

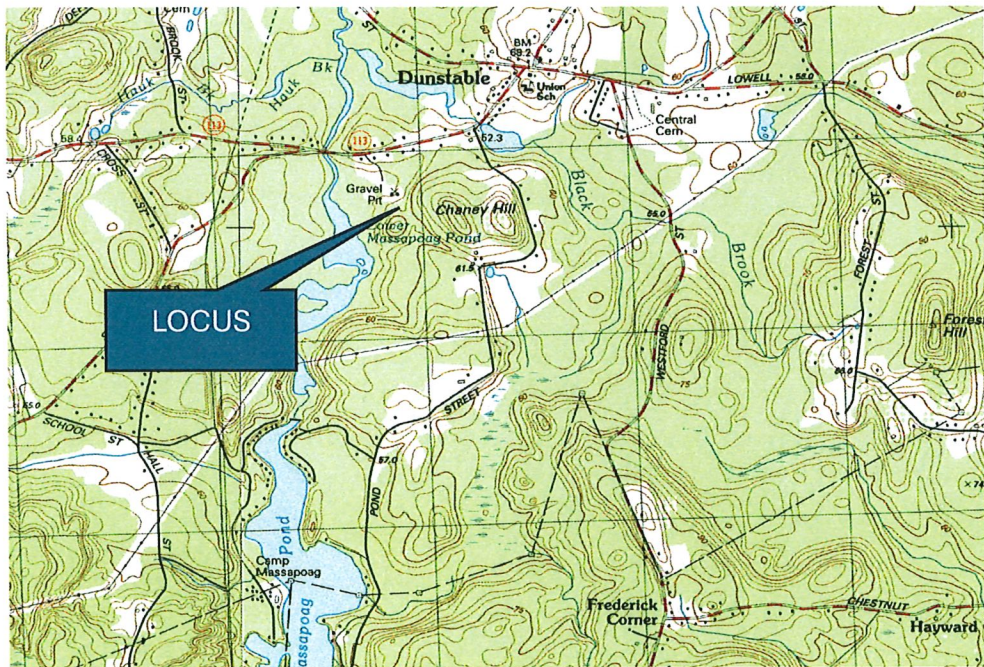


HALEY WARD®

STORMWATER ANALYSIS

MCO COTTAGE RENTALS
PLEASANT STREET
Dunstable, MA

APPLICANT:
MCO Cottage Rentals
P.O. Box 372 | Harvard, MA 01451



REPORT PREPARED BY:
Haley Ward, Inc.

510 Mechanic Street | Leominster, MA 01453

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1.0

DRAINAGE NARRATIVE

1.0 NARRATIVE

1.1 INTRODUCTION

As part of the submittal of a site plan for a new residential development off of Pleasant Street in Dunstable, MA, Haley Ward, Inc., has prepared this stormwater system analysis pursuant to the Town of Dunstable rules and regulations. The purpose of this report is to compare the pre-construction drainage conditions to the post-construction drainage conditions relative to increases in runoff generally associated with the increase of developed area.

The proposed project consists of the construction of a new 48-unit residential development with associated roadways, driveways, parking areas, utilities, and stormwater management devices. For a complete description of the site plan refer to a set of plans, entitled *"Site Development Plan for MCO Cottage Rentals located at 164 Pleasant Street in Dunstable, Massachusetts"* dated April 7, 2025 prepared by Haley Ward, Inc., 510 Mechanic Street, Leominster, MA 01453.

1.2 METHOD OF ANALYSIS

The enclosed hydrologic calculations utilize the runoff estimating techniques developed by the USDA Soil Conservation Service (SCS). The following publications were used in the preparation of this report:

1. "Urban Hydrology for Small Watersheds"¹
2. "National Engineering Handbook, Hydrology, Section 4" (NEH-4)²

Using SCS publications and other texts on surface water hydrology, in conjunction with drainage software "HydroCAD" developed by Applied Microcomputer Systems³, Whitman & Bingham Associates has calculated peak rates of runoff relative to the subject site. The drainage software program "HydroCAD" calculates peak rates of runoff similarly to the computer program known as "Computer Programs for Project Formulations Hydrology, Technical Release Number 20" (TR-20), developed by SCS.

Times of concentration are computed by using the "Upland Method" which calculates times of concentrations utilizing land use and slope in conjunction with other land use variables. Time of concentration is the time required for a droplet of water to travel from the most hydraulically distant point of the subwatershed to the design point. It is computed by summing the times it takes the water to travel through the different components of the subwatershed drainage system.

As a result of urbanization of an area (increase of impervious area), time of concentration will be decreased since velocity of overland flow will be increased. Therefore, as time of concentration is decreased, the hydrographic peak will be increased for that particular subwatershed. The time of concentration (Tc) is a major hydrograph shape parameter. The hydrograph peak for a subwatershed area is attenuated and shifted to the right with an increase in Tc. The "upland method" translates to more accurate Tc's than other general methods.

1.3 SOILS

Generally, soils are classified from A through D, with A being very pervious (i.e. gravels, etc.) and D being very impervious (i.e. clays, muck, peat, etc.).

The four (4) soil classifications as defined by SCS are:

- Group A Generally have low runoff potential and have high infiltration rates. This group includes mainly sands and gravels consisting of deep, well to excessively drained media (sand, loamy sand, or sandy loam).
- Group B Soils in this classification have moderate infiltration rates and contain well drained soils with moderately fine to moderately coarse textures (silt loam or loam).
- Group C These soils have low infiltration rates and generally consist of a soil layer that prevents downward movement of water to the water table (sandy, clay, loam).
- Group D Soils under this group have high runoff potential since they are chiefly clay soils with high expansive capability. High water table, clay layers, nearly impervious material are all associated with this classification (clay loam, silty clay loam, sand clay, silty clay, or clay).

Soils throughout the subject site were classified by the Soil Conservation Service (SCS) as the following soil groups:

<u>Soil Group</u>	<u>Hydrologic Runoff Class</u>
Hinckley loamy sand	A
Scarboro mucky fine sandy loam	A/D
Freetown muck (wetland areas)	D

These types of soils are described by the SCS in the *preceding paragraph*.

A series of on-site test pits were performed by Haley Ward, inc. Soils were found to be well-drained sands. Therefore, the analysis utilized an infiltration rate of 8.27 inches per hour per Table 2.3.3 1982 Rawls Rates as found in the Massachusetts Stormwater handbook, Volume 3.

1.4 RUNOFF CURVE NUMBERS

There are several major factors affecting the amount of runoff that can be expected from a particular land use. They include treatment, cover type, hydrologic condition, and antecedent runoff condition.

Hydraulic condition represents the effects of cover type and treatment on infiltration and runoff. Density of plant cover and forest litter heavily influences this condition. Good hydraulic condition indicates a low run-off potential due to heavy ground cover while poor hydraulic condition indicates poor cover (i.e. bare soil, etc.) and is indicative of high runoff potential.

As the curve number increases the amount of expected runoff is also increased. A curve number of 30 indicates a low potential for runoff while a number of 90 indicates a high potential. Curve numbers were selected for the various soil types and land uses found on the site in accordance with the following table. Weighted curve numbers for each subwatershed were determined by land area of the different soil types.

The SCS runoff curve numbers used in all watershed modeling contained in this report are based upon the following Hydrologic Soil Group and their following land uses:

SURFACE TYPE	HYDROLOGICAL SOIL GROUP			
	A	B	C	D
	CURVE NUMBERS			
Pavement	98	98	98	98
Grass/Lawn	39	61	74	80
Wooded	30	55	70	77
Woods – Grass Combination (good cover)	32	58	72	79
Gravel - Dirt Driveways	75	83	88	90
Residential 1/2 Acre Zoning	54	70	80	85
Residential 1 Acre Zoning	51	68	79	84
Residential 2 Acre Zoning	46	65	77	82
Pasture (grazing purposes)	39	61	74	80
Bare Soil Surfaces (little or no vegetation)	77	86	91	94
Residential districts, 2-acre lots	46	65	77	82
Open space, grass cover 50% to 75%	49	69	79	84

1.5 DESIGN CRITERIA

This drainage analysis was developed utilizing storm frequencies and the corresponding rainfall depths were compiled from NOAA Atlas 14, Volume 10, Versions and are as follows:

<u>Storm Frequency (years)</u>	<u>Rainfall Depth (inches)</u>
100	7.48
25	5.86
10	4.81
2	3.12

The stormwater management network has been designed to handle up to and including the 100-year design storm. Calculations relative to the 2, 10, 25, and 100-year storms are provided in section 2.0 herein.

1.6 HYDROLOGICAL DESCRIPTIONS

1.6.1 Pre-Development

The subject site is located on the southerly side of Pleasant Street in Tyngsborough, Massachusetts. The site is bounded to the north by the United States Post office and a parcel of undeveloped property along Pleasant Street. The parcel is bounded to the west by Salmon Brook and its associated wetland system. The parcel is bounded to the south by residentially developed areas and to the east by undeveloped property.

The topography of the site consists of mostly gentle slopes within the area proposed for development. There are steep slopes to the east and to the north entering the property that are indicative of earth removal activities.

The subject site drains in a westerly manner towards Salmon Brook and the adjacent wetland system.

A portion of the property lies within the 100-year flood hazard zone as referenced on FIRM panel 25017CO111E dated June 4, 2010.

The design point chosen for this analysis is the existing wetland system located at the westerly side of the property. This design point was chosen to simulate the total change in peak rates of runoff at the limits of the proposed improvements. The composite hydrographs at these design points were chosen to compare peak rates of runoff for the 2, 10, and 25 and 100-year storm frequencies in order to show that there would be no negative drainage impacts to the abutting properties. For a more conservative approach, the pre-development watershed that was chosen encompasses only the area to the east of the wetland system where the proposed improvements will take place.

1.6.2 Post-Development

As stated previously, the proposed project consists of the construction of a 48-unit residential development with associated roadways, driveways, parking areas, utilities, and stormwater management devices.

In order to mitigate the increase in the volume and the rate of stormwater runoff from the project, all stormwater runoff from proposed impervious areas will be connected to a subsurface stormwater infiltration or recharge system that will recharge the collected and treated stormwater into the underlying soil stratum.

Stormwater runoff from the roof areas of each building will be routed to individual roof recharge systems. These systems will be comprised of Stormtech SC-310 recharge chamber units or an approved equal. Refer to the submitted site plans for construction details.

All stormwater runoff from the proposed road, driveway and parking areas will be collected by deep sump, hooded catch basins for initial treatment of the stormwater. The catch basins are connected, via a closed pipe system, to several subsurface recharge systems placed throughout the project site. The recharge system further treats the collected stormwater prior to discharge to the underlying soil stratum.

The recharge systems for the road, driveway and parking areas will be comprised of Stormtech SC-740 recharge chamber units or an approved equal. Refer to the submitted site plans for construction details. These systems are to be fitted with Stormtech's "Isolator Row technology to enhance the system's total suspended solids (TSS) removal efficiency. The stormwater volume directed to the proposed recharge systems is entirely contained within the chambers and do not overtop. Additionally, the site has been graded such that any stormwater runoff that may overtop the recharge systems due to a system failure, is directed away from the dwellings until a repair can be made.

The proposed recharge systems have been designed to accommodate all design storms up to and including the 100-year design storm.

Due to the proposed improvements of the subject site, the existing watershed was separated into smaller subwatersheds. These subwatersheds represent the tributary area(s) to the collection system and ultimately to the individual subsurface recharge area(s). Individual hydrographs were determined and were combined at the appropriate points to compare the total flows at the design point as mentioned in section 1.6.1 above.

1.7 CONCLUSIONS

The proposed site will encompass the design of the aforementioned storm water system which will mitigate the increase in peak rates of runoff as outlined below:

TABLE I
Peak Flows at Design Point

Storm Event	Existing Conditions (cfs)	Proposed Conditions (cfs)
100 yr. storm	18.73	11.28
25 yr. storm	4.51	2.32
10 yr. storm	0.88	0.49
2 yr. storm	0.00	0.00

As outlined in the table above, the proposed storm water management system has been designed so that no negative impact to abutting properties relative to increases in runoff will occur.

The storm water management system as outlined herein and as shown on the accompanying plans have the following positive values relative to stormwater management:

- A) The proposed stormwater network will collect stormwater runoff from impervious area(s) of the site and treat the collected stormwater runoff prior to discharge.
- B) Attenuation of the 2-year, 10-year, 25-year and 100-year design storm events will occur in the stormwater recharge system thus mitigating increased peak rates of storm water discharge.
- C) The proposed stormwater system has been designed in accordance with Town of Dunstable Regulations as well as the Massachusetts Department of Environmental Protection Stormwater Guidelines and Policies.

The subject drainage design was designed with good engineering practice and indicates that no negative impacts to abutting properties associated with stormwater will occur.



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.320 (0.259-0.396)	0.378 (0.305-0.468)	0.473 (0.380-0.586)	0.551 (0.441-0.687)	0.659 (0.508-0.855)	0.740 (0.556-0.979)	0.826 (0.600-1.13)	0.925 (0.630-1.29)	1.07 (0.697-1.54)	1.19 (0.755-1.74)
10-min	0.454 (0.367-0.560)	0.536 (0.433-0.662)	0.670 (0.539-0.831)	0.781 (0.624-0.973)	0.934 (0.719-1.21)	1.05 (0.789-1.39)	1.17 (0.850-1.60)	1.31 (0.892-1.82)	1.52 (0.988-2.18)	1.69 (1.07-2.47)
15-min	0.534 (0.432-0.659)	0.630 (0.509-0.779)	0.788 (0.634-0.977)	0.919 (0.734-1.14)	1.10 (0.846-1.43)	1.23 (0.926-1.63)	1.38 (1.00-1.89)	1.54 (1.05-2.14)	1.78 (1.16-2.56)	1.99 (1.26-2.91)
30-min	0.731 (0.591-0.903)	0.864 (0.698-1.07)	1.08 (0.870-1.34)	1.26 (1.01-1.57)	1.51 (1.16-1.96)	1.69 (1.27-2.24)	1.89 (1.37-2.59)	2.12 (1.44-2.94)	2.45 (1.60-3.52)	2.73 (1.73-3.99)
60-min	0.929 (0.751-1.15)	1.10 (0.886-1.36)	1.37 (1.10-1.70)	1.60 (1.28-2.00)	1.92 (1.48-2.49)	2.15 (1.62-2.85)	2.40 (1.75-3.29)	2.69 (1.83-3.75)	3.12 (2.03-4.48)	3.47 (2.20-5.08)
2-hr	1.16 (0.948-1.43)	1.40 (1.14-1.72)	1.79 (1.45-2.21)	2.11 (1.70-2.62)	2.56 (1.98-3.31)	2.89 (2.19-3.81)	3.24 (2.38-4.45)	3.67 (2.51-5.08)	4.32 (2.82-6.16)	4.88 (3.10-7.08)
3-hr	1.33 (1.09-1.63)	1.62 (1.32-1.98)	2.08 (1.69-2.56)	2.47 (1.99-3.04)	3.00 (2.34-3.87)	3.39 (2.58-4.47)	3.82 (2.82-5.24)	4.34 (2.97-5.99)	5.14 (3.36-7.31)	5.83 (3.71-8.44)
6-hr	1.68 (1.39-2.04)	2.06 (1.69-2.50)	2.67 (2.18-3.25)	3.17 (2.58-3.89)	3.87 (3.03-4.96)	4.38 (3.36-5.74)	4.94 (3.67-6.74)	5.63 (3.87-7.72)	6.70 (4.39-9.46)	7.62 (4.86-11.0)
12-hr	2.12 (1.76-2.56)	2.59 (2.14-3.13)	3.35 (2.76-4.06)	3.98 (3.26-4.85)	4.85 (3.82-6.18)	5.50 (4.23-7.15)	6.20 (4.62-8.38)	7.05 (4.86-9.59)	8.38 (5.51-11.8)	9.52 (6.09-13.6)
24-hr	2.55 (2.13-3.06)	3.12 (2.60-3.74)	4.04 (3.35-4.86)	4.81 (3.96-5.81)	5.86 (4.64-7.41)	6.64 (5.14-8.58)	7.48 (5.60-10.1)	8.52 (5.90-11.5)	10.1 (6.68-14.1)	11.5 (7.37-16.3)
2-day	2.93 (2.46-3.48)	3.59 (3.01-4.28)	4.67 (3.90-5.58)	5.57 (4.62-6.69)	6.81 (5.43-8.55)	7.72 (6.01-9.91)	8.72 (6.56-11.6)	9.93 (6.90-13.3)	11.8 (7.81-16.3)	13.4 (8.62-18.9)
3-day	3.21 (2.71-3.81)	3.92 (3.30-4.65)	5.08 (4.26-6.04)	6.04 (5.02-7.22)	7.36 (5.88-9.20)	8.33 (6.50-10.6)	9.39 (7.08-12.5)	10.7 (7.44-14.3)	12.6 (8.39-17.4)	14.3 (9.23-20.1)
4-day	3.47 (2.94-4.10)	4.21 (3.55-4.98)	5.40 (4.54-6.41)	6.40 (5.34-7.63)	7.77 (6.22-9.67)	8.78 (6.86-11.2)	9.88 (7.45-13.0)	11.2 (7.82-14.9)	13.2 (8.76-18.1)	14.9 (9.60-20.8)
7-day	4.19 (3.56-4.92)	4.96 (4.22-5.84)	6.23 (5.26-7.35)	7.27 (6.10-8.62)	8.72 (7.01-10.8)	9.79 (7.67-12.3)	10.9 (8.24-14.3)	12.3 (8.61-16.2)	14.2 (9.50-19.4)	15.9 (10.3-22.1)
10-day	4.86 (4.15-5.70)	5.66 (4.83-6.64)	6.96 (5.91-8.19)	8.04 (6.77-9.50)	9.53 (7.68-11.7)	10.6 (8.35-13.3)	11.8 (8.90-15.3)	13.1 (9.25-17.3)	15.0 (10.1-20.5)	16.6 (10.8-23.0)
20-day	6.86 (5.90-7.98)	7.72 (6.62-8.98)	9.12 (7.79-10.6)	10.3 (8.72-12.1)	11.9 (9.62-14.4)	13.1 (10.3-16.2)	14.4 (10.8-18.2)	15.6 (11.1-20.4)	17.3 (11.7-23.4)	18.6 (12.1-25.6)
30-day	8.52 (7.35-9.86)	9.42 (8.12-10.9)	10.9 (9.36-12.7)	12.1 (10.3-14.2)	13.8 (11.2-16.7)	15.2 (11.9-18.6)	16.5 (12.3-20.7)	17.7 (12.6-23.0)	19.3 (13.0-25.9)	20.4 (13.3-28.0)
45-day	10.6 (9.18-12.2)	11.6 (10.0-13.3)	13.2 (11.3-15.2)	14.5 (12.4-16.8)	16.3 (13.3-19.5)	17.7 (14.0-21.6)	19.1 (14.3-23.8)	20.3 (14.5-26.3)	21.8 (14.8-29.2)	22.8 (14.9-31.1)
60-day	12.3 (10.7-14.2)	13.4 (11.6-15.4)	15.0 (13.0-17.4)	16.4 (14.1-19.1)	18.4 (15.0-21.9)	19.9 (15.8-24.1)	21.3 (16.0-26.4)	22.6 (16.2-29.1)	24.1 (16.3-32.0)	25.0 (16.4-34.0)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

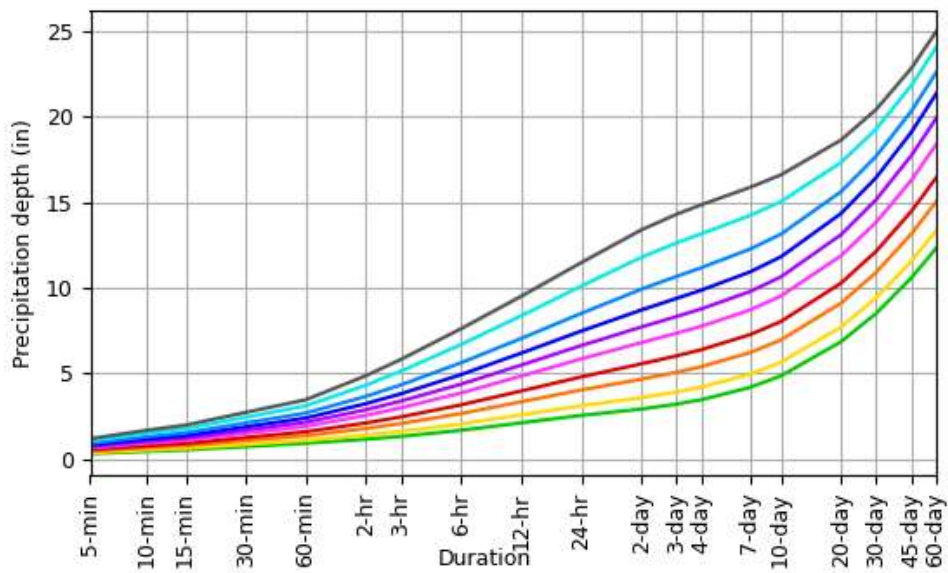
Please refer to NOAA Atlas 14 document for more information.

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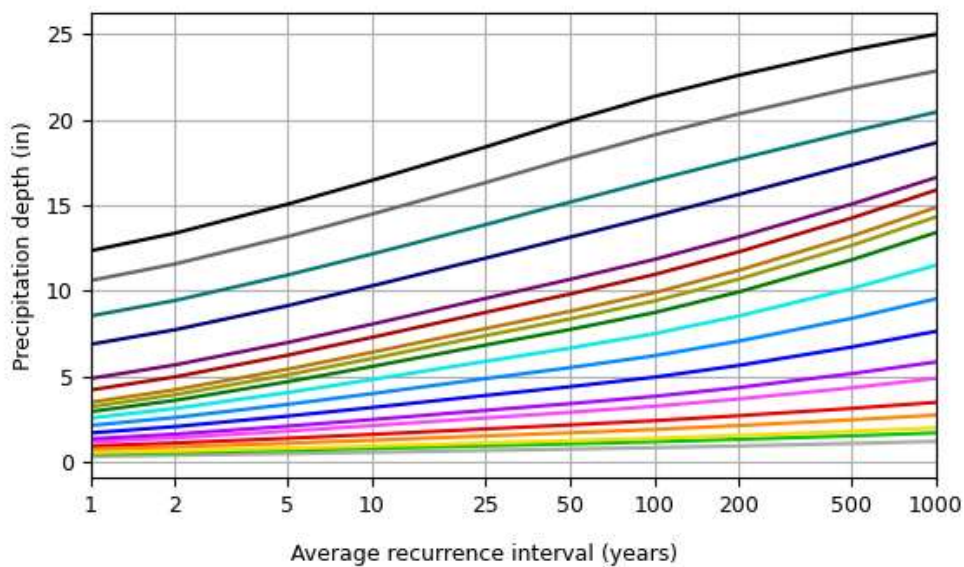
PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 42.6676°, Longitude: -71.4912°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

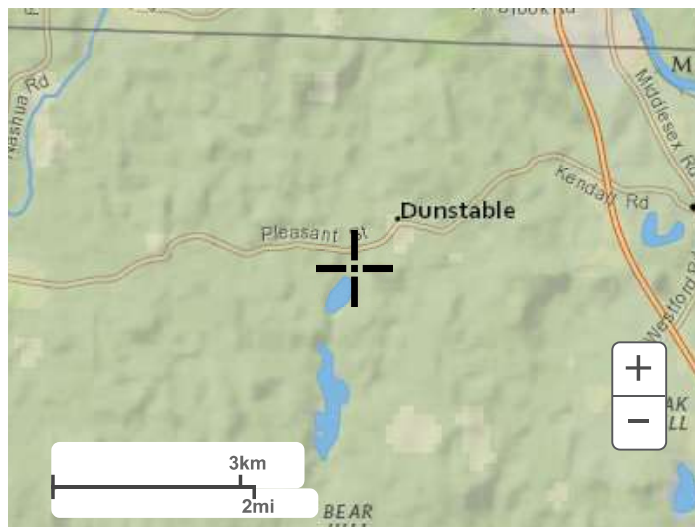


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

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Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



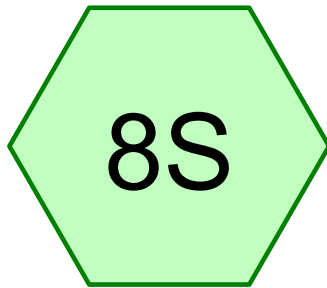
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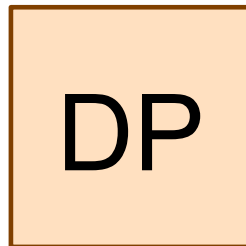
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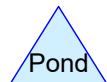
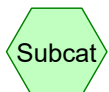
HYDROLOGICAL CALCULATIONS



Pre-Development
Tributary Area to DP



Design Point



Pleasant Street Dunstable Pre-Development-2025

Prepared by Haley Ward

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year Storm	Type III 24-hr		Default	24.00	1	3.12	2
2	10-year Storm	Type III 24-hr		Default	24.00	1	4.81	2
3	25-year Storm	Type III 24-hr		Default	24.00	1	5.86	2
4	100-year Storm	Type III 24-hr		Default	24.00	1	7.48	2

Pleasant Street Dunstable Pre-Development-2025

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
11.832	46	2 acre lots, 12% imp, HSG A (8S)
9.446	49	50-75% Grass cover, Fair, HSG A (8S)
27.826	30	Woods, Good, HSG A (8S)
49.104	38	TOTAL AREA

Pleasant Street Dunstable Pre-Development-2025

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
49.104	HSG A	8S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
49.104		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
11.832	0.000	0.000	0.000	0.000	11.832	2 acre lots, 12% imp	8S
9.446	0.000	0.000	0.000	0.000	9.446	50-75% Grass cover, Fair	8S
27.826	0.000	0.000	0.000	0.000	27.826	Woods, Good	8S
49.104	0.000	0.000	0.000	0.000	49.104	TOTAL AREA	

Pleasant Street Dunstable Pre-Development-202*Type III 24-hr 2-year Storm Rainfall=3.12"*

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S: Pre-Development

Runoff Area=2,138,975 sf 2.89% Impervious Runoff Depth=0.00"

Flow Length=1,285' Tc=23.5 min CN=38 Runoff=0.00 cfs 0.000 af

Reach DP: Design Point

Inflow=0.00 cfs 0.000 af

Outflow=0.00 cfs 0.000 af

Total Runoff Area = 49.104 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
97.11% Pervious = 47.684 ac 2.89% Impervious = 1.420 ac

Summary for Subcatchment 8S: Pre-Development Tributary Area to DP

[45] Hint: Runoff=Zero

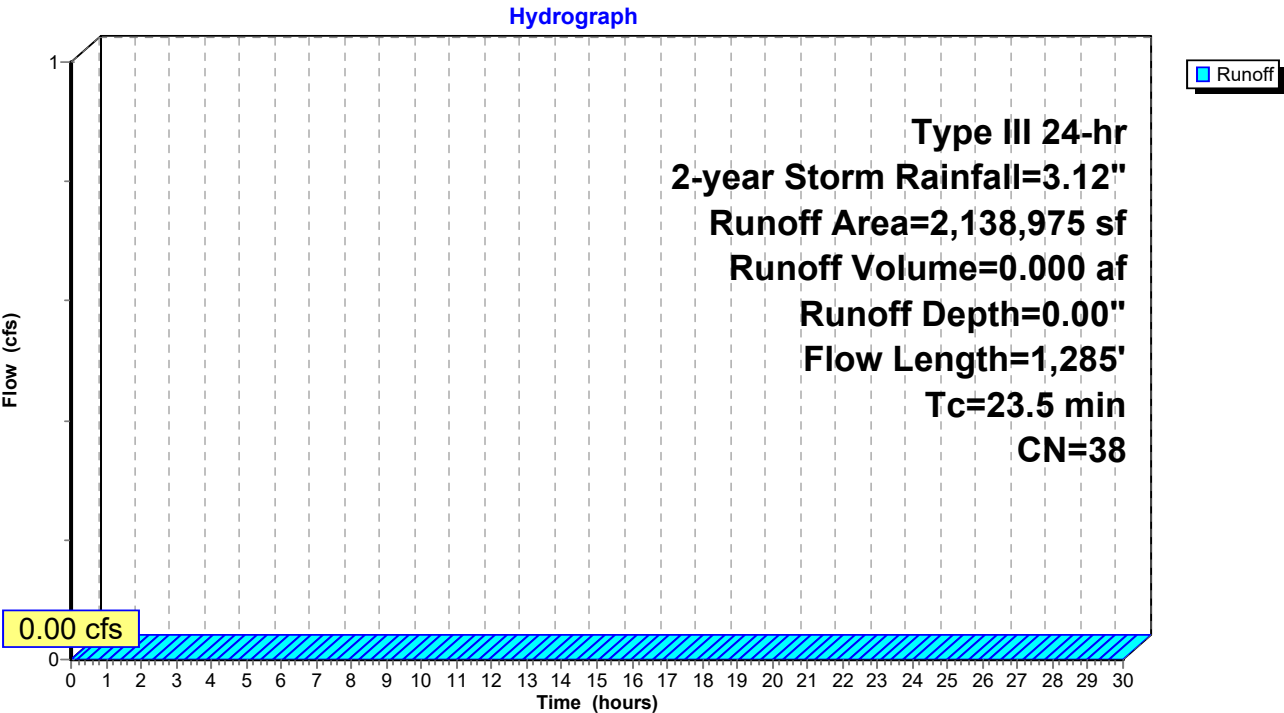
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
515,400	46	2 acre lots, 12% imp, HSG A
411,475	49	50-75% Grass cover, Fair, HSG A
1,212,100	30	Woods, Good, HSG A
2,138,975	38	Weighted Average
2,077,127		97.11% Pervious Area
61,848		2.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Pre-Development Tributary Area to DP



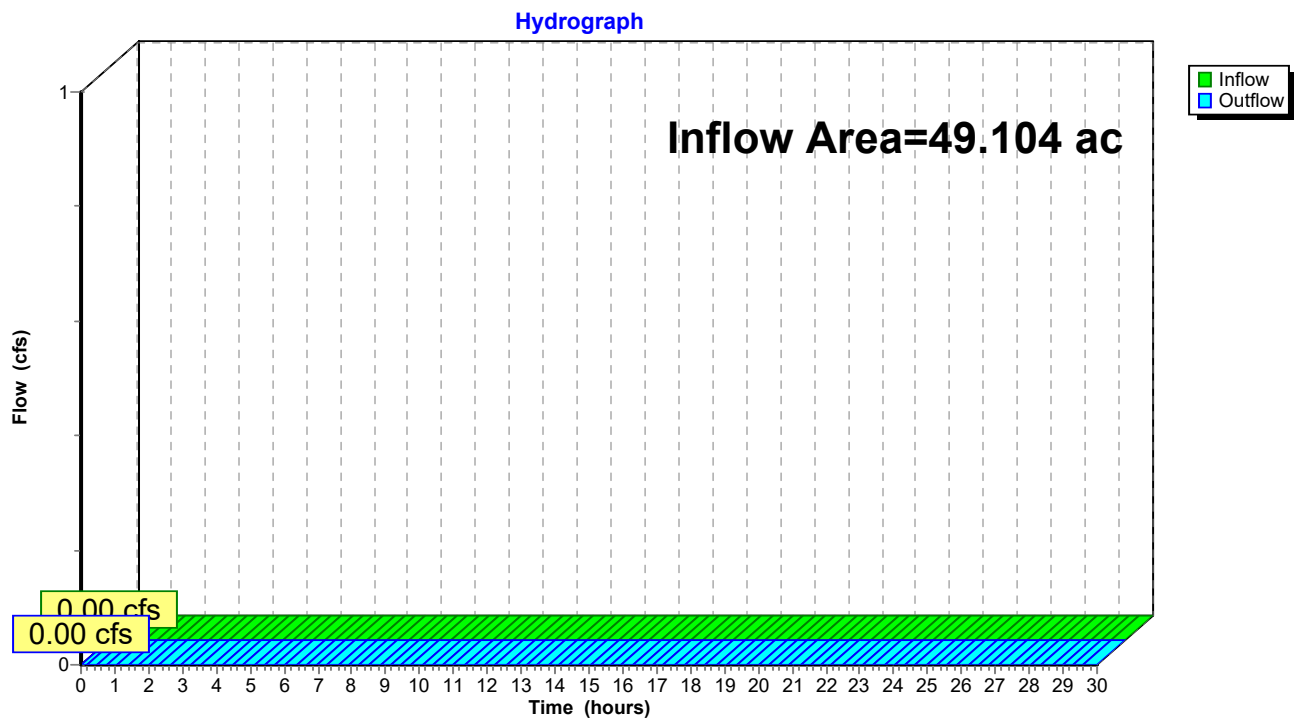
Summary for Reach DP: Design Point

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

Inflow Area = 49.104 ac, 2.89% Impervious, Inflow Depth = 0.00" for 2-year Storm event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP: Design Point



Pleasant Street Dunstable Pre-Development-20 Type III 24-hr 10-year Storm Rainfall=4.81"

Prepared by Haley Ward

Printed 6/26/2025

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S: Pre-Development

Runoff Area=2,138,975 sf 2.89% Impervious Runoff Depth=0.13"

Flow Length=1,285' Tc=23.5 min CN=38 Runoff=0.88 cfs 0.548 af

Reach DP: Design Point

Inflow=0.88 cfs 0.548 af

Outflow=0.88 cfs 0.548 af

Total Runoff Area = 49.104 ac Runoff Volume = 0.548 af Average Runoff Depth = 0.13"
97.11% Pervious = 47.684 ac 2.89% Impervious = 1.420 ac

Summary for Subcatchment 8S: Pre-Development Tributary Area to DP

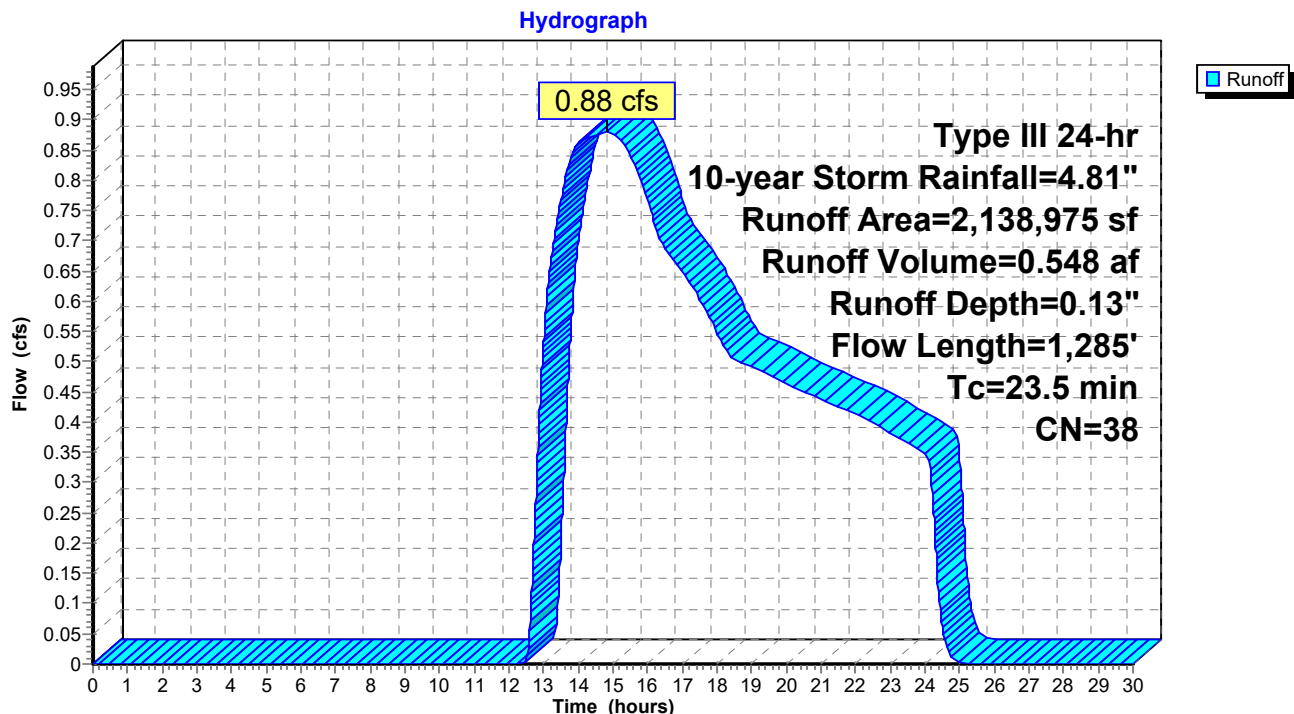
Runoff = 0.88 cfs @ 14.81 hrs, Volume= 0.548 af, Depth= 0.13"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
515,400	46	2 acre lots, 12% imp, HSG A
411,475	49	50-75% Grass cover, Fair, HSG A
1,212,100	30	Woods, Good, HSG A
2,138,975	38	Weighted Average
2,077,127		97.11% Pervious Area
61,848		2.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Pre-Development Tributary Area to DP



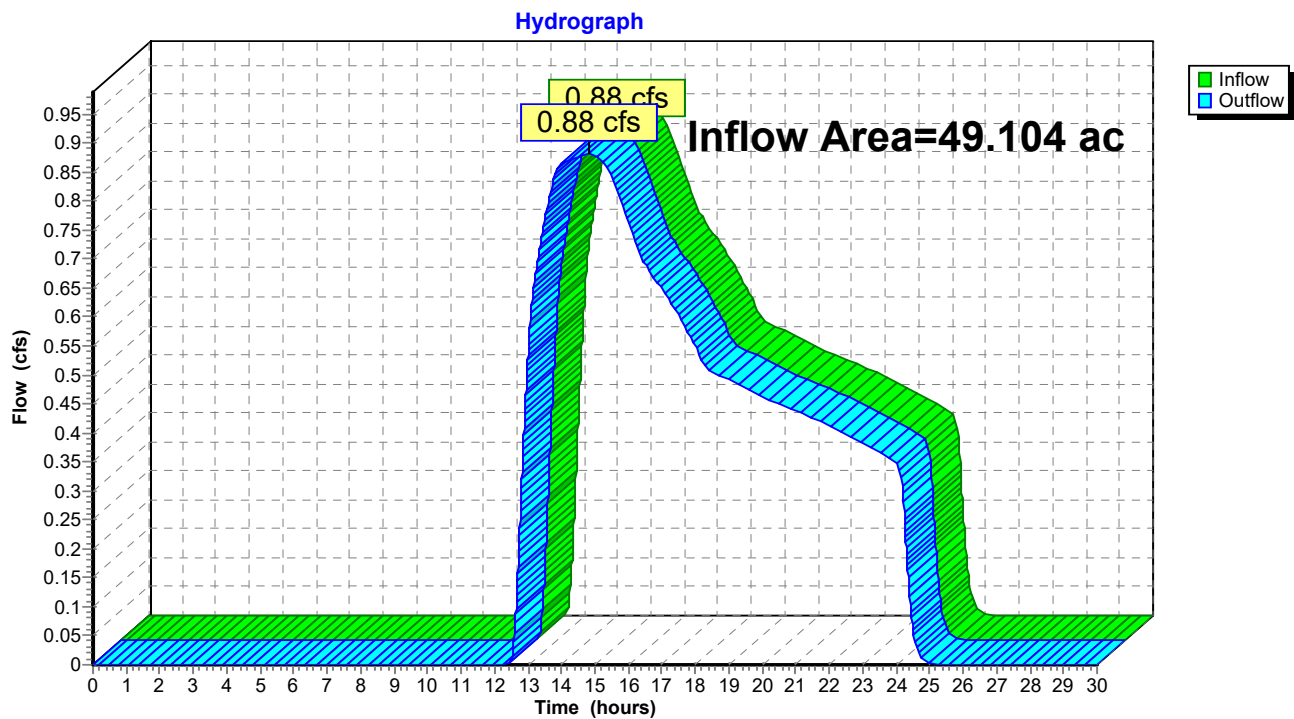
Summary for Reach DP: Design Point

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

Inflow Area = 49.104 ac, 2.89% Impervious, Inflow Depth = 0.13" for 10-year Storm event
Inflow = 0.88 cfs @ 14.81 hrs, Volume= 0.548 af
Outflow = 0.88 cfs @ 14.81 hrs, Volume= 0.548 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP: Design Point



Pleasant Street Dunstable Pre-Development-20 Type III 24-hr 25-year Storm Rainfall=5.86"

Prepared by Haley Ward

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S: Pre-Development

Runoff Area=2,138,975 sf 2.89% Impervious Runoff Depth=0.36"

Flow Length=1,285' Tc=23.5 min CN=38 Runoff=4.51 cfs 1.459 af

Reach DP: Design Point

Inflow=4.51 cfs 1.459 af

Outflow=4.51 cfs 1.459 af

Total Runoff Area = 49.104 ac Runoff Volume = 1.459 af Average Runoff Depth = 0.36"
97.11% Pervious = 47.684 ac 2.89% Impervious = 1.420 ac

Summary for Subcatchment 8S: Pre-Development Tributary Area to DP

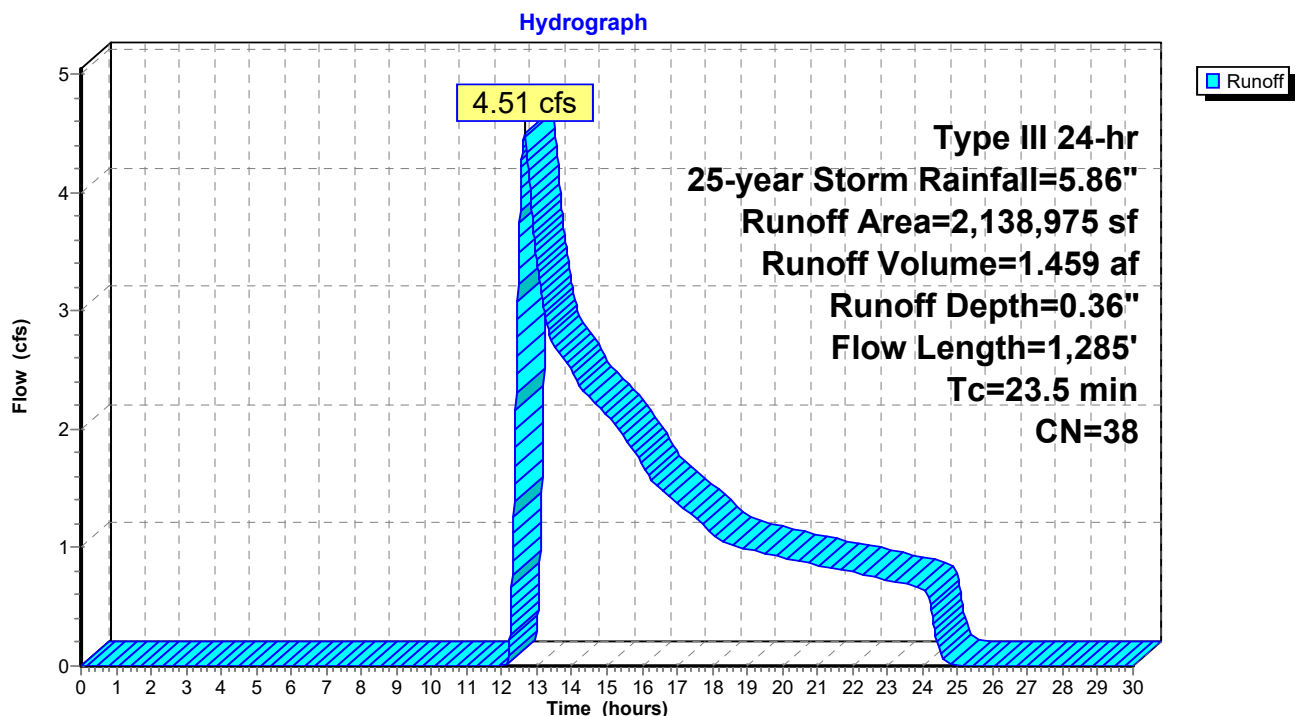
Runoff = 4.51 cfs @ 12.66 hrs, Volume= 1.459 af, Depth= 0.36"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
515,400	46	2 acre lots, 12% imp, HSG A
411,475	49	50-75% Grass cover, Fair, HSG A
1,212,100	30	Woods, Good, HSG A
2,138,975	38	Weighted Average
2,077,127		97.11% Pervious Area
61,848		2.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Pre-Development Tributary Area to DP



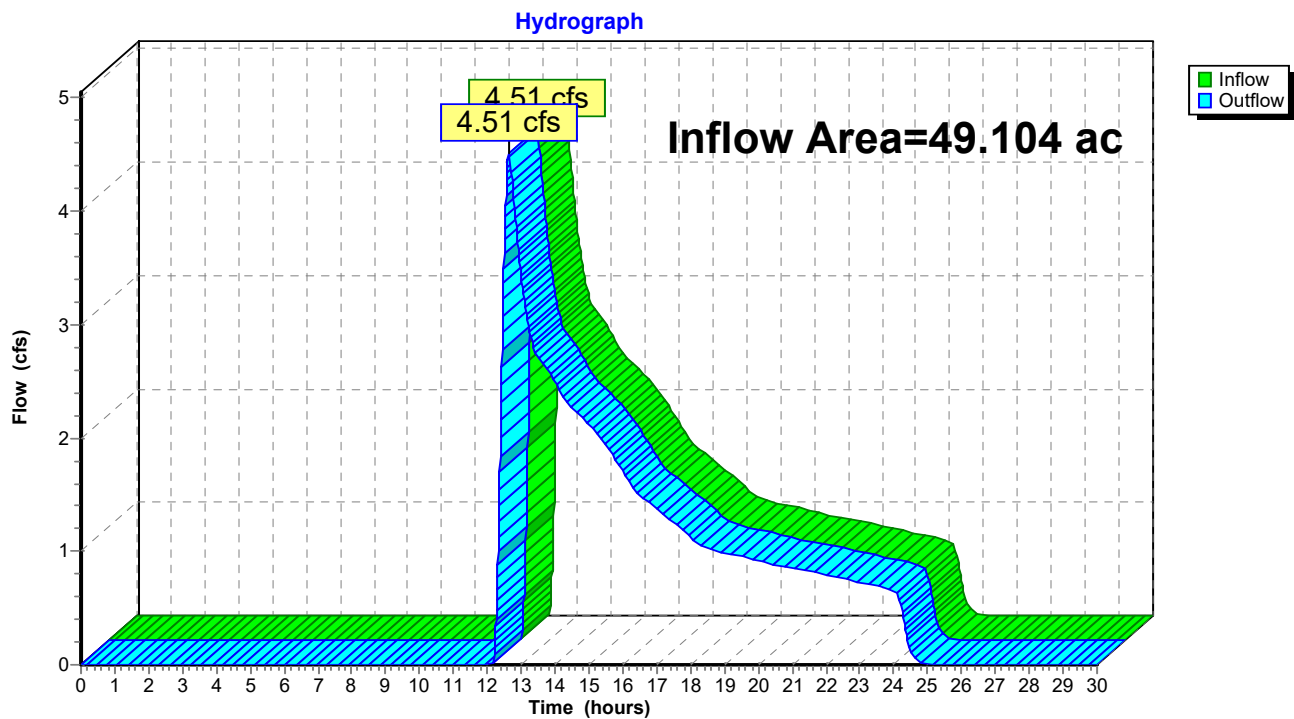
Summary for Reach DP: Design Point

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

Inflow Area = 49.104 ac, 2.89% Impervious, Inflow Depth = 0.36" for 25-year Storm event
Inflow = 4.51 cfs @ 12.66 hrs, Volume= 1.459 af
Outflow = 4.51 cfs @ 12.66 hrs, Volume= 1.459 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP: Design Point



Pleasant Street Dunstable Pre-Development-2 Type III 24-hr 100-year Storm Rainfall=7.48"

