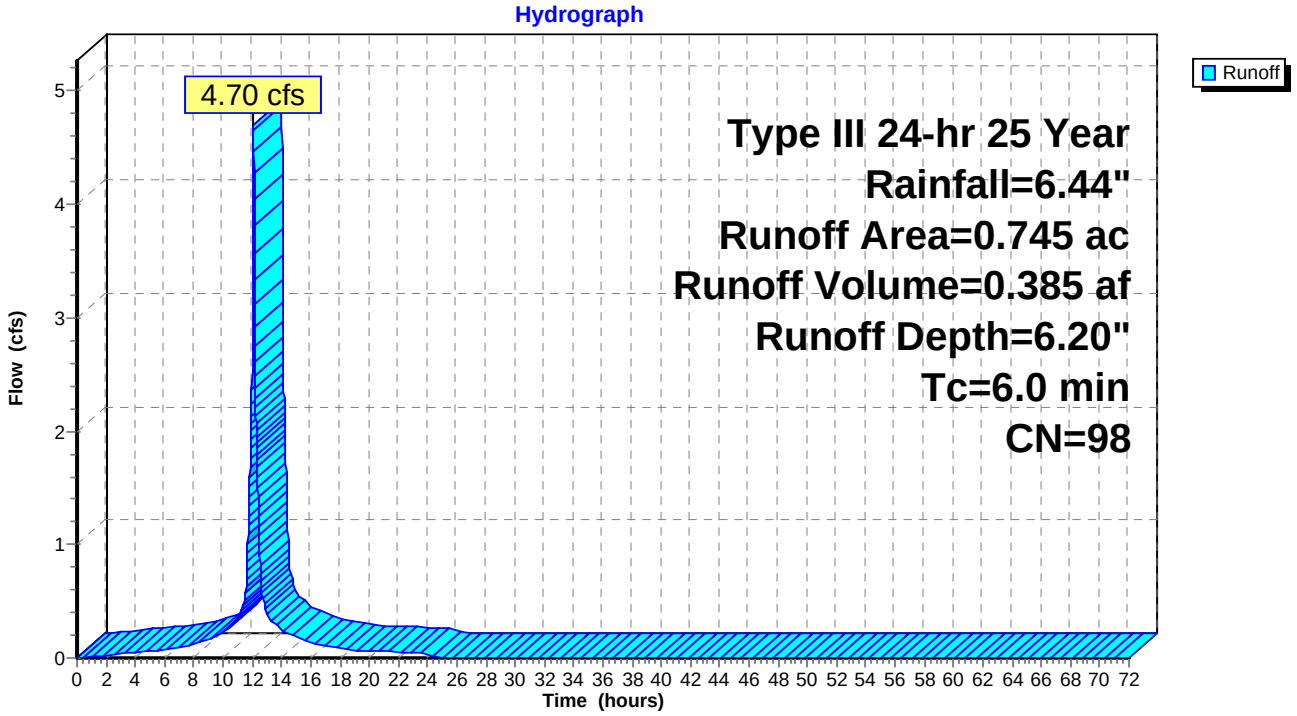
Runoff = 4.70 cfs @ 12.08 hrs, Volume= 0.385 af, Depth= 6.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.745	98	Paved parking, HSG D
0.745		100.00% Impervious Area

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

Subcatchment 11S: PDA-2 (Imp.)



Summary for Subcatchment 12S: PDA-2 (Per.)

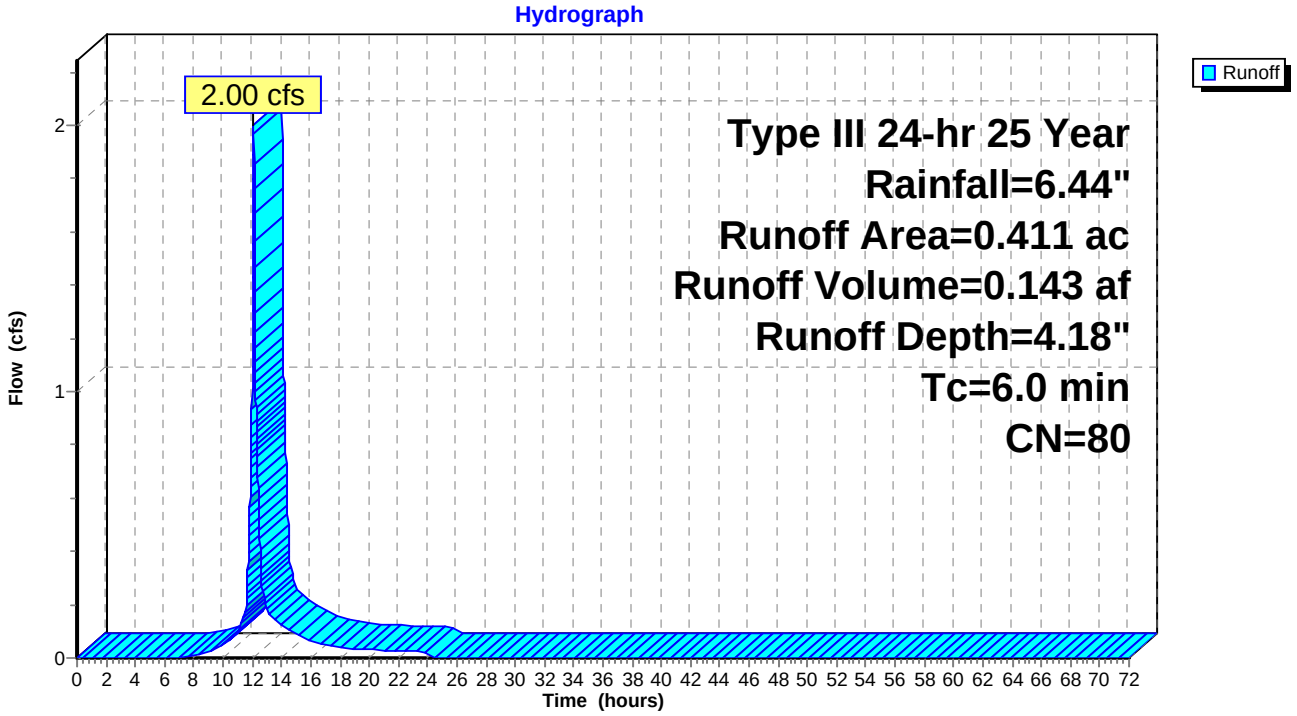
Runoff = 2.00 cfs @ 12.09 hrs, Volume= 0.143 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.411	80	>75% Grass cover, Good, HSG D
0.411		100.00% Pervious Area

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

Subcatchment 12S: PDA-2 (Per.)



Summary for Subcatchment 13S: PDA-3 (Per.)

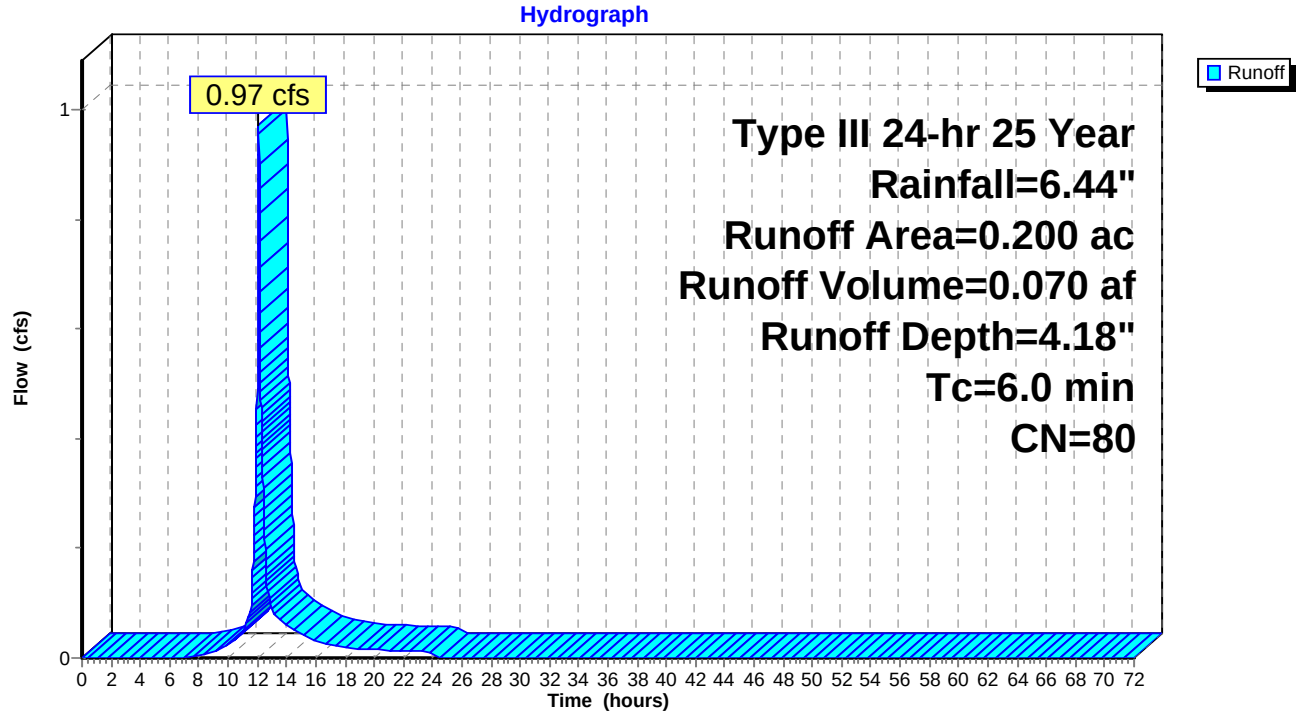
Runoff = 0.97 cfs @ 12.09 hrs, Volume= 0.070 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (ac)	CN	Description
0.200	80	>75% Grass cover, Good, HSG D
0.200		100.00% Pervious Area

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

Subcatchment 13S: PDA-3 (Per.)



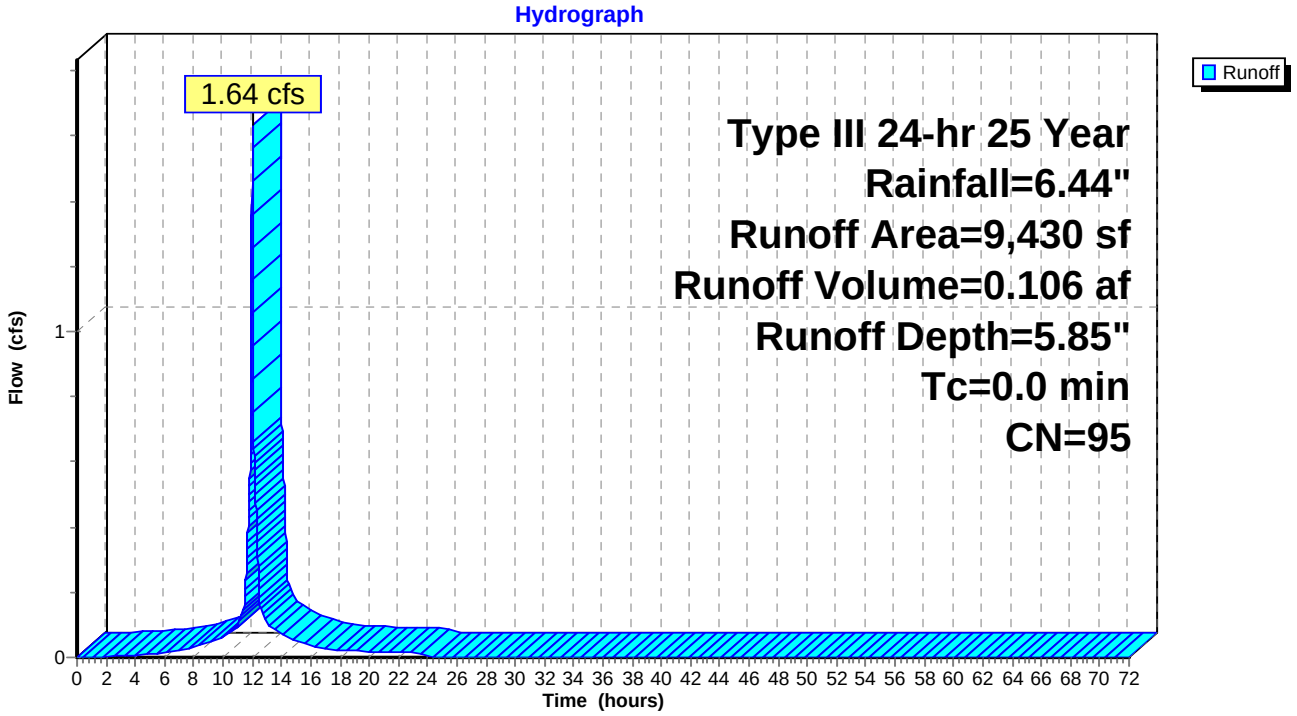
Summary for Subcatchment 14S: (1/2) Roof Area

Runoff = 1.64 cfs @ 12.00 hrs, Volume= 0.106 af, Depth= 5.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.44"

Area (sf)	CN	Description
8,056	98	Paved parking, HSG D
1,374	80	>75% Grass cover, Good, HSG D
9,430	95	Weighted Average
1,374		14.57% Pervious Area
8,056		85.43% Impervious Area

Subcatchment 14S: (1/2) Roof Area



Summary for Pond 15P: Infiltration Basin

Inflow Area = 0.216 ac, 85.43% Impervious, Inflow Depth = 5.85" for 25 Year event
Inflow = 1.64 cfs @ 12.00 hrs, Volume= 0.106 af
Outflow = 1.64 cfs @ 12.00 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 1.64 cfs @ 12.00 hrs, Volume= 0.091 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 242.66' @ 12.00 hrs Surf.Area= 0.000 ac Storage= 0.015 af

Plug-Flow detention time= 106.7 min calculated for 0.091 af (86% of inflow)
Center-of-Mass det. time= 45.6 min (801.9 - 756.4)

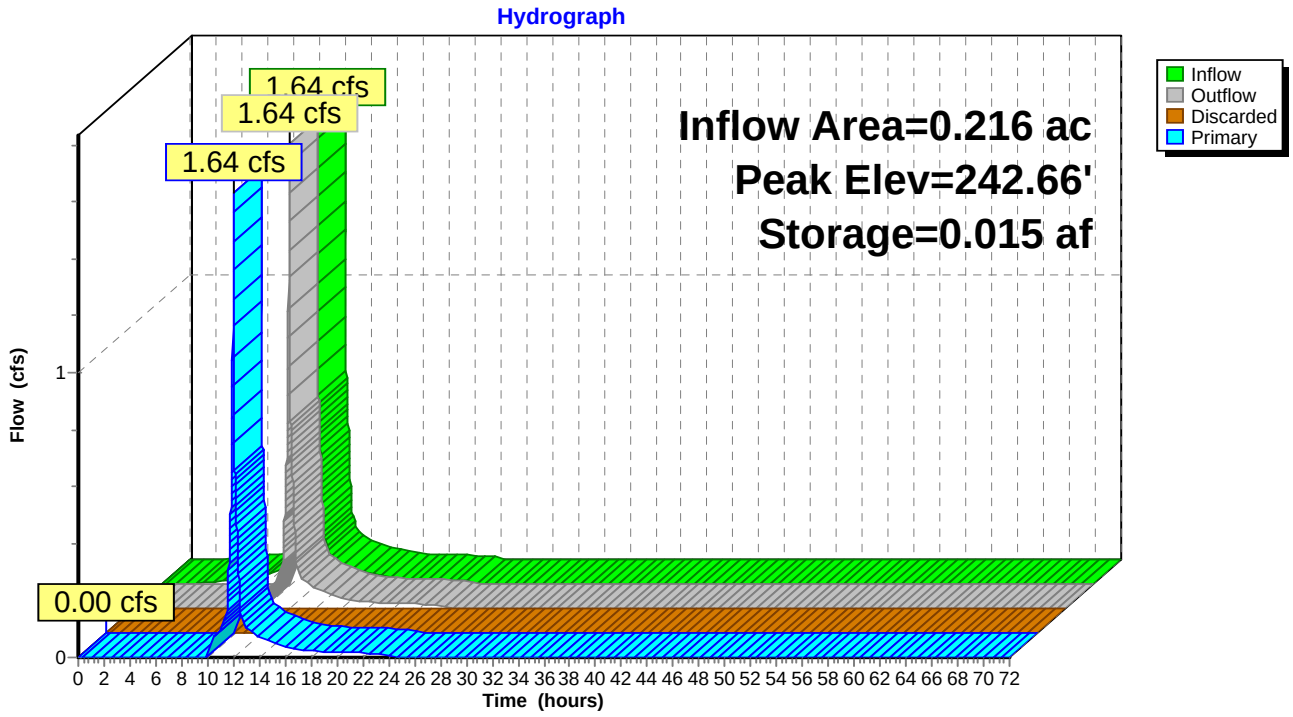
Volume	Invert	Avail.Storage	Storage Description
#1	237.50'	0.015 af	**36.0" D x 90.0'L Pipe Storage**

Device	Routing	Invert	Outlet Devices
#1	Primary	242.00'	**15.0" Round Culvert** L= 22.0' Ke= 0.500 Outlet Invert= 241.78' S= 0.0100 '/' Cc= 0.900 n= 0.010
#2	Discarded	237.50'	**0.450 in/hr Exfiltration X 0.00 over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.50' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=1.63 cfs @ 12.00 hrs HW=242.66' TW=238.27' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.63 cfs @ 3.63 fps)

Pond 15P: Infiltration Basin



Summary for Pond B1: U/G Basin 1

Inflow Area = 2.032 ac, 76.23% Impervious, Inflow Depth = 5.63" for 25 Year event
Inflow = 11.65 cfs @ 12.08 hrs, Volume= 0.953 af
Outflow = 6.02 cfs @ 12.22 hrs, Volume= 0.953 af, Atten= 48%, Lag= 8.6 min
Primary = 6.02 cfs @ 12.22 hrs, Volume= 0.953 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 239.02' @ 12.22 hrs Surf.Area= 0.115 ac Storage= 0.206 af

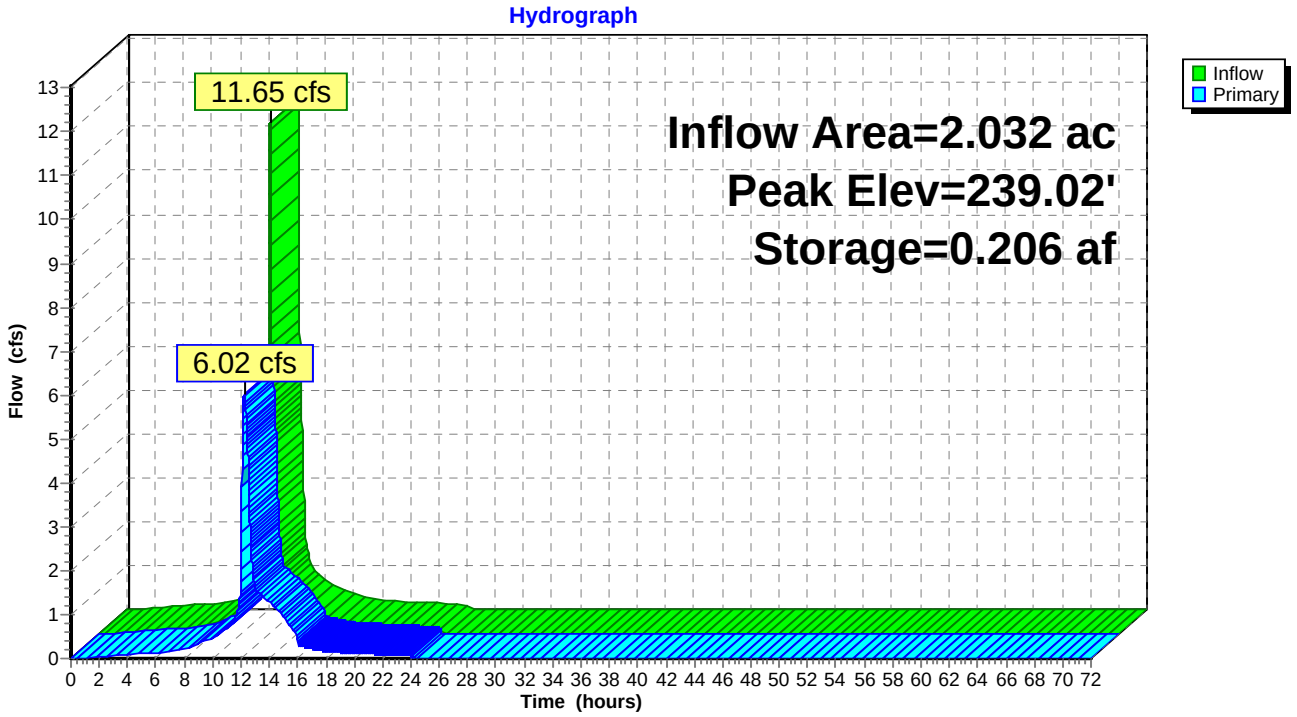
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 22.3 min (783.0 - 760.7)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	0.277 af	**36.0" D x 213.0'L Pipe Storage** x 8
#2	237.00'	0.011 af	**36.0" D x 35.0'L Pipe Storage** x 2
		0.288 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	236.60'	**15.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 236.30' S= 0.0100 '/' Cc= 0.900 n= 0.011
#2	Device 1	236.60'	**7.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	238.30'	**42.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=6.02 cfs @ 12.22 hrs HW=239.02' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 6.02 cfs of 7.91 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.88 cfs @ 7.02 fps)
  └─**3=Orifice/Grate** (Orifice Controls 4.14 cfs @ 3.55 fps)

