Drainage Report:
for
38 St. Luke's Subdivision

Prepared for:

Beacon 226 Main, LLC.
1 East Main Street, Unit 1
Beacon, NY 12508

June 26, 2018
(Revised July 31, 2018)

HUDSON
LAND DESIGN

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1.0 INTRODUCTION

The 38 St. Lukes Subdivision project is located at 38 St. Lukes Place in the City of Beacon, Dutchess County, New York. The project consists of one parcel, Tax ID: 6054-38-156634 (±0.405 ac). Parcel 156634 contains an existing single-family residence. The project proposes to subdivide the existing parcel into three lots, with the existing residence to remain as one of the three lots, and the remainder two being building lots. The parcel is in the R1-5 zoning district.

2.0 METHODOLOGY AND REGULATORY COMPLIANCE

The proposed development of Parcel 156634 will result in 4,002 sqft of additional impervious area and 12,653 sqft of disturbance, and therefore is not subject to the requirements of NYSDEC GP-0-15-002 General Permit for Construction Activities. Pre-development vs. post-development drainage analysis for the project was performed to evaluate stormwater runoff patterns and demonstrate that the post-development runoff rates to the existing stormwater discharge points do not exceed the pre-development runoff rates.

Runoff calculations were performed utilizing HydroCAD® version 10.00 published by HydroCAD Software Solutions, LLC. The software utilizes the principles of TR-55 and TR-20 to generate unit hydrographs. Rainfall events are generated utilizing Soil Conservation Service (SCS) Type III, 24-hour rainfall event for Dutchess County, NY. The Type III rainfall depths for the 1-Year, 10-Year, and 25-Year events are 2.61”, 4.71”, and 5.92”, respectively. Rainfall Data can be found within Appendix B of this report.

3.0 SOIL CONDITIONS

A review of the Soil Survey of Dutchess County indicates that there is one type of soil present on the project site and its associated contributing drainage area. Table I below summarizes the characteristics of the soil types present within the drainage area.

Table I: Soil Types

Map Unit	Soil Names	Water Table (ft)	Bedrock	Hydrologic Soil Group	Erosion Hazard
KuA	Knickerbocker Urban Land Complex, nearly level	>96”	>96”	A	Low

Source: websoilsurvey.sc.egov.usda.gov

Soil testing in the proposed infiltration area on the northern side of Lot 2 was conducted on May 9, 2018 (Deep Test Pits) and May 10, 2018 (Infiltration Tests). Two test pits were excavated to a total depth of 8 feet and were primarily comprised of a brown sandy loam with cobbles

throughout. Test Pit 1 had 6" of topsoil over 90" of the brown sandy-loam. No bedrock, groundwater or mottling was observed. Test Pit 2 had 6" of topsoil over 90" of brown sandy loam. No bedrock, no groundwater or mottling was observed in Test Pit 2. The soil components are uniform throughout the entire project area.

One infiltration test was conducted in the stormwater infiltration area. The infiltration test was run three times at a depth of 96" at the bottom. Infiltration Test 1 stabilized at 5.0 inches per hour.

A second round of soil testing was conducted on July 18, 2018 and observed by Mr. John Russo, P.E. of Lanc & Tully, P.C. Three test pits were excavated, and two infiltration tests were conducted.

Test Pit 1A and 2A were excavated on the proposed Lot 2. Test Pit 1A had 8" of topsoil over 40" of Rock Sandy Fill. Below 48", a brown sandy-loam was encountered to a depth of 102". Test Pit 2A was excavated to 48" and hit a bedrock shelf. 2A had 6" of topsoil over 42" of rocky sandy fill. The bedrock in the area of Test Pit 2A is shelfed, starting at 12" below existing grade on the southern side of the test pit and increased to 48" as the pit was dug to the north. Test pit 2A was not necessary for drainage analysis but dug to understand general bedrock conditions on site.

Test Pit 3A was excavated on the proposed Lot 3 to a depth of 96". Test Pit 3A had 6" of Topsoil over 24" of rocky sandy fill. From 30" depth to 96" a fine sandy loam was encountered. No bedrock, groundwater or mottling was observed in Test Pit 3A.

Two infiltration tests were conducted in the stormwater infiltration area for Lot 2 and Lot 3. The infiltration test on Lot 3 was designated IT2 and was run three times at a depth of 54" from existing grade to the bottom of the infiltration test hole. Infiltration Test 2 drained extremely fast. It was run twice and drained 12" in one minute. Infiltration Test 3, IT3, was performed in the infiltration area on the proposed Lot 2. The test was run three times with recorded results on 14" in 15 minutes. 9.25" in 26 minutes and 9.0" in 26 minutes. All infiltration tests had observed results in excess of the maximum 5" per hour design standard.

Stormwater management design for both proposed lots utilized the maximum allowable infiltration rate of 5 inches per hour per the NYSDEC Stormwater Design Manual. The observed soil conditions greatly exceeded the maximum allowable infiltration rate. Therefore, the stormwater management practices on Lot 2 and Lot 3 can be considered conservative in design with respect to the actual soil conditions and infiltration capacity.

Supporting information has been provided in Appendix B.

4.0 EXISTING DRAINAGE CONDITIONS

4.1 Design Points

Design Points represent the location where the majority of runoff from an area exits the site. The same design point is identified in post-development conditions, so that a comparison can be

made between the pre-development and post-development conditions. Two design points for the main project area were selected, and are as follows:

Table II - Stormwater Design/Discharge Point	
SDP	**Description**
1	St. Luke's Place Municipal Stormwater Sewer System
2	Existing low point on Lot 1

4.2 Existing Watershed Area

The pre-developed watershed is 16,334 sqft in total, which includes the existing grassed area around the existing residence, a portion of Union Street and a section of the existing house and concrete patio. In the drainage analysis model, the existing pre-development area is delineated as subcatchment 1 and subcatchment 2. Drainage generally flows via sheet flow and shallow concentrated flow to the stormwater design points; 1 and 2, located on the western property line and the low point within the existing parcel, respectively.

The Time of Concentration (Tc) is less than 6 minutes, so a minimum of 6 minutes was used for all subcatchments, and therefore the Tc is not graphically shown or listed on the drainage map. The watershed area contributing to the SDP's is graphically shown and listed on the drainage map, and is also provided within the HydroCAD computations within Appendix C. A drainage map is included within Appendix A.

4.3 Existing Runoff Rates

Runoff rates for existing conditions have been calculated at the designated SDP and summarized in Table III as follows:

TABLE III - EXISTING RUNOFF RATES

Runoff Rates (cfs)

Designation	Area (sqft)	1-Year	10-Year	25-Year
SDP 1	3,002	0.00	0.03	0.08
SDP2	13,332	0.00	0.11	0.30

Unit hydrograph analysis results for pre-development conditions have been included as Appendix C.

5.0 PROPOSED DRAINAGE CONDITIONS

5.1 Developed Watershed Area

The proposed project results in a total of 12,653 sqft of disturbance due to the construction of the two proposed single-family residences, driveways, municipal water and sewer connections and infiltration chamber construction. The post-developed watershed area is 16,334 sqft in total, and includes the proposed residences, driveways, and grass & landscaped areas. The post development watershed was delineated into four stormwater subcatchments; subcatchment 11, subcatchment 20, subcatchment 21 and subcatchment 22.

Subcatchment 11 consists of the eastern portion of Lot 2. This area consists of part of the proposed driveway, some grass area and a portion of Union Street. The subcatchment contains soils in hydrologic soil group A. Drainage generally flows via sheet flow and shallow concentrated flow to the stormwater design point located on the western property line in St. Lukes Place (SDP1).

Subcatchment 20 consists of the proposed residence on Lot 2, a small portion of Lot 2's proposed driveway and grassed areas and a portion of Union Street. The subcatchment contains soils in hydrologic soil group A. Drainage generally flows via sheet flow and shallow concentrated flow to a yard drain and then to stormwater infiltrator units located in the rear of lot 2. All stormwater is mitigated using infiltration.

Subcatchment 21 consists of a portion of the existing residence's pitched roof and concrete patio, a small portion of Lot 2's proposed driveway and grassed areas. The subcatchment contains soils in hydrologic soil group A. Drainage generally flows via sheet flow and shallow concentrated flow to stormwater design point 2 located at the low point in the rear of Lot 1.

Subcatchment 22 consists of the proposed residence on Lot 3, the proposed driveway, grassed areas and a portion of Union Street. The subcatchment contains soils in hydrologic soil group A. Drainage generally flows via sheet flow and shallow concentrated flow to a yard drain and then to stormwater infiltrator units located in the rear of Lot 3. Stormwater is mitigated using infiltration for the increased impervious area on both Lot 2 and Lot 3.

The Time of Concentration (Tc) for all subcatchments is less than 6 minutes, so a minimum of 6 minutes was used, and therefore the Tc's are not graphically shown or listed on the drainage map. The watershed area contributing to the SDP's is graphically shown and listed on the drainage map. The hydrologic model can be found in Appendix D. A post-development drainage map is included within Appendix A.

5.2 Proposed Runoff Rates

Runoff rates for proposed conditions have been calculated at the designated SDP and summarized in Table IV as follows:

TABLE IV
PROPOSED RUNOFF RATES

Runoff Rates (cfs)

Designation	Area (sqft)	1-Year	10-Year	25-Year
SDP 1	2,438	0.00	0.04	0.08
SDP 2	6,654	0.00	0.11	0.23

Unit hydrograph analysis results for post-development conditions have been included as Appendix D.

6.0 DRAINAGE ANALYSIS CONCLUSIONS

The stormwater runoff rates at both SDP's under pre-development and post-development conditions are summarized below.

SDP	1 – Year (cfs)		10 – Year (cfs)		25 – Year (cfs)	
	Pre	Post	Pre	Post	Post	Post
1	0.00	0.00	0.03	0.04	0.08	0.08
2	0.00	0.00	0.11	0.11	0.30	0.23

The runoff rates at the SDP decrease from pre-development to post-development conditions with for all subcatchments, for the 1 and 25-year storms, with the exception of the post development 10-year storm for SDP1. However, the slight increase in rate is justified due to the volume of runoff staying the same for pre and post conditions (0.003 acre-feet).

The increased impervious area created by the development of Lot 2 and Lot 3 for the 1, 10 and 25-year storms, is mitigated by infiltrating the increased runoff into Stormtech SC310 infiltration chambers placed underground. Lot 2 has six proposed SC310 chambers configured in three rows. Lot 3 requires 10 chamber units configured in 5 rows to mitigate increased runoff.

Supporting hydrologic analyses for pre-development and post-development conditions are included in Appendices C and D.

7.0 EROSION AND SEDIMENT CONTROL

Contractors shall adhere to the temporary and permanent erosion control measures as indicated on the plans. Repairs shall be made as necessary to remain in compliance with the New York State Standards and Specifications for Erosion and Sediment Control, 2016.

APPENDIX A

DRAINAGE MAPS

APPENDIX B

SUPPORTING DATA

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	73.962 degrees West
Latitude	41.499 degrees North
Elevation	0 feet
Date/Time	Mon, 18 Jun 2018 15:15:07 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.50	0.62	0.82	1.02	1.27	**1yr**	0.88	1.20	1.45	1.77	2.15	2.61	2.96	**1yr**	2.31	2.85	3.29	3.96	4.59	**1yr**
2yr	0.39	0.60	0.74	0.98	1.23	1.53	**2yr**	1.06	1.43	1.75	2.15	2.61	3.17	3.57	**2yr**	2.80	3.44	3.94	4.64	5.29	**2yr**
5yr	0.46	0.71	0.89	1.19	1.52	1.92	**5yr**	1.32	1.76	2.20	2.70	3.29	3.97	4.53	**5yr**	3.51	4.35	5.01	5.79	6.54	**5yr**
10yr	0.51	0.80	1.02	1.38	1.79	2.27	**10yr**	1.55	2.07	2.62	3.22	3.91	4.71	5.42	**10yr**	4.17	5.21	6.01	6.84	7.69	**10yr**
25yr	0.60	0.95	1.21	1.67	2.23	2.85	**25yr**	1.92	2.56	3.30	4.06	4.94	5.92	6.87	**25yr**	5.24	6.61	7.65	8.53	9.53	**25yr**
50yr	0.68	1.09	1.39	1.95	2.62	3.38	**50yr**	2.26	3.00	3.93	4.84	5.87	7.04	8.23	**50yr**	6.23	7.91	9.19	10.09	11.21	**50yr**
100yr	0.77	1.24	1.60	2.27	3.10	4.03	**100yr**	2.68	3.53	4.68	5.78	7.00	8.37	9.86	**100yr**	7.41	9.48	11.04	11.94	13.20	**100yr**
200yr	0.87	1.43	1.85	2.65	3.67	4.79	**200yr**	3.16	4.15	5.58	6.90	8.35	9.96	11.82	**200yr**	8.81	11.37	13.28	14.13	15.55	**200yr**
500yr	1.05	1.73	2.25	3.27	4.59	6.03	**500yr**	3.96	5.15	7.04	8.71	10.54	12.55	15.03	**500yr**	11.10	14.46	16.96	17.67	19.33	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.44	0.53	0.72	0.88	1.09	**1yr**	0.76	1.06	1.25	1.60	2.01	2.08	2.36	**1yr**	1.84	2.27	2.59	3.32	4.16	**1yr**
2yr	0.37	0.58	0.71	0.96	1.19	1.42	**2yr**	1.03	1.39	1.61	2.06	2.59	3.08	3.46	**2yr**	2.72	3.33	3.79	4.49	5.14	**2yr**
5yr	0.42	0.65	0.81	1.11	1.41	1.66	**5yr**	1.22	1.62	1.88	2.42	3.01	3.67	4.18	**5yr**	3.25	4.02	4.59	5.31	6.09	**5yr**
10yr	0.47	0.72	0.90	1.25	1.62	1.85	**10yr**	1.40	1.81	2.12	2.72	3.38	4.16	4.83	**10yr**	3.69	4.65	5.28	6.02	6.92	**10yr**
25yr	0.54	0.82	1.03	1.46	1.93	2.14	**25yr**	1.66	2.09	2.46	3.06	3.94	4.89	5.85	**25yr**	4.33	5.63	6.36	7.10	8.19	**25yr**
50yr	0.60	0.92	1.15	1.65	2.22	2.38	**50yr**	1.91	2.33	2.77	3.42	4.44	5.54	6.77	**50yr**	4.91	6.51	7.32	8.05	9.33	**50yr**
100yr	0.68	1.03	1.29	1.87	2.56	2.68	**100yr**	2.21	2.62	3.13	3.81	5.02	6.24	7.85	**100yr**	5.53	7.55	8.43	9.11	10.63	**100yr**
200yr	0.77	1.16	1.47	2.13	2.98	2.99	**200yr**	2.57	2.93	3.54	4.28	5.67	6.99	9.12	**200yr**	6.19	8.77	9.72	10.30	12.13	**200yr**
500yr	0.92	1.37	1.76	2.56	3.65	3.49	**500yr**	3.15	3.41	4.19	4.99	6.70	8.13	11.14	**500yr**	7.20	10.72	11.73	12.10	14.45	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.56	0.68	0.92	1.13	1.36	**1yr**	0.97	1.33	1.53	1.97	2.43	2.82	3.20	**1yr**	2.49	3.08	3.57	4.25	4.93	**1yr**
2yr	0.40	0.62	0.77	1.04	1.28	1.54	**2yr**	1.10	1.51	1.74	2.25	2.80	3.34	3.71	**2yr**	2.95	3.56	4.10	4.82	5.47	**2yr**
5yr	0.49	0.76	0.94	1.29	1.64	1.96	**5yr**	1.42	1.91	2.26	2.89	3.66	4.26	4.88	**5yr**	3.77	4.70	5.41	6.28	7.01	**5yr**
10yr	0.58	0.89	1.11	1.55	2.00	2.37	**10yr**	1.72	2.31	2.74	3.53	4.49	5.21	6.01	**10yr**	4.61	5.78	6.70	7.69	8.48	**10yr**
25yr	0.72	1.10	1.37	1.95	2.57	3.05	**25yr**	2.22	2.98	3.57	4.73	5.88	6.79	7.92	**25yr**	6.01	7.62	8.92	10.04	10.93	**25yr**
50yr	0.85	1.29	1.61	2.32	3.12	3.70	**50yr**	2.69	3.62	4.35	5.83	7.21	8.32	9.76	**50yr**	7.37	9.39	11.09	12.30	13.24	**50yr**
100yr	1.01	1.52	1.91	2.75	3.78	4.50	**100yr**	3.26	4.40	5.30	7.20	8.83	10.20	12.02	**100yr**	9.03	11.56	13.78	15.10	16.05	**100yr**
200yr	1.19	1.79	2.26	3.28	4.57	5.45	**200yr**	3.94	5.33	6.47	8.86	10.82	12.52	14.82	**200yr**	11.08	14.25	17.15	18.53	19.46	**200yr**
500yr	1.49	2.22	2.85	4.14	5.89	7.05	**500yr**	5.08	6.89	8.41	11.70	14.17	16.44	19.52	**500yr**	14.55	18.77	22.91	24.33	25.10	**500yr**

Soil Map—Dutchess County, New York
(38 St. Lukes Place)

Map Scale: 1:432 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 20 40 80 120

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Dutchess County, New York
Survey Area Data: Version 14, Oct 8, 2017

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

Date(s) aerial images were photographed: Oct 7, 2013—Feb 26, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
KuA	Knickerbocker-Urban land complex, nearly level	0.4	100.0%
Totals for Area of Interest		**0.4**	**100.0%**

INFILTRATION TEST DATA

Name: 38 St. Lukes Subdivision City of Beacon Date: 5/11/2018

By: Adam Gasparre

Lot No.	Test Hole No.	Test Hole Depth	Soil Type	Soaked	TEST RUNS					
					*	1	2	3	4	5
2	1	96”	Brown sandy-Loam with Cob-bles	Yes	Finish	14:00	14:45	15:45		
					Start	1:20	14:00	14:45		
					Depth (in)	5.0”	5.0”	5.0”		
					Finish					
					Start					
					Depth (in)					
					Finish					
					Start					
					Depth (in)					
					Finish					
					Start					
					Depth (in)					
					Finish					
					Start					
					Depth (in)					

I, Daniel G. Koehler, the undersigned, certify that these percolation tests were done by myself or under my direction according to the standard procedure. The data and results presented are true and correct.

