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STORM WATER DRAINAGE
CALCULATIONS

FOR
PROPOSED SUBDIVISION
BLOCK 102, LOT 9
SUBDIVISION

CITY OF NORTHFIELD
ATLANTIC COUNTY, NEW JERSEY

PREPARED BY:

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ANDREW F. SCHAEFFER, PE Sept. 13, 2024
NJPE No. 32883

Proj No. 24-223

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DESIGN METHODOLOGY:

BACKGROUND:

The site is proposed to be developed as a single family residential subdivision and situated on DocA (Downer) soil with an NRCS hydrologic soil group "B".

RAINFALL DEPTH:

ATLANTIC COUNTY	NRCS rainfall amounts from Table 5-1 in NJDEP BMP		
	2-Year	10- Year	100-Year
"rainfall" depths [inch]	3.31	5.16	8.9
"Current" rainfall factors	1.01	1.02	1.03
"Current" rainfall depths [inch]	**3.34**	**5.26**	**9.17**
"Future" rainfall factors (pg 17, chap 5) to "rainfall" depths	1.22	1.24	1.39
"Future" rainfall depths [inch]	**4.04**	**6.40**	**12.37**

GREEN INFRASTRUCTURE BMP's:

Specifically, the following Green Infrastructure (GI) management strategies have been employed:

1) GI small scale bioretention:

The site is proposing a Small Scale Bioretention swale east of the proposed street which will serve the entire 2.49 Ac drainage area.

All drainage runoff from street and driveway areas enters a forebay shown on the plans as located within the bio retention areas. The sizing data is noted on the plans.

In terms of N.J.A.C. 7:8-5.3(f):

1. All soil testing is in compliance with Chap. 12 of the NJBMP.
2. The small scale bioretention is compliant with design criteria noted in NJBMP Chap. 9.
3. Pretreatment is provided by a forebay sized to retain a minimum of 10% of in WQDS runoff volume.
4. No under drain is proposed for the small scale bioretention facilities proposed where exfiltration is also proposed.

5. Groundwater hydrology analysis is included in this report that includes exfiltration during the storm routing.
6. The exfiltrated or discarded storm water volume is the parameter used to determine the time for the basin to empty for ground water mounding calculations on small scale facilities.
7. The range of permeability at the bottom of the bio-retention which is 36 inches deep on soil log # 4 will be greater than the planting bed permeability of 5 in/hour.

2) Small scale sub-surface infiltration basin:

The proposal is to convey the discharge from the small scale bio-retention swales to the small scale sub-surface infiltration basin via an "E" inlet bio-retention discharge control to the proposed sub-surface basin. The discharge from the system is an overflow "E" inlet located in the south east corner of the site which is where storm water in the pre-developed condition discharges the site. The underlying soils below the infiltration basin will exceed 5 in/hour.

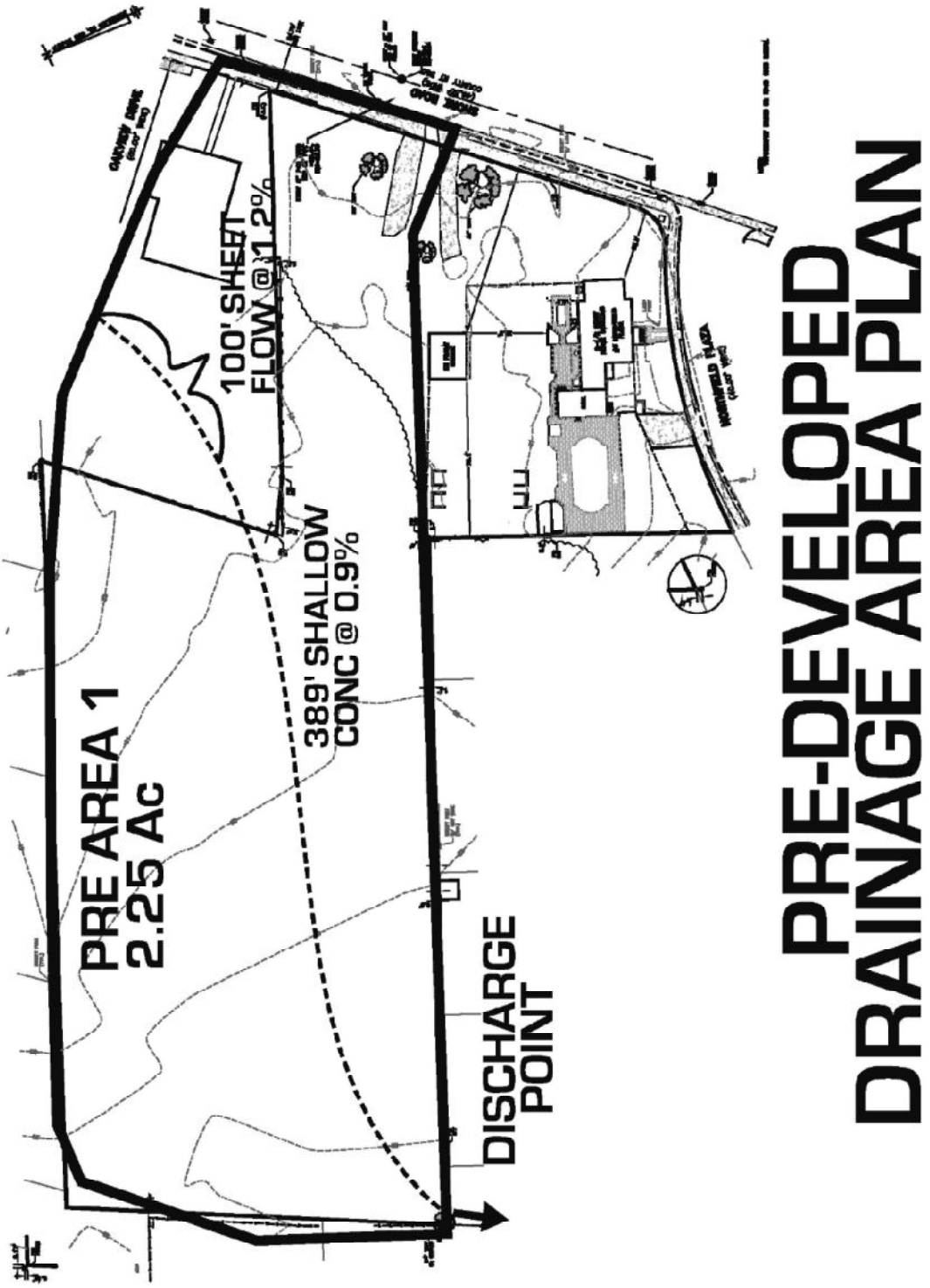
STORMWATER POLLUTANT REMOVAL STRATEGY:

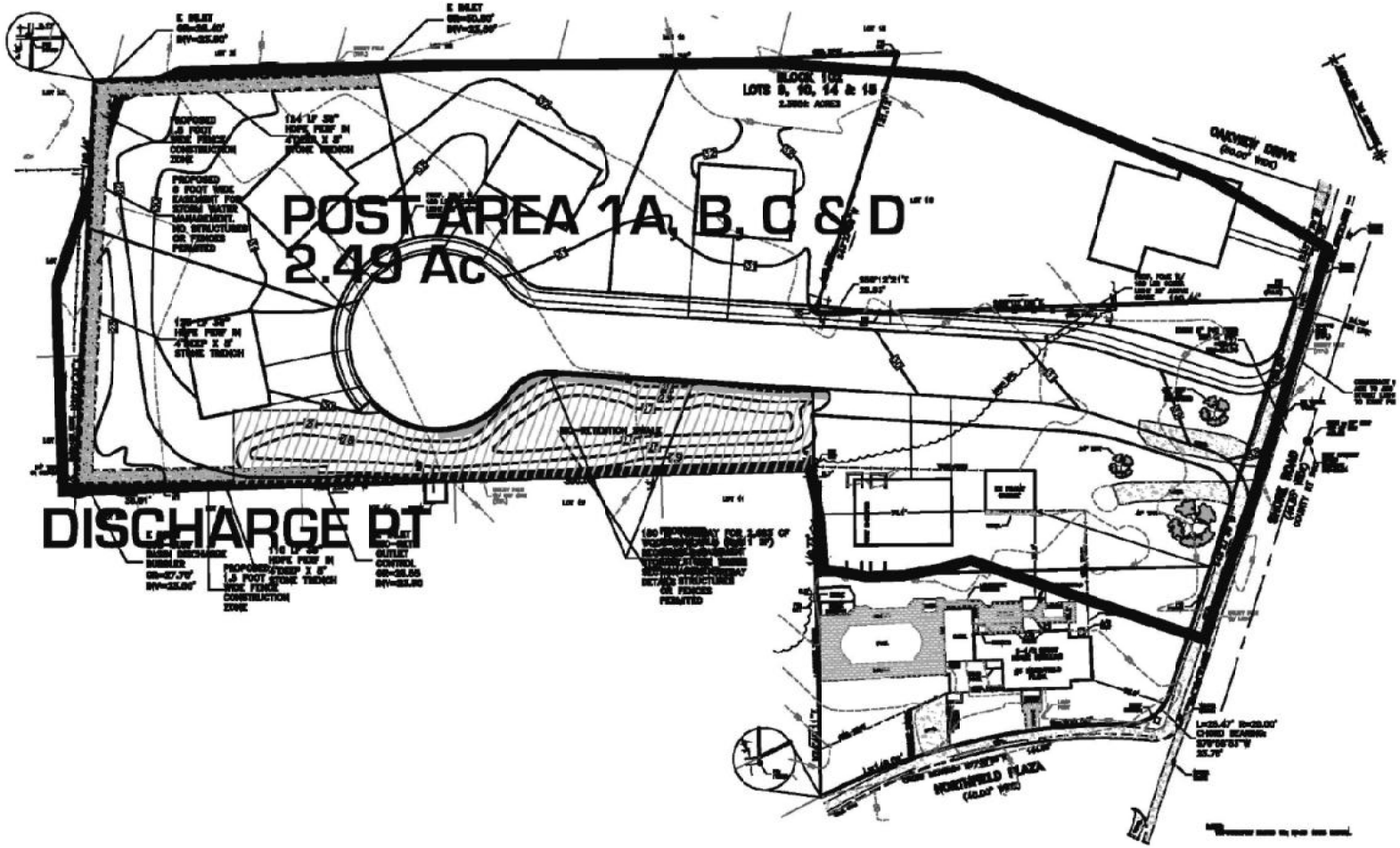
The methods and measures used to remove pollutants from stormwater runoff work hand in hand with the measures to remove total suspended solids (TSS). In this case, the basin has been designed to recharge or retain the difference in the 2-year pre and post storm, which by definition qualifies as an infiltration basin.

PATHWAY OF POSITIVE OUTFLOW:

The post developed runoff discharge points match the locations of the pre-developed discharge points.

DRAINAGE AREA PLANS:

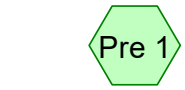




POST-DEVELOPED DRAINAGE AREA PLAN

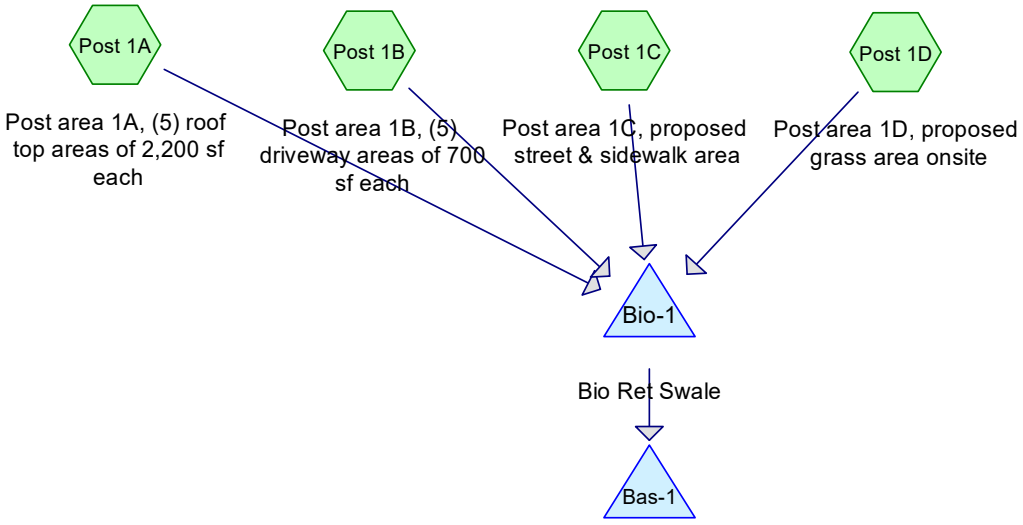
STORM WATER ROUTING DIAGRAM:

Pre-Developed Conditioins



Pre Area 1 (oniste only) to Discharge Pt 1

Post-Developed Conditions, Quince Ave.



Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface storage basin

SOILS MAP:

DoeA	100%	NRCS Hydrologic Soil Type B

ANNUAL GROUND WATER RECHARGE ANALYSIS:

The criteria of retaining or recharging the difference between the 2-year pre and post runoff event is exceeded.

Pre-Developed Areas:	**2-year runoff Vol. [cf]**
Pre area 1	2,657
Total Pre-Developed 2-year runoff:	**2,657**
Post-Developed Areas:	**2-year runoff Vol. [cf]**
post area 1A to 1D	10,400
Total Post-Developed 2-year runoff:	**10,400**
Difference between pre & post 2-yr runoff	**7,743**
Small Scale Infiltration Structure:	**Infiltration Vol. [cf] (discarded)**
Bio-1	3566
Basin 1	699
Total Infiltration Volume Available	**4,265**
Tot vol avail > 2-yr diff	

DISCHARGE POINT PERFORMANCE SUMMARIES

DISCHARGE POINT 1

STORM FREQ. EVENT	RUNOFF RATES Discharge to discharge pt 1			RUNOFF Discharge to discharge pt 1		
	PRE-DEV (cfs)	POST-DEV [cfs]	Percent Post of Pre [%]	PRE-DEV (cf)	POST-DEV [cf]	Percent Post of Pre [%]
Water Quality	0.00	0.00	0%	0	0	0%
2-year cur	0.35	0.00	0%	2,657	0	0%
2-year fut	0.76	0.00	0%	4,763	0	0%
10-year cur	1.73	0.00	0%	9,403	0	0%
10-year fut	2.82	0.00	0%	14,578	0	0%
100-year cur	5.87	0.47	8%	29,401	9,902	34%
100-year fut	9.81	1.62	17%	48,968	29,367	60%

STORM FREQ. EVENT	Bio-Retention Swale 1 Results						
	Basin INFLOW RATE (cfs]	Basin STAGE (ft]	PEAK Basin DEPTH (ft]	Basin Peak STORAGE (cf]	Basin discharge rate (cfs]	Basin exfiltration rate (cfs]	DISCHARGE WEIR VELOCITY (fps]
1.25 inch in (2) hour water qual.	2.24	27.85	0.85	2,272	0.00	0.07	0.00
2 future	3.58	28.61	1.61	6,548	0.72	0.07	0.80
10 future	6.54	28.75	1.75	7,563	4.32	0.07	1.45
100 future	15.03	28.97	1.97	9,370	13.41	0.07	2.11

Basin Bottem Elev =	27.00	feet	
Number of discharge weirs =	1	each	Weir is an "E" inlet
Width [ft] of each weir =	10.00	feet	
Weir crest elevation [ft] =	28.55	feet	

	Infiltration Basin 1 Results						
STORM FREQ. EVENT	Basin INFLOW RATE (cfs]	Basin STAGE (ft]	PEAK Basin DEPTH (ft]	Basin Peak STORAGE (cf]	Basin "E" inlet discharge rate (cfs]	2 1/2" orifice flow rate (cfs]	MAIN WEIR VELOCITY (fps]
1.25 inch in (2) hour water qual.	0.00	23.50	0.00	0	0.00	0.00	0.00
2 future	0.72	25.00	1.50	1,903	0.00	0.12	0.00
10 future	4.32	27.67	4.17	14,305	0.00	0.12	0.00
100 future	13.41	28.00	4.50	38,526	1.62	0.12	1.62

Basin Bottem Elev = 23.50 feet
Number of discharge weirs = 1 each Weir is an "E" inlet
Width [ft] of each weir = 4.00 feet
Weir crest elevation [ft] = 27.70 feet

REMOVAL OF PHOSPHOROUS, NITROGEN & SUSPENDED SOLIDS (TSS):

TSS removal from NJDEPBMP Table 4-1 and TN removal Table 4.2		post-developed conditions		post-developed cumulative removal rate
Discharge		bio-retention	infiltration basin	
Point 1	TSS removal	80%	80%	**96%**
	Nitrogen removal	30%	50%	**65%**
	Phosporous removal	60%	60%	**84%**

STORM CONDUIT OUTLET PROTECTION CALCULATIONS:

There are no proposed rip rap aprons nor is there any discharge velocities over 2 fps.

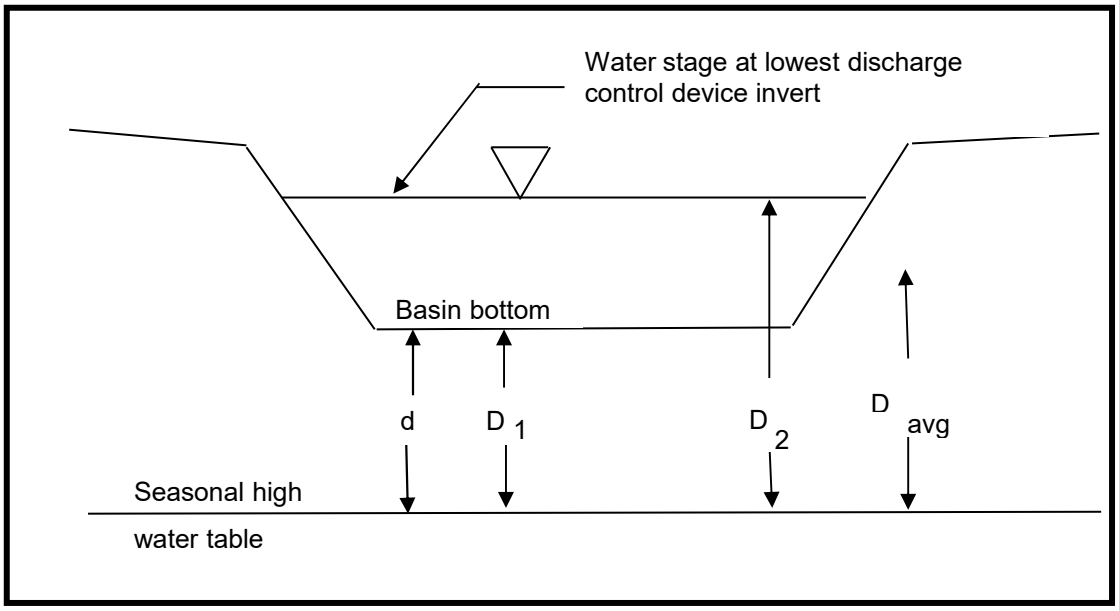
EMERGENCY OVERFLOW SPILLWAY DESIGN:

The proposed basin is situated such that it for storms greater than a 100-year event will still be directed to the same discharge point. .

TIME TO EMPTY BASIN CALCULATION:

TIME TO EMPTY BIO-1 CALCULATION:

(FROM BMP CHAPTER 9.5, G)



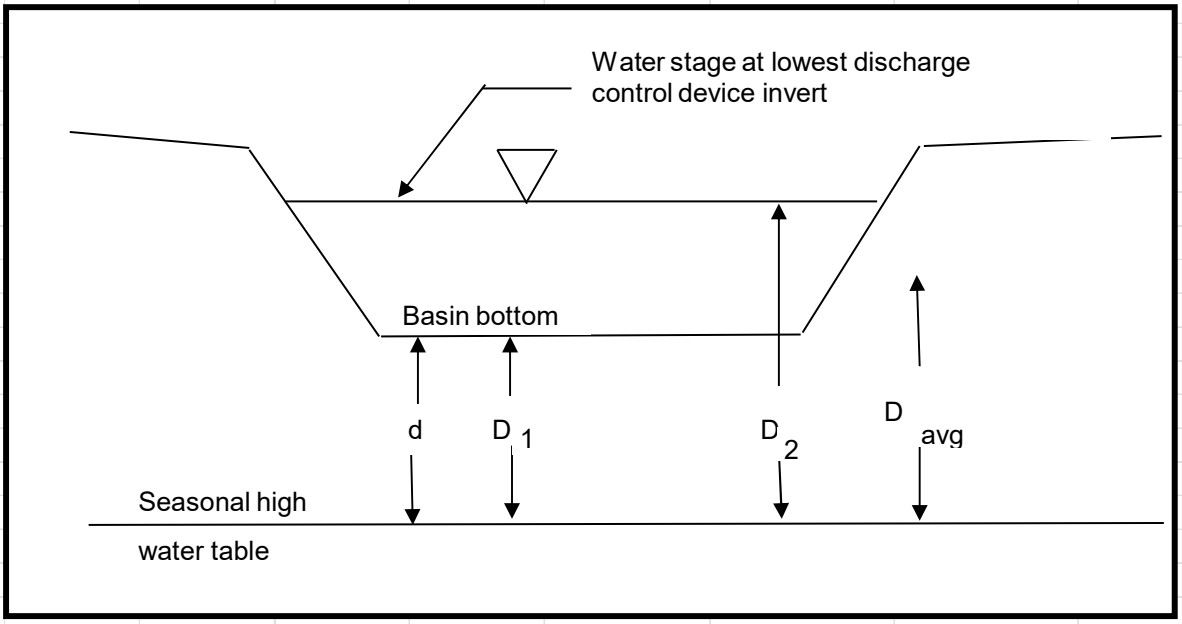
	SHWT EL =	**25**	**ft**
	PEAK STAGE	**28.97**	**ft**
	BAS BOT El =	**27**	**ft**
o IN THIS CASE, THE PERM RATE USED IS THE MINIMUM RANGE FOR THE PLANTING BED (5.0 IN/HR) SINCE UNDERLYING SOIL IS FASTER	**d =**	**2**	**ft**
	D1 =	**2**	**ft**
	D2 =	**3.97**	**ft**
	D avg =	**2.985**	**ft**
o PERM RATE USED FOR CALC **5** in/hour	**so K =**	**0.000116**	**fps**
	I = Davg/d =	**1.49**	**ft**
o PERCOLATION AREA OF BASIN	**A =**	**1,226**	**sf**
"K" WITH A FACTOR OF SAFETY OF 2.0 INLUDED	**Ksafe =**	**0.0001**	**fps**
o VOLUME OF WATER TO BE PERCOLATED **(From bottom open basin to lowest discharge control invert elev.)**	**=**	**9,370**	**cf**
	Q =	**0.1**	**cfs**
o **TIME TO EMPTY BASIN (100 YR FUTURE) =**	**=**	**36.7**	**hours**

Replace soil if restrictive soils found

NJDEP BMP SECTION 9.5-B REQUIRES THAT THE MAXIMUM DESIGN STORM PERCOLATE WITHIN 72-HOURS

TIME TO EMPTY BASIN-1 CALCULATION:

(FROM BMP CHAPTER 9.5, G)



	SHWT EL =	**21**	**ft**
	PEAK STAGE	**28**	**ft**
	BAS BOT El =	**23.5**	**ft**
o IN THIS CASE, THE PERM RATE USED IS THE	**d =**	**2.5**	**ft**
MIN RANGE FOR THE "K4" REPALCEMENT SOIL	**D1 =**	**2.5**	**ft**
MAKING UP THE UPPER 2 FT OF BASIN BOTTOM	**D2 =**	**7**	**ft**
	D avg =	**4.75**	**ft**
o PERM RATE USED FOR CALC **5** in/hour	**so K =**	**0.000115741**	**fps**
.	**I = Davg/d =**	**1.90**	**ft**
o PERCOLATION AREA OF BASIN	**A =**	**2,045**	**sf**
"K" WITH A FACTOR OF SAFETY OF 2.0 INLUDED	**Ksafe =**	**0.0001**	**fps**
o VOLUME OF WATER TO BE PERCOLATED	**=**	**8,885**	**cf**
(From bottom of basin to lowest discharge control invert elev.)			
	Q =	**0.1**	**cfs**
o **TIME TO EMPTY BASIN (100 YR FUTURE) =**	**=**	**20.9**	**hours**

Soil replacement only if restrictive soils found

NJDEP BMP SECTION 9.5-B REQUIRES THAT THE MAXIMUM DESIGN STORM PERCOLATE WITHIN 72-HOURS

GROUND WATER MOUNDING ANALYSIS:

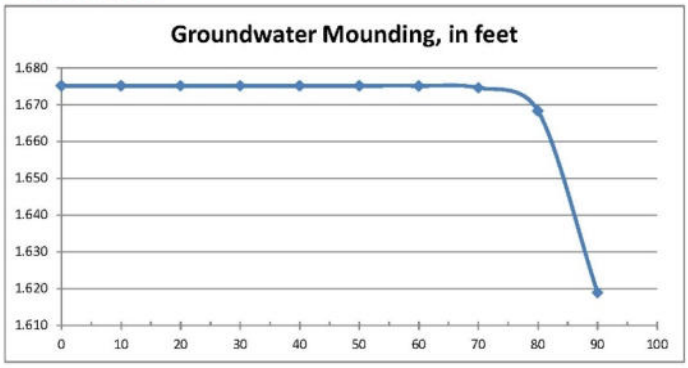
Input Values

3.00	R	Recharge rate (permeability rate) (in/hr)
0.200	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
12.50	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
107.000	x	1/2 length of basin (x direction, in feet)
15.000	y	1/2 width of basin (y direction, in feet)
1.50	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)
11.675	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.675	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.675	0
1.675	10
1.675	20
1.675	30
1.675	40
1.675	50
1.675	60
1.675	70
1.668	80
1.619	90

Re-Calculate Now

SEAONAL HIGH WATER TABLE



Bioretention Swale **1** (Small scale bioretention swale)

Duration of infiltration [hrs] = Discarded vol via exfiltration [cf] x 12 [in/ft] / Infiltration area [sf] **X** exfiltration rate [in/hr]

T[hr] = **2,875** cf x 12 in/ft / **1476** sf x **3** in/hr = 7.8 hours

o Discarded vol from WQDS

Plnt bed thick=	**2.0** ft			
△ h =	**1.9** ft			
SHWT El =	**22** ft			
Bio Bot El =	**27** ft	so, bottom of planting bed	**25.0**	ft
Max Mound =	**23.9** ft	**is below**	bottom of **2.0**	ft thick planting bed

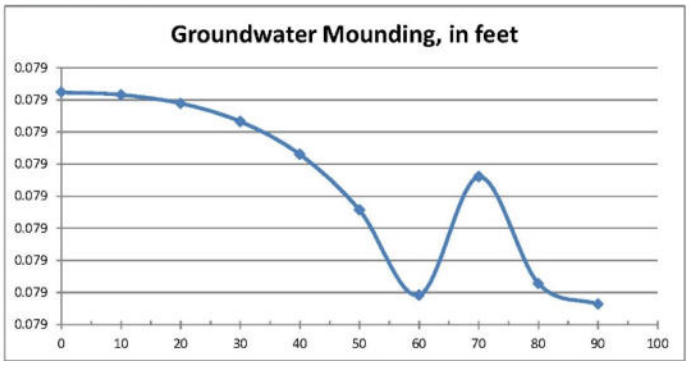
Input Values

2.50	R	Recharge rate (permeability rate) (in/hr)
0.200	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
12.50	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
204.500	x	1/2 length of basin (x direction, in feet)
2.500	y	1/2 width of basin (y direction, in feet)
0.10	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)
10.079	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
0.079	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.079	0
0.079	10
0.079	20
0.079	30
0.079	40
0.079	50
0.079	60
0.079	70
0.079	80
0.079	90

Re-Calculate Now

SEAONAL HIGH WATER TABLE



Infiltration Basin **1** (Small scale infiltration basin)

Duration of infiltration [hrs] = Discarded vol via exfiltration [cf] x 12 [in/ft] / Infiltration area [sf] x exfiltration rate [in/hr]

T[hr] = **0** cf x 12 in/ft / **2045** sf x **2.5** in/hr = 0.0 hours

o Discarded vol from WQDS

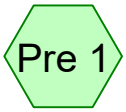
Δ h =	**0.08** ft	
SHWT El =	**20** ft	
Basin Bot El =	**23.5** ft	
Max Mound =	**20.08** ft	**which is below** bottom of basin elev of **23.5** ft

PIPE CAPACITY CALCULATIONS:

All pipes are discharge or storage pipes and are addressed in the Hyrocad routing.