Pond B1: U/G Basin 1

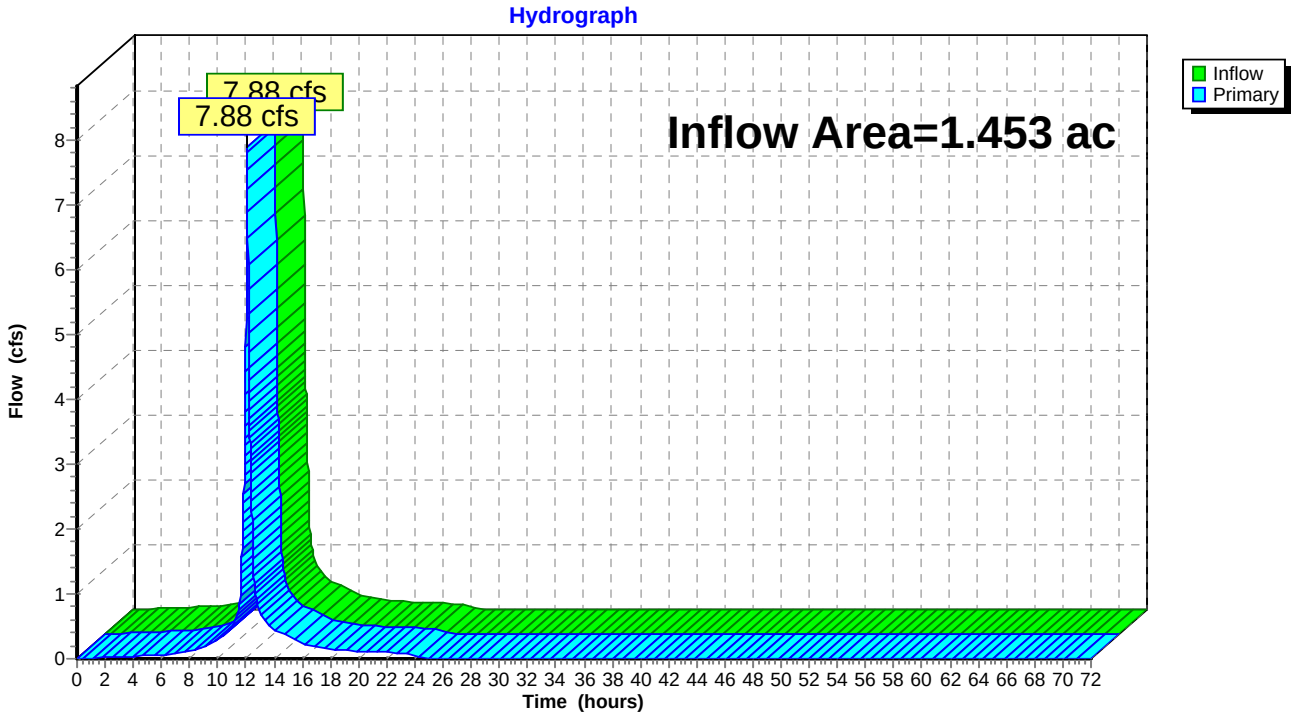


Summary for Link E1: EDA-1

Inflow Area = 1.453 ac, 38.27% Impervious, Inflow Depth = 4.95" for 25 Year event
Inflow = 7.88 cfs @ 12.09 hrs, Volume= 0.600 af
Primary = 7.88 cfs @ 12.09 hrs, Volume= 0.600 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E1: EDA-1

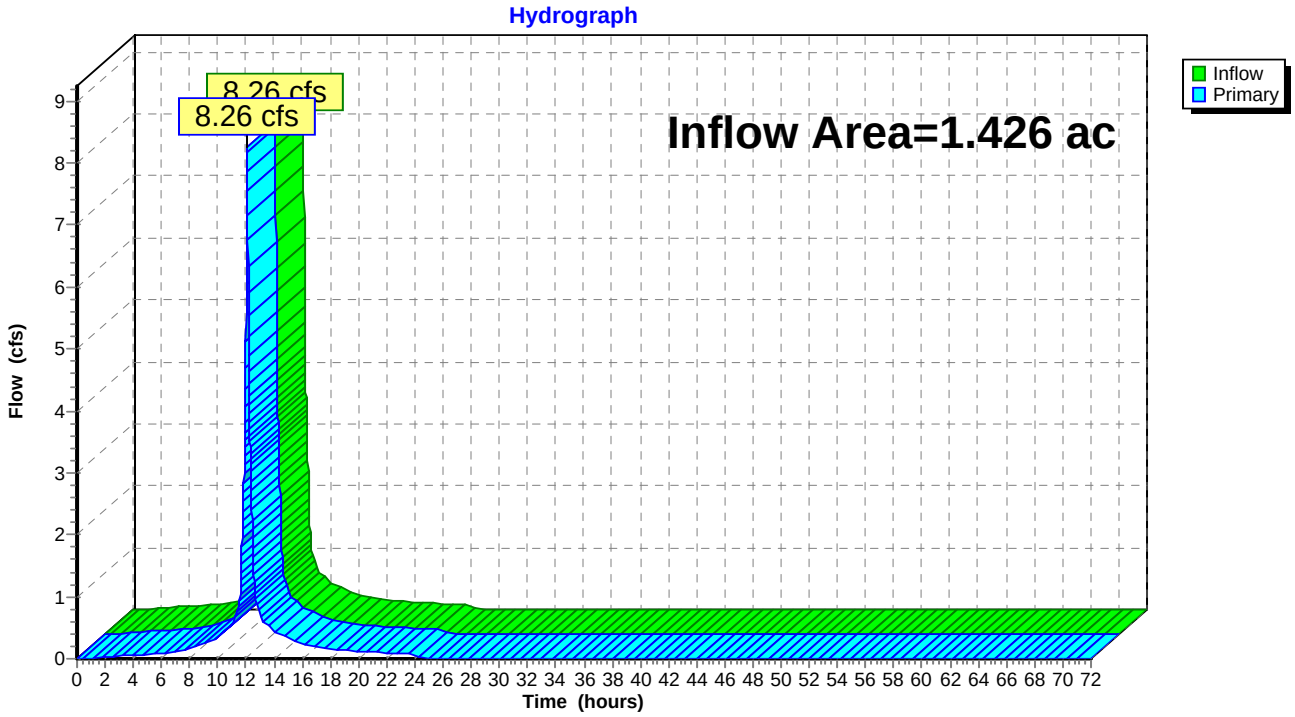


Summary for Link E2: EDA-2

Inflow Area = 1.426 ac, 63.74% Impervious, Inflow Depth = 5.47" for 25 Year event
Inflow = 8.26 cfs @ 12.08 hrs, Volume= 0.650 af
Primary = 8.26 cfs @ 12.08 hrs, Volume= 0.650 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E2: EDA-2

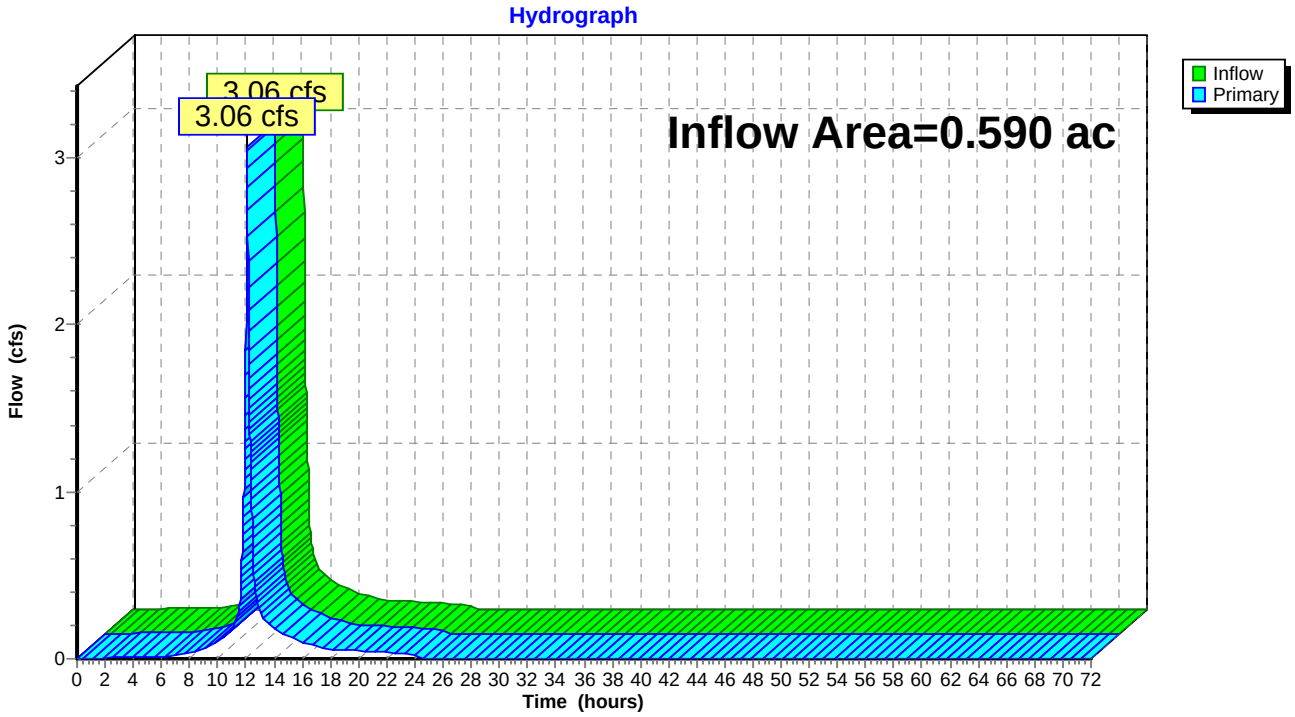


Summary for Link E3: EDA-3

Inflow Area = 0.590 ac, 22.37% Impervious, Inflow Depth = 4.63" for 25 Year event
Inflow = 3.06 cfs @ 12.09 hrs, Volume= 0.228 af
Primary = 3.06 cfs @ 12.09 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E3: EDA-3

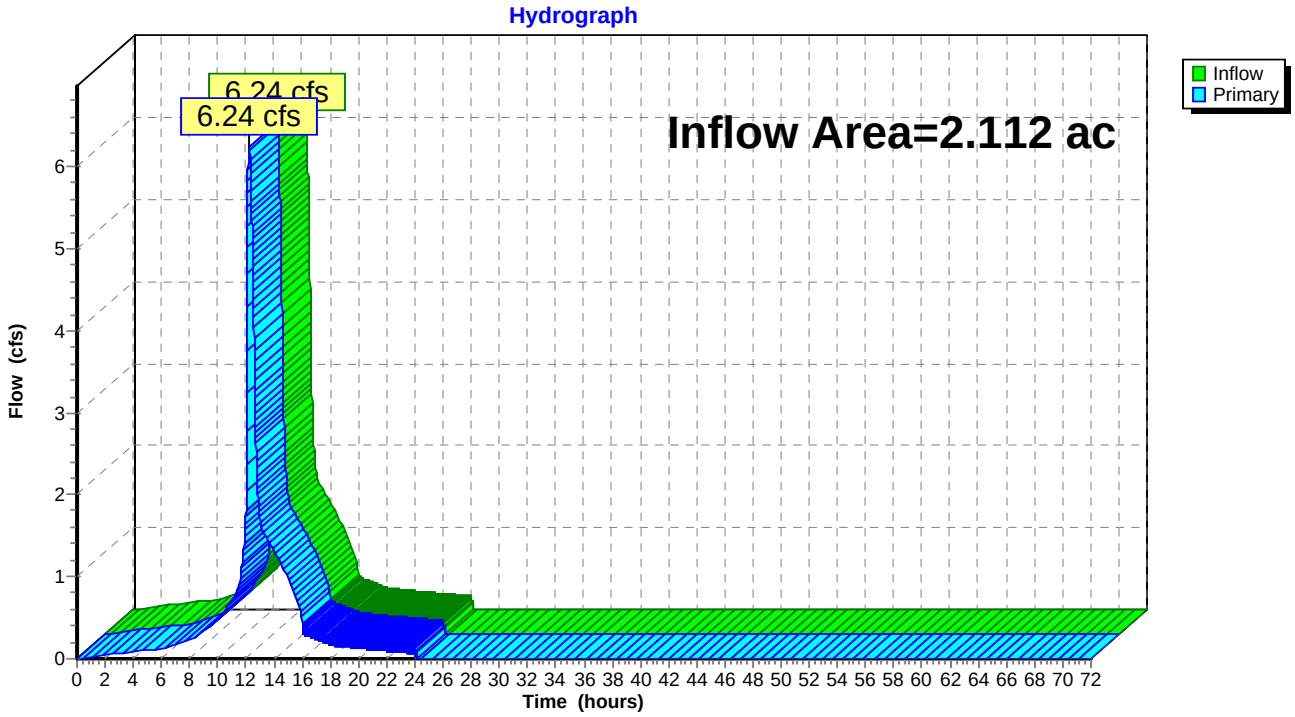


Summary for Link P1: PDA-1

Inflow Area = 2.112 ac, 73.91% Impervious, Inflow Depth = 5.59" for 25 Year event
Inflow = 6.24 cfs @ 12.21 hrs, Volume= 0.983 af
Primary = 6.24 cfs @ 12.21 hrs, Volume= 0.983 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P1: PDA-1

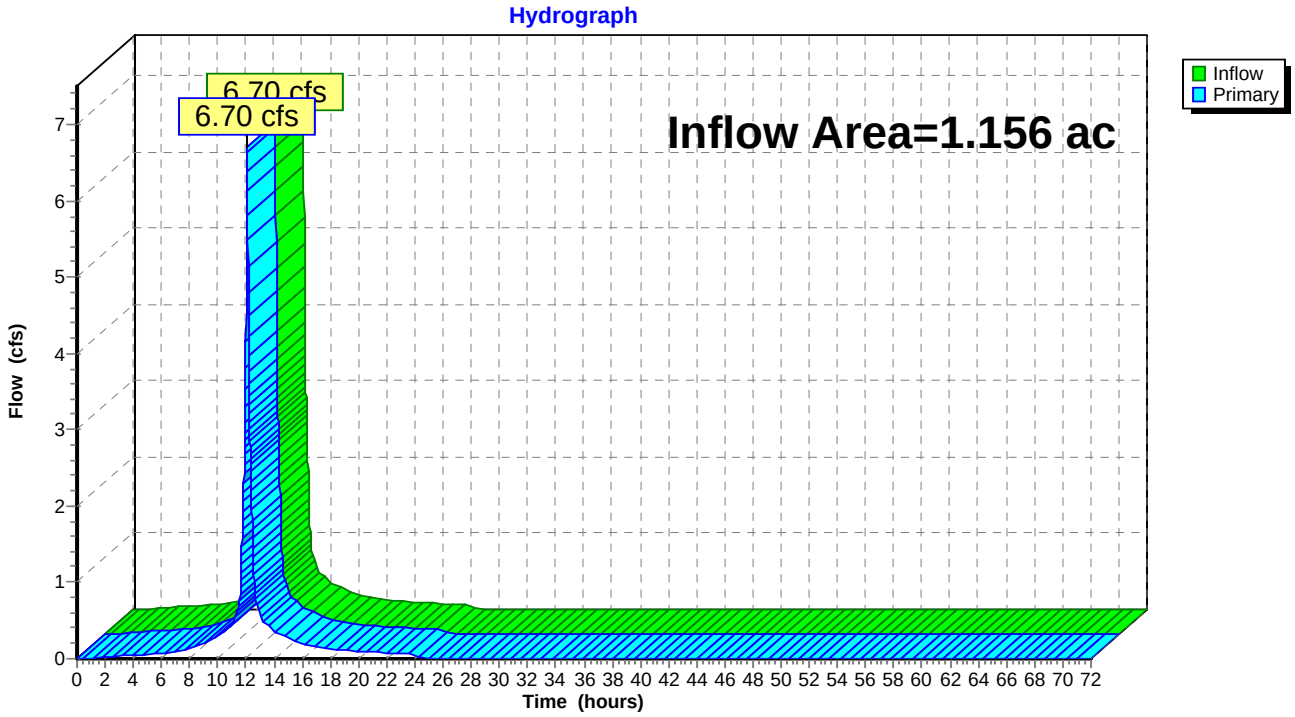


Summary for Link P2: PDA-2

Inflow Area = 1.156 ac, 64.45% Impervious, Inflow Depth = 5.48" for 25 Year event
Inflow = 6.70 cfs @ 12.08 hrs, Volume= 0.528 af
Primary = 6.70 cfs @ 12.08 hrs, Volume= 0.528 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P2: PDA-2

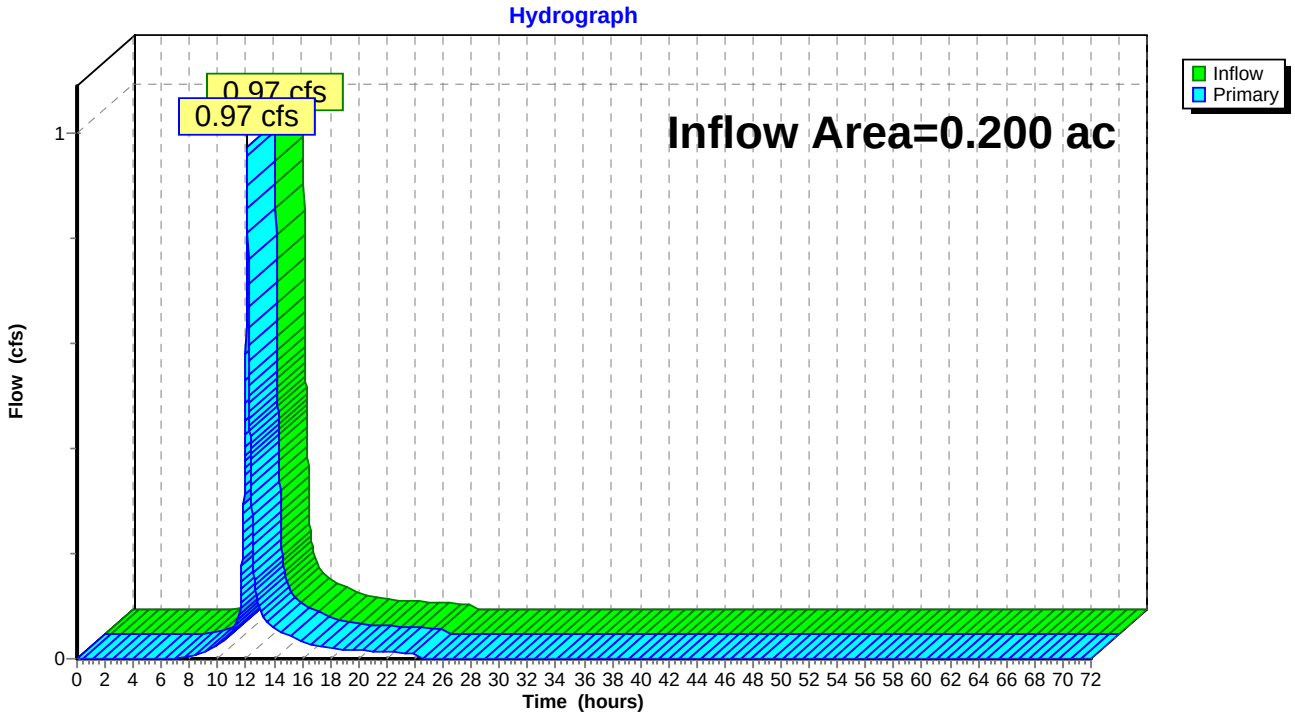


Summary for Link P3: PDA-3

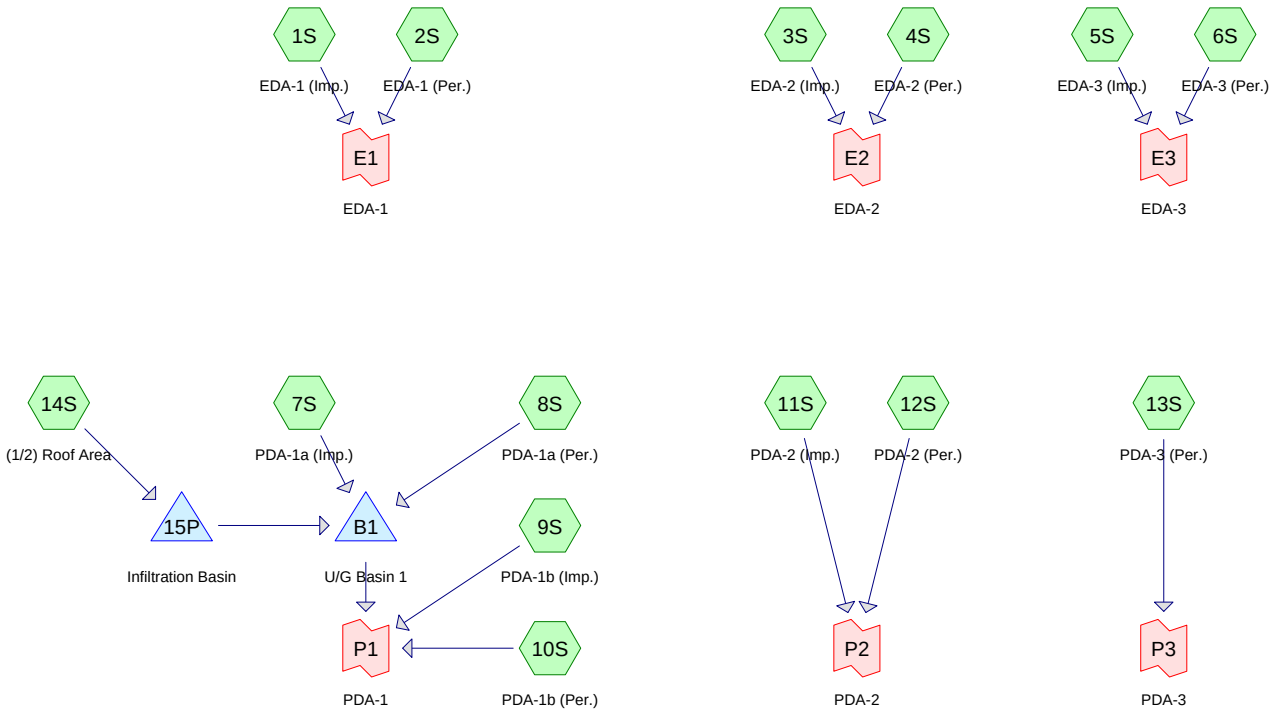
Inflow Area = 0.200 ac, 0.00% Impervious, Inflow Depth = 4.18" for 25 Year event
Inflow = 0.97 cfs @ 12.09 hrs, Volume= 0.070 af
Primary = 0.97 cfs @ 12.09 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P3: PDA-3



100-Year Storm Event



Subcat Reach Pond Link

Drainage Diagram for EX-PR_03-2018
Prepared by Bohler Engineering, Printed 3/15/2018

Summary for Subcatchment 1S: EDA-1 (Imp.)

