ACORN
ENGINEERING, INC.

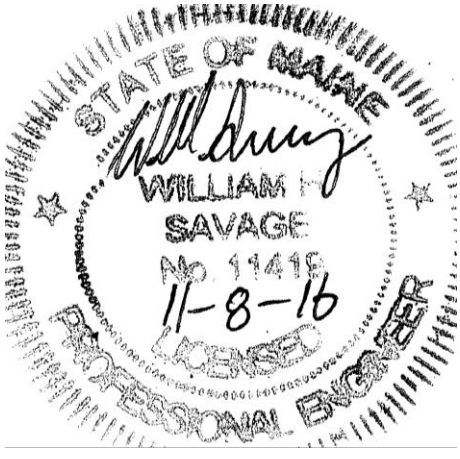
STORMWATER MANAGEMENT REPORT

Prepared For:

York Street Redevelopment, LLC
161 York Redevelopment
161 York Street
Portland, Maine 04101

Prepared By:

Acorn Engineering, Inc.
158 Danforth Street
Portland, Maine 04102



November 2016

INTRODUCTION

Acorn Engineering, Inc. has been retained by York Street Redevelopment, LLC to provide civil engineering services for the proposed redevelopment of 161 York Street. The proposed project is to develop two, two-story dwellings into a five-story, eleven-unit condominium subdivision. The site has recently been demolished to facilitate the redevelopment and is currently a vacant lot.

A stormwater analysis will be prepared to demonstrate that the project will meet the following requirements of the City of Portland (the City):

- City of Portland Land Use Ordinance Chapter 14, Article V. Site Plan Section 14-523. Required Approvals and Applicability (F) Level III Site Plan Review.
- City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards and Maine DEP Chapter 500 Stormwater Management.

The proposed project will include the redevelopment of existing, impervious area including rooftops, and paved asphalt and concrete driveways prior to demolition. The project will result in a net increase of impervious area above 1,000 sf, and, as such, is required to include stormwater management features for stormwater quality & quantity control. The stormwater analysis is documented with supporting calculations and reports attached to this narrative.

The current course of action is to provide primary water quality treatment to the stormwater through filtration utilizing a Best Management Practice (BMP) through a subsurface chamber sand filter that will detain and treat the majority of the site's stormwater. The implemented BMP is to provide water quality treatment for no less than 95% of the new impervious area and 80% of the developed area.

EXISTING CONDITIONS

The proposed project site is located at 161 York Street near the corner of York Street and State Street. A boundary plan has been prepared by Spurwink Surveying, LLC of Scarborough, Maine dated September 29, 2015.

Abutting Uses:

➢ North	R-6 Zone	Residential Condominiums
➢ West	R-6 Zone	Vacant Land
➢ South	R-6 Zone	Residential Condominiums
➢ East	R-6 Zone	Multi-Family Residential

The property is also near the Casco Bay Bridge and Harbor View Memorial Park, both west of the property.

Before the demolition, approximately a quarter of the property was covered by impervious surfaces including a bituminous driveway and two, two-story dwellings. The remaining surface was mature tree growth, vegetation, and exposed soil. The site slopes at

approximately 10% toward York Street. Based on existing conditions, the stormwater runoff is directed towards York Street where it then enters the municipal stormwater system.

The project team is not aware of the presence of any existing significant natural features located on the site. Given the urban setting, and existing free-draining soils, a field inventory of significant natural feature was not undertaken. The project is not located within a watershed classified as an Urban Impaired Stream.

PROPOSED DEVELOPMENT

The proposed project is an eleven-unit redevelopment of two previously existing dwellings. Site stormwater treatment will be provided by a Underdrained Subsurface Sand Filter (USSF) to be installed beneath the upper driveway entrance from Guilford Court. Stormwater runoff generated by the roof and driveway is to be redirected into the system and then outlet into the existing municipal system within York Street. The remainder of the runoff generated by the front driveway and sidewalks will flow into York Street. Areas not covered by the building and impervious surfaces will be landscaped per L-1 Landscape Plan attached to the plan set.

Tenant parking is to be provided on-site with access from both York Street and Guilford Court. The five-story building will feature a parking garage with fourteen spaces on the first level parking garage, four spaces on the second-floor garage, and two, uncovered parking spaces off York Street and Guilford Court for a total of twenty-two parking spaces on two levels. Pedestrian access to the site shall be provided off York Street with two internal walkways to a main and side entrance.

The development will be served by the Portland Water District, underground power/cable/communications, natural gas, and the municipal stormwater and sewer systems. The project anticipates incorporating Maine DEP approved stormwater Best Management Practices to meet the General and Flooding Standards.

GENERAL STANDARDS - WATER QUALITY

The underdrained subsurface sand filter was sized to meet or exceed the requirements set forth within the MDEP Volume III BMPs Technical Design Manual, Chapter 7.3. Filter BMP systems have shown to be effective at filtering out and removing a wide range of pollutants from stormwater runoff.

Impervious Treatment Area

The stormwater runoff shall first flow into a central catch basin and then into the StormTech Isolator Row which shall provide initial treatment. The stormwater shall be detained within the chambers and surrounding aggregate for a minimum of 24 hours and a maximum of 48 hours before flowing vertically through the sand filter layer. The treated stormwater shall then be collected within the perforated underdrain pipe and released slowly by the outlet control structure at an attenuated rate. When stormwater flows exceed the storage and treatment volume capacity of the isolator row, the stormwater will flow into the second Stormtech chamber row and outlet into the control structure. This structure will serve to

attenuate flows into the existing municipal stormwater system within York Street and prevent flooding.

The treatment of the impervious surface by the BMPs are as follows:

Table 1 - Impervious Treatment Area Table					
	Existing Impervious Area (SF)	Proposed Total Impervious Area (SF)	Net change in Impervious Area (SF)	Proposed Impervious Area with Treatment (SF)	% Overall New Imp. Area Treated
Subsurface Sand Filter	3,271	8,681	5,410	7,611	141%

As shown above, the project anticipates meeting the required treatment for new impervious surfaces with the filter BMP.

Filter Area Size

Per the requirements for an underdrained subsurface sand filter as defined in Volume III BMPs Technical Design Manual, Chapter 7.3, the surface area of the filter shall be no less than the sum of 5% of the tributary impervious area and 2% of the tributary landscaped area. The filter area is calculated by the following formula:

[(Imp. SF x 0.05) + (Veg. SF x 0.02)] = Filter Area (SF)

Please refer to Table 2 below.

Table 2 – Total Filter Surface Area, displays the proposed Subsurface Sand Filter sizing requirements, actual size and the percentage of required area.

Table 2 –Total Filter Surface Area			
	Required Filter Area (SF)	Actual Filter Area (SF)	Percentage of Required Area (%)
Subsurface Sand Filter	402	489	122%

The outflow from the sand filter structure is then tributary to the outlet control structure before entering the municipal stormwater system. As shown, the size of the soil filter area will meet and exceed the surface area requirements. Values from the HydroCAD calculations are attached to this report.

Water Quality Volume

In accordance with the Volume III: BMPs Technical Design Manual, a water quality volume of 1.0 inch times the tributary impervious area plus 0.4 inch times the tributary landscaped developed area is required to be treated by the Subsurface Sand Filter. The water quality volume is calculated by the following formula:

$$\left(\frac{\text{Imp. [SF] x 1.0"}}{\text{12"/1'}}\right) + \left(\frac{\text{Dist. [SF] x 0.4"}}{\text{12"/1'}}\right) = \text{Treatment Volume [CF]}$$

The proposed water quality volume is as follows:

Table 4 - Water Quality Volume Table				
	Tributary Landscaped Area (SF)	Tributary Impervious Area (SF)	Treatment Volume Required (CF)	Treatment Volume Provided (CF)
Subsurface Sand Filter	1072	7611	**670**	**958**

As shown, the size of the combined water quality volume will meet and exceed the treatment volume requirements. Values from the HydroCAD calculations are attached to this report.

HydroCAD Adjustments

Provided that the water quality volumetric infiltration rates through the soil filter vary, a water quality outlet is modeled to provide the required minimum 24-hour release time. This is completed by adjusting the rainfall amount in HydroCAD until the inflow volume is equal to or greater than the calculated treatment volume. The storm events are modeled as type III, 24-hour storm events in HydroCAD.

A vertical orifice is modeled in HydroCAD at the outlet structures of the USSF BMP. The orifice diameter is sized to detain the stormwater for an approximate period of 24 hours. The orifice shall be placed at the end of the outfall pipe on the outlet control structure baffle to be inspected or replaced if necessary. The orifice is intended to be a PVC cap placed on the outfall pipe (no glue) with the orifice drilled into the cap eccentrically. The PVC cap can be easily inspected, removed or replaced if necessary. The orifice for the water quantity volume is then set above the peak elevation determined for the water quality volume.

FLOODING STANDARD – WATER QUANTITY

The proposed project was modeled using HydroCAD to verify that the post-development conditions do not exceed the pre-development conditions. A 24-hour SCS Type III storm distribution for the 2, 10, and 25-year storm events were used. The corresponding rainfall amounts for these storms are 3.10", 4.60", and 5.80" respectively. Rainfall amounts are from the Northeast Regional Climate Center website (http://precip.eas.cornell.edu), Extreme Precipitation Tables.

The existing stormwater runoff flows into the York Street municipal system. Therefore, both the pre- and post-development conditions model the runoff into York Street.

Due to the numerous variables and inherent inaccuracies with the modeling program used to calculate stormwater runoff, it is custom at Acorn Engineering, Inc. to round to the nearest whole number or to the nearest tenth for urban infill projects. Due to the small size of the

project the stormwater runoff shall be rounded to the nearest tenth of a cubic foot per second (cfs).

Time of Concentration (T_c)

A time of concentration (T_c) of 5 minutes was applied to the subcatchment for both the pre- and post-development condition, given the urban setting.

Curve Number

Conservative curve number (CN) runoff values were used within the subcatchment for the remaining area surrounding the building footprint. The stormwater calculations used the following CN values in the post development condition for all such areas, as follows:

- Paved Parking Lots, Driveways, Sidewalks
- Wood/Grass Combo – Good

It was assumed that the proposed retaining walls, concrete pad, and internal brick sidewalks have the same curve number as paved parking lots.

Pre-development Calculations

The pre-development condition was modeled as one subcatchment to determine the net impact of the development.

- Subcatchment 1 – Rear property line to York Street.

A Pre-Development Watershed Map developed for this project can be viewed in Attachment A, and a copy of the HydroCAD calculations is included within Attachment C, or this report.

Peak flow rates for the storm events are as follows:

Table 4 – Pre-Development Peak Stormwater Flows

Drainage Area	2 – Year Storm Event (cfs)	10 – Year Storm Event (cfs)	25 – Year Storm Event (cfs)
York Street	0.05	0.3	0.5

Post-development Calculations:

The one predevelopment subcatchment was divided into three separate subcatchments for the post-development condition.

- Subcatchment 1 – Rooftop of the proposed building
- Subcatchment 2 – Rear driveway and landscaped areas
- Subcatchment 3 – Front sidewalks and landscaped areas

The post development calculations include changes to the land use and compensation provided by the subsurface BMP system. The following table represents comparison of predevelopment and post-development condition peak runoff rates for the proposed development and tributary area.

Table 5 – Comparison of Peak Flows						
Drainage Area	**2 – Year Storm Event (cfs)**		**10 – Year Storm Event (cfs)**		**25 – Year Storm Event (cfs)**	
York Street	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
	0.05	0.04	0.3	0.3	0.5	0.4

As shown in Table 5, the net impact of the post development peak flows shall remain at or below the predevelopment levels for the two-, ten-, and twenty-five-year storms.

A Post-Development Watershed Map created for this project can be viewed in Attachment B, and a copy of the HydroCAD calculations is included within Attachment C of this report.

SOILS

Onsite soil information includes the following:

- Soil Conservation Service Medium Intensity Soil Survey for Cumberland County

The existing soils are exclusively Hinckley throughout the site. The Hinckley soil series consists of very deep, excessively drained soils formed in glaciofluvial materials. The permeability of the Hinckley soil is rapid in the surface layer and subsoil and very rapid in the substratum, typically with a low groundwater table. Given the soils information as listed above, no onsite wastewater is proposed and the applicant does not intend to perform a more intense hydric soil boundary delineation or permeability test due to the waiver requirements set forth in the City of Portland Technical Manual – Section 7 – Soil Survey, Rev. 6/17/11 have been met. Acorn has used the conservative exfiltration rate of 2.41 in/hr when modeling the USSF system in HydroCAD.

The area within and surrounding the project includes soils types listed in the table below. The susceptibility of soils to erosion is indicated on a relative "K" scale of values over a range of 0.02 to 0.69. Higher "K" values indicate more erodible soils.

Table 3 - "K" Value		
Soils Type	**Subsurface**	**Substratum**
Hinckley	0.17	0.17

The soil "K" values for the soils, listed above, show a low susceptibility to erosion. The site's susceptibility to erosion is from the Soil Conservation Service Medium Intensity Soil Survey for Cumberland County. Although soil "K" values for the soils show a low susceptibility to erosion, implementation of the proposed Erosion & Sedimentation Measures by the contractor will still be of considerable importance.

Conclusion

The proposed development was designed to meet the requirements implemented by the MDEP under the Stormwater Management Statute (38 M.R.S.A. § 420-D) as well as the City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards. As a result, the design of the proposed development and stormwater system does not anticipate to create erosion, drainage or runoff problems either in the development or with respect to adjoining properties.

Attachments

Attachment A: Pre-Development Watershed Map
Attachment B: Post-Development Watershed Map
Attachment C: HydroCAD Calculations
Attachment D: Soils Map

GENERAL NOTES:

1. REFER TO STORMWATER REPORT FOR MORE INFORMATION
2. GIVEN THE URBAN SETTING, SMALL WATERSHED AREA AND PREDOMINANCE OF IMPERVIOUS AREAS A 5 MINUTE TIME OF CONCENTRATION WAS USED FOR BOTH THE PRE-DEVELOPMENT AND POST-DEVELOPMENT CONDITIONS.

1 — SUBCATCHMENT NUMBER

SUBCATCHMENT EXTENTS

POI #1 — POINT OF INTEREST (POI)

N/F
CBPC HOLDINGS, LLC
27715/23
44-B-15

N/F
RAJ & RAJ, LLC
26324/151
44-B-10

N/F
JEFFREY BOURKE &
MICHELLE BOURKE
24241/120
44-B-8

N/F
ERIC A. FORTIN
GUILFORD COURT
CONDOMINIUM UNIT 1A
26314/229
44-B-5

GUILFORD COURT
(PRIVATE)

YORK STREET
(PUBLIC)

CONCRETE WALL
LOOSE STONE RETAINING WALL
GRAVEL PARKING
EXISTING BUILDING
BRICKED PARKING
BRICK WALL
FLOWLINES, TYP.
DECK
EXISTING 2 STORY DWELLING
PAVED PARKING
CONCRETE PAD
CAPPED REBAR FND. #2205 DISTURBED
CAPPED REBAR FND. #2205 .3' A.G.
CAPPED REBAR FND. #2205 .8' A.G.
BORING 58.6'
BORING 57.6'
BORING 52'
BORING 51.2'
5 FOOT WIDE STRIP TO BE CONVEYED IN FEE TO YORK STREET REDEVELOPMENT, LLC WITH AN EASEMENT OVER THE SAME PARCEL TO BE CONVEYED TO THE GUILFORD CONDOMINIUM ASSOCIATION. PARCEL CONTAINS 660 S.F.
THE BUILDING APPEARS TO ECROACH ON AN EASEMENT "IN A STRIP OF LAND TO BE USED AS A 'DRIVEWAY'" RESERVED IN A DEED FROM ROSARY M. LAROCHELLE TO YACHA VOSBURGH DATED MAY 18, 1989 AND RECORDED AT CUMBERLAND COUNTY REGISTRY OF DEEDS IN BOOK 8761, PAGE 284.
13' WIDE DRIVEWAY EASEMENT TO BE EXTINGUISHED
N54°21'41"W 2.00
N35°01'53"E 25.09
S35°01'53"W 5.00
N54°21'41"W 130.00
S54°21'41"E 130.00
S35°01'53"W 84.89
MAG NAIL FOUND TBM: EL.=52.41' 297538.01 2928141.10
DRILL HOLE FOUND 297607.52 2928190.72
CB ELEV. = 49.7' INV. IN = 42.2' INV. OUT = 42.1
CATCH BASIN RIM = 41.2' INV = 33.9'
12" UD TYPE C
6" WATER LINE
36" EGG SHAPED SEWER LINE
SMH ELEV. = 41.2'
TELEPHONE 3 DUCT
GRANITE CURB
BRICK SIDEWALK
GAS
WSO
FA
W
S
D
G

PRELIMINARY
NOT ISSUED FOR CONSTRUCTION

ISSUED FOR	BY DATE
PRELIM. APP.	WHS 11/8/16

DRAWING NAME: PRE - DEVELOPMENT PLAN

PROJECT NAME: 161 YORK STREET REDEVELOPMENT

CLIENT: YORK STREET REDEVELOPMENT, LLC
42 MARKET STREET, PORTLAND, MAINE 04101

ACORN ENGINEERING, INC.

ACORN ENGINEERING, INC.
158 DANFORTH ST. PORTLAND, MAINE 04102
(207) 775-2655

FILE:	1074_CIVIL
JN:	1074
SCALE:	NTS
DESIGNED BY:	WHS
DRAWN BY:	SJL
CHECKED BY:	WHS

STATE OF MAINE
WILLIAM SAVAGE
No. 11416
11-8-16
REGISTERED PROFESSIONAL ENGINEER

DRAWING NO.
PRE

GENERAL NOTES:

1. REFER TO STORMWATER REPORT FOR MORE INFORMATION
2. GIVEN THE URBAN SETTING, SMALL WATERSHED AREA AND PREDOMINANCE OF IMPERVIOUS AREAS, A 5-MINUTE TIME OF CONCENTRATION WAS USED FOR BOTH THE PRE-DEVELOPMENT AND POST-DEVELOPMENT CONDITIONS.

1 — SUBCATCHMENT NUMBER

SUBCATCHMENT EXTENTS

UNDERDRAIN

GUILFORD COURT
(PRIVATE)

MARGARET M. BUSBY
26375/142
44-B-13

N/F
CBPC HOLDINGS, LLC
27715/23
44-B-15

N/F
RAJ & RAJ, LLC
26324/151
44-B-10

N/F
ERIC A. FORTIN
GUILFORD COURT
CONDOMINIUM UNIT 1A
26314/229
44-B-5

N/F
JEFFREY BOURKE &
MICHELLE BOURKE
24241/120
44-B-8

POND 1: USSF BMP

GARAGE LEVEL

RE-CYCLE
MECH
JAN.
SPRINKLER
ELEC
EMR
EMR
LOBBY
MAIL

BORING 58.6'

CONCRETE WALL
CONCRETE PAD
GAS
GRAVEL PARKING
PAVED PARKING
EXISTING BUILDING
BRICKED PARKING

5 FOOT WIDE STRIP TO BE CONVEYED IN FEE TO YORK STREET REDEVELOPMENT, LLC WITH AN EASEMENT OVER THE SAME PARCEL TO BE THE GUILFORD CONDOMINIUM PARCEL CONTAINS 680 S.F.

FLOWLINES, TYP.

THE BUILDING APPEARS TO ECROACH ON AN EASEMENT "IN A STRIP OF LAND TO BE USED AS A DRIVEWAY" RESERVED IN A DEED FROM ROSARY M. LAROCHELLE TO TACHA VOSBURGH DATED MAY 18, 1989 AND RECORDED AT CUMBERLAND COUNTY REGISTRY OF DEEDS IN BOOK 8761, PAGE 284.

MAG. NAIL FOUND
TBM: EL.=52.41'
297538.01
2928141.10

GRANITE CURB

CB ELEV. = 49.7'
INV. IN = 42.2'
INV. OUT = 42.1

DRILL HOLE FOUND
297687.52
2928190.72

TELEPHONE 3 DUCT
FIRE ALARM
6" WATER LINE
12" UD TYPE C
CATCH BASIN
RIM = 41.2'
INV = 33.9'

YORK STREET
(PUBLIC)

PRELIMINARY
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR	BY
PRELIM. APP.	WHS 11/8/16

DRAWING NAME: POST - DEVELOPMENT PLAN

PROJECT NAME: 161 YORK STREET REDEVELOPMENT

CLIENT: YORK STREET REDEVELOPMENT, LLC
42 MARKET STREET, PORTLAND, MAINE 04101

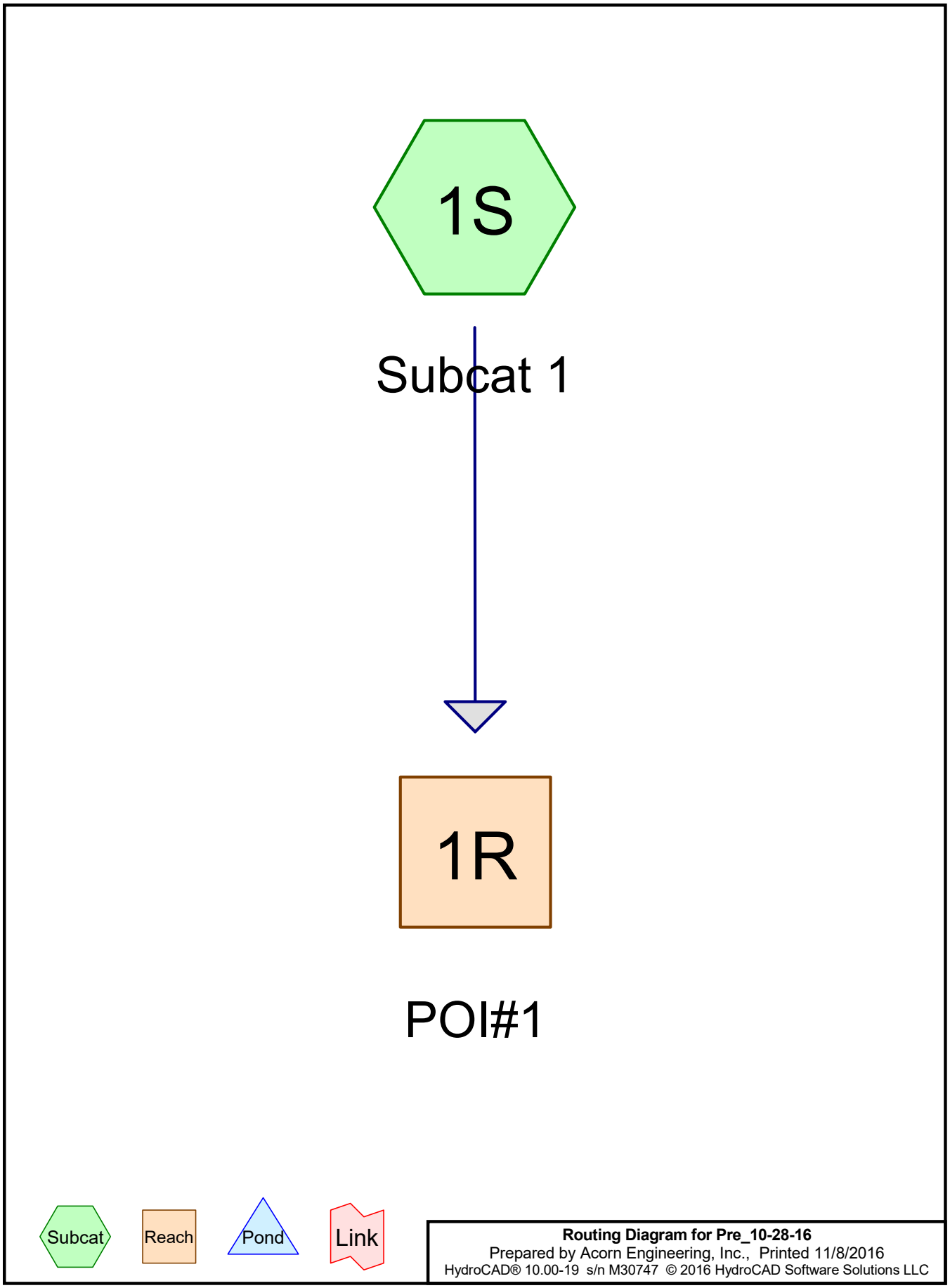
ACORN ENGINEERING, INC.

ACORN ENGINEERING, INC.
158 DANFORTH ST PORTLAND, MAINE 04102
(207) 775-2455

FILE:	1074_CIVIL
JN:	1074
SCALE:	NTS
DESIGNED BY:	WHS
DRAWN BY:	SJL
CHECKED BY:	WHS

STATE OF MAINE
WILLIAM H. SAVAGE
NO. 11415
11-8-16
LICENSED PROFESSIONAL ENGINEER

DRAWING NO.
POST


1S
Subcat 1
1R
POI#1
Subcat
Reach
Pond
Link
Routing Diagram for Pre_10-28-16
Prepared by Acorn Engineering, Inc., Printed 11/8/2016
HydroCAD® 10.00-19 s/n M30747 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.047	98	Roofs (1S)
0.176	43	Woods/grass comb., Fair, HSG A (1S)
0.026	98	sidewalk/pavement (1S)
0.002	98	walls concrete pad (1S)
0.251	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.176	HSG A	1S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.075	Other	1S
0.251		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.047	0.047	Roofs	1S
0.176	0.000	0.000	0.000	0.000	0.176	Woods/grass comb., Fair	1S
0.000	0.000	0.000	0.000	0.026	0.026	sidewalk/pavement	1S
0.000	0.000	0.000	0.000	0.002	0.002	walls concrete pad	1S
0.176	**0.000**	**0.000**	**0.000**	**0.075**	**0.251**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1S: Subcat 1 Runoff Area=10,935 sf 29.78% Impervious Runoff Depth=0.34"
Tc=5.0 min CN=59 Runoff=0.05 cfs 0.007 af

Reach 1R: POI#1 Inflow=0.05 cfs 0.007 af
Outflow=0.05 cfs 0.007 af

Total Runoff Area = 0.251 ac Runoff Volume = 0.007 af Average Runoff Depth = 0.34"
70.22% Pervious = 0.176 ac 29.78% Impervious = 0.075 ac

Summary for Subcatchment 1S: Subcat 1

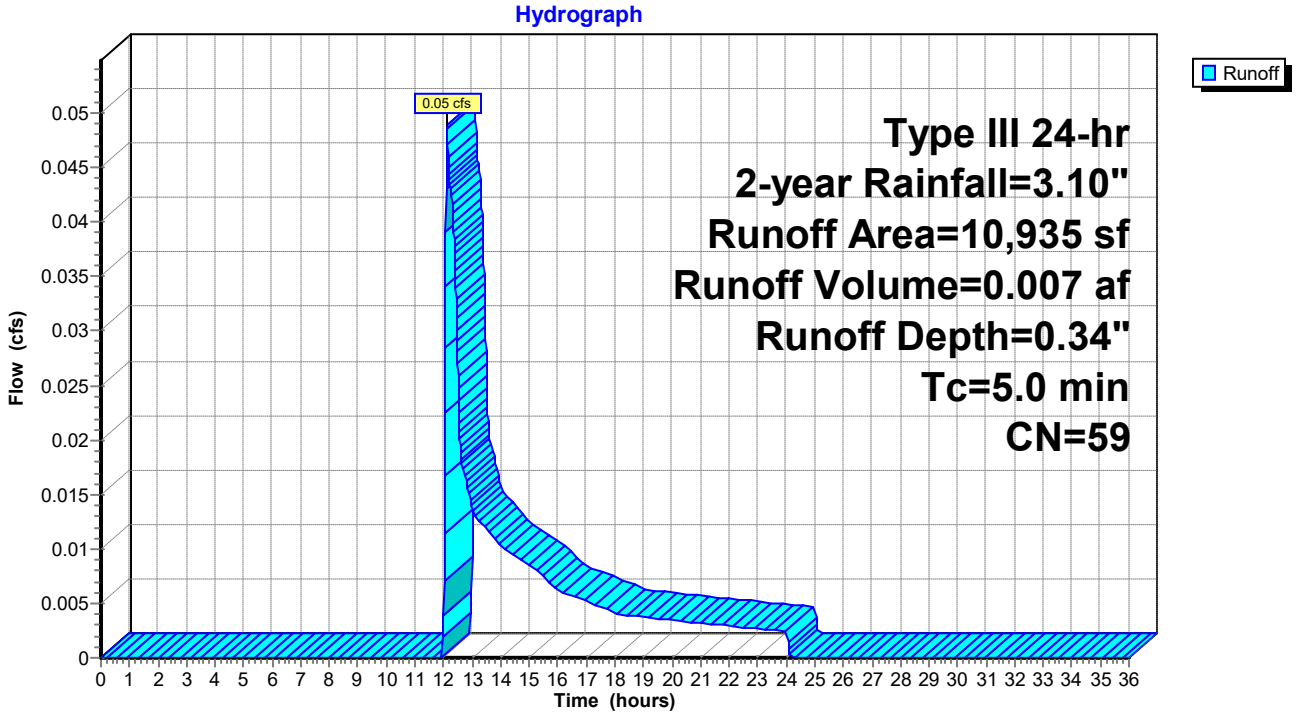
Runoff = 0.05 cfs @ 12.12 hrs, Volume= 0.007 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	2,039	98	Roofs
*	1,135	98	sidewalk/pavement
*	82	98	walls concrete pad
	7,679	43	Woods/grass comb., Fair, HSG A
	10,935	59	Weighted Average
	7,679		70.22% Pervious Area
	3,256		29.78% Impervious Area

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

Subcatchment 1S: Subcat 1



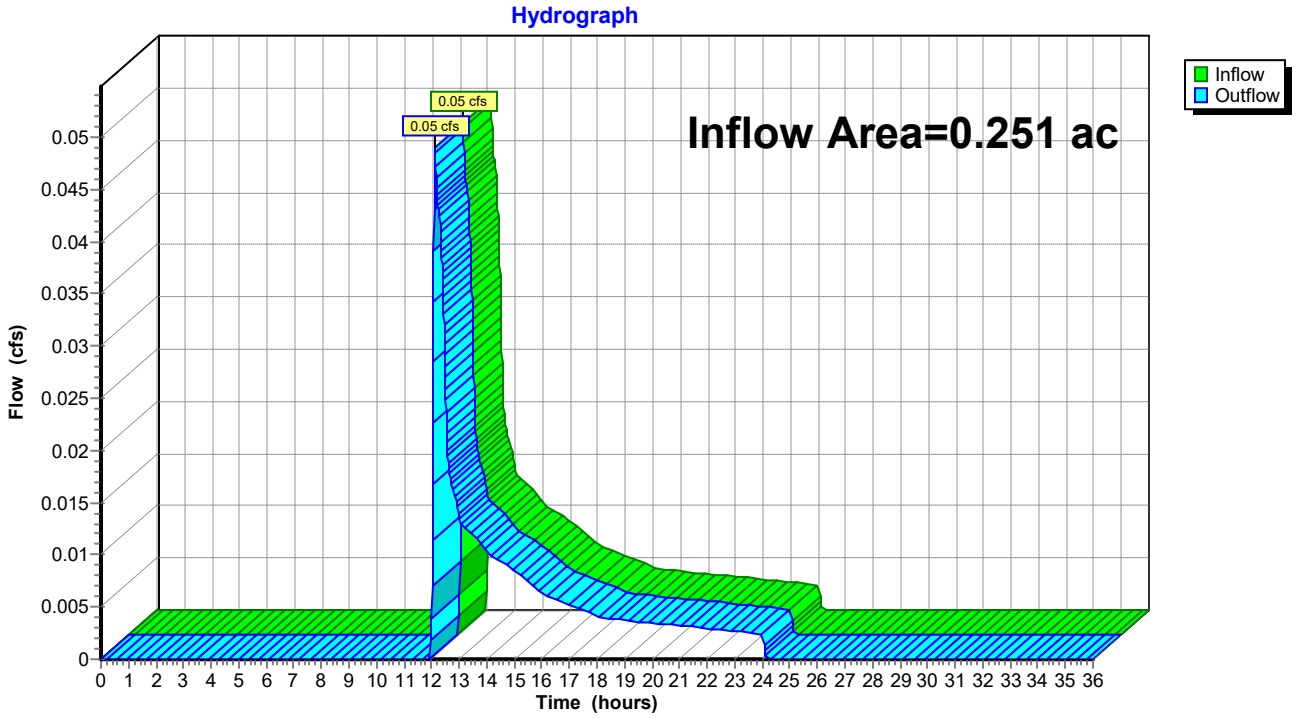
Summary for Reach 1R: POI#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.251 ac, 29.78% Impervious, Inflow Depth = 0.34" for 2-year event
Inflow = 0.05 cfs @ 12.12 hrs, Volume= 0.007 af
Outflow = 0.05 cfs @ 12.12 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: POI#1



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1S: Subcat 1 Runoff Area=10,935 sf 29.78% Impervious Runoff Depth=1.01"
Tc=5.0 min CN=59 Runoff=0.26 cfs 0.021 af

Reach 1R: POI#1 Inflow=0.26 cfs 0.021 af
Outflow=0.26 cfs 0.021 af

Total Runoff Area = 0.251 ac Runoff Volume = 0.021 af Average Runoff Depth = 1.01"
70.22% Pervious = 0.176 ac 29.78% Impervious = 0.075 ac

Summary for Subcatchment 1S: Subcat 1

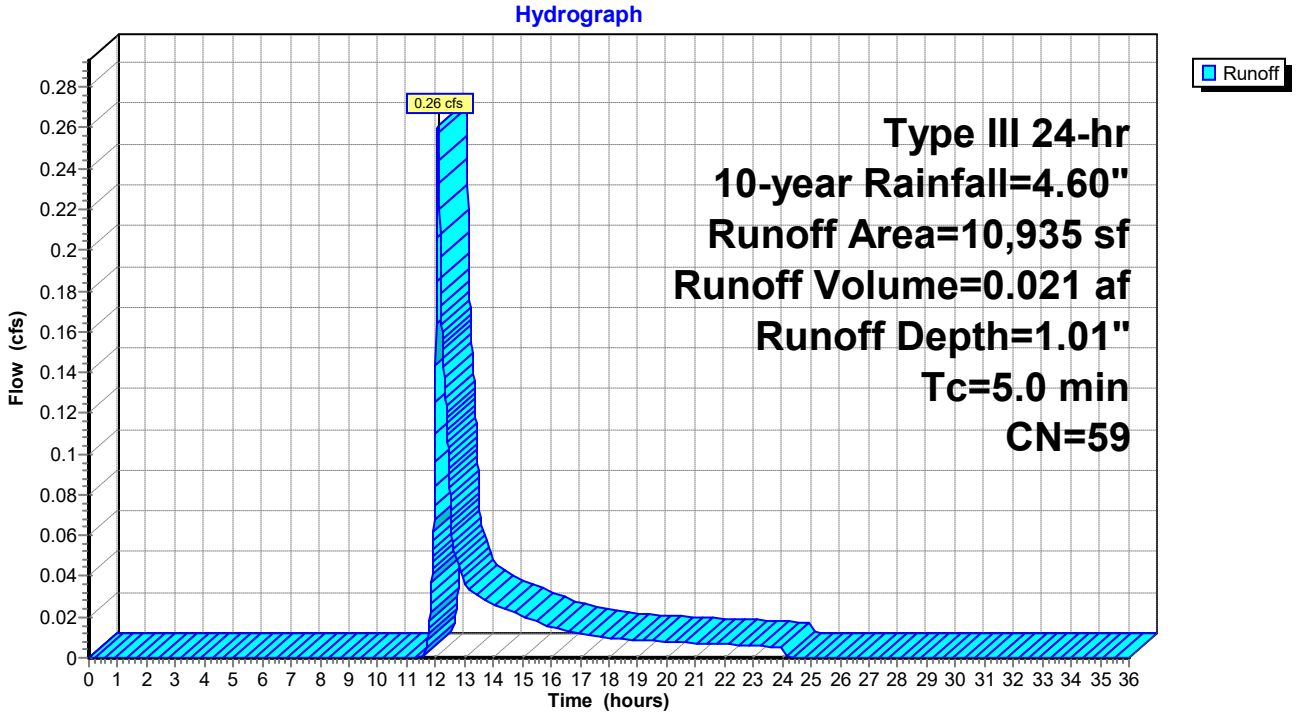
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.021 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	2,039	98	Roofs
*	1,135	98	sidewalk/pavement
*	82	98	walls concrete pad
	7,679	43	Woods/grass comb., Fair, HSG A
	10,935	59	Weighted Average
	7,679		70.22% Pervious Area
	3,256		29.78% Impervious Area

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

Subcatchment 1S: Subcat 1



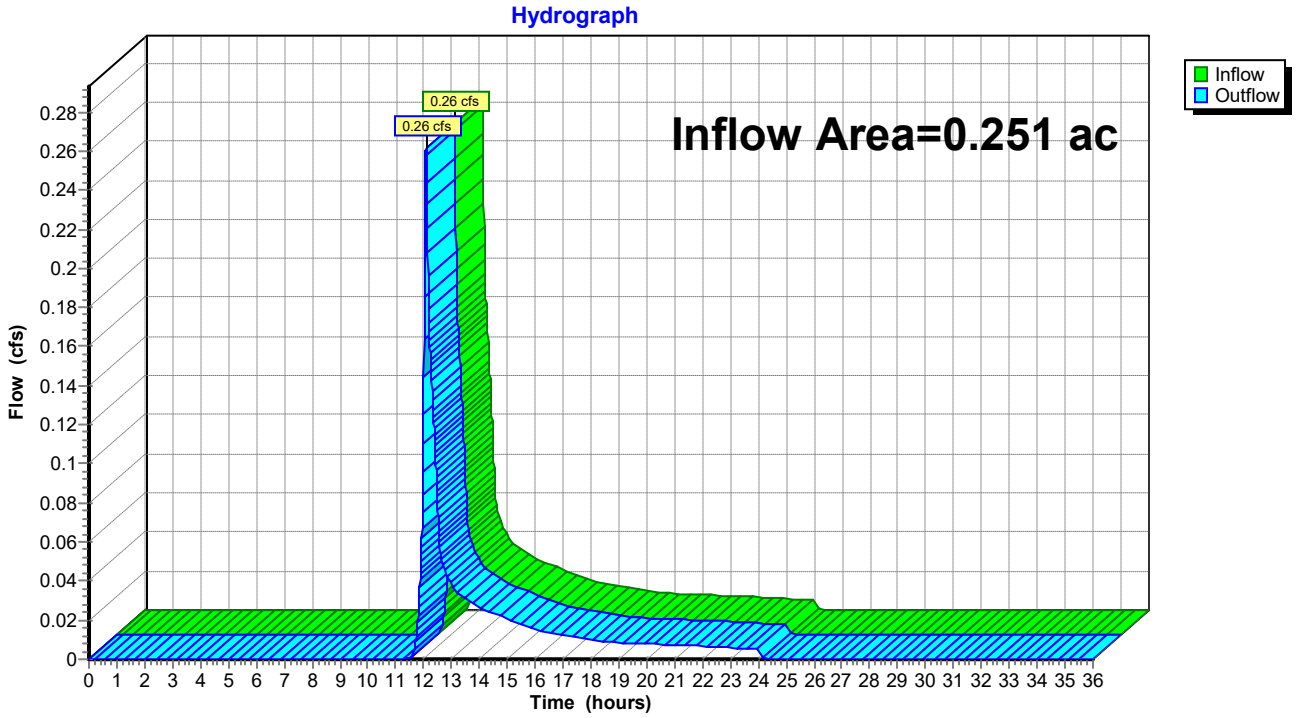
Summary for Reach 1R: POI#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.251 ac, 29.78% Impervious, Inflow Depth = 1.01" for 10-year event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.021 af
Outflow = 0.26 cfs @ 12.09 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: POI#1



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 1S: Subcat 1 Runoff Area=10,935 sf 29.78% Impervious Runoff Depth=1.71"
Tc=5.0 min CN=59 Runoff=0.49 cfs 0.036 af

Reach 1R: POI#1 Inflow=0.49 cfs 0.036 af
Outflow=0.49 cfs 0.036 af

Total Runoff Area = 0.251 ac Runoff Volume = 0.036 af Average Runoff Depth = 1.71"
70.22% Pervious = 0.176 ac 29.78% Impervious = 0.075 ac

Summary for Subcatchment 1S: Subcat 1

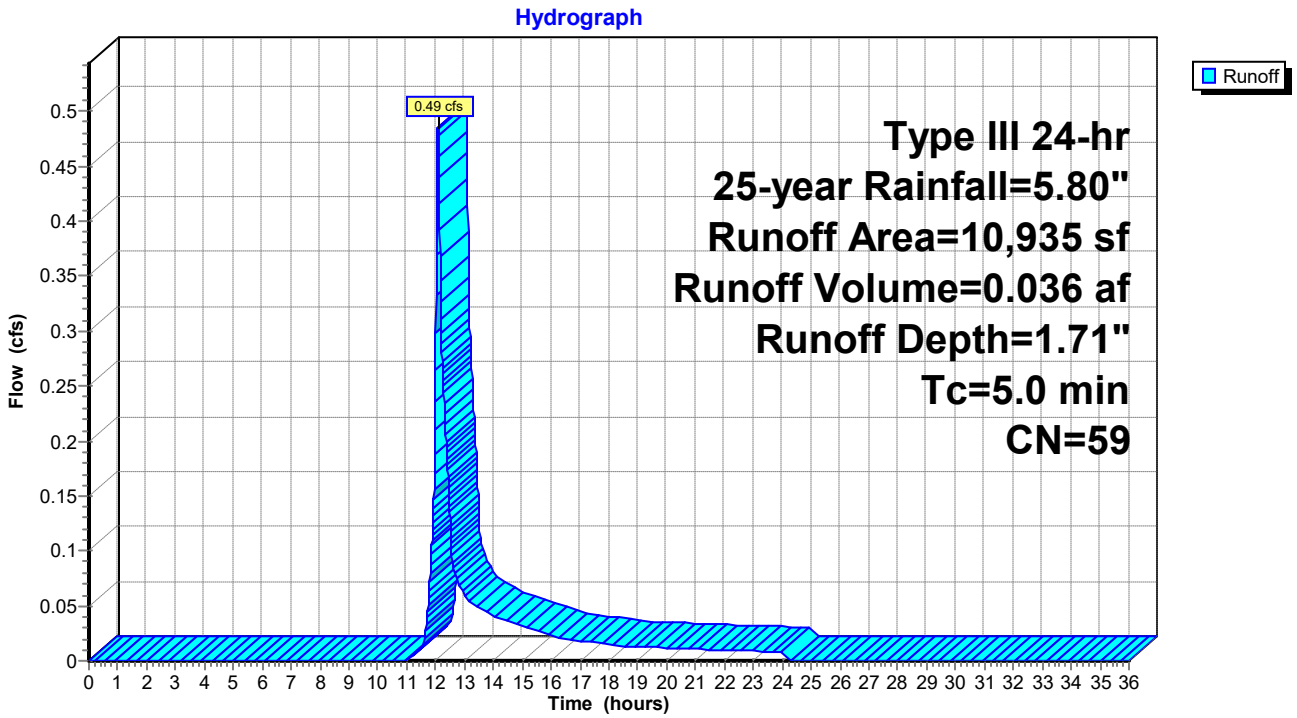
Runoff = 0.49 cfs @ 12.08 hrs, Volume= 0.036 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	2,039	98	Roofs
*	1,135	98	sidewalk/pavement
*	82	98	walls concrete pad
	7,679	43	Woods/grass comb., Fair, HSG A
	10,935	59	Weighted Average
	7,679		70.22% Pervious Area
	3,256		29.78% Impervious Area

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

Subcatchment 1S: Subcat 1



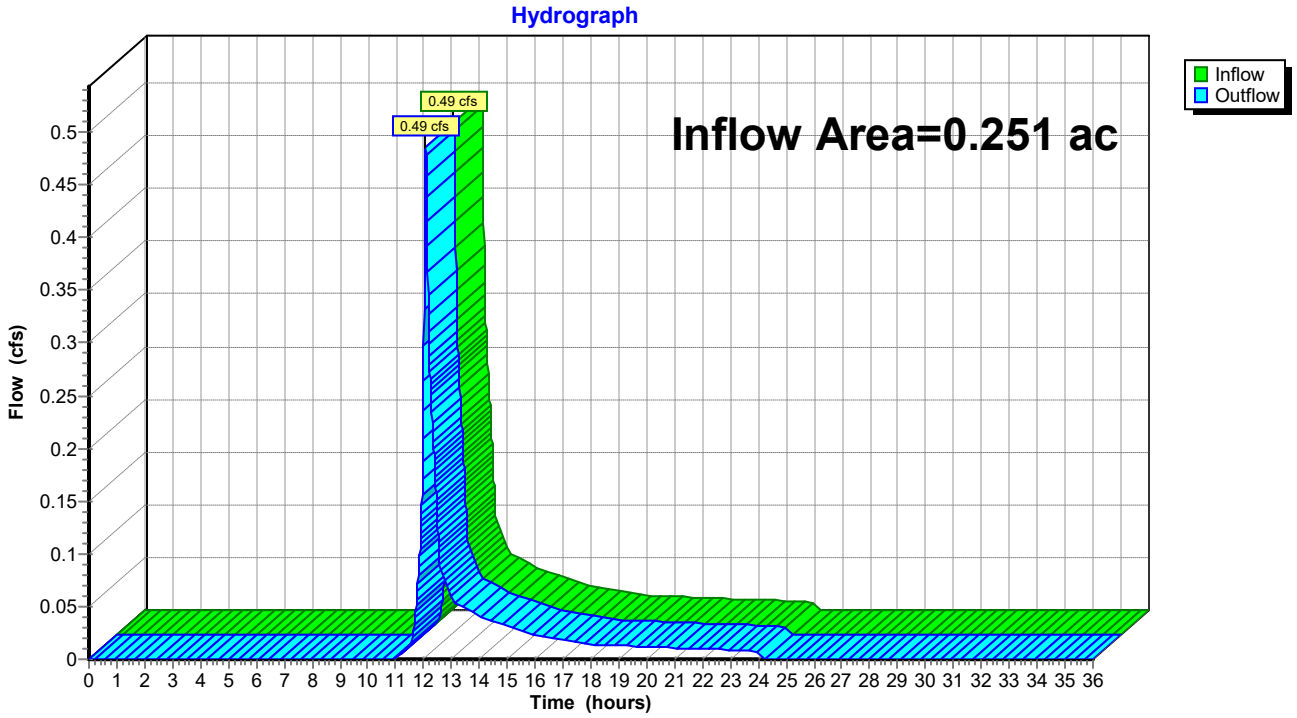
Summary for Reach 1R: POI#1

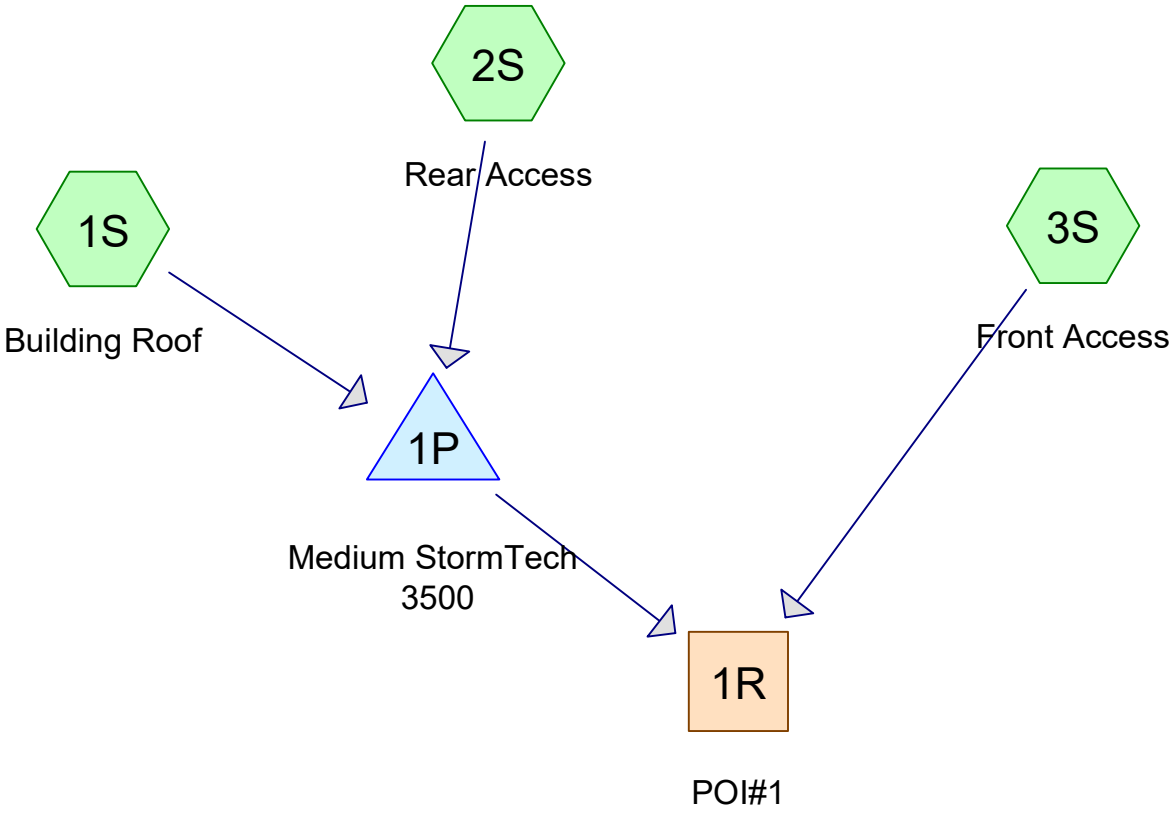
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.251 ac, 29.78% Impervious, Inflow Depth = 1.71" for 25-year event
Inflow = 0.49 cfs @ 12.08 hrs, Volume= 0.036 af
Outflow = 0.49 cfs @ 12.08 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: POI#1





Subcat Reach Pond Link

Routing Diagram for Post_11-7-16
Prepared by Acorn Engineering, Inc., Printed 11/8/2016

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.001	98	Brick (2S)
0.030	98	Driveway (2S)
0.026	98	Driveway, Sidewalks, Walls, etc (3S)
0.144	98	Roofs, HSG A (1S)
0.001	98	Wall (2S)
0.051	32	Woods/grass comb., Good, HSG A (2S, 3S)
0.251	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.194	HSG A	1S, 2S, 3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.057	Other	2S, 3S
0.251		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.001	0.001	Brick	2S
0.000	0.000	0.000	0.000	0.030	0.030	Driveway	2S
0.000	0.000	0.000	0.000	0.026	0.026	Driveway, Sidewalks, Walls, etc	3S
0.144	0.000	0.000	0.000	0.000	0.144	Roofs	1S
0.000	0.000	0.000	0.000	0.001	0.001	Wall	2S
0.051	0.000	0.000	0.000	0.000	0.051	Woods/grass comb., Good	2S, 3S
0.194	**0.000**	**0.000**	**0.000**	**0.057**	**0.251**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	50.60	40.00	125.0	0.0848	0.010	12.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.001 hrs, 48001 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 1S: Building Roof Runoff Area=6,264 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=98 Runoff=0.45 cfs 0.034 af

Subcatchment 2S: Rear Access Runoff Area=2,419 sf 55.68% Impervious Runoff Depth=0.72"
Tc=5.0 min CN=69 Runoff=0.04 cfs 0.003 af

Subcatchment 3S: Front Access Runoff Area=2,253 sf 49.80% Impervious Runoff Depth=0.55"
Tc=5.0 min CN=65 Runoff=0.03 cfs 0.002 af

Reach 1R: POI#1 Inflow=0.04 cfs 0.039 af
Outflow=0.04 cfs 0.039 af

Pond 1P: Medium StormTech 3500 Peak Elev=55.50' Storage=0.022 af Inflow=0.49 cfs 0.038 af
Outflow=0.04 cfs 0.037 af

Total Runoff Area = 0.251 ac Runoff Volume = 0.040 af Average Runoff Depth = 1.92"
20.14% Pervious = 0.051 ac 79.86% Impervious = 0.200 ac

Summary for Subcatchment 1S: Building Roof

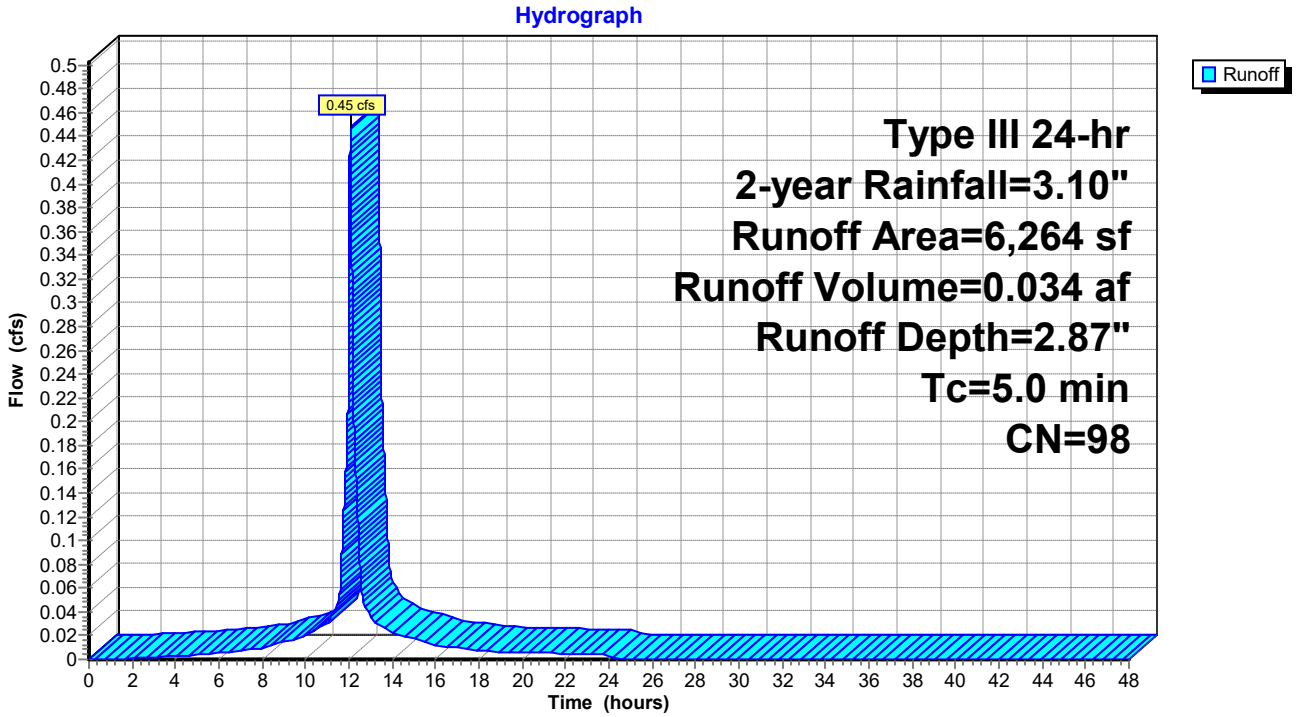
Runoff = 0.45 cfs @ 12.07 hrs, Volume= 0.034 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
6,264	98	Roofs, HSG A
6,264		100.00% Impervious Area

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

Subcatchment 1S: Building Roof



Summary for Subcatchment 2S: Rear Access

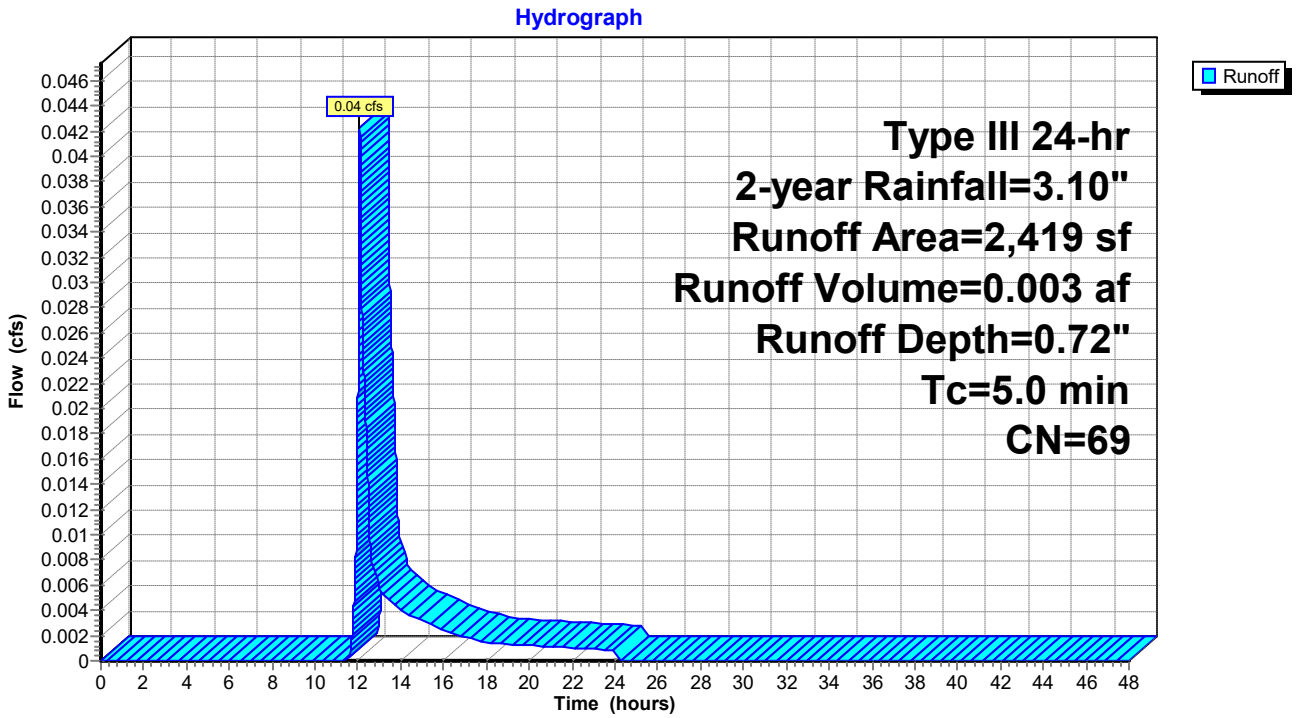
Runoff = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,295	98	Driveway
*	28	98	Wall
*	24	98	Brick
	1,072	32	Woods/grass comb., Good, HSG A
	2,419	69	Weighted Average
	1,072		44.32% Pervious Area
	1,347		55.68% Impervious Area

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

Subcatchment 2S: Rear Access



Summary for Subcatchment 3S: Front Access

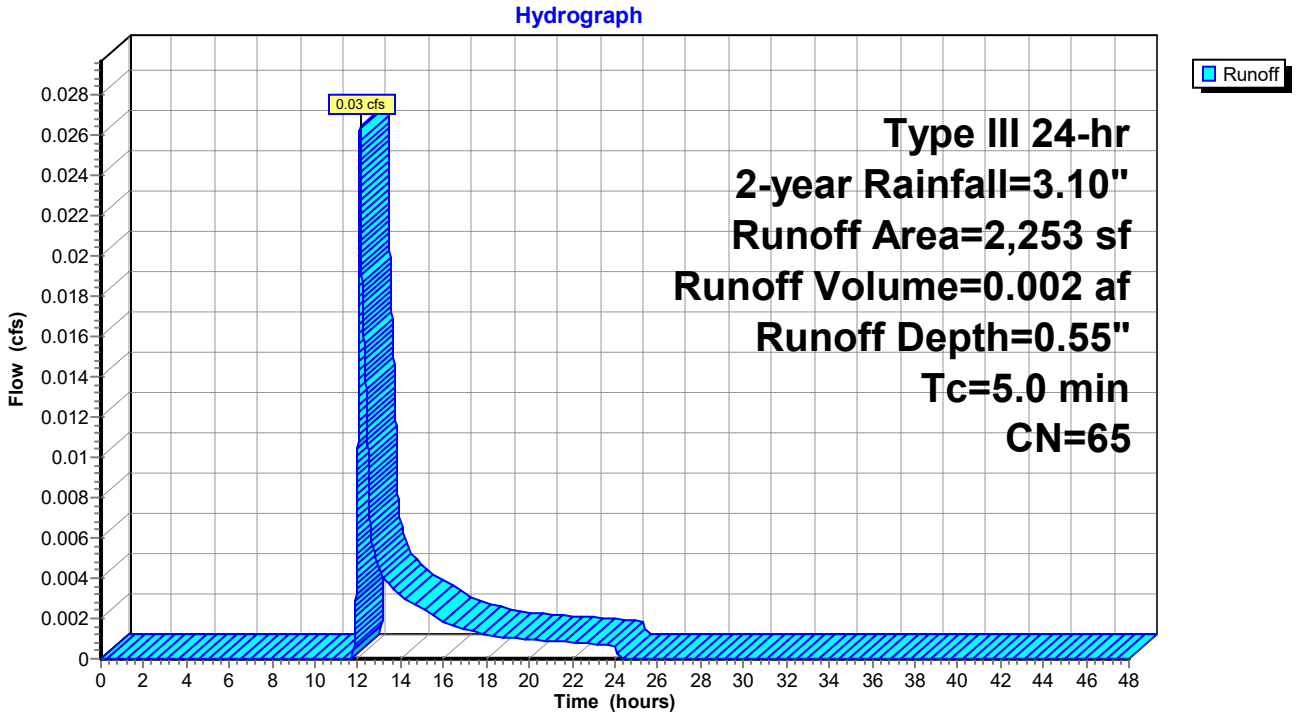
Runoff = 0.03 cfs @ 12.09 hrs, Volume= 0.002 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,122	98	Driveway, Sidewalks, Walls, etc
	1,131	32	Woods/grass comb., Good, HSG A
	2,253	65	Weighted Average
	1,131		50.20% Pervious Area
	1,122		49.80% Impervious Area

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

Subcatchment 3S: Front Access



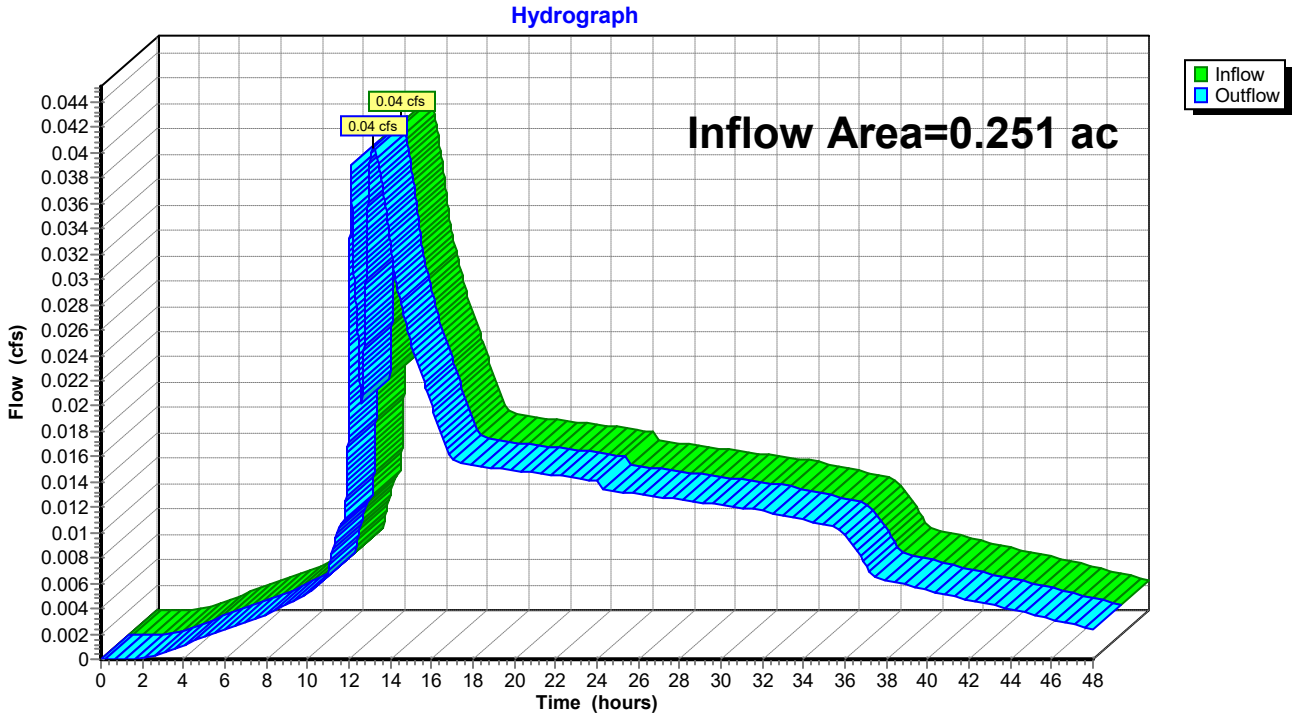
Summary for Reach 1R: POI#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.251 ac, 79.86% Impervious, Inflow Depth > 1.89" for 2-year event
Inflow = 0.04 cfs @ 13.18 hrs, Volume= 0.039 af
Outflow = 0.04 cfs @ 13.18 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs

Reach 1R: POI#1



Summary for Pond 1P: Medium StormTech 3500

Inflow Area = 0.199 ac, 87.65% Impervious, Inflow Depth = 2.27" for 2-year event
Inflow = 0.49 cfs @ 12.07 hrs, Volume= 0.038 af
Outflow = 0.04 cfs @ 13.21 hrs, Volume= 0.037 af, Atten= 93%, Lag= 68.0 min
Primary = 0.04 cfs @ 13.21 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Peak Elev= 55.50' @ 13.21 hrs Surf.Area= 0.034 ac Storage= 0.022 af

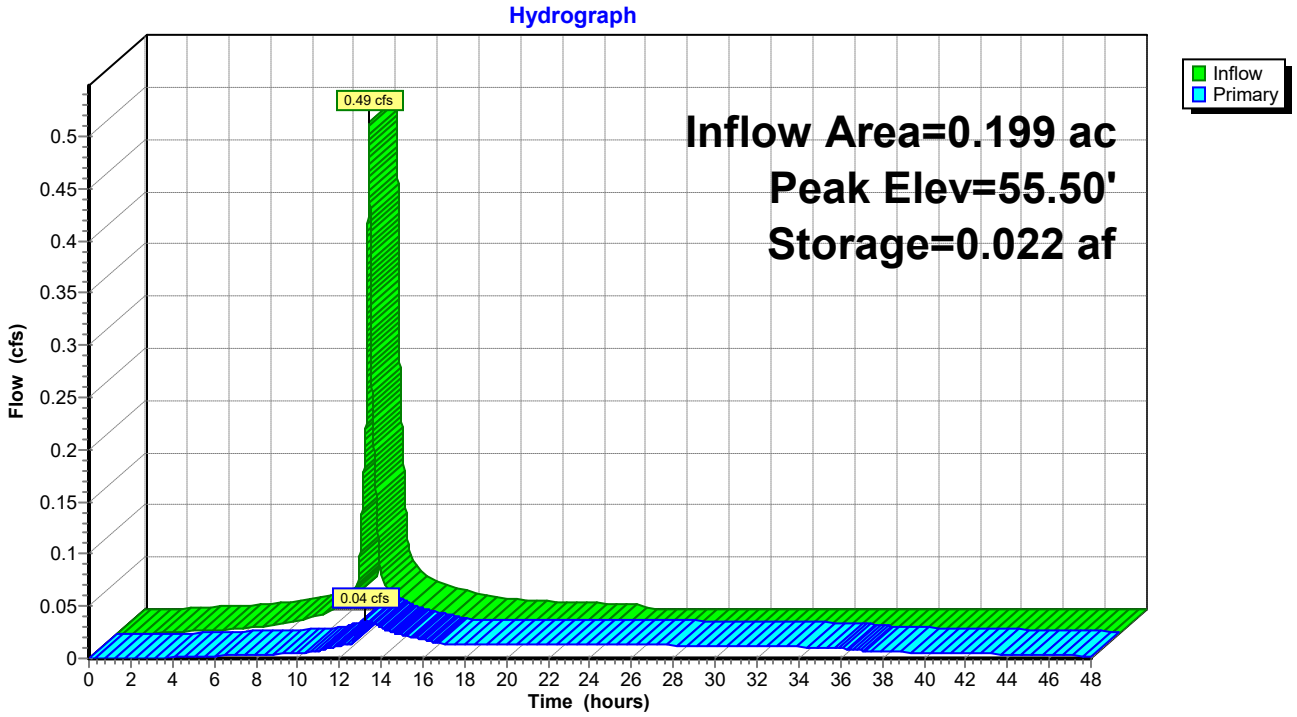
Plug-Flow detention time= 663.8 min calculated for 0.037 af (98% of inflow)
Center-of-Mass det. time= 653.0 min (1,420.2 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	53.21'	0.016 af	**8.42'W x 58.14'L x 5.00'H Stone** 0.056 af Overall - 0.017 af Embedded = 0.040 af x 40.0% Voids
#2	53.96'	0.017 af	**ADS_StormTech MC-3500 d +Cap** x 6 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 2 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
#3	51.71'	0.001 af	**8.42'W x 58.14'L x 1.50'H Sand** 0.017 af Overall x 5.0% Voids
#4	50.71'	0.004 af	**8.42'W x 58.14'L x 1.00'H Crushed Stone** 0.011 af Overall - 0.000 af Embedded = 0.011 af x 40.0% Voids
#5	51.04'	0.000 af	**4.0" Round Underdrain Storage** Inside #4 L= 58.0'
#6	52.13'	0.002 af	**4.00'D x 8.12'H Catch Basin**
		0.040 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	**12.0" Round Culvert** L= 125.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.60' / 40.00' S= 0.0848 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	50.70'	**0.5" Vert. Vert Water Quality** C= 0.600
#3	Device 1	55.40'	**3.0" Vert. Vert Quantity** C= 0.600
#4	Device 1	58.00'	**6.0' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=0.04 cfs @ 13.21 hrs HW=55.50' (Free Discharge)
└**1=Culvert** (Passes 0.04 cfs of 6.26 cfs potential flow)
  ├**2=Vert Water Quality** (Orifice Controls 0.01 cfs @ 10.53 fps)
  ├**3=Vert Quantity** (Orifice Controls 0.02 cfs @ 1.10 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Medium StormTech 3500



Time span=0.00-48.00 hrs, dt=0.001 hrs, 48001 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 1S: Building Roof Runoff Area=6,264 sf 100.00% Impervious Runoff Depth=4.36"
Tc=5.0 min CN=98 Runoff=0.67 cfs 0.052 af

Subcatchment 2S: Rear Access Runoff Area=2,419 sf 55.68% Impervious Runoff Depth=1.67"
Tc=5.0 min CN=69 Runoff=0.11 cfs 0.008 af

Subcatchment 3S: Front Access Runoff Area=2,253 sf 49.80% Impervious Runoff Depth=1.39"
Tc=5.0 min CN=65 Runoff=0.08 cfs 0.006 af

Reach 1R: POI#1 Inflow=0.25 cfs 0.065 af
Outflow=0.25 cfs 0.065 af

Pond 1P: Medium StormTech 3500 Peak Elev=56.25' Storage=0.028 af Inflow=0.78 cfs 0.060 af
Outflow=0.22 cfs 0.059 af

Total Runoff Area = 0.251 ac Runoff Volume = 0.066 af Average Runoff Depth = 3.16"
20.14% Pervious = 0.051 ac 79.86% Impervious = 0.200 ac

Summary for Subcatchment 1S: Building Roof

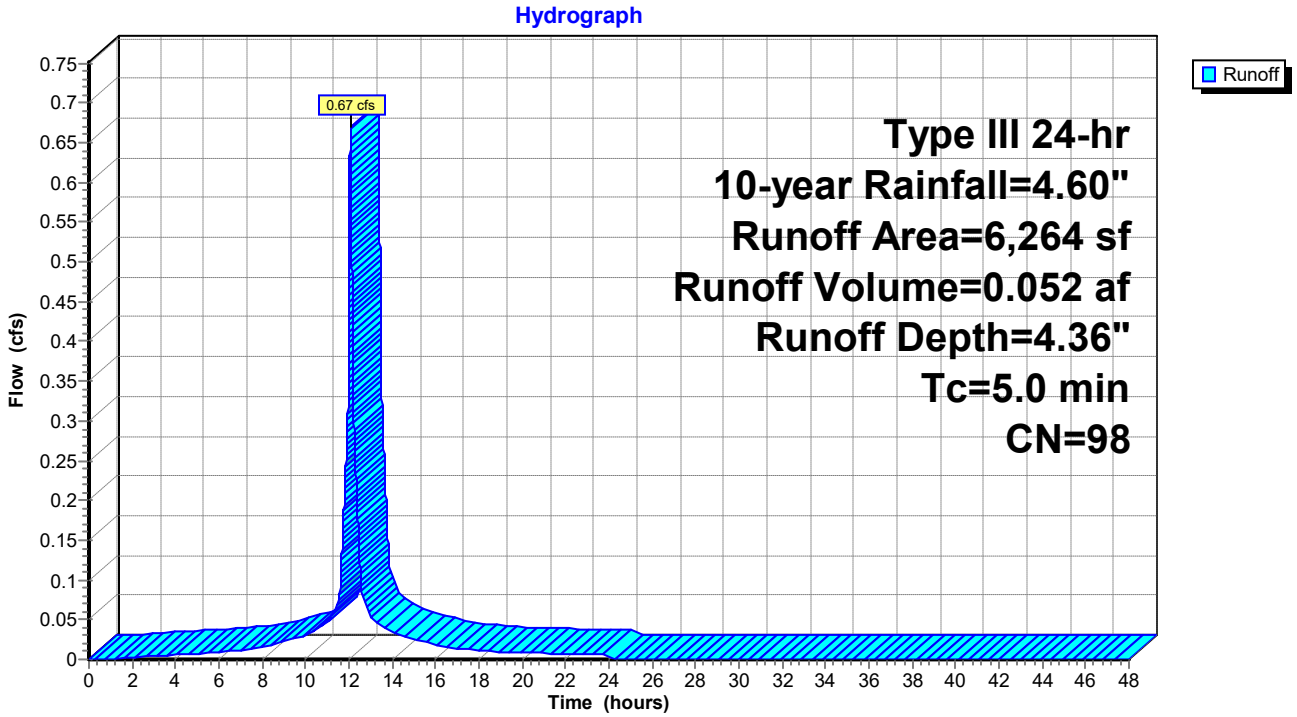
Runoff = 0.67 cfs @ 12.07 hrs, Volume= 0.052 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
6,264	98	Roofs, HSG A
6,264		100.00% Impervious Area

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

Subcatchment 1S: Building Roof



Summary for Subcatchment 2S: Rear Access

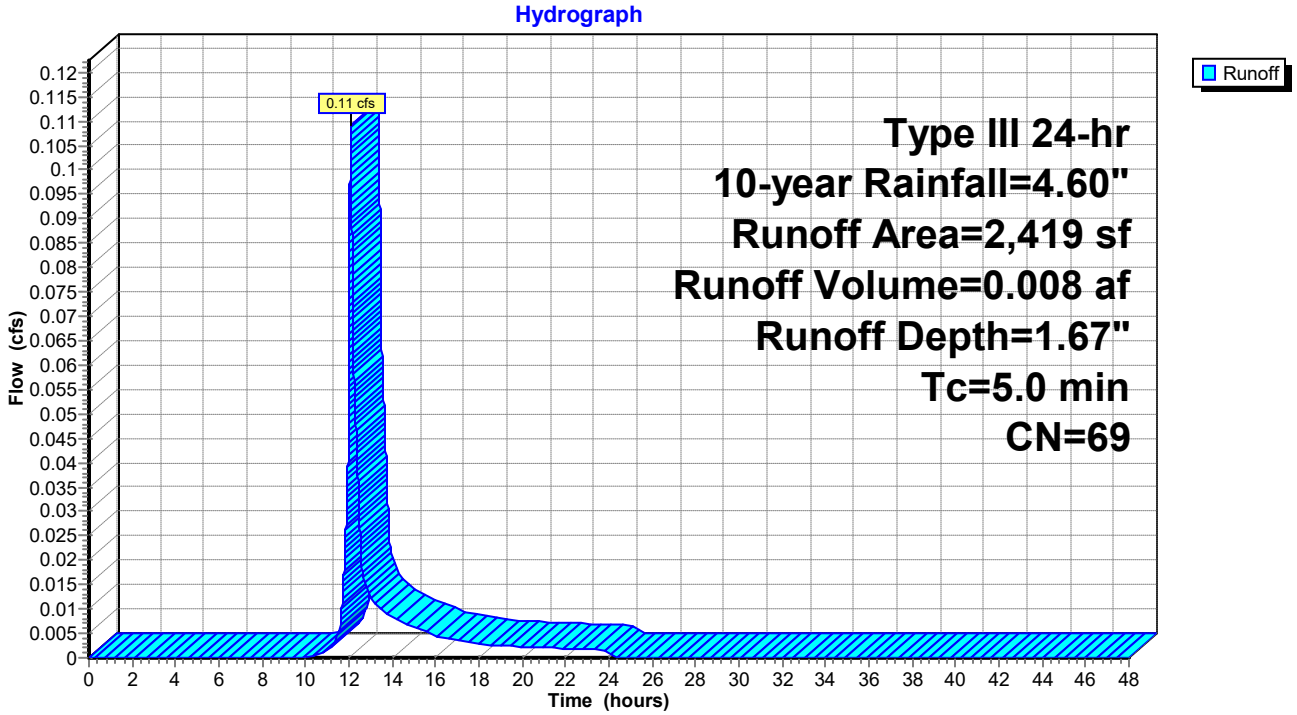
Runoff = 0.11 cfs @ 12.08 hrs, Volume= 0.008 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	1,295	98	Driveway
*	28	98	Wall
*	24	98	Brick
	1,072	32	Woods/grass comb., Good, HSG A
	2,419	69	Weighted Average
	1,072		44.32% Pervious Area
	1,347		55.68% Impervious Area

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

Subcatchment 2S: Rear Access



Summary for Subcatchment 3S: Front Access

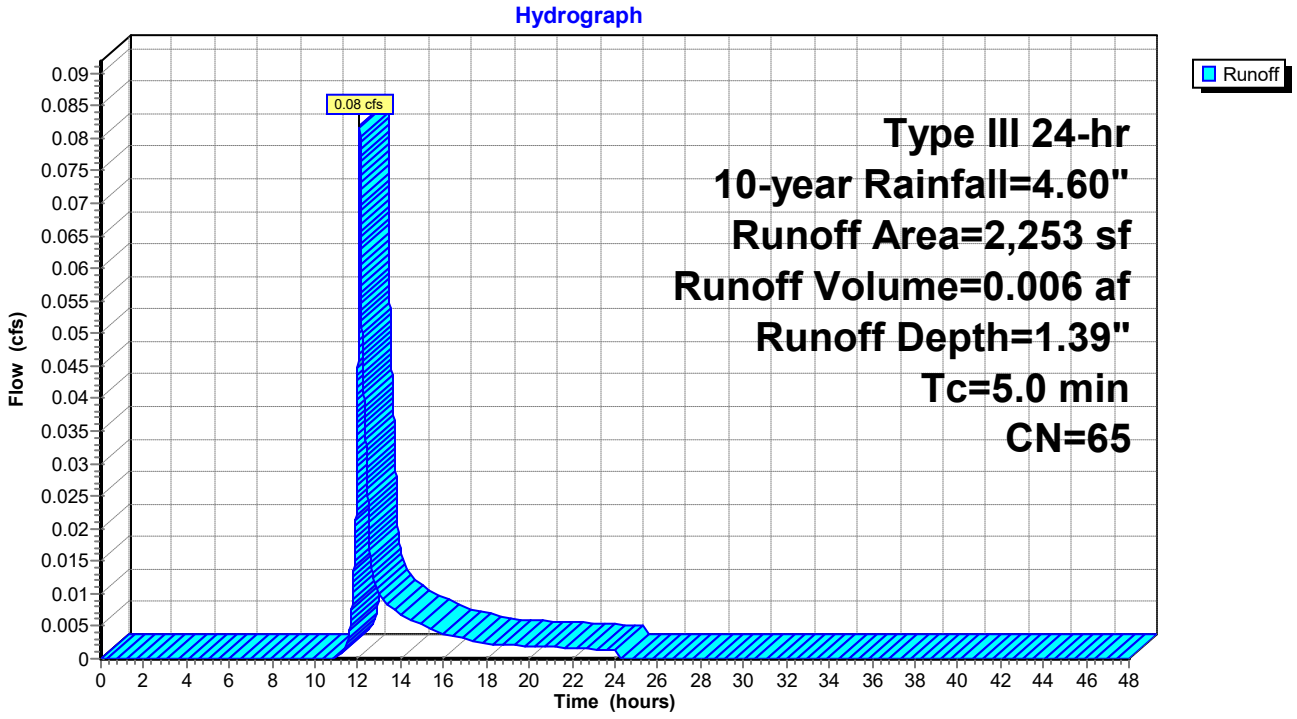
Runoff = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	1,122	98	Driveway, Sidewalks, Walls, etc
	1,131	32	Woods/grass comb., Good, HSG A
	2,253	65	Weighted Average
	1,131		50.20% Pervious Area
	1,122		49.80% Impervious Area

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

Subcatchment 3S: Front Access



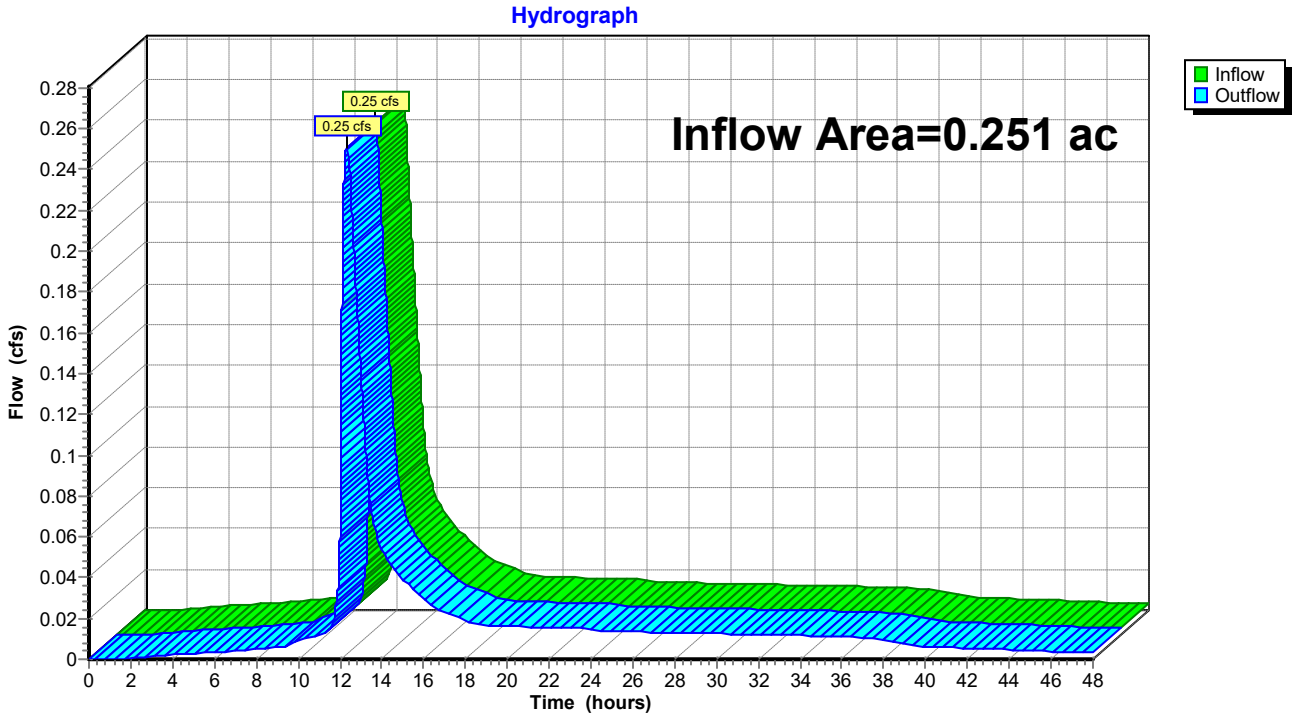
Summary for Reach 1R: POI#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.251 ac, 79.86% Impervious, Inflow Depth > 3.11" for 10-year event
Inflow = 0.25 cfs @ 12.34 hrs, Volume= 0.065 af
Outflow = 0.25 cfs @ 12.34 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs

Reach 1R: POI#1



Summary for Pond 1P: Medium StormTech 3500

Inflow Area = 0.199 ac, 87.65% Impervious, Inflow Depth = 3.61" for 10-year event
Inflow = 0.78 cfs @ 12.07 hrs, Volume= 0.060 af
Outflow = 0.22 cfs @ 12.41 hrs, Volume= 0.059 af, Atten= 72%, Lag= 20.0 min
Primary = 0.22 cfs @ 12.41 hrs, Volume= 0.059 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Peak Elev= 56.25' @ 12.41 hrs Surf.Area= 0.034 ac Storage= 0.028 af

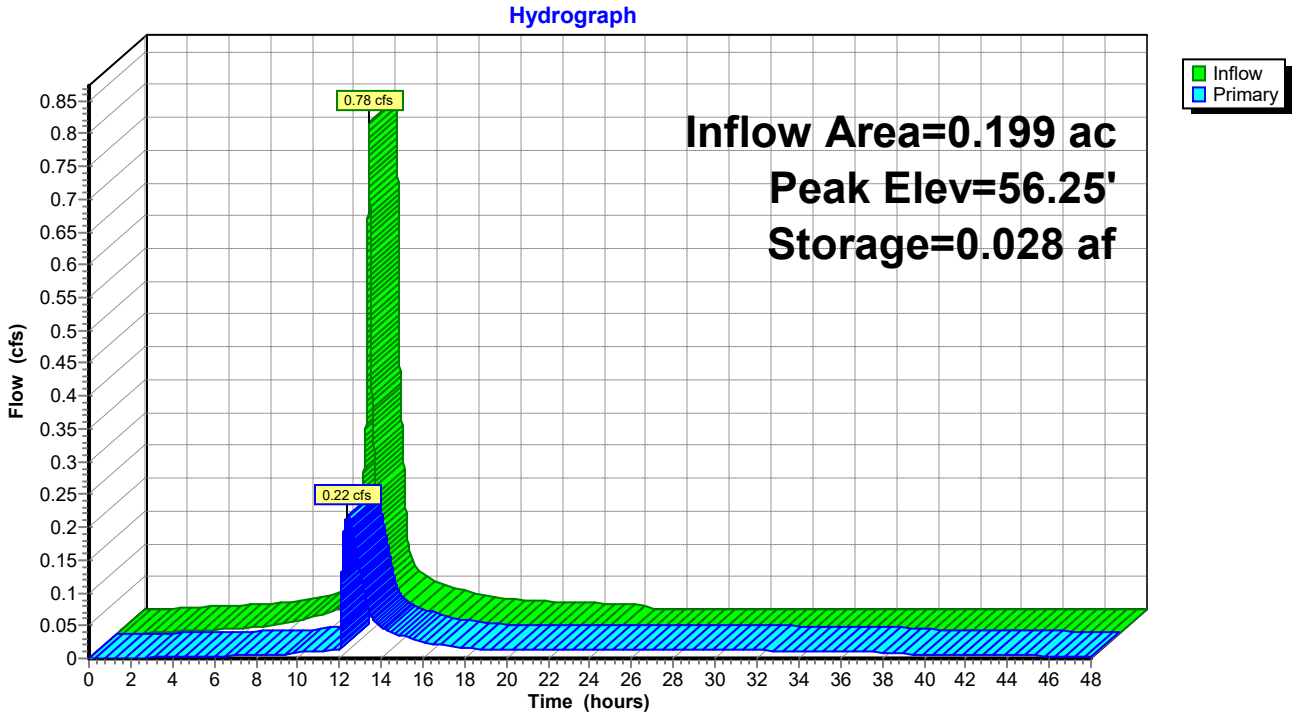
Plug-Flow detention time= 471.5 min calculated for 0.059 af (98% of inflow)
Center-of-Mass det. time= 460.2 min (1,222.3 - 762.1)

Volume	Invert	Avail.Storage	Storage Description
#1	53.21'	0.016 af	**8.42'W x 58.14'L x 5.00'H Stone** 0.056 af Overall - 0.017 af Embedded = 0.040 af x 40.0% Voids
#2	53.96'	0.017 af	**ADS_StormTech MC-3500 d +Cap** x 6 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 2 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
#3	51.71'	0.001 af	**8.42'W x 58.14'L x 1.50'H Sand** 0.017 af Overall x 5.0% Voids
#4	50.71'	0.004 af	**8.42'W x 58.14'L x 1.00'H Crushed Stone** 0.011 af Overall - 0.000 af Embedded = 0.011 af x 40.0% Voids
#5	51.04'	0.000 af	**4.0" Round Underdrain Storage** Inside #4 L= 58.0'
#6	52.13'	0.002 af	**4.00'D x 8.12'H Catch Basin**
		0.040 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	**12.0" Round Culvert** L= 125.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.60' / 40.00' S= 0.0848 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	50.70'	**0.5" Vert. Vert Water Quality** C= 0.600
#3	Device 1	55.40'	**3.0" Vert. Vert Quantity** C= 0.600
#4	Device 1	58.00'	**6.0' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=0.22 cfs @ 12.41 hrs HW=56.25' (Free Discharge)
└**1=Culvert** (Passes 0.22 cfs of 6.78 cfs potential flow)
  ├**2=Vert Water Quality** (Orifice Controls 0.02 cfs @ 11.33 fps)
  ├**3=Vert Quantity** (Orifice Controls 0.20 cfs @ 4.11 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Medium StormTech 3500



Time span=0.00-48.00 hrs, dt=0.001 hrs, 48001 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 1S: Building Roof Runoff Area=6,264 sf 100.00% Impervious Runoff Depth=5.56"
Tc=5.0 min CN=98 Runoff=0.85 cfs 0.067 af

Subcatchment 2S: Rear Access Runoff Area=2,419 sf 55.68% Impervious Runoff Depth=2.56"
Tc=5.0 min CN=69 Runoff=0.17 cfs 0.012 af

Subcatchment 3S: Front Access Runoff Area=2,253 sf 49.80% Impervious Runoff Depth=2.21"
Tc=5.0 min CN=65 Runoff=0.14 cfs 0.010 af

Reach 1R: POI#1 Inflow=0.39 cfs 0.087 af
Outflow=0.39 cfs 0.087 af

Pond 1P: Medium StormTech 3500 Peak Elev=57.20' Storage=0.034 af Inflow=1.02 cfs 0.078 af
Outflow=0.32 cfs 0.077 af

Total Runoff Area = 0.251 ac Runoff Volume = 0.088 af Average Runoff Depth = 4.21"
20.14% Pervious = 0.051 ac 79.86% Impervious = 0.200 ac

Summary for Subcatchment 1S: Building Roof

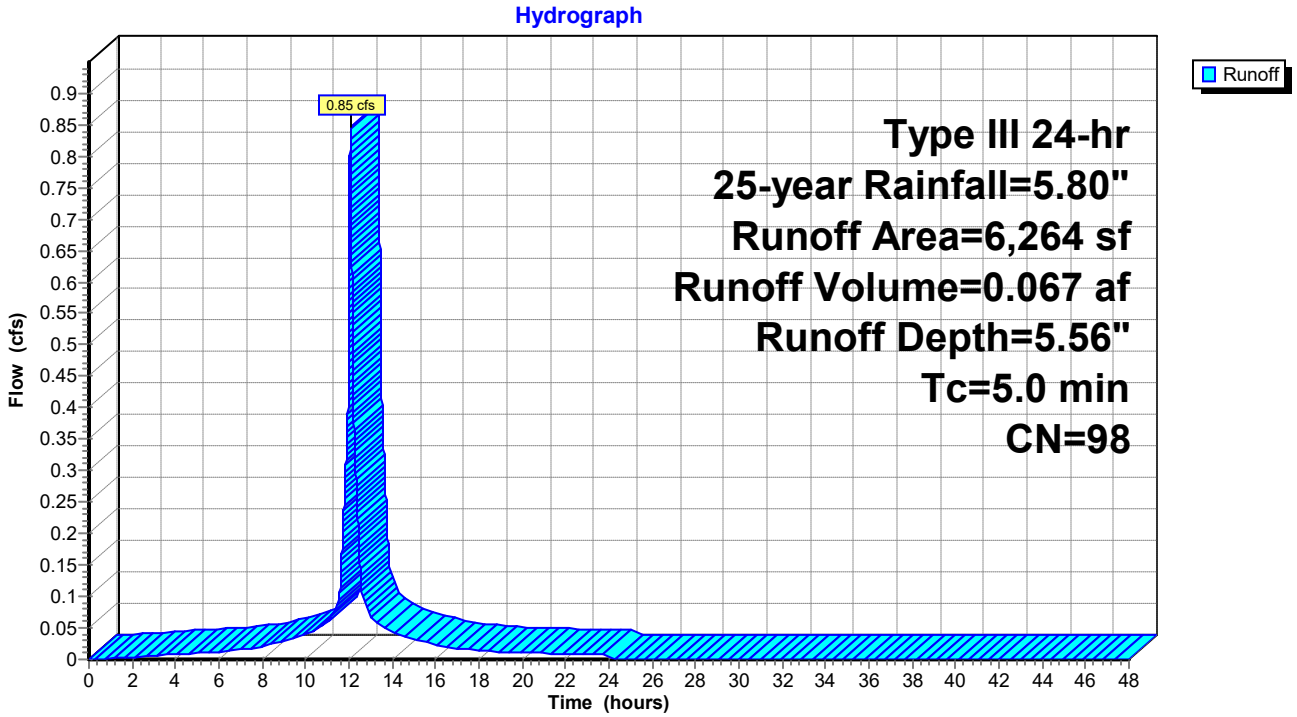
Runoff = 0.85 cfs @ 12.07 hrs, Volume= 0.067 af, Depth= 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
6,264	98	Roofs, HSG A
6,264		100.00% Impervious Area

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

Subcatchment 1S: Building Roof



Summary for Subcatchment 2S: Rear Access

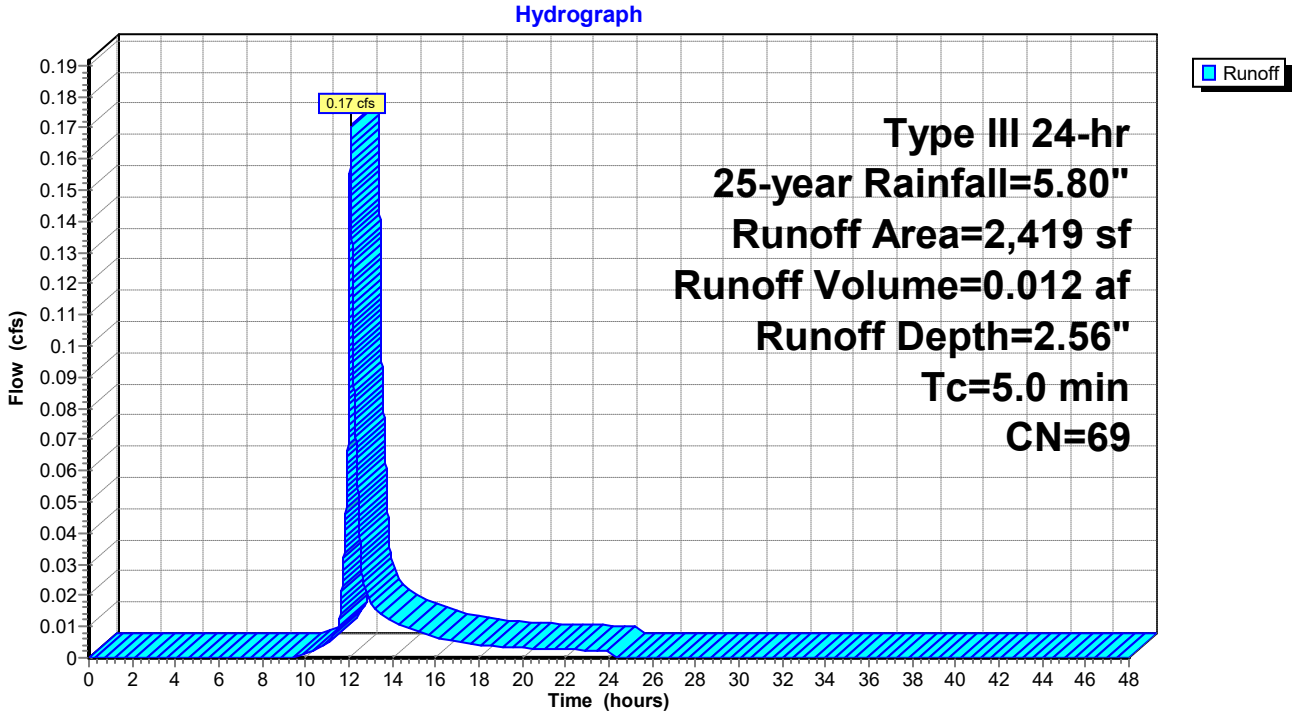
Runoff = 0.17 cfs @ 12.08 hrs, Volume= 0.012 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	1,295	98	Driveway
*	28	98	Wall
*	24	98	Brick
	1,072	32	Woods/grass comb., Good, HSG A
	2,419	69	Weighted Average
	1,072		44.32% Pervious Area
	1,347		55.68% Impervious Area

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

Subcatchment 2S: Rear Access



Summary for Subcatchment 3S: Front Access

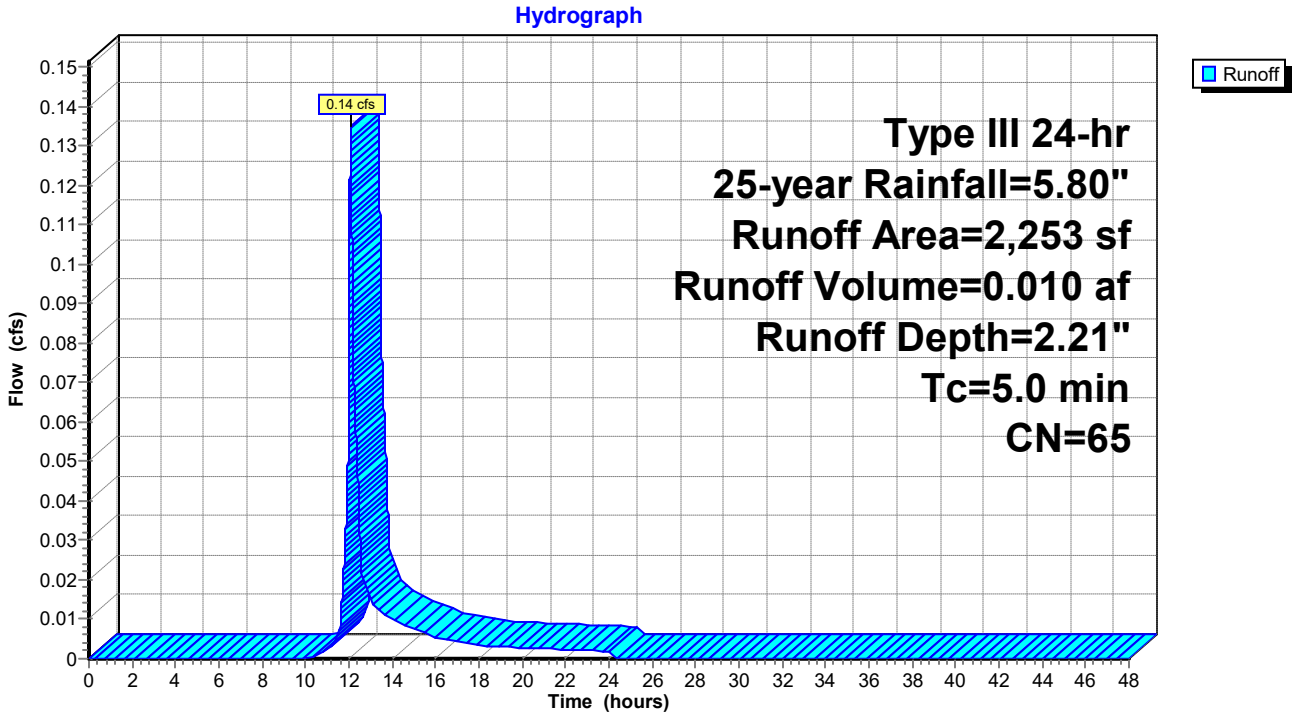
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	1,122	98	Driveway, Sidewalks, Walls, etc
	1,131	32	Woods/grass comb., Good, HSG A
	2,253	65	Weighted Average
	1,131		50.20% Pervious Area
	1,122		49.80% Impervious Area

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

Subcatchment 3S: Front Access



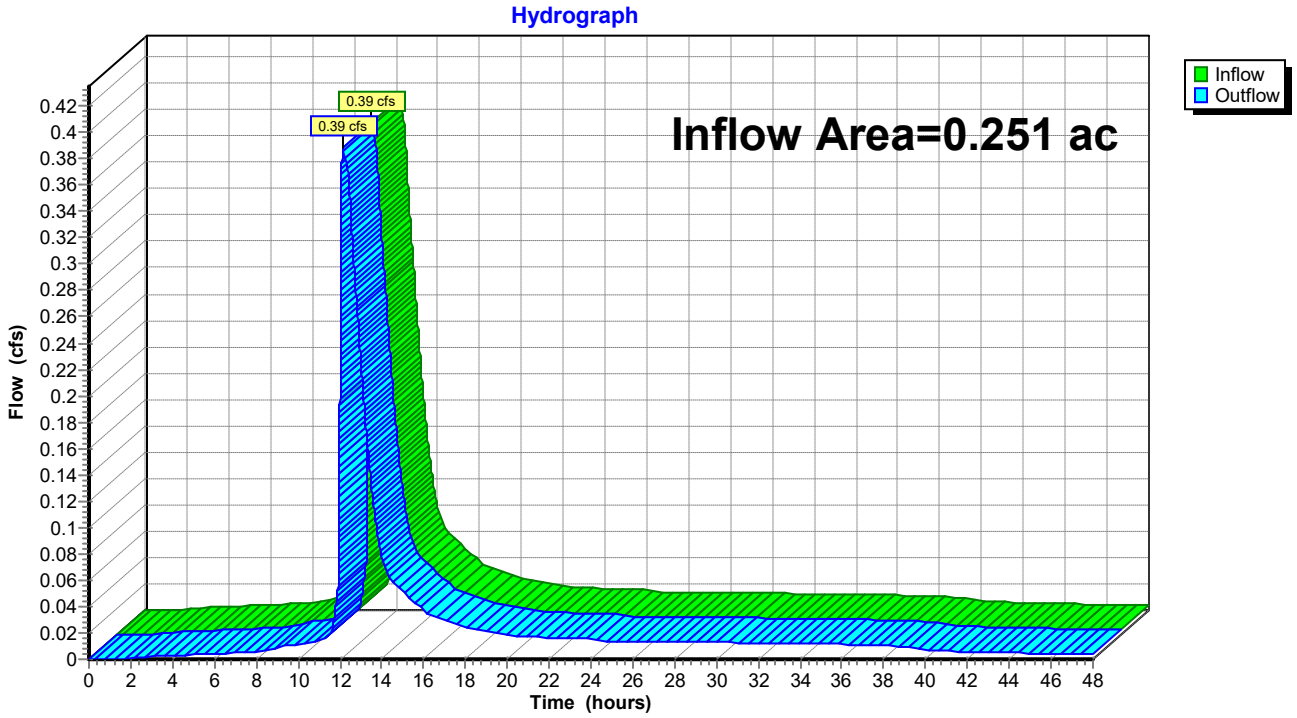
Summary for Reach 1R: POI#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.251 ac, 79.86% Impervious, Inflow Depth > 4.14" for 25-year event
Inflow = 0.39 cfs @ 12.13 hrs, Volume= 0.087 af
Outflow = 0.39 cfs @ 12.13 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs

Reach 1R: POI#1



Summary for Pond 1P: Medium StormTech 3500

Inflow Area = 0.199 ac, 87.65% Impervious, Inflow Depth = 4.72" for 25-year event
Inflow = 1.02 cfs @ 12.07 hrs, Volume= 0.078 af
Outflow = 0.32 cfs @ 12.36 hrs, Volume= 0.077 af, Atten= 68%, Lag= 17.4 min
Primary = 0.32 cfs @ 12.36 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.001 hrs
Peak Elev= 57.20' @ 12.36 hrs Surf.Area= 0.034 ac Storage= 0.034 af

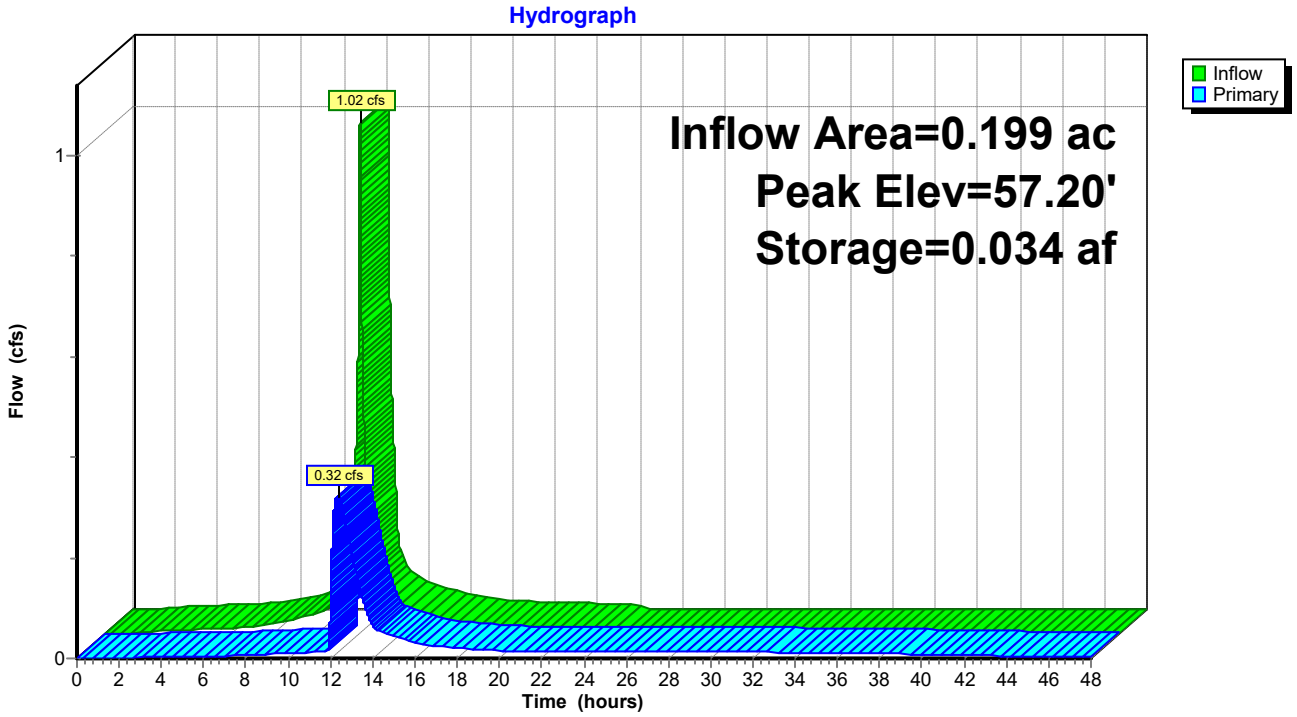
Plug-Flow detention time= 387.7 min calculated for 0.077 af (98% of inflow)
Center-of-Mass det. time= 376.8 min (1,136.1 - 759.3)

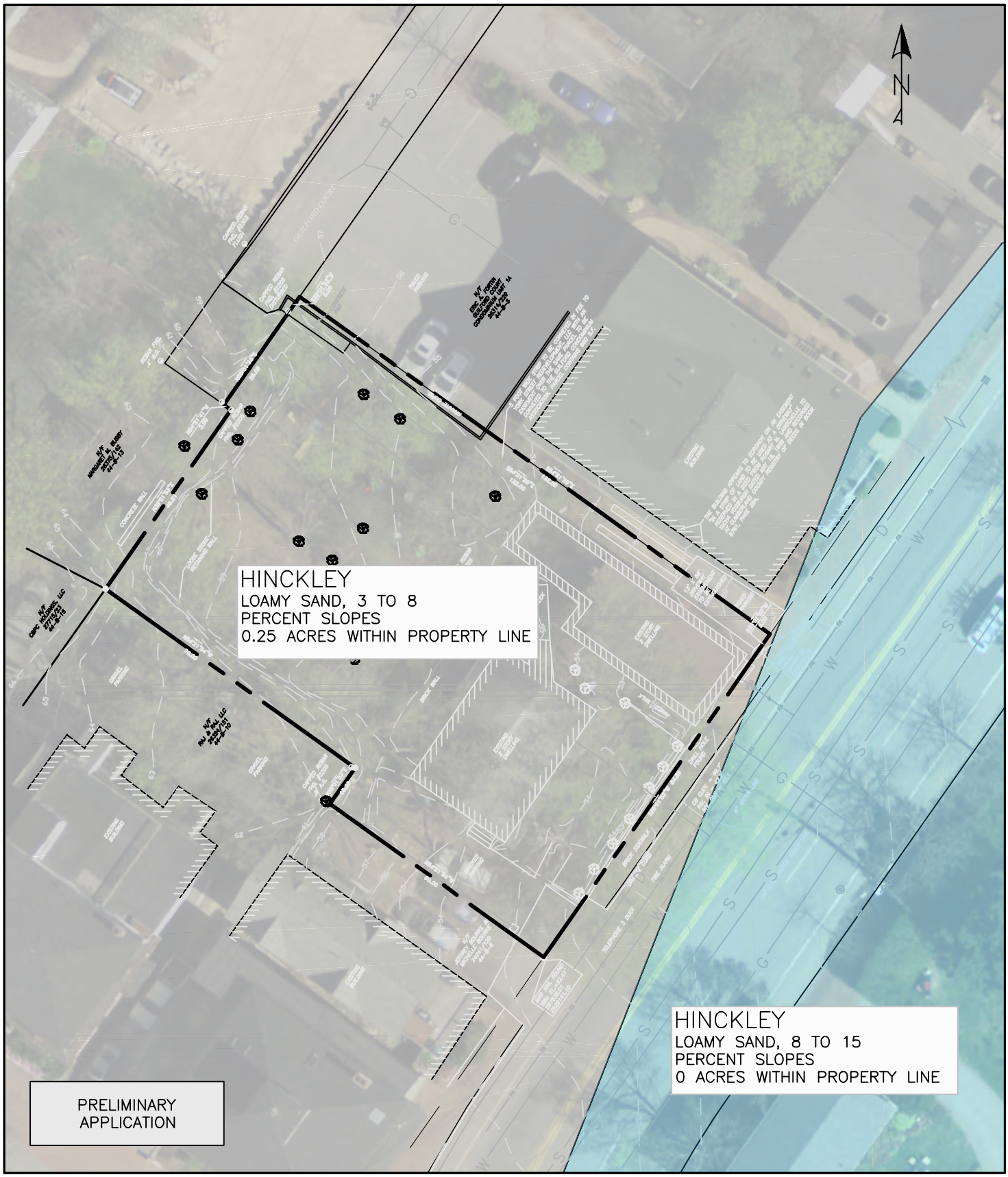
Volume	Invert	Avail.Storage	Storage Description
#1	53.21'	0.016 af	**8.42'W x 58.14'L x 5.00'H Stone** 0.056 af Overall - 0.017 af Embedded = 0.040 af x 40.0% Voids
#2	53.96'	0.017 af	**ADS_StormTech MC-3500 d +Cap** x 6 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 2 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
#3	51.71'	0.001 af	**8.42'W x 58.14'L x 1.50'H Sand** 0.017 af Overall x 5.0% Voids
#4	50.71'	0.004 af	**8.42'W x 58.14'L x 1.00'H Crushed Stone** 0.011 af Overall - 0.000 af Embedded = 0.011 af x 40.0% Voids
#5	51.04'	0.000 af	**4.0" Round Underdrain Storage** Inside #4 L= 58.0'
#6	52.13'	0.002 af	**4.00'D x 8.12'H Catch Basin**
		0.040 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	**12.0" Round Culvert** L= 125.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.60' / 40.00' S= 0.0848 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	50.70'	**0.5" Vert. Vert Water Quality** C= 0.600
#3	Device 1	55.40'	**3.0" Vert. Vert Quantity** C= 0.600
#4	Device 1	58.00'	**6.0' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=0.32 cfs @ 12.36 hrs HW=57.20' (Free Discharge)
└**1=Culvert** (Passes 0.32 cfs of 7.37 cfs potential flow)
  ├**2=Vert Water Quality** (Orifice Controls 0.02 cfs @ 12.25 fps)
  ├**3=Vert Quantity** (Orifice Controls 0.31 cfs @ 6.23 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Medium StormTech 3500





DRAWING NO.
SOILS

FILE:	1074_CIVIL
DATE:	11/8/2016
JN:	1074
SCALE:	1"=30'
DESIGN BY:	OJD
DRAWN BY:	SJL
CHECKED BY:	WHS

ACORN ENGINEERING, INC
ACORN ENGINEERING, INC. P.O. BOX 3372
PORTLAND, MAINE 04104 (207) 775-2655

DRAWING NAME:
SOILS MAP

PROJECT NAME:
161 YORK STREET REDEVELOPMENT

CLIENT:
YORK STREET REDEVELOPMENT, LLC

ISSUED FOR	BY	DATE
PRELIM. APP.	WHS	11/8/16

REV. DATE