Prepared by Haley Ward

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S: Pre-Development

Runoff Area=2,138,975 sf 2.89% Impervious Runoff Depth=0.87"

Flow Length=1,285' Tc=23.5 min CN=38 Runoff=18.73 cfs 3.544 af

Reach DP: Design Point

Inflow=18.73 cfs 3.544 af

Outflow=18.73 cfs 3.544 af

Total Runoff Area = 49.104 ac Runoff Volume = 3.544 af Average Runoff Depth = 0.87"
97.11% Pervious = 47.684 ac 2.89% Impervious = 1.420 ac

Summary for Subcatchment 8S: Pre-Development Tributary Area to DP

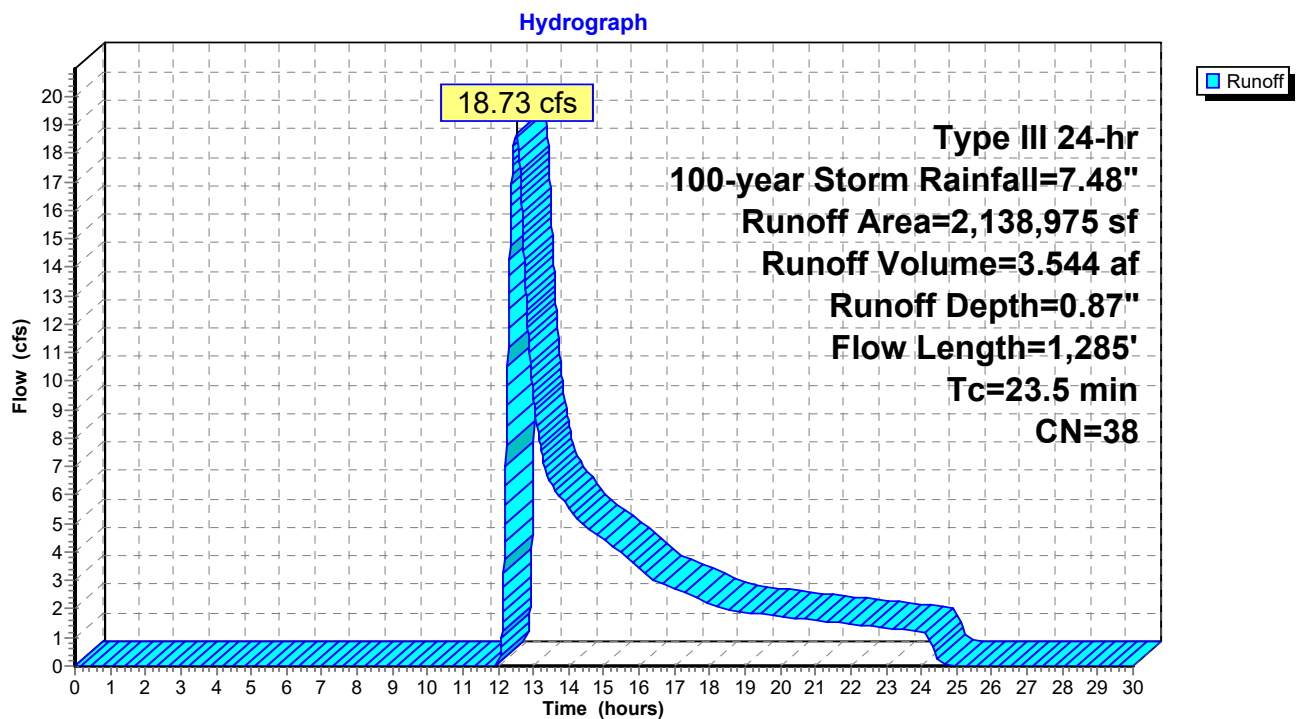
Runoff = 18.73 cfs @ 12.51 hrs, Volume= 3.544 af, Depth= 0.87"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
515,400	46	2 acre lots, 12% imp, HSG A
411,475	49	50-75% Grass cover, Fair, HSG A
1,212,100	30	Woods, Good, HSG A
2,138,975	38	Weighted Average
2,077,127		97.11% Pervious Area
61,848		2.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Pre-Development Tributary Area to DP

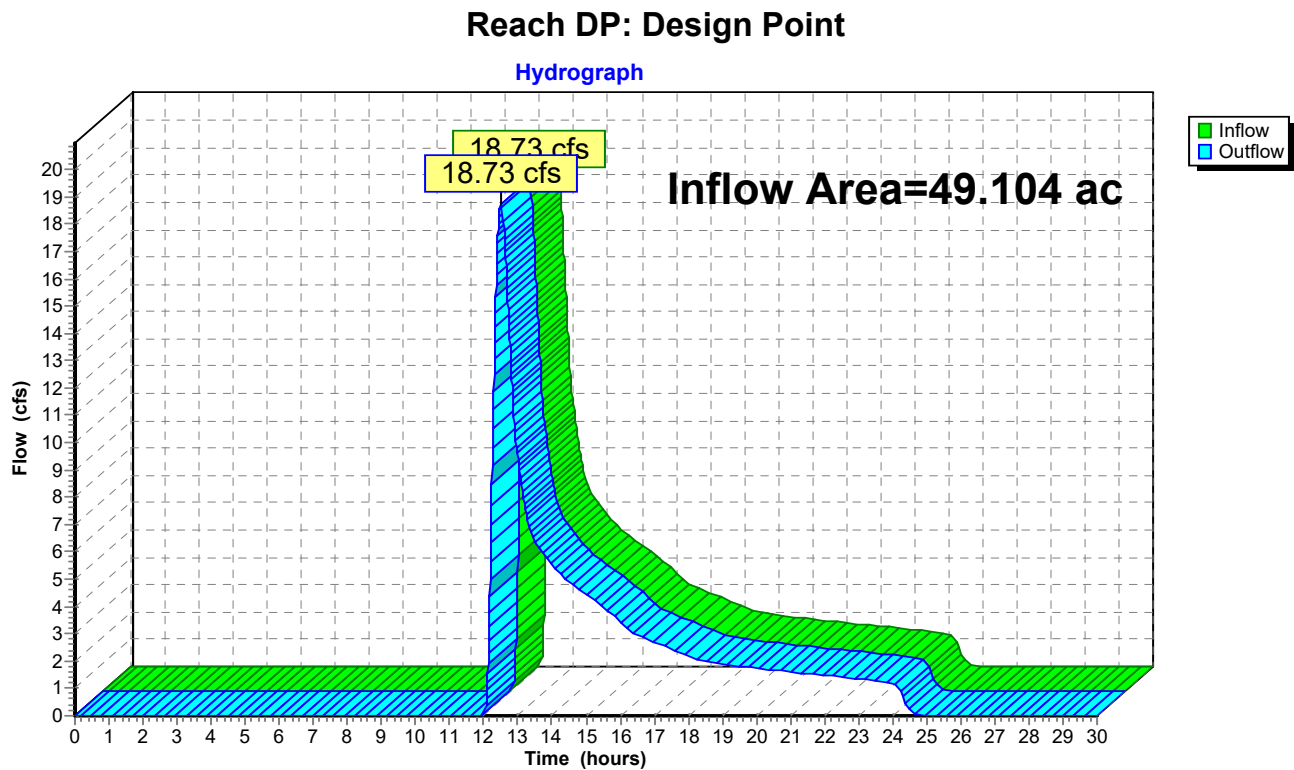


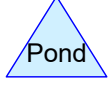
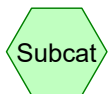
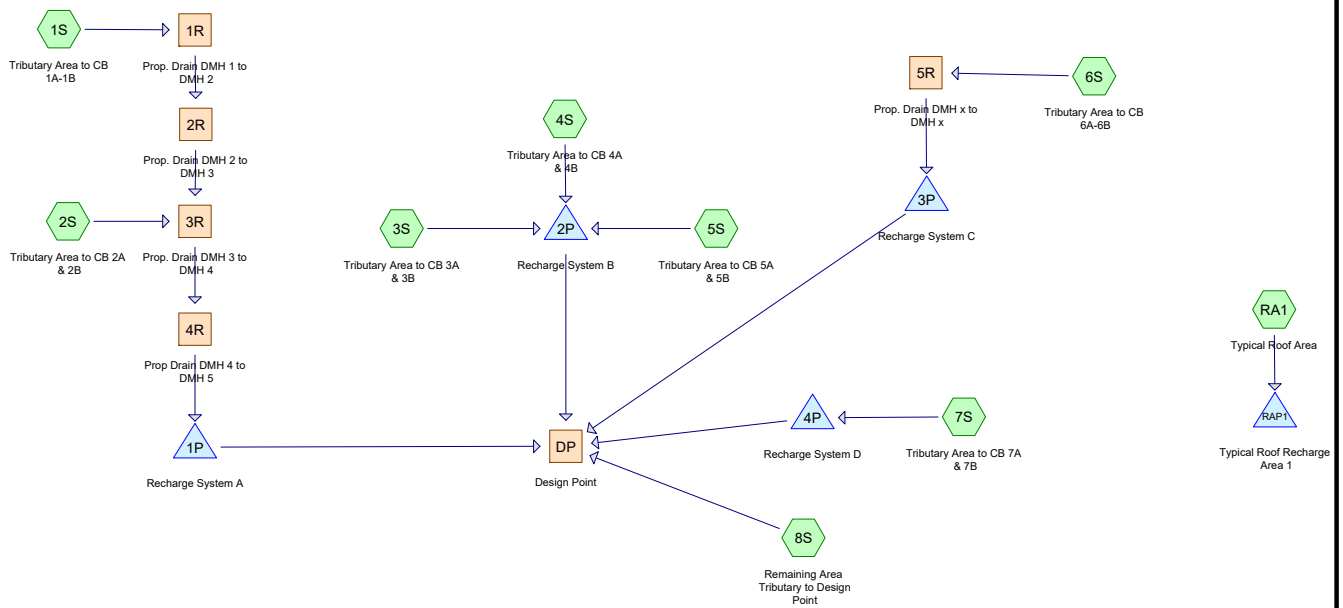
Summary for Reach DP: Design Point

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

Inflow Area = 49.104 ac, 2.89% Impervious, Inflow Depth = 0.87" for 100-year Storm event
Inflow = 18.73 cfs @ 12.51 hrs, Volume= 3.544 af
Outflow = 18.73 cfs @ 12.51 hrs, Volume= 3.544 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs





Routing Diagram for Pleasant Street Dunstable Post-Development-2025 REV

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Pleasant Street Dunstable Post-Development-2025 REV

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year Storm	Type III 24-hr		Default	24.00	1	3.12	2
2	10-year Storm	Type III 24-hr		Default	24.00	1	4.81	2
3	25-year Storm	Type III 24-hr		Default	24.00	1	5.86	2
4	100-year Storm	Type III 24-hr		Default	24.00	1	7.48	2

Pleasant Street Dunstable Post-Development-2025 REV

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
13.209	46	2 acre lots, 12% imp, HSG A (8S)
2.562	49	50-75% Grass cover, Fair, HSG A (8S)
3.215	39	>75% Grass cover, Good, HSG A (3S, 4S, 5S, 6S, 7S)
0.241	98	Paved parking, HSG A (3S)
1.481	98	Paved roads w/curbs & sewers, HSG A (2S, 4S, 5S, 6S, 7S)
0.261	98	Roadway, driveways, sidewalks (1S)
0.030	98	Roof Area (RA1)
18.995	30	Woods, Good, HSG A (8S)
7.959	32	Woods/grass comb., Good, HSG A (1S, 2S, 3S, 4S, 5S)
47.954	39	TOTAL AREA

Pleasant Street Dunstable Post-Development-2025 REV

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
47.662	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.291	Other	1S, RA1
47.954		TOTAL AREA

Pleasant Street Dunstable Post-Development-2025 REV

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
13.209	0.000	0.000	0.000	0.000	13.209	2 acre lots, 12% imp	8S
2.562	0.000	0.000	0.000	0.000	2.562	50-75% Grass cover, Fair	8S
3.215	0.000	0.000	0.000	0.000	3.215	>75% Grass cover, Good	3S, 4S, 5S, 6S, 7S
0.241	0.000	0.000	0.000	0.000	0.241	Paved parking	3S
1.481	0.000	0.000	0.000	0.000	1.481	Paved roads w/curbs & sewers	2S, 4S, 5S, 6S, 7S
0.000	0.000	0.000	0.000	0.261	0.261	Roadway, driveways, sidewalks	1S
0.000	0.000	0.000	0.000	0.030	0.030	Roof Area	RA 1
18.995	0.000	0.000	0.000	0.000	18.995	Woods, Good	8S
7.959	0.000	0.000	0.000	0.000	7.959	Woods/grass comb., Good	1S, 2S, 3S, 4S, 5S
47.662	0.000	0.000	0.000	0.291	47.954	TOTAL AREA	

Pleasant Street Dunstable Post-Development-2025 REV

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1R	168.00	167.10	180.0	0.0050	0.013	0.0	12.0	0.0	
2	2R	167.00	166.10	180.0	0.0050	0.013	0.0	12.0	0.0	
3	3R	166.00	165.45	110.0	0.0050	0.013	0.0	12.0	0.0	
4	4R	165.35	165.21	28.0	0.0050	0.013	0.0	12.0	0.0	
5	5R	164.40	164.00	40.0	0.0100	0.013	0.0	12.0	0.0	

Pleasant Street Dunstable Post-Development-20Type III 24-hr 2-year Storm Rainfall=3.12"

Prepared by Haley Ward

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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: Tributary Area to CB Runoff Area=123,030 sf 9.26% Impervious Runoff Depth=0.00"
Flow Length=230' Slope=0.0500 '/ Tc=6.0 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: Tributary Area to CB 2A Runoff Area=35,455 sf 10.14% Impervious Runoff Depth=0.00"
Flow Length=120' Slope=0.0200 '/ Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: Tributary Area to CB 3A Runoff Area=97,380 sf 10.78% Impervious Runoff Depth=0.00"
Flow Length=95' Slope=0.0200 '/ Tc=6.5 min CN=40 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: Tributary Area to CB 4A Runoff Area=166,140 sf 9.46% Impervious Runoff Depth=0.00"
Flow Length=100' Slope=0.0200 '/ Tc=6.5 min CN=41 Runoff=0.00 cfs 0.001 af

Subcatchment 5S: Tributary Area to CB 5A Runoff Area=49,501 sf 8.35% Impervious Runoff Depth=0.00"
Flow Length=105' Slope=0.0200 '/ Tc=6.6 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 6S: Tributary Area to CB Runoff Area=46,170 sf 39.30% Impervious Runoff Depth=0.45"
Flow Length=215' Slope=0.0200 '/ Tc=6.8 min CN=62 Runoff=0.35 cfs 0.039 af

Subcatchment 7S: Tributary Area to CB 7A Runoff Area=55,449 sf 41.36% Impervious Runoff Depth=0.48"
Flow Length=266' Slope=0.0200 '/ Tc=7.1 min CN=63 Runoff=0.48 cfs 0.051 af

Subcatchment 8S: Remaining Area Runoff Area=1,514,422 sf 4.56% Impervious Runoff Depth=0.00"
Flow Length=1,285' Tc=23.5 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment RA1: Typical Roof Area Runoff Area=1,310 sf 100.00% Impervious Runoff Depth=2.89"
Tc=6.0 min CN=98 Runoff=0.09 cfs 0.007 af

Reach 1R: Prop. Drain DMH 1 to DMH 2 Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.00 cfs 0.000 af

Reach 2R: Prop. Drain DMH 2 to DMH 3 Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.00 cfs 0.000 af

Reach 3R: Prop. Drain DMH 3 to DMH 4 Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
12.0" Round Pipe n=0.013 L=110.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.00 cfs 0.000 af

Reach 4R: Prop Drain DMH 4 to DMH 5 Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
12.0" Round Pipe n=0.013 L=28.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.00 cfs 0.000 af

Reach 5R: Prop. Drain DMH x to DMH x Avg. Flow Depth=0.21' Max Vel=2.88 fps Inflow=0.35 cfs 0.039 af
12.0" Round Pipe n=0.013 L=40.0' S=0.0100 '/ Capacity=3.56 cfs Outflow=0.35 cfs 0.039 af

Reach DP: Design Point Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond 1P: Recharge System A Peak Elev=164.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pleasant Street Dunstable Post-Development-20*Type III 24-hr 2-year Storm Rainfall=3.12"*

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Pond 2P: Recharge System B

Peak Elev=162.00' 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

Pond 3P: Recharge System C

Peak Elev=162.04' Storage=31 cf Inflow=0.35 cfs 0.039 af
Discarded=0.33 cfs 0.039 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.039 af

Pond 4P: Recharge System D

Peak Elev=162.04' Storage=42 cf Inflow=0.48 cfs 0.051 af
Discarded=0.46 cfs 0.051 af Primary=0.00 cfs 0.000 af Outflow=0.46 cfs 0.051 af

Pond RAP1: Typical Roof Recharge Area 1

Peak Elev=164.43' Storage=32 cf Inflow=0.09 cfs 0.007 af
Discarded=0.04 cfs 0.007 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.007 af

Total Runoff Area = 47.954 ac Runoff Volume = 0.100 af Average Runoff Depth = 0.02"
92.50% Pervious = 44.355 ac 7.50% Impervious = 3.599 ac

Summary for Subcatchment 1S: Tributary Area to CB 1A-1B

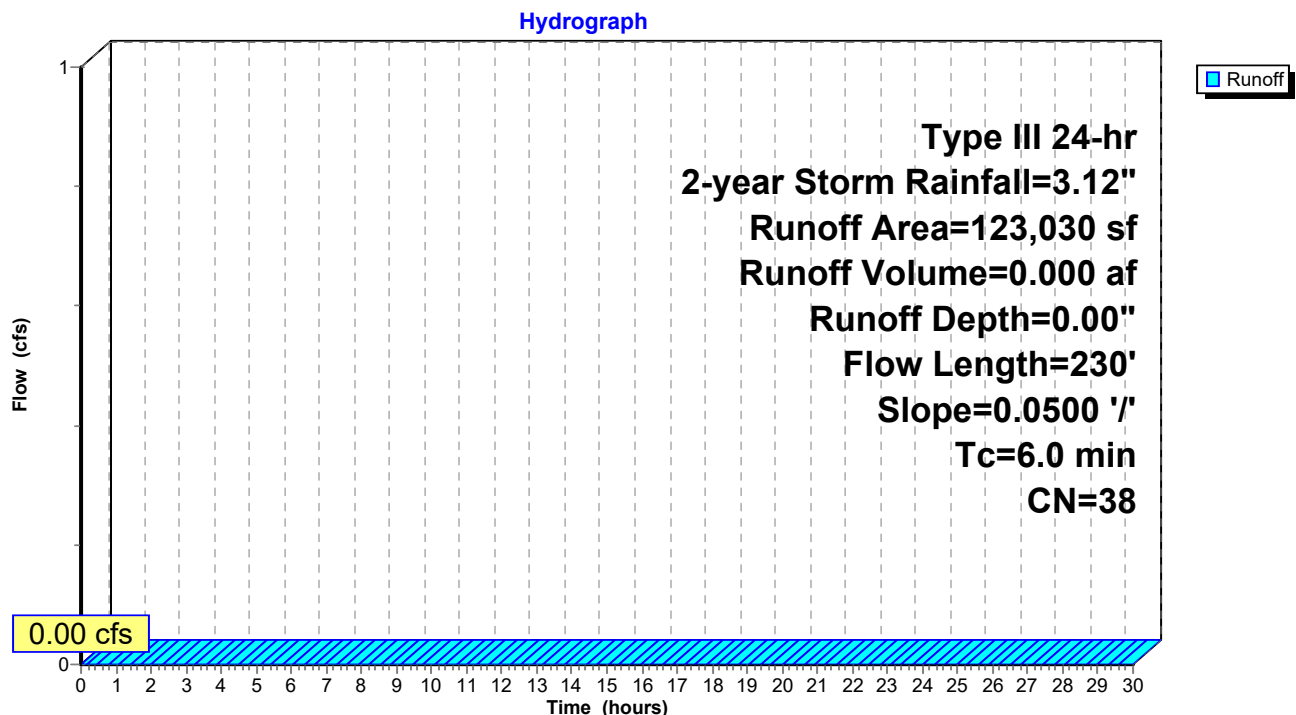
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Reach 1R : Prop. Drain DMH 1 to DMH 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
* 11,387	98	Roadway, driveways, sidewalks
111,643	32	Woods/grass comb., Good, HSG A
123,030	38	Weighted Average
111,643		90.74% Pervious Area
11,387		9.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0500	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.7	180	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.7	230	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: Tributary Area to CB 1A-1B



Summary for Subcatchment 2S: Tributary Area to CB 2A & 2B

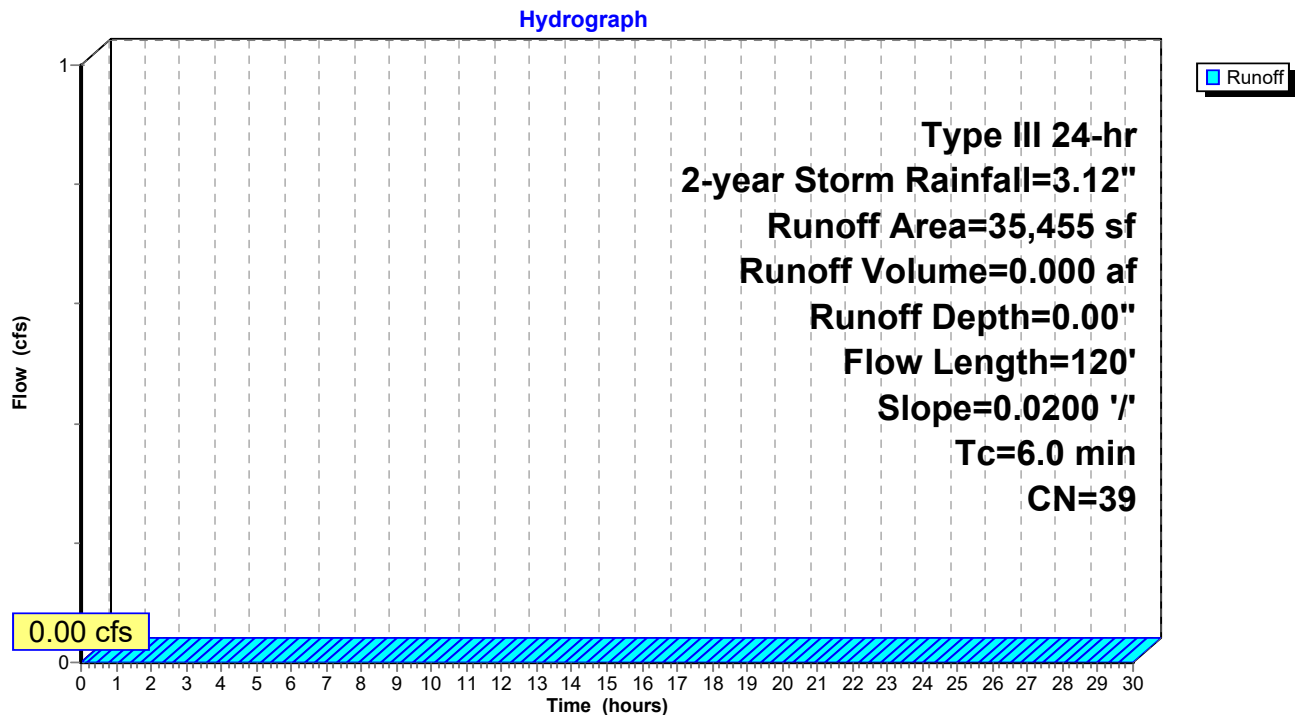
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
3,595	98	Paved roads w/curbs & sewers, HSG A
31,860	32	Woods/grass comb., Good, HSG A
35,455	39	Weighted Average
31,860		89.86% Pervious Area
3,595		10.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.12"
0.4	70	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Tributary Area to CB 2A & 2B



Summary for Subcatchment 3S: Tributary Area to CB 3A & 3B

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Pond 2P : Recharge System B

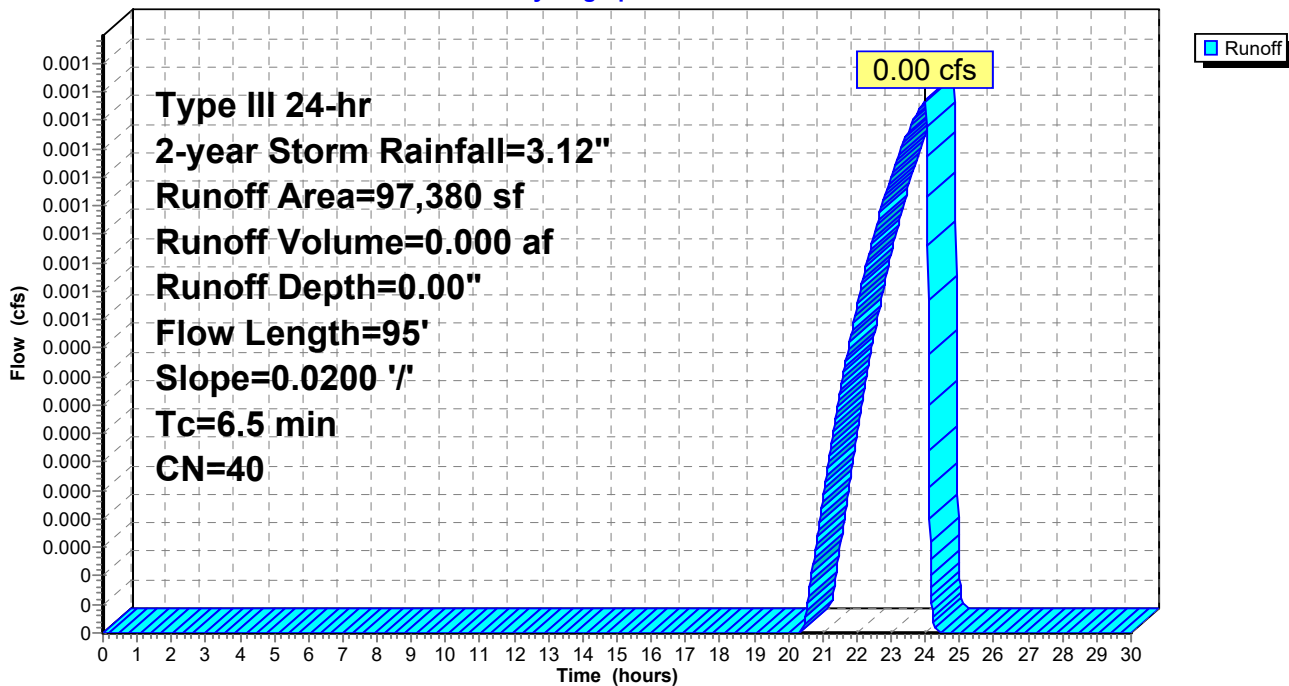
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
10,499	98	Paved parking, HSG A
15,431	39	>75% Grass cover, Good, HSG A
71,450	32	Woods/grass comb., Good, HSG A
97,380	40	Weighted Average
86,881		89.22% Pervious Area
10,499		10.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	45	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	95	Total			

Subcatchment 3S: Tributary Area to CB 3A & 3B

Hydrograph



Summary for Subcatchment 4S: Tributary Area to CB 4A & 4B

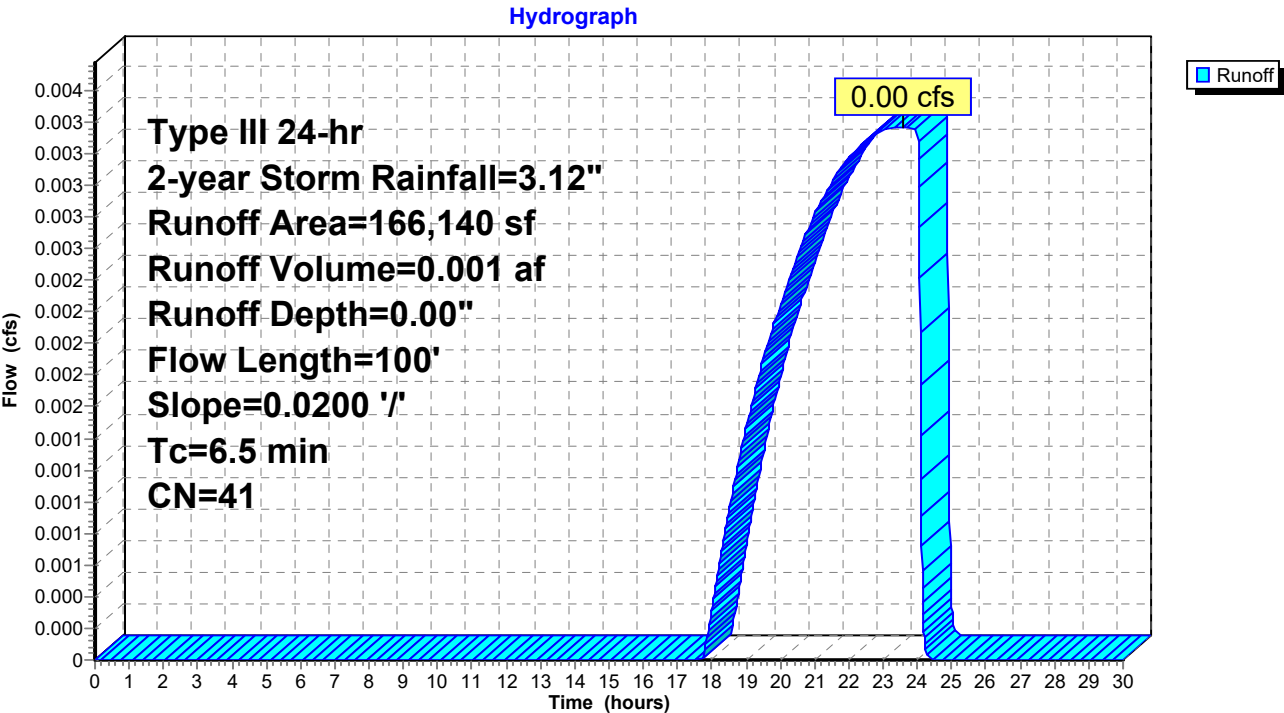
Runoff = 0.00 cfs @ 23.58 hrs, Volume= 0.001 af, Depth= 0.00"
Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
15,714	98	Paved roads w/curbs & sewers, HSG A
54,686	39	>75% Grass cover, Good, HSG A
95,740	32	Woods/grass comb., Good, HSG A
166,140	41	Weighted Average
150,426		90.54% Pervious Area
15,714		9.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	100	Total			

Subcatchment 4S: Tributary Area to CB 4A & 4B



Summary for Subcatchment 5S: Tributary Area to CB 5A & 5B

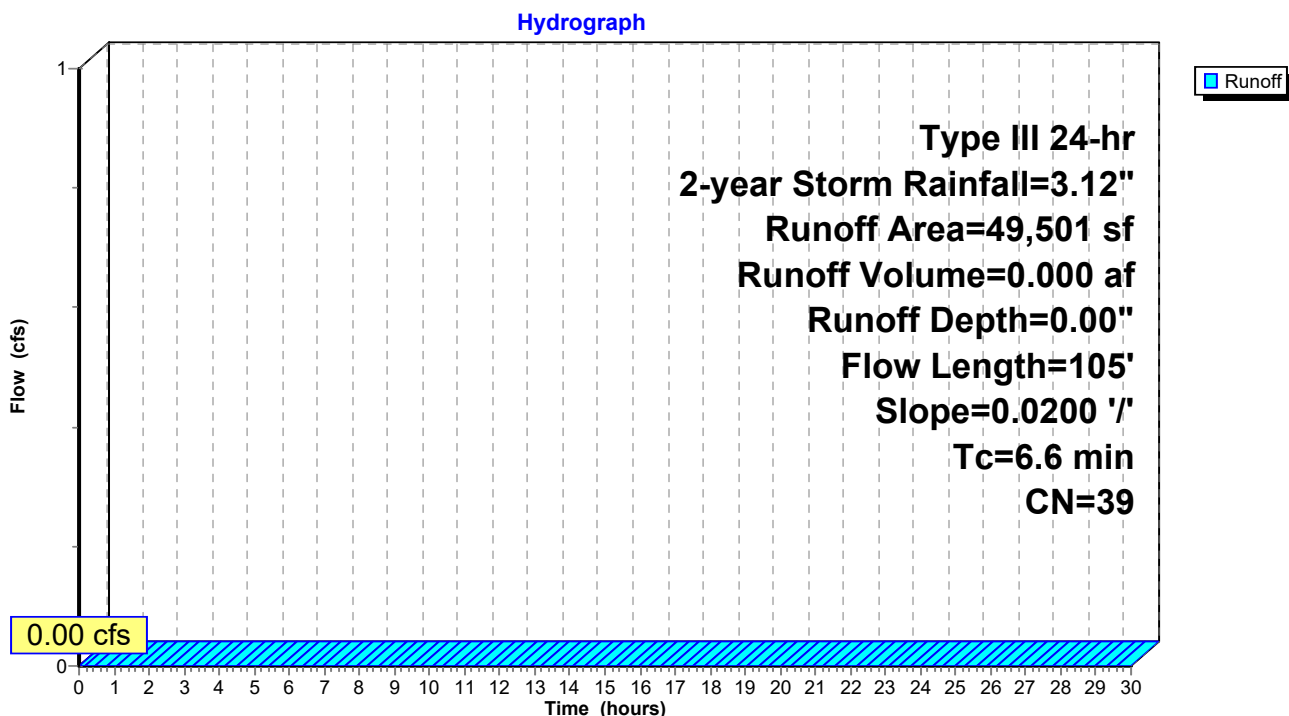
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
4,134	98	Paved roads w/curbs & sewers, HSG A
9,382	39	>75% Grass cover, Good, HSG A
35,985	32	Woods/grass comb., Good, HSG A
49,501	39	Weighted Average
45,367		91.65% Pervious Area
4,134		8.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.9	55	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.6	105	Total			

Subcatchment 5S: Tributary Area to CB 5A & 5B



Summary for Subcatchment 6S: Tributary Area to CB 6A-6B

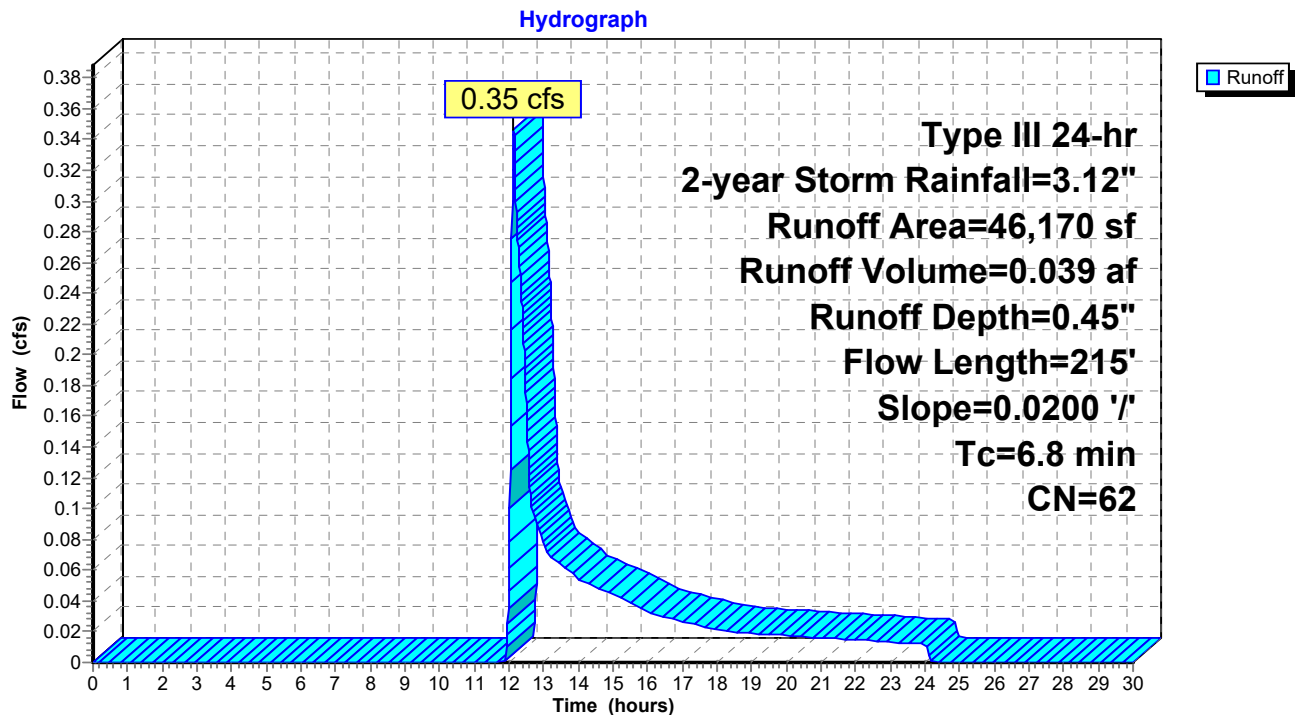
Runoff = 0.35 cfs @ 12.13 hrs, Volume= 0.039 af, Depth= 0.45"
 Routed to Reach 5R : Prop. Drain DMH x to DMH x

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
18,144	98	Paved roads w/curbs & sewers, HSG A
28,026	39	>75% Grass cover, Good, HSG A
46,170	62	Weighted Average
28,026		60.70% Pervious Area
18,144		39.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.6	80	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.8	215	Total			

Subcatchment 6S: Tributary Area to CB 6A-6B



Summary for Subcatchment 7S: Tributary Area to CB 7A & 7B

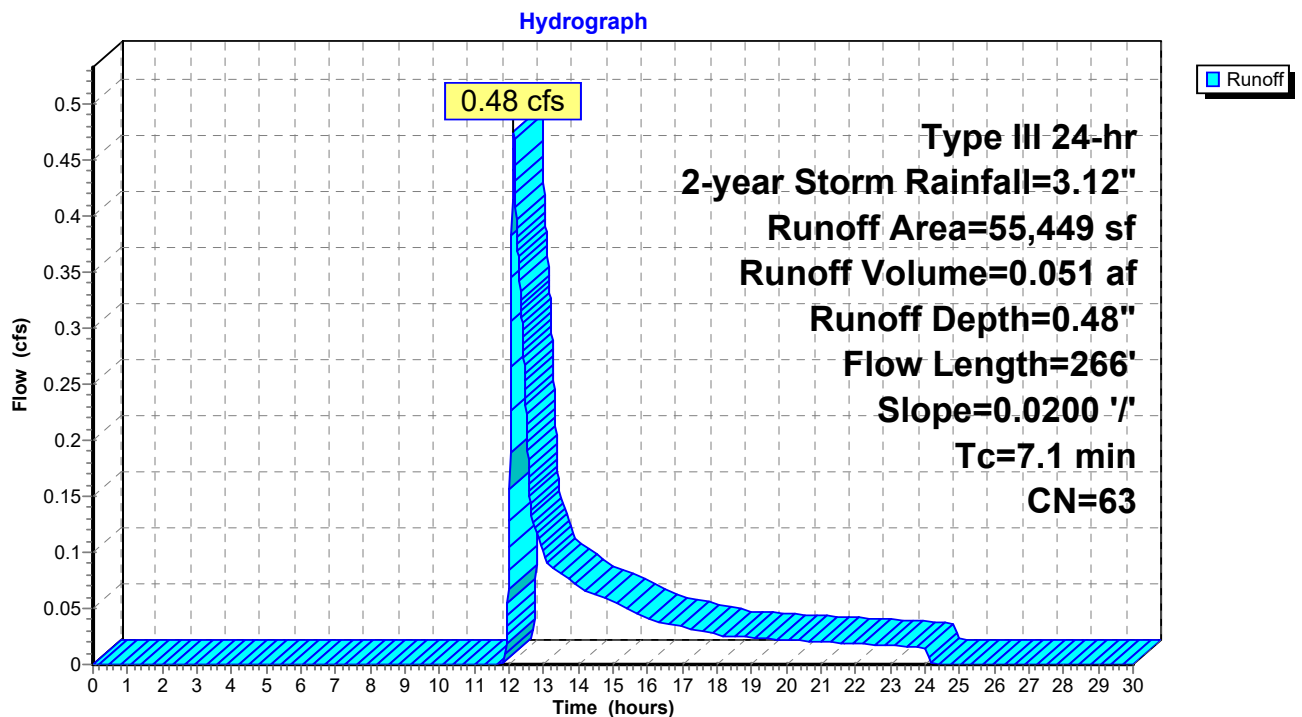
Runoff = 0.48 cfs @ 12.13 hrs, Volume= 0.051 af, Depth= 0.48"
 Routed to Pond 4P : Recharge System D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
22,933	98	Paved roads w/curbs & sewers, HSG A
32,516	39	>75% Grass cover, Good, HSG A
55,449	63	Weighted Average
32,516		58.64% Pervious Area
22,933		41.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.5	66	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	150	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.1	266	Total			

Subcatchment 7S: Tributary Area to CB 7A & 7B



Summary for Subcatchment 8S: Remaining Area Tributary to Design Point

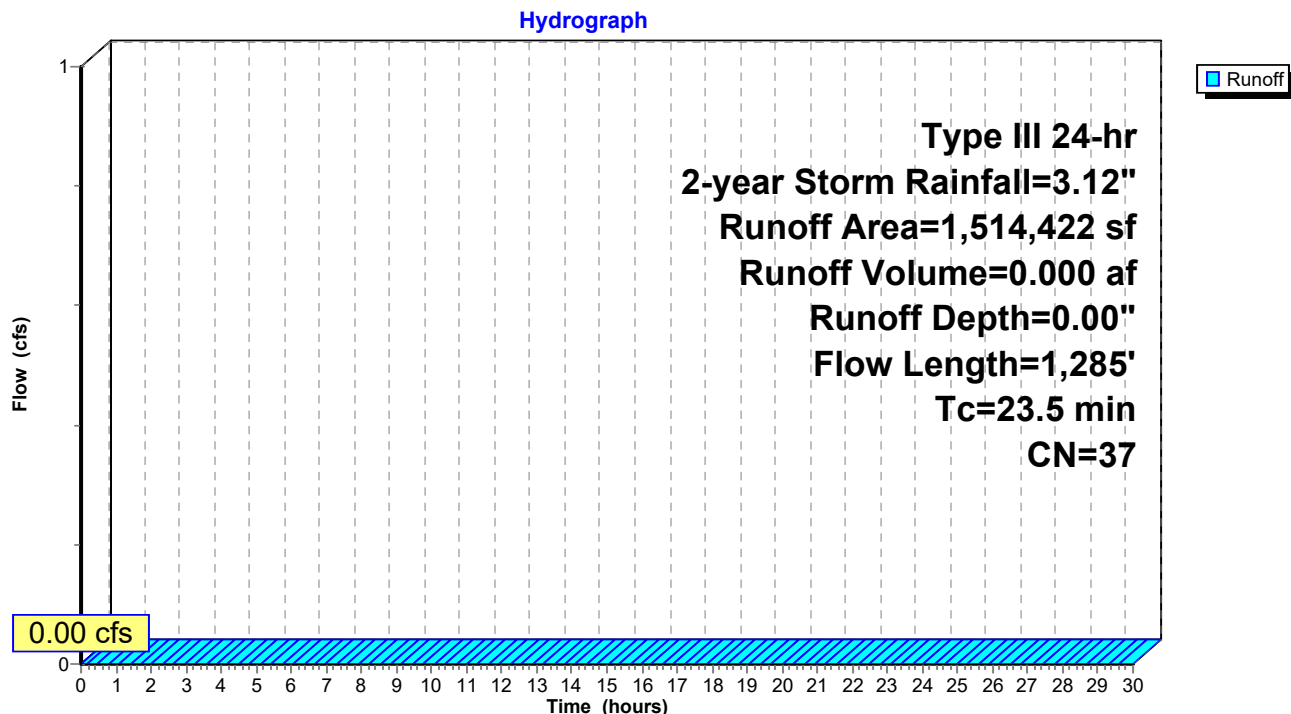
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description
575,400	46	2 acre lots, 12% imp, HSG A
111,580	49	50-75% Grass cover, Fair, HSG A
827,442	30	Woods, Good, HSG A
1,514,422	37	Weighted Average
1,445,374		95.44% Pervious Area
69,048		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Remaining Area Tributary to Design Point



Summary for Subcatchment RA1: Typical Roof Area

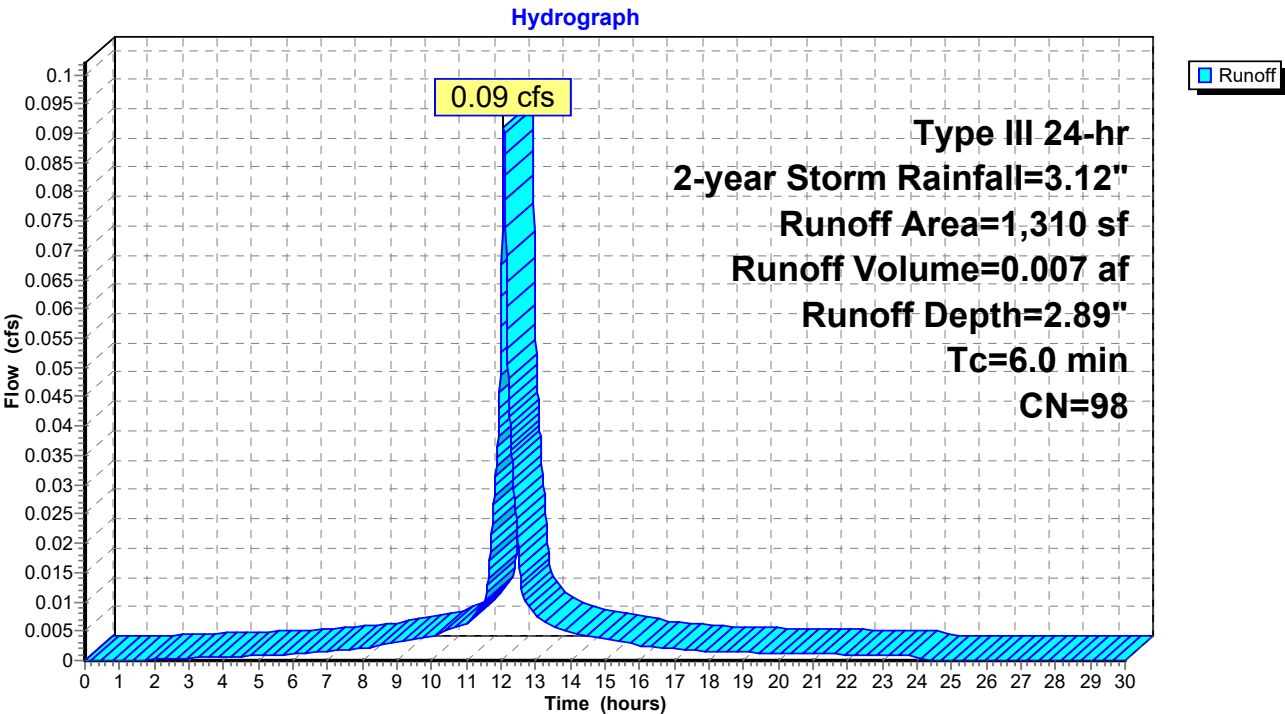
Runoff = 0.09 cfs @ 12.08 hrs, Volume= 0.007 af, Depth= 2.89"
Routed to Pond RAP1 : Typical Roof Recharge Area 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Storm Rainfall=3.12"

Area (sf)	CN	Description			
1,310	98	Roof Area			
1,310		100.00% Impervious Area			

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

Subcatchment RA1: Typical Roof Area



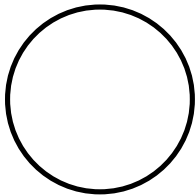
Summary for Reach 1R: Prop. Drain DMH 1 to DMH 2