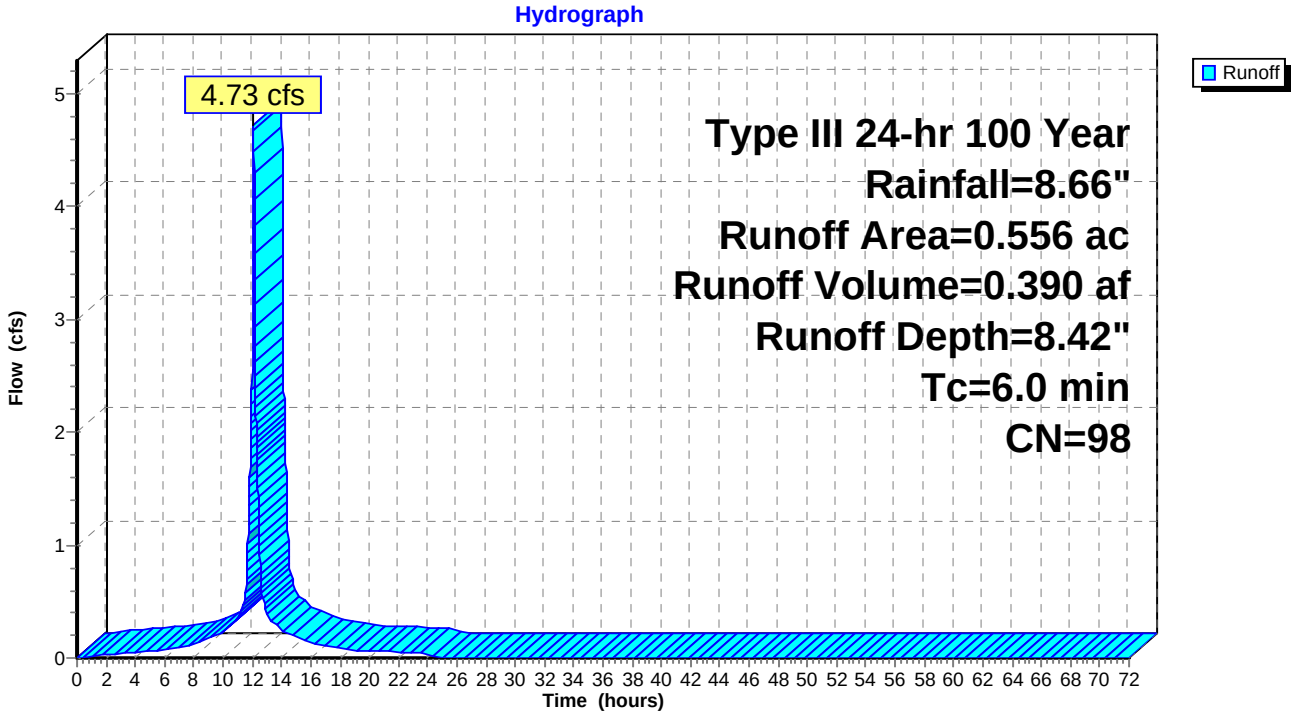
Runoff = 4.73 cfs @ 12.08 hrs, Volume= 0.390 af, Depth= 8.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.556	98	Paved parking, HSG D
0.556		100.00% Impervious Area

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

Subcatchment 1S: EDA-1 (Imp.)



Summary for Subcatchment 2S: EDA-1 (Per.)

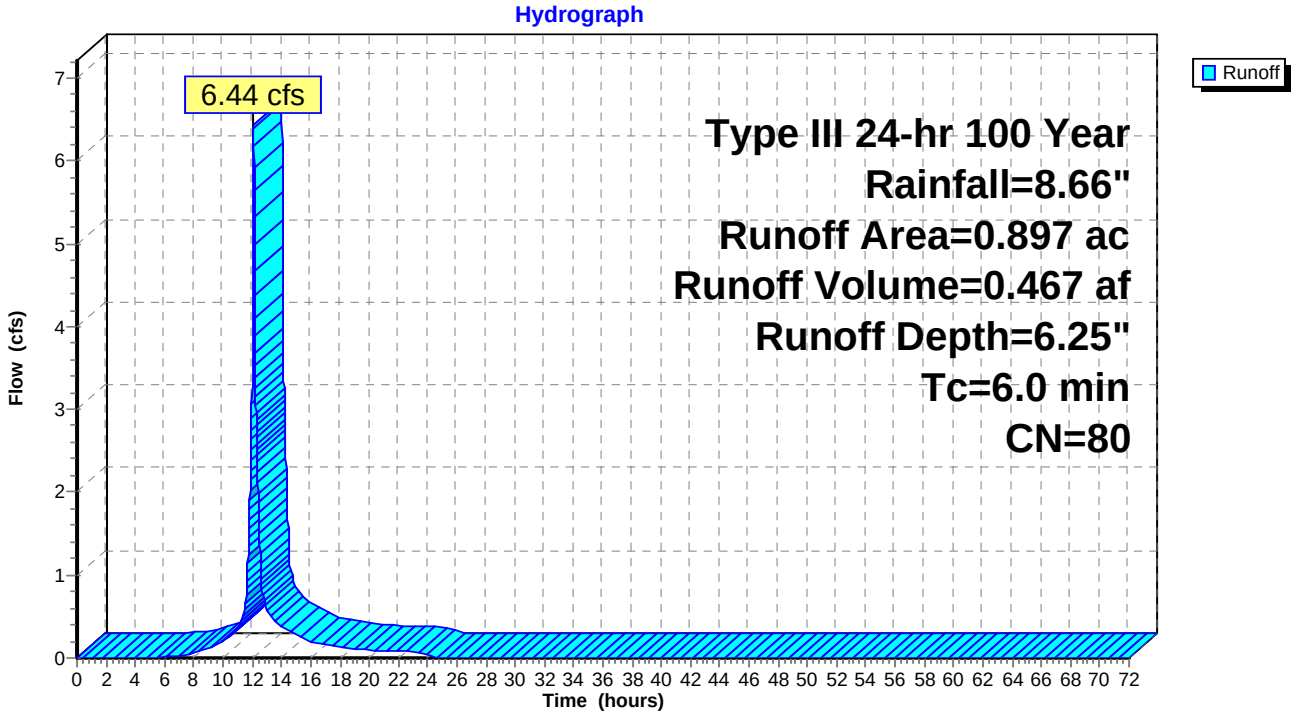
Runoff = 6.44 cfs @ 12.09 hrs, Volume= 0.467 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.897	80	>75% Grass cover, Good, HSG D
0.897		100.00% Pervious Area

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

Subcatchment 2S: EDA-1 (Per.)



Summary for Subcatchment 3S: EDA-2 (Imp.)

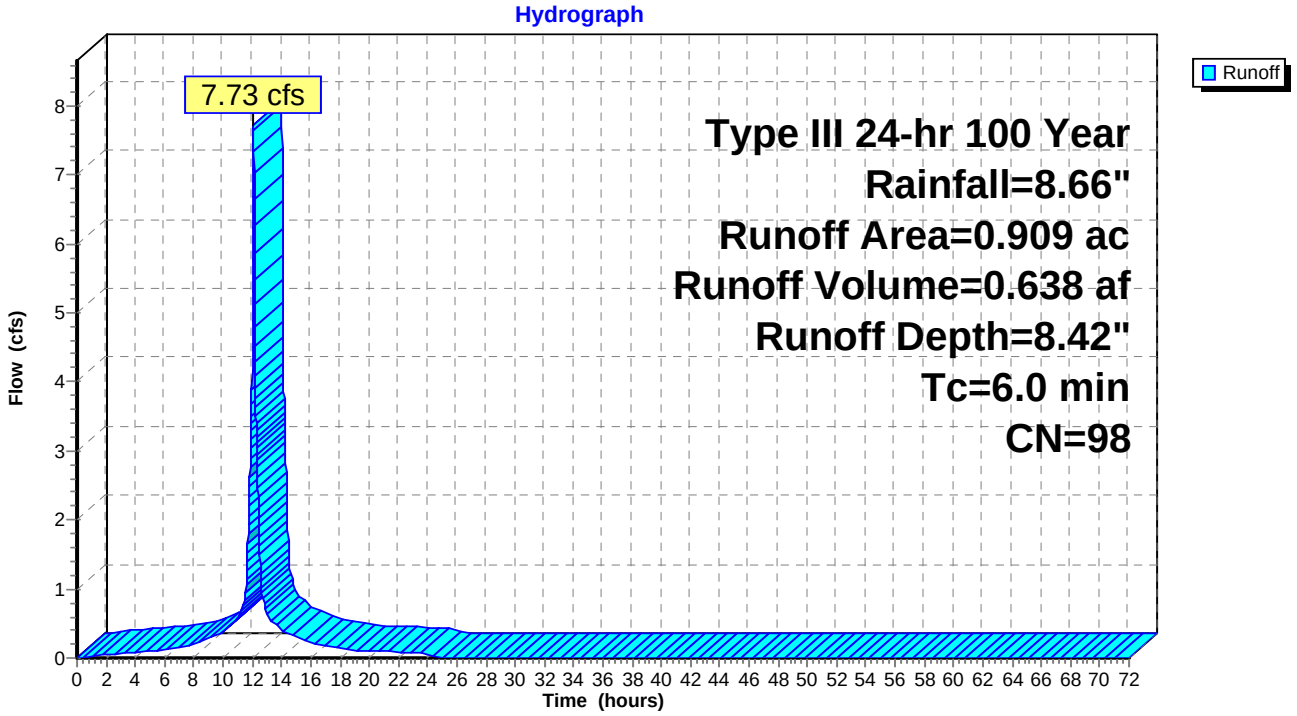
Runoff = 7.73 cfs @ 12.08 hrs, Volume= 0.638 af, Depth= 8.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.909	98	Paved parking, HSG D
0.909		100.00% Impervious Area

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

Subcatchment 3S: EDA-2 (Imp.)



Summary for Subcatchment 4S: EDA-2 (Per.)

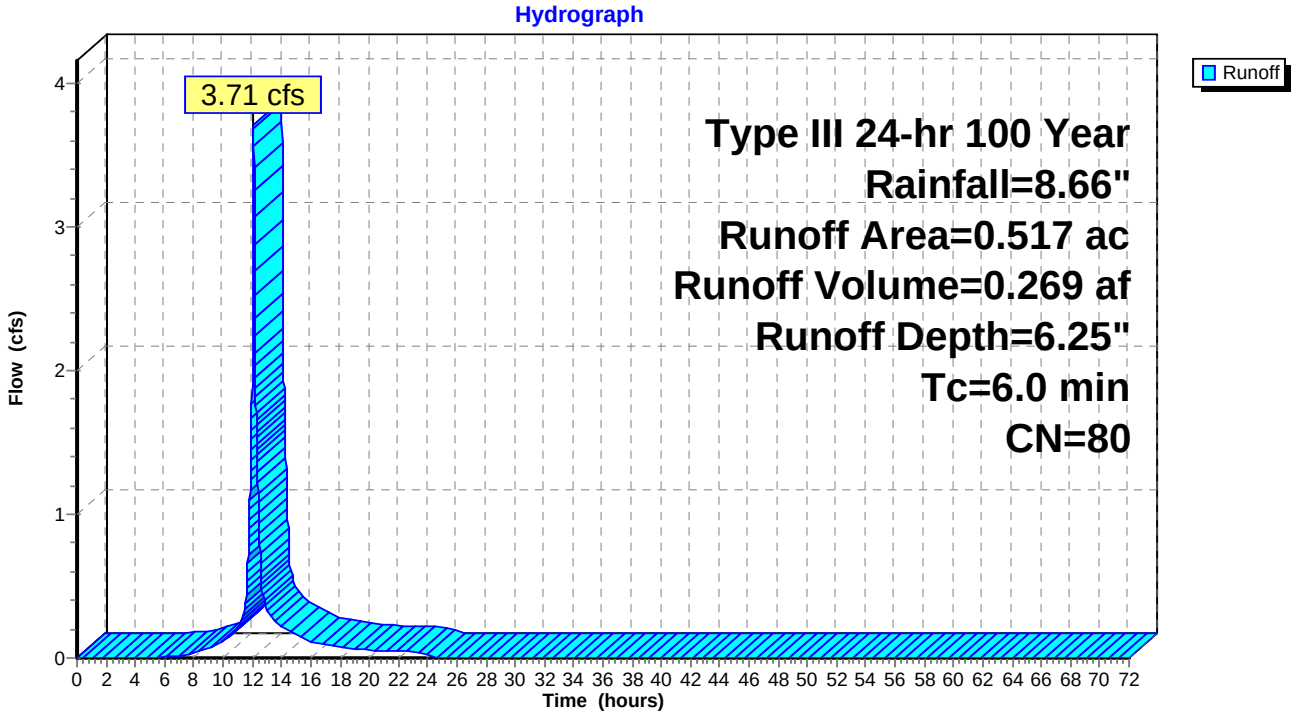
Runoff = 3.71 cfs @ 12.09 hrs, Volume= 0.269 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.517	80	>75% Grass cover, Good, HSG D
0.517		100.00% Pervious Area

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

Subcatchment 4S: EDA-2 (Per.)



Summary for Subcatchment 5S: EDA-3 (Imp.)

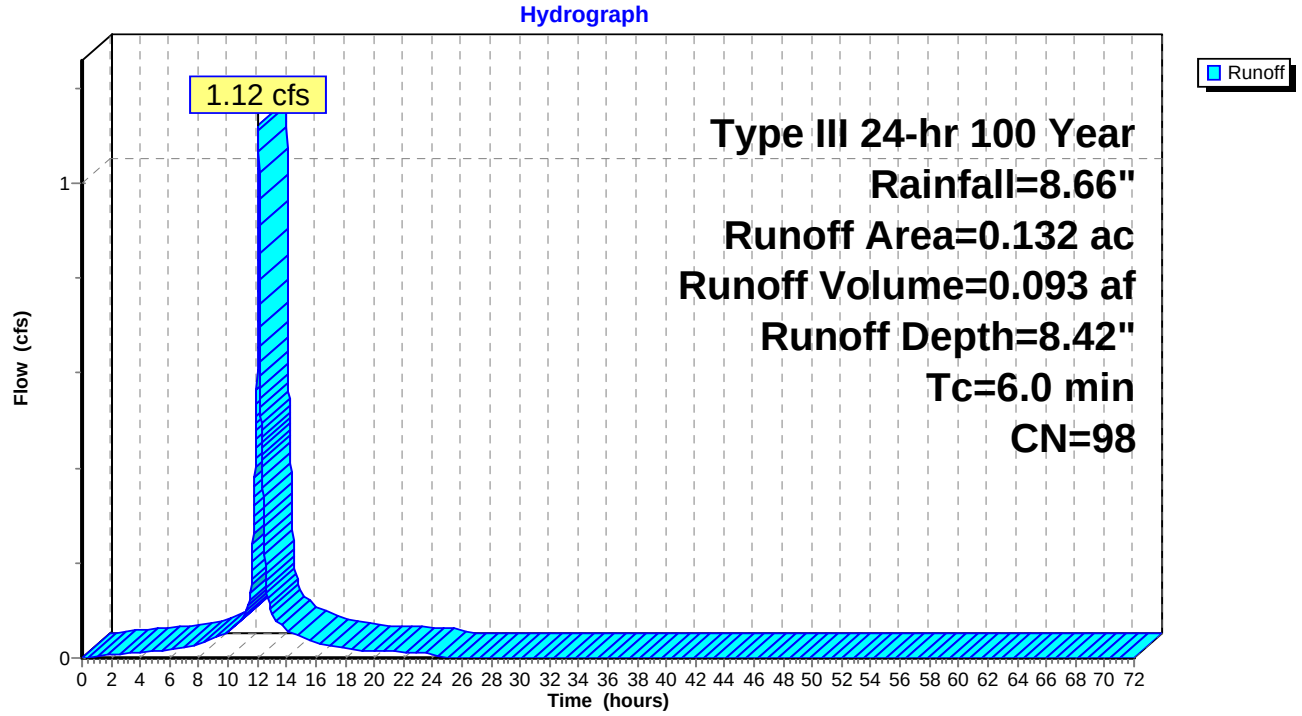
Runoff = 1.12 cfs @ 12.08 hrs, Volume= 0.093 af, Depth= 8.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.132	98	Paved parking, HSG D
0.132		100.00% Impervious Area

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

Subcatchment 5S: EDA-3 (Imp.)



Summary for Subcatchment 6S: EDA-3 (Per.)

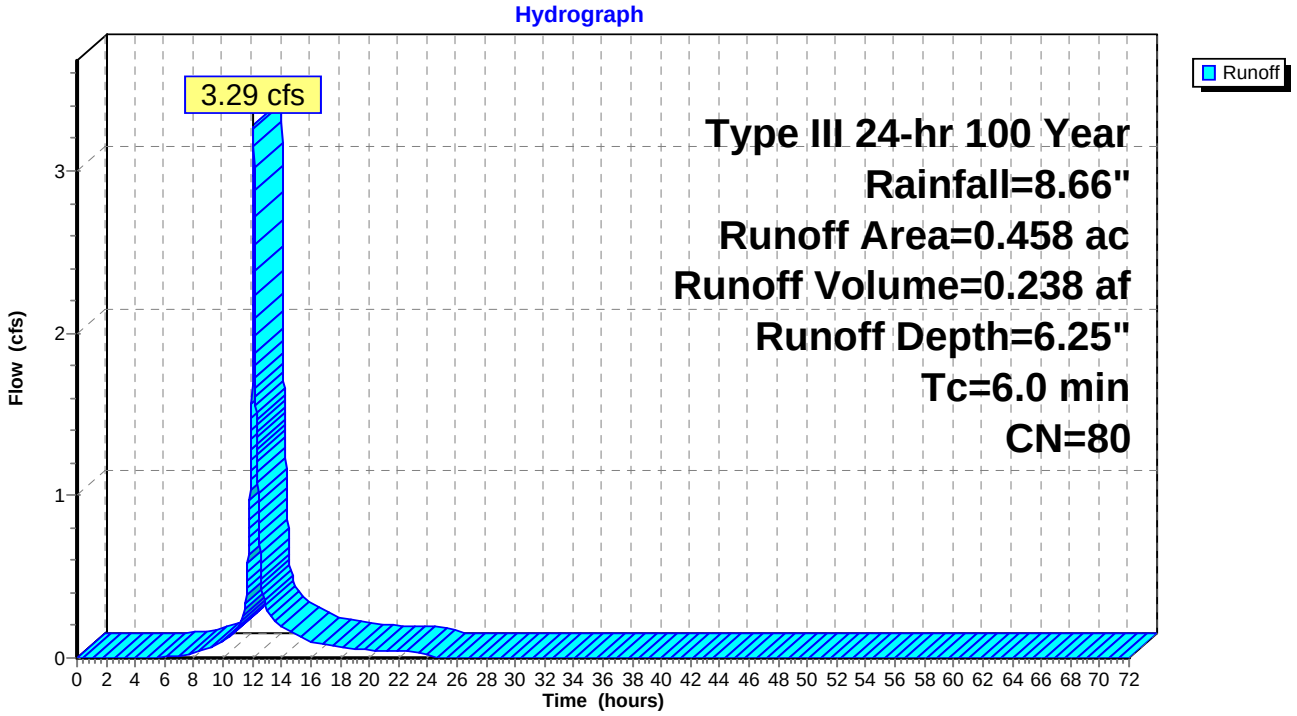
Runoff = 3.29 cfs @ 12.09 hrs, Volume= 0.238 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.458	80	>75% Grass cover, Good, HSG D
0.458		100.00% Pervious Area

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

Subcatchment 6S: EDA-3 (Per.)



