Stormwater Narrative
672 Randolph Ave & 7-9 Pleasant Street
Milton, Massachusetts

Project Summary

The project applicant/owner, Falconi Properties, LLC, proposes to construct an expansion to an existing parking area for a mixed-used structure located at 7-9 Pleasant Street. This expansion would connect to the existing parking lot and reside in the rear yard of 672 Randolph Ave. 7-9 Pleasant Street is labeled as Assessor's Parcel I-4-9 and is approximately 9,786 square feet in size, consisting of a mixture of roof, pavement, landscaping, lawn, and wooded areas. The rear yard of 672 Randolph Ave is labeled as Assessor's Parcel I-4-10 and is approximately 23,758 square feet in size, and the rear yard where the parking is proposed consists of a mixture of lawn and woodland areas.

All the areas are upland in nature. The site has frontage along Pleasant Street and Randolph Ave to the west, is abutted by developed single family dwellings to the north and south, and by vacant lot to the east.

This report contains a narrative review of the stormwater management systems associated with the proposed project in accordance with the Massachusetts Stormwater standards. The work proposed includes the construction of a paved parking area with associated screening, lighting, and stormwater management BMPs. Across the site, the proposed work results in a 4,579 square foot increase in impervious area and disturb 8,000 square feet of land, which will be restored and stabilized post-construction.

Pre-Development Condition

The site in its existing condition consists of a mixed-use structure and single-family dwelling with associated driveways, parking lot, lawn, and wooded areas. In general, the site slopes to the west towards Randolph Ave and Pleasant Street. Existing stormwater BMPs are in place for 7-9 Pleasant Street, consisting of a series of leaching catch basins that were installed when the parking lot was constructed.

Soils information was obtained through a review of the web-based USDA Soil Survey as well as on-site soils testing. The USDA Soil Survey describes the soils as Charlton-Hollis Rock Outcrop Complex, Hydraulic Soil Group A, Map Unit 103B. Multiple areas on-site had soil testing for the stormwater systems, conducted by Paul Graeme Gunn, SE#14392 on May 3, 2023. The test pits across the property were consistent in demonstrating the existing material to be loamy sand with no evidence of redoximorphic features that would indicate an elevated groundwater table.

Post-Development Condition

The proposed site will include an expanded parking area for 7-9 Pleasant Street, located behind the existing single family dwelling located at 672 Randolph Ave. The project proposes to disturb approximately 8,000 square feet and will result in a net increase in

impervious areas of 4,579 square feet. The increased runoff from the expanded parking area is proposed to be captured and infiltrated by a series of subsurface Cultec drywell chambers embedded in crushed stone. These drywell systems will serve to reduce the post-construction rates and runoff volumes when compared to the pre-construction conditions and will ensure there is no loss of annual recharge to the groundwater table.

Mitigation of Peak-Discharge Rates

The project has been designed to mitigate peak rates and volumes of runoff. See below for calculations of the runoff discharges and volumes for the 2, 10, 25 and 100-yr. storm events.

DESIGN POINT 1:

RATES OF RUNOFF (C.F.S.)

Event	*2-yr.*	*10-yr.*	*25-yr.*	*100-yr.*
Pre-Dev.	0.94	1.97	2.48	3.28
Post-Dev.	0.96	1.86	2.28	2.93

VOLUME OF RUNOFF (Ac-ft.)

Event	*2-yr.*	*10-yr.*	*25-yr.*	*100-yr.*
Pre-Dev.	0.058	0.126	0.165	0.227
Post-Dev.	0.056	0.113	0.148	0.211

DESIGN POINT 2:

RATES OF RUNOFF (C.F.S.)

Event	*2-yr.*	*10-yr.*	*25-yr.*	*100-yr.*
Pre-Dev.	0.19	0.48	0.65	0.92
Post-Dev.	0.18	0.45	0.62	0.88

VOLUME OF RUNOFF (Ac-ft.)

Event	*2-yr.*	*10-yr.*	*25-yr.*	*100-yr.*
Pre-Dev.	0.018	0.039	0.052	0.074
Post-Dev.	0.017	0.039	0.052	0.073

Groundwater Recharge

There is no loss of annual recharge to groundwater because the project proposes Cultec drywells to capture and promote recharge. The soils are listed by NRCS sources as a Hydraulic Soil Group A, which require 0.60 inches of runoff to be recharged.

Recharge Volume = (0.60 inch of runoff) (Total Proposed Impervious Area)

The proposed project results in 4,579 s.f. of new impervious area.

Therefore:
Minimum Recharge Volume = (0.60 in.) (4,579 s.f. (1 ft./12 in.)) = 229 c.f.

PROVIDED RECHARGE = 1,517 c.f.
(Provided within the Cultec Chambers - see HydroCAD results)

Water Quality Volume

Requirement: Provide 80% TSS Removal of the Water Quality Volume.

Water Quality Volume = (0.5 inch of runoff) (Total Impervious Area*)

The proposed driveway results in new impervious area of 4,579 s.f.

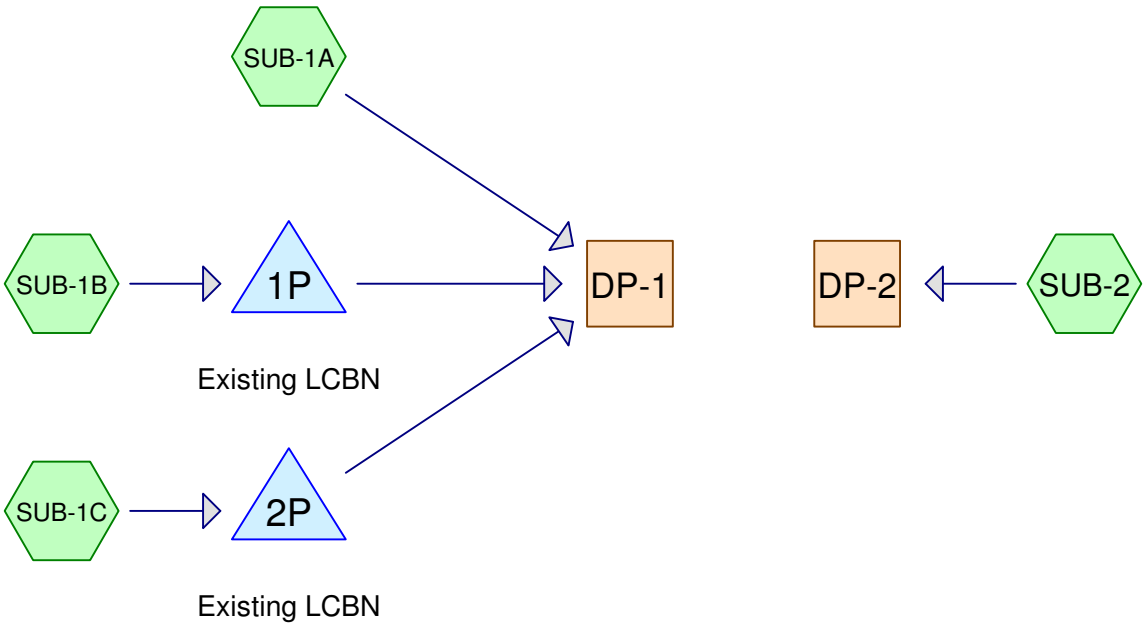
Therefore:
Minimum Water Quality Volume = (0.5 in.) (4,579 s.f.(1 ft./12 in.)) = 191 c.f. (min.)

PROVIDED RECHARGE = 1,517 c.f.
(Provided within the Cultec Chambers - see HydroCAD results)

Erosion and Siltation Control

The potential for temporary off-site impacts due to erosion and migration of sediments will be mitigated by adherence to basic erosion control practices. Erosion control consisting of a staked mulch sock will be placed along the entire limit of work prior to project commencement, which will serve to clearly define the limit of work. The integrity of the erosion control barrier will be maintained by periodic inspection and replacement as necessary. The barrier will remain in place until all disturbed surfaces have been loamed and seeded and vegetation has been established.

Silt socks will be placed on all existing catch basins and newly installed catch basins until the site is fully stabilized in order to prevent any undue sedimentation build up. A stabilized crushed stone construction entrance is to be provided as shown on the site plan and will be maintained until the site is fully stabilized or until the new driveway is installed.



Subcat Reach Pond Link

Drainage Diagram for Pre-Cornell

Prepared by {enter your company name here}, Printed 10/20/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.171	60	Woods, Fair, HSG B (SUB-1A, SUB-2)
0.402	61	>75% Grass cover, Good, HSG B (SUB-1A, SUB-1B, SUB-1C, SUB-2)
0.265	98	Pavement (SUB-1A, SUB-1B, SUB-1C, SUB-2)
0.118	98	Roof (SUB-1A, SUB-2)
0.020	98	Walkways, Retaining Walls (SUB-1A)
0.006	98	Walkways/Retaining Walls (SUB-2)
0.983	76	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.573	HSG B	SUB-1A, SUB-1B, SUB-1C, SUB-2
0.000	HSG C	
0.000	HSG D	
0.410	Other	SUB-1A, SUB-1B, SUB-1C, SUB-2
0.983		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=22,285 sf 33.57% Impervious Runoff Depth>0.98"
Flow Length=265' Tc=8.0 min CN=73 Runoff=0.51 cfs 0.042 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth>2.54"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.32 cfs 0.024 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth>2.44"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.24 cfs 0.018 af

Subcatchment SUB-2: Runoff Area=11,786 sf 22.36% Impervious Runoff Depth>0.78"
Flow Length=138' Tc=9.4 min CN=69 Runoff=0.19 cfs 0.018 af

Reach DP-1: Inflow=0.94 cfs 0.058 af
Outflow=0.94 cfs 0.058 af

Reach DP-2: Inflow=0.19 cfs 0.018 af
Outflow=0.19 cfs 0.018 af

Pond 1P: Existing LCBN Peak Elev=109.67' Storage=291 cf Inflow=0.32 cfs 0.024 af
Discarded=0.00 cfs 0.006 af Primary=0.45 cfs 0.011 af Outflow=0.46 cfs 0.018 af

Pond 2P: Existing LCBN Peak Elev=111.84' Storage=296 cf Inflow=0.24 cfs 0.018 af
Discarded=0.00 cfs 0.006 af Primary=0.20 cfs 0.005 af Outflow=0.20 cfs 0.012 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.101 af Average Runoff Depth = 1.23"
58.31% Pervious = 0.573 ac 41.69% Impervious = 0.410 ac

Summary for Subcatchment SUB-1A:

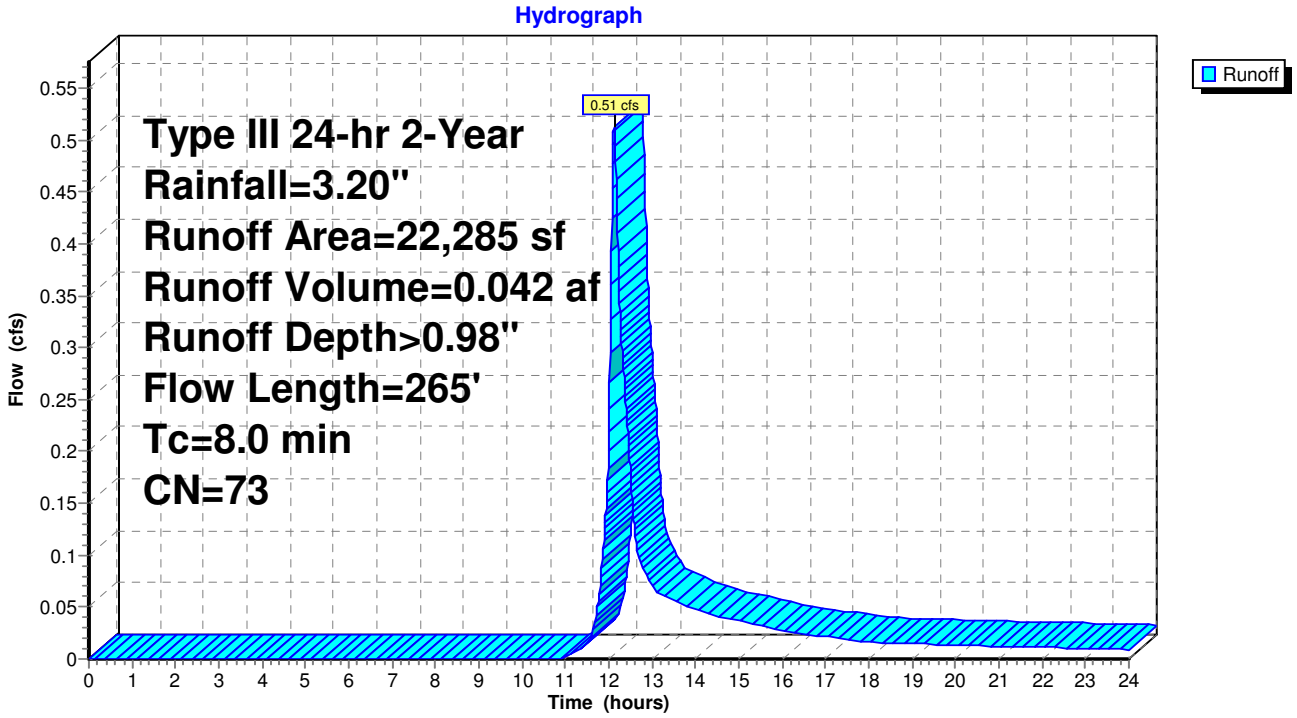
Runoff = 0.51 cfs @ 12.12 hrs, Volume= 0.042 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	4,359	98	Roof
*	2,233	98	Pavement
	2,834	60	Woods, Fair, HSG B
	11,969	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	22,285	73	Weighted Average
	14,803		66.43% Pervious Area
	7,482		33.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0850	0.12		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	35	0.0500	1.12		**Shallow Concentrated Flow, 50-85** Woodland Kv= 5.0 fps
0.6	180	0.1000	5.09		**Shallow Concentrated Flow, 85-265** Unpaved Kv= 16.1 fps
8.0	265	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

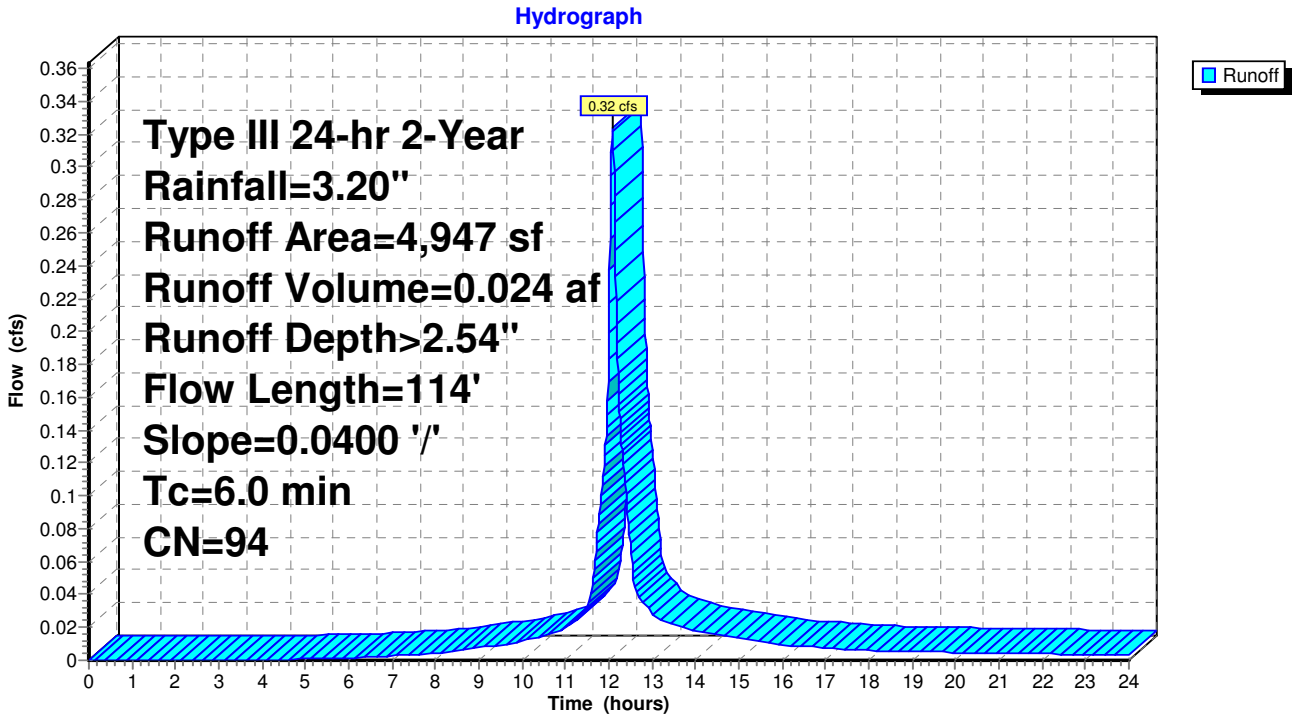
Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.024 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

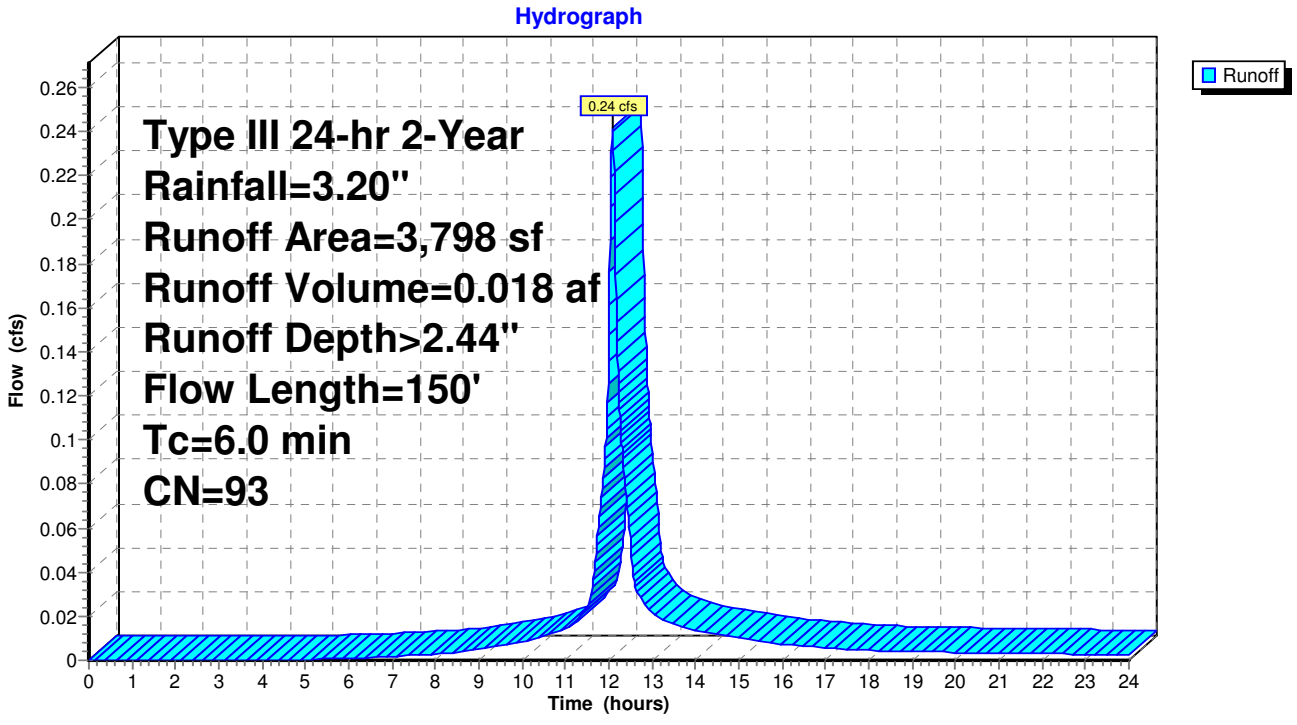
Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-2:

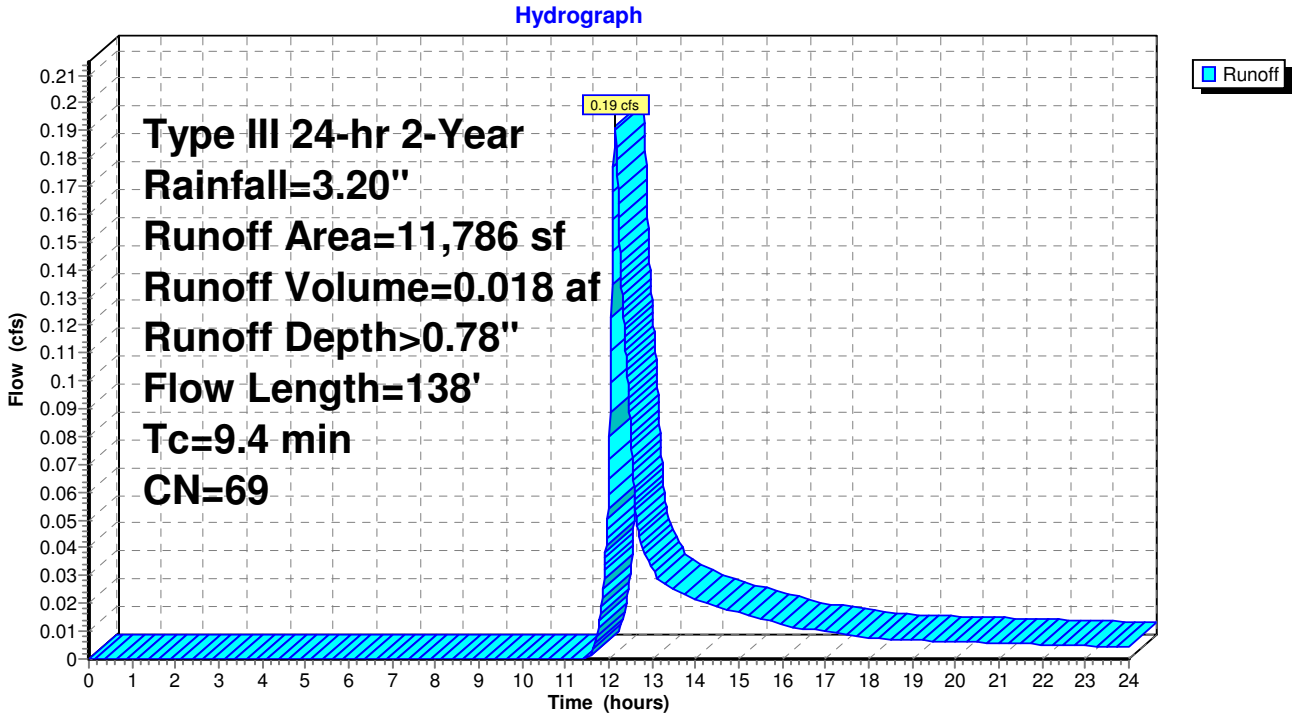
Runoff = 0.19 cfs @ 12.15 hrs, Volume= 0.018 af, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,635	60	Woods, Fair, HSG B
	4,516	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,786	69	Weighted Average
	9,151		77.64% Pervious Area
	2,635		22.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	75	0.0300	0.87		**Shallow Concentrated Flow, 50-125** Woodland Kv= 5.0 fps
0.1	13	0.0200	2.28		**Shallow Concentrated Flow, 125-138** Unpaved Kv= 16.1 fps
9.4	138	Total			

Subcatchment SUB-2:

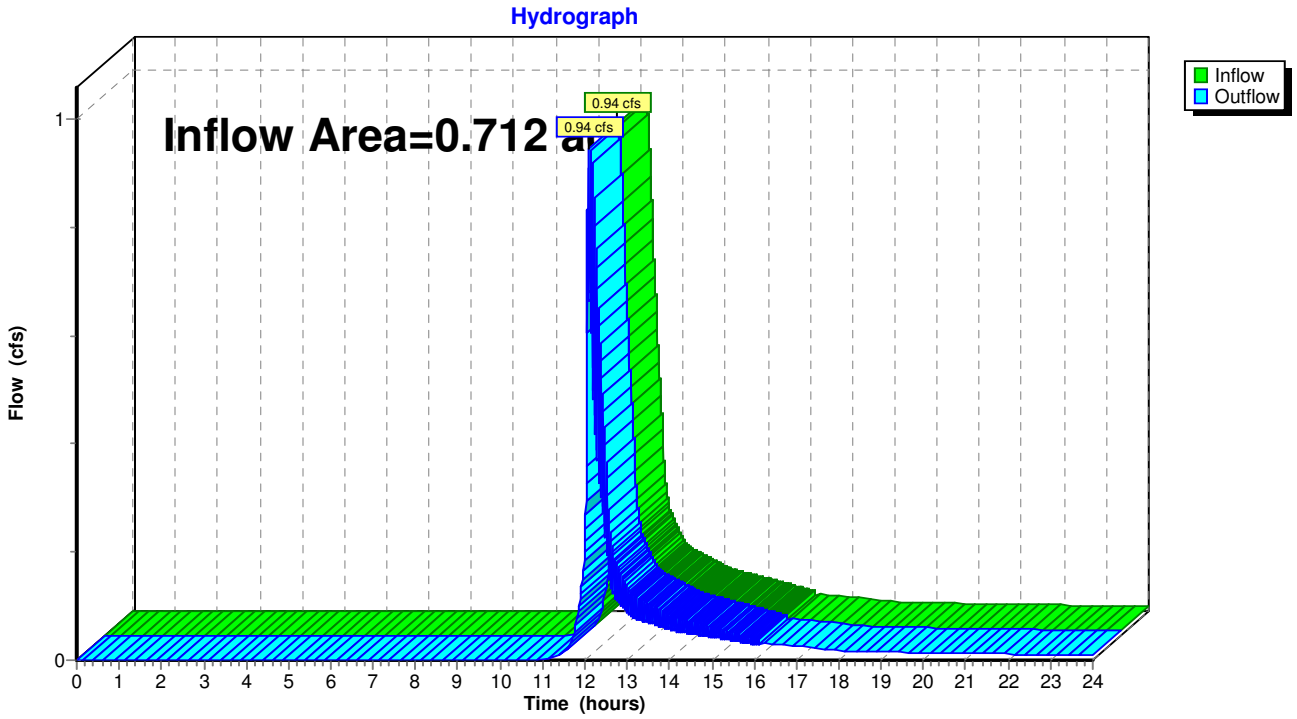


Summary for Reach DP-1:

Inflow Area = 0.712 ac, 49.03% Impervious, Inflow Depth > 0.98" for 2-Year event
Inflow = 0.94 cfs @ 12.10 hrs, Volume= 0.058 af
Outflow = 0.94 cfs @ 12.10 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-1:

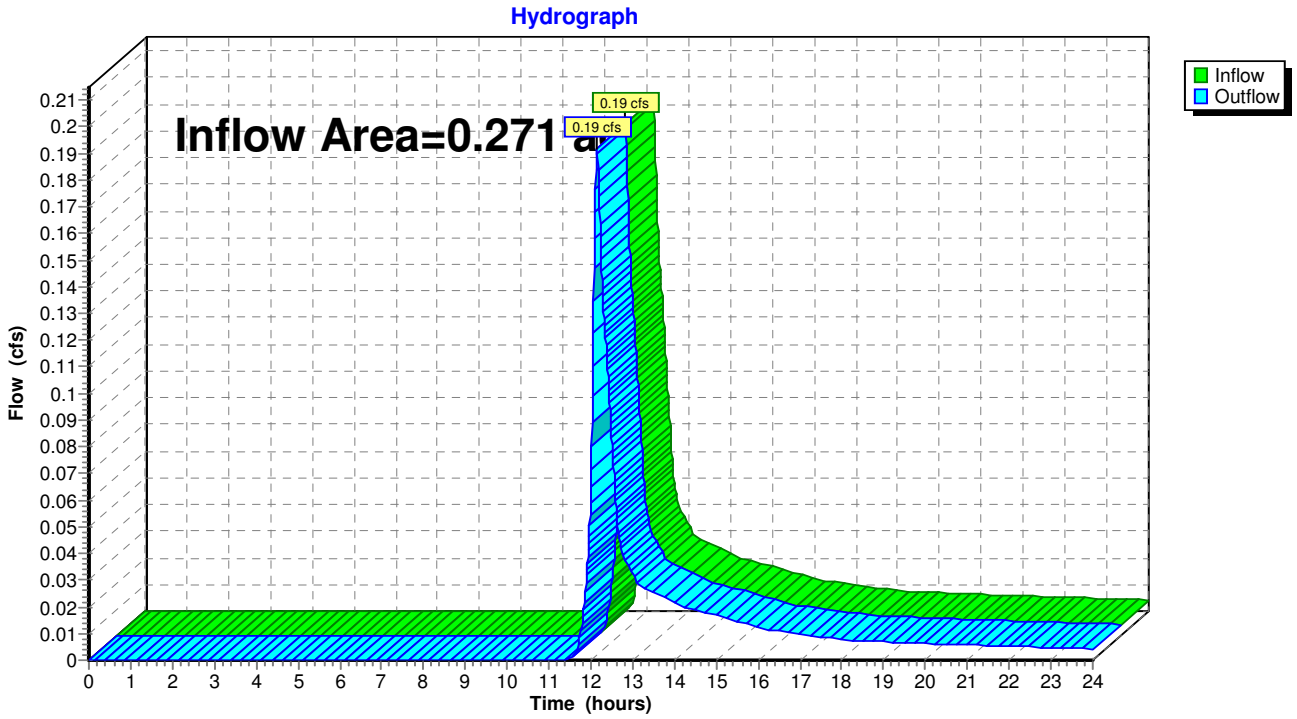


Summary for Reach DP-2:

Inflow Area = 0.271 ac, 22.36% Impervious, Inflow Depth > 0.78" for 2-Year event
Inflow = 0.19 cfs @ 12.15 hrs, Volume= 0.018 af
Outflow = 0.19 cfs @ 12.15 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth > 2.54" for 2-Year event
Inflow = 0.32 cfs @ 12.08 hrs, Volume= 0.024 af
Outflow = 0.46 cfs @ 12.08 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 8.84 hrs, Volume= 0.006 af
Primary = 0.45 cfs @ 12.08 hrs, Volume= 0.011 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 109.67' @ 12.08 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 44.8 min (831.3 - 786.5)

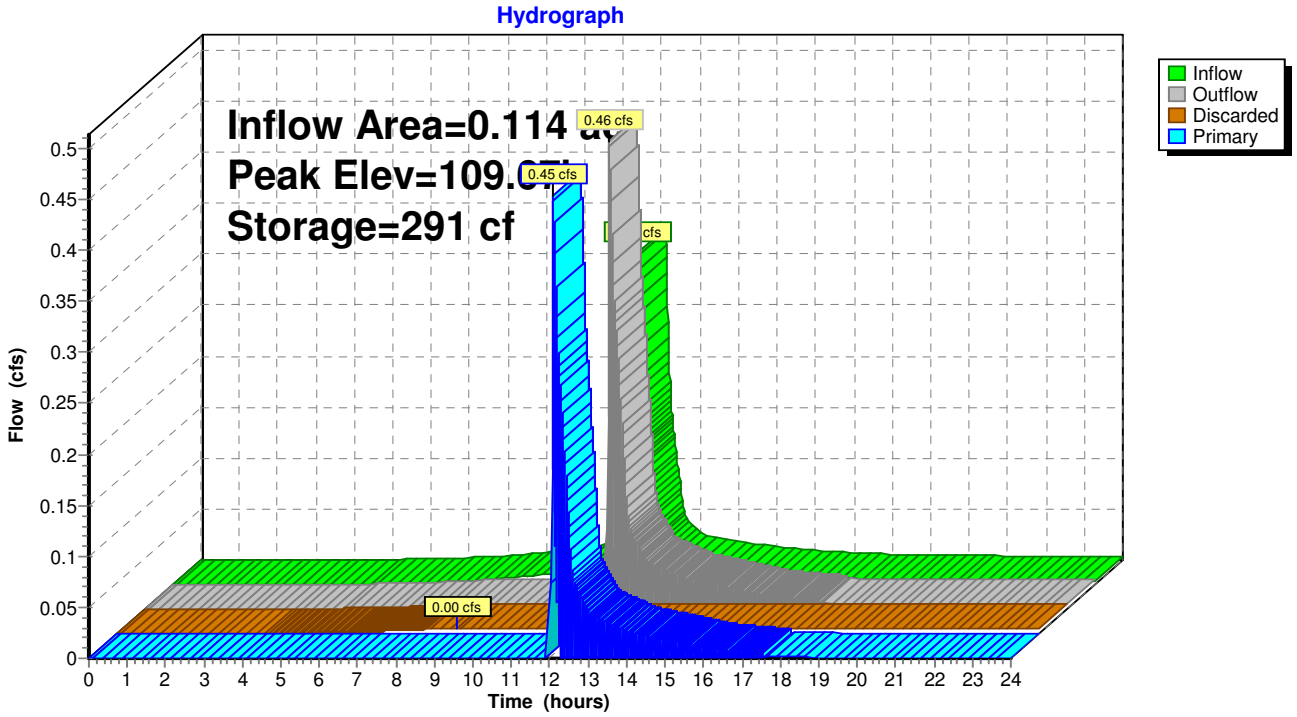
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 8.84 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.45 cfs @ 12.08 hrs HW=109.67' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.45 cfs @ 0.85 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth > 2.44" for 2-Year event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af
Outflow = 0.20 cfs @ 12.20 hrs, Volume= 0.012 af, Atten= 17%, Lag= 7.0 min
Discarded = 0.00 cfs @ 9.49 hrs, Volume= 0.006 af
Primary = 0.20 cfs @ 12.20 hrs, Volume= 0.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 111.84' @ 12.20 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 76.7 min (868.8 - 792.1)