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.00" for 2-year Storm event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Routed to Reach 2R : Prop. Drain DMH 2 to DMH 3

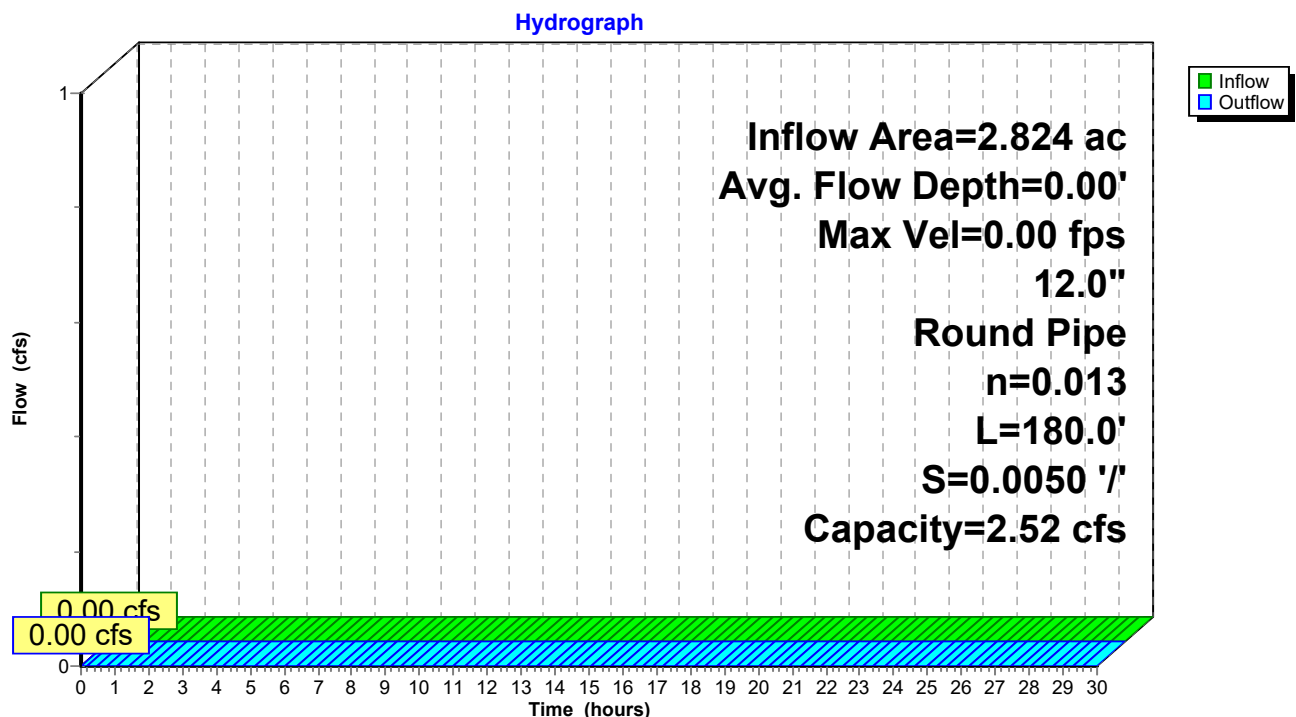
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 180.0' Slope= 0.0050 '/'
 Inlet Invert= 168.00', Outlet Invert= 167.10'



Reach 1R: Prop. Drain DMH 1 to DMH 2



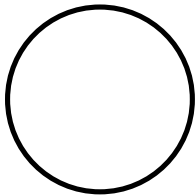
Summary for Reach 2R: Prop. Drain DMH 2 to DMH 3

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.00" for 2-year Storm event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

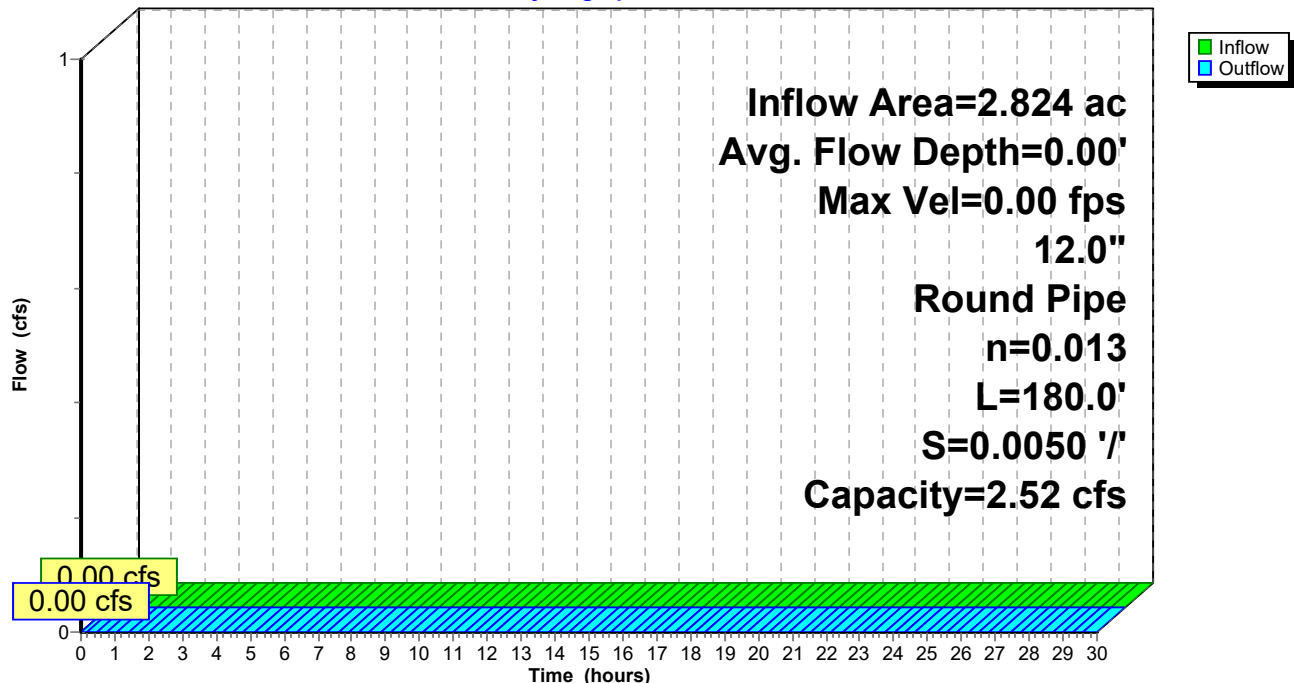
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 180.0' Slope= 0.0050 '/'
 Inlet Invert= 167.00', Outlet Invert= 166.10'



Reach 2R: Prop. Drain DMH 2 to DMH 3

Hydrograph



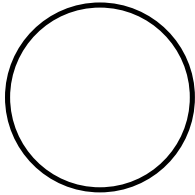
Summary for Reach 3R: Prop. Drain DMH 3 to DMH 4

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.00" for 2-year Storm event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Routed to Reach 4R : Prop Drain DMH 4 to DMH 5

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

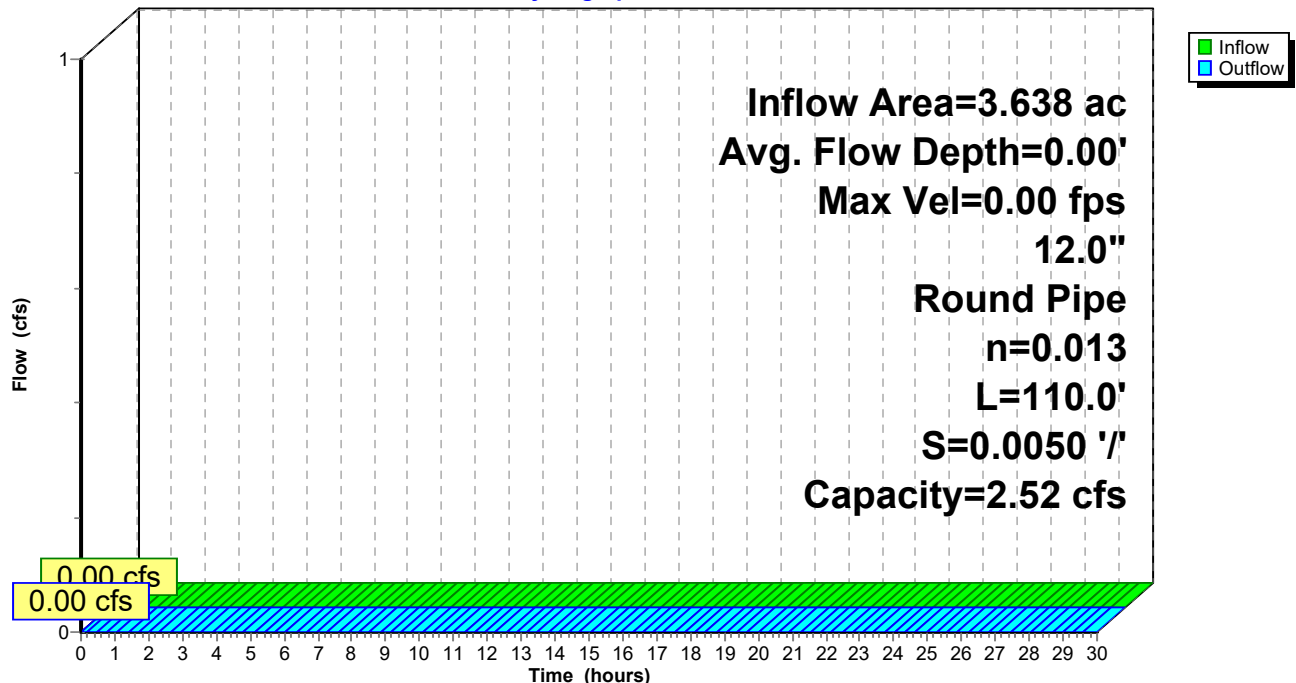
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 110.0' Slope= 0.0050 '/'
 Inlet Invert= 166.00', Outlet Invert= 165.45'



Reach 3R: Prop. Drain DMH 3 to DMH 4

Hydrograph



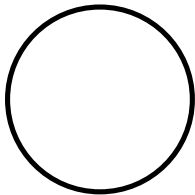
Summary for Reach 4R: Prop Drain DMH 4 to DMH 5

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.00" for 2-year Storm event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Routed to Pond 1P : Recharge System A

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

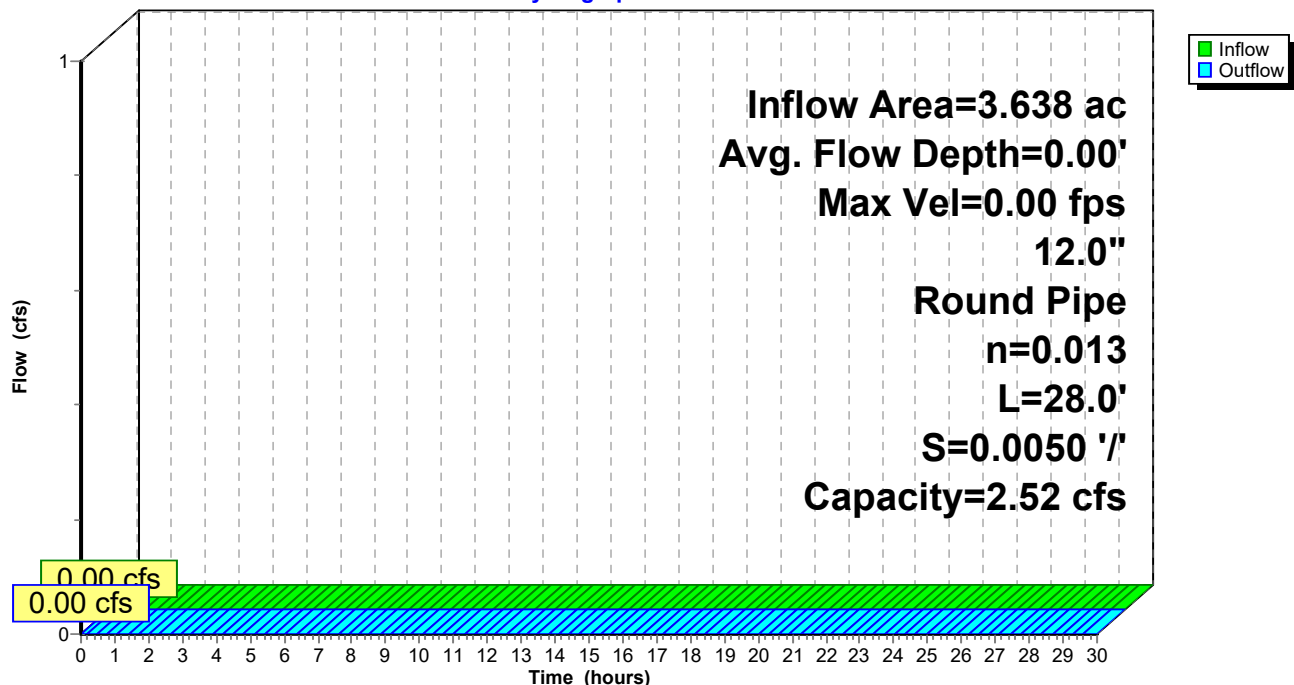
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 28.0' Slope= 0.0050 '/'
 Inlet Invert= 165.35', Outlet Invert= 165.21'



Reach 4R: Prop Drain DMH 4 to DMH 5

Hydrograph



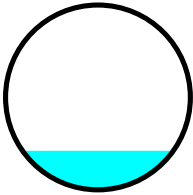
Summary for Reach 5R: Prop. Drain DMH x to DMH x

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 0.45" for 2-year Storm event
Inflow = 0.35 cfs @ 12.13 hrs, Volume= 0.039 af
Outflow = 0.35 cfs @ 12.14 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.4 min
Routed to Pond 3P : Recharge System C

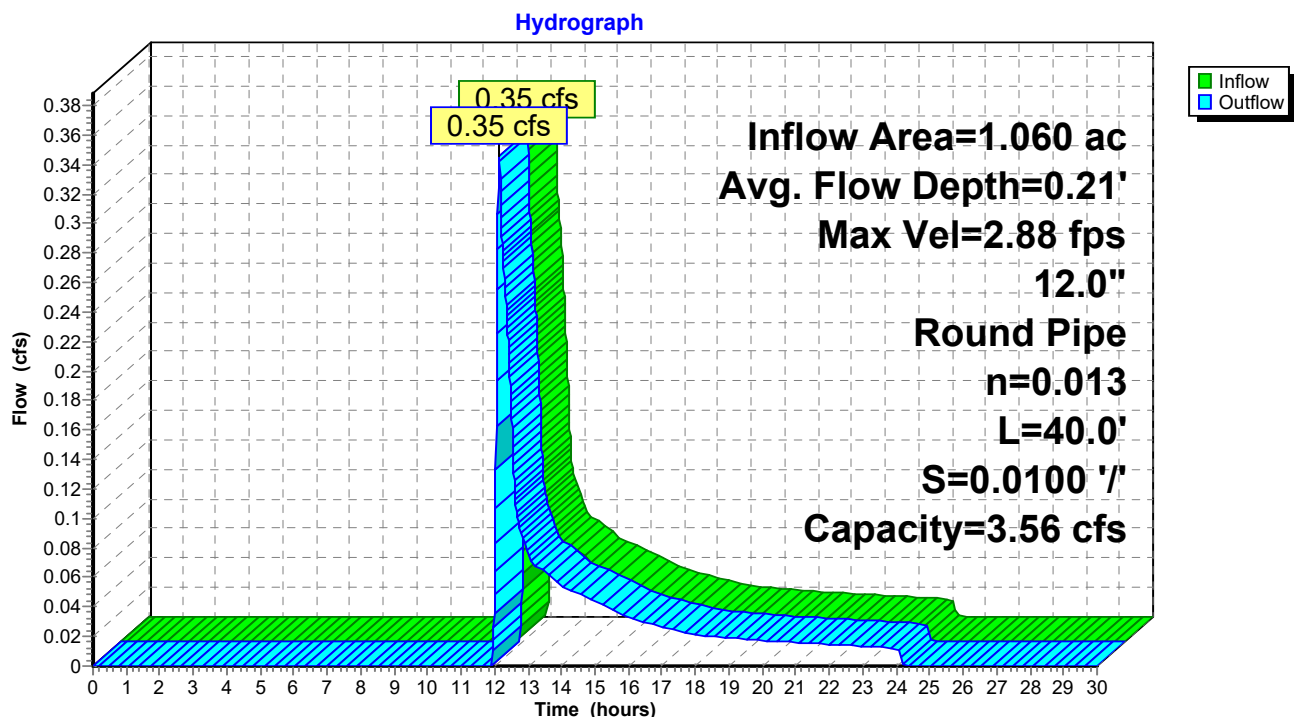
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.88 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 1.36 fps, Avg. Travel Time= 0.5 min

Peak Storage= 5 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 0.82'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.56 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 40.0' Slope= 0.0100 '/
Inlet Invert= 164.40', Outlet Invert= 164.00'



Reach 5R: Prop. Drain DMH x to DMH x

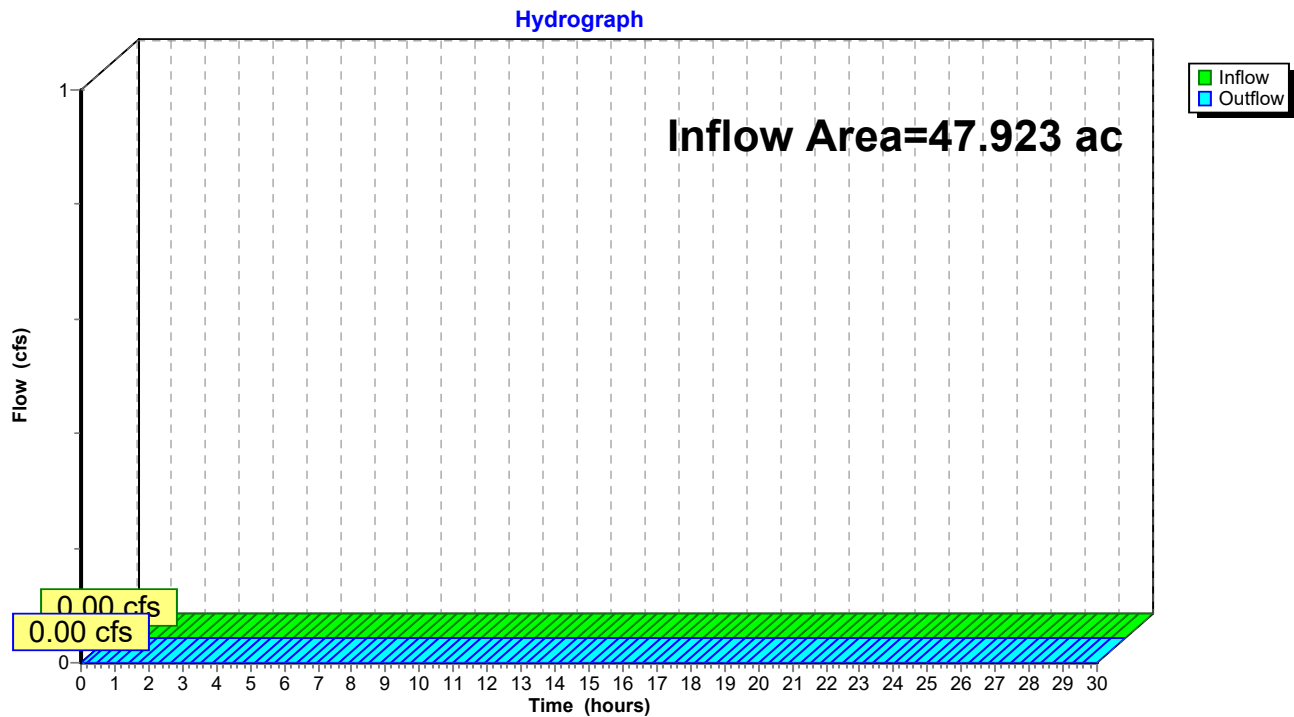


Summary for Reach DP: Design Point

Inflow Area = 47.923 ac, 7.45% Impervious, Inflow Depth = 0.00" for 2-year Storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP: Design Point



Summary for Pond 1P: Recharge System A

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.00" for 2-year Storm event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.00' @ 0.00 hrs Surf.Area= 1,309 sf Storage= 0 cf

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

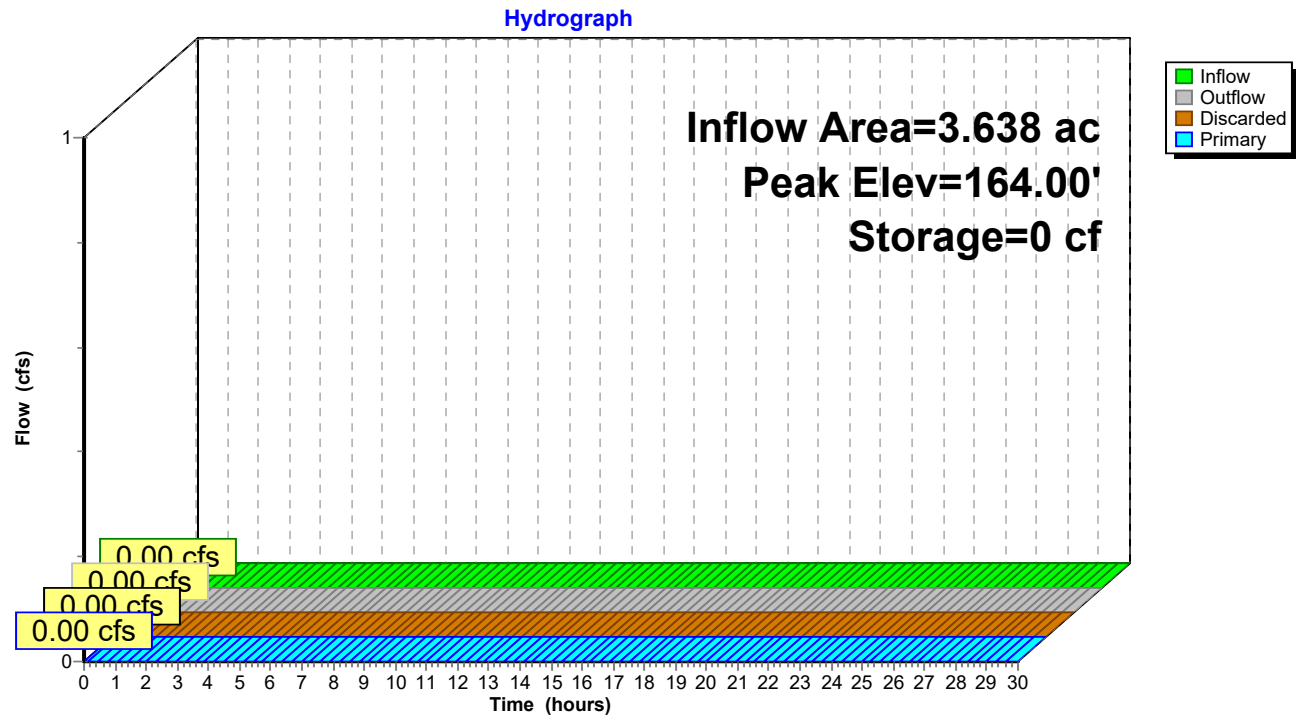
Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	1,608 cf	ADS_StormTech SC-740 b +Cap x 35 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	1,189 cf	25.25'W x 51.84'L x 3.50'H Prismatic 4,581 cf Overall - 1,608 cf Embedded = 2,973 cf x 40.0% Voids
		2,797 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	171.25'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑ **1=Exfiltration** (Passes 0.00 cfs of 0.25 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑ **2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Recharge System A



Summary for Pond 2P: Recharge System B

Inflow Area = 7.186 ac, 9.69% Impervious, Inflow Depth = 0.00" for 2-year Storm event
 Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af
 Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.2 min
 Discarded = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.00' @ 24.00 hrs Surf.Area= 3,257 sf Storage= 0 cf

Plug-Flow detention time= 1.5 min calculated for 0.001 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (1,307.2 - 1,305.6)

Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	4,135 cf	ADS_StormTech SC-740 b +Cap x 90 Inside #2 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
#2	162.00'	2,907 cf	44.50"W x 73.20"L x 3.50'H Prismatic 11,401 cf Overall - 4,135 cf Embedded = 7,266 cf x 40.0% Voids
		7,041 cf	Total Available Storage

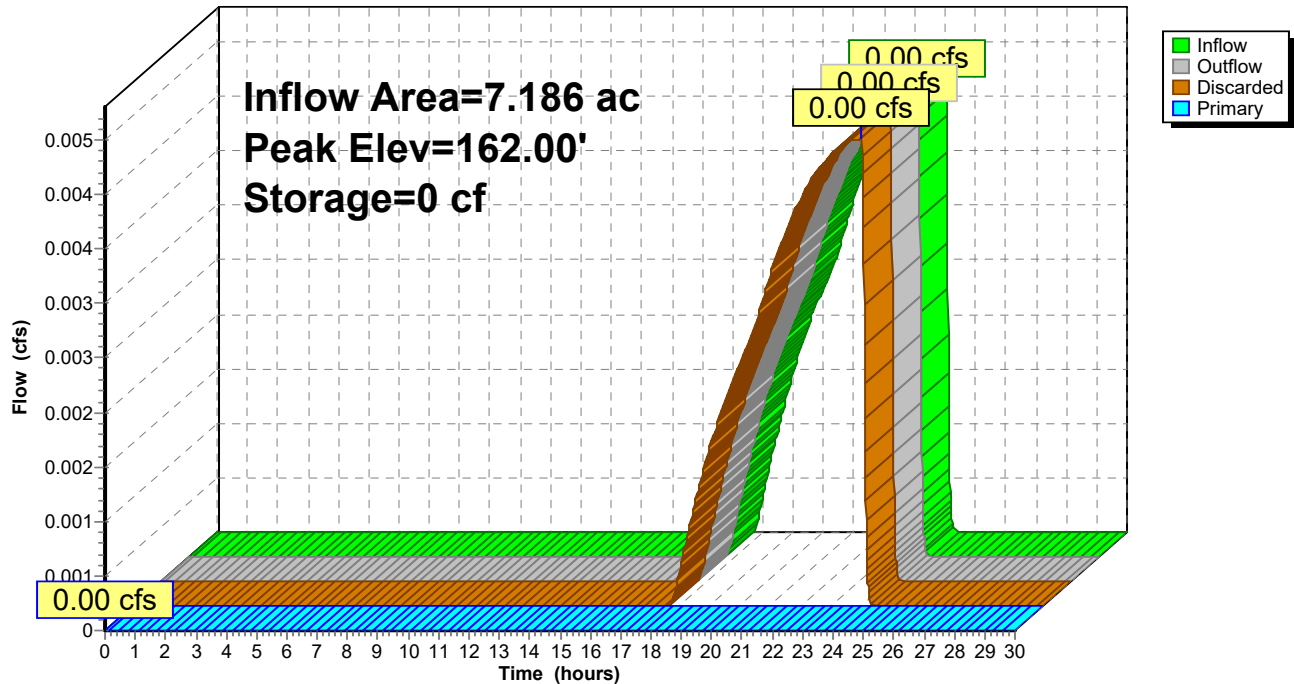
Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.62 cfs @ 24.00 hrs HW=162.00' (Free Discharge)
 ↑1=Exfiltration (Controls 0.62 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 2P: Recharge System B

Hydrograph



Summary for Pond 3P: Recharge System C

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 0.45" for 2-year Storm event
 Inflow = 0.35 cfs @ 12.14 hrs, Volume= 0.039 af
 Outflow = 0.33 cfs @ 12.17 hrs, Volume= 0.039 af, Atten= 4%, Lag= 1.7 min
 Discarded = 0.33 cfs @ 12.17 hrs, Volume= 0.039 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.04' @ 12.17 hrs Surf.Area= 1,848 sf Storage= 31 cf

Plug-Flow detention time= 1.5 min calculated for 0.039 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (915.5 - 914.0)

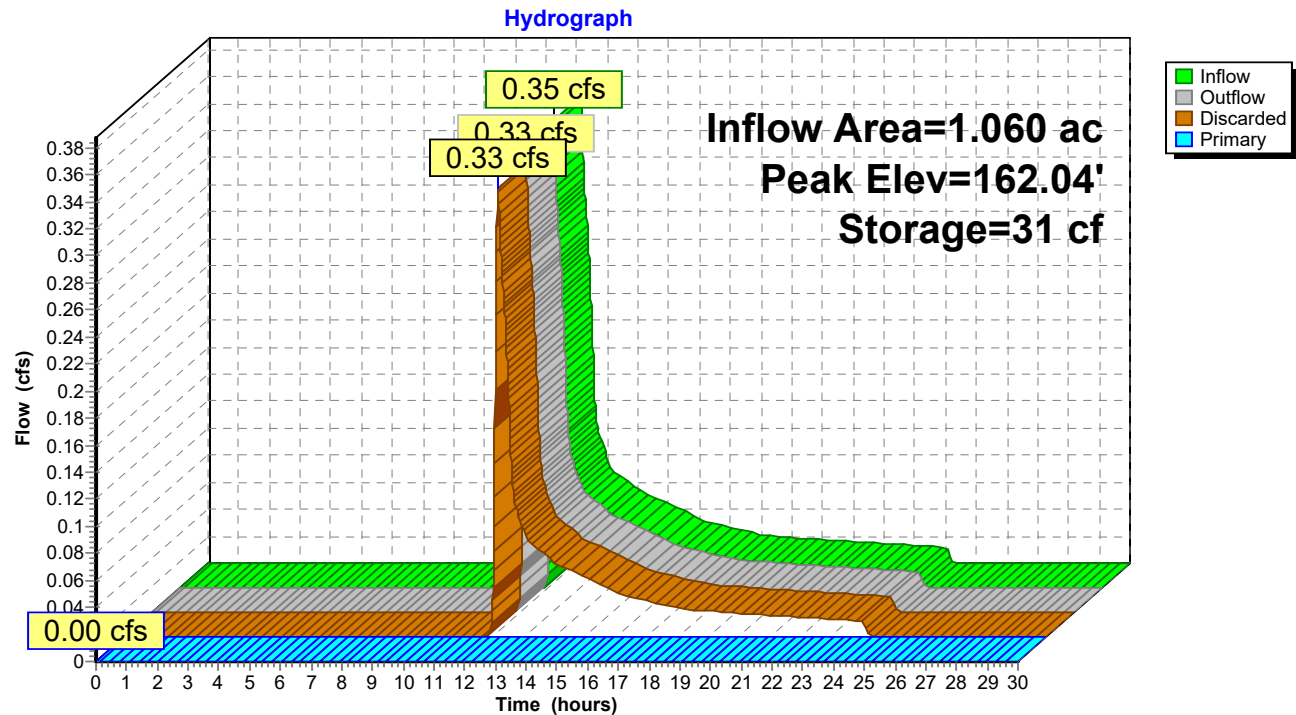
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	2,297 cf	ADS_StormTech SC-740 b +Cap x 50 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	1,669 cf	25.25'W x 73.20'L x 3.50'H Prismatic 6,469 cf Overall - 2,297 cf Embedded = 4,172 cf x 40.0% Voids
		3,966 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.36 cfs @ 12.17 hrs HW=162.04' (Free Discharge)
 ↑1=Exfiltration (Controls 0.36 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 3P: Recharge System C



Summary for Pond 4P: Recharge System D

Inflow Area = 1.273 ac, 41.36% Impervious, Inflow Depth = 0.48" for 2-year Storm event
 Inflow = 0.48 cfs @ 12.13 hrs, Volume= 0.051 af
 Outflow = 0.46 cfs @ 12.16 hrs, Volume= 0.051 af, Atten= 4%, Lag= 1.7 min
 Discarded = 0.46 cfs @ 12.16 hrs, Volume= 0.051 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.04' @ 12.16 hrs Surf.Area= 2,544 sf Storage= 42 cf

Plug-Flow detention time= 1.5 min calculated for 0.051 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (910.0 - 908.5)

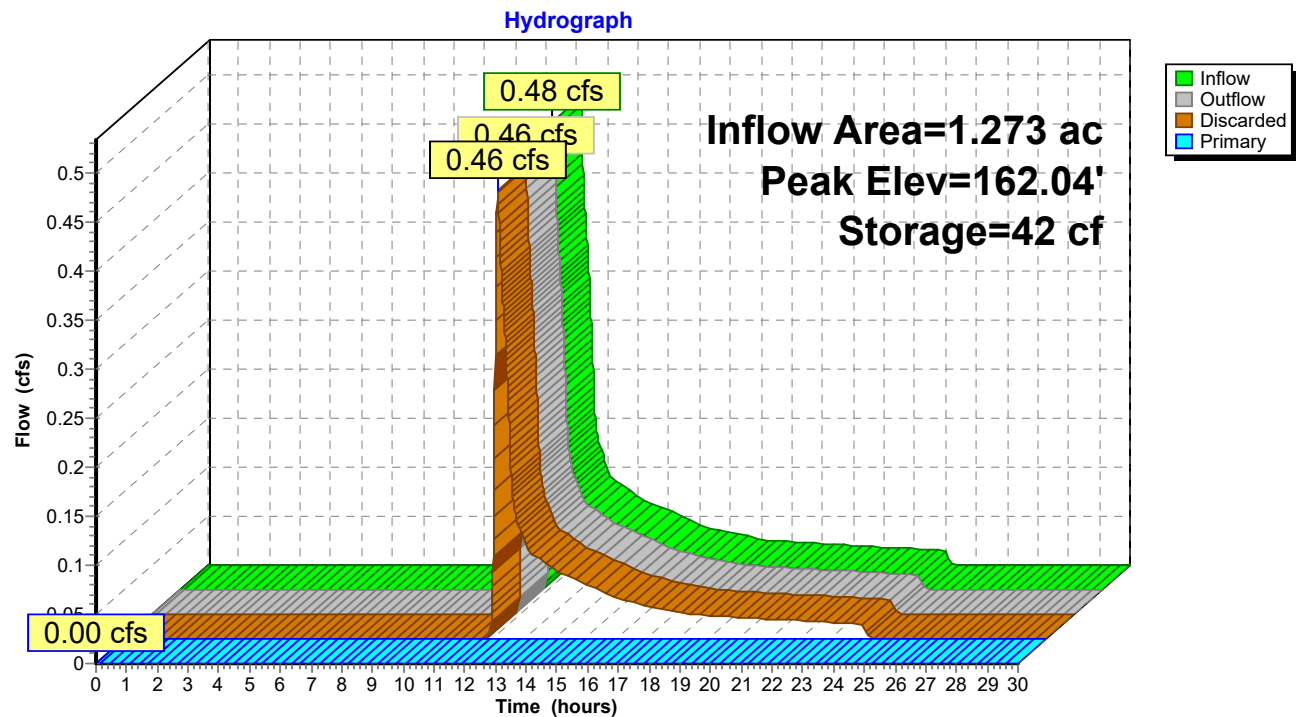
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	3,216 cf	ADS_StormTech SC-740 b +Cap x 70 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	2,275 cf	34.75'W x 73.20'L x 3.50'H Prismatic 8,903 cf Overall - 3,216 cf Embedded = 5,687 cf x 40.0% Voids
		5,491 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.50 cfs @ 12.16 hrs HW=162.04' (Free Discharge)
 ↑1=Exfiltration (Controls 0.50 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Recharge System D



Summary for Pond RAP1: Typical Roof Recharge Area 1

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth = 2.89" for 2-year Storm event
 Inflow = 0.09 cfs @ 12.08 hrs, Volume= 0.007 af
 Outflow = 0.04 cfs @ 12.27 hrs, Volume= 0.007 af, Atten= 57%, Lag= 10.9 min
 Discarded = 0.04 cfs @ 12.27 hrs, Volume= 0.007 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.43' @ 12.27 hrs Surf.Area= 187 sf Storage= 32 cf

Plug-Flow detention time= 3.6 min calculated for 0.007 af (100% of inflow)
 Center-of-Mass det. time= 3.6 min (760.5 - 756.9)

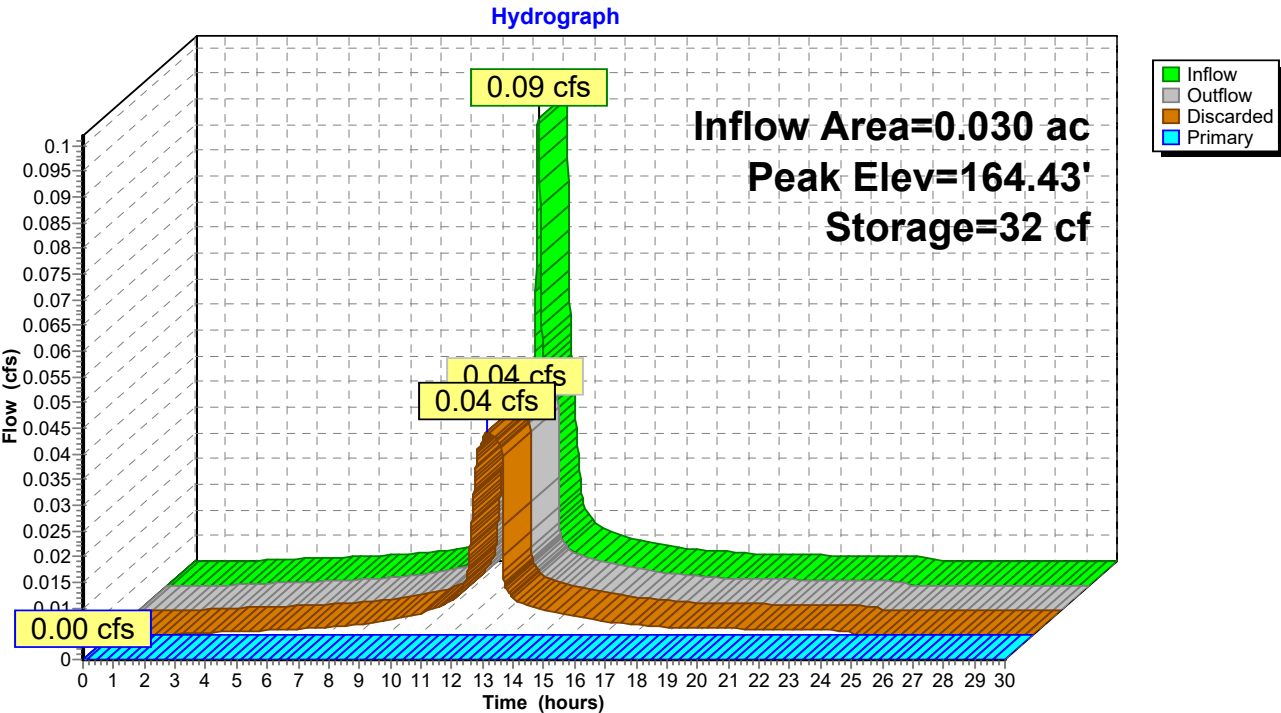
Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	88 cf	ADS_StormTech SC-310 x 6 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	139 cf	11.50'W x 16.24'L x 2.33'H Prismatic 435 cf Overall - 88 cf Embedded = 347 cf x 40.0% Voids
		227 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.27 hrs HW=164.43' (Free Discharge)
 ↑1=Exfiltration (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond RAP1: Typical Roof Recharge Area 1



Pleasant Street Dunstable Post-Development-2Type III 24-hr 10-year Storm Rainfall=4.81"

Prepared by Haley Ward

Printed 9/11/2025

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Tributary Area to CB Runoff Area=123,030 sf 9.26% Impervious Runoff Depth=0.13"
Flow Length=230' Slope=0.0500 '/ Tc=6.0 min CN=38 Runoff=0.05 cfs 0.032 af

Subcatchment2S: Tributary Area to CB 2A Runoff Area=35,455 sf 10.14% Impervious Runoff Depth=0.16"
Flow Length=120' Slope=0.0200 '/ Tc=6.0 min CN=39 Runoff=0.02 cfs 0.011 af

Subcatchment3S: Tributary Area to CB 3A Runoff Area=97,380 sf 10.78% Impervious Runoff Depth=0.19"
Flow Length=95' Slope=0.0200 '/ Tc=6.5 min CN=40 Runoff=0.08 cfs 0.036 af

Subcatchment4S: Tributary Area to CB 4A Runoff Area=166,140 sf 9.46% Impervious Runoff Depth=0.23"
Flow Length=100' Slope=0.0200 '/ Tc=6.5 min CN=41 Runoff=0.22 cfs 0.073 af

Subcatchment5S: Tributary Area to CB 5A Runoff Area=49,501 sf 8.35% Impervious Runoff Depth=0.16"
Flow Length=105' Slope=0.0200 '/ Tc=6.6 min CN=39 Runoff=0.03 cfs 0.015 af

Subcatchment6S: Tributary Area to CB Runoff Area=46,170 sf 39.30% Impervious Runoff Depth=1.32"
Flow Length=215' Slope=0.0200 '/ Tc=6.8 min CN=62 Runoff=1.45 cfs 0.117 af

Subcatchment7S: Tributary Area to CB 7A Runoff Area=55,449 sf 41.36% Impervious Runoff Depth=1.39"
Flow Length=266' Slope=0.0200 '/ Tc=7.1 min CN=63 Runoff=1.84 cfs 0.147 af

Subcatchment8S: Remaining Area Runoff Area=1,514,422 sf 4.56% Impervious Runoff Depth=0.11"
Flow Length=1,285' Tc=23.5 min CN=37 Runoff=0.49 cfs 0.310 af

SubcatchmentRA1: Typical Roof Area Runoff Area=1,310 sf 100.00% Impervious Runoff Depth=4.57"
Tc=6.0 min CN=98 Runoff=0.14 cfs 0.011 af

Reach 1R: Prop. Drain DMH 1 to DMH 2 Avg. Flow Depth=0.10' Max Vel=1.27 fps Inflow=0.05 cfs 0.032 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.05 cfs 0.032 af

Reach 2R: Prop. Drain DMH 2 to DMH 3 Avg. Flow Depth=0.10' Max Vel=1.27 fps Inflow=0.05 cfs 0.032 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.05 cfs 0.032 af

Reach 3R: Prop. Drain DMH 3 to DMH 4 Avg. Flow Depth=0.11' Max Vel=1.40 fps Inflow=0.07 cfs 0.043 af
12.0" Round Pipe n=0.013 L=110.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.07 cfs 0.043 af

Reach 4R: Prop Drain DMH 4 to DMH 5 Avg. Flow Depth=0.11' Max Vel=1.40 fps Inflow=0.07 cfs 0.043 af
12.0" Round Pipe n=0.013 L=28.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.07 cfs 0.043 af

Reach 5R: Prop. Drain DMH x to DMH x Avg. Flow Depth=0.44' Max Vel=4.31 fps Inflow=1.45 cfs 0.117 af
12.0" Round Pipe n=0.013 L=40.0' S=0.0100 '/ Capacity=3.56 cfs Outflow=1.45 cfs 0.117 af

Reach DP: Design Point Inflow=0.49 cfs 0.310 af
Outflow=0.49 cfs 0.310 af

Pond 1P: Recharge System A Peak Elev=164.02' Storage=10 cf Inflow=0.07 cfs 0.043 af
Discarded=0.07 cfs 0.043 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.043 af

Pleasant Street Dunstable Post-Development-2Type III 24-hr 10-year Storm Rainfall=4.81"

Prepared by Haley Ward

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Pond 2P: Recharge System B

Peak Elev=162.02' Storage=29 cf Inflow=0.32 cfs 0.124 af
Discarded=0.31 cfs 0.124 af Primary=0.00 cfs 0.000 af Outflow=0.31 cfs 0.124 af

Pond 3P: Recharge System C

Peak Elev=162.83' Storage=877 cf Inflow=1.45 cfs 0.117 af
Discarded=0.50 cfs 0.117 af Primary=0.00 cfs 0.000 af Outflow=0.50 cfs 0.117 af

Pond 4P: Recharge System D

Peak Elev=162.76' Storage=1,050 cf Inflow=1.84 cfs 0.147 af
Discarded=0.67 cfs 0.147 af Primary=0.00 cfs 0.000 af Outflow=0.67 cfs 0.147 af

Pond RAP1: Typical Roof Recharge Area 1

Peak Elev=164.84' Storage=82 cf Inflow=0.14 cfs 0.011 af
Discarded=0.04 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.011 af

Total Runoff Area = 47.954 ac Runoff Volume = 0.753 af Average Runoff Depth = 0.19"
92.50% Pervious = 44.355 ac 7.50% Impervious = 3.599 ac

Summary for Subcatchment 1S: Tributary Area to CB 1A-1B

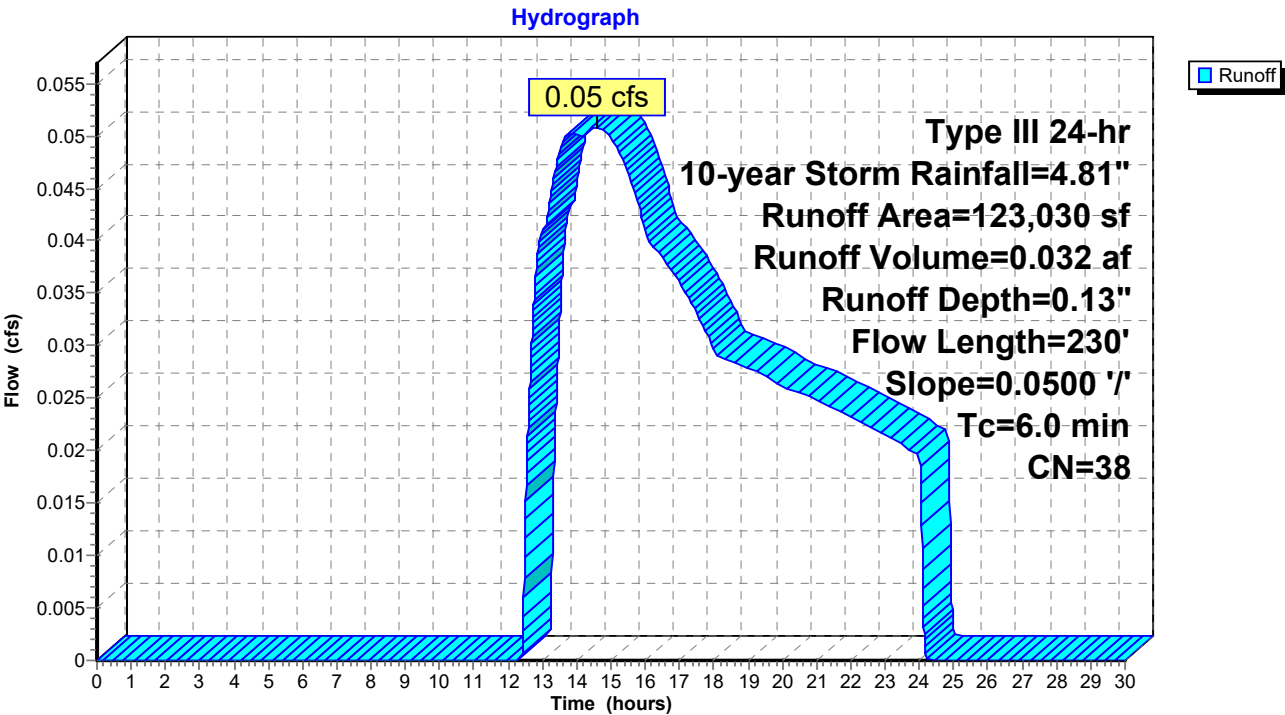
Runoff = 0.05 cfs @ 14.58 hrs, Volume= 0.032 af, Depth= 0.13"
Routed to Reach 1R : Prop. Drain DMH 1 to DMH 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Storm Rainfall=4.81"

	Area (sf)	CN	Description
*	11,387	98	Roadway, driveways, sidewalks
	111,643	32	Woods/grass comb., Good, HSG A
	123,030	38	Weighted Average
	111,643		90.74% Pervious Area
	11,387		9.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0500	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.7	180	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.7	230	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: Tributary Area to CB 1A-1B