Summary for Subcatchment 7S: PDA-1a (Imp.)

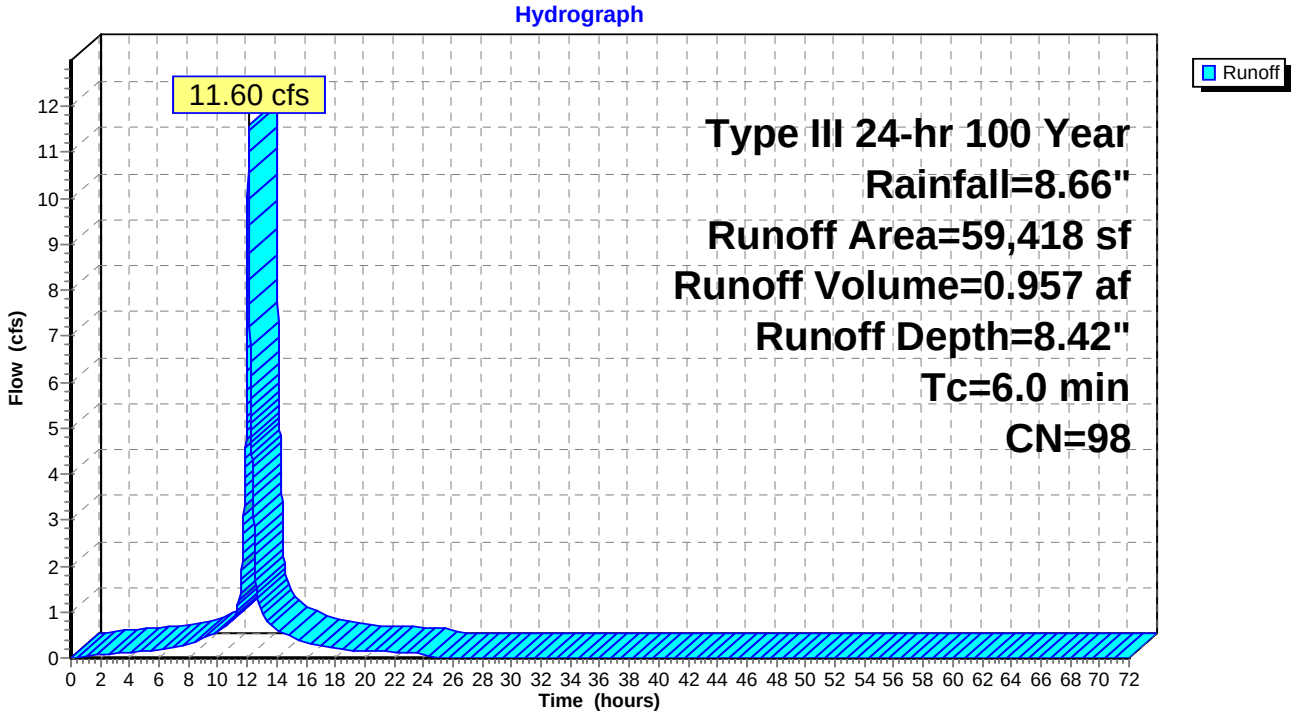
Runoff = 11.60 cfs @ 12.08 hrs, Volume= 0.957 af, Depth= 8.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (sf)	CN	Description
59,418	98	Paved parking, HSG D
59,418		100.00% Impervious Area

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

Subcatchment 7S: PDA-1a (Imp.)



Summary for Subcatchment 8S: PDA-1a (Per.)

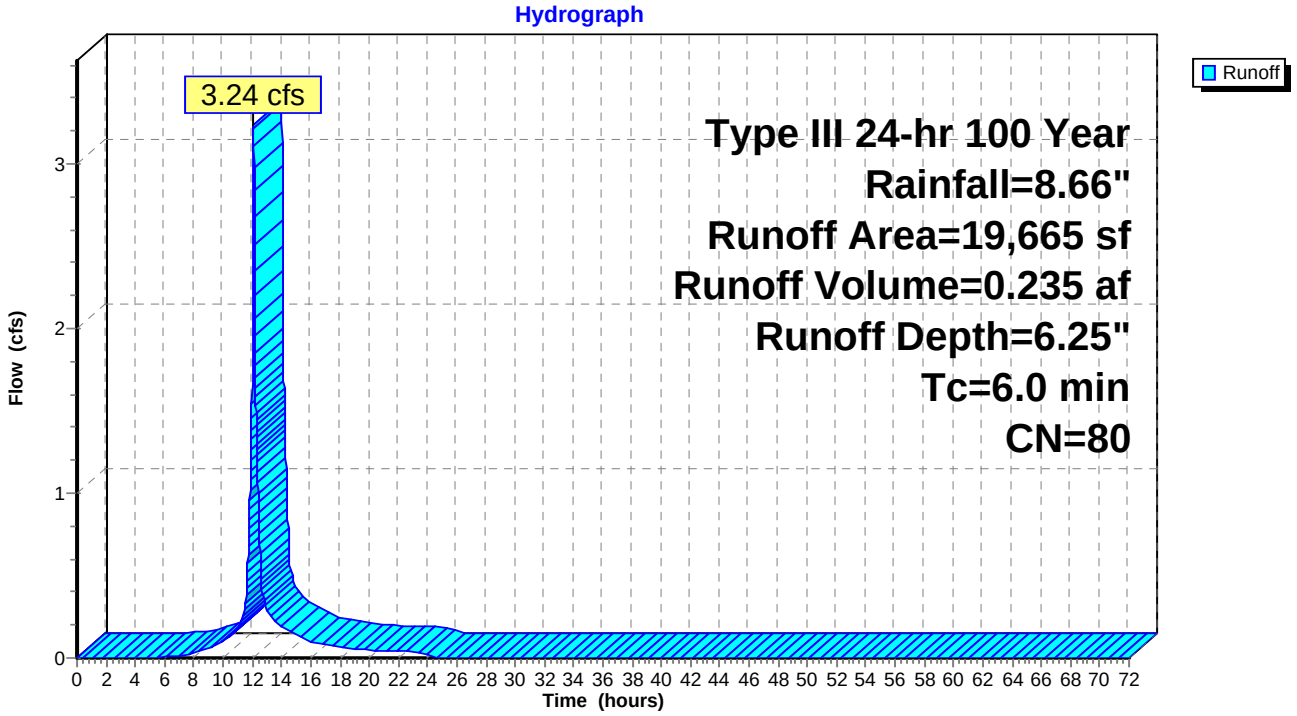
Runoff = 3.24 cfs @ 12.09 hrs, Volume= 0.235 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (sf)	CN	Description
19,665	80	>75% Grass cover, Good, HSG D
19,665		100.00% Pervious Area

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

Subcatchment 8S: PDA-1a (Per.)



Summary for Subcatchment 9S: PDA-1b (Imp.)

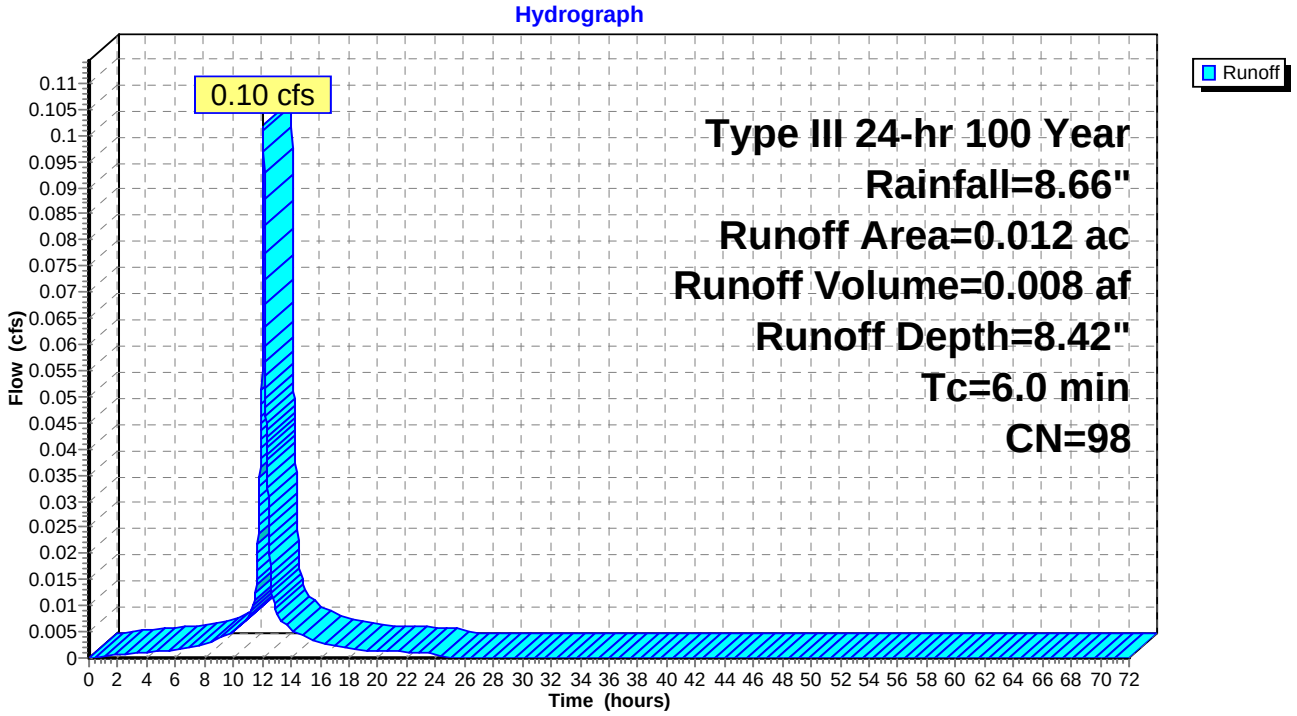
Runoff = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af, Depth= 8.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.012	98	Paved parking, HSG D
0.012		100.00% Impervious Area

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

Subcatchment 9S: PDA-1b (Imp.)



Summary for Subcatchment 10S: PDA-1b (Per.)

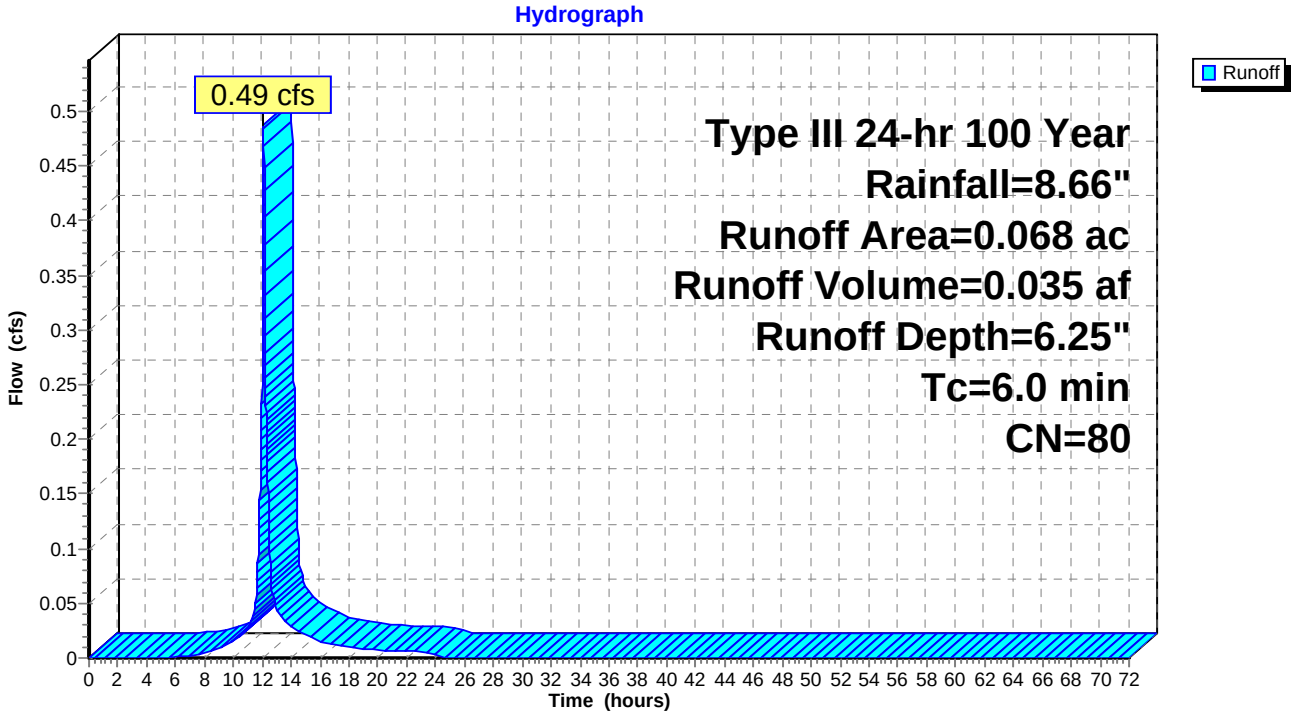
Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.068	80	>75% Grass cover, Good, HSG D
0.068		100.00% Pervious Area

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

Subcatchment 10S: PDA-1b (Per.)



Summary for Subcatchment 11S: PDA-2 (Imp.)

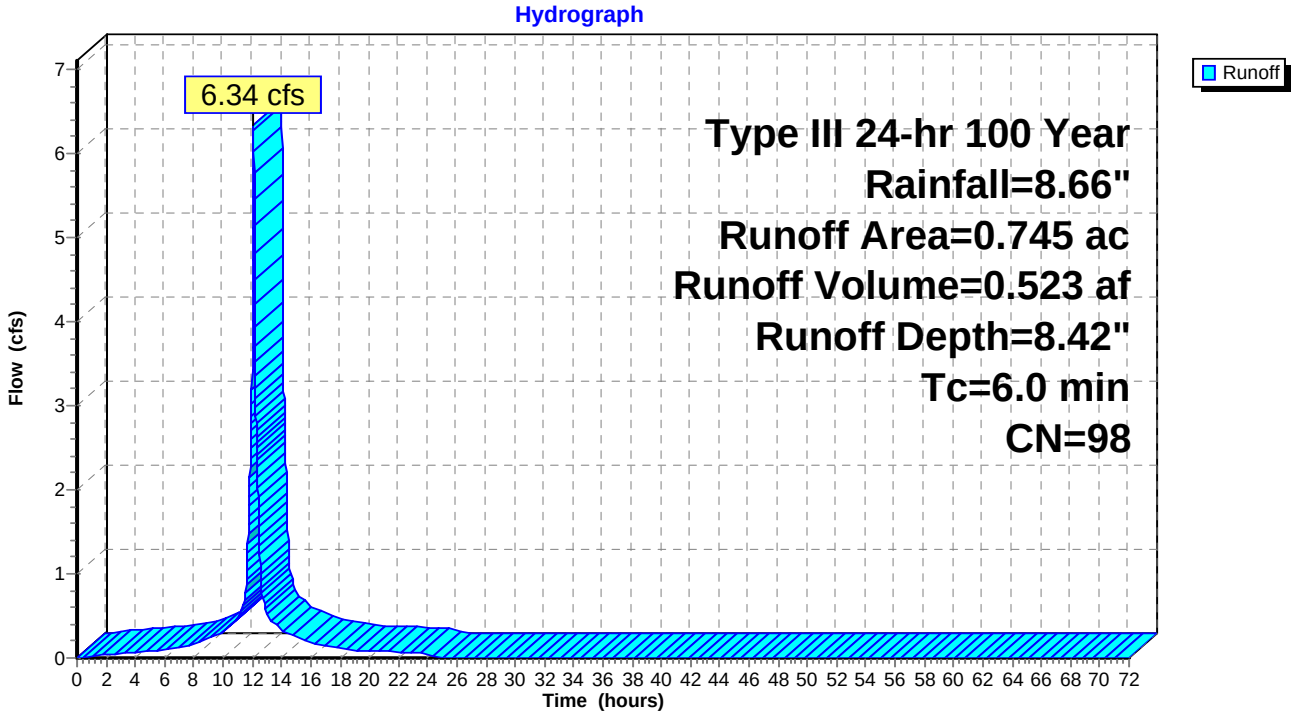
Runoff = 6.34 cfs @ 12.08 hrs, Volume= 0.523 af, Depth= 8.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.745	98	Paved parking, HSG D
0.745		100.00% Impervious Area

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

Subcatchment 11S: PDA-2 (Imp.)



Summary for Subcatchment 12S: PDA-2 (Per.)

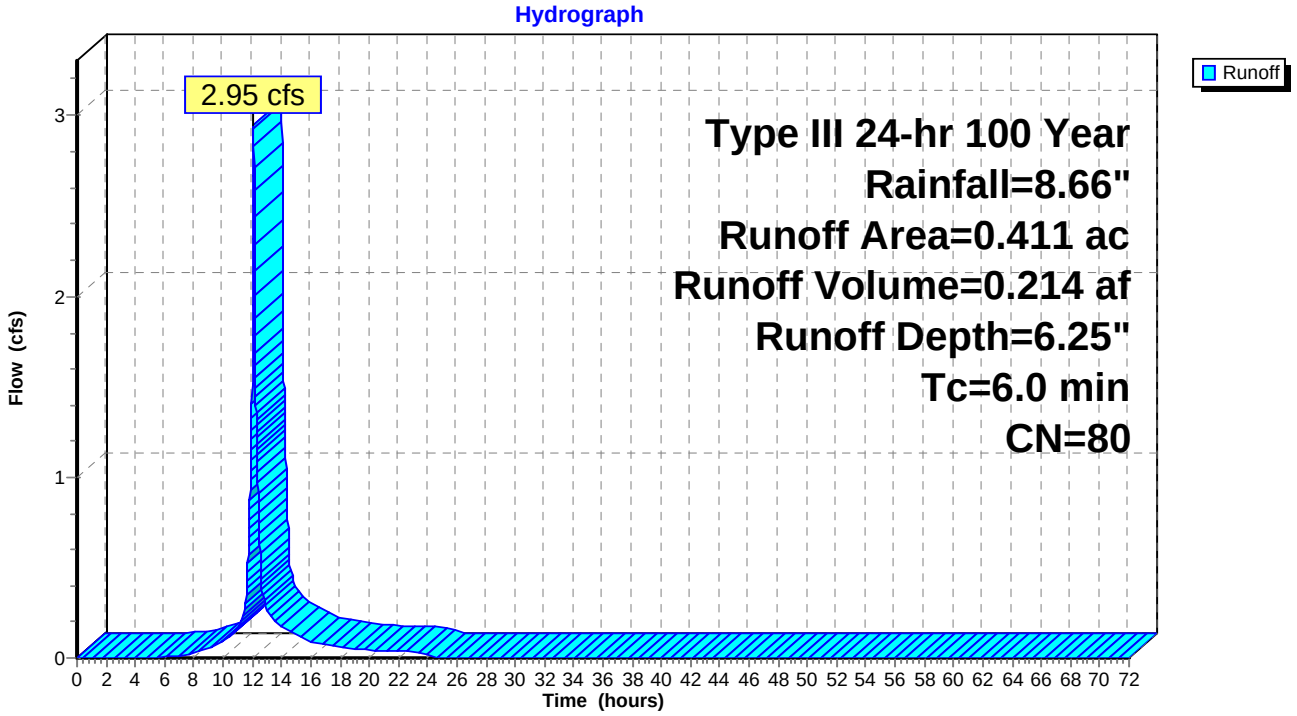
Runoff = 2.95 cfs @ 12.09 hrs, Volume= 0.214 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.411	80	>75% Grass cover, Good, HSG D
0.411		100.00% Pervious Area

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

Subcatchment 12S: PDA-2 (Per.)



Summary for Subcatchment 13S: PDA-3 (Per.)