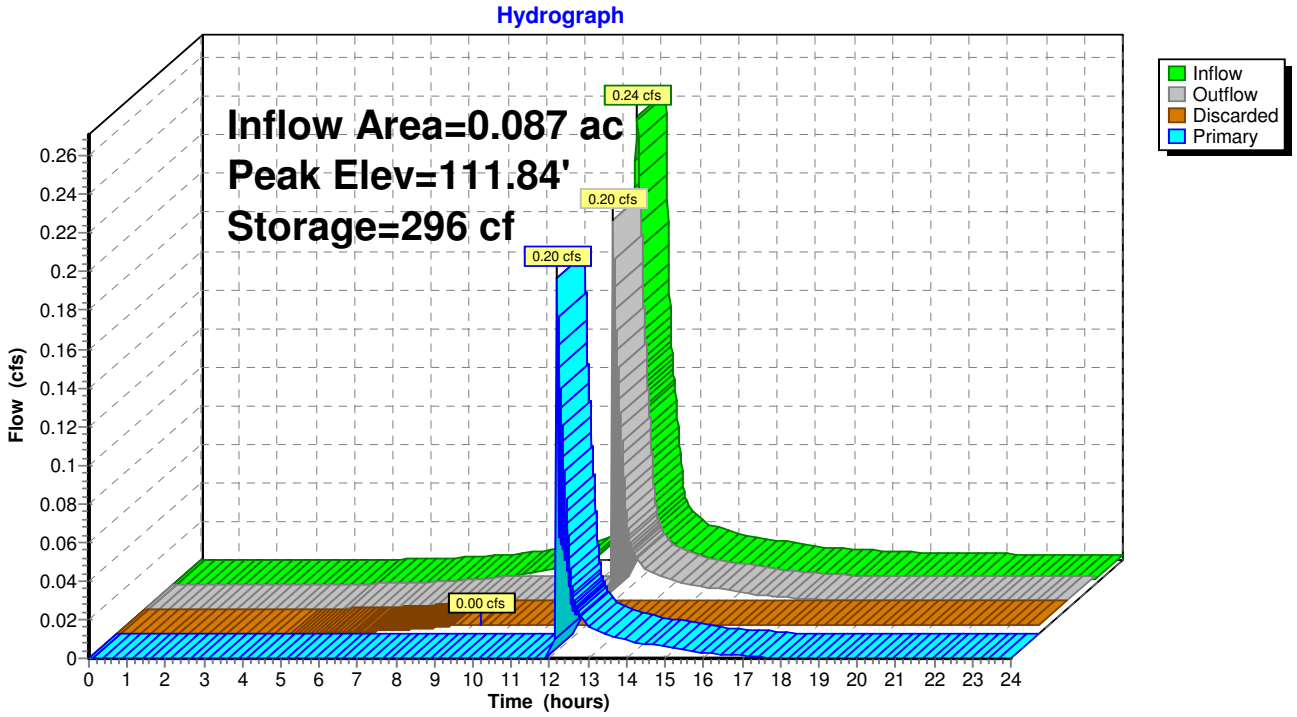
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 9.49 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.18 cfs @ 12.20 hrs HW=111.84' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.62 fps)

Pond 2P: Existing LCBN



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=22,285 sf 33.57% Impervious Runoff Depth>2.04"
Flow Length=265' Tc=8.0 min CN=73 Runoff=1.13 cfs 0.087 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth>4.01"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.50 cfs 0.038 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth>3.90"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.38 cfs 0.028 af

Subcatchment SUB-2: Runoff Area=11,786 sf 22.36% Impervious Runoff Depth>1.74"
Flow Length=138' Tc=9.4 min CN=69 Runoff=0.48 cfs 0.039 af

Reach DP-1: Inflow=1.98 cfs 0.126 af
Outflow=1.98 cfs 0.126 af

Reach DP-2: Inflow=0.48 cfs 0.039 af
Outflow=0.48 cfs 0.039 af

Pond 1P: Existing LCBN Peak Elev=109.68' Storage=291 cf Inflow=0.50 cfs 0.038 af
Discarded=0.00 cfs 0.007 af Primary=0.58 cfs 0.024 af Outflow=0.59 cfs 0.031 af

Pond 2P: Existing LCBN Peak Elev=111.87' Storage=296 cf Inflow=0.38 cfs 0.028 af
Discarded=0.00 cfs 0.007 af Primary=0.45 cfs 0.015 af Outflow=0.45 cfs 0.022 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.193 af Average Runoff Depth = 2.35"
58.31% Pervious = 0.573 ac 41.69% Impervious = 0.410 ac

Summary for Subcatchment SUB-1A:

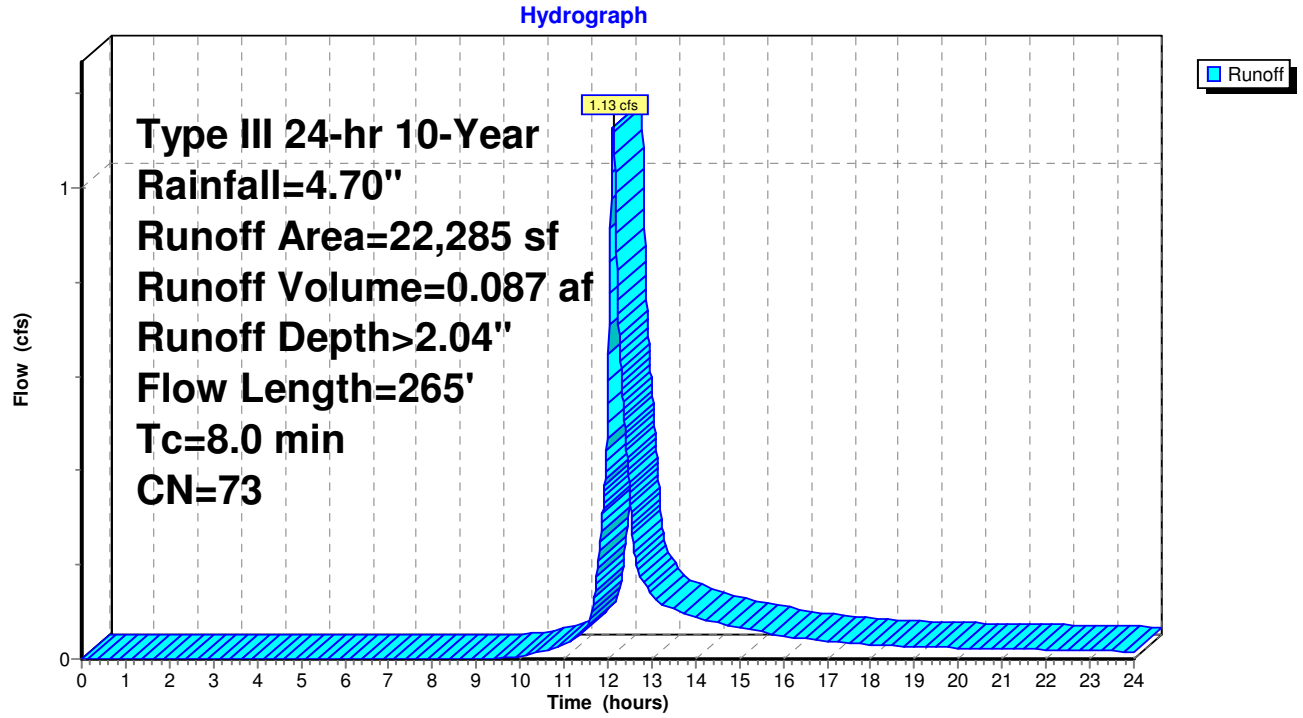
Runoff = 1.13 cfs @ 12.12 hrs, Volume= 0.087 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	4,359	98	Roof
*	2,233	98	Pavement
	2,834	60	Woods, Fair, HSG B
	11,969	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	22,285	73	Weighted Average
	14,803		66.43% Pervious Area
	7,482		33.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0850	0.12		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	35	0.0500	1.12		**Shallow Concentrated Flow, 50-85** Woodland Kv= 5.0 fps
0.6	180	0.1000	5.09		**Shallow Concentrated Flow, 85-265** Unpaved Kv= 16.1 fps
8.0	265	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

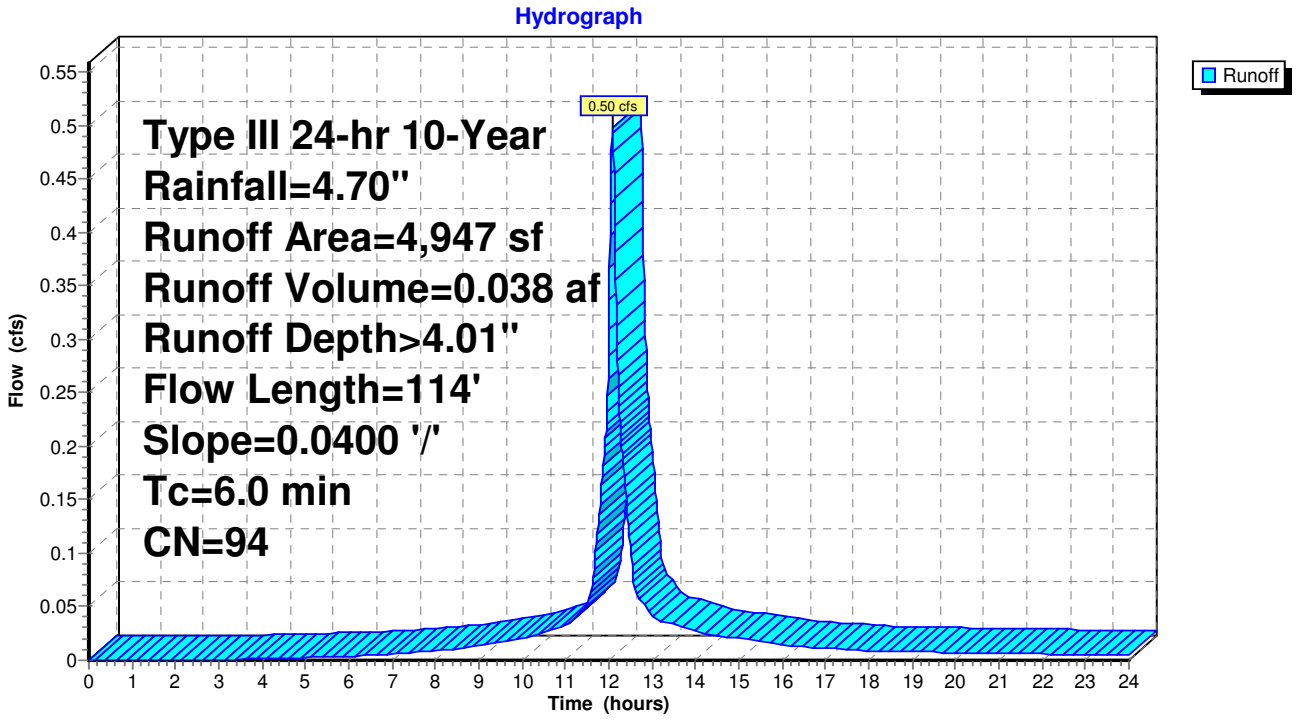
Runoff = 0.50 cfs @ 12.08 hrs, Volume= 0.038 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

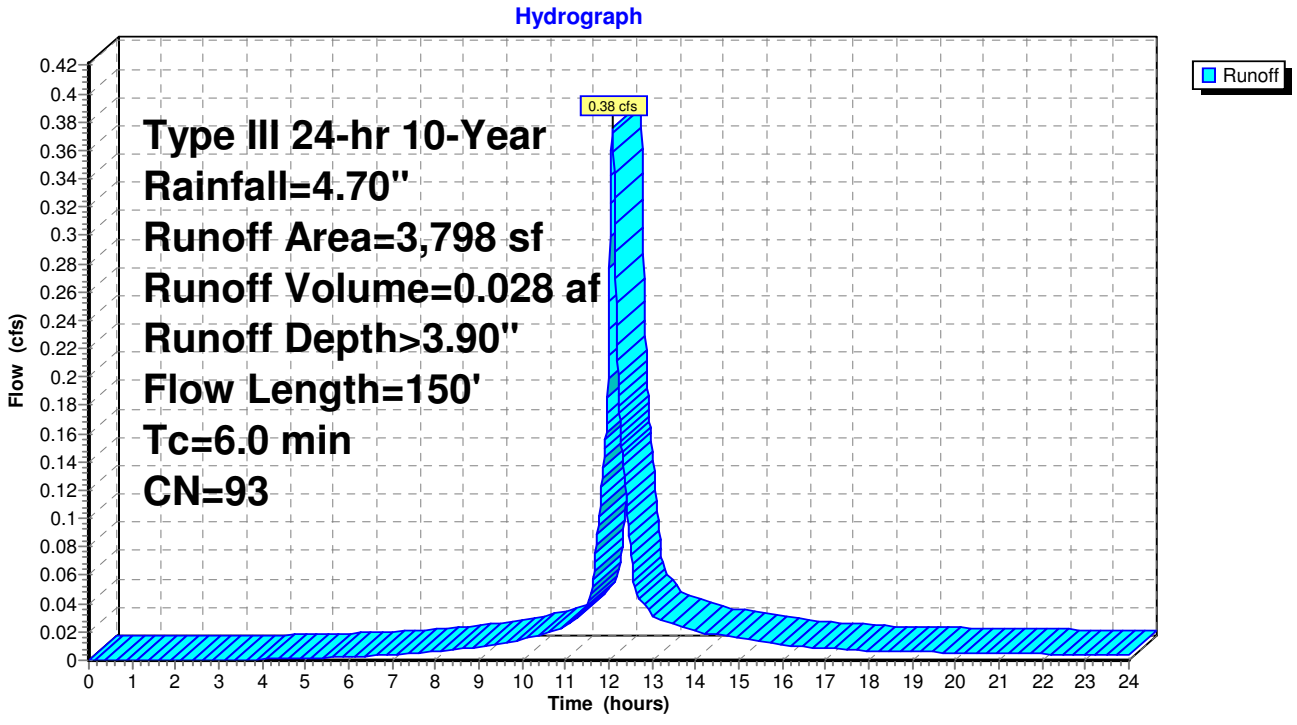
Runoff = 0.38 cfs @ 12.08 hrs, Volume= 0.028 af, Depth> 3.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-2:

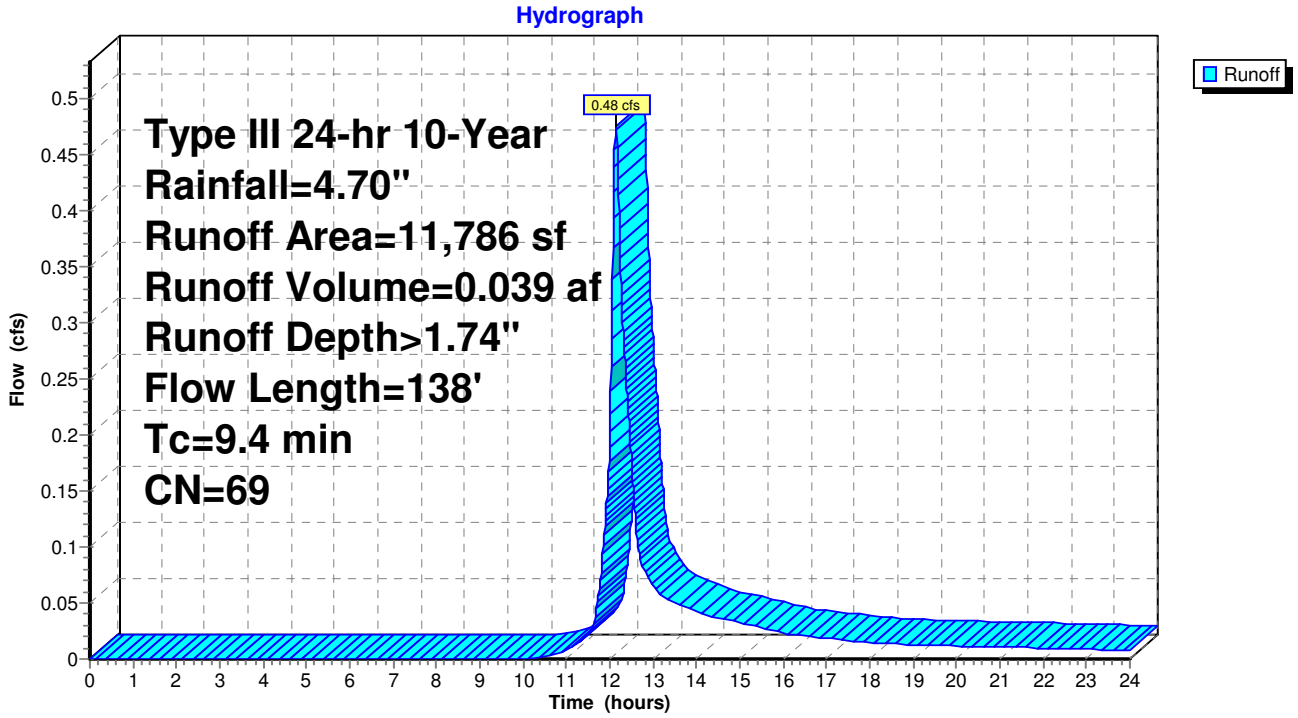
Runoff = 0.48 cfs @ 12.14 hrs, Volume= 0.039 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,635	60	Woods, Fair, HSG B
	4,516	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,786	69	Weighted Average
	9,151		77.64% Pervious Area
	2,635		22.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	75	0.0300	0.87		**Shallow Concentrated Flow, 50-125** Woodland Kv= 5.0 fps
0.1	13	0.0200	2.28		**Shallow Concentrated Flow, 125-138** Unpaved Kv= 16.1 fps
9.4	138	Total			

Subcatchment SUB-2:

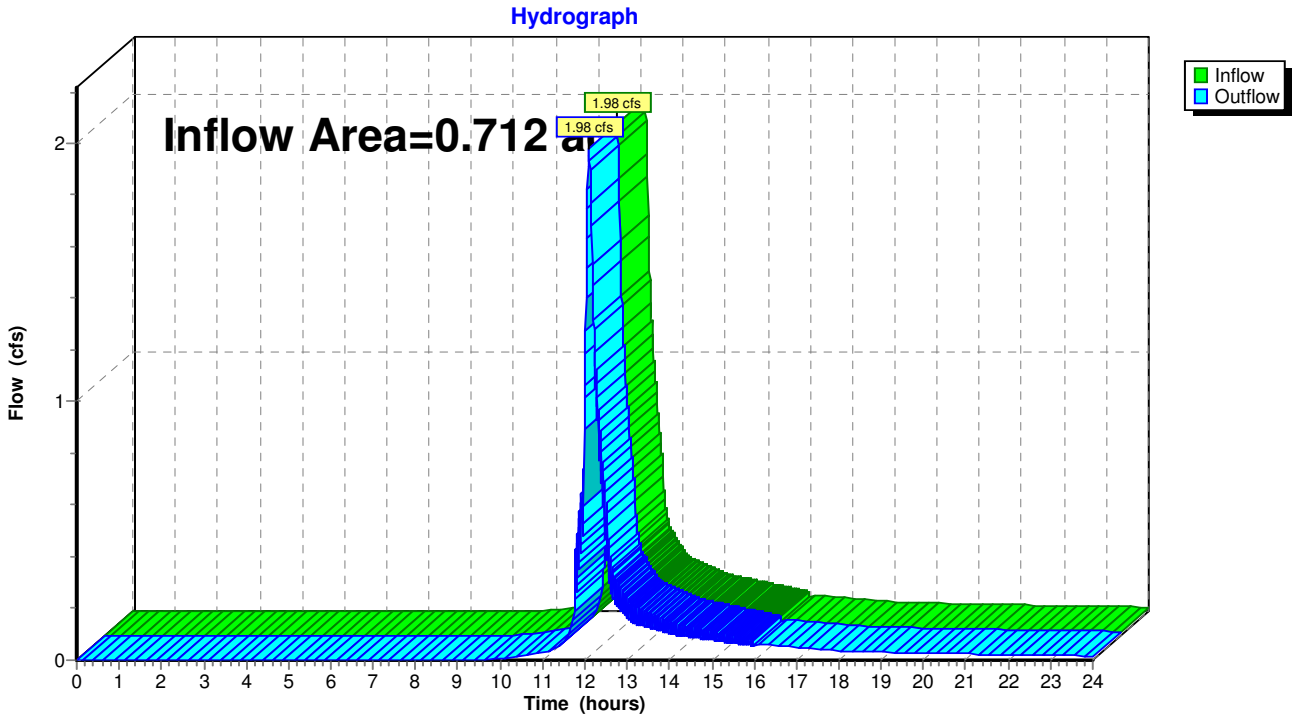


Summary for Reach DP-1:

Inflow Area = 0.712 ac, 49.03% Impervious, Inflow Depth > 2.13" for 10-Year event
Inflow = 1.98 cfs @ 12.10 hrs, Volume= 0.126 af
Outflow = 1.98 cfs @ 12.10 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-1:

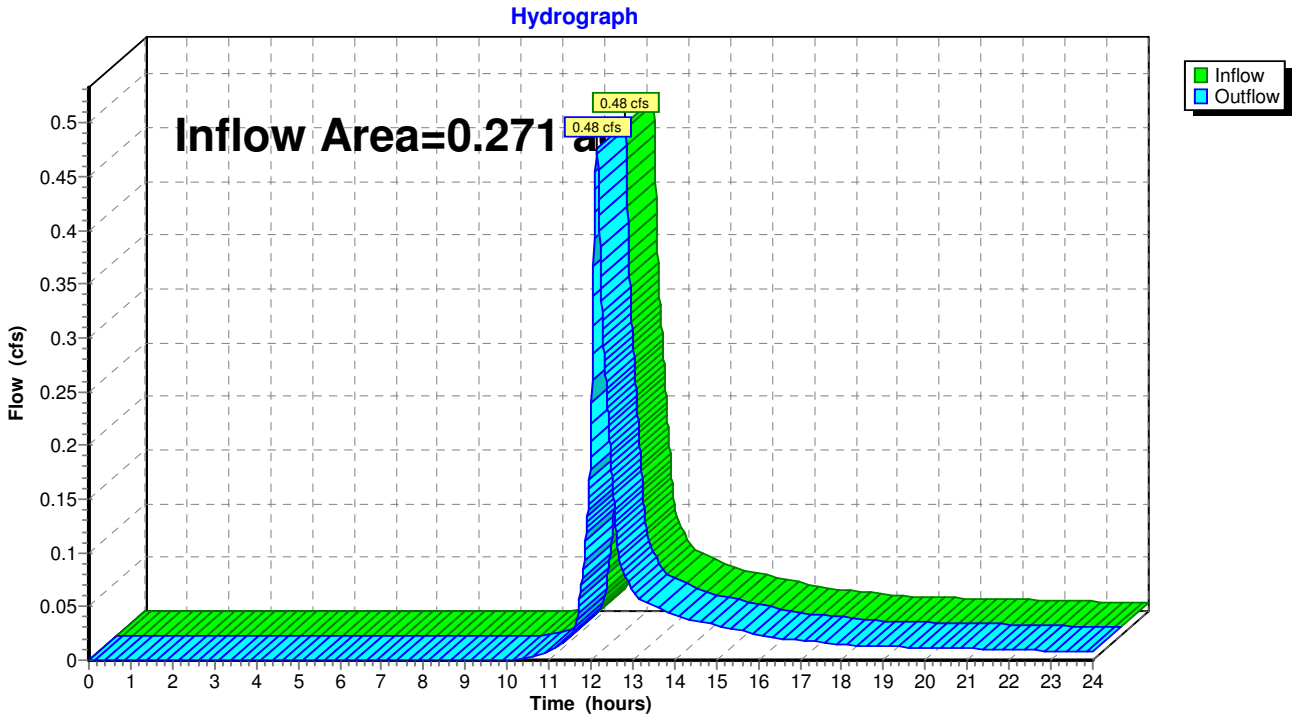


Summary for Reach DP-2:

Inflow Area = 0.271 ac, 22.36% Impervious, Inflow Depth > 1.74" for 10-Year event
Inflow = 0.48 cfs @ 12.14 hrs, Volume= 0.039 af
Outflow = 0.48 cfs @ 12.14 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth > 4.01" for 10-Year event
Inflow = 0.50 cfs @ 12.08 hrs, Volume= 0.038 af
Outflow = 0.59 cfs @ 12.08 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 7.30 hrs, Volume= 0.007 af
Primary = 0.58 cfs @ 12.08 hrs, Volume= 0.024 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 109.68' @ 12.08 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 30.7 min (805.3 - 774.7)

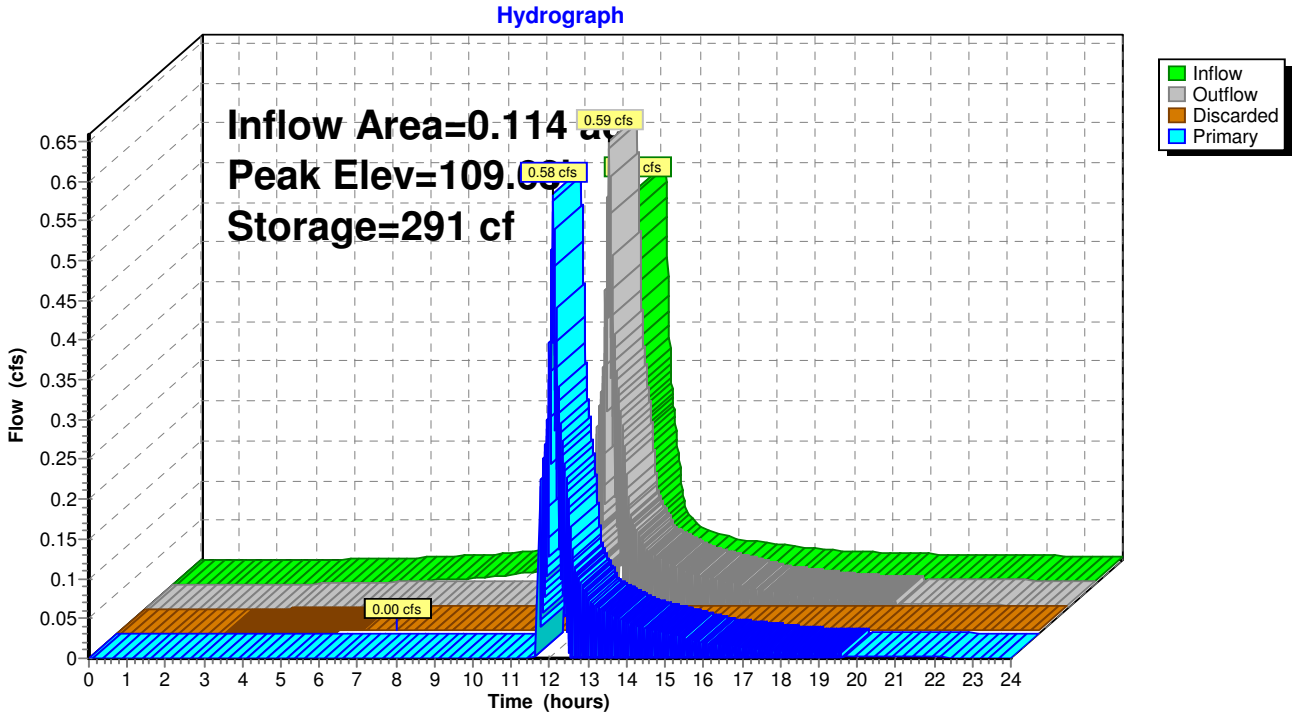
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 7.30 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.58 cfs @ 12.08 hrs HW=109.68' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.58 cfs @ 0.92 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth > 3.90" for 10-Year event
Inflow = 0.38 cfs @ 12.08 hrs, Volume= 0.028 af
Outflow = 0.45 cfs @ 12.07 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 8.15 hrs, Volume= 0.007 af
Primary = 0.45 cfs @ 12.07 hrs, Volume= 0.015 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 111.87' @ 12.07 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 37.2 min (816.8 - 779.6)

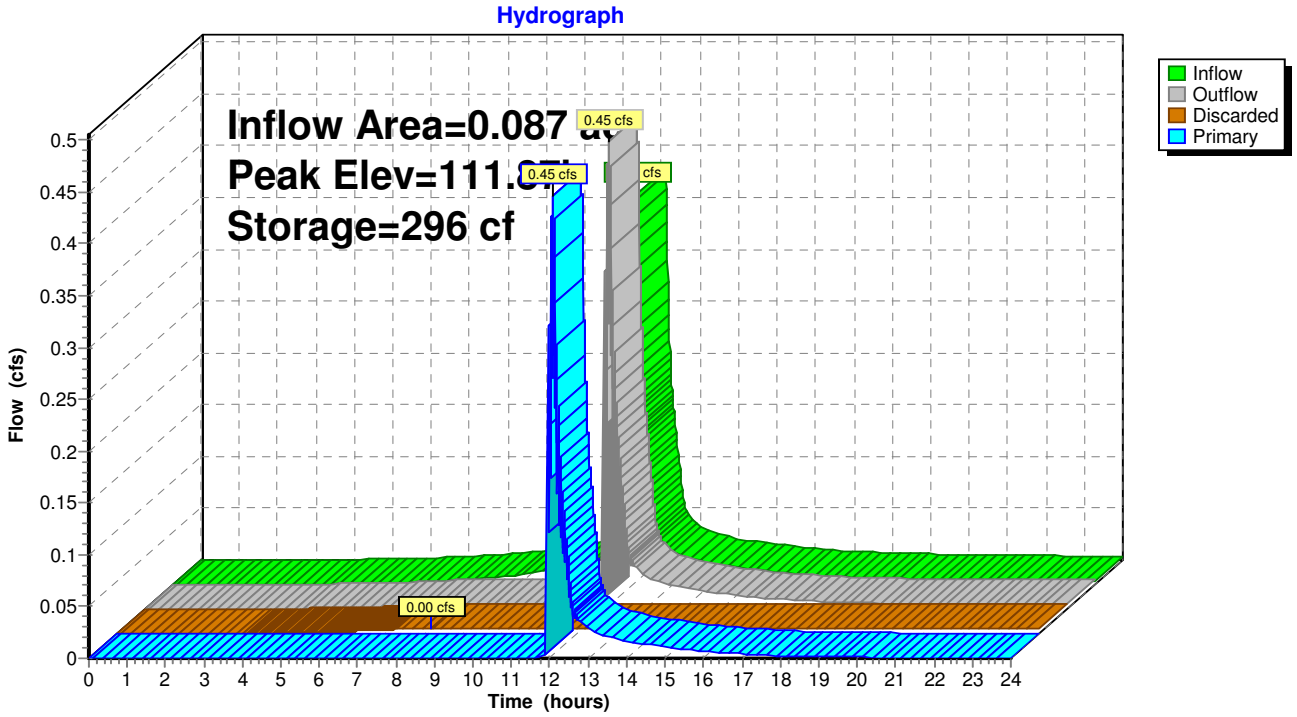
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 8.15 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.45 cfs @ 12.07 hrs HW=111.87' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.45 cfs @ 0.84 fps)

Pond 2P: Existing LCBN



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=22,285 sf 33.57% Impervious Runoff Depth>2.67"
Flow Length=265' Tc=8.0 min CN=73 Runoff=1.49 cfs 0.114 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth>4.80"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.59 cfs 0.045 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth>4.69"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.45 cfs 0.034 af

Subcatchment SUB-2: Runoff Area=11,786 sf 22.36% Impervious Runoff Depth>2.32"
Flow Length=138' Tc=9.4 min CN=69 Runoff=0.65 cfs 0.052 af

Reach DP-1: Inflow=2.49 cfs 0.166 af
Outflow=2.49 cfs 0.166 af

Reach DP-2: Inflow=0.65 cfs 0.052 af
Outflow=0.65 cfs 0.052 af

Pond 1P: Existing LCBN Peak Elev=109.68' Storage=291 cf Inflow=0.59 cfs 0.045 af
Discarded=0.00 cfs 0.007 af Primary=0.59 cfs 0.031 af Outflow=0.60 cfs 0.039 af

Pond 2P: Existing LCBN Peak Elev=111.87' Storage=296 cf Inflow=0.45 cfs 0.034 af
Discarded=0.00 cfs 0.007 af Primary=0.45 cfs 0.020 af Outflow=0.45 cfs 0.027 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.246 af Average Runoff Depth = 3.00"
58.31% Pervious = 0.573 ac 41.69% Impervious = 0.410 ac

Summary for Subcatchment SUB-1A:

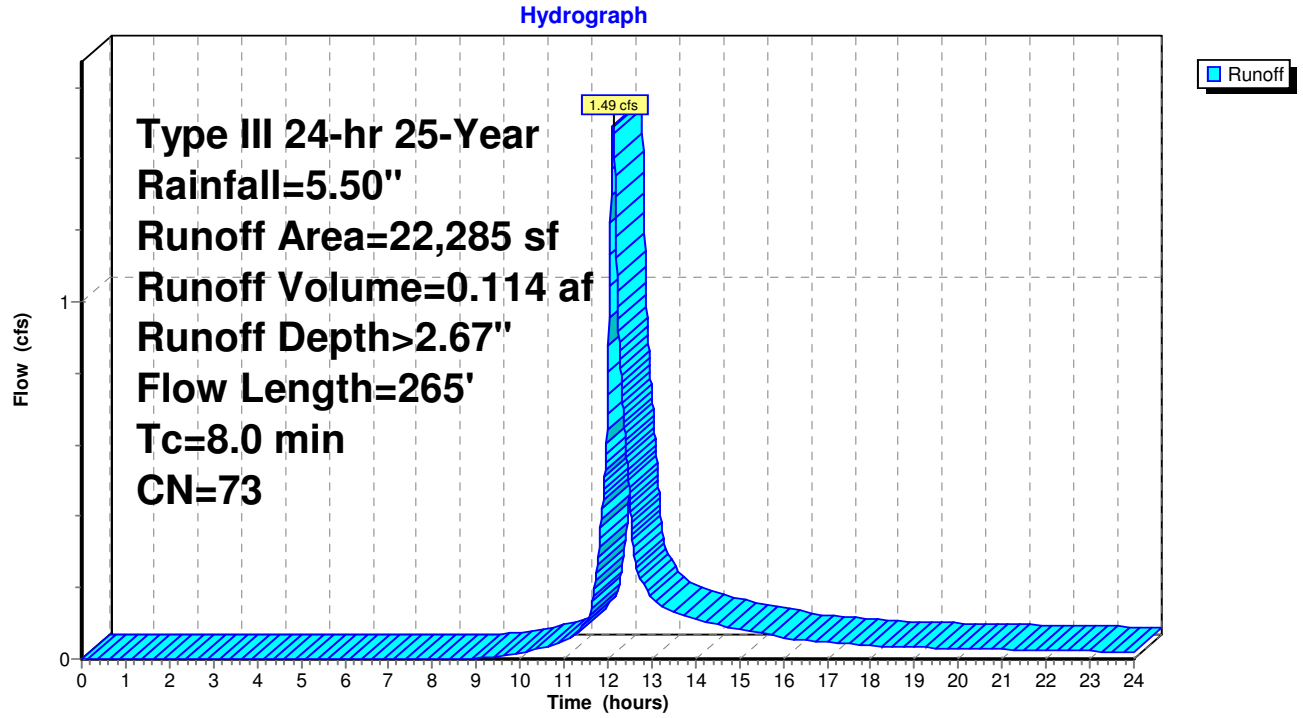
Runoff = 1.49 cfs @ 12.12 hrs, Volume= 0.114 af, Depth> 2.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	4,359	98	Roof
*	2,233	98	Pavement
	2,834	60	Woods, Fair, HSG B
	11,969	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	22,285	73	Weighted Average
	14,803		66.43% Pervious Area
	7,482		33.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0850	0.12		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	35	0.0500	1.12		**Shallow Concentrated Flow, 50-85** Woodland Kv= 5.0 fps
0.6	180	0.1000	5.09		**Shallow Concentrated Flow, 85-265** Unpaved Kv= 16.1 fps
8.0	265	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

