STORMWATER MANAGEMENT REPORT

for

58 FIRST AVENUE

BLOCK 97; LOT 15

BOROUGH OF ATLANTIC HIGHLANDS
MONMOUTH COUNTY, NJ

Prepared for:

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58 First Avenue
Borough of Atlantic Highlands, NJ 07716

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Insite Job #: 23-2121-01

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I. INTRODUCTION

The proposed project, known as 58 First Avenue, will propose the construction of an accessory garage building, improved parking, and other impervious improvements to the site. The project is located within the Borough of Atlantic Highlands. The project consists of Lot 15 within Block 97 and is bounded by First Avenue to the West-North-West and Second Avenue to the East-South-East. Lot 15 is considered a through lot, by definition.

About half of the site slopes from Second Avenue toward the existing retail buildings on First Avenue into a catch basin. The catch basin is connected to a 4" HDPE pipe. The remaining portion of the site, which includes the existing retail buildings, drains to the existing catch basin through roof leaders. The site is located outside the 100-year flood limits based upon the latest available information, the Preliminary FEMA FIRM maps.

It is the purpose of this report to demonstrate the following:

1) Required flow reductions for the post-development condition will be obtained through the use of a drywell system with infiltration.
2) Existing drainage on site will be upgraded to handle post-development runoff volume.

Methods of determining stormwater runoff and peak discharge follow the procedures as outlined in "Urban Hydrology for Small Watersheds", Soil Conservation Service Technical Release No. 55, and New Jersey 24-hour rainfall data for Monmouth County for each storm event studied. Stormwater hydrographs were performed using HydoCAD Software Solutions' "HydroCAD" computer program.

The following 24-hour storm events were studied using a NOAA 24-hr D Storm distribution. The rainfall intensities are based upon NOAA Point Precipitation Frequency estimates:

Storm Frequency (Years)	Rainfall (Inches)
2	3.29
10	5.05
25	6.28
100	8.54

II. PRE-DEVELOPMENT CONDITIONS

A summary of the previously discussed coverage areas for the pre-development condition follows below. Refer to Appendix B for Pre-Development Hydrograph calculations and Appendix I for the Coverage Area Map.

Watershed (Total Area 9,750 square feet (0.2238 acres))

Subarea A1i: Impervious/Concrete Area Tributary to Catch Basin
Area: 4,264 square feet

Subarea A1p: Pervious Area Tributary to Catch Basin
Area: 1,901 square feet

Subarea A1r: Impervious/Roof Area Tributary to Catch Basin
Area: 3,585 square feet

III. POST DEVELOPMENT CONDITIONS

A summary of the previously discussed drainage areas for the post-development condition follows below. Refer to Appendix C for Post-Development Hydrograph calculations with Infiltration and refer to Appendix I for the Coverage Area Map.

Watershed (Total Area 9,750 square feet (0.2238 acres))

Subarea A2i: Impervious/Pavement Area Tributary to Pervious Pavement
Area: 3,455 square feet

Subarea A2p: Pervious Area Tributary to Pervious Pavement
Area: 995 square feet

Subarea B2i: Impervious/Concrete Area Tributary to Catch Basin
Area: 1,398 square feet

Subarea B2r: Impervious/Roof Area Tributary to Catch Basin
Area: 3,585 square feet

Subarea B2p: Pervious/Roof Area Tributary to Catch Basin
Area: 317 square feet

IV. STORMWATER MANAGEMENT SUMMARY:

Pre- and Post-development computations for the resultant hydrographs, routing computations, and runoff volumes are appended, respectively, to this report. For each drainage area, the following summaries were generated:

Watershed: Runoff Rate Summary
Pre-Development: Subarea A1i, A1r, A1p (0.2238 ac)
Post-Development: Subarea A2i, A2p, B2i, B2p, B2r (0.2238 ac)

Storm (Year)	Pre-Development Peak Flow (cfs)	Post-Development Peak Flow (cfs)	Difference (cfs)
2	0.62	0.32	-0.30
10	0.99	0.50	-0.49
25	1.24	0.63	-0.61
100	1.72	0.86	-0.86

Watershed: Runoff Volume Summary

Pre-Development: Subarea A1i, A1r, A1p (0.2238 ac)
Post-Development: Subarea A2i, A2p, B2i, B2p, B2r (0.2238 ac)

Storm (Year)	Pre-Development Runoff Volume (ac-ft)	Post-Development Runoff Volume (ac-ft)	Difference (ac-ft)
2	0.051	0.030	-0.021
10	0.083	0.048	-0.035
25	0.105	0.060	-0.045
100	0.147	0.083	-0.064

V. PIPE CAPACITY CALCUALTIONS

Existing 4" PVC Storm Pipe at 5.00%:

$$Q = \frac{1.486}{n} * A * R^{2/3} * S^{1/2}$$

where,

Q = Flow Rate, cfs

n = Mannings roughness coefficient (PVC = 0.010)

A = flow area = 0.0873 sf

R = hydraulic radius = A/WP = 0.1667 ft.

S = pipe slope = 0.0500 ft/ft.

$$Q_d = \frac{1.486}{0.010} \times 0.0873 * 0.1667^{2/3} * 0.05^{1/2} = 0.553\ cfs = 0.6\ cfs$$

Total Flow Rate & 4" Pipe Capacity Comparison

Storm (Year)	Watershed Peak Flow (cfs)	Pipe Capacity (Q) (cfs)	Difference (cfs)	Pipe Capacity Equal or Exceeds Demand
2	0.3	0.6	-0.3	Yes
10	0.5	0.6	-0.1	Yes
25	0.6	0.6	0.0	Yes

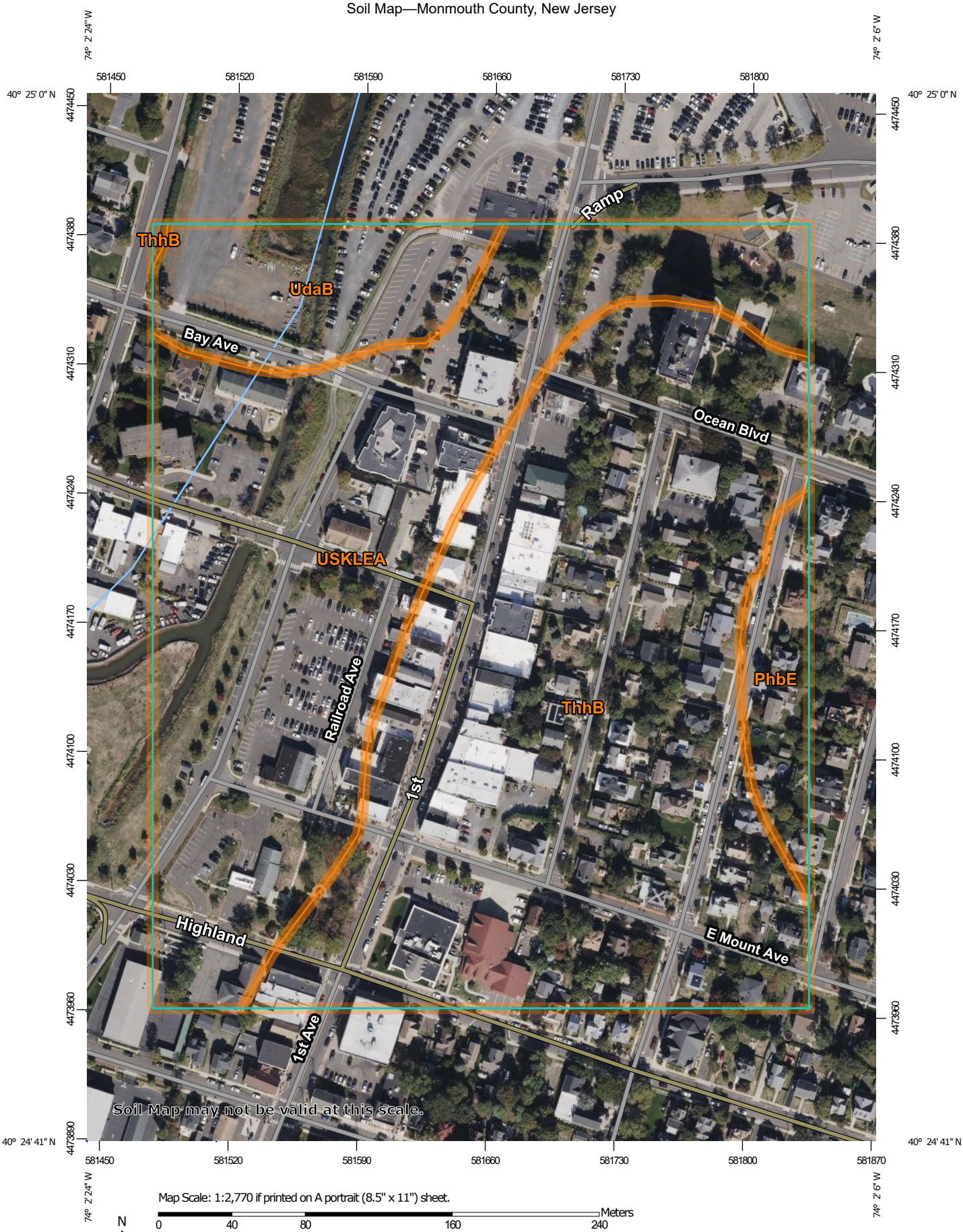
VI. CONCLUSION

In conclusion, the project overall does not disturb one acre of area and does not increase impervious coverage by more than 0.25 acres and therefore is not considered a “Major Development”. However, since we are proposing a slight increase in impervious coverage, we have added a pervious pavement with will reduce runoff rate and volume to below Predevelopment values. The capacity of the 4” drainage line will allow the 2-year, 10-year, and 25-year storm to pass and continue onto the underground conveyance system within First Avenue.

A P P E N D I X A

Soils Map

Soil Map—Monmouth County, New Jersey



Map Scale: 1:2,770 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

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: Monmouth County, New Jersey
Survey Area Data: Version 16, Aug 30, 2022

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

Date(s) aerial images were photographed: Oct 9, 2022—Oct 16, 2022

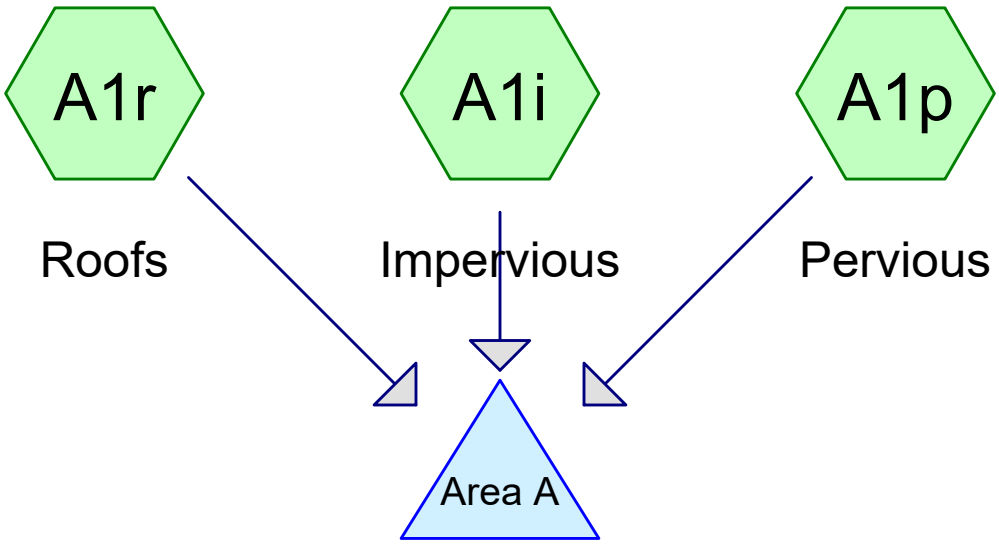
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PhbE	Phalanx loamy sand, 10 to 25 percent slopes	1.5	3.9%
ThhB	Tinton-Urban land complex, 0 to 5 percent slopes	18.9	50.2%
UdaB	Udorthents, 0 to 8 percent slopes	3.0	8.1%
USKLEA	Urban land-Klej complex, 0 to 2 percent slopes	14.2	37.8%
Totals for Area of Interest		**37.7**	**100.0%**

A P P E N D I X B

Pre-Development Flow Calculations



Total Flow A

Subcat Reach Pond Link

Routing Diagram for Pre-Development
Prepared by InSite Engineering, LLC, Printed 8/23/2024

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1i: Impervious Runoff Area=4,264 sf 100.00% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=98 Runoff=0.30 cfs 0.025 af

Subcatchment A1p: Pervious Runoff Area=1,901 sf 0.00% Impervious Runoff Depth=1.47"
Tc=6.0 min CN=80 Runoff=0.07 cfs 0.005 af

Subcatchment A1r: Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.021 af

Pond Area A: Total Flow A Inflow=0.62 cfs 0.051 af
Primary=0.62 cfs 0.051 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.051 af Average Runoff Depth = 2.75"
19.50% Pervious = 0.044 ac 80.50% Impervious = 0.180 ac

Summary for Subcatchment A1i: Impervious

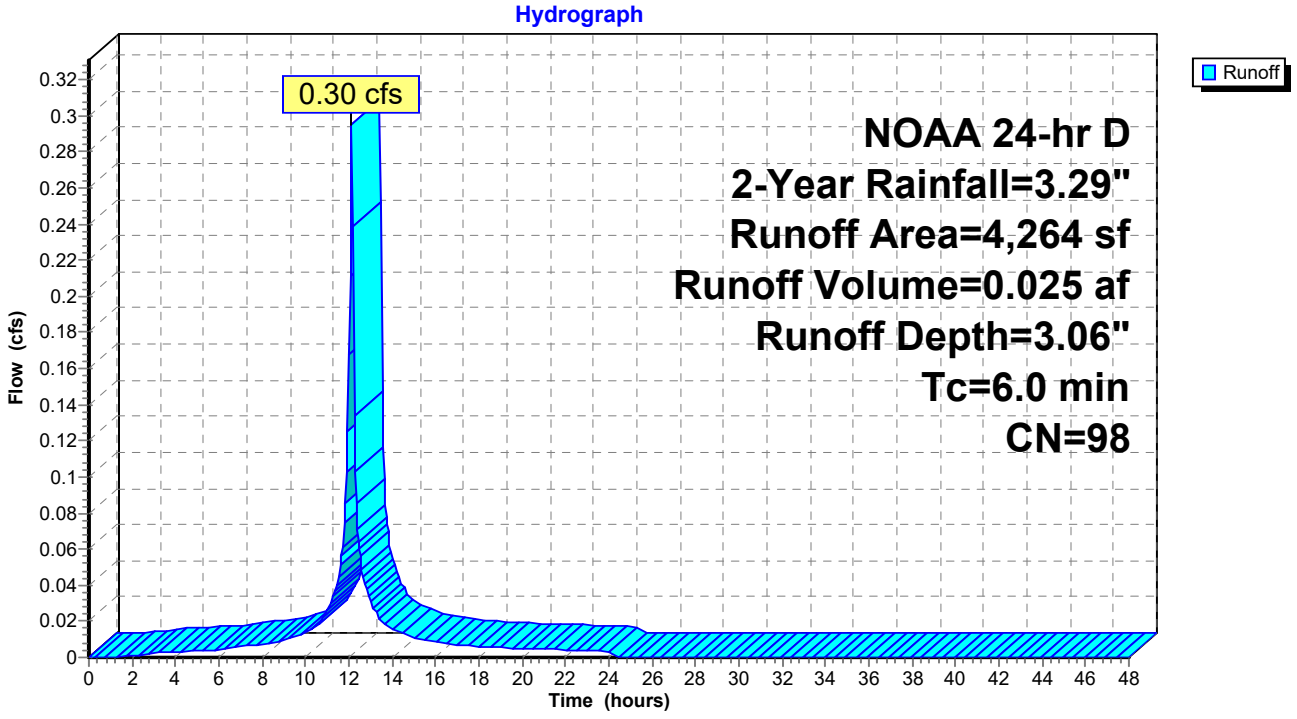
Runoff = 0.30 cfs @ 12.13 hrs, Volume= 0.025 af, Depth= 3.06"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
2,879	98	Paved parking, HSG D
964	98	Unconnected pavement, HSG D
421	98	Unconnected pavement, HSG D
4,264	98	Weighted Average
4,264		100.00% Impervious Area
1,385		32.48% Unconnected

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

Subcatchment A1i: Impervious



Summary for Subcatchment A1p: Pervious

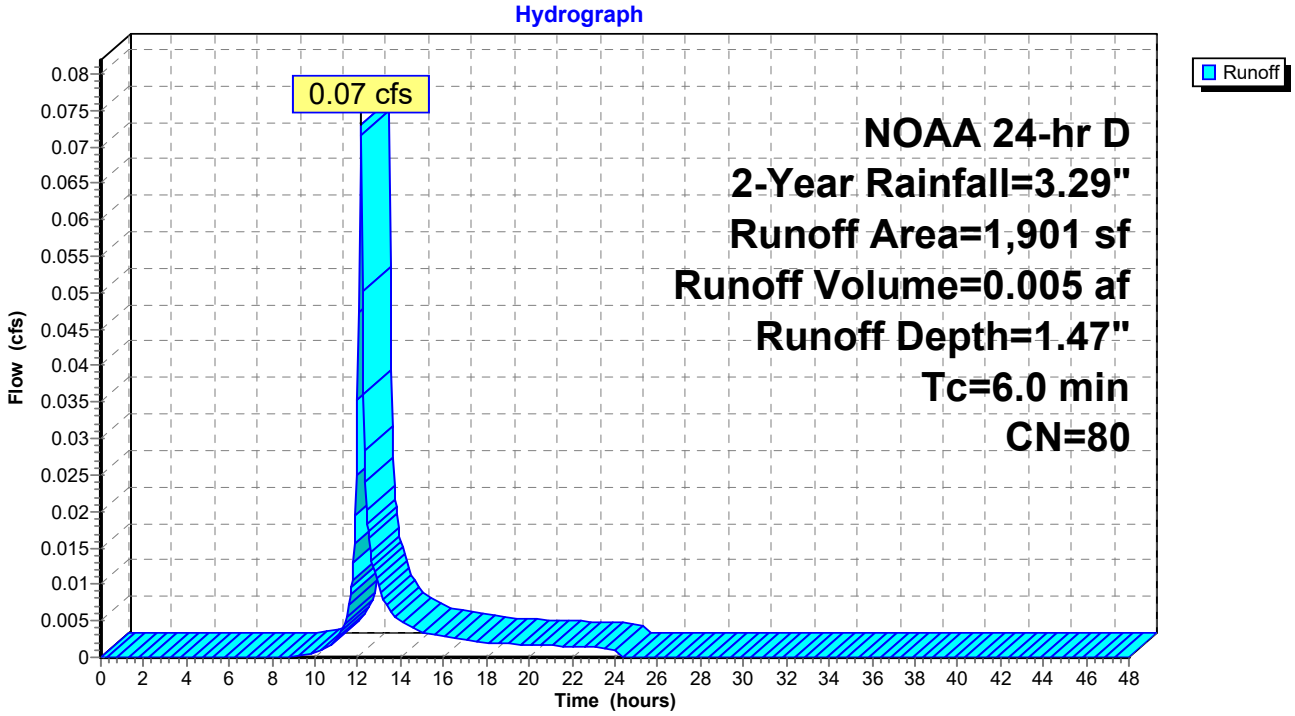
Runoff = 0.07 cfs @ 12.13 hrs, Volume= 0.005 af, Depth= 1.47"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
1,901	80	>75% Grass cover, Good, HSG D
1,901		100.00% Pervious Area

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

Subcatchment A1p: Pervious



Summary for Subcatchment A1r: Roofs

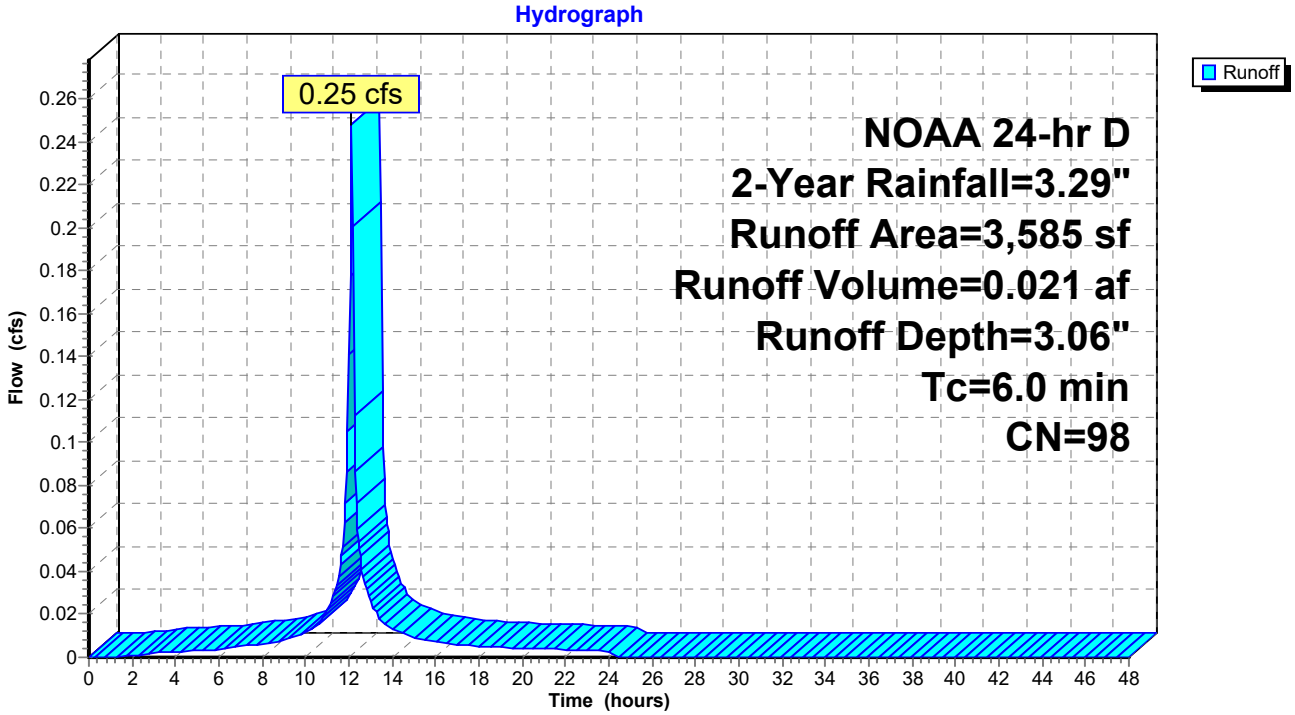
Runoff = 0.25 cfs @ 12.13 hrs, Volume= 0.021 af, Depth= 3.06"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment A1r: Roofs