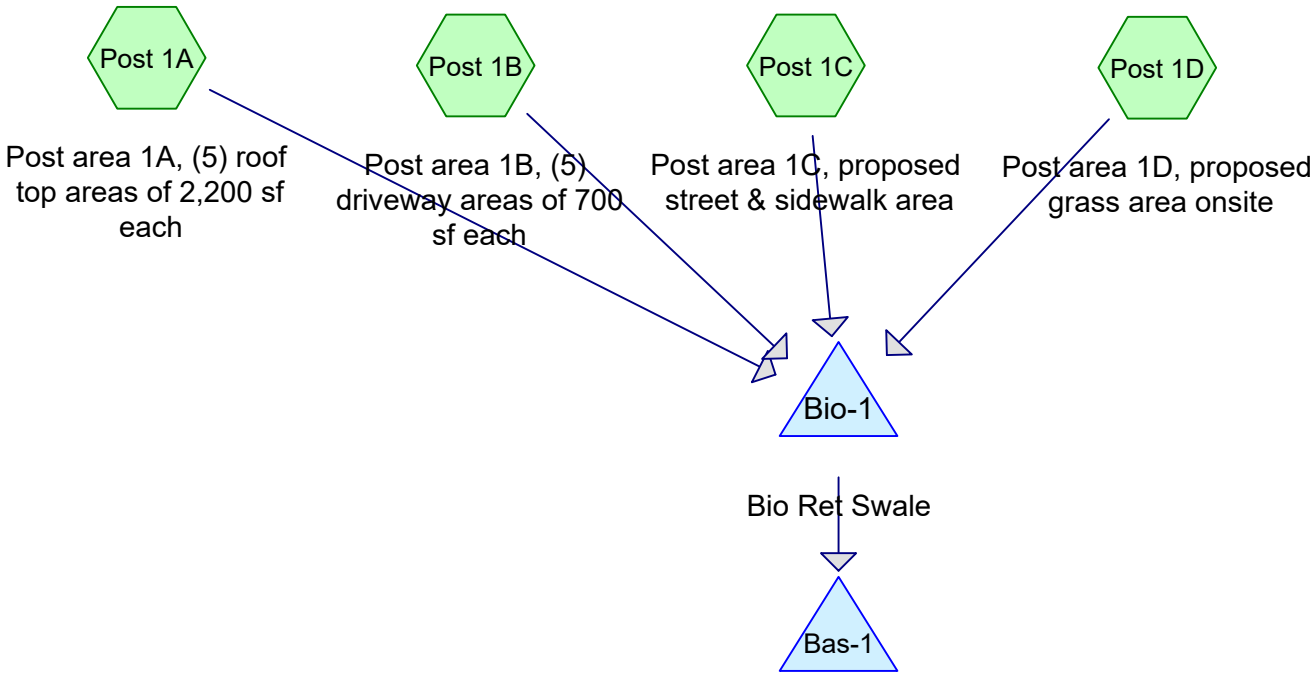
RUNOFF AND ROUTING HYDROCAD CALCULATIONS

Pre-Developed Conditioins



Pre Area 1 (oniste only)
to Discharge Pt 1

Post-Developed Conditions, Quince Ave.



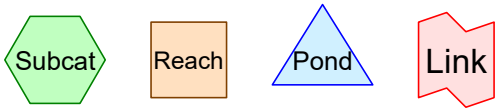
Post area 1A, (5) roof top areas of 2,200 sf each

Post area 1B, (5) driveway areas of 700 sf each

Post area 1C, proposed street & sidewalk area

Post area 1D, proposed grass area onsite

Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface storage basin



Routing Diagram for 24-223 basin-01
Prepared by Schaeffer Nassar Scheidegg, Printed 10/2/2024

Project Notes

Rainfall events imported from "Basin-02.hcp"
Rainfall events imported from "NRCS-Rain.txt" for 6604 NJ Cape May-C

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	Water Quality	NJ DEP 2-hr		Default	2.00	1	1.25	2
2	2-Year current	NOAA 24-hr	C	Default	24.00	1	3.34	2
3	2-Year Future	NOAA 24-hr	C	Default	24.00	1	4.04	2
4	10-Year current	NOAA 24-hr	C	Default	24.00	1	5.26	2
5	10-Year Future	NOAA 24-hr	C	Default	24.00	1	6.40	2
6	100-Year current	NOAA 24-hr	C	Default	24.00	1	9.17	2
7	100-Year Future	NOAA 24-hr	C	Default	24.00	1	12.37	2

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPost 1A: Post area 1A, (5) Runoff Area=11,000 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=145' Tc=1.2 min CN=98 Runoff=0.79 cfs 948 cf

SubcatchmentPost 1B: Post area 1B, (5) Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=124' Tc=1.2 min CN=98 Runoff=0.25 cfs 302 cf

SubcatchmentPost 1C: Post area 1C, Runoff Area=16,621 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=105' Tc=1.1 min CN=98 Runoff=1.20 cfs 1,433 cf

SubcatchmentPost 1D: Post area 1D, Runoff Area=77,343 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=265' Tc=20.2 min CN=61 Runoff=0.00 cfs 0 cf

SubcatchmentPre 1: Pre Area 1 (oniste Runoff Area=98,084 sf 3.83% Impervious Runoff Depth=0.00"
Flow Length=489' Tc=32.4 min CN=58 Runoff=0.00 cfs 0 cf

Pond Bas-1: Basin 1, Post discharge point 1, Existing Peak Elev=23.50' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond Bio-1: Bio Ret Swale Peak Elev=27.85' Storage=2,272 cf Inflow=2.24 cfs 2,683 cf
Discarded=0.07 cfs 2,685 cf Primary=0.00 cfs 0 cf Outflow=0.07 cfs 2,685 cf

Total Runoff Area = 206,548 sf Runoff Volume = 2,683 cf Average Runoff Depth = 0.16"
83.11% Pervious = 171,666 sf 16.89% Impervious = 34,882 sf

Summary for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

[49] Hint: Tc<2dt may require smaller dt

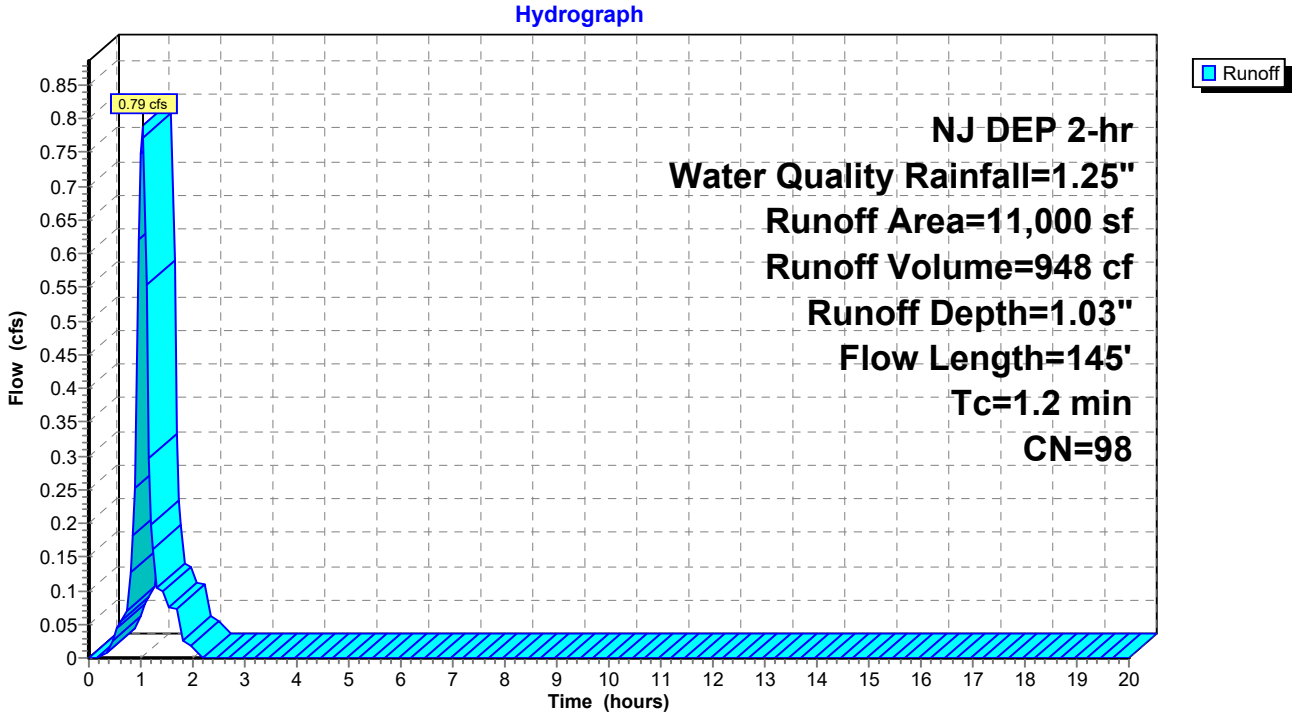
Runoff = 0.79 cfs @ 1.03 hrs, Volume= 948 cf, Depth= 1.03"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Water Quality Rainfall=1.25"

	Area (sf)	CN	Description
*	11,000	98	(18) 918 sf roofs
	11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.2000	2.34		**Sheet Flow, roof** Smooth surfaces n= 0.011 P2= 2.80"
0.4	45	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, gutter flow** Paved Kv= 20.3 fps
1.2	145	Total			

Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each



Summary for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

[49] Hint: Tc<2dt may require smaller dt

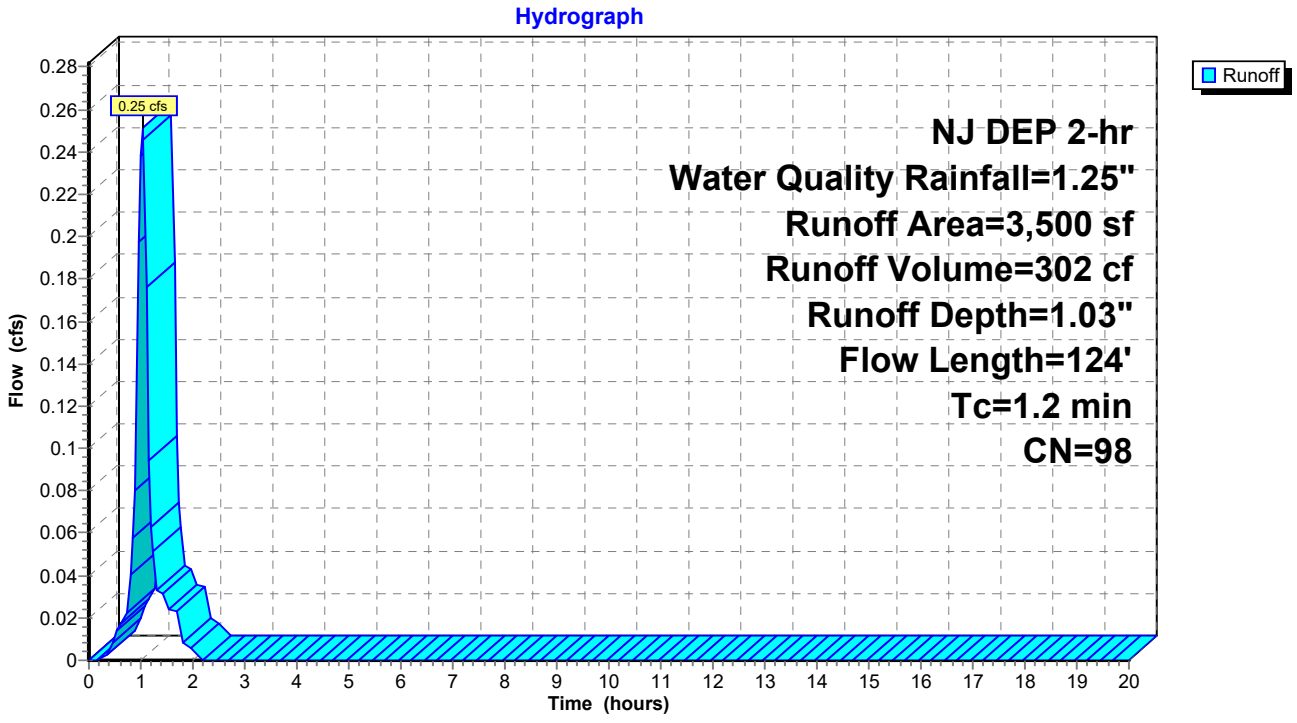
Runoff = 0.25 cfs @ 1.03 hrs, Volume= 302 cf, Depth= 1.03"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Water Quality Rainfall=1.25"

	Area (sf)	CN	Description
*	3,500	98	5 DRIVEWAYS
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.0350	1.37		**Sheet Flow, driveway** Smooth surfaces n= 0.011 P2= 2.80"
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.2	124	Total			

Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each



Summary for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

[49] Hint: Tc<2dt may require smaller dt

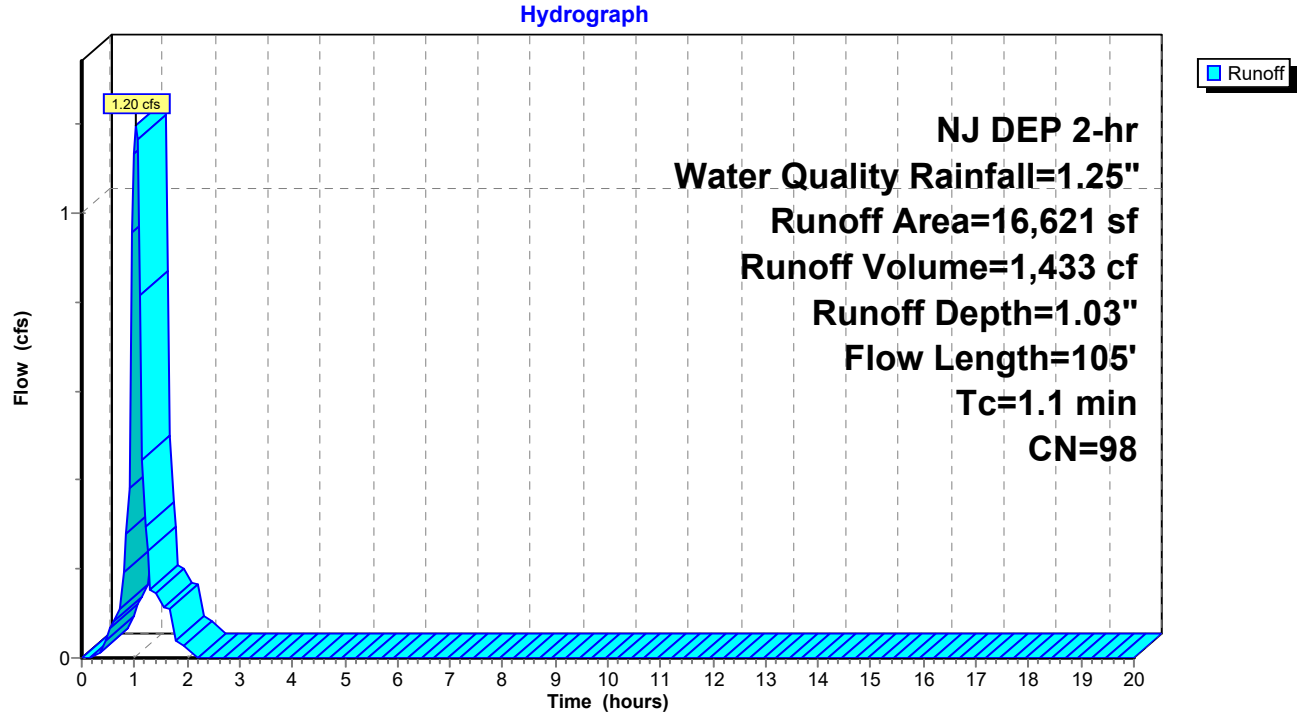
Runoff = 1.20 cfs @ 1.03 hrs, Volume= 1,433 cf, Depth= 1.03"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Water Quality Rainfall=1.25"

	Area (sf)	CN	Description
*	14,605	98	Proposed street area
*	2,016	98	Proposed sidewalk
	16,621	98	Weighted Average
	16,621		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0200	0.88		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.80"
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.1	105	Total			

Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area



Summary for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

[45] Hint: Runoff=Zero

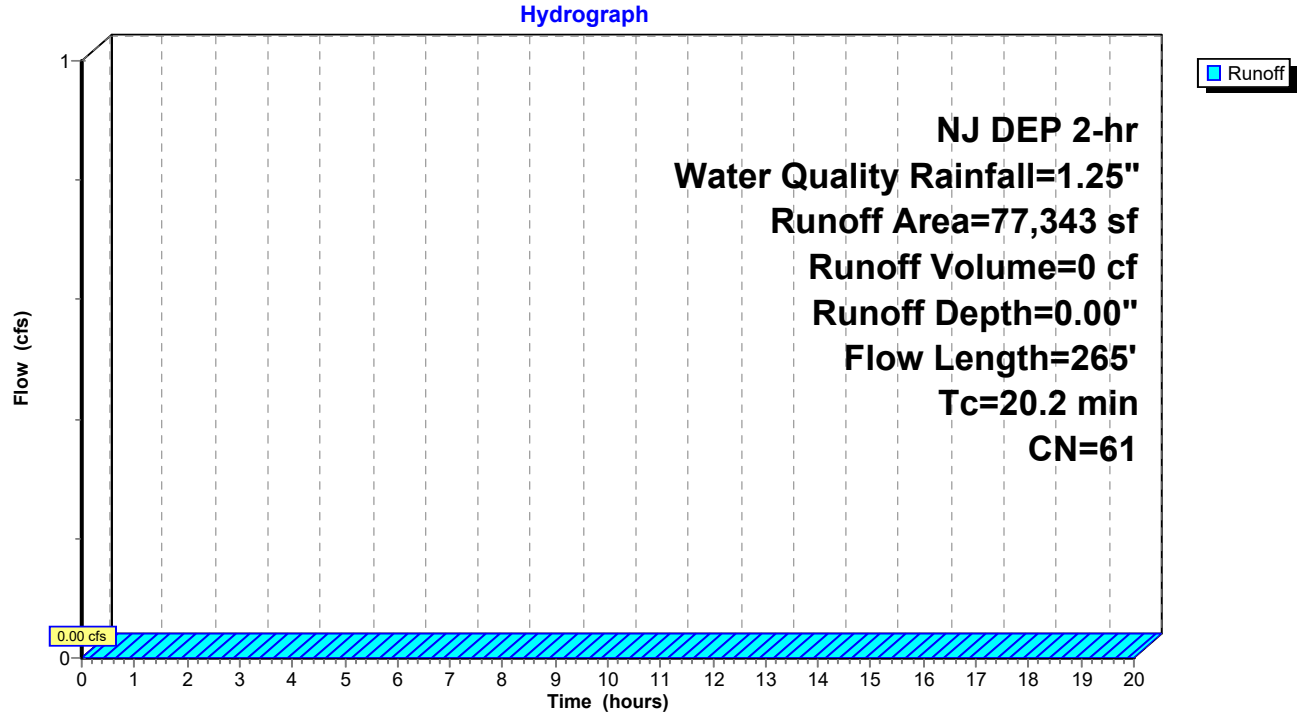
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Water Quality Rainfall=1.25"

	Area (sf)	CN	Description
*	77,343	61	Proposed onsite grass area
	77,343		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 2.80"
0.7	75	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
20.2	265	Total			

Subcatchment Post 1D: Post area 1D, proposed grass area onsite



Summary for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

[45] Hint: Runoff=Zero

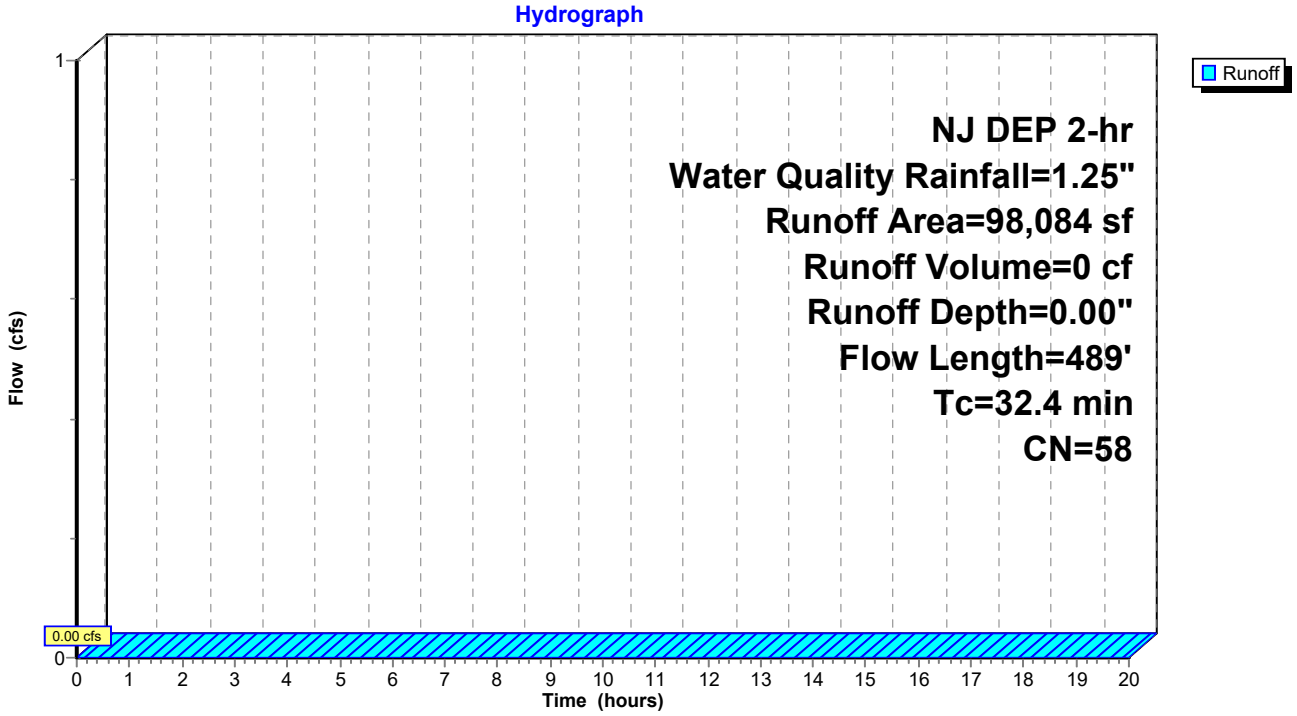
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to nonexistent node Pre Dis 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr Water Quality Rainfall=1.25"

	Area (sf)	CN	Description
*	2,430	98	exist roof
*	0	98	exist asphalt
*	1,331	98	exist conc
	17,505	61	>75% Grass cover, Good, HSG B
	76,818	55	Woods, Good, HSG B
	98,084	58	Weighted Average
	94,323		96.17% Pervious Area
	3,761		3.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, grass** Grass: Dense n= 0.240 P2= 2.80"
13.7	389	0.0090	0.47		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
32.4	489	Total			

Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1



r Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surfa

The infiltration area for the infiltration basin is 409 feet x 5 feet in width for 2,045 sf and use a consertative perm rate of 2.5 in/hour for a flow of 0.12 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth = 0.00" for Water Quality event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 23.50' @ 0.00 hrs Surf.Area= 1,268 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	23.50'	76,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

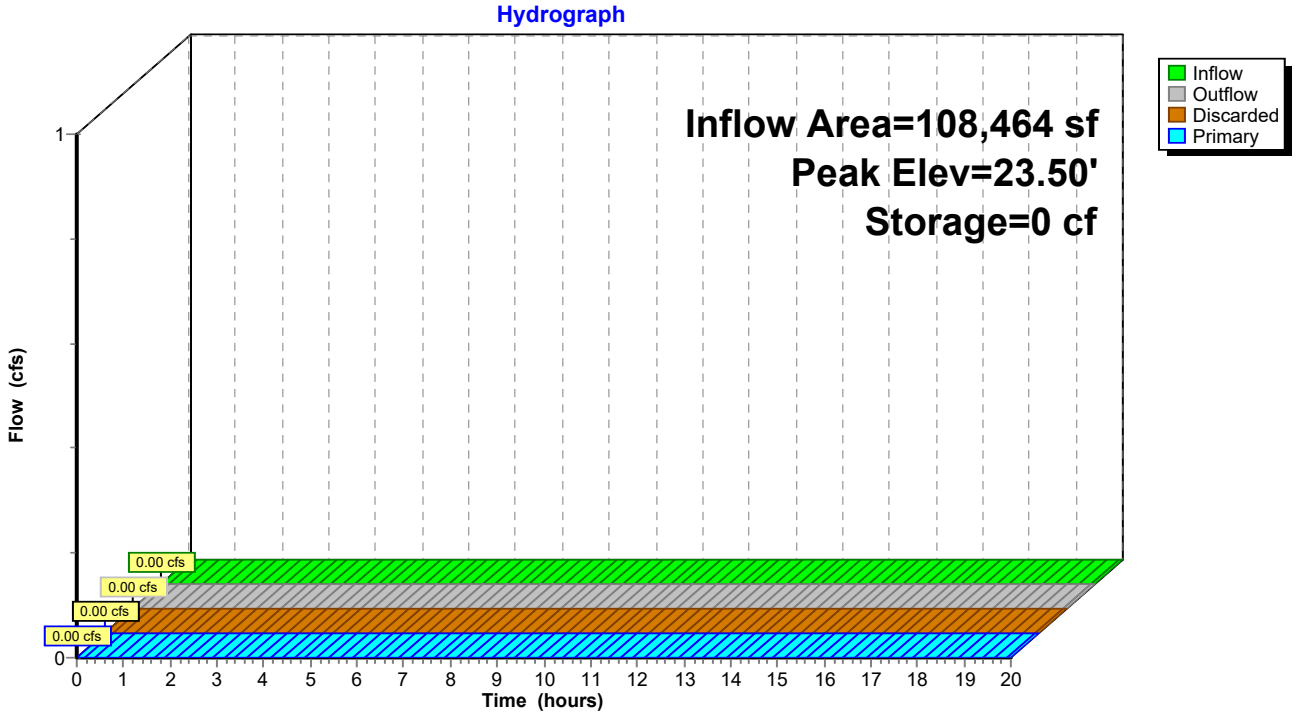
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	1,268	0	0
27.50	1,268	5,072	5,072
27.60	75,000	3,813	8,885
28.50	75,000	67,500	76,385

Device	Routing	Invert	Outlet Devices
#1	Primary	27.70'	**4.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	23.50'	**0.12 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.50' (Free Discharge)
↑—**2=Exfiltration** (Passes 0.00 cfs of 0.12 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface stor



Summary for Pond Bio-1: Bio Ret Swale

Exfiltration area is 1,226 sf or area of contour elev. 27. Use 5 in/hr as tested perm rate for a planting bed. Use 2.5 for factor of safety and resulting exfiltration rate is 0.07 cfs

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Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth = 0.30" for Water Quality event
Inflow = 2.24 cfs @ 1.03 hrs, Volume= 2,683 cf
Outflow = 0.07 cfs @ 0.65 hrs, Volume= 2,685 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.07 cfs @ 0.65 hrs, Volume= 2,685 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond Bas-1 : Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.85' @ 1.95 hrs Surf.Area= 4,149 sf Storage= 2,272 cf

Plug-Flow detention time= 276.4 min calculated for 2,679 cf (100% of inflow)
Center-of-Mass det. time= 277.1 min (342.9 - 65.8)

Volume	Invert	Avail.Storage	Storage Description
#1	27.00'	9,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