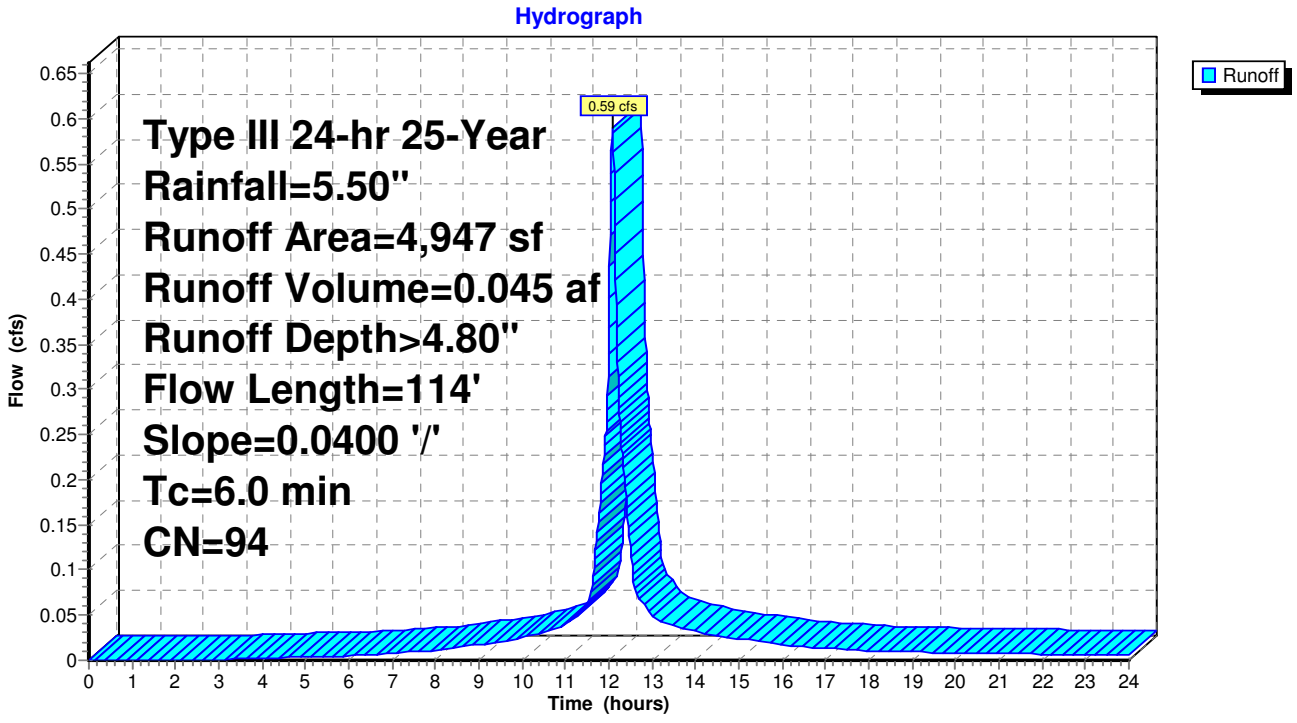
Runoff = 0.59 cfs @ 12.08 hrs, Volume= 0.045 af, Depth> 4.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

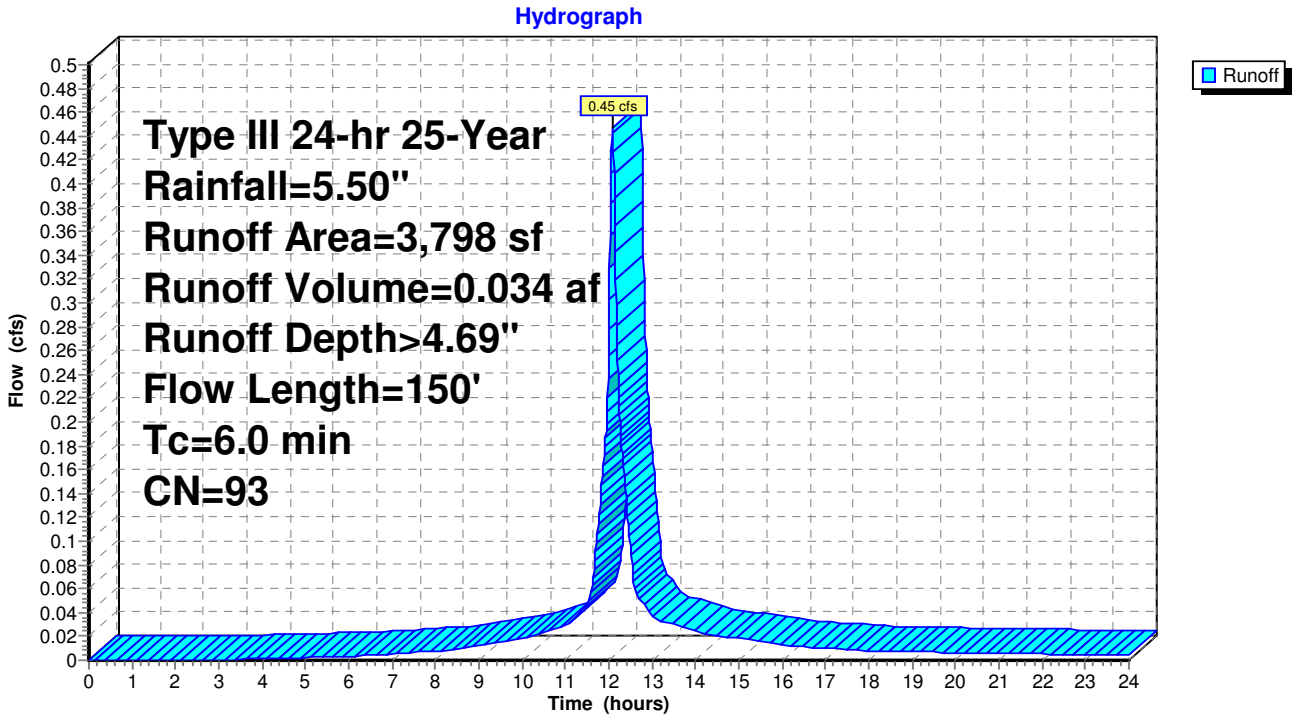
Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.034 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-2:

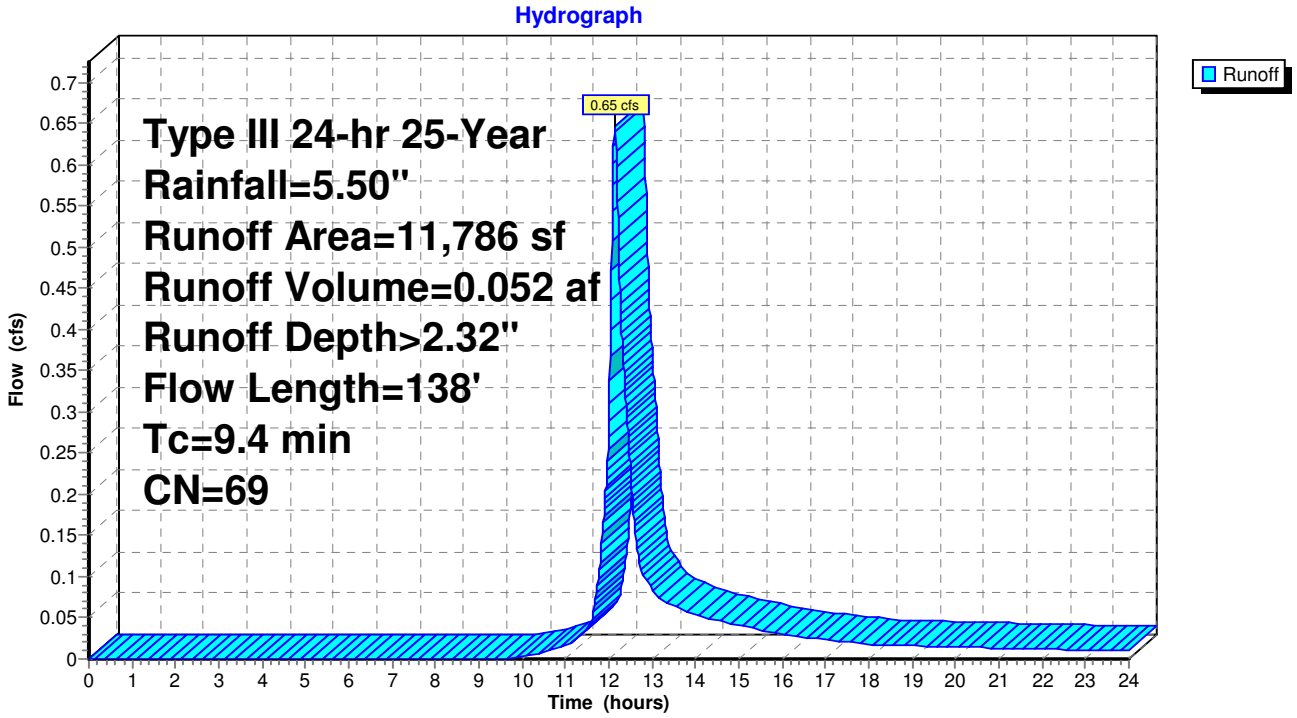
Runoff = 0.65 cfs @ 12.14 hrs, Volume= 0.052 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,635	60	Woods, Fair, HSG B
	4,516	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,786	69	Weighted Average
	9,151		77.64% Pervious Area
	2,635		22.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	75	0.0300	0.87		**Shallow Concentrated Flow, 50-125** Woodland Kv= 5.0 fps
0.1	13	0.0200	2.28		**Shallow Concentrated Flow, 125-138** Unpaved Kv= 16.1 fps
9.4	138	Total			

Subcatchment SUB-2:

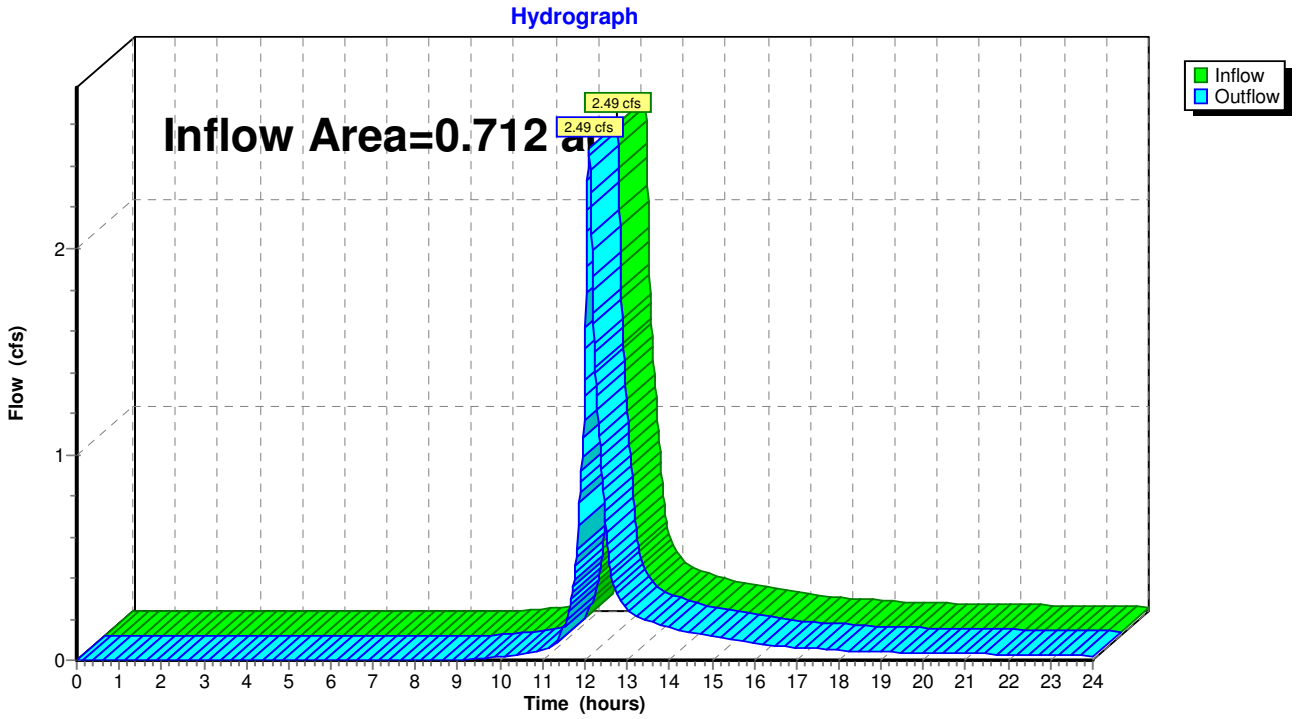


Summary for Reach DP-1:

Inflow Area = 0.712 ac, 49.03% Impervious, Inflow Depth > 2.79" for 25-Year event
Inflow = 2.49 cfs @ 12.11 hrs, Volume= 0.166 af
Outflow = 2.49 cfs @ 12.11 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-1:

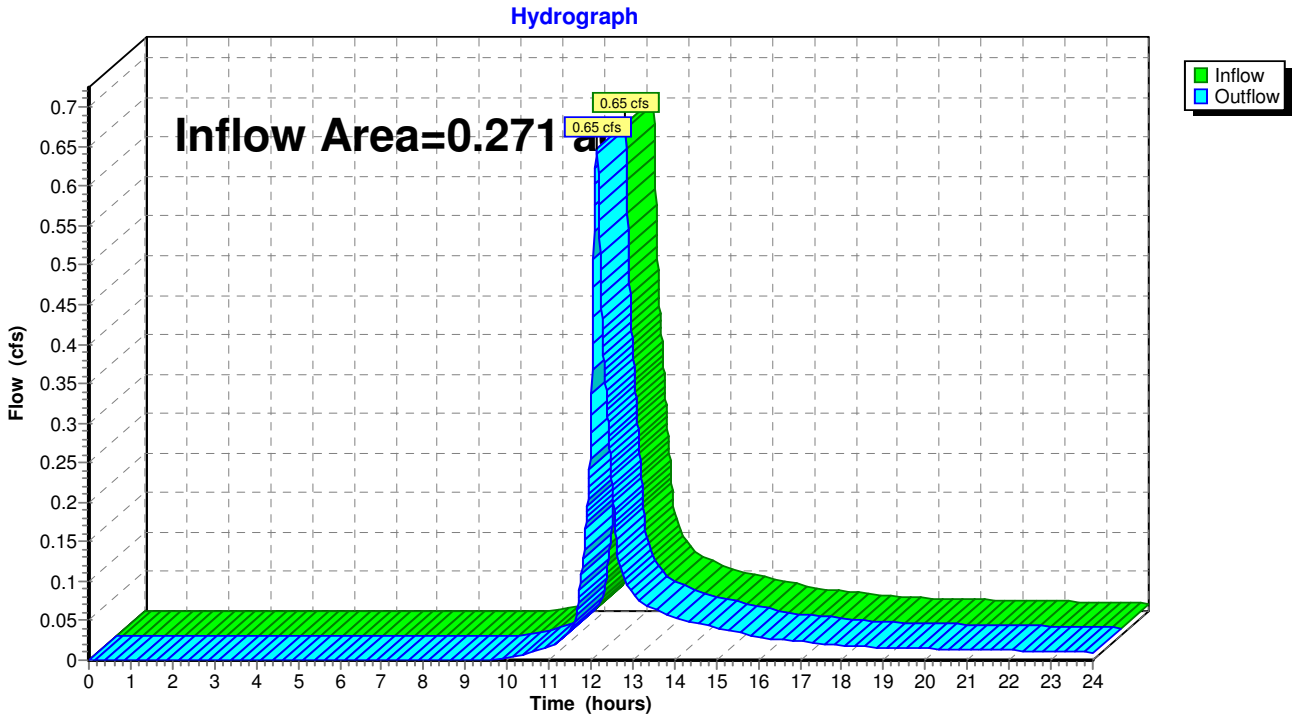


Summary for Reach DP-2:

Inflow Area = 0.271 ac, 22.36% Impervious, Inflow Depth > 2.32" for 25-Year event
Inflow = 0.65 cfs @ 12.14 hrs, Volume= 0.052 af
Outflow = 0.65 cfs @ 12.14 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth > 4.80" for 25-Year event
Inflow = 0.59 cfs @ 12.08 hrs, Volume= 0.045 af
Outflow = 0.60 cfs @ 12.09 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 6.64 hrs, Volume= 0.007 af
Primary = 0.59 cfs @ 12.09 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 109.68' @ 12.09 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 29.3 min (799.6 - 770.3)

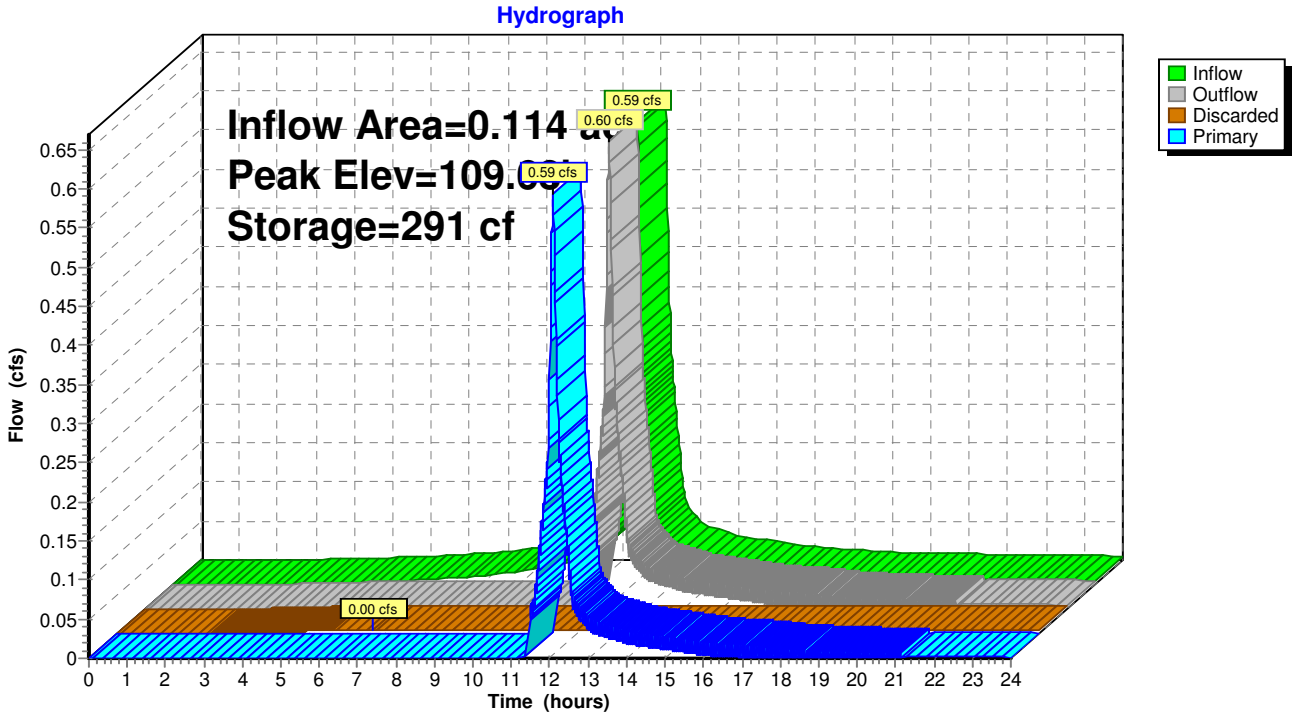
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 6.64 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.59 cfs @ 12.09 hrs HW=109.68' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.59 cfs @ 0.92 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth > 4.69" for 25-Year event
Inflow = 0.45 cfs @ 12.08 hrs, Volume= 0.034 af
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 7.46 hrs, Volume= 0.007 af
Primary = 0.45 cfs @ 12.09 hrs, Volume= 0.020 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 111.87' @ 12.09 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 32.5 min (807.4 - 774.9)

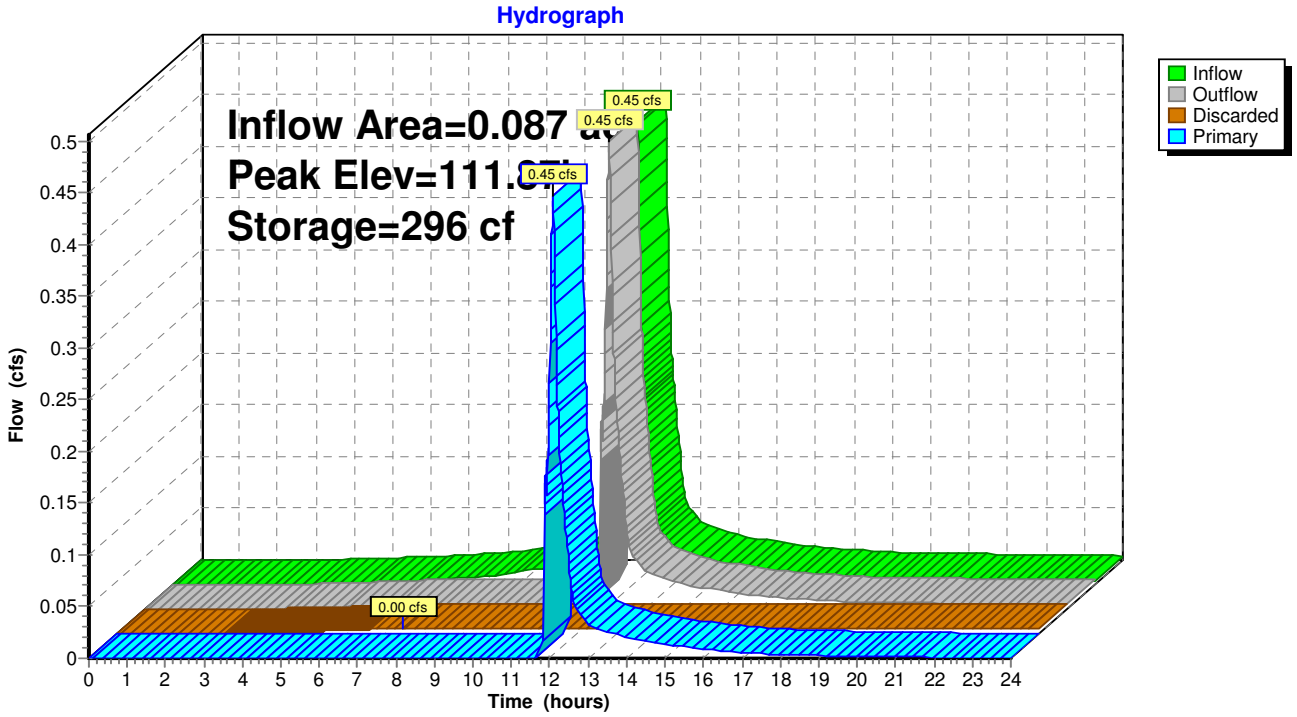
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 7.46 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.45 cfs @ 12.09 hrs HW=111.87' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.45 cfs @ 0.84 fps)

Pond 2P: Existing LCBN



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=22,285 sf 33.57% Impervious Runoff Depth>3.67"
Flow Length=265' Tc=8.0 min CN=73 Runoff=2.06 cfs 0.157 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth>5.99"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.73 cfs 0.057 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth>5.87"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.55 cfs 0.043 af

Subcatchment SUB-2: Runoff Area=11,786 sf 22.36% Impervious Runoff Depth>3.26"
Flow Length=138' Tc=9.4 min CN=69 Runoff=0.92 cfs 0.074 af

Reach DP-1: Inflow=3.29 cfs 0.228 af
Outflow=3.29 cfs 0.228 af

Reach DP-2: Inflow=0.92 cfs 0.074 af
Outflow=0.92 cfs 0.074 af

Pond 1P: Existing LCBN Peak Elev=109.69' Storage=291 cf Inflow=0.73 cfs 0.057 af
Discarded=0.00 cfs 0.008 af Primary=0.75 cfs 0.042 af Outflow=0.75 cfs 0.050 af

Pond 2P: Existing LCBN Peak Elev=111.88' Storage=296 cf Inflow=0.55 cfs 0.043 af
Discarded=0.00 cfs 0.007 af Primary=0.55 cfs 0.029 af Outflow=0.56 cfs 0.036 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.329 af Average Runoff Depth = 4.02"
58.31% Pervious = 0.573 ac 41.69% Impervious = 0.410 ac

Summary for Subcatchment SUB-1A:

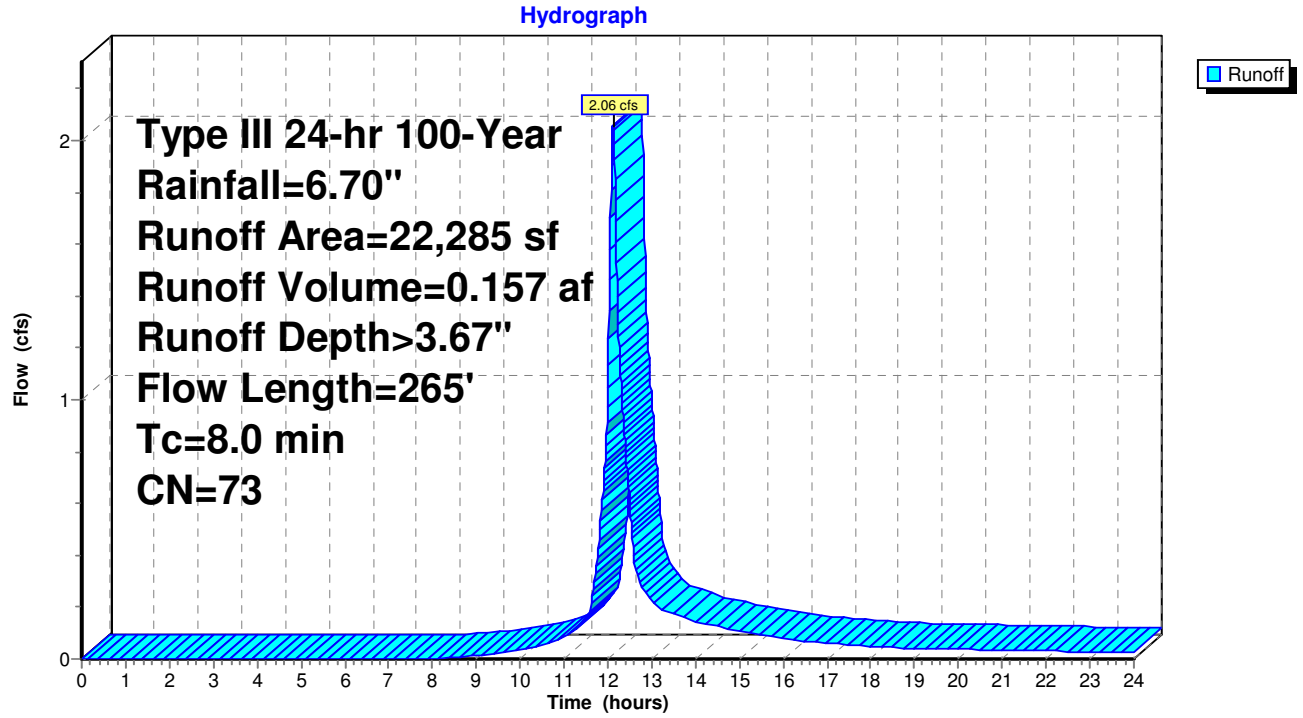
Runoff = 2.06 cfs @ 12.12 hrs, Volume= 0.157 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	4,359	98	Roof
*	2,233	98	Pavement
	2,834	60	Woods, Fair, HSG B
	11,969	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	22,285	73	Weighted Average
	14,803		66.43% Pervious Area
	7,482		33.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0850	0.12		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	35	0.0500	1.12		**Shallow Concentrated Flow, 50-85** Woodland Kv= 5.0 fps
0.6	180	0.1000	5.09		**Shallow Concentrated Flow, 85-265** Unpaved Kv= 16.1 fps
8.0	265	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

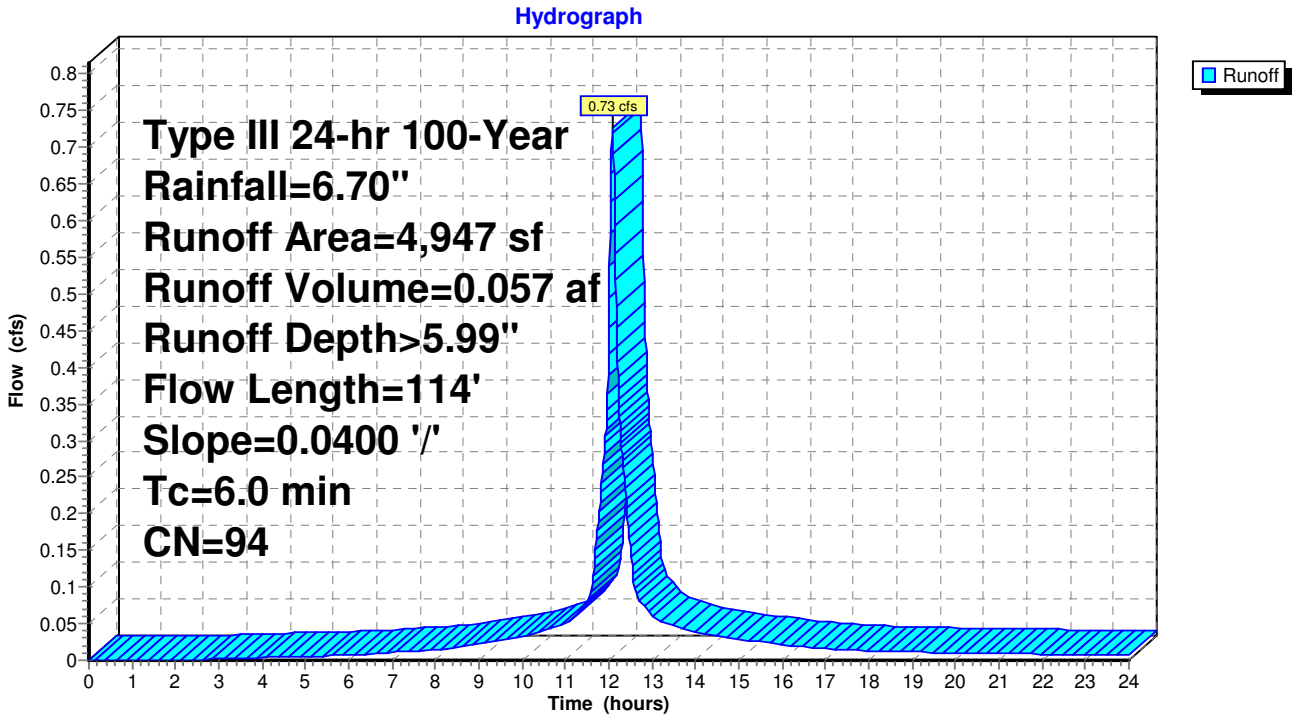
Runoff = 0.73 cfs @ 12.08 hrs, Volume= 0.057 af, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

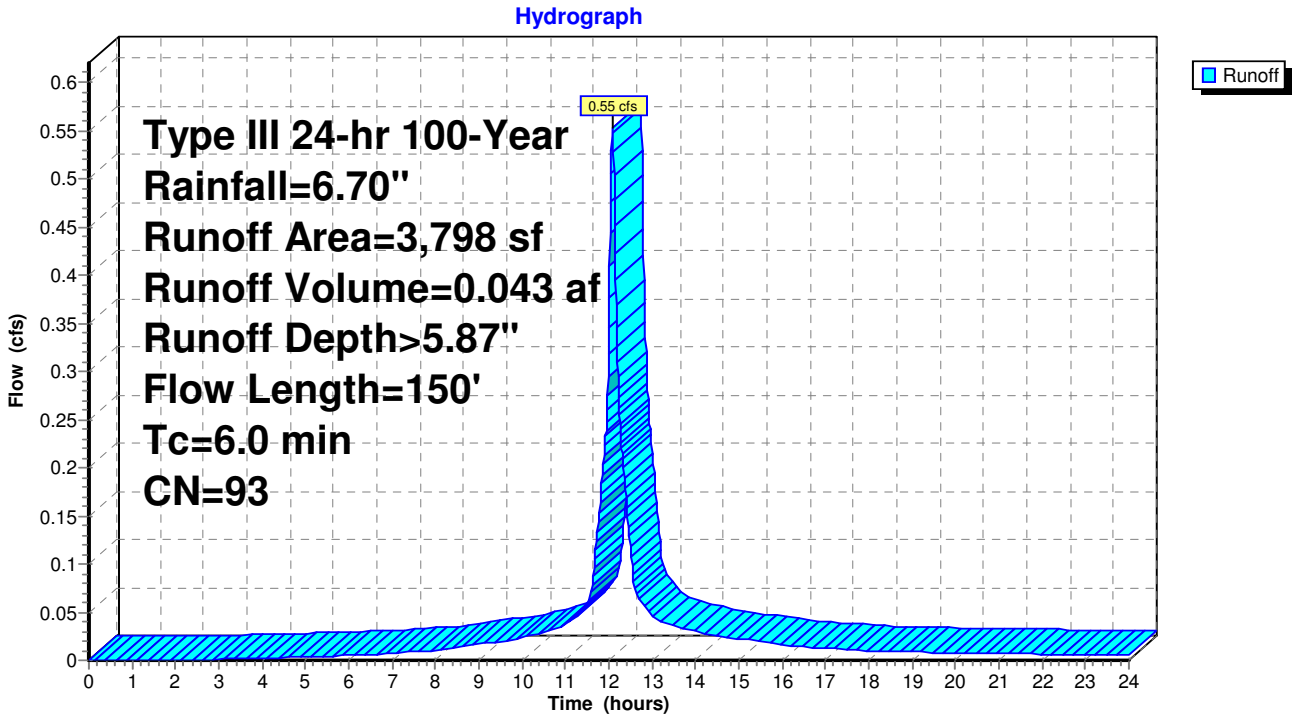
Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.043 af, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-2:

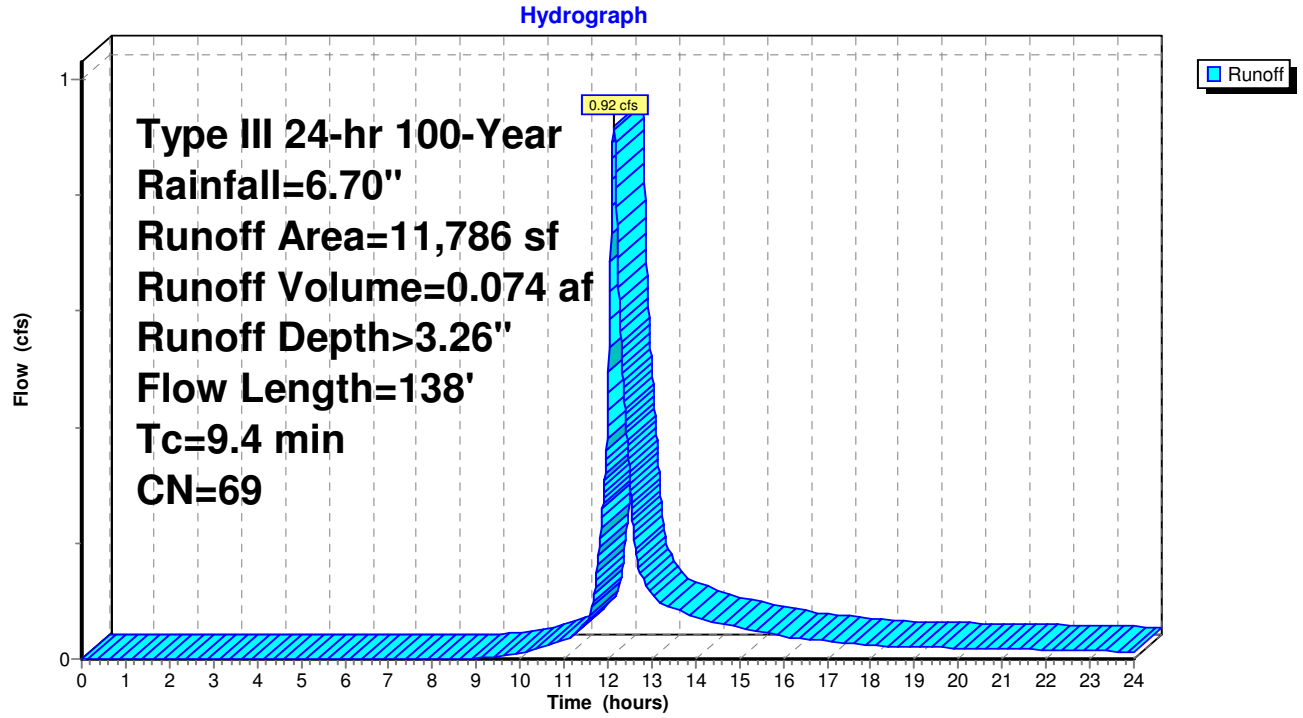
Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.074 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,635	60	Woods, Fair, HSG B
	4,516	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,786	69	Weighted Average
	9,151		77.64% Pervious Area
	2,635		22.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	75	0.0300	0.87		**Shallow Concentrated Flow, 50-125** Woodland Kv= 5.0 fps
0.1	13	0.0200	2.28		**Shallow Concentrated Flow, 125-138** Unpaved Kv= 16.1 fps
9.4	138	Total			

Subcatchment SUB-2:

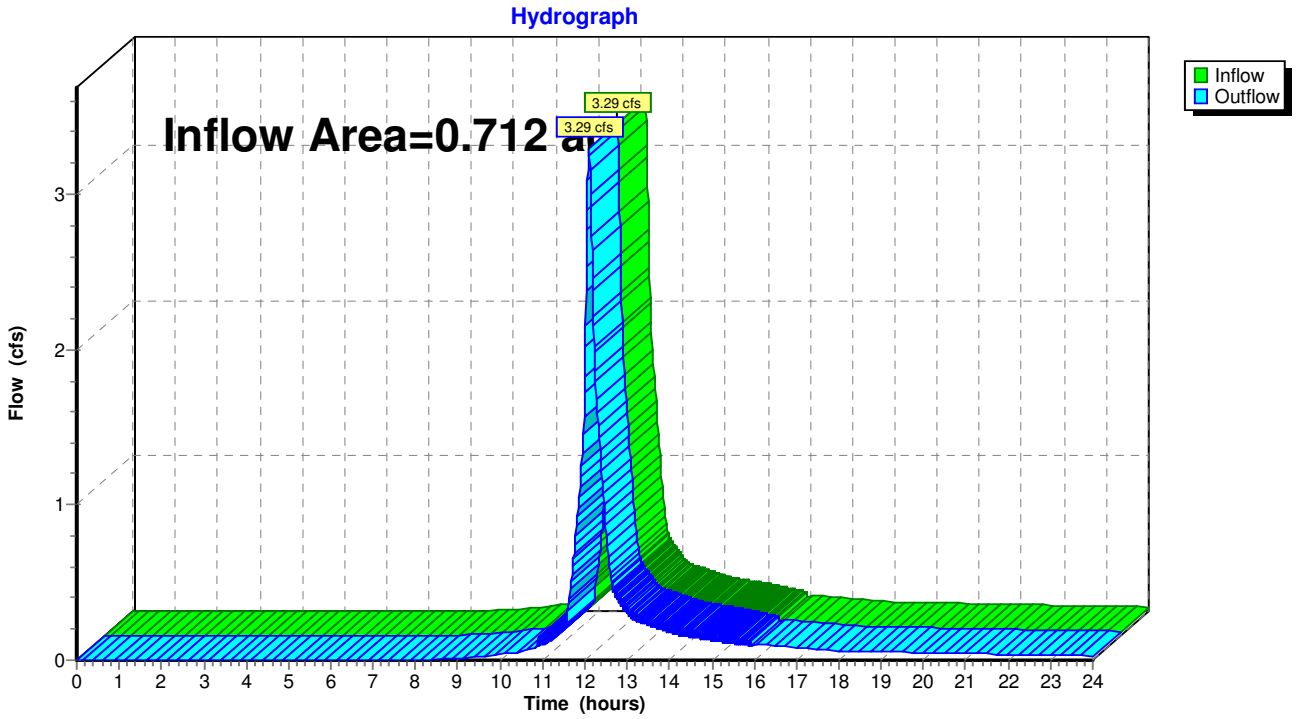


Summary for Reach DP-1:

Inflow Area = 0.712 ac, 49.03% Impervious, Inflow Depth > 3.83" for 100-Year event
Inflow = 3.29 cfs @ 12.11 hrs, Volume= 0.228 af
Outflow = 3.29 cfs @ 12.11 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-1:

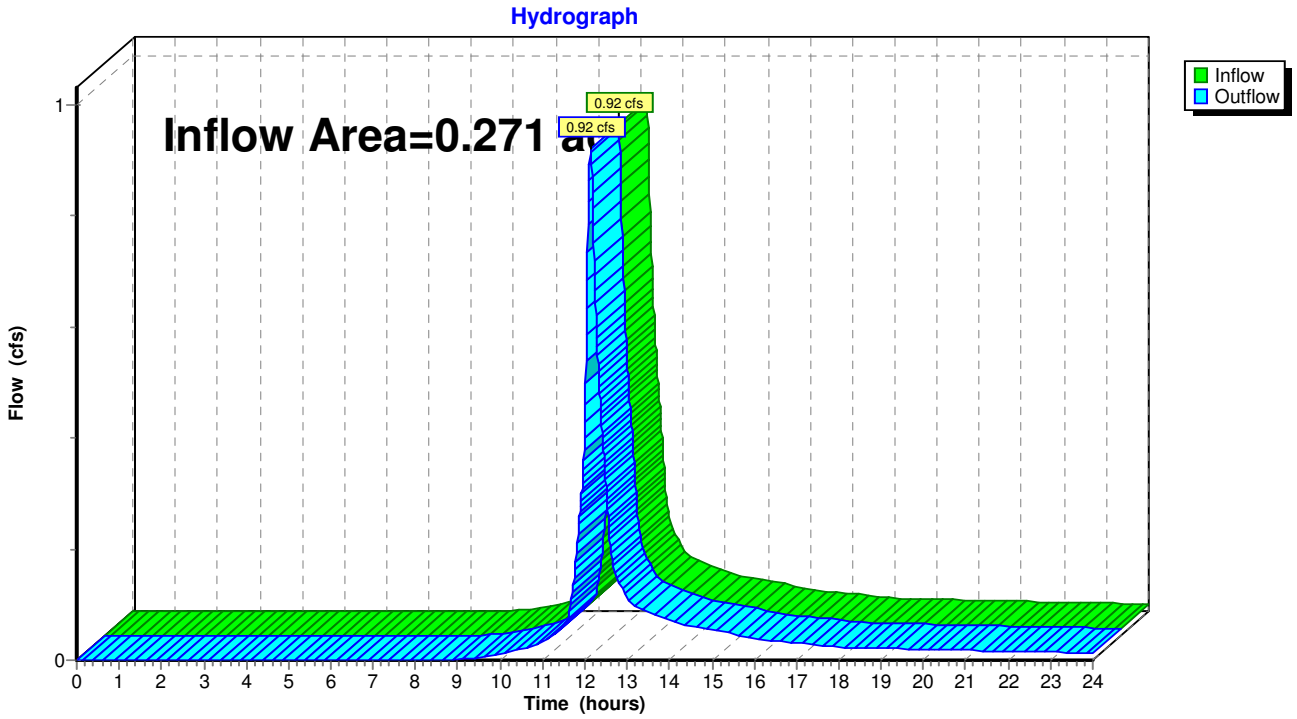


Summary for Reach DP-2:

Inflow Area = 0.271 ac, 22.36% Impervious, Inflow Depth > 3.26" for 100-Year event
Inflow = 0.92 cfs @ 12.13 hrs, Volume= 0.074 af
Outflow = 0.92 cfs @ 12.13 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth > 5.99" for 100-Year event
Inflow = 0.73 cfs @ 12.08 hrs, Volume= 0.057 af
Outflow = 0.75 cfs @ 12.09 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 5.55 hrs, Volume= 0.008 af
Primary = 0.75 cfs @ 12.09 hrs, Volume= 0.042 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 109.69' @ 12.09 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 28.1 min (793.2 - 765.1)

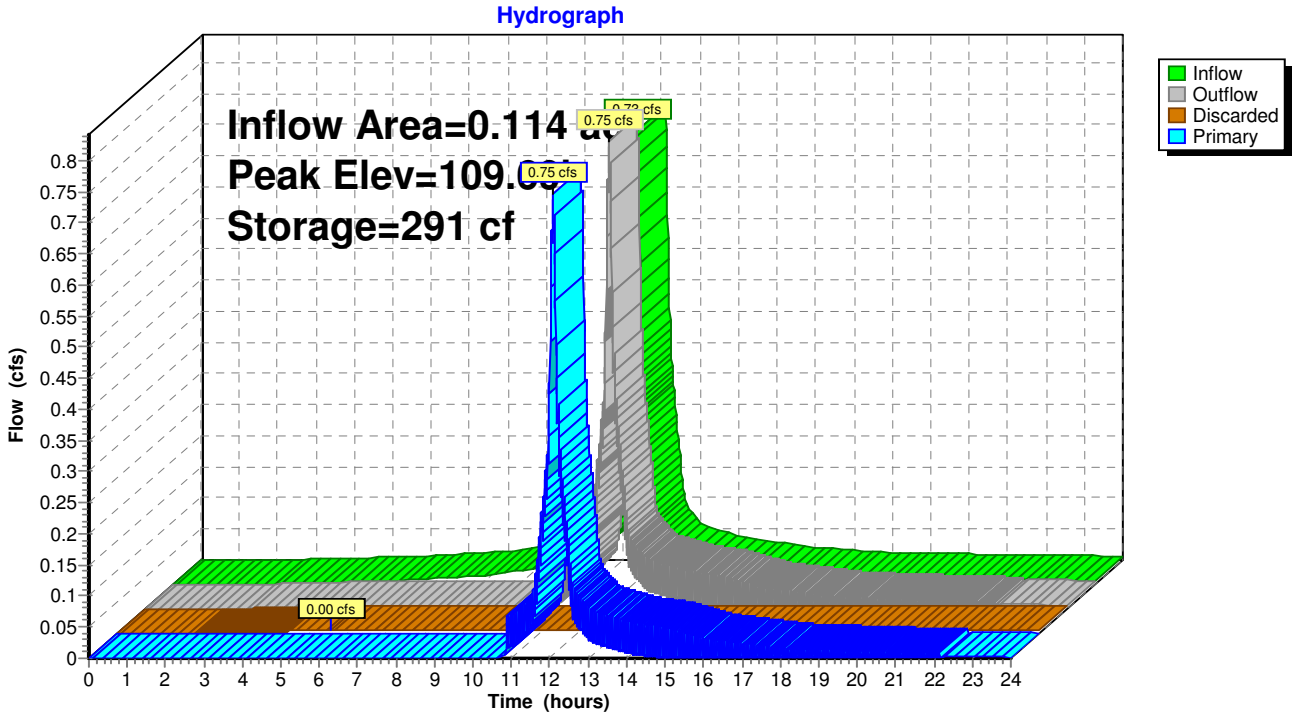
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 5.55 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.74 cfs @ 12.09 hrs HW=109.69' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.74 cfs @ 1.00 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth > 5.87" for 100-Year event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 0.043 af
Outflow = 0.56 cfs @ 12.08 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 6.65 hrs, Volume= 0.007 af
Primary = 0.55 cfs @ 12.08 hrs, Volume= 0.029 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 111.88' @ 12.08 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= 96.4 min calculated for 0.036 af (84% of inflow)
Center-of-Mass det. time= 30.4 min (799.8 - 769.4)

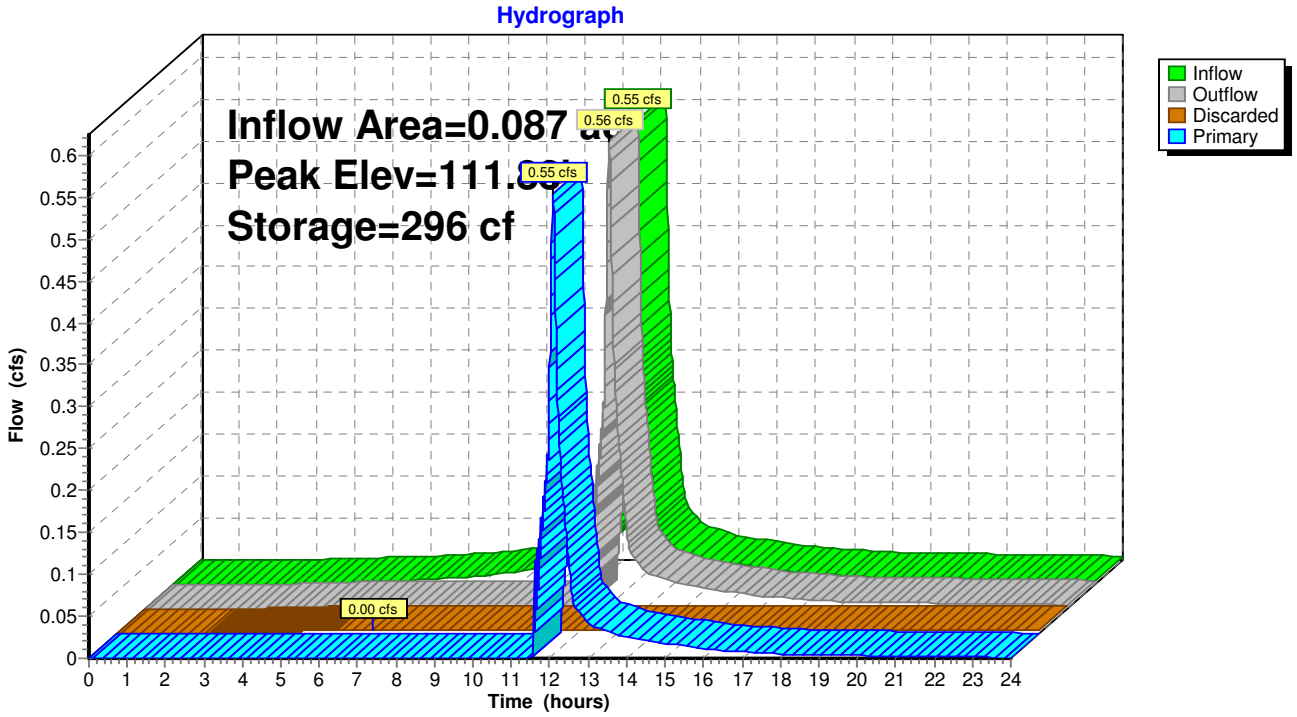
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

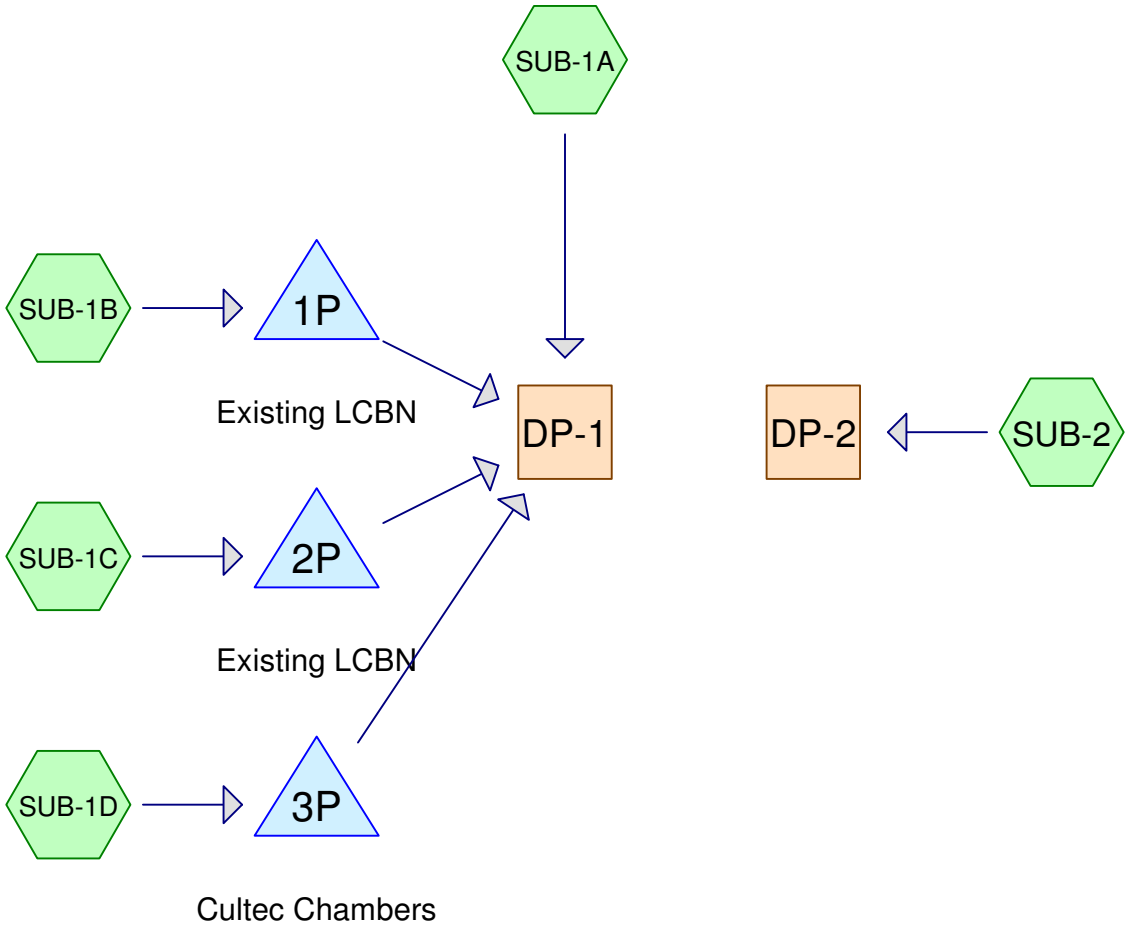
Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 6.65 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.55 cfs @ 12.08 hrs HW=111.88' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.55 cfs @ 0.90 fps)

Pond 2P: Existing LCBN





Subcat Reach Pond Link

Drainage Diagram for Post-Cornell - Copy

Prepared by {enter your company name here}, Printed 10/20/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.136	60	Woods, Fair, HSG B (SUB-1D, SUB-2)
0.332	61	>75% Grass cover, Good, HSG B (SUB-1A, SUB-1B, SUB-1C, SUB-1D, SUB-2)
0.372	98	Pavement (SUB-1A, SUB-1B, SUB-1C, SUB-1D, SUB-2)
0.116	98	Roof (SUB-1A, SUB-2)
0.020	98	Walkways, Retaining Walls (SUB-1A)
0.006	98	Walkways/Retaining Walls (SUB-2)
0.983	80	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.468	HSG B	SUB-1A, SUB-1B, SUB-1C, SUB-1D, SUB-2
0.000	HSG C	
0.000	HSG D	
0.515	Other	SUB-1A, SUB-1B, SUB-1C, SUB-1D, SUB-2
0.983		**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=15,248 sf 48.50% Impervious Runoff Depth=1.34"
Flow Length=186' Tc=7.5 min CN=79 Runoff=0.51 cfs 0.039 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth=2.54"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.32 cfs 0.024 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth=2.45"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.24 cfs 0.018 af

Subcatchment SUB-1D: Runoff Area=7,214 sf 64.62% Impervious Runoff Depth=1.76"
Flow Length=131' Tc=8.4 min CN=85 Runoff=0.31 cfs 0.024 af

Subcatchment SUB-2: Runoff Area=11,609 sf 22.70% Impervious Runoff Depth=0.78"
Flow Length=107' Tc=10.3 min CN=69 Runoff=0.18 cfs 0.017 af

Reach DP-1: Inflow=0.96 cfs 0.056 af
Outflow=0.96 cfs 0.056 af

Reach DP-2: Inflow=0.18 cfs 0.017 af
Outflow=0.18 cfs 0.017 af

Pond 1P: Existing LCBN Peak Elev=109.67' Storage=291 cf Inflow=0.32 cfs 0.024 af
Discarded=0.00 cfs 0.013 af Primary=0.45 cfs 0.011 af Outflow=0.46 cfs 0.024 af

Pond 2P: Existing LCBN Peak Elev=111.84' Storage=296 cf Inflow=0.24 cfs 0.018 af
Discarded=0.00 cfs 0.012 af Primary=0.20 cfs 0.005 af Outflow=0.20 cfs 0.018 af

Pond 3P: Cultec Chambers Peak Elev=110.36' Storage=428 cf Inflow=0.31 cfs 0.024 af
Discarded=0.03 cfs 0.024 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.024 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.122 af Average Runoff Depth = 1.49"
47.63% Pervious = 0.468 ac 52.37% Impervious = 0.515 ac

Summary for Subcatchment SUB-1A:

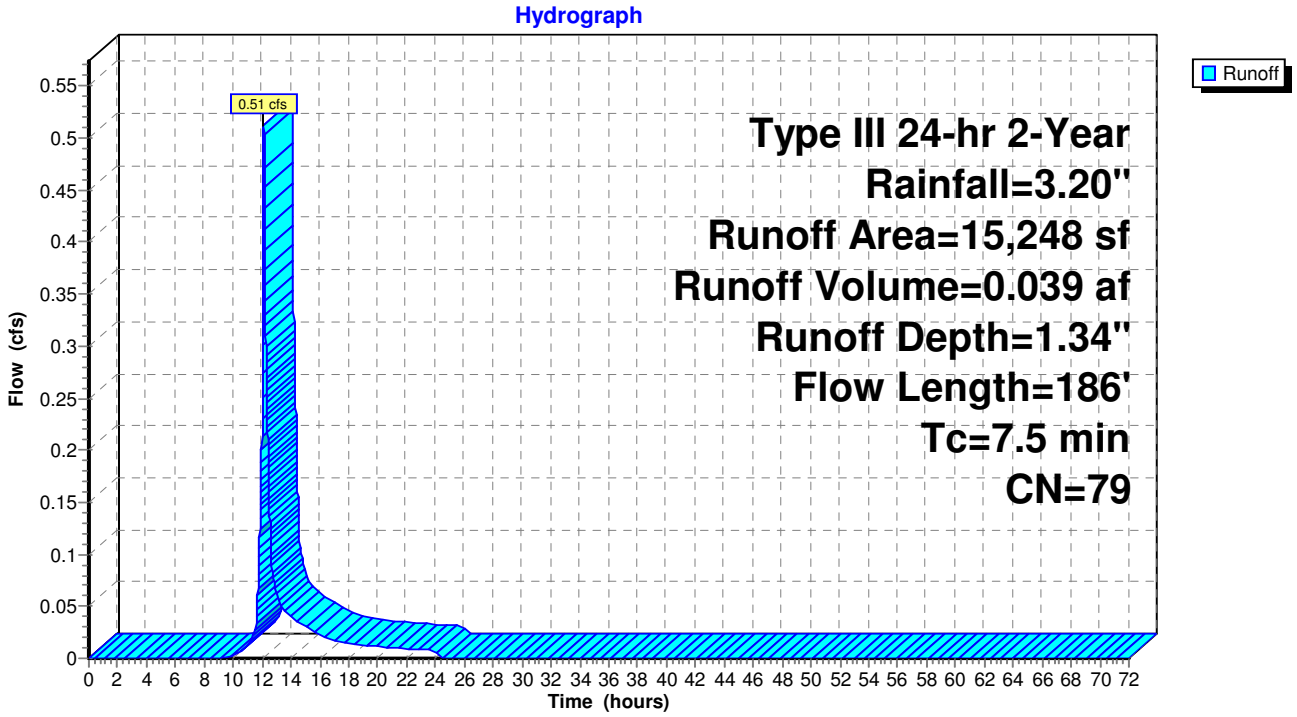
Runoff = 0.51 cfs @ 12.11 hrs, Volume= 0.039 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	4,273	98	Roof
*	2,233	98	Pavement
	7,852	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	15,248	79	Weighted Average
	7,852		51.50% Pervious Area
	7,396		48.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		**Sheet Flow, 0-50** Grass: Dense n= 0.240 P2= 3.20"
0.0	10	0.0600	3.94		**Shallow Concentrated Flow, 50-60** Unpaved Kv= 16.1 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, 60-77** Paved Kv= 20.3 fps
0.4	109	0.0800	4.55		**Shallow Concentrated Flow, 77-189** Unpaved Kv= 16.1 fps
7.5	186	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

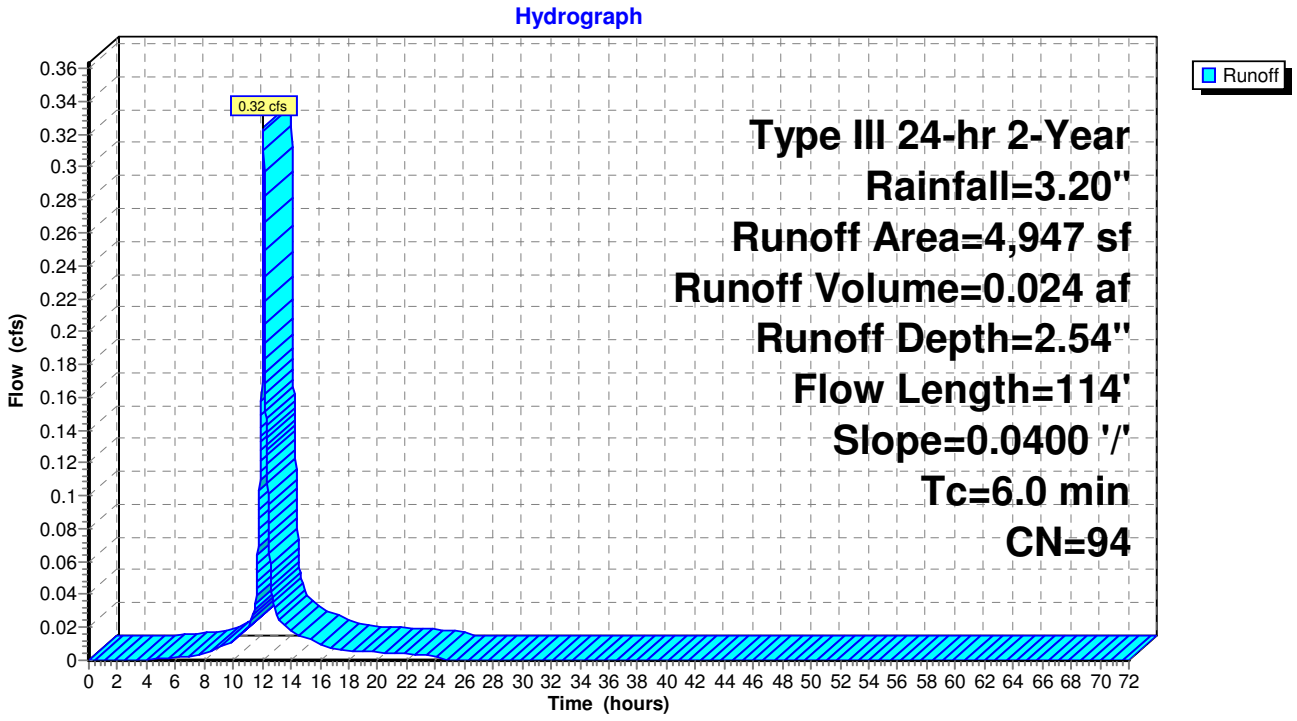
Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.024 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

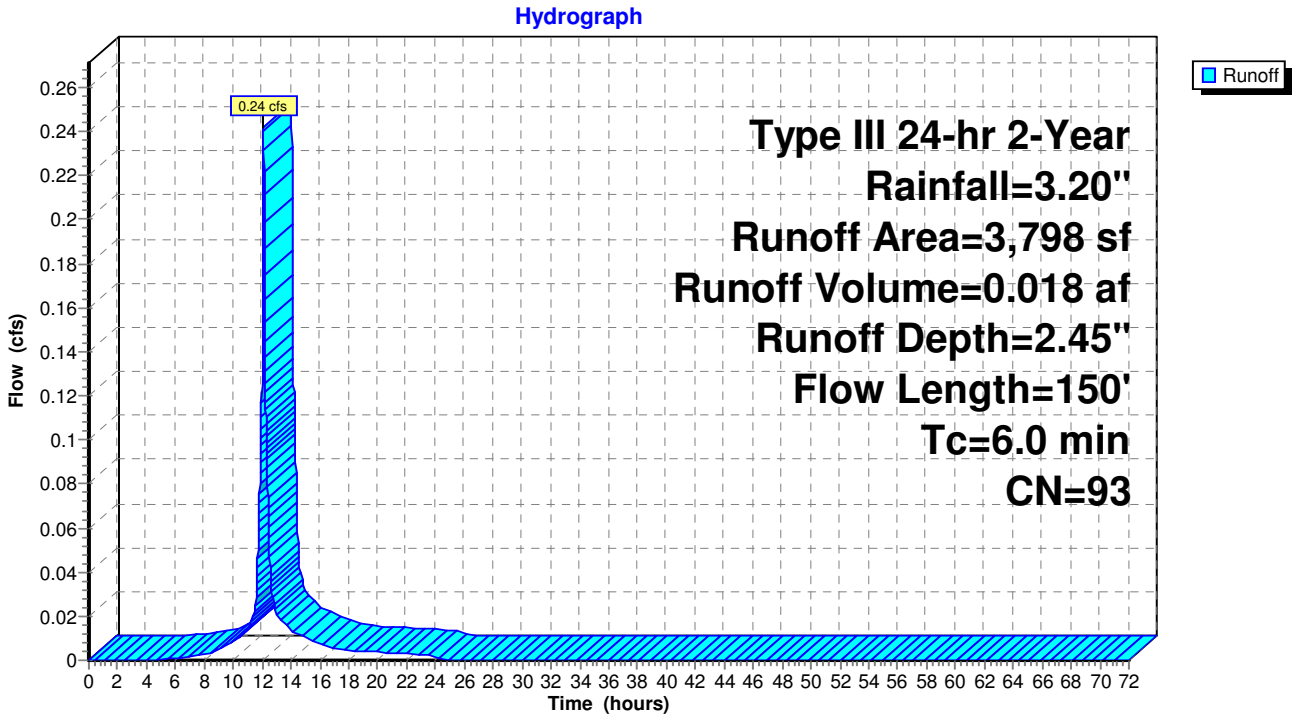
Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-1D:

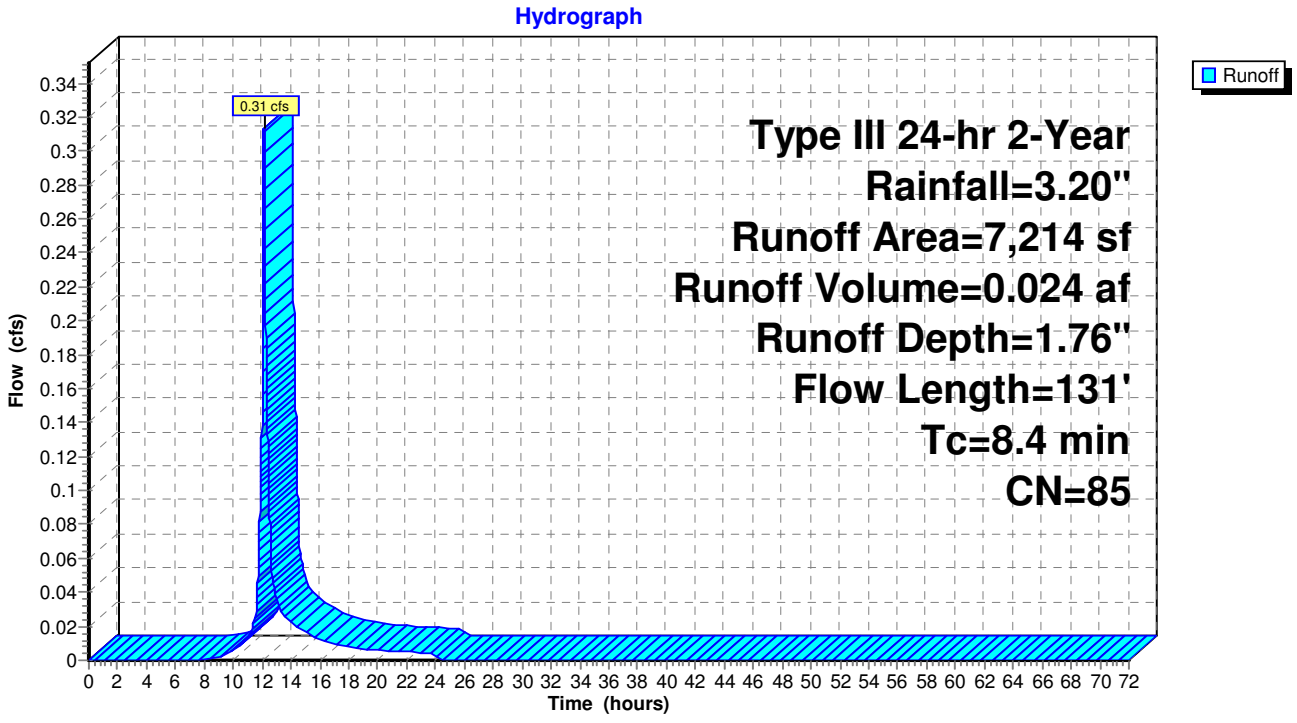
Runoff = 0.31 cfs @ 12.12 hrs, Volume= 0.024 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	4,662	98	Pavement
	1,859	60	Woods, Fair, HSG B
	693	61	>75% Grass cover, Good, HSG B
	7,214	85	Weighted Average
	2,552		35.38% Pervious Area
	4,662		64.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	81	0.0200	2.87		**Shallow Concentrated Flow, 50-145** Paved Kv= 20.3 fps
8.4	131	Total			