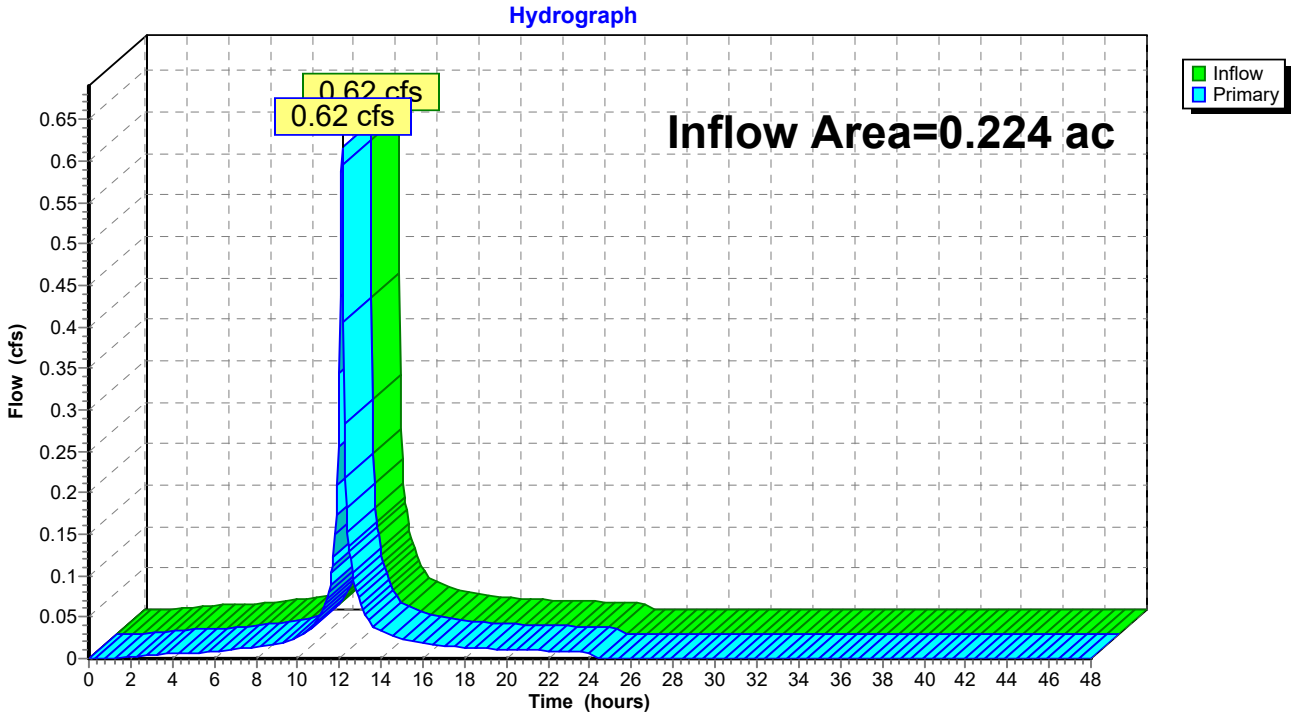


Summary for Pond Area A: Total Flow A

Inflow Area = 0.224 ac, 80.50% Impervious, Inflow Depth = 2.75" for 2-Year event
Inflow = 0.62 cfs @ 12.13 hrs, Volume= 0.051 af
Primary = 0.62 cfs @ 12.13 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area A: Total Flow A



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1i: Impervious Runoff Area=4,264 sf 100.00% Impervious Runoff Depth=4.81"
Tc=6.0 min CN=98 Runoff=0.46 cfs 0.039 af

Subcatchment A1p: Pervious Runoff Area=1,901 sf 0.00% Impervious Runoff Depth=2.94"
Tc=6.0 min CN=80 Runoff=0.15 cfs 0.011 af

Subcatchment A1r: Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=4.81"
Tc=6.0 min CN=98 Runoff=0.38 cfs 0.033 af

Pond Area A: Total Flow A Inflow=0.99 cfs 0.083 af
Primary=0.99 cfs 0.083 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.083 af Average Runoff Depth = 4.45"
19.50% Pervious = 0.044 ac 80.50% Impervious = 0.180 ac

Summary for Subcatchment A1i: Impervious

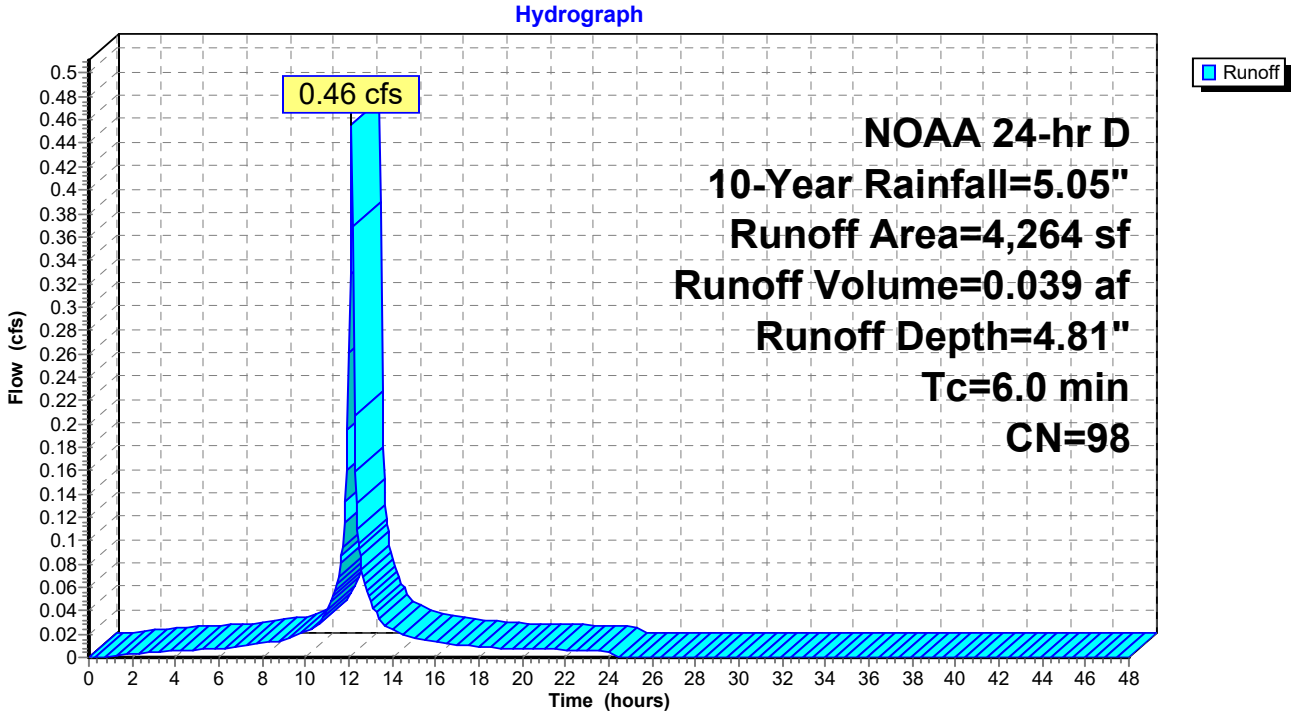
Runoff = 0.46 cfs @ 12.13 hrs, Volume= 0.039 af, Depth= 4.81"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
2,879	98	Paved parking, HSG D
964	98	Unconnected pavement, HSG D
421	98	Unconnected pavement, HSG D
4,264	98	Weighted Average
4,264		100.00% Impervious Area
1,385		32.48% Unconnected

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

Subcatchment A1i: Impervious



Summary for Subcatchment A1p: Pervious

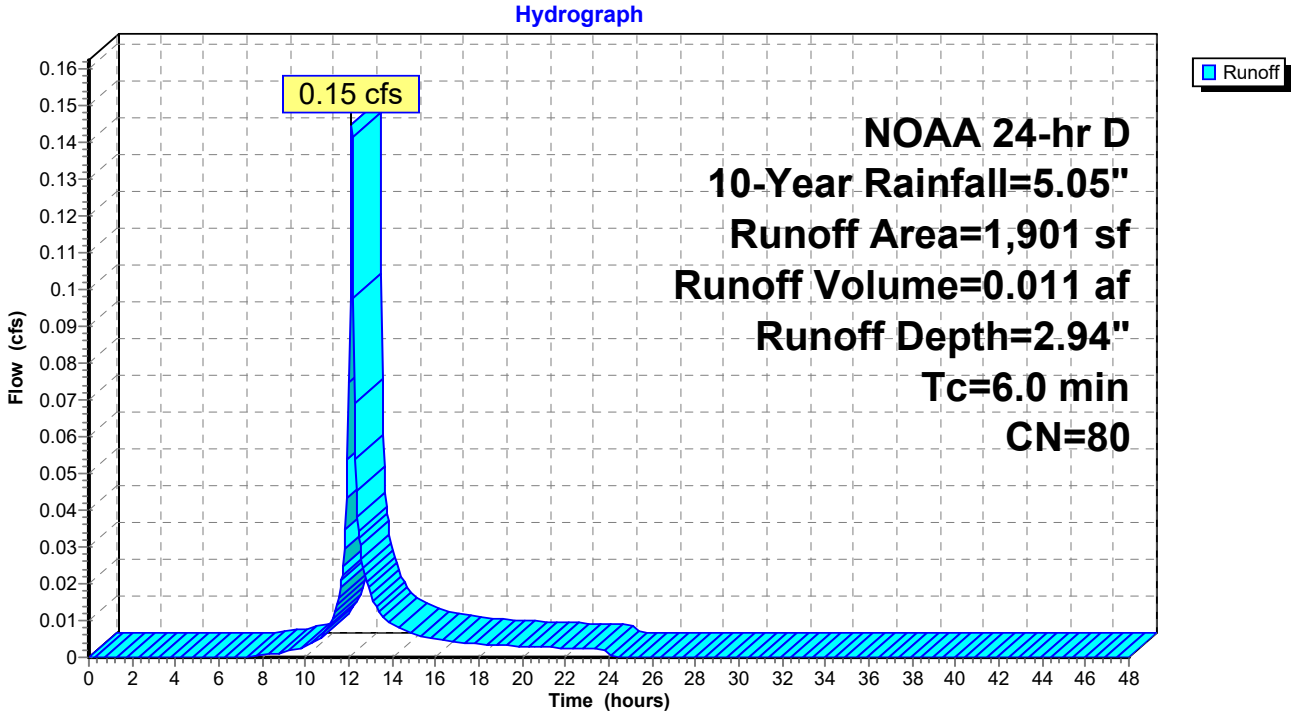
Runoff = 0.15 cfs @ 12.13 hrs, Volume= 0.011 af, Depth= 2.94"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
1,901	80	>75% Grass cover, Good, HSG D
1,901		100.00% Pervious Area

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

Subcatchment A1p: Pervious



Summary for Subcatchment A1r: Roofs

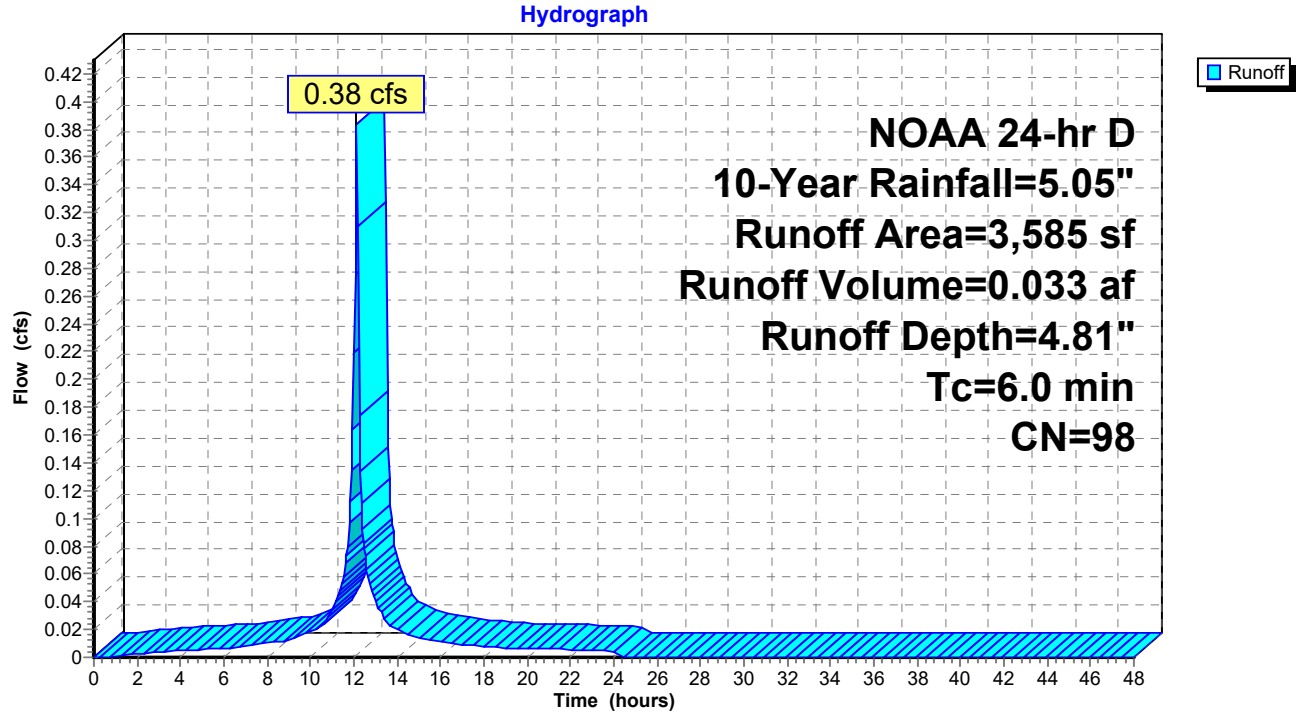
Runoff = 0.38 cfs @ 12.13 hrs, Volume= 0.033 af, Depth= 4.81"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment A1r: Roofs

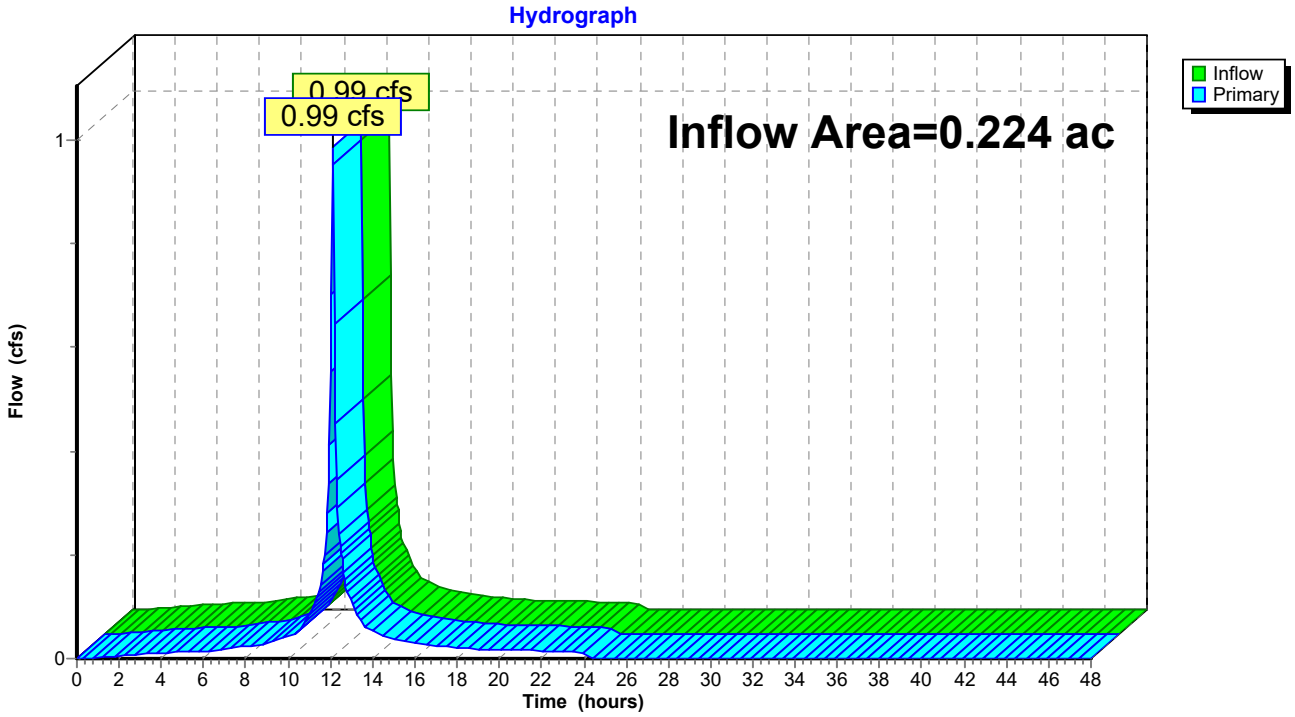


Summary for Pond Area A: Total Flow A

Inflow Area = 0.224 ac, 80.50% Impervious, Inflow Depth = 4.45" for 10-Year event
Inflow = 0.99 cfs @ 12.13 hrs, Volume= 0.083 af
Primary = 0.99 cfs @ 12.13 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area A: Total Flow A



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1i: Impervious Runoff Area=4,264 sf 100.00% Impervious Runoff Depth=6.04"
Tc=6.0 min CN=98 Runoff=0.57 cfs 0.049 af

Subcatchment A1p: Pervious Runoff Area=1,901 sf 0.00% Impervious Runoff Depth=4.03"
Tc=6.0 min CN=80 Runoff=0.20 cfs 0.015 af

Subcatchment A1r: Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=6.04"
Tc=6.0 min CN=98 Runoff=0.48 cfs 0.041 af

Pond Area A: Total Flow A Inflow=1.24 cfs 0.105 af
Primary=1.24 cfs 0.105 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.105 af Average Runoff Depth = 5.65"
19.50% Pervious = 0.044 ac 80.50% Impervious = 0.180 ac

Summary for Subcatchment A1i: Impervious

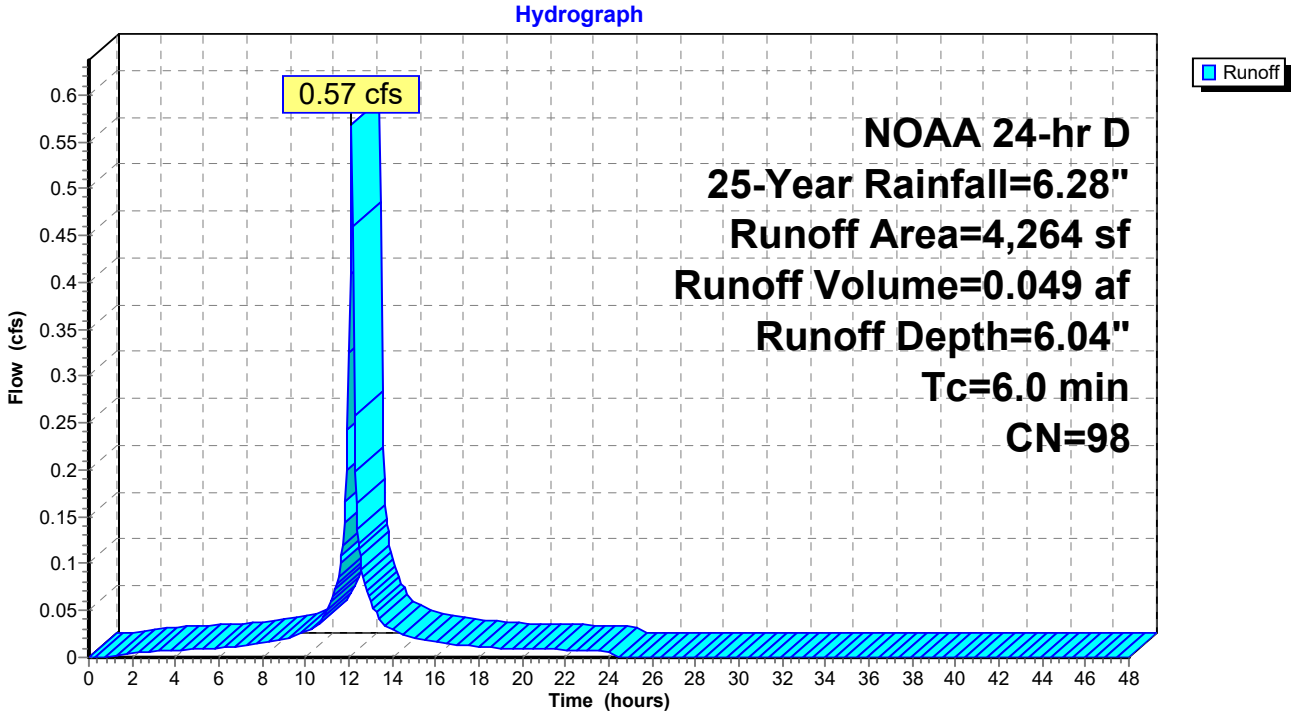
Runoff = 0.57 cfs @ 12.13 hrs, Volume= 0.049 af, Depth= 6.04"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
2,879	98	Paved parking, HSG D
964	98	Unconnected pavement, HSG D
421	98	Unconnected pavement, HSG D
4,264	98	Weighted Average
4,264		100.00% Impervious Area
1,385		32.48% Unconnected