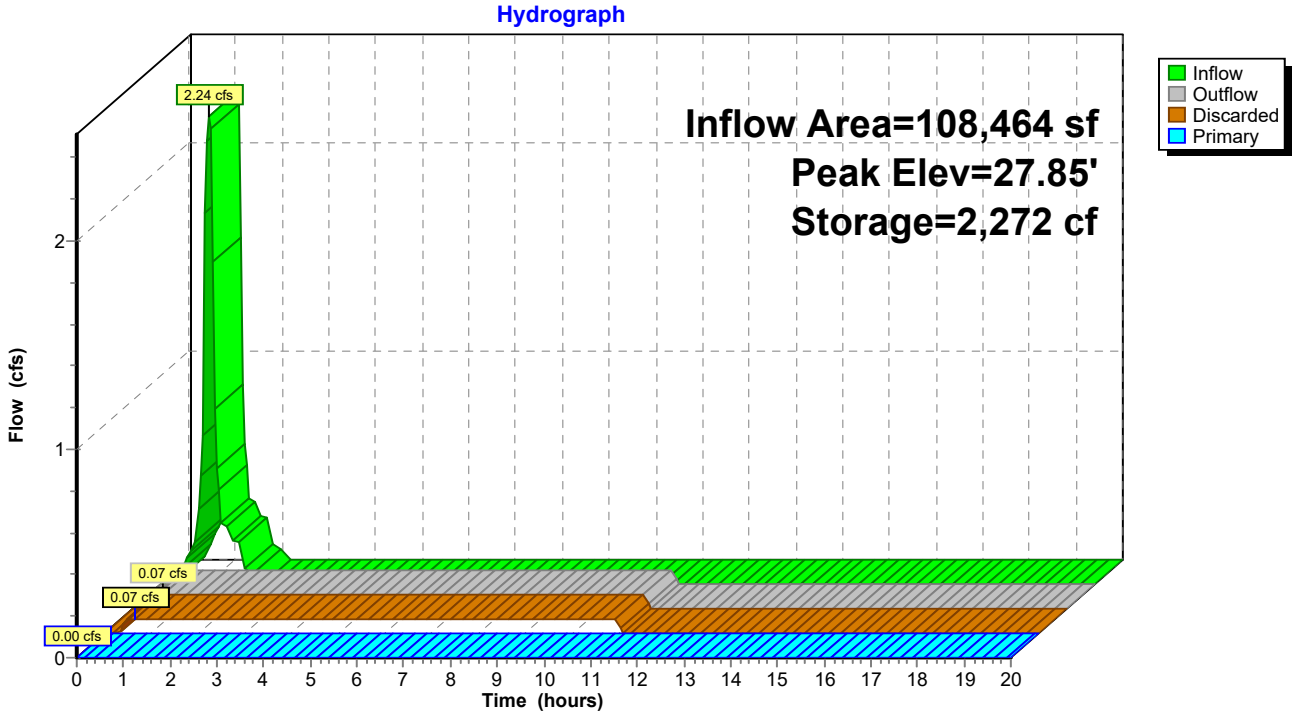
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.00	1,226	0	0
28.00	4,683	2,955	2,955
29.00	8,637	6,660	9,615

Device	Routing	Invert	Outlet Devices
#1	Primary	28.55'	**42.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	27.00'	**0.07 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.07 cfs @ 0.65 hrs HW=27.03' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=27.00' TW=23.50' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Controls 0.00 cfs)

Pond Bio-1: Bio Ret Swale



Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPost 1A: Post area 1A, (5) Runoff Area=11,000 sf 100.00% Impervious Runoff Depth>2.94"
Flow Length=145' Tc=1.2 min CN=98 Runoff=0.99 cfs 2,699 cf

SubcatchmentPost 1B: Post area 1B, (5) Runoff Area=3,500 sf 100.00% Impervious Runoff Depth>2.94"
Flow Length=124' Tc=1.2 min CN=98 Runoff=0.31 cfs 859 cf

SubcatchmentPost 1C: Post area 1C, Runoff Area=16,621 sf 100.00% Impervious Runoff Depth>2.94"
Flow Length=105' Tc=1.1 min CN=98 Runoff=1.49 cfs 4,078 cf

SubcatchmentPost 1D: Post area 1D, Runoff Area=77,343 sf 0.00% Impervious Runoff Depth>0.43"
Flow Length=265' Tc=20.2 min CN=61 Runoff=0.52 cfs 2,764 cf

SubcatchmentPre 1: Pre Area 1 (oniste Runoff Area=98,084 sf 3.83% Impervious Runoff Depth>0.33"
Flow Length=489' Tc=32.4 min CN=58 Runoff=0.35 cfs 2,657 cf

Pond Bas-1: Basin 1, Post discharge point 1, Peak Elev=23.50' Storage=0 cf Inflow=0.09 cfs 699 cf
Discarded=0.09 cfs 699 cf Primary=0.00 cfs 0 cf Outflow=0.09 cfs 699 cf

Pond Bio-1: Bio Ret Swale Peak Elev=28.56' Storage=6,228 cf Inflow=2.82 cfs 10,400 cf
Discarded=0.07 cfs 3,566 cf Primary=0.09 cfs 699 cf Outflow=0.16 cfs 4,265 cf

Total Runoff Area = 206,548 sf Runoff Volume = 13,057 cf Average Runoff Depth = 0.76"
83.11% Pervious = 171,666 sf 16.89% Impervious = 34,882 sf

Summary for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

[49] Hint: Tc<2dt may require smaller dt

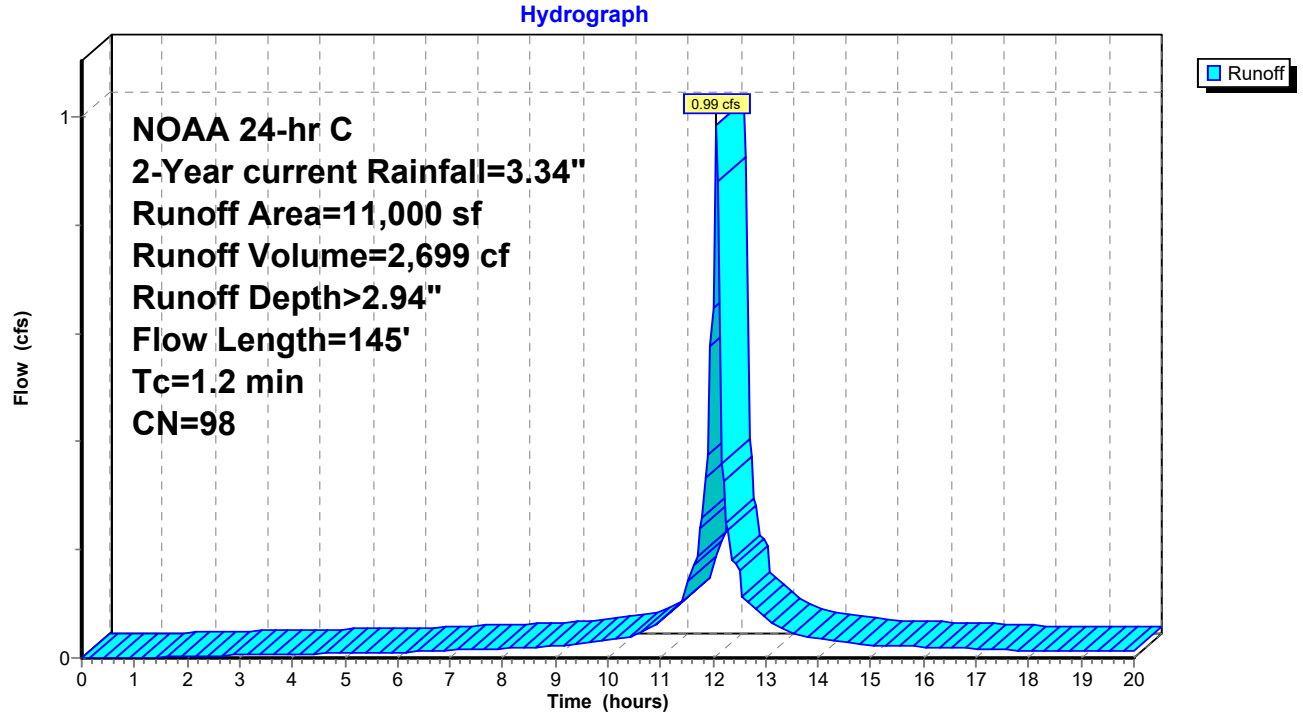
Runoff = 0.99 cfs @ 12.06 hrs, Volume= 2,699 cf, Depth> 2.94"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year current Rainfall=3.34"

	Area (sf)	CN	Description
*	11,000	98	(18) 918 sf roofs
	11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.2000	2.34		**Sheet Flow, roof** Smooth surfaces n= 0.011 P2= 2.80"
0.4	45	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, gutter flow** Paved Kv= 20.3 fps
1.2	145	Total			

Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each



Summary for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

[49] Hint: Tc<2dt may require smaller dt

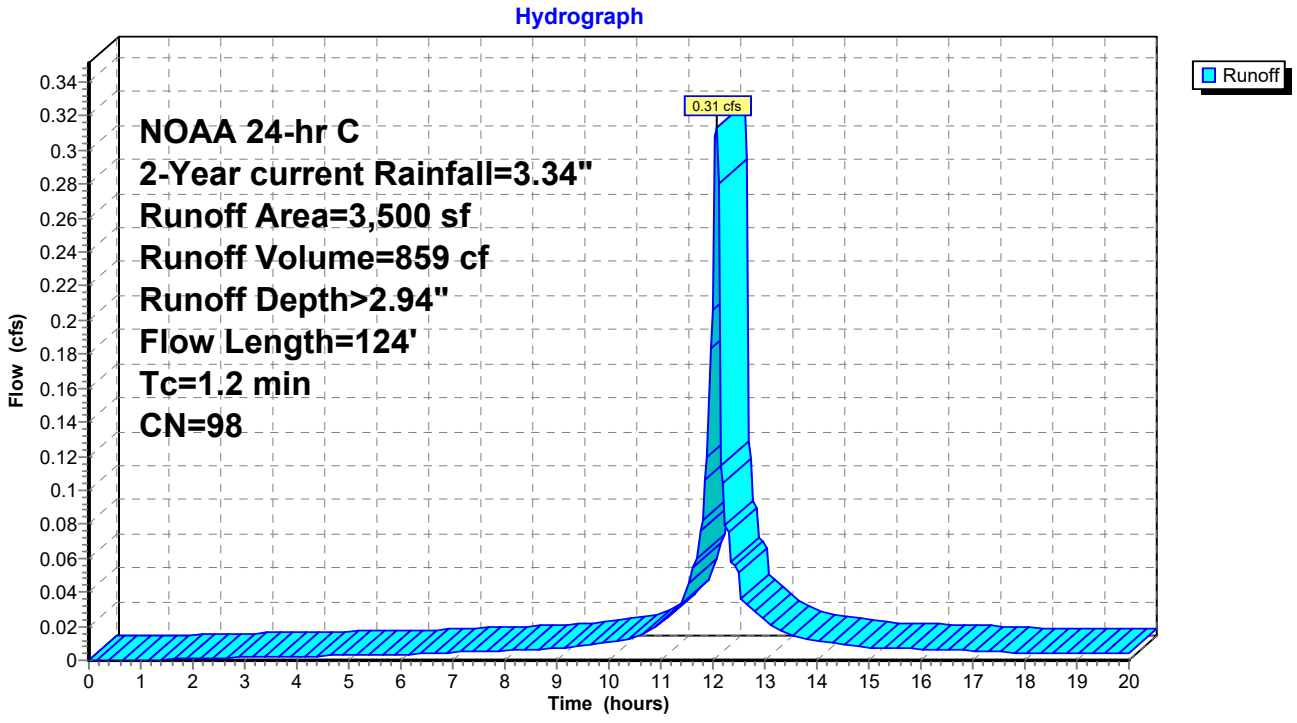
Runoff = 0.31 cfs @ 12.06 hrs, Volume= 859 cf, Depth> 2.94"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year current Rainfall=3.34"

	Area (sf)	CN	Description
*	3,500	98	5 DRIVEWAYS
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.0350	1.37		**Sheet Flow, driveway** Smooth surfaces n= 0.011 P2= 2.80"
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.2	124	Total			

Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each



Summary for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

[49] Hint: Tc<2dt may require smaller dt

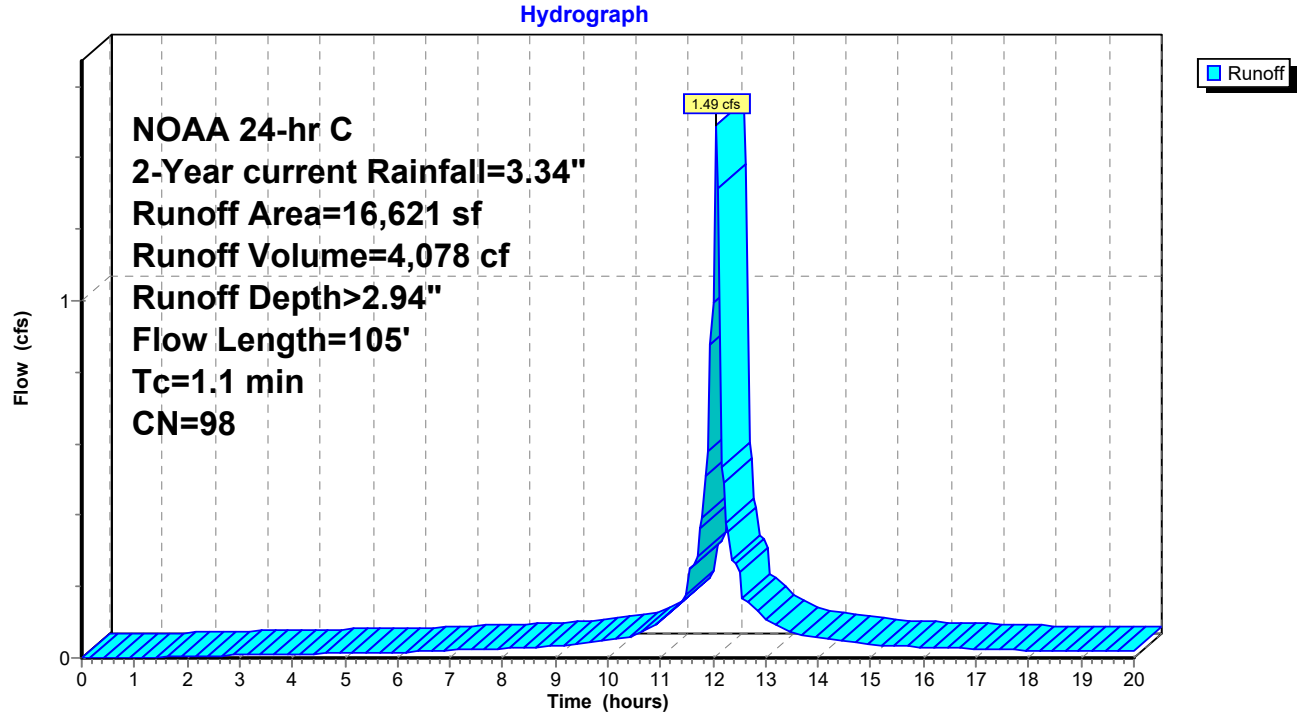
Runoff = 1.49 cfs @ 12.06 hrs, Volume= 4,078 cf, Depth> 2.94"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year current Rainfall=3.34"

	Area (sf)	CN	Description
*	14,605	98	Proposed street area
*	2,016	98	Proposed sidewalk
	16,621	98	Weighted Average
	16,621		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0200	0.88		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.80"
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.1	105	Total			

Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area



Summary for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

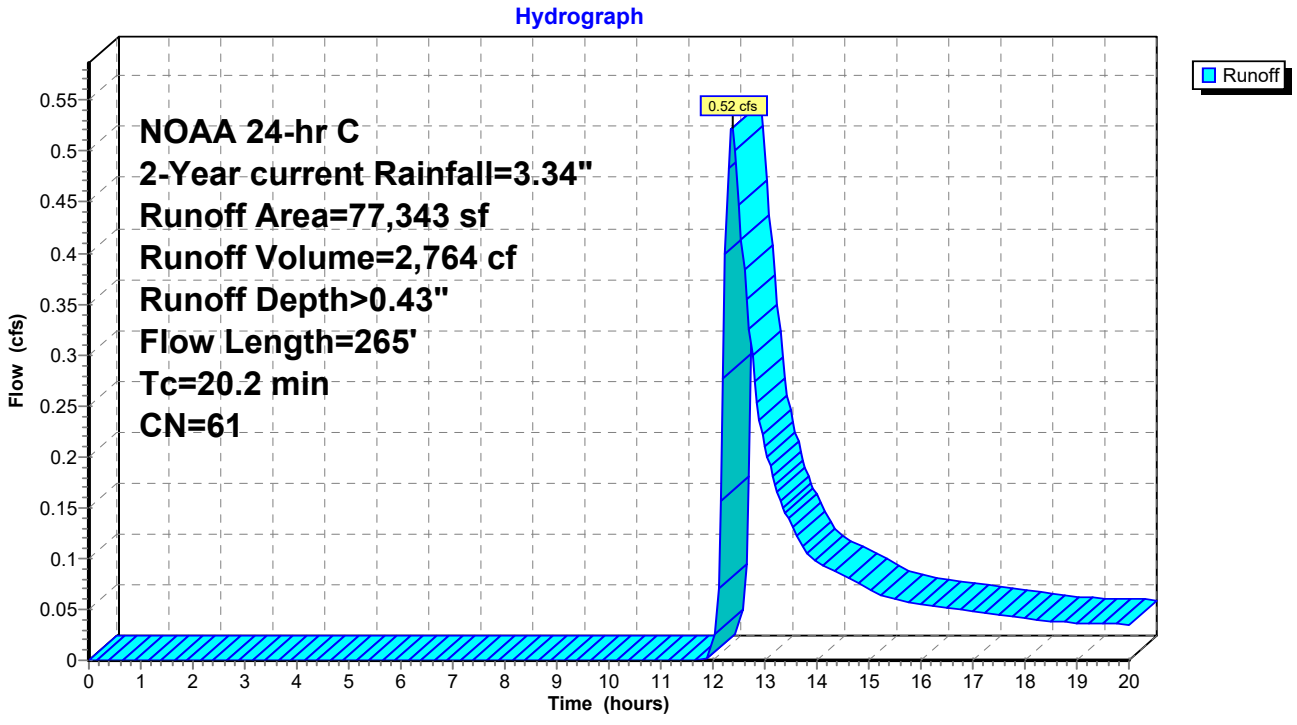
Runoff = 0.52 cfs @ 12.37 hrs, Volume= 2,764 cf, Depth> 0.43"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year current Rainfall=3.34"

	Area (sf)	CN	Description
*	77,343	61	Proposed onsite grass area
	77,343		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 2.80"
0.7	75	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
20.2	265	Total			

Subcatchment Post 1D: Post area 1D, proposed grass area onsite



Summary for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

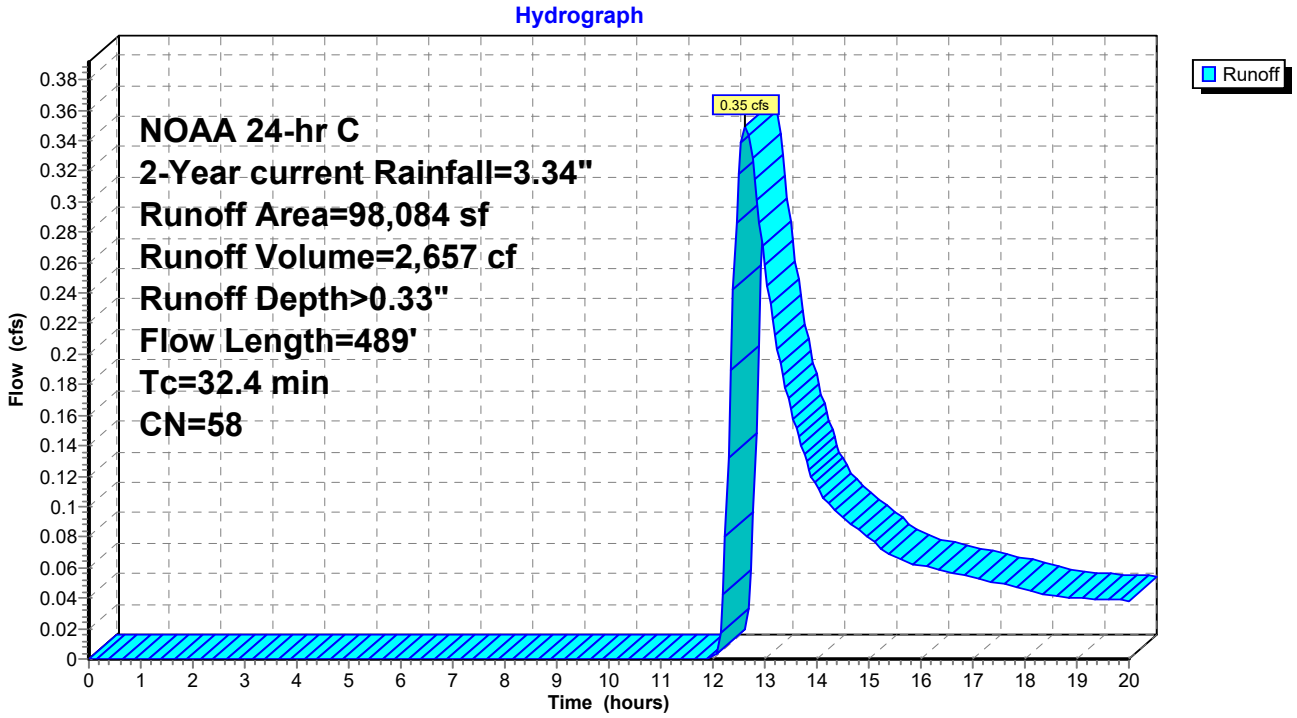
Runoff = 0.35 cfs @ 12.62 hrs, Volume= 2,657 cf, Depth> 0.33"
Routed to nonexistent node Pre Dis 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year current Rainfall=3.34"

	Area (sf)	CN	Description
*	2,430	98	exist roof
*	0	98	exist asphalt
*	1,331	98	exist conc
	17,505	61	>75% Grass cover, Good, HSG B
	76,818	55	Woods, Good, HSG B
	98,084	58	Weighted Average
	94,323		96.17% Pervious Area
	3,761		3.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, grass** Grass: Dense n= 0.240 P2= 2.80"
13.7	389	0.0090	0.47		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
32.4	489	Total			

Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1



r Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surfa

The infiltration area for the infiltration basin is 409 feet x 5 feet in width for 2,045 sf and use a consertative perm rate of 2.5 in/hour for a flow of 0.12 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 0.08" for 2-Year current event
Inflow = 0.09 cfs @ 14.75 hrs, Volume= 699 cf
Outflow = 0.09 cfs @ 14.75 hrs, Volume= 699 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.09 cfs @ 14.75 hrs, Volume= 699 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 23.50' @ 14.75 hrs Surf.Area= 1,268 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 699 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (954.9 - 954.9)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	76,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

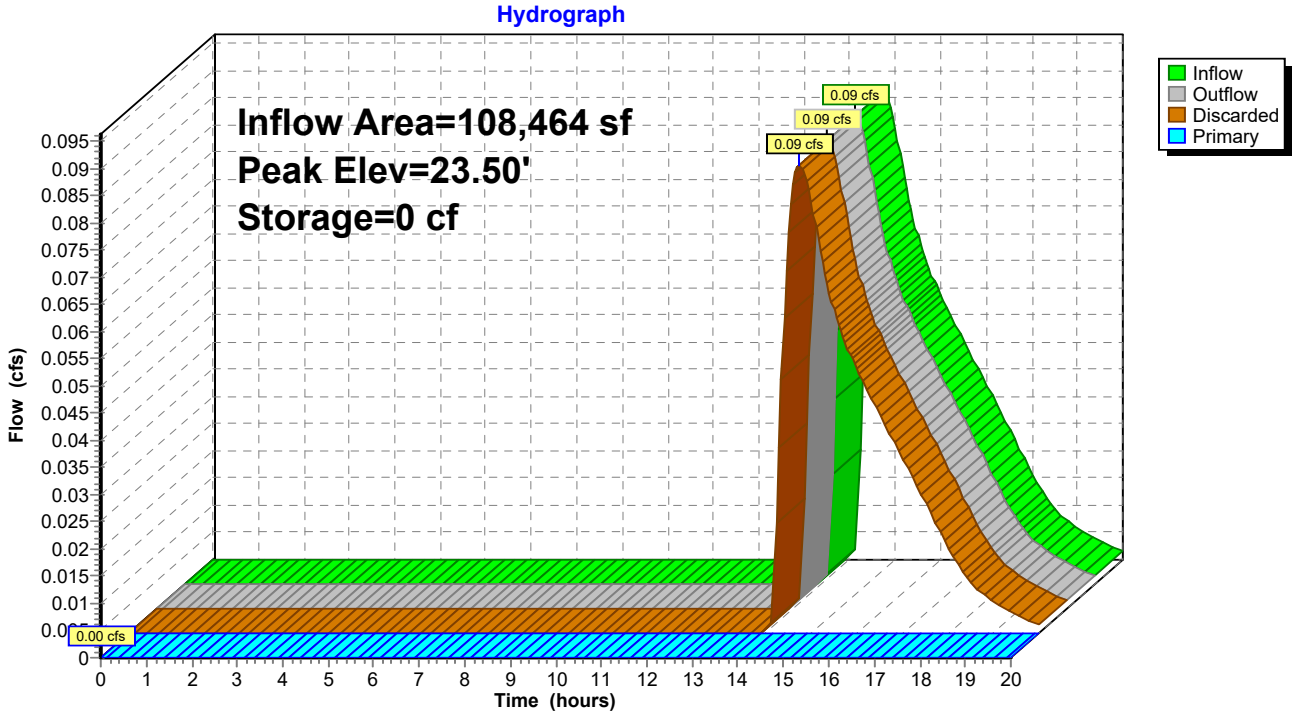
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	1,268	0	0
27.50	1,268	5,072	5,072
27.60	75,000	3,813	8,885
28.50	75,000	67,500	76,385

Device	Routing	Invert	Outlet Devices
#1	Primary	27.70'	**4.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	23.50'	**0.12 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.12 cfs @ 14.75 hrs HW=23.50' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface stor



Summary for Pond Bio-1: Bio Ret Swale

Exfiltration area is 1,226 sf or area of contour elev. 27. Use 5 in/hr as tested perm rate for a planting bed. Use 2.5 for factor of safety and resulting exfiltration rate is 0.07 cfs

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Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 1.15" for 2-Year current event
Inflow = 2.82 cfs @ 12.06 hrs, Volume= 10,400 cf
Outflow = 0.16 cfs @ 14.75 hrs, Volume= 4,265 cf, Atten= 94%, Lag= 160.8 min
Discarded = 0.07 cfs @ 9.90 hrs, Volume= 3,566 cf
Primary = 0.09 cfs @ 14.75 hrs, Volume= 699 cf
Routed to Pond Bas-1 : Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.56' @ 14.75 hrs Surf.Area= 6,915 sf Storage= 6,228 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 36.3 min (794.1 - 757.8)

Volume	Invert	Avail.Storage	Storage Description
#1	27.00'	9,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

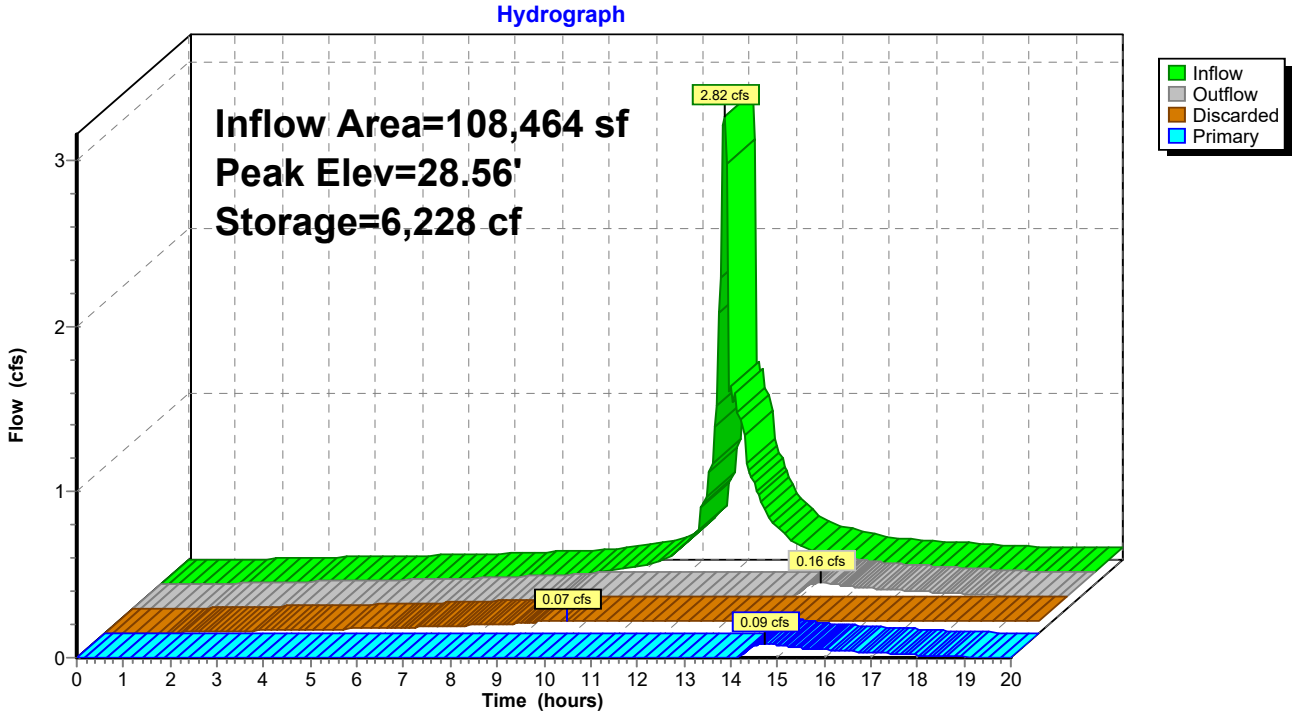
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.00	1,226	0	0
28.00	4,683	2,955	2,955
29.00	8,637	6,660	9,615