Dated: 05/11/2018 Signature: _____

License No. (P.E.) _____

D E E P T E S T R E S U L T S

Date: 05/09/2018

Name of property: 38 St. Lukes Subdivision City of Beacon

TAX GRID #

6	0	5	4	-	3	8	-	1	5	6	6	3	4

Owner of property: Beacon 226 Main Street LLC Engineer: Hudson Land Design

Person directing test: Daniel G. Koehler P.E.; conducted by Adam Gasparre

HOLE #	LOT #	TOTAL DEPTH	ROCK DEPTH	WATER DEPTH	MOTTLING DEPTH	SOIL DESCRIPTION
1	2	96”	None Observed	None Observed	None Observed	0-6” Topsoil; 6”-96” Brown sandy Loam with Cobbles
2	2	96”	None Observed	None Observed	None Observed	0-6” Topsoil; 6”-96” Brown sandy Loam with Cobbles

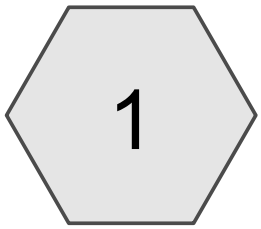
General remarks (terrain; weather; springs, streams, etc.)

Sunny, 70 degrees.

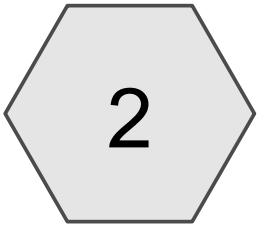
HD-185

APPENDIX C

PRE-DEVELOPMENT HYDROLOGY CALCULATIONS



DA 1



DA 2

Subcat Reach Pond Link

Routing Diagram for PRE DEV
Prepared by Hudson Land Design, P.C. , Printed 7/26/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.306	39	>75% Grass cover, Good, HSG A (1, 2)
0.069	98	Paved parking, HSG A (1, 2)

Summary for Subcatchment 1: DA 1

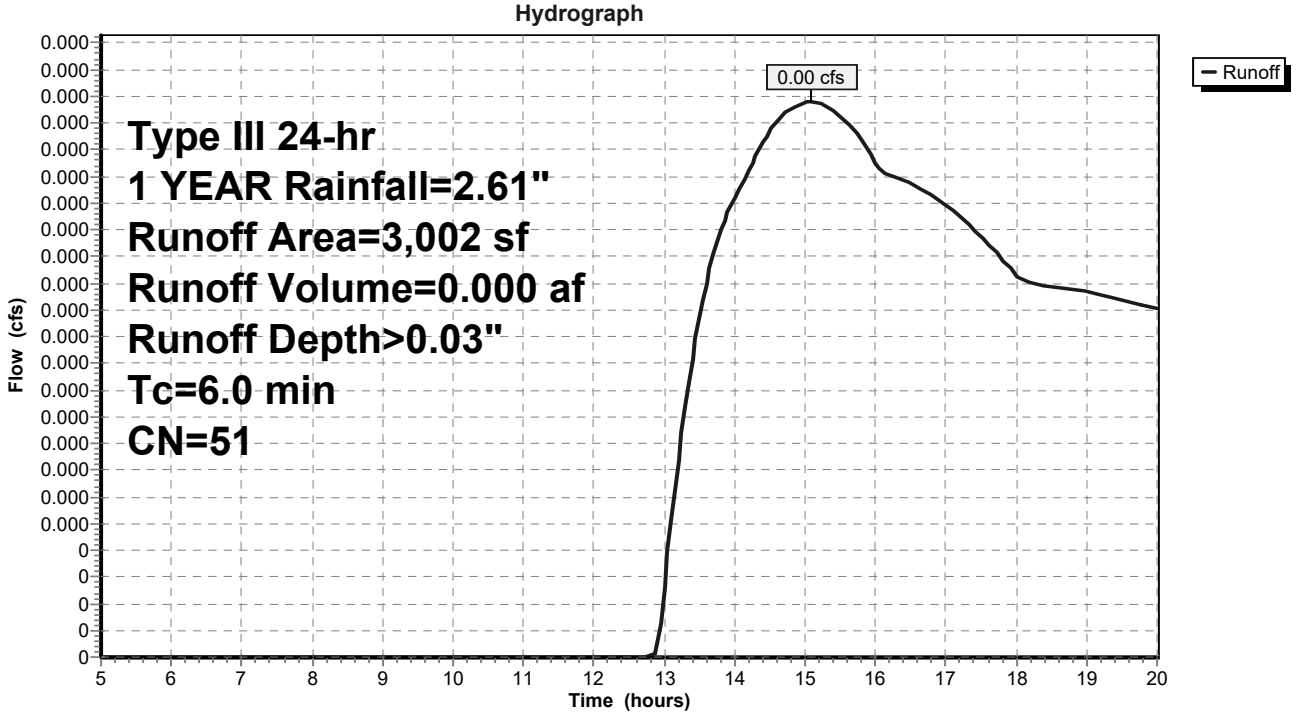
Runoff = 0.00 cfs @ 15.08 hrs, Volume= 0.000 af, Depth> 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 YEAR Rainfall=2.61"

Area (sf)	CN	Description
2,373	39	>75% Grass cover, Good, HSG A
629	98	Paved parking, HSG A
3,002	51	Weighted Average
2,373		79.05% Pervious Area
629		20.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 1: DA 1



Summary for Subcatchment 2: DA 2

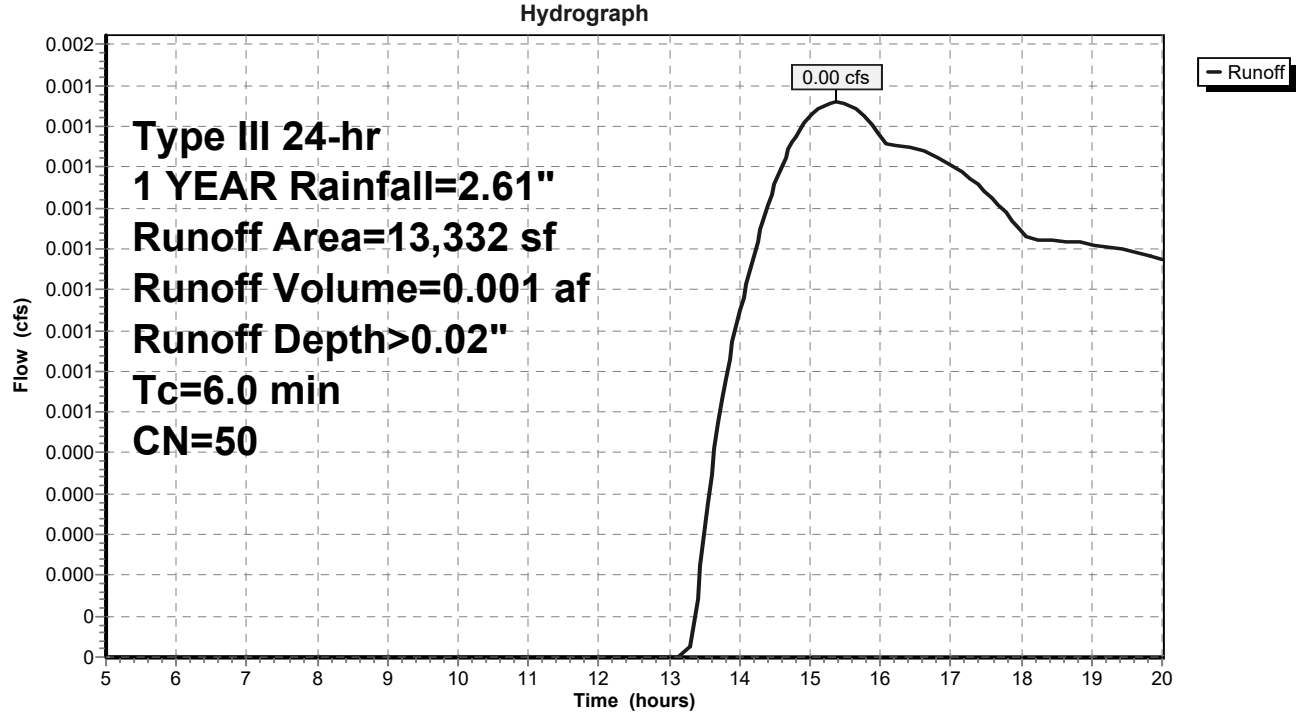
Runoff = 0.00 cfs @ 15.38 hrs, Volume= 0.001 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 YEAR Rainfall=2.61"

Area (sf)	CN	Description
2,390	98	Paved parking, HSG A
10,942	39	>75% Grass cover, Good, HSG A
13,332	50	Weighted Average
10,942		82.07% Pervious Area
2,390		17.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 2: DA 2



Summary for Subcatchment 1: DA 1

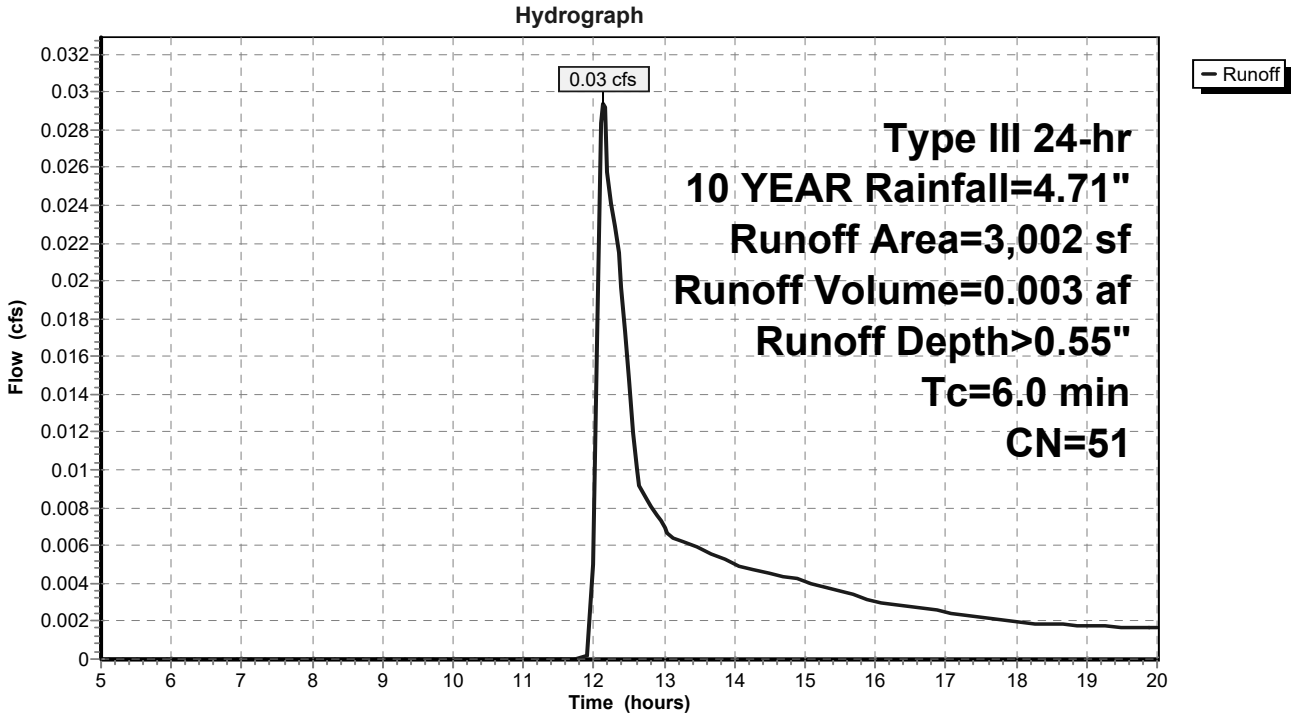
Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.003 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YEAR Rainfall=4.71"

Area (sf)	CN	Description
2,373	39	>75% Grass cover, Good, HSG A
629	98	Paved parking, HSG A
3,002	51	Weighted Average
2,373		79.05% Pervious Area
629		20.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 1: DA 1



Summary for Subcatchment 2: DA 2

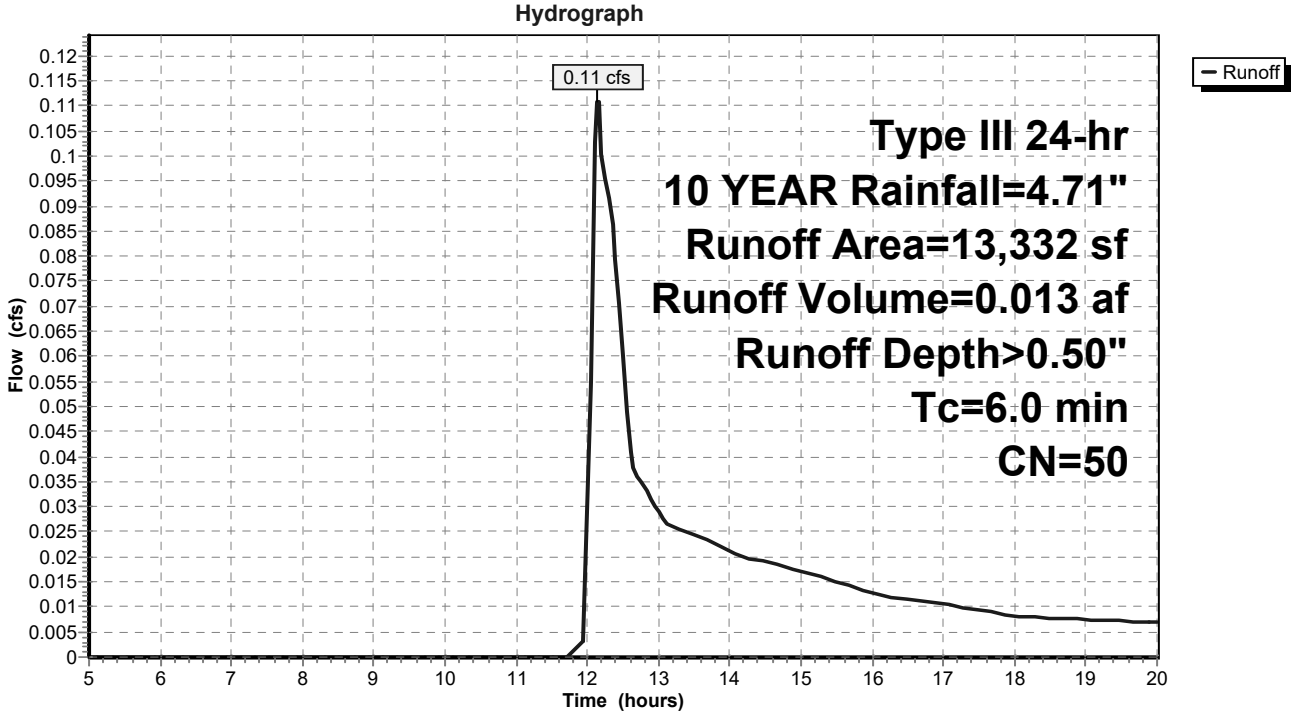
Runoff = 0.11 cfs @ 12.15 hrs, Volume= 0.013 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YEAR Rainfall=4.71"

Area (sf)	CN	Description
2,390	98	Paved parking, HSG A
10,942	39	>75% Grass cover, Good, HSG A
13,332	50	Weighted Average
10,942		82.07% Pervious Area
2,390		17.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 2: DA 2