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

Subcatchment A1i: Impervious



Summary for Subcatchment A1p: Pervious

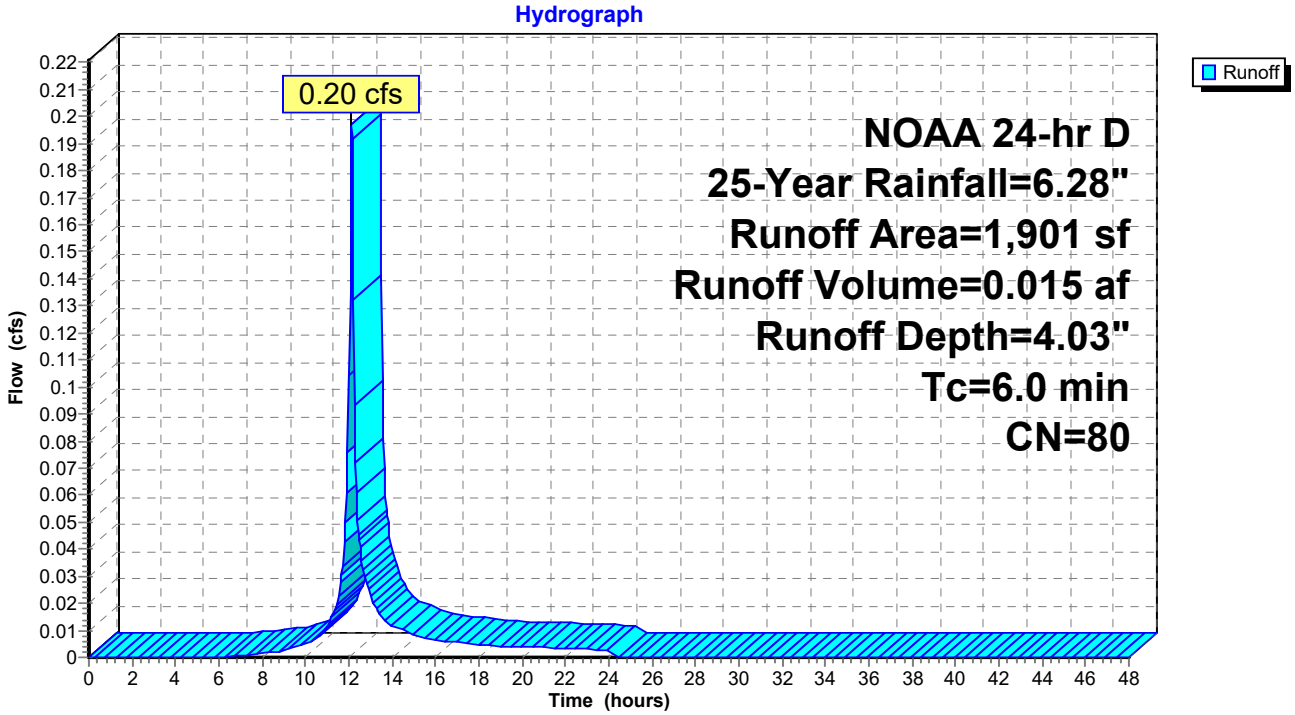
Runoff = 0.20 cfs @ 12.13 hrs, Volume= 0.015 af, Depth= 4.03"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
1,901	80	>75% Grass cover, Good, HSG D
1,901		100.00% Pervious Area

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

Subcatchment A1p: Pervious



Summary for Subcatchment A1r: Roofs

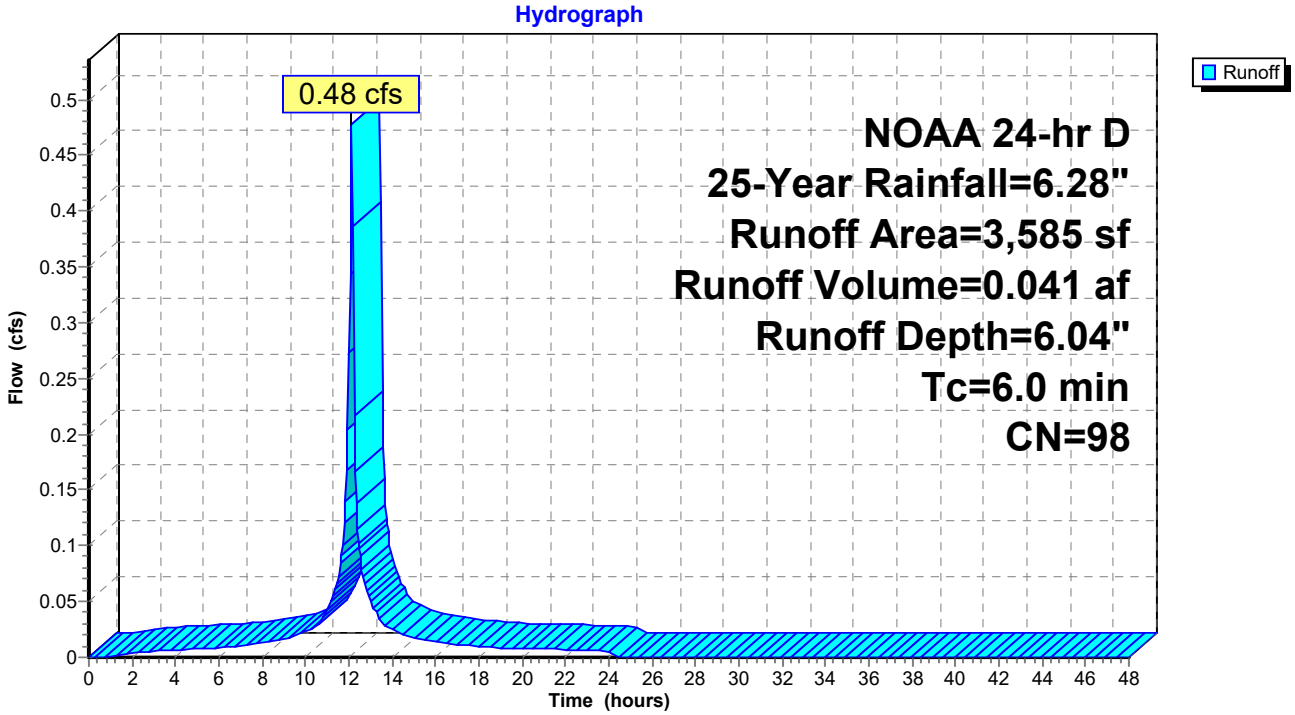
Runoff = 0.48 cfs @ 12.13 hrs, Volume= 0.041 af, Depth= 6.04"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment A1r: Roofs

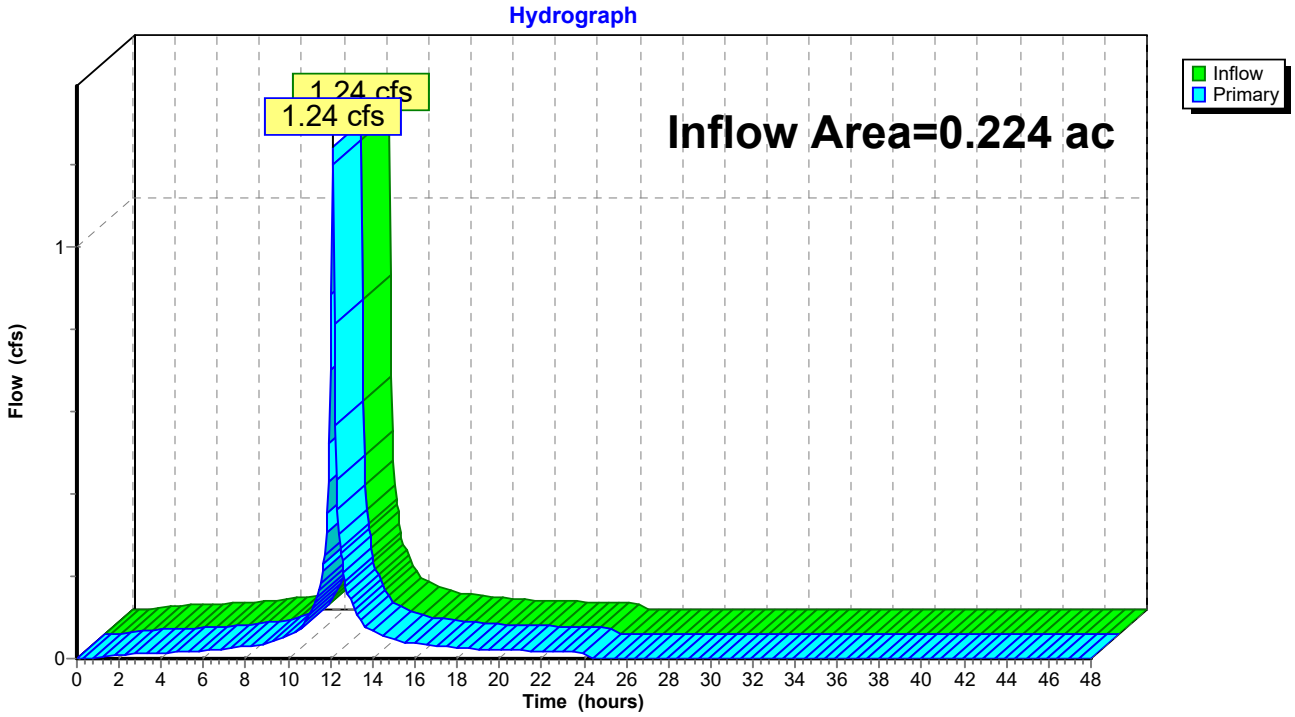


Summary for Pond Area A: Total Flow A

Inflow Area = 0.224 ac, 80.50% Impervious, Inflow Depth = 5.65" for 25-Year event
Inflow = 1.24 cfs @ 12.13 hrs, Volume= 0.105 af
Primary = 1.24 cfs @ 12.13 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area A: Total Flow A



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1i: Impervious Runoff Area=4,264 sf 100.00% Impervious Runoff Depth=8.30"
Tc=6.0 min CN=98 Runoff=0.77 cfs 0.068 af

Subcatchment A1p: Pervious Runoff Area=1,901 sf 0.00% Impervious Runoff Depth=6.13"
Tc=6.0 min CN=80 Runoff=0.29 cfs 0.022 af

Subcatchment A1r: Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=8.30"
Tc=6.0 min CN=98 Runoff=0.65 cfs 0.057 af

Pond Area A: Total Flow A Inflow=1.72 cfs 0.147 af
Primary=1.72 cfs 0.147 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.147 af Average Runoff Depth = 7.88"
19.50% Pervious = 0.044 ac 80.50% Impervious = 0.180 ac

Summary for Subcatchment A1i: Impervious

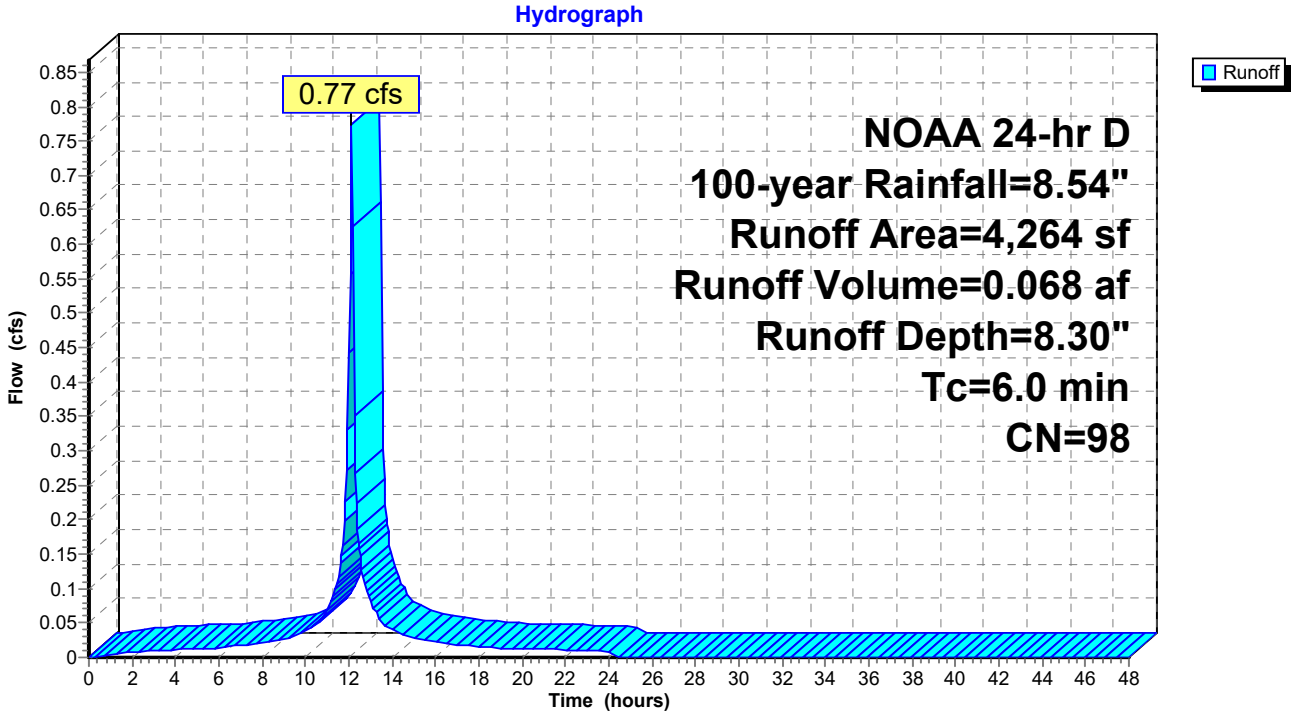
Runoff = 0.77 cfs @ 12.13 hrs, Volume= 0.068 af, Depth= 8.30"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=8.54"

Area (sf)	CN	Description
2,879	98	Paved parking, HSG D
964	98	Unconnected pavement, HSG D
421	98	Unconnected pavement, HSG D
4,264	98	Weighted Average
4,264		100.00% Impervious Area
1,385		32.48% Unconnected

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

Subcatchment A1i: Impervious



Summary for Subcatchment A1p: Pervious

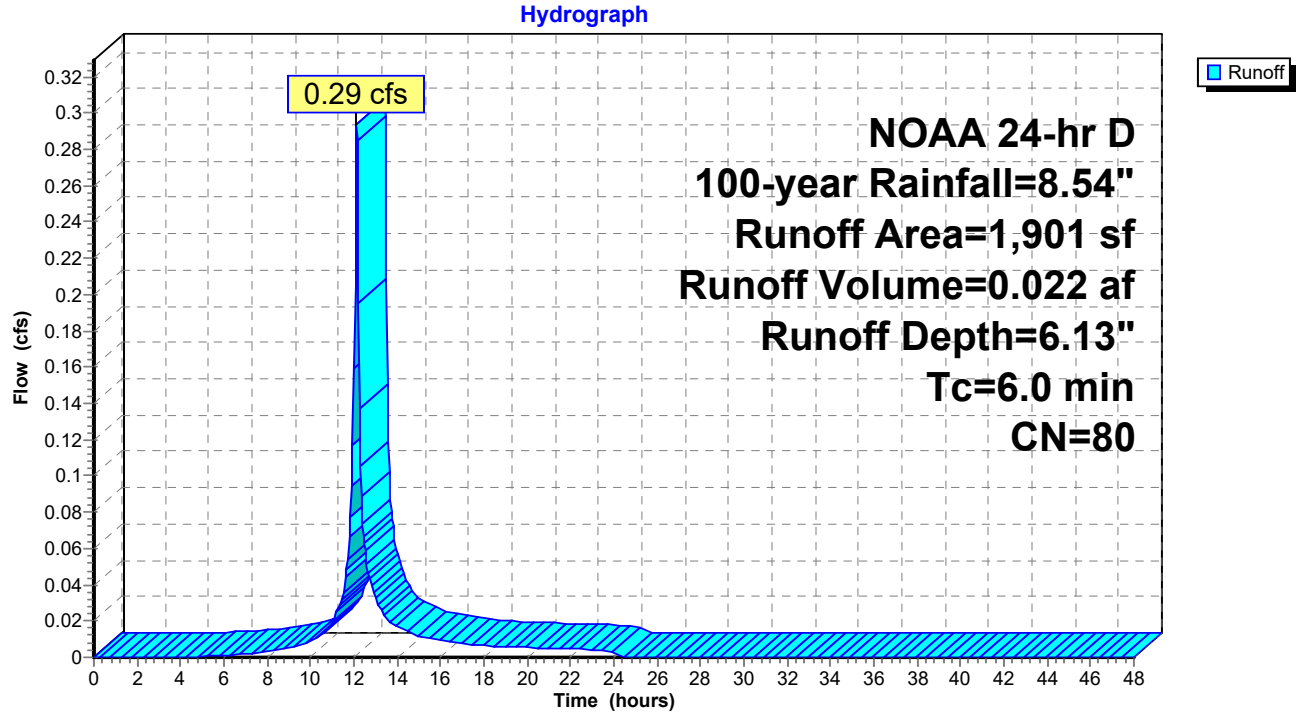
Runoff = 0.29 cfs @ 12.13 hrs, Volume= 0.022 af, Depth= 6.13"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=8.54"

Area (sf)	CN	Description
1,901	80	>75% Grass cover, Good, HSG D
1,901		100.00% Pervious Area

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

Subcatchment A1p: Pervious



Summary for Subcatchment A1r: Roofs

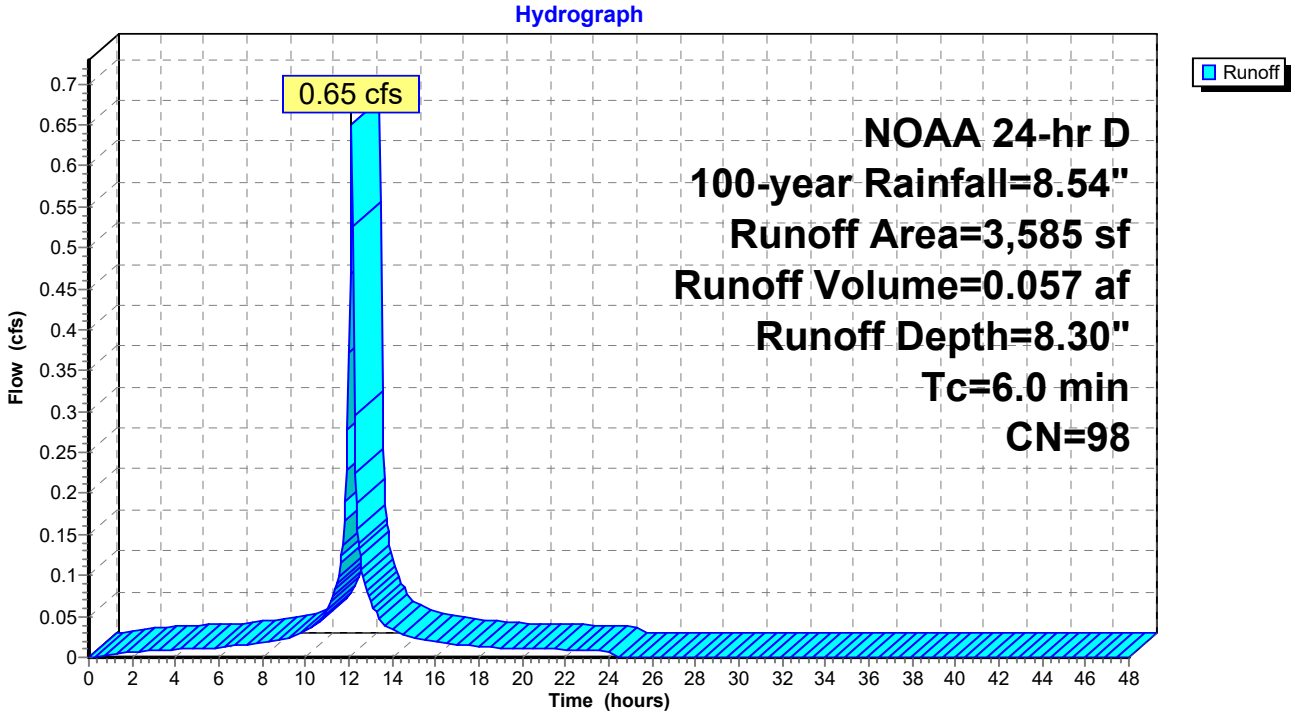
Runoff = 0.65 cfs @ 12.13 hrs, Volume= 0.057 af, Depth= 8.30"
Routed to Pond Area A : Total Flow A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=8.54"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment A1r: Roofs

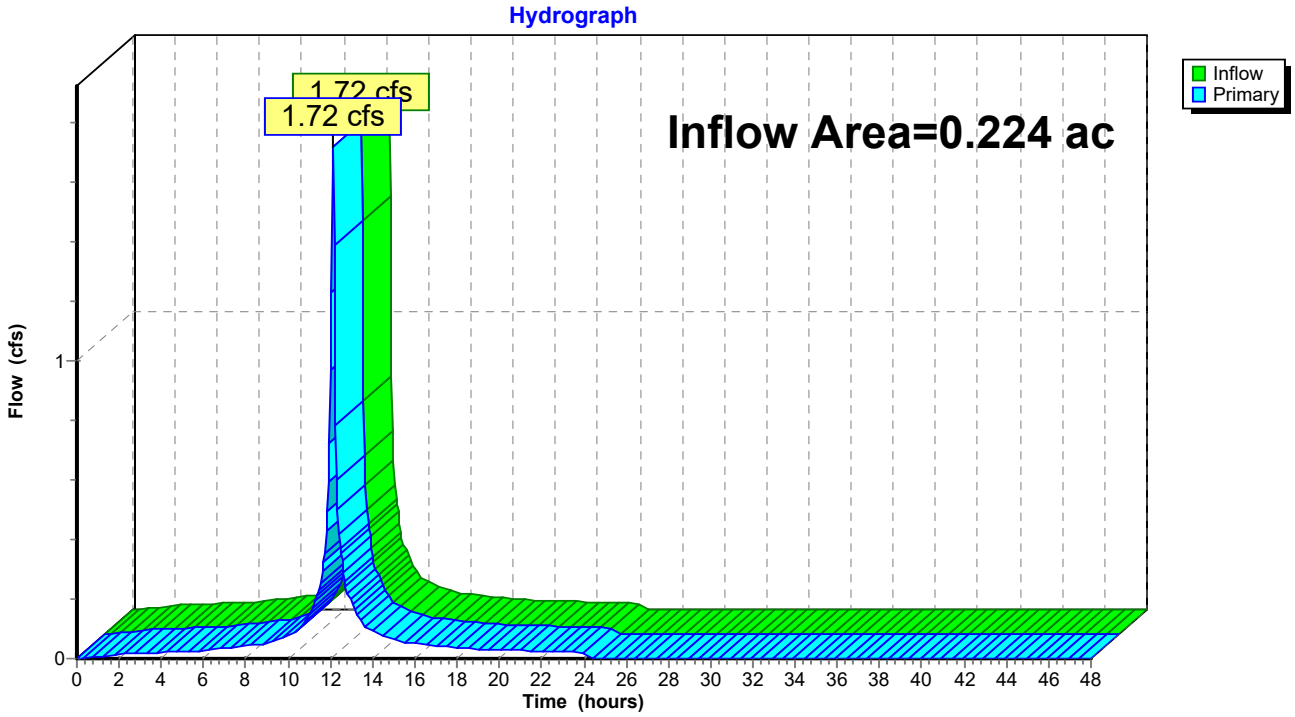


Summary for Pond Area A: Total Flow A

Inflow Area = 0.224 ac, 80.50% Impervious, Inflow Depth = 7.88" for 100-year event
Inflow = 1.72 cfs @ 12.13 hrs, Volume= 0.147 af
Primary = 1.72 cfs @ 12.13 hrs, Volume= 0.147 af, Atten= 0%, Lag= 0.0 min