Device	Routing	Invert	Outlet Devices
#1	Primary	28.55'	**42.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	27.00'	**0.07 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.07 cfs @ 9.90 hrs HW=27.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.09 cfs @ 14.75 hrs HW=28.56' TW=23.50' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 0.09 cfs @ 0.39 fps)

Pond Bio-1: Bio Ret Swale



Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPost 1A: Post area 1A, (5) Runoff Area=11,000 sf 100.00% Impervious Runoff Depth>3.61"
Flow Length=145' Tc=1.2 min CN=98 Runoff=1.20 cfs 3,307 cf

SubcatchmentPost 1B: Post area 1B, (5) Runoff Area=3,500 sf 100.00% Impervious Runoff Depth>3.61"
Flow Length=124' Tc=1.2 min CN=98 Runoff=0.38 cfs 1,052 cf

SubcatchmentPost 1C: Post area 1C, Runoff Area=16,621 sf 100.00% Impervious Runoff Depth>3.61"
Flow Length=105' Tc=1.1 min CN=98 Runoff=1.81 cfs 4,998 cf

SubcatchmentPost 1D: Post area 1D, Runoff Area=77,343 sf 0.00% Impervious Runoff Depth>0.73"
Flow Length=265' Tc=20.2 min CN=61 Runoff=1.03 cfs 4,677 cf

SubcatchmentPre 1: Pre Area 1 (oniste Runoff Area=98,084 sf 3.83% Impervious Runoff Depth>0.58"
Flow Length=489' Tc=32.4 min CN=58 Runoff=0.76 cfs 4,763 cf

Pond Bas-1: Basin 1, Post discharge point 1, Peak Elev=25.00' Storage=1,903 cf Inflow=0.72 cfs 4,057 cf
Discarded=0.12 cfs 3,240 cf Primary=0.00 cfs 0 cf Outflow=0.12 cfs 3,240 cf

Pond Bio-1: Bio Ret Swale Peak Elev=28.61' Storage=6,548 cf Inflow=3.58 cfs 14,034 cf
Discarded=0.07 cfs 3,806 cf Primary=0.72 cfs 4,057 cf Outflow=0.79 cfs 7,863 cf

Total Runoff Area = 206,548 sf Runoff Volume = 18,797 cf Average Runoff Depth = 1.09"
83.11% Pervious = 171,666 sf 16.89% Impervious = 34,882 sf

Summary for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

[49] Hint: Tc<2dt may require smaller dt

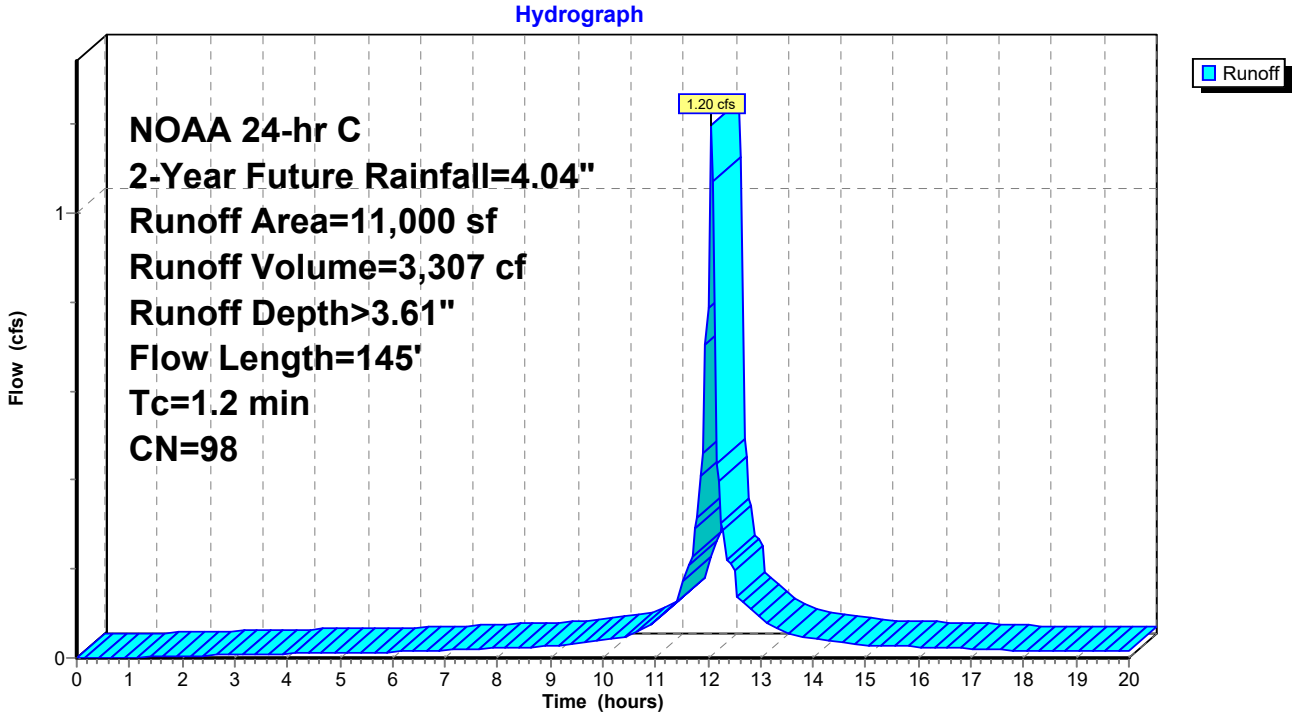
Runoff = 1.20 cfs @ 12.06 hrs, Volume= 3,307 cf, Depth> 3.61"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Future Rainfall=4.04"

	Area (sf)	CN	Description
*	11,000	98	(18) 918 sf roofs
	11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.2000	2.34		**Sheet Flow, roof** Smooth surfaces n= 0.011 P2= 2.80"
0.4	45	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, gutter flow** Paved Kv= 20.3 fps
1.2	145	Total			

Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each



Summary for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

[49] Hint: Tc<2dt may require smaller dt

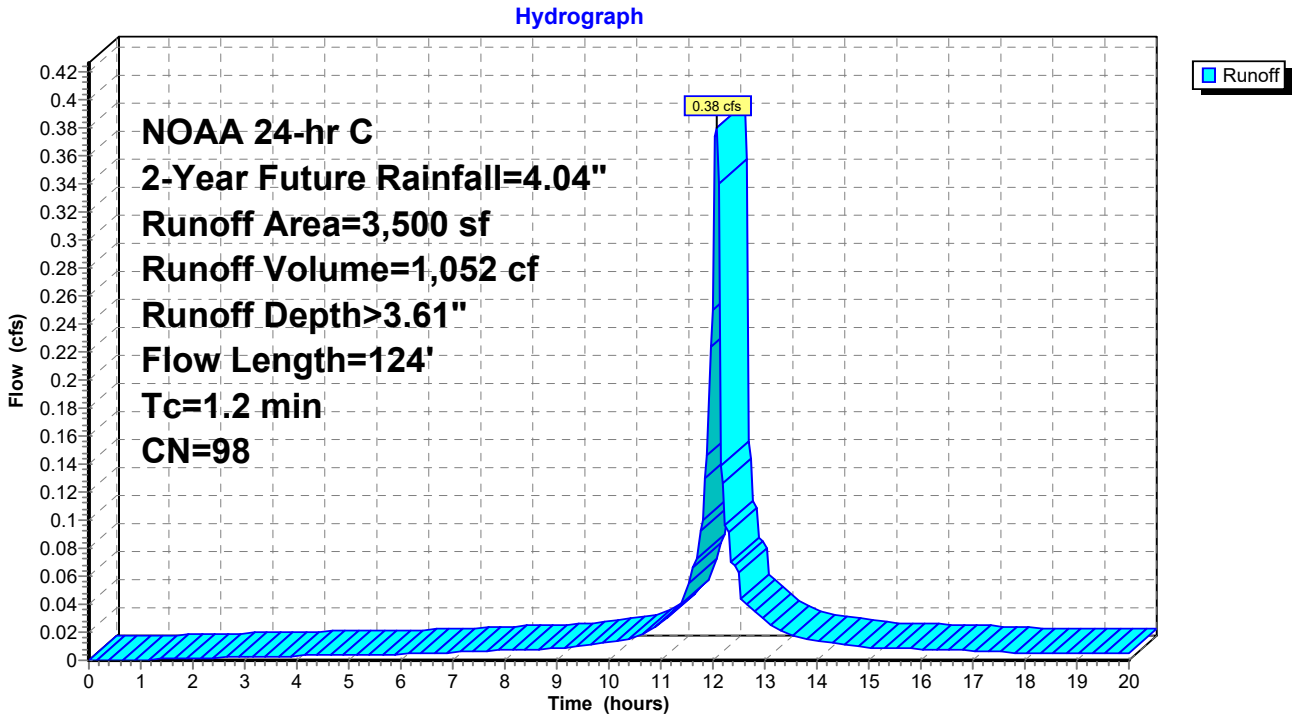
Runoff = 0.38 cfs @ 12.06 hrs, Volume= 1,052 cf, Depth> 3.61"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Future Rainfall=4.04"

	Area (sf)	CN	Description
*	3,500	98	5 DRIVEWAYS
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.0350	1.37		**Sheet Flow, driveway** Smooth surfaces n= 0.011 P2= 2.80"
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.2	124	Total			

Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each



Summary for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

[49] Hint: Tc<2dt may require smaller dt

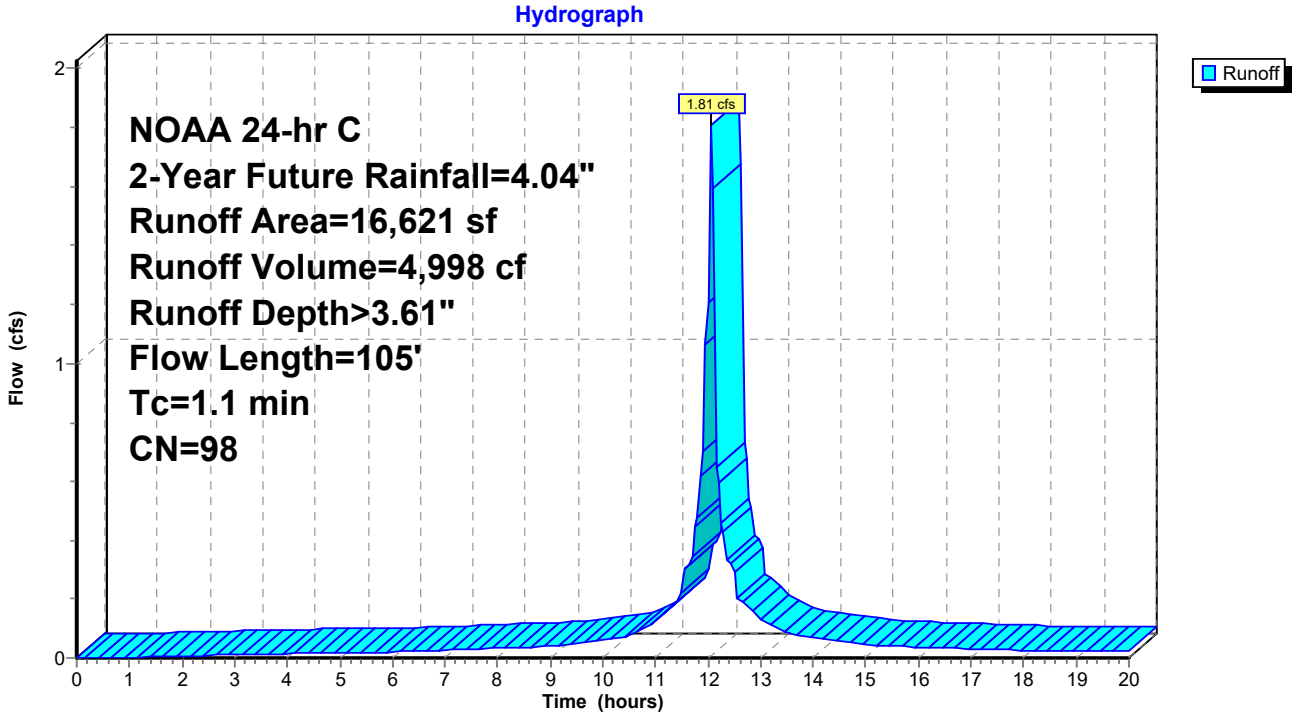
Runoff = 1.81 cfs @ 12.06 hrs, Volume= 4,998 cf, Depth> 3.61"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Future Rainfall=4.04"

	Area (sf)	CN	Description
*	14,605	98	Proposed street area
*	2,016	98	Proposed sidewalk
	16,621	98	Weighted Average
	16,621		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0200	0.88		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.80"
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.1	105	Total			

Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area



Summary for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

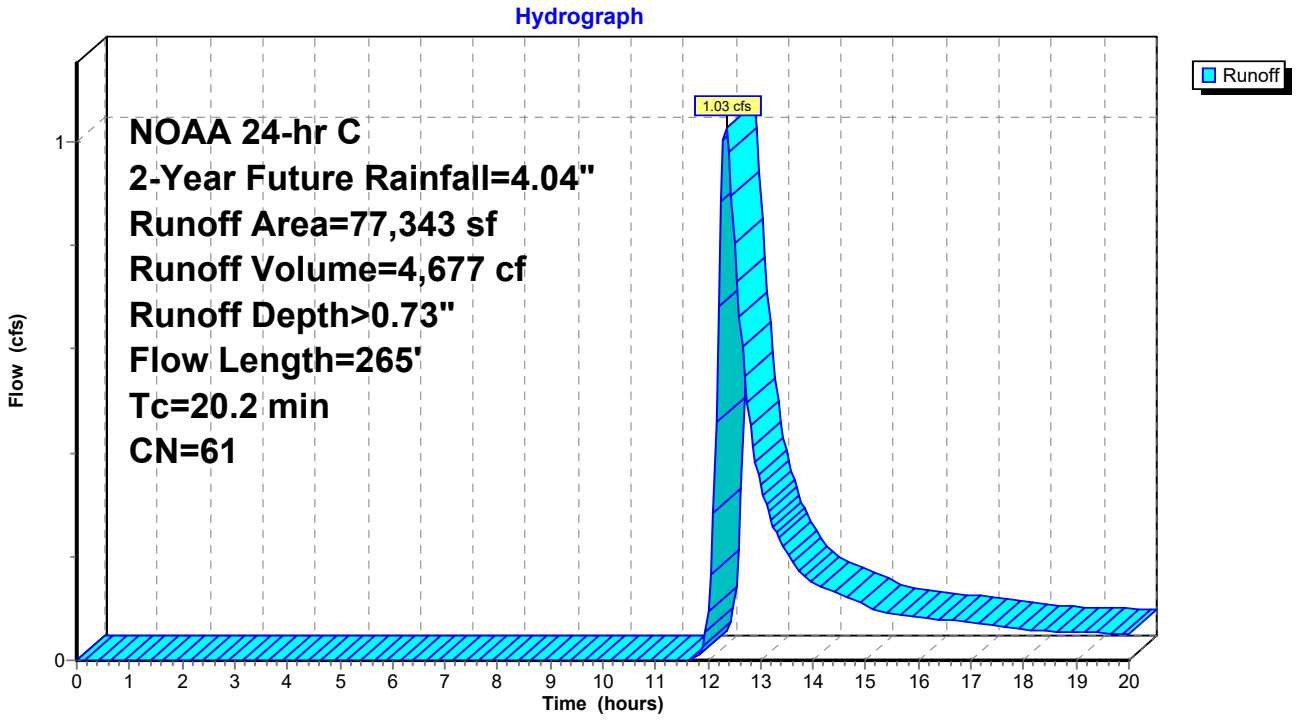
Runoff = 1.03 cfs @ 12.34 hrs, Volume= 4,677 cf, Depth> 0.73"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Future Rainfall=4.04"

	Area (sf)	CN	Description
*	77,343	61	Proposed onsite grass area
	77,343		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 2.80"
0.7	75	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
20.2	265	Total			

Subcatchment Post 1D: Post area 1D, proposed grass area onsite



Summary for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

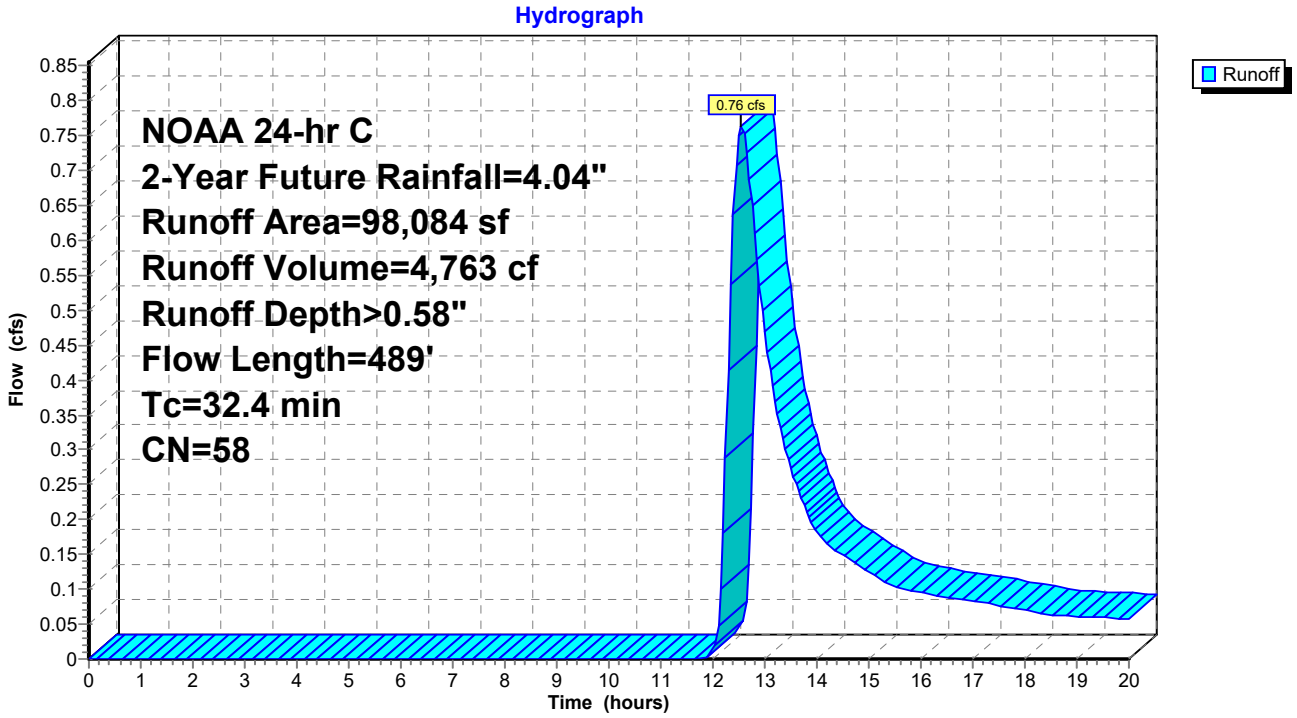
Runoff = 0.76 cfs @ 12.55 hrs, Volume= 4,763 cf, Depth> 0.58"
Routed to nonexistent node Pre Dis 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Future Rainfall=4.04"

	Area (sf)	CN	Description
*	2,430	98	exist roof
*	0	98	exist asphalt
*	1,331	98	exist conc
	17,505	61	>75% Grass cover, Good, HSG B
	76,818	55	Woods, Good, HSG B
	98,084	58	Weighted Average
	94,323		96.17% Pervious Area
	3,761		3.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, grass** Grass: Dense n= 0.240 P2= 2.80"
13.7	389	0.0090	0.47		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
32.4	489	Total			

Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1



r Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surfa

The infiltration area for the infiltration basin is 409 feet x 5 feet in width for 2,045 sf and use a consertative perm rate of 2.5 in/hour for a flow of 0.12 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 0.45" for 2-Year Future event
Inflow = 0.72 cfs @ 12.78 hrs, Volume= 4,057 cf
Outflow = 0.12 cfs @ 12.65 hrs, Volume= 3,240 cf, Atten= 83%, Lag= 0.0 min
Discarded = 0.12 cfs @ 12.65 hrs, Volume= 3,240 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 25.00' @ 15.20 hrs Surf.Area= 1,268 sf Storage= 1,903 cf

Plug-Flow detention time= 160.9 min calculated for 3,232 cf (80% of inflow)
Center-of-Mass det. time= 116.3 min (976.5 - 860.2)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	76,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

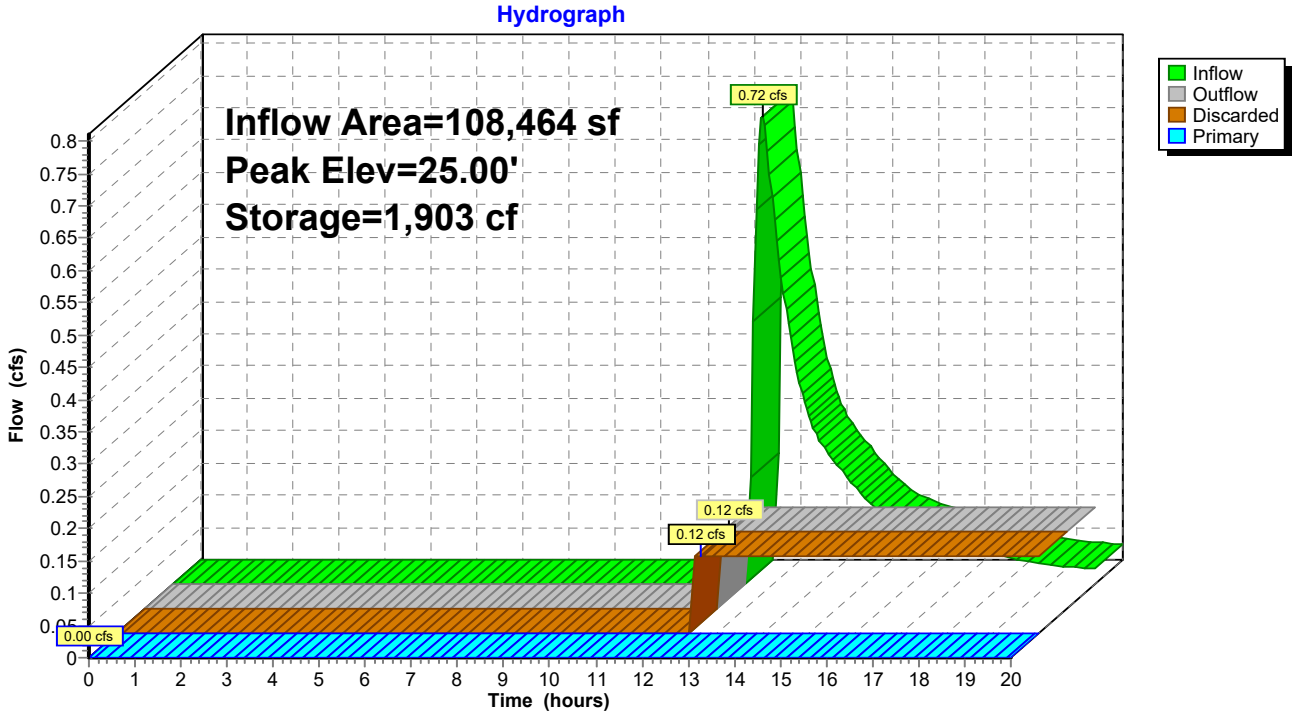
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	1,268	0	0
27.50	1,268	5,072	5,072
27.60	75,000	3,813	8,885
28.50	75,000	67,500	76,385

Device	Routing	Invert	Outlet Devices
#1	Primary	27.70'	**4.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	23.50'	**0.12 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.12 cfs @ 12.65 hrs HW=23.58' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface stor



Summary for Pond Bio-1: Bio Ret Swale

Exfiltration area is 1,226 sf or area of contour elev. 27. Use 5 in/hr as tested perm rate for a planting bed. Use 2.5 for factor of safety and resulting exfiltration rate is 0.07 cfs

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Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 1.55" for 2-Year Future event
Inflow = 3.58 cfs @ 12.07 hrs, Volume= 14,034 cf
Outflow = 0.79 cfs @ 12.78 hrs, Volume= 7,863 cf, Atten= 78%, Lag= 42.7 min
Discarded = 0.07 cfs @ 9.40 hrs, Volume= 3,806 cf
Primary = 0.72 cfs @ 12.78 hrs, Volume= 4,057 cf
Routed to Pond Bas-1 : Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.61' @ 12.78 hrs Surf.Area= 7,096 sf Storage= 6,548 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 40.4 min (800.4 - 760.0)

Volume	Invert	Avail.Storage	Storage Description
#1	27.00'	9,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

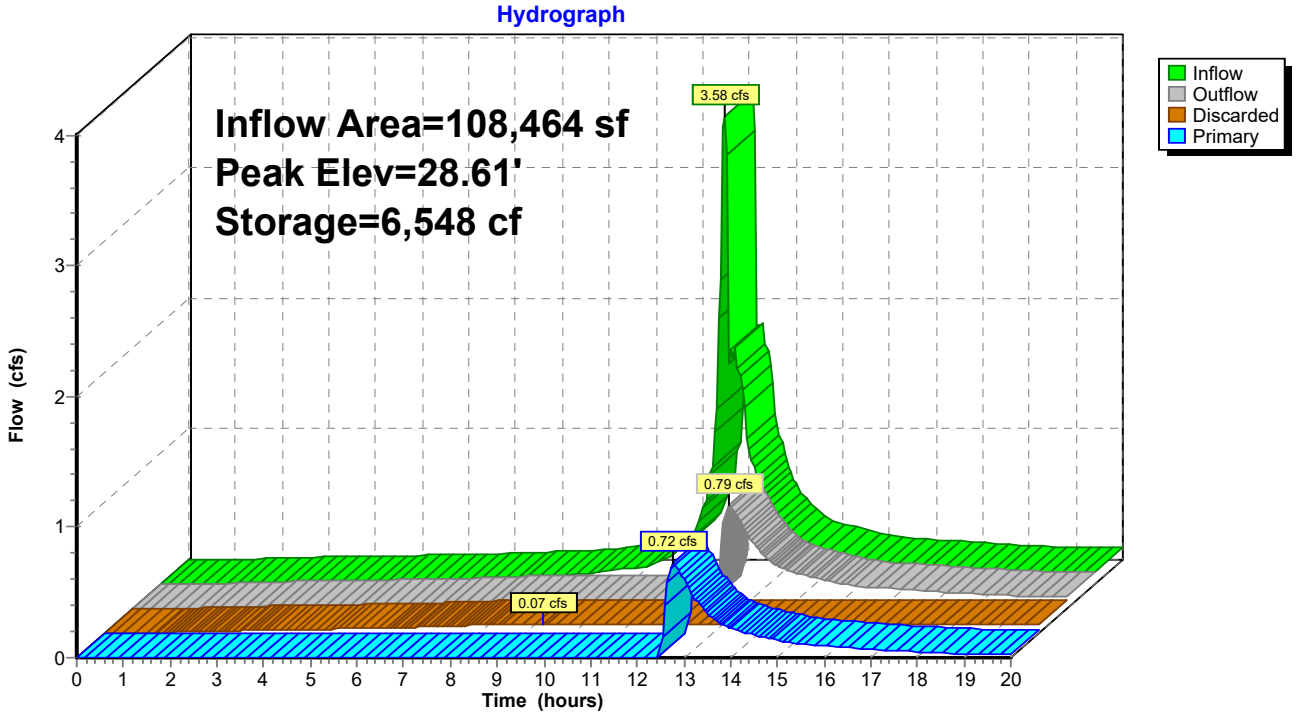
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.00	1,226	0	0
28.00	4,683	2,955	2,955
29.00	8,637	6,660	9,615

Device	Routing	Invert	Outlet Devices
#1	Primary	28.55'	**42.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	27.00'	**0.07 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.07 cfs @ 9.40 hrs HW=27.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.72 cfs @ 12.78 hrs HW=28.61' TW=23.78' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 0.72 cfs @ 0.80 fps)

Pond Bio-1: Bio Ret Swale



Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPost 1A: Post area 1A, (5) Runoff Area=11,000 sf 100.00% Impervious Runoff Depth>4.77"
Flow Length=145' Tc=1.2 min CN=98 Runoff=1.56 cfs 4,369 cf

SubcatchmentPost 1B: Post area 1B, (5) Runoff Area=3,500 sf 100.00% Impervious Runoff Depth>4.77"
Flow Length=124' Tc=1.2 min CN=98 Runoff=0.50 cfs 1,390 cf

SubcatchmentPost 1C: Post area 1C, Runoff Area=16,621 sf 100.00% Impervious Runoff Depth>4.77"
Flow Length=105' Tc=1.1 min CN=98 Runoff=2.36 cfs 6,602 cf