Summary for Subcatchment 1: DA 1

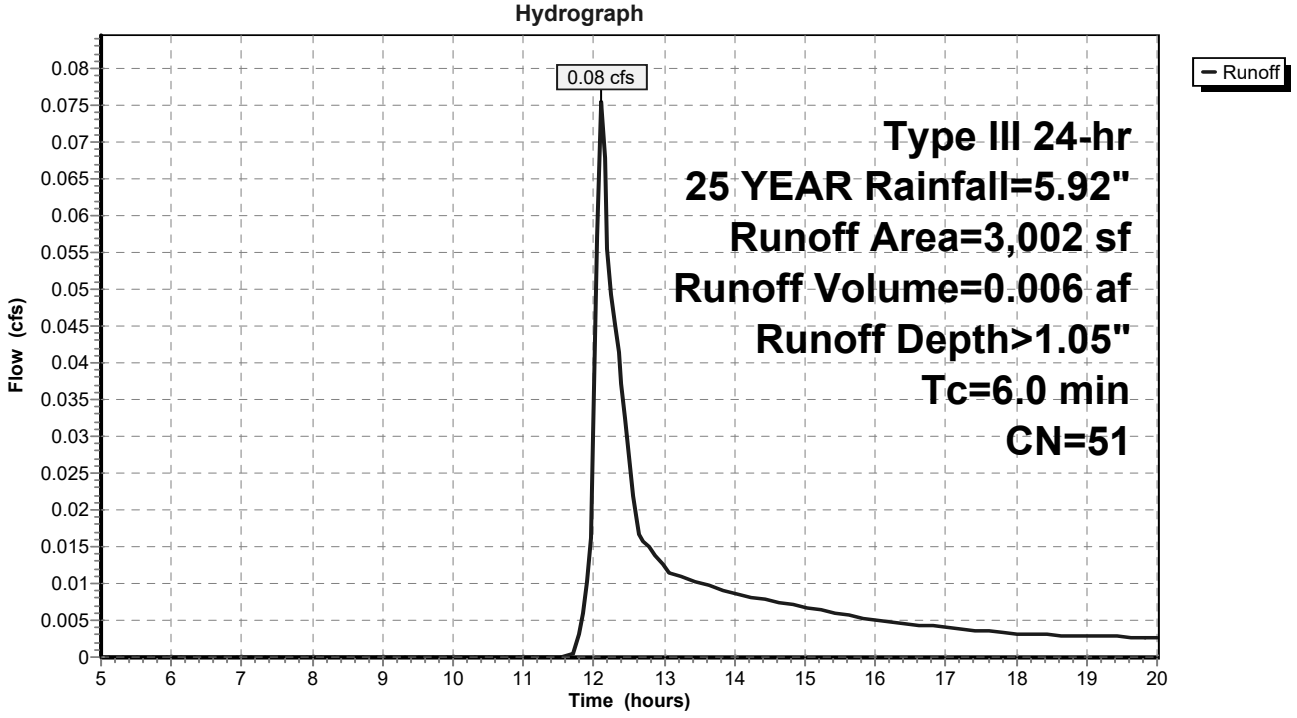
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.006 af, Depth> 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YEAR Rainfall=5.92"

Area (sf)	CN	Description
2,373	39	>75% Grass cover, Good, HSG A
629	98	Paved parking, HSG A
3,002	51	Weighted Average
2,373		79.05% Pervious Area
629		20.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 1: DA 1



Summary for Subcatchment 2: DA 2

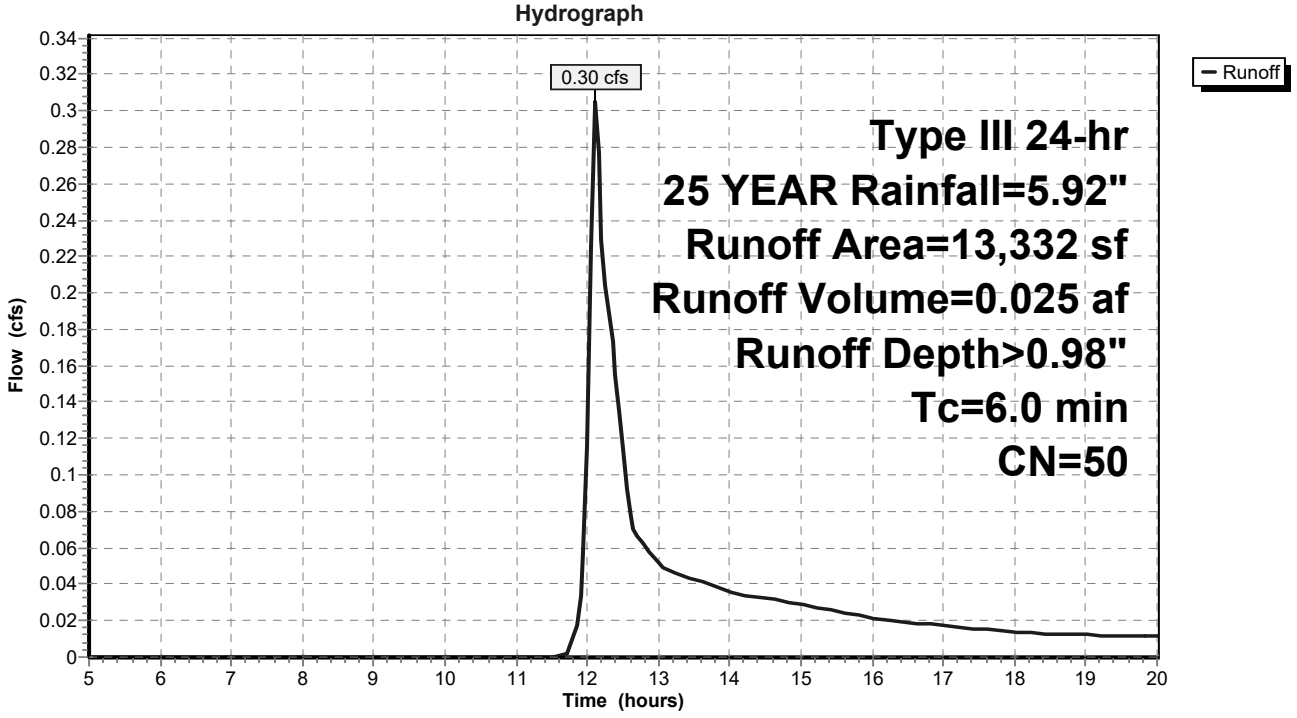
Runoff = 0.30 cfs @ 12.11 hrs, Volume= 0.025 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YEAR Rainfall=5.92"

Area (sf)	CN	Description
2,390	98	Paved parking, HSG A
10,942	39	>75% Grass cover, Good, HSG A
13,332	50	Weighted Average
10,942		82.07% Pervious Area
2,390		17.93% Impervious Area

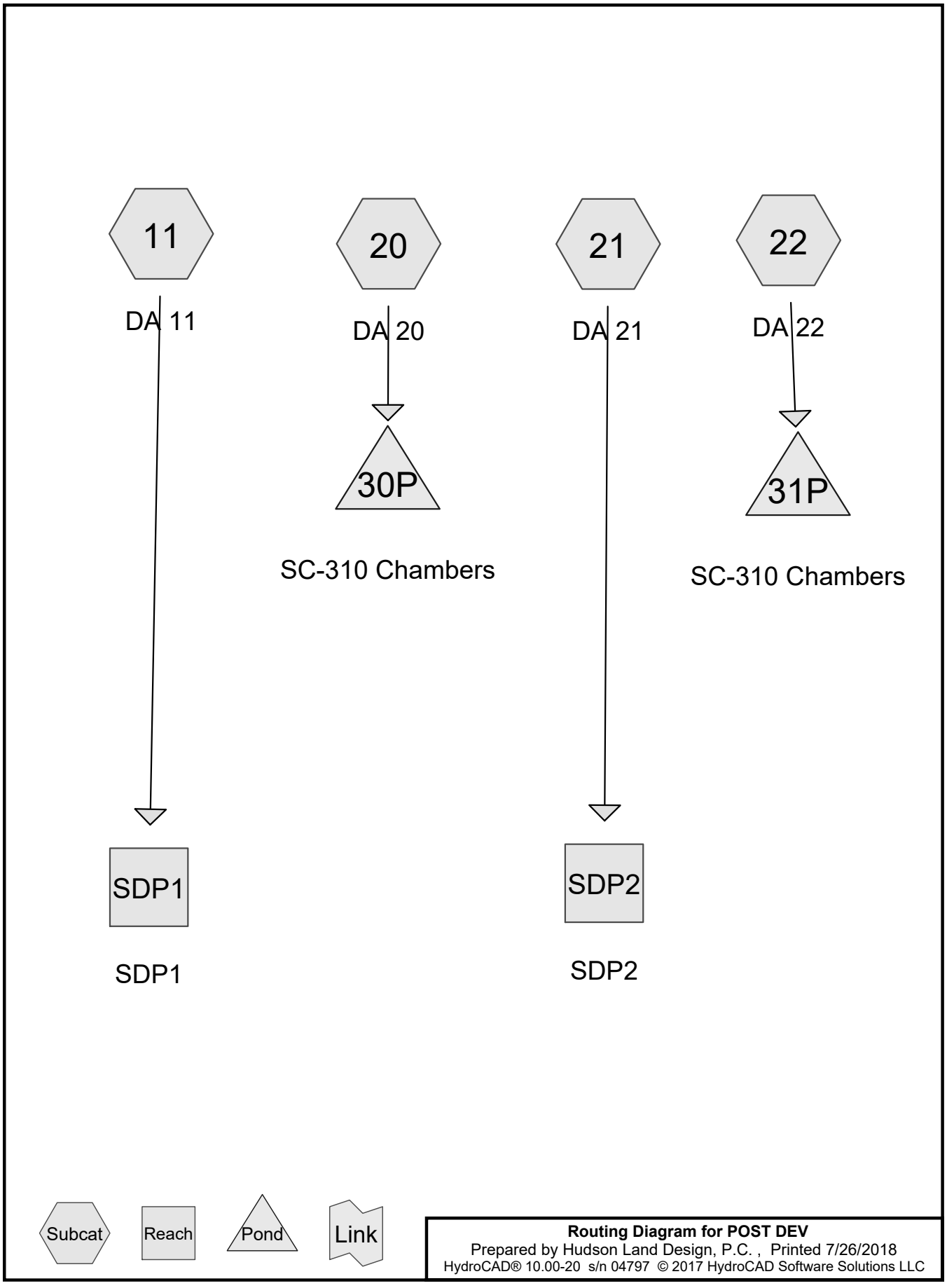
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 2: DA 2



APPENDIX D

POST-DEVELOPMENT HYDROLOGY CALCULATIONS



Routing Diagram for POST DEV

Prepared by Hudson Land Design, P.C. , Printed 7/26/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.221	39	>75% Grass cover, Good, HSG A (11, 20, 21, 22)
0.153	98	Paved parking, HSG A (11, 20, 21, 22)

Summary for Subcatchment 11: DA 11

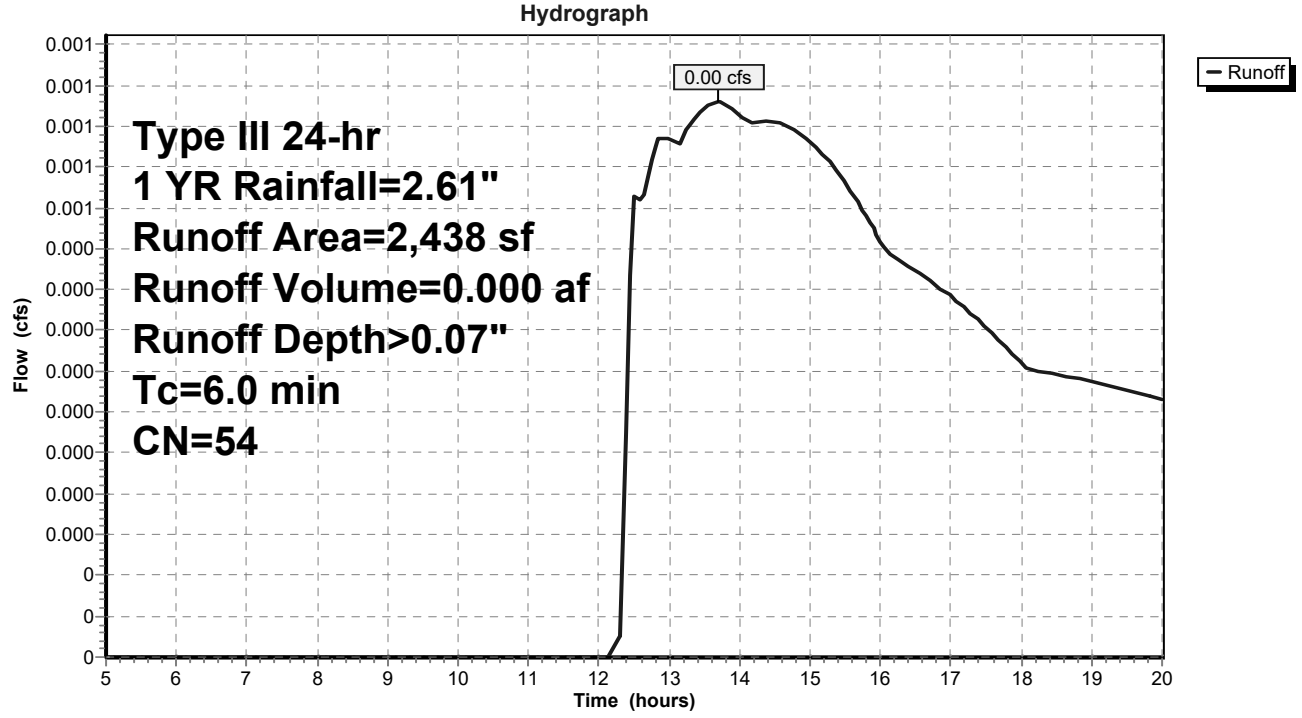
Runoff = 0.00 cfs @ 13.68 hrs, Volume= 0.000 af, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 YR Rainfall=2.61"

Area (sf)	CN	Description
624	98	Paved parking, HSG A
1,814	39	>75% Grass cover, Good, HSG A
2,438	54	Weighted Average
1,814		74.41% Pervious Area
624		25.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 11: DA 11



Summary for Subcatchment 20: DA 20

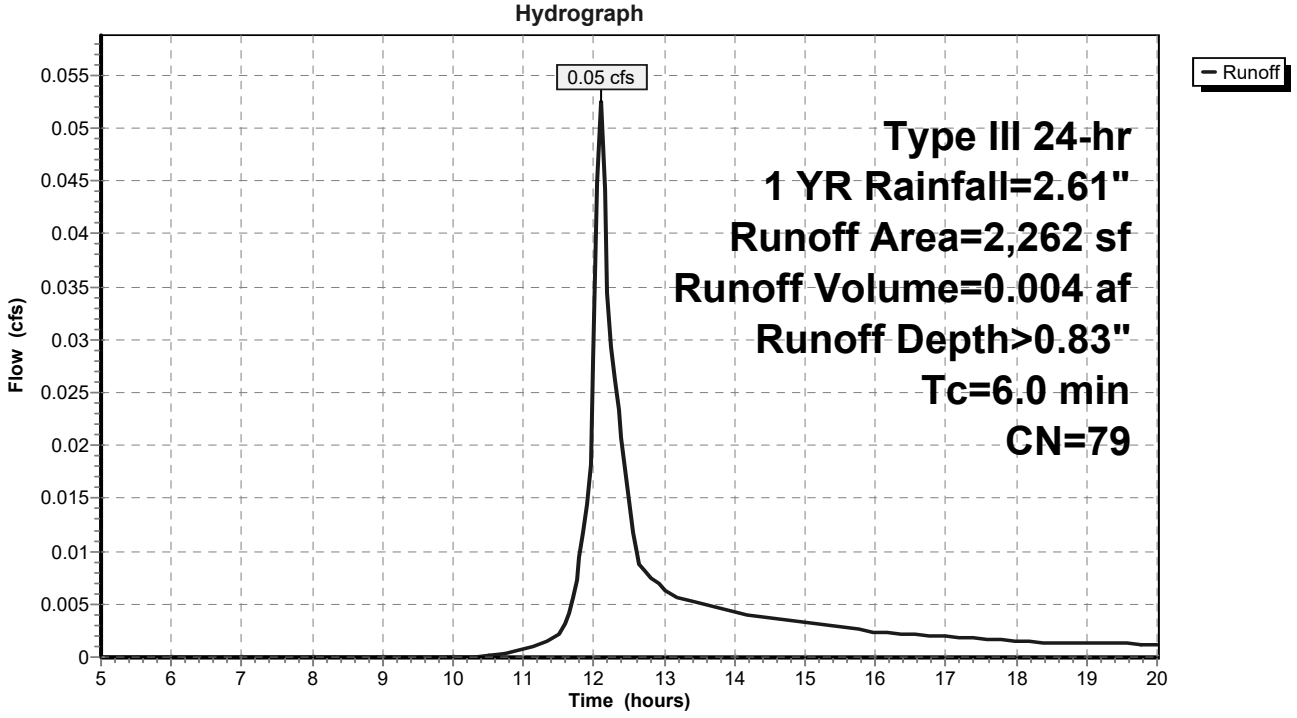
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 YR Rainfall=2.61"

Area (sf)	CN	Description
1,538	98	Paved parking, HSG A
724	39	>75% Grass cover, Good, HSG A
2,262	79	Weighted Average
724		32.01% Pervious Area
1,538		67.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 20: DA 20