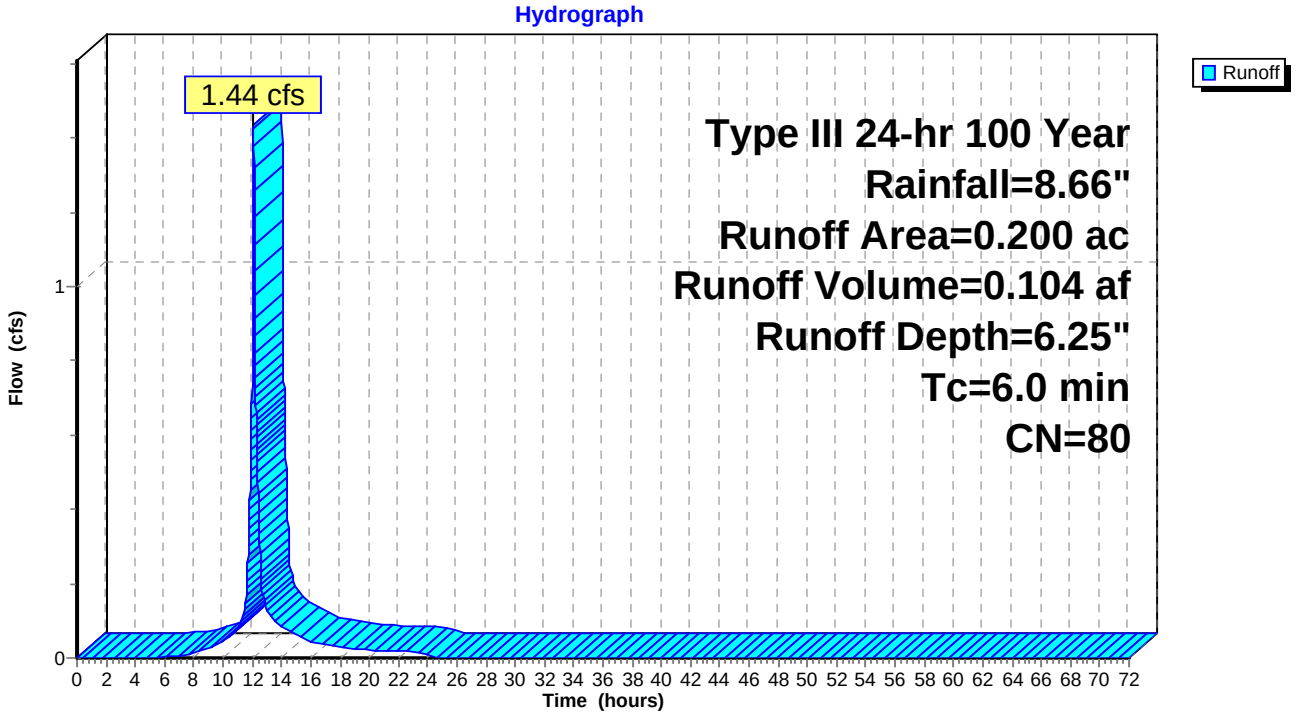
Runoff = 1.44 cfs @ 12.09 hrs, Volume= 0.104 af, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (ac)	CN	Description
0.200	80	>75% Grass cover, Good, HSG D
0.200		100.00% Pervious Area

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

Subcatchment 13S: PDA-3 (Per.)



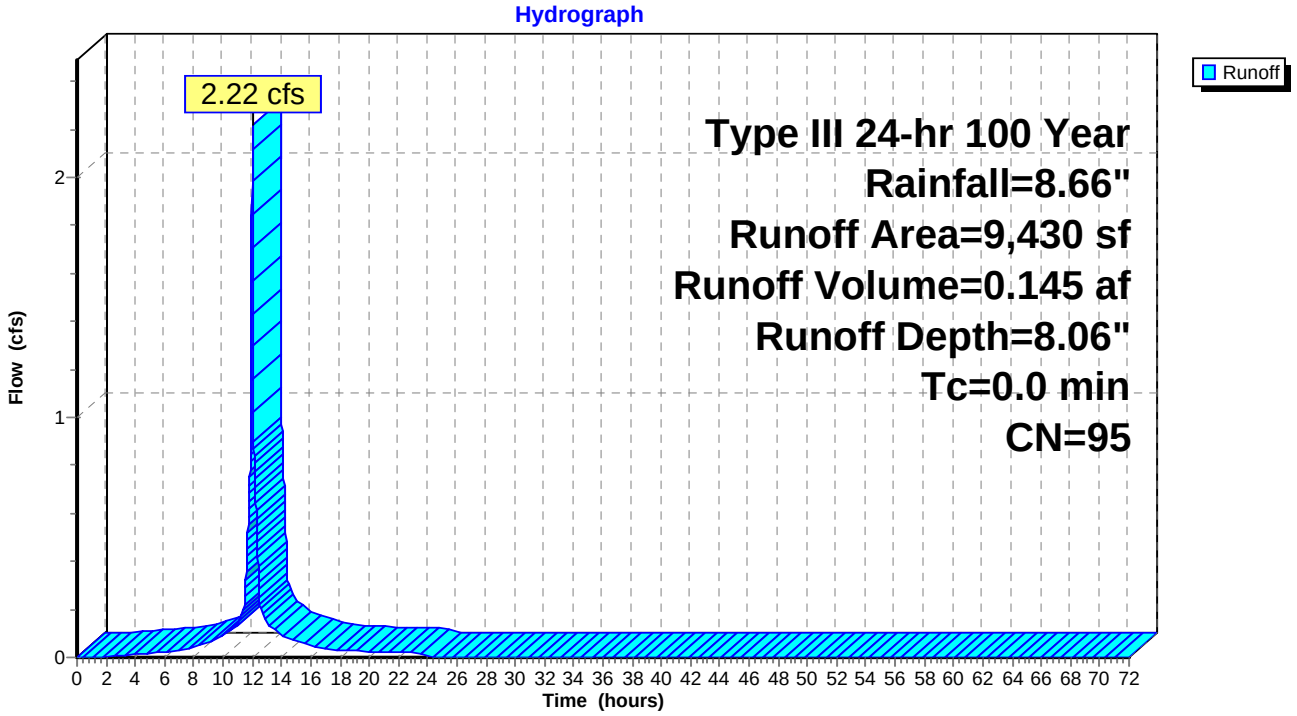
Summary for Subcatchment 14S: (1/2) Roof Area

Runoff = 2.22 cfs @ 12.00 hrs, Volume= 0.145 af, Depth= 8.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.66"

Area (sf)	CN	Description
8,056	98	Paved parking, HSG D
1,374	80	>75% Grass cover, Good, HSG D
9,430	95	Weighted Average
1,374		14.57% Pervious Area
8,056		85.43% Impervious Area

Subcatchment 14S: (1/2) Roof Area



Summary for Pond 15P: Infiltration Basin

Inflow Area = 0.216 ac, 85.43% Impervious, Inflow Depth = 8.06" for 100 Year event
Inflow = 2.22 cfs @ 12.00 hrs, Volume= 0.145 af
Outflow = 2.27 cfs @ 12.00 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 2.27 cfs @ 12.00 hrs, Volume= 0.131 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 242.80' @ 12.00 hrs Surf.Area= 0.000 ac Storage= 0.015 af

Plug-Flow detention time= 88.6 min calculated for 0.131 af (90% of inflow)
Center-of-Mass det. time= 38.9 min (788.7 - 749.8)

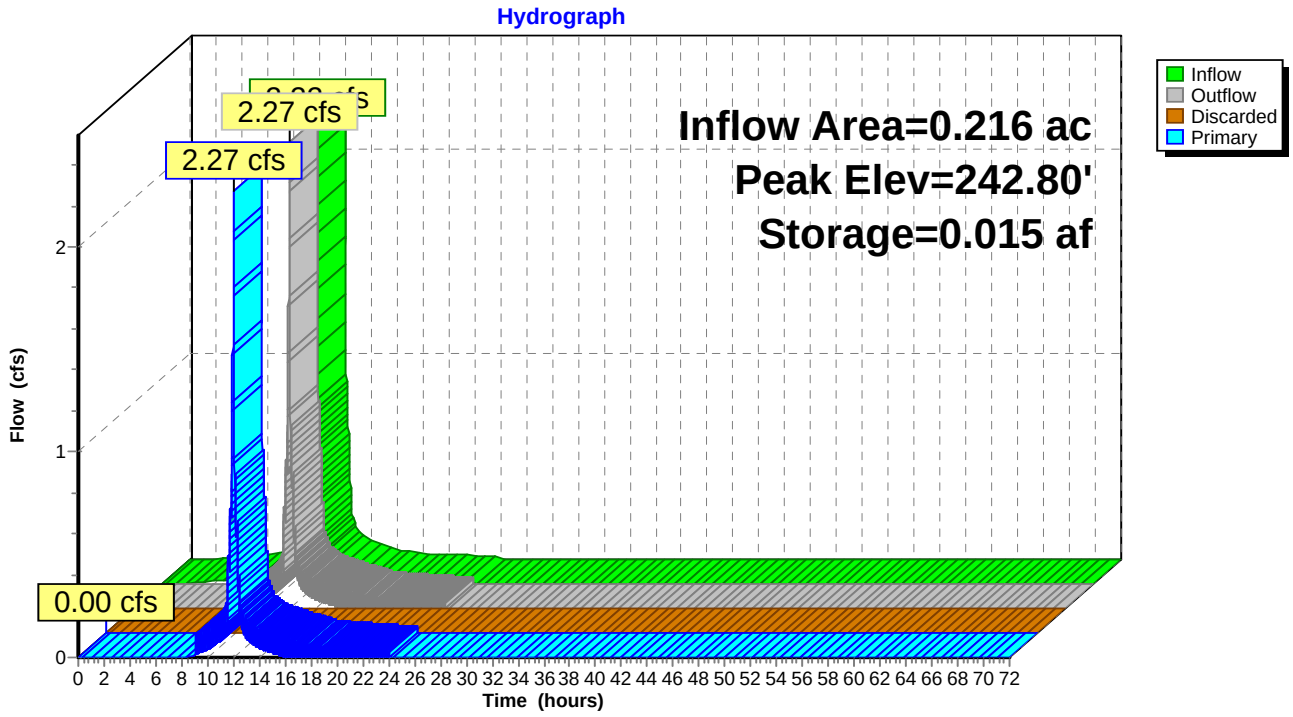
Volume	Invert	Avail.Storage	Storage Description
#1	237.50'	0.015 af	**36.0" D x 90.0'L Pipe Storage**

Device	Routing	Invert	Outlet Devices
#1	Primary	242.00'	**15.0" Round Culvert** L= 22.0' Ke= 0.500 Outlet Invert= 241.78' S= 0.0100 '/' Cc= 0.900 n= 0.010
#2	Discarded	237.50'	**0.450 in/hr Exfiltration X 0.00 over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.50' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=2.27 cfs @ 12.00 hrs HW=242.80' TW=238.73' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 2.27 cfs @ 3.87 fps)

Pond 15P: Infiltration Basin



Summary for Pond B1: U/G Basin 1

Inflow Area = 2.032 ac, 76.23% Impervious, Inflow Depth = 7.81" for 100 Year event
Inflow = 16.03 cfs @ 12.08 hrs, Volume= 1.323 af
Outflow = 8.53 cfs @ 12.21 hrs, Volume= 1.323 af, Atten= 47%, Lag= 8.0 min
Primary = 8.53 cfs @ 12.21 hrs, Volume= 1.323 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 9
Peak Elev= 239.75' @ 12.21 hrs Surf.Area= 0.068 ac Storage= 0.276 af

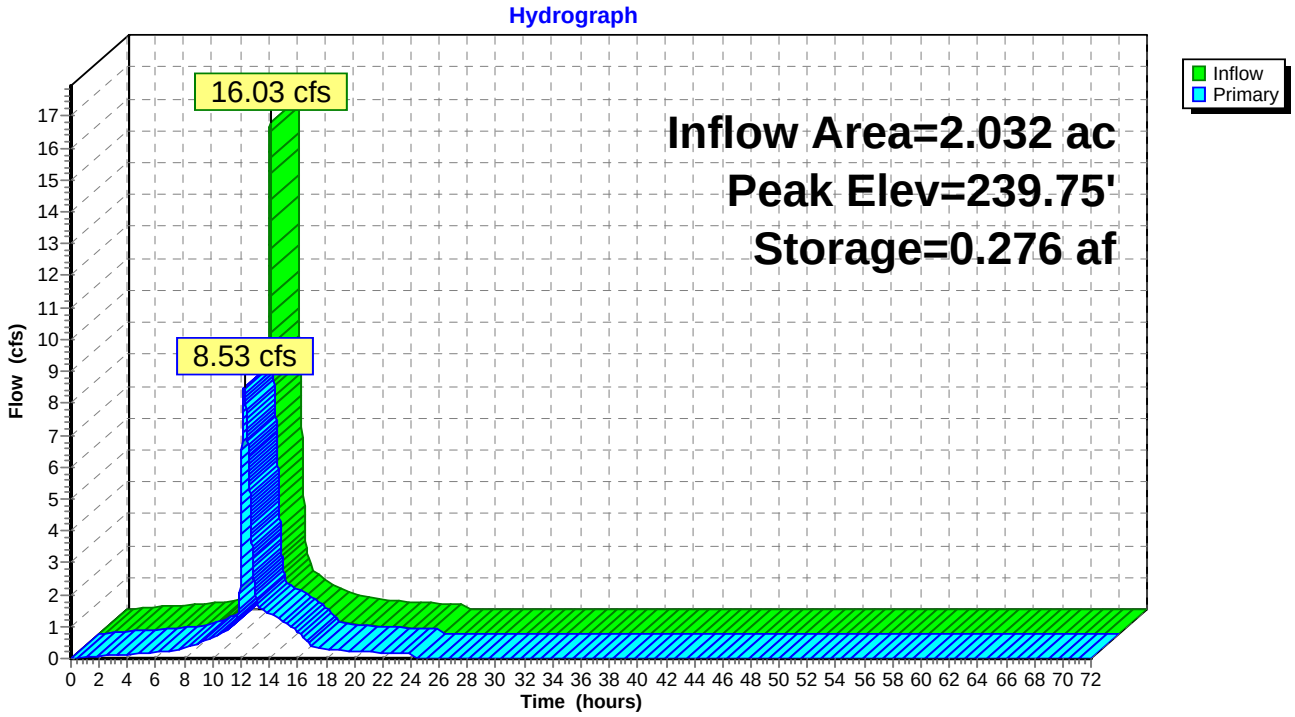
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 23.0 min (778.7 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	0.277 af	**36.0" D x 213.0'L Pipe Storage** x 8
#2	237.00'	0.011 af	**36.0" D x 35.0'L Pipe Storage** x 2
		0.288 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	236.60'	**15.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Outlet Invert= 236.30' S= 0.0100 '/' Cc= 0.900 n= 0.011
#2	Device 1	236.60'	**7.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	238.30'	**42.0" W x 4.0" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=8.53 cfs @ 12.21 hrs HW=239.75' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 8.53 cfs of 9.38 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 2.17 cfs @ 8.14 fps)
3=Orifice/Grate (Orifice Controls 6.35 cfs @ 5.44 fps)

Pond B1: U/G Basin 1

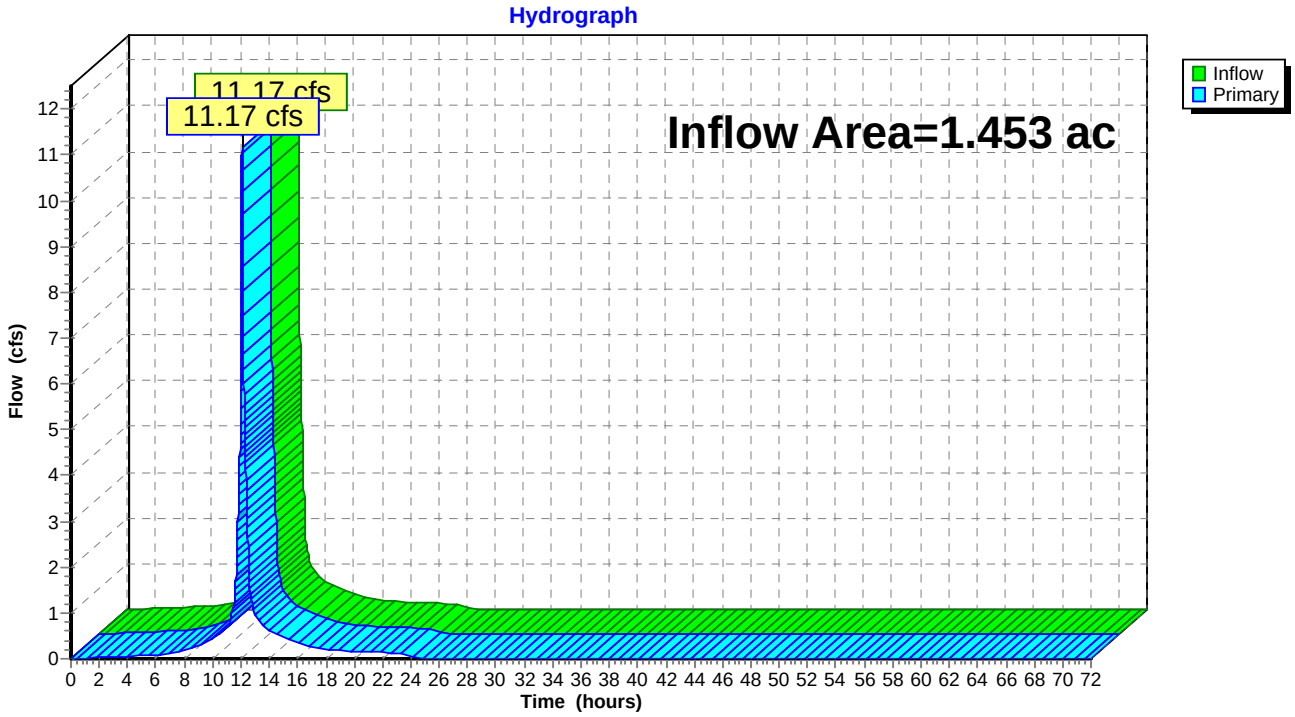


Summary for Link E1: EDA-1

Inflow Area = 1.453 ac, 38.27% Impervious, Inflow Depth = 7.08" for 100 Year event
Inflow = 11.17 cfs @ 12.08 hrs, Volume= 0.857 af
Primary = 11.17 cfs @ 12.08 hrs, Volume= 0.857 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E1: EDA-1

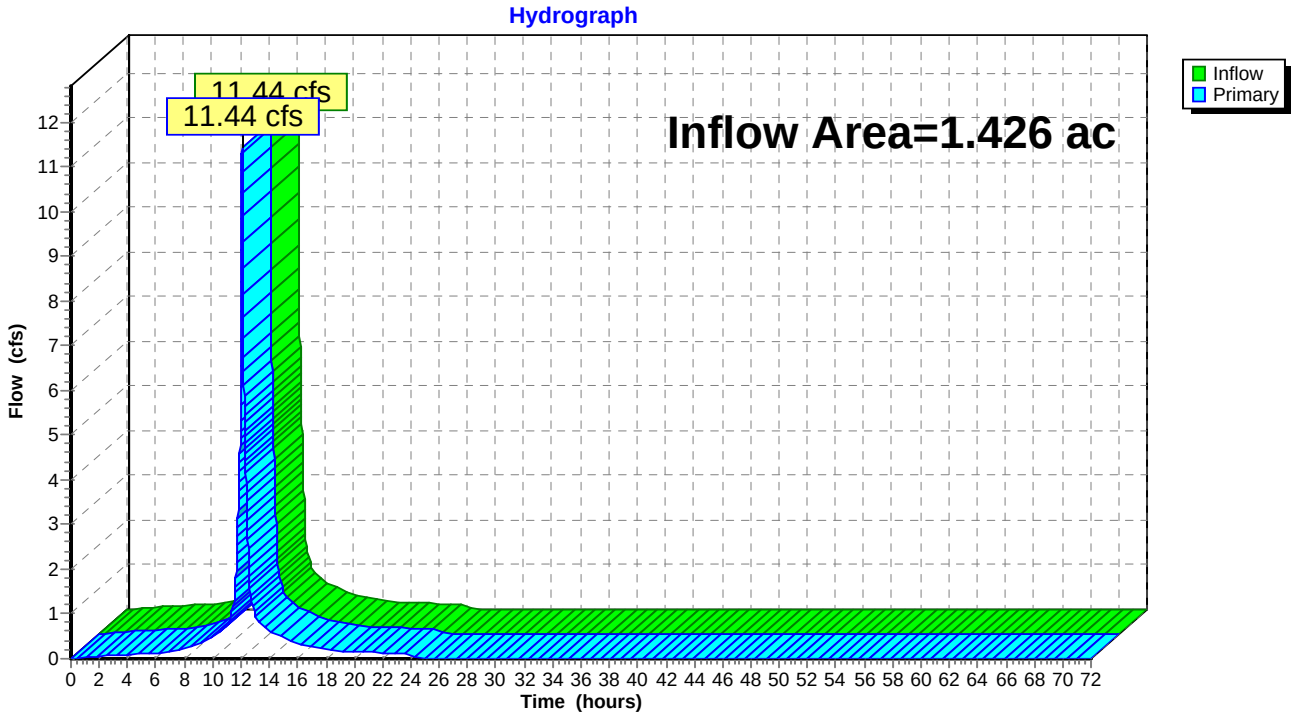


Summary for Link E2: EDA-2

Inflow Area = 1.426 ac, 63.74% Impervious, Inflow Depth = 7.63" for 100 Year event
Inflow = 11.44 cfs @ 12.08 hrs, Volume= 0.907 af
Primary = 11.44 cfs @ 12.08 hrs, Volume= 0.907 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E2: EDA-2