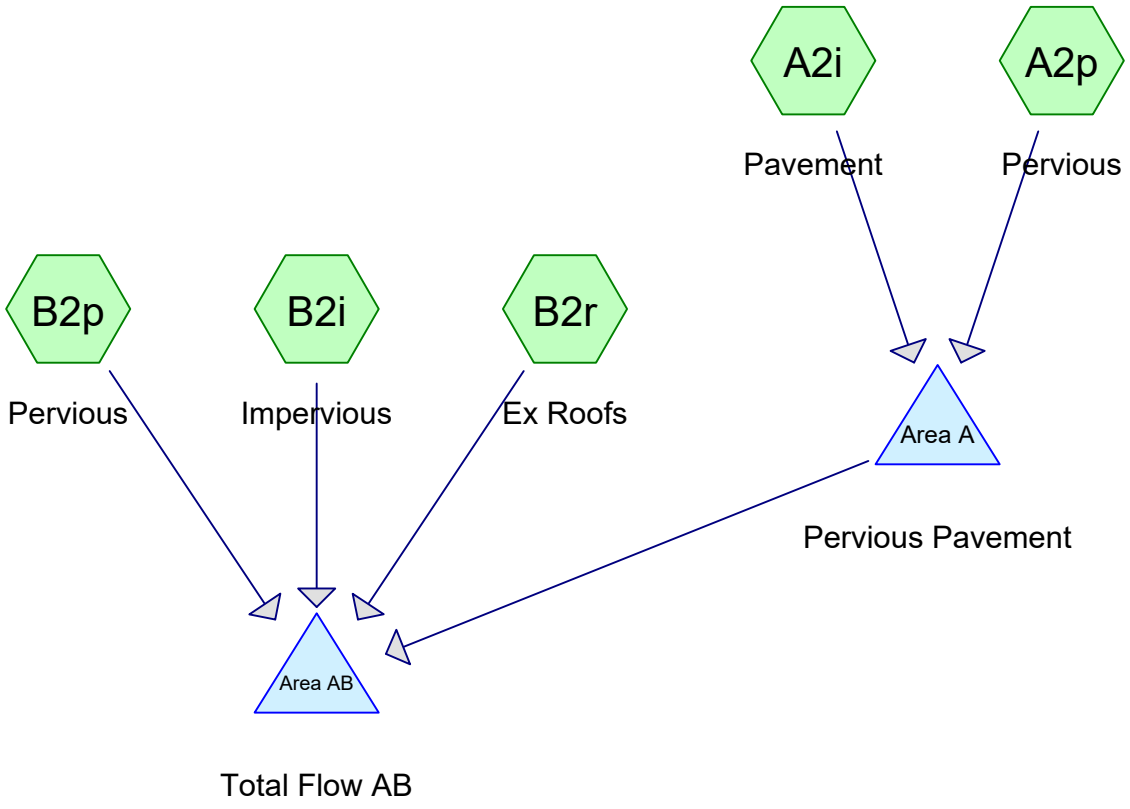
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area A: Total Flow A



A P P E N D I X C

Post-Development Flow Calculations



Subcat Reach Pond Link

Routing Diagram for Post-Development
Prepared by InSite Engineering, LLC, Printed 8/22/2024

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A2i: Pavement Runoff Area=3,455 sf 100.00% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=98 Runoff=0.24 cfs 0.020 af

Subcatchment A2p: Pervious Runoff Area=995 sf 0.00% Impervious Runoff Depth=1.47"
Tc=6.0 min CN=80 Runoff=0.04 cfs 0.003 af

Subcatchment B2i: Impervious Runoff Area=1,398 sf 100.00% Impervious Runoff Depth=3.06"
Tc=0.0 min CN=98 Runoff=0.11 cfs 0.008 af

Subcatchment B2p: Pervious Runoff Area=317 sf 0.00% Impervious Runoff Depth=1.47"
Tc=0.0 min CN=80 Runoff=0.01 cfs 0.001 af

Subcatchment B2r: Ex Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.021 af

Pond Area A: Pervious Pavement Peak Elev=17.74' Storage=218 cf Inflow=0.28 cfs 0.023 af
Discarded=0.05 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.023 af

Pond Area AB: Total Flow AB Inflow=0.32 cfs 0.030 af
Primary=0.32 cfs 0.030 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.053 af Average Runoff Depth = 2.84"
13.46% Pervious = 0.030 ac 86.54% Impervious = 0.194 ac

Summary for Subcatchment A2i: Pavement

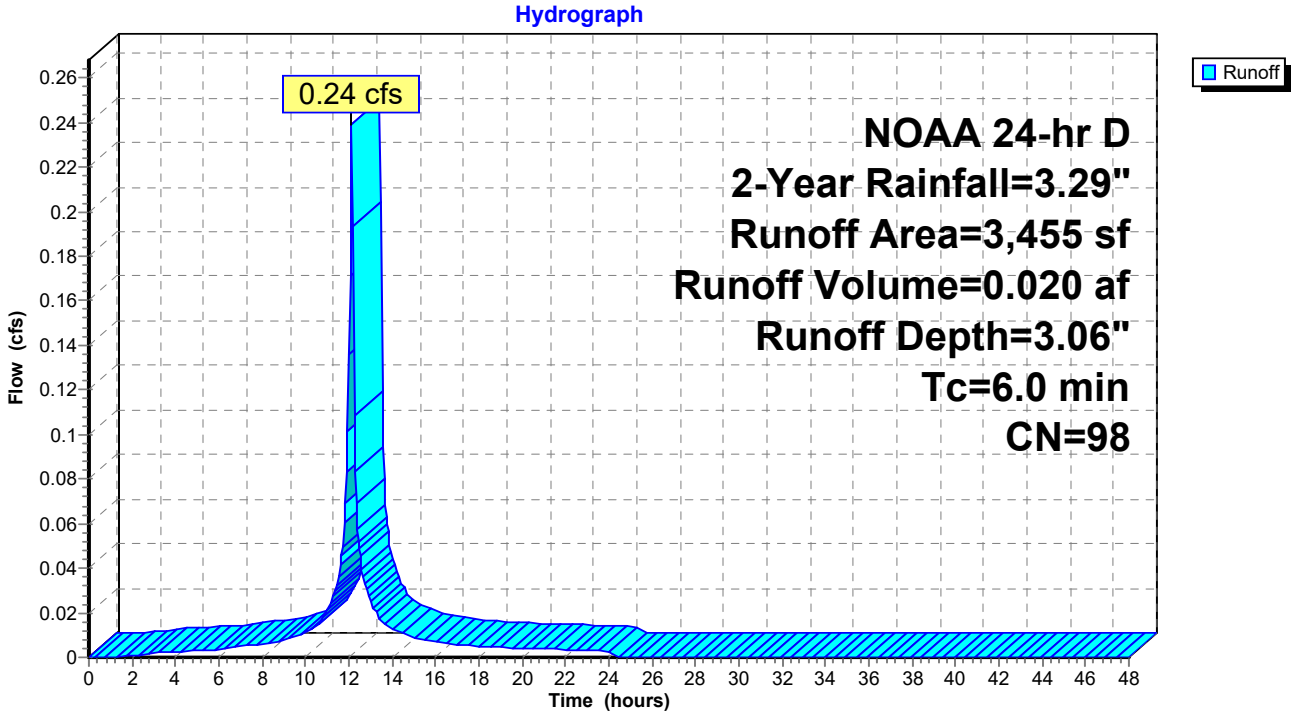
Runoff = 0.24 cfs @ 12.13 hrs, Volume= 0.020 af, Depth= 3.06"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
3,455	98	Paved parking, HSG D
3,455		100.00% Impervious Area

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

Subcatchment A2i: Pavement



Summary for Subcatchment A2p: Pervious

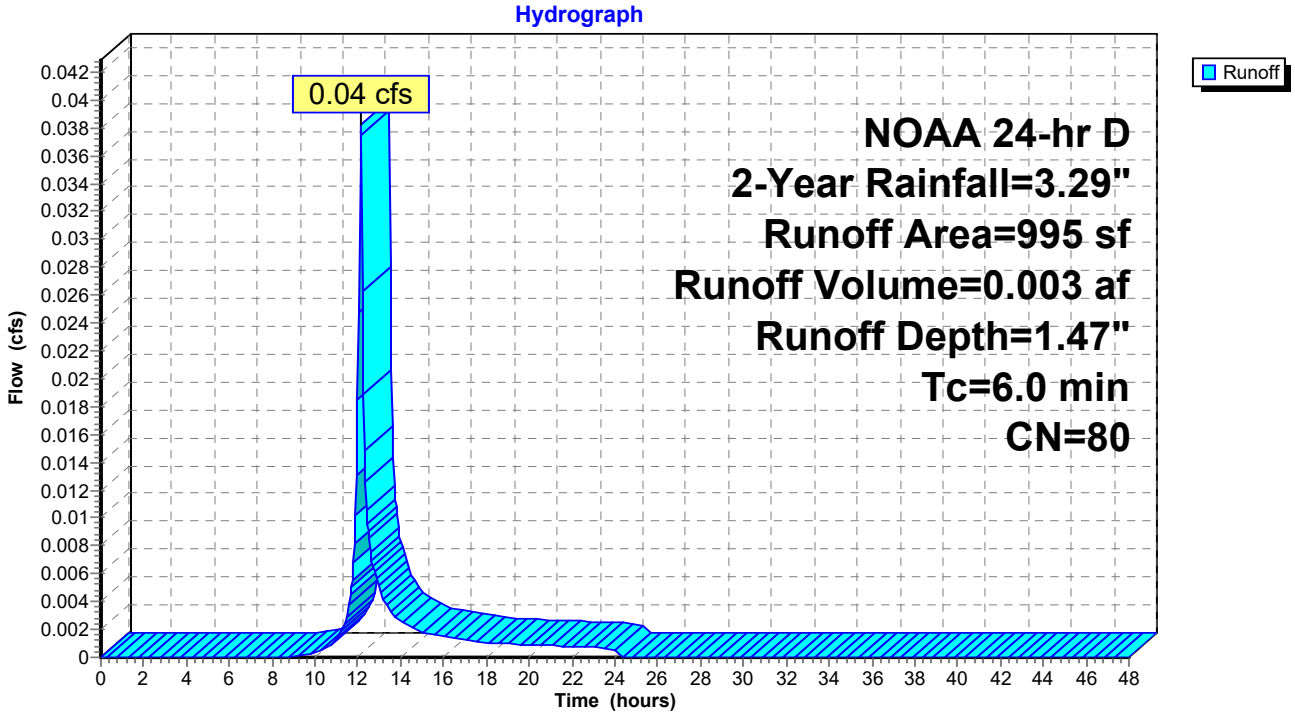
Runoff = 0.04 cfs @ 12.13 hrs, Volume= 0.003 af, Depth= 1.47"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
995	80	>75% Grass cover, Good, HSG D
995		100.00% Pervious Area

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

Subcatchment A2p: Pervious



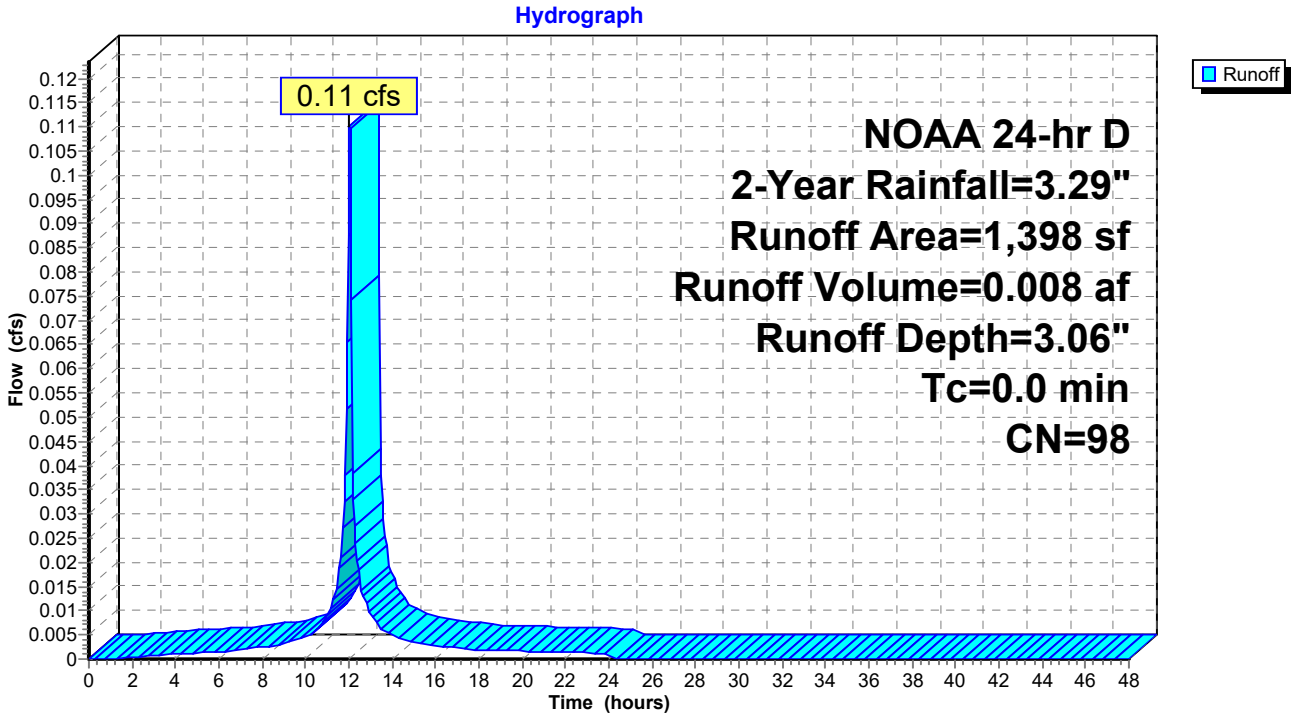
Summary for Subcatchment B2i: Impervious

Runoff = 0.11 cfs @ 12.04 hrs, Volume= 0.008 af, Depth= 3.06"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
670	98	Unconnected pavement, HSG D
198	98	Unconnected pavement, HSG D
530	98	Unconnected pavement, HSG D
1,398	98	Weighted Average
1,398		100.00% Impervious Area
1,398		100.00% Unconnected

Subcatchment B2i: Impervious



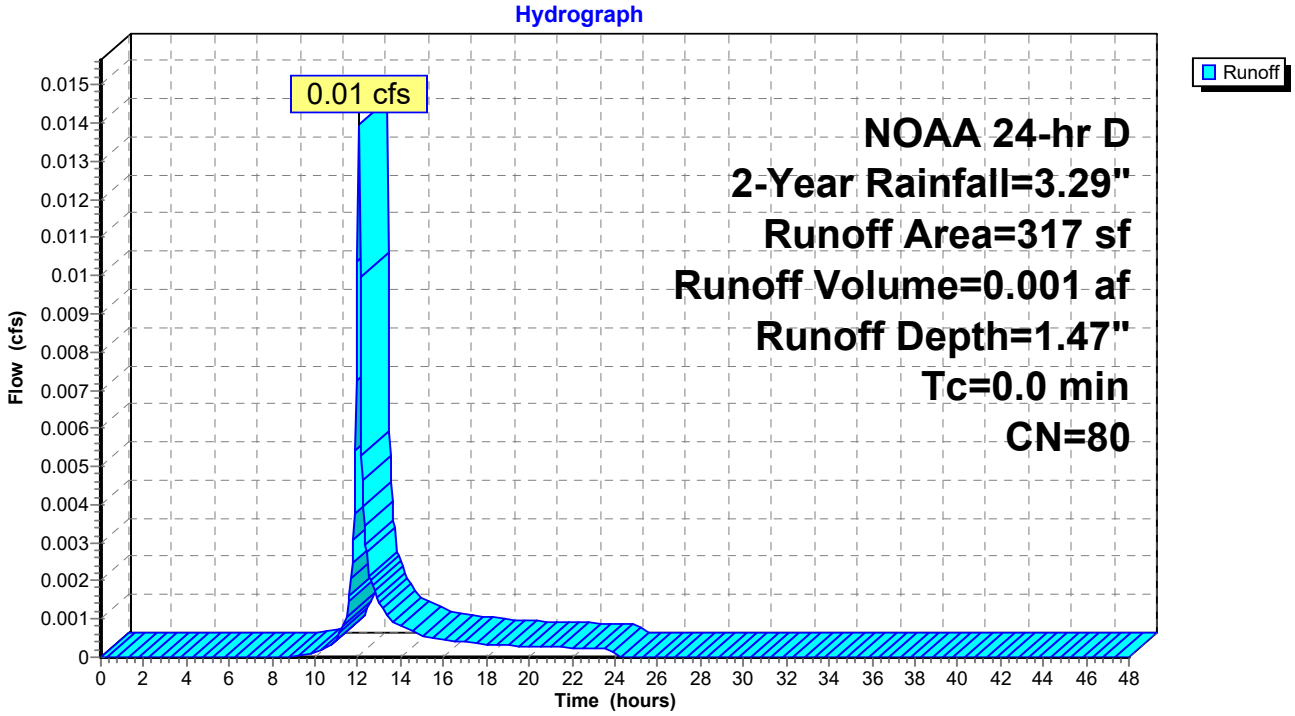
Summary for Subcatchment B2p: Pervious

Runoff = 0.01 cfs @ 12.05 hrs, Volume= 0.001 af, Depth= 1.47"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
317	80	>75% Grass cover, Good, HSG D
317		100.00% Pervious Area

Subcatchment B2p: Pervious



Summary for Subcatchment B2r: Ex Roofs

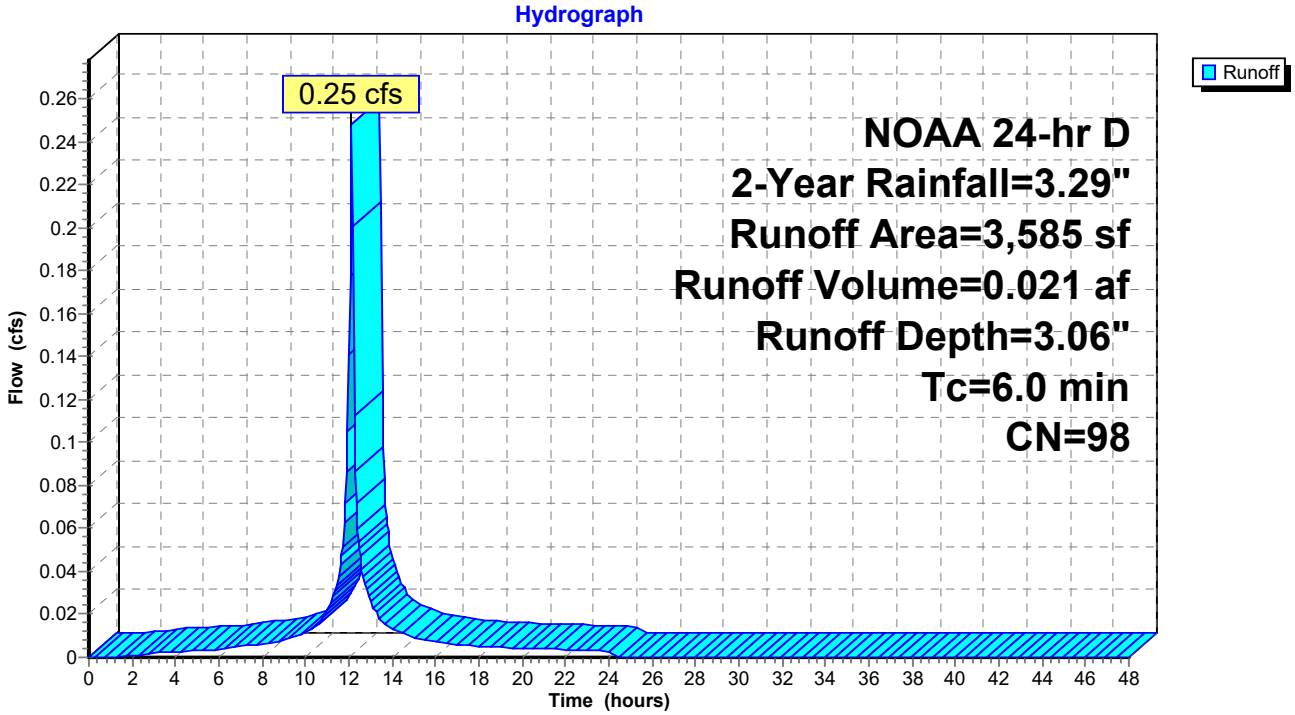
Runoff = 0.25 cfs @ 12.13 hrs, Volume= 0.021 af, Depth= 3.06"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.29"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment B2r: Ex Roofs



Summary for Pond Area A: Pervious Pavement

Inflow Area = 0.102 ac, 77.64% Impervious, Inflow Depth = 2.70" for 2-Year event
Inflow = 0.28 cfs @ 12.13 hrs, Volume= 0.023 af
Outflow = 0.05 cfs @ 11.80 hrs, Volume= 0.023 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.80 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond Area AB : Total Flow AB

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 17.74' @ 12.55 hrs Surf.Area= 2,310 sf Storage= 218 cf

Plug-Flow detention time= 24.1 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 24.1 min (793.3 - 769.2)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	1,848 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