Summary for Subcatchment 2S: Tributary Area to CB 2A & 2B

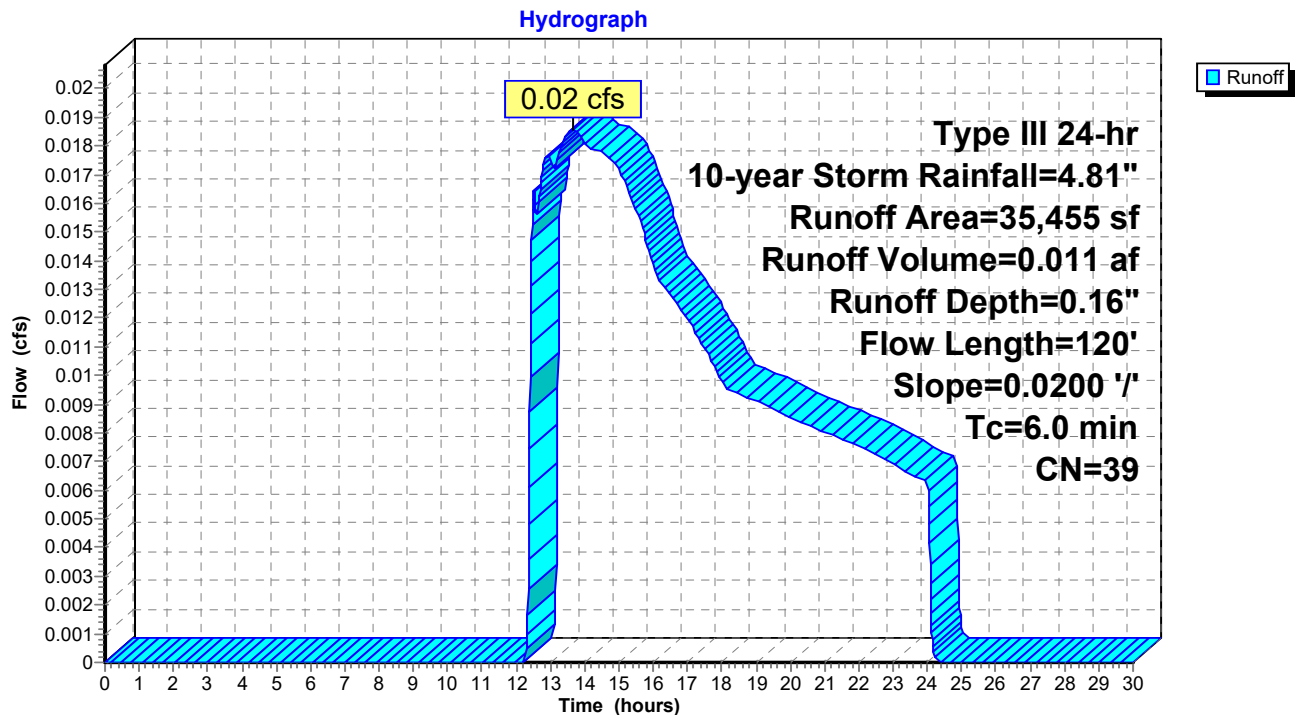
Runoff = 0.02 cfs @ 13.66 hrs, Volume= 0.011 af, Depth= 0.16"
 Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
3,595	98	Paved roads w/curbs & sewers, HSG A
31,860	32	Woods/grass comb., Good, HSG A
35,455	39	Weighted Average
31,860		89.86% Pervious Area
3,595		10.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.12"
0.4	70	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Tributary Area to CB 2A & 2B



Summary for Subcatchment 3S: Tributary Area to CB 3A & 3B

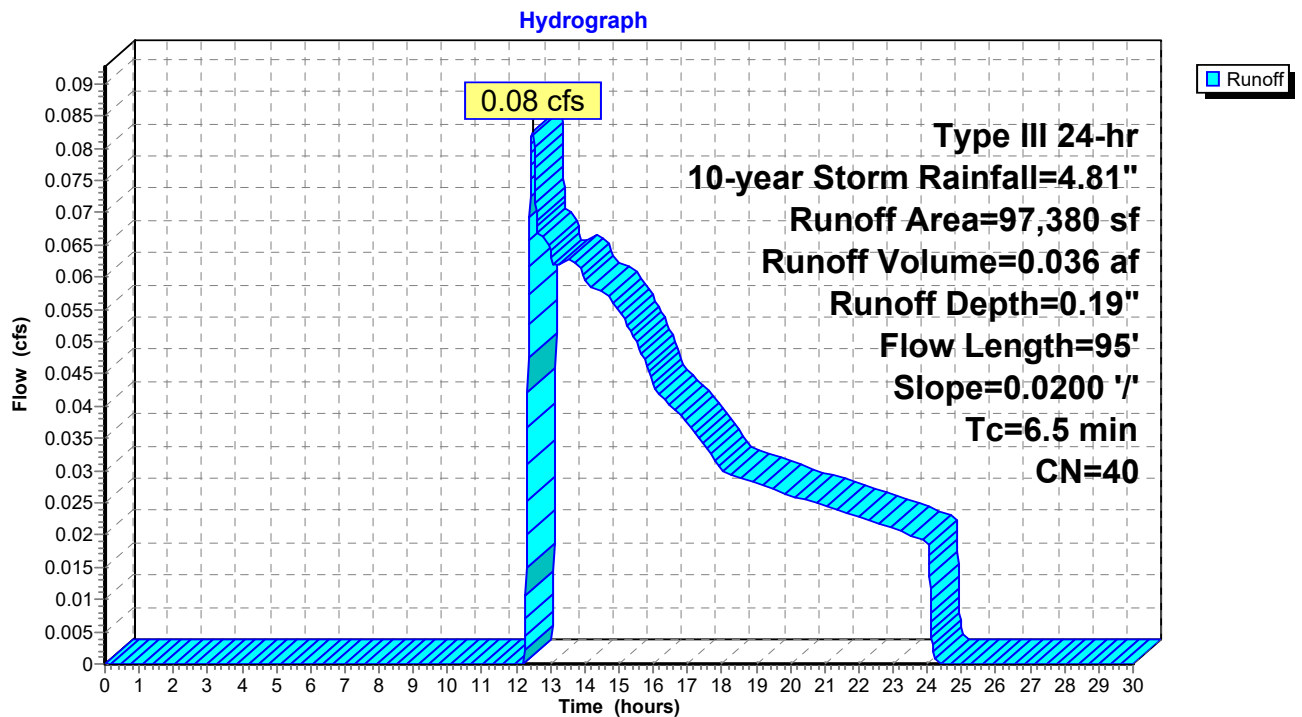
Runoff = 0.08 cfs @ 12.48 hrs, Volume= 0.036 af, Depth= 0.19"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
10,499	98	Paved parking, HSG A
15,431	39	>75% Grass cover, Good, HSG A
71,450	32	Woods/grass comb., Good, HSG A
97,380	40	Weighted Average
86,881		89.22% Pervious Area
10,499		10.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	45	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	95	Total			

Subcatchment 3S: Tributary Area to CB 3A & 3B



Summary for Subcatchment 4S: Tributary Area to CB 4A & 4B

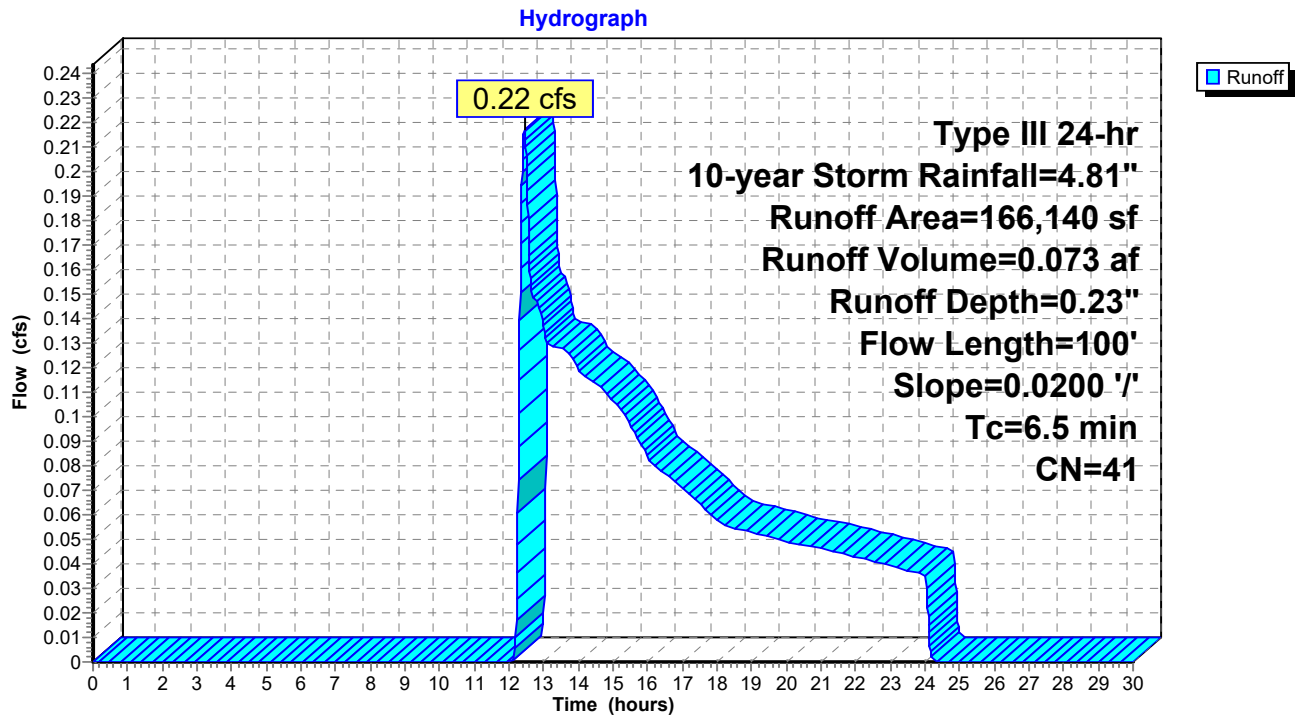
Runoff = 0.22 cfs @ 12.44 hrs, Volume= 0.073 af, Depth= 0.23"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
15,714	98	Paved roads w/curbs & sewers, HSG A
54,686	39	>75% Grass cover, Good, HSG A
95,740	32	Woods/grass comb., Good, HSG A
166,140	41	Weighted Average
150,426		90.54% Pervious Area
15,714		9.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	100	Total			

Subcatchment 4S: Tributary Area to CB 4A & 4B



Summary for Subcatchment 5S: Tributary Area to CB 5A & 5B

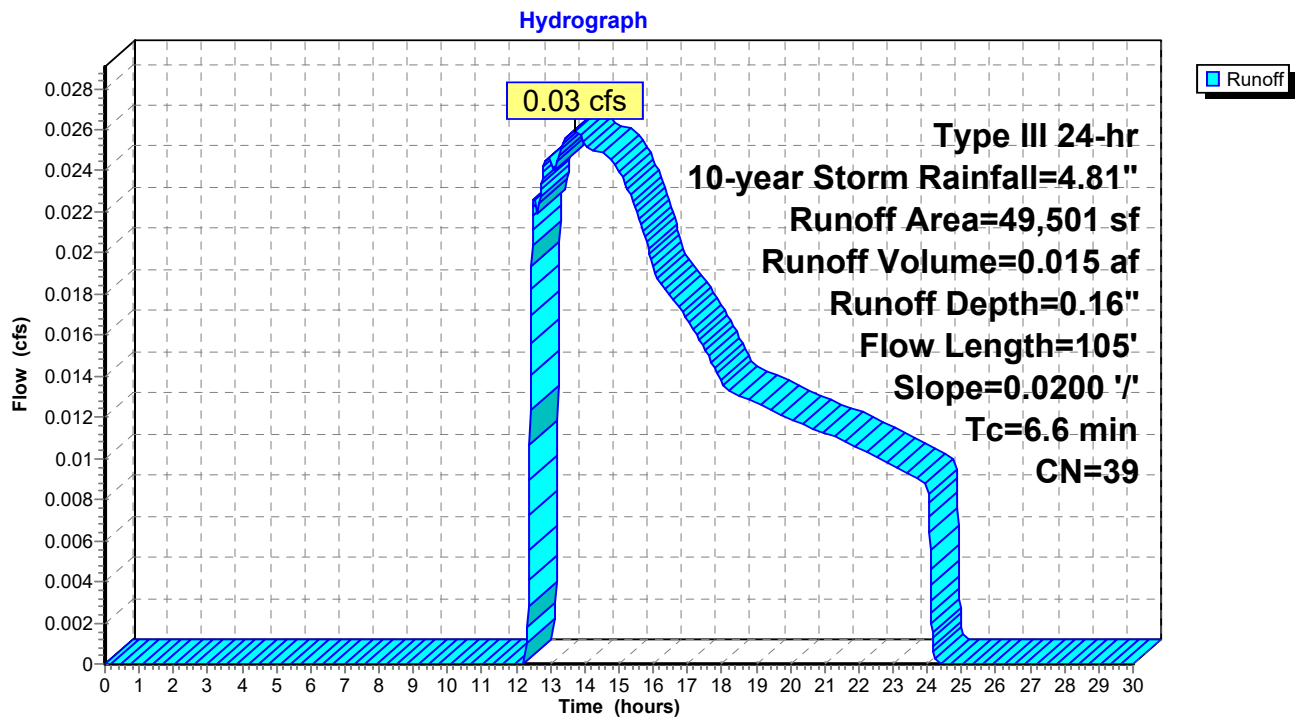
Runoff = 0.03 cfs @ 13.69 hrs, Volume= 0.015 af, Depth= 0.16"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
4,134	98	Paved roads w/curbs & sewers, HSG A
9,382	39	>75% Grass cover, Good, HSG A
35,985	32	Woods/grass comb., Good, HSG A
49,501	39	Weighted Average
45,367		91.65% Pervious Area
4,134		8.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.9	55	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.6	105	Total			

Subcatchment 5S: Tributary Area to CB 5A & 5B



Summary for Subcatchment 6S: Tributary Area to CB 6A-6B

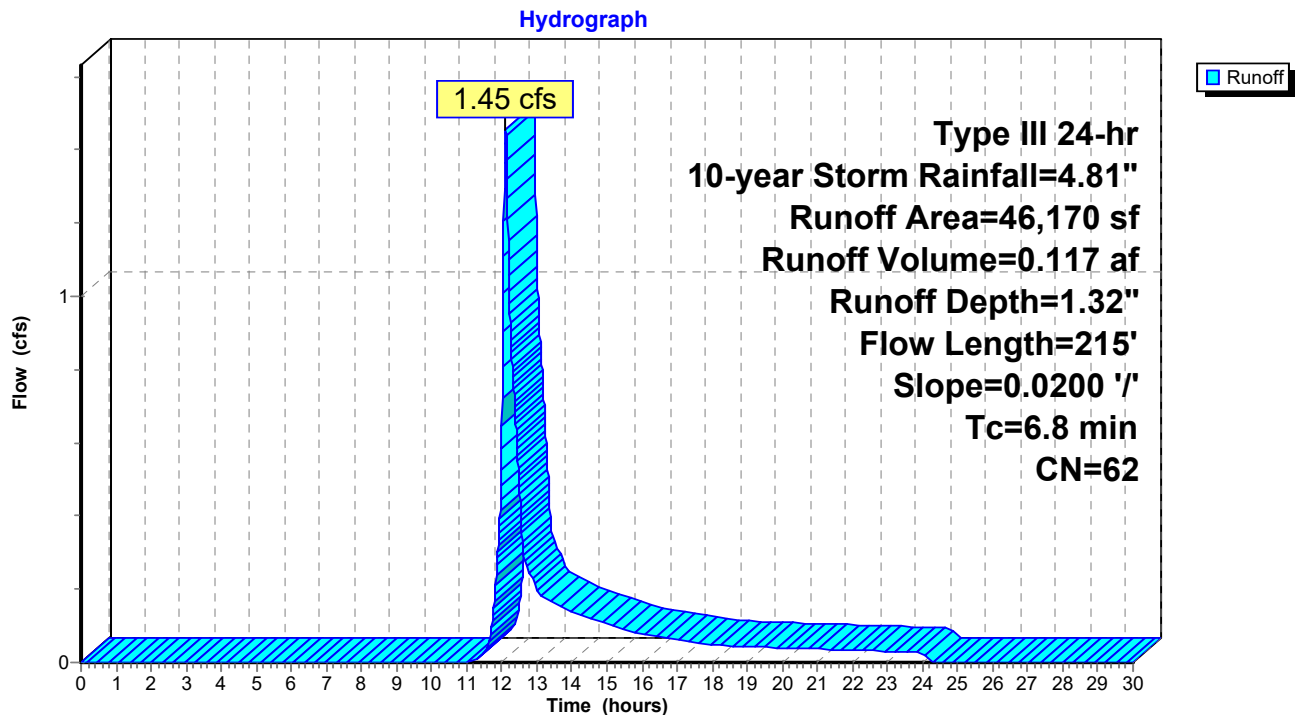
Runoff = 1.45 cfs @ 12.11 hrs, Volume= 0.117 af, Depth= 1.32"
 Routed to Reach 5R : Prop. Drain DMH x to DMH x

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
18,144	98	Paved roads w/curbs & sewers, HSG A
28,026	39	>75% Grass cover, Good, HSG A
46,170	62	Weighted Average
28,026		60.70% Pervious Area
18,144		39.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.6	80	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.8	215	Total			

Subcatchment 6S: Tributary Area to CB 6A-6B



Summary for Subcatchment 7S: Tributary Area to CB 7A & 7B

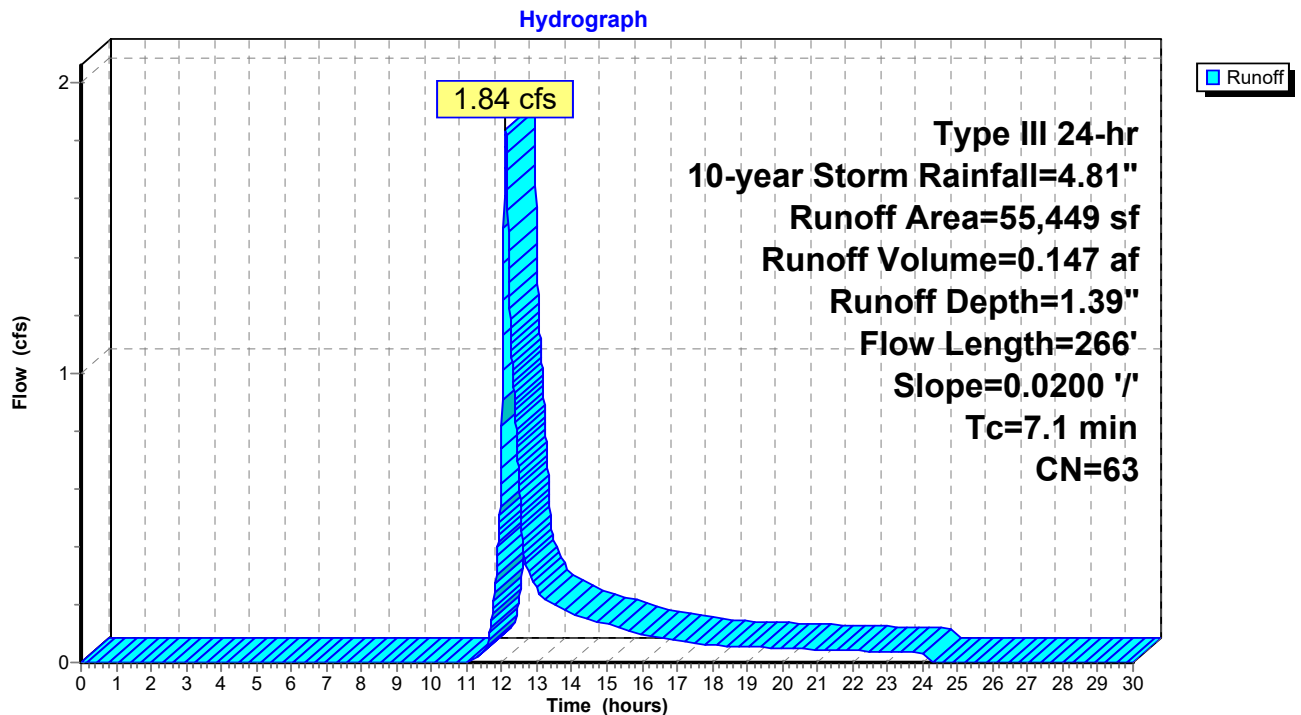
Runoff = 1.84 cfs @ 12.11 hrs, Volume= 0.147 af, Depth= 1.39"
 Routed to Pond 4P : Recharge System D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
22,933	98	Paved roads w/curbs & sewers, HSG A
32,516	39	>75% Grass cover, Good, HSG A
55,449	63	Weighted Average
32,516		58.64% Pervious Area
22,933		41.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.5	66	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	150	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.1	266	Total			

Subcatchment 7S: Tributary Area to CB 7A & 7B



Summary for Subcatchment 8S: Remaining Area Tributary to Design Point

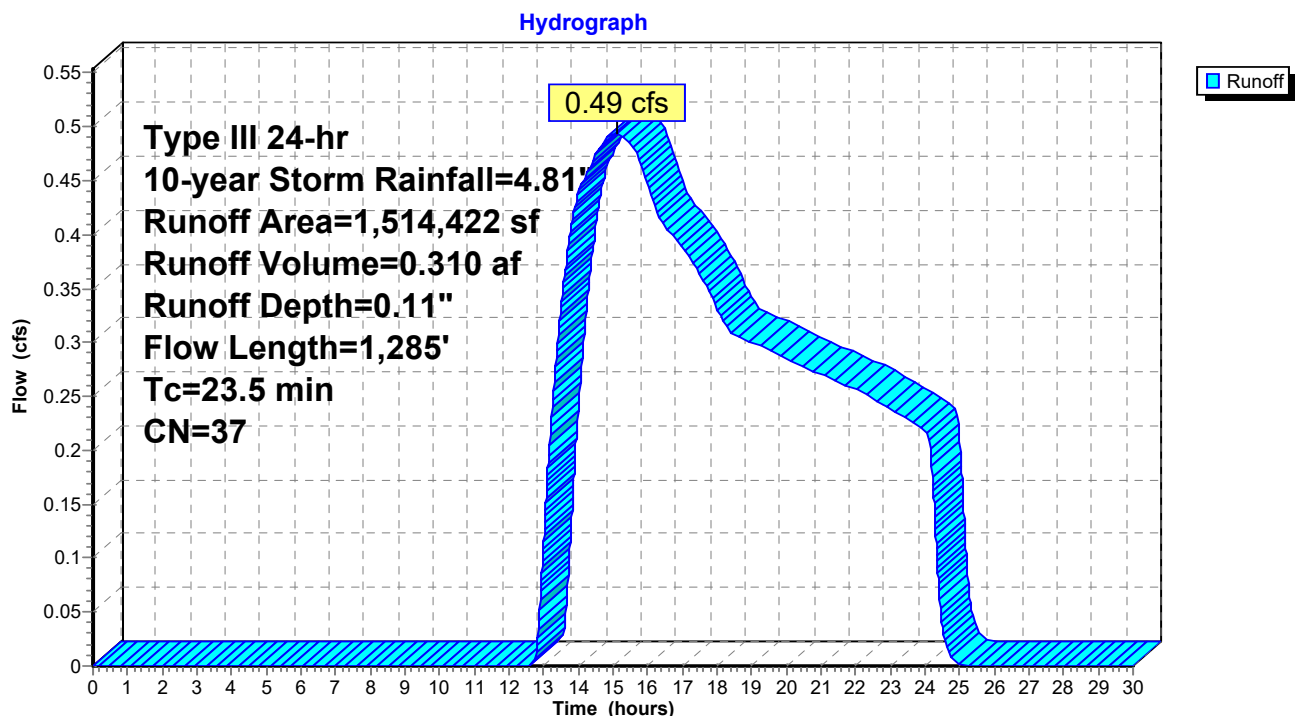
Runoff = 0.49 cfs @ 15.12 hrs, Volume= 0.310 af, Depth= 0.11"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
575,400	46	2 acre lots, 12% imp, HSG A
111,580	49	50-75% Grass cover, Fair, HSG A
827,442	30	Woods, Good, HSG A
1,514,422	37	Weighted Average
1,445,374		95.44% Pervious Area
69,048		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Remaining Area Tributary to Design Point



Summary for Subcatchment RA1: Typical Roof Area

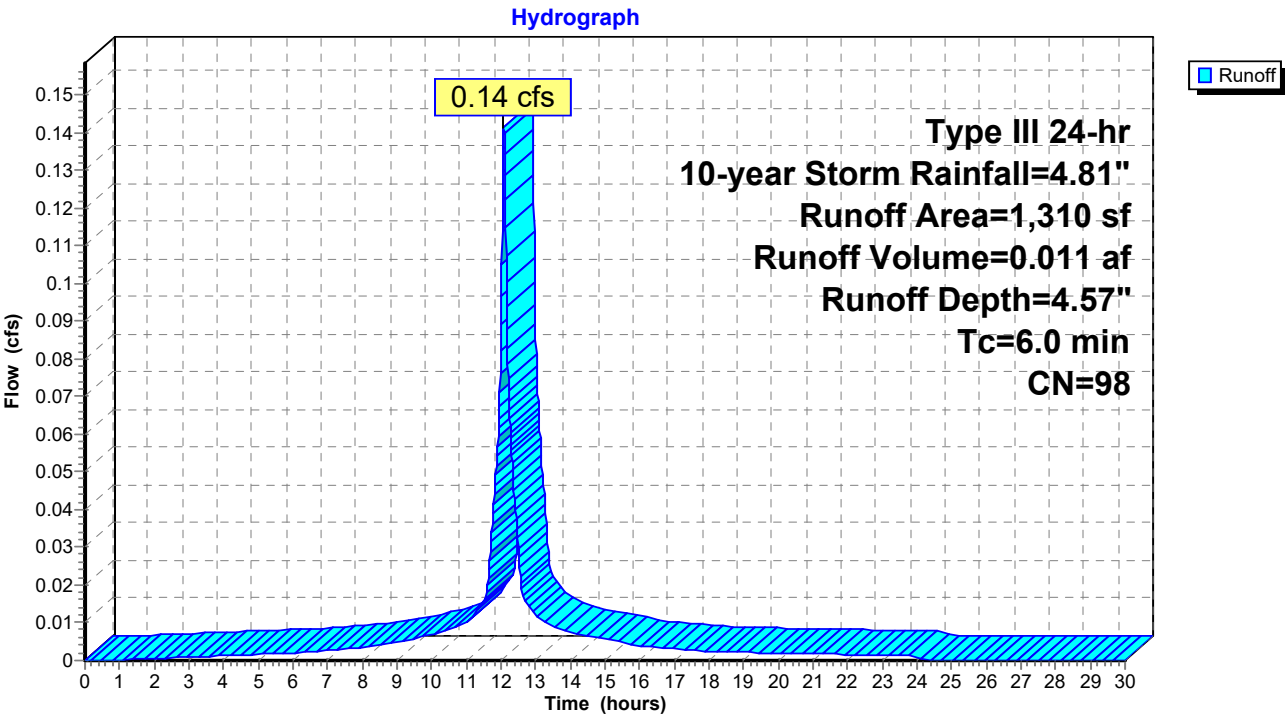
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af, Depth= 4.57"
Routed to Pond RAP1 : Typical Roof Recharge Area 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Storm Rainfall=4.81"

Area (sf)	CN	Description
1,310	98	Roof Area
1,310		100.00% Impervious Area

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

Subcatchment RA1: Typical Roof Area



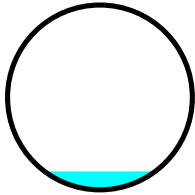
Summary for Reach 1R: Prop. Drain DMH 1 to DMH 2

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.13" for 10-year Storm event
 Inflow = 0.05 cfs @ 14.58 hrs, Volume= 0.032 af
 Outflow = 0.05 cfs @ 14.63 hrs, Volume= 0.032 af, Atten= 0%, Lag= 3.0 min
 Routed to Reach 2R : Prop. Drain DMH 2 to DMH 3

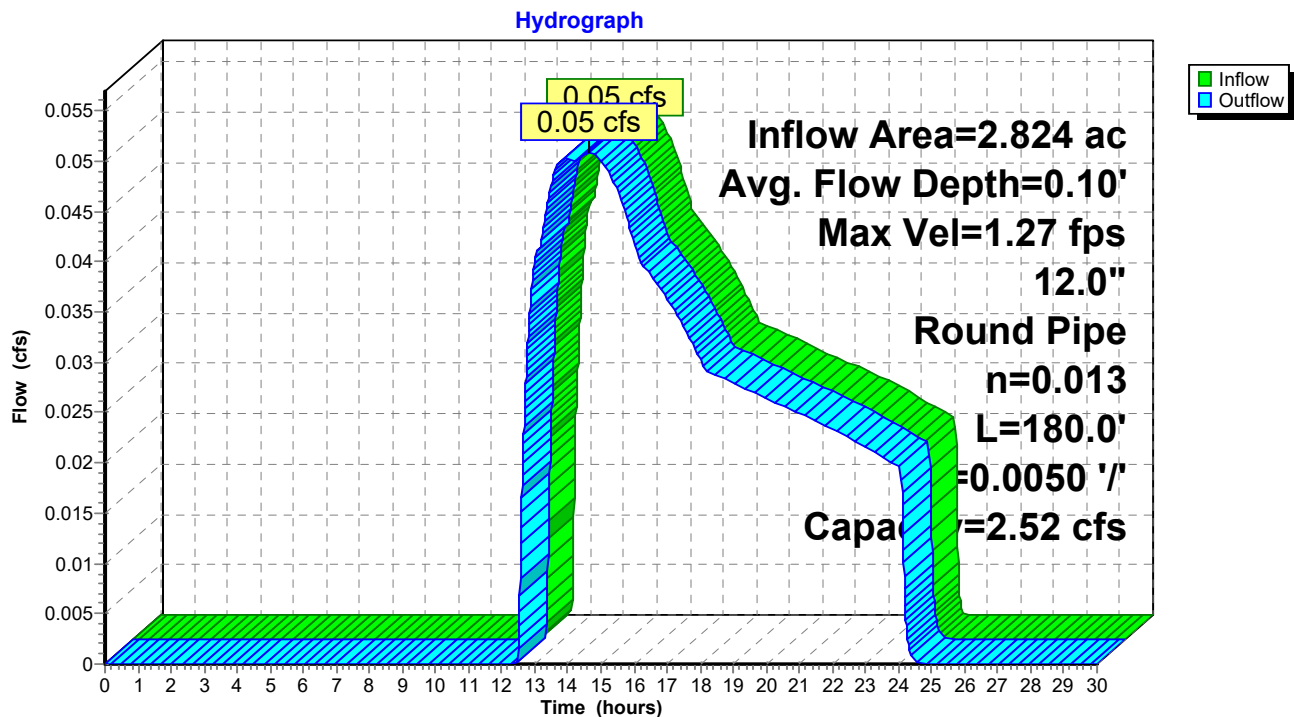
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.27 fps, Min. Travel Time= 2.4 min
 Avg. Velocity = 1.06 fps, Avg. Travel Time= 2.8 min

Peak Storage= 7 cf @ 14.59 hrs
 Average Depth at Peak Storage= 0.10' , Surface Width= 0.60'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 180.0' Slope= 0.0050 '/'
 Inlet Invert= 168.00', Outlet Invert= 167.10'



Reach 1R: Prop. Drain DMH 1 to DMH 2



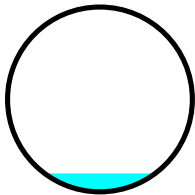
Summary for Reach 2R: Prop. Drain DMH 2 to DMH 3

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.13" for 10-year Storm event
 Inflow = 0.05 cfs @ 14.63 hrs, Volume= 0.032 af
 Outflow = 0.05 cfs @ 14.70 hrs, Volume= 0.032 af, Atten= 0%, Lag= 4.3 min
 Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

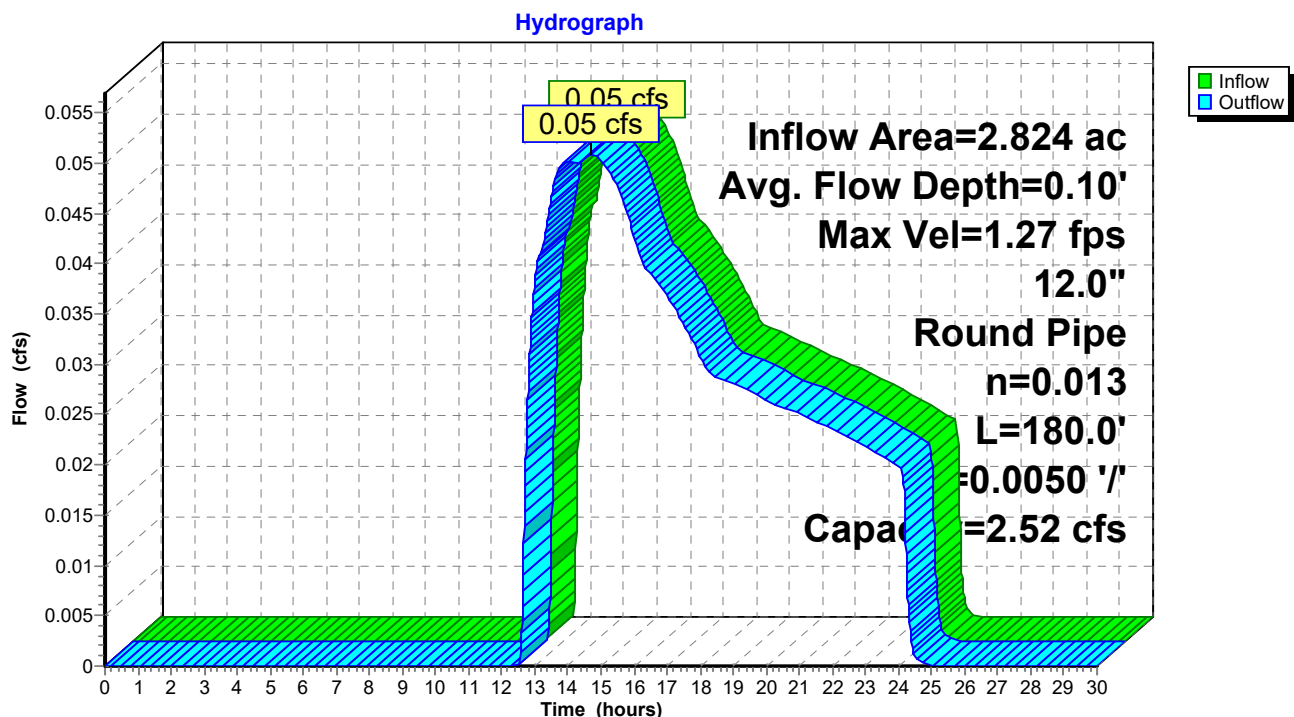
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.27 fps, Min. Travel Time= 2.4 min
 Avg. Velocity = 1.04 fps, Avg. Travel Time= 2.9 min

Peak Storage= 7 cf @ 14.66 hrs
 Average Depth at Peak Storage= 0.10' , Surface Width= 0.60'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 180.0' Slope= 0.0050 '/'
 Inlet Invert= 167.00', Outlet Invert= 166.10'



Reach 2R: Prop. Drain DMH 2 to DMH 3



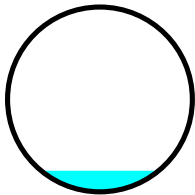
Summary for Reach 3R: Prop. Drain DMH 3 to DMH 4

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.14" for 10-year Storm event
 Inflow = 0.07 cfs @ 13.90 hrs, Volume= 0.043 af
 Outflow = 0.07 cfs @ 13.94 hrs, Volume= 0.043 af, Atten= 0%, Lag= 2.4 min
 Routed to Reach 4R : Prop Drain DMH 4 to DMH 5

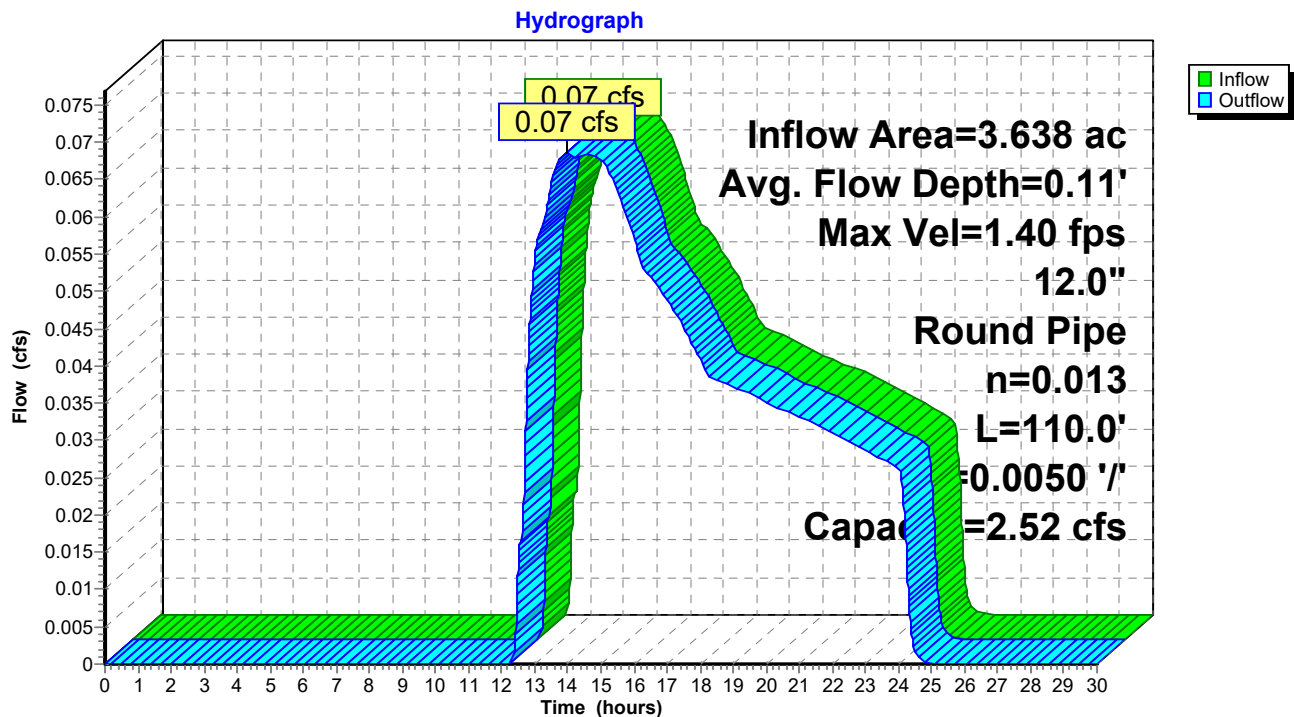
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.40 fps, Min. Travel Time= 1.3 min
 Avg. Velocity= 1.12 fps, Avg. Travel Time= 1.6 min

Peak Storage= 5 cf @ 13.92 hrs
 Average Depth at Peak Storage= 0.11' , Surface Width= 0.63'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 110.0' Slope= 0.0050 '/'
 Inlet Invert= 166.00', Outlet Invert= 165.45'



Reach 3R: Prop. Drain DMH 3 to DMH 4



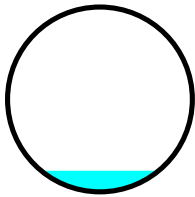
Summary for Reach 4R: Prop Drain DMH 4 to DMH 5

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.14" for 10-year Storm event
 Inflow = 0.07 cfs @ 13.94 hrs, Volume= 0.043 af
 Outflow = 0.07 cfs @ 13.95 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.6 min
 Routed to Pond 1P : Recharge System A

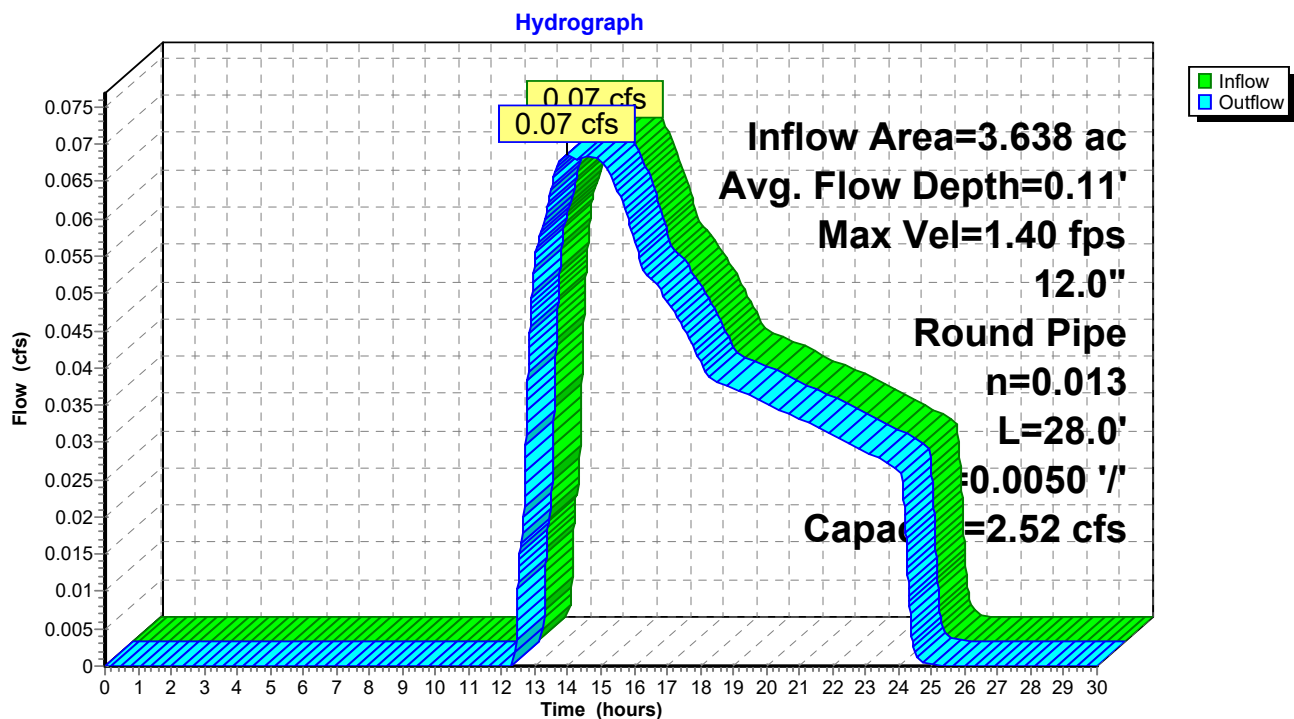
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.40 fps, Min. Travel Time= 0.3 min
 Avg. Velocity= 1.12 fps, Avg. Travel Time= 0.4 min

Peak Storage= 1 cf @ 13.95 hrs
 Average Depth at Peak Storage= 0.11' , Surface Width= 0.63'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 28.0' Slope= 0.0050 '/
 Inlet Invert= 165.35', Outlet Invert= 165.21'



Reach 4R: Prop Drain DMH 4 to DMH 5



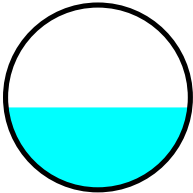
Summary for Reach 5R: Prop. Drain DMH x to DMH x

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 1.32" for 10-year Storm event
Inflow = 1.45 cfs @ 12.11 hrs, Volume= 0.117 af
Outflow = 1.45 cfs @ 12.11 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.3 min
Routed to Pond 3P : Recharge System C

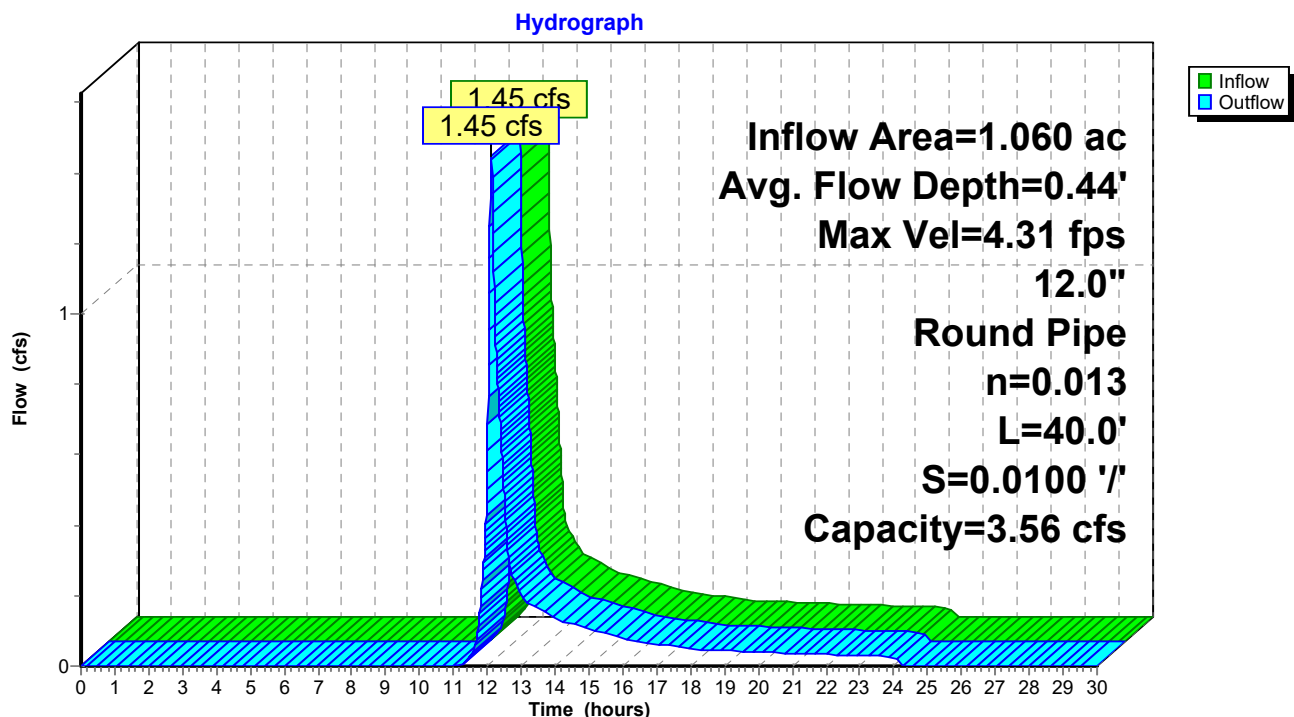
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.31 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 1.78 fps, Avg. Travel Time= 0.4 min

Peak Storage= 14 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.44' , Surface Width= 0.99'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.56 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 40.0' Slope= 0.0100 '/
Inlet Invert= 164.40', Outlet Invert= 164.00'