Summary for Subcatchment 21: DA 21

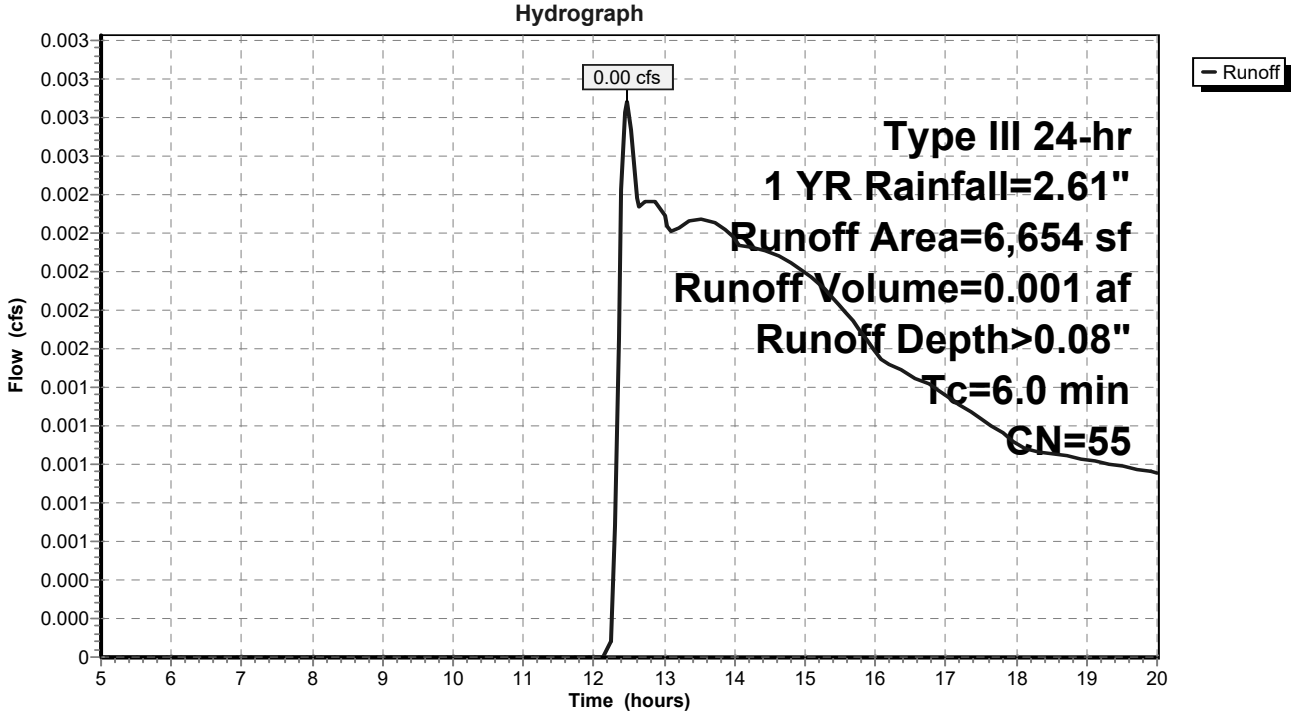
Runoff = 0.00 cfs @ 12.48 hrs, Volume= 0.001 af, Depth> 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 YR Rainfall=2.61"

Area (sf)	CN	Description
1,838	98	Paved parking, HSG A
4,816	39	>75% Grass cover, Good, HSG A
6,654	55	Weighted Average
4,816		72.38% Pervious Area
1,838		27.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 21: DA 21



Summary for Subcatchment 22: DA 22

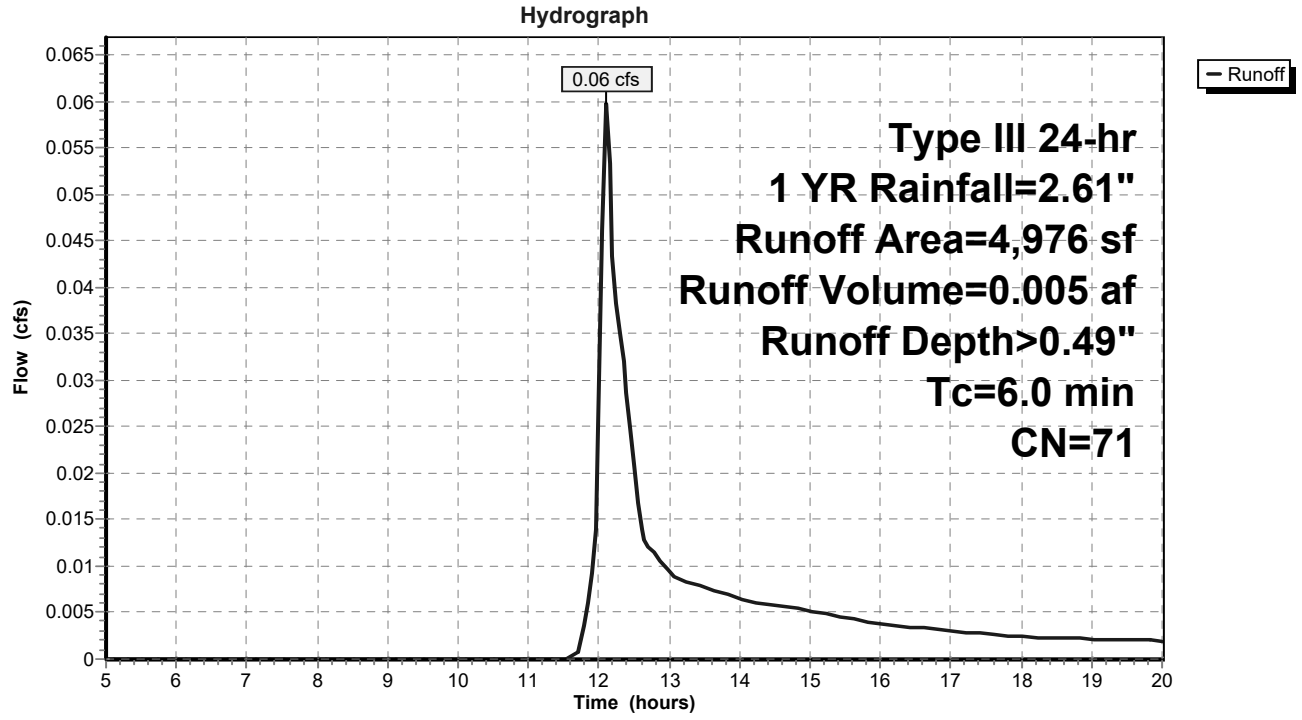
Runoff = 0.06 cfs @ 12.11 hrs, Volume= 0.005 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1 YR Rainfall=2.61"

Area (sf)	CN	Description
2,686	98	Paved parking, HSG A
2,290	39	>75% Grass cover, Good, HSG A
4,976	71	Weighted Average
2,290		46.02% Pervious Area
2,686		53.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 22: DA 22

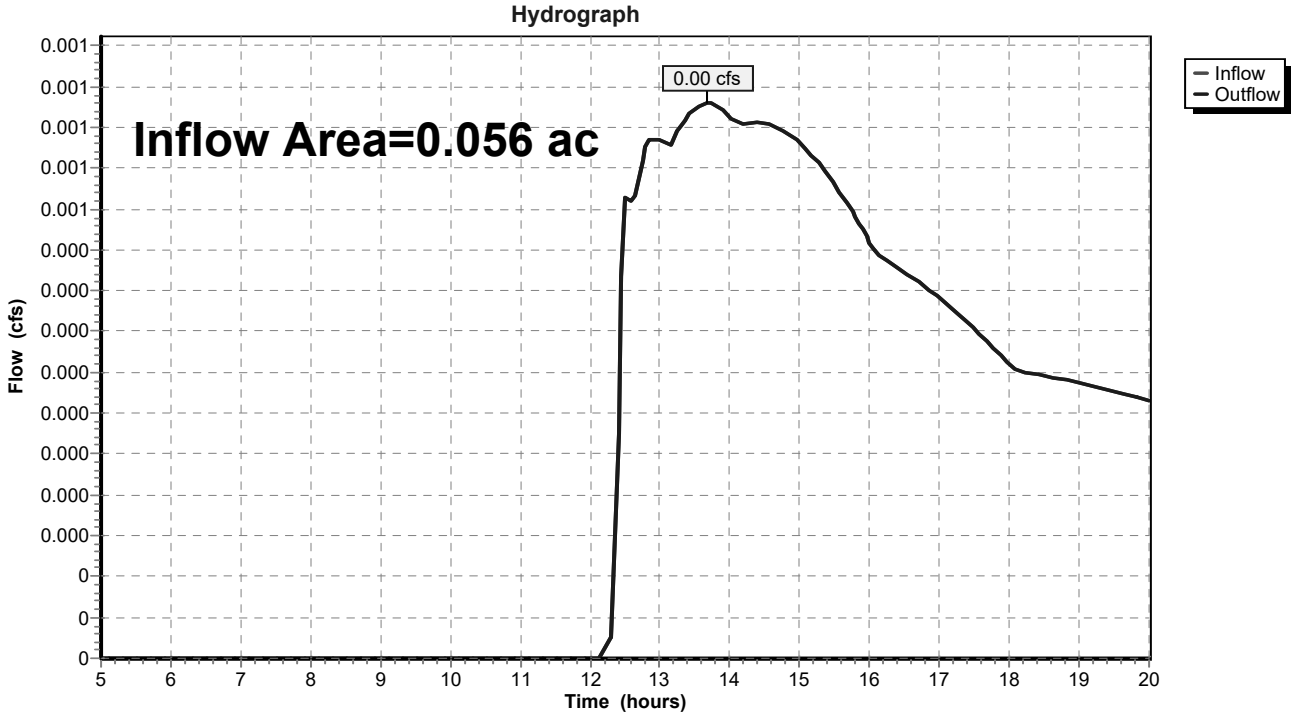


Summary for Reach SDP1: SDP1

Inflow Area = 0.056 ac, 25.59% Impervious, Inflow Depth > 0.07" for 1 YR event
Inflow = 0.00 cfs @ 13.68 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 13.68 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SDP1: SDP1

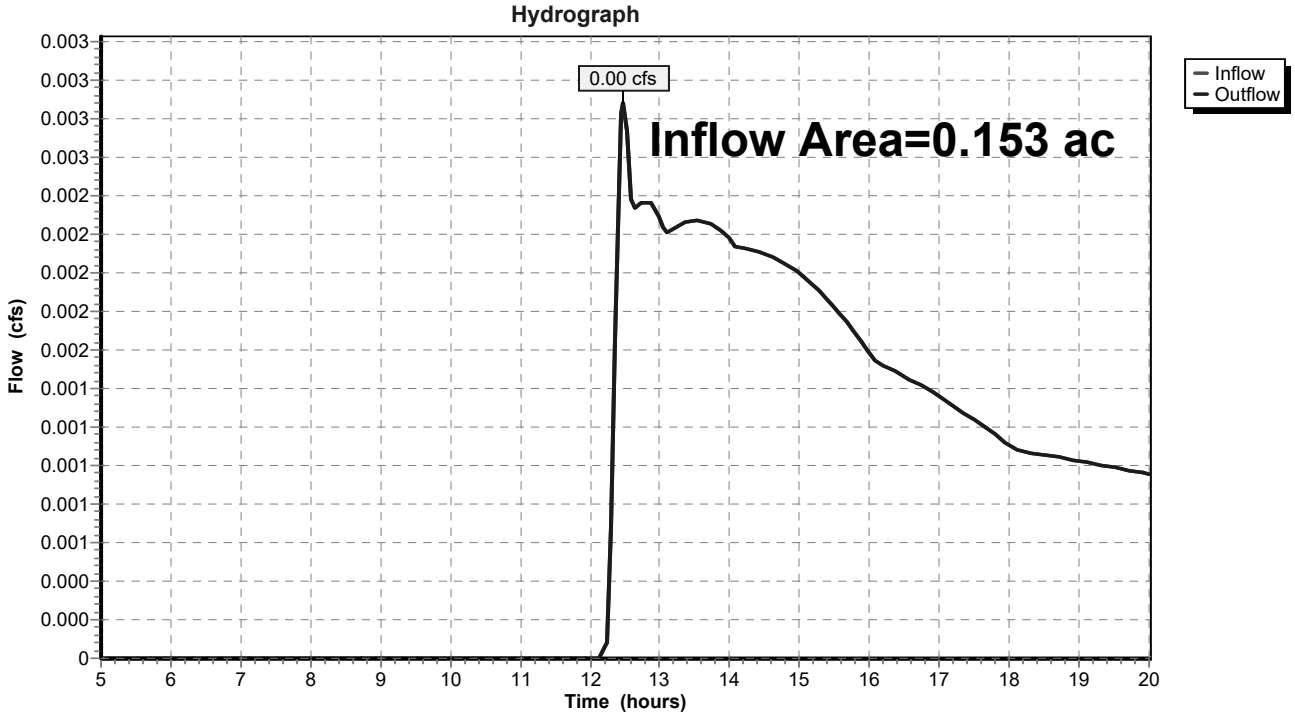


Summary for Reach SDP2: SDP2

Inflow Area = 0.153 ac, 27.62% Impervious, Inflow Depth > 0.08" for 1 YR event
Inflow = 0.00 cfs @ 12.48 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 12.48 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SDP2: SDP2



Summary for Pond 30P: SC-310 Chambers

Inflow Area = 0.052 ac, 67.99% Impervious, Inflow Depth > 0.83" for 1 YR event
Inflow = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 12.36 hrs, Volume= 0.004 af, Atten= 57%, Lag= 15.9 min
Discarded = 0.02 cfs @ 12.36 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 138.98' @ 12.36 hrs Surf.Area= 0.004 ac Storage= 0.000 af

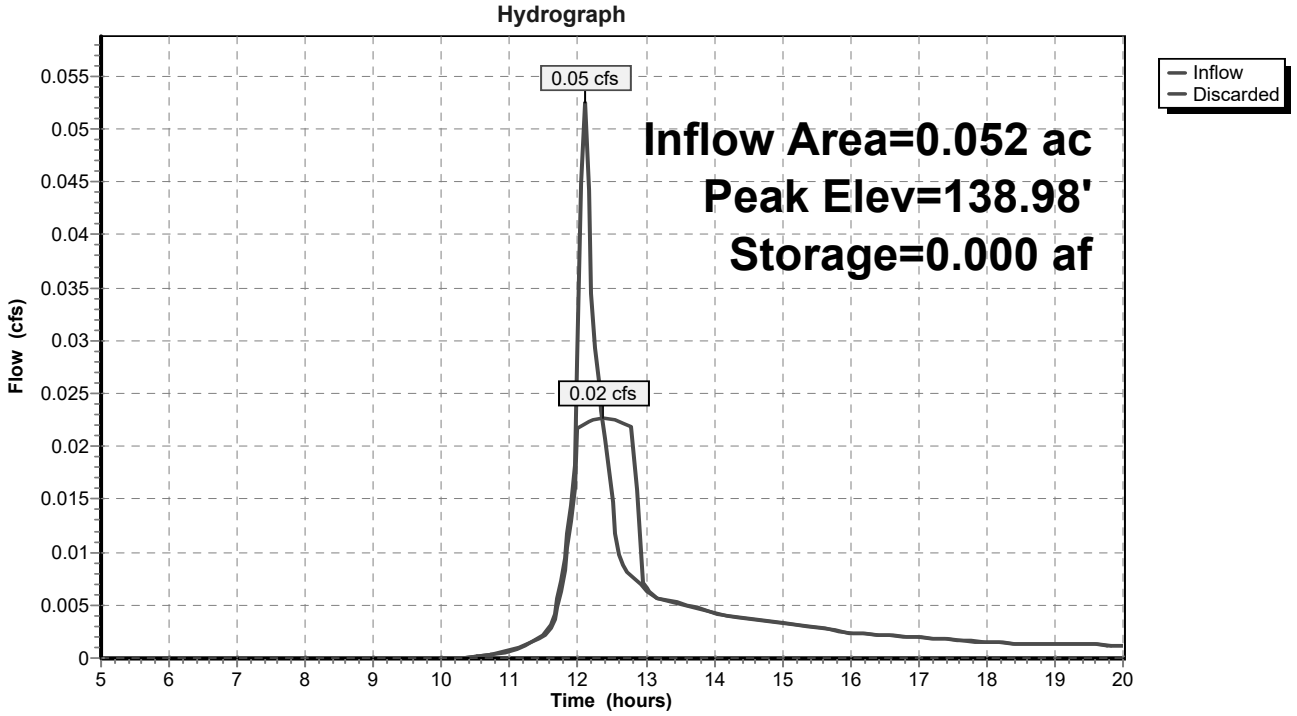
Plug-Flow detention time= 5.5 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 5.2 min (820.1 - 814.9)

Volume	Invert	Avail.Storage	Storage Description
#1	138.70'	0.004 af	**11.50'W x 16.23'L x 3.00'H Prismatoid** 0.013 af Overall - 0.002 af Embedded = 0.011 af x 40.0% Voids
#2	139.20'	0.002 af	**ADS_StormTech SC-310** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 3 rows
		0.006 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	138.70'	**5.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 133.00' Phase-In= 0.01'

Discarded OutFlow Max=0.02 cfs @ 12.36 hrs HW=138.98' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Pond 30P: SC-310 Chambers



Summary for Pond 31P: SC-310 Chambers

Inflow Area = 0.114 ac, 53.98% Impervious, Inflow Depth > 0.49" for 1 YR event
Inflow = 0.06 cfs @ 12.11 hrs, Volume= 0.005 af
Outflow = 0.04 cfs @ 12.30 hrs, Volume= 0.005 af, Atten= 41%, Lag= 11.2 min
Discarded = 0.04 cfs @ 12.30 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 137.62' @ 12.30 hrs Surf.Area= 0.007 ac Storage= 0.000 af