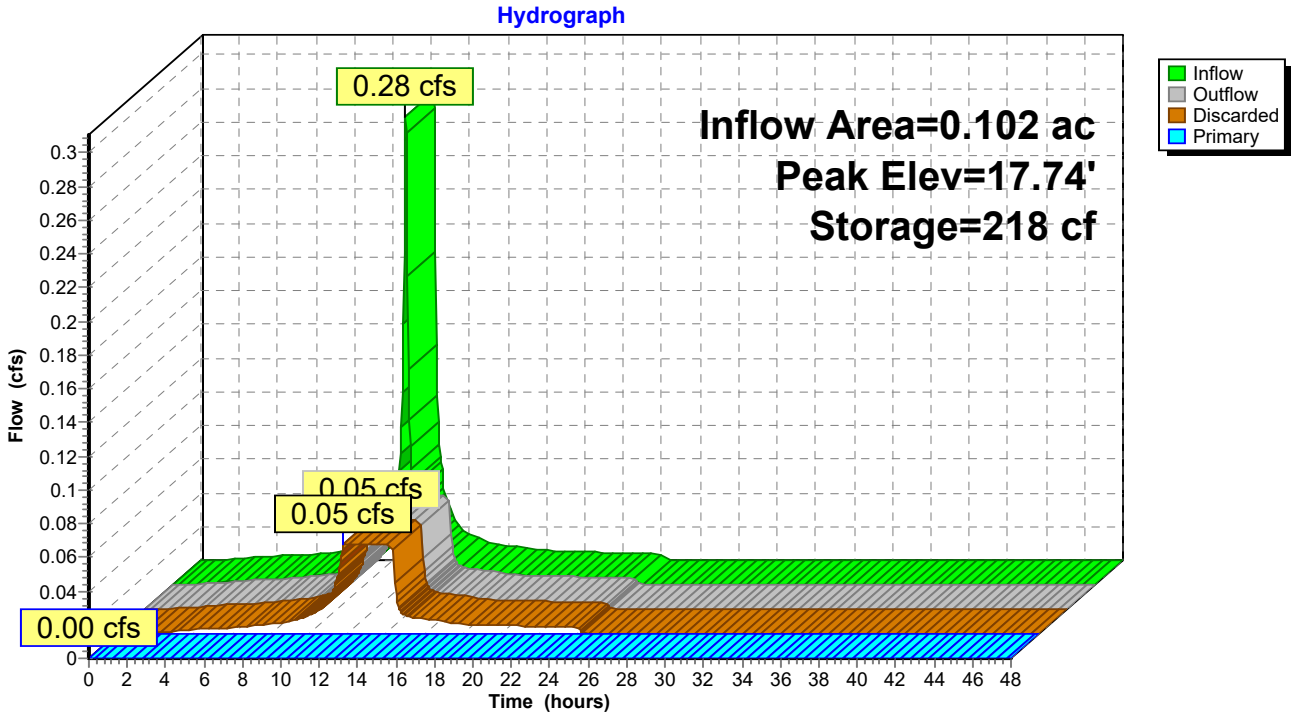
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.50	2,310	0.0	0	0
18.00	2,310	40.0	462	462
19.00	2,310	40.0	924	1,386
19.50	2,310	40.0	462	1,848

Device	Routing	Invert	Outlet Devices
#1	Primary	18.75'	**4.0" Round Culvert** L= 13.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 18.75' / 18.36' S= 0.0300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf
#2	Discarded	17.50'	**1.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.80 hrs HW=17.52' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.50' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Pond Area A: Pervious Pavement

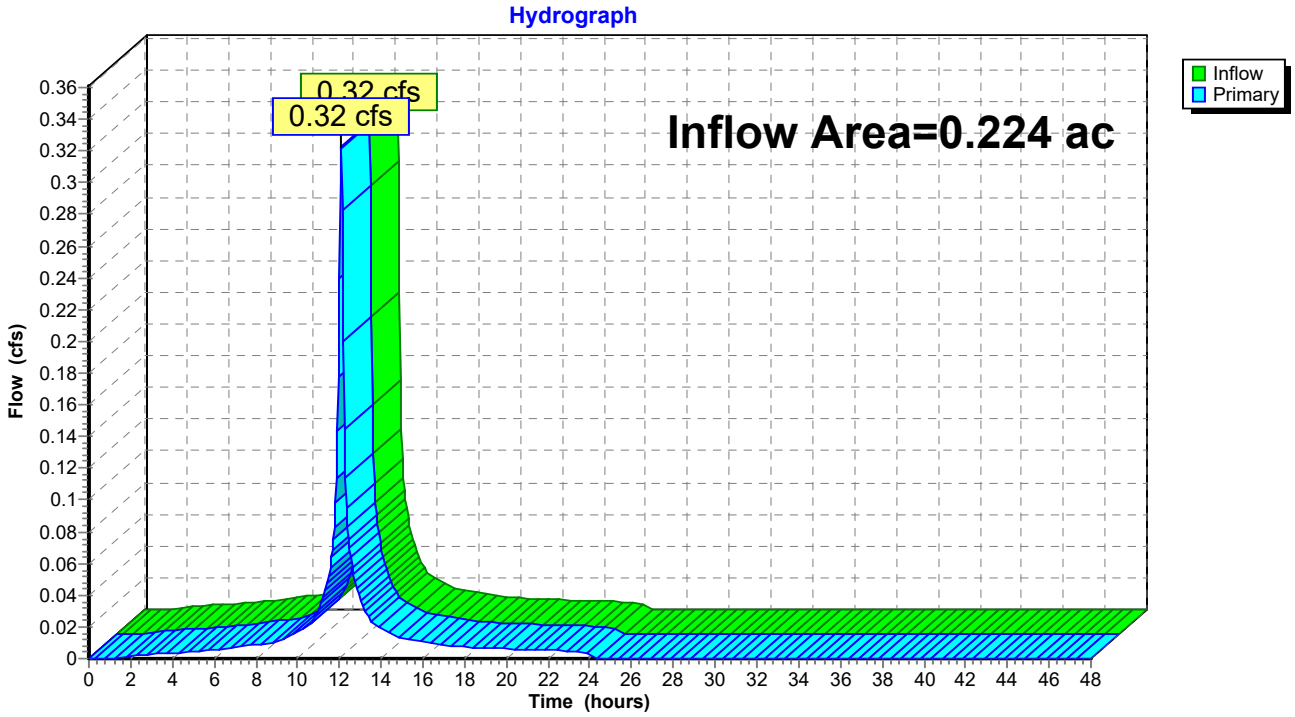


Summary for Pond Area AB: Total Flow AB

Inflow Area = 0.224 ac, 86.54% Impervious, Inflow Depth = 1.61" for 2-Year event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 0.030 af
Primary = 0.32 cfs @ 12.09 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area AB: Total Flow AB



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A2i: Pavement Runoff Area=3,455 sf 100.00% Impervious Runoff Depth=4.81"
Tc=6.0 min CN=98 Runoff=0.37 cfs 0.032 af

Subcatchment A2p: Pervious Runoff Area=995 sf 0.00% Impervious Runoff Depth=2.94"
Tc=6.0 min CN=80 Runoff=0.08 cfs 0.006 af

Subcatchment B2i: Impervious Runoff Area=1,398 sf 100.00% Impervious Runoff Depth=4.81"
Tc=0.0 min CN=98 Runoff=0.17 cfs 0.013 af

Subcatchment B2p: Pervious Runoff Area=317 sf 0.00% Impervious Runoff Depth=2.94"
Tc=0.0 min CN=80 Runoff=0.03 cfs 0.002 af

Subcatchment B2r: Ex Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=4.81"
Tc=6.0 min CN=98 Runoff=0.38 cfs 0.033 af

Pond Area A: Pervious Pavement Peak Elev=18.01' Storage=470 cf Inflow=0.45 cfs 0.037 af
Discarded=0.05 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.037 af

Pond Area AB: Total Flow AB Inflow=0.50 cfs 0.048 af
Primary=0.50 cfs 0.048 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.085 af Average Runoff Depth = 4.56"
13.46% Pervious = 0.030 ac 86.54% Impervious = 0.194 ac

Summary for Subcatchment A2i: Pavement

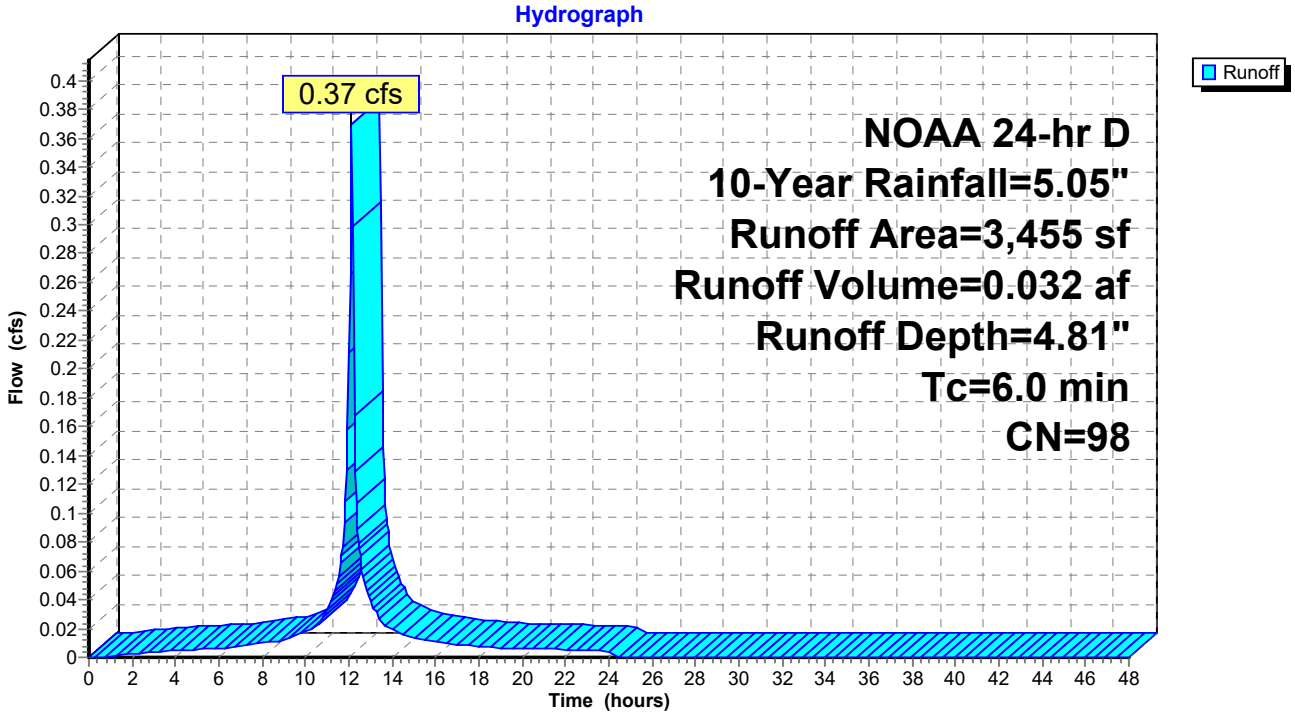
Runoff = 0.37 cfs @ 12.13 hrs, Volume= 0.032 af, Depth= 4.81"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
3,455	98	Paved parking, HSG D
3,455		100.00% Impervious Area

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

Subcatchment A2i: Pavement



Summary for Subcatchment A2p: Pervious

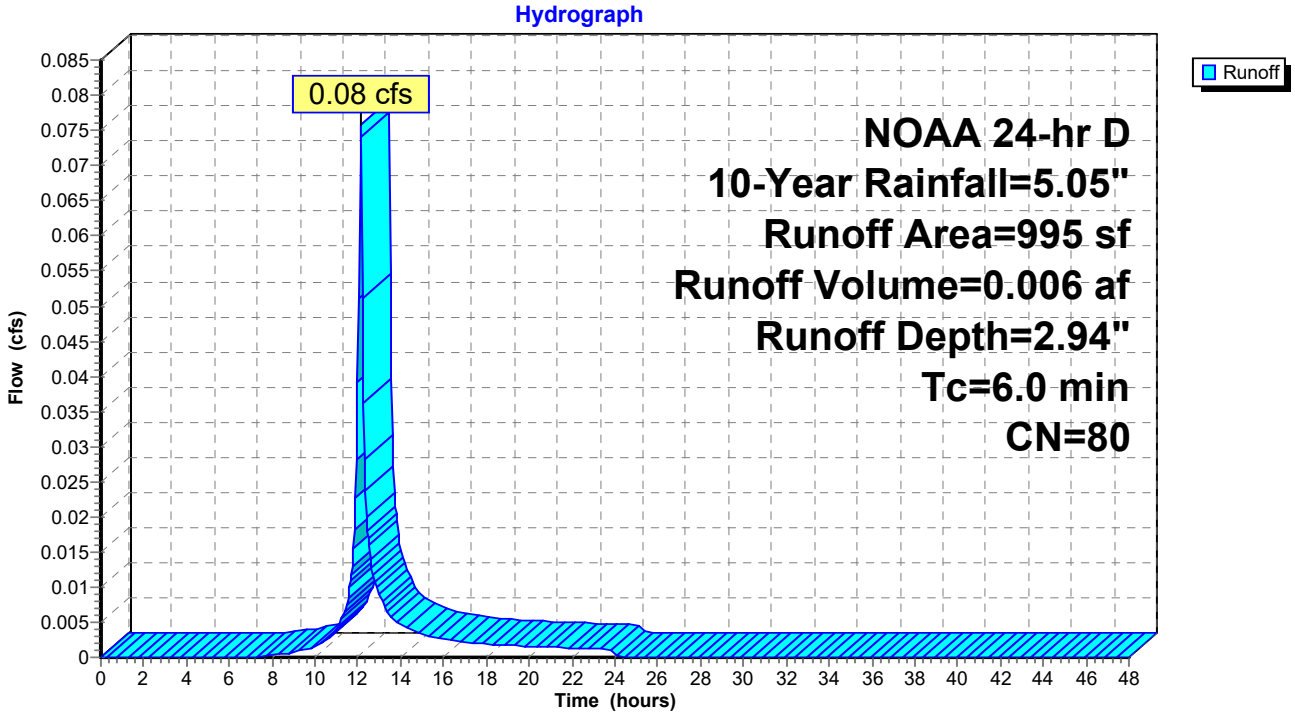
Runoff = 0.08 cfs @ 12.13 hrs, Volume= 0.006 af, Depth= 2.94"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
995	80	>75% Grass cover, Good, HSG D
995		100.00% Pervious Area

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

Subcatchment A2p: Pervious



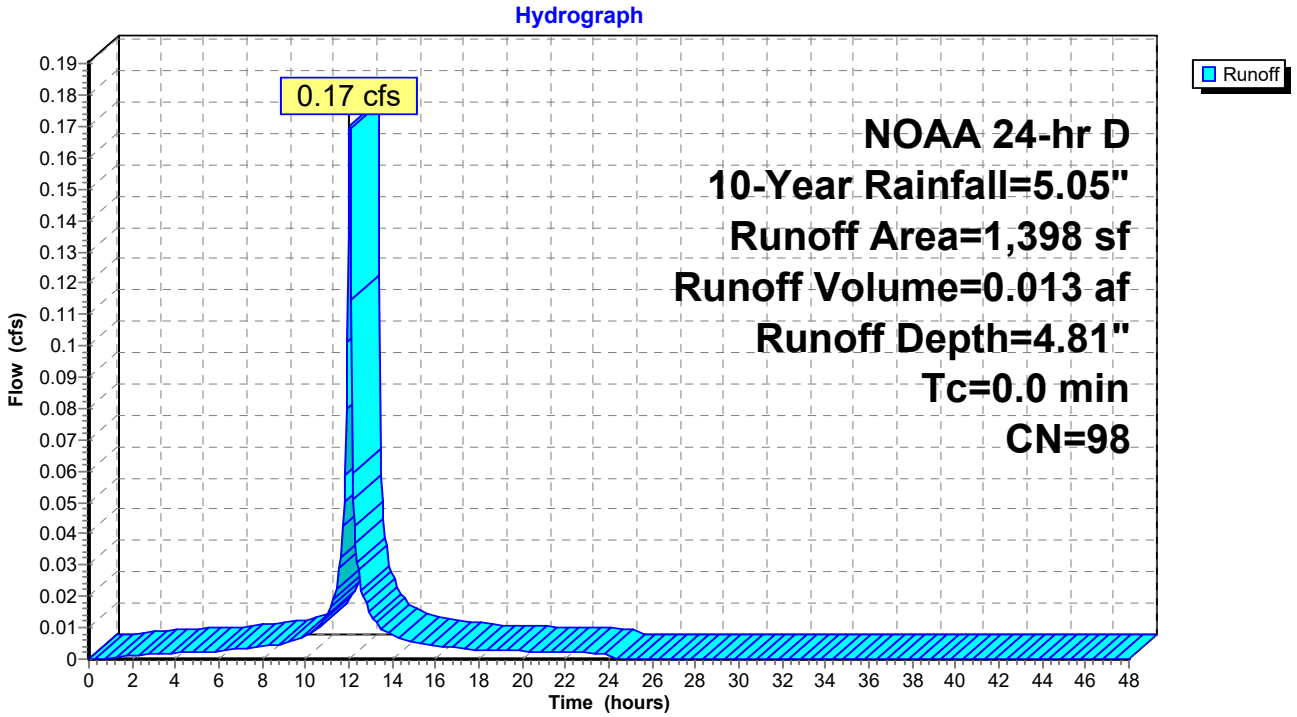
Summary for Subcatchment B2i: Impervious

Runoff = 0.17 cfs @ 12.04 hrs, Volume= 0.013 af, Depth= 4.81"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
670	98	Unconnected pavement, HSG D
198	98	Unconnected pavement, HSG D
530	98	Unconnected pavement, HSG D
1,398	98	Weighted Average
1,398		100.00% Impervious Area
1,398		100.00% Unconnected

Subcatchment B2i: Impervious



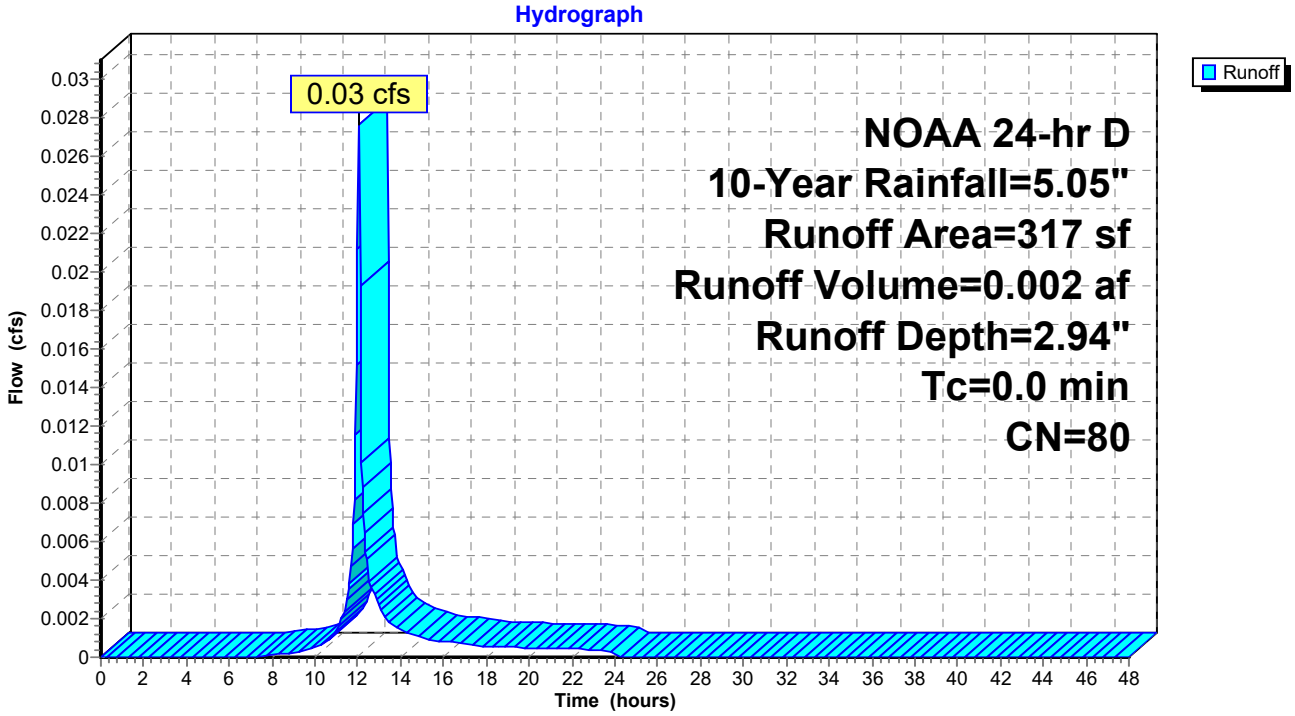
Summary for Subcatchment B2p: Pervious

Runoff = 0.03 cfs @ 12.05 hrs, Volume= 0.002 af, Depth= 2.94"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
317	80	>75% Grass cover, Good, HSG D
317		100.00% Pervious Area

Subcatchment B2p: Pervious



Summary for Subcatchment B2r: Ex Roofs

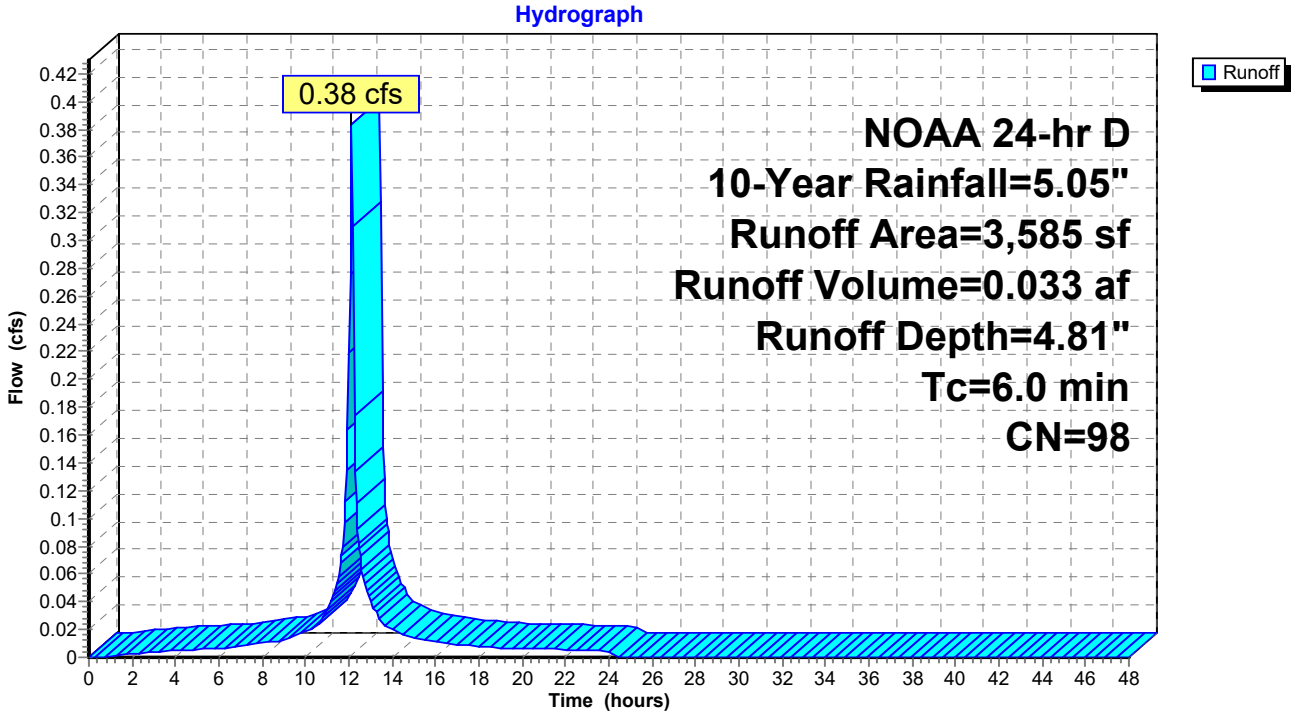
Runoff = 0.38 cfs @ 12.13 hrs, Volume= 0.033 af, Depth= 4.81"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.05"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment B2r: Ex Roofs