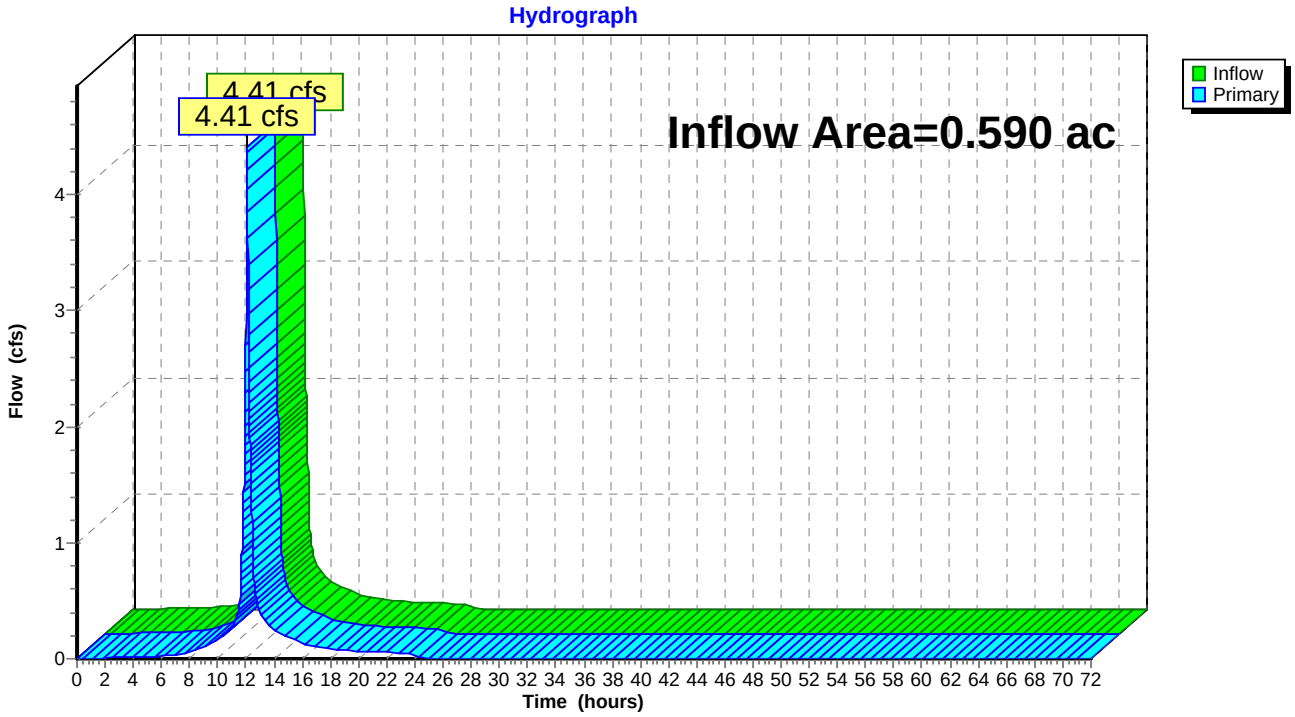


Summary for Link E3: EDA-3

Inflow Area = 0.590 ac, 22.37% Impervious, Inflow Depth = 6.73" for 100 Year event
Inflow = 4.41 cfs @ 12.09 hrs, Volume= 0.331 af
Primary = 4.41 cfs @ 12.09 hrs, Volume= 0.331 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link E3: EDA-3

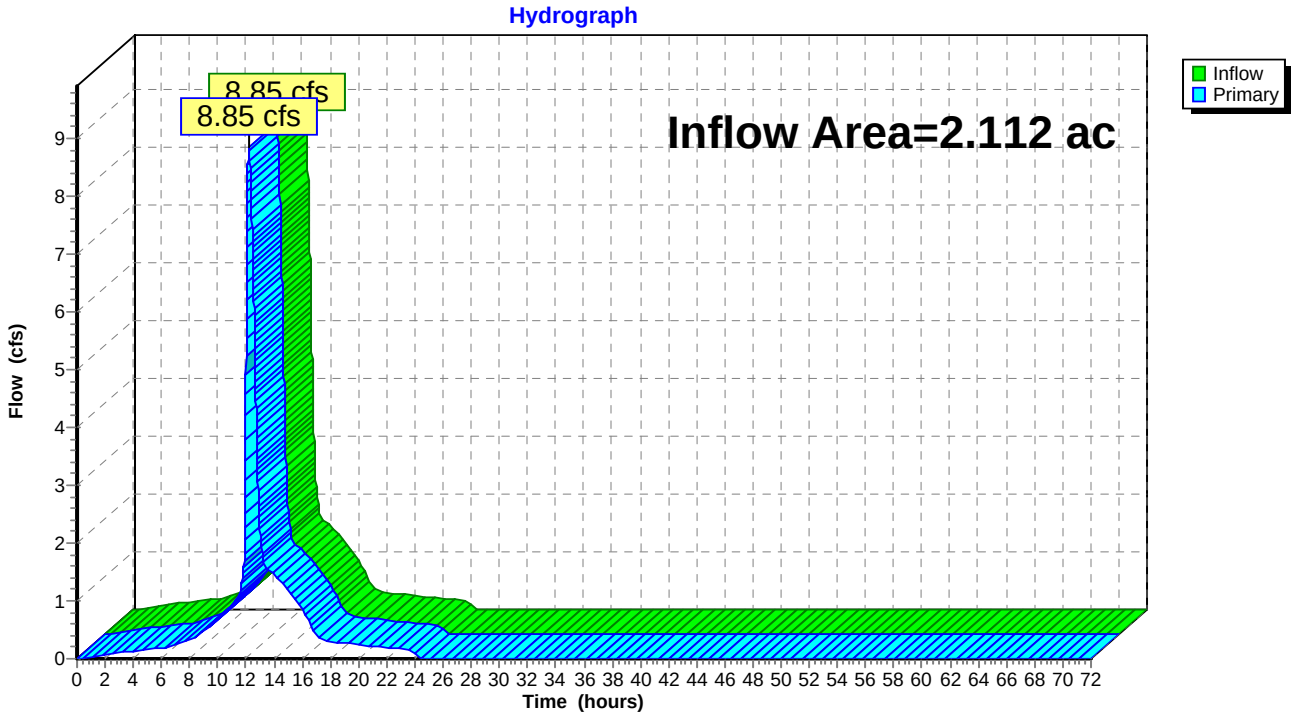


Summary for Link P1: PDA-1

Inflow Area = 2.112 ac, 73.91% Impervious, Inflow Depth = 7.77" for 100 Year event
Inflow = 8.85 cfs @ 12.20 hrs, Volume= 1.367 af
Primary = 8.85 cfs @ 12.20 hrs, Volume= 1.367 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P1: PDA-1

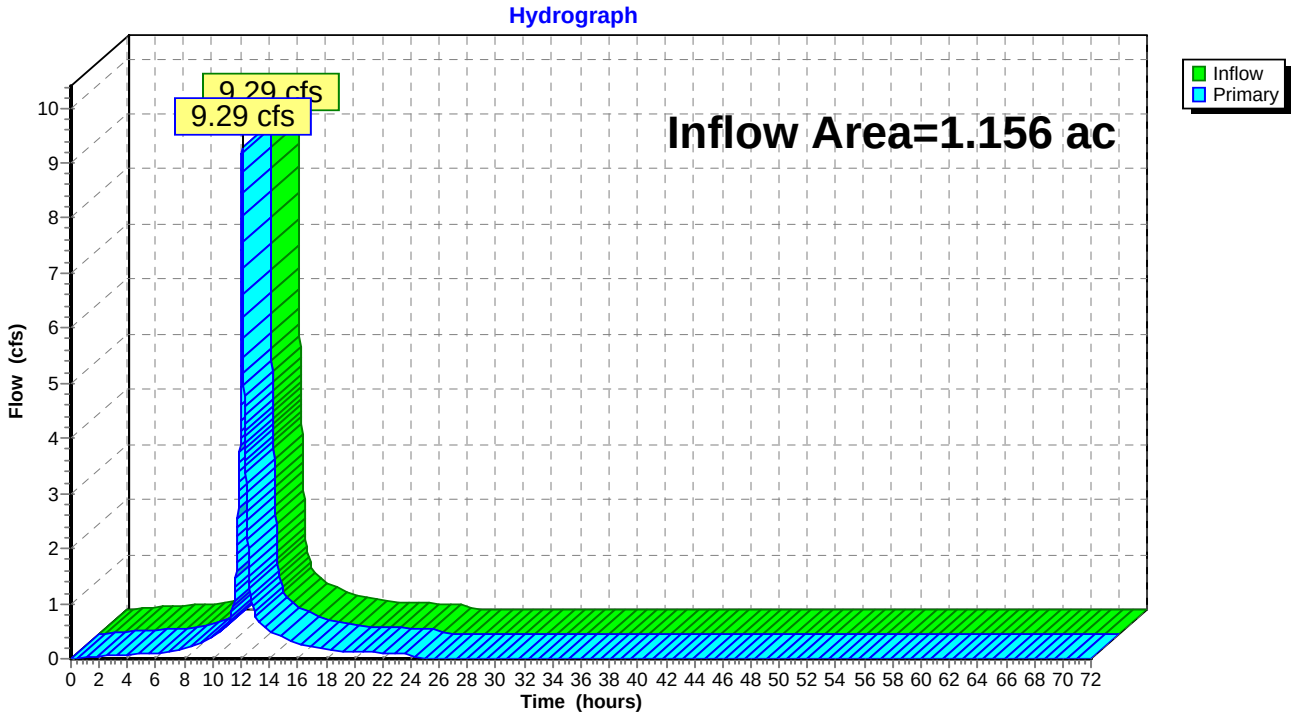


Summary for Link P2: PDA-2

Inflow Area = 1.156 ac, 64.45% Impervious, Inflow Depth = 7.65" for 100 Year event
Inflow = 9.29 cfs @ 12.08 hrs, Volume= 0.737 af
Primary = 9.29 cfs @ 12.08 hrs, Volume= 0.737 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P2: PDA-2

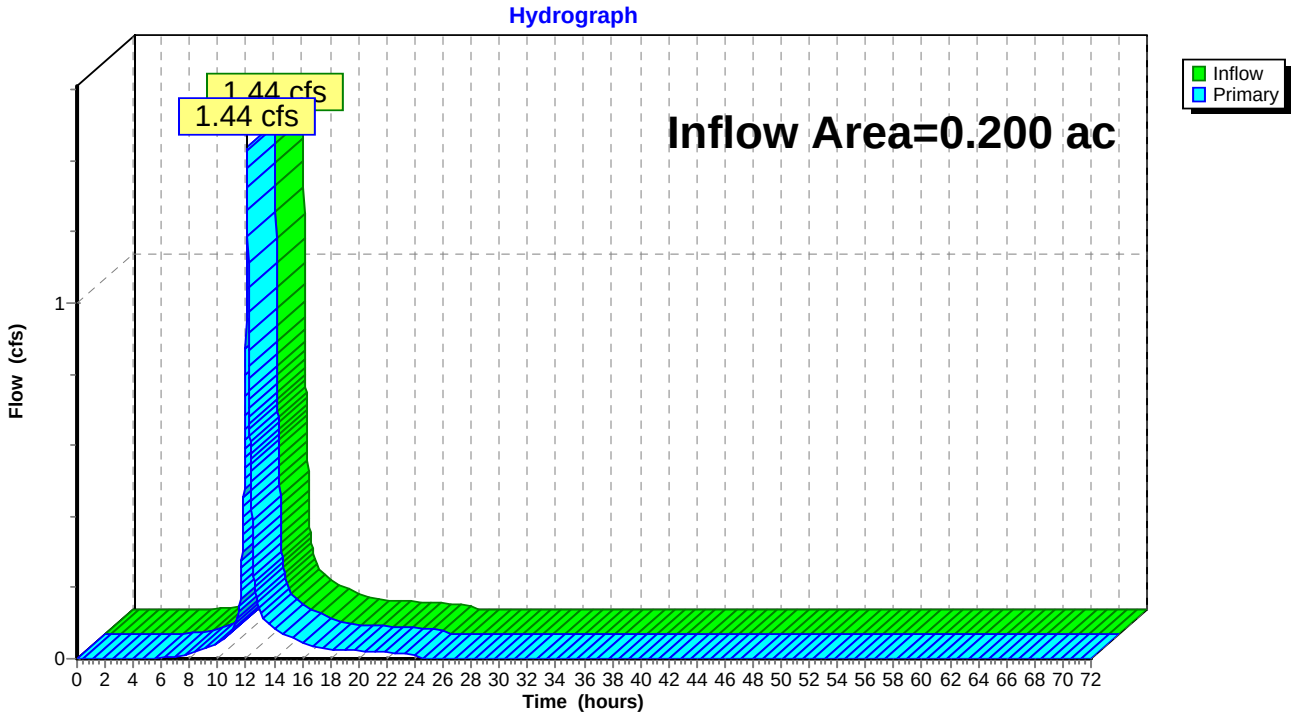


Summary for Link P3: PDA-3

Inflow Area = 0.200 ac, 0.00% Impervious, Inflow Depth = 6.25" for 100 Year event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 0.104 af
Primary = 1.44 cfs @ 12.09 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link P3: PDA-3



B. DESIGN CALCULATIONS

- **Water Quality Unit Sizing**
- **Basin Drain Time Calculation**
- **Pipe Sizing**

Water Quality Unit Sizing

CDS Design Summary

MOB in Montclair/Glen Ridge

Montclair, NJ

Information provided by Engineer (Bohler Engineering):

- Water Quality Flow = 2.35 cfs
- 100-YR Storm Flow = 9.29 cfs
- Presiding agency = NJDEP
- Stormwater treatment system TSS removal required = 50%

Sizing Summary:

The CDS technology features a patented non-blocking, indirect screening technique developed to treat stormwater runoff. The unit is highly effective in the capture of suspended solids, fine sands and larger particles. Because of its non-blocking screening capacity, the CDS unit is un-matched in its ability to capture and retain gross pollutants such as trash and debris. The CDS system is NJCAT verified and as a result has received certification from the NJDEP for 50% TSS removal.

For this project the CDS system was designed to treat the water quality design storm. The peak water quality design storm runoff flow rate provided the engineer of record is **2.35 cfs**.

Water Quality Design Storm Peak Runoff Rate (cfs)	CDS-7 (CDS3535-7) NJDEP Approved Water Quality Treatment Flow Rate (cfs)
2.35	2.8

Maintenance:

Like any stormwater best management practice, the CDS system requires regular inspection and maintenance to ensure optimal performance. Maintenance frequency will be driven by site conditions. Quarterly visual inspections are recommended, at which time the accumulation of pollutants can be determined. On average, the CDS system requires annual removal of accumulated pollutants.

Thank you for the opportunity to present this information to you and your client.

Sincerely,

Andrew Brown
Contech Engineered Solutions LLC

7037 Ridge Road, Suite 350 | Hanover, MD 21076
Office: 443.457.1500 Fax: 410.740.8492

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 21, 2017

Derek M. Berg
Contech Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: Revised MTD Lab Certification
Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered Solutions, LLC
On-line Installation

TSS Removal Rate 50%

Dear Mr. Berg:

This revised certification letter supersedes the Department's prior certification dated January 9, 2015. This revision was completed to reflect the updated Manufactured Treatment Device (MTD) scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. In part, the updated scaling for hydrodynamic MTDs is based on the depth of the reference (tested) MTD from the top of the false floor utilized during removal efficiency testing, not from the physical bottom of the unit. Based on the above decision, Table A-2 of the NJCAT Technology Verification report located at http://www.njcat.org/uploads/newDocs/CDSVerificationReportFinal1.pdf has been revised, and Table 1 noted below has been added.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested an MTD Laboratory Certification for the CDS® Stormwater Treatment Device.

The verification is subject to the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification

Appendix dated September 2014 (Revised January 2017) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the CDS® Stormwater Treatment Device by Contech Engineered Solutions, LLC at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The CDS® Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This CDS® Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the CDS® Stormwater Treatment Device. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the CDS®:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a CDS®. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (runoff coefficient for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the CDS® Model CDS-4 with an MTFR of 0.93 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and A-2.

Table 1 CDS Models

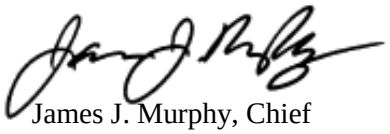
CDS Model	Manhole Diameter (ft.)	Treatment Chamber Depth (ft.)	MTFR (cfs)
CDS-3	3	3.50	0.52
CDS-4	4	3.50	0.93
CDS-5	5	3.75	1.5
CDS-6	6	4.50	2.1
CDS-7	7	5.25	2.8
CDS-8	8	6.00	3.7
CDS-10	10	7.50	5.8
CDS-12	12	9.00	8.4

- Treatment Chamber Depth is defined as the depth below the invert to the top of the false floor installed at 50% sediment depth.

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

c: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP – BNPC

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CONTECH ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

StormFilter Design Summary

MOB in Montclair/Glen Ridge

Montclair, NJ

Information Provided by Engineer (Bohler Engineering):

- Required TSS removal rate = 80%
- Treatment flow rate = 1.24 cfs
- 100-YR Storm bypass flow rate = 8.55 cfs
- Impervious drainage area = 1.549 acres
- Presiding agency = NJDEP

StormFilter Information and Cartridge Data:

The Stormwater Management StormFilter® is a passive, siphon-actuated, flow-through stormwater filtration system consisting of a precast concrete structure that houses rechargeable, media-filled filter cartridges. The StormFilter works by passing stormwater through the media-filled cartridges, which trap particulates and adsorb pollutants such as dissolved metals, nutrients, and hydrocarbons. **The StormFilter has received final certification from the NJDEP for 80% TSS removal as a stand-alone treatment system.**

- StormFilter cartridge filter media = Perlite
- StormFilter cartridge media height = 18 inches (nominal)
- StormFilter cartridge surface area = 7.07 square feet (nominal)
- StormFilter cartridge specific treatment flow rate = 2.12 gallons/minute per square foot (nominal)
- StormFilter cartridge treatment flow = 15 gpm
- **Hydraulic head required = 2.3 feet** (with 18 inch cartridge)
- Minimum physical drop between inlet and outlet pipe = 6 inches

Design Summary:

The StormFilter is sized based on the NJDEP certification, which lists an approved treatment flow rate and maximum impervious acreage limit per cartridge in Table 1. The number of cartridges required based on the impervious drainage area is compared with the number of cartridges required based on the treatment flowrate; the larger number of cartridges governs the sizing.

The StormFilter for this site was sized to provide **38 cartridges** in order to meet the hydraulic load requirement (calculations shown below). To house this number of cartridges, Contech Engineered Solutions recommends an 8' x 18' precast Peak Diversion StormFilter.

$$N_{\substack{cartridges \\ Hyd.Load}} = \frac{Q_{treat} \times 449\,{}^{gpm}/_{cfs}}{SA_{cartridge} \times Q_{specific(cart)}} = \frac{1.24cfs \times 449\,{}^{gpm}/_{cfs}}{15\,{}^{gpm}/_{cartridge}} = 37.12 \rightarrow (38)\ 18\text{" cartridges}$$

$$N_{\substack{cartridges \\ MassLoad}} = \frac{Area_{site}}{MaxArea_{cartridge}} = \frac{1.549\,acres}{0.09\,{}^{acres}/_{cartridge}} = 17.21 \rightarrow (18)\ 18\text{" cartridges}$$

7037 Ridge Road, Suite 350 | Hanover, MD 21076
Office: 443-457-1500 Fax: 410-740-8492

StormFilter Design Summary

Maintenance:

Maintenance of Stormwater best management practices is required per the New Jersey Administrative Code 7:8-5.8. Recommendations for maintenance are included in chapters 8 & 9 of the New Jersey Stormwater Best Management Practices Manual. To comply with requirements, CONTECH offers a network of Preferred Service Providers that have the capability to perform all necessary inspections, compliance reporting and cleaning services. CONTECH recommends inspecting the system annually and maintaining the system at the recommendation of the annual inspection. Full maintenance is typically required every 24-36 months. Disposal of material should be handled in accordance with local regulations. Please contact CONTECH's Maintenance Department for all questions regarding maintenance at (503) 258-3157 or visit our website at www.contech-cpi.com/maintenance.

Thank you for the opportunity to present this information to you and your client.

Sincerely,

Andrew Brown
Contech Engineered Solutions LLC

7037 Ridge Road, Suite 350 | Hanover, MD 21076
Office: 443-457-1500 Fax: 410-740-8492

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
Mail Code 401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 14, 2016

Derek M. Berg
Director - Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Laboratory Certification
Stormwater Management StormFilter® (StormFilter) by Contech Engineered Solutions LLC
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the StormFilter System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the StormFilter System by Contech Engineered Solutions LLC at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 2.12 gpm/sf of effective filtration treatment area.

2. The StormFilter System shall be installed using the same configuration as the unit tested by NJCAT, and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormFilter, which is attached to this document. However, it is recommended to review the maintenance website at http://www.conteches.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=2813&PortalId=0&DownloadMethod=attachment for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for a StormFilter System.

   Example: A 0.25 acre impervious site is to be treated to 80% TSS removal using a StormFilter System. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The calculation of the minimum number of cartridges for use in the StormFilter System is based upon both the MTFR and the maximum inflow drainage area. It is necessary to calculate the required cartridges using both methods and to rely on the method that results in the highest minimum number of cartridges determined by the two methods.