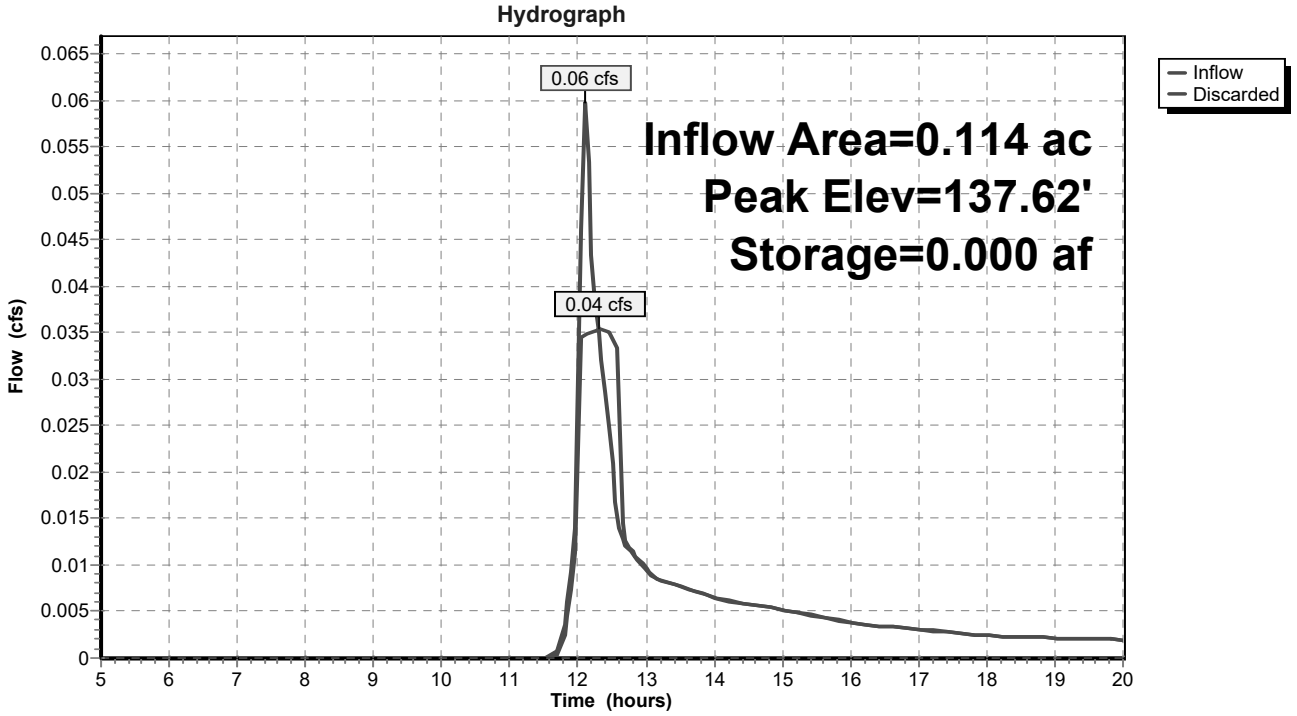
Plug-Flow detention time= 2.9 min calculated for 0.005 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (840.2 - 837.7)

Volume	Invert	Avail.Storage	Storage Description
#1	137.50'	0.007 af	**18.20'W x 16.23'L x 3.00'H Prismatoid** 0.020 af Overall - 0.003 af Embedded = 0.017 af x 40.0% Voids
#2	138.00'	0.003 af	**ADS_StormTech SC-310** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		0.010 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.50'	**5.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 134.00'

Discarded OutFlow Max=0.04 cfs @ 12.30 hrs HW=137.62' (Free Discharge)
↑**1=Exfiltration** (Controls 0.04 cfs)

Pond 31P: SC-310 Chambers



Summary for Subcatchment 11: DA 11

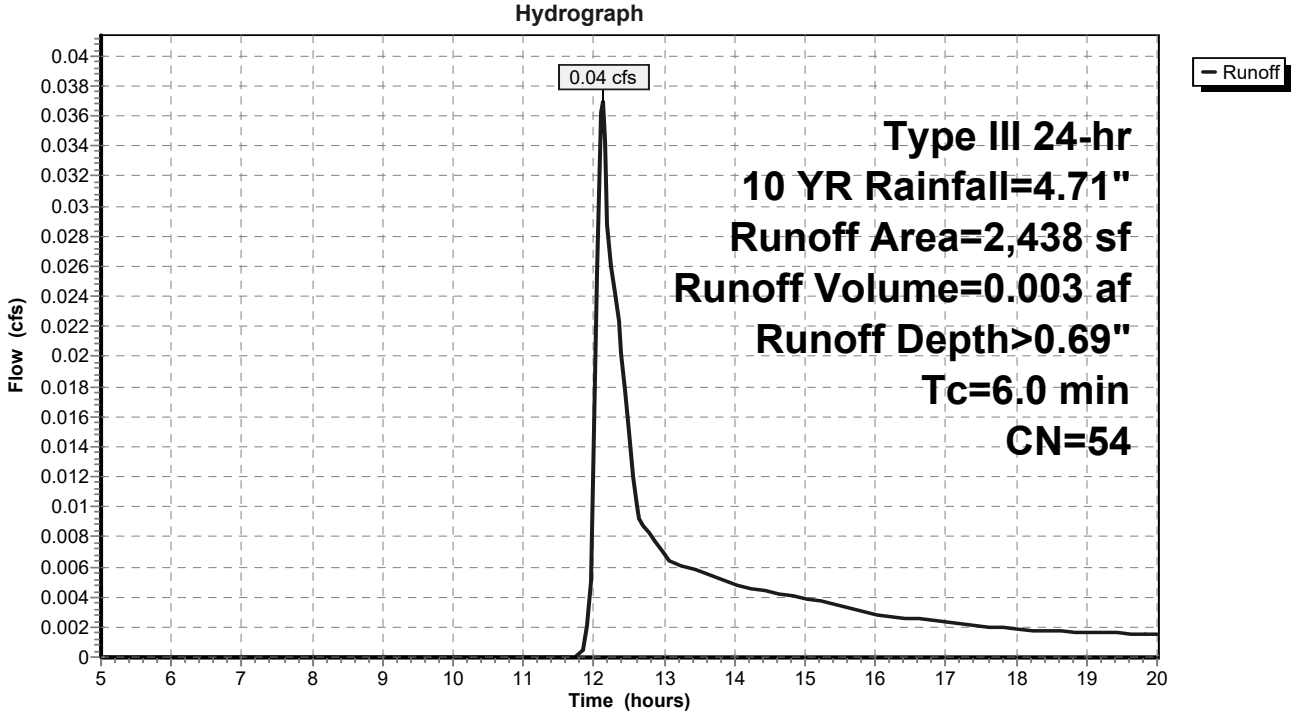
Runoff = 0.04 cfs @ 12.12 hrs, Volume= 0.003 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.71"

Area (sf)	CN	Description
624	98	Paved parking, HSG A
1,814	39	>75% Grass cover, Good, HSG A
2,438	54	Weighted Average
1,814		74.41% Pervious Area
624		25.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 11: DA 11



Summary for Subcatchment 20: DA 20

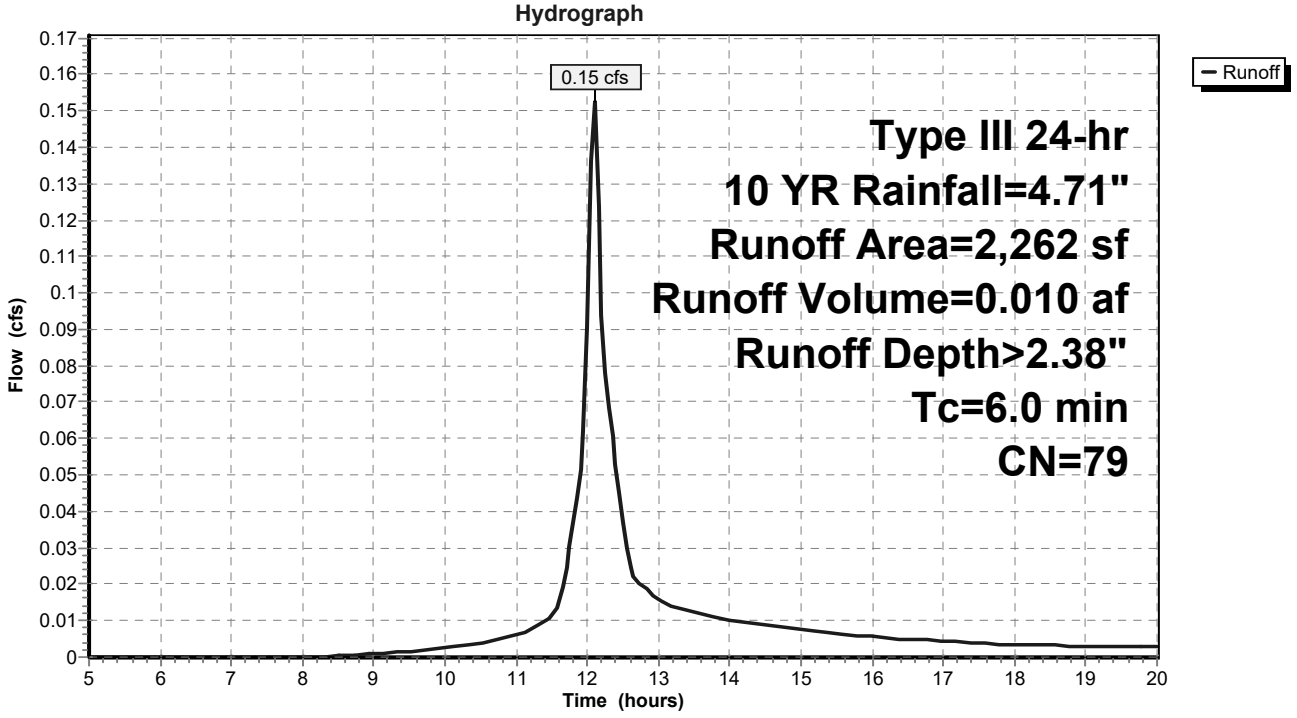
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.010 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.71"

Area (sf)	CN	Description
1,538	98	Paved parking, HSG A
724	39	>75% Grass cover, Good, HSG A
2,262	79	Weighted Average
724		32.01% Pervious Area
1,538		67.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 20: DA 20



Summary for Subcatchment 21: DA 21

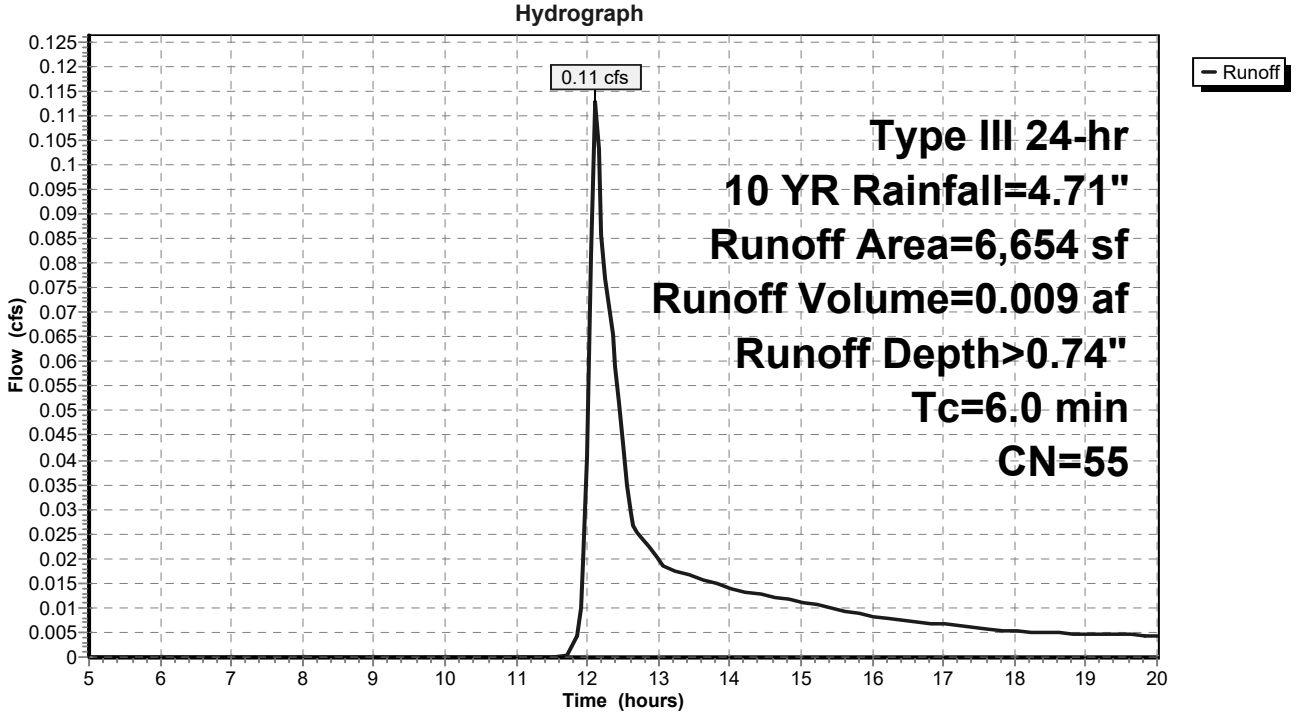
Runoff = 0.11 cfs @ 12.11 hrs, Volume= 0.009 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.71"

Area (sf)	CN	Description
1,838	98	Paved parking, HSG A
4,816	39	>75% Grass cover, Good, HSG A
6,654	55	Weighted Average
4,816		72.38% Pervious Area
1,838		27.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 21: DA 21



Summary for Subcatchment 22: DA 22

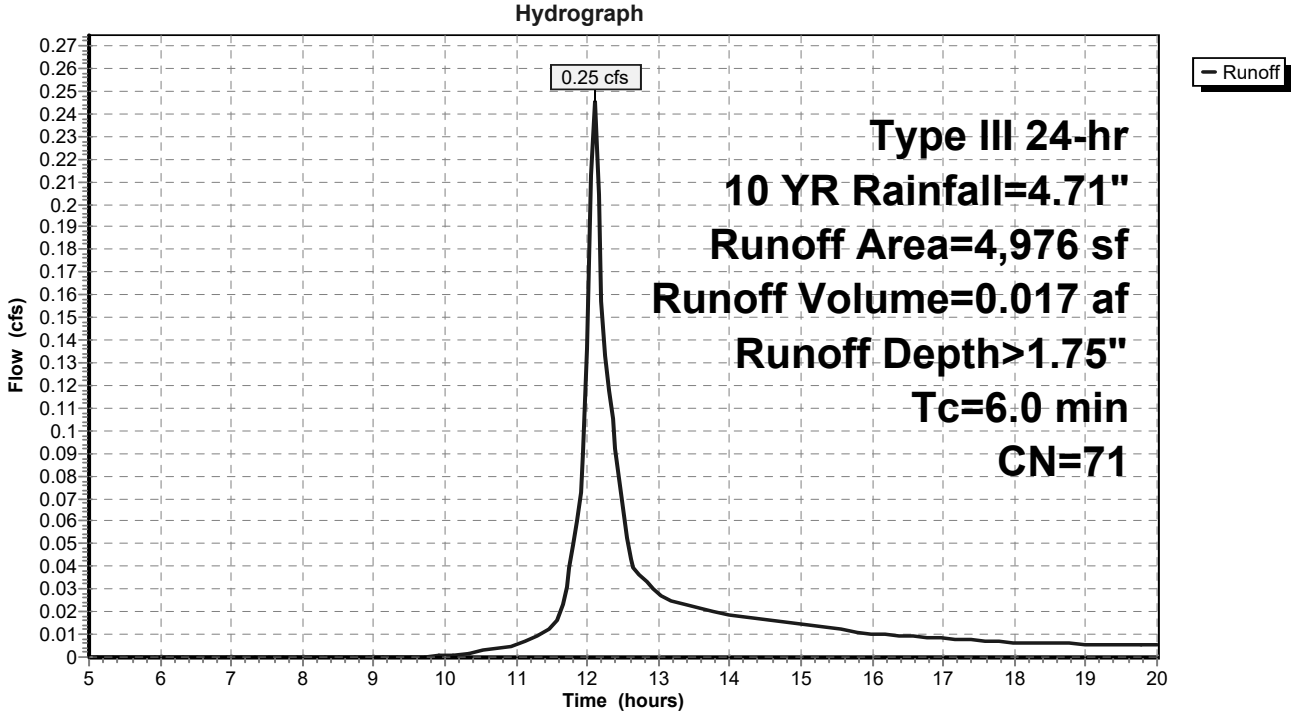
Runoff = 0.25 cfs @ 12.10 hrs, Volume= 0.017 af, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.71"

Area (sf)	CN	Description
2,686	98	Paved parking, HSG A
2,290	39	>75% Grass cover, Good, HSG A
4,976	71	Weighted Average
2,290		46.02% Pervious Area
2,686		53.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 22: DA 22