Summary for Pond Area A: Pervious Pavement

Inflow Area = 0.102 ac, 77.64% Impervious, Inflow Depth = 4.39" for 10-Year event
Inflow = 0.45 cfs @ 12.13 hrs, Volume= 0.037 af
Outflow = 0.05 cfs @ 11.50 hrs, Volume= 0.037 af, Atten= 88%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.50 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond Area AB : Total Flow AB

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 18.01' @ 12.90 hrs Surf.Area= 2,310 sf Storage= 470 cf

Plug-Flow detention time= 56.6 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 56.6 min (817.8 - 761.3)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	1,848 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

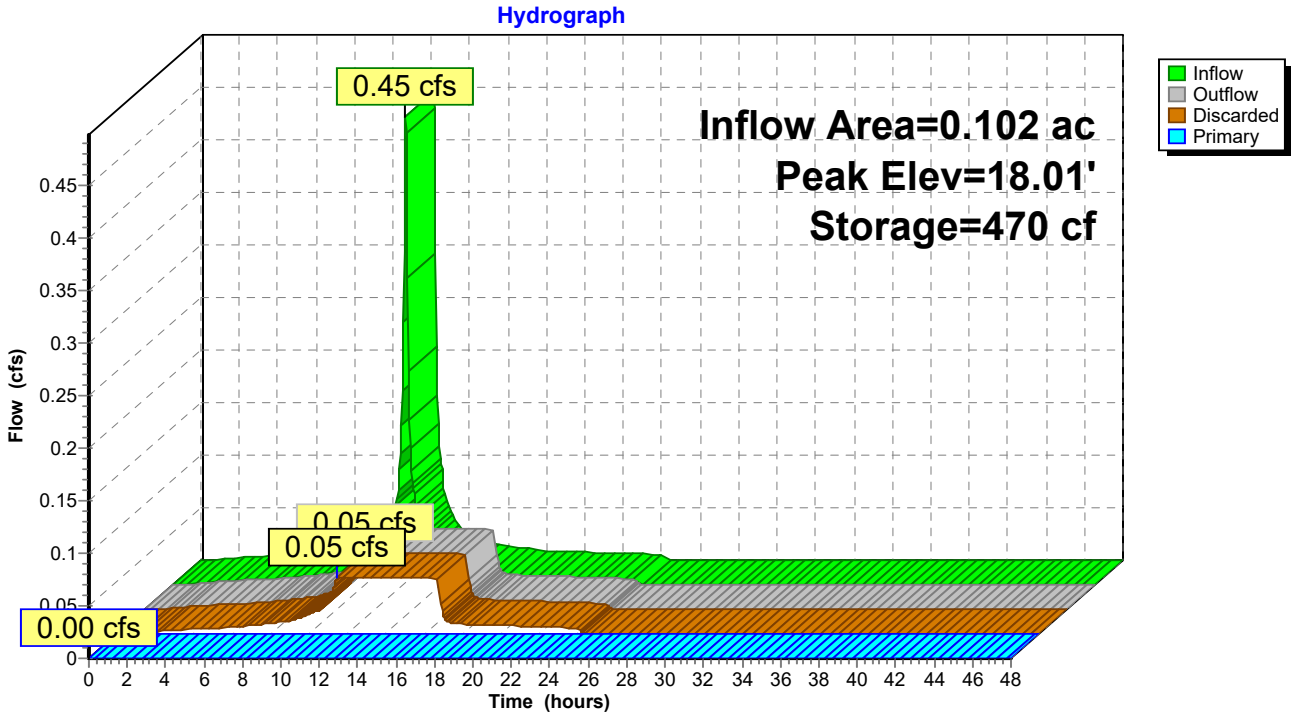
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.50	2,310	0.0	0	0
18.00	2,310	40.0	462	462
19.00	2,310	40.0	924	1,386
19.50	2,310	40.0	462	1,848

Device	Routing	Invert	Outlet Devices
#1	Primary	18.75'	**4.0" Round Culvert** L= 13.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 18.75' / 18.36' S= 0.0300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf
#2	Discarded	17.50'	**1.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.50 hrs HW=17.52' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.50' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Pond Area A: Pervious Pavement

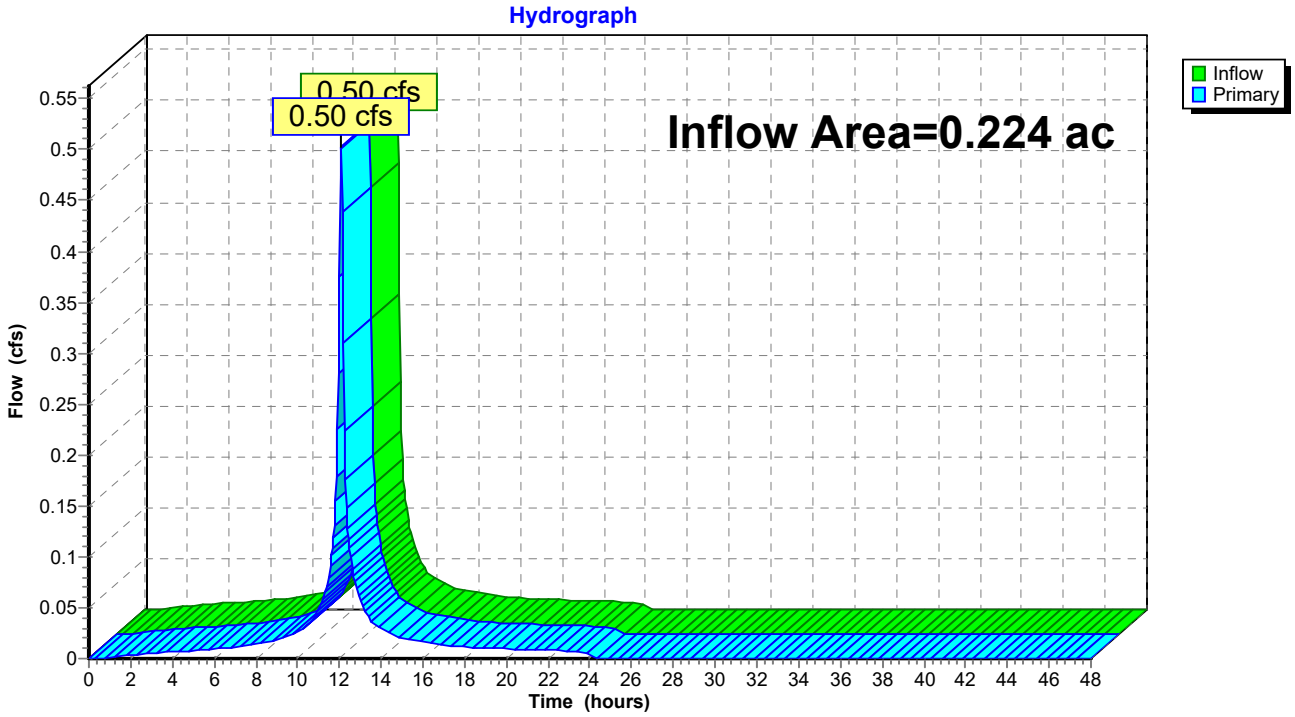


Summary for Pond Area AB: Total Flow AB

Inflow Area = 0.224 ac, 86.54% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 0.048 af
Primary = 0.50 cfs @ 12.09 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area AB: Total Flow AB



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A2i: Pavement Runoff Area=3,455 sf 100.00% Impervious Runoff Depth=6.04"
Tc=6.0 min CN=98 Runoff=0.46 cfs 0.040 af

Subcatchment A2p: Pervious Runoff Area=995 sf 0.00% Impervious Runoff Depth=4.03"
Tc=6.0 min CN=80 Runoff=0.10 cfs 0.008 af

Subcatchment B2i: Impervious Runoff Area=1,398 sf 100.00% Impervious Runoff Depth=6.04"
Tc=0.0 min CN=98 Runoff=0.21 cfs 0.016 af

Subcatchment B2p: Pervious Runoff Area=317 sf 0.00% Impervious Runoff Depth=4.03"
Tc=0.0 min CN=80 Runoff=0.04 cfs 0.002 af

Subcatchment B2r: Ex Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=6.04"
Tc=6.0 min CN=98 Runoff=0.48 cfs 0.041 af

Pond Area A: Pervious Pavement Peak Elev=18.24' Storage=681 cf Inflow=0.56 cfs 0.048 af
Discarded=0.05 cfs 0.048 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.048 af

Pond Area AB: Total Flow AB Inflow=0.63 cfs 0.060 af
Primary=0.63 cfs 0.060 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.108 af Average Runoff Depth = 5.77"
13.46% Pervious = 0.030 ac 86.54% Impervious = 0.194 ac

Summary for Subcatchment A2i: Pavement

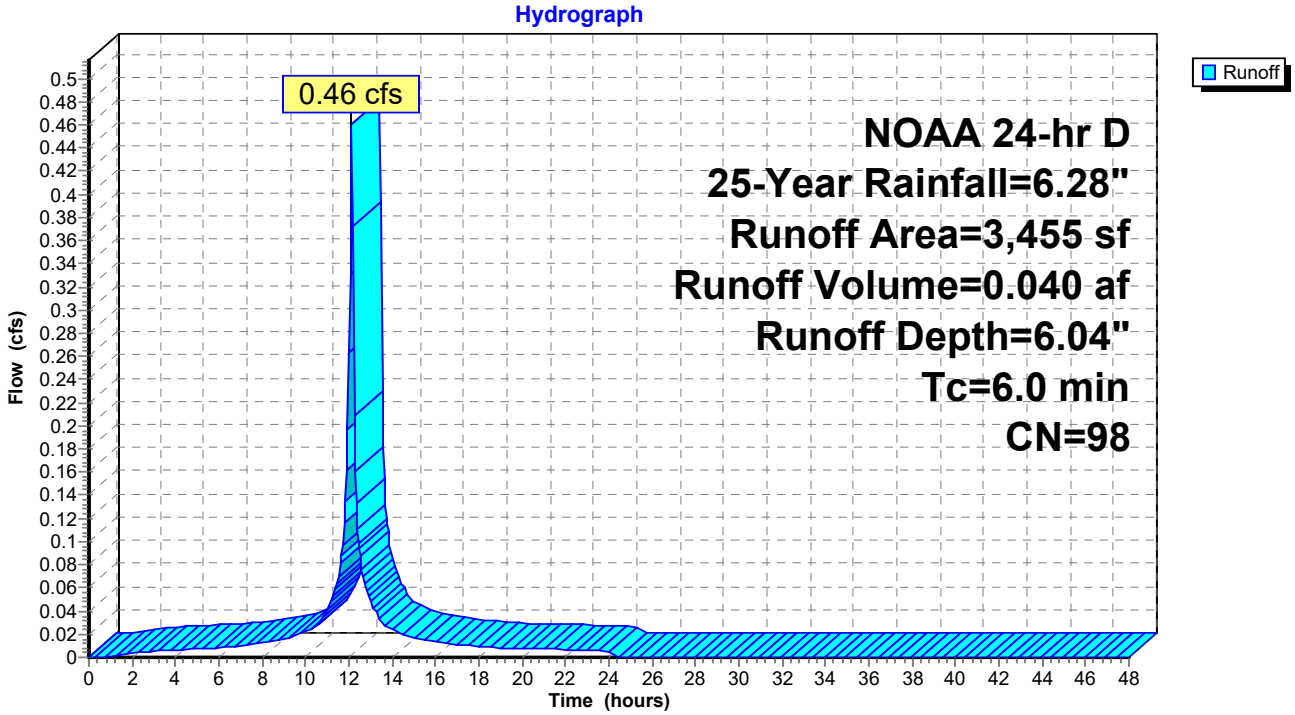
Runoff = 0.46 cfs @ 12.13 hrs, Volume= 0.040 af, Depth= 6.04"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
3,455	98	Paved parking, HSG D
3,455		100.00% Impervious Area

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

Subcatchment A2i: Pavement



Summary for Subcatchment A2p: Pervious

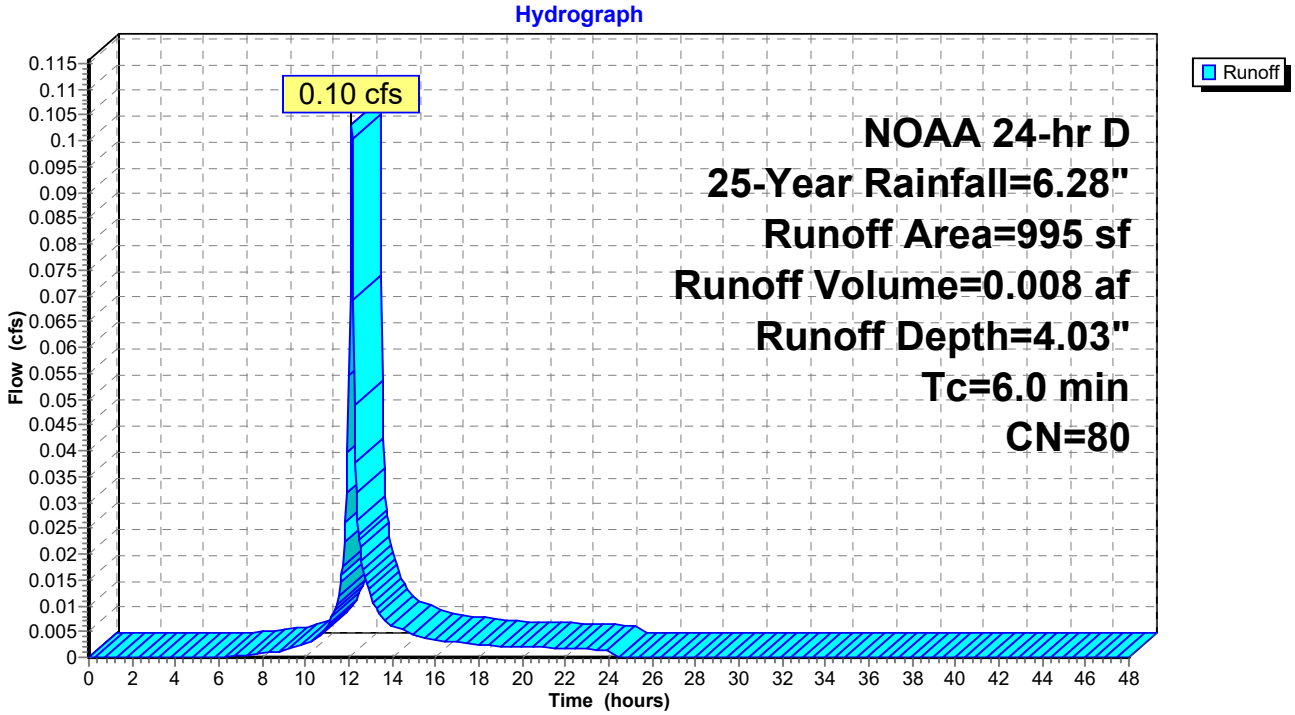
Runoff = 0.10 cfs @ 12.13 hrs, Volume= 0.008 af, Depth= 4.03"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
995	80	>75% Grass cover, Good, HSG D
995		100.00% Pervious Area

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

Subcatchment A2p: Pervious



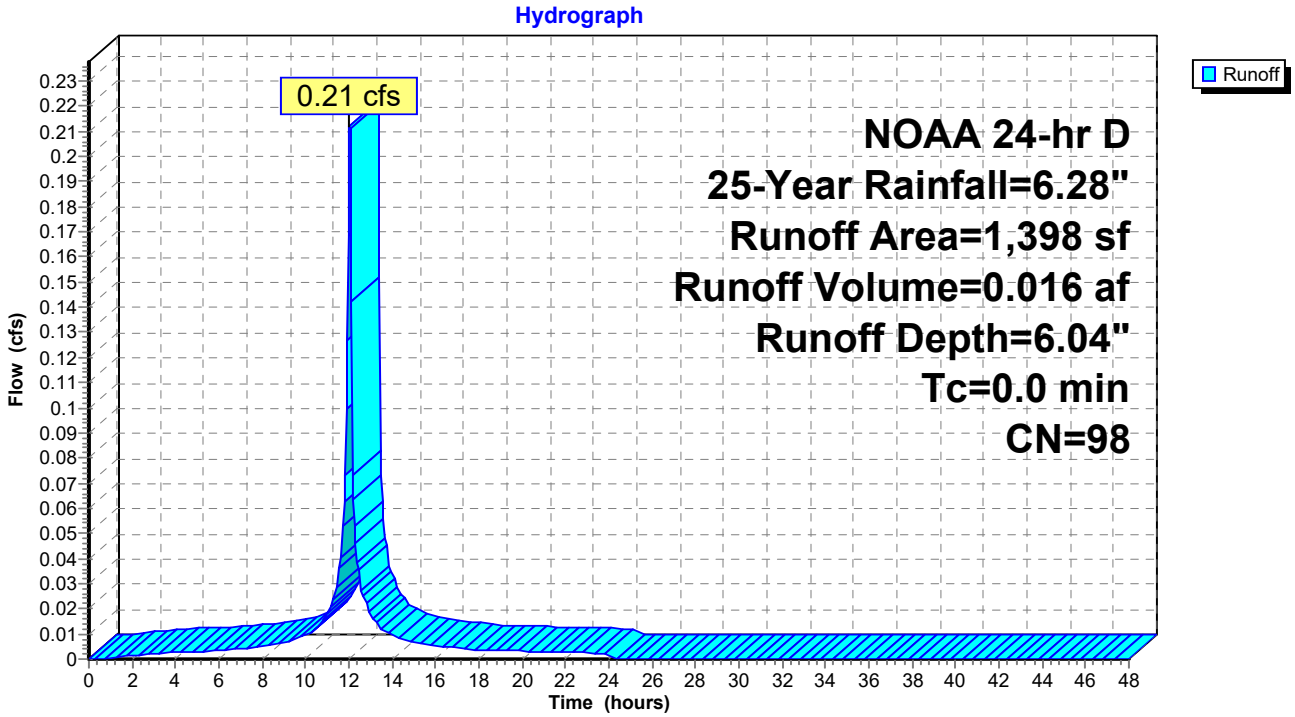
Summary for Subcatchment B2i: Impervious

Runoff = 0.21 cfs @ 12.04 hrs, Volume= 0.016 af, Depth= 6.04"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
670	98	Unconnected pavement, HSG D
198	98	Unconnected pavement, HSG D
530	98	Unconnected pavement, HSG D
1,398	98	Weighted Average
1,398		100.00% Impervious Area
1,398		100.00% Unconnected

Subcatchment B2i: Impervious



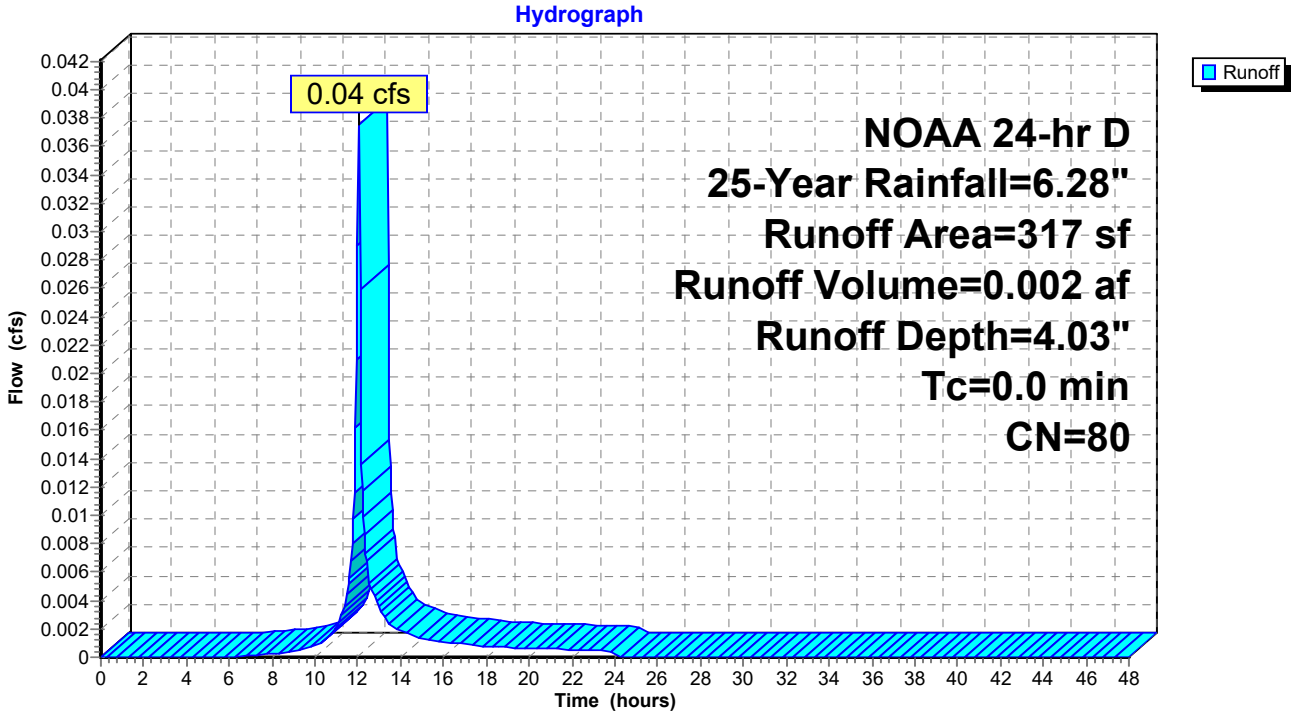
Summary for Subcatchment B2p: Pervious

Runoff = 0.04 cfs @ 12.05 hrs, Volume= 0.002 af, Depth= 4.03"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
317	80	>75% Grass cover, Good, HSG D
317		100.00% Pervious Area