Subcatchment SUB-1D:



Summary for Subcatchment SUB-2:

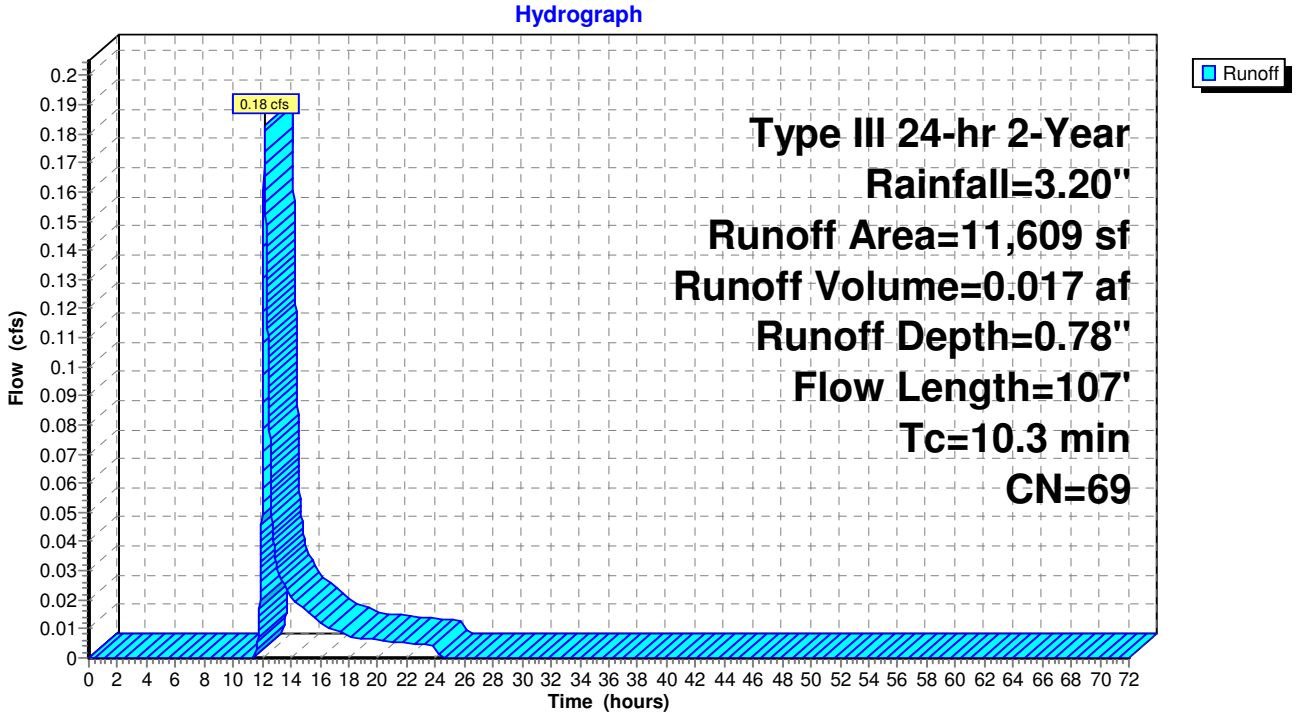
Runoff = 0.18 cfs @ 12.16 hrs, Volume= 0.017 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,077	60	Woods, Fair, HSG B
	4,897	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,609	69	Weighted Average
	8,974		77.30% Pervious Area
	2,635		22.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	57	0.0350	0.94		**Shallow Concentrated Flow, 50-107** Woodland Kv= 5.0 fps
10.3	107	Total			

Subcatchment SUB-2:

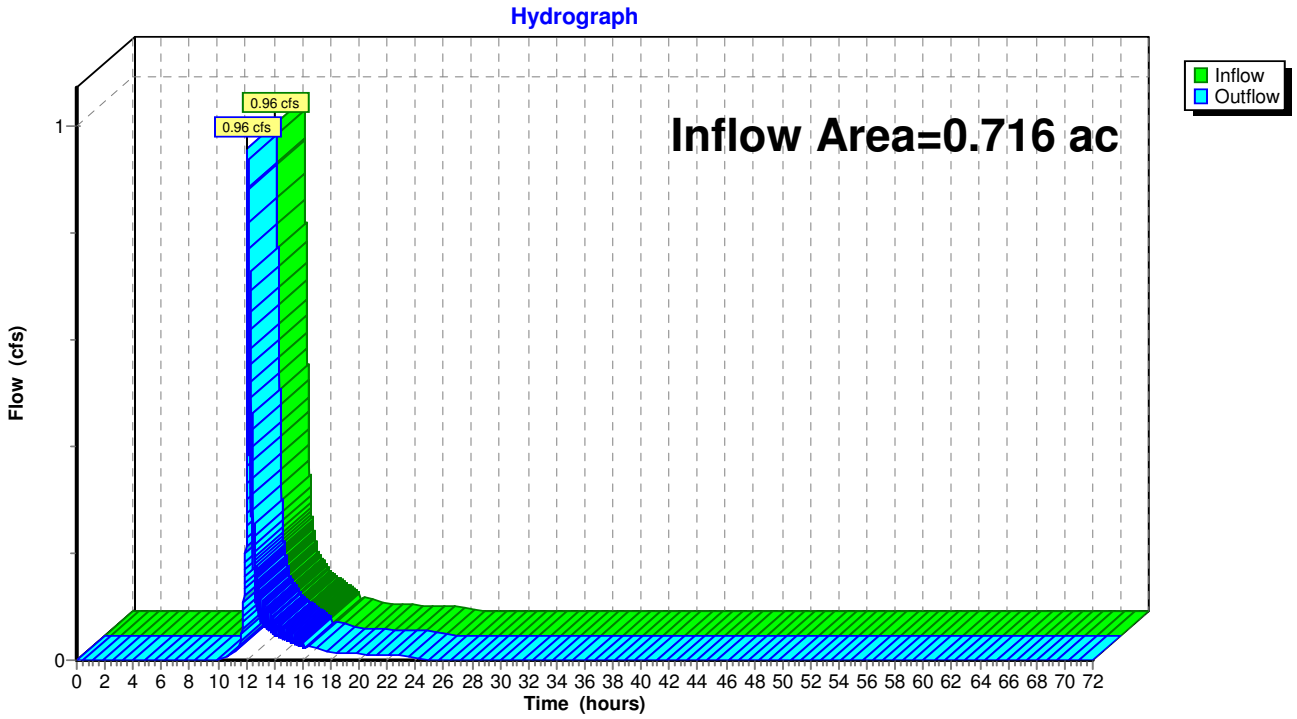


Summary for Reach DP-1:

Inflow Area = 0.716 ac, 63.41% Impervious, Inflow Depth = 0.93" for 2-Year event
Inflow = 0.96 cfs @ 12.10 hrs, Volume= 0.056 af
Outflow = 0.96 cfs @ 12.10 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-1:

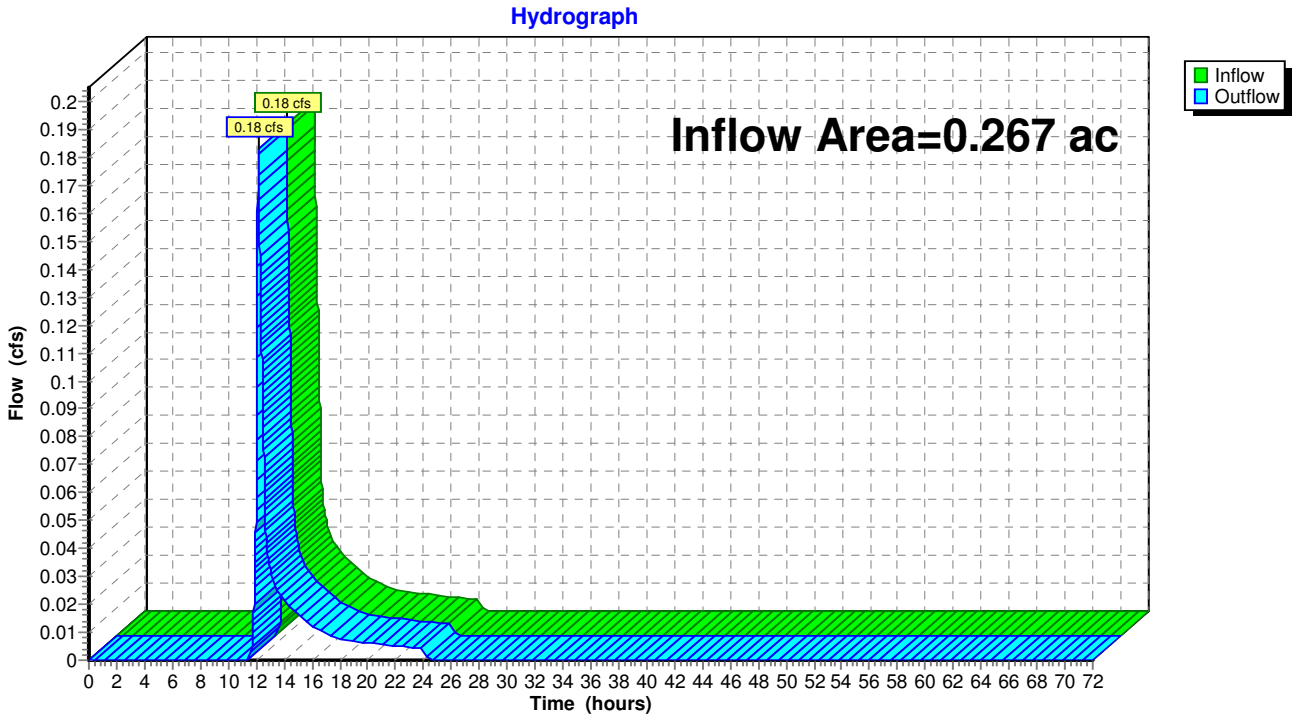


Summary for Reach DP-2:

Inflow Area = 0.267 ac, 22.70% Impervious, Inflow Depth = 0.78" for 2-Year event
Inflow = 0.18 cfs @ 12.16 hrs, Volume= 0.017 af
Outflow = 0.18 cfs @ 12.16 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth = 2.54" for 2-Year event
Inflow = 0.32 cfs @ 12.08 hrs, Volume= 0.024 af
Outflow = 0.46 cfs @ 12.08 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 8.84 hrs, Volume= 0.013 af
Primary = 0.45 cfs @ 12.08 hrs, Volume= 0.011 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 109.67' @ 12.08 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 356.3 min (1,143.4 - 787.1)

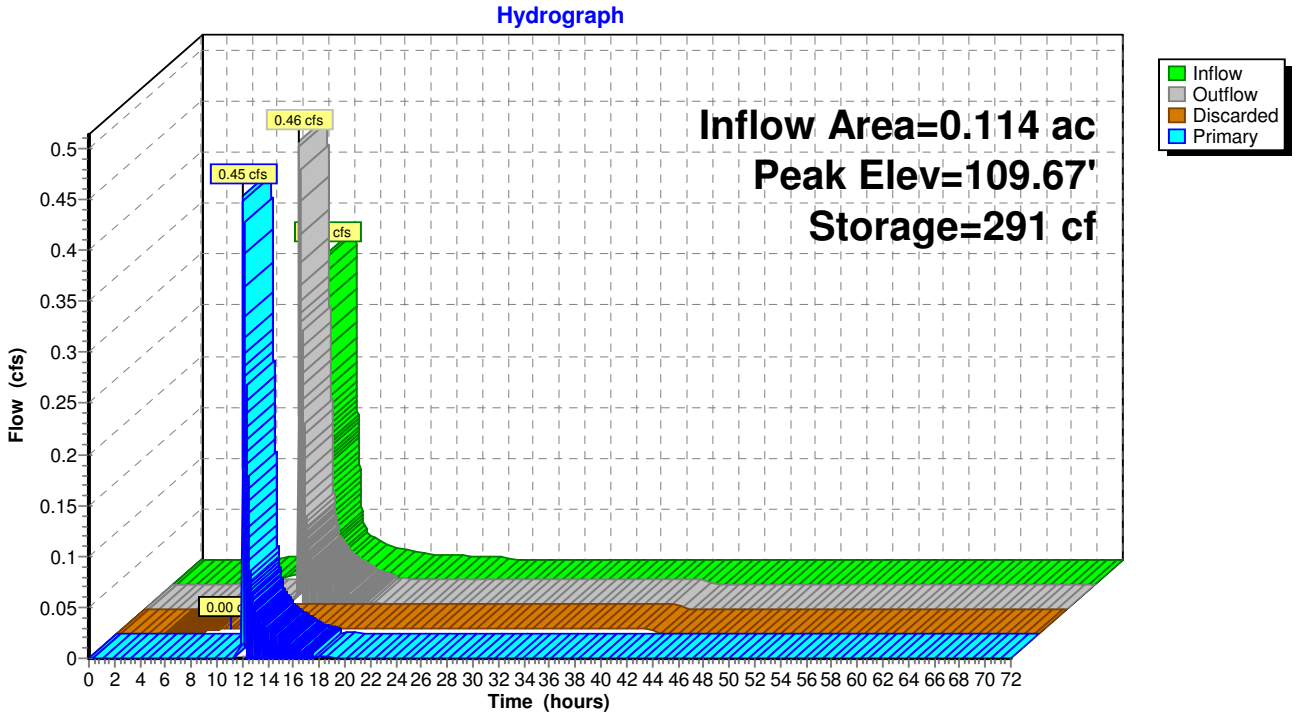
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 8.84 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.45 cfs @ 12.08 hrs HW=109.67' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.45 cfs @ 0.85 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth = 2.45" for 2-Year event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af
Outflow = 0.20 cfs @ 12.20 hrs, Volume= 0.018 af, Atten= 17%, Lag= 7.0 min
Discarded = 0.00 cfs @ 9.49 hrs, Volume= 0.012 af
Primary = 0.20 cfs @ 12.20 hrs, Volume= 0.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.84' @ 12.20 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 460.5 min (1,253.1 - 792.7)

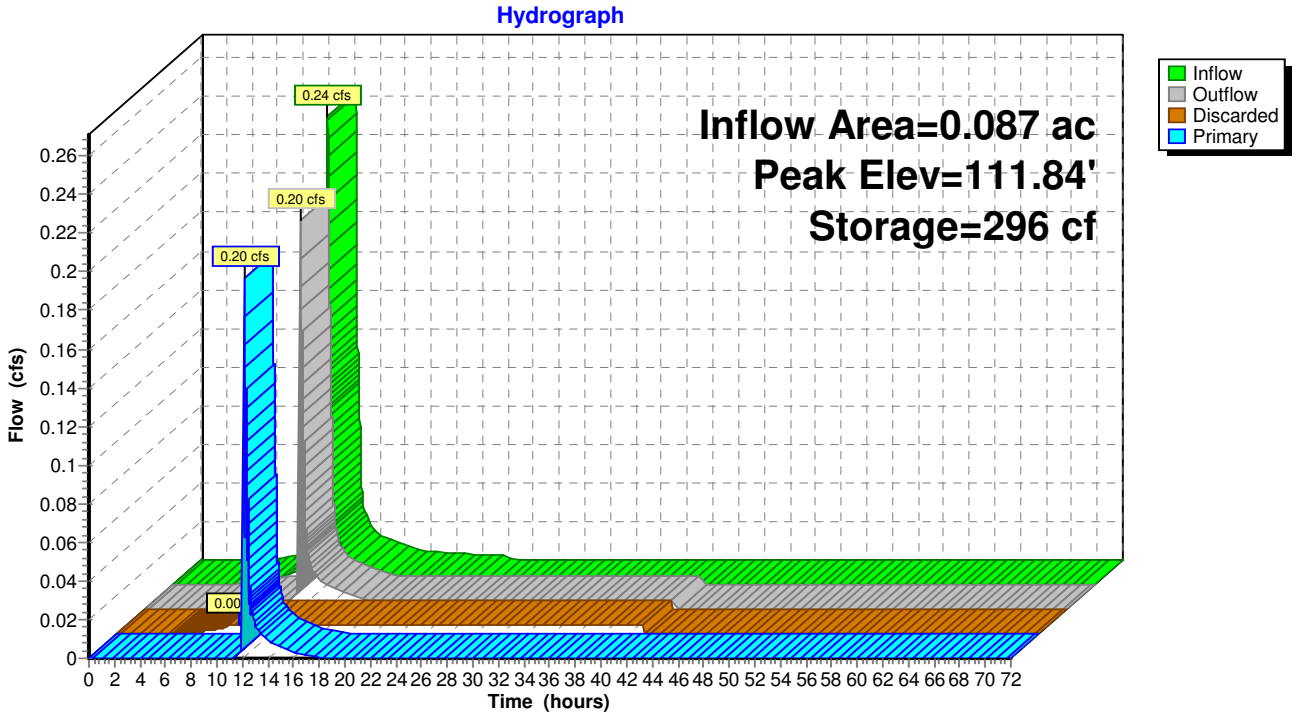
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 9.49 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.18 cfs @ 12.20 hrs HW=111.84' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.62 fps)

Pond 2P: Existing LCBN



Summary for Pond 3P: Cultec Chambers

Inflow Area = 0.166 ac, 64.62% Impervious, Inflow Depth = 1.76" for 2-Year event
Inflow = 0.31 cfs @ 12.12 hrs, Volume= 0.024 af
Outflow = 0.03 cfs @ 11.78 hrs, Volume= 0.024 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.78 hrs, Volume= 0.024 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 110.36' @ 13.55 hrs Surf.Area= 479 sf Storage= 428 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 142.8 min (971.2 - 828.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	109.00'	428 cf	**20.83'W x 23.00'L x 3.54'H Field A** 1,697 cf Overall - 626 cf Embedded = 1,071 cf x 40.0% Voids
#2A	109.50'	626 cf	**Cultec R-330XL** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
#3	112.00'	136 cf	**4.00'D x 2.70'H Vertical Cone/Cylinder** x 4 -Impervious
		1,190 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	114.50'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 11.78 hrs HW=109.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=109.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Cultec Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

52.0" Wide + 6.0" Spacing = 58.0" C-C

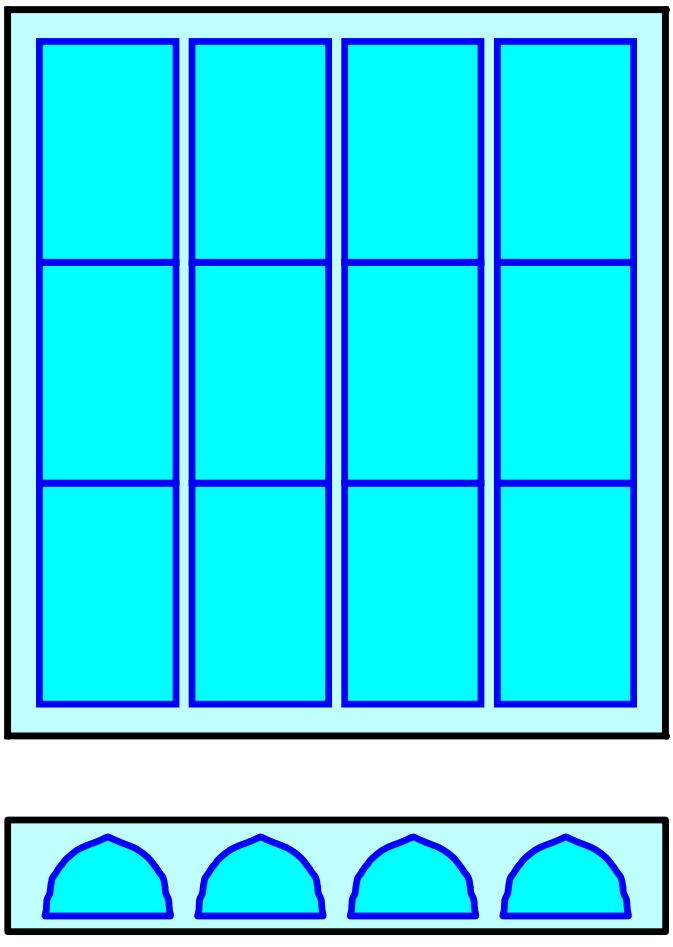
3 Chambers/Row x 7.00' Long = 21.00' + 12.0" End Stone x 2 = 23.00' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf = 625.9 cf Chamber Storage

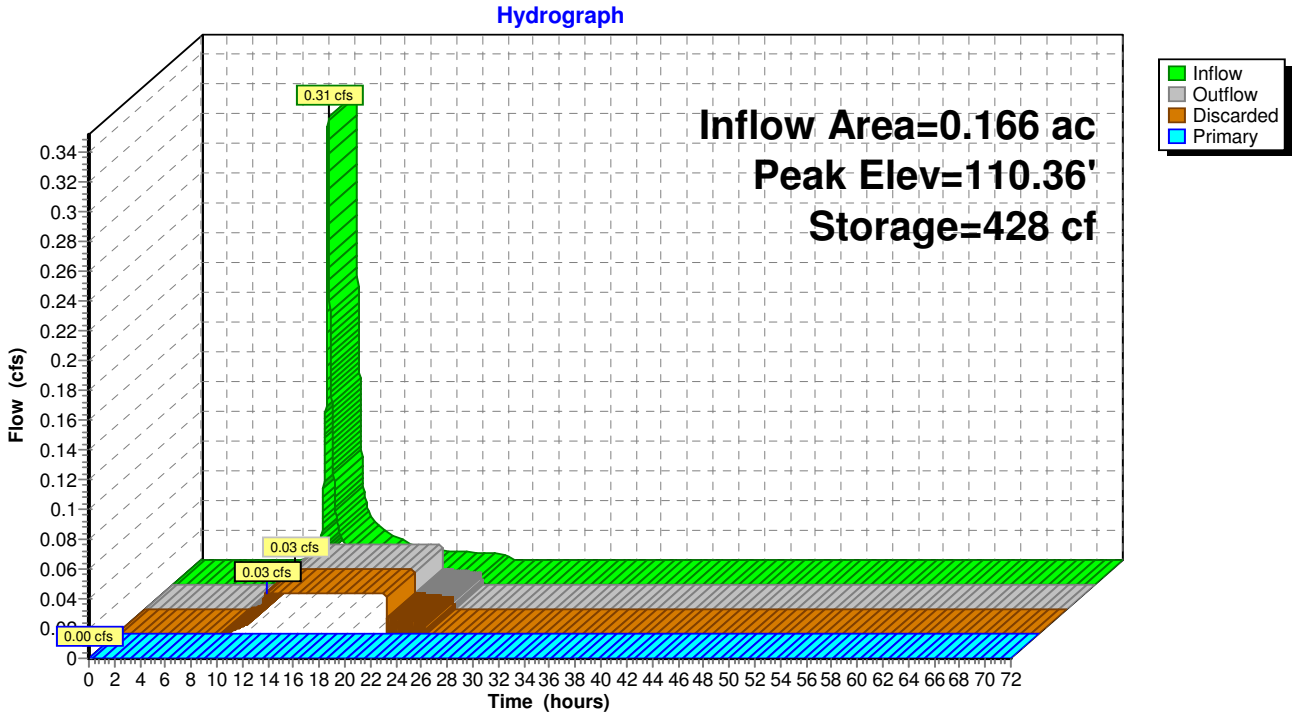
1,697.0 cf Field - 625.9 cf Chambers = 1,071.2 cf Stone x 40.0% Voids = 428.5 cf Stone Storage

Stone + Chamber Storage = 1,054.3 cf = 0.024 af

12 Chambers
62.9 cy Field
39.7 cy Stone



Pond 3P: Cultec Chambers



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=15,248 sf 48.50% Impervious Runoff Depth=2.55"
Flow Length=186' Tc=7.5 min CN=79 Runoff=0.99 cfs 0.074 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth=4.01"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.50 cfs 0.038 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth=3.90"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.38 cfs 0.028 af

Subcatchment SUB-1D: Runoff Area=7,214 sf 64.62% Impervious Runoff Depth=3.09"
Flow Length=131' Tc=8.4 min CN=85 Runoff=0.55 cfs 0.043 af

Subcatchment SUB-2: Runoff Area=11,609 sf 22.70% Impervious Runoff Depth=1.74"
Flow Length=107' Tc=10.3 min CN=69 Runoff=0.45 cfs 0.039 af

Reach DP-1: Inflow=1.86 cfs 0.113 af
Outflow=1.86 cfs 0.113 af

Reach DP-2: Inflow=0.45 cfs 0.039 af
Outflow=0.45 cfs 0.039 af

Pond 1P: Existing LCBN Peak Elev=109.68' Storage=291 cf Inflow=0.50 cfs 0.038 af
Discarded=0.00 cfs 0.014 af Primary=0.58 cfs 0.024 af Outflow=0.59 cfs 0.038 af

Pond 2P: Existing LCBN Peak Elev=111.87' Storage=296 cf Inflow=0.38 cfs 0.028 af
Discarded=0.00 cfs 0.013 af Primary=0.45 cfs 0.015 af Outflow=0.45 cfs 0.028 af

Pond 3P: Cultec Chambers Peak Elev=111.97' Storage=945 cf Inflow=0.55 cfs 0.043 af
Discarded=0.03 cfs 0.043 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.043 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.222 af Average Runoff Depth = 2.71"
47.63% Pervious = 0.468 ac 52.37% Impervious = 0.515 ac

Summary for Subcatchment SUB-1A:

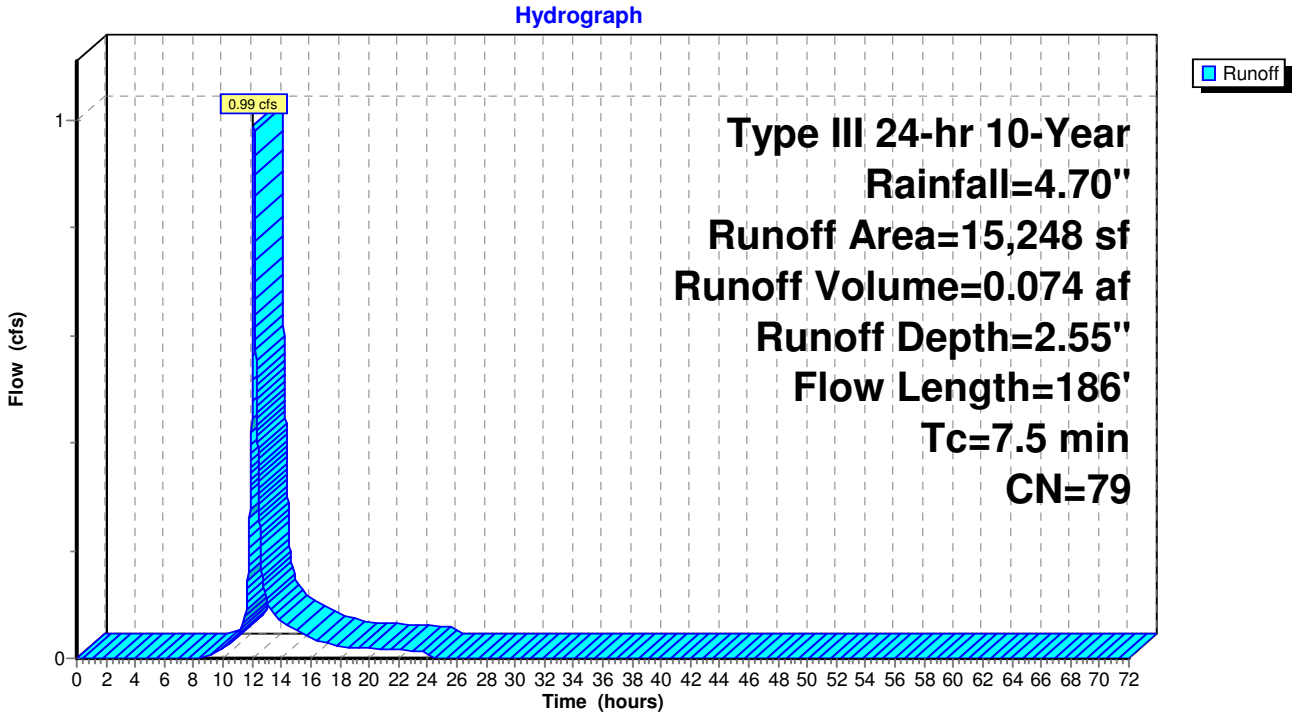
Runoff = 0.99 cfs @ 12.11 hrs, Volume= 0.074 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	4,273	98	Roof
*	2,233	98	Pavement
	7,852	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	15,248	79	Weighted Average
	7,852		51.50% Pervious Area
	7,396		48.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		**Sheet Flow, 0-50** Grass: Dense n= 0.240 P2= 3.20"
0.0	10	0.0600	3.94		**Shallow Concentrated Flow, 50-60** Unpaved Kv= 16.1 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, 60-77** Paved Kv= 20.3 fps
0.4	109	0.0800	4.55		**Shallow Concentrated Flow, 77-189** Unpaved Kv= 16.1 fps
7.5	186	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

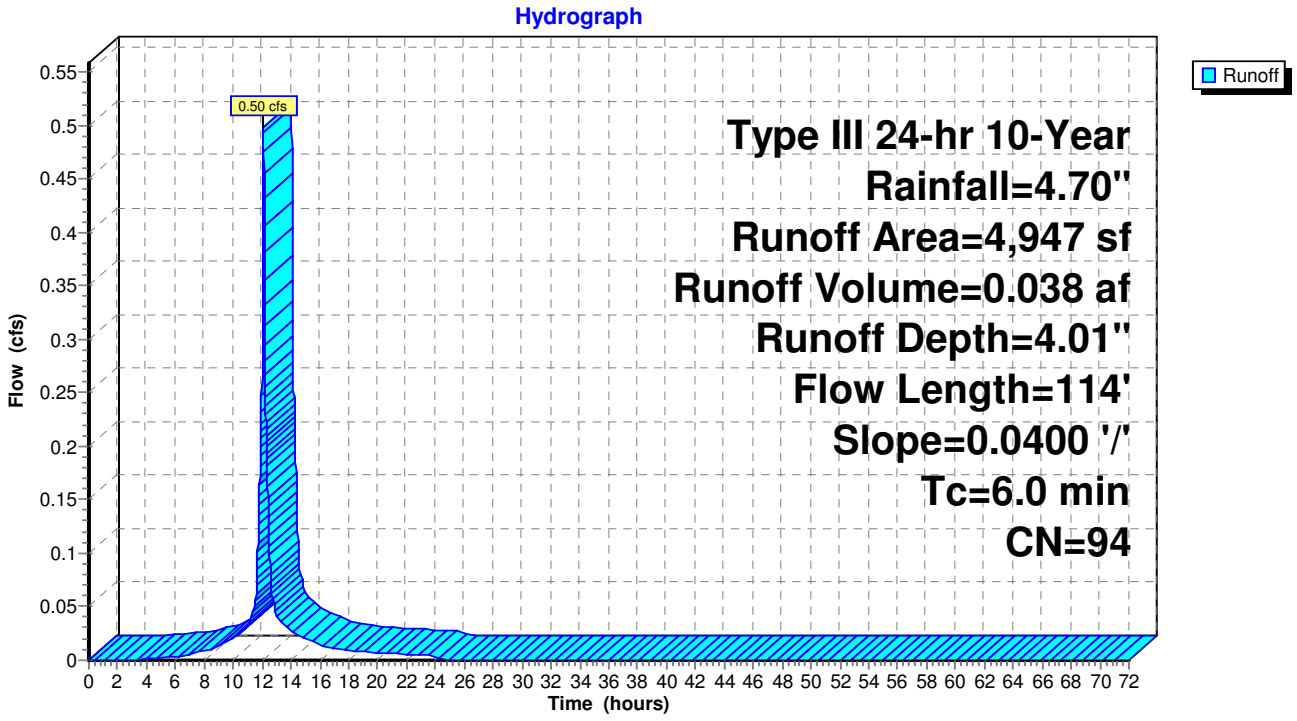
Runoff = 0.50 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

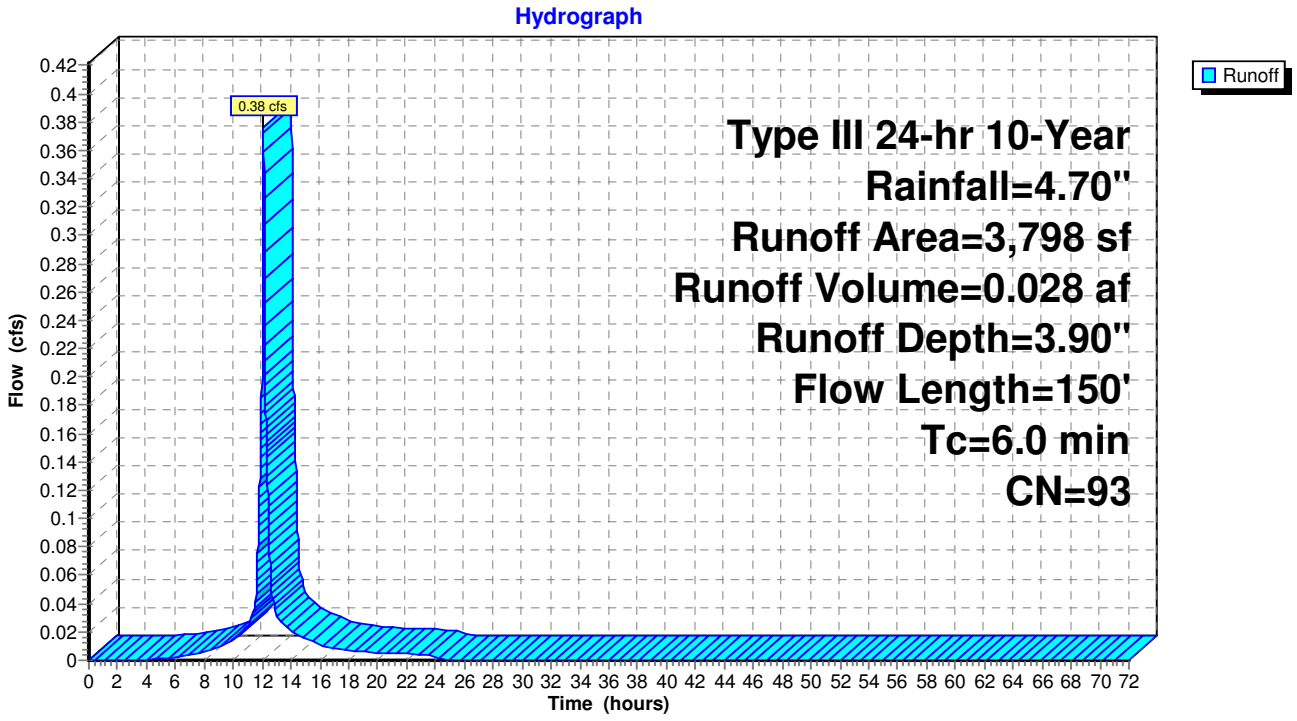
Runoff = 0.38 cfs @ 12.08 hrs, Volume= 0.028 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-1D:

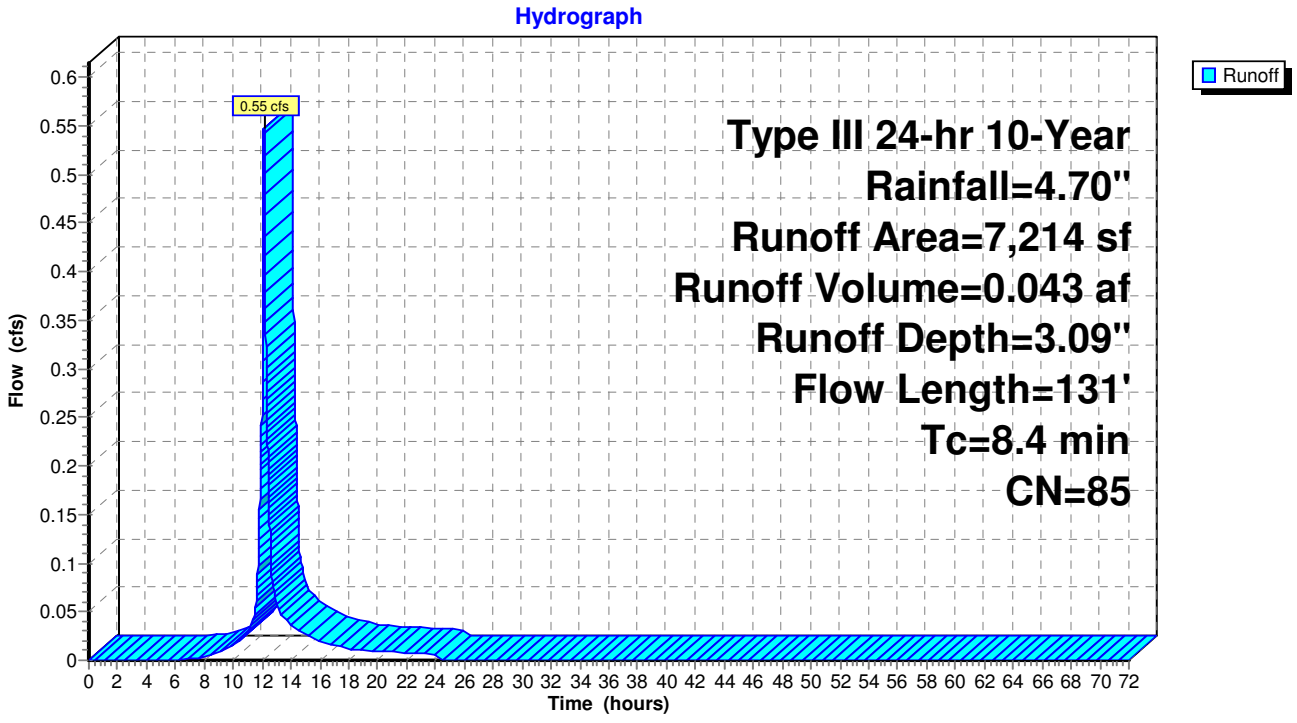
Runoff = 0.55 cfs @ 12.12 hrs, Volume= 0.043 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	4,662	98	Pavement
	1,859	60	Woods, Fair, HSG B
	693	61	>75% Grass cover, Good, HSG B
	7,214	85	Weighted Average
	2,552		35.38% Pervious Area
	4,662		64.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	81	0.0200	2.87		**Shallow Concentrated Flow, 50-145** Paved Kv= 20.3 fps
8.4	131	Total			

Subcatchment SUB-1D:



Summary for Subcatchment SUB-2:

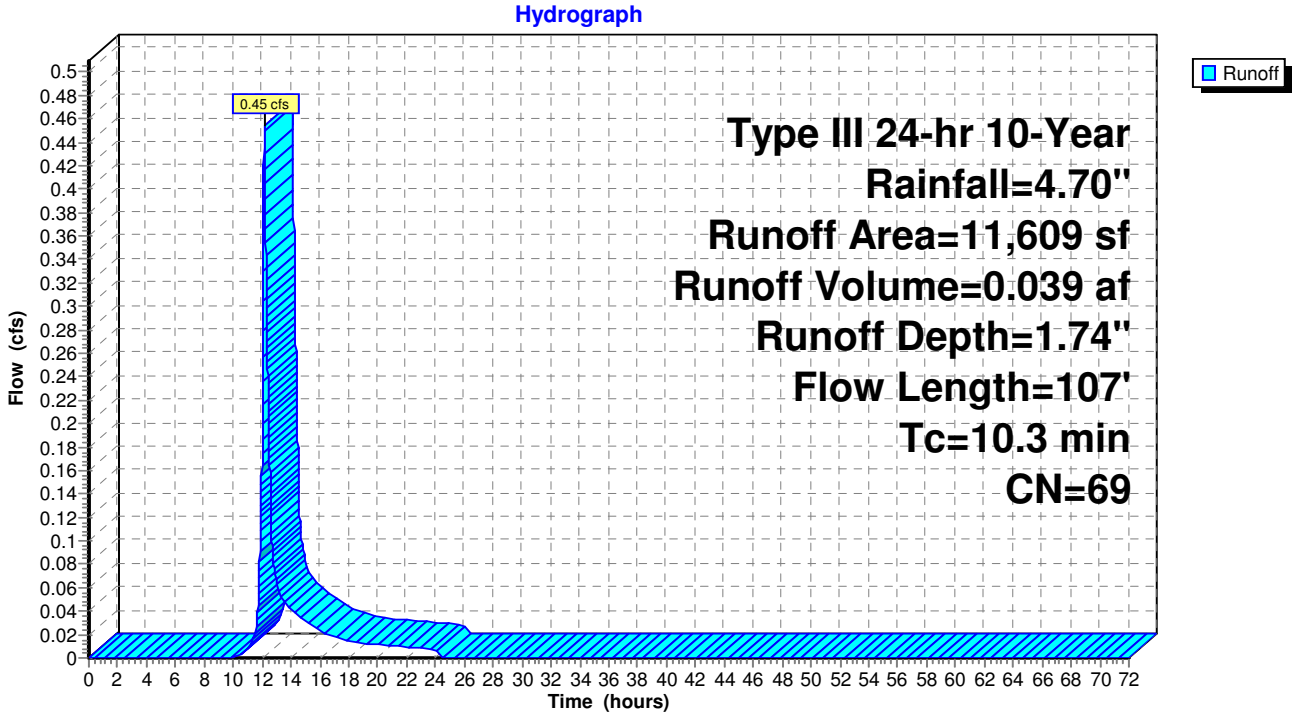
Runoff = 0.45 cfs @ 12.15 hrs, Volume= 0.039 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,077	60	Woods, Fair, HSG B
	4,897	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,609	69	Weighted Average
	8,974		77.30% Pervious Area
	2,635		22.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	57	0.0350	0.94		**Shallow Concentrated Flow, 50-107** Woodland Kv= 5.0 fps
10.3	107	Total			

Subcatchment SUB-2:

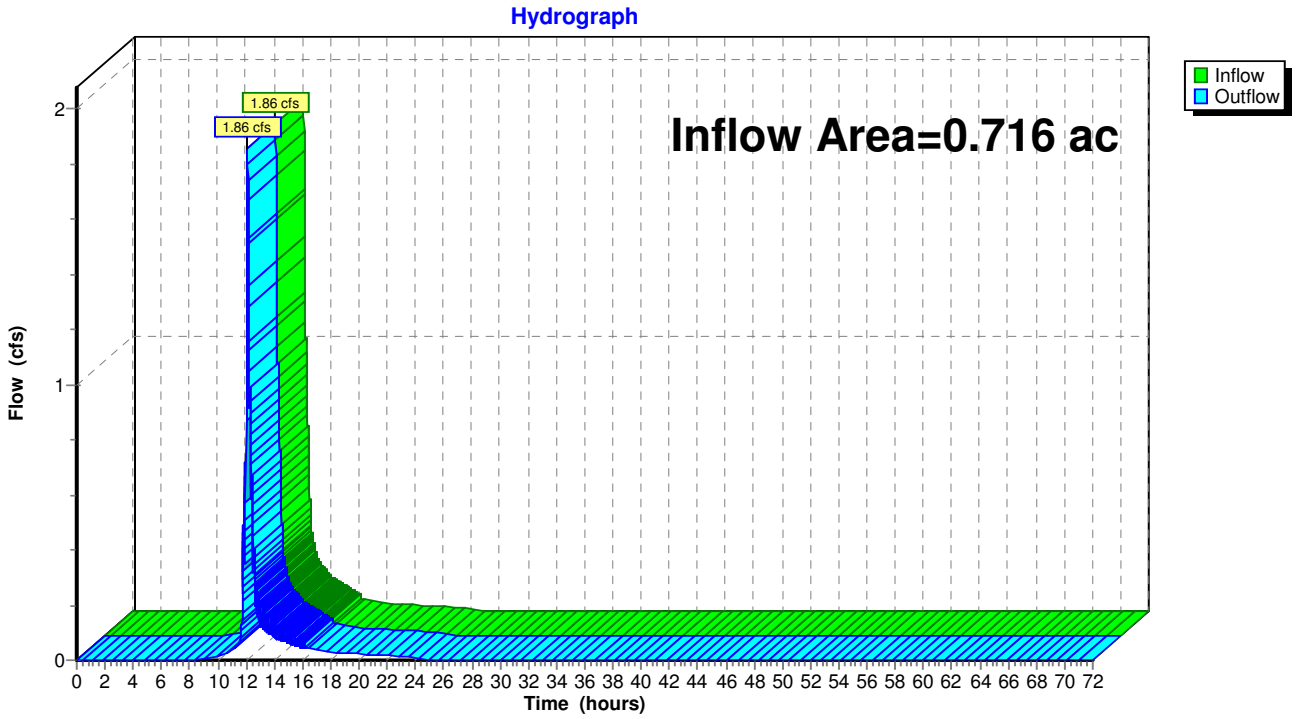


Summary for Reach DP-1:

Inflow Area = 0.716 ac, 63.41% Impervious, Inflow Depth = 1.90" for 10-Year event
Inflow = 1.86 cfs @ 12.10 hrs, Volume= 0.113 af
Outflow = 1.86 cfs @ 12.10 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-1:

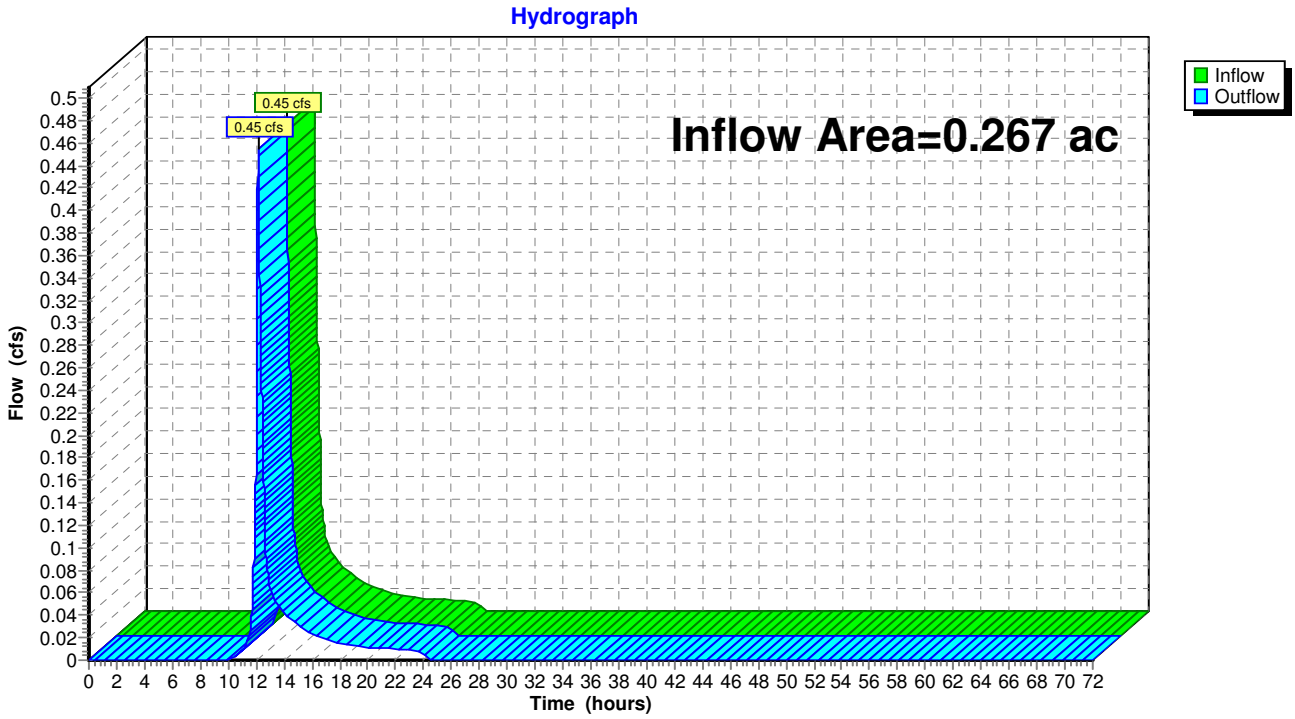


Summary for Reach DP-2:

Inflow Area = 0.267 ac, 22.70% Impervious, Inflow Depth = 1.74" for 10-Year event
Inflow = 0.45 cfs @ 12.15 hrs, Volume= 0.039 af
Outflow = 0.45 cfs @ 12.15 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth = 4.01" for 10-Year event
Inflow = 0.50 cfs @ 12.08 hrs, Volume= 0.038 af
Outflow = 0.59 cfs @ 12.08 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 7.30 hrs, Volume= 0.014 af
Primary = 0.58 cfs @ 12.08 hrs, Volume= 0.024 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 109.68' @ 12.08 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 241.2 min (1,016.4 - 775.3)

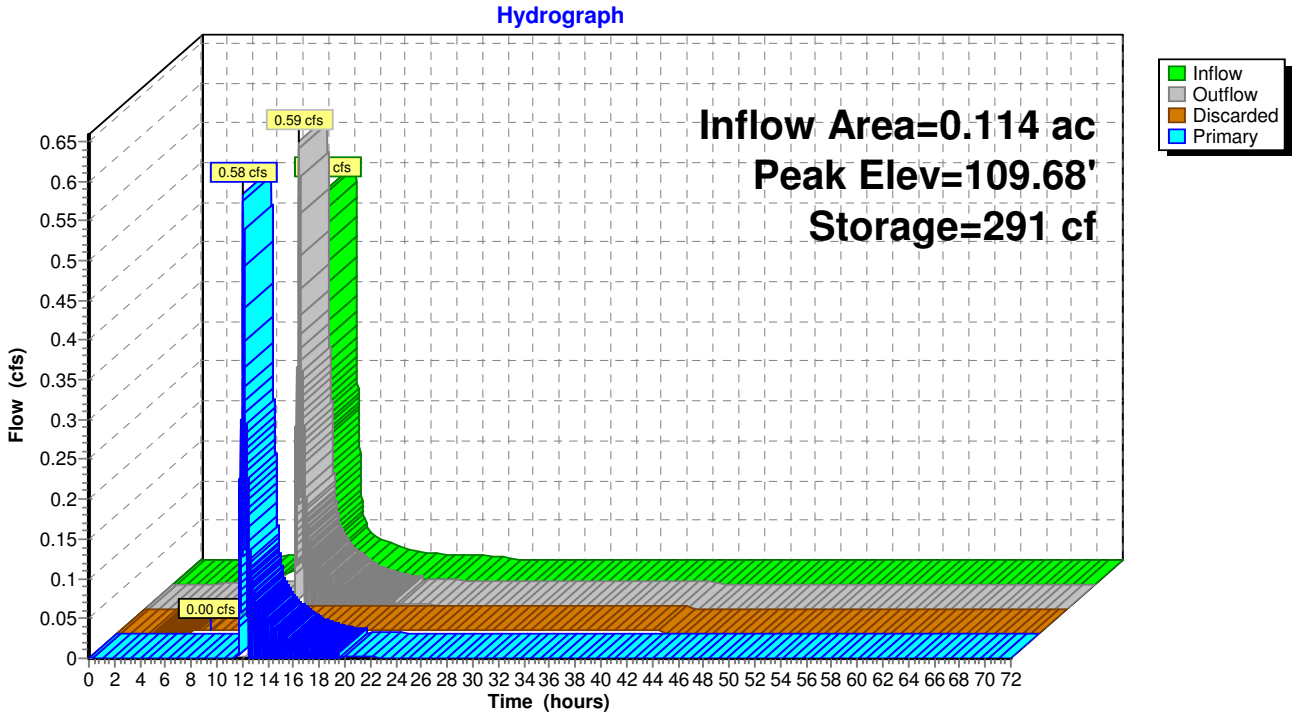
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 7.30 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.58 cfs @ 12.08 hrs HW=109.68' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.58 cfs @ 0.92 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth = 3.90" for 10-Year event
Inflow = 0.38 cfs @ 12.08 hrs, Volume= 0.028 af
Outflow = 0.45 cfs @ 12.07 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 8.15 hrs, Volume= 0.013 af
Primary = 0.45 cfs @ 12.07 hrs, Volume= 0.015 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.87' @ 12.07 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 318.2 min (1,098.4 - 780.2)

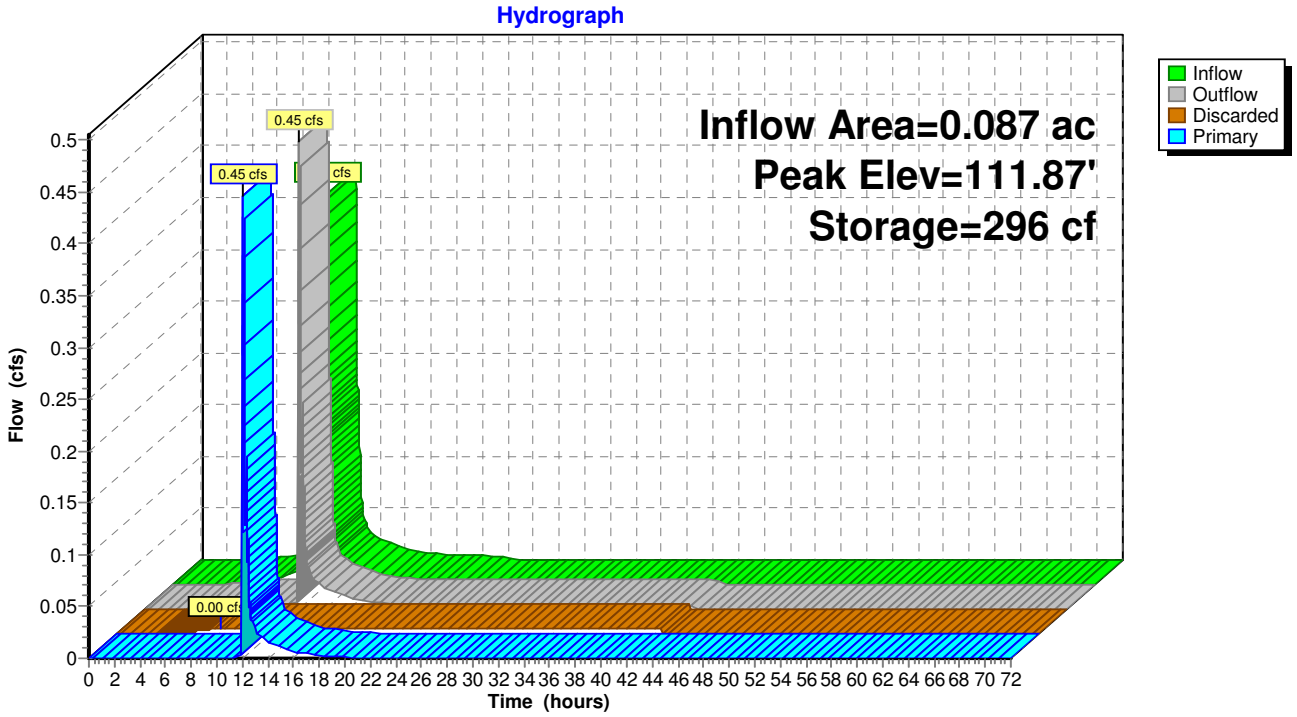
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 8.15 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.45 cfs @ 12.07 hrs HW=111.87' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.45 cfs @ 0.84 fps)

Pond 2P: Existing LCBN



Summary for Pond 3P: Cultec Chambers

Inflow Area = 0.166 ac, 64.62% Impervious, Inflow Depth = 3.09" for 10-Year event
Inflow = 0.55 cfs @ 12.12 hrs, Volume= 0.043 af
Outflow = 0.03 cfs @ 11.39 hrs, Volume= 0.043 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.39 hrs, Volume= 0.043 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.97' @ 15.08 hrs Surf.Area= 479 sf Storage= 945 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 336.2 min (1,148.4 - 812.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	109.00'	428 cf	**20.83'W x 23.00'L x 3.54'H Field A** 1,697 cf Overall - 626 cf Embedded = 1,071 cf x 40.0% Voids
#2A	109.50'	626 cf	**Cultec R-330XL** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
#3	112.00'	136 cf	**4.00'D x 2.70'H Vertical Cone/Cylinder** x 4 -Impervious
		1,190 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	114.50'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 11.39 hrs HW=109.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=109.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: Cultec Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

52.0" Wide + 6.0" Spacing = 58.0" C-C

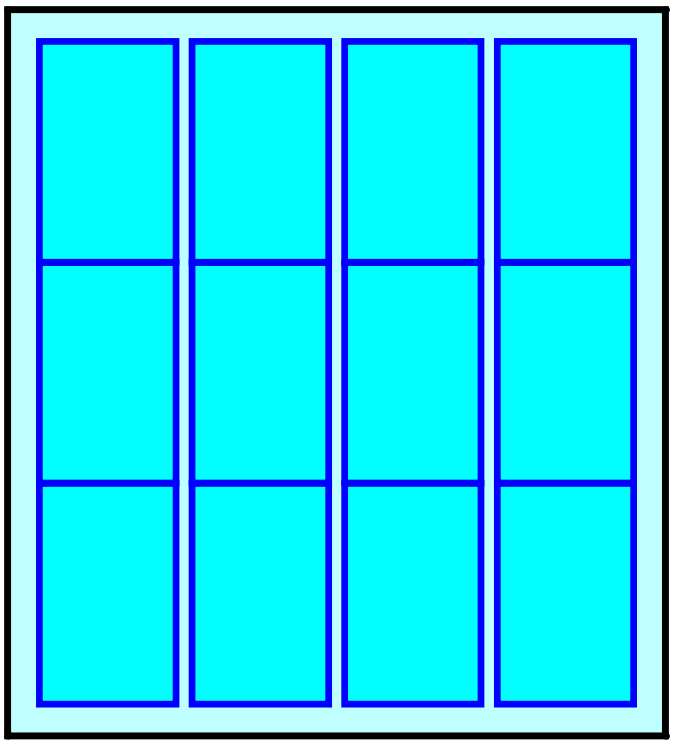
3 Chambers/Row x 7.00' Long = 21.00' + 12.0" End Stone x 2 = 23.00' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

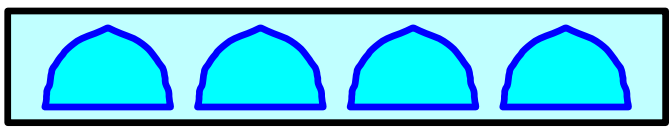
12 Chambers x 52.2 cf = 625.9 cf Chamber Storage

1,697.0 cf Field - 625.9 cf Chambers = 1,071.2 cf Stone x 40.0% Voids = 428.5 cf Stone Storage

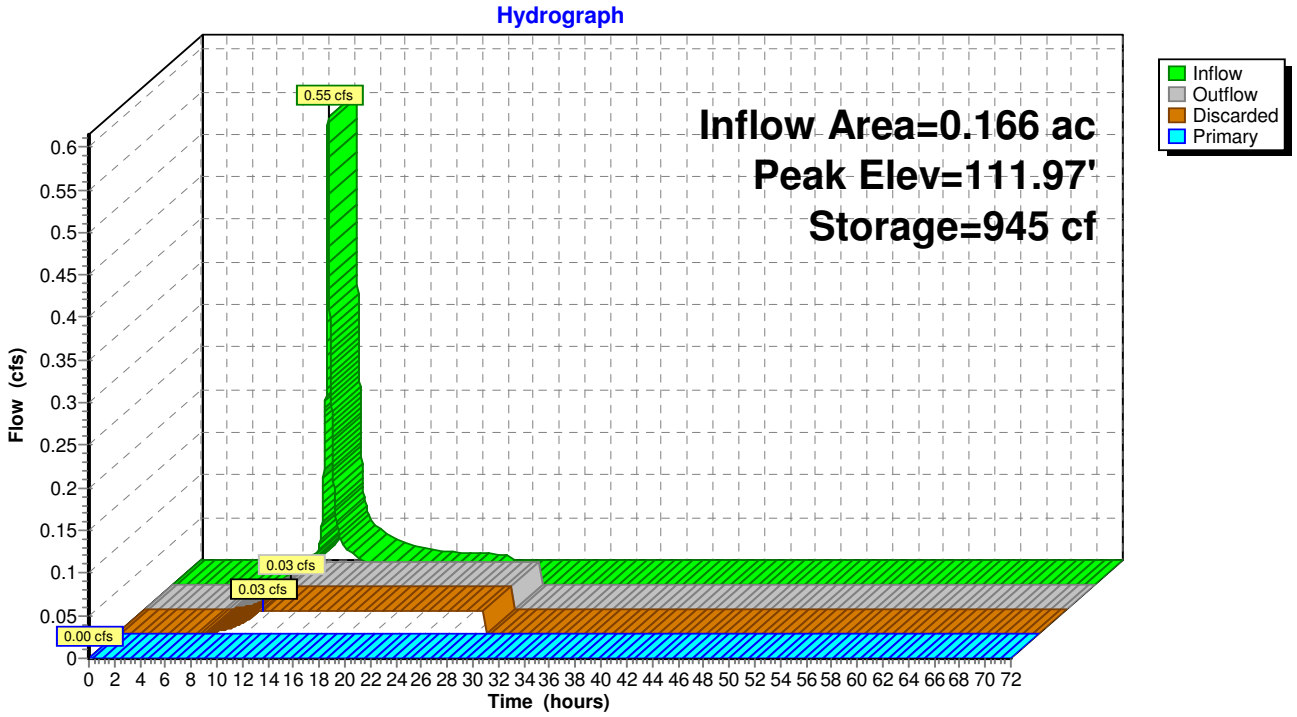
Stone + Chamber Storage = 1,054.3 cf = 0.024 af

12 Chambers
62.9 cy Field
39.7 cy Stone





Pond 3P: Cultec Chambers



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=15,248 sf 48.50% Impervious Runoff Depth=3.24"
Flow Length=186' Tc=7.5 min CN=79 Runoff=1.26 cfs 0.094 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth=4.80"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.59 cfs 0.045 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth=4.69"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.45 cfs 0.034 af

Subcatchment SUB-1D: Runoff Area=7,214 sf 64.62% Impervious Runoff Depth=3.83"
Flow Length=131' Tc=8.4 min CN=85 Runoff=0.68 cfs 0.053 af

Subcatchment SUB-2: Runoff Area=11,609 sf 22.70% Impervious Runoff Depth=2.33"
Flow Length=107' Tc=10.3 min CN=69 Runoff=0.62 cfs 0.052 af

Reach DP-1: Inflow=2.28 cfs 0.148 af
Outflow=2.28 cfs 0.148 af

Reach DP-2: Inflow=0.62 cfs 0.052 af
Outflow=0.62 cfs 0.052 af

Pond 1P: Existing LCBN Peak Elev=109.68' Storage=291 cf Inflow=0.59 cfs 0.045 af
Discarded=0.00 cfs 0.014 af Primary=0.59 cfs 0.031 af Outflow=0.60 cfs 0.045 af

Pond 2P: Existing LCBN Peak Elev=111.87' Storage=296 cf Inflow=0.45 cfs 0.034 af
Discarded=0.00 cfs 0.014 af Primary=0.45 cfs 0.020 af Outflow=0.45 cfs 0.034 af

Pond 3P: Cultec Chambers Peak Elev=114.52' Storage=1,181 cf Inflow=0.68 cfs 0.053 af
Discarded=0.03 cfs 0.051 af Primary=0.03 cfs 0.002 af Outflow=0.05 cfs 0.053 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.279 af Average Runoff Depth = 3.40"
47.63% Pervious = 0.468 ac 52.37% Impervious = 0.515 ac

Summary for Subcatchment SUB-1A:

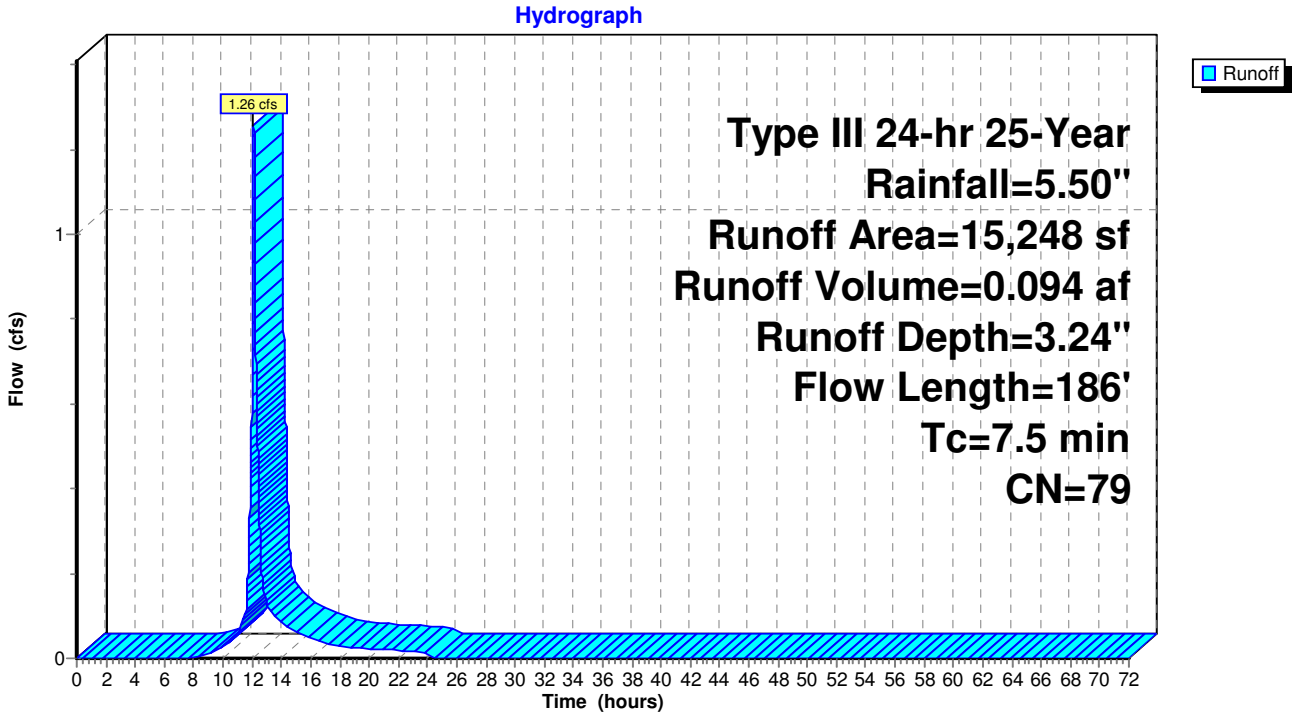
Runoff = 1.26 cfs @ 12.11 hrs, Volume= 0.094 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	4,273	98	Roof
*	2,233	98	Pavement
	7,852	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	15,248	79	Weighted Average
	7,852		51.50% Pervious Area
	7,396		48.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		**Sheet Flow, 0-50** Grass: Dense n= 0.240 P2= 3.20"
0.0	10	0.0600	3.94		**Shallow Concentrated Flow, 50-60** Unpaved Kv= 16.1 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, 60-77** Paved Kv= 20.3 fps
0.4	109	0.0800	4.55		**Shallow Concentrated Flow, 77-189** Unpaved Kv= 16.1 fps
7.5	186	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

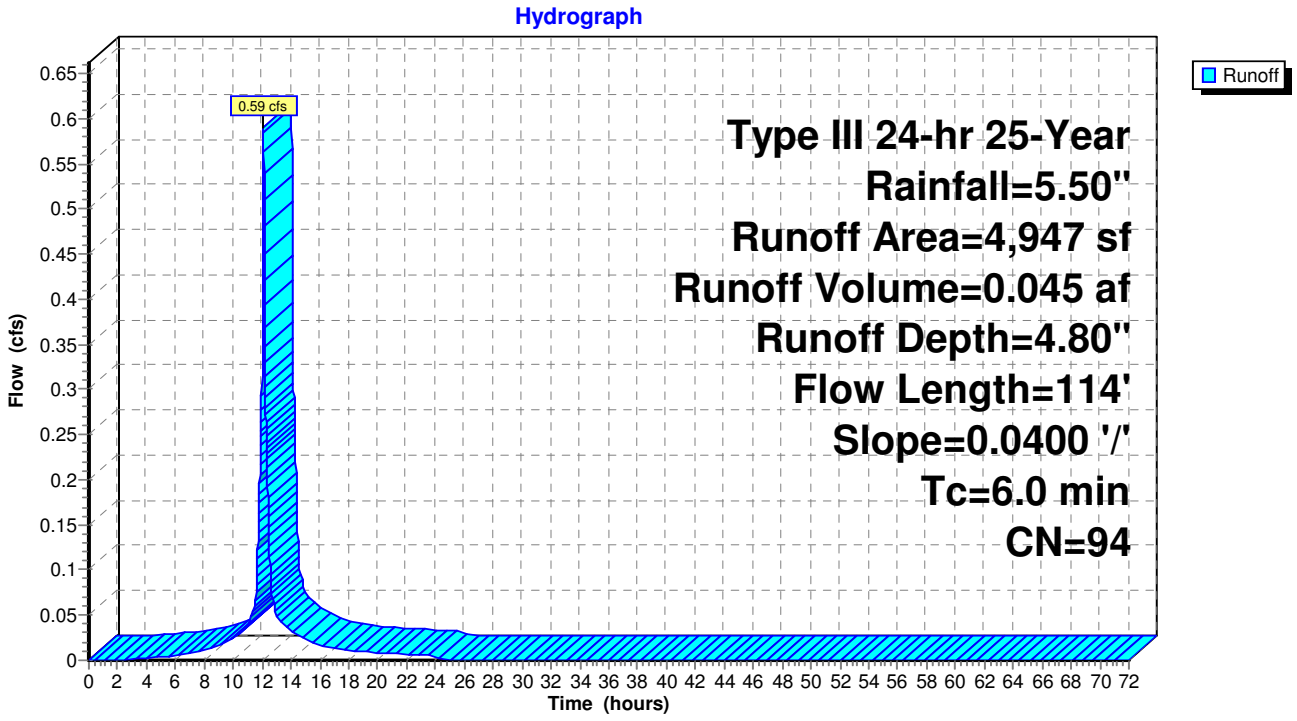
Runoff = 0.59 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