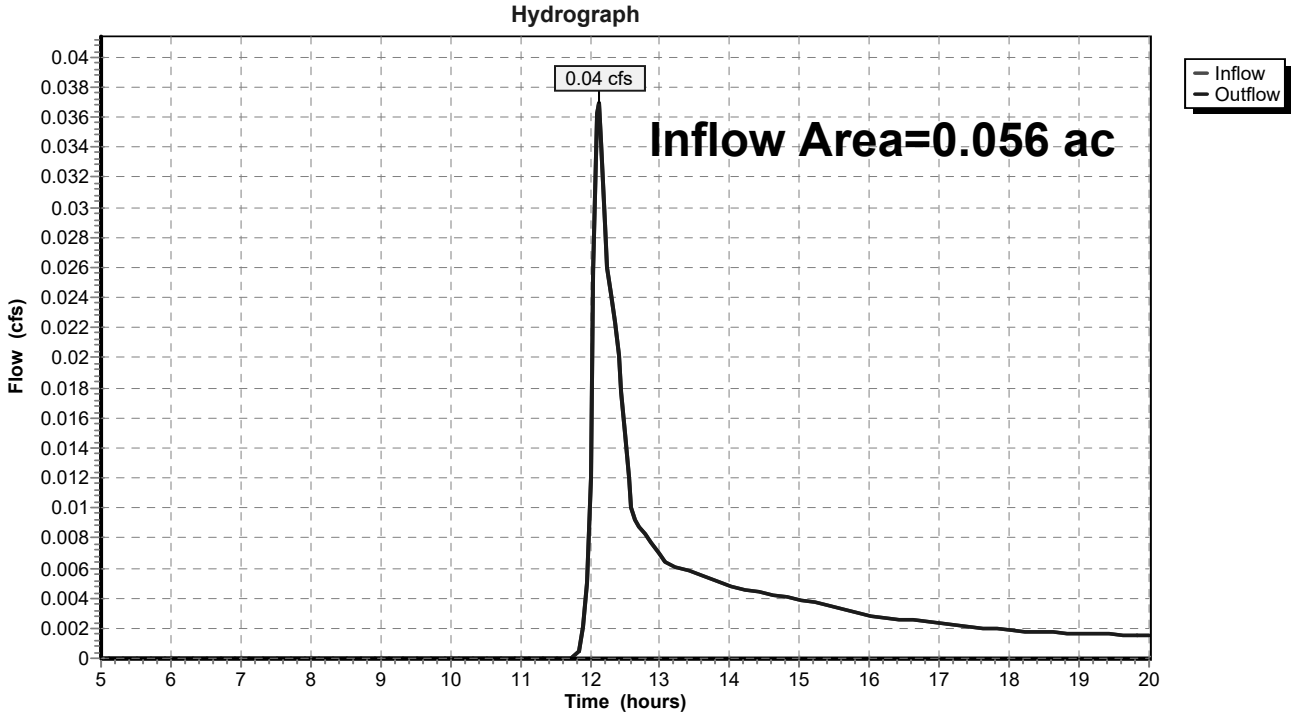


Summary for Reach SDP1: SDP1

Inflow Area = 0.056 ac, 25.59% Impervious, Inflow Depth > 0.69" for 10 YR event
Inflow = 0.04 cfs @ 12.12 hrs, Volume= 0.003 af
Outflow = 0.04 cfs @ 12.12 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SDP1: SDP1

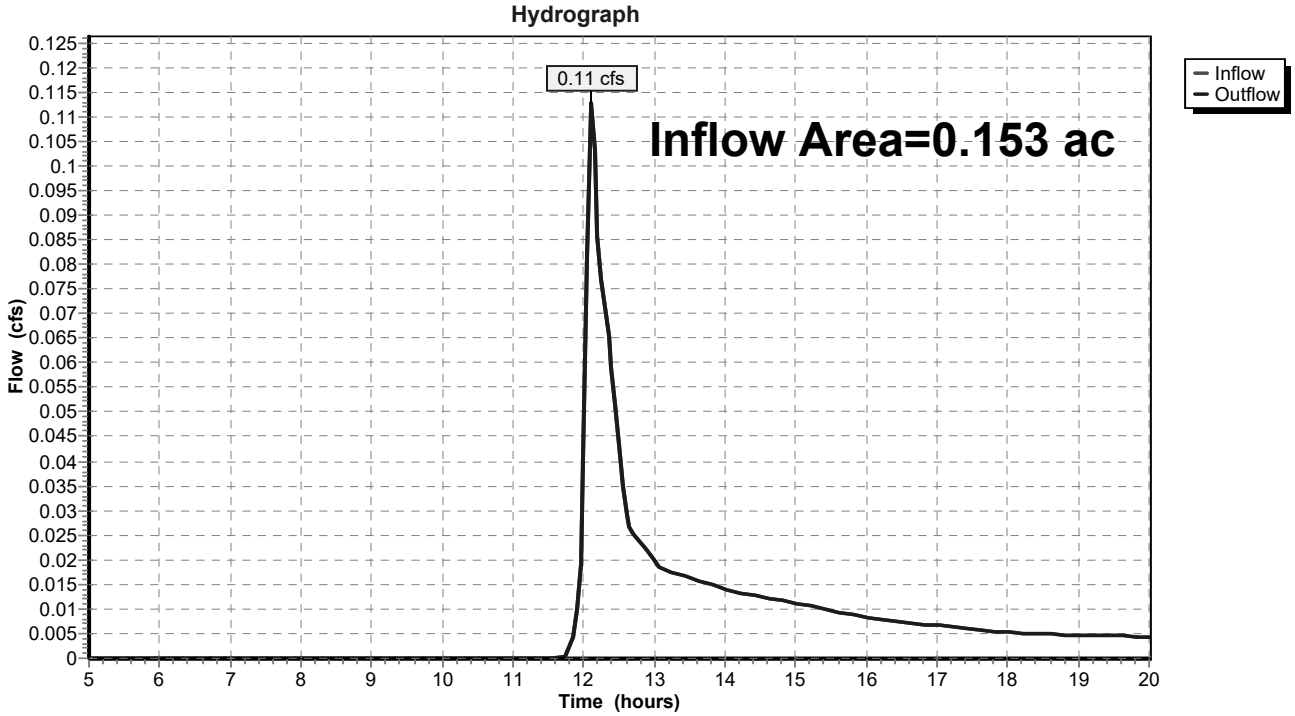


Summary for Reach SDP2: SDP2

Inflow Area = 0.153 ac, 27.62% Impervious, Inflow Depth > 0.74" for 10 YR event
Inflow = 0.11 cfs @ 12.11 hrs, Volume= 0.009 af
Outflow = 0.11 cfs @ 12.11 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SDP2: SDP2



Summary for Pond 30P: SC-310 Chambers

Inflow Area = 0.052 ac, 67.99% Impervious, Inflow Depth > 2.38" for 10 YR event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.010 af
Outflow = 0.03 cfs @ 12.58 hrs, Volume= 0.010 af, Atten= 83%, Lag= 29.2 min
Discarded = 0.03 cfs @ 12.58 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 140.01' @ 12.58 hrs Surf.Area= 0.004 ac Storage= 0.003 af

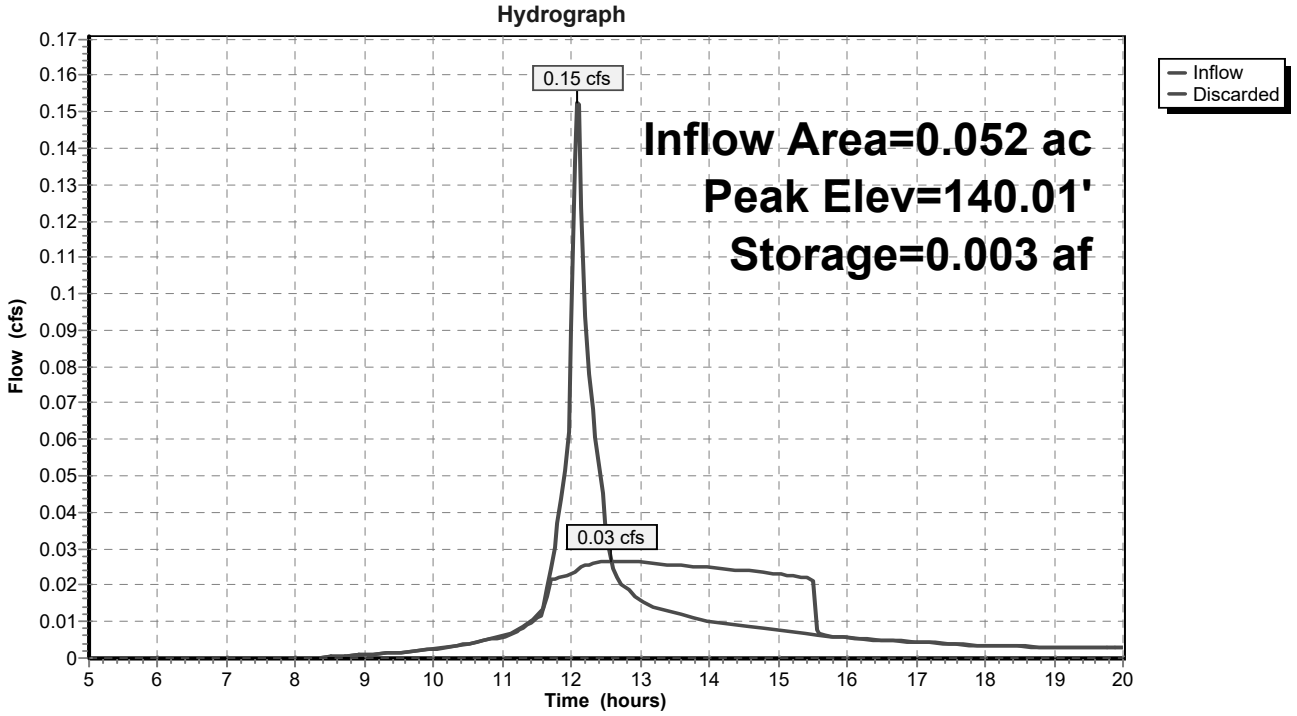
Plug-Flow detention time= 40.4 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 40.1 min (831.4 - 791.3)

Volume	Invert	Avail.Storage	Storage Description
#1	138.70'	0.004 af	**11.50'W x 16.23'L x 3.00'H Prismatoid** 0.013 af Overall - 0.002 af Embedded = 0.011 af x 40.0% Voids
#2	139.20'	0.002 af	**ADS_StormTech SC-310** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 3 rows
		0.006 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	138.70'	**5.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 133.00' Phase-In= 0.01'

Discarded OutFlow Max=0.03 cfs @ 12.58 hrs HW=140.01' (Free Discharge)
↑**1=Exfiltration** (Controls 0.03 cfs)

Pond 30P: SC-310 Chambers



Summary for Pond 31P: SC-310 Chambers

Inflow Area = 0.114 ac, 53.98% Impervious, Inflow Depth > 1.75" for 10 YR event
Inflow = 0.25 cfs @ 12.10 hrs, Volume= 0.017 af
Outflow = 0.05 cfs @ 12.58 hrs, Volume= 0.017 af, Atten= 81%, Lag= 29.2 min
Discarded = 0.05 cfs @ 12.58 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 138.77' @ 12.58 hrs Surf.Area= 0.007 ac Storage= 0.005 af

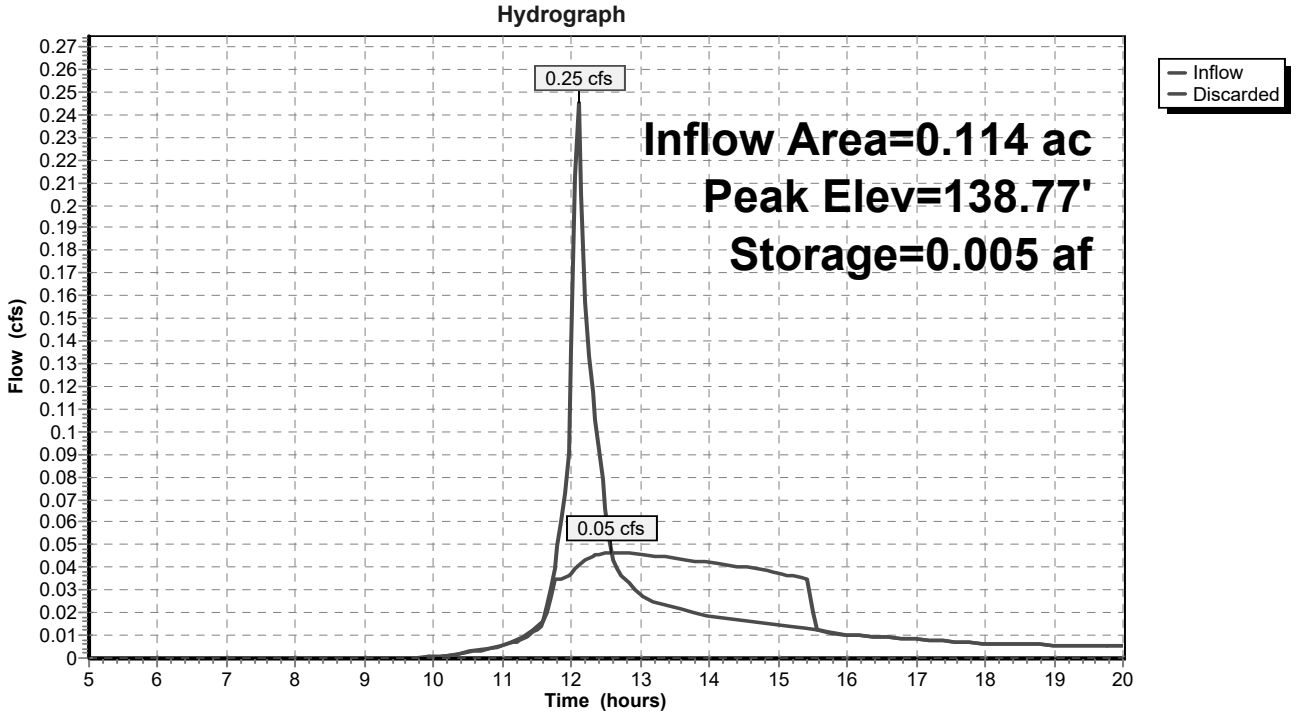
Plug-Flow detention time= 37.7 min calculated for 0.017 af (100% of inflow)
Center-of-Mass det. time= 37.4 min (845.4 - 807.9)

Volume	Invert	Avail.Storage	Storage Description
#1	137.50'	0.007 af	**18.20'W x 16.23'L x 3.00'H Prismatoid** 0.020 af Overall - 0.003 af Embedded = 0.017 af x 40.0% Voids
#2	138.00'	0.003 af	**ADS_StormTech SC-310** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		0.010 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.50'	**5.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 134.00'

Discarded OutFlow Max=0.05 cfs @ 12.58 hrs HW=138.77' (Free Discharge)
1=Exfiltration (Controls 0.05 cfs)

Pond 31P: SC-310 Chambers



Summary for Subcatchment 11: DA 11

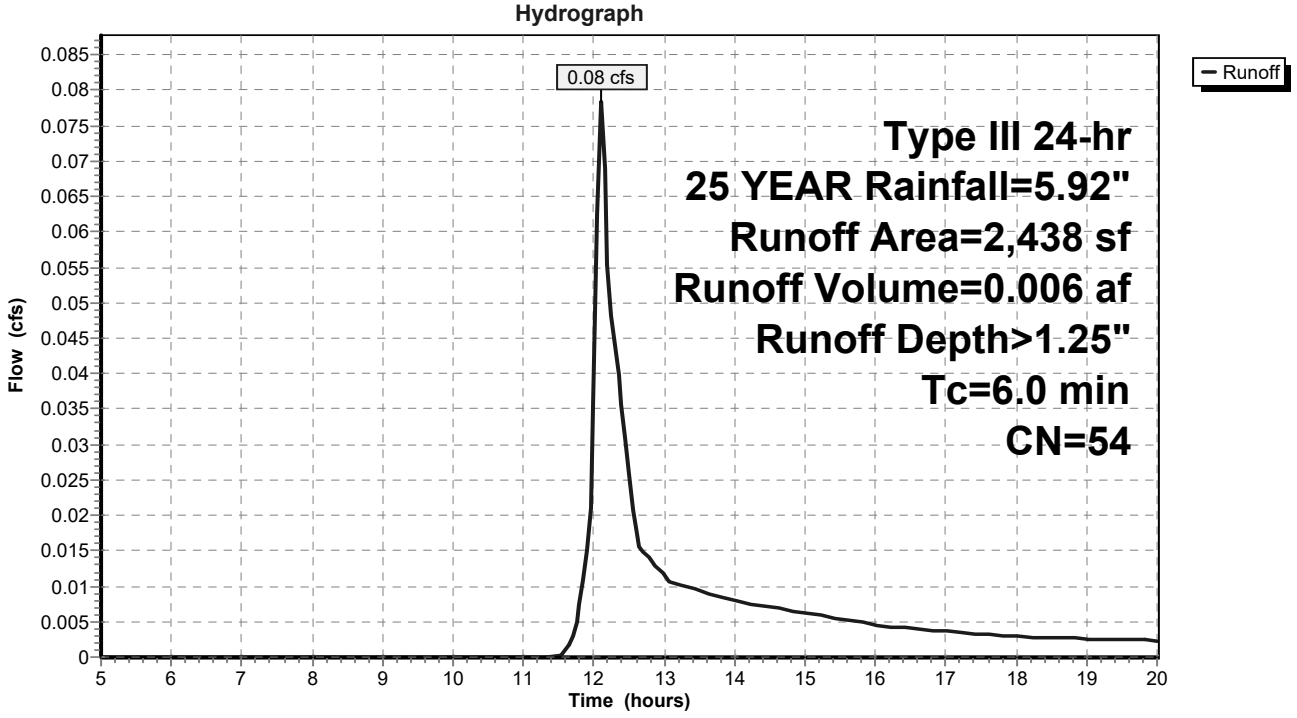
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.006 af, Depth> 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YEAR Rainfall=5.92"