SubcatchmentPost 1D: Post area 1D, Runoff Area=77,343 sf 0.00% Impervious Runoff Depth>1.36"
Flow Length=265' Tc=20.2 min CN=61 Runoff=2.11 cfs 8,750 cf

SubcatchmentPre 1: Pre Area 1 (oniste Runoff Area=98,084 sf 3.83% Impervious Runoff Depth>1.15"
Flow Length=489' Tc=32.4 min CN=58 Runoff=1.73 cfs 9,403 cf

Pond Bas-1: Basin 1, Post discharge point Peak Elev=27.58' Storage=7,710 cf Inflow=2.71 cfs 10,766 cf
Discarded=0.12 cfs 3,397 cf Primary=0.00 cfs 0 cf Outflow=0.12 cfs 3,397 cf

Pond Bio-1: Bio Ret Swale Peak Elev=28.69' Storage=7,163 cf Inflow=5.06 cfs 21,111 cf
Discarded=0.07 cfs 4,132 cf Primary=2.71 cfs 10,766 cf Outflow=2.78 cfs 14,898 cf

Total Runoff Area = 206,548 sf Runoff Volume = 30,514 cf Average Runoff Depth = 1.77"
83.11% Pervious = 171,666 sf 16.89% Impervious = 34,882 sf

Summary for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

[49] Hint: Tc<2dt may require smaller dt

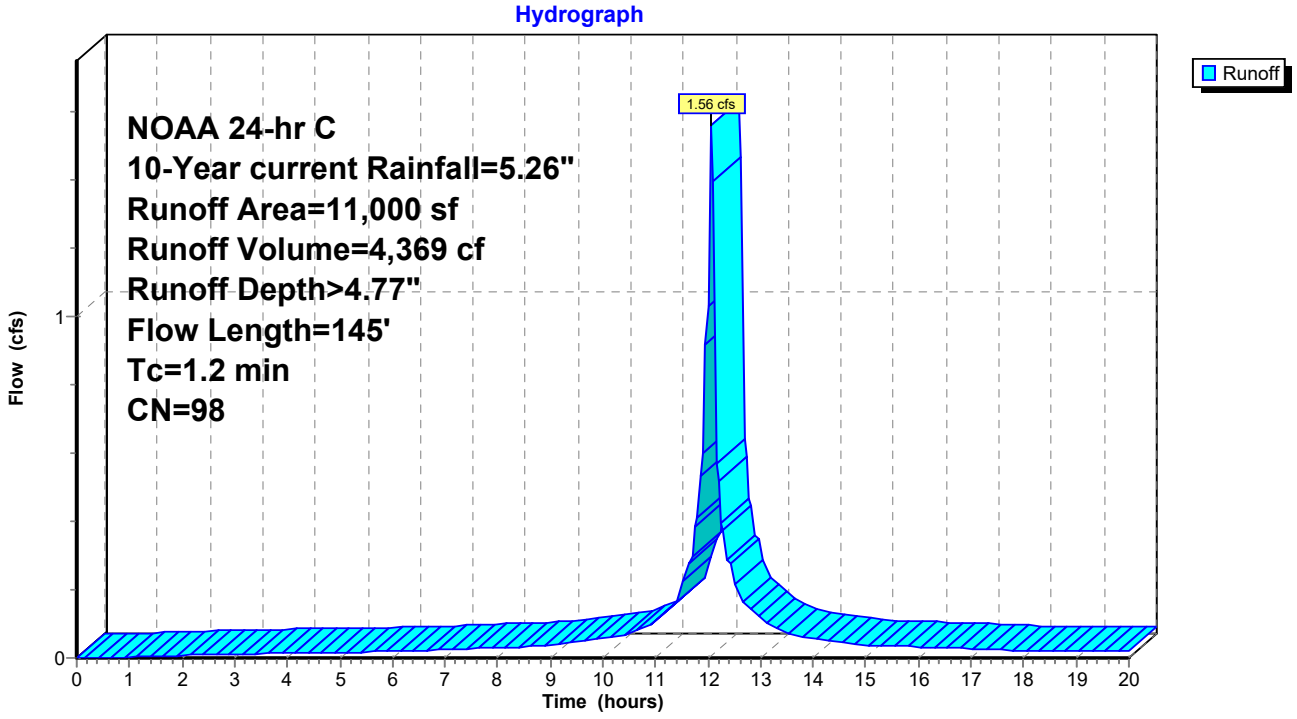
Runoff = 1.56 cfs @ 12.06 hrs, Volume= 4,369 cf, Depth> 4.77"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year current Rainfall=5.26"

	Area (sf)	CN	Description
*	11,000	98	(18) 918 sf roofs
	11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.2000	2.34		**Sheet Flow, roof** Smooth surfaces n= 0.011 P2= 2.80"
0.4	45	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, gutter flow** Paved Kv= 20.3 fps
1.2	145	Total			

Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each



Summary for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

[49] Hint: Tc<2dt may require smaller dt

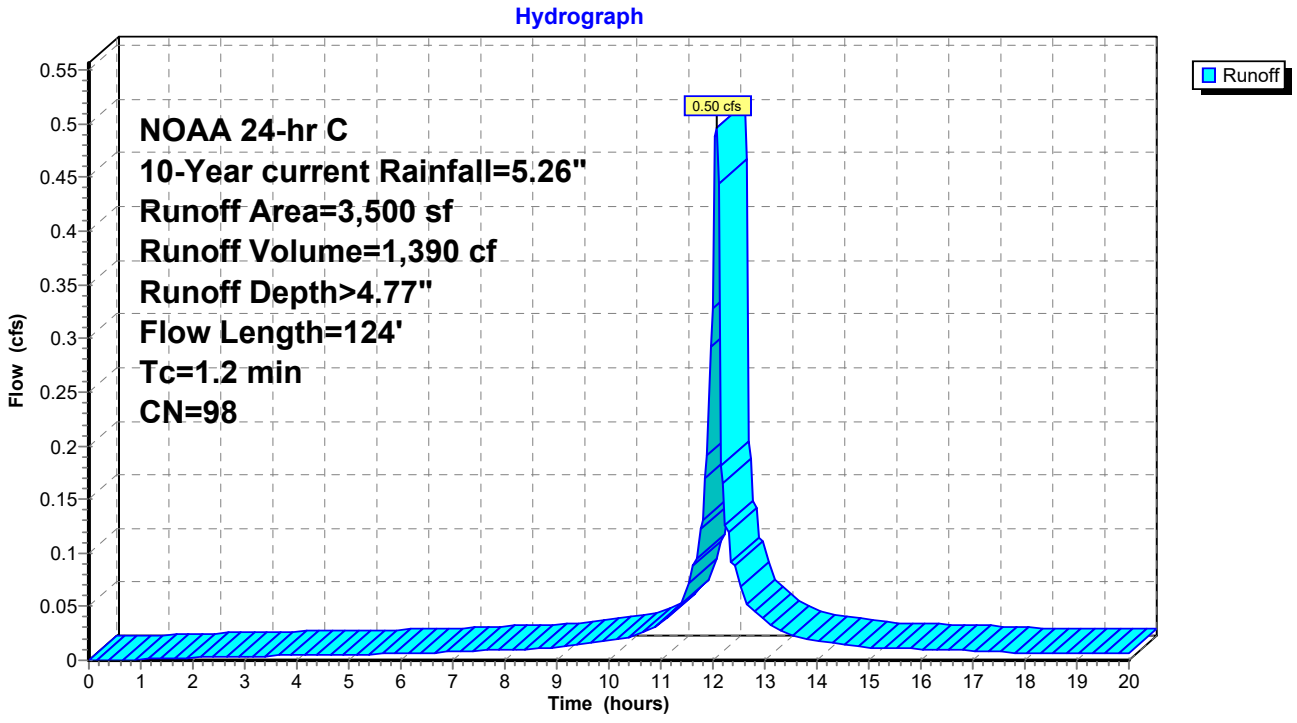
Runoff = 0.50 cfs @ 12.06 hrs, Volume= 1,390 cf, Depth> 4.77"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year current Rainfall=5.26"

	Area (sf)	CN	Description
*	3,500	98	5 DRIVEWAYS
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.0350	1.37		**Sheet Flow, driveway** Smooth surfaces n= 0.011 P2= 2.80"
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.2	124	Total			

Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each



Summary for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

[49] Hint: Tc<2dt may require smaller dt

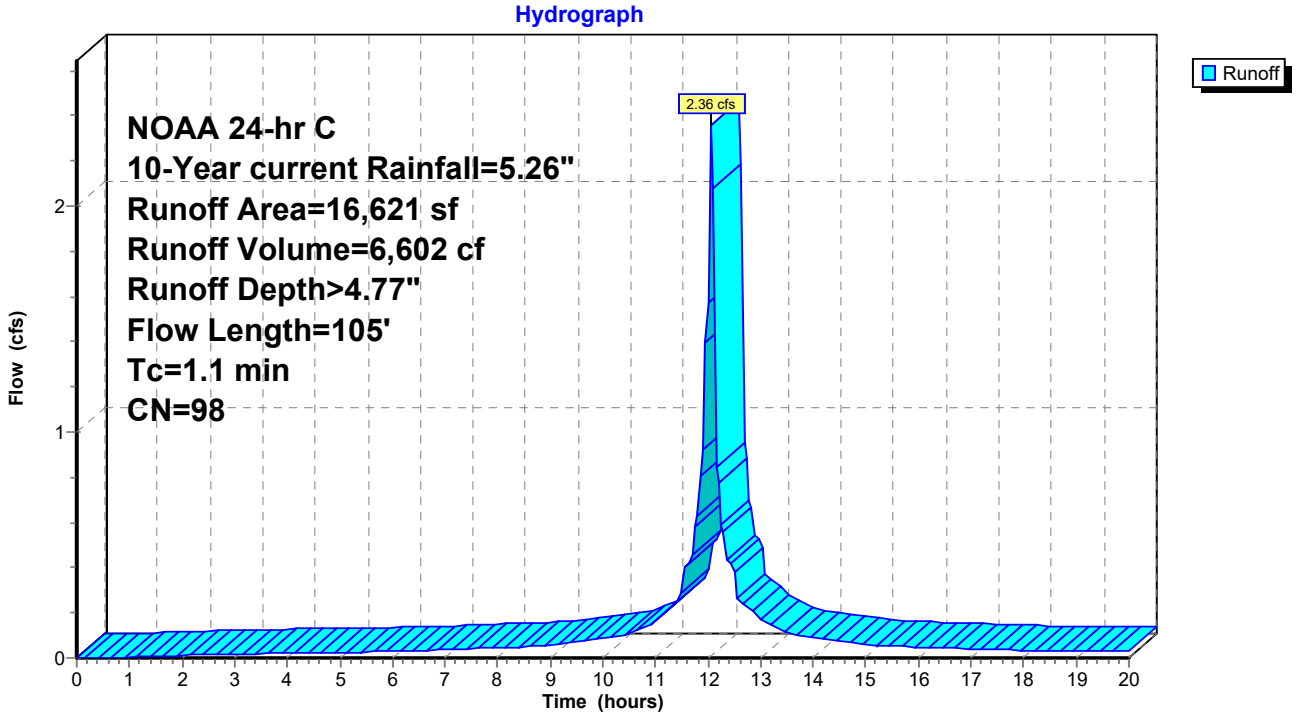
Runoff = 2.36 cfs @ 12.06 hrs, Volume= 6,602 cf, Depth> 4.77"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year current Rainfall=5.26"

	Area (sf)	CN	Description
*	14,605	98	Proposed street area
*	2,016	98	Proposed sidewalk
	16,621	98	Weighted Average
	16,621		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0200	0.88		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.80"
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.1	105	Total			

Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area



Summary for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

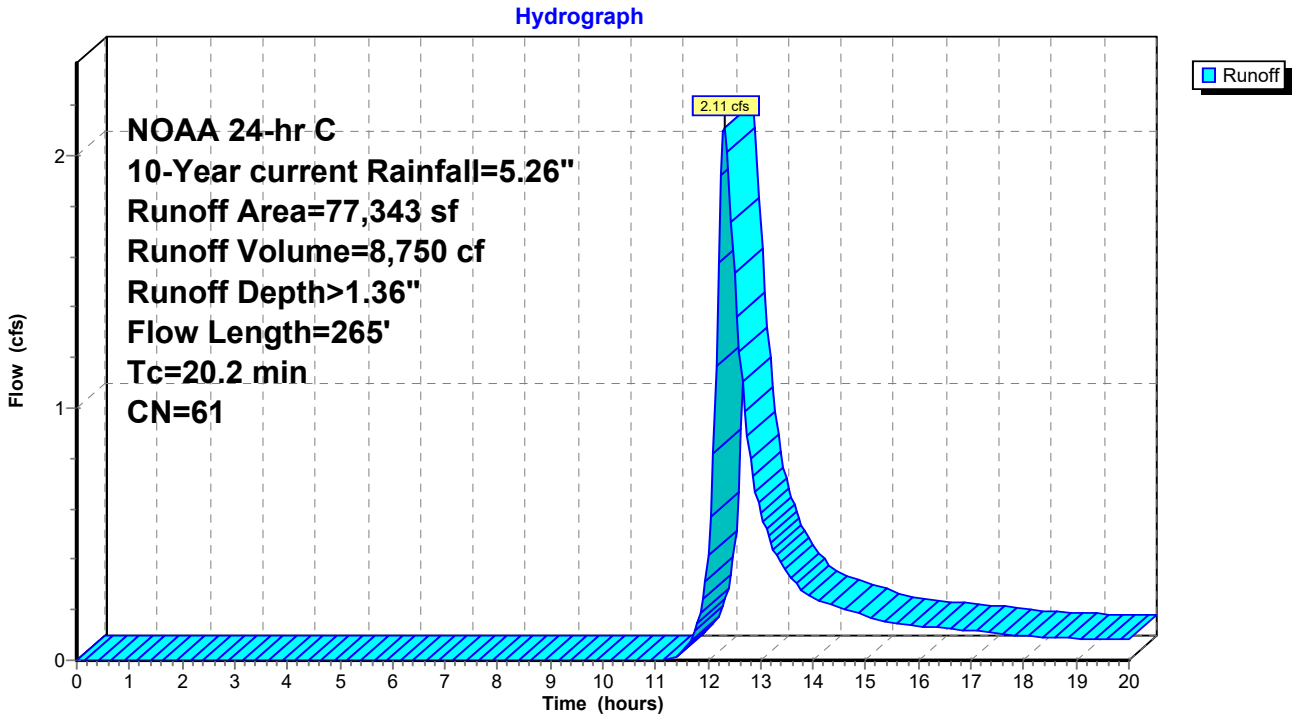
Runoff = 2.11 cfs @ 12.32 hrs, Volume= 8,750 cf, Depth> 1.36"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year current Rainfall=5.26"

	Area (sf)	CN	Description
*	77,343	61	Proposed onsite grass area
	77,343		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 2.80"
0.7	75	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
20.2	265	Total			

Subcatchment Post 1D: Post area 1D, proposed grass area onsite



Summary for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

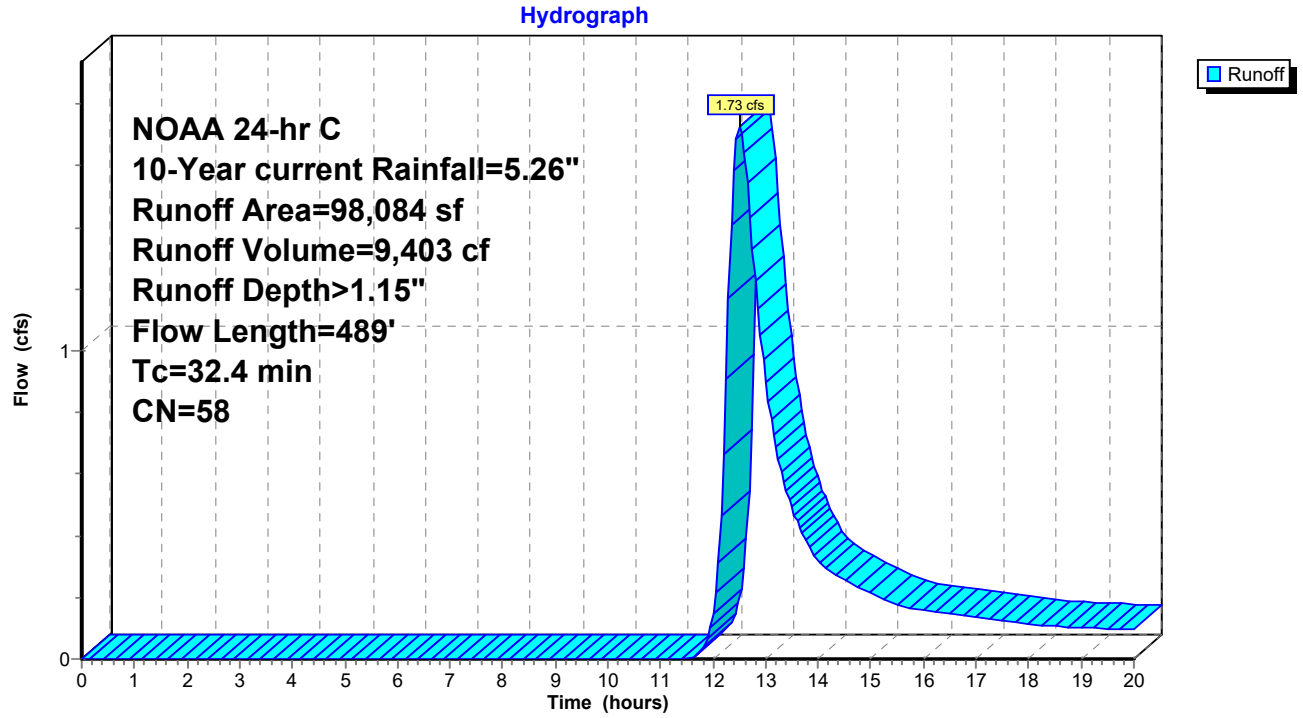
Runoff = 1.73 cfs @ 12.51 hrs, Volume= 9,403 cf, Depth> 1.15"
Routed to nonexistent node Pre Dis 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year current Rainfall=5.26"

	Area (sf)	CN	Description
*	2,430	98	exist roof
*	0	98	exist asphalt
*	1,331	98	exist conc
	17,505	61	>75% Grass cover, Good, HSG B
	76,818	55	Woods, Good, HSG B
	98,084	58	Weighted Average
	94,323		96.17% Pervious Area
	3,761		3.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, grass** Grass: Dense n= 0.240 P2= 2.80"
13.7	389	0.0090	0.47		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
32.4	489	Total			

Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1



r Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surfa

The infiltration area for the infiltration basin is 409 feet x 5 feet in width for 2,045 sf and use a consertative perm rate of 2.5 in/hour for a flow of 0.12 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 1.19" for 10-Year current event
Inflow = 2.71 cfs @ 12.39 hrs, Volume= 10,766 cf
Outflow = 0.12 cfs @ 12.20 hrs, Volume= 3,397 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.12 cfs @ 12.20 hrs, Volume= 3,397 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.58' @ 17.30 hrs Surf.Area= 62,385 sf Storage= 7,710 cf

Plug-Flow detention time= 221.3 min calculated for 3,397 cf (32% of inflow)
Center-of-Mass det. time= 137.0 min (965.6 - 828.5)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	76,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

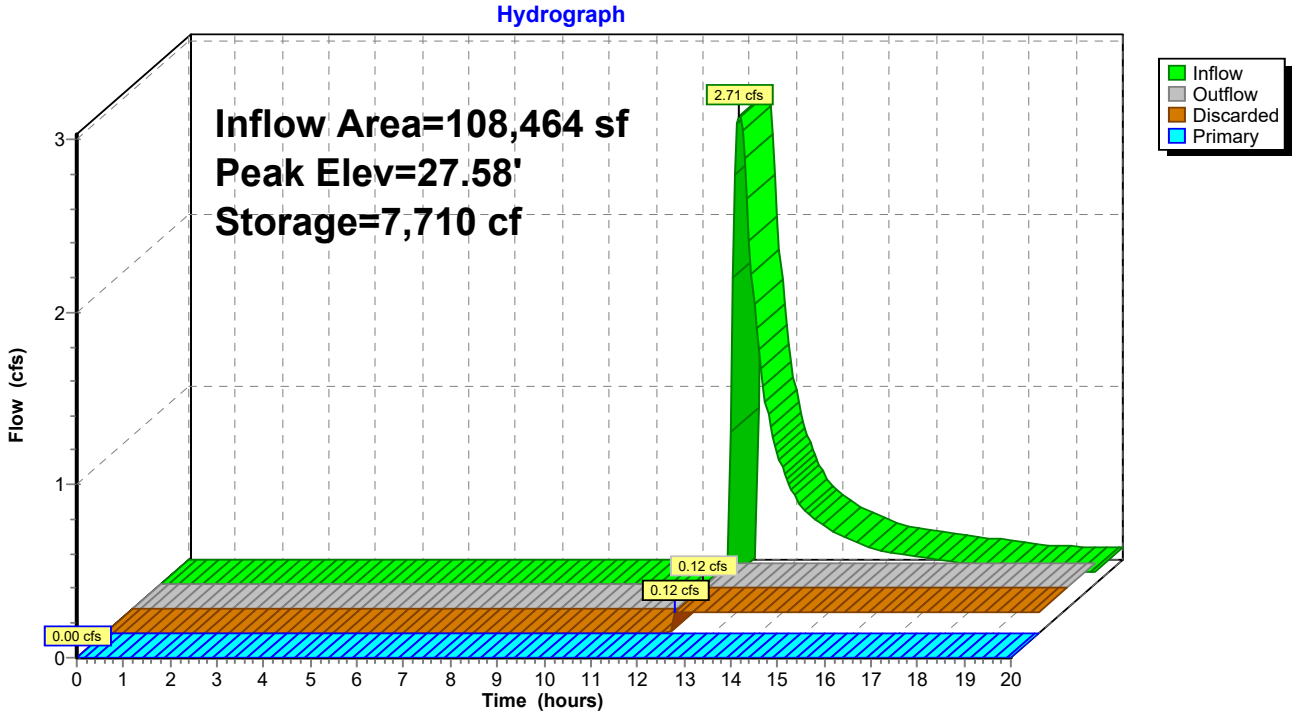
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	1,268	0	0
27.50	1,268	5,072	5,072
27.60	75,000	3,813	8,885
28.50	75,000	67,500	76,385

Device	Routing	Invert	Outlet Devices
#1	Primary	27.70'	**4.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	23.50'	**0.12 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.12 cfs @ 12.20 hrs HW=23.55' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface stor



Summary for Pond Bio-1: Bio Ret Swale

Exfiltration area is 1,226 sf or area of contour elev. 27. Use 5 in/hr as tested perm rate for a planting bed. Use 2.5 for factor of safety and resulting exfiltration rate is 0.07 cfs

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Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 2.34" for 10-Year current event
Inflow = 5.06 cfs @ 12.07 hrs, Volume= 21,111 cf
Outflow = 2.78 cfs @ 12.39 hrs, Volume= 14,898 cf, Atten= 45%, Lag= 19.4 min
Discarded = 0.07 cfs @ 8.00 hrs, Volume= 4,132 cf
Primary = 2.71 cfs @ 12.39 hrs, Volume= 10,766 cf
Routed to Pond Bas-1 : Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.69' @ 12.39 hrs Surf.Area= 7,431 sf Storage= 7,163 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 31.7 min (793.3 - 761.6)

Volume	Invert	Avail.Storage	Storage Description
#1	27.00'	9,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

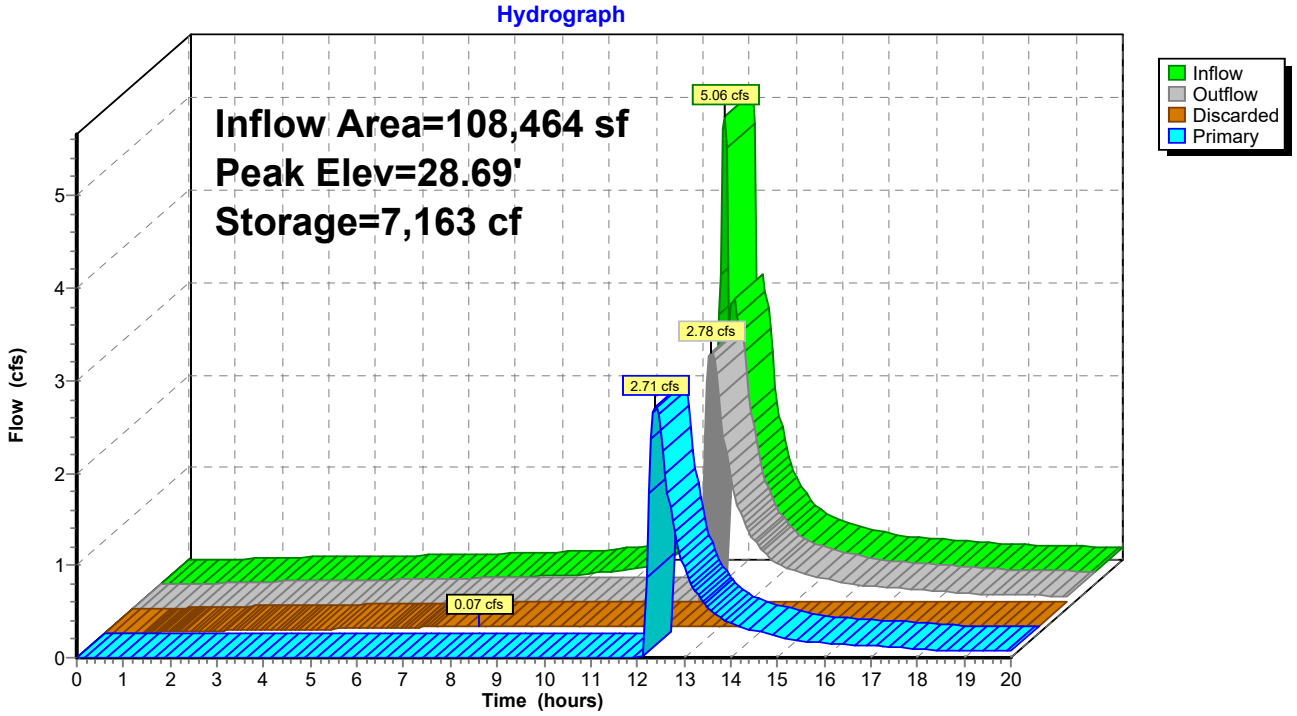
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.00	1,226	0	0
28.00	4,683	2,955	2,955
29.00	8,637	6,660	9,615

Device	Routing	Invert	Outlet Devices
#1	Primary	28.55'	**42.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	27.00'	**0.07 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.07 cfs @ 8.00 hrs HW=27.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=2.70 cfs @ 12.39 hrs HW=28.69' TW=24.66' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 2.70 cfs @ 1.24 fps)

Pond Bio-1: Bio Ret Swale



Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPost 1A: Post area 1A, (5) Runoff Area=11,000 sf 100.00% Impervious Runoff Depth>5.85"
Flow Length=145' Tc=1.2 min CN=98 Runoff=1.90 cfs 5,362 cf

SubcatchmentPost 1B: Post area 1B, (5) Runoff Area=3,500 sf 100.00% Impervious Runoff Depth>5.85"
Flow Length=124' Tc=1.2 min CN=98 Runoff=0.61 cfs 1,706 cf

SubcatchmentPost 1C: Post area 1C, Runoff Area=16,621 sf 100.00% Impervious Runoff Depth>5.85"
Flow Length=105' Tc=1.1 min CN=98 Runoff=2.88 cfs 8,102 cf

SubcatchmentPost 1D: Post area 1D, Runoff Area=77,343 sf 0.00% Impervious Runoff Depth>2.05"
Flow Length=265' Tc=20.2 min CN=61 Runoff=3.28 cfs 13,187 cf

SubcatchmentPre 1: Pre Area 1 (oniste Runoff Area=98,084 sf 3.83% Impervious Runoff Depth>1.78"
Flow Length=489' Tc=32.4 min CN=58 Runoff=2.82 cfs 14,578 cf

Pond Bas-1: Basin 1, Post discharge point Peak Elev=27.67' Storage=14,305 cf Inflow=4.32 cfs 17,741 cf
Discarded=0.12 cfs 3,456 cf Primary=0.00 cfs 0 cf Outflow=0.12 cfs 3,456 cf

Pond Bio-1: Bio Ret Swale Peak Elev=28.75' Storage=7,563 cf Inflow=6.54 cfs 28,357 cf
Discarded=0.07 cfs 4,370 cf Primary=4.32 cfs 17,741 cf Outflow=4.39 cfs 22,111 cf