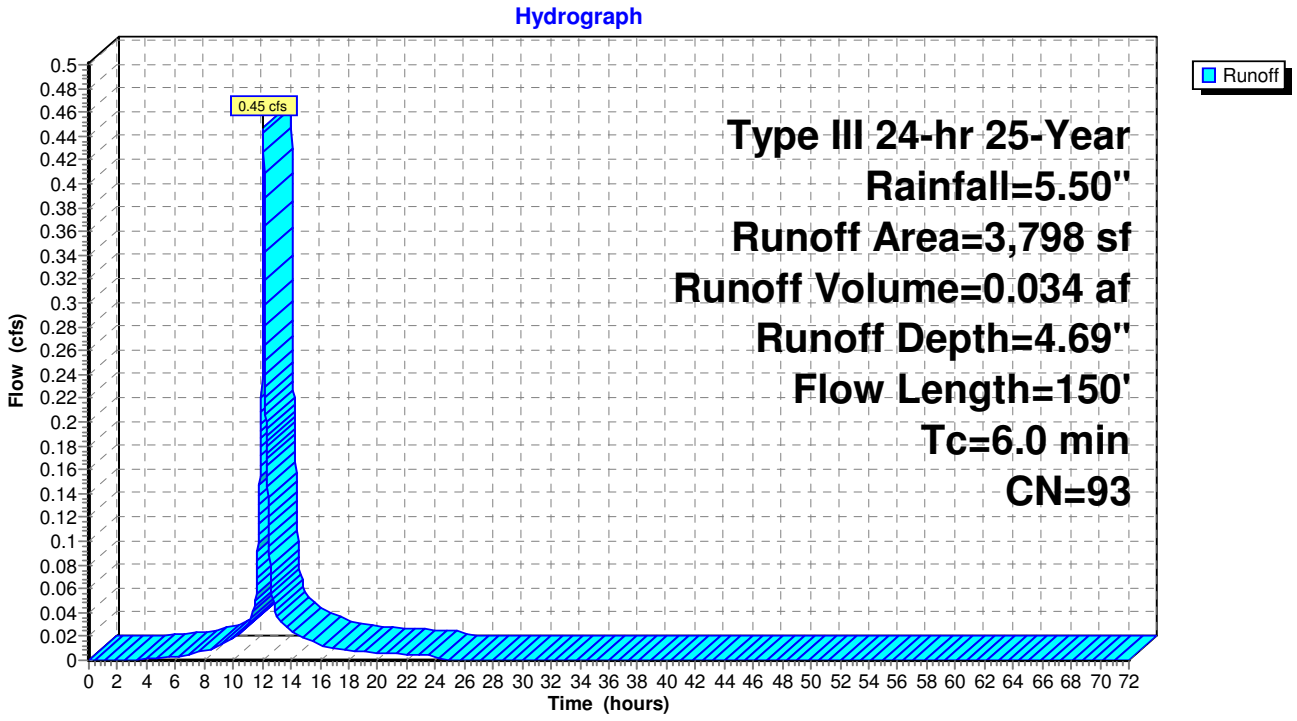
Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.034 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-1D:

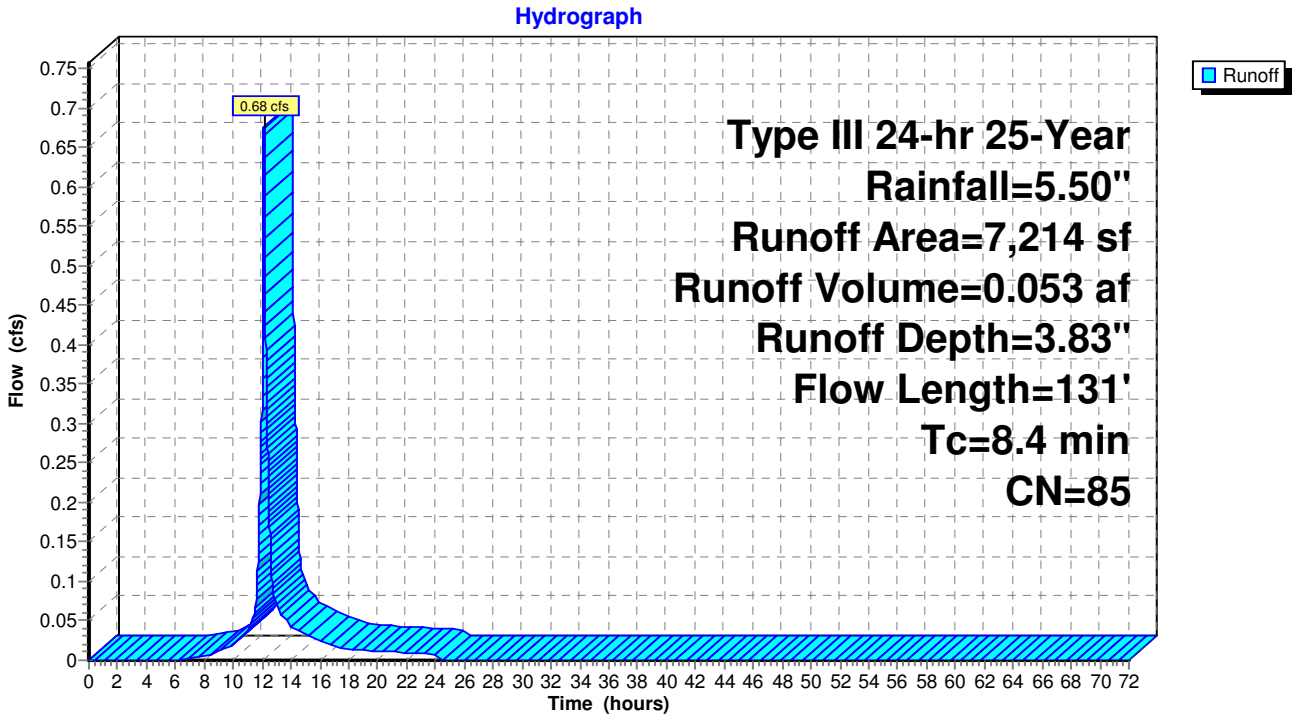
Runoff = 0.68 cfs @ 12.12 hrs, Volume= 0.053 af, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	4,662	98	Pavement
	1,859	60	Woods, Fair, HSG B
	693	61	>75% Grass cover, Good, HSG B
	7,214	85	Weighted Average
	2,552		35.38% Pervious Area
	4,662		64.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	81	0.0200	2.87		**Shallow Concentrated Flow, 50-145** Paved Kv= 20.3 fps
8.4	131	Total			

Subcatchment SUB-1D:



Summary for Subcatchment SUB-2:

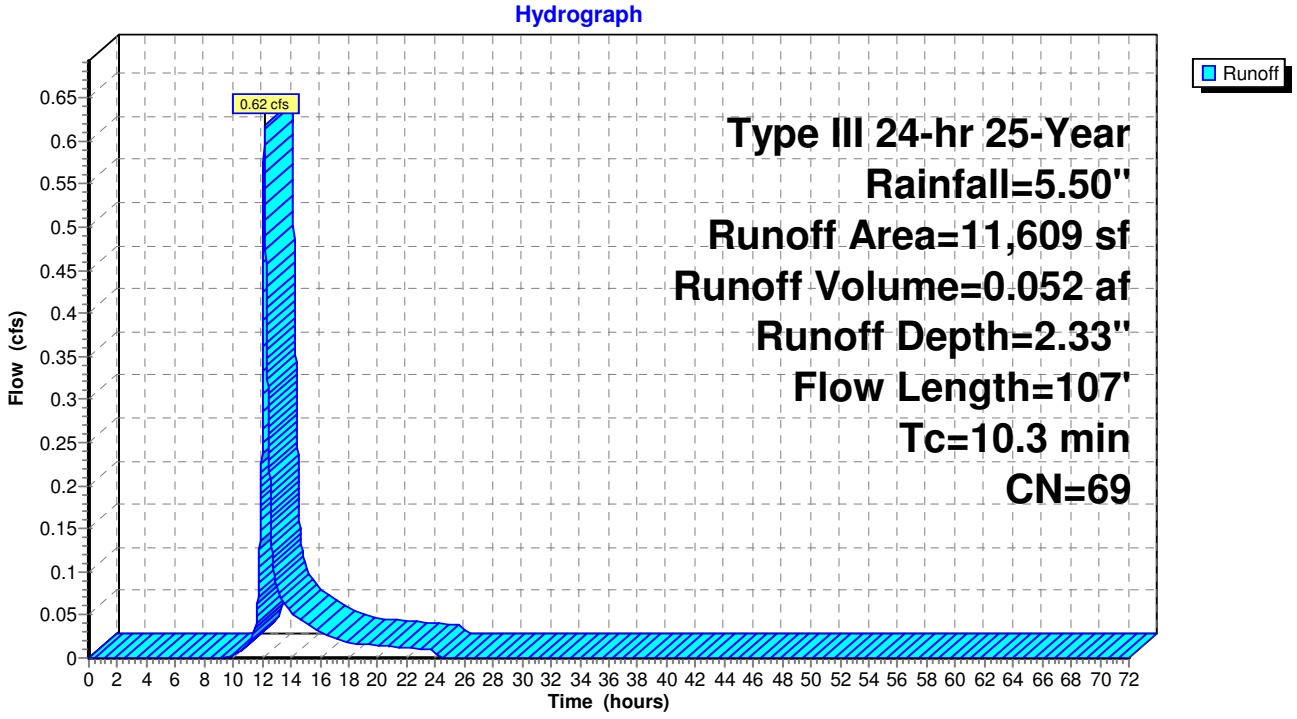
Runoff = 0.62 cfs @ 12.15 hrs, Volume= 0.052 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,077	60	Woods, Fair, HSG B
	4,897	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,609	69	Weighted Average
	8,974		77.30% Pervious Area
	2,635		22.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	57	0.0350	0.94		**Shallow Concentrated Flow, 50-107** Woodland Kv= 5.0 fps
10.3	107	Total			

Subcatchment SUB-2:

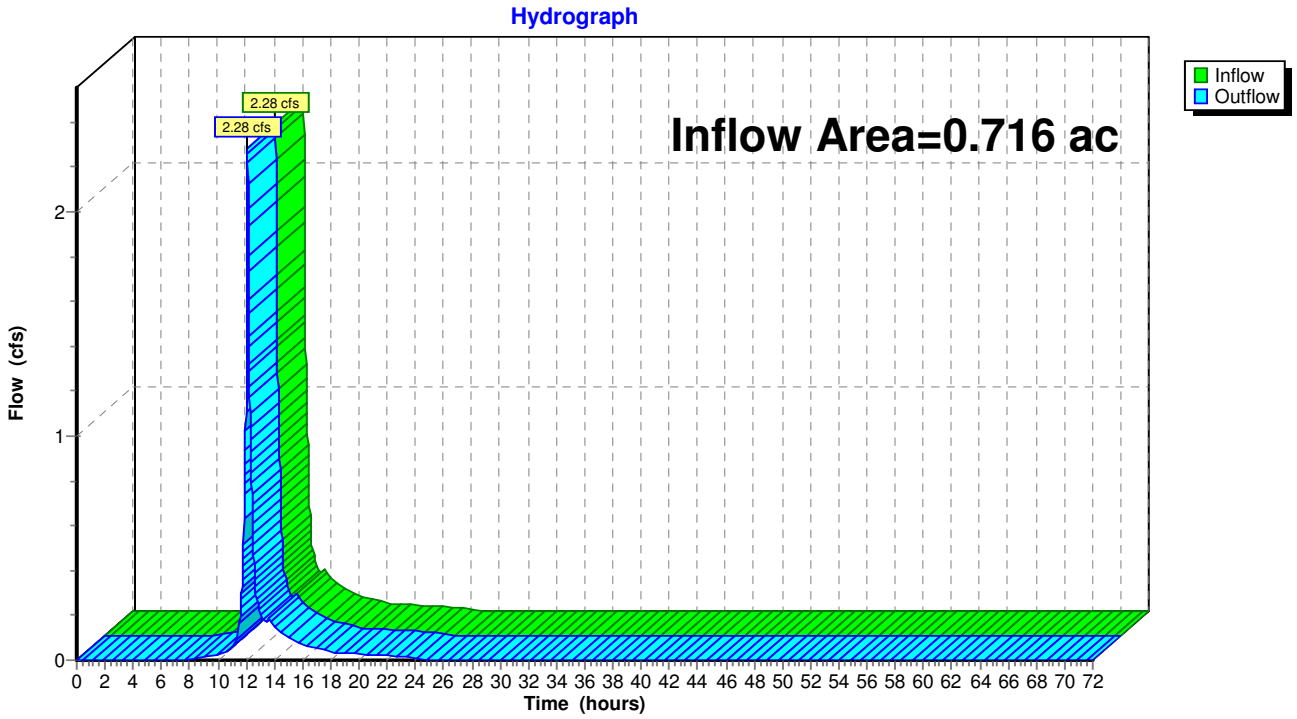


Summary for Reach DP-1:

Inflow Area = 0.716 ac, 63.41% Impervious, Inflow Depth = 2.48" for 25-Year event
Inflow = 2.28 cfs @ 12.09 hrs, Volume= 0.148 af
Outflow = 2.28 cfs @ 12.09 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-1:

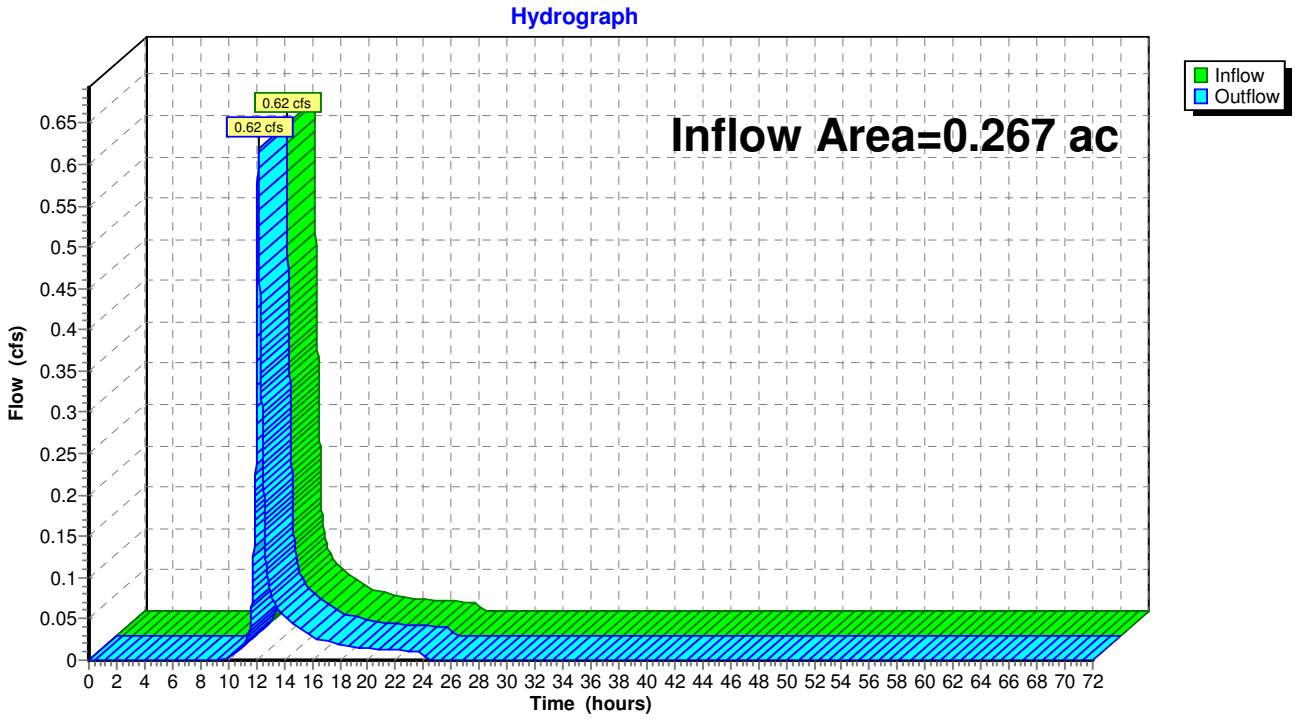


Summary for Reach DP-2:

Inflow Area = 0.267 ac, 22.70% Impervious, Inflow Depth = 2.33" for 25-Year event
Inflow = 0.62 cfs @ 12.15 hrs, Volume= 0.052 af
Outflow = 0.62 cfs @ 12.15 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth = 4.80" for 25-Year event
Inflow = 0.59 cfs @ 12.08 hrs, Volume= 0.045 af
Outflow = 0.60 cfs @ 12.09 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 6.64 hrs, Volume= 0.014 af
Primary = 0.59 cfs @ 12.09 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 109.68' @ 12.09 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 206.2 min (977.0 - 770.8)

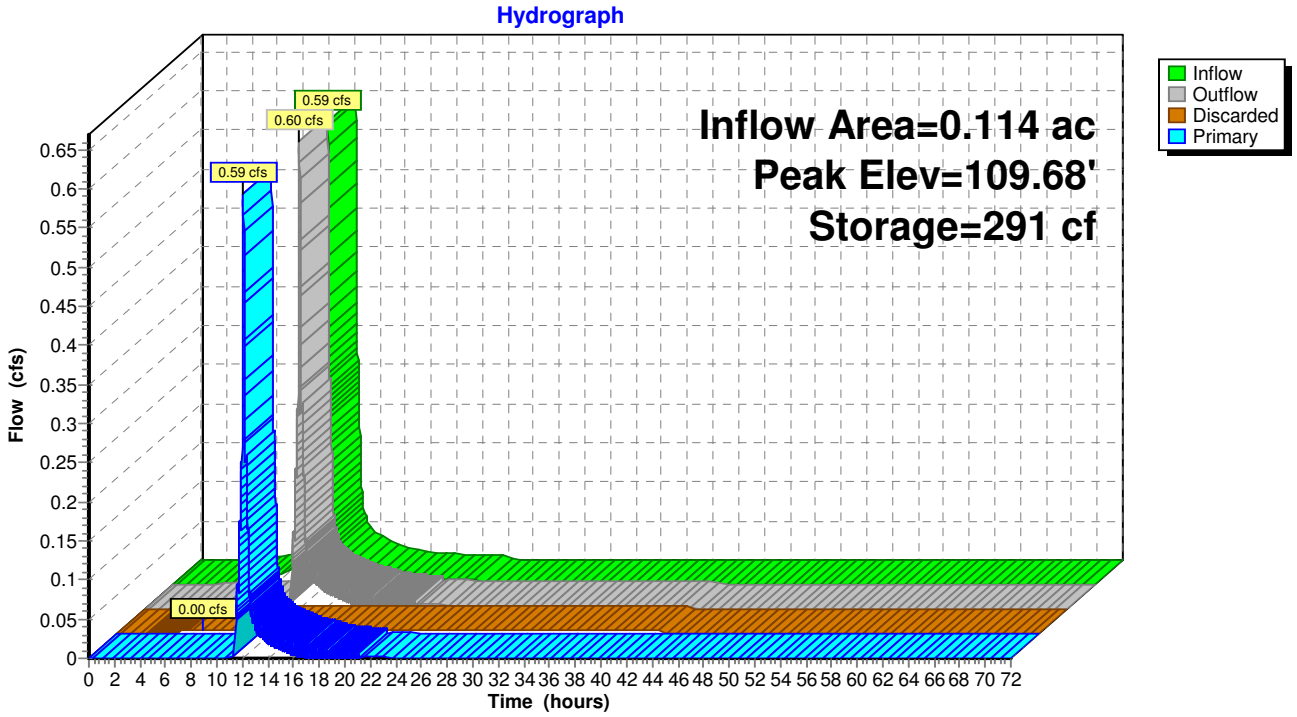
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 6.64 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.59 cfs @ 12.09 hrs HW=109.68' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.59 cfs @ 0.92 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth = 4.69" for 25-Year event
Inflow = 0.45 cfs @ 12.08 hrs, Volume= 0.034 af
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 7.46 hrs, Volume= 0.014 af
Primary = 0.45 cfs @ 12.09 hrs, Volume= 0.020 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.87' @ 12.09 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 271.9 min (1,047.3 - 775.5)

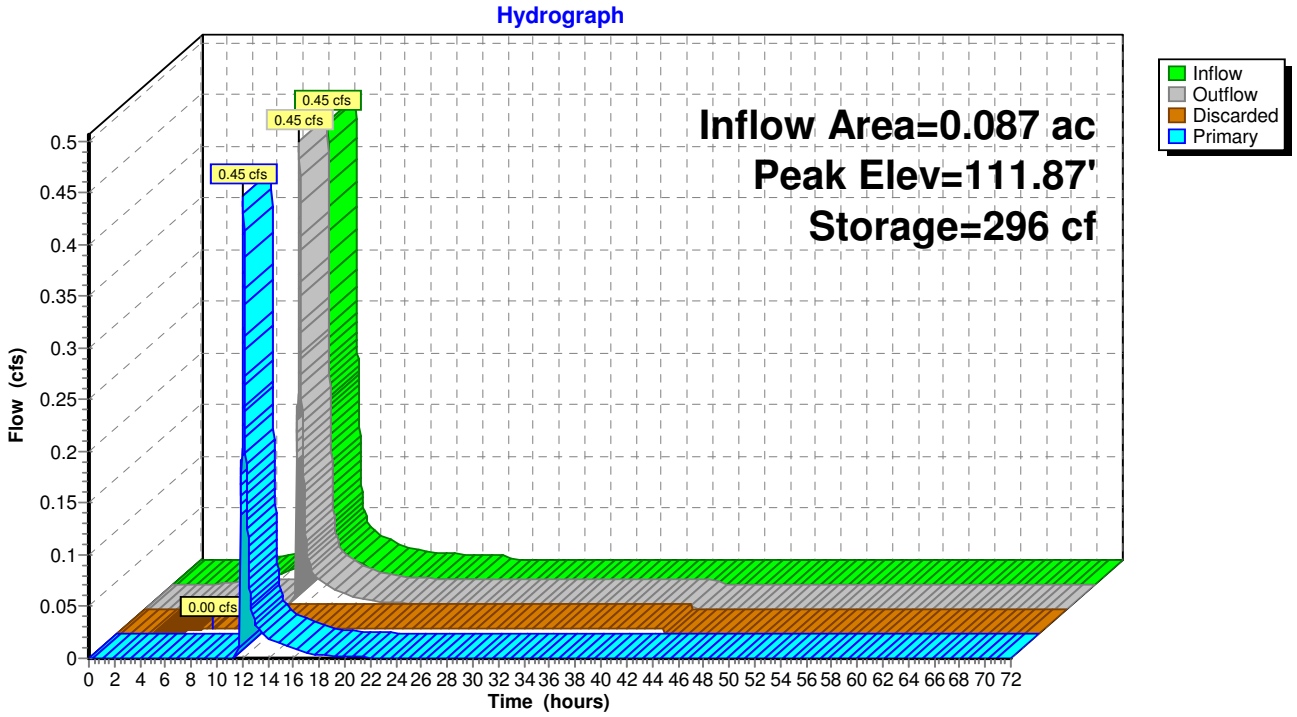
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 7.46 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.45 cfs @ 12.09 hrs HW=111.87' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.45 cfs @ 0.84 fps)

Pond 2P: Existing LCBN



Summary for Pond 3P: Cultec Chambers

Inflow Area = 0.166 ac, 64.62% Impervious, Inflow Depth = 3.83" for 25-Year event
Inflow = 0.68 cfs @ 12.12 hrs, Volume= 0.053 af
Outflow = 0.05 cfs @ 13.50 hrs, Volume= 0.053 af, Atten= 92%, Lag= 82.8 min
Discarded = 0.03 cfs @ 11.01 hrs, Volume= 0.051 af
Primary = 0.03 cfs @ 13.50 hrs, Volume= 0.002 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 114.52' @ 13.50 hrs Surf.Area= 479 sf Storage= 1,181 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 405.9 min (1,212.0 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	109.00'	428 cf	**20.83'W x 23.00'L x 3.54'H Field A** 1,697 cf Overall - 626 cf Embedded = 1,071 cf x 40.0% Voids
#2A	109.50'	626 cf	**Cultec R-330XL** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
#3	112.00'	136 cf	**4.00'D x 2.70'H Vertical Cone/Cylinder** x 4 -Impervious
		1,190 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	114.50'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 11.01 hrs HW=109.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.03 cfs @ 13.50 hrs HW=114.52' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.03 cfs @ 0.41 fps)

Pond 3P: Cultec Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

52.0" Wide + 6.0" Spacing = 58.0" C-C

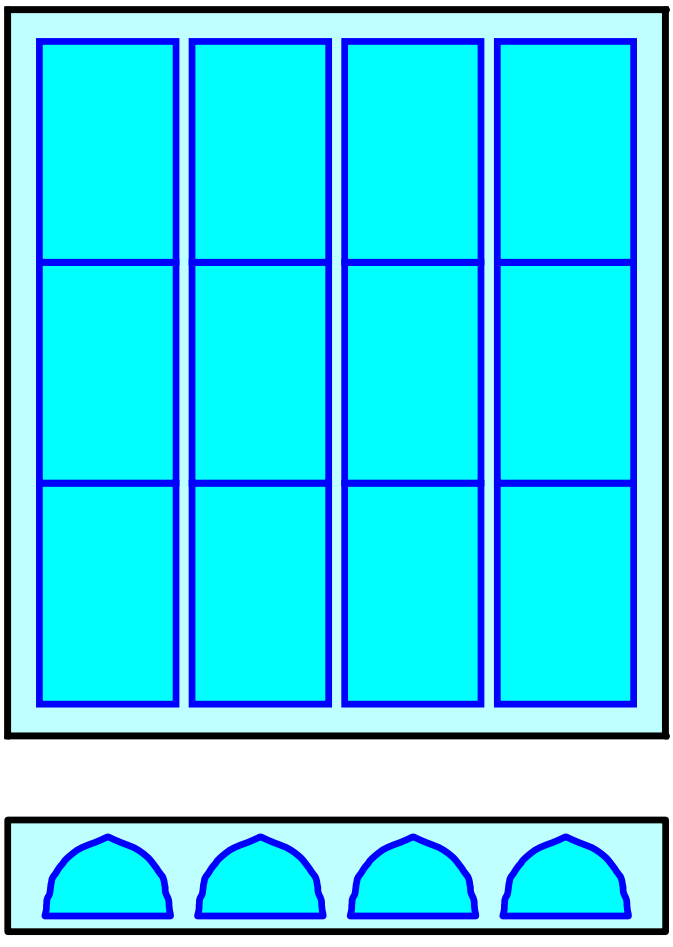
3 Chambers/Row x 7.00' Long = 21.00' + 12.0" End Stone x 2 = 23.00' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf = 625.9 cf Chamber Storage

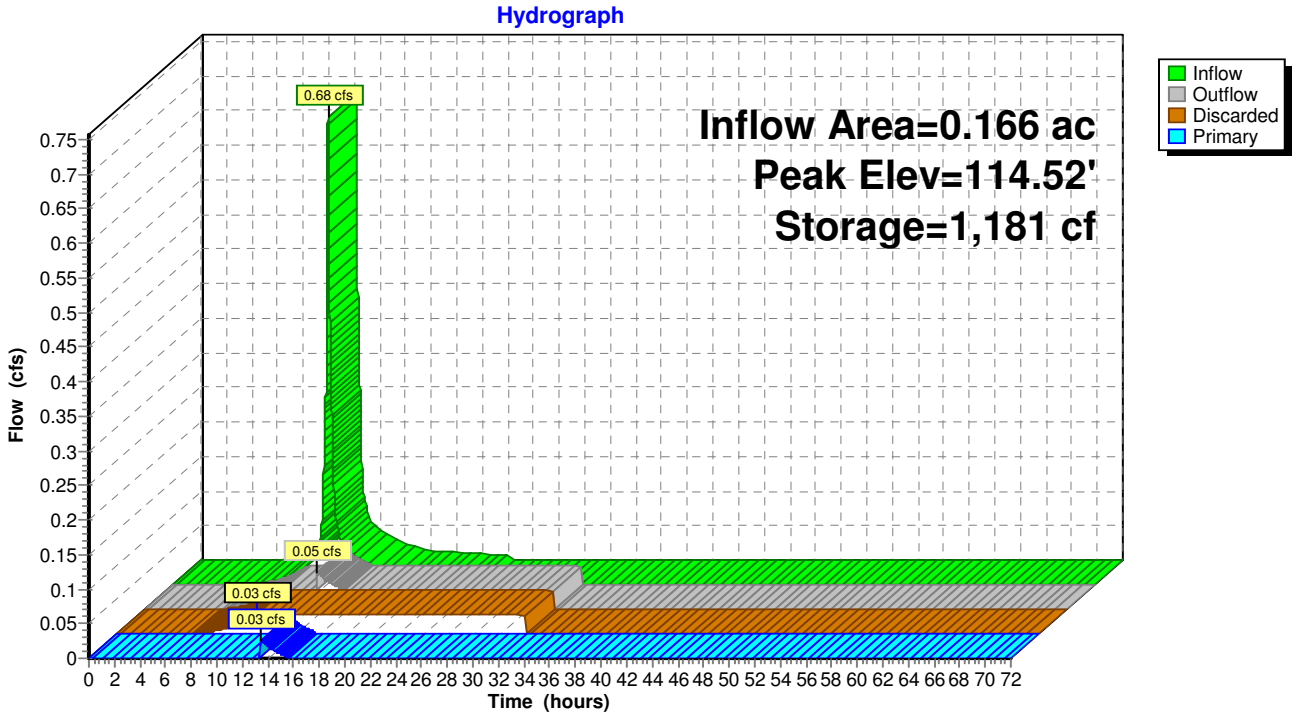
1,697.0 cf Field - 625.9 cf Chambers = 1,071.2 cf Stone x 40.0% Voids = 428.5 cf Stone Storage

Stone + Chamber Storage = 1,054.3 cf = 0.024 af

12 Chambers
62.9 cy Field
39.7 cy Stone



Pond 3P: Cultec Chambers



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment SUB-1A: Runoff Area=15,248 sf 48.50% Impervious Runoff Depth=4.31"
Flow Length=186' Tc=7.5 min CN=79 Runoff=1.67 cfs 0.126 af

Subcatchment SUB-1B: Runoff Area=4,947 sf 89.97% Impervious Runoff Depth=5.99"
Flow Length=114' Slope=0.0400 '/' Tc=6.0 min CN=94 Runoff=0.73 cfs 0.057 af

Subcatchment SUB-1C: Runoff Area=3,798 sf 86.36% Impervious Runoff Depth=5.87"
Flow Length=150' Tc=6.0 min CN=93 Runoff=0.55 cfs 0.043 af

Subcatchment SUB-1D: Runoff Area=7,214 sf 64.62% Impervious Runoff Depth=4.97"
Flow Length=131' Tc=8.4 min CN=85 Runoff=0.87 cfs 0.069 af

Subcatchment SUB-2: Runoff Area=11,609 sf 22.70% Impervious Runoff Depth=3.27"
Flow Length=107' Tc=10.3 min CN=69 Runoff=0.88 cfs 0.073 af

Reach DP-1: Inflow=2.93 cfs 0.211 af
Outflow=2.93 cfs 0.211 af

Reach DP-2: Inflow=0.88 cfs 0.073 af
Outflow=0.88 cfs 0.073 af

Pond 1P: Existing LCBN Peak Elev=109.69' Storage=291 cf Inflow=0.73 cfs 0.057 af
Discarded=0.00 cfs 0.014 af Primary=0.75 cfs 0.042 af Outflow=0.75 cfs 0.057 af

Pond 2P: Existing LCBN Peak Elev=111.88' Storage=296 cf Inflow=0.55 cfs 0.043 af
Discarded=0.00 cfs 0.014 af Primary=0.55 cfs 0.029 af Outflow=0.56 cfs 0.043 af

Pond 3P: Cultec Chambers Peak Elev=114.60' Storage=1,185 cf Inflow=0.87 cfs 0.069 af
Discarded=0.03 cfs 0.055 af Primary=0.46 cfs 0.014 af Outflow=0.48 cfs 0.069 af

Total Runoff Area = 0.983 ac Runoff Volume = 0.366 af Average Runoff Depth = 4.47"
47.63% Pervious = 0.468 ac 52.37% Impervious = 0.515 ac

Summary for Subcatchment SUB-1A:

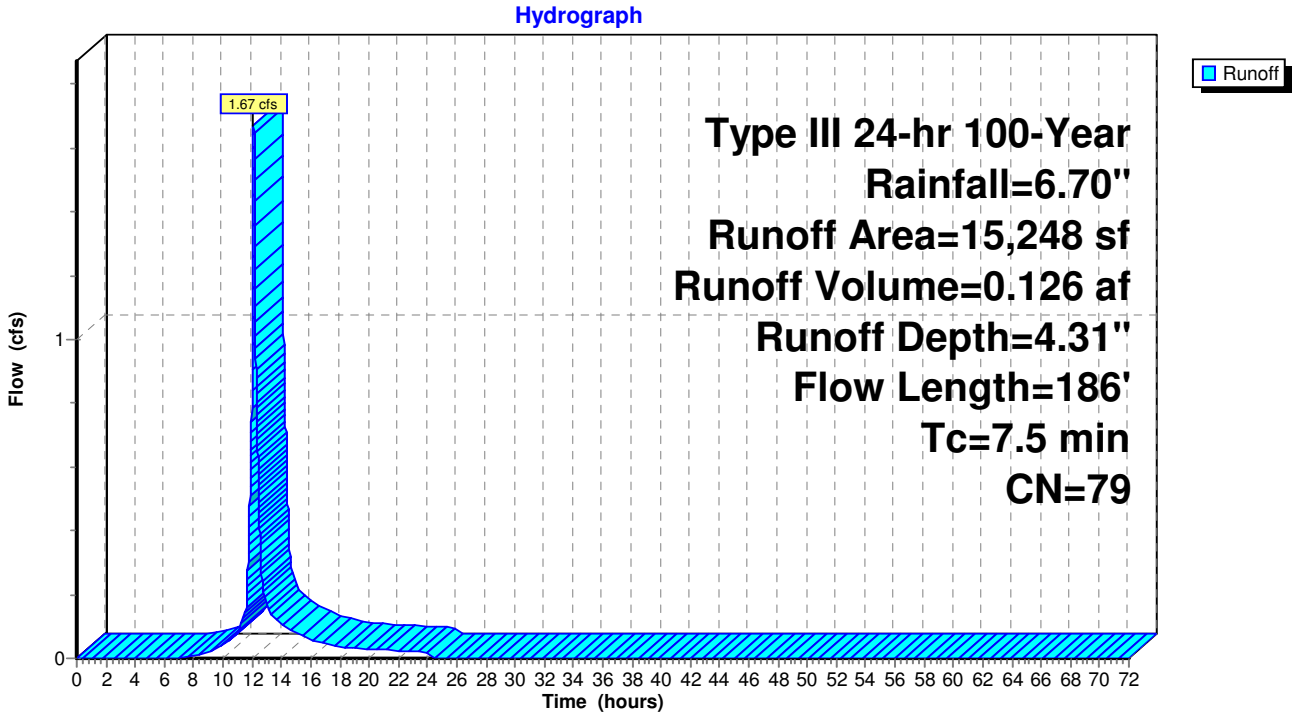
Runoff = 1.67 cfs @ 12.11 hrs, Volume= 0.126 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	4,273	98	Roof
*	2,233	98	Pavement
	7,852	61	>75% Grass cover, Good, HSG B
*	890	98	Walkways, Retaining Walls
	15,248	79	Weighted Average
	7,852		51.50% Pervious Area
	7,396		48.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0300	0.12		**Sheet Flow, 0-50** Grass: Dense n= 0.240 P2= 3.20"
0.0	10	0.0600	3.94		**Shallow Concentrated Flow, 50-60** Unpaved Kv= 16.1 fps
0.1	17	0.0100	2.03		**Shallow Concentrated Flow, 60-77** Paved Kv= 20.3 fps
0.4	109	0.0800	4.55		**Shallow Concentrated Flow, 77-189** Unpaved Kv= 16.1 fps
7.5	186	Total			

Subcatchment SUB-1A:



Summary for Subcatchment SUB-1B:

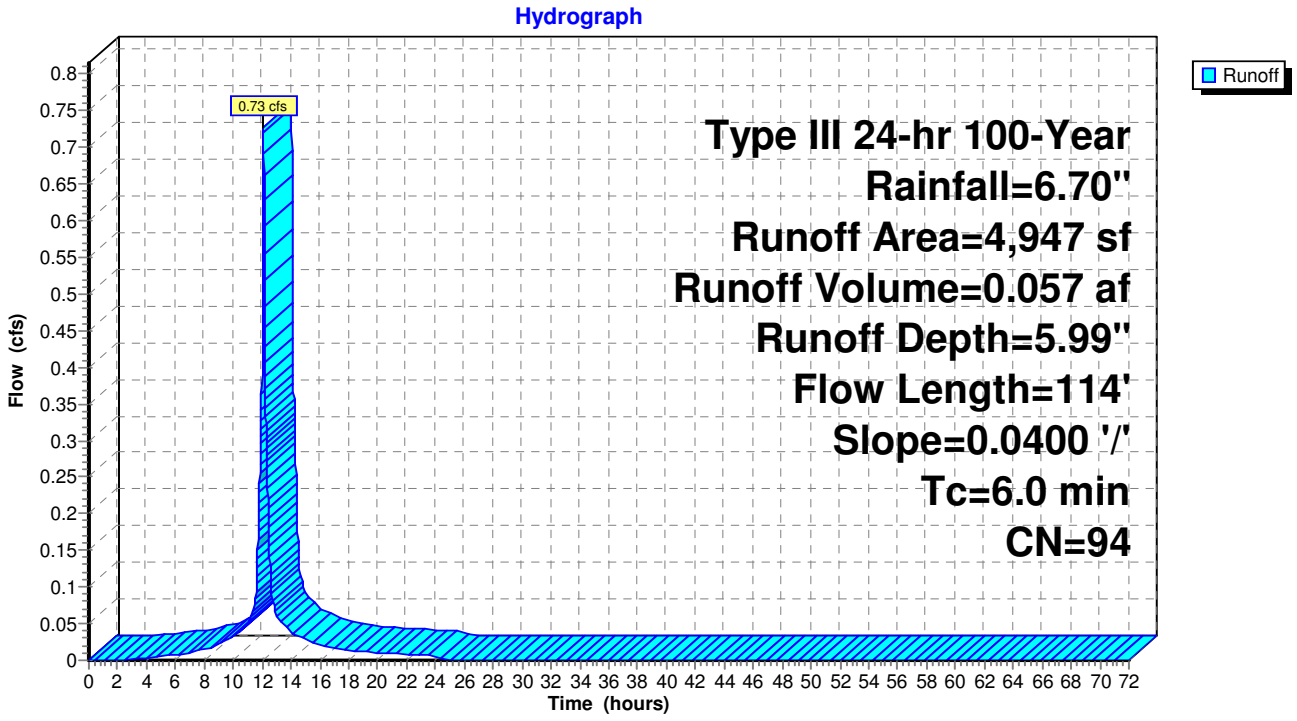
Runoff = 0.73 cfs @ 12.08 hrs, Volume= 0.057 af, Depth= 5.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	4,451	98	Pavement
	496	61	>75% Grass cover, Good, HSG B
	4,947	94	Weighted Average
	496		10.03% Pervious Area
	4,451		89.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.3	64	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2					**Direct Entry,**
6.0	114	Total			

Subcatchment SUB-1B:



Summary for Subcatchment SUB-1C:

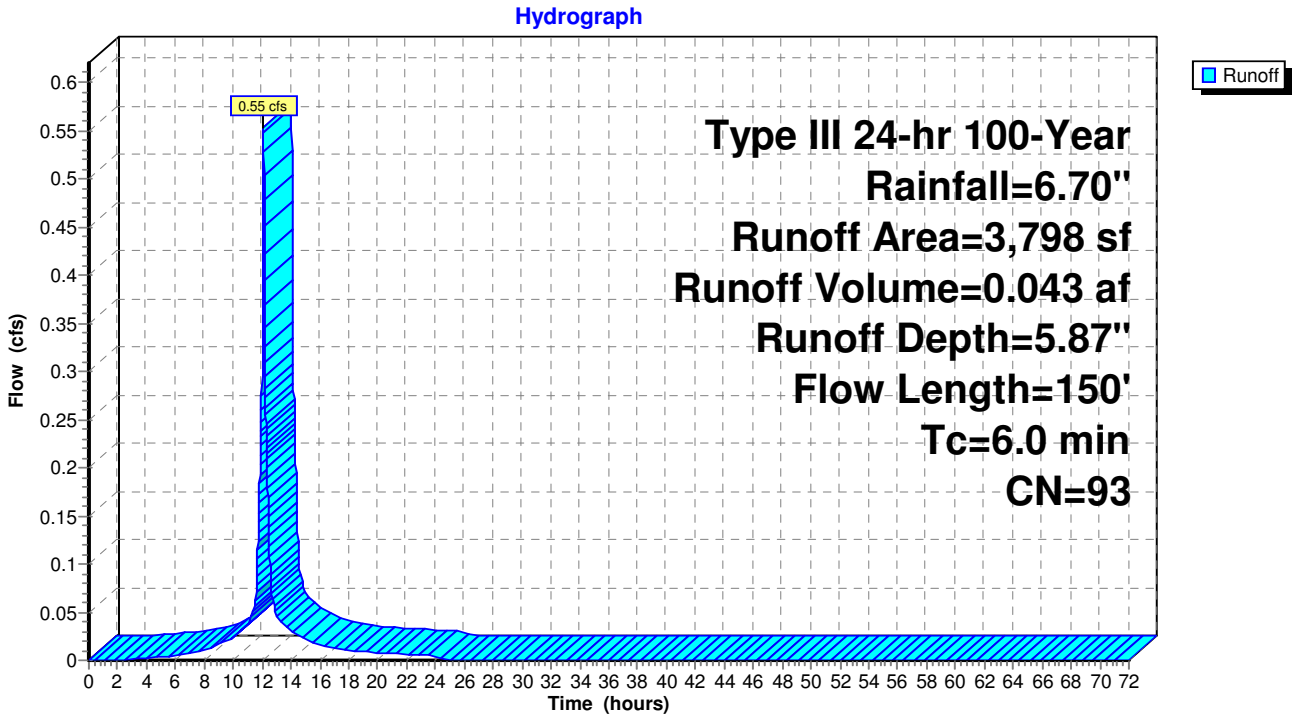
Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.043 af, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	518	61	>75% Grass cover, Good, HSG B
*	3,280	98	Pavement
	3,798	93	Weighted Average
	518		13.64% Pervious Area
	3,280		86.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		**Sheet Flow, 0-50** Smooth surfaces n= 0.011 P2= 3.20"
0.4	100	0.0500	4.54		**Shallow Concentrated Flow, 50-150** Paved Kv= 20.3 fps
5.1					**Direct Entry, Direct**
6.0	150	Total			

Subcatchment SUB-1C:



Summary for Subcatchment SUB-1D:

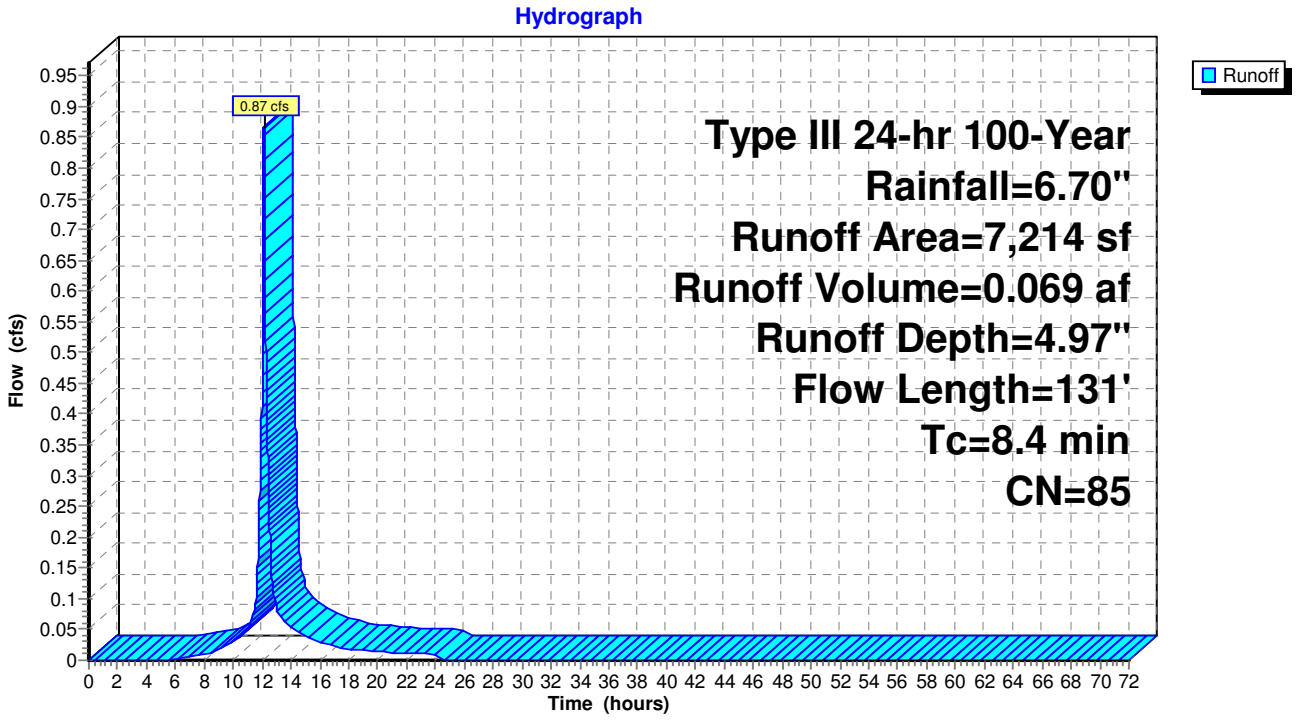
Runoff = 0.87 cfs @ 12.12 hrs, Volume= 0.069 af, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	4,662	98	Pavement
	1,859	60	Woods, Fair, HSG B
	693	61	>75% Grass cover, Good, HSG B
	7,214	85	Weighted Average
	2,552		35.38% Pervious Area
	4,662		64.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	81	0.0200	2.87		**Shallow Concentrated Flow, 50-145** Paved Kv= 20.3 fps
8.4	131	Total			

Subcatchment SUB-1D:



Summary for Subcatchment SUB-2:

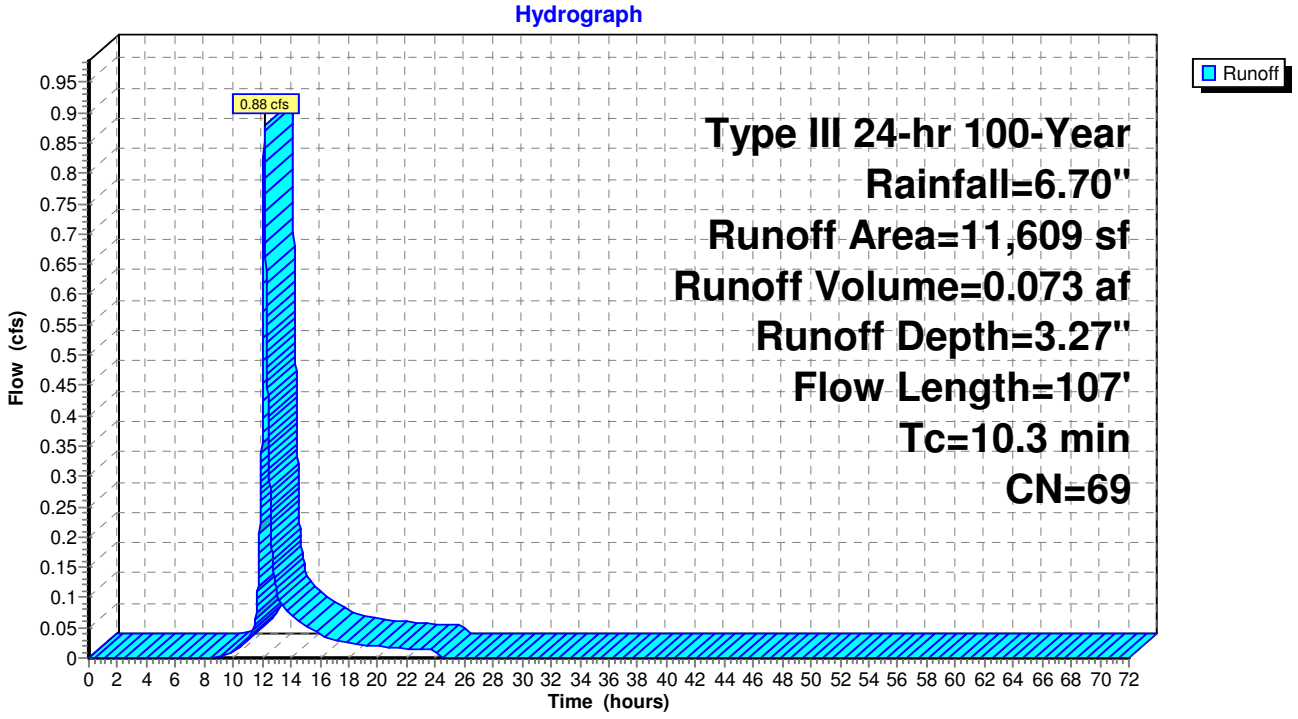
Runoff = 0.88 cfs @ 12.15 hrs, Volume= 0.073 af, Depth= 3.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	776	98	Roof
*	1,576	98	Pavement
	4,077	60	Woods, Fair, HSG B
	4,897	61	>75% Grass cover, Good, HSG B
*	283	98	Walkways/Retaining Walls
	11,609	69	Weighted Average
	8,974		77.30% Pervious Area
	2,635		22.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, 0-50** Woods: Light underbrush n= 0.400 P2= 3.20"
1.0	57	0.0350	0.94		**Shallow Concentrated Flow, 50-107** Woodland Kv= 5.0 fps
10.3	107	Total			

Subcatchment SUB-2:

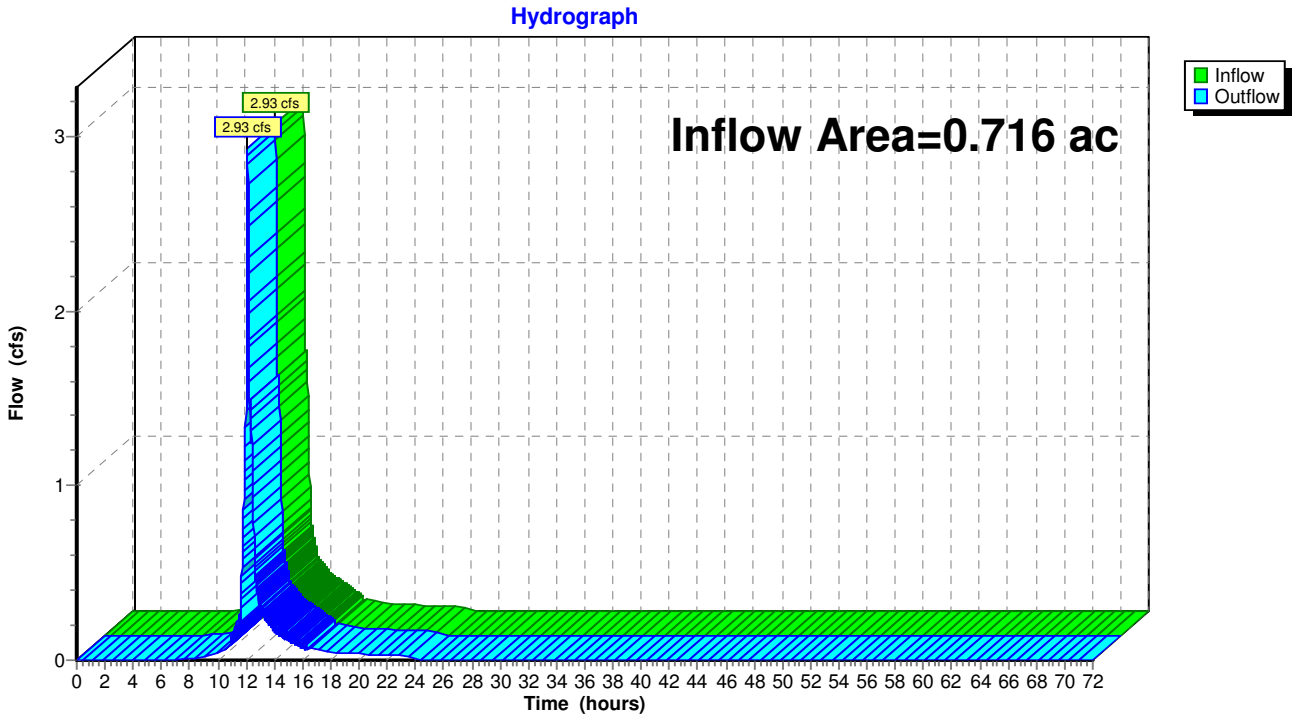


Summary for Reach DP-1:

Inflow Area = 0.716 ac, 63.41% Impervious, Inflow Depth = 3.53" for 100-Year event
Inflow = 2.93 cfs @ 12.09 hrs, Volume= 0.211 af
Outflow = 2.93 cfs @ 12.09 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-1:

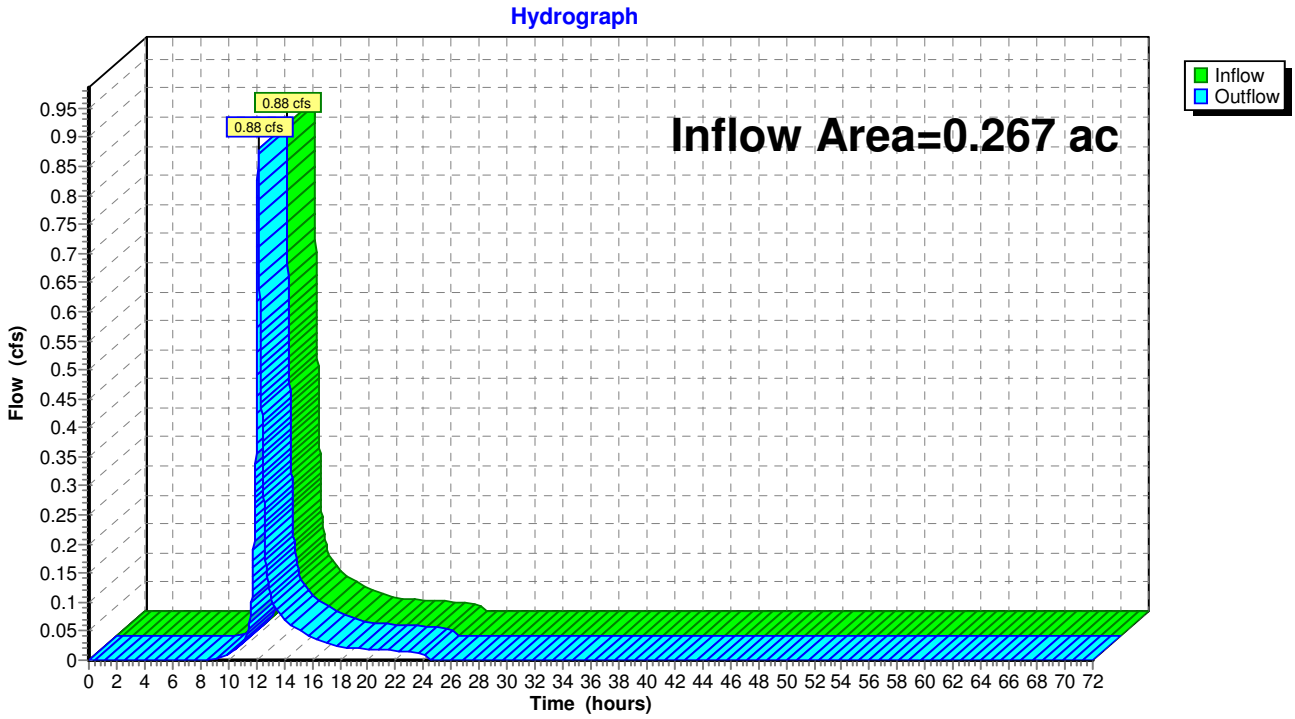


Summary for Reach DP-2:

Inflow Area = 0.267 ac, 22.70% Impervious, Inflow Depth = 3.27" for 100-Year event
Inflow = 0.88 cfs @ 12.15 hrs, Volume= 0.073 af
Outflow = 0.88 cfs @ 12.15 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Reach DP-2:



Summary for Pond 1P: Existing LCBN

Inflow Area = 0.114 ac, 89.97% Impervious, Inflow Depth = 5.99" for 100-Year event
Inflow = 0.73 cfs @ 12.08 hrs, Volume= 0.057 af
Outflow = 0.75 cfs @ 12.09 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.00 cfs @ 5.55 hrs, Volume= 0.014 af
Primary = 0.75 cfs @ 12.09 hrs, Volume= 0.042 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 109.69' @ 12.09 hrs Surf.Area= 79 sf Storage= 291 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 170.7 min (936.4 - 765.7)

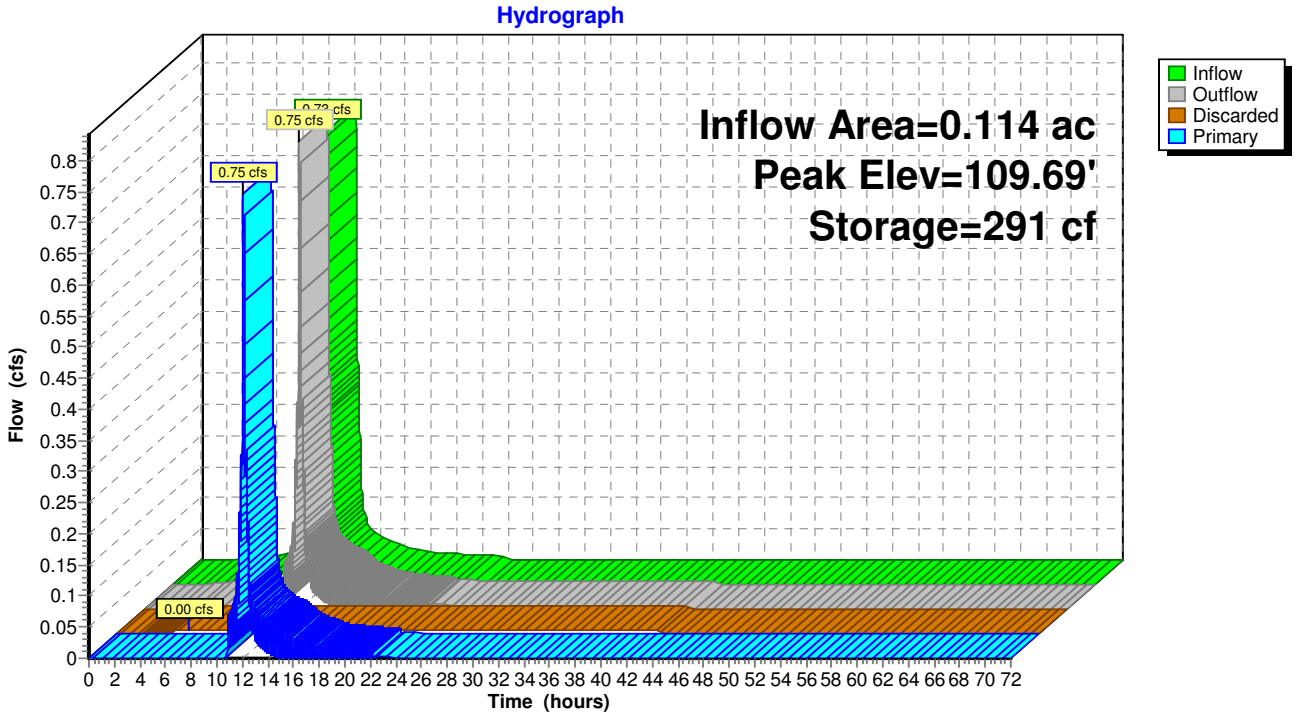
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	101.10'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	103.10'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.10'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	109.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 5.55 hrs HW=101.21' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.74 cfs @ 12.09 hrs HW=109.69' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.74 cfs @ 1.00 fps)

Pond 1P: Existing LCBN



Summary for Pond 2P: Existing LCBN

Inflow Area = 0.087 ac, 86.36% Impervious, Inflow Depth = 5.87" for 100-Year event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 0.043 af
Outflow = 0.56 cfs @ 12.08 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 6.65 hrs, Volume= 0.014 af
Primary = 0.55 cfs @ 12.08 hrs, Volume= 0.029 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.88' @ 12.08 hrs Surf.Area= 79 sf Storage= 296 cf

Plug-Flow detention time= 222.9 min calculated for 0.043 af (100% of inflow)
Center-of-Mass det. time= 223.1 min (993.0 - 770.0)

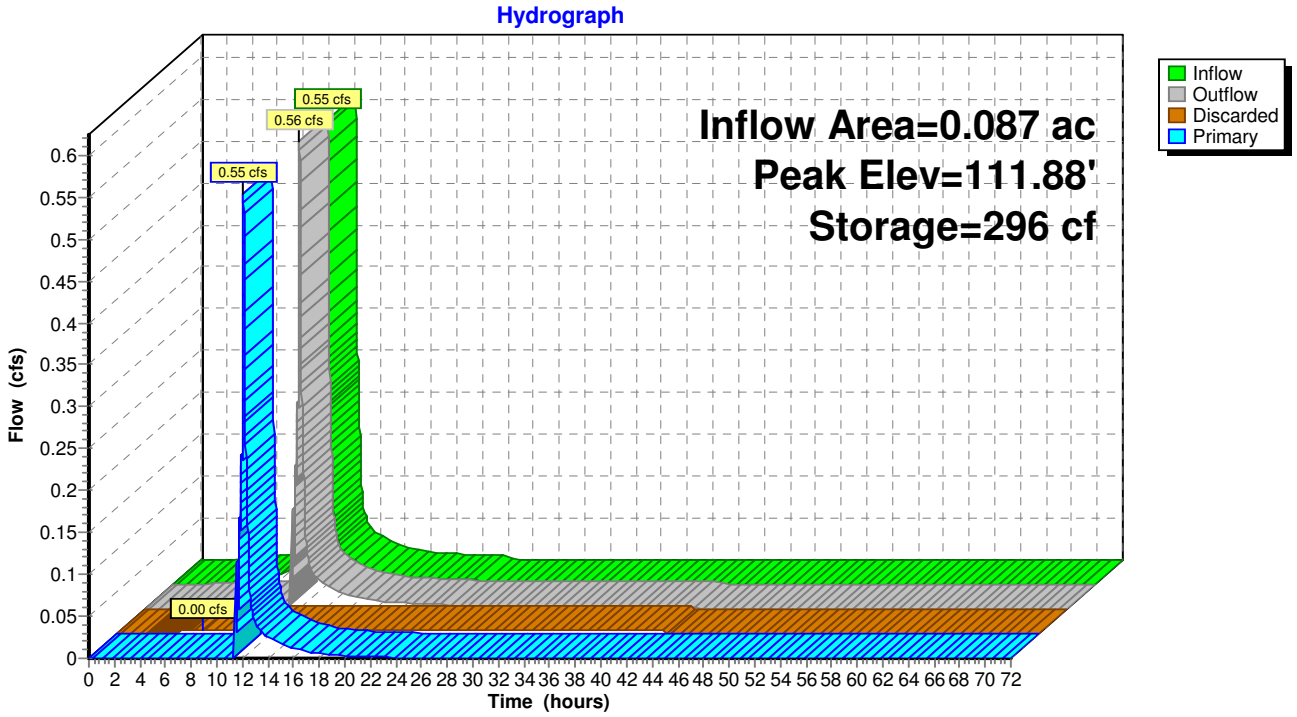
Volume	Invert	Avail.Storage	Storage Description
#1	110.30'	5 cf	**2.00'D x 1.70'H Grate** -Impervious
#2	103.30'	150 cf	**10.00'D x 7.00'H Stone** 550 cf Overall - 175 cf Embedded = 375 cf x 40.0% Voids
#3	105.30'	141 cf	**6.00'D x 5.00'H Leaching CB** Inside #2 175 cf Overall - 4.0" Wall Thickness = 141 cf
		297 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.30'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	111.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 6.65 hrs HW=103.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.55 cfs @ 12.08 hrs HW=111.88' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.55 cfs @ 0.90 fps)

Pond 2P: Existing LCBN



Summary for Pond 3P: Cultec Chambers

Inflow Area = 0.166 ac, 64.62% Impervious, Inflow Depth = 4.97" for 100-Year event
Inflow = 0.87 cfs @ 12.12 hrs, Volume= 0.069 af
Outflow = 0.48 cfs @ 12.34 hrs, Volume= 0.069 af, Atten= 44%, Lag= 13.6 min
Discarded = 0.03 cfs @ 10.44 hrs, Volume= 0.055 af
Primary = 0.46 cfs @ 12.34 hrs, Volume= 0.014 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 114.60' @ 12.34 hrs Surf.Area= 479 sf Storage= 1,185 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 342.7 min (1,141.5 - 798.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	109.00'	428 cf	**20.83'W x 23.00'L x 3.54'H Field A** 1,697 cf Overall - 626 cf Embedded = 1,071 cf x 40.0% Voids
#2A	109.50'	626 cf	**Cultec R-330XL** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
#3	112.00'	136 cf	**4.00'D x 2.70'H Vertical Cone/Cylinder** x 4 -Impervious
		1,190 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	109.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	114.50'	**4.0" Horiz. Orifice/Grate X 4.00** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 10.44 hrs HW=109.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.40 cfs @ 12.34 hrs HW=114.59' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 0.40 cfs @ 1.01 fps)

Pond 3P: Cultec Chambers - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

52.0" Wide + 6.0" Spacing = 58.0" C-C

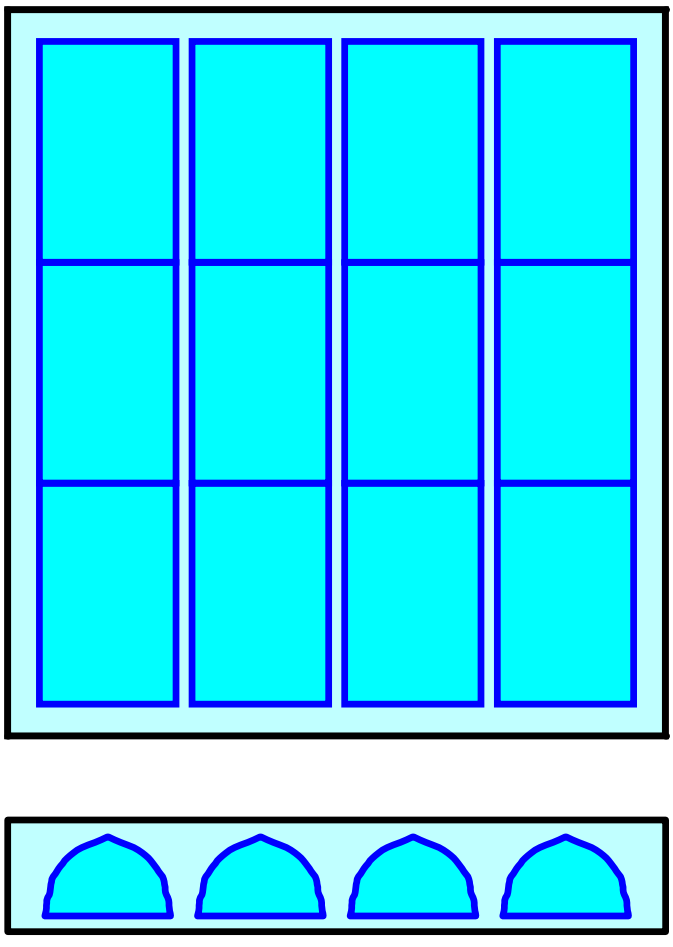
3 Chambers/Row x 7.00' Long = 21.00' + 12.0" End Stone x 2 = 23.00' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf = 625.9 cf Chamber Storage

1,697.0 cf Field - 625.9 cf Chambers = 1,071.2 cf Stone x 40.0% Voids = 428.5 cf Stone Storage

Stone + Chamber Storage = 1,054.3 cf = 0.024 af

12 Chambers
62.9 cy Field
39.7 cy Stone



Pond 3P: Cultec Chambers