Area (sf)	CN	Description
624	98	Paved parking, HSG A
1,814	39	>75% Grass cover, Good, HSG A
2,438	54	Weighted Average
1,814		74.41% Pervious Area
624		25.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 11: DA 11



Summary for Subcatchment 20: DA 20

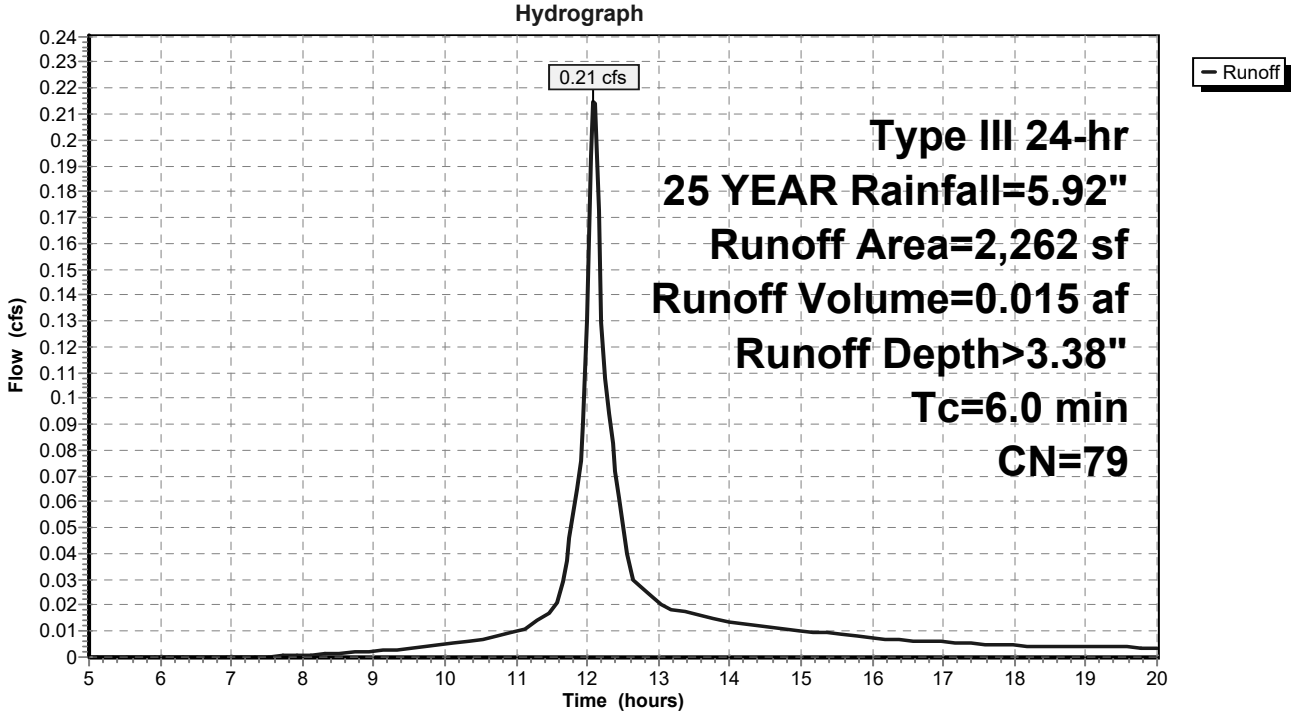
Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YEAR Rainfall=5.92"

Area (sf)	CN	Description
1,538	98	Paved parking, HSG A
724	39	>75% Grass cover, Good, HSG A
2,262	79	Weighted Average
724		32.01% Pervious Area
1,538		67.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 20: DA 20



Summary for Subcatchment 21: DA 21

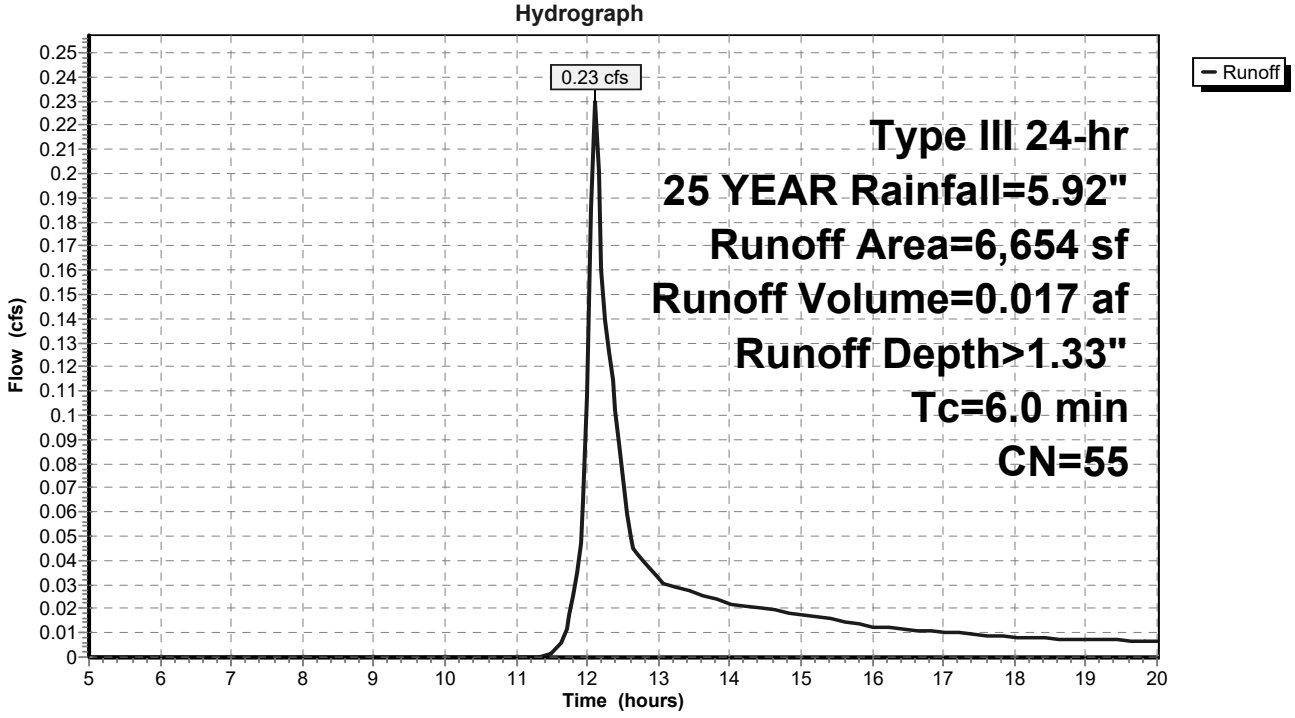
Runoff = 0.23 cfs @ 12.11 hrs, Volume= 0.017 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YEAR Rainfall=5.92"

Area (sf)	CN	Description
1,838	98	Paved parking, HSG A
4,816	39	>75% Grass cover, Good, HSG A
6,654	55	Weighted Average
4,816		72.38% Pervious Area
1,838		27.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 21: DA 21



Summary for Subcatchment 22: DA 22

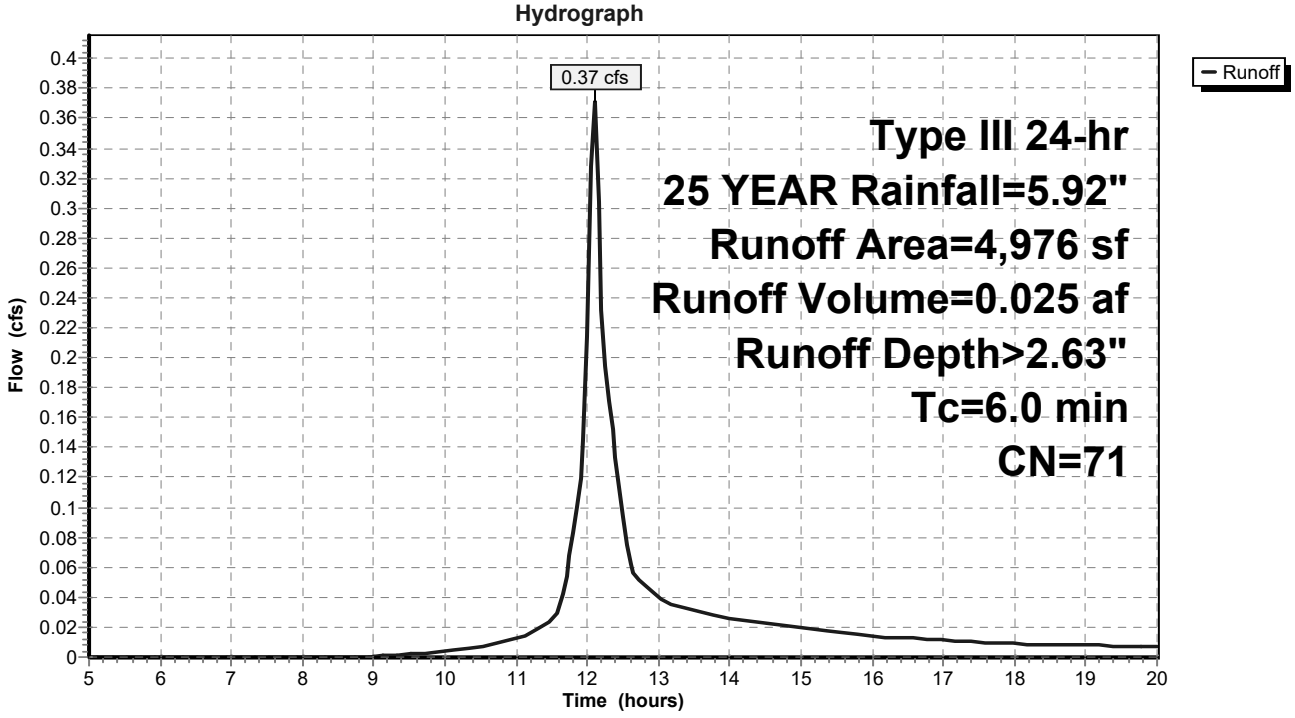
Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.025 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YEAR Rainfall=5.92"

Area (sf)	CN	Description
2,686	98	Paved parking, HSG A
2,290	39	>75% Grass cover, Good, HSG A
4,976	71	Weighted Average
2,290		46.02% Pervious Area
2,686		53.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, S1**

Subcatchment 22: DA 22

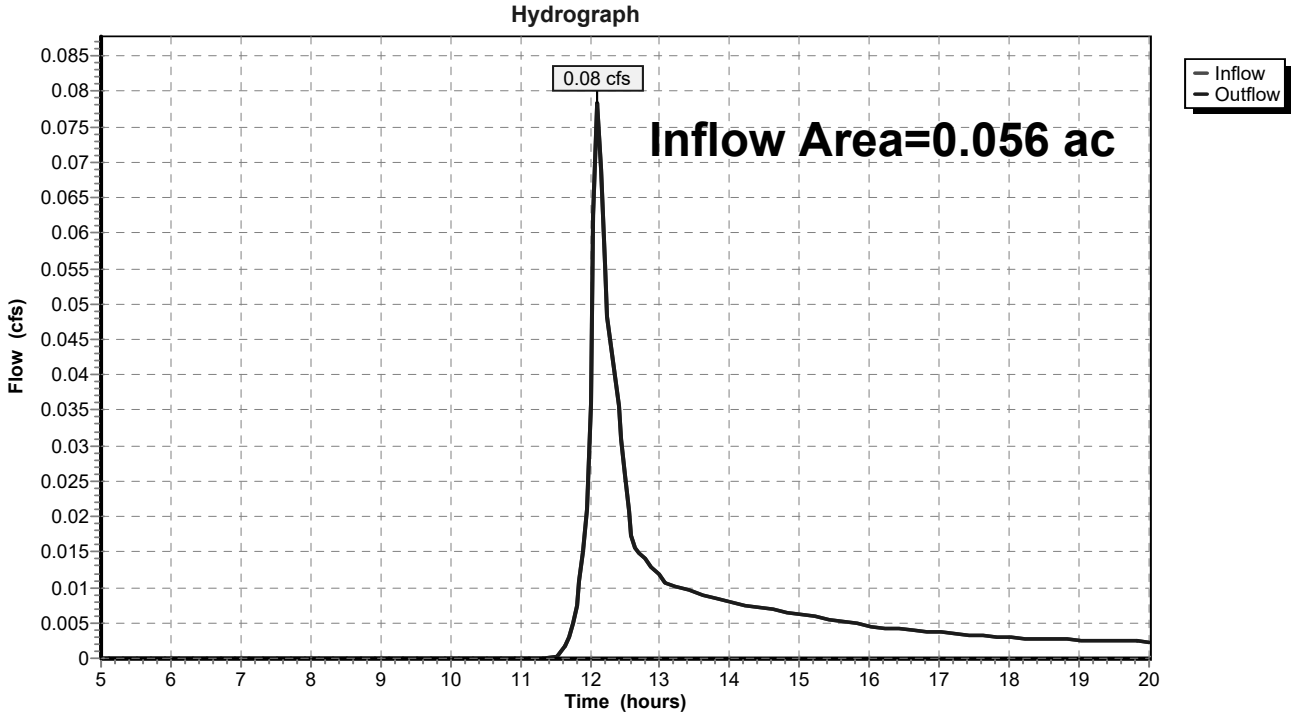


Summary for Reach SDP1: SDP1

Inflow Area = 0.056 ac, 25.59% Impervious, Inflow Depth > 1.25" for 25 YEAR event
Inflow = 0.08 cfs @ 12.11 hrs, Volume= 0.006 af
Outflow = 0.08 cfs @ 12.11 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SDP1: SDP1

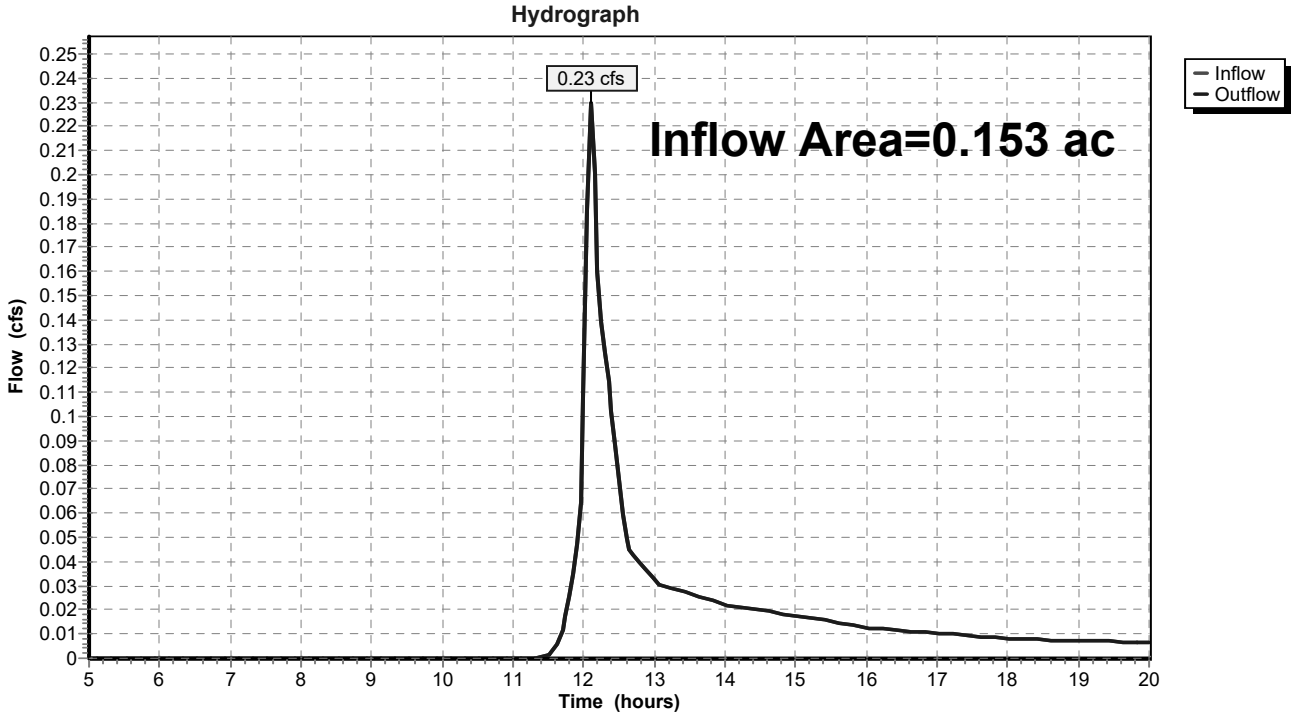


Summary for Reach SDP2: SDP2

Inflow Area = 0.153 ac, 27.62% Impervious, Inflow Depth > 1.33" for 25 YEAR event
Inflow = 0.23 cfs @ 12.11 hrs, Volume= 0.017 af
Outflow = 0.23 cfs @ 12.11 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach SDP2: SDP2