Total Runoff Area = 206,548 sf Runoff Volume = 42,934 cf Average Runoff Depth = 2.49"
83.11% Pervious = 171,666 sf 16.89% Impervious = 34,882 sf

Summary for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

[49] Hint: Tc<2dt may require smaller dt

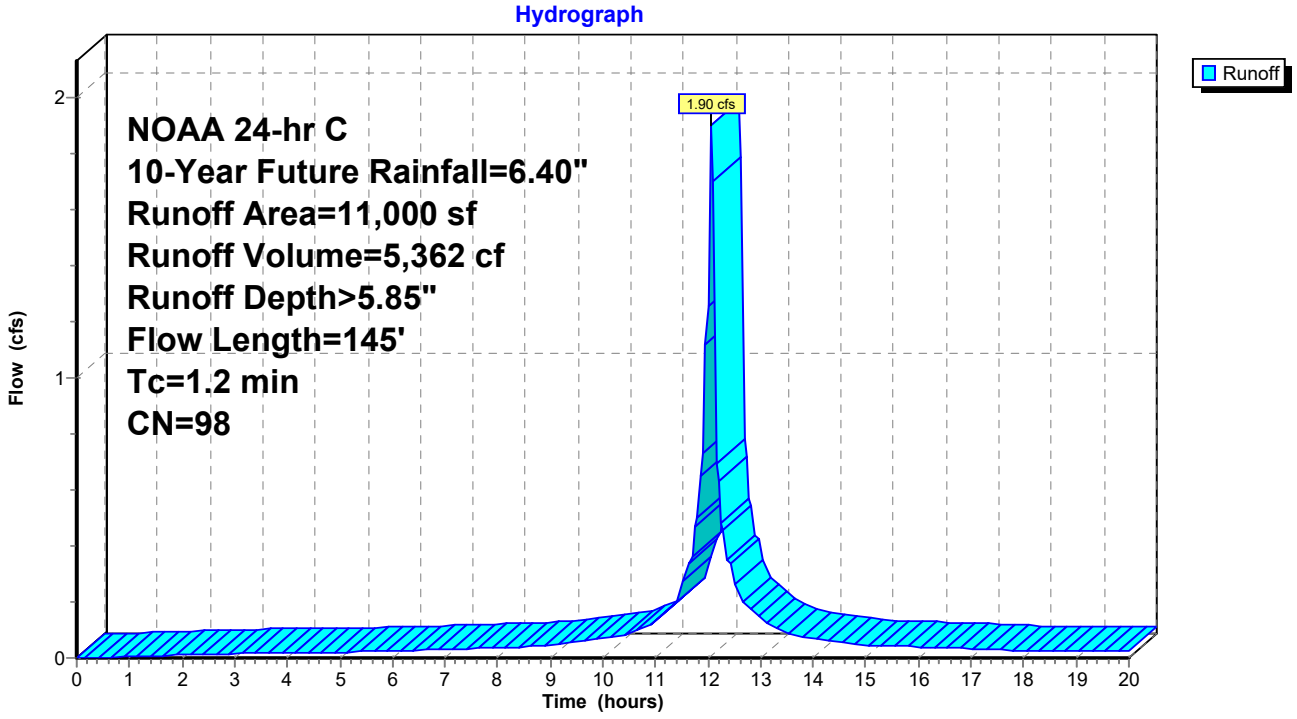
Runoff = 1.90 cfs @ 12.06 hrs, Volume= 5,362 cf, Depth> 5.85"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Future Rainfall=6.40"

	Area (sf)	CN	Description
*	11,000	98	(18) 918 sf roofs
	11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.2000	2.34		**Sheet Flow, roof** Smooth surfaces n= 0.011 P2= 2.80"
0.4	45	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, gutter flow** Paved Kv= 20.3 fps
1.2	145	Total			

Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each



Summary for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

[49] Hint: Tc<2dt may require smaller dt

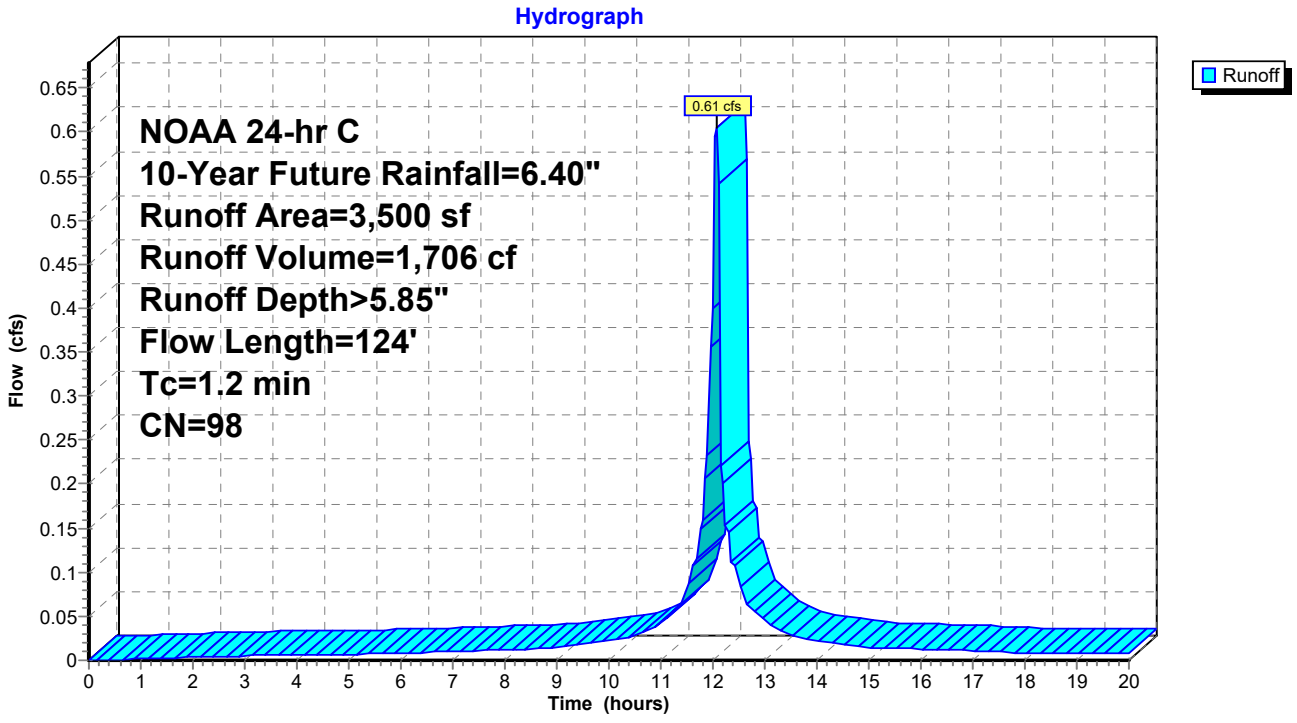
Runoff = 0.61 cfs @ 12.06 hrs, Volume= 1,706 cf, Depth> 5.85"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Future Rainfall=6.40"

	Area (sf)	CN	Description
*	3,500	98	5 DRIVEWAYS
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.0350	1.37		**Sheet Flow, driveway** Smooth surfaces n= 0.011 P2= 2.80"
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.2	124	Total			

Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each



Summary for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

[49] Hint: Tc<2dt may require smaller dt

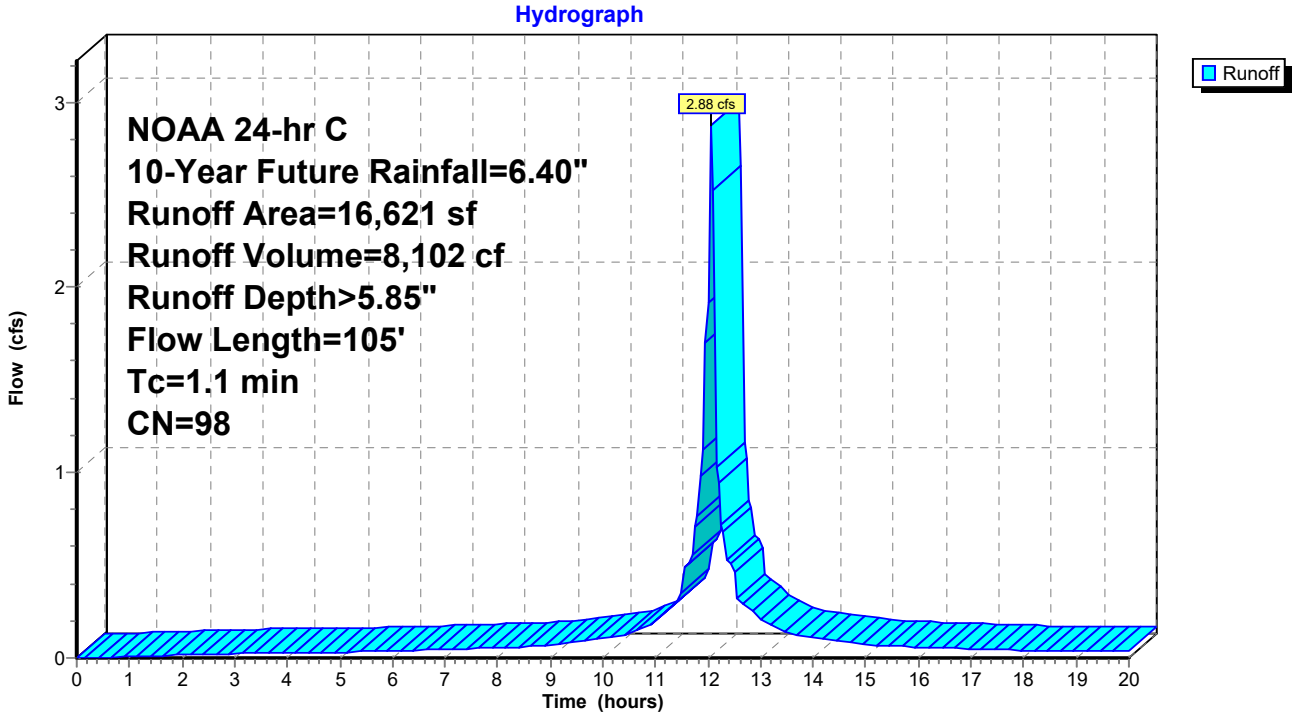
Runoff = 2.88 cfs @ 12.06 hrs, Volume= 8,102 cf, Depth> 5.85"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Future Rainfall=6.40"

	Area (sf)	CN	Description
*	14,605	98	Proposed street area
*	2,016	98	Proposed sidewalk
	16,621	98	Weighted Average
	16,621		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0200	0.88		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.80"
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.1	105	Total			

Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area



Summary for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

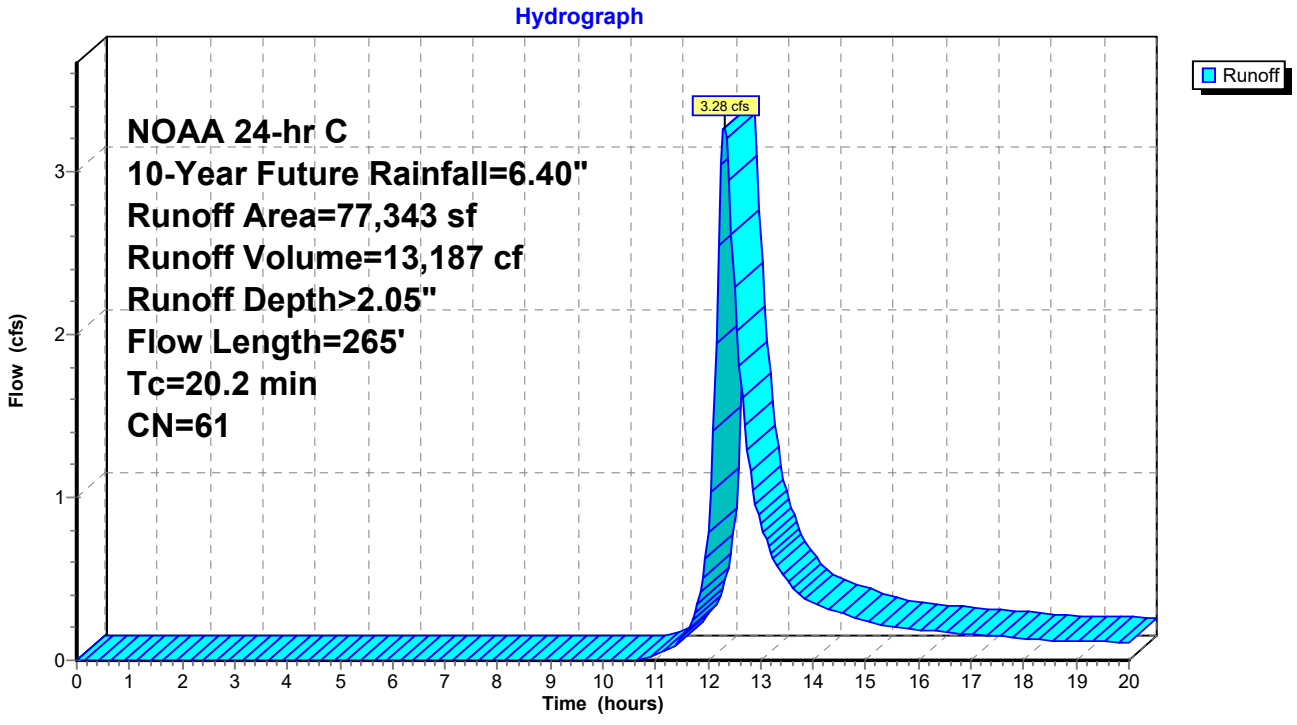
Runoff = 3.28 cfs @ 12.31 hrs, Volume= 13,187 cf, Depth> 2.05"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Future Rainfall=6.40"

	Area (sf)	CN	Description
*	77,343	61	Proposed onsite grass area
	77,343		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 2.80"
0.7	75	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
20.2	265	Total			

Subcatchment Post 1D: Post area 1D, proposed grass area onsite



Summary for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

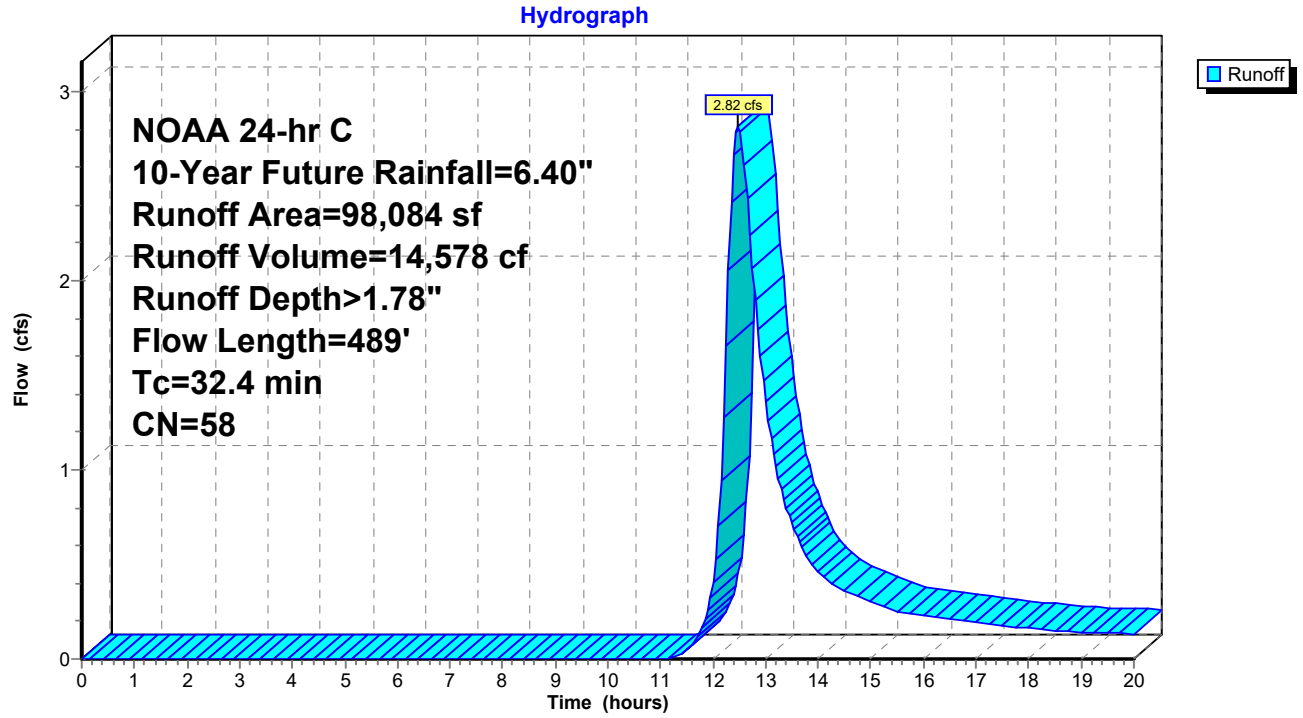
Runoff = 2.82 cfs @ 12.49 hrs, Volume= 14,578 cf, Depth> 1.78"
Routed to nonexistent node Pre Dis 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Future Rainfall=6.40"

	Area (sf)	CN	Description
*	2,430	98	exist roof
*	0	98	exist asphalt
*	1,331	98	exist conc
	17,505	61	>75% Grass cover, Good, HSG B
	76,818	55	Woods, Good, HSG B
	98,084	58	Weighted Average
	94,323		96.17% Pervious Area
	3,761		3.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, grass** Grass: Dense n= 0.240 P2= 2.80"
13.7	389	0.0090	0.47		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
32.4	489	Total			

Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1



r Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surfa

The infiltration area for the infiltration basin is 409 feet x 5 feet in width for 2,045 sf and use a consertative perm rate of 2.5 in/hour for a flow of 0.12 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 1.96" for 10-Year Future event
Inflow = 4.32 cfs @ 12.32 hrs, Volume= 17,741 cf
Outflow = 0.12 cfs @ 12.10 hrs, Volume= 3,456 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.12 cfs @ 12.10 hrs, Volume= 3,456 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.67' @ 19.03 hrs Surf.Area= 75,000 sf Storage= 14,305 cf

Plug-Flow detention time= 229.7 min calculated for 3,456 cf (19% of inflow)
Center-of-Mass det. time= 144.2 min (961.5 - 817.3)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	76,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

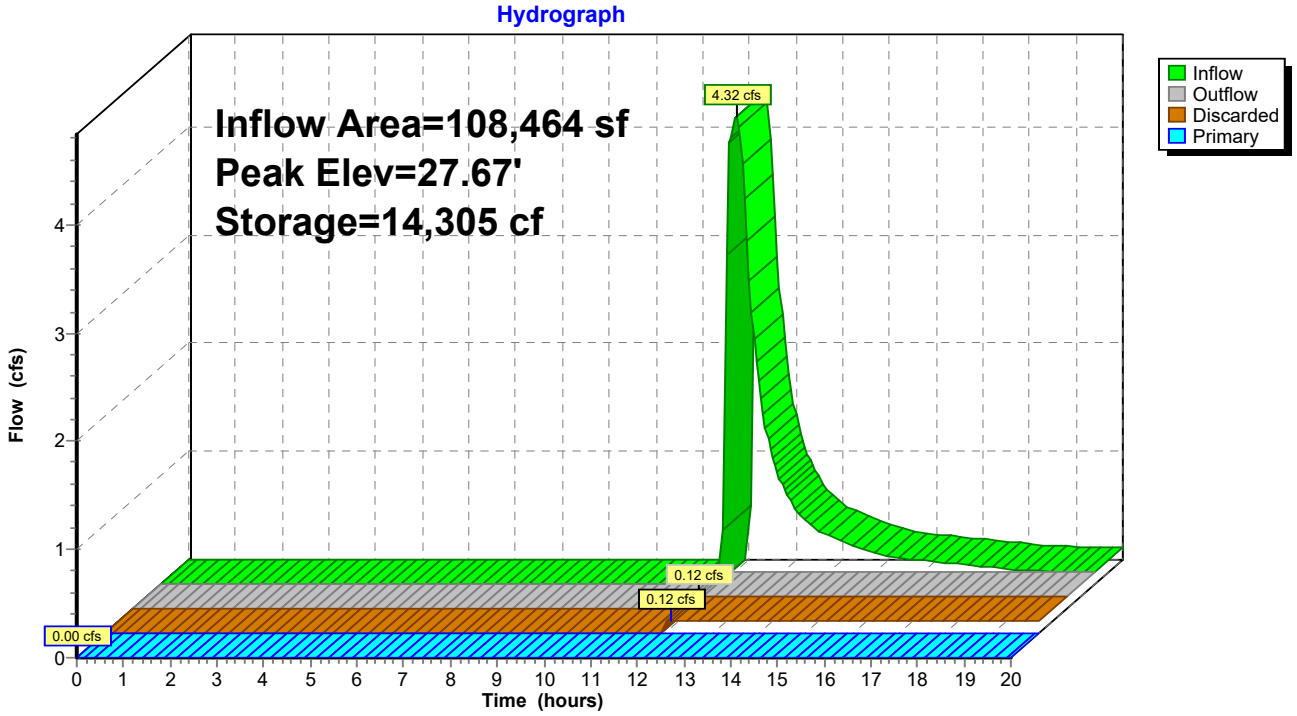
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	1,268	0	0
27.50	1,268	5,072	5,072
27.60	75,000	3,813	8,885
28.50	75,000	67,500	76,385

Device	Routing	Invert	Outlet Devices
#1	Primary	27.70'	**4.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	23.50'	**0.12 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.12 cfs @ 12.10 hrs HW=23.76' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=23.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface stor



Summary for Pond Bio-1: Bio Ret Swale

Exfiltration area is 1,226 sf or area of contour elev. 27. Use 5 in/hr as tested perm rate for a planting bed. Use 2.5 for factor of safety and resulting exfiltration rate is 0.07 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 3.14" for 10-Year Future event
Inflow = 6.54 cfs @ 12.07 hrs, Volume= 28,357 cf
Outflow = 4.39 cfs @ 12.32 hrs, Volume= 22,111 cf, Atten= 33%, Lag= 15.1 min
Discarded = 0.07 cfs @ 7.00 hrs, Volume= 4,370 cf
Primary = 4.32 cfs @ 12.32 hrs, Volume= 17,741 cf
Routed to Pond Bas-1 : Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.75' @ 12.32 hrs Surf.Area= 7,640 sf Storage= 7,563 cf

Plug-Flow detention time= 89.7 min calculated for 22,111 cf (78% of inflow)
Center-of-Mass det. time= 27.6 min (789.5 - 761.9)

Volume	Invert	Avail.Storage	Storage Description
#1	27.00'	9,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

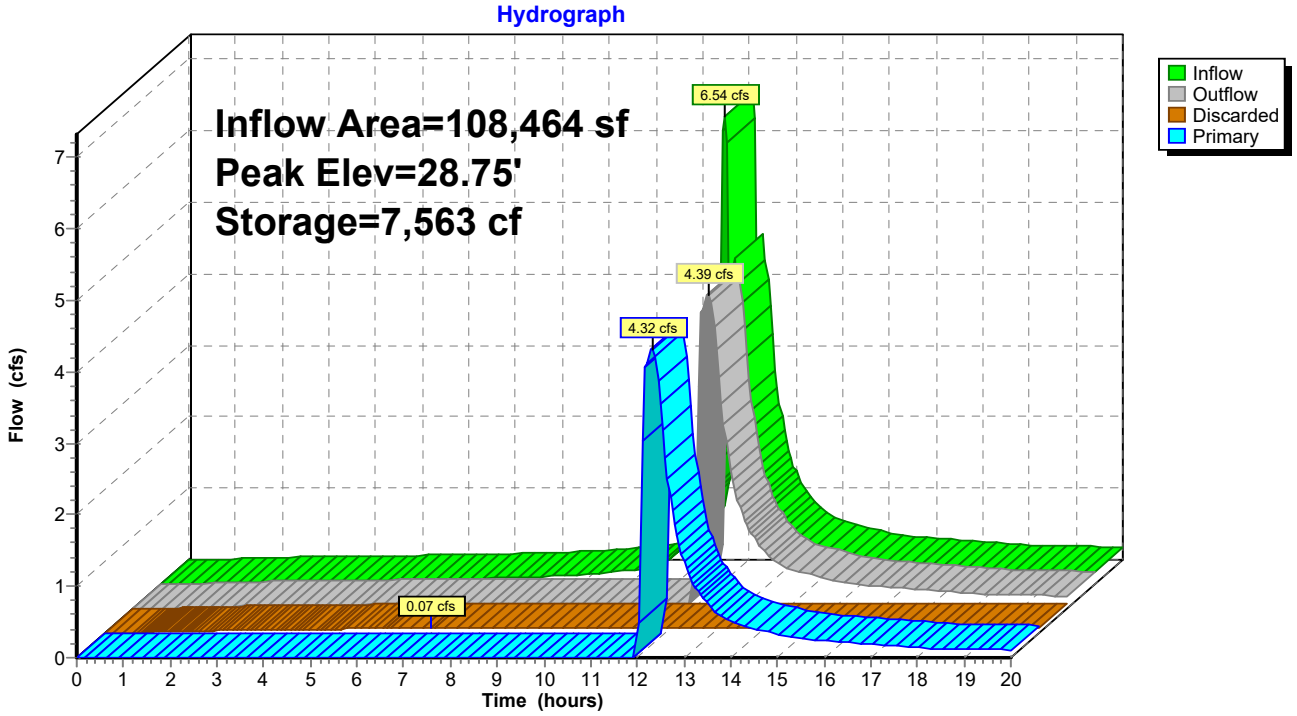
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.00	1,226	0	0
28.00	4,683	2,955	2,955
29.00	8,637	6,660	9,615

Device	Routing	Invert	Outlet Devices
#1	Primary	28.55'	**42.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	27.00'	**0.07 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.07 cfs @ 7.00 hrs HW=27.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=4.31 cfs @ 12.32 hrs HW=28.75' TW=26.24' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 4.31 cfs @ 1.45 fps)

Pond Bio-1: Bio Ret Swale



Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPost 1A: Post area 1A, (5) Runoff Area=11,000 sf 100.00% Impervious Runoff Depth>8.48"
Flow Length=145' Tc=1.2 min CN=98 Runoff=2.73 cfs 7,775 cf

SubcatchmentPost 1B: Post area 1B, (5) Runoff Area=3,500 sf 100.00% Impervious Runoff Depth>8.48"
Flow Length=124' Tc=1.2 min CN=98 Runoff=0.87 cfs 2,474 cf

SubcatchmentPost 1C: Post area 1C, Runoff Area=16,621 sf 100.00% Impervious Runoff Depth>8.48"
Flow Length=105' Tc=1.1 min CN=98 Runoff=4.13 cfs 11,748 cf

SubcatchmentPost 1D: Post area 1D, Runoff Area=77,343 sf 0.00% Impervious Runoff Depth>3.97"
Flow Length=265' Tc=20.2 min CN=61 Runoff=6.46 cfs 25,612 cf

SubcatchmentPre 1: Pre Area 1 (oniste Runoff Area=98,084 sf 3.83% Impervious Runoff Depth>3.60"
Flow Length=489' Tc=32.4 min CN=58 Runoff=5.87 cfs 29,401 cf

Pond Bas-1: Basin 1, Post discharge point Peak Elev=27.83' Storage=26,124 cf Inflow=9.02 cfs 36,586 cf
Discarded=0.12 cfs 3,591 cf Primary=0.47 cfs 9,902 cf Outflow=0.59 cfs 13,493 cf

Pond Bio-1: Bio Ret Swale Peak Elev=28.87' Storage=8,554 cf Inflow=10.36 cfs 47,609 cf
Discarded=0.07 cfs 4,711 cf Primary=9.02 cfs 36,586 cf Outflow=9.09 cfs 41,297 cf

Total Runoff Area = 206,548 sf Runoff Volume = 77,010 cf Average Runoff Depth = 4.47"
83.11% Pervious = 171,666 sf 16.89% Impervious = 34,882 sf