   Inflow Drainage Area Evaluation:

   The drainage area to the StormFilter System in this example is 0.25 acres. Based upon the information in Table 1 below, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the maximum drainage area:

1. Five (5) 12” cartridges,
2. Three (3) 18” cartridges, or
3. Two (2) 27” cartridges

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c=0.99 (runoff coefficient for impervious)
Q=ciA=0.99x3.2x0.25=0.79 cfs=0.79x448.83 gpm=354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the MTFR:

1. Thirty-six (36) 12” cartridges,
2. Twenty-four (24) 18” cartridges, or
3. Sixteen (16) 27” cartridges

The MTFR Evaluation results will be used since that method results in the higher minimum number of cartridges determined by the two methods.

The sizing table corresponding to the available system models are noted below:

TABLE 1 STORMFILTER CARTRIDGE HEIGHTS AND NEW JERSEY TREATMENT CAPACITIES

StormFilter Cartridge Heights and New Jersey Treatment Capacities				
StormFilter Cartridge Height	**Filtration Surface Area (sq.ft)**	**MTFR[1] (GPM)**	**Mass Capture Capacity (lbs)**	**Maximum Allowable Inflow Area[2] (acres)**
Low Drop (12")	4.71	10	36.3	0.061
18"	7.07	15	54.5	0.09
27"	10.61	22.5	81.8	0.136

Notes:

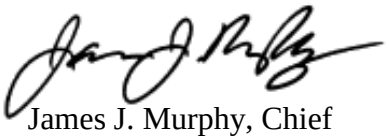
1. *MTFR calculated based on 4.72x10-3 cfs/sf (2.12 gpm/sf) of effective filtration treatment area.*
2. *Based upon the equation found in the NJDEP Filter Protocol Maximum Inflow Drainage Area (acres) = weight of TSS before 10% loss in MTFR (lbs)/600 lbs/acre of drainage area annually.*

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of

indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

CONTECH®
ENGINEERED SOLUTIONS

StormFilter Inspection and Maintenance Procedures

The Stormwater Management StormFilter®

Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. **Inspection**
   - Inspection of the vault interior to determine the need for maintenance.
2. **Maintenance**
   - Cartridge replacement
   - Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/ maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..

Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

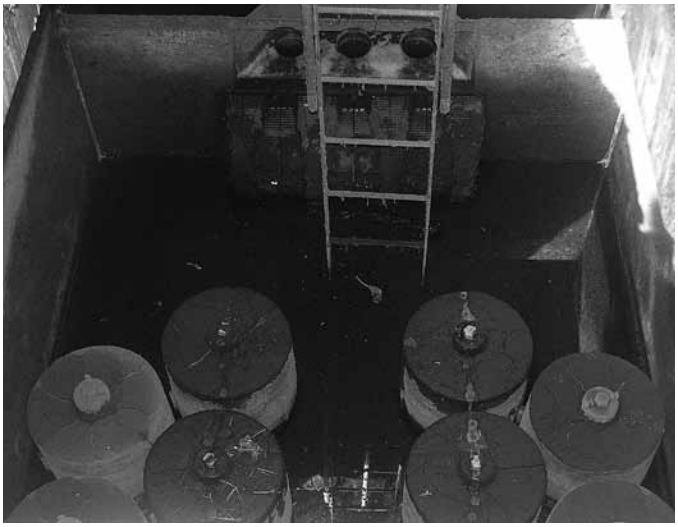
Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to weather or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
   a. If >4" of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
   a. If >1/4" of accumulation, maintenance is required.
3. Submerged cartridges.
   a. If >4" of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
   a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
   a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
   a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
   a. If pronounced scum line (say ≥ 1/4" thick) is present above top cap, maintenance is required.



Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

   Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

B. Remove the used cartridges (up to 250 lbs. each) from the vault.

Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

C. Set the used cartridge aside or load onto the hauling truck.

D. Continue steps a through c until all cartridges have been removed.

Method 2:

A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

B. Unscrew the cartridge cap.

C. Remove the cartridge hood and float.

D. At location under structure access, tip the cartridge on its side.

E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.

F. Set the empty, used cartridge aside or load onto the hauling truck.

G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

Inspection Report

Date: Personnel:

Location: System Size:

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

Sediment Thickness in Forebay: Date:

Sediment Depth on Vault Floor:

Structural Damage:

Estimated Flow from Drainage Pipes (if available):

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water:

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal:

☐ Minor Structural Repairs:

☐ Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source:

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source:

Erosion of Landscaped Areas: Yes ☐ No ☐ Source:

Items Needing Further Work:

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

List Safety Procedures and Equipment Used: _____

_____

_____

System Observations

Months in Service:

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: _____

Replace Cartridges: Yes ☐ No ☐ Details: _____

Sediment Removed: Yes ☐ No ☐ Details: _____

Quantity of Sediment Removed (estimate?):

Minor Structural Repairs: Yes ☐ No ☐ Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:

_____

_____

_____

_____

_____

_____

_____

RECYCLED PAPER

CONTECH®
ENGINEERED SOLUTIONS

800-338-1122

www.ContechES.com

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit contech-cpi.com or call 800.338.1122.

Support

- Drawings and specifications are available at www.conteches.com.
- Site-specific design support is available from our engineers.

800.338.1122
www.conteches.com

Basin Drain Time Calculation

Hydrograph for Pond B1: U/G Basin 1

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	237.00	0.00
1.00	0.03	0.000	237.00	0.03
2.00	0.07	0.000	237.00	0.07
3.00	0.10	0.000	237.00	0.10
4.00	0.13	0.000	237.00	0.13
5.00	0.15	0.000	237.00	0.15
6.00	0.18	0.000	237.00	0.18
7.00	0.25	0.000	237.00	0.25
8.00	0.32	0.000	237.00	0.32
9.00	0.48	0.000	237.02	0.46
10.00	0.75	0.006	237.16	0.67
11.00	1.14	0.020	237.36	0.88
12.00	**11.50**	**0.176**	**238.76**	**4.76**
13.00	**1.40**	**0.136**	**238.43**	**2.14**
14.00	0.89	0.096	238.10	1.42
15.00	0.67	0.053	237.72	1.17
16.00	0.47	0.016	237.32	0.84
17.00	0.37	0.000	237.00	0.34
18.00	0.29	0.000	237.00	0.26
19.00	0.25	0.000	237.00	0.23
20.00	0.23	0.000	237.00	0.20
21.00	0.21	0.000	237.00	0.18
22.00	0.19	0.000	237.00	0.16
23.00	0.17	0.000	237.00	0.14
24.00	0.14	0.000	237.00	0.11
25.00	0.00	0.000	237.00	0.00
26.00	0.00	0.000	237.00	0.00
27.00	0.00	0.000	237.00	0.00
28.00	0.00	0.000	237.00	0.00
29.00	0.00	0.000	237.00	0.00
30.00	0.00	0.000	237.00	0.00
31.00	0.00	0.000	237.00	0.00
32.00	0.00	0.000	237.00	0.00
33.00	0.00	0.000	237.00	0.00
34.00	0.00	0.000	237.00	0.00
35.00	0.00	0.000	237.00	0.00
36.00	0.00	0.000	237.00	0.00
37.00	0.00	0.000	237.00	0.00
38.00	0.00	0.000	237.00	0.00
39.00	0.00	0.000	237.00	0.00
40.00	0.00	0.000	237.00	0.00
41.00	0.00	0.000	237.00	0.00
42.00	0.00	0.000	237.00	0.00
43.00	0.00	0.000	237.00	0.00
44.00	0.00	0.000	237.00	0.00
45.00	0.00	0.000	237.00	0.00
46.00	0.00	0.000	237.00	0.00
47.00	0.00	0.000	237.00	0.00
48.00	0.00	0.000	237.00	0.00

17 - 12 = 5 hours
The proposed underground basin will be drained in approximately 5 hours from the time that peak water elevation in the basin.

Hydrograph for Pond 15P: Infiltration Basin

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	**0.00**	0.000	237.50	0.00	0.00	**0.00**
2.00	**0.01**	**0.014**	**240.14**	**0.01**	**0.01**	0.00
4.00	0.00	0.013	239.90	0.01	0.01	0.00
6.00	0.00	0.012	239.71	0.01	0.01	0.00
8.00	0.00	0.011	239.54	0.01	0.01	0.00
10.00	0.00	0.010	239.39	0.01	0.01	0.00
12.00	0.00	0.009	239.26	0.00	0.00	0.00
14.00	0.00	0.008	239.13	0.00	0.00	0.00
16.00	0.00	0.007	239.01	0.00	0.00	0.00
18.00	0.00	0.007	238.89	0.00	0.00	0.00
20.00	0.00	0.006	238.78	0.00	0.00	0.00
22.00	0.00	0.005	238.68	0.00	0.00	0.00
24.00	0.00	0.005	238.57	0.00	0.00	0.00
26.00	0.00	0.004	238.48	0.00	0.00	0.00
28.00	0.00	0.004	238.38	0.00	0.00	0.00
30.00	0.00	0.003	238.29	0.00	0.00	0.00
32.00	0.00	0.003	238.20	0.00	0.00	0.00
34.00	0.00	0.002	238.11	0.00	0.00	0.00
36.00	0.00	0.002	238.02	0.00	0.00	0.00
38.00	0.00	0.001	237.94	0.00	0.00	0.00
40.00	0.00	0.001	237.86	0.00	0.00	0.00
42.00	0.00	0.001	237.77	0.00	0.00	0.00
44.00	0.00	0.000	237.70	0.00	0.00	0.00
46.00	0.00	0.000	237.62	0.00	0.00	0.00
48.00	0.00	0.000	237.54	0.00	0.00	0.00
50.00	0.00	0.000	237.50	0.00	0.00	0.00
52.00	0.00	0.000	237.50	0.00	0.00	0.00
54.00	0.00	0.000	237.50	0.00	0.00	0.00
56.00	0.00	0.000	237.50	0.00	0.00	0.00
58.00	0.00	0.000	237.50	0.00	0.00	0.00
60.00	0.00	0.000	237.50	0.00	0.00	0.00
62.00	0.00	0.000	237.50	0.00	0.00	0.00
64.00	0.00	0.000	237.50	0.00	0.00	0.00
66.00	0.00	0.000	237.50	0.00	0.00	0.00
68.00	0.00	0.000	237.50	0.00	0.00	0.00
70.00	0.00	0.000	237.50	0.00	0.00	0.00
72.00	0.00	0.000	237.50	0.00	0.00	0.00

Infiltration Basin fully drains NJDEP Water Quality storm in 42 hours < 72 hours. Therefore basin drain down time is acceptable.

Pipe Sizing

Runoff Coefficient 'C' Calculation Worksheet

Inlet Area	Total Area (sf)	Total Area (Acres)	Impervious Area (sf)	Open Space (sf)	C
1	12,985	0.30	11,396	1,589	0.91
2	5,875	0.13	4,533	1,342	0.84
3	19,669	0.45	16,342	3,327	0.88
4	12,311	0.28	8,369	3,942	0.79
5	4,887	0.11	3,963	924	0.87
6	6,193	0.14	5,212	981	0.89
7	5,327	0.12	4,999	328	0.95
8	4,688	0.11	3,849	839	0.88
9	4,742	0.11	4,193	549	0.92
10	5,773	0.13	3,785	1,988	0.77
11	5,587	0.13	3,781	1,806	0.78
12	2,638	0.06	0	2,638	0.35
13	15,069	0.35	12,269	2,800	0.87
14	9,303	0.21	5,783	3,520	0.75
15	14,389	0.33	8,805	5,584	0.74
16	11,974	0.27	11,205	769	0.95

BOHLER ENGINEERING

Stormwater Collection System Calculations

Project: MOB
Job #: J140578
Location: Glen Ridge/Montclair
Design Storm: 25 year

Computed By: AO
Checked By: BB
Date: 3/15/2018

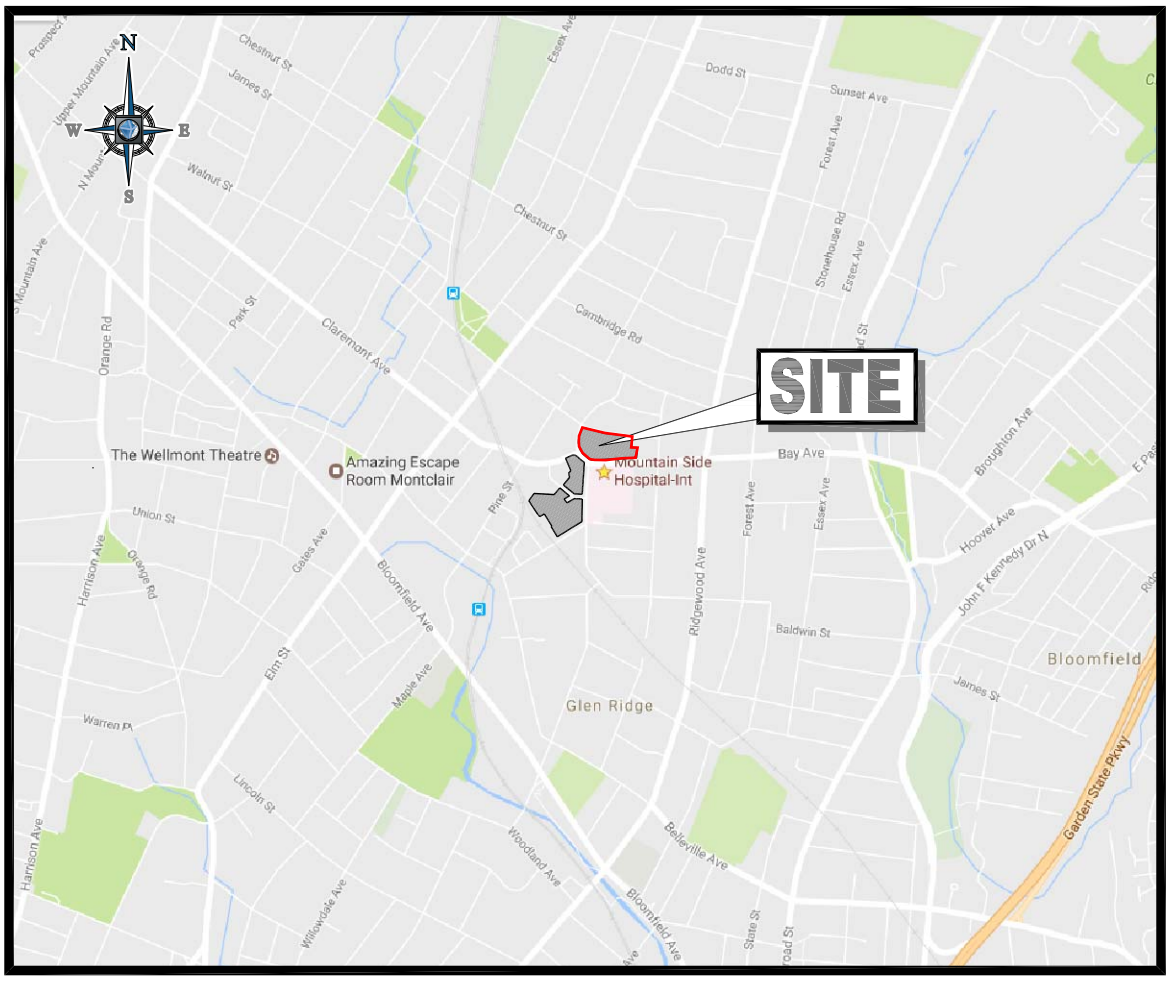
NOTES:
1) Design method used is Rational Method
2) "X" denotes existing structure.
2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (%)	Pipe Capacity (cfs)	Pipe Velocity (fps)
Drainage System																	
1	2	0.30 Ac.	0.91	0.27	0.27	6.00	0.24	6.00	7.70	2.08	2.08	15	63	0.011	0.50	5.40	4.40
2	3	0.13 Ac.	0.84	0.11	0.38	6.00	0.28	6.24	7.70	0.85	2.93	15	75	0.011	0.50	5.40	4.40
3	WQ	0.45 Ac.	0.88	0.40	0.78	6.00	0.03	6.52	7.56	3.03	5.90	15	11	0.011	1.12	8.08	6.59
WQ	EX.Inlet	0.00 Ac.	0.89	0.00	0.78	6.00	0.14	6.55	7.56	0.00	5.90	15	56	0.011	1.12	8.08	6.59
4	5	0.28 Ac.	0.79	0.22	0.22	6.00	0.30	6.00	7.70	1.69	1.69	15	78	0.011	0.50	5.40	4.40
5	6	0.11 Ac.	0.87	0.10	0.32	6.00	0.28	6.30	7.70	0.77	2.46	15	73	0.011	0.50	5.40	4.40
6	7	0.14 Ac.	0.89	0.12	0.44	6.00	0.19	6.58	7.56	0.91	3.33	15	72	0.011	1.00	7.63	6.22
8	9	0.11 Ac.	0.88	0.10	0.10	6.00	0.25	6.00	7.70	0.77	0.77	15	66	0.011	0.50	5.40	4.40
9	MH3	0.11 Ac.	0.92	0.10	0.20	6.00	0.29	6.25	7.70	0.77	1.54	15	154	0.011	2.00	10.79	8.80
10	11	0.13 Ac.	0.77	0.10	0.10	6.00	0.25	6.00	7.70	0.77	0.77	15	66	0.011	0.50	5.40	4.40
11	12	0.13 Ac.	0.78	0.10	0.20	6.00	0.25	6.25	7.70	0.77	1.54	15	66	0.011	0.50	5.40	4.40
12	13	0.06 Ac.	0.35	0.02	0.22	6.00	0.26	6.50	7.56	0.15	1.66	15	135	0.011	2.00	10.79	8.80
13	MH5	0.35 Ac.	0.87	0.30	0.52	6.00	0.11	6.76	7.56	2.27	3.93	15	73	0.011	3.00	13.22	10.78
15	17	0.33 Ac.	0.74	0.24	0.24	6.00	0.31	6.00	7.70	1.85	1.85	15	183	0.013	3.40	11.91	9.71

Note:
MH4 to MH2, Inlet 14 to WQ Unit and WQ Unit to Inlet 15 are not sized in this pipe sizing spreadsheet as they are modeled in HydroCAD as basin outlet pipes.

C. MAPS

- **Site Location Map**
- **Soils Map**
- **USGS Map**
- **Drainage Area Maps**
  - Existing
  - Proposed
  - Inlet



SITE LOCATION MAP

SCALE: 1" = 2,000'

SOURCE: GOOGLE MAPS

Hydrologic Soil Group—Essex County, New Jersey
(Hamshire Montclair HSG Ratings)

Map Scale: 1:3,930 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:12,000.