Summary for Pond 30P: SC-310 Chambers

Inflow Area = 0.052 ac, 67.99% Impervious, Inflow Depth > 3.38" for 25 YEAR event
Inflow = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af
Outflow = 0.03 cfs @ 12.65 hrs, Volume= 0.015 af, Atten= 86%, Lag= 33.2 min
Discarded = 0.03 cfs @ 12.65 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 141.03' @ 12.65 hrs Surf.Area= 0.004 ac Storage= 0.005 af

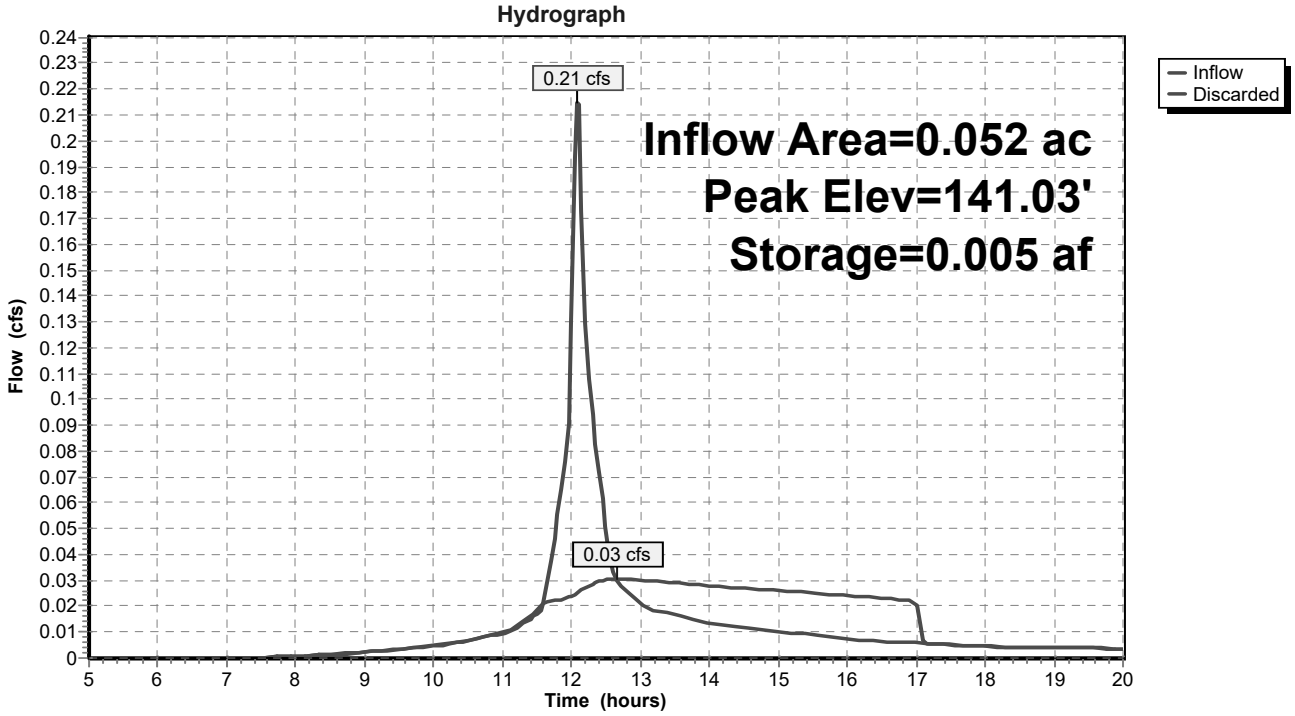
Plug-Flow detention time= 65.1 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 64.7 min (847.9 - 783.2)

Volume	Invert	Avail.Storage	Storage Description
#1	138.70'	0.004 af	**11.50'W x 16.23'L x 3.00'H Prismatoid** 0.013 af Overall - 0.002 af Embedded = 0.011 af x 40.0% Voids
#2	139.20'	0.002 af	**ADS_StormTech SC-310** x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 3 rows
		0.006 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	138.70'	**5.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 133.00' Phase-In= 0.01'

Discarded OutFlow Max=0.03 cfs @ 12.65 hrs HW=141.03' (Free Discharge)
↑**1=Exfiltration** (Controls 0.03 cfs)

Pond 30P: SC-310 Chambers



Summary for Pond 31P: SC-310 Chambers

Inflow Area = 0.114 ac, 53.98% Impervious, Inflow Depth > 2.63" for 25 YEAR event
Inflow = 0.37 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.06 cfs @ 12.63 hrs, Volume= 0.025 af, Atten= 84%, Lag= 31.9 min
Discarded = 0.06 cfs @ 12.63 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 140.00' @ 12.63 hrs Surf.Area= 0.007 ac Storage= 0.009 af

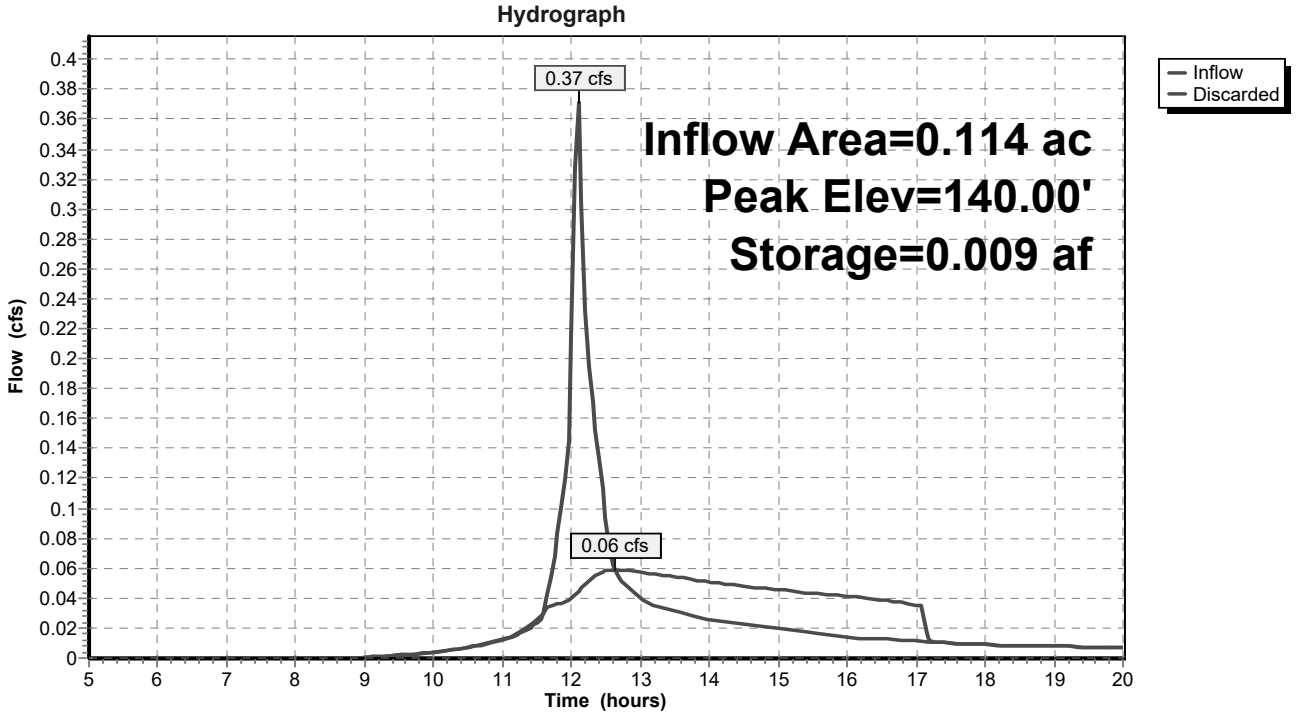
Plug-Flow detention time= 62.7 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 62.4 min (861.2 - 798.8)

Volume	Invert	Avail.Storage	Storage Description
#1	137.50'	0.007 af	**18.20'W x 16.23'L x 3.00'H Prismatoid** 0.020 af Overall - 0.003 af Embedded = 0.017 af x 40.0% Voids
#2	138.00'	0.003 af	**ADS_StormTech SC-310** x 10 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		0.010 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.50'	**5.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 134.00'

Discarded OutFlow Max=0.06 cfs @ 12.63 hrs HW=140.00' (Free Discharge)
↑**1=Exfiltration** (Controls 0.06 cfs)

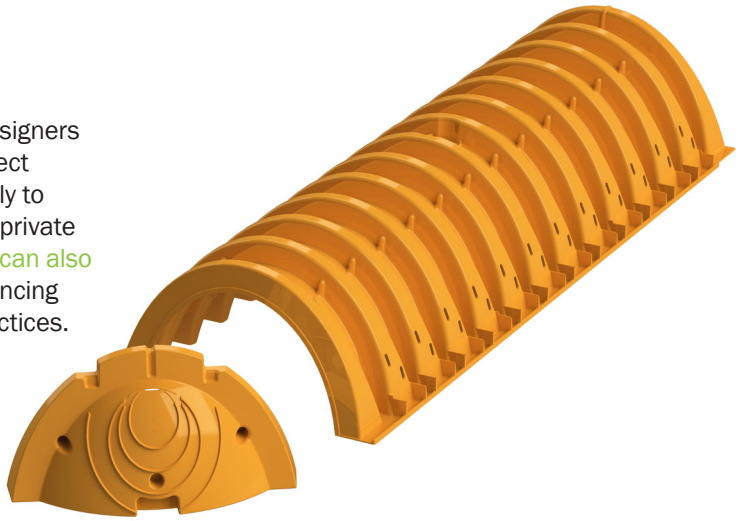
Pond 31P: SC-310 Chambers



APPENDIX E:
PRODUCT CUT SHEETS

SC-310 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH SC-310 CHAMBER
(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
85.4" x 34.0" x 16.0"
2,170 mm x 864 mm x 406 mm

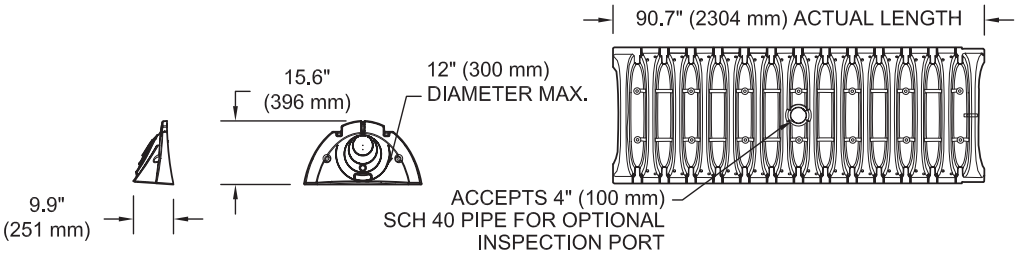
Chamber Storage
14.7 ft³ (0.42 m³)

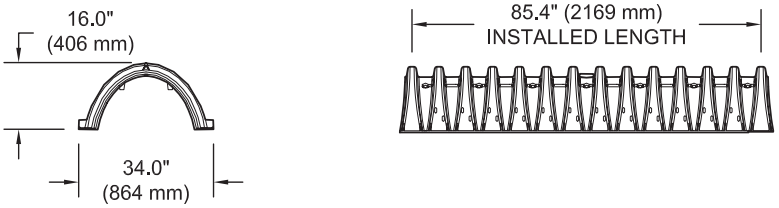
Min. Installed Storage*
31.0 ft³ (0.88 m³)

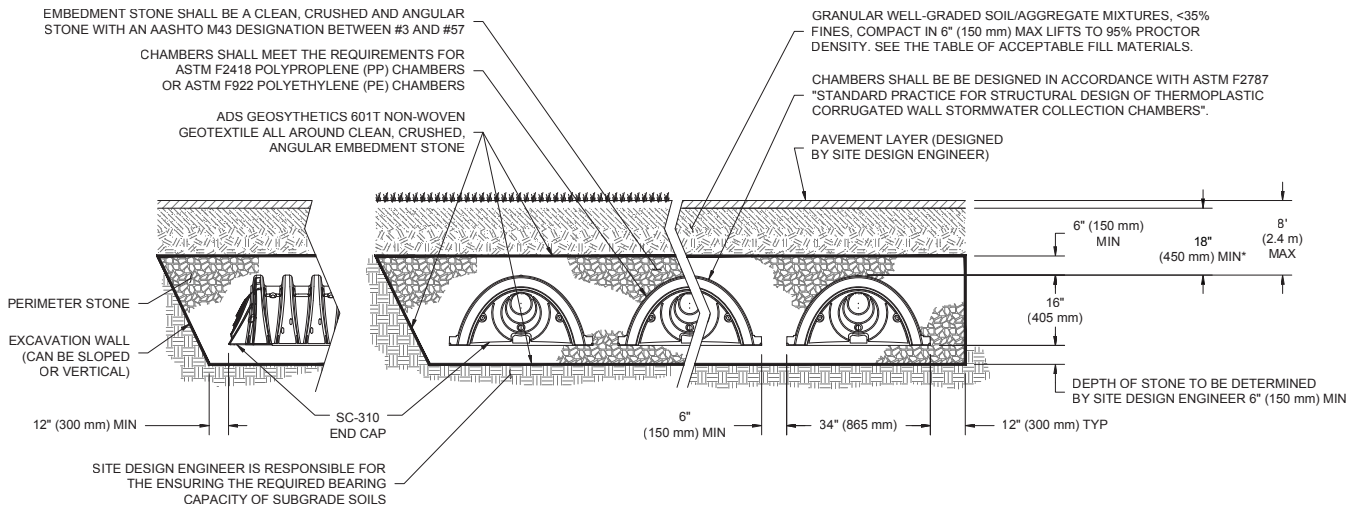
Weight
37.0 lbs (16.8 kg)

Shipping
41 chambers/pallet
108 end caps/pallet
18 pallets/truck

*Assumes 6" (150 mm) stone above and below chambers and 40% stone porosity.







*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

SC-310 CUMULATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)	14.70 (0.416)	31.00 (0.878)
27 (686)	14.70 (0.416)	30.21 (0.855)
26 (680)	Stone 14.70 (0.416)	29.42 (0.833)
25 (610)	Cover 14.70 (0.416)	28.63 (0.811)
24 (609)	14.70 (0.416)	27.84 (0.788)
23 (584)	14.70 (0.416)	27.05 (0.766)
22 (559)	14.70 (0.416)	26.26 (0.748)
21 (533)	14.64 (0.415)	25.43 (0.720)
20 (508)	14.49 (0.410)	24.54 (0.695)
19 (483)	14.22 (0.403)	23.58 (0.668)
18 (457)	13.68 (0.387)	22.47 (0.636)
17 (432)	12.99 (0.368)	21.25 (0.602)
16 (406)	12.17 (0.345)	19.97 (0.566)
15 (381)	11.25 (0.319)	18.62 (0.528)
14 (356)	10.23 (0.290)	17.22 (0.488)
13 (330)	9.15 (0.260)	15.78 (0.447)
12 (305)	7.99 (0.227)	14.29 (0.425)
11 (279)	6.78 (0.192)	12.77 (0.362)
10 (254)	5.51 (0.156)	11.22 (0.318)
9 (229)	4.19 (0.119)	9.64 (0.278)
8 (203)	2.83 (0.081)	8.03 (0.227)
7 (178)	1.43 (0.041)	6.40 (0.181)
6 (152)	0	4.74 (0.134)
5 (127)	0	3.95 (0.112)
4(102)	Stone Foundation 0	3.16 (0.090)
3 (76)	0	2.37 (0.067)
2 (51)	0	1.58 (0.046)
1 (25)	0	0.79 (0.022)

Note: Add 0.79 ft³ (0.022 m³) of storage for each additional inch. (25 mm) of stone foundation.

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
StormTech SC-310	14.7 (0.4)	31.0 (0.9)	35.7 (1.0)	40.4 (1.1)

Note: Assumes 6" (150 mm) of stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

AMOUNT OF STONE PER CHAMBER

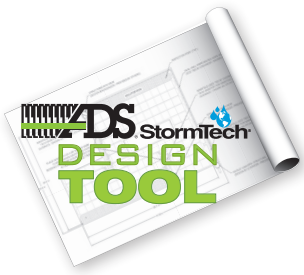
ENGLISH TONS (yds³)	Stone Foundation Depth		
	6"	12"	18"
StormTech SC-310	2.1 (1.5 yd³)	2.7 (1.9 yd³)	3.4 (2.4 yd³)
METRIC KILOGRAMS (m³)	**150 mm**	**300 mm**	**450 mm**
StormTech SC-310	1830 (1.1 m³)	2490 (1.5 m³)	2990 (1.8 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth		
	6" (150 mm)	12" (300 mm)	18" (450 mm)
StormTech SC-310	2.9 (2.2)	3.4 (2.6)	3.8 (2.9)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as the depth of the cover increases.



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For more information on the StormTech SC-310 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

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