Subcatchment B2p: Pervious



Summary for Subcatchment B2r: Ex Roofs

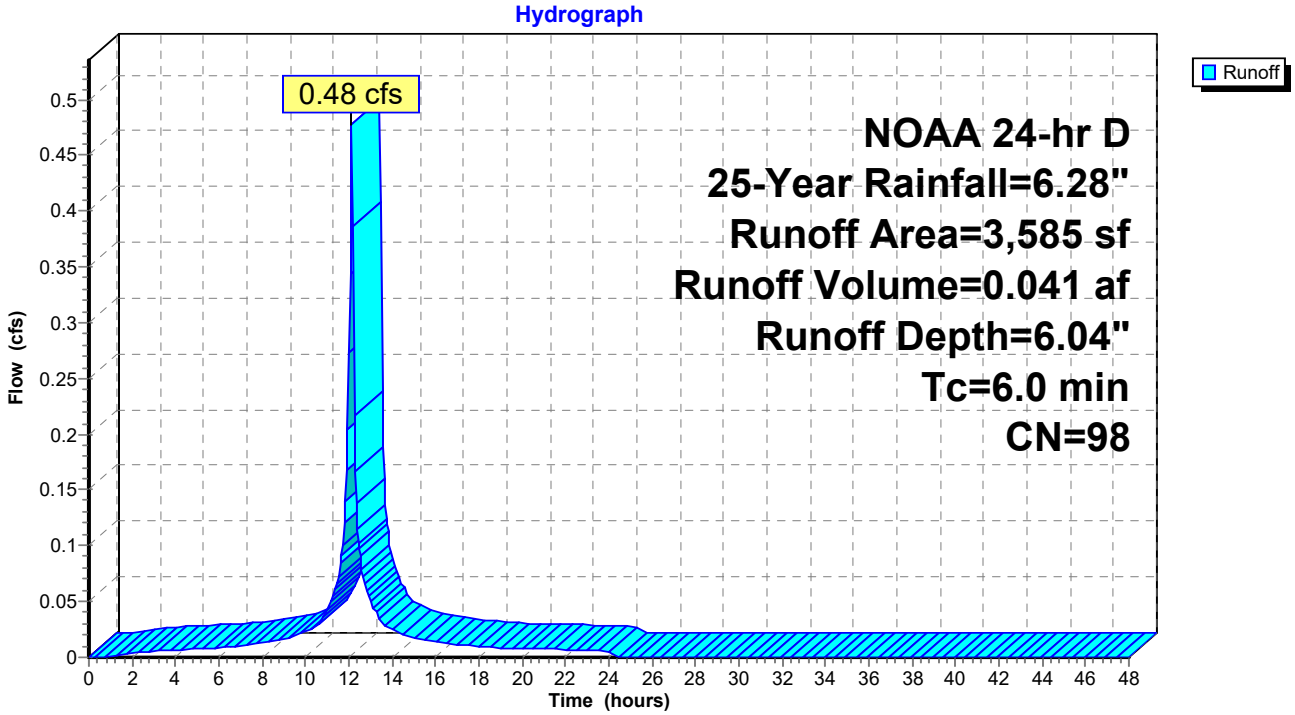
Runoff = 0.48 cfs @ 12.13 hrs, Volume= 0.041 af, Depth= 6.04"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-Year Rainfall=6.28"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment B2r: Ex Roofs



Summary for Pond Area A: Pervious Pavement

Inflow Area = 0.102 ac, 77.64% Impervious, Inflow Depth = 5.59" for 25-Year event
Inflow = 0.56 cfs @ 12.13 hrs, Volume= 0.048 af
Outflow = 0.05 cfs @ 11.25 hrs, Volume= 0.048 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.25 hrs, Volume= 0.048 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond Area AB : Total Flow AB

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 18.24' @ 13.13 hrs Surf.Area= 2,310 sf Storage= 681 cf

Plug-Flow detention time= 87.1 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 87.0 min (844.6 - 757.6)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	1,848 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

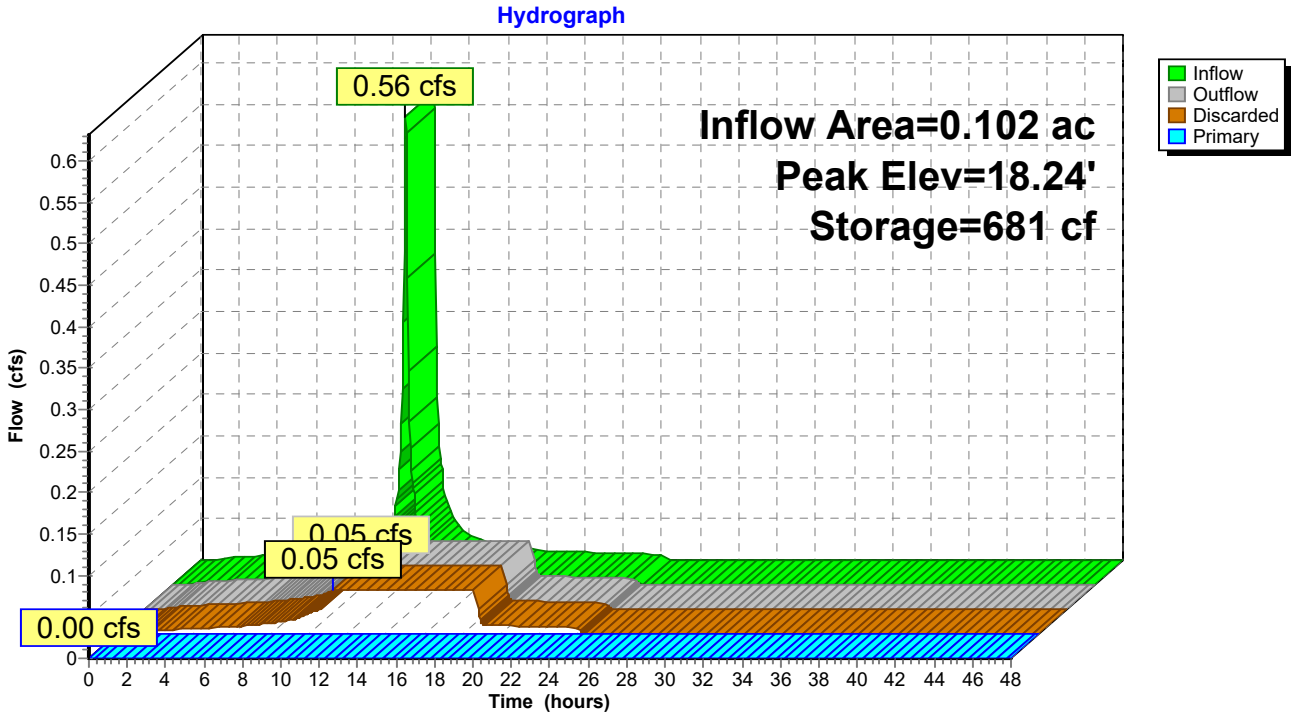
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.50	2,310	0.0	0	0
18.00	2,310	40.0	462	462
19.00	2,310	40.0	924	1,386
19.50	2,310	40.0	462	1,848

Device	Routing	Invert	Outlet Devices
#1	Primary	18.75'	**4.0" Round Culvert** L= 13.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 18.75' / 18.36' S= 0.0300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf
#2	Discarded	17.50'	**1.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.25 hrs HW=17.52' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.50' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Pond Area A: Pervious Pavement

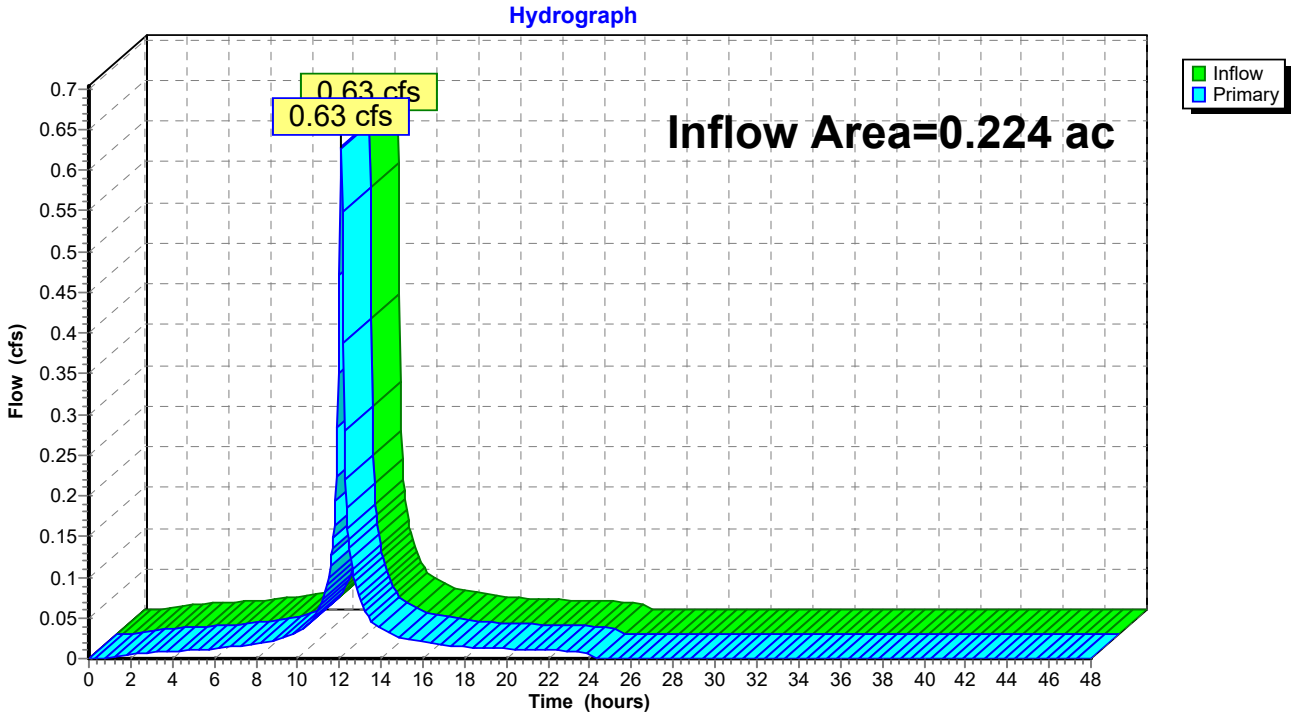


Summary for Pond Area AB: Total Flow AB

Inflow Area = 0.224 ac, 86.54% Impervious, Inflow Depth = 3.22" for 25-Year event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 0.060 af
Primary = 0.63 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area AB: Total Flow AB



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A2i: Pavement Runoff Area=3,455 sf 100.00% Impervious Runoff Depth=8.30"
Tc=6.0 min CN=98 Runoff=0.63 cfs 0.055 af

Subcatchment A2p: Pervious Runoff Area=995 sf 0.00% Impervious Runoff Depth=6.13"
Tc=6.0 min CN=80 Runoff=0.15 cfs 0.012 af

Subcatchment B2i: Impervious Runoff Area=1,398 sf 100.00% Impervious Runoff Depth=8.30"
Tc=0.0 min CN=98 Runoff=0.29 cfs 0.022 af

Subcatchment B2p: Pervious Runoff Area=317 sf 0.00% Impervious Runoff Depth=6.13"
Tc=0.0 min CN=80 Runoff=0.06 cfs 0.004 af

Subcatchment B2r: Ex Roofs Runoff Area=3,585 sf 100.00% Impervious Runoff Depth=8.30"
Tc=6.0 min CN=98 Runoff=0.65 cfs 0.057 af

Pond Area A: Pervious Pavement Peak Elev=18.71' Storage=1,114 cf Inflow=0.78 cfs 0.067 af
Discarded=0.05 cfs 0.067 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.067 af

Pond Area AB: Total Flow AB Inflow=0.86 cfs 0.083 af
Primary=0.86 cfs 0.083 af

Total Runoff Area = 0.224 ac Runoff Volume = 0.149 af Average Runoff Depth = 8.01"
13.46% Pervious = 0.030 ac 86.54% Impervious = 0.194 ac

Summary for Subcatchment A2i: Pavement

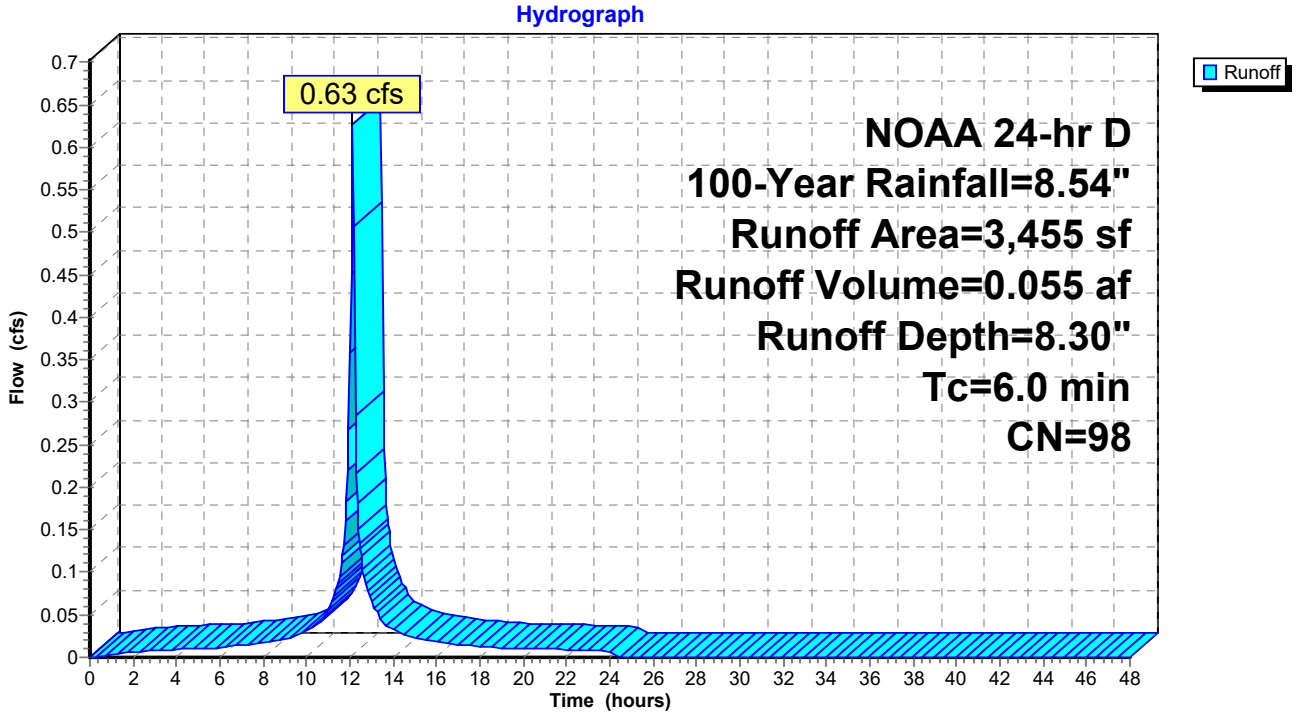
Runoff = 0.63 cfs @ 12.13 hrs, Volume= 0.055 af, Depth= 8.30"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.54"

Area (sf)	CN	Description
3,455	98	Paved parking, HSG D
3,455		100.00% Impervious Area

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

Subcatchment A2i: Pavement



Summary for Subcatchment A2p: Pervious

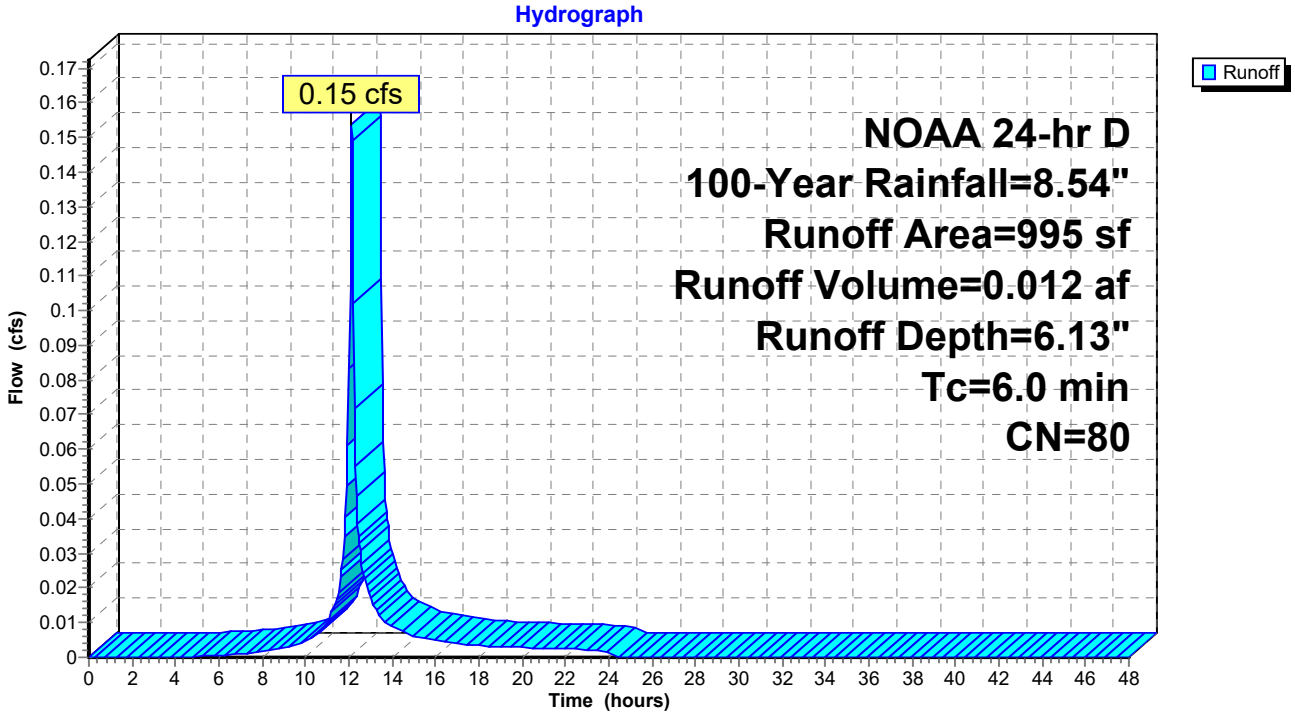
Runoff = 0.15 cfs @ 12.13 hrs, Volume= 0.012 af, Depth= 6.13"
Routed to Pond Area A : Pervious Pavement

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.54"

Area (sf)	CN	Description
995	80	>75% Grass cover, Good, HSG D
995		100.00% Pervious Area

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

Subcatchment A2p: Pervious



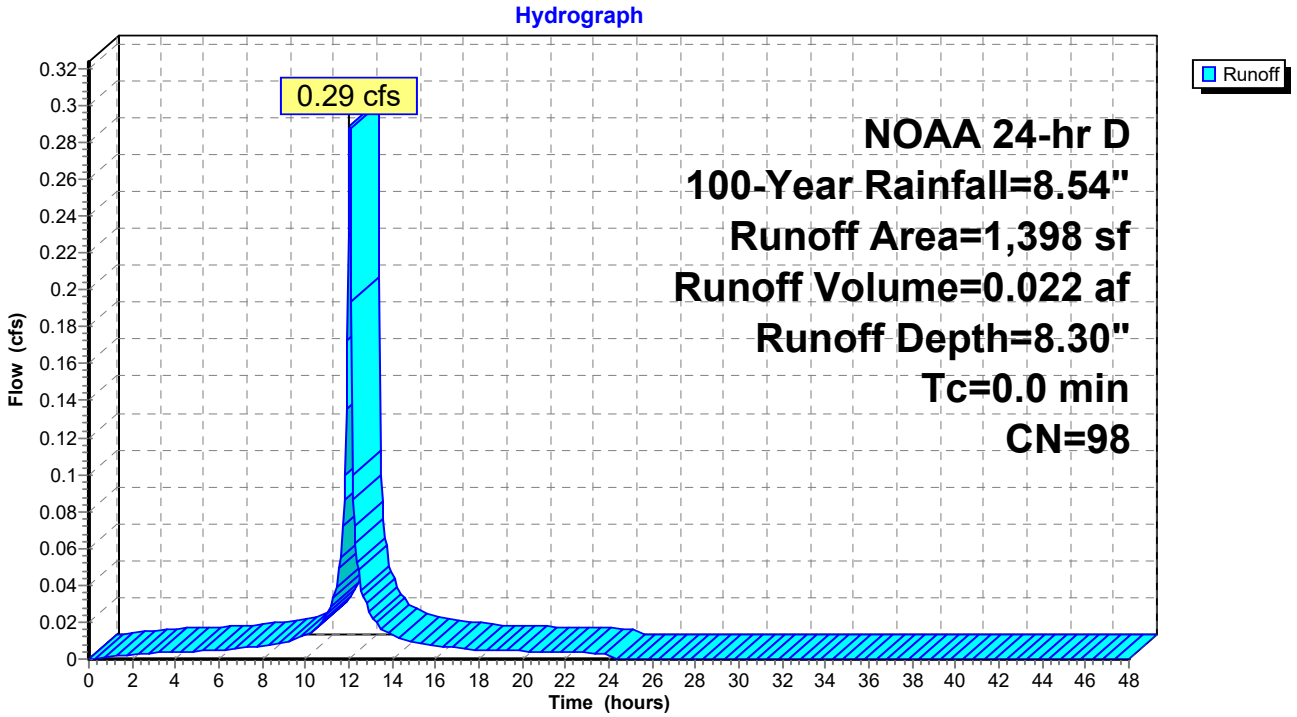
Summary for Subcatchment B2i: Impervious

Runoff = 0.29 cfs @ 12.04 hrs, Volume= 0.022 af, Depth= 8.30"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.54"

Area (sf)	CN	Description
670	98	Unconnected pavement, HSG D
198	98	Unconnected pavement, HSG D
530	98	Unconnected pavement, HSG D
1,398	98	Weighted Average
1,398		100.00% Impervious Area
1,398		100.00% Unconnected