Summary for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

[49] Hint: Tc<2dt may require smaller dt

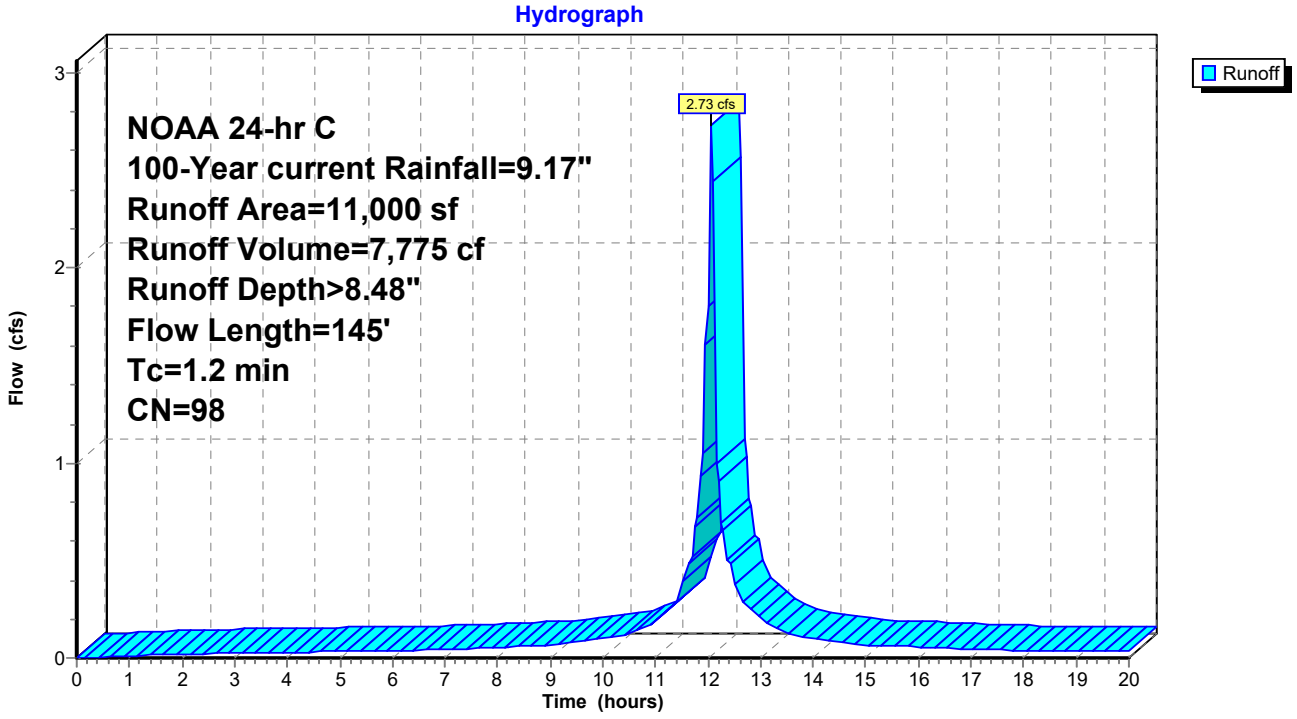
Runoff = 2.73 cfs @ 12.06 hrs, Volume= 7,775 cf, Depth> 8.48"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year current Rainfall=9.17"

	Area (sf)	CN	Description
*	11,000	98	(18) 918 sf roofs
	11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.2000	2.34		**Sheet Flow, roof** Smooth surfaces n= 0.011 P2= 2.80"
0.4	45	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, gutter flow** Paved Kv= 20.3 fps
1.2	145	Total			

Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each



Summary for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

[49] Hint: Tc<2dt may require smaller dt

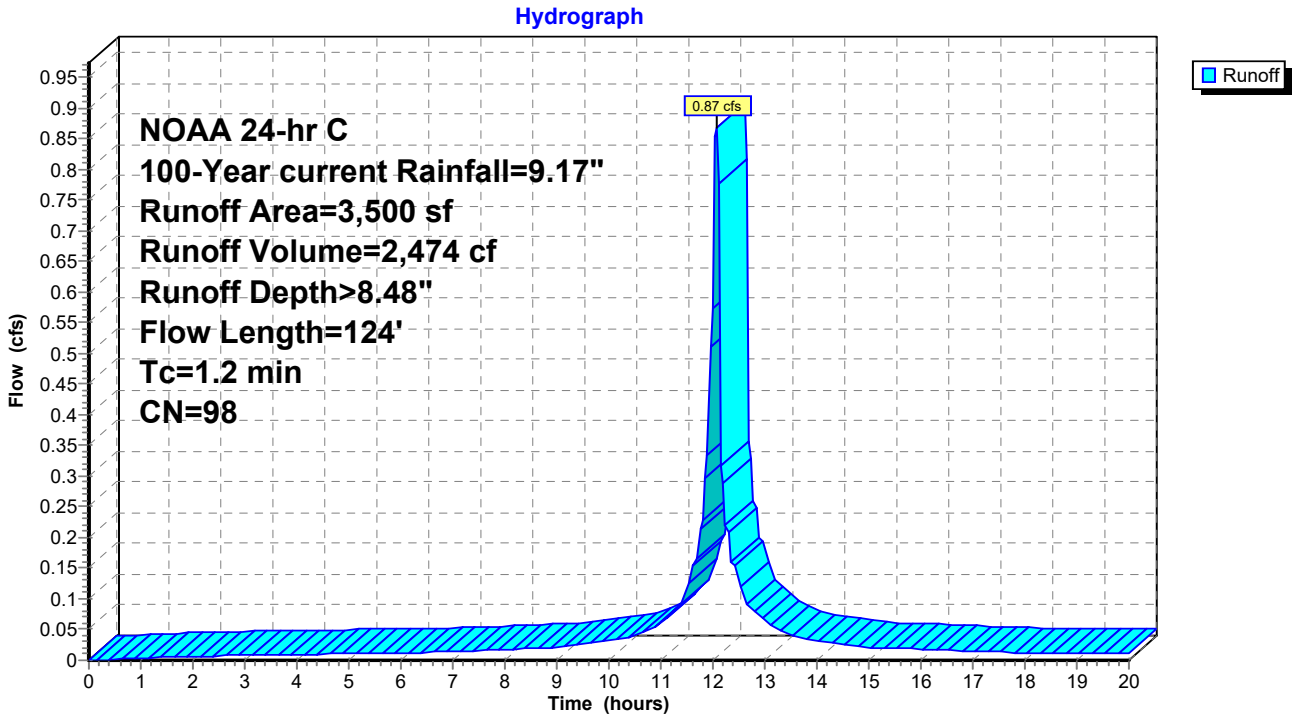
Runoff = 0.87 cfs @ 12.06 hrs, Volume= 2,474 cf, Depth> 8.48"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year current Rainfall=9.17"

	Area (sf)	CN	Description
*	3,500	98	5 DRIVEWAYS
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.0350	1.37		**Sheet Flow, driveway** Smooth surfaces n= 0.011 P2= 2.80"
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.2	124	Total			

Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each



Summary for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

[49] Hint: Tc<2dt may require smaller dt

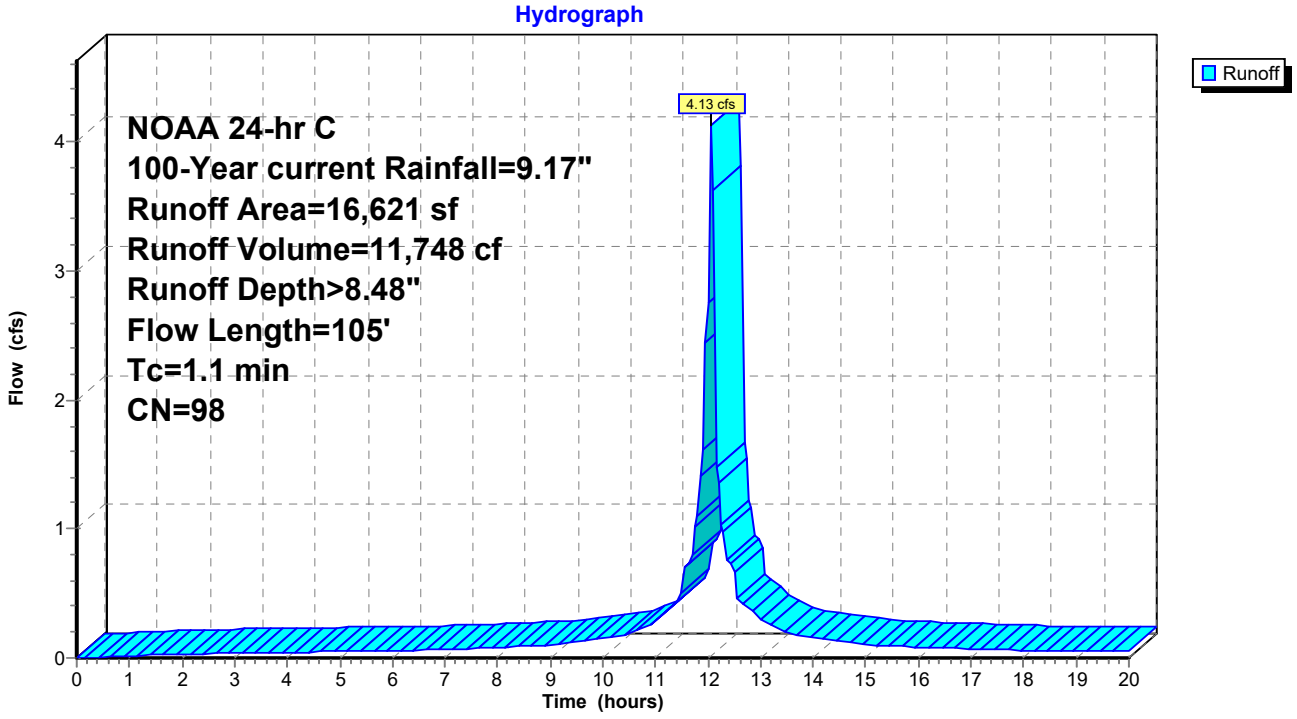
Runoff = 4.13 cfs @ 12.06 hrs, Volume= 11,748 cf, Depth> 8.48"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year current Rainfall=9.17"

	Area (sf)	CN	Description
*	14,605	98	Proposed street area
*	2,016	98	Proposed sidewalk
	16,621	98	Weighted Average
	16,621		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0200	0.88		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.80"
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.1	105	Total			

Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area



Summary for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

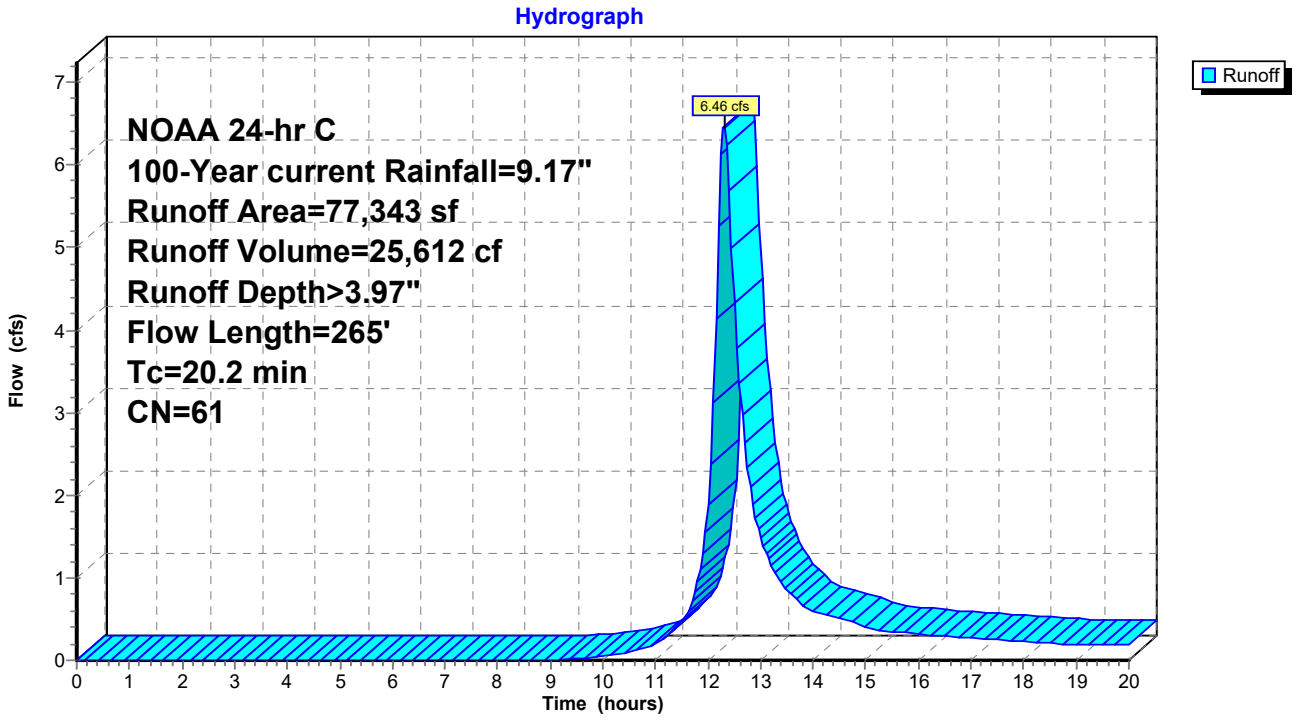
Runoff = 6.46 cfs @ 12.31 hrs, Volume= 25,612 cf, Depth> 3.97"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year current Rainfall=9.17"

	Area (sf)	CN	Description
*	77,343	61	Proposed onsite grass area
	77,343		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 2.80"
0.7	75	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
20.2	265	Total			

Subcatchment Post 1D: Post area 1D, proposed grass area onsite



Summary for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

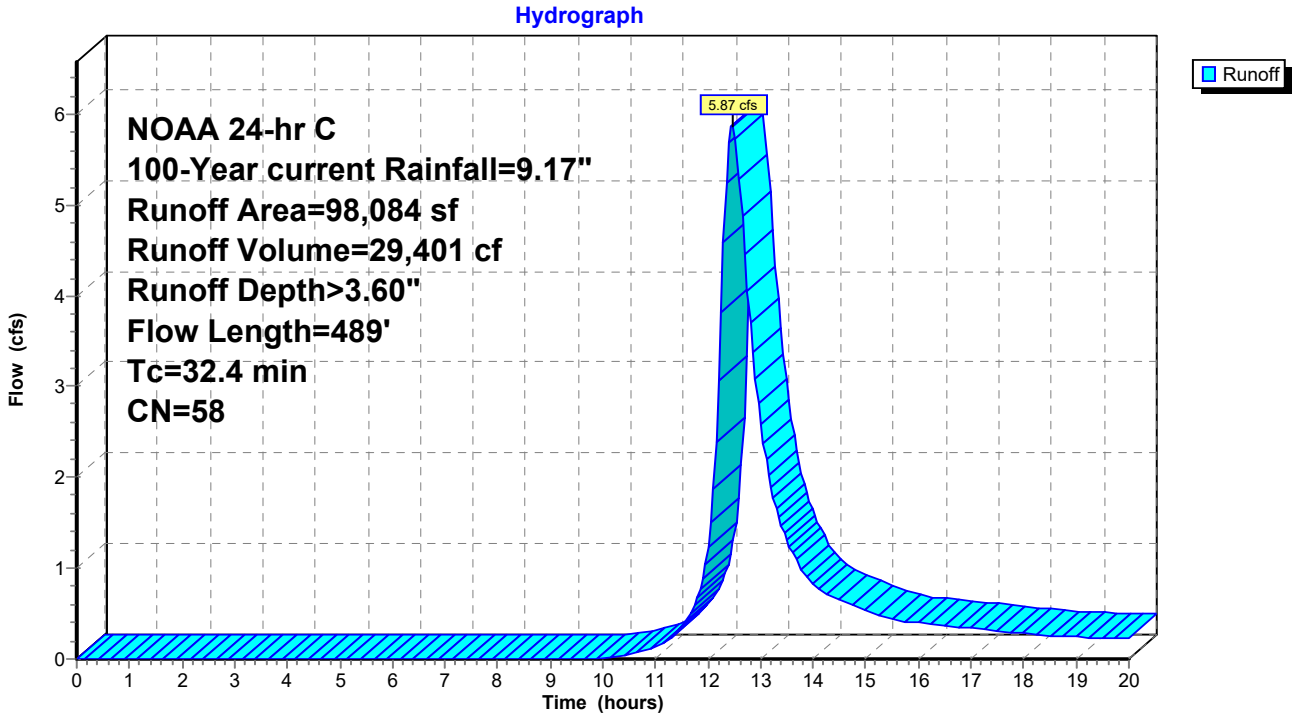
Runoff = 5.87 cfs @ 12.47 hrs, Volume= 29,401 cf, Depth> 3.60"
Routed to nonexistent node Pre Dis 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year current Rainfall=9.17"

	Area (sf)	CN	Description
*	2,430	98	exist roof
*	0	98	exist asphalt
*	1,331	98	exist conc
	17,505	61	>75% Grass cover, Good, HSG B
	76,818	55	Woods, Good, HSG B
	98,084	58	Weighted Average
	94,323		96.17% Pervious Area
	3,761		3.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, grass** Grass: Dense n= 0.240 P2= 2.80"
13.7	389	0.0090	0.47		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
32.4	489	Total			

Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1



r Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surfa

The infiltration area for the infiltration basin is 409 feet x 5 feet in width for 2,045 sf and use a consertative perm rate of 2.5 in/hour for a flow of 0.12 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 4.05" for 100-Year current event
Inflow = 9.02 cfs @ 12.12 hrs, Volume= 36,586 cf
Outflow = 0.59 cfs @ 14.93 hrs, Volume= 13,493 cf, Atten= 94%, Lag= 168.9 min
Discarded = 0.12 cfs @ 11.80 hrs, Volume= 3,591 cf
Primary = 0.47 cfs @ 14.93 hrs, Volume= 9,902 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.83' @ 14.93 hrs Surf.Area= 75,000 sf Storage= 26,124 cf

Plug-Flow detention time= 239.6 min calculated for 13,460 cf (37% of inflow)
Center-of-Mass det. time= 164.3 min (968.3 - 804.0)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	76,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

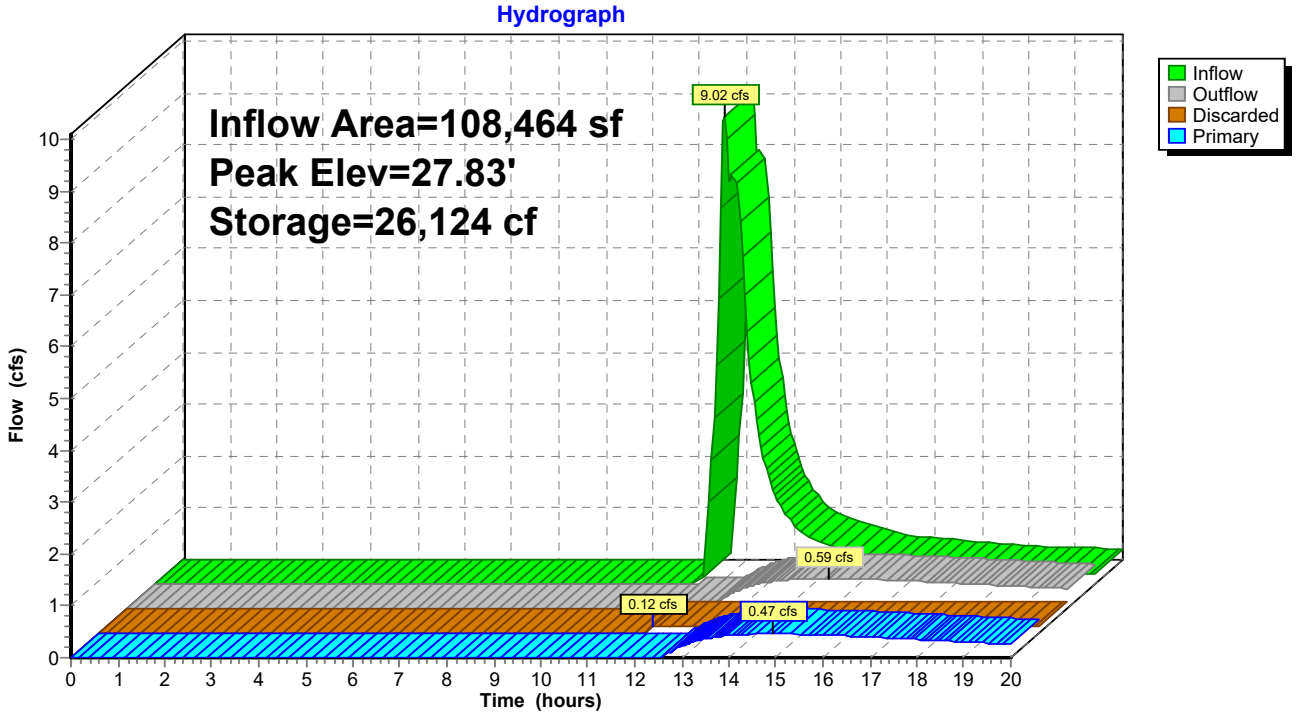
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	1,268	0	0
27.50	1,268	5,072	5,072
27.60	75,000	3,813	8,885
28.50	75,000	67,500	76,385

Device	Routing	Invert	Outlet Devices
#1	Primary	27.70'	**4.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	23.50'	**0.12 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.12 cfs @ 11.80 hrs HW=23.69' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.47 cfs @ 14.93 hrs HW=27.83' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.47 cfs @ 0.90 fps)

Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface stor



Summary for Pond Bio-1: Bio Ret Swale

Exfiltration area is 1,226 sf or area of contour elev. 27. Use 5 in/hr as tested perm rate for a planting bed. Use 2.5 for factor of safety and resulting exfiltration rate is 0.07 cfs

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Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 5.27" for 100-Year current event
Inflow = 10.36 cfs @ 12.07 hrs, Volume= 47,609 cf
Outflow = 9.09 cfs @ 12.12 hrs, Volume= 41,297 cf, Atten= 12%, Lag= 2.5 min
Discarded = 0.07 cfs @ 3.95 hrs, Volume= 4,711 cf
Primary = 9.02 cfs @ 12.12 hrs, Volume= 36,586 cf
Routed to Pond Bas-1 : Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.87' @ 12.12 hrs Surf.Area= 8,137 sf Storage= 8,554 cf

Plug-Flow detention time= 67.8 min calculated for 41,194 cf (87% of inflow)
Center-of-Mass det. time= 24.9 min (785.3 - 760.4)

Volume	Invert	Avail.Storage	Storage Description
#1	27.00'	9,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

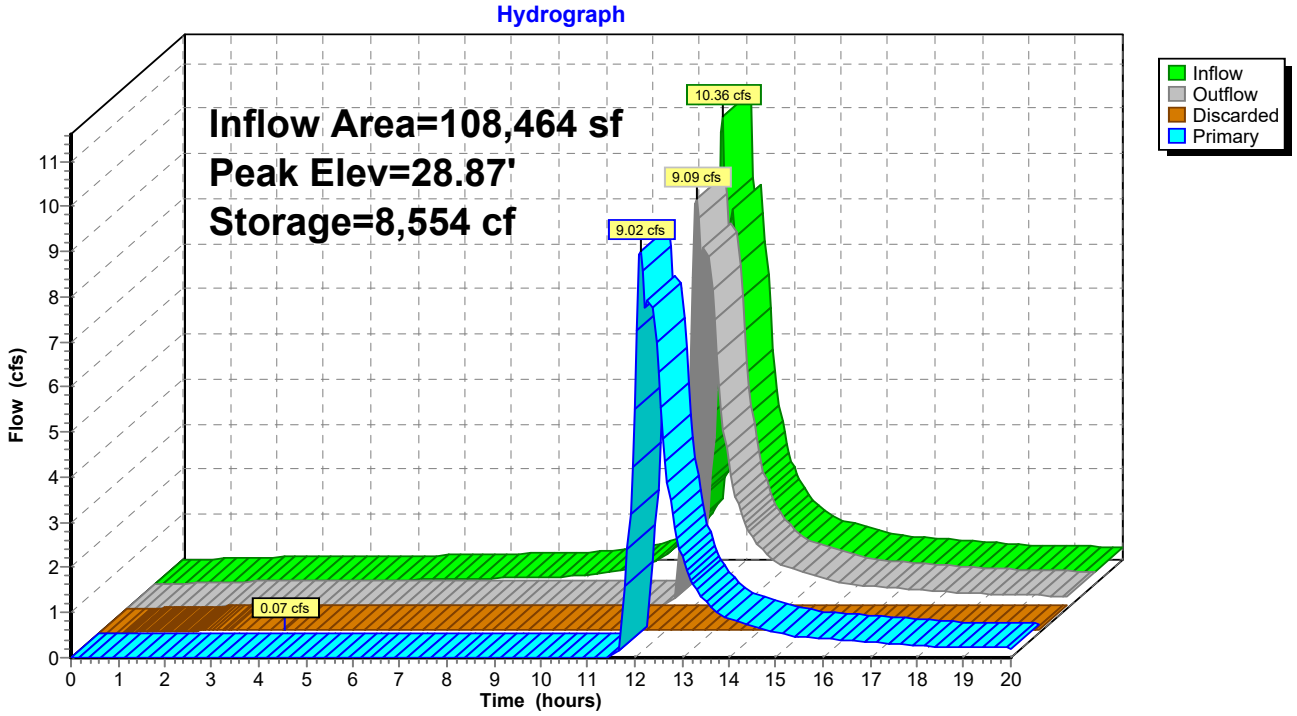
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.00	1,226	0	0
28.00	4,683	2,955	2,955
29.00	8,637	6,660	9,615

Device	Routing	Invert	Outlet Devices
#1	Primary	28.55'	**42.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	27.00'	**0.07 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.07 cfs @ 3.95 hrs HW=27.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=8.80 cfs @ 12.12 hrs HW=28.87' TW=27.53' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 8.80 cfs @ 1.84 fps)

Pond Bio-1: Bio Ret Swale



Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPost 1A: Post area 1A, (5) Runoff Area=11,000 sf 100.00% Impervious Runoff Depth>11.52"
Flow Length=145' Tc=1.2 min CN=98 Runoff=3.69 cfs 10,564 cf

SubcatchmentPost 1B: Post area 1B, (5) Runoff Area=3,500 sf 100.00% Impervious Runoff Depth>11.52"
Flow Length=124' Tc=1.2 min CN=98 Runoff=1.17 cfs 3,361 cf

SubcatchmentPost 1C: Post area 1C, Runoff Area=16,621 sf 100.00% Impervious Runoff Depth>11.52"
Flow Length=105' Tc=1.1 min CN=98 Runoff=5.58 cfs 15,963 cf

SubcatchmentPost 1D: Post area 1D, Runoff Area=77,343 sf 0.00% Impervious Runoff Depth>6.47"
Flow Length=265' Tc=20.2 min CN=61 Runoff=10.47 cfs 41,704 cf

SubcatchmentPre 1: Pre Area 1 (oniste Runoff Area=98,084 sf 3.83% Impervious Runoff Depth>5.99"
Flow Length=489' Tc=32.4 min CN=58 Runoff=9.81 cfs 48,968 cf

Pond Bas-1: Basin 1, Post discharge point Peak Elev=28.00' Storage=38,526 cf Inflow=13.41 cfs 60,360 cf
Discarded=0.12 cfs 3,888 cf Primary=1.62 cfs 29,367 cf Outflow=1.74 cfs 33,255 cf

Pond Bio-1: Bio Ret Swale Peak Elev=28.97' Storage=9,370 cf Inflow=15.03 cfs 71,592 cf
Discarded=0.07 cfs 4,855 cf Primary=13.41 cfs 60,360 cf Outflow=13.48 cfs 65,215 cf

Total Runoff Area = 206,548 sf Runoff Volume = 120,560 cf Average Runoff Depth = 7.00"
83.11% Pervious = 171,666 sf 16.89% Impervious = 34,882 sf

Summary for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

[49] Hint: Tc<2dt may require smaller dt

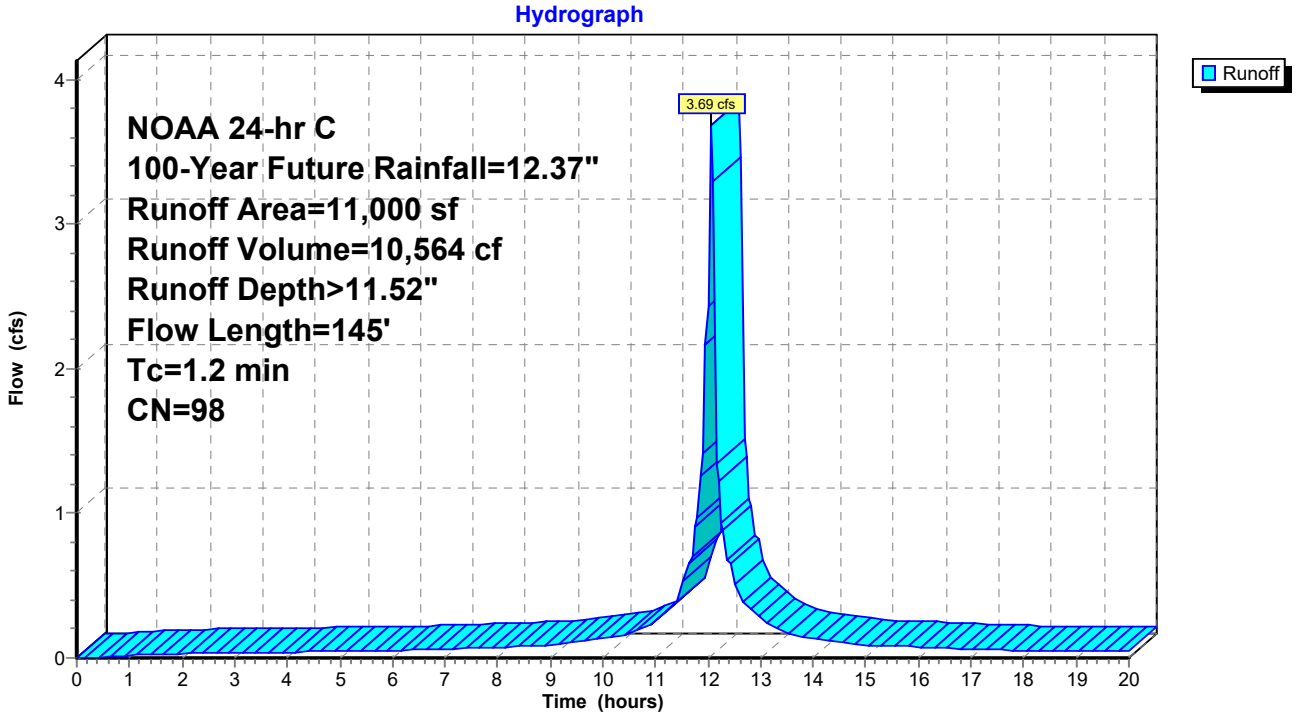
Runoff = 3.69 cfs @ 12.06 hrs, Volume= 10,564 cf, Depth>11.52"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Future Rainfall=12.37"

	Area (sf)	CN	Description
*	11,000	98	(18) 918 sf roofs
	11,000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	20	0.2000	2.34		**Sheet Flow, roof** Smooth surfaces n= 0.011 P2= 2.80"
0.4	45	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, gutter flow** Paved Kv= 20.3 fps
1.2	145	Total			

Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each



Summary for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

[49] Hint: Tc<2dt may require smaller dt

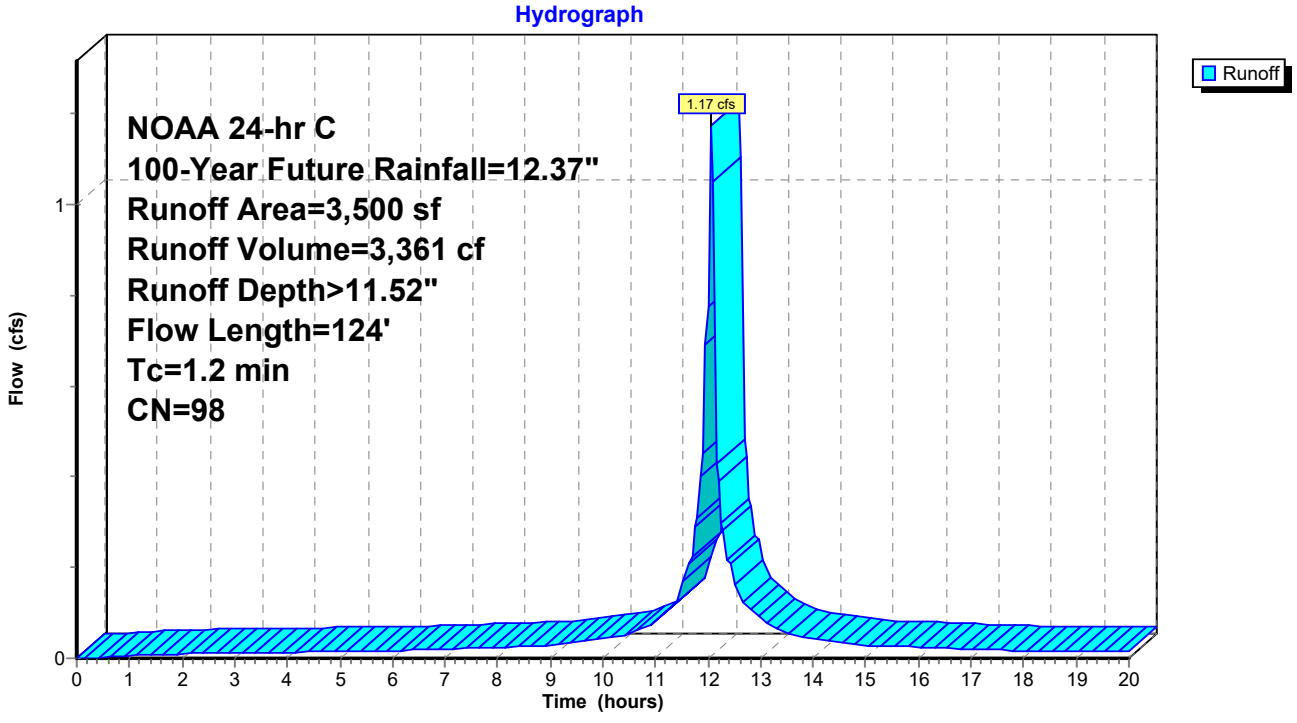
Runoff = 1.17 cfs @ 12.06 hrs, Volume= 3,361 cf, Depth>11.52"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Future Rainfall=12.37"

	Area (sf)	CN	Description
*	3,500	98	5 DRIVEWAYS
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.0350	1.37		**Sheet Flow, driveway** Smooth surfaces n= 0.011 P2= 2.80"
0.7	80	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.2	124	Total			

Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each



Summary for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

[49] Hint: Tc<2dt may require smaller dt

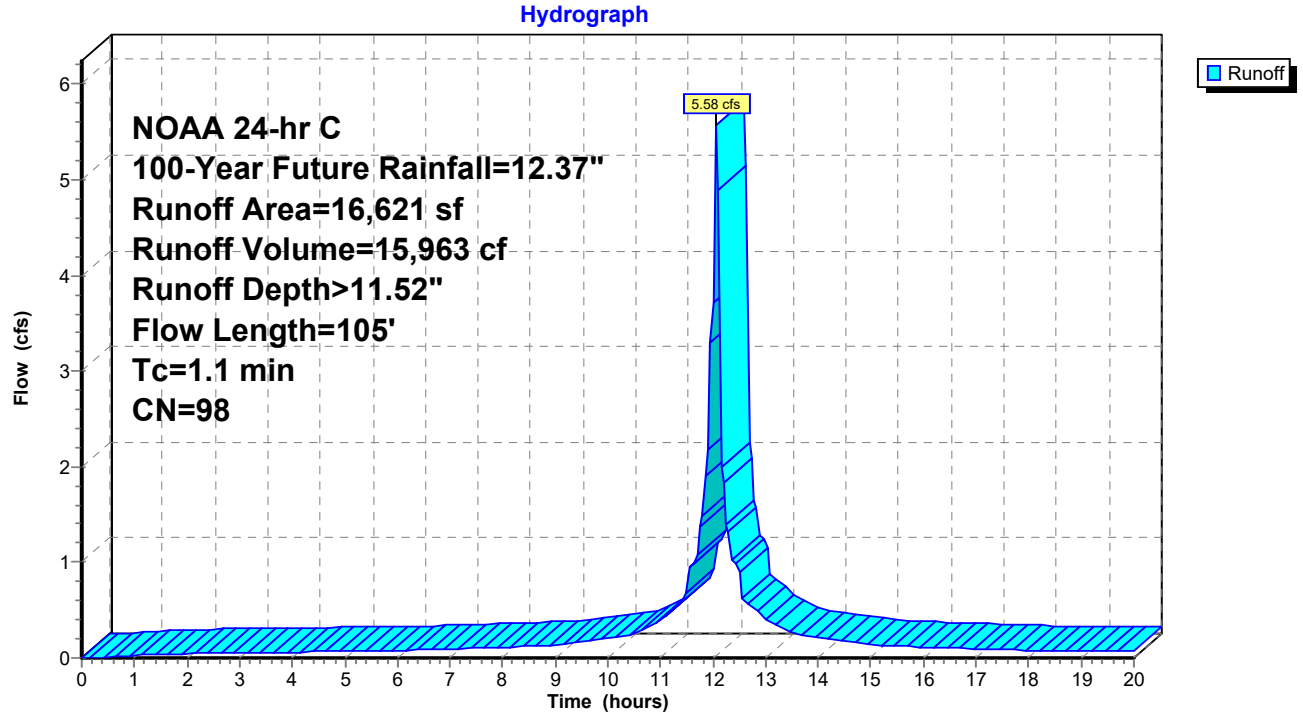
Runoff = 5.58 cfs @ 12.06 hrs, Volume= 15,963 cf, Depth>11.52"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Future Rainfall=12.37"

	Area (sf)	CN	Description
*	14,605	98	Proposed street area
*	2,016	98	Proposed sidewalk
	16,621	98	Weighted Average
	16,621		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	15	0.0200	0.88		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.80"
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
1.1	105	Total			

Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area



Summary for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

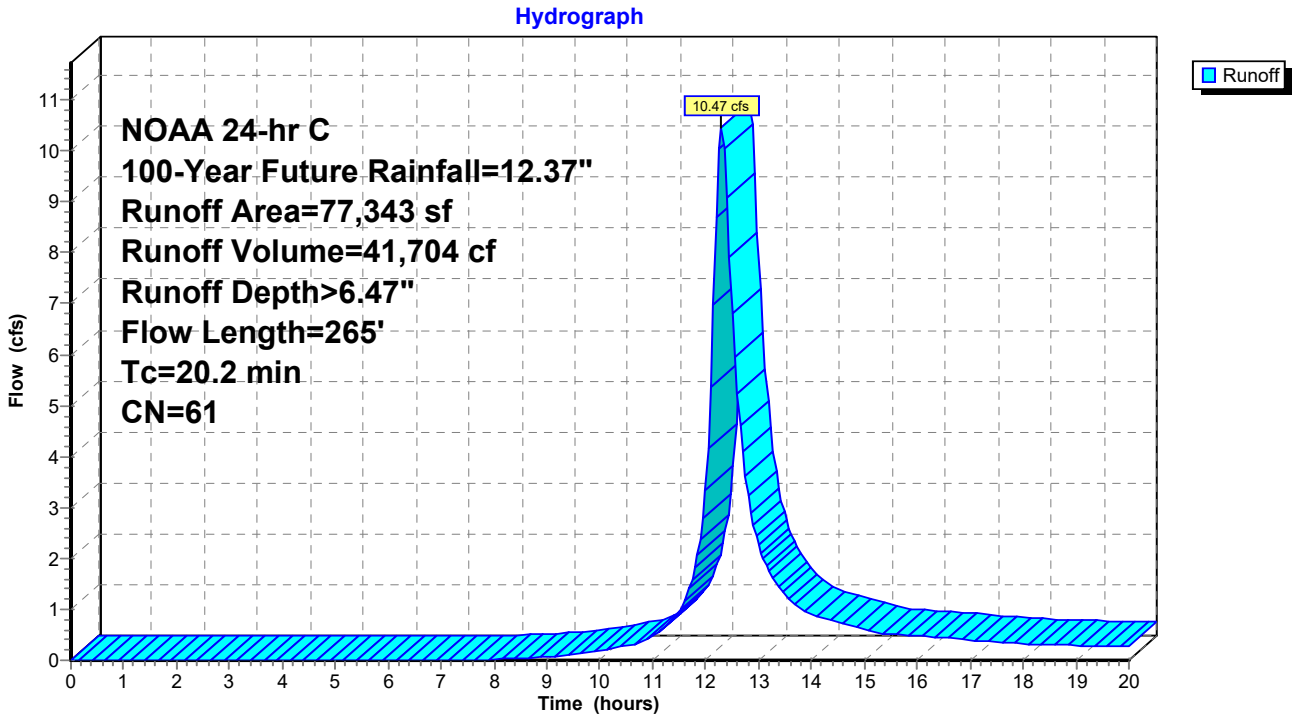
Runoff = 10.47 cfs @ 12.30 hrs, Volume= 41,704 cf, Depth> 6.47"
Routed to Pond Bio-1 : Bio Ret Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Future Rainfall=12.37"

	Area (sf)	CN	Description
*	77,343	61	Proposed onsite grass area
	77,343		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, Grass** Grass: Dense n= 0.240 P2= 2.80"
0.7	75	0.0150	1.84		**Shallow Concentrated Flow, grass** Grassed Waterway Kv= 15.0 fps
0.8	90	0.0080	1.82		**Shallow Concentrated Flow, Gutter flow** Paved Kv= 20.3 fps
20.2	265	Total			

Subcatchment Post 1D: Post area 1D, proposed grass area onsite



Summary for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

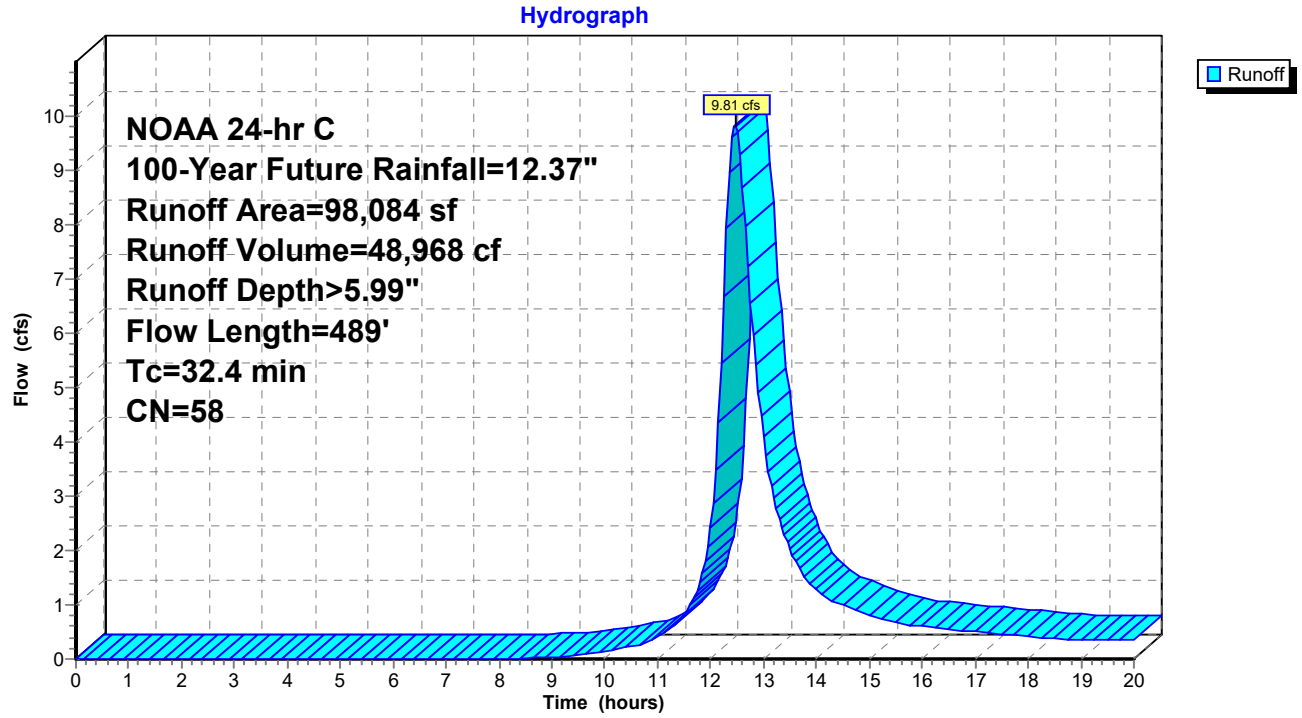
Runoff = 9.81 cfs @ 12.46 hrs, Volume= 48,968 cf, Depth> 5.99"
Routed to nonexistent node Pre Dis 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100-Year Future Rainfall=12.37"

	Area (sf)	CN	Description
*	2,430	98	exist roof
*	0	98	exist asphalt
*	1,331	98	exist conc
	17,505	61	>75% Grass cover, Good, HSG B
	76,818	55	Woods, Good, HSG B
	98,084	58	Weighted Average
	94,323		96.17% Pervious Area
	3,761		3.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0120	0.09		**Sheet Flow, grass** Grass: Dense n= 0.240 P2= 2.80"
13.7	389	0.0090	0.47		**Shallow Concentrated Flow, WOODS** Woodland Kv= 5.0 fps
32.4	489	Total			

Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1



r Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surfa

The infiltration area for the infiltration basin is 409 feet x 5 feet in width for 2,045 sf and use a consertative perm rate of 2.5 in/hour for a flow of 0.12 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 6.68" for 100-Year Future event
Inflow = 13.41 cfs @ 12.12 hrs, Volume= 60,360 cf
Outflow = 1.74 cfs @ 13.57 hrs, Volume= 33,255 cf, Atten= 87%, Lag= 87.2 min
Discarded = 0.12 cfs @ 11.15 hrs, Volume= 3,888 cf
Primary = 1.62 cfs @ 13.57 hrs, Volume= 29,367 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.00' @ 13.57 hrs Surf.Area= 75,000 sf Storage= 38,526 cf

Plug-Flow detention time= 206.2 min calculated for 33,172 cf (55% of inflow)
Center-of-Mass det. time= 139.5 min (934.3 - 794.8)

Volume	Invert	Avail.Storage	Storage Description
#1	23.50'	76,385 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

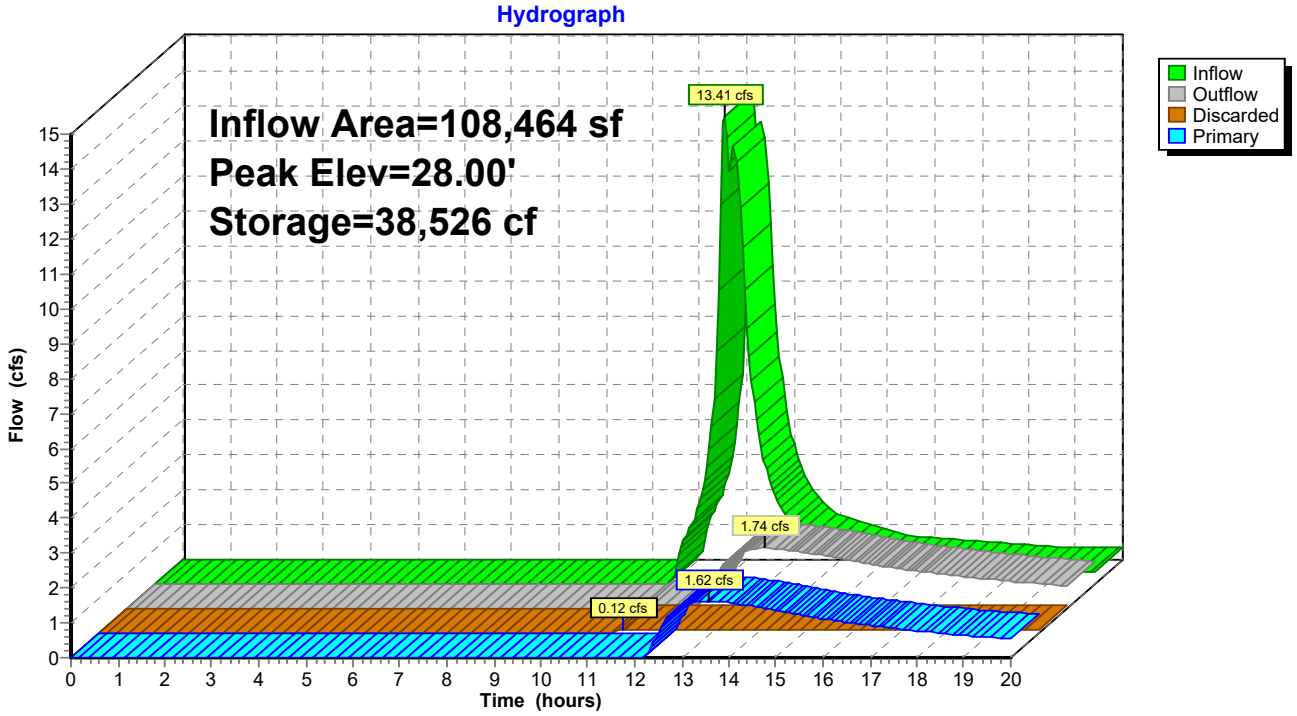
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
23.50	1,268	0	0
27.50	1,268	5,072	5,072
27.60	75,000	3,813	8,885
28.50	75,000	67,500	76,385

Device	Routing	Invert	Outlet Devices
#1	Primary	27.70'	**4.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	23.50'	**0.12 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.12 cfs @ 11.15 hrs HW=23.63' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=1.62 cfs @ 13.57 hrs HW=28.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.62 cfs @ 1.37 fps)

Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface stor



Summary for Pond Bio-1: Bio Ret Swale

Exfiltration area is 1,226 sf or area of contour elev. 27. Use 5 in/hr as tested perm rate for a planting bed. Use 2.5 for factor of safety and resulting exfiltration rate is 0.07 cfs

Inflow Area = 108,464 sf, 28.69% Impervious, Inflow Depth > 7.92" for 100-Year Future event
Inflow = 15.03 cfs @ 12.08 hrs, Volume= 71,592 cf
Outflow = 13.48 cfs @ 12.12 hrs, Volume= 65,215 cf, Atten= 10%, Lag= 2.4 min
Discarded = 0.07 cfs @ 2.15 hrs, Volume= 4,855 cf
Primary = 13.41 cfs @ 12.12 hrs, Volume= 60,360 cf
Routed to Pond Bas-1 : Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface

Routing by Dyn-Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.97' @ 12.12 hrs Surf.Area= 8,524 sf Storage= 9,370 cf

Plug-Flow detention time= 56.0 min calculated for 65,052 cf (91% of inflow)
Center-of-Mass det. time= 24.6 min (782.1 - 757.5)

Volume	Invert	Avail.Storage	Storage Description
#1	27.00'	9,615 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

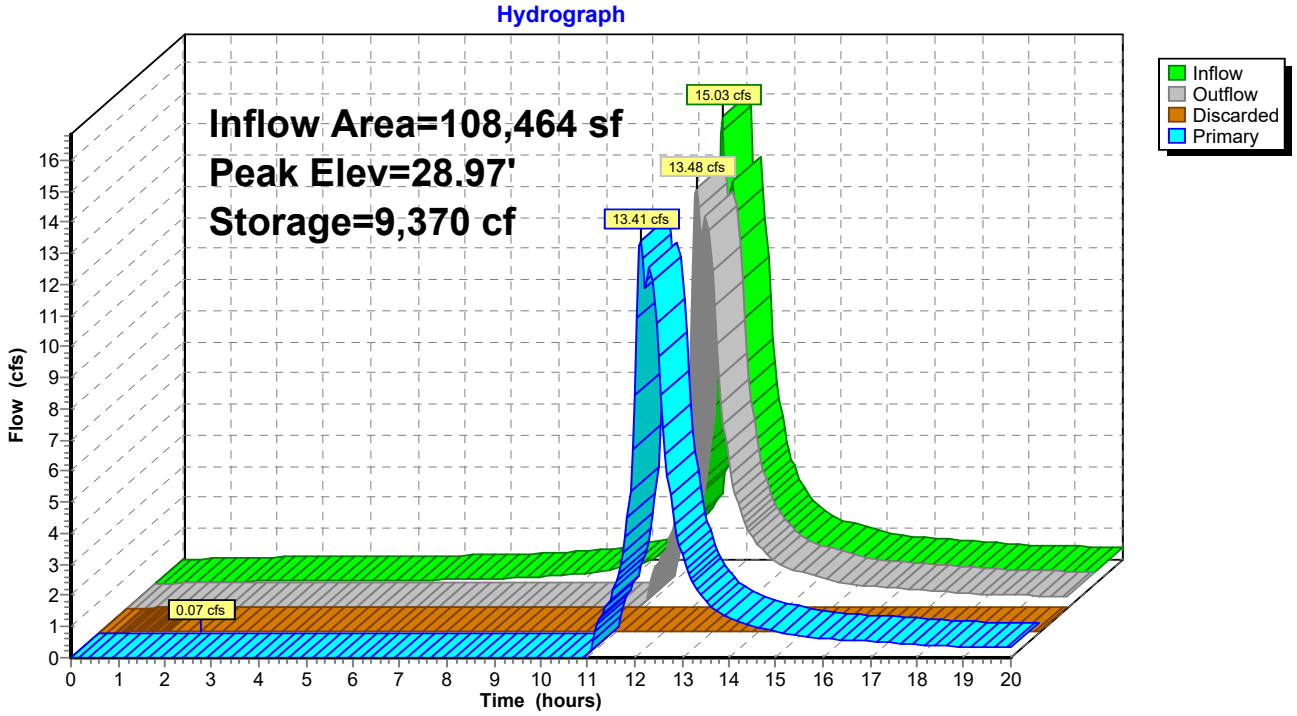
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
27.00	1,226	0	0
28.00	4,683	2,955	2,955
29.00	8,637	6,660	9,615

Device	Routing	Invert	Outlet Devices
#1	Primary	28.55'	**42.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	27.00'	**0.07 cfs Exfiltration at all elevations**

Discarded OutFlow Max=0.07 cfs @ 2.15 hrs HW=27.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=13.10 cfs @ 12.12 hrs HW=28.96' TW=27.66' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 13.10 cfs @ 2.11 fps)

Pond Bio-1: Bio Ret Swale



Events for Subcatchment Post 1A: Post area 1A, (5) roof top areas of 2,200 sf each

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
Water Quality	1.25	0.79	948	1.03
2-Year current	3.34	0.99	2,699	2.94
2-Year Future	4.04	1.20	3,307	3.61
10-Year current	5.26	1.56	4,369	4.77
10-Year Future	6.40	1.90	5,362	5.85
100-Year current	9.17	2.73	7,775	8.48
100-Year Future	**12.37**	**3.69**	**10,564**	**11.52**

Events for Subcatchment Post 1B: Post area 1B, (5) driveway areas of 700 sf each

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
Water Quality	1.25	0.25	302	1.03
2-Year current	3.34	0.31	859	2.94
2-Year Future	4.04	0.38	1,052	3.61
10-Year current	5.26	0.50	1,390	4.77
10-Year Future	6.40	0.61	1,706	5.85
100-Year current	9.17	0.87	2,474	8.48
100-Year Future	**12.37**	**1.17**	**3,361**	**11.52**

Events for Subcatchment Post 1C: Post area 1C, proposed street & sidewalk area

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
Water Quality	1.25	1.20	1,433	1.03
2-Year current	3.34	1.49	4,078	2.94
2-Year Future	4.04	1.81	4,998	3.61
10-Year current	5.26	2.36	6,602	4.77
10-Year Future	6.40	2.88	8,102	5.85
100-Year current	9.17	4.13	11,748	8.48
100-Year Future	**12.37**	**5.58**	**15,963**	**11.52**

Events for Subcatchment Post 1D: Post area 1D, proposed grass area onsite

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
Water Quality	1.25	0.00	0	0.00
2-Year current	3.34	0.52	2,764	0.43
2-Year Future	4.04	1.03	4,677	0.73
10-Year current	5.26	2.11	8,750	1.36
10-Year Future	6.40	3.28	13,187	2.05
100-Year current	9.17	6.46	25,612	3.97
100-Year Future	**12.37**	**10.47**	**41,704**	**6.47**

Events for Subcatchment Pre 1: Pre Area 1 (oniste only) to Discharge Pt 1

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
Water Quality	1.25	0.00	0	0.00
2-Year current	3.34	0.35	2,657	0.33
2-Year Future	4.04	0.76	4,763	0.58
10-Year current	5.26	1.73	9,403	1.15
10-Year Future	6.40	2.82	14,578	1.78
100-Year current	9.17	5.87	29,401	3.60
100-Year Future	**12.37**	**9.81**	**48,968**	**5.99**

s for Pond Bas-1: Basin 1, Post discharge point 1, Existing inlet in Poplar Ave. and is an existing sub-surface sto

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
Water Quality	0.00	0.00	0.00	0.00	23.50	0
2-Year current	0.09	0.09	0.09	0.00	23.50	0
2-Year Future	0.72	0.12	**0.12**	0.00	25.00	1,903
10-Year current	2.71	0.12	0.12	0.00	27.58	7,710
10-Year Future	4.32	0.12	0.12	0.00	27.67	14,305
100-Year current	9.02	0.59	0.12	0.47	27.83	26,124
100-Year Future	**13.41**	**1.74**	0.12	**1.62**	**28.00**	**38,526**

Events for Pond Bio-1: Bio Ret Swale

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
Water Quality	2.24	0.07	**0.07**	0.00	27.85	2,272
2-Year current	2.82	0.16	0.07	0.09	28.56	6,228
2-Year Future	3.58	0.79	0.07	0.72	28.61	6,548
10-Year current	5.06	2.78	0.07	2.71	28.69	7,163
10-Year Future	6.54	4.39	0.07	4.32	28.75	7,563
100-Year current	10.36	9.09	0.07	9.02	28.87	8,554
100-Year Future	**15.03**	**13.48**	0.07	**13.41**	**28.97**	**9,370**