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

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

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

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

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

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

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 12, Sep 27, 2016

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

Date(s) aerial images were photographed: Aug 25, 2014—Sep 27, 2014

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Essex County, New Jersey (NJ013)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BowrB	Boonton - Urban land, Boonton substratum complex, red sandstone lowland, 0 to 8 percent slopes	C	7.5	10.9%
URBOOB	Urban land, Boonton substratum, 0 to 8 percent slopes, red sandstone lowland		26.2	38.0%
USBOOB	Urban land, Boonton substratum - Boonton complex, red sandstone lowland, 0 to 8 percent slopes		35.3	51.2%
Totals for Area of Interest			**69.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

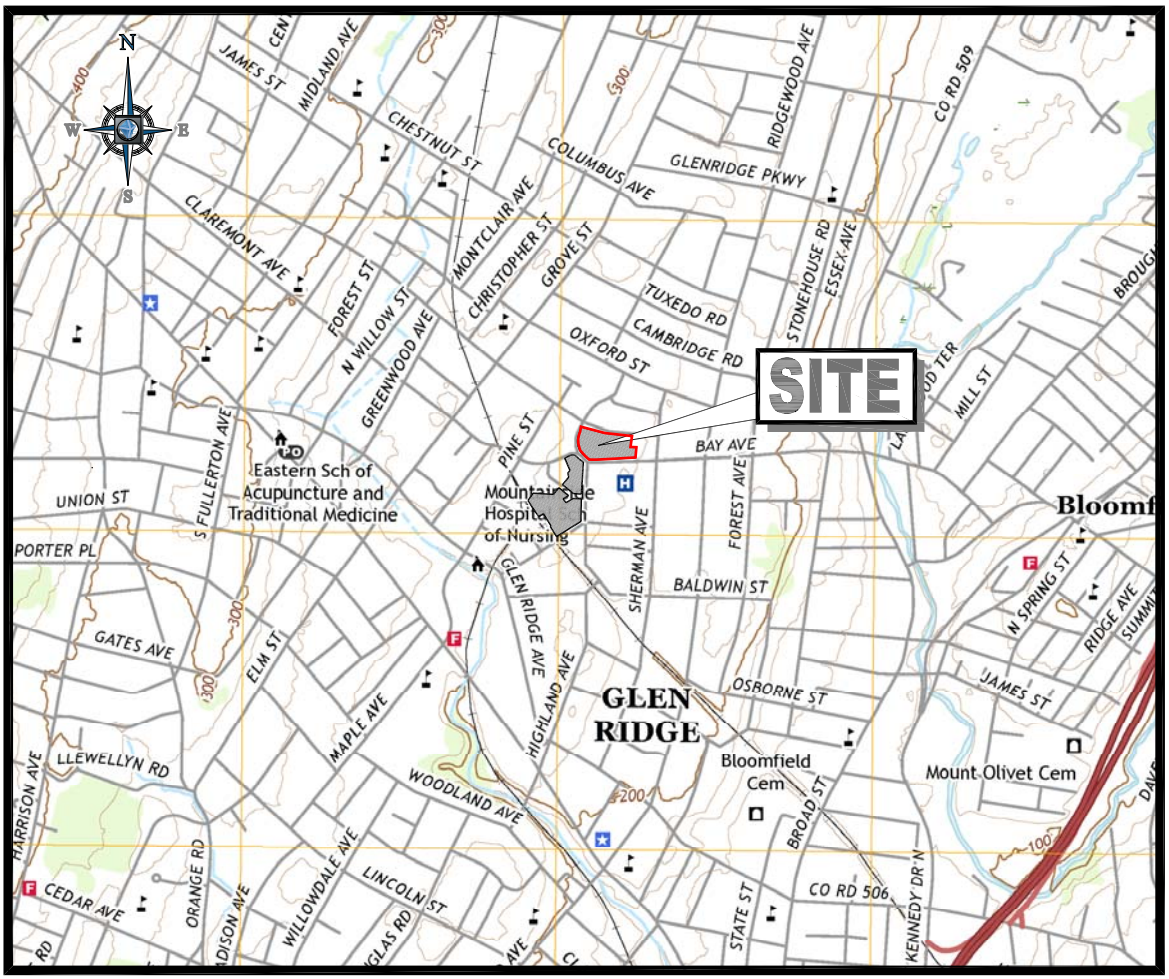
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



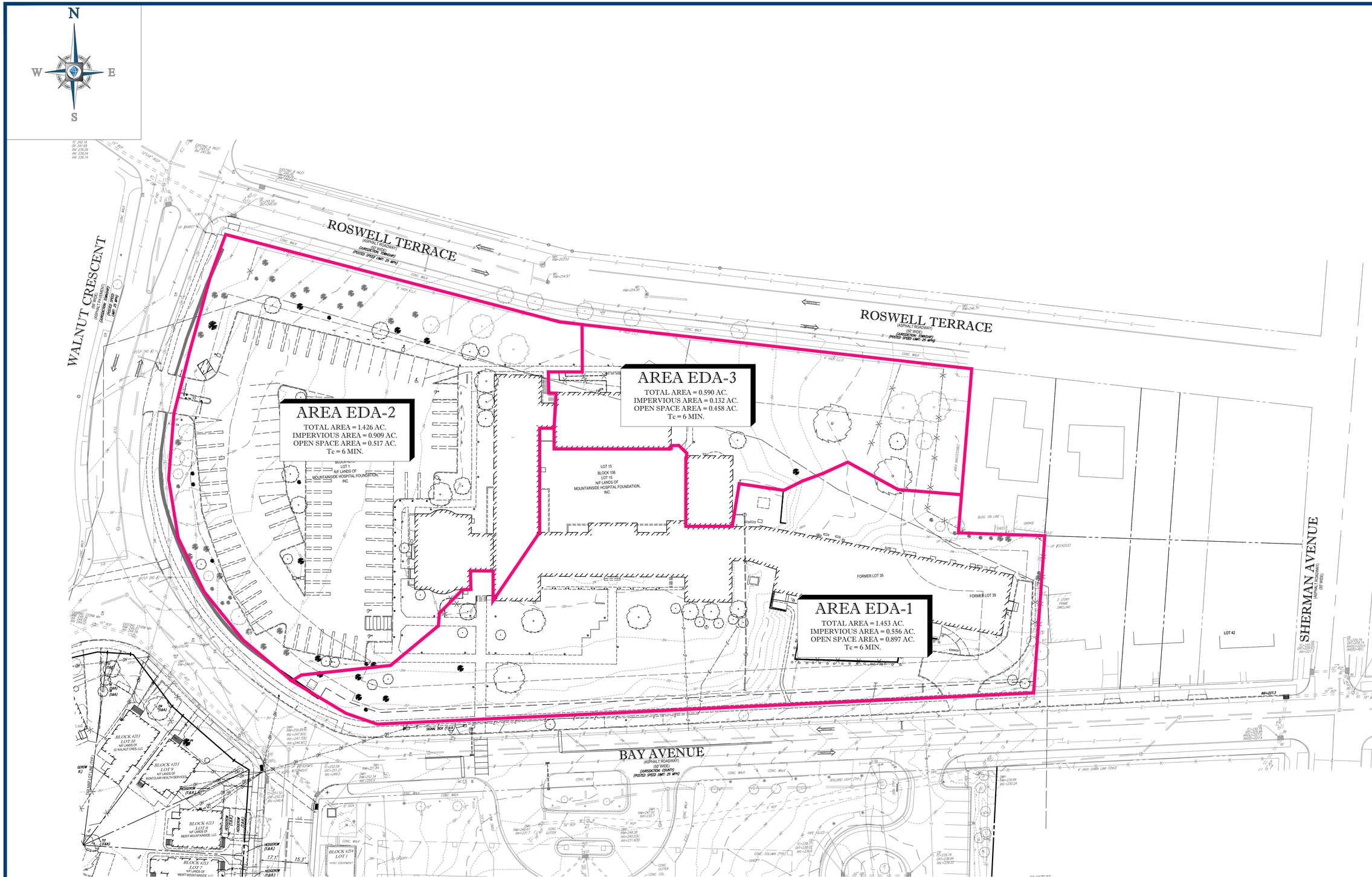
USGS MAP

SCALE: 1" = 2,000'

SOURCE: U.S. GEOLOGICAL SURVEYS MAP

Drainage Area Maps

- **Existing**
- **Proposed**
- **Inlet**



BOHLER ENGINEERING
LAND SURVEYING · SITE CIVIL AND CONSULTING ENGINEERING · LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN · WATER RESOURCES ENGINEERING · PERMITTING SERVICES · TRANSPORTATION SERVICES
UPSTATE NEW YORK · SOUTHERN NEW JERSEY · BALTIMORE, MD · CHARLOTTE, NC
NEW ENGLAND · PHILADELPHIA, PA · SOUTHERN MARYLAND · ATLANTA, GA
ROCHESTER, NY · NORTHERN NEW JERSEY · FREDERICK, MD · TAMPA, FL
NEW YORK, NY · LEHIGH VALLEY, PA · CENTRAL VIRGINIA · SOUTH FLORIDA
NEW YORK METRO · SOUTHEASTERN, PA · RALEIGH, NC · DALLAS, TX
MASSACHUSETTS · CENTRAL NEW JERSEY · WASHINGTON, DC
THE INFORMATION, DESIGNS AND CONCEPTS OF THIS PLAN ARE PROPRIETARY AND SHALL NOT BE LOANED OR USED IN WHOLE OR PART FOR ANY PURPOSE WITHOUT THE WRITTEN AUTHORIZATION OF BOHLER ENGINEERING. ONLY APPROVED AND DULY AUTHORIZED COPIES OF THIS PLAN SHALL BE CONSIDERED VALID. ANY UNAUTHORIZED USE OF THIS PLAN IS THE SOLE RESPONSIBILITY OF THE USER.

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	03/15/2018	REV. PER TOWNSHIP COMMENTS	AO / BB

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

ISSUED FOR MUNICIPAL & AGENCY REVIEW & APPROVAL

PROTECT YOURSELF
A PHONE CALL CAN BE YOUR INSURANCE POLICY

WHAT YOU DON'T KNOW CAN HURT YOU.
THE STATE OF NEW JERSEY REQUIRES NOTIFICATION OF EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE STATE.

PROJECT No.:	J140578
DRAWN BY:	GB/JZ
CHECKED BY:	TA/BB
DATE:	10/27/2017
SCALE:	AS SHOWN
CAD I.D.:	EDA-1A

PROJECT:

PRELIMINARY & FINAL MAJOR SITE PLAN

FOR

ONE BAY URBAN RENEWAL LLC

PROPOSED MEDICAL OFFICE BUILDING

BLOCK 106, LOT 15 (GLEN RIDGE) AND
BLOCK 4215, LOT 1 (MONTCLAIR)
311 BAY AVENUE
BOROUGH OF GLEN RIDGE &
TOWNSHIP OF MONTCLAIR
ESSEX COUNTY, NEW JERSEY

BOHLER ENGINEERING
35 TECHNOLOGY DRIVE
WARREN, NJ 07059
Phone: (908) 668-8300
Fax: (908) 754-4401
www.BohlerEngineering.com
NJ CERT. OF AUTHORIZATION NO. 24GA28161700

B.A. BOHLER
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47421 · NEW YORK LICENSE No. 088514-1
DELAWARE LICENSE No. 17111 · CONNECTICUT LICENSE No. 26039
FLORIDA LICENSE No. 73277 · PENNSYLVANIA LICENSE No. 077366

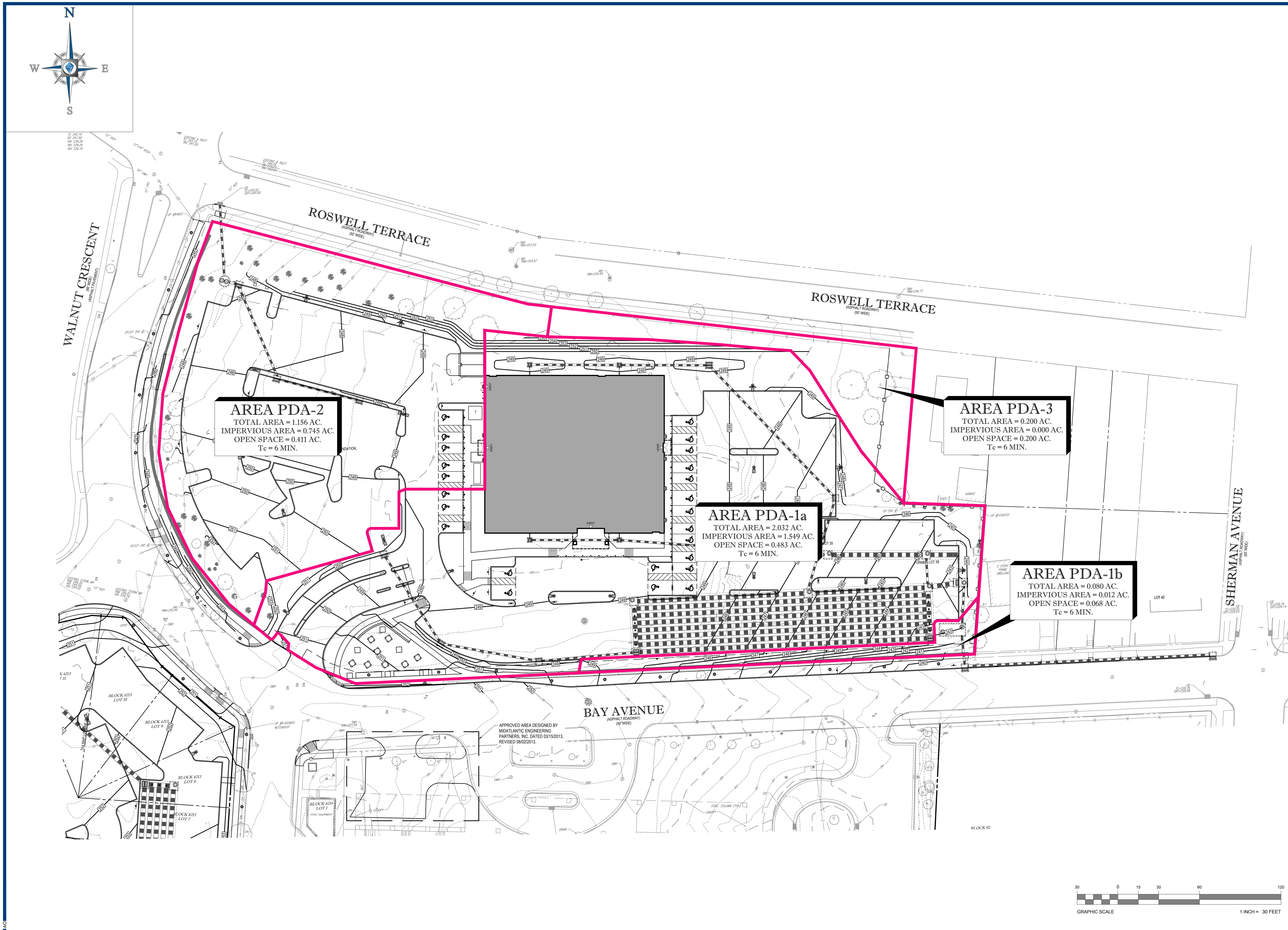
SHEET TITLE:

EXISTING DRAINAGE AREA MAP

SHEET NUMBER:

1 OF 1

REVISION 1 - 03/15/2018



BOHLER ENGINEERING

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING · PROGRAM MANAGEMENT · LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN · PERMITTING SERVICES · TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	03/15/2018	REV. PER TOWNSHIP COMMENTS	AO / BB

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

ISSUED FOR MUNICIPAL & AGENCY REVIEW & APPROVAL

PROTECT YOURSELF
A PHONE CALL CAN BE YOUR INSURANCE POLICY

GARDEN STATE UNDERGROUND LOCATION
1-800-272-1000
STOP - CALL BEFORE YOU DIG!

WHAT YOU DON'T KNOW CAN HURT YOU.
THE STATE OF NEW JERSEY REQUIRES NOTIFICATION OF EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE STATE.

PROJECT No.:	J140578
DRAWN BY:	GB/JZ
CHECKED BY:	TA/BB
DATE:	10/27/2017
SCALE:	AS SHOWN
CAD I.D.:	PDA-1A

PROJECT:

PRELIMINARY & FINAL MAJOR SITE PLAN

FOR

ONE BAY URBAN RENEWAL LLC

PROPOSED MEDICAL OFFICE BUILDING

BLOCK 106, LOT 15 (GLEN RIDGE) AND
BLOCK 4215, LOT 1 (MONTCLAIR)
311 BAY AVENUE
BOROUGH OF GLEN RIDGE &
TOWNSHIP OF MONTCLAIR
ESSEX COUNTY, NEW JERSEY

BOHLER ENGINEERING
35 TECHNOLOGY DRIVE
WARREN, NJ 07059
Phone: (908) 668-8300
Fax: (908) 754-4401
www.BohlerEngineering.com
NJ CERT. OF AUTHORIZATION NO. 24GA28161700

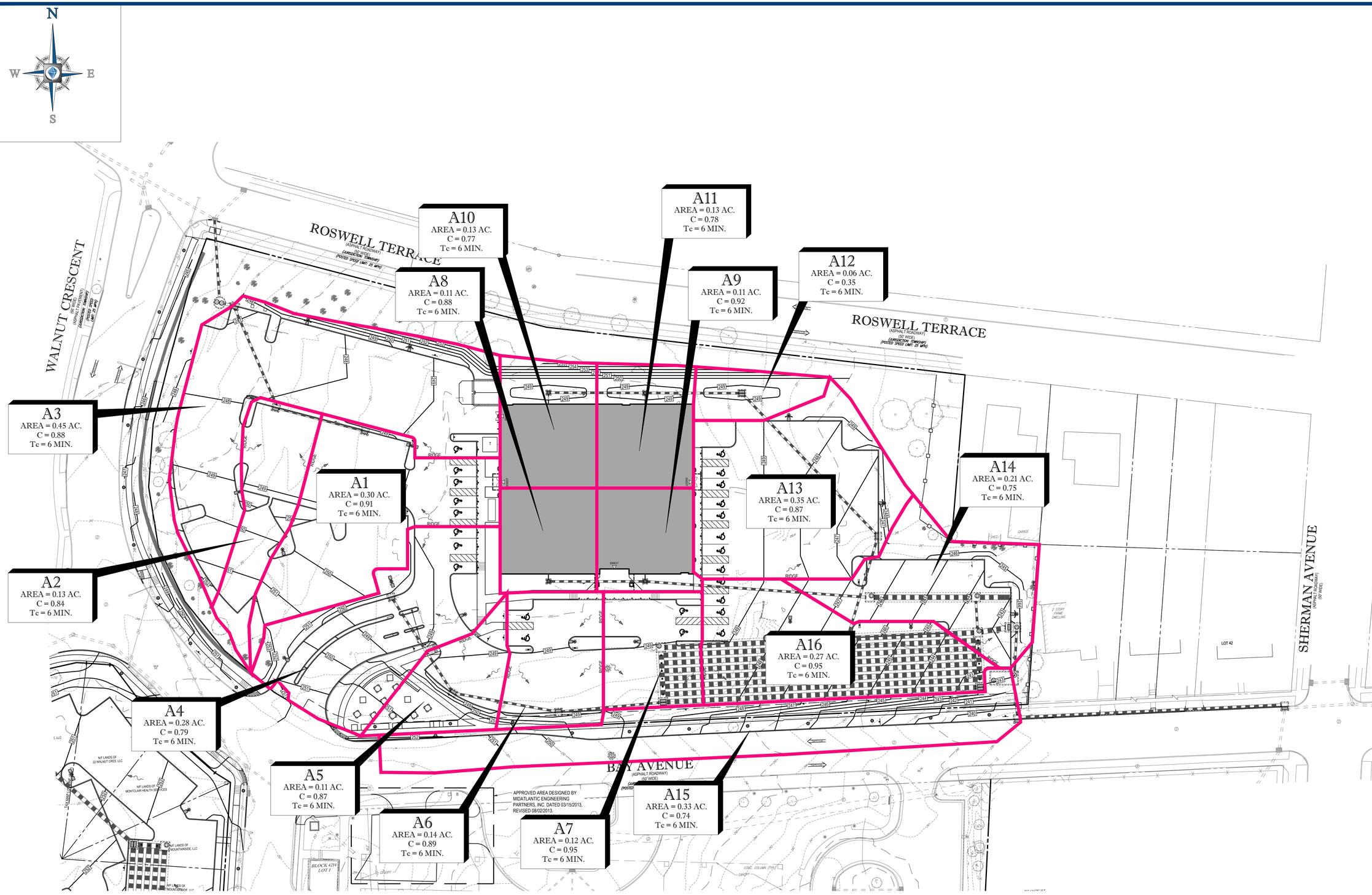
B.A. BOHLER
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47421
NEW YORK LICENSE No. 088514-1
DELAWARE LICENSE No. 17111
CONNECTICUT LICENSE No. 26039
FLORIDA LICENSE No. 73277
PENNSYLVANIA LICENSE No. 077366

SHEET TITLE:

PROPOSED DRAINAGE AREA MAP

SHEET NUMBER:
1
OF 1

REVISION 1 - 03/15/2018



BOHLER ENGINEERING

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN PERMITTING SERVICES TRANSPORTATION SERVICES

UPSTATE NEW YORK
SOUTHERN NEW JERSEY
NEW ENGLAND
PHILADELPHIA, PA
NORTHERN VA
NEW YORK, NY
LEHIGH VALLEY, PA
NEW YORK METRO
SOUTHEASTERN, PA
BALTIMORE, MD
SOUTHERN MARYLAND
NORTHERN VIRGINIA
CENTRAL VIRGINIA
SOUTHEASTERN, PA
RALEIGH, NC
CHARLOTTE, NC
ATLANTA, GA
TAMPA, FL
SOUTH FLORIDA
DALLAS, TX
WASHINGTON, DC

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	03/15/2018	REV. PER TOWNSHIP COMMENTS	AO / BB

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

ISSUED FOR MUNICIPAL & AGENCY REVIEW & APPROVAL

PROTECT YOURSELF
A PHONE CALL CAN BE YOUR INSURANCE POLICY

WHAT YOU DON'T KNOW CAN HURT YOU.
THE STATE OF NEW JERSEY REQUIRES NOTIFICATION OF EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE STATE.

PROJECT No.:	J140578
DRAWN BY:	GB/JZ
CHECKED BY:	TA/BB
DATE:	10/27/2017
SCALE:	AS SHOWN
CAD I.D.:	IDA-1A

PROJECT:

PRELIMINARY & FINAL MAJOR SITE PLAN

FOR

ONE BAY URBAN RENEWAL LLC

PROPOSED MEDICAL OFFICE BUILDING

BLOCK 106, LOT 15 (GLEN RIDGE) AND
BLOCK 4215, LOT 1 (MONTCLAIR)
311 BAY AVENUE
BOROUGH OF GLEN RIDGE &
TOWNSHIP OF MONTCLAIR
ESSEX COUNTY, NEW JERSEY

BOHLER ENGINEERING
35 TECHNOLOGY DRIVE
WARREN, NJ 07059
Phone: (908) 668-8300
Fax: (908) 754-4401
www.BohlerEngineering.com
NJ CERT. OF AUTHORIZATION NO. 24GA28161700

B.A. BOHLER
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47421 NEW YORK LICENSE No. 088514-1
DELAWARE LICENSE No. 17111 CONNECTICUT LICENSE No. 28039
FLORIDA LICENSE No. 73277 PENNSYLVANIA LICENSE No. 077366

SHEET TITLE:

PROPOSED INLET DRAINAGE AREA MAP

SHEET NUMBER:

1
OF 1

REVISION 1 - 03/15/2018