Reach 5R: Prop. Drain DMH x to DMH x

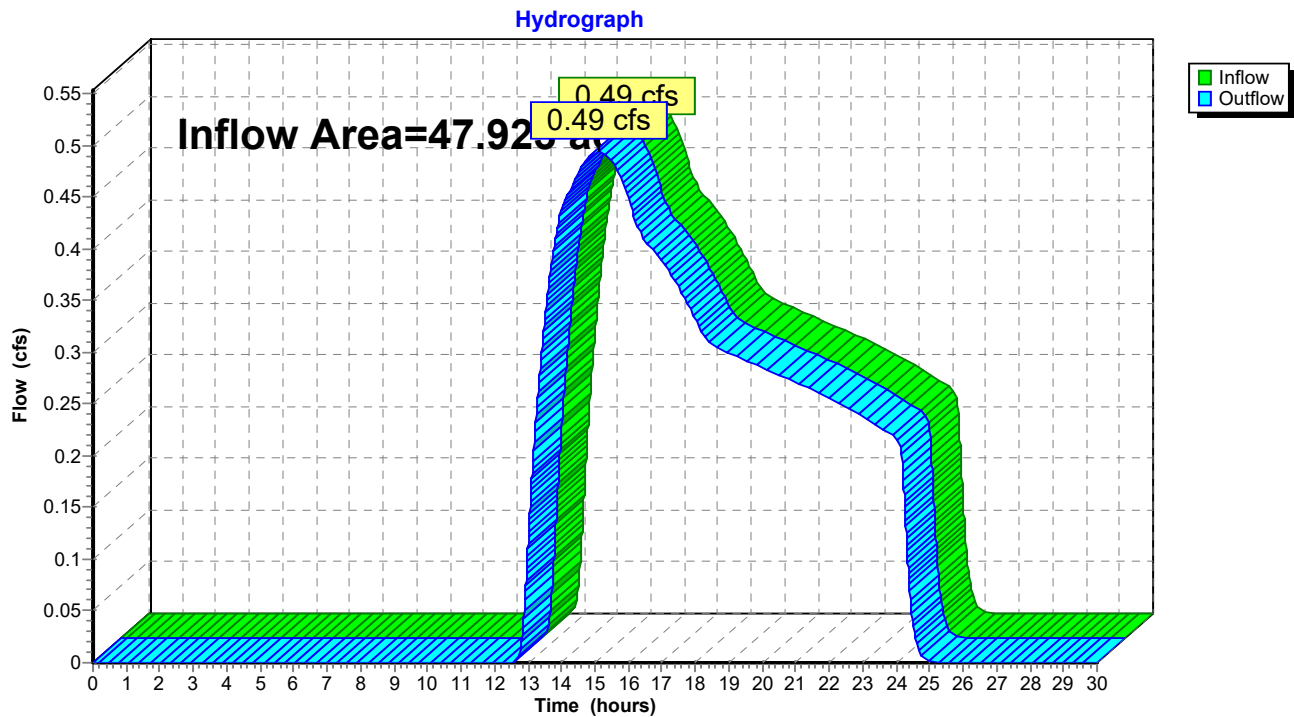


Summary for Reach DP: Design Point

Inflow Area = 47.923 ac, 7.45% Impervious, Inflow Depth = 0.08" for 10-year Storm event
Inflow = 0.49 cfs @ 15.12 hrs, Volume= 0.310 af
Outflow = 0.49 cfs @ 15.12 hrs, Volume= 0.310 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP: Design Point



Summary for Pond 1P: Recharge System A

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.14" for 10-year Storm event
 Inflow = 0.07 cfs @ 13.95 hrs, Volume= 0.043 af
 Outflow = 0.07 cfs @ 14.00 hrs, Volume= 0.043 af, Atten= 0%, Lag= 2.6 min
 Discarded = 0.07 cfs @ 14.00 hrs, Volume= 0.043 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.02' @ 14.00 hrs Surf.Area= 1,309 sf Storage= 10 cf

Plug-Flow detention time= 2.5 min calculated for 0.043 af (100% of inflow)
 Center-of-Mass det. time= 2.5 min (1,051.3 - 1,048.8)

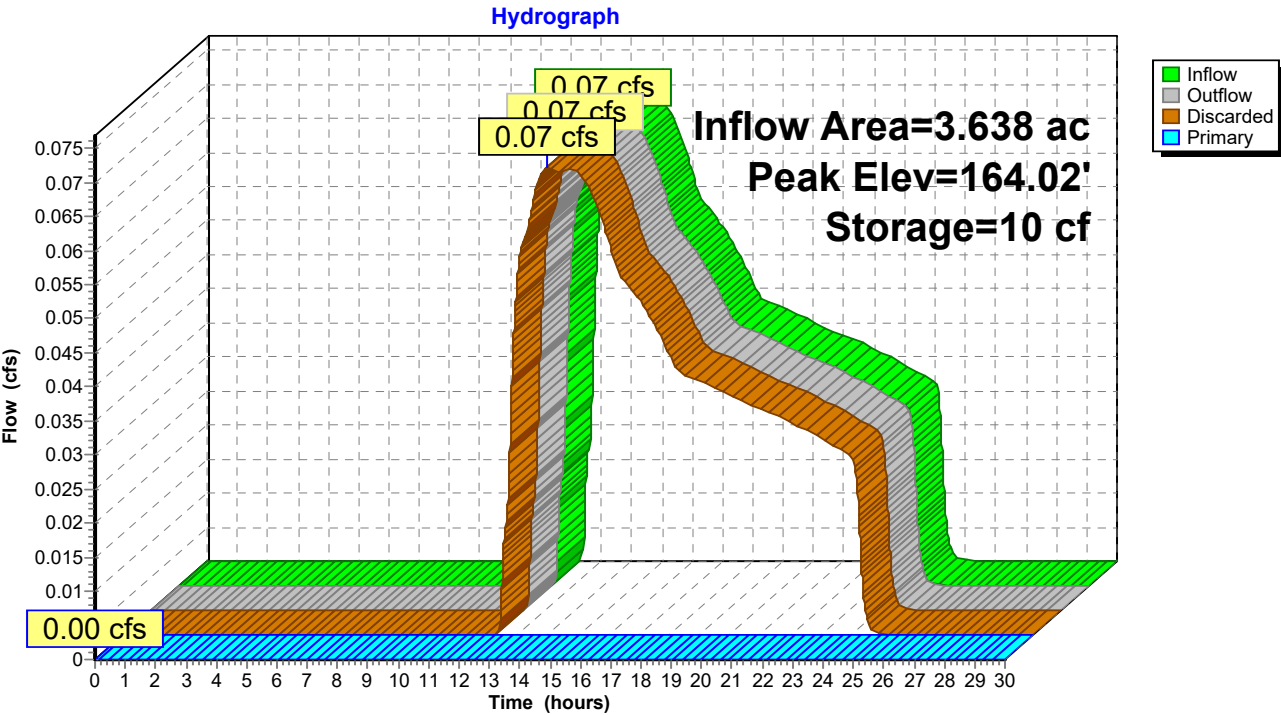
Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	1,608 cf	ADS_StormTech SC-740 b +Cap x 35 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	1,189 cf	25.25'W x 51.84'L x 3.50'H Prismatic 4,581 cf Overall - 1,608 cf Embedded = 2,973 cf x 40.0% Voids
		2,797 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	171.25'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.25 cfs @ 14.00 hrs HW=164.02' (Free Discharge)
 ↑1=Exfiltration (Controls 0.25 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 1P: Recharge System A



Summary for Pond 2P: Recharge System B

Inflow Area = 7.186 ac, 9.69% Impervious, Inflow Depth = 0.21" for 10-year Storm event
 Inflow = 0.32 cfs @ 12.47 hrs, Volume= 0.124 af
 Outflow = 0.31 cfs @ 12.49 hrs, Volume= 0.124 af, Atten= 1%, Lag= 1.6 min
 Discarded = 0.31 cfs @ 12.49 hrs, Volume= 0.124 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.02' @ 12.49 hrs Surf.Area= 3,257 sf Storage= 29 cf

Plug-Flow detention time= 1.5 min calculated for 0.124 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (1,005.2 - 1,003.7)

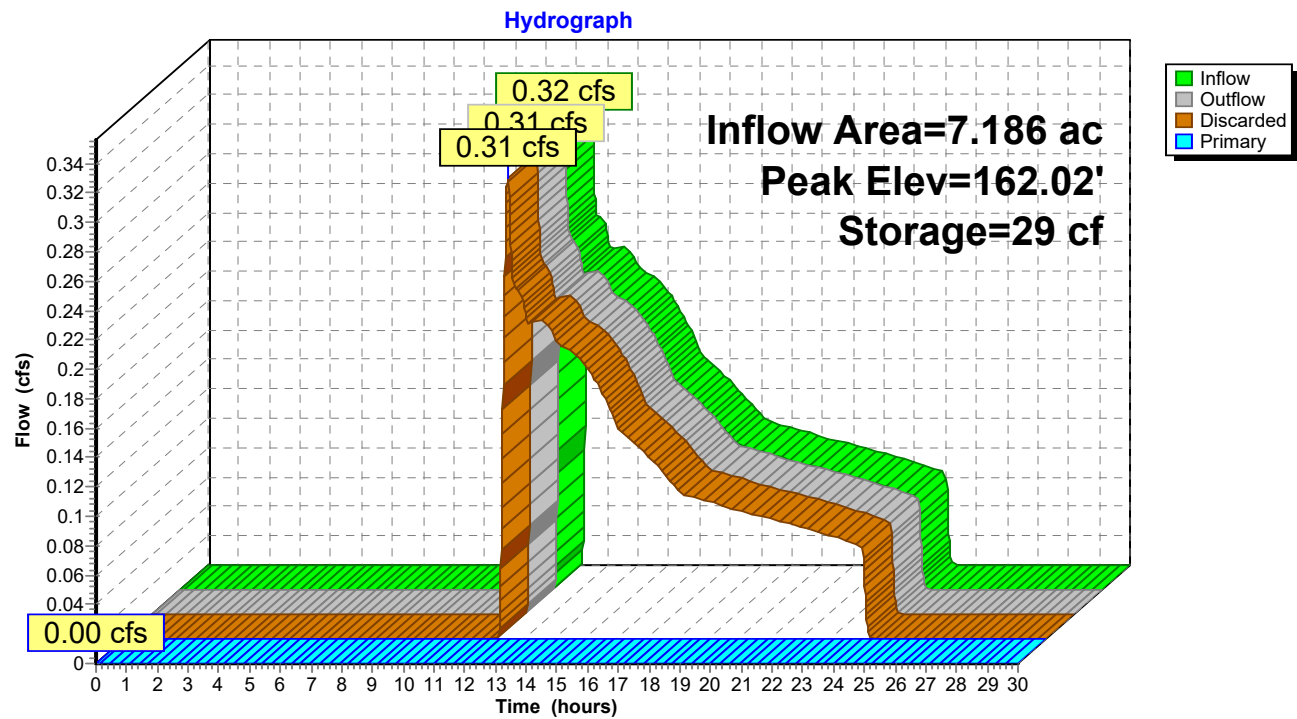
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	4,135 cf	ADS_StormTech SC-740 b +Cap x 90 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	2,907 cf	44.50"W x 73.20"L x 3.50'H Prismatic 11,401 cf Overall - 4,135 cf Embedded = 7,266 cf x 40.0% Voids
		7,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.63 cfs @ 12.49 hrs HW=162.02' (Free Discharge)
 ↑1=Exfiltration (Controls 0.63 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 2P: Recharge System B



Summary for Pond 3P: Recharge System C

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 1.32" for 10-year Storm event
 Inflow = 1.45 cfs @ 12.11 hrs, Volume= 0.117 af
 Outflow = 0.50 cfs @ 12.49 hrs, Volume= 0.117 af, Atten= 65%, Lag= 22.6 min
 Discarded = 0.50 cfs @ 12.49 hrs, Volume= 0.117 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.83' @ 12.49 hrs Surf.Area= 1,848 sf Storage= 877 cf

Plug-Flow detention time= 10.2 min calculated for 0.117 af (100% of inflow)
 Center-of-Mass det. time= 10.2 min (883.5 - 873.3)

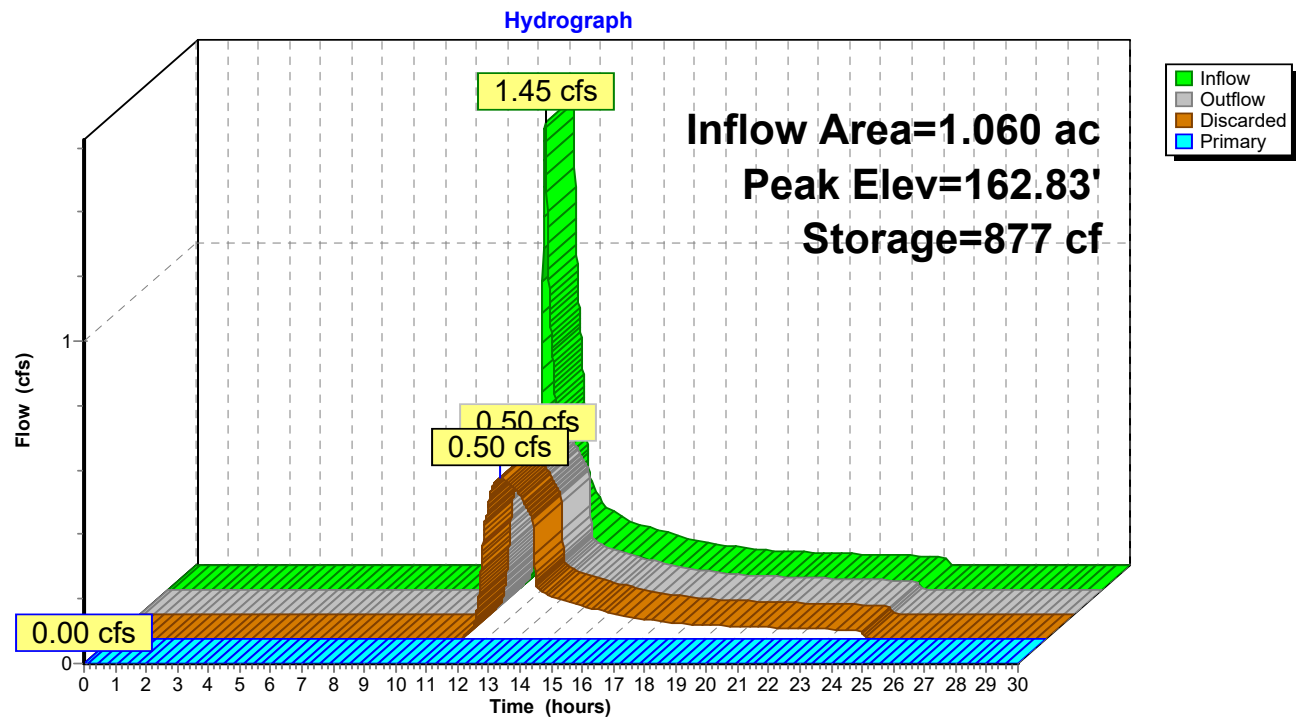
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	2,297 cf	ADS_StormTech SC-740 b +Cap x 50 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	1,669 cf	25.25'W x 73.20'L x 3.50'H Prismatic 6,469 cf Overall - 2,297 cf Embedded = 4,172 cf x 40.0% Voids
		3,966 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.50 cfs @ 12.49 hrs HW=162.83' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.50 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Recharge System C



Summary for Pond 4P: Recharge System D

Inflow Area = 1.273 ac, 41.36% Impervious, Inflow Depth = 1.39" for 10-year Storm event
 Inflow = 1.84 cfs @ 12.11 hrs, Volume= 0.147 af
 Outflow = 0.67 cfs @ 12.47 hrs, Volume= 0.147 af, Atten= 64%, Lag= 21.6 min
 Discarded = 0.67 cfs @ 12.47 hrs, Volume= 0.147 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.76' @ 12.47 hrs Surf.Area= 2,544 sf Storage= 1,050 cf

Plug-Flow detention time= 9.0 min calculated for 0.147 af (100% of inflow)
 Center-of-Mass det. time= 9.0 min (879.1 - 870.1)

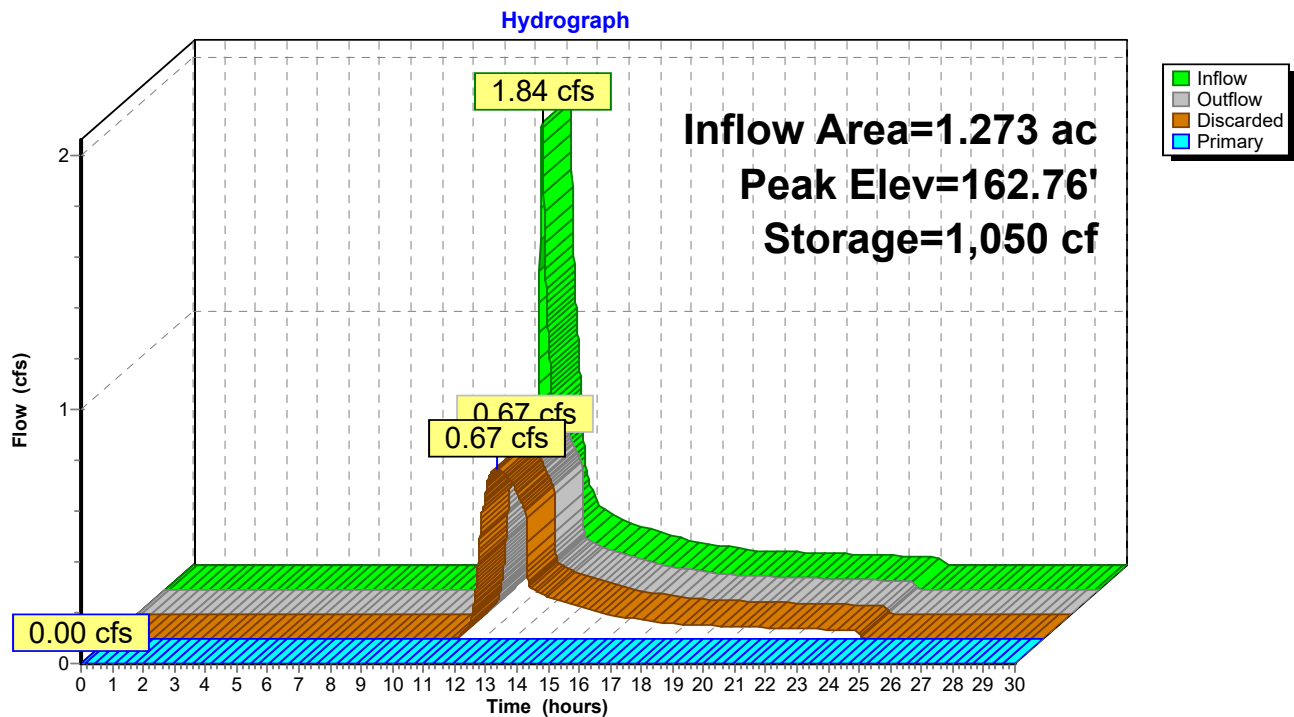
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	3,216 cf	ADS_StormTech SC-740 b +Cap x 70 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	2,275 cf	34.75"W x 73.20"L x 3.50'H Prismatic 8,903 cf Overall - 3,216 cf Embedded = 5,687 cf x 40.0% Voids
		5,491 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.67 cfs @ 12.47 hrs HW=162.76' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.67 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Recharge System D



Summary for Pond RAP1: Typical Roof Recharge Area 1

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth = 4.57" for 10-year Storm event
 Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af
 Outflow = 0.04 cfs @ 12.39 hrs, Volume= 0.011 af, Atten= 69%, Lag= 18.4 min
 Discarded = 0.04 cfs @ 12.39 hrs, Volume= 0.011 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.84' @ 12.39 hrs Surf.Area= 187 sf Storage= 82 cf

Plug-Flow detention time= 8.9 min calculated for 0.011 af (100% of inflow)
 Center-of-Mass det. time= 8.9 min (757.6 - 748.7)

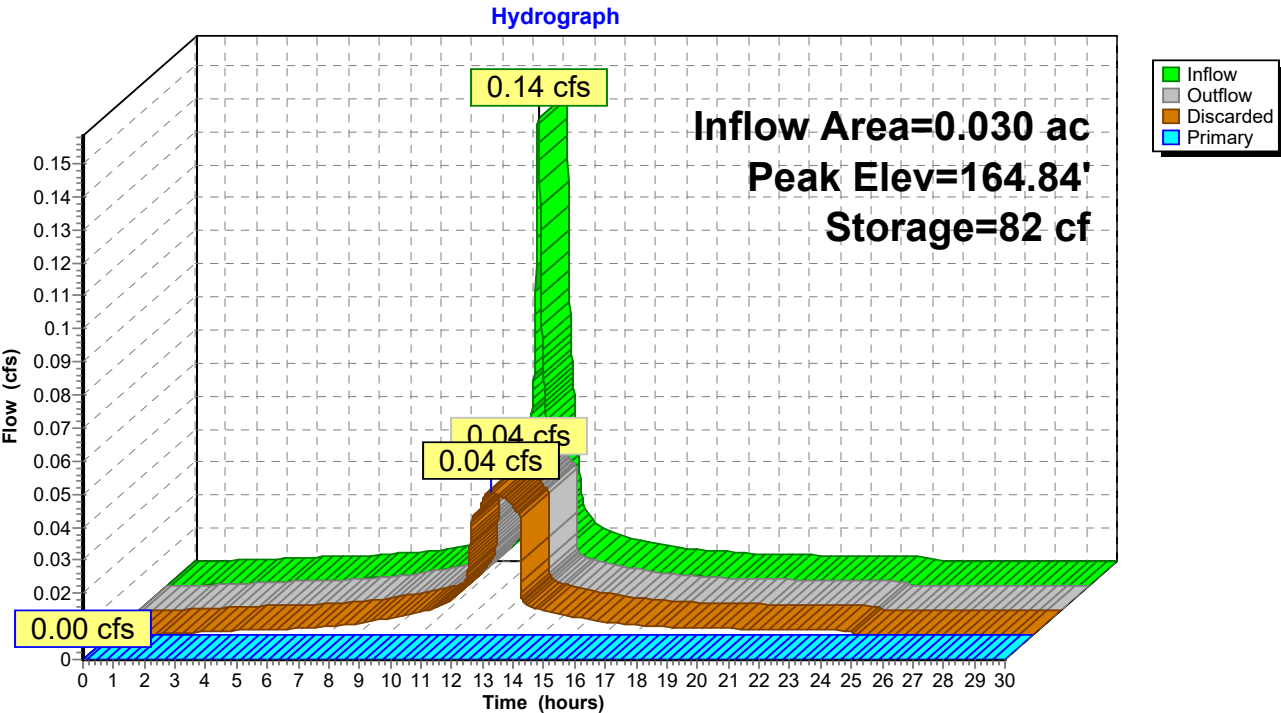
Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	88 cf	ADS_StormTech SC-310 x 6 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	139 cf	11.50'W x 16.24'L x 2.33'H Prismatic 435 cf Overall - 88 cf Embedded = 347 cf x 40.0% Voids
		227 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.39 hrs HW=164.84' (Free Discharge)
 ↑1=Exfiltration (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond RAP1: Typical Roof Recharge Area 1



Pleasant Street Dunstable Post-Development-2 Type III 24-hr 25-year Storm Rainfall=5.86"

Prepared by Haley Ward

Printed 9/11/2025

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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: Tributary Area to CB Runoff Area=123,030 sf 9.26% Impervious Runoff Depth=0.36"
Flow Length=230' Slope=0.0500 '/ Tc=6.0 min CN=38 Runoff=0.34 cfs 0.084 af

Subcatchment 2S: Tributary Area to CB 2A Runoff Area=35,455 sf 10.14% Impervious Runoff Depth=0.41"
Flow Length=120' Slope=0.0200 '/ Tc=6.0 min CN=39 Runoff=0.12 cfs 0.028 af

Subcatchment 3S: Tributary Area to CB 3A Runoff Area=97,380 sf 10.78% Impervious Runoff Depth=0.46"
Flow Length=95' Slope=0.0200 '/ Tc=6.5 min CN=40 Runoff=0.42 cfs 0.085 af

Subcatchment 4S: Tributary Area to CB 4A Runoff Area=166,140 sf 9.46% Impervious Runoff Depth=0.51"
Flow Length=100' Slope=0.0200 '/ Tc=6.5 min CN=41 Runoff=0.87 cfs 0.163 af

Subcatchment 5S: Tributary Area to CB 5A Runoff Area=49,501 sf 8.35% Impervious Runoff Depth=0.41"
Flow Length=105' Slope=0.0200 '/ Tc=6.6 min CN=39 Runoff=0.17 cfs 0.038 af

Subcatchment 6S: Tributary Area to CB Runoff Area=46,170 sf 39.30% Impervious Runoff Depth=2.00"
Flow Length=215' Slope=0.0200 '/ Tc=6.8 min CN=62 Runoff=2.30 cfs 0.176 af

Subcatchment 7S: Tributary Area to CB 7A Runoff Area=55,449 sf 41.36% Impervious Runoff Depth=2.08"
Flow Length=266' Slope=0.0200 '/ Tc=7.1 min CN=63 Runoff=2.87 cfs 0.221 af

Subcatchment 8S: Remaining Area Runoff Area=1,514,422 sf 4.56% Impervious Runoff Depth=0.31"
Flow Length=1,285' Tc=23.5 min CN=37 Runoff=2.32 cfs 0.896 af

Subcatchment RA1: Typical Roof Area Runoff Area=1,310 sf 100.00% Impervious Runoff Depth=5.62"
Tc=6.0 min CN=98 Runoff=0.17 cfs 0.014 af

Reach 1R: Prop. Drain DMH 1 to DMH 2 Avg. Flow Depth=0.25' Max Vel=2.23 fps Inflow=0.34 cfs 0.084 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.34 cfs 0.084 af

Reach 2R: Prop. Drain DMH 2 to DMH 3 Avg. Flow Depth=0.25' Max Vel=2.23 fps Inflow=0.34 cfs 0.084 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.34 cfs 0.084 af

Reach 3R: Prop. Drain DMH 3 to DMH 4 Avg. Flow Depth=0.29' Max Vel=2.42 fps Inflow=0.45 cfs 0.111 af
12.0" Round Pipe n=0.013 L=110.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.45 cfs 0.111 af

Reach 4R: Prop Drain DMH 4 to DMH 5 Avg. Flow Depth=0.29' Max Vel=2.42 fps Inflow=0.45 cfs 0.111 af
12.0" Round Pipe n=0.013 L=28.0' S=0.0050 '/ Capacity=2.52 cfs Outflow=0.45 cfs 0.111 af

Reach 5R: Prop. Drain DMH x to DMH x Avg. Flow Depth=0.59' Max Vel=4.82 fps Inflow=2.30 cfs 0.176 af
12.0" Round Pipe n=0.013 L=40.0' S=0.0100 '/ Capacity=3.56 cfs Outflow=2.30 cfs 0.176 af

Reach DP: Design Point Inflow=2.32 cfs 0.896 af
Outflow=2.32 cfs 0.896 af

Pond 1P: Recharge System A Peak Elev=164.37' Storage=195 cf Inflow=0.45 cfs 0.111 af
Discarded=0.27 cfs 0.111 af Primary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.111 af

Pleasant Street Dunstable Post-Development-2 Type III 24-hr 25-year Storm Rainfall=5.86"

Prepared by Haley Ward

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Pond 2P: Recharge System B

Peak Elev=162.58' Storage=879 cf Inflow=1.46 cfs 0.286 af
Discarded=0.81 cfs 0.286 af Primary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.286 af

Pond 3P: Recharge System C

Peak Elev=163.46' Storage=1,797 cf Inflow=2.30 cfs 0.176 af
Discarded=0.61 cfs 0.176 af Primary=0.00 cfs 0.000 af Outflow=0.61 cfs 0.176 af

Pond 4P: Recharge System D

Peak Elev=163.30' Storage=2,166 cf Inflow=2.87 cfs 0.221 af
Discarded=0.80 cfs 0.221 af Primary=0.00 cfs 0.000 af Outflow=0.80 cfs 0.221 af

Pond RAP1: Typical Roof Recharge Area 1

Peak Elev=165.12' Storage=119 cf Inflow=0.17 cfs 0.014 af
Discarded=0.05 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.014 af

Total Runoff Area = 47.954 ac Runoff Volume = 1.705 af Average Runoff Depth = 0.43"
92.50% Pervious = 44.355 ac 7.50% Impervious = 3.599 ac

Summary for Subcatchment 1S: Tributary Area to CB 1A-1B

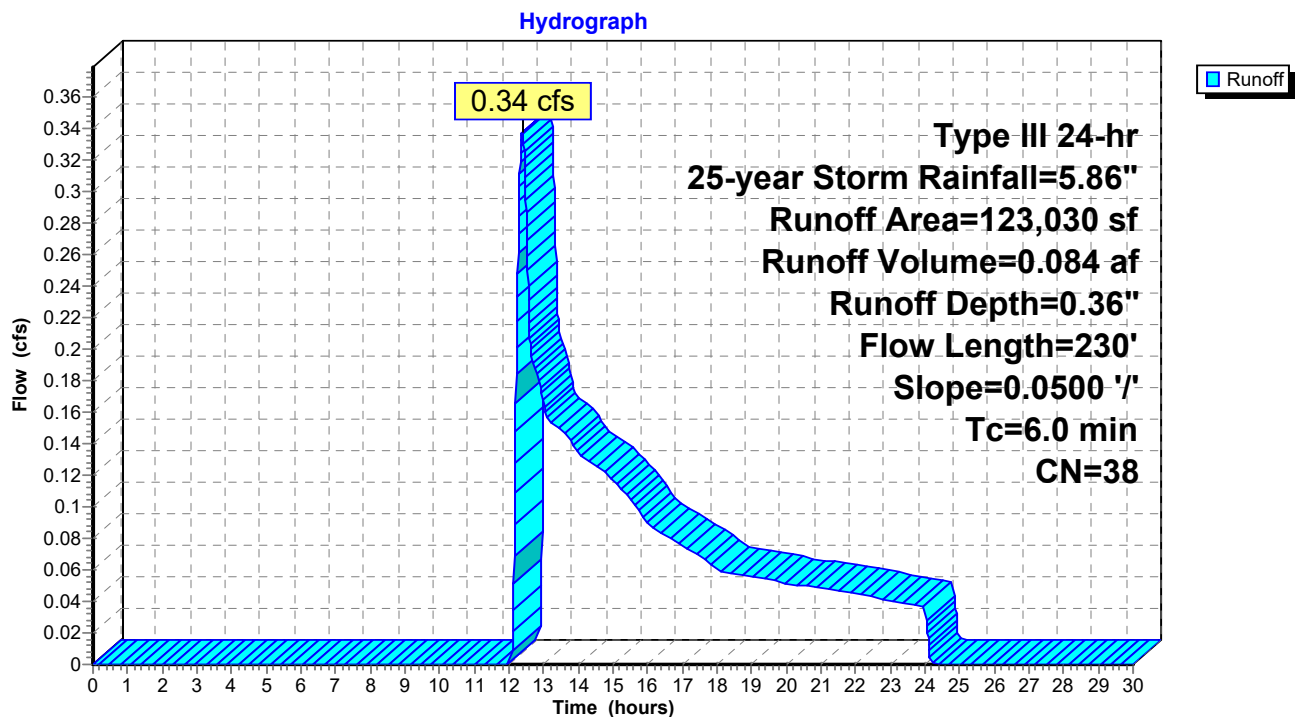
Runoff = 0.34 cfs @ 12.38 hrs, Volume= 0.084 af, Depth= 0.36"
 Routed to Reach 1R : Prop. Drain DMH 1 to DMH 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
* 11,387	98	Roadway, driveways, sidewalks
111,643	32	Woods/grass comb., Good, HSG A
123,030	38	Weighted Average
111,643		90.74% Pervious Area
11,387		9.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0500	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.7	180	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.7	230	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: Tributary Area to CB 1A-1B



Summary for Subcatchment 2S: Tributary Area to CB 2A & 2B

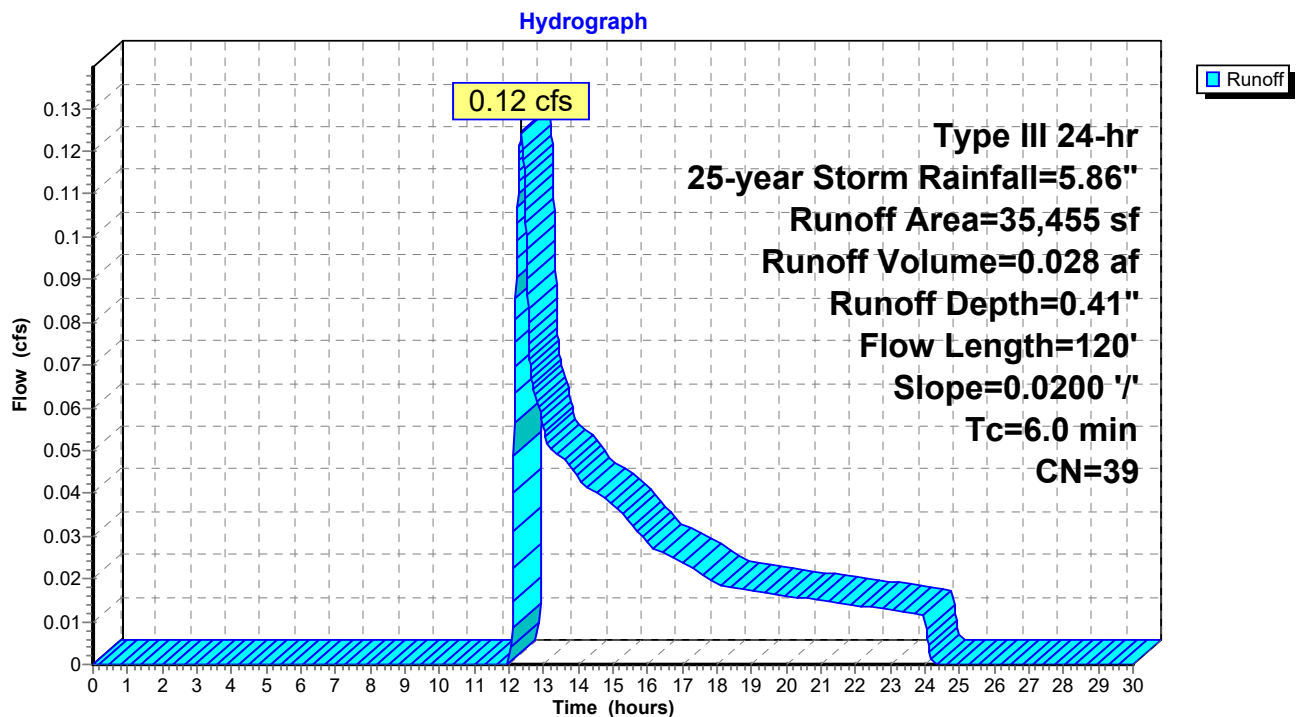
Runoff = 0.12 cfs @ 12.36 hrs, Volume= 0.028 af, Depth= 0.41"
 Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
3,595	98	Paved roads w/curbs & sewers, HSG A
31,860	32	Woods/grass comb., Good, HSG A
35,455	39	Weighted Average
31,860		89.86% Pervious Area
3,595		10.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.12"
0.4	70	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Tributary Area to CB 2A & 2B



Summary for Subcatchment 3S: Tributary Area to CB 3A & 3B

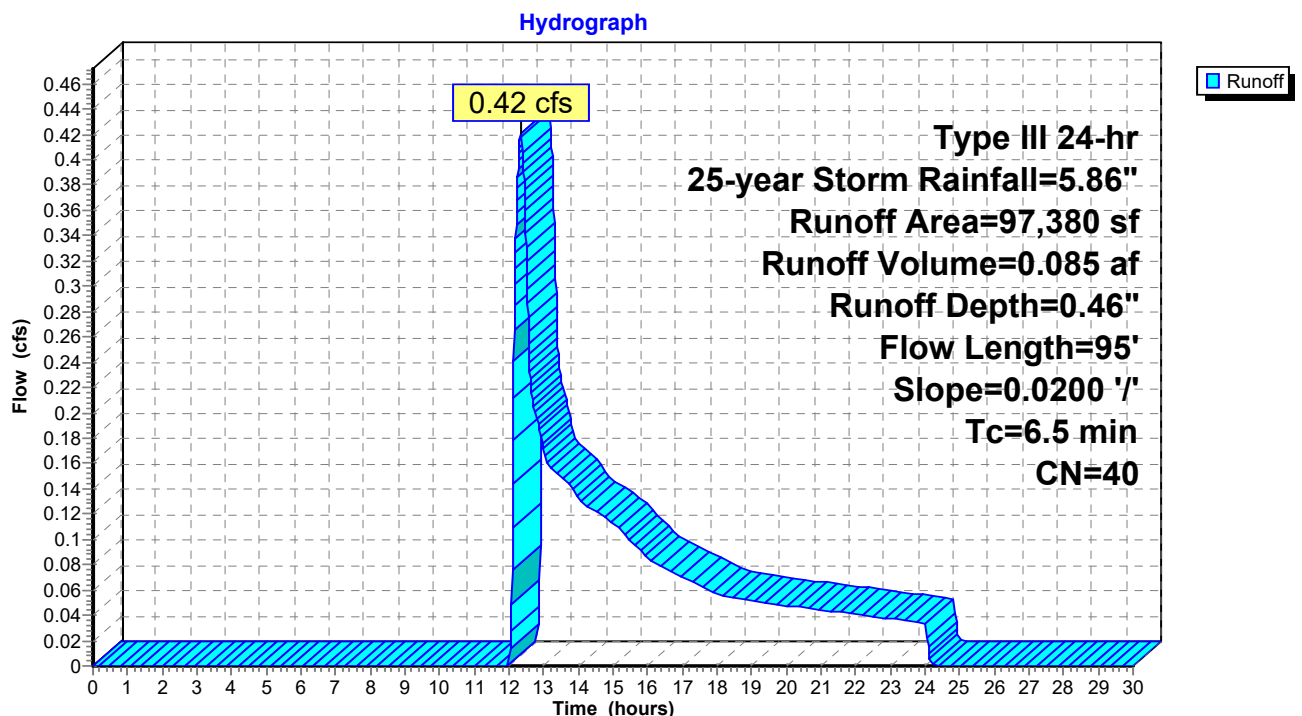
Runoff = 0.42 cfs @ 12.34 hrs, Volume= 0.085 af, Depth= 0.46"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
10,499	98	Paved parking, HSG A
15,431	39	>75% Grass cover, Good, HSG A
71,450	32	Woods/grass comb., Good, HSG A
97,380	40	Weighted Average
86,881		89.22% Pervious Area
10,499		10.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	45	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	95	Total			

Subcatchment 3S: Tributary Area to CB 3A & 3B



Summary for Subcatchment 4S: Tributary Area to CB 4A & 4B

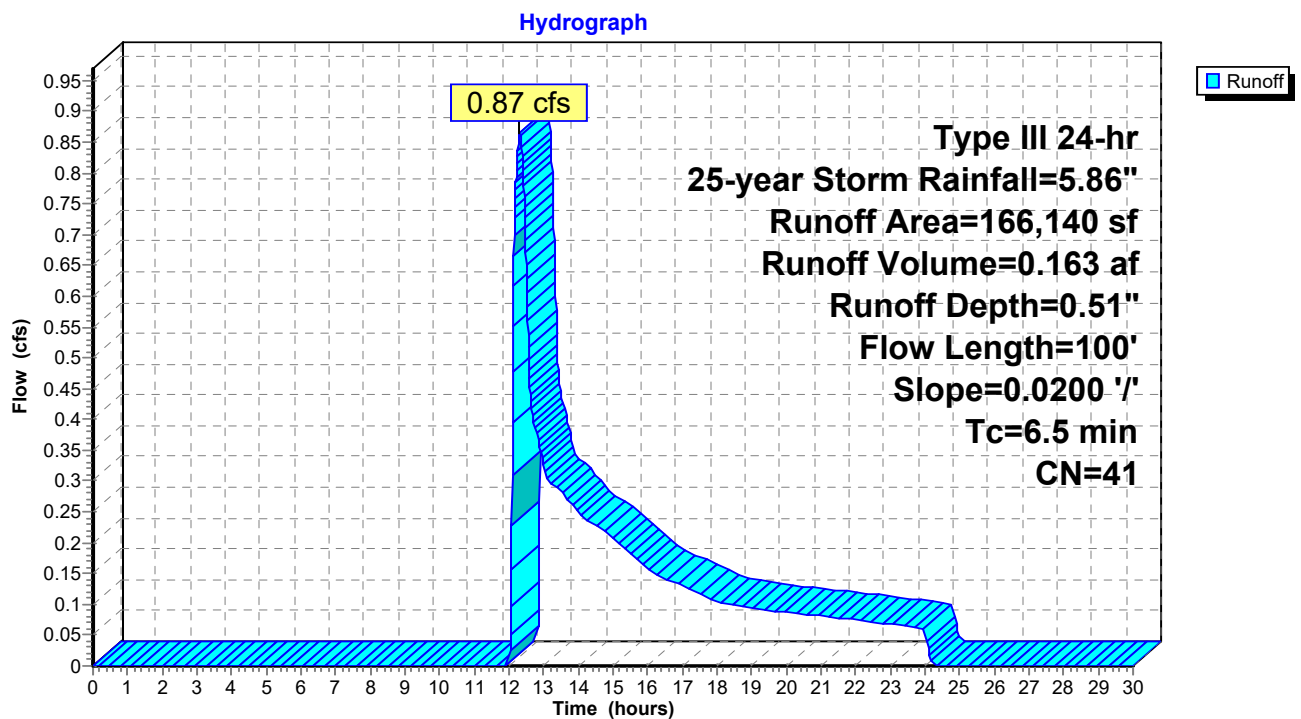
Runoff = 0.87 cfs @ 12.31 hrs, Volume= 0.163 af, Depth= 0.51"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
15,714	98	Paved roads w/curbs & sewers, HSG A
54,686	39	>75% Grass cover, Good, HSG A
95,740	32	Woods/grass comb., Good, HSG A
166,140	41	Weighted Average
150,426		90.54% Pervious Area
15,714		9.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	100	Total			

Subcatchment 4S: Tributary Area to CB 4A & 4B



Summary for Subcatchment 5S: Tributary Area to CB 5A & 5B

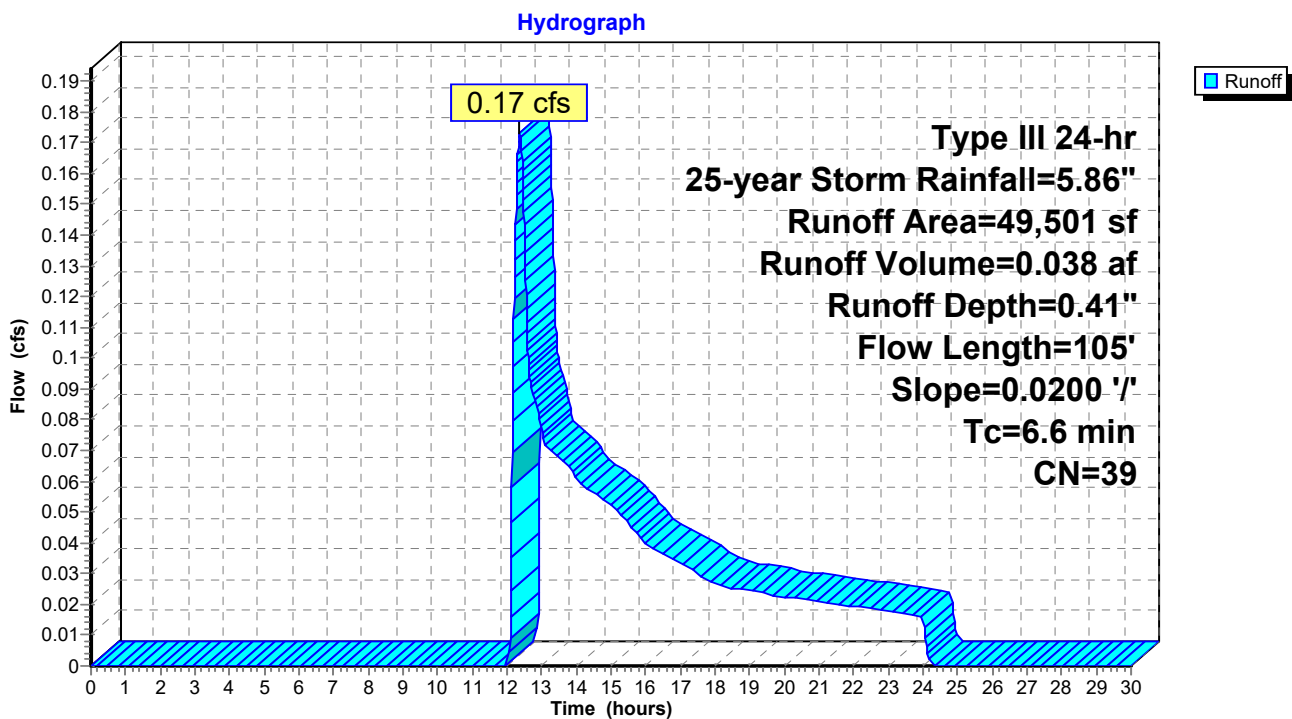
Runoff = 0.17 cfs @ 12.37 hrs, Volume= 0.038 af, Depth= 0.41"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
4,134	98	Paved roads w/curbs & sewers, HSG A
9,382	39	>75% Grass cover, Good, HSG A
35,985	32	Woods/grass comb., Good, HSG A
49,501	39	Weighted Average
45,367		91.65% Pervious Area
4,134		8.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.9	55	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.6	105	Total			

Subcatchment 5S: Tributary Area to CB 5A & 5B



Summary for Subcatchment 6S: Tributary Area to CB 6A-6B

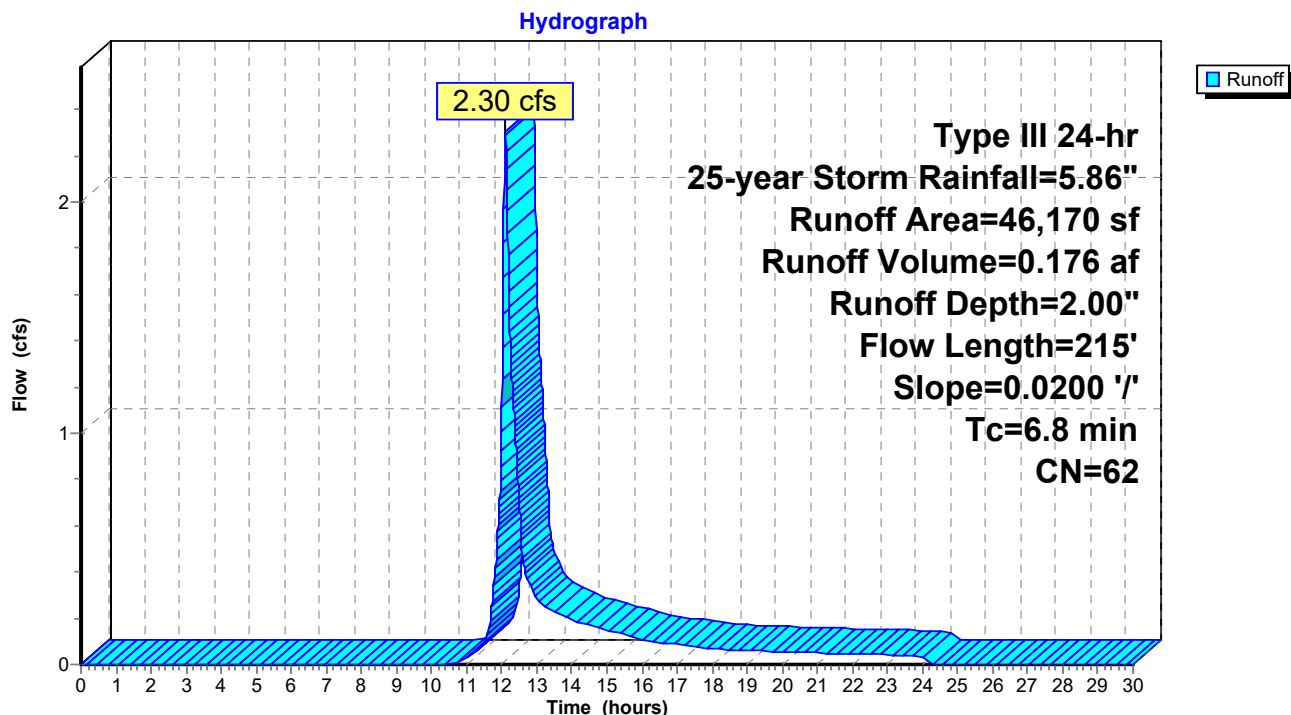
Runoff = 2.30 cfs @ 12.11 hrs, Volume= 0.176 af, Depth= 2.00"
 Routed to Reach 5R : Prop. Drain DMH x to DMH x

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
18,144	98	Paved roads w/curbs & sewers, HSG A
28,026	39	>75% Grass cover, Good, HSG A
46,170	62	Weighted Average
28,026		60.70% Pervious Area
18,144		39.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.6	80	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.8	215	Total			

Subcatchment 6S: Tributary Area to CB 6A-6B



Summary for Subcatchment 7S: Tributary Area to CB 7A & 7B

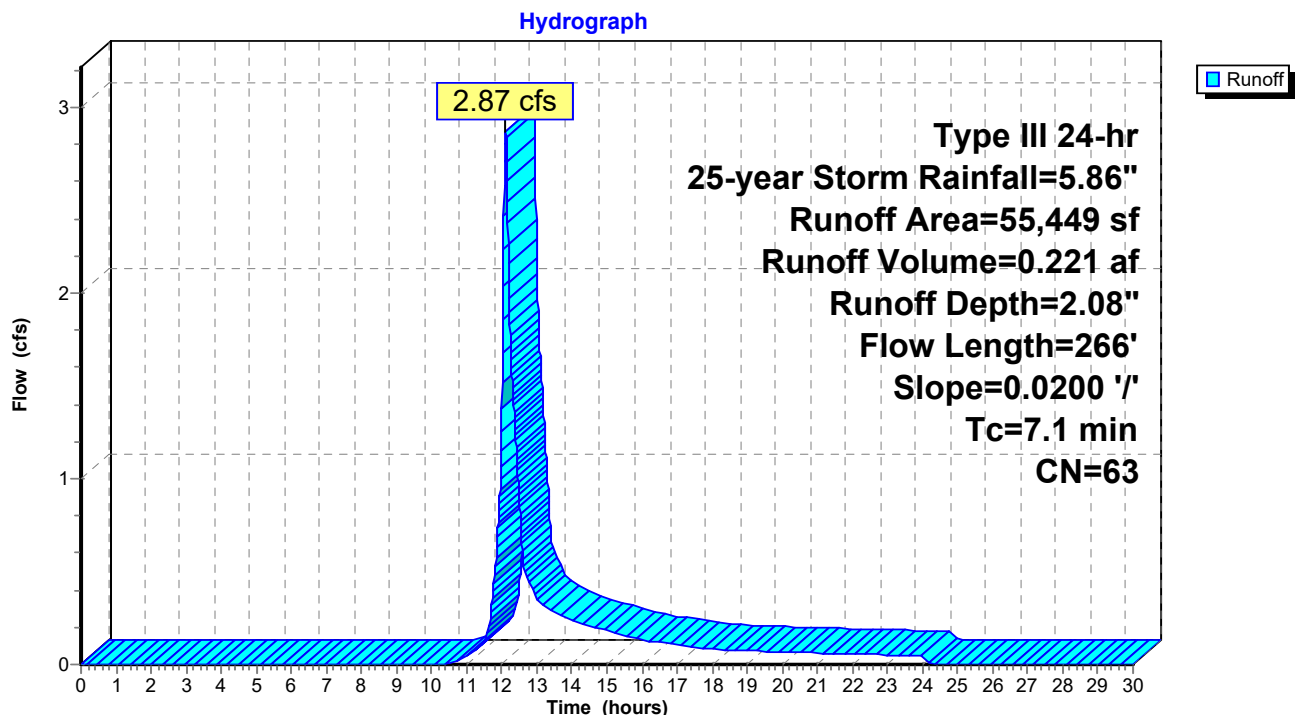
Runoff = 2.87 cfs @ 12.11 hrs, Volume= 0.221 af, Depth= 2.08"
 Routed to Pond 4P : Recharge System D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
22,933	98	Paved roads w/curbs & sewers, HSG A
32,516	39	>75% Grass cover, Good, HSG A
55,449	63	Weighted Average
32,516		58.64% Pervious Area
22,933		41.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.5	66	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	150	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.1	266	Total			

Subcatchment 7S: Tributary Area to CB 7A & 7B



Summary for Subcatchment 8S: Remaining Area Tributary to Design Point

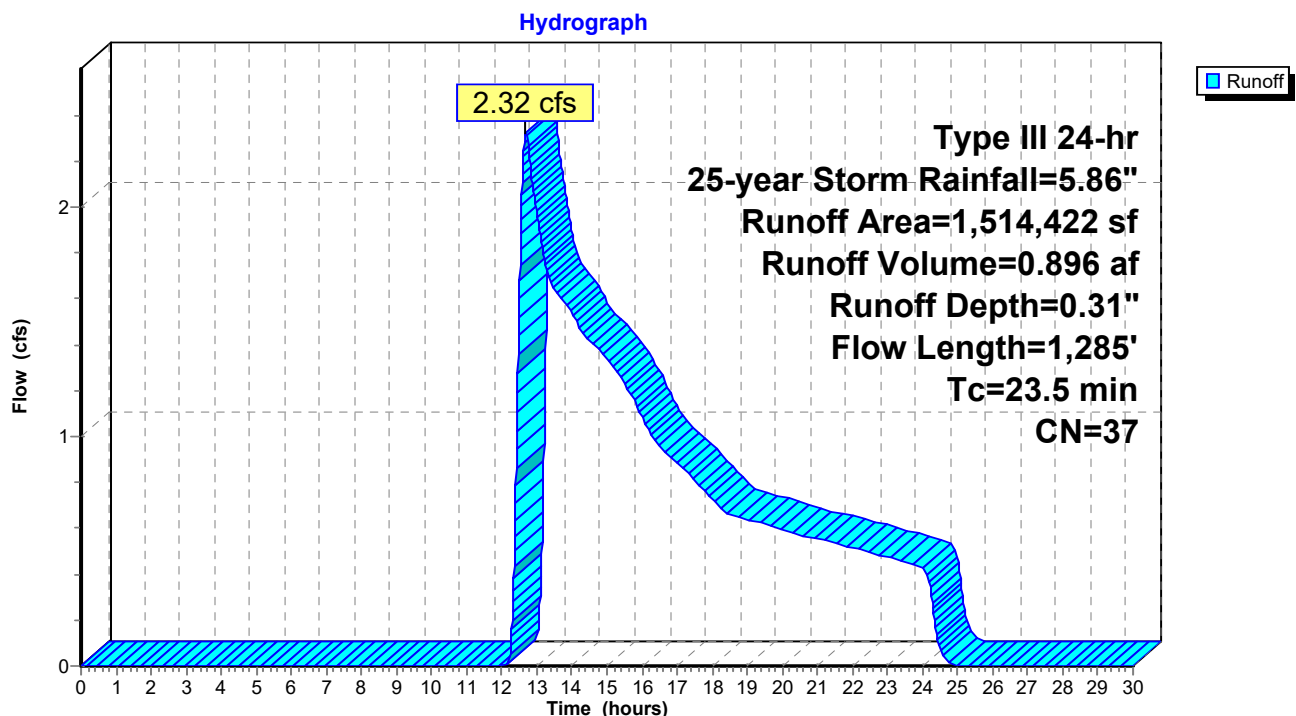
Runoff = 2.32 cfs @ 12.69 hrs, Volume= 0.896 af, Depth= 0.31"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description
575,400	46	2 acre lots, 12% imp, HSG A
111,580	49	50-75% Grass cover, Fair, HSG A
827,442	30	Woods, Good, HSG A
1,514,422	37	Weighted Average
1,445,374		95.44% Pervious Area
69,048		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Remaining Area Tributary to Design Point



Summary for Subcatchment RA1: Typical Roof Area

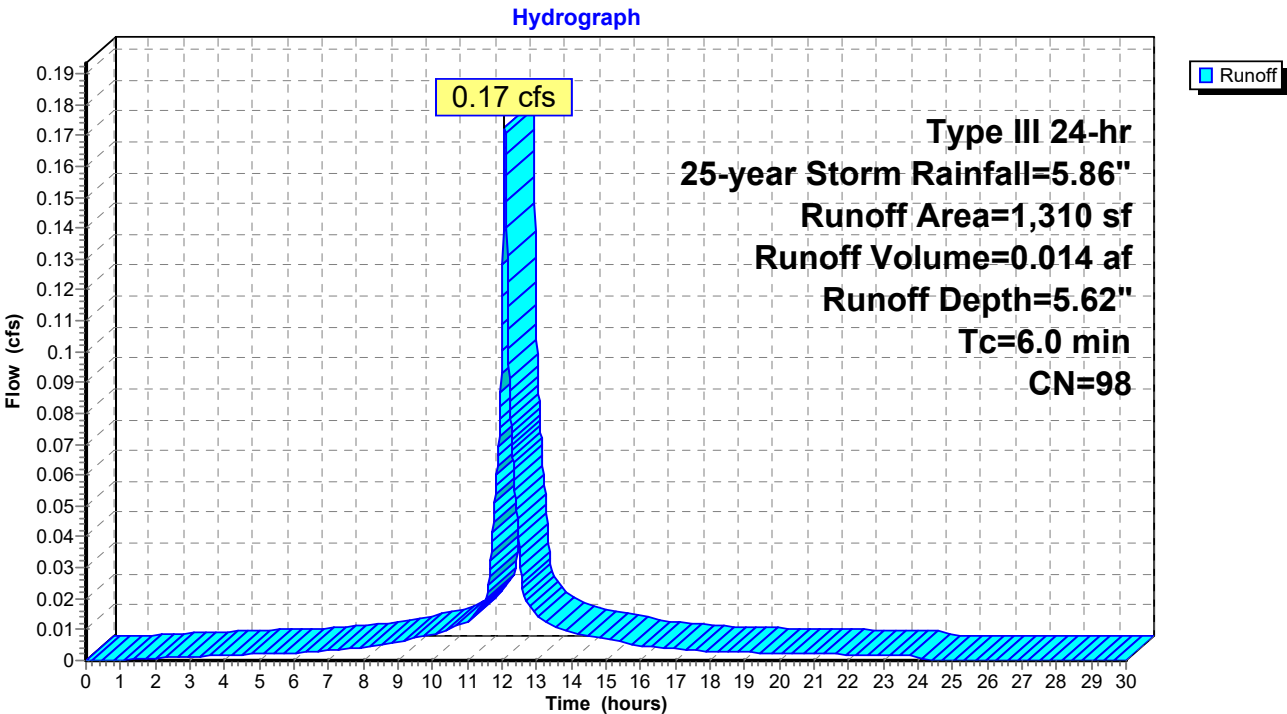
Runoff = 0.17 cfs @ 12.08 hrs, Volume= 0.014 af, Depth= 5.62"
Routed to Pond RAP1 : Typical Roof Recharge Area 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Storm Rainfall=5.86"

Area (sf)	CN	Description			
1,310	98	Roof Area			
1,310		100.00% Impervious Area			

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

Subcatchment RA1: Typical Roof Area



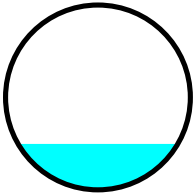
Summary for Reach 1R: Prop. Drain DMH 1 to DMH 2

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.36" for 25-year Storm event
 Inflow = 0.34 cfs @ 12.38 hrs, Volume= 0.084 af
 Outflow = 0.34 cfs @ 12.42 hrs, Volume= 0.084 af, Atten= 0%, Lag= 2.4 min
 Routed to Reach 2R : Prop. Drain DMH 2 to DMH 3

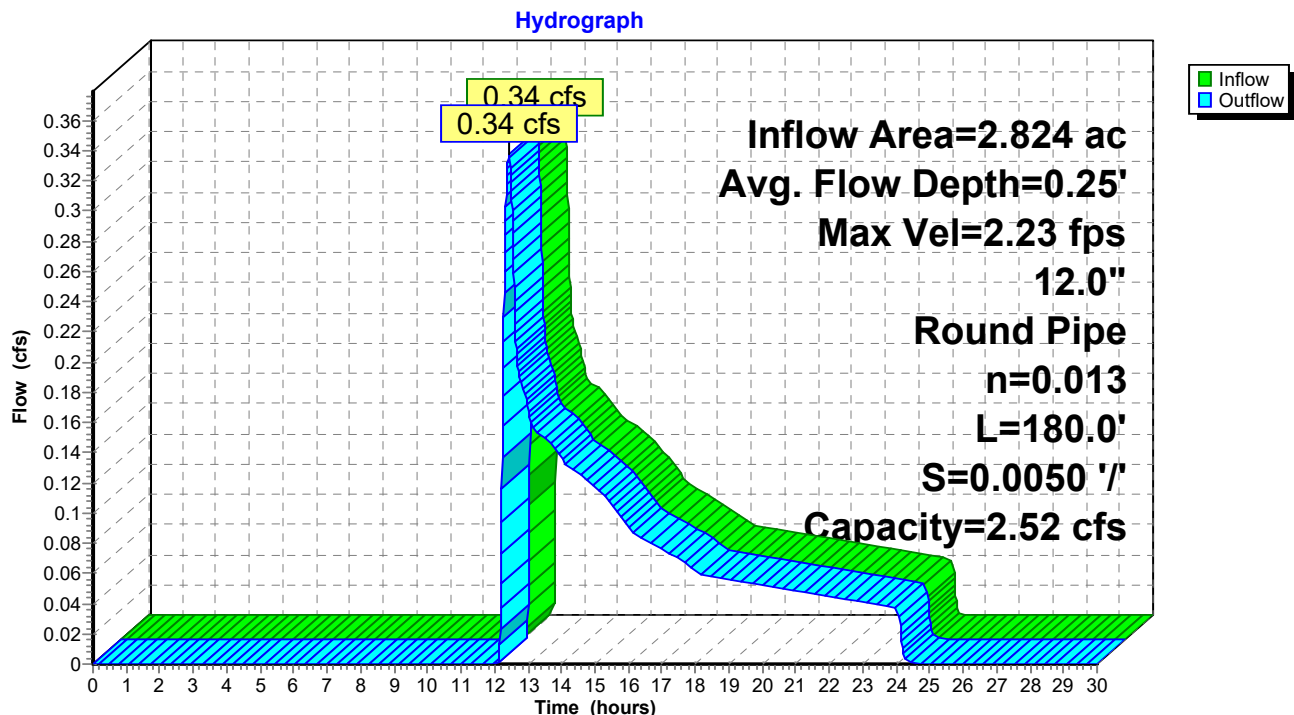
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.23 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 1.37 fps, Avg. Travel Time= 2.2 min

Peak Storage= 27 cf @ 12.40 hrs
 Average Depth at Peak Storage= 0.25' , Surface Width= 0.86'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 180.0' Slope= 0.0050 '/'
 Inlet Invert= 168.00', Outlet Invert= 167.10'



Reach 1R: Prop. Drain DMH 1 to DMH 2



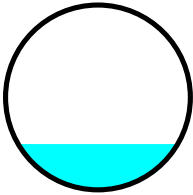
Summary for Reach 2R: Prop. Drain DMH 2 to DMH 3

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.36" for 25-year Storm event
 Inflow = 0.34 cfs @ 12.42 hrs, Volume= 0.084 af
 Outflow = 0.34 cfs @ 12.46 hrs, Volume= 0.084 af, Atten= 0%, Lag= 2.3 min
 Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

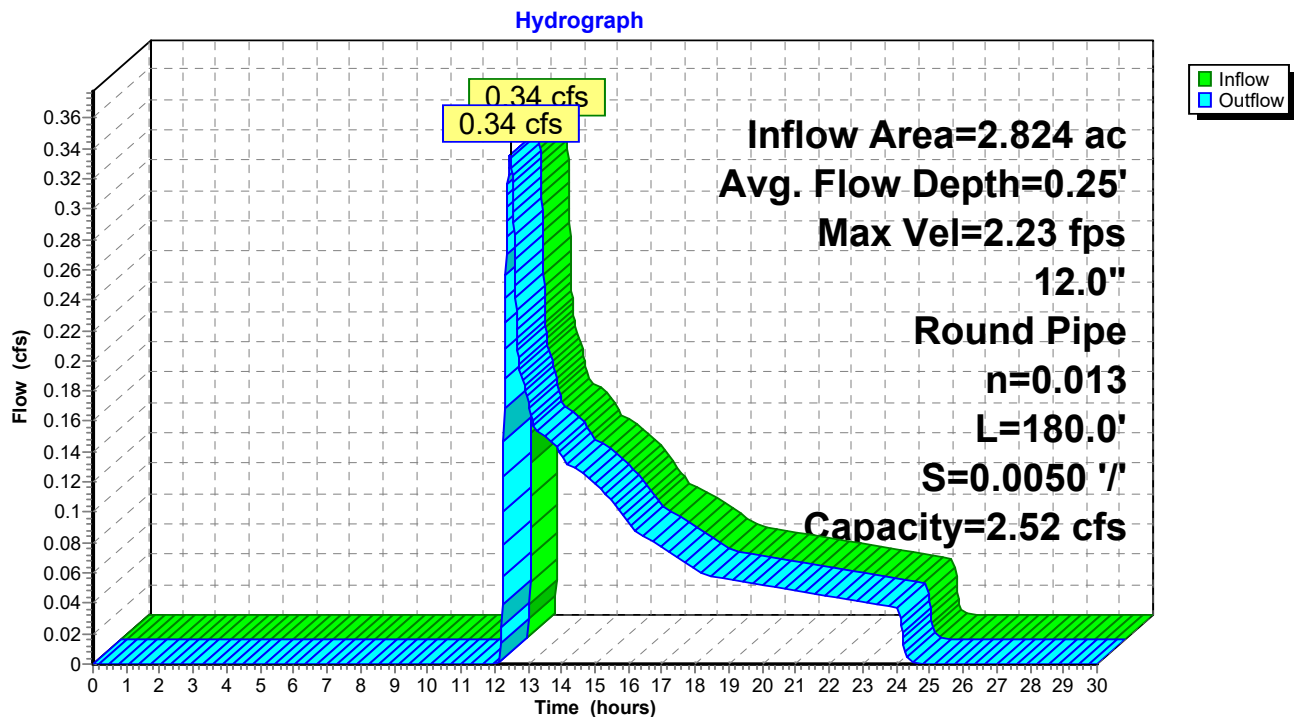
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.23 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 1.35 fps, Avg. Travel Time= 2.2 min

Peak Storage= 27 cf @ 12.44 hrs
 Average Depth at Peak Storage= 0.25' , Surface Width= 0.86'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 180.0' Slope= 0.0050 '/'
 Inlet Invert= 167.00', Outlet Invert= 166.10'



Reach 2R: Prop. Drain DMH 2 to DMH 3



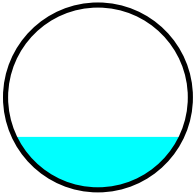
Summary for Reach 3R: Prop. Drain DMH 3 to DMH 4

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.37" for 25-year Storm event
 Inflow = 0.45 cfs @ 12.44 hrs, Volume= 0.111 af
 Outflow = 0.45 cfs @ 12.46 hrs, Volume= 0.111 af, Atten= 0%, Lag= 1.3 min
 Routed to Reach 4R : Prop Drain DMH 4 to DMH 5

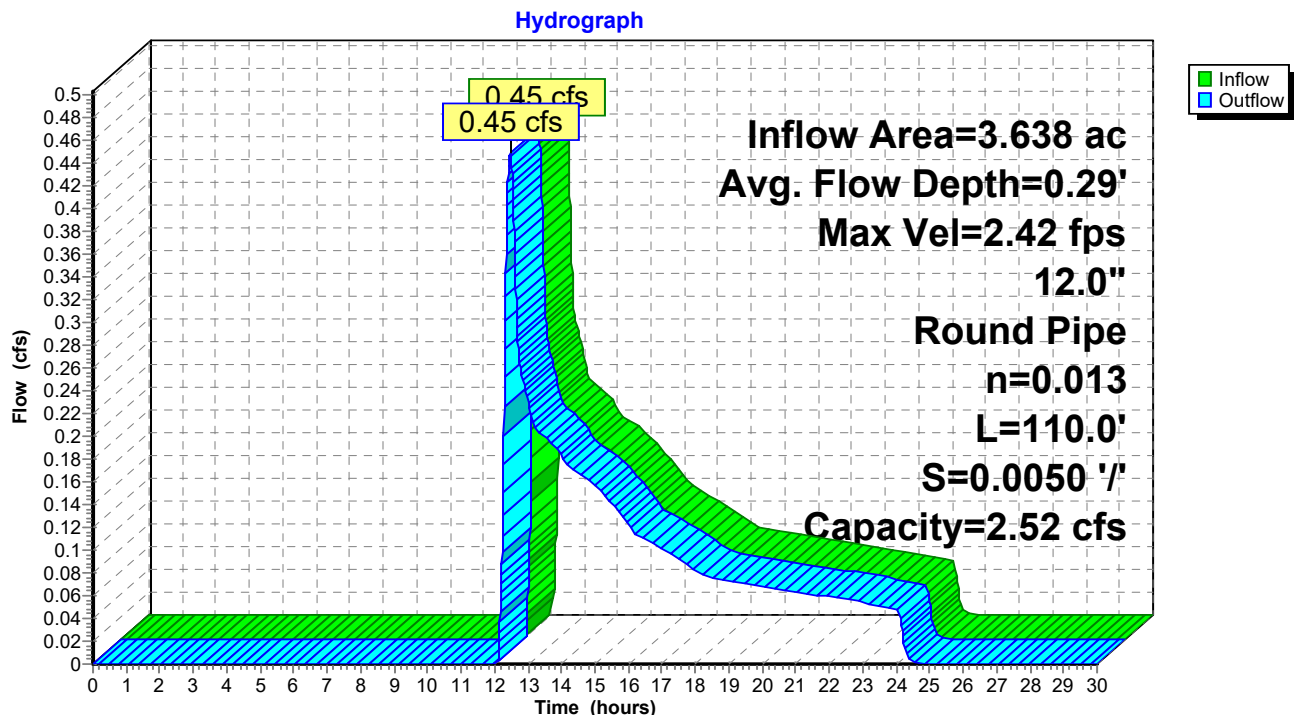
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.42 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 1.45 fps, Avg. Travel Time= 1.3 min

Peak Storage= 20 cf @ 12.45 hrs
 Average Depth at Peak Storage= 0.29' , Surface Width= 0.90'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013
 Length= 110.0' Slope= 0.0050 '/'
 Inlet Invert= 166.00', Outlet Invert= 165.45'



Reach 3R: Prop. Drain DMH 3 to DMH 4



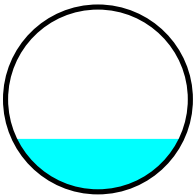
Summary for Reach 4R: Prop Drain DMH 4 to DMH 5

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.37" for 25-year Storm event
 Inflow = 0.45 cfs @ 12.46 hrs, Volume= 0.111 af
 Outflow = 0.45 cfs @ 12.47 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.3 min
 Routed to Pond 1P : Recharge System A

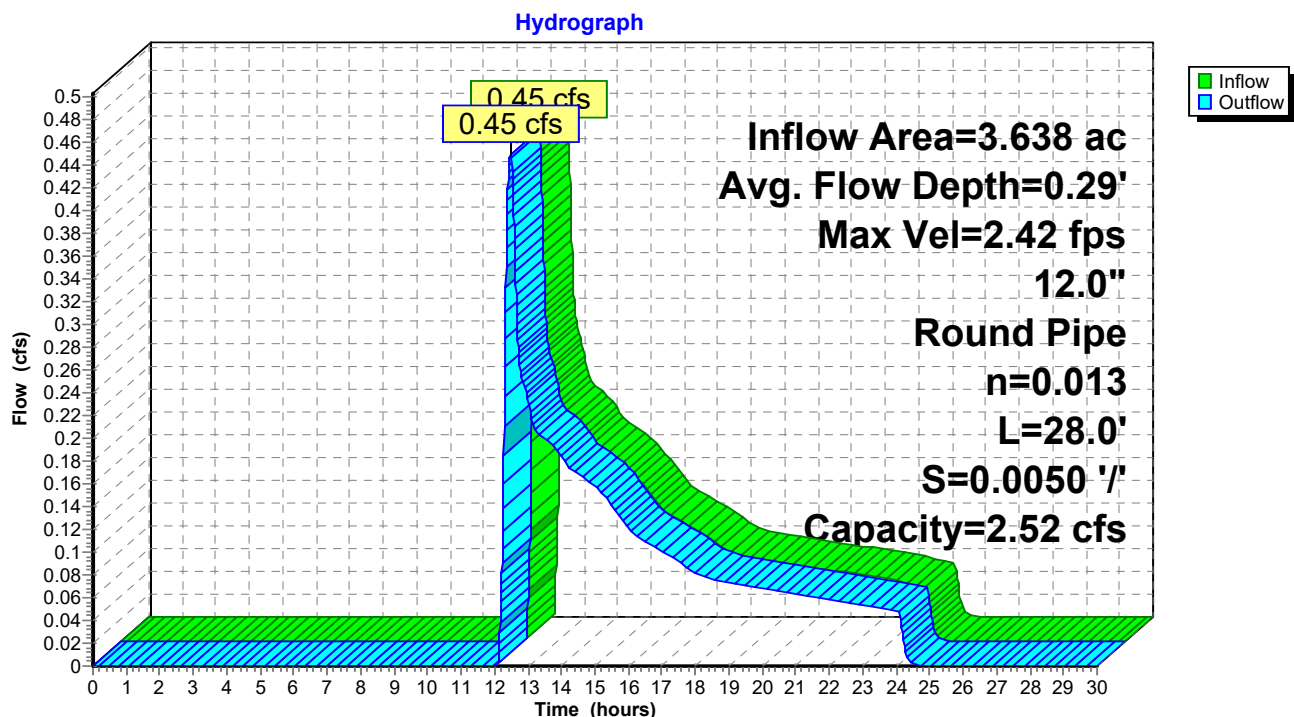
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.42 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.45 fps, Avg. Travel Time= 0.3 min

Peak Storage= 5 cf @ 12.46 hrs
 Average Depth at Peak Storage= 0.29' , Surface Width= 0.90'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 28.0' Slope= 0.0050 '/
 Inlet Invert= 165.35', Outlet Invert= 165.21'



Reach 4R: Prop Drain DMH 4 to DMH 5



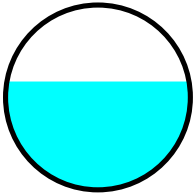
Summary for Reach 5R: Prop. Drain DMH x to DMH x

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 2.00" for 25-year Storm event
Inflow = 2.30 cfs @ 12.11 hrs, Volume= 0.176 af
Outflow = 2.30 cfs @ 12.11 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.3 min
Routed to Pond 3P : Recharge System C

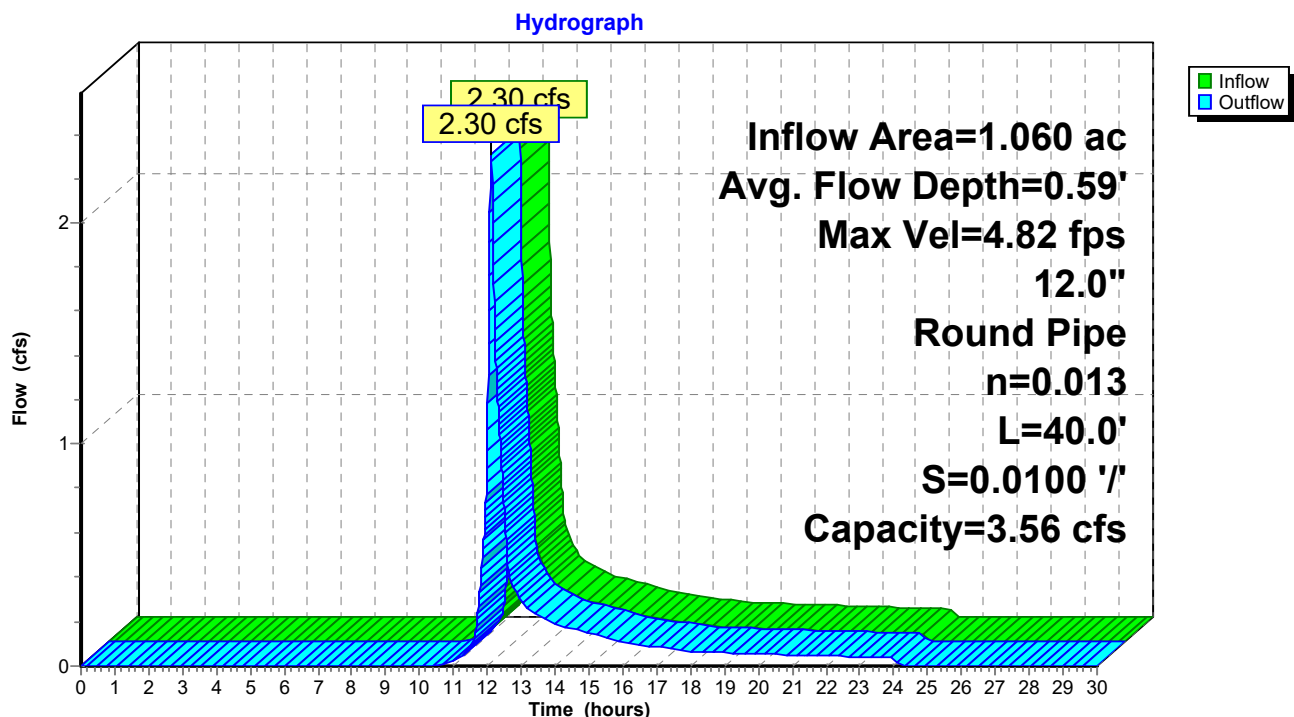
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.82 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.95 fps, Avg. Travel Time= 0.3 min

Peak Storage= 19 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.59' , Surface Width= 0.99'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.56 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 40.0' Slope= 0.0100 '/
Inlet Invert= 164.40', Outlet Invert= 164.00'



Reach 5R: Prop. Drain DMH x to DMH x

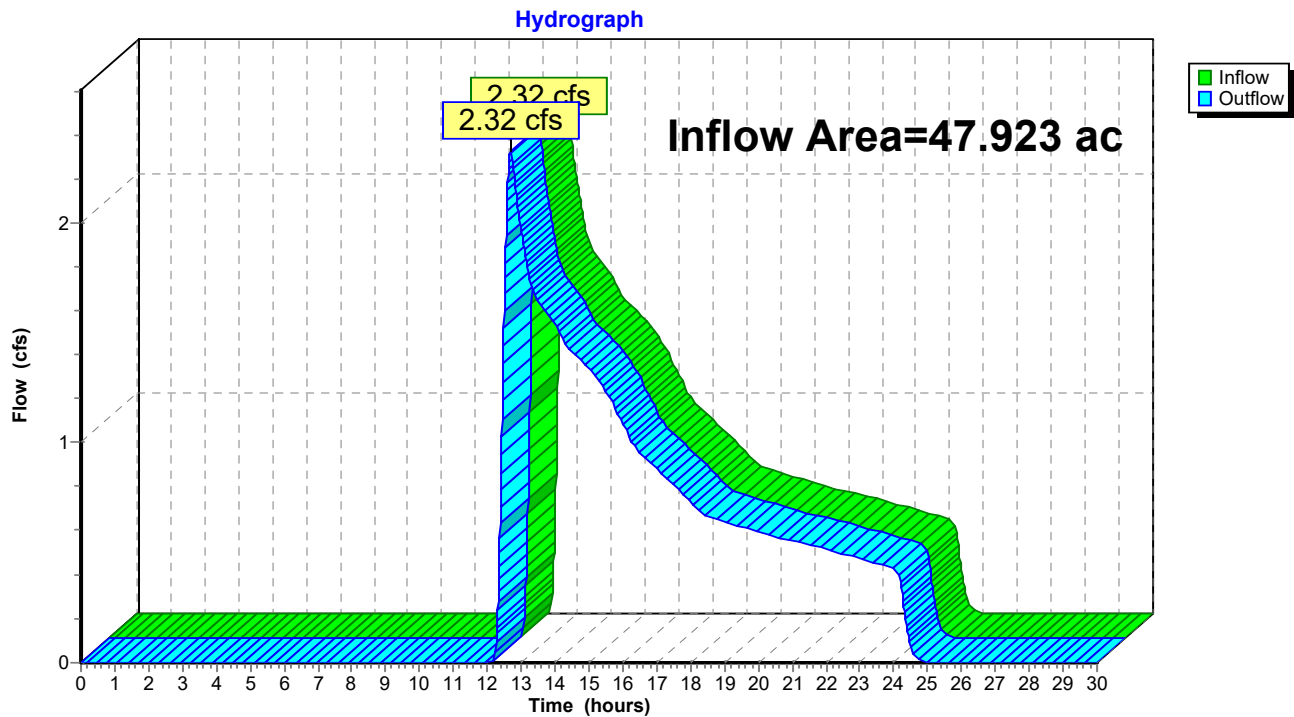


Summary for Reach DP: Design Point

Inflow Area = 47.923 ac, 7.45% Impervious, Inflow Depth = 0.22" for 25-year Storm event
Inflow = 2.32 cfs @ 12.69 hrs, Volume= 0.896 af
Outflow = 2.32 cfs @ 12.69 hrs, Volume= 0.896 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP: Design Point



Summary for Pond 1P: Recharge System A

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.37" for 25-year Storm event
 Inflow = 0.45 cfs @ 12.47 hrs, Volume= 0.111 af
 Outflow = 0.27 cfs @ 12.71 hrs, Volume= 0.111 af, Atten= 39%, Lag= 14.8 min
 Discarded = 0.27 cfs @ 12.71 hrs, Volume= 0.111 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.37' @ 12.71 hrs Surf.Area= 1,309 sf Storage= 195 cf

Plug-Flow detention time= 4.0 min calculated for 0.111 af (100% of inflow)
 Center-of-Mass det. time= 4.0 min (983.9 - 980.0)

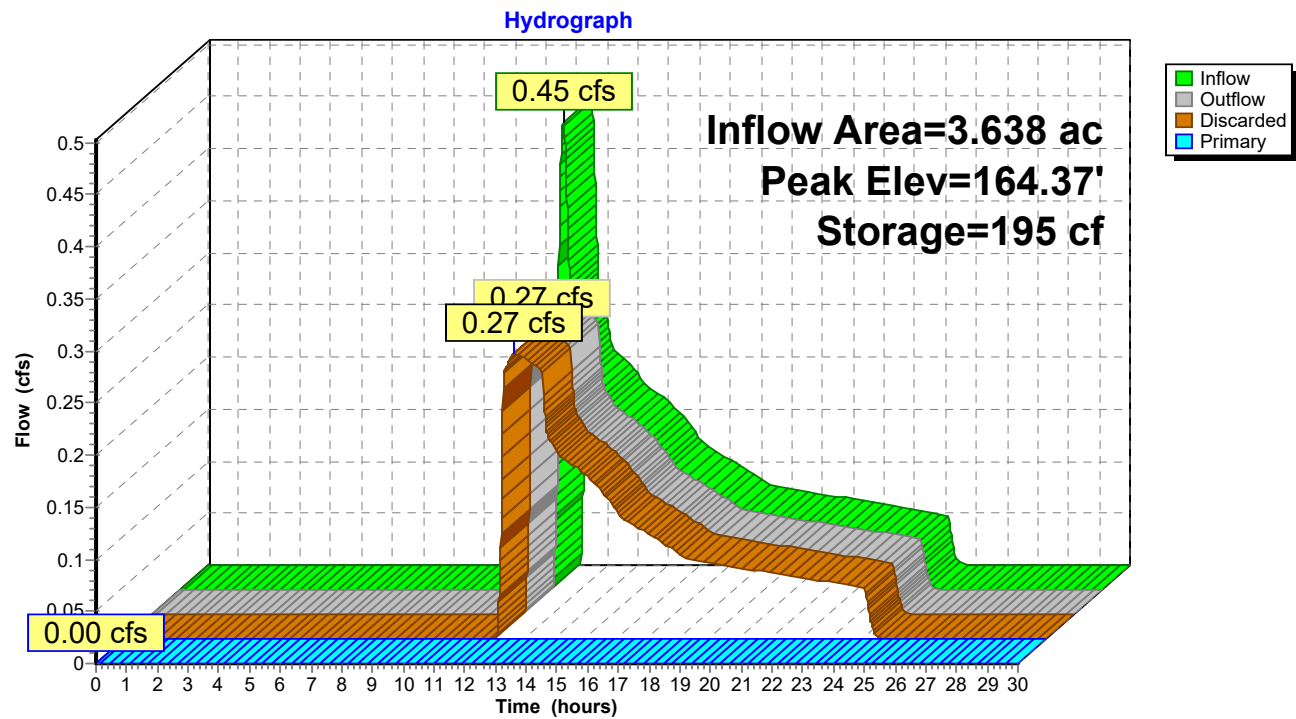
Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	1,608 cf	ADS_StormTech SC-740 b +Cap x 35 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	1,189 cf	25.25'W x 51.84'L x 3.50'H Prismatic 4,581 cf Overall - 1,608 cf Embedded = 2,973 cf x 40.0% Voids
		2,797 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	171.25'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.27 cfs @ 12.71 hrs HW=164.37' (Free Discharge)
 ↑1=Exfiltration (Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 1P: Recharge System A



Summary for Pond 2P: Recharge System B

Inflow Area = 7.186 ac, 9.69% Impervious, Inflow Depth = 0.48" for 25-year Storm event
 Inflow = 1.46 cfs @ 12.33 hrs, Volume= 0.286 af
 Outflow = 0.81 cfs @ 12.59 hrs, Volume= 0.286 af, Atten= 45%, Lag= 15.6 min
 Discarded = 0.81 cfs @ 12.59 hrs, Volume= 0.286 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 162.58' @ 12.59 hrs Surf.Area= 3,257 sf Storage= 879 cf

Plug-Flow detention time= 5.2 min calculated for 0.286 af (100% of inflow)
 Center-of-Mass det. time= 5.2 min (957.8 - 952.6)

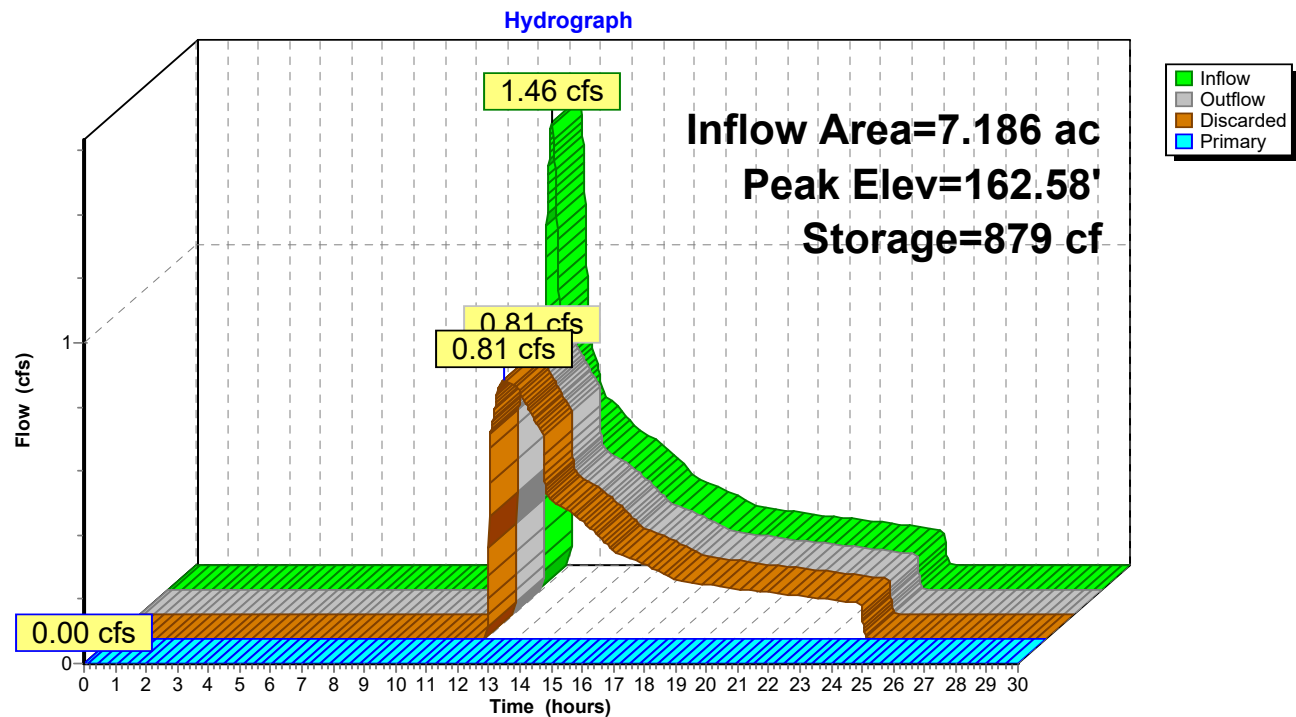
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	4,135 cf	ADS_StormTech SC-740 b +Cap x 90 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	2,907 cf	44.50"W x 73.20"L x 3.50'H Prismatic 11,401 cf Overall - 4,135 cf Embedded = 7,266 cf x 40.0% Voids
		7,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.81 cfs @ 12.59 hrs HW=162.58' (Free Discharge)
 ↑1=Exfiltration (Controls 0.81 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 2P: Recharge System B



Summary for Pond 3P: Recharge System C

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 2.00" for 25-year Storm event
 Inflow = 2.30 cfs @ 12.11 hrs, Volume= 0.176 af
 Outflow = 0.61 cfs @ 12.54 hrs, Volume= 0.176 af, Atten= 73%, Lag= 25.5 min
 Discarded = 0.61 cfs @ 12.54 hrs, Volume= 0.176 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 163.46' @ 12.54 hrs Surf.Area= 1,848 sf Storage= 1,797 cf

Plug-Flow detention time= 20.2 min calculated for 0.176 af (100% of inflow)
 Center-of-Mass det. time= 20.2 min (880.4 - 860.2)

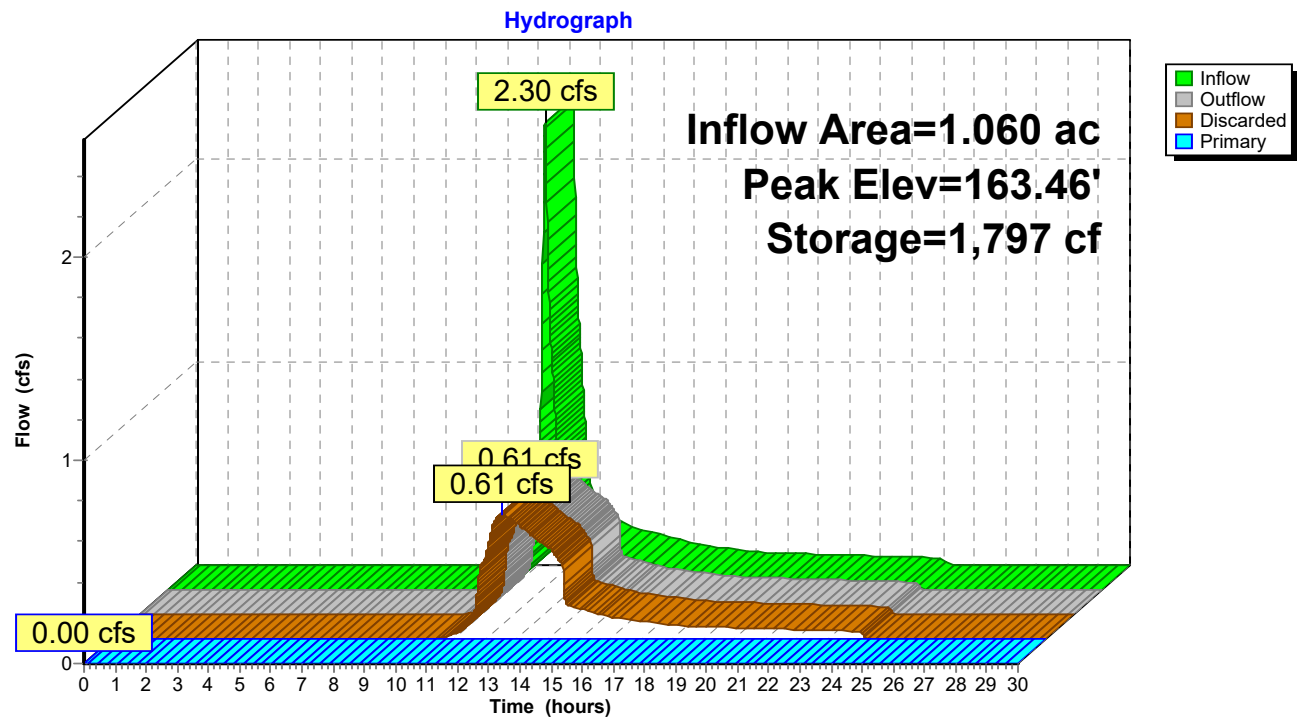
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	2,297 cf	ADS_StormTech SC-740 b +Cap x 50 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	1,669 cf	25.25'W x 73.20'L x 3.50'H Prismatic 6,469 cf Overall - 2,297 cf Embedded = 4,172 cf x 40.0% Voids
		3,966 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.61 cfs @ 12.54 hrs HW=163.46' (Free Discharge)
 ↑ **1=Exfiltration** (Controls 0.61 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑ **2=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Recharge System C



Summary for Pond 4P: Recharge System D

Inflow Area = 1.273 ac, 41.36% Impervious, Inflow Depth = 2.08" for 25-year Storm event
 Inflow = 2.87 cfs @ 12.11 hrs, Volume= 0.221 af
 Outflow = 0.80 cfs @ 12.52 hrs, Volume= 0.221 af, Atten= 72%, Lag= 24.8 min
 Discarded = 0.80 cfs @ 12.52 hrs, Volume= 0.221 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 163.30' @ 12.52 hrs Surf.Area= 2,544 sf Storage= 2,166 cf

Plug-Flow detention time= 17.8 min calculated for 0.220 af (100% of inflow)
 Center-of-Mass det. time= 17.8 min (875.4 - 857.5)

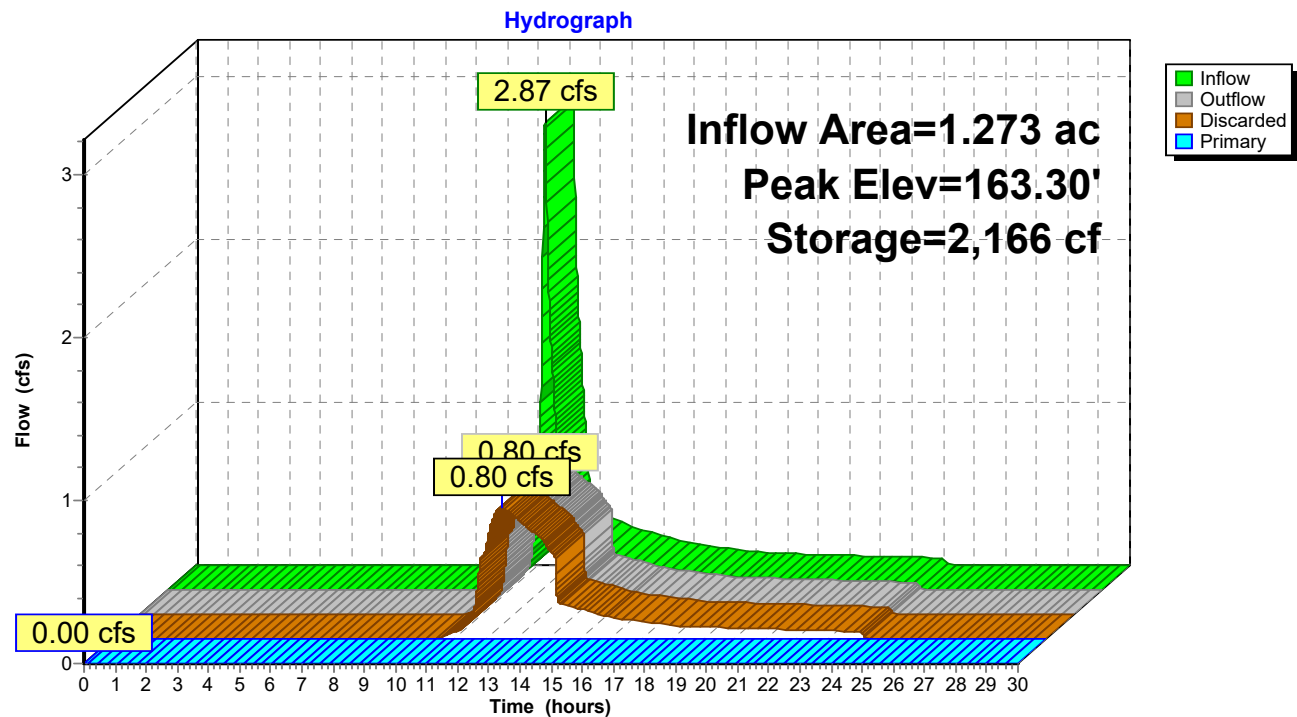
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	3,216 cf	ADS_StormTech SC-740 b +Cap x 70 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	2,275 cf	34.75'W x 73.20'L x 3.50'H Prismatic 8,903 cf Overall - 3,216 cf Embedded = 5,687 cf x 40.0% Voids
		5,491 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.80 cfs @ 12.52 hrs HW=163.30' (Free Discharge)
 ↑ **1=Exfiltration** (Controls 0.80 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑ **2=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Recharge System D



Summary for Pond RAP1: Typical Roof Recharge Area 1

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth = 5.62" for 25-year Storm event
 Inflow = 0.17 cfs @ 12.08 hrs, Volume= 0.014 af
 Outflow = 0.05 cfs @ 12.43 hrs, Volume= 0.014 af, Atten= 73%, Lag= 21.1 min
 Discarded = 0.05 cfs @ 12.43 hrs, Volume= 0.014 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 165.12' @ 12.43 hrs Surf.Area= 187 sf Storage= 119 cf

Plug-Flow detention time= 12.8 min calculated for 0.014 af (100% of inflow)
 Center-of-Mass det. time= 12.8 min (758.3 - 745.5)

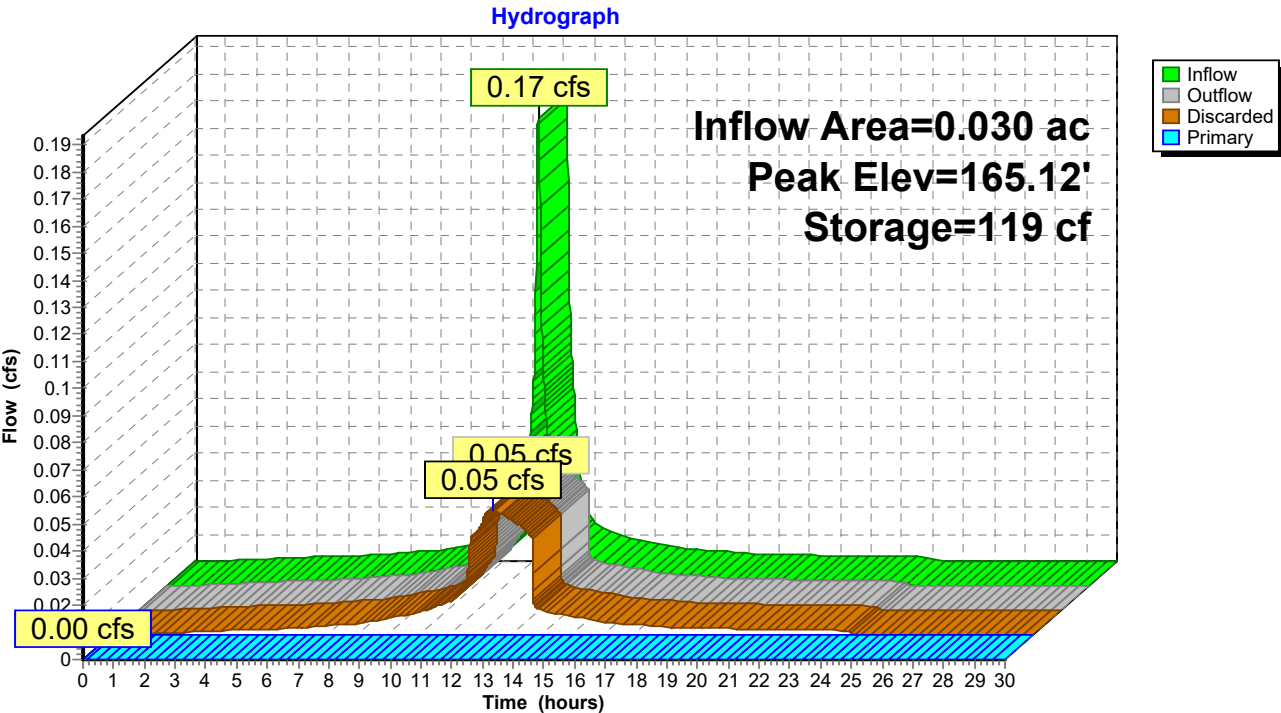
Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	88 cf	ADS_StormTech SC-310 x 6 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	139 cf	11.50'W x 16.24'L x 2.33'H Prismatic 435 cf Overall - 88 cf Embedded = 347 cf x 40.0% Voids
		227 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.43 hrs HW=165.12' (Free Discharge)
 ↑1=Exfiltration (Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond RAP1: Typical Roof Recharge Area 1



Pleasant Street Dunstable Post-Development-Type III 24-hr 100-year Storm Rainfall=7.48"

Prepared by Haley Ward

Printed 9/11/2025

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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: Tributary Area to CB Runoff Area=123,030 sf 9.26% Impervious Runoff Depth=0.87"
Flow Length=230' Slope=0.0500 '/' Tc=6.0 min CN=38 Runoff=1.47 cfs 0.204 af

Subcatchment 2S: Tributary Area to CB 2A Runoff Area=35,455 sf 10.14% Impervious Runoff Depth=0.95"
Flow Length=120' Slope=0.0200 '/' Tc=6.0 min CN=39 Runoff=0.51 cfs 0.064 af

Subcatchment 3S: Tributary Area to CB 3A Runoff Area=97,380 sf 10.78% Impervious Runoff Depth=1.03"
Flow Length=95' Slope=0.0200 '/' Tc=6.5 min CN=40 Runoff=1.64 cfs 0.192 af

Subcatchment 4S: Tributary Area to CB 4A Runoff Area=166,140 sf 9.46% Impervious Runoff Depth=1.12"
Flow Length=100' Slope=0.0200 '/' Tc=6.5 min CN=41 Runoff=3.26 cfs 0.354 af

Subcatchment 5S: Tributary Area to CB 5A Runoff Area=49,501 sf 8.35% Impervious Runoff Depth=0.95"
Flow Length=105' Slope=0.0200 '/' Tc=6.6 min CN=39 Runoff=0.70 cfs 0.090 af

Subcatchment 6S: Tributary Area to CB Runoff Area=46,170 sf 39.30% Impervious Runoff Depth=3.16"
Flow Length=215' Slope=0.0200 '/' Tc=6.8 min CN=62 Runoff=3.76 cfs 0.279 af

Subcatchment 7S: Tributary Area to CB 7A Runoff Area=55,449 sf 41.36% Impervious Runoff Depth=3.26"
Flow Length=266' Slope=0.0200 '/' Tc=7.1 min CN=63 Runoff=4.64 cfs 0.346 af

Subcatchment 8S: Remaining Area Runoff Area=1,514,422 sf 4.56% Impervious Runoff Depth=0.79"
Flow Length=1,285' Tc=23.5 min CN=37 Runoff=11.28 cfs 2.279 af

Subcatchment RA1: Typical Roof Area Runoff Area=1,310 sf 100.00% Impervious Runoff Depth=7.24"
Tc=6.0 min CN=98 Runoff=0.22 cfs 0.018 af

Reach 1R: Prop. Drain DMH 1 to DMH 2 Avg. Flow Depth=0.54' Max Vel=3.32 fps Inflow=1.47 cfs 0.204 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/' Capacity=2.52 cfs Outflow=1.45 cfs 0.204 af

Reach 2R: Prop. Drain DMH 2 to DMH 3 Avg. Flow Depth=0.54' Max Vel=3.31 fps Inflow=1.45 cfs 0.204 af
12.0" Round Pipe n=0.013 L=180.0' S=0.0050 '/' Capacity=2.52 cfs Outflow=1.44 cfs 0.204 af

Reach 3R: Prop. Drain DMH 3 to DMH 4 Avg. Flow Depth=0.64' Max Vel=3.52 fps Inflow=1.89 cfs 0.268 af
12.0" Round Pipe n=0.013 L=110.0' S=0.0050 '/' Capacity=2.52 cfs Outflow=1.88 cfs 0.268 af

Reach 4R: Prop Drain DMH 4 to DMH 5 Avg. Flow Depth=0.64' Max Vel=3.52 fps Inflow=1.88 cfs 0.268 af
12.0" Round Pipe n=0.013 L=28.0' S=0.0050 '/' Capacity=2.52 cfs Outflow=1.88 cfs 0.268 af

Reach 5R: Prop. Drain DMH x to DMH x Avg. Flow Depth=0.88' Max Vel=5.17 fps Inflow=3.76 cfs 0.279 af
12.0" Round Pipe n=0.013 L=40.0' S=0.0100 '/' Capacity=3.56 cfs Outflow=3.76 cfs 0.279 af

Reach DP: Design Point Inflow=11.28 cfs 2.279 af
Outflow=11.28 cfs 2.279 af

Pond 1P: Recharge System A Peak Elev=167.04' Storage=2,557 cf Inflow=1.88 cfs 0.268 af
Discarded=0.44 cfs 0.268 af Primary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.268 af

Pleasant Street Dunstable Post-Development-Type III 24-hr 100-year Storm Rainfall=7.48"

Prepared by Haley Ward

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Pond 2P: Recharge System B

Peak Elev=164.57' Storage=5,718 cf Inflow=5.59 cfs 0.636 af
Discarded=1.42 cfs 0.636 af Primary=0.00 cfs 0.000 af Outflow=1.42 cfs 0.636 af

Pond 3P: Recharge System C

Peak Elev=164.84' Storage=3,470 cf Inflow=3.76 cfs 0.279 af
Discarded=0.86 cfs 0.279 af Primary=0.00 cfs 0.000 af Outflow=0.86 cfs 0.279 af

Pond 4P: Recharge System D

Peak Elev=164.41' Storage=4,214 cf Inflow=4.64 cfs 0.346 af
Discarded=1.07 cfs 0.346 af Primary=0.00 cfs 0.000 af Outflow=1.07 cfs 0.346 af

Pond RAP1: Typical Roof Recharge Area 1

Peak Elev=165.67' Storage=177 cf Inflow=0.22 cfs 0.018 af
Discarded=0.05 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.018 af

Total Runoff Area = 47.954 ac Runoff Volume = 3.827 af Average Runoff Depth = 0.96"
92.50% Pervious = 44.355 ac 7.50% Impervious = 3.599 ac

Summary for Subcatchment 1S: Tributary Area to CB 1A-1B

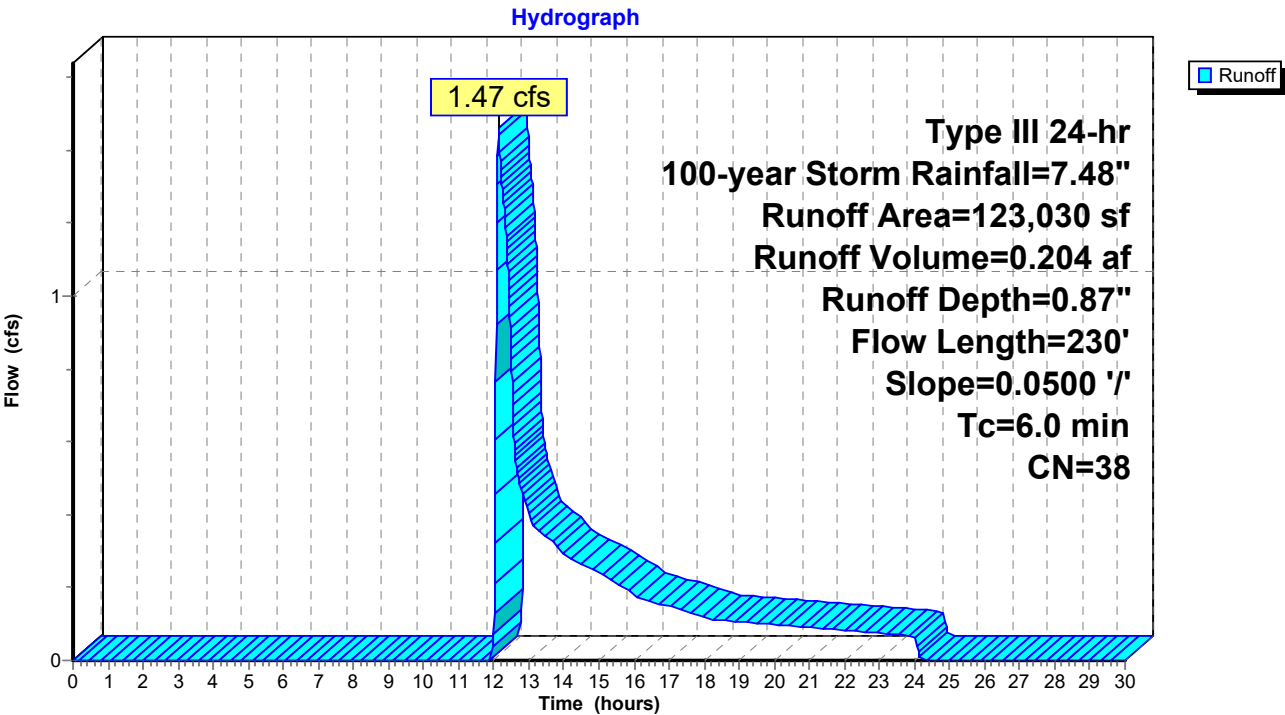
Runoff = 1.47 cfs @ 12.14 hrs, Volume= 0.204 af, Depth= 0.87"
Routed to Reach 1R : Prop. Drain DMH 1 to DMH 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Storm Rainfall=7.48"

	Area (sf)	CN	Description
*	11,387	98	Roadway, driveways, sidewalks
	111,643	32	Woods/grass comb., Good, HSG A
	123,030	38	Weighted Average
	111,643		90.74% Pervious Area
	11,387		9.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0500	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.7	180	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.7	230	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: Tributary Area to CB 1A-1B



Summary for Subcatchment 2S: Tributary Area to CB 2A & 2B

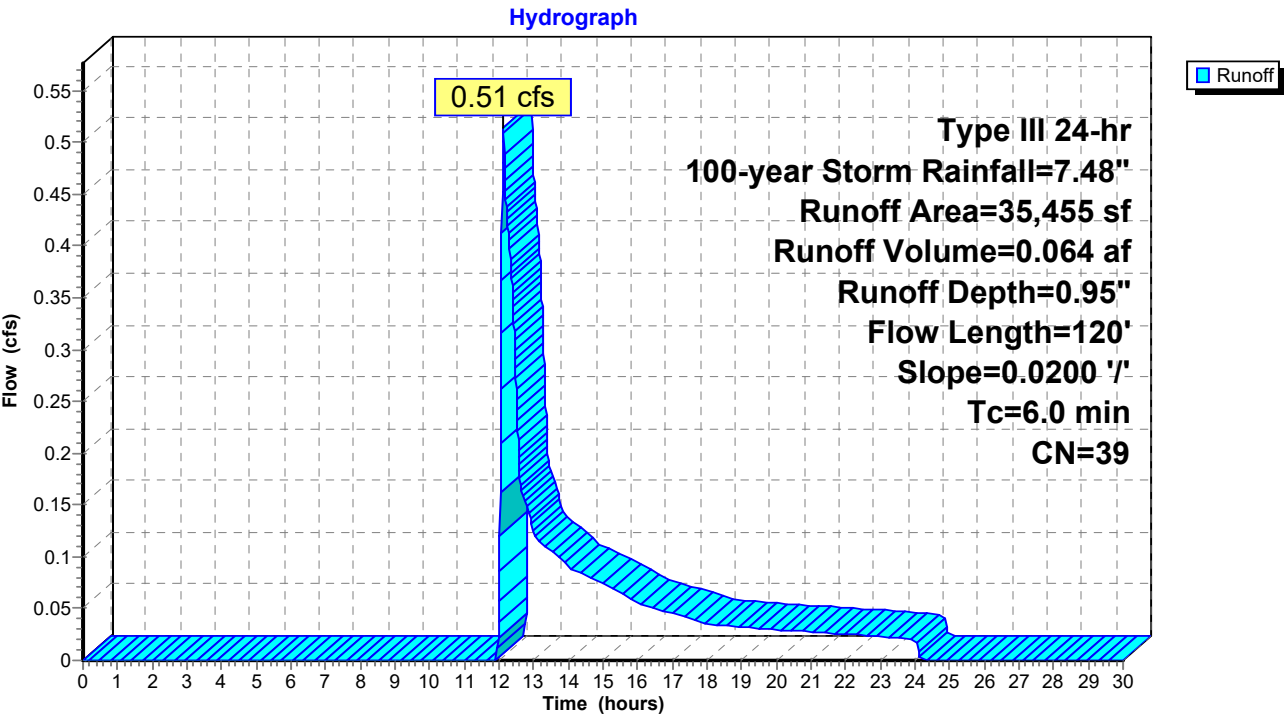
Runoff = 0.51 cfs @ 12.13 hrs, Volume= 0.064 af, Depth= 0.95"
Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
3,595	98	Paved roads w/curbs & sewers, HSG A
31,860	32	Woods/grass comb., Good, HSG A
35,455	39	Weighted Average
31,860		89.86% Pervious Area
3,595		10.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.12"
0.4	70	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.1	120	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Tributary Area to CB 2A & 2B



Summary for Subcatchment 3S: Tributary Area to CB 3A & 3B

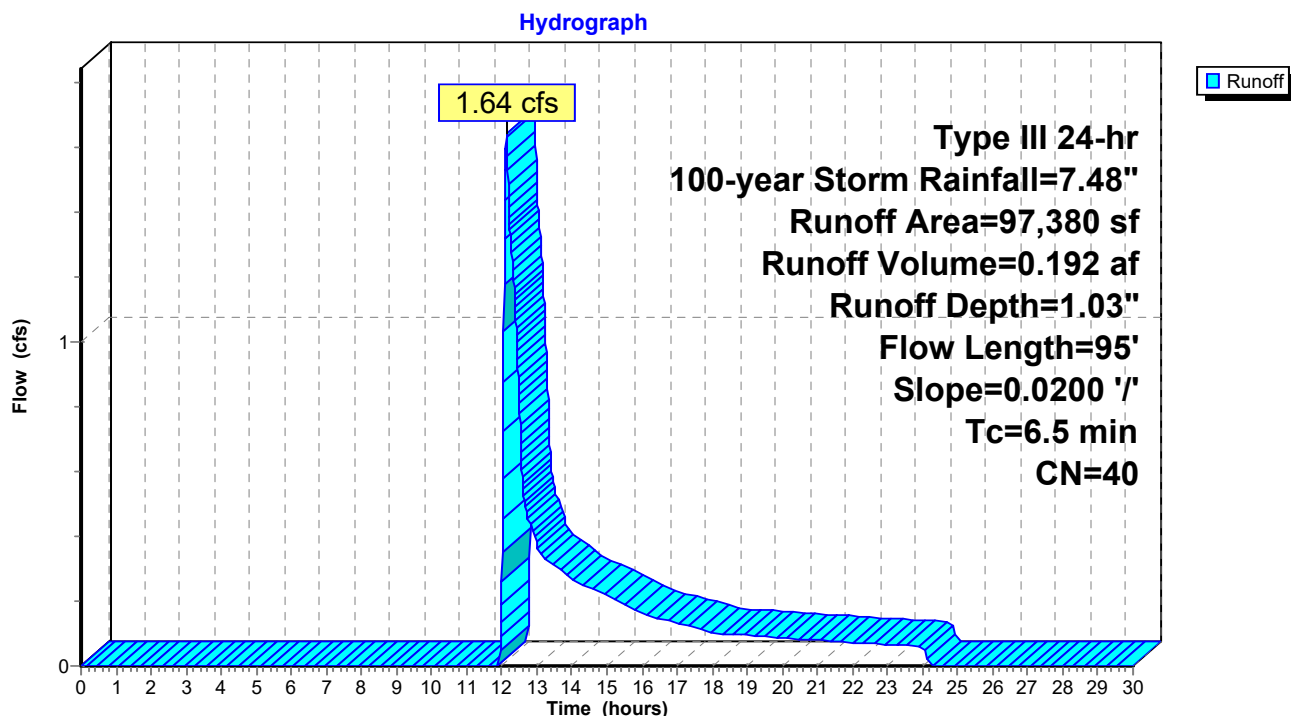
Runoff = 1.64 cfs @ 12.13 hrs, Volume= 0.192 af, Depth= 1.03"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
10,499	98	Paved parking, HSG A
15,431	39	>75% Grass cover, Good, HSG A
71,450	32	Woods/grass comb., Good, HSG A
97,380	40	Weighted Average
86,881		89.22% Pervious Area
10,499		10.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	45	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	95	Total			

Subcatchment 3S: Tributary Area to CB 3A & 3B



Summary for Subcatchment 4S: Tributary Area to CB 4A & 4B

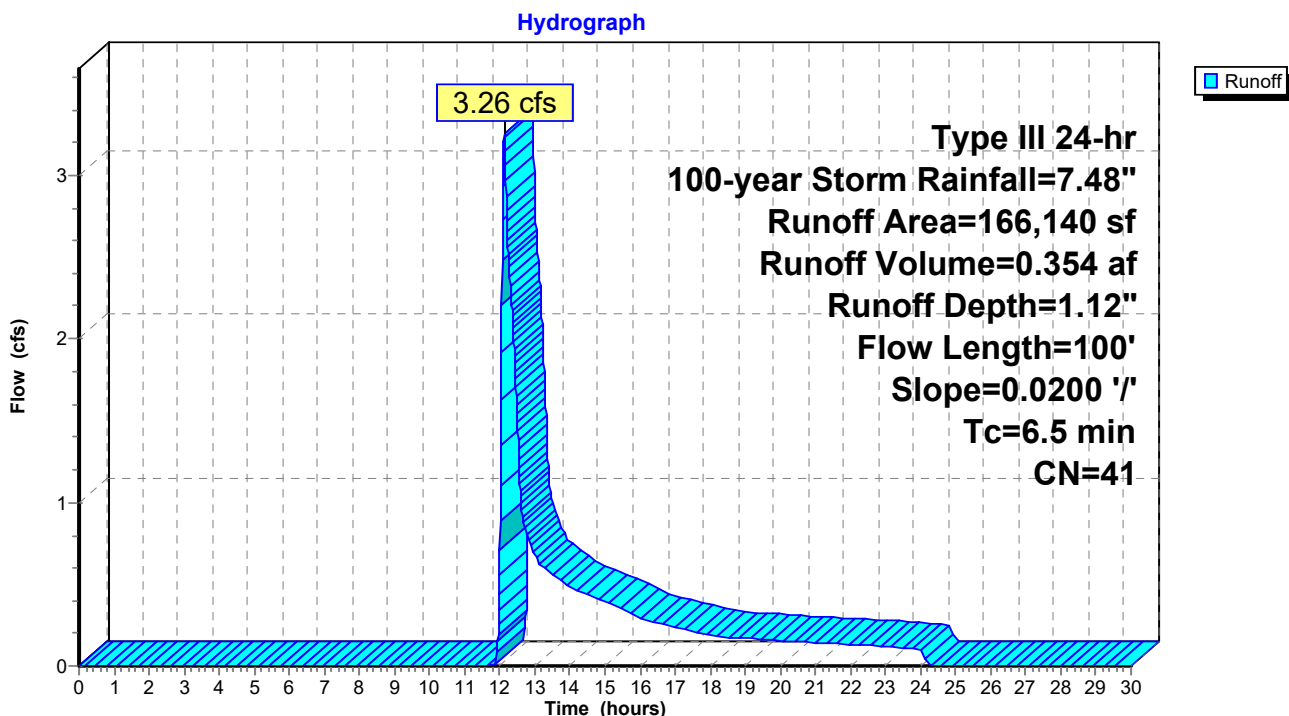
Runoff = 3.26 cfs @ 12.13 hrs, Volume= 0.354 af, Depth= 1.12"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
15,714	98	Paved roads w/curbs & sewers, HSG A
54,686	39	>75% Grass cover, Good, HSG A
95,740	32	Woods/grass comb., Good, HSG A
166,140	41	Weighted Average
150,426		90.54% Pervious Area
15,714		9.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	100	Total			

Subcatchment 4S: Tributary Area to CB 4A & 4B



Summary for Subcatchment 5S: Tributary Area to CB 5A & 5B

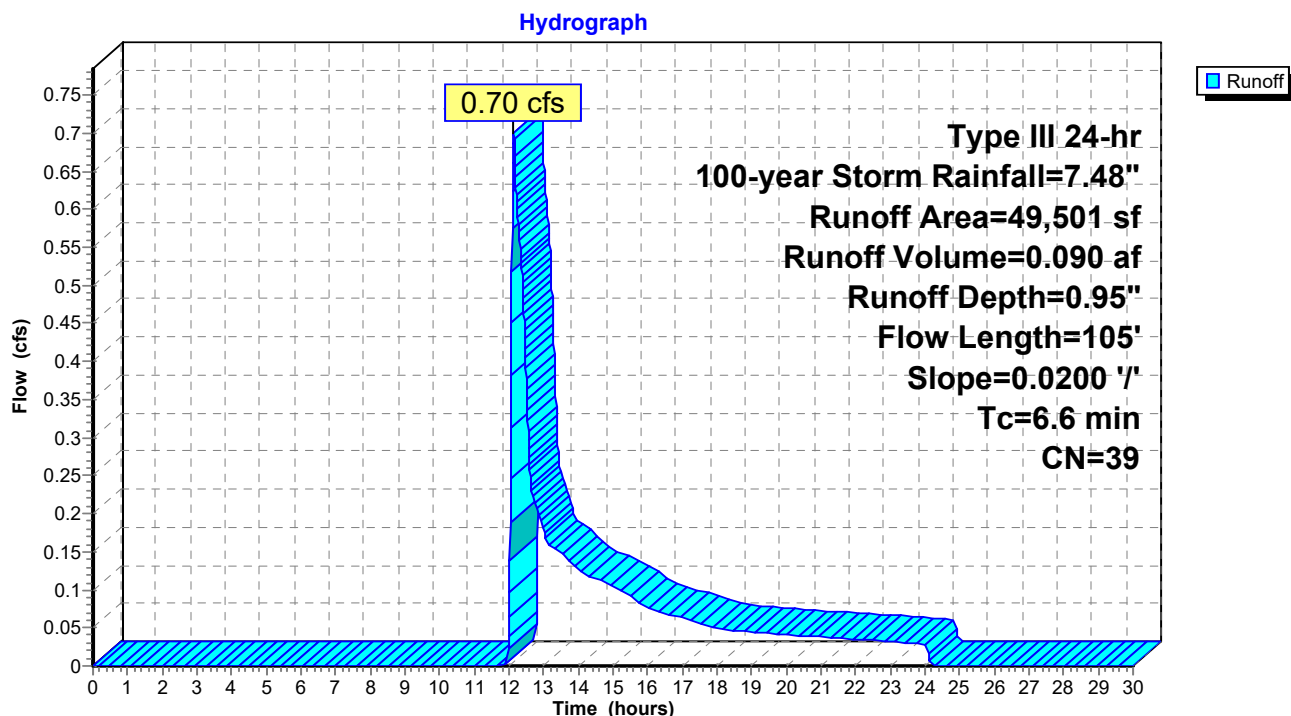
Runoff = 0.70 cfs @ 12.14 hrs, Volume= 0.090 af, Depth= 0.95"
 Routed to Pond 2P : Recharge System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
4,134	98	Paved roads w/curbs & sewers, HSG A
9,382	39	>75% Grass cover, Good, HSG A
35,985	32	Woods/grass comb., Good, HSG A
49,501	39	Weighted Average
45,367		91.65% Pervious Area
4,134		8.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.9	55	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.6	105	Total			

Subcatchment 5S: Tributary Area to CB 5A & 5B



Summary for Subcatchment 6S: Tributary Area to CB 6A-6B

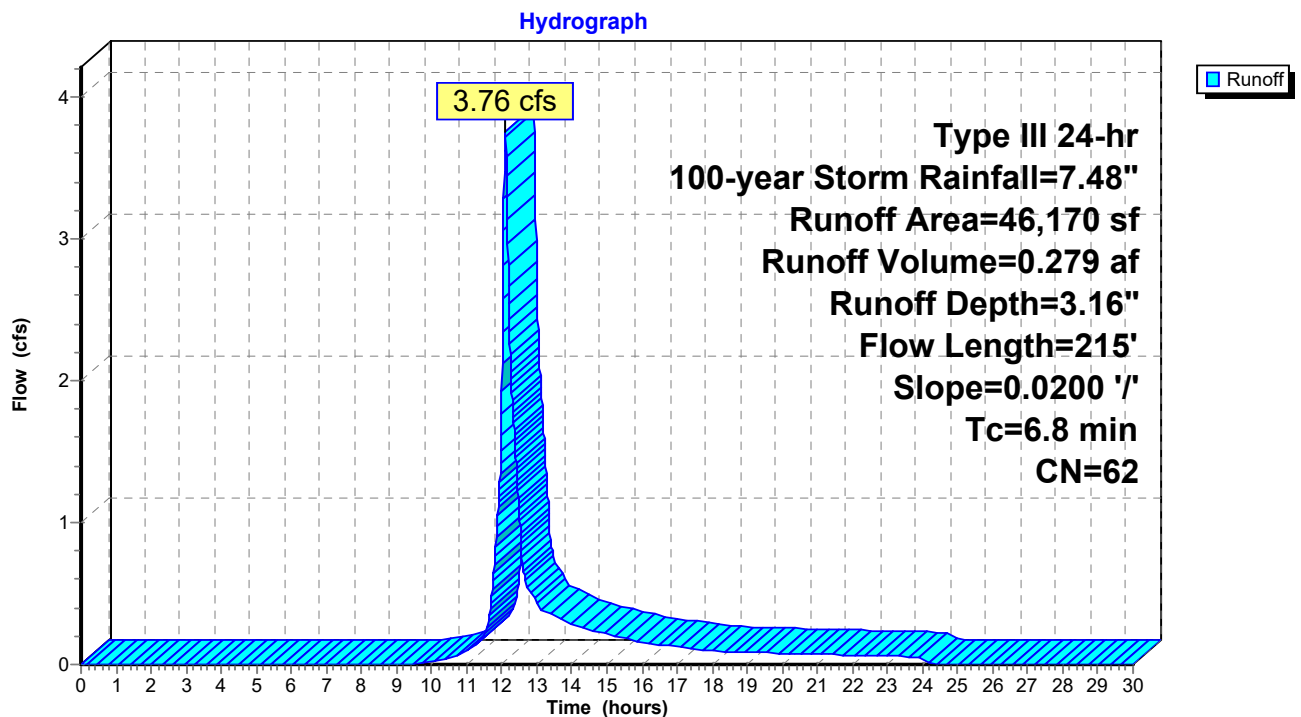
Runoff = 3.76 cfs @ 12.10 hrs, Volume= 0.279 af, Depth= 3.16"
 Routed to Reach 5R : Prop. Drain DMH x to DMH x

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
18,144	98	Paved roads w/curbs & sewers, HSG A
28,026	39	>75% Grass cover, Good, HSG A
46,170	62	Weighted Average
28,026		60.70% Pervious Area
18,144		39.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.6	80	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	85	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.8	215	Total			

Subcatchment 6S: Tributary Area to CB 6A-6B



Summary for Subcatchment 7S: Tributary Area to CB 7A & 7B

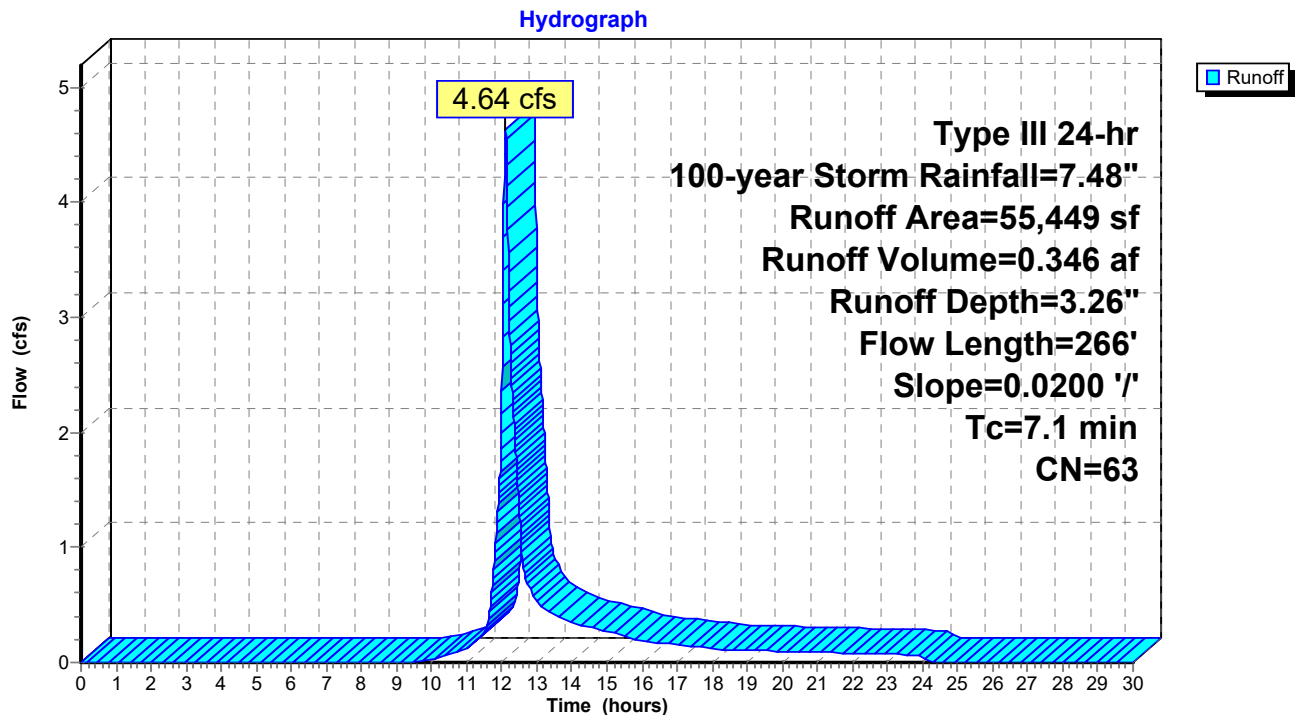
Runoff = 4.64 cfs @ 12.11 hrs, Volume= 0.346 af, Depth= 3.26"
 Routed to Pond 4P : Recharge System D

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
22,933	98	Paved roads w/curbs & sewers, HSG A
32,516	39	>75% Grass cover, Good, HSG A
55,449	63	Weighted Average
32,516		58.64% Pervious Area
22,933		41.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.12"
0.5	66	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	150	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.1	266	Total			

Subcatchment 7S: Tributary Area to CB 7A & 7B



Summary for Subcatchment 8S: Remaining Area Tributary to Design Point

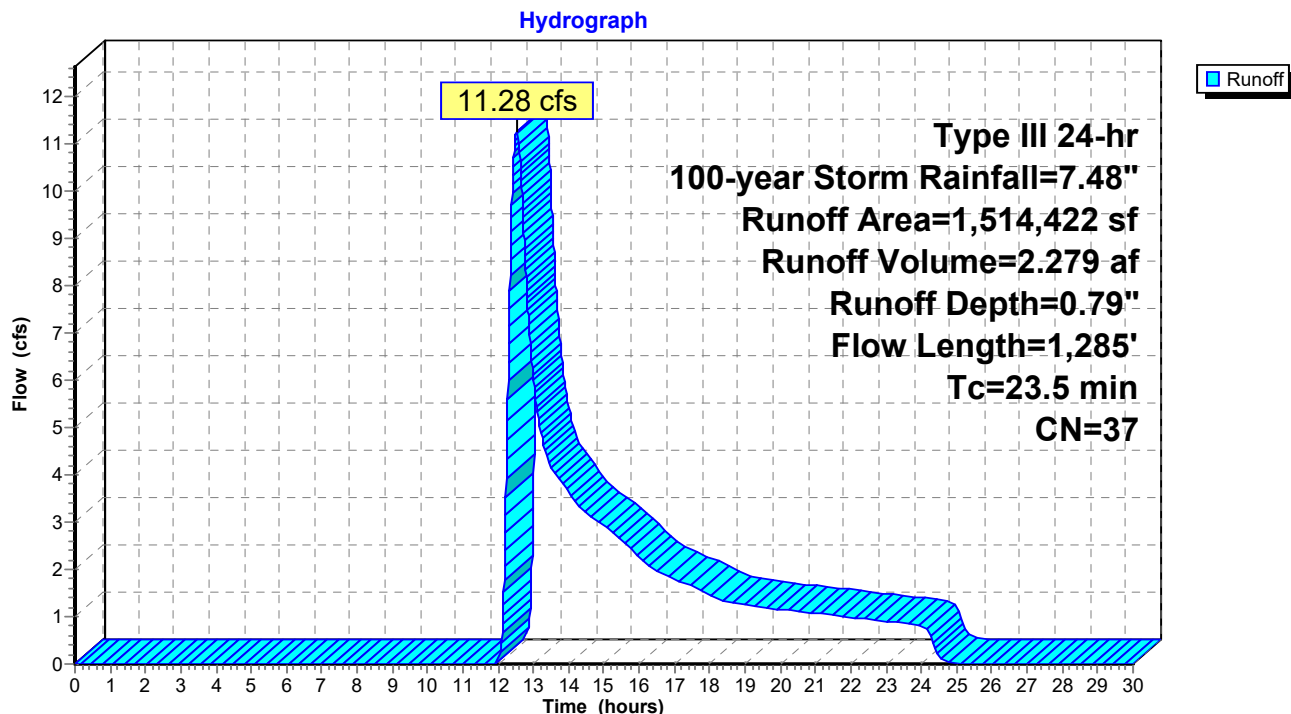
Runoff = 11.28 cfs @ 12.53 hrs, Volume= 2.279 af, Depth= 0.79"
 Routed to Reach DP : Design Point

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description
575,400	46	2 acre lots, 12% imp, HSG A
111,580	49	50-75% Grass cover, Fair, HSG A
827,442	30	Woods, Good, HSG A
1,514,422	37	Weighted Average
1,445,374		95.44% Pervious Area
69,048		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	50	0.0500	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.12"
5.4	725	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.0	510	0.0300	2.79		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.5	1,285	Total			

Subcatchment 8S: Remaining Area Tributary to Design Point



Summary for Subcatchment RA1: Typical Roof Area

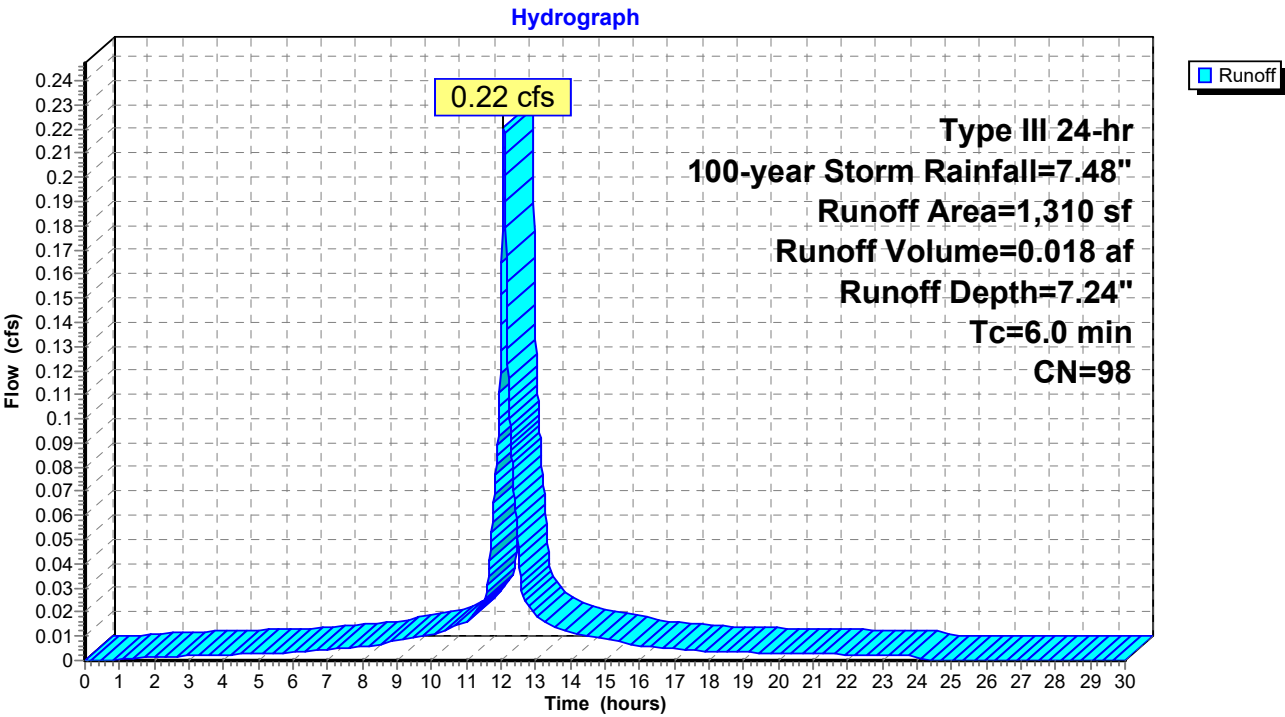
Runoff = 0.22 cfs @ 12.08 hrs, Volume= 0.018 af, Depth= 7.24"
Routed to Pond RAP1 : Typical Roof Recharge Area 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Storm Rainfall=7.48"

Area (sf)	CN	Description			
1,310	98	Roof Area			
1,310		100.00% Impervious Area			

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

Subcatchment RA1: Typical Roof Area



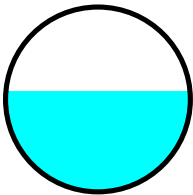
Summary for Reach 1R: Prop. Drain DMH 1 to DMH 2

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.87" for 100-year Storm event
Inflow = 1.47 cfs @ 12.14 hrs, Volume= 0.204 af
Outflow = 1.45 cfs @ 12.16 hrs, Volume= 0.204 af, Atten= 1%, Lag= 1.7 min
Routed to Reach 2R : Prop. Drain DMH 2 to DMH 3

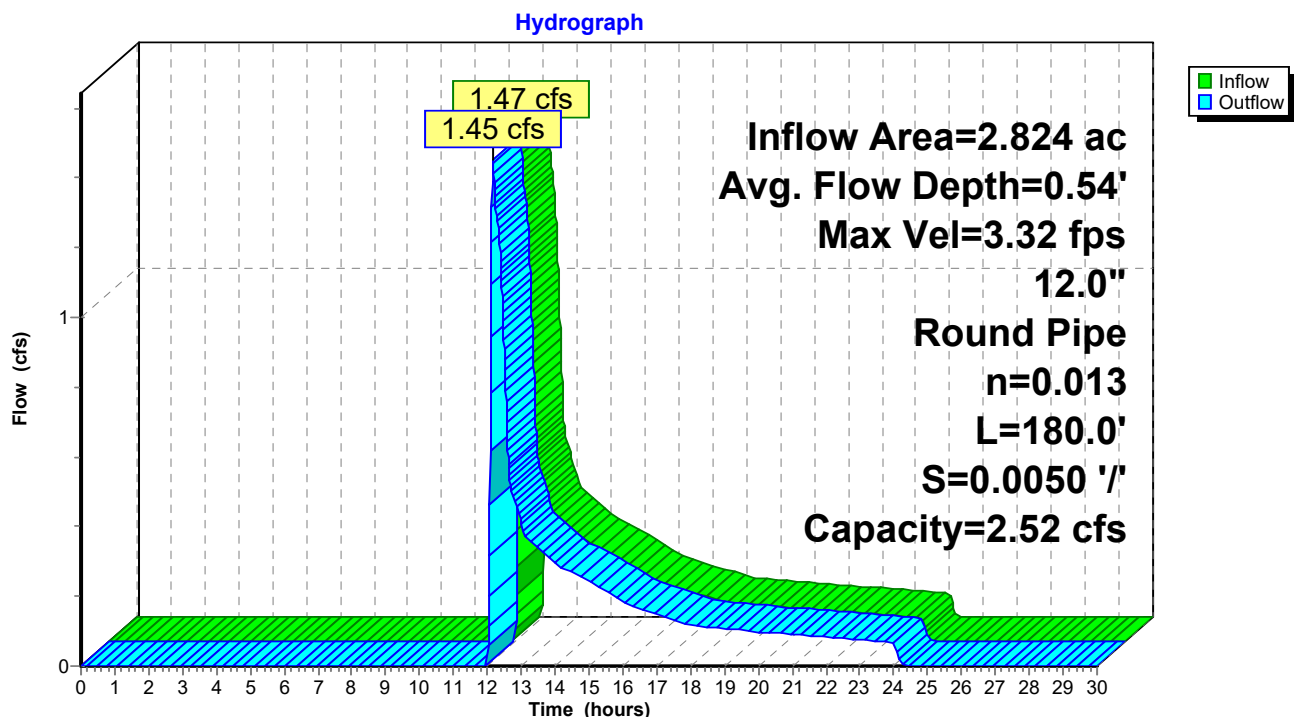
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.32 fps, Min. Travel Time= 0.9 min
Avg. Velocity= 1.71 fps, Avg. Travel Time= 1.8 min

Peak Storage= 79 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 1.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
n= 0.013
Length= 180.0' Slope= 0.0050 '/'
Inlet Invert= 168.00', Outlet Invert= 167.10'



Reach 1R: Prop. Drain DMH 1 to DMH 2



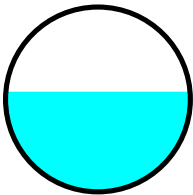
Summary for Reach 2R: Prop. Drain DMH 2 to DMH 3

Inflow Area = 2.824 ac, 9.26% Impervious, Inflow Depth = 0.87" for 100-year Storm event
Inflow = 1.45 cfs @ 12.16 hrs, Volume= 0.204 af
Outflow = 1.44 cfs @ 12.19 hrs, Volume= 0.204 af, Atten= 1%, Lag= 1.8 min
Routed to Reach 3R : Prop. Drain DMH 3 to DMH 4

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.31 fps, Min. Travel Time= 0.9 min
Avg. Velocity= 1.68 fps, Avg. Travel Time= 1.8 min

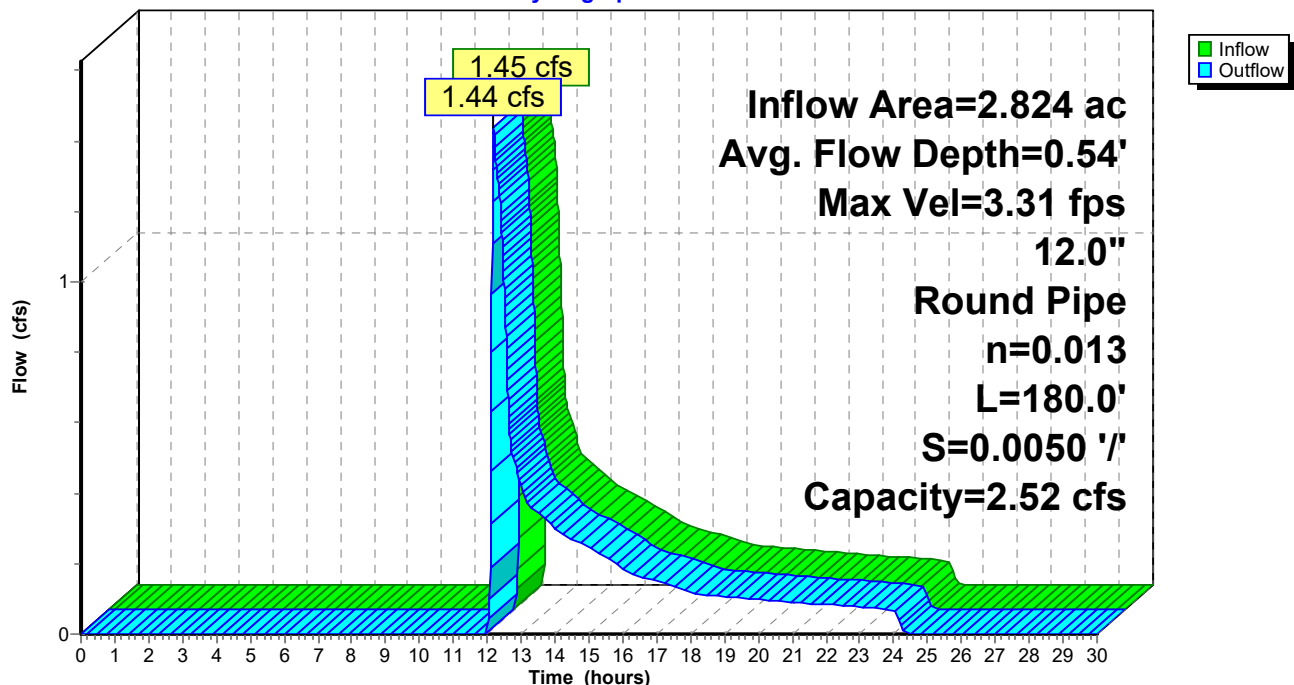
Peak Storage= 78 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 1.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
n= 0.013
Length= 180.0' Slope= 0.0050 '/'
Inlet Invert= 167.00', Outlet Invert= 166.10'



Reach 2R: Prop. Drain DMH 2 to DMH 3

Hydrograph



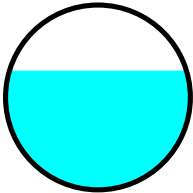
Summary for Reach 3R: Prop. Drain DMH 3 to DMH 4

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.88" for 100-year Storm event
Inflow = 1.89 cfs @ 12.19 hrs, Volume= 0.268 af
Outflow = 1.88 cfs @ 12.20 hrs, Volume= 0.268 af, Atten= 0%, Lag= 1.0 min
Routed to Reach 4R : Prop Drain DMH 4 to DMH 5

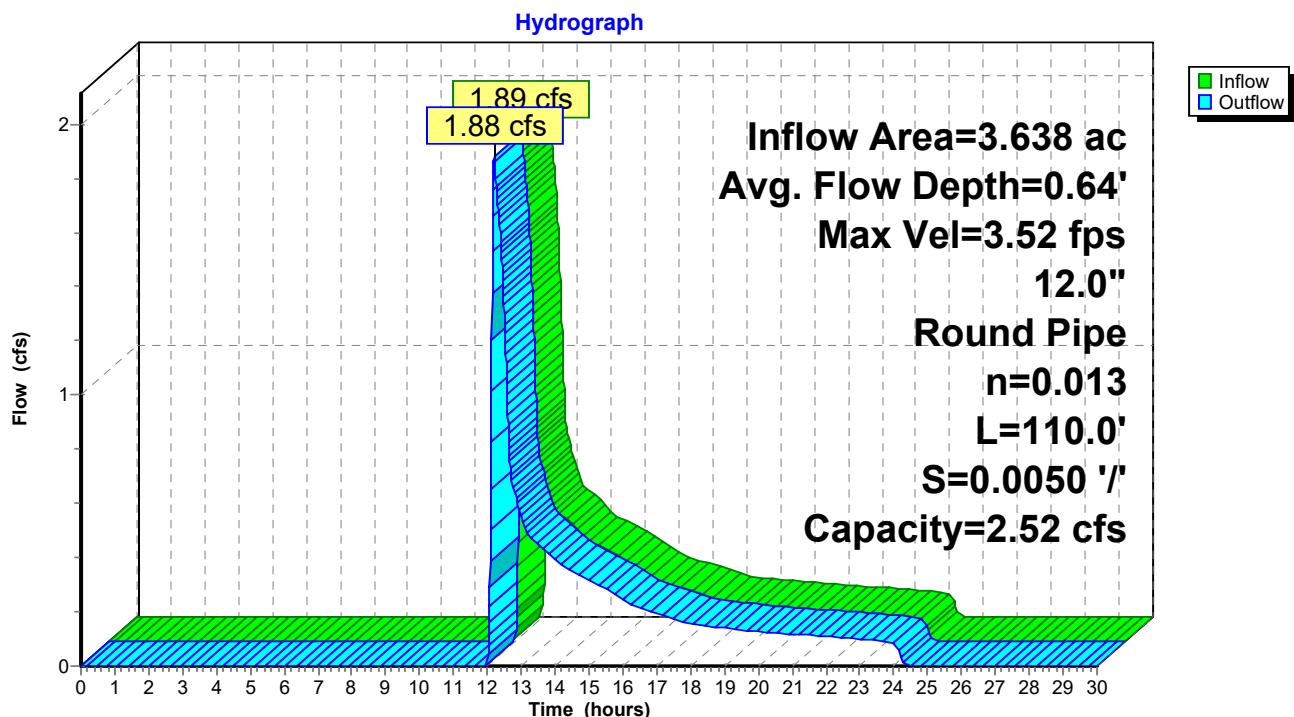
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.52 fps, Min. Travel Time= 0.5 min
Avg. Velocity= 1.80 fps, Avg. Travel Time= 1.0 min

Peak Storage= 59 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 0.96'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
n= 0.013
Length= 110.0' Slope= 0.0050 '/'
Inlet Invert= 166.00', Outlet Invert= 165.45'



Reach 3R: Prop. Drain DMH 3 to DMH 4



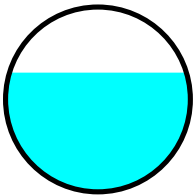
Summary for Reach 4R: Prop Drain DMH 4 to DMH 5

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.88" for 100-year Storm event
Inflow = 1.88 cfs @ 12.20 hrs, Volume= 0.268 af
Outflow = 1.88 cfs @ 12.21 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.3 min
Routed to Pond 1P : Recharge System A

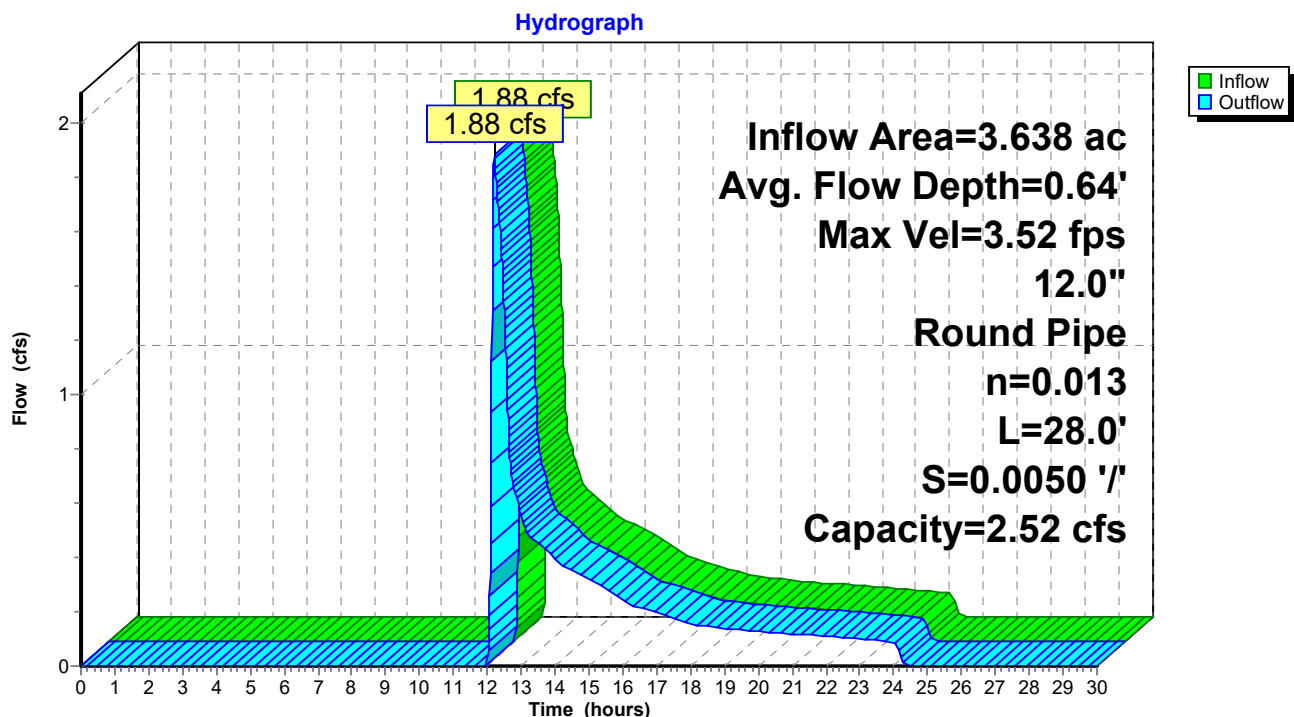
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.52 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.80 fps, Avg. Travel Time= 0.3 min

Peak Storage= 15 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 0.96'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.52 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 28.0' Slope= 0.0050 '/
Inlet Invert= 165.35', Outlet Invert= 165.21'



Reach 4R: Prop Drain DMH 4 to DMH 5



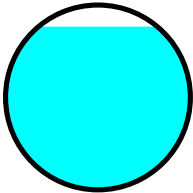
Summary for Reach 5R: Prop. Drain DMH x to DMH x

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 3.16" for 100-year Storm event
Inflow = 3.76 cfs @ 12.10 hrs, Volume= 0.279 af
Outflow = 3.76 cfs @ 12.11 hrs, Volume= 0.279 af, Atten= 0%, Lag= 0.3 min
Routed to Pond 3P : Recharge System C

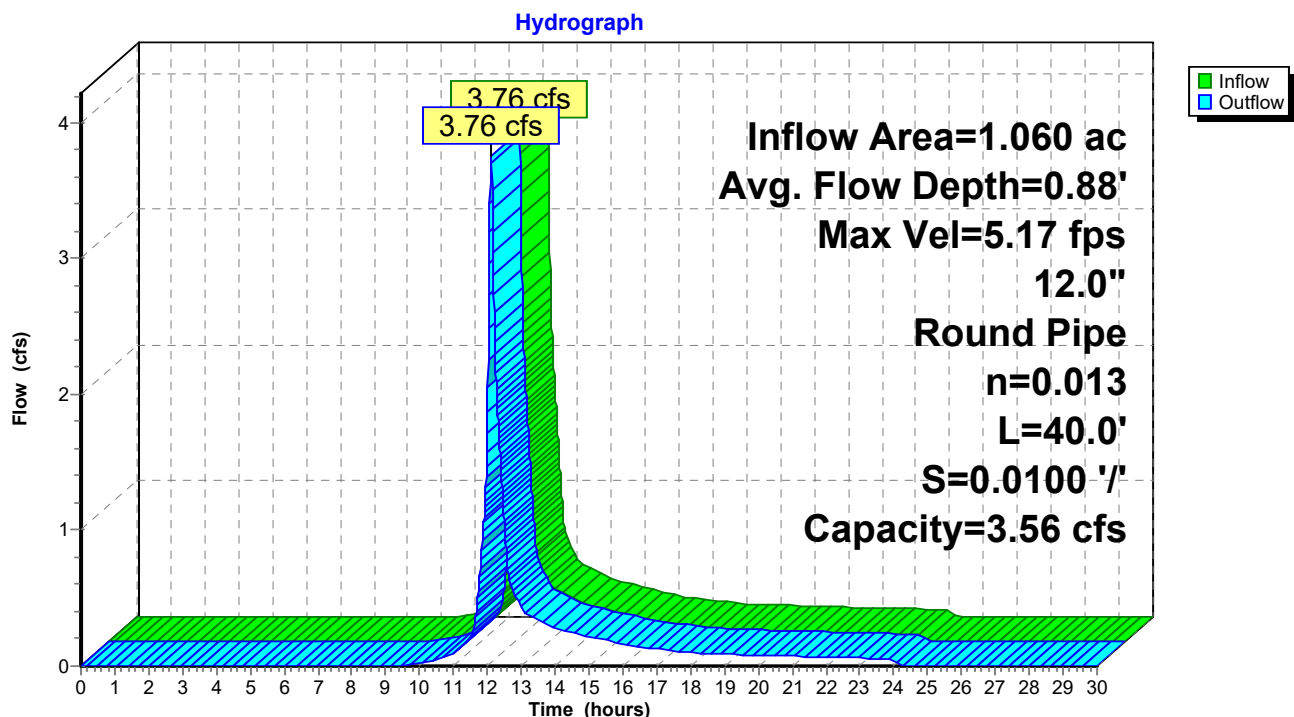
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.17 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.16 fps, Avg. Travel Time= 0.3 min

Peak Storage= 29 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.88' , Surface Width= 0.65'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.56 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 40.0' Slope= 0.0100 '/
Inlet Invert= 164.40', Outlet Invert= 164.00'



Reach 5R: Prop. Drain DMH x to DMH x

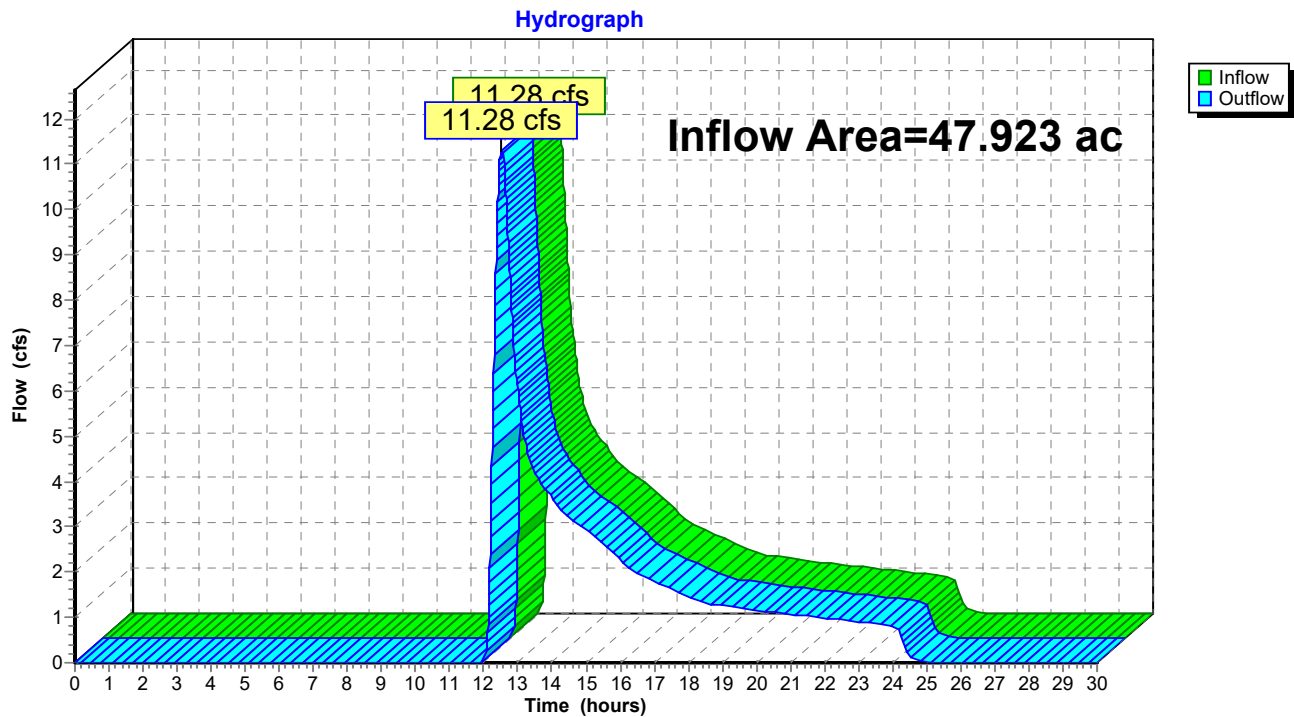


Summary for Reach DP: Design Point

Inflow Area = 47.923 ac, 7.45% Impervious, Inflow Depth = 0.57" for 100-year Storm event
Inflow = 11.28 cfs @ 12.53 hrs, Volume= 2.279 af
Outflow = 11.28 cfs @ 12.53 hrs, Volume= 2.279 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP: Design Point



Summary for Pond 1P: Recharge System A

Inflow Area = 3.638 ac, 9.45% Impervious, Inflow Depth = 0.88" for 100-year Storm event
 Inflow = 1.88 cfs @ 12.21 hrs, Volume= 0.268 af
 Outflow = 0.44 cfs @ 13.61 hrs, Volume= 0.268 af, Atten= 77%, Lag= 84.0 min
 Discarded = 0.44 cfs @ 13.61 hrs, Volume= 0.268 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 167.04' @ 13.61 hrs Surf.Area= 1,309 sf Storage= 2,557 cf

Plug-Flow detention time= 60.8 min calculated for 0.268 af (100% of inflow)
 Center-of-Mass det. time= 60.7 min (991.6 - 930.8)

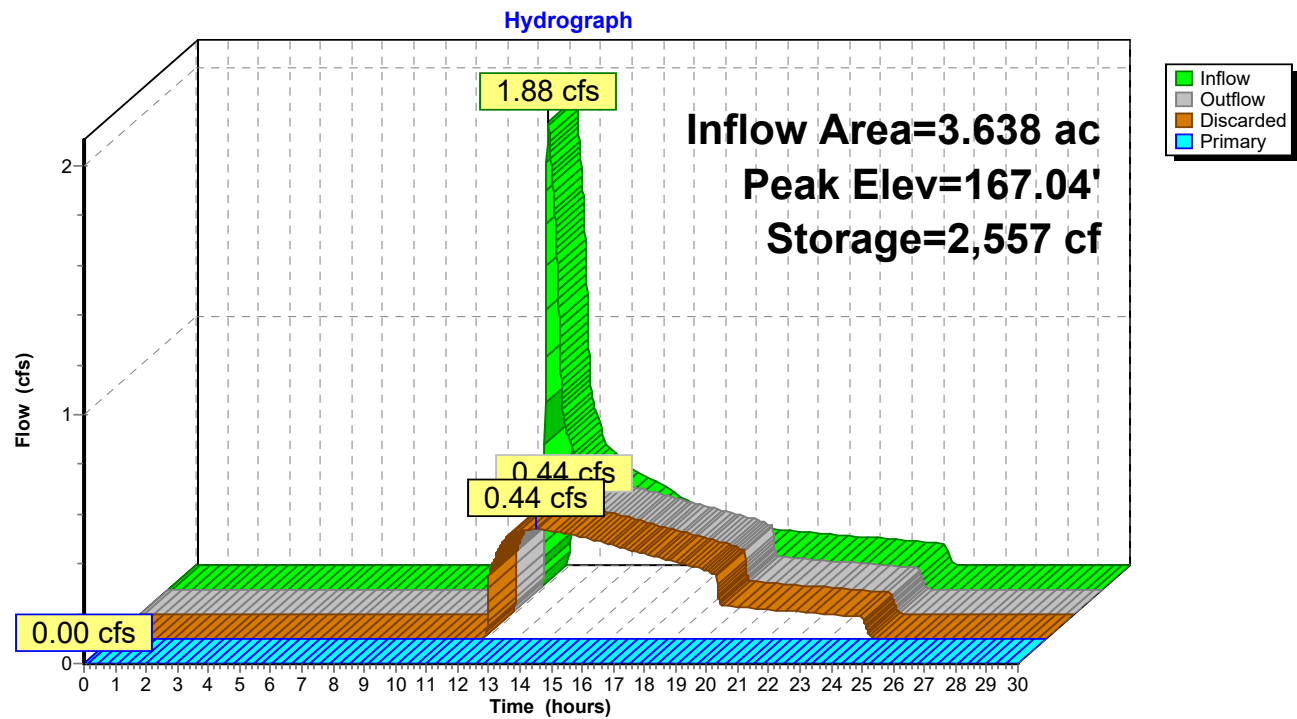
Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	1,608 cf	ADS_StormTech SC-740 b +Cap x 35 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	1,189 cf	25.25'W x 51.84'L x 3.50'H Prismatic 4,581 cf Overall - 1,608 cf Embedded = 2,973 cf x 40.0% Voids
		2,797 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	171.25'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.44 cfs @ 13.61 hrs HW=167.04' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Recharge System A



Summary for Pond 2P: Recharge System B

Inflow Area = 7.186 ac, 9.69% Impervious, Inflow Depth = 1.06" for 100-year Storm event
 Inflow = 5.59 cfs @ 12.13 hrs, Volume= 0.636 af
 Outflow = 1.42 cfs @ 12.82 hrs, Volume= 0.636 af, Atten= 75%, Lag= 41.6 min
 Discarded = 1.42 cfs @ 12.82 hrs, Volume= 0.636 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.57' @ 12.82 hrs Surf.Area= 3,257 sf Storage= 5,718 cf

Plug-Flow detention time= 37.4 min calculated for 0.636 af (100% of inflow)
 Center-of-Mass det. time= 37.4 min (951.0 - 913.6)

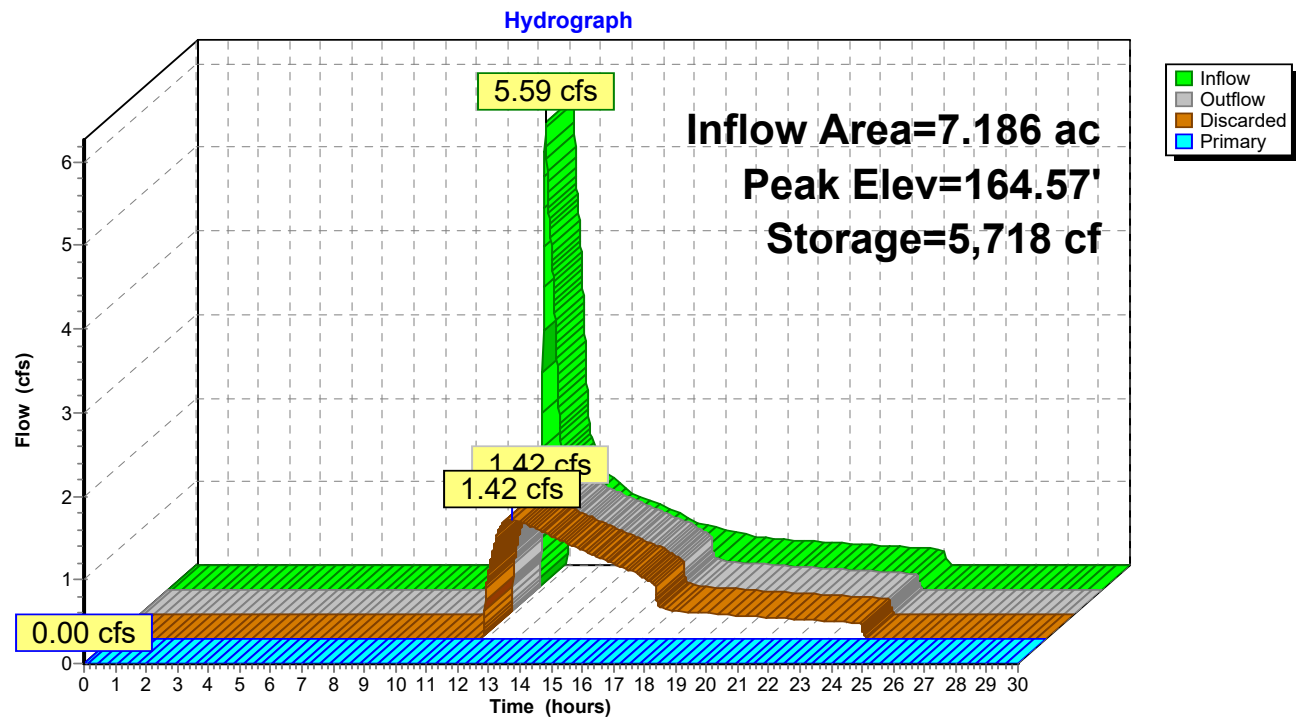
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	4,135 cf	ADS_StormTech SC-740 b +Cap x 90 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	2,907 cf	44.50"W x 73.20"L x 3.50'H Prisma toid 11,401 cf Overall - 4,135 cf Embedded = 7,266 cf x 40.0% Voids
		7,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=1.42 cfs @ 12.82 hrs HW=164.57' (Free Discharge)
 ↑**1=Exfiltration** (Controls 1.42 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 2P: Recharge System B



Summary for Pond 3P: Recharge System C

Inflow Area = 1.060 ac, 39.30% Impervious, Inflow Depth = 3.16" for 100-year Storm event
 Inflow = 3.76 cfs @ 12.11 hrs, Volume= 0.279 af
 Outflow = 0.86 cfs @ 12.55 hrs, Volume= 0.279 af, Atten= 77%, Lag= 26.7 min
 Discarded = 0.86 cfs @ 12.55 hrs, Volume= 0.279 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.84' @ 12.55 hrs Surf.Area= 1,848 sf Storage= 3,470 cf

Plug-Flow detention time= 34.5 min calculated for 0.279 af (100% of inflow)
 Center-of-Mass det. time= 34.5 min (880.8 - 846.3)

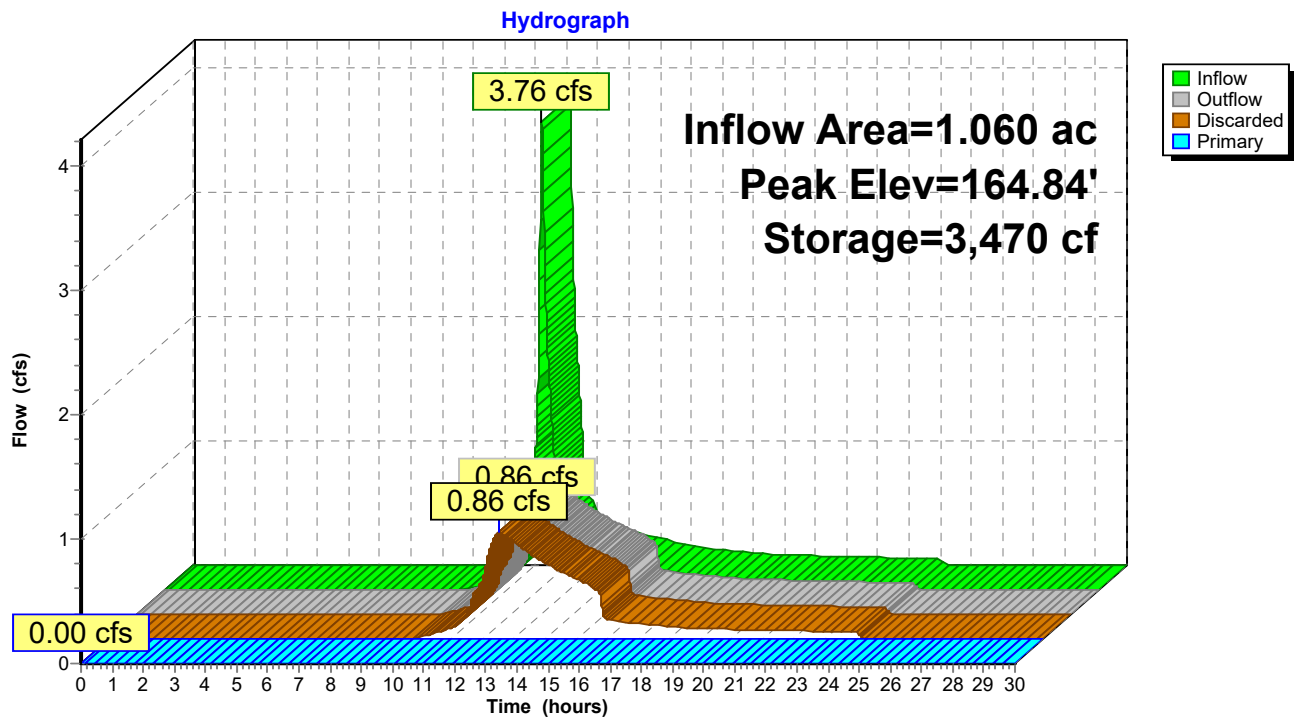
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	2,297 cf	ADS_StormTech SC-740 b +Cap x 50 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	1,669 cf	25.25'W x 73.20'L x 3.50'H Prismatic 6,469 cf Overall - 2,297 cf Embedded = 4,172 cf x 40.0% Voids
		3,966 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.86 cfs @ 12.55 hrs HW=164.84' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.86 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Recharge System C



Summary for Pond 4P: Recharge System D

Inflow Area = 1.273 ac, 41.36% Impervious, Inflow Depth = 3.26" for 100-year Storm event
 Inflow = 4.64 cfs @ 12.11 hrs, Volume= 0.346 af
 Outflow = 1.07 cfs @ 12.55 hrs, Volume= 0.346 af, Atten= 77%, Lag= 26.5 min
 Discarded = 1.07 cfs @ 12.55 hrs, Volume= 0.346 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach DP : Design Point

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 164.41' @ 12.55 hrs Surf.Area= 2,544 sf Storage= 4,214 cf

Plug-Flow detention time= 31.4 min calculated for 0.346 af (100% of inflow)
 Center-of-Mass det. time= 31.4 min (875.5 - 844.0)

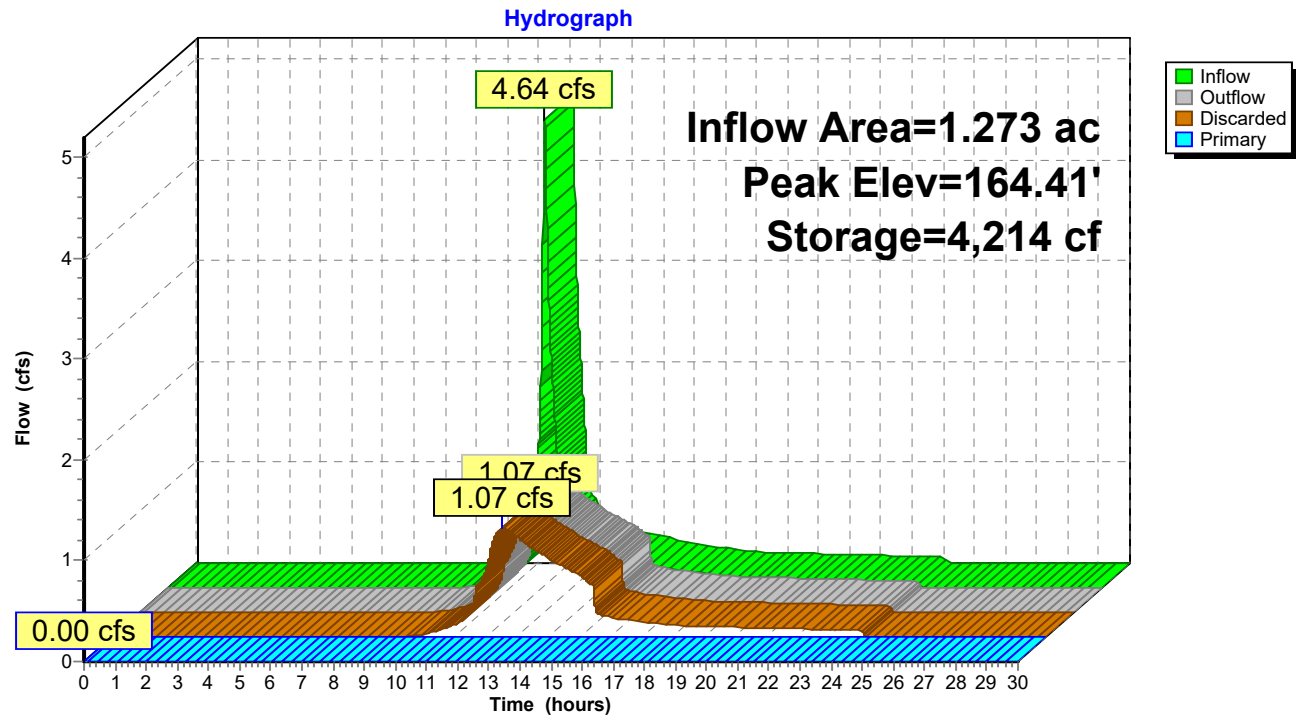
Volume	Invert	Avail.Storage	Storage Description
#1	162.50'	3,216 cf	ADS_StormTech SC-740 b +Cap x 70 Inside #2 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
#2	162.00'	2,275 cf	34.75'W x 73.20'L x 3.50'H Prismatic 8,903 cf Overall - 3,216 cf Embedded = 5,687 cf x 40.0% Voids
		5,491 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	162.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=1.07 cfs @ 12.55 hrs HW=164.41' (Free Discharge)
 ↑**1=Exfiltration** (Controls 1.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 4P: Recharge System D



Summary for Pond RAP1: Typical Roof Recharge Area 1

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth = 7.24" for 100-year Storm event
 Inflow = 0.22 cfs @ 12.08 hrs, Volume= 0.018 af
 Outflow = 0.05 cfs @ 12.47 hrs, Volume= 0.018 af, Atten= 77%, Lag= 23.4 min
 Discarded = 0.05 cfs @ 12.47 hrs, Volume= 0.018 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 165.67' @ 12.47 hrs Surf.Area= 187 sf Storage= 177 cf

Plug-Flow detention time= 18.9 min calculated for 0.018 af (100% of inflow)
 Center-of-Mass det. time= 18.9 min (761.0 - 742.1)

Volume	Invert	Avail.Storage	Storage Description
#1	164.50'	88 cf	ADS_StormTech SC-310 x 6 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#2	164.00'	139 cf	11.50'W x 16.24'L x 2.33'H Prismatic 435 cf Overall - 88 cf Embedded = 347 cf x 40.0% Voids
		227 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	164.00'	8.270 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 160.00'
#2	Primary	166.50'	6.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.47 hrs HW=165.67' (Free Discharge)
 ↑**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RAP1: Typical Roof Recharge Area 1

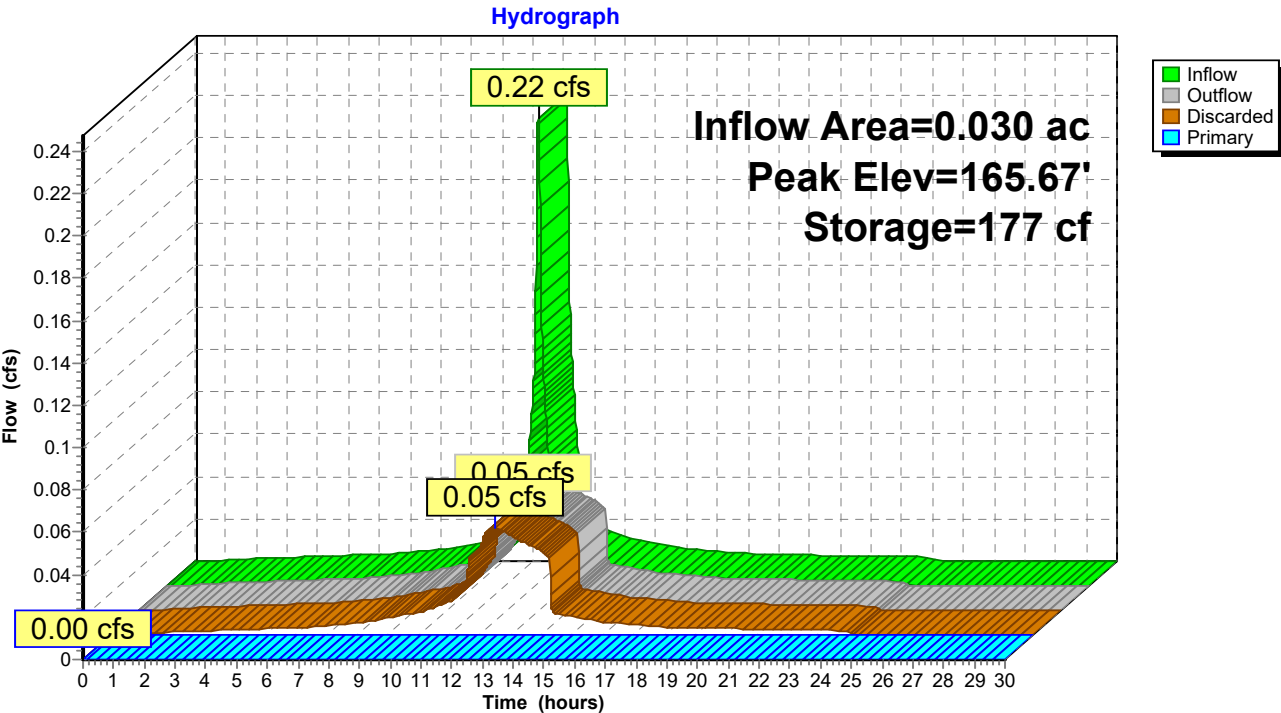


FIGURE 1

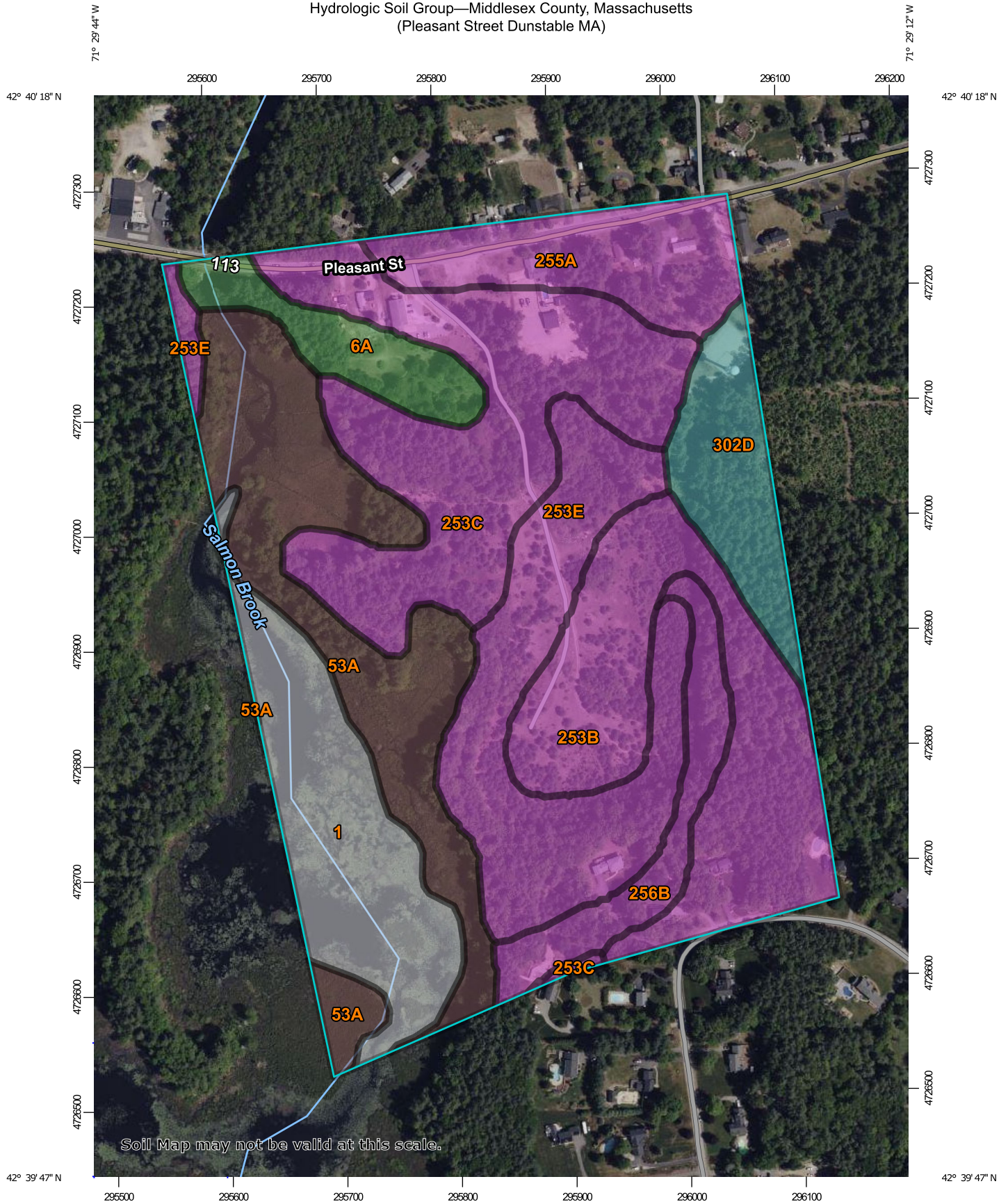
PRE-DEVELOPMENT WATERSHED DELINEATION

FIGURE 2

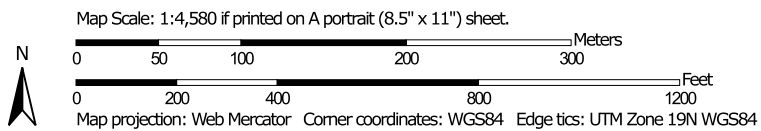
POST-DEVELOPMENT WATERSHED DELINEATION

FIGURE 3
SOILS MAP

Hydrologic Soil Group—Middlesex County, Massachusetts
(Pleasant Street Dunstable MA)



Soil Map may not be valid at this scale.



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/29/2025
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

A 

A/D 

B 

B/D 

C 

C/D 

D 

Not rated or not available 

Soil Rating Lines

A 

A/D 

B 

B/D 

C 

C/D 

D 

Not rated or not available 

Soil Rating Points

A 

A/D 

B 

B/D 

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

C 

C/D 

D 

Not rated or not available 

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: Middlesex County, Massachusetts
Survey Area Data: Version 24, Aug 27, 2024

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		8.9	11.3%
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	3.3	4.2%
53A	Freetown muck, ponded, 0 to 1 percent slopes	B/D	13.0	16.5%
253B	Hinckley loamy sand, 3 to 8 percent slopes	A	12.5	15.9%
253C	Hinckley loamy sand, 8 to 15 percent slopes	A	14.9	18.9%
253E	Hinckley loamy sand, 25 to 35 percent slopes	A	12.0	15.2%
255A	Windsor loamy sand, 0 to 3 percent slopes	A	5.8	7.4%
256B	Deerfield loamy fine sand, 3 to 8 percent slopes	A	3.7	4.7%
302D	Montauk fine sandy loam, 15 to 35 percent slopes, extremely stony	C	4.6	5.9%
Totals for Area of Interest			78.7	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

FIGURE 4
FLOOD INSURANCE RATE MAP

National Flood Hazard Layer FIRMMette

71°29'47"W 42°40'17"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS

- NO SCREEN
- Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

Cross Sections with 1% Annual Chance

- Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

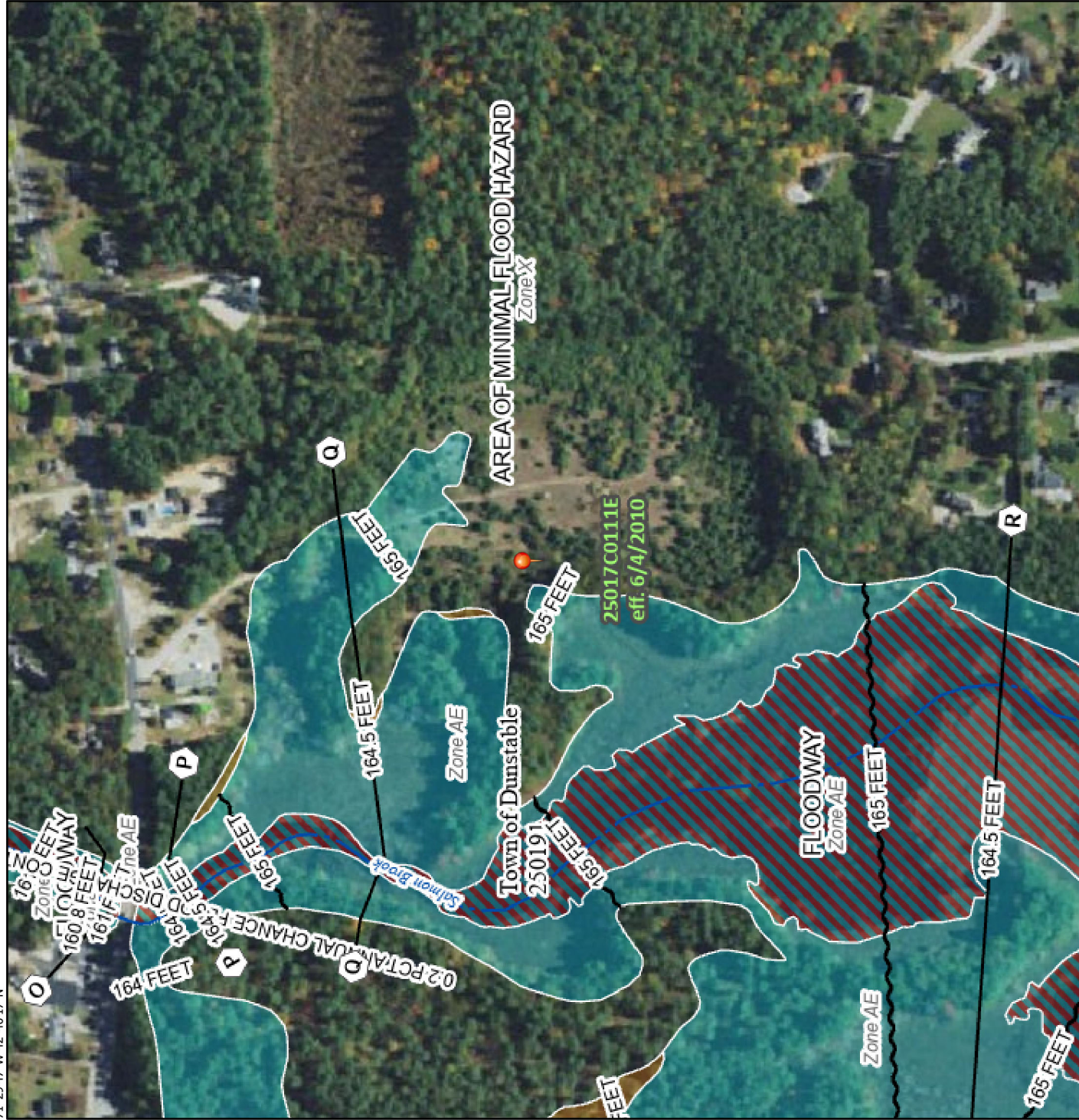
- Digital Data Available
- No Digital Data Available
- Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/24/2025 at 7:05 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmapped areas cannot be used for regulatory purposes.



71°29'10"W 42°39'50"N



1:6,000

Basemap Imagery Source: USGS National Map 2023

¹“Urban Hydrology for Small Watersheds (Technical Release Number 55); Engineering Division, United States Dept. of Agriculture, Soil Conservation Service (Jan. 1975).

²“National Engineering Handbook Section 4-Hydrology”; United States Dept. of Agriculture, Soil Conservation Service (March 1985)

³“HydroCAD” Drainage software developed by Applied Microcomputer, Page Hill Road, Chocorua, NH; Tel. (604) 927-RAIN
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