Subcatchment B2i: Impervious



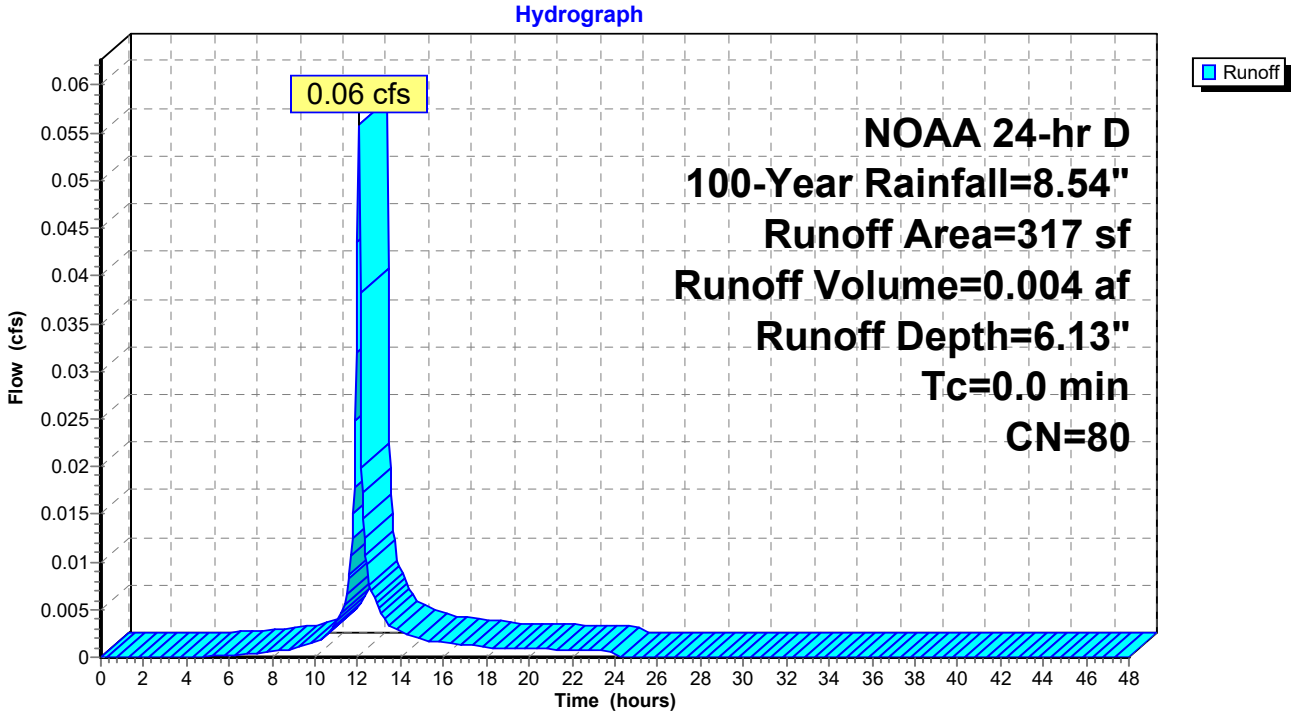
Summary for Subcatchment B2p: Pervious

Runoff = 0.06 cfs @ 12.05 hrs, Volume= 0.004 af, Depth= 6.13"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.54"

Area (sf)	CN	Description
317	80	>75% Grass cover, Good, HSG D
317		100.00% Pervious Area

Subcatchment B2p: Pervious



Summary for Subcatchment B2r: Ex Roofs

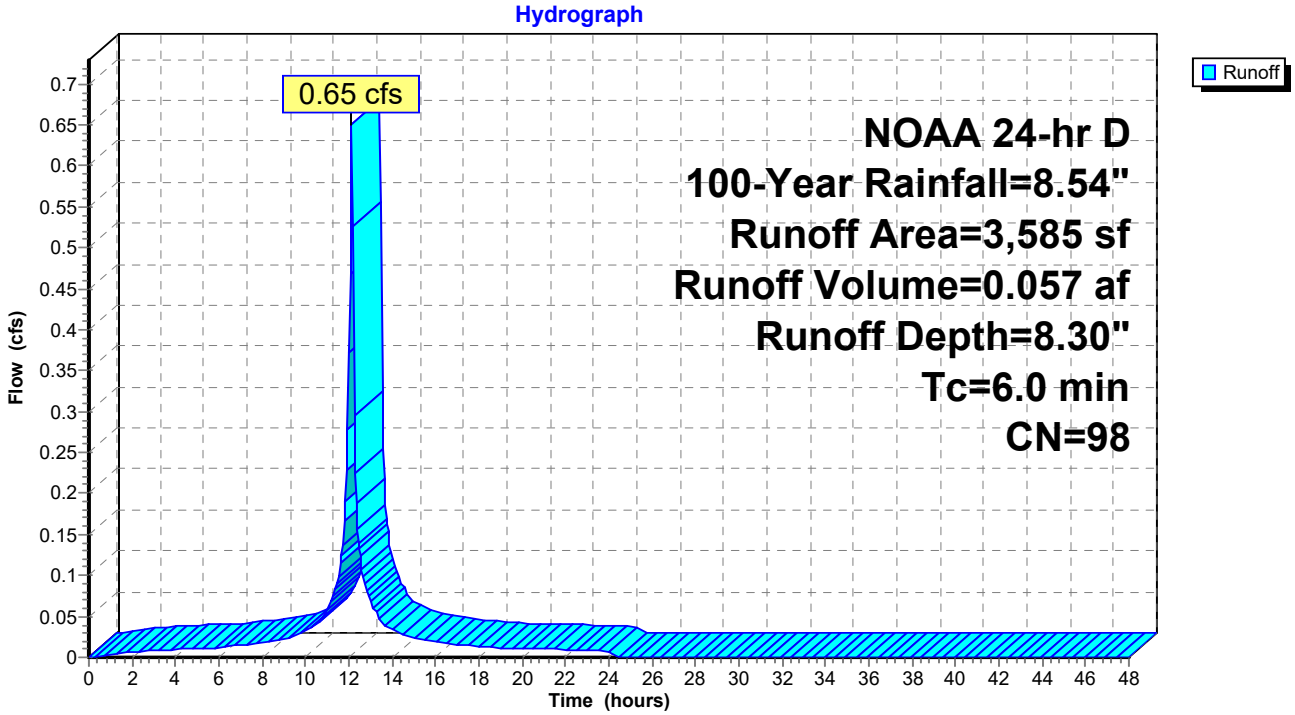
Runoff = 0.65 cfs @ 12.13 hrs, Volume= 0.057 af, Depth= 8.30"
Routed to Pond Area AB : Total Flow AB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.54"

Area (sf)	CN	Description
3,585	98	Roofs, HSG D
3,585		100.00% Impervious Area

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

Subcatchment B2r: Ex Roofs



Summary for Pond Area A: Pervious Pavement

Inflow Area = 0.102 ac, 77.64% Impervious, Inflow Depth = 7.82" for 100-Year event
Inflow = 0.78 cfs @ 12.13 hrs, Volume= 0.067 af
Outflow = 0.05 cfs @ 10.90 hrs, Volume= 0.067 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.05 cfs @ 10.90 hrs, Volume= 0.067 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond Area AB : Total Flow AB

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 18.71' @ 13.51 hrs Surf.Area= 2,310 sf Storage= 1,114 cf

Plug-Flow detention time= 156.6 min calculated for 0.066 af (100% of inflow)
Center-of-Mass det. time= 156.4 min (909.2 - 752.7)

Volume	Invert	Avail.Storage	Storage Description
#1	17.50'	1,848 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

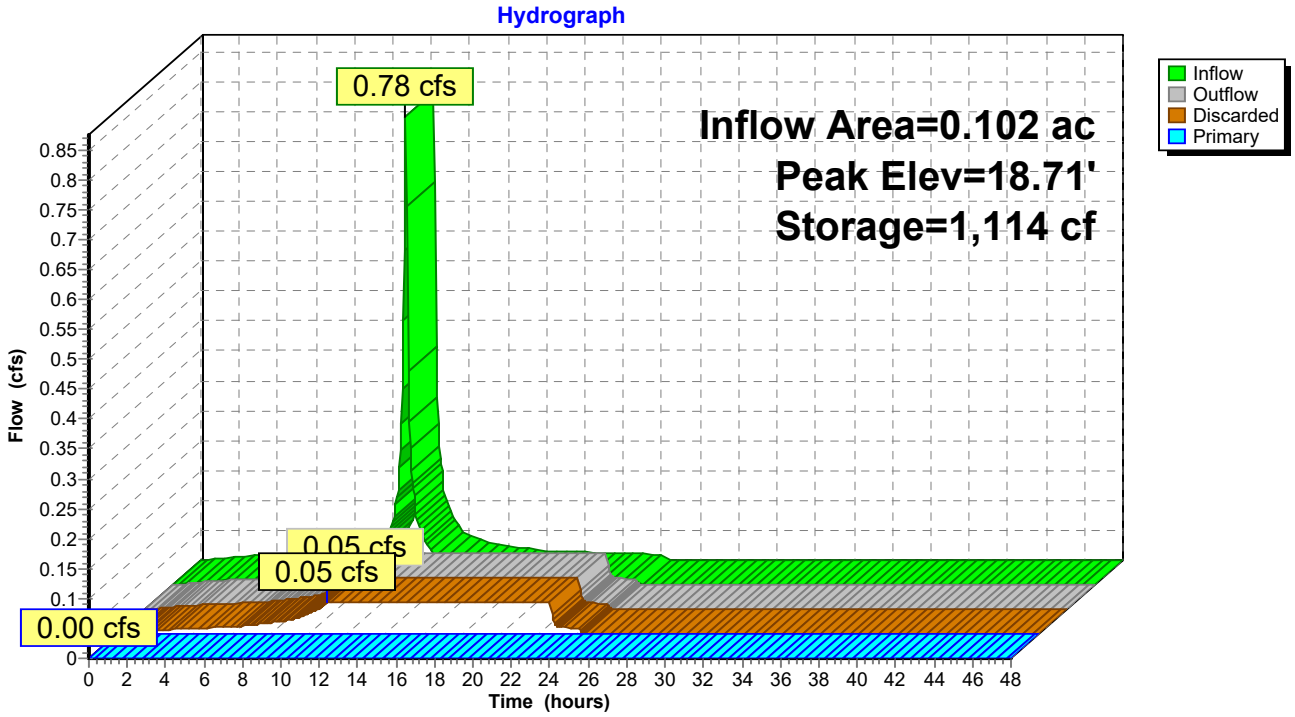
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.50	2,310	0.0	0	0
18.00	2,310	40.0	462	462
19.00	2,310	40.0	924	1,386
19.50	2,310	40.0	462	1,848

Device	Routing	Invert	Outlet Devices
#1	Primary	18.75'	**4.0" Round Culvert** L= 13.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 18.75' / 18.36' S= 0.0300 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf
#2	Discarded	17.50'	**1.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 10.90 hrs HW=17.52' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.50' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Pond Area A: Pervious Pavement

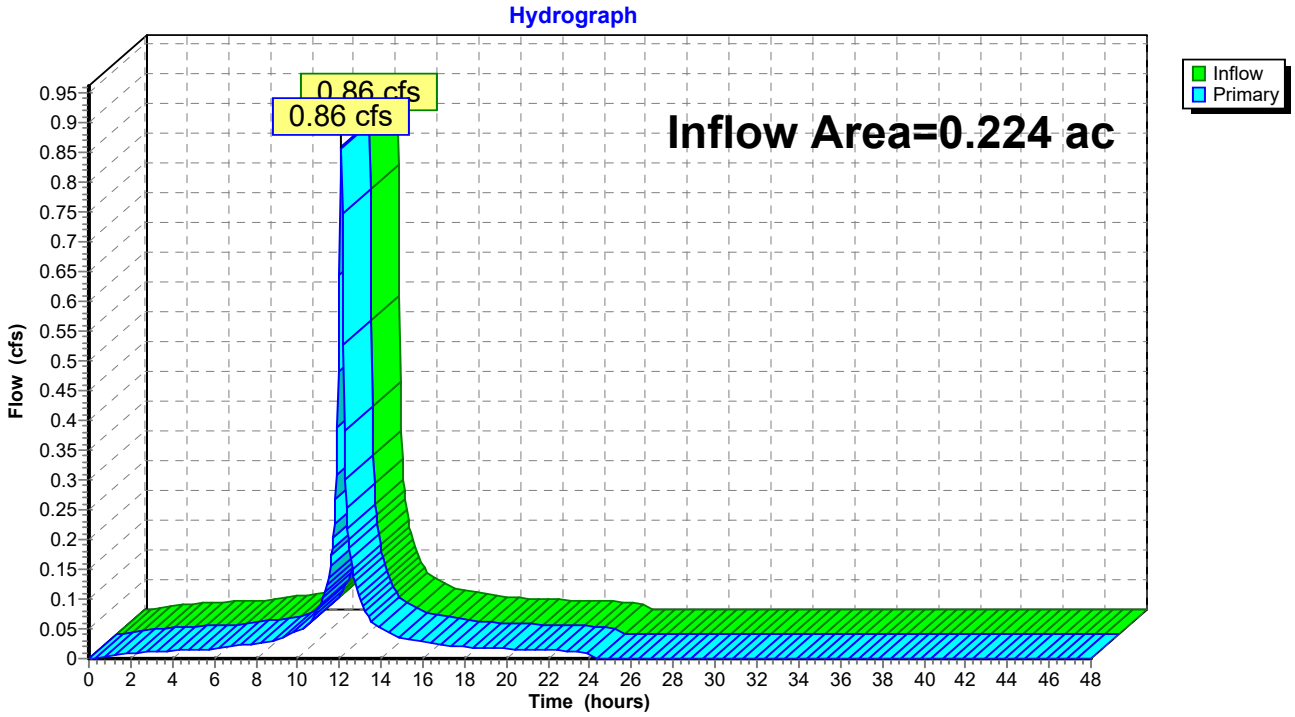


Summary for Pond Area AB: Total Flow AB

Inflow Area = 0.224 ac, 86.54% Impervious, Inflow Depth = 4.44" for 100-Year event
Inflow = 0.86 cfs @ 12.09 hrs, Volume= 0.083 af
Primary = 0.86 cfs @ 12.09 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

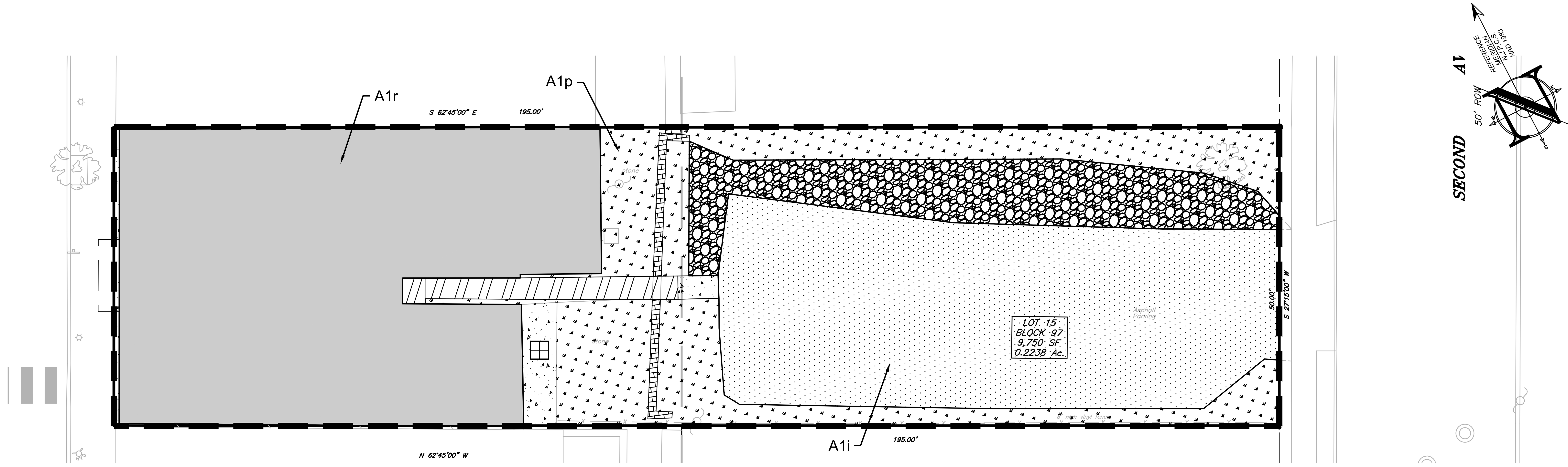
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond Area AB: Total Flow AB



A P P E N D I X D

Pre and Post-Development Coverage Maps

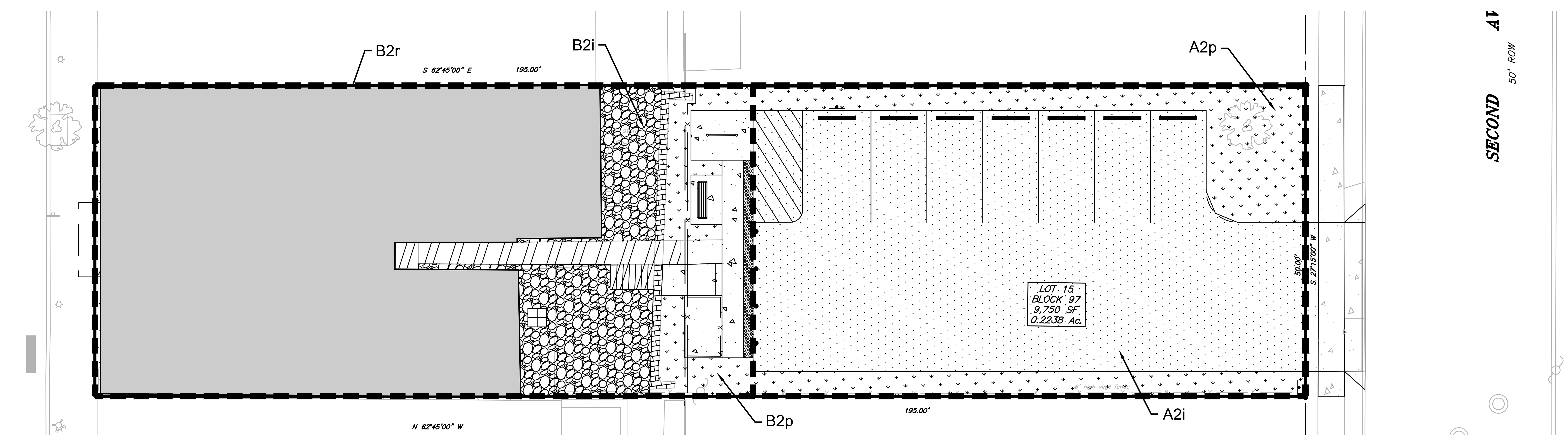


LEGEND

ANALYSIS AREA: 9,750 SF (0.2238 AC)

- BUILDINGS: 36.77% 3,585 SF (0.0823 AC)
- ASPHALT: 29.53% 2,879 SF (0.0661 AC)
- STONE: 9.89% 964 SF (0.0221 AC)
- WOOD RAMP: 1.75% 171 SF (0.0039 AC)
- RETAINING WALL: 0.73% 71 SF (0.0017 AC)
- CONCRETE AREA 1.83% 179 SF (0.0041 AC)
- PERVIOUS AREA: 19.50% 1,901 SF (0.0436 AC)

TOTAL AREA:	100%	9,750 SF (0.2238 AC)
TOTAL IMPERVIOUS:	80.50%	7,849 SF (0.1802 AC)
TOTAL PERVIOUS:	19.50%	1,901 SF (0.0436 AC)



LEGEND

ANALYSIS AREA: 9,750 SF (0.2238 AC)

- BUILDINGS: 36.77% 3,585 SF (0.0823 AC)
- ASPHALT: 35.43% 3,455 SF (0.0793 AC)
- STONE: 6.87% 670 SF (0.0154 AC)
- WOOD RAMP/STAIRS: 2.03% 198 SF (0.0045 AC)
- RETAINING WALL: 0.73% 71 SF (0.0017 AC)
- CONCRETE AREA 4.71% 459 SF (0.0105 AC)
- PERVIOUS AREA: 13.46% 1,312 SF (0.0301 AC)

TOTAL AREA:	100%	9,750 SF (0.2238 AC)
TOTAL IMPERVIOUS:	86.54%	8,438 SF (0.1937 AC)
TOTAL PERVIOUS:	13.46%	1,312 SF (0.0301 AC)

10 0 10 20

SCALE : 1" = 10'

LEGEND

EXISTING		PROPOSED
	BOUNDARY LINE	
58	CONTOUR LINE	10
+ 46.80	SPOT ELEVATION	+46.80
	BUILDING	
	WALL	
G G	GAS	GAS
W W	WATER	WTR
	INLET	
	STORM	D
	SANITARY MAIN	S
SAN CO	SANITARY LATERAL	SAN CO
OH	OVERHEAD WIRE	O/H
E E	ELECTRIC	E
T T	TELEPHONE	TEL
	UTILITY POLE	
HYD	HYDRANT	HYD
	SIGN POST	
x x	FENCE	x x
	LIGHT FIXTURE	
TP-1	TEST PIT LOCATION	TP-1
	GRADE FLOW ARROW	
	SWALE CENTER LINE	℄

File: X:\Jobs\2121 - Kevin Birch\23-2121-01 - 58 First Avenue_Atlantic Highlands, NJ\2321210 1CAD\dwg\Support\240823 r2 Coverage Map\01-Coverage Maps.dwg, --> 01 - Coverage Maps

PROJECT INFORMATION

PROJECT NAME:

58 FIRST AVENUE

PROJECT LOCATION:

BLOCK 97, LOT 15
58 FIRST AVENUE
BOROUGH OF ATLANTIC HIGHLANDS,
MONMOUTH COUNTY, NJ

OWNER:

HUGH A. MCGUIRE, JR.
58 FIRST AVENUE
BOROUGH OF ATLANTIC HIGHLANDS,
MONMOUTH COUNTY, NJ

APPLICANT:

BIRCHWOOD, INC.
58 FIRST AVENUE
BOROUGH OF ATLANTIC HIGHLANDS,
MONMOUTH COUNTY, NJ

APPLICANT'S PROFESSIONALS

ATTORNEY:
MARK R. AIKINS, LLC
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TOWNSHIP OF WALL, NJ 07719

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GRASSO DESIGN GROUP
231 HIGHWAY 71
MANASQUAN, NJ 08736

SURVEYOR:
R AND T LAND SURVEYING
P.O. BOX 124
ATLANTIC HIGHLANDS, NJ 07716

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COMMUNICATION / TV	ORANGE
WATER	BLUE
SEWER	GREEN
TEMP. SURVEY MARKINGS	MAGENTA
PROPOSED EXCAVATION	WHITE

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Engineering • Surveying • Planning

InSite Engineering, LLC
CERTIFICATE OF AUTHORIZATION: 24GA28083200
1955 ROUTE 34, SUITE 1A, WALL, NJ 07719
732-531-7100 (Ph) 732-531-7344 (Fax)
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LICENSED IN: NEW JERSEY, NEW YORK, PENNSYLVANIA
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COLORADO, & DISTRICT OF COLUMBIA

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Christopher M. Bednarski

CHRISTOPHER M. BEDNARSKI, P.E.
PROFESSIONAL ENGINEER
NJPE LIC. NO. 24GE05256400

REVISIONS

Rev.#	Date	Comment
2	08/23/24	REVISED PER REVIEW LETTER #2
1	07/19/24	REVISED PER ENG REVIEW LETTER
0	08/11/23	INITIAL RELEASE

SCALE: 1"=10'	DESIGNED BY: CMB
DATE: 08/11/23	DRAWN BY: SGD
JOB #: 23-2121-01	CHECKED BY: CMB
CAD ID: 23-2121-01r2	

☒ NOT FOR CONSTRUCTION

APPROVED BY:

☐ FOR CONSTRUCTION

PLAN INFORMATION

DRAWING TITLE:

PRELIMINARY & FINAL
MAJOR SITE PLAN

SHEET TITLE:

COVERAGE MAPS

SHEET NO: