ACORN ENGINEERING, INC.

STORMWATER MANAGEMENT REPORT

Prepared For:

The Preserve at South Ridge, LLC
94 South Street
Yarmouth, Maine 04096

Prepared By:

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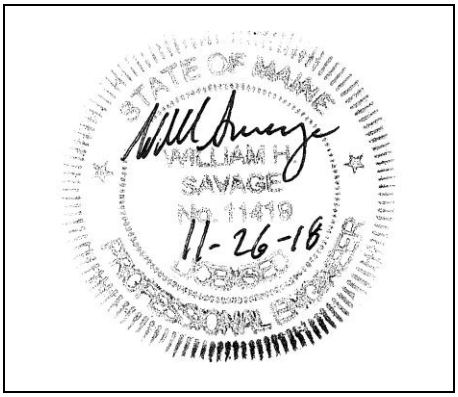

November 2018

INTRODUCTION

Acorn Engineering, Inc. has been retained by The Preserve at South Ridge, LLC to provide civil engineering services for the proposed development of the Hammond House located along 4-12 Hammond Street in Portland, Maine. The project is a 16-unit urban infill redevelopment in East Bayside set into the steep slopes that run east to west. The majority of the on-site parking is within a subsurface garage. Three living levels will sit atop the garage.

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, asphalt and gravel driveways, and parking. The current course of action is to provide water quality treatment to the stormwater through filtration utilizing a Maine Department of Environmental Protection - Underdrained Subsurface Sand Filter approved stormwater Best Management Practice (BMP). This development shall incorporate green infrastructure to provide water quality treatment for no less than 95% of the new impervious area and 80% of the new developed area.

The stormwater analysis is documented with supporting calculations and reports attached to this narrative.

EXISTING CONDITIONS

The proposed project is located at the intersection of Fox and Hammond Street. The proposed lot is a combination of multiple properties which presently include Portland Tax Map 12-C-6,8,10,11, and 14 comprising 15,433 square feet. Portland has zoned this area as an R-6 Residential Zone. An existing conditions plan has been prepared by R.W. Eaton Associates dated 9/4/2018. All abutting uses are residential (R-6 zone) except to the west (B-5 zone).

The entire site is currently developed with 26% of it being impervious area which includes the existing buildings, the paved driveways, patio stones, an old skate ramp, and a covered firewood storage area. The grassed areas are in fair condition with some patches of exposed soils. From south to east the grades are gradual up to the structures where they then fall off at an average of 12%.

The project area presently drains the entirety of its runoff the abutting property to the west (117 Anderson Street – the Portland Housing Authority's Maintenance Facility). It is likely that the runoff is contributing to the icing of the Facility's parking lot that was observed in November of 2018 after a series of rain events and freezing temperatures.

The project team is not aware of the presence of any existing significant natural features located on the site. Given the urban setting, existing free-draining soils and steep slopes 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 Hammond House redevelopment proposes 16 units on 3 levels of living with a subsurface parking garage. The building will be set into the slope, taking advantage of the grade change to accommodate one parking space per unit while "hiding" the parking from the streetscape. A driveway will dive down at an average grade of 11% to the rear of the building.

The landscaping plan includes aggressive planting of trees and shrubs. The re-vegetation strategy proposes native plants in which will complement the new structure while offering environmental benefits such as reducing the heat island effect, stormwater uptake and treatment, reduction of erosion, provide wildlife habitat, and screening in between properties.

The development will be served by the Portland Water District, underground power/cable/communications, natural gas and the municipal sewer system. Solid waste and recycling will be contracted through a private waste disposal and recycling provider. The project anticipates incorporating Maine DEP approved stormwater Best Management Practices (BMP) to meet the General and Flooding Standards.

GENERAL STANDARDS - WATER QUALITY

The development shall provide water quality treatment for no less than 95% of the new impervious area and 80% of the developed area. The project includes the redevelopment of existing impervious area including rooftops and asphalt driveways and parking. Water quality treatment shall be provided through the use of an Underdrained Subsurface Sand Filter (USSF)

The USSF BMP was sized to meet or exceed the requirements set forth within the MDEP Volume III: BMPs Technical Design Manual Section 7.3. Filtration BMPs have been shown to be very effective at removing a wide range of pollutants from stormwater runoff. The stormwater runoff shall first flow into the StormTech Isolator Row which shall provide initial treatment, although sediment levels are anticipated to be low given the relative cleanliness of roof runoff with respect to solids. The stormwater will be detained within the chambers and surrounding aggregate before flowing vertically through the sand filter layer. The treated stormwater shall then be collected within perforated pipes and released slowly by the outlet control structure at an attenuated rate. The outlet will be routed to the separated storm system within Fox Street.

The treatment of the impervious surface is as follows:

Table 1 – Impervious Treatment Area Table

	Existing Impervious Area (SF)	Proposed Total Impervious Area (SF)	Proposed Impervious Area with No Treatment (SF)	Proposed Impervious Area with Treatment (SF)	Net change in Impervious Area (SF)	% Overall New Imp. Area Treated
USSF	4,009	11,565	3,427	8,138	7,556	108%

Furthermore, the minimum 80% treatment of new developed area is met and exceeded since the entirety of the existing site is already developed.

As shown above, the project anticipates meeting and exceeding the required treatment for new impervious surfaces and developed area through the use of the underdrained subsurface sand filter. Additionally, the plethora of native plants, the infiltration trench, and the catch basin will provide additional water quality benefits in addition to the treatment of the USSF.

A calculation for sand filter area is necessary to meet the requirements below the surface of the USSF. As defined in the Volume III: BMPs Technical Design Manual, Chapter 7, 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 vegetated area. The filter area is calculated by the following formula:

$$[(\text{Imp. SF} \times 0.05) + (\text{Veg. SF} \times 0.02)] = \text{Filter Area (SF)}$$

Please refer to Table 2 below.

Table 2 – Total Filter Surface Area, displays the proposed USSF 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 (%)
USSF BMP	407	410	101%

As shown, the size of the soil filter area will meet and exceed the surface area requirements.

In accordance with the Volume III: BMPs Technical Design Manual, a water quality volume of 1.0 inches times the tributary impervious area plus 0.4 inches times the tributary vegetated area is required to be treated by the USSF. The water quality volume is calculated by the following formula:

$$\left(\frac{\text{Imp. SF} \times 1.0''}{12''/1'}\right) + \left(\frac{\text{Veg. SF} \times 0.4''}{12''/1'}\right) = \text{Treatment Volume (CF)}$$

The proposed water quality volume is as follows:

Table 3 – Water Quality Volume Table				
	Vegetated Area (SF)	Impervious Area (SF)	Treatment Volume Required (CF)	Treatment Volume Provided (CF)
USSF BMP	0	8,138 SF	**678**	**863***

*Derived from the HydroCAD model and the rainfall that produces 18" of ponding within the chambers. The storage volume within the crushed stone and chambers – the two layers above the filter sand – is then added together to calculate the water quality volume.

As shown, the size of the combined water quality volume will meet and exceed the treatment volume requirements.

Once the water quality volume is known an artificial rainfall event is created within HydroCAD, to mimic a storm event which equals the required water quality volume. Based upon the artificial rainfall event the depth of the water quality volume within the chamber system will not exceed 18", as required.

Provided the infiltration rates of the water quality volume through the sand filter are variable, 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 control structure. 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 larger 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.

Isolator Row

Typically, an isolator row would have an access structure from both sides to inspect the accumulation of sediment/debris and remove when necessary. Given that many systems have a tributary area comprised of pavement and other ground-level developed areas, this requirement makes sense for these instances where the system would receive sand, debris, and organic matter eventually clogging up the filter fabric within the isolator row. However, within this project, the StormTech system will receive only roof runoff which will contain significantly less solids that would contribute to clogging of the fabric.

After consulting with a representative from Advanced Drainage Systems, the manufacturer of StormTech, they have communicated that an isolator row is not necessary when the watershed is comprised of 100% roof runoff because there are essentially no solids to remove from the inflow. This exception is routinely accepted in other states and was recently implemented in a site development project within Cumberland County. Within this project, an isolator row is proposed as a precautionary measure. There are no structures directly abutting the isolator row; however, two inspection ports and two cleanouts within the system will provide opportunity for maintenance in the unlikely event that sediment/debris builds up. Given the low sediment loading from roof runoff as well as the small footprint of the system itself, it our professional opinion that the access structure requirement for both ends of an isolator row within section 7.3 of the MDEP's Best Management Practice manual be waived.

The isolator row length was sized to meet the DEP's regulations where the number of chambers within the isolator row is equal to the peak inflow flowrate during a 1-year storm into the system divided by 0.2 cfs. The project proposes 3 chambers within the isolator row compared the yielded value of 2.45 from the above equation.

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.

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. However due to the small size of the project and the minimal existing flows, the stormwater runoff shall be rounded to the nearest tenth of a cubic feet per second (cfs).

Time of Concentration (T_c)

Within the pre-development, calculating a Tc using site specific flow paths yielded less than 5 minutes when the sheet flow regime was capped at 100 feet (due to the steep sustained slopes). A consistent time of concentration (T_c) of 5 minutes was applied to each subcatchment for both the pre and post-development conditions given the urban setting and steep slopes.

Curve Number

Within the pre-development model, the vegetated areas were considered fair grass cover within the hydrologic soil group A. The fair rating is due to some of the patches and exposed soils throughout the site. In the post-development plan, the landscaped areas were considered good grass cover within the hydrologic soil group A. This is a conservative approach given the aggressive landscape plan which may be more accurately depicted as grass/woodlands combo due to the extensive root systems and canopy cover that will exist once the landscaping has matured.

Pre-development Calculations

The entirety of the existing site was modeled as one subcatchment given the existing contours. The site's runoff flows to the abutting property on Anderson Street which ultimately drains to the public drainage system in Anderson 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, of 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)
POI #1	0.1	0.5	0.8

Post-development Calculations:

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

- Subcatchment 1 – This is comprised of the roof which will be routed to the USSF.
- Subcatchment 2 – This subcatchment is characterized as the driveway, the walkways, the retaining wall, the decks above, and the swale along the property line which will drain to the infiltration trench.
- Subcatchment 3 - This is comprised of the edges of property lines which may not drain to the infiltration trench as well as the first five feet of the property in front of the proposed building.

The post-development calculations include changes to the land use, and the compensation provided by the detention facility. The following table represents comparison of pre-development 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)**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
POI #1	0.1	0.1	0.5	0.4	0.8	0.7

As shown in Table 5 the net impact of the post development peak flows will remain at or below the predevelopment levels. A post-development watershed map developed for this project can be viewed in Attachment B, and a copy of the HydroCAD calculations is included within Attachment C of this report.

Down Gradient Property Owners:

The post development (proposed) peak stormwater surface flows tributary to the down gradient property owners will significantly decrease. The proposed infiltration trench dimensions have been sized to contain the runoff from up to a 25-year storm event and promote infiltration into the surrounding glacial till layer. Currently, all stormwater runoff generated by the site drains the Portland Housing Authority Maintenance Facility. In the proposed condition, the flows will be redirected to the separated storm system in Fox Street, therefore improving upon the existing conditions to the downgradient property owner.

SOILS

Onsite soil information includes the following:

- Soil Conservation Service Medium Intensity Soil Survey for Cumberland County

Given the soils information, listed above, no onsite wastewater is proposed, deep fills/cuts the applicant does not intend to perform a more intense hydric soil boundary delineation because

of the waiver requirements set forth in the City of Portland Technical Manual – Section 7 – Soil Survey, Rev. 6/17/12 are met.

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 6 - "K" Value		
Soils Type	**Subsurface**	**Substratum**
Hinckley	.17	.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 be of the utmost importance, given the long sustained slopes.

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, the project does not anticipate to create erosion, drainage or runoff problems either in the development or with respect to adjoining properties. The existing flows will be maintained, but redirected to the stormwater system through LID techniques rather than the abutting property.

Attachments

Attachment A: Pre Development Watershed Map
Attachment B: Post Development Watershed Map
Attachment C: HydroCAD Calculations
Attachment D: Soil Survey

POI #1
ANDERSON ST.

FOX STREET

HAMMOND STREET

N.F. Fox Hole LLC
30563/163

N.F. Portland Housing Development Corp.
12639/206

N.F. Pininsula Community LP
20561/263

N.F. Steven Oldford et al
34575/58

N.F. Amy Lippmann
31784/227

Maloney
4927/92
Parcel 1

Maloney
4927/92
Parcel 2

Didonato
6420/257

Didonato
3207/5/4

N.F. Remo DiMillo
2993/435
4031/71

1 1/2 story
wood frame
house

Paved
Parking Lot

Garage

Deck

Porch

Paved Driveway

Concrete Sidewalk

1st Floor Elev.
39.8'

1

NOTE:

1. REFER TO STORMWATER REPORT FOR MORE INFORMATION

1 — SUBCATCHMENT NUMBER

SUBCATCHMENT EXTENTS

POI #1 — POINT OF INTEREST (POI)

PRELIMINARY
SUBMISSION

ISSUED FOR	BY DATE
FINAL APP.	WHS 11/26/18
REVISION	REV. DATE

DRAWING NAME:
PRE-DEVELOPMENT WATERSHED MAP

PROJECT NAME:
HAMMOND HOUSE REDEVELOPMENT

CLIENT:
THE PRESERVE AT SOUTH RIDGE, LLC
94 SOUTH STREET, YARMOUTH, ME 04096

ACORN ENGINEERING, INC
158 DANFORTH ST
PORTLAND, MAINE 04104
(207) 775-2655

FILE:	1112_CIVIL
JN:	1112
SCALE:	1"=20'
DESIGN BY:	SJL
DRAWN BY:	SJL
CHECKED BY:	WHS

DRAWING NO.
PRE

POI #1
ANDERSON ST.

POND 2: INFILTRATION TRENCH

P2

FOX STREET STORM MAIN CONNECTS TO ANDERSON STREET DRAINAGE SYSTEM DOWNSTREAM

EXISTING CONTOUR, TYP.

SUBCAT DIVIDE ALONG WALL

PROPOSED CONTOUR, TYP.

POND 1: UNDERDRAINED SUBSURFACE SAND FILTER (USSF) TO ACCEPT ROOF RUNOFF

8" USSF OUTLET INTO SEPARATED STORM MAIN

FOX STREET

HAMMOND STREET

N.F. Steven Oldford et al
34575/58

N.F. Amy Lippmann
31784/227

N.F. Pininsula Community LP
20561/263

N.F. Remo DiMillo
2993/435
4031/71

NOTE:

1. REFER TO STORMWATER REPORT AND SHEET C-30 FOR MORE INFORMATION.

P1 — STORMWATER POND

1 — SUBCATCHMENT NUMBER

SUBCATCHMENT EXTENTS

POI #1 — POINT OF INTEREST (POI)

PRELIMINARY SUBMISSION

ISSUED FOR	BY DATE
FINAL APP	WHS 11/27/18
REVISION	REV. DATE

DRAWING NAME: POST-DEVELOPMENT WATERSHED MAP

PROJECT NAME: HAMMOND HOUSE REDEVELOPMENT

CLIENT: THE PRESERVE AT SOUTH RIDGE, LLC
94 SOUTH STREET, YARMOUTH, ME 04096

ACORN ENGINEERING, INC
158 DANFORTH ST
PORTLAND, MAINE 04104
(207) 775-2655

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SCALE:	1"=20'
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DRAWN BY:	SJL
CHECKED BY:	WHS

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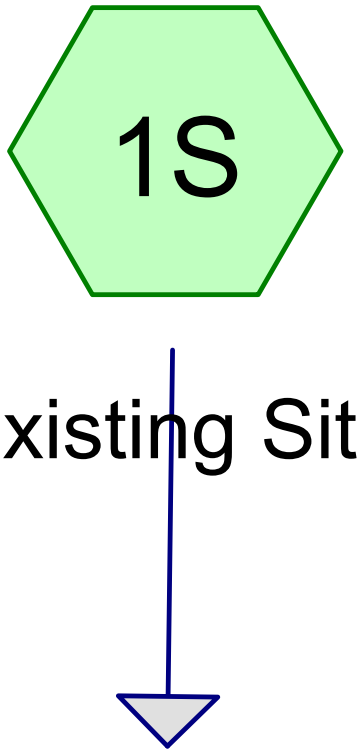


POI #1 - Anderson St.

Subcat Reach Pond Link

Routing Diagram for Pre Development
Prepared by Acorn Engineering, Inc., Printed 11/27/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.262	49	50-75% Grass cover, Fair, HSG A (1S)
0.092	98	Pavement, roof, concrete (1S)
0.354	**62**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.262	HSG A	1S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.092	Other	1S
0.354		**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
0.262	0.000	0.000	0.000	0.000	0.262	50-75% Grass cover, Fair	1S
0.000	0.000	0.000	0.000	0.092	0.092	Pavement, roof, concrete	1S
0.262	**0.000**	**0.000**	**0.000**	**0.092**	**0.354**	**TOTAL AREA**	

Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Existing Site Runoff Area=15,433 sf 25.98% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=62 Runoff=0.12 cfs 0.013 af

Reach 1R: POI #1 - Anderson St. Inflow=0.12 cfs 0.013 af
Outflow=0.12 cfs 0.013 af

Total Runoff Area = 0.354 ac Runoff Volume = 0.013 af Average Runoff Depth = 0.44"
74.02% Pervious = 0.262 ac 25.98% Impervious = 0.092 ac

Summary for Subcatchment 1S: Existing Site

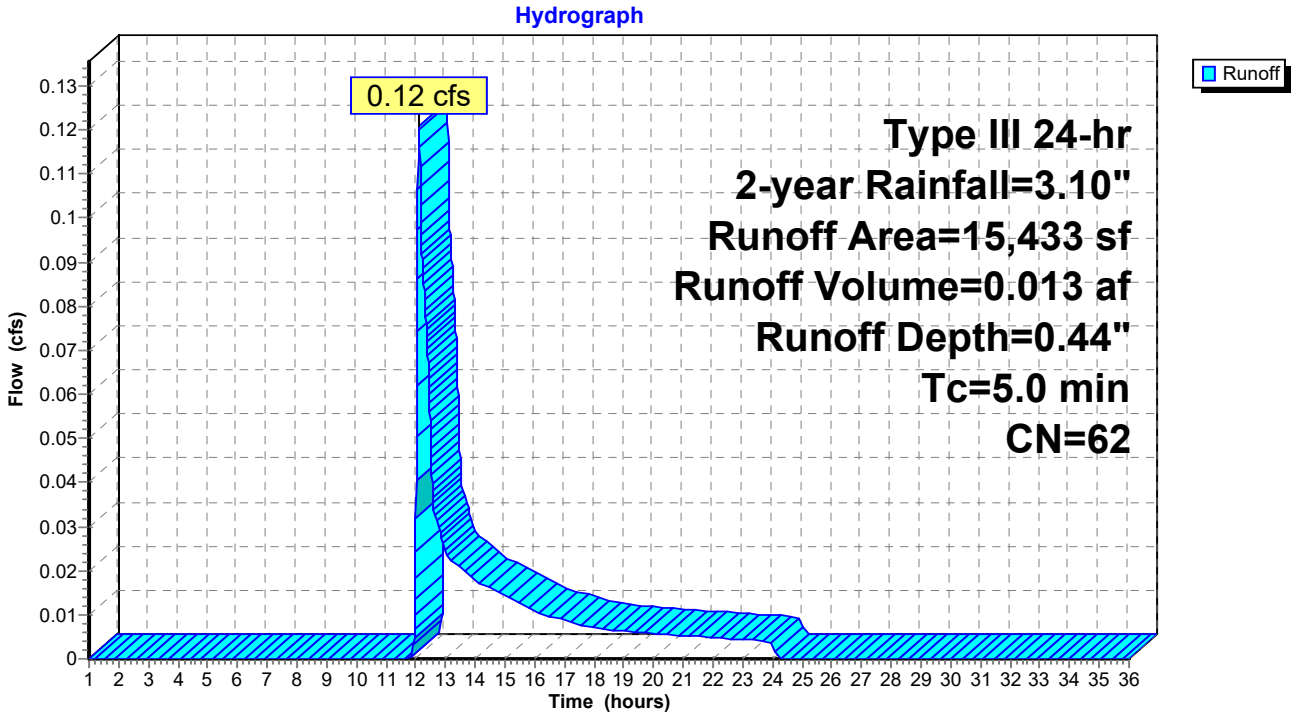
Runoff = 0.12 cfs @ 12.11 hrs, Volume= 0.013 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
	11,424	49	50-75% Grass cover, Fair, HSG A
*	4,009	98	Pavement, roof, concrete
	15,433	62	Weighted Average
	11,424		74.02% Pervious Area
	4,009		25.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Paved Drive to Steep Banks**

Subcatchment 1S: Existing Site

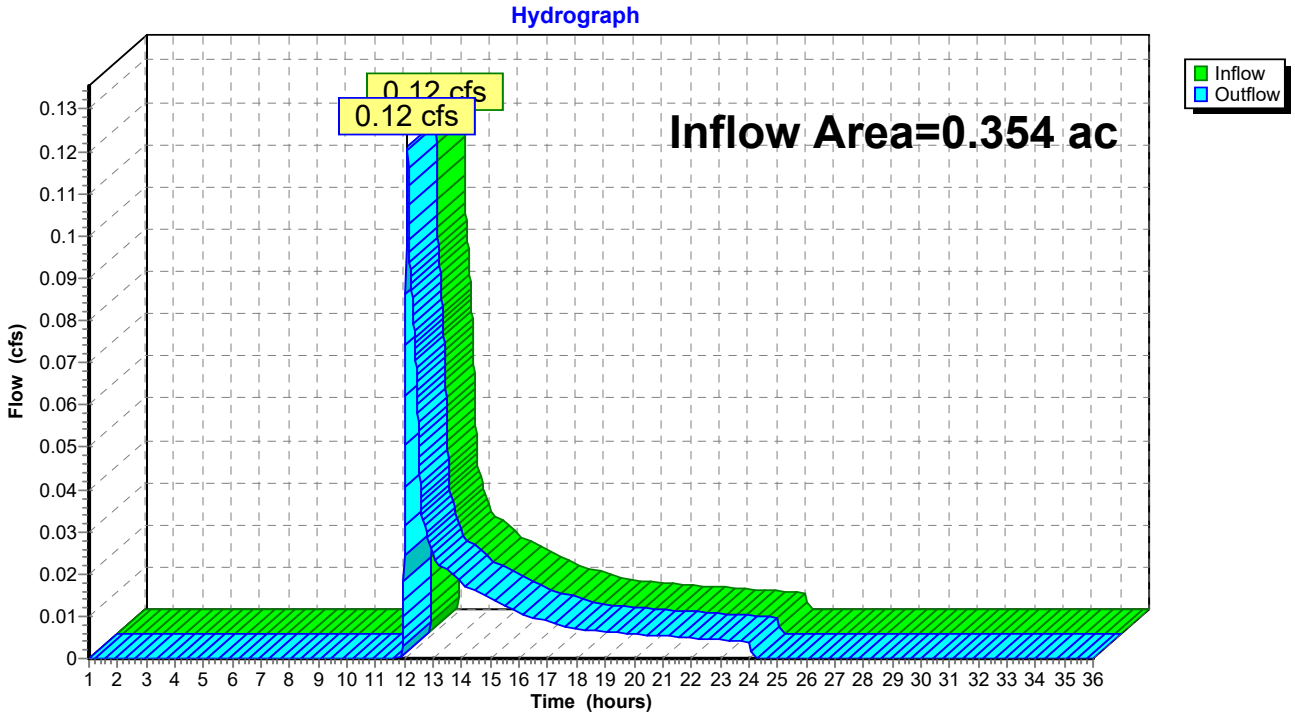


Summary for Reach 1R: POI #1 - Anderson St.

Inflow Area = 0.354 ac, 25.98% Impervious, Inflow Depth = 0.44" for 2-year event
Inflow = 0.12 cfs @ 12.11 hrs, Volume= 0.013 af
Outflow = 0.12 cfs @ 12.11 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: POI #1 - Anderson St.



Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Existing Site Runoff Area=15,433 sf 25.98% Impervious Runoff Depth=1.20"
Tc=5.0 min CN=62 Runoff=0.46 cfs 0.035 af

Reach 1R: POI #1 - Anderson St. Inflow=0.46 cfs 0.035 af
Outflow=0.46 cfs 0.035 af

Total Runoff Area = 0.354 ac Runoff Volume = 0.035 af Average Runoff Depth = 1.20"
74.02% Pervious = 0.262 ac 25.98% Impervious = 0.092 ac

Summary for Subcatchment 1S: Existing Site

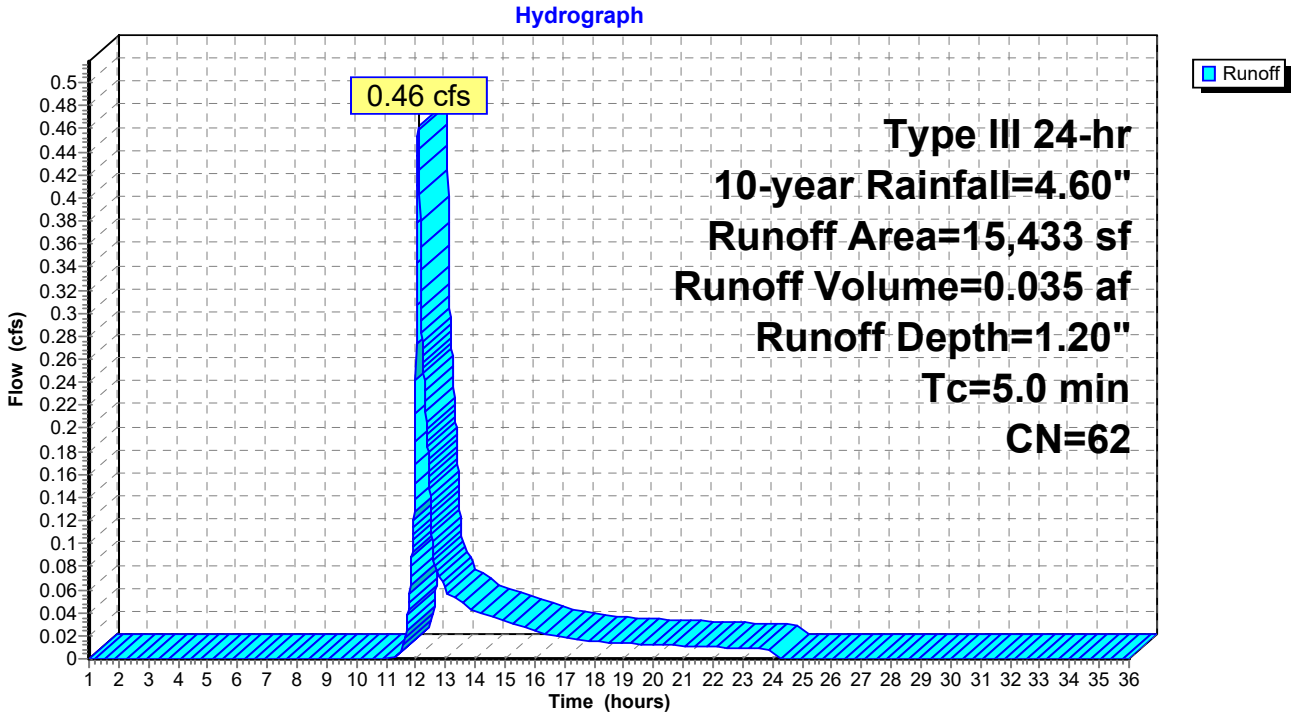
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
	11,424	49	50-75% Grass cover, Fair, HSG A
*	4,009	98	Pavement, roof, concrete
	15,433	62	Weighted Average
	11,424		74.02% Pervious Area
	4,009		25.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Paved Drive to Steep Banks**

Subcatchment 1S: Existing Site

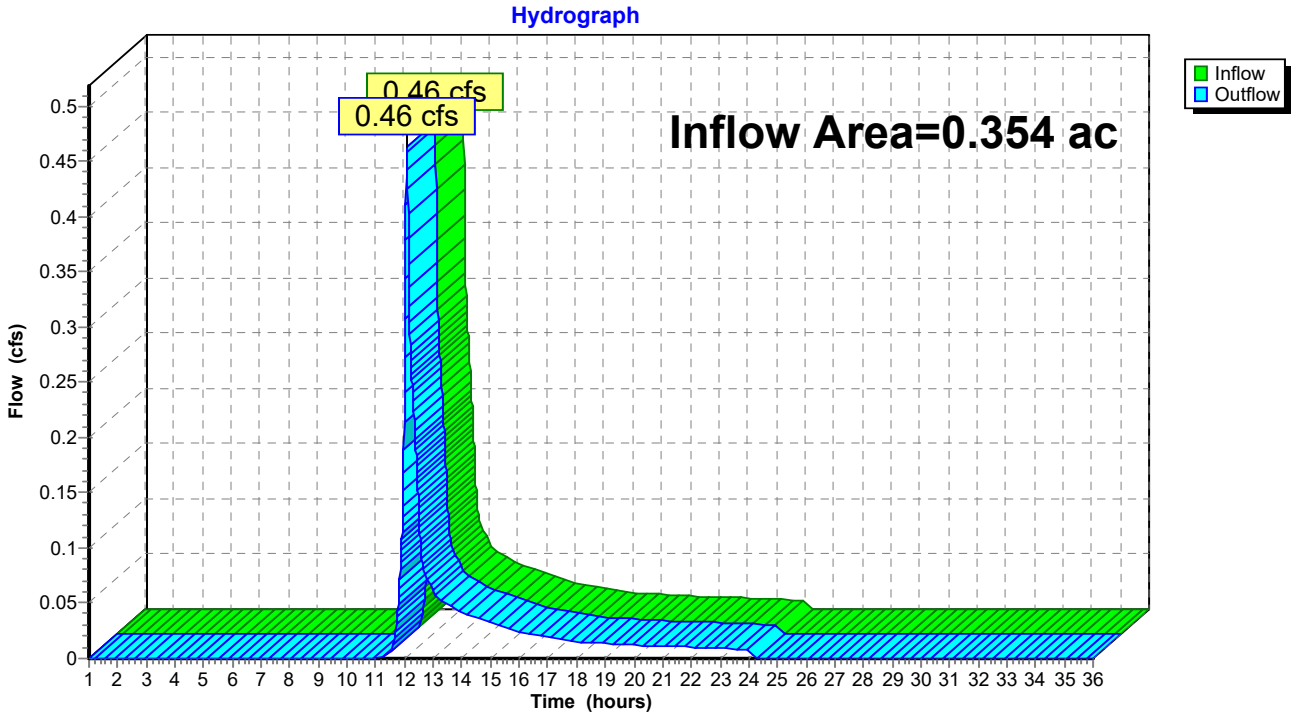


Summary for Reach 1R: POI #1 - Anderson St.

Inflow Area = 0.354 ac, 25.98% Impervious, Inflow Depth = 1.20" for 10-year event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 0.035 af
Outflow = 0.46 cfs @ 12.09 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: POI #1 - Anderson St.



Time span=1.00-36.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Existing Site Runoff Area=15,433 sf 25.98% Impervious Runoff Depth=1.95"
Tc=5.0 min CN=62 Runoff=0.80 cfs 0.058 af

Reach 1R: POI #1 - Anderson St. Inflow=0.80 cfs 0.058 af
Outflow=0.80 cfs 0.058 af

Total Runoff Area = 0.354 ac Runoff Volume = 0.058 af Average Runoff Depth = 1.95"
74.02% Pervious = 0.262 ac 25.98% Impervious = 0.092 ac

Summary for Subcatchment 1S: Existing Site

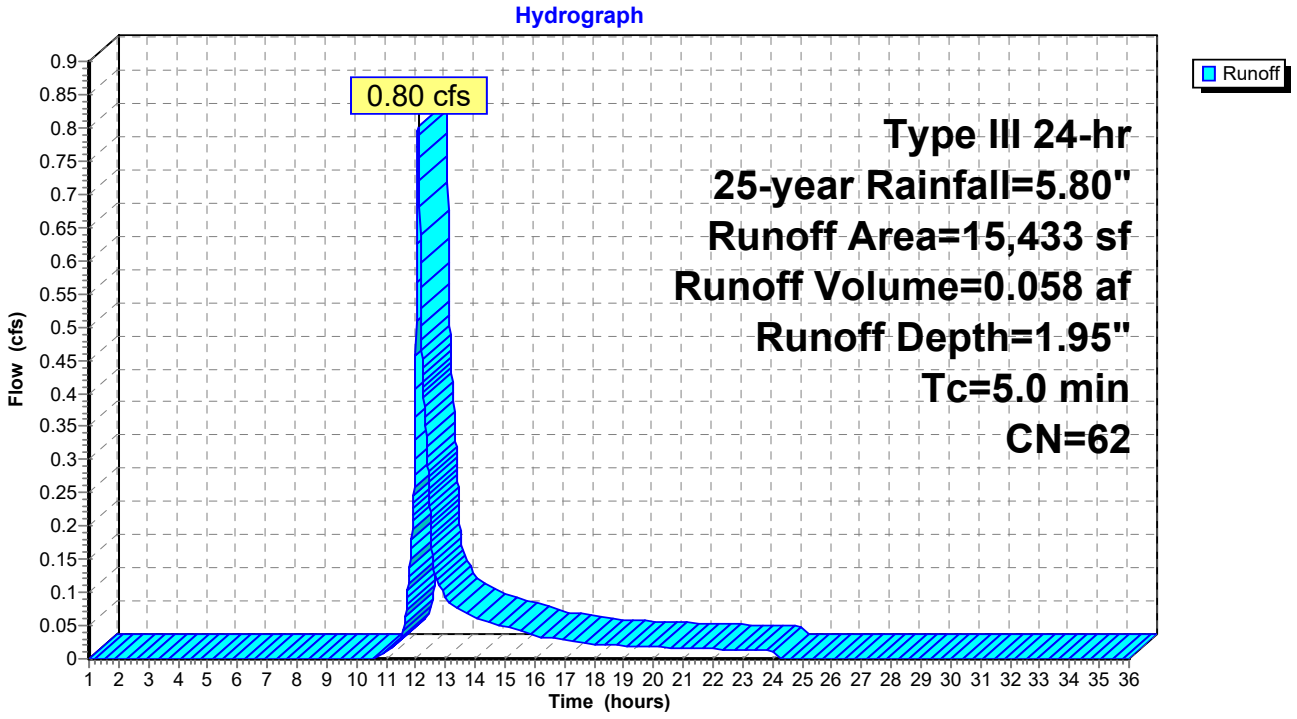
Runoff = 0.80 cfs @ 12.08 hrs, Volume= 0.058 af, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
	11,424	49	50-75% Grass cover, Fair, HSG A
*	4,009	98	Pavement, roof, concrete
	15,433	62	Weighted Average
	11,424		74.02% Pervious Area
	4,009		25.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Paved Drive to Steep Banks**

Subcatchment 1S: Existing Site

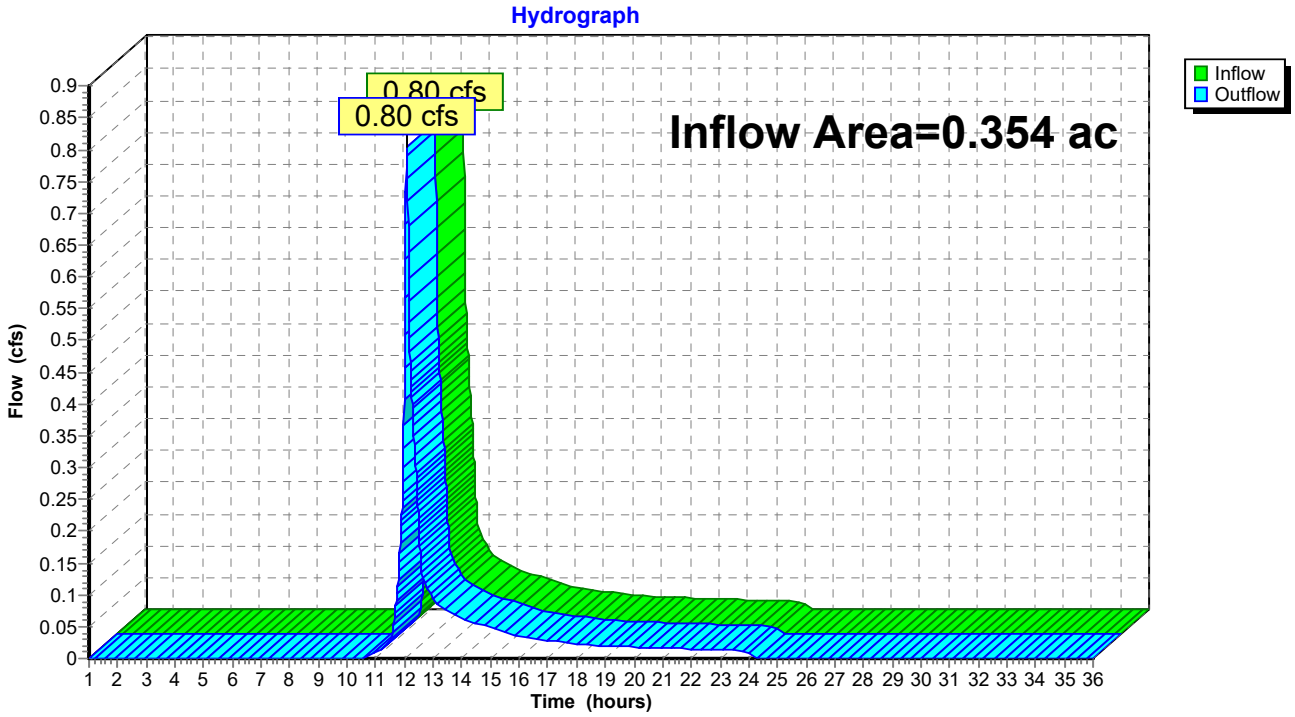


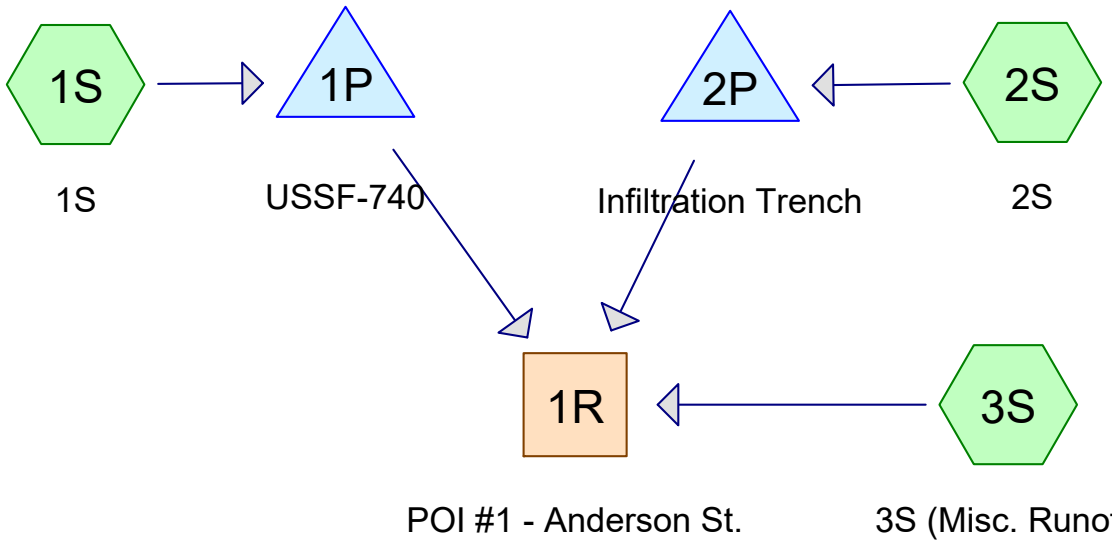
Summary for Reach 1R: POI #1 - Anderson St.

Inflow Area = 0.354 ac, 25.98% Impervious, Inflow Depth = 1.95" for 25-year event
Inflow = 0.80 cfs @ 12.08 hrs, Volume= 0.058 af
Outflow = 0.80 cfs @ 12.08 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 1.00-36.00 hrs, dt= 0.01 hrs

Reach 1R: POI #1 - Anderson St.





Subcat Reach Pond Link

Routing Diagram for Post Development 11-26-18
Prepared by Acorn Engineering, Inc., Printed 11/27/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.089	39	>75% Grass cover, Good, HSG A (2S, 3S)
0.078	98	Drive, wall, walks, decks above, misc. roof (2S)
0.001	98	Front entrance walk/sculptures (3S)
0.187	98	Roof (1S)
0.354	**83**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.089	HSG A	2S, 3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.265	Other	1S, 2S, 3S
0.354		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchmen Numbers
0.089	0.000	0.000	0.000	0.000	0.089	>75% Grass cover, Good	
0.000	0.000	0.000	0.000	0.078	0.078	Drive, wall, walks, decks above, misc. roof	
0.000	0.000	0.000	0.000	0.001	0.001	Front entrance walk/sculptures	
0.000	0.000	0.000	0.000	0.187	0.187	Roof	
0.089	**0.000**	**0.000**	**0.000**	**0.265**	**0.354**	**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	27.65	27.00	130.0	0.0050	0.013	8.0	0.0	0.0

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=8,138 sf 100.00% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=98 Runoff=0.58 cfs 0.045 af

Subcatchment 2S: 2S Runoff Area=6,291 sf 53.79% Impervious Runoff Depth=0.82"
Tc=5.0 min CN=71 Runoff=0.13 cfs 0.010 af

Subcatchment 3S: 3S (Misc. Runoff) Runoff Area=1,004 sf 4.28% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=42 Runoff=0.00 cfs 0.000 af

Reach 1R: POI #1 - Anderson St. Inflow=0.13 cfs 0.045 af
Outflow=0.13 cfs 0.045 af

Pond 1P: USSF-740 Peak Elev=31.80' Storage=554 cf Inflow=0.58 cfs 0.045 af
Outflow=0.13 cfs 0.045 af

Pond 2P: Infiltration Trench Peak Elev=21.46' Storage=161 cf Inflow=0.13 cfs 0.010 af
Discarded=0.01 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.010 af

Total Runoff Area = 0.354 ac Runoff Volume = 0.055 af Average Runoff Depth = 1.85"
25.06% Pervious = 0.089 ac 74.94% Impervious = 0.265 ac

Summary for Subcatchment 1S: 1S

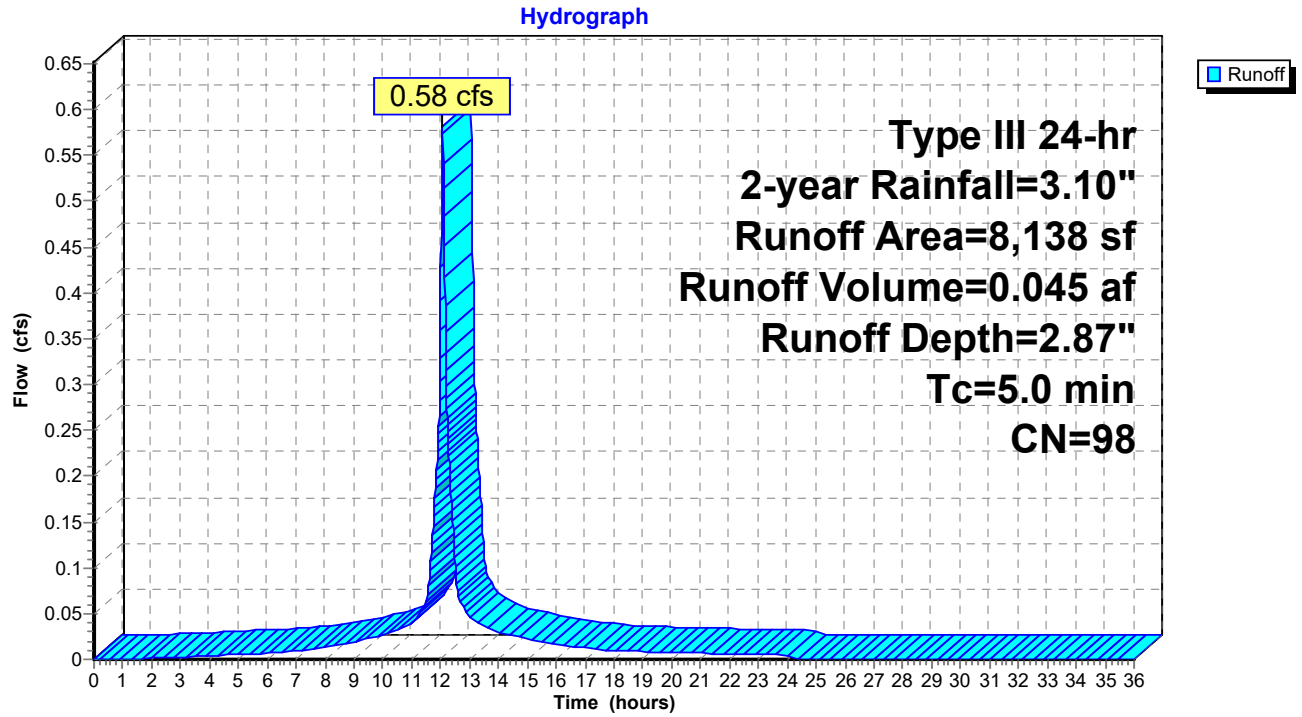
Runoff = 0.58 cfs @ 12.07 hrs, Volume= 0.045 af, Depth= 2.87"

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
*	8,138	98	Roof
	8,138		100.00% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

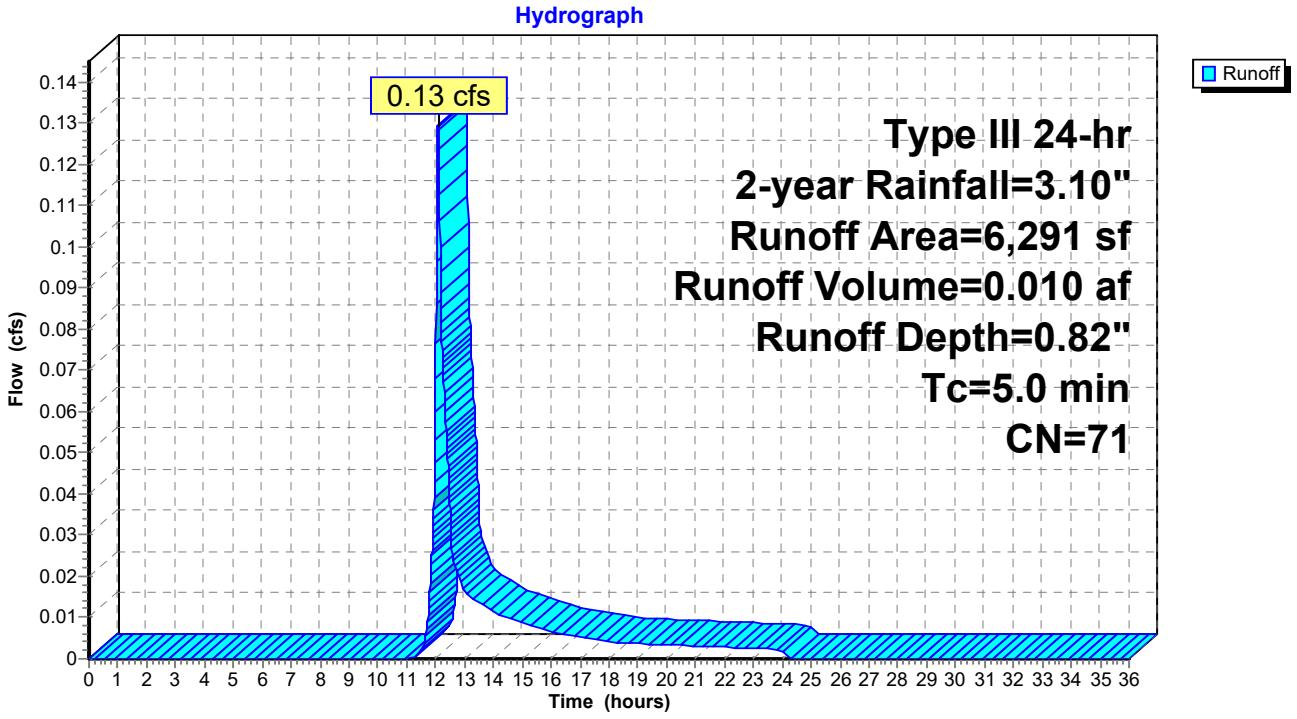
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.010 af, Depth= 0.82"

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
*	3,384	98	Drive, wall, walks, decks above, misc. roof
	2,907	39	>75% Grass cover, Good, HSG A
	6,291	71	Weighted Average
	2,907		46.21% Pervious Area
	3,384		53.79% Impervious Area

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

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S (Misc. Runoff)

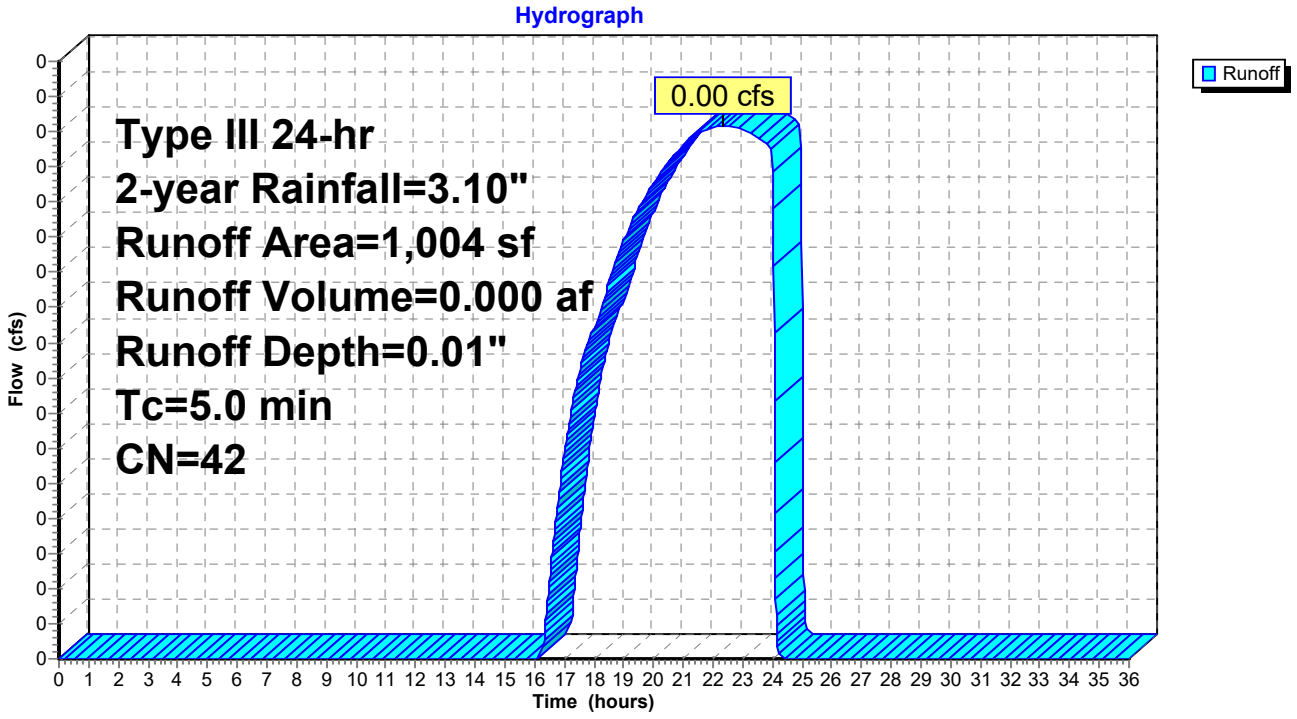
Runoff = 0.00 cfs @ 22.35 hrs, Volume= 0.000 af, Depth= 0.01"

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 2-year Rainfall=3.10"

	Area (sf)	CN	Description
	961	39	>75% Grass cover, Good, HSG A
*	43	98	Front entrance walk/sculptures
	1,004	42	Weighted Average
	961		95.72% Pervious Area
	43		4.28% Impervious Area

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

Subcatchment 3S: 3S (Misc. Runoff)

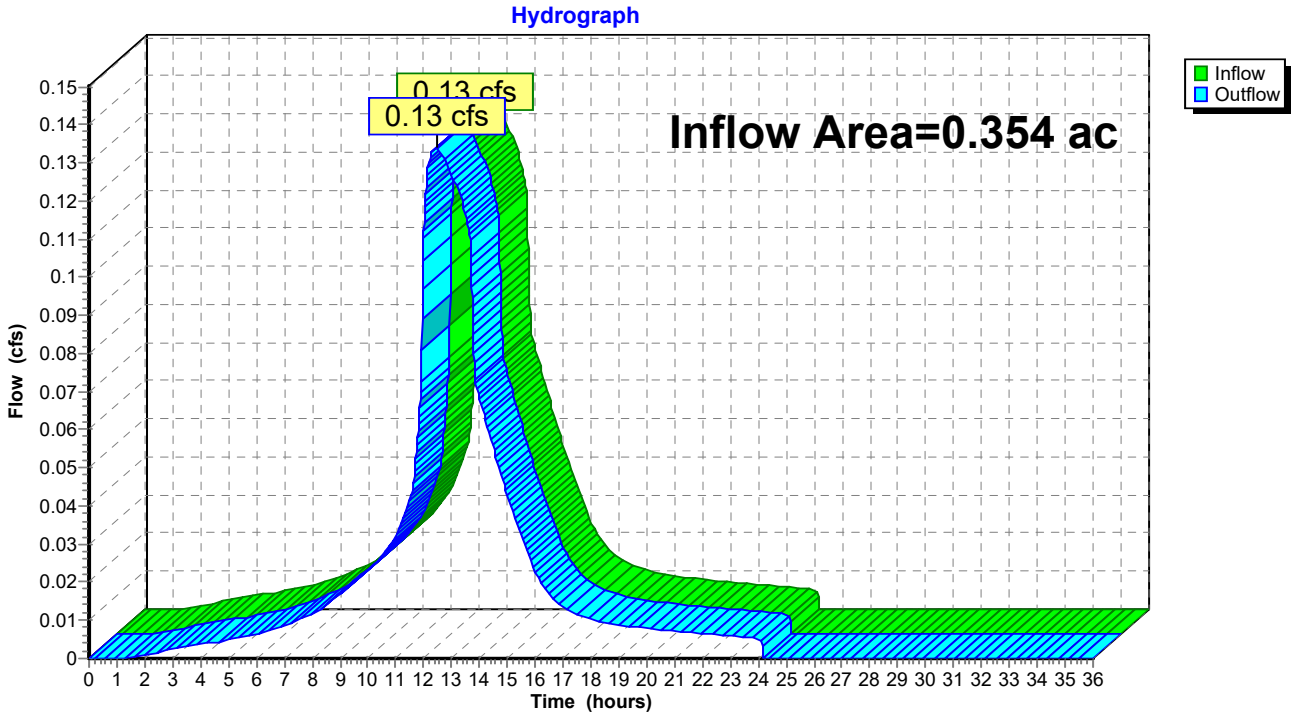


Summary for Reach 1R: POI #1 - Anderson St.

Inflow Area = 0.354 ac, 74.94% Impervious, Inflow Depth = 1.51" for 2-year event
Inflow = 0.13 cfs @ 12.45 hrs, Volume= 0.045 af
Outflow = 0.13 cfs @ 12.45 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: POI #1 - Anderson St.



Summary for Pond 1P: USSF-740

Inflow Area = 0.187 ac,100.00% Impervious, Inflow Depth = 2.87" for 2-year event
Inflow = 0.58 cfs @ 12.07 hrs, Volume= 0.045 af
Outflow = 0.13 cfs @ 12.45 hrs, Volume= 0.045 af, Atten= 77%, Lag= 22.7 min
Primary = 0.13 cfs @ 12.45 hrs, Volume= 0.045 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 31.80' @ 12.45 hrs Surf.Area= 1,231 sf Storage= 554 cf

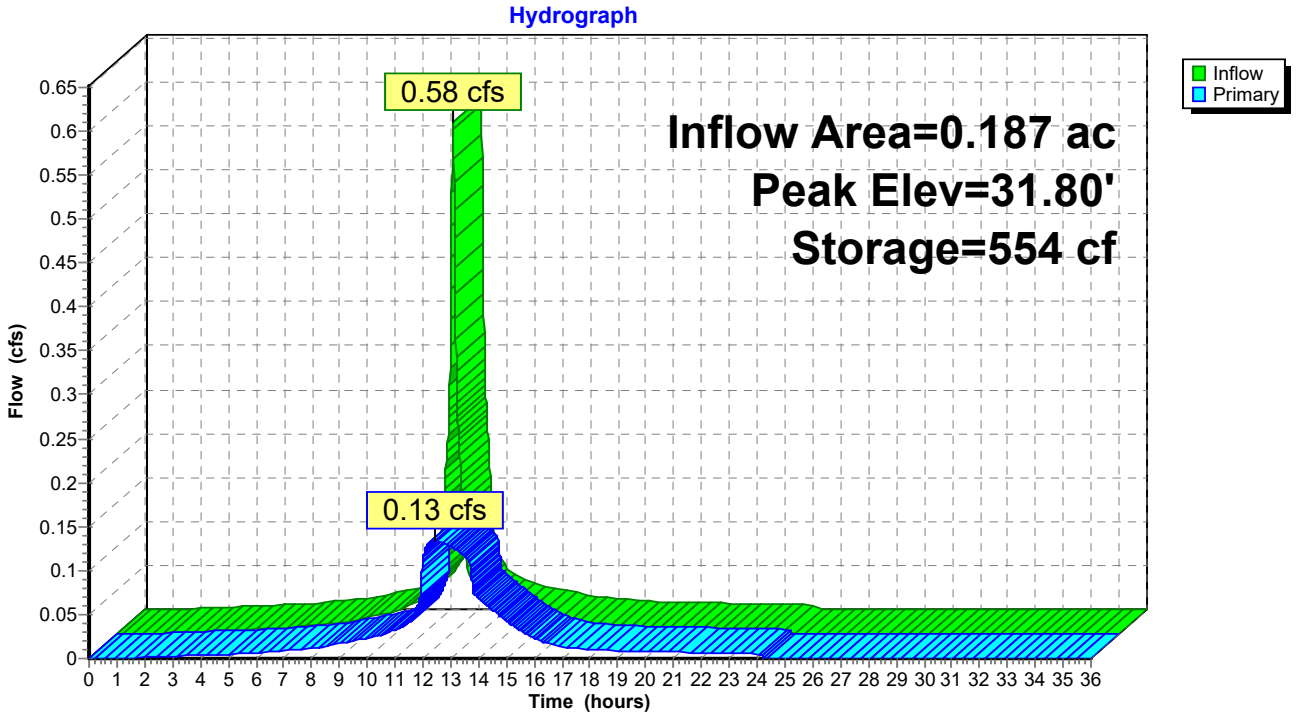
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 35.1 min (791.2 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1	30.50'	450 cf	**25.25'W x 16.25'L x 3.75'H Crushed Stone** 1,539 cf Overall - 413 cf Embedded = 1,125 cf x 40.0% Voids
#2	31.00'	413 cf	**ADS_StormTech SC-740** x 9 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#3	29.00'	31 cf	**16.25'W x 25.25'L x 1.50'H Sand** 615 cf Overall x 5.0% Voids
#4	27.80'	195 cf	**16.25'W x 25.25'L x 1.20'H Crushed Stone Underdrain** 492 cf Overall - 5 cf Embedded = 487 cf x 40.0% Voids
#5	28.33'	5 cf	**4.0" Round Underdrains** Inside #4 L= 61.0' S= 0.0050 '/'
		1,094 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	27.65'	**8.0" Round 8" Outlet** L= 130.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 27.65' / 27.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	27.75'	**1.6" Vert. Quality Outlet** C= 0.600
#3	Device 1	32.10'	**5.7" Vert. Quantity Outlet** C= 0.600
#4	Device 1	32.90'	**6.0' long x 0.7' breadth Overflow Wier** 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=0.13 cfs @ 12.45 hrs HW=31.80' TW=0.00' (Dynamic Tailwater)
- **1=8" Outlet** (Passes 0.13 cfs of 1.91 cfs potential flow)
  - **2=Quality Outlet** (Orifice Controls 0.13 cfs @ 9.61 fps)
  - **3=Quantity Outlet** (Controls 0.00 cfs)
  - **4=Overflow Wier** (Controls 0.00 cfs)

Pond 1P: USSF-740



Summary for Pond 2P: Infiltration Trench

Inflow Area = 0.144 ac, 53.79% Impervious, Inflow Depth = 0.82" for 2-year event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 0.010 af
Outflow = 0.01 cfs @ 11.85 hrs, Volume= 0.010 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.85 hrs, Volume= 0.010 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 21.46' @ 14.00 hrs Surf.Area= 205 sf Storage= 161 cf

Plug-Flow detention time= 140.4 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 140.4 min (1,013.9 - 873.6)

Volume	Invert	Avail.Storage	Storage Description
#1	19.50'	164 cf	**3/4" Stone Detention (Prismatic)** Listed below (Recalc) 410 cf Overall x 40.0% Voids
#2	21.50'	558 cf	**Detention above Stone (Prismatic)** Listed below (Recalc)
		722 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.50	205	0	0
21.50	205	410	410

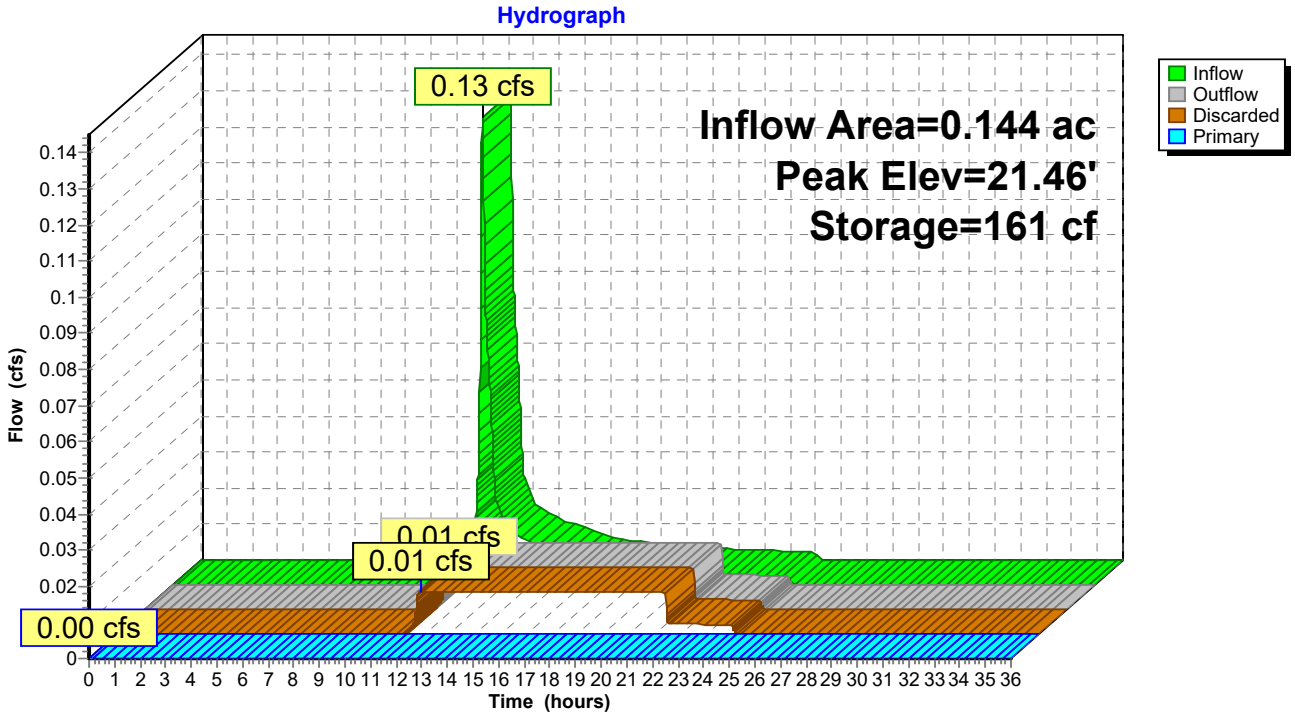
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	217	0	0
22.75	675	558	558

Device	Routing	Invert	Outlet Devices
#1	Discarded	19.50'	**2.410 in/hr Infiltration over Surface area** Phase-In= 0.01'
#2	Primary	22.60'	**1.0' long x 1.0' breadth Emergency Outlet** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.01 cfs @ 11.85 hrs HW=19.53' (Free Discharge)
1=Infiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.50' TW=0.00' (Dynamic Tailwater)
2=Emergency Outlet (Controls 0.00 cfs)

Pond 2P: Infiltration Trench



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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=8,138 sf 100.00% Impervious Runoff Depth=4.36"
Tc=5.0 min CN=98 Runoff=0.87 cfs 0.068 af

Subcatchment 2S: 2S Runoff Area=6,291 sf 53.79% Impervious Runoff Depth=1.82"
Tc=5.0 min CN=71 Runoff=0.31 cfs 0.022 af

Subcatchment 3S: 3S (Misc. Runoff) Runoff Area=1,004 sf 4.28% Impervious Runoff Depth=0.22"
Tc=5.0 min CN=42 Runoff=0.00 cfs 0.000 af

Reach 1R: POI #1 - Anderson St. Inflow=0.43 cfs 0.068 af
Outflow=0.43 cfs 0.068 af

Pond 1P: USSF-740 Peak Elev=32.45' Storage=737 cf Inflow=0.87 cfs 0.068 af
Outflow=0.43 cfs 0.068 af

Pond 2P: Infiltration Trench Peak Elev=22.12' Storage=368 cf Inflow=0.31 cfs 0.022 af
Discarded=0.04 cfs 0.022 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.022 af

Total Runoff Area = 0.354 ac Runoff Volume = 0.090 af Average Runoff Depth = 3.06"
25.06% Pervious = 0.089 ac 74.94% Impervious = 0.265 ac

Summary for Subcatchment 1S: 1S

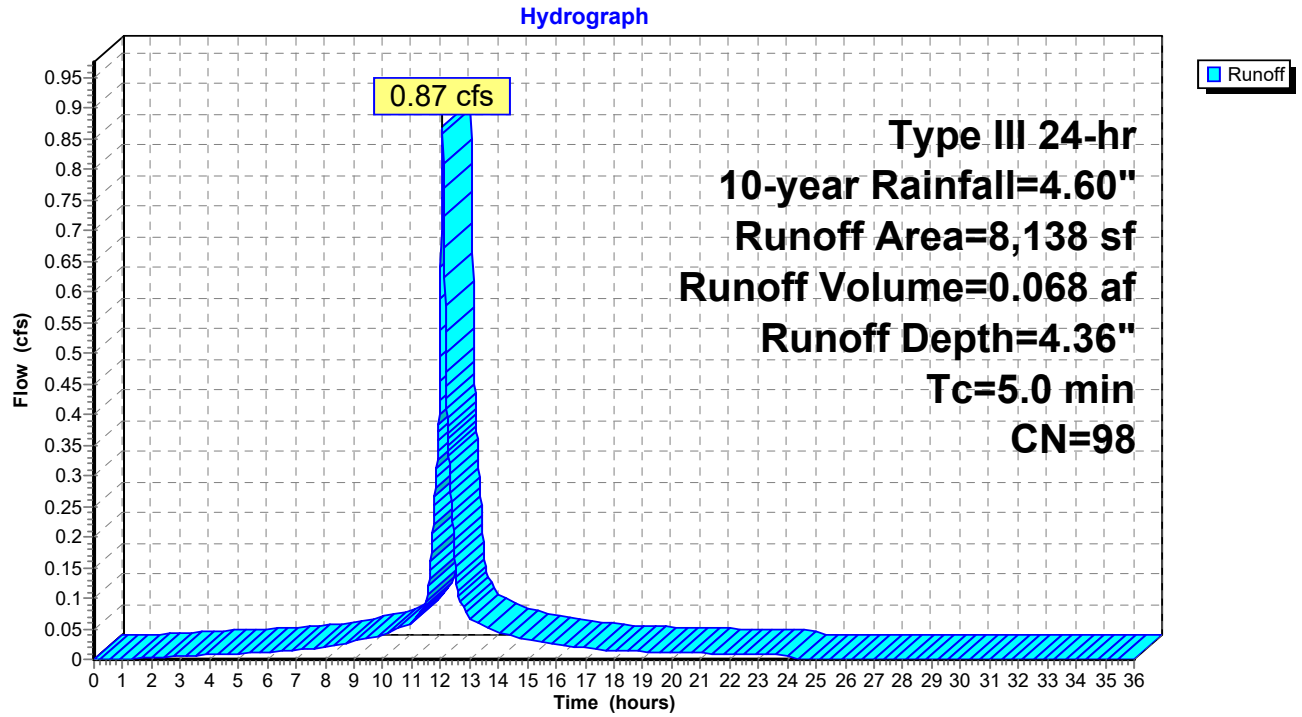
Runoff = 0.87 cfs @ 12.07 hrs, Volume= 0.068 af, Depth= 4.36"

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
*	8,138	98	Roof
	8,138		100.00% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

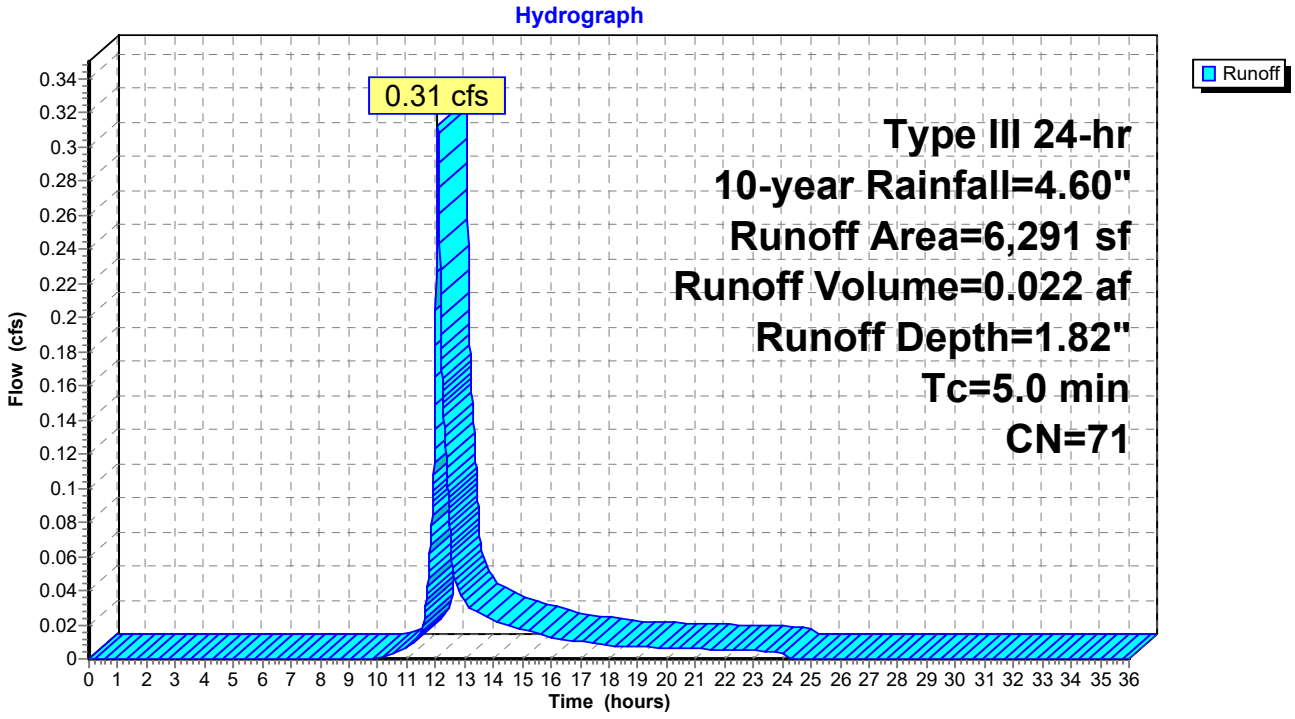
Runoff = 0.31 cfs @ 12.08 hrs, Volume= 0.022 af, Depth= 1.82"

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
*	3,384	98	Drive, wall, walks, decks above, misc. roof
	2,907	39	>75% Grass cover, Good, HSG A
	6,291	71	Weighted Average
	2,907		46.21% Pervious Area
	3,384		53.79% Impervious Area

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

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S (Misc. Runoff)

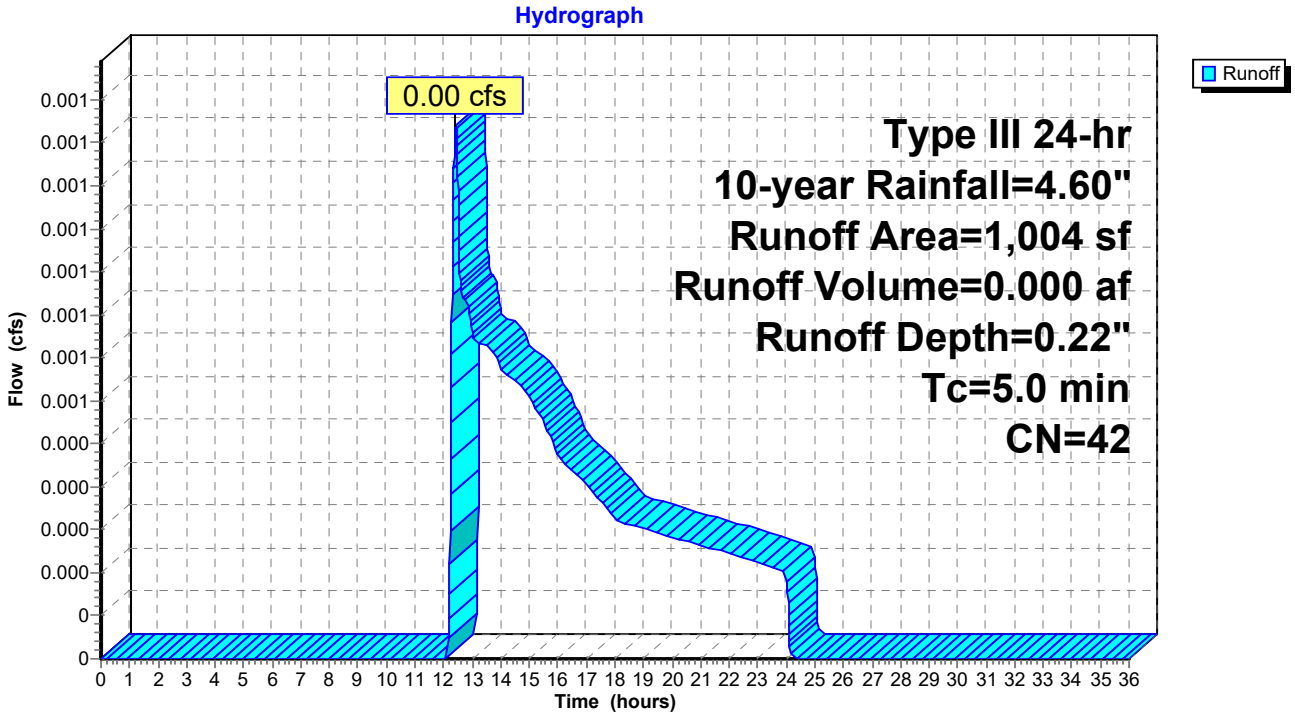
Runoff = 0.00 cfs @ 12.42 hrs, Volume= 0.000 af, Depth= 0.22"

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
	961	39	>75% Grass cover, Good, HSG A
*	43	98	Front entrance walk/sculptures
	1,004	42	Weighted Average
	961		95.72% Pervious Area
	43		4.28% Impervious Area

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

Subcatchment 3S: 3S (Misc. Runoff)

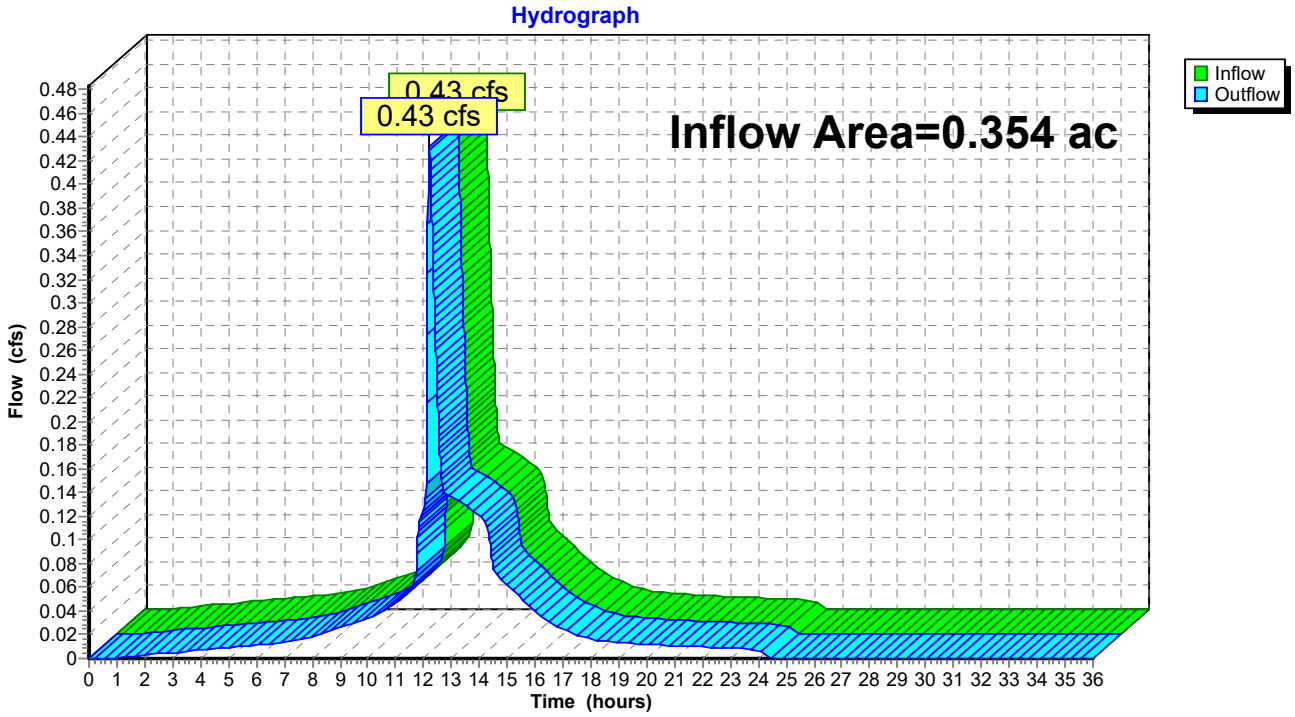


Summary for Reach 1R: POI #1 - Anderson St.

Inflow Area = 0.354 ac, 74.94% Impervious, Inflow Depth = 2.32" for 10-year event
Inflow = 0.43 cfs @ 12.20 hrs, Volume= 0.068 af
Outflow = 0.43 cfs @ 12.20 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: POI #1 - Anderson St.



Summary for Pond 1P: USSF-740

Inflow Area = 0.187 ac,100.00% Impervious, Inflow Depth = 4.36" for 10-year event
Inflow = 0.87 cfs @ 12.07 hrs, Volume= 0.068 af
Outflow = 0.43 cfs @ 12.20 hrs, Volume= 0.068 af, Atten= 50%, Lag= 7.6 min
Primary = 0.43 cfs @ 12.20 hrs, Volume= 0.068 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 32.45' @ 12.20 hrs Surf.Area= 1,231 sf Storage= 737 cf

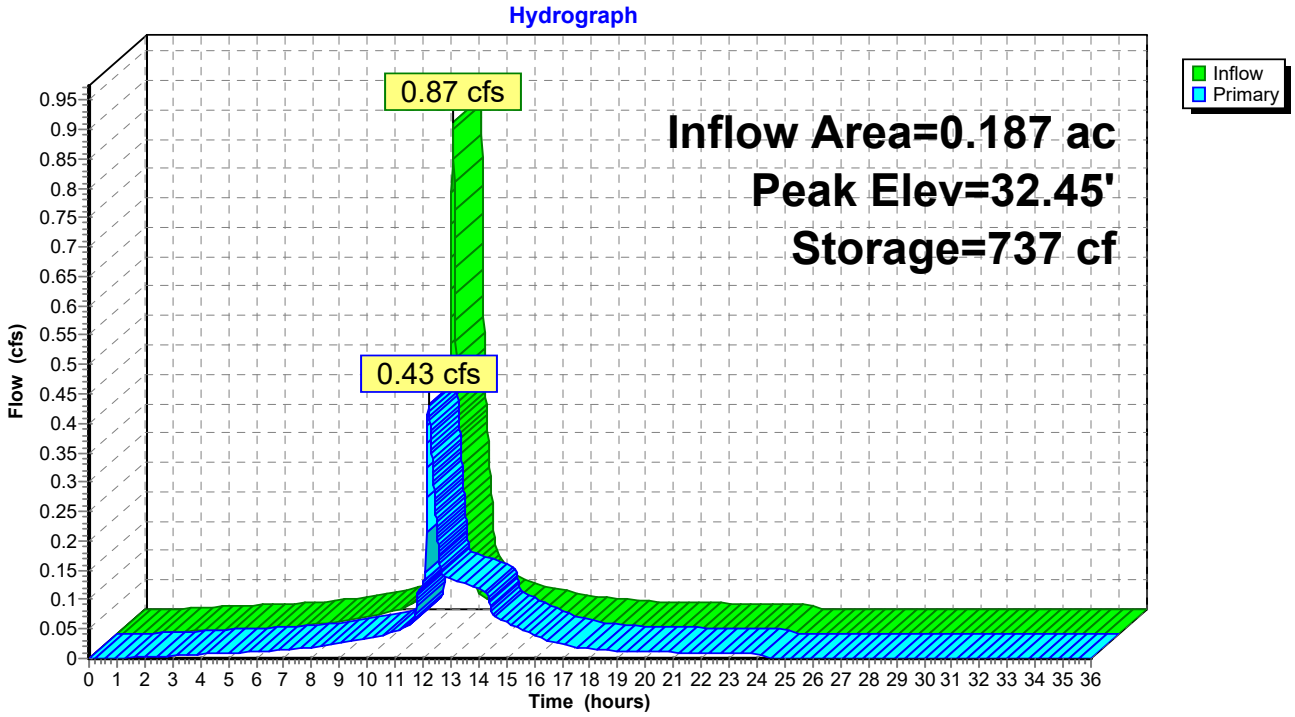
Plug-Flow detention time= 37.1 min calculated for 0.068 af (100% of inflow)
Center-of-Mass det. time= 37.1 min (785.6 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1	30.50'	450 cf	**25.25'W x 16.25'L x 3.75'H Crushed Stone** 1,539 cf Overall - 413 cf Embedded = 1,125 cf x 40.0% Voids
#2	31.00'	413 cf	**ADS_StormTech SC-740** x 9 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#3	29.00'	31 cf	**16.25'W x 25.25'L x 1.50'H Sand** 615 cf Overall x 5.0% Voids
#4	27.80'	195 cf	**16.25'W x 25.25'L x 1.20'H Crushed Stone Underdrain** 492 cf Overall - 5 cf Embedded = 487 cf x 40.0% Voids
#5	28.33'	5 cf	**4.0" Round Underdrains** Inside #4 L= 61.0' S= 0.0050 '/'
		1,094 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	27.65'	**8.0" Round 8" Outlet** L= 130.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 27.65' / 27.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	27.75'	**1.6" Vert. Quality Outlet** C= 0.600
#3	Device 1	32.10'	**5.7" Vert. Quantity Outlet** C= 0.600
#4	Device 1	32.90'	**6.0' long x 0.7' breadth Overflow Wier** 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=0.43 cfs @ 12.20 hrs HW=32.45' TW=0.00' (Dynamic Tailwater)
└─**1=8" Outlet** (Passes 0.43 cfs of 2.05 cfs potential flow)
  ├─**2=Quality Outlet** (Orifice Controls 0.14 cfs @ 10.37 fps)
  ├─**3=Quantity Outlet** (Orifice Controls 0.29 cfs @ 2.02 fps)
  └─**4=Overflow Wier** (Controls 0.00 cfs)

Pond 1P: USSF-740



Summary for Pond 2P: Infiltration Trench

Inflow Area = 0.144 ac, 53.79% Impervious, Inflow Depth = 1.82" for 10-year event
Inflow = 0.31 cfs @ 12.08 hrs, Volume= 0.022 af
Outflow = 0.04 cfs @ 12.93 hrs, Volume= 0.022 af, Atten= 88%, Lag= 51.1 min
Discarded = 0.04 cfs @ 12.93 hrs, Volume= 0.022 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 22.12' @ 12.93 hrs Surf.Area= 648 sf Storage= 368 cf

Plug-Flow detention time= 141.3 min calculated for 0.022 af (100% of inflow)
Center-of-Mass det. time= 141.2 min (989.9 - 848.7)

Volume	Invert	Avail.Storage	Storage Description
#1	19.50'	164 cf	**3/4" Stone Detention (Prismatic)** Listed below (Recalc) 410 cf Overall x 40.0% Voids
#2	21.50'	558 cf	**Detention above Stone (Prismatic)** Listed below (Recalc)
		722 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.50	205	0	0
21.50	205	410	410

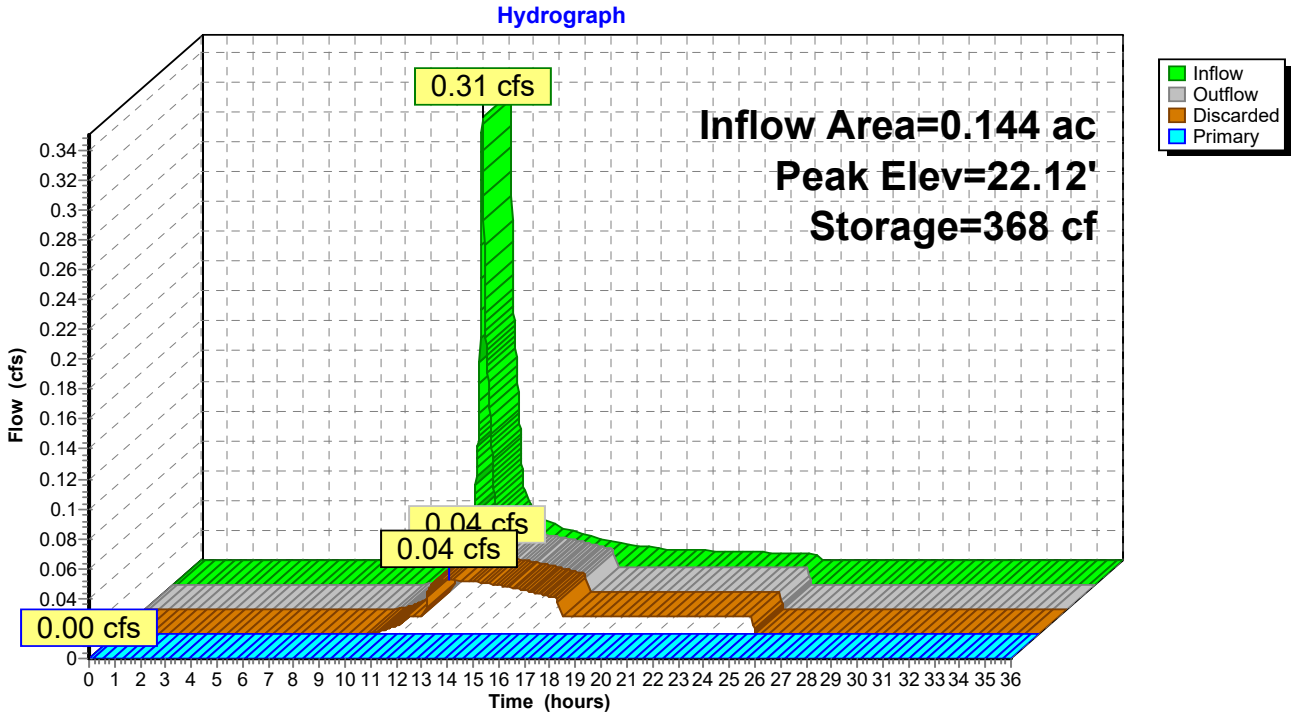
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	217	0	0
22.75	675	558	558

Device	Routing	Invert	Outlet Devices
#1	Discarded	19.50'	**2.410 in/hr Infiltration over Surface area** Phase-In= 0.01'
#2	Primary	22.60'	**1.0' long x 1.0' breadth Emergency Outlet** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.04 cfs @ 12.93 hrs HW=22.12' (Free Discharge)
1=Infiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.50' TW=0.00' (Dynamic Tailwater)
2=Emergency Outlet (Controls 0.00 cfs)

Pond 2P: Infiltration Trench



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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=8,138 sf 100.00% Impervious Runoff Depth=5.56"
Tc=5.0 min CN=98 Runoff=1.10 cfs 0.087 af

Subcatchment 2S: 2S Runoff Area=6,291 sf 53.79% Impervious Runoff Depth=2.74"
Tc=5.0 min CN=71 Runoff=0.48 cfs 0.033 af

Subcatchment 3S: 3S (Misc. Runoff) Runoff Area=1,004 sf 4.28% Impervious Runoff Depth=0.55"
Tc=5.0 min CN=42 Runoff=0.01 cfs 0.001 af

Reach 1R: POI #1 - Anderson St. Inflow=0.74 cfs 0.088 af
Outflow=0.74 cfs 0.088 af

Pond 1P: USSF-740 Peak Elev=32.80' Storage=826 cf Inflow=1.10 cfs 0.087 af
Outflow=0.73 cfs 0.087 af

Pond 2P: Infiltration Trench Peak Elev=22.58' Storage=615 cf Inflow=0.48 cfs 0.033 af
Discarded=0.05 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.033 af

Total Runoff Area = 0.354 ac Runoff Volume = 0.121 af Average Runoff Depth = 4.08"
25.06% Pervious = 0.089 ac 74.94% Impervious = 0.265 ac

Summary for Subcatchment 1S: 1S

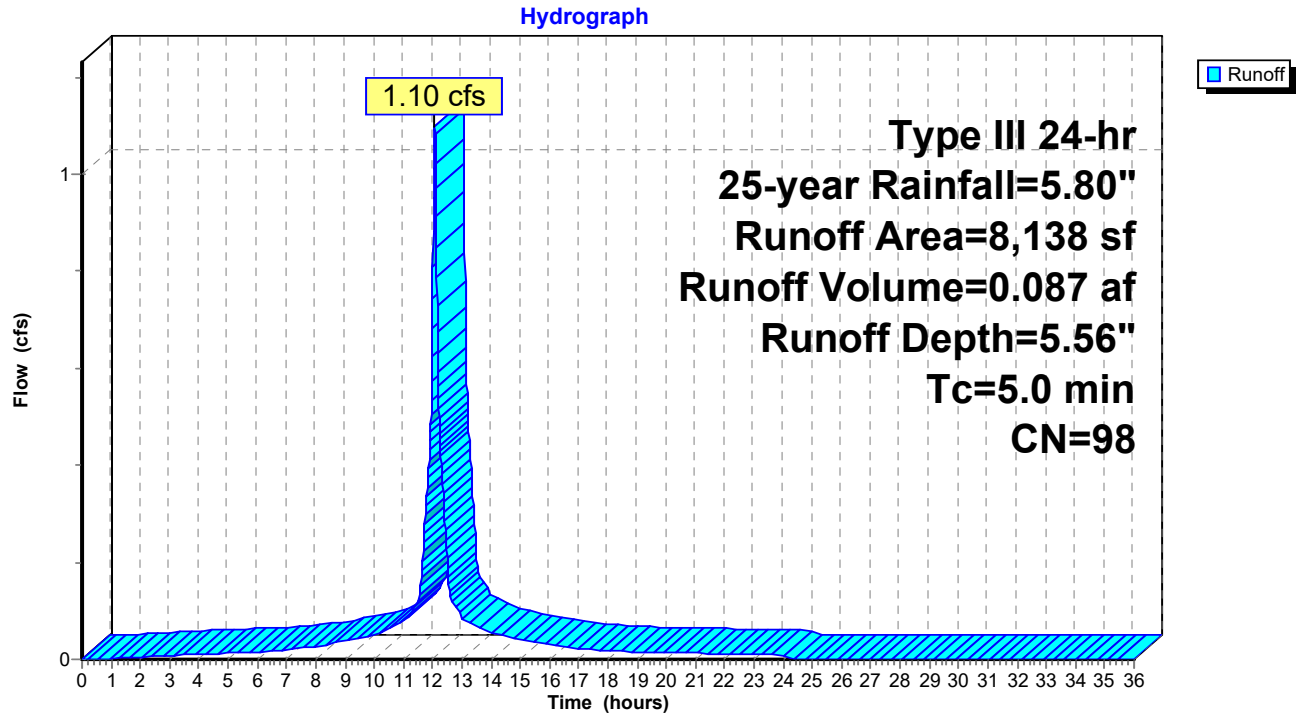
Runoff = 1.10 cfs @ 12.07 hrs, Volume= 0.087 af, Depth= 5.56"

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
*	8,138	98	Roof
	8,138		100.00% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

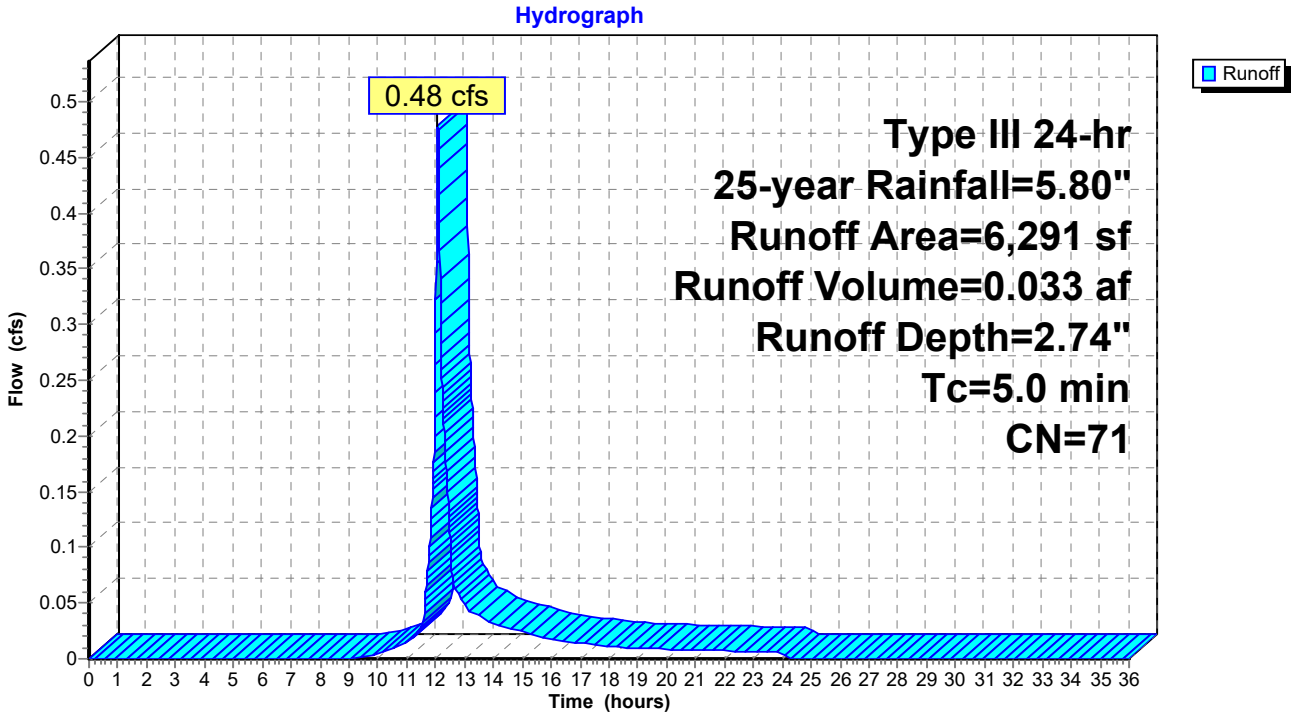
Runoff = 0.48 cfs @ 12.08 hrs, Volume= 0.033 af, Depth= 2.74"

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
*	3,384	98	Drive, wall, walks, decks above, misc. roof
	2,907	39	>75% Grass cover, Good, HSG A
	6,291	71	Weighted Average
	2,907		46.21% Pervious Area
	3,384		53.79% Impervious Area

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

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S (Misc. Runoff)

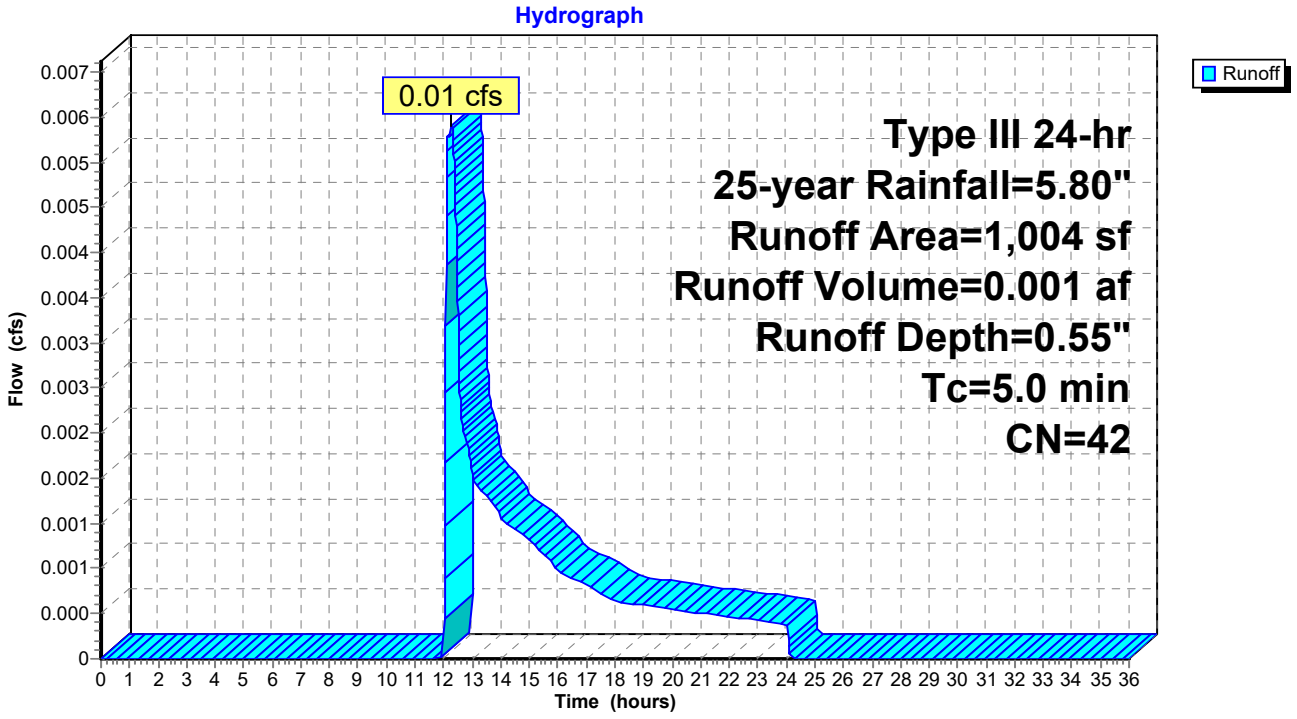
Runoff = 0.01 cfs @ 12.27 hrs, Volume= 0.001 af, Depth= 0.55"

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
	961	39	>75% Grass cover, Good, HSG A
*	43	98	Front entrance walk/sculptures
	1,004	42	Weighted Average
	961		95.72% Pervious Area
	43		4.28% Impervious Area

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

Subcatchment 3S: 3S (Misc. Runoff)

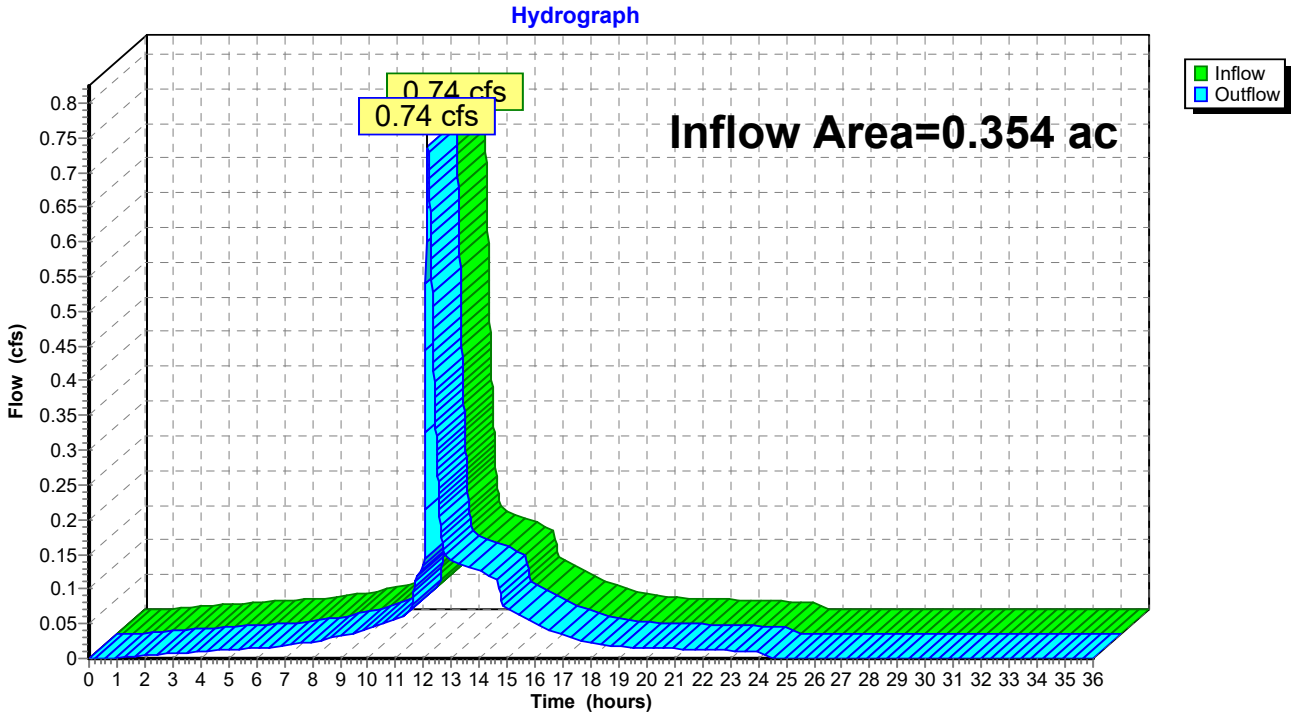


Summary for Reach 1R: POI #1 - Anderson St.

Inflow Area = 0.354 ac, 74.94% Impervious, Inflow Depth = 2.97" for 25-year event
Inflow = 0.74 cfs @ 12.15 hrs, Volume= 0.088 af
Outflow = 0.74 cfs @ 12.15 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: POI #1 - Anderson St.



Summary for Pond 1P: USSF-740

Inflow Area = 0.187 ac,100.00% Impervious, Inflow Depth = 5.56" for 25-year event
Inflow = 1.10 cfs @ 12.07 hrs, Volume= 0.087 af
Outflow = 0.73 cfs @ 12.15 hrs, Volume= 0.087 af, Atten= 34%, Lag= 4.8 min
Primary = 0.73 cfs @ 12.15 hrs, Volume= 0.087 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 32.80' @ 12.15 hrs Surf.Area= 1,231 sf Storage= 826 cf

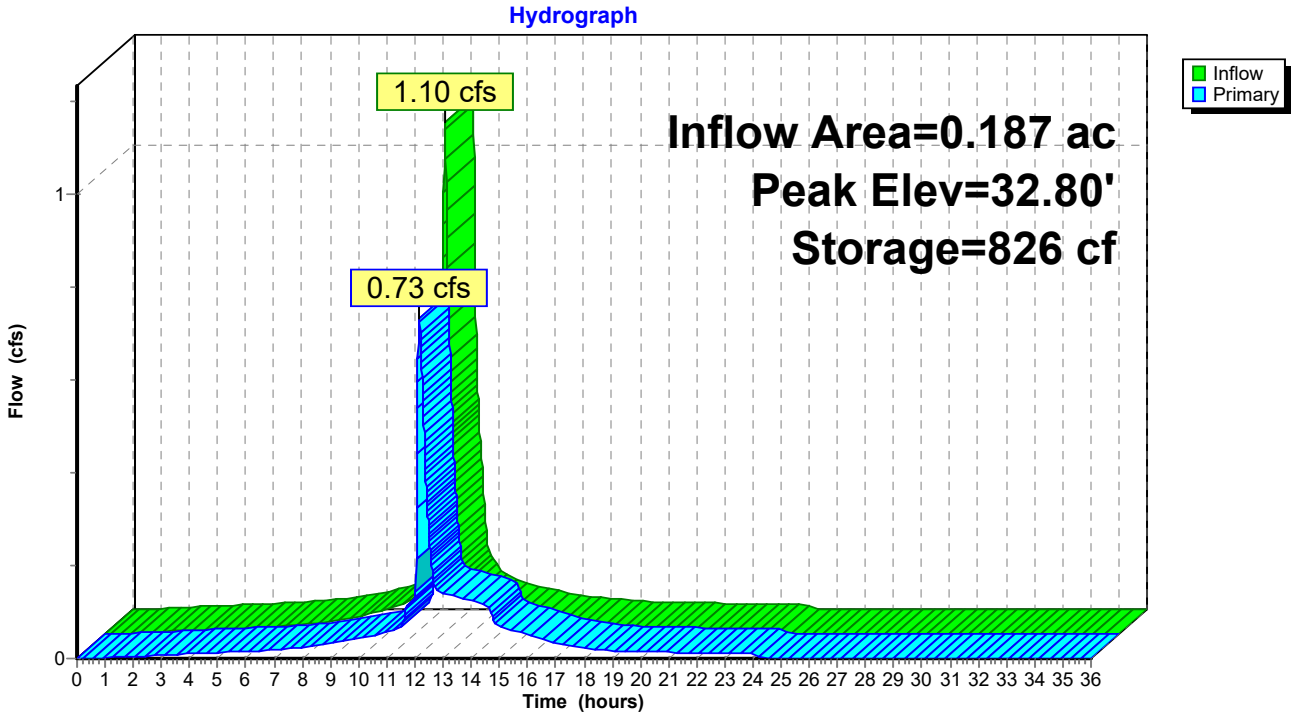
Plug-Flow detention time= 35.4 min calculated for 0.087 af (100% of inflow)
Center-of-Mass det. time= 35.4 min (780.1 - 744.7)

Volume	Invert	Avail.Storage	Storage Description
#1	30.50'	450 cf	**25.25'W x 16.25'L x 3.75'H Crushed Stone** 1,539 cf Overall - 413 cf Embedded = 1,125 cf x 40.0% Voids
#2	31.00'	413 cf	**ADS_StormTech SC-740** x 9 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#3	29.00'	31 cf	**16.25'W x 25.25'L x 1.50'H Sand** 615 cf Overall x 5.0% Voids
#4	27.80'	195 cf	**16.25'W x 25.25'L x 1.20'H Crushed Stone Underdrain** 492 cf Overall - 5 cf Embedded = 487 cf x 40.0% Voids
#5	28.33'	5 cf	**4.0" Round Underdrains** Inside #4 L= 61.0' S= 0.0050 '/'
		1,094 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	27.65'	**8.0" Round 8" Outlet** L= 130.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 27.65' / 27.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	27.75'	**1.6" Vert. Quality Outlet** C= 0.600
#3	Device 1	32.10'	**5.7" Vert. Quantity Outlet** C= 0.600
#4	Device 1	32.90'	**6.0' long x 0.7' breadth Overflow Wier** 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=0.73 cfs @ 12.15 hrs HW=32.80' TW=0.00' (Dynamic Tailwater)
- **1=8" Outlet** (Passes 0.73 cfs of 2.13 cfs potential flow)
  - **2=Quality Outlet** (Orifice Controls 0.15 cfs @ 10.75 fps)
  - **3=Quantity Outlet** (Orifice Controls 0.58 cfs @ 3.28 fps)
  - **4=Overflow Wier** (Controls 0.00 cfs)

Pond 1P: USSF-740



Summary for Pond 2P: Infiltration Trench

Inflow Area = 0.144 ac, 53.79% Impervious, Inflow Depth = 2.74" for 25-year event
Inflow = 0.48 cfs @ 12.08 hrs, Volume= 0.033 af
Outflow = 0.05 cfs @ 13.05 hrs, Volume= 0.033 af, Atten= 90%, Lag= 58.1 min
Discarded = 0.05 cfs @ 13.05 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 22.58' @ 13.05 hrs Surf.Area= 819 sf Storage= 615 cf

Plug-Flow detention time= 171.7 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 171.7 min (1,008.3 - 836.6)

Volume	Invert	Avail.Storage	Storage Description
#1	19.50'	164 cf	**3/4" Stone Detention (Prismatic)** Listed below (Recalc) 410 cf Overall x 40.0% Voids
#2	21.50'	558 cf	**Detention above Stone (Prismatic)** Listed below (Recalc)
		722 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.50	205	0	0
21.50	205	410	410

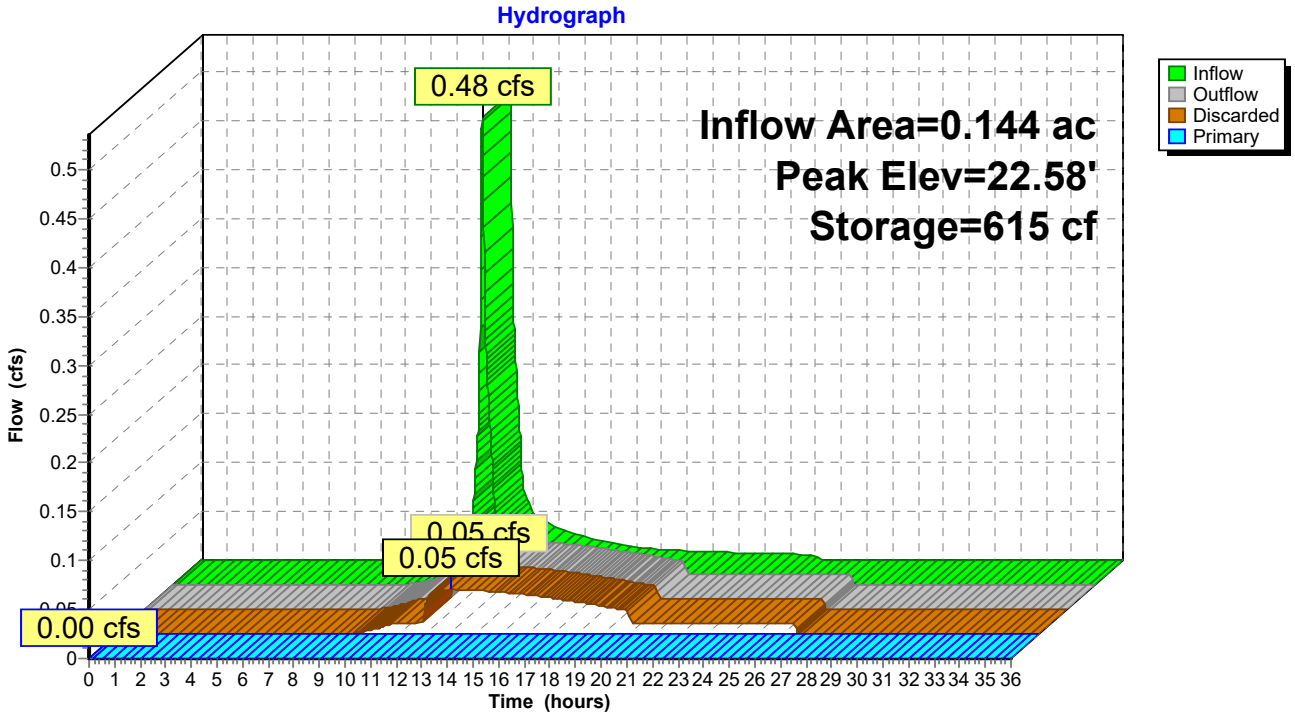
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	217	0	0
22.75	675	558	558

Device	Routing	Invert	Outlet Devices
#1	Discarded	19.50'	**2.410 in/hr Infiltration over Surface area** Phase-In= 0.01'
#2	Primary	22.60'	**1.0' long x 1.0' breadth Emergency Outlet** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.05 cfs @ 13.05 hrs HW=22.58' (Free Discharge)
1=Infiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.50' TW=0.00' (Dynamic Tailwater)
2=Emergency Outlet (Controls 0.00 cfs)

Pond 2P: Infiltration Trench



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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1S Runoff Area=8,138 sf 100.00% Impervious Runoff Depth=1.05"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.016 af

Subcatchment 2S: 2S Runoff Area=6,291 sf 53.79% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=71 Runoff=0.00 cfs 0.001 af

Subcatchment 3S: 3S (Misc. Runoff) Runoff Area=1,004 sf 4.28% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=42 Runoff=0.00 cfs 0.000 af

Reach 1R: POI #1 - Anderson St. Inflow=0.07 cfs 0.016 af
Outflow=0.07 cfs 0.016 af

Pond 1P: USSF-740 Peak Elev=28.84' Storage=175 cf Inflow=0.23 cfs 0.016 af
Outflow=0.07 cfs 0.016 af

Pond 2P: Infiltration Trench Peak Elev=19.50' Storage=0 cf Inflow=0.00 cfs 0.001 af
Discarded=0.00 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Total Runoff Area = 0.354 ac Runoff Volume = 0.017 af Average Runoff Depth = 0.57"
25.06% Pervious = 0.089 ac 74.94% Impervious = 0.265 ac

Summary for Subcatchment 1S: 1S

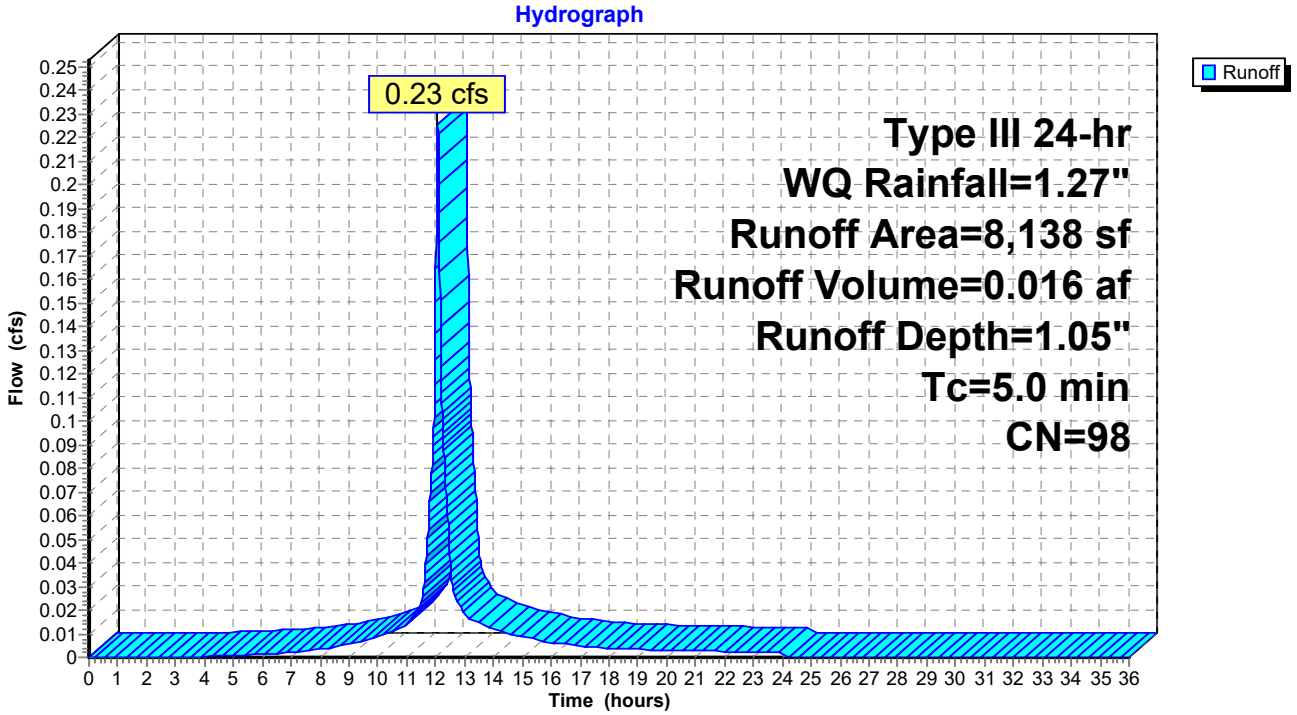
Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.016 af, Depth= 1.05"

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 WQ Rainfall=1.27"

	Area (sf)	CN	Description
*	8,138	98	Roof
	8,138		100.00% Impervious Area

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

Subcatchment 1S: 1S



Summary for Subcatchment 2S: 2S

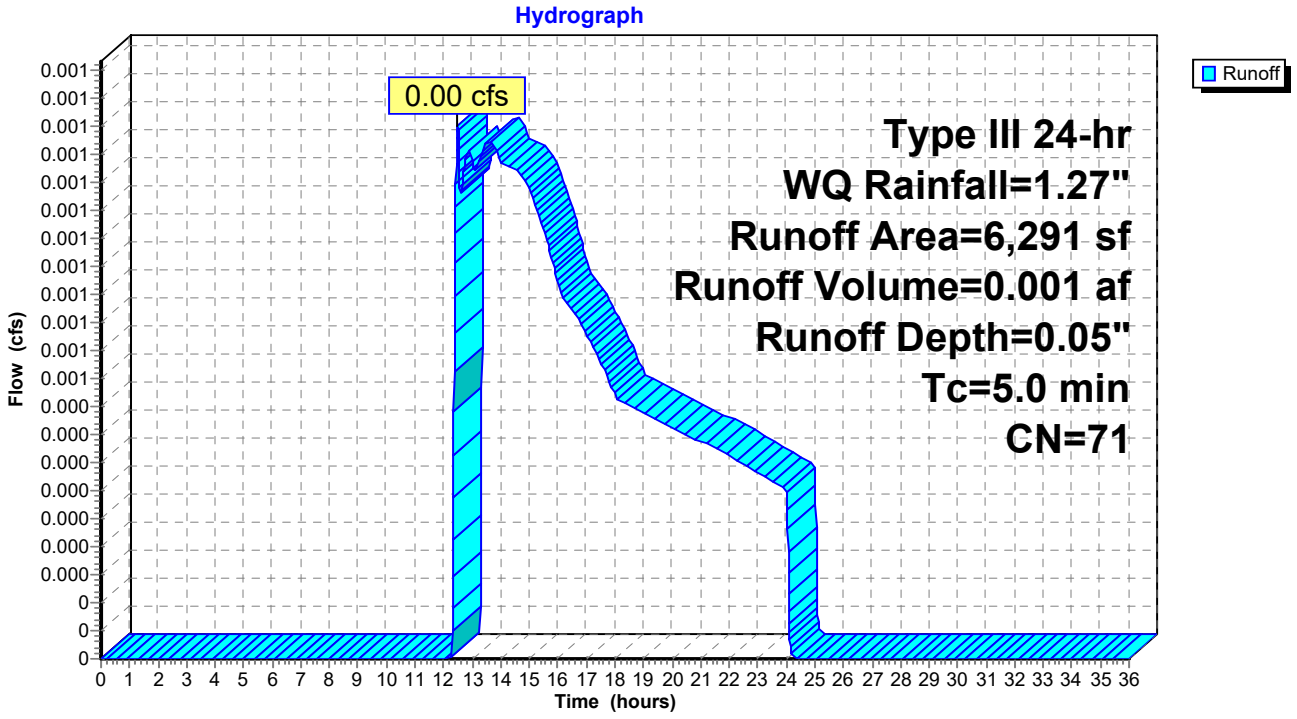
Runoff = 0.00 cfs @ 12.49 hrs, Volume= 0.001 af, Depth= 0.05"

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 WQ Rainfall=1.27"

	Area (sf)	CN	Description
*	3,384	98	Drive, wall, walks, decks above, misc. roof
	2,907	39	>75% Grass cover, Good, HSG A
	6,291	71	Weighted Average
	2,907		46.21% Pervious Area
	3,384		53.79% Impervious Area

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

Subcatchment 2S: 2S



Summary for Subcatchment 3S: 3S (Misc. Runoff)

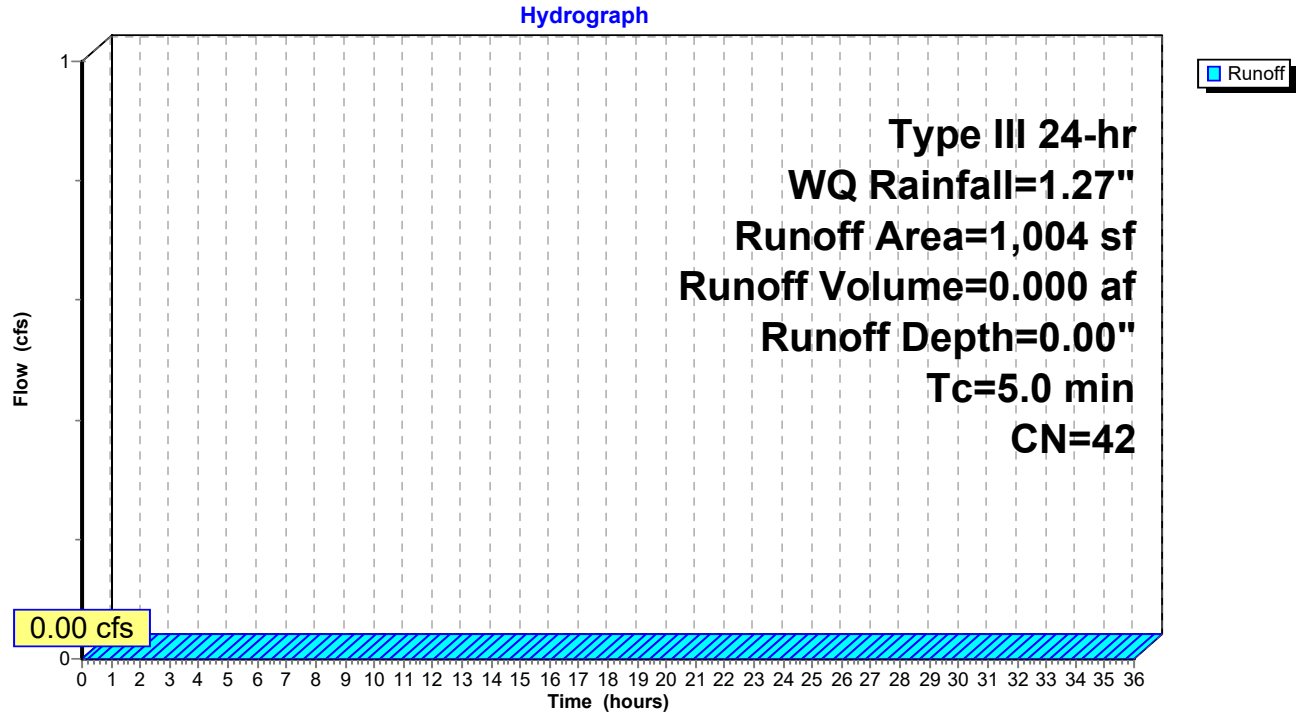
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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 WQ Rainfall=1.27"

	Area (sf)	CN	Description
	961	39	>75% Grass cover, Good, HSG A
*	43	98	Front entrance walk/sculptures
	1,004	42	Weighted Average
	961		95.72% Pervious Area
	43		4.28% Impervious Area

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

Subcatchment 3S: 3S (Misc. Runoff)

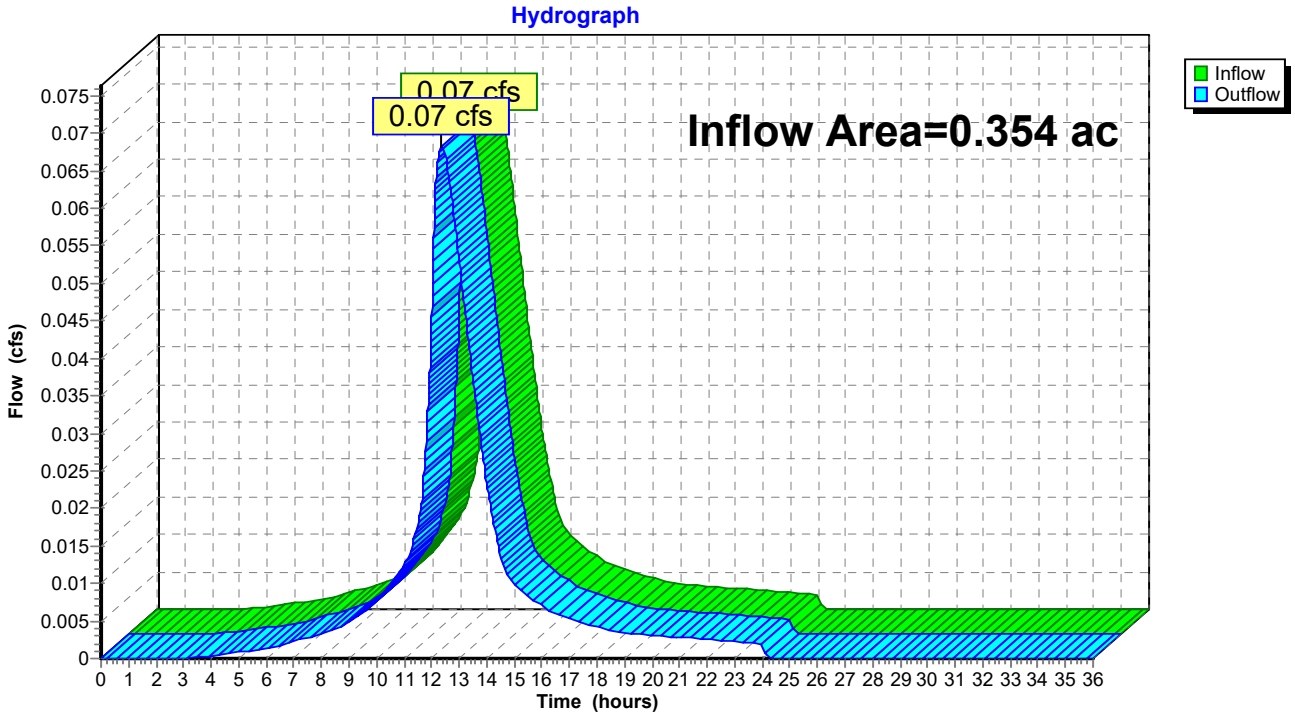


Summary for Reach 1R: POI #1 - Anderson St.

Inflow Area = 0.354 ac, 74.94% Impervious, Inflow Depth = 0.56" for WQ event
Inflow = 0.07 cfs @ 12.37 hrs, Volume= 0.016 af
Outflow = 0.07 cfs @ 12.37 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

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

Reach 1R: POI #1 - Anderson St.



Summary for Pond 1P: USSF-740

Inflow Area = 0.187 ac,100.00% Impervious, Inflow Depth = 1.05" for WQ event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 0.016 af
Outflow = 0.07 cfs @ 12.37 hrs, Volume= 0.016 af, Atten= 70%, Lag= 18.2 min
Primary = 0.07 cfs @ 12.37 hrs, Volume= 0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 28.84' @ 12.37 hrs Surf.Area= 410 sf Storage= 175 cf

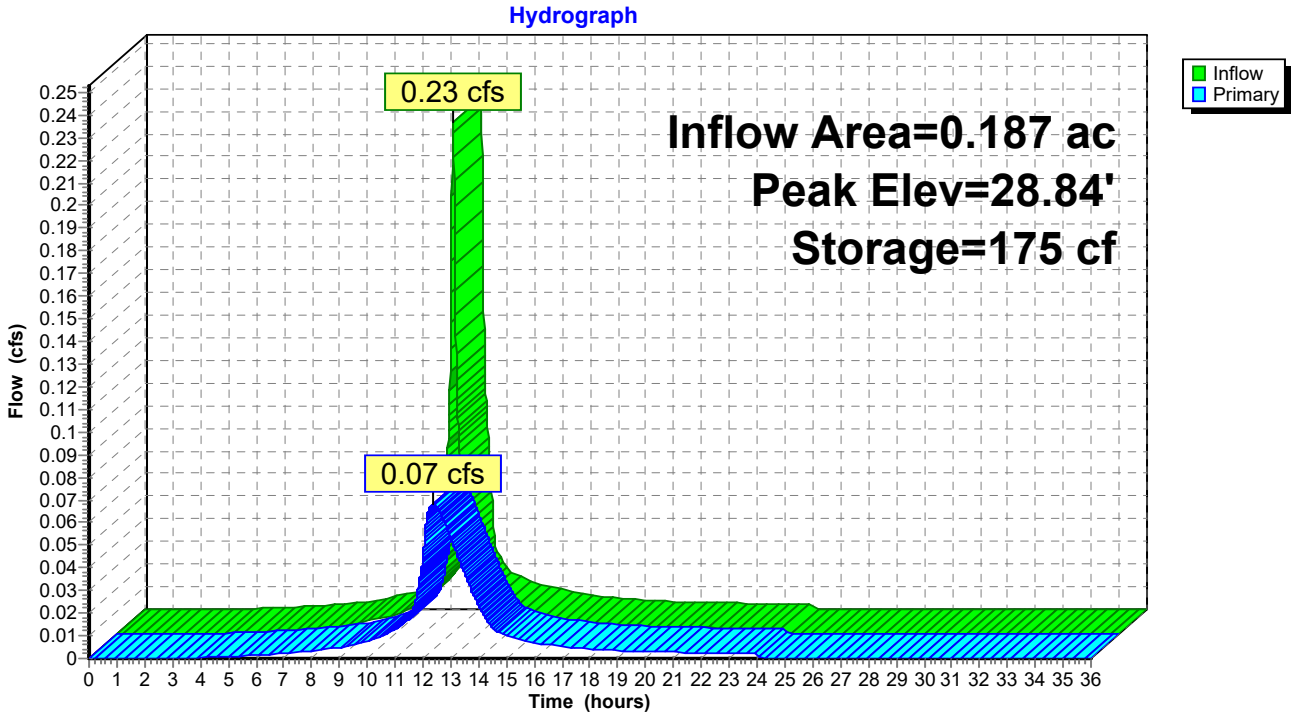
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 21.3 min (800.6 - 779.3)

Volume	Invert	Avail.Storage	Storage Description
#1	30.50'	450 cf	**25.25'W x 16.25'L x 3.75'H Crushed Stone** 1,539 cf Overall - 413 cf Embedded = 1,125 cf x 40.0% Voids
#2	31.00'	413 cf	**ADS_StormTech SC-740** x 9 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#3	29.00'	31 cf	**16.25'W x 25.25'L x 1.50'H Sand** 615 cf Overall x 5.0% Voids
#4	27.80'	195 cf	**16.25'W x 25.25'L x 1.20'H Crushed Stone Underdrain** 492 cf Overall - 5 cf Embedded = 487 cf x 40.0% Voids
#5	28.33'	5 cf	**4.0" Round Underdrains** Inside #4 L= 61.0' S= 0.0050 '/'
		1,094 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	27.65'	**8.0" Round 8" Outlet** L= 130.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 27.65' / 27.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Device 1	27.75'	**1.6" Vert. Quality Outlet** C= 0.600
#3	Device 1	32.10'	**5.7" Vert. Quantity Outlet** C= 0.600
#4	Device 1	32.90'	**6.0' long x 0.7' breadth Overflow Wier** 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=0.07 cfs @ 12.37 hrs HW=28.84' TW=0.00' (Dynamic Tailwater)
└─**1=8" Outlet** (Passes 0.07 cfs of 1.02 cfs potential flow)
  ├─**2=Quality Outlet** (Orifice Controls 0.07 cfs @ 4.88 fps)
  ├─**3=Quantity Outlet** (Controls 0.00 cfs)
  └─**4=Overflow Wier** (Controls 0.00 cfs)

Pond 1P: USSF-740



Summary for Pond 2P: Infiltration Trench

Inflow Area = 0.144 ac, 53.79% Impervious, Inflow Depth = 0.05" for WQ event
Inflow = 0.00 cfs @ 12.49 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 12.51 hrs, Volume= 0.001 af, Atten= 1%, Lag= 1.2 min
Discarded = 0.00 cfs @ 12.51 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 19.50' @ 12.51 hrs Surf.Area= 205 sf Storage= 0 cf

Plug-Flow detention time= 1.2 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (1,020.7 - 1,019.6)

Volume	Invert	Avail.Storage	Storage Description
#1	19.50'	164 cf	**3/4" Stone Detention (Prismatic)** Listed below (Recalc) 410 cf Overall x 40.0% Voids
#2	21.50'	558 cf	**Detention above Stone (Prismatic)** Listed below (Recalc)
		722 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
19.50	205	0	0
21.50	205	410	410

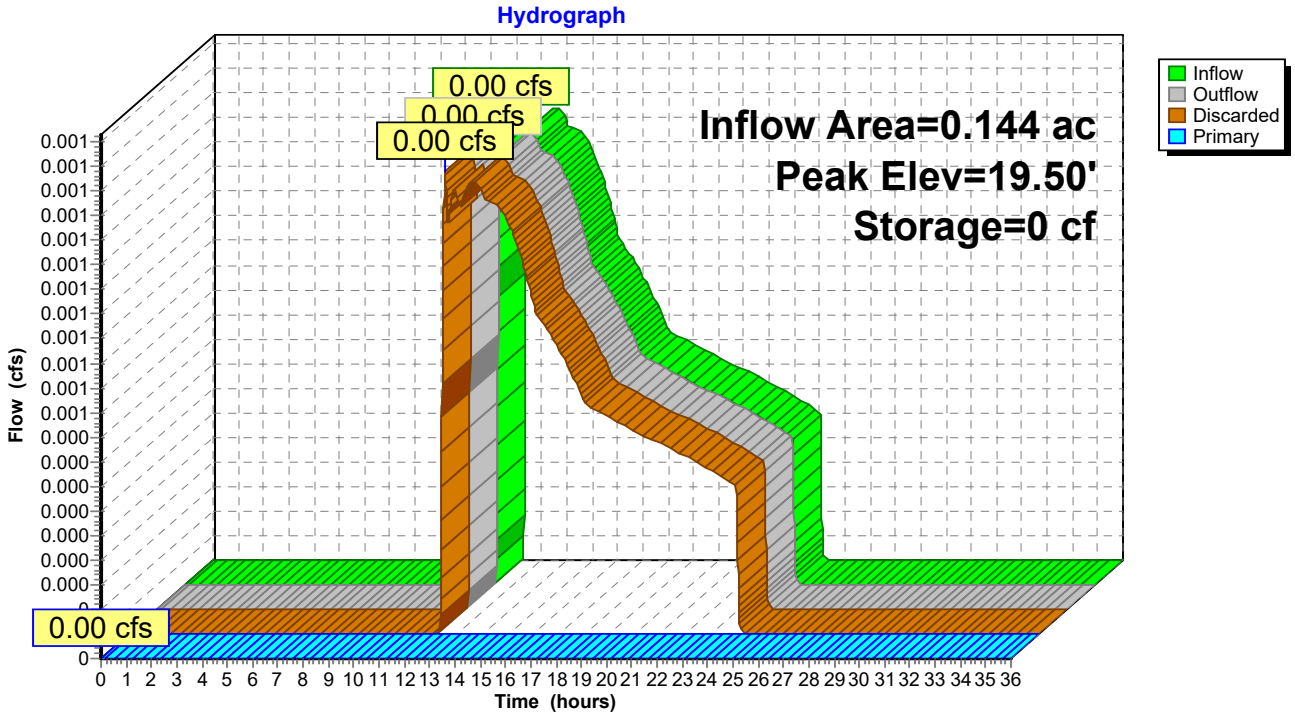
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	217	0	0
22.75	675	558	558

Device	Routing	Invert	Outlet Devices
#1	Discarded	19.50'	**2.410 in/hr Infiltration over Surface area** Phase-In= 0.01'
#2	Primary	22.60'	**1.0' long x 1.0' breadth Emergency Outlet** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 12.51 hrs HW=19.50' (Free Discharge)
1=Infiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=19.50' TW=0.00' (Dynamic Tailwater)
2=Emergency Outlet (Controls 0.00 cfs)

Pond 2P: Infiltration Trench



Map Scale: 1:463 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 20 40 80 120

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 15, Sep 6, 2018

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

Date(s) aerial images were photographed: Data not available.

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
HID	Hinckley loamy sand, 15 to 25 percent slopes	0.9	100.0%
Totals for Area of Interest		**0.9**	**100.0%**

Cumberland County and Part of Oxford County, Maine

HID—Hinckley loamy sand, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2svmc
Elevation: 0 to 1,460 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash plains, eskers, moraines, outwash terraces, outwash deltas, kame terraces, kames
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser
Down-slope shape: Convex, linear, concave
Across-slope shape: Linear, convex, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Hydric soil rating: No

Data Source Information

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 15, Sep 6, 2018