CARMINA WOOD
DESIGN

ENGINEER'S REPORT

for

Legacy Village Senior Housing

3900 Maple Road
Town of Amherst, Erie County, New York

Prepared for

Southern Tier Living Environments, Inc. - STEL

175 Central Avenue
Dunkirk, NY 14043

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September 2025

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Section 1 - Location & Description

This project is a redevelopment of the 2.25 acre northeast portion of the site located at 3900 Maple Road in the Town of Amherst. Construction will consist of a four story, 81-unit senior housing building to include associated utility, lighting, and landscaping improvements. Currently the site is developed consisting of a building pad site with associated parking lot and utility infrastructure. The proposed site development area to be disturbed for this project is approximately 1.7 acres when construction is completed.

Section 2 - Water Service

Water service for the building will be tapped off the existing 8" ECWA water main on the north side of Meyer Road. The service will be a 6" Class 52 DI combined water service, then split into a 6" fire service and a 4" domestic service at the ROW line. Both services will continue into an internal mechanical room where the 4" domestic service will have a meter and RPZ and the 6" fire service will have a RPDA. Proper heat and lighting will be provided to the enclosure, drainage due to testing or failure of the RPZ will be to the outside grade. The owner will be responsible for keeping the drainage ports clear of snow and debris. Water inside the building will be used for typical domestic uses.

The proposed senior housing building is to be sprinklered, interior fire protection system to be designed by others. Existing public hydrants along Meyer Road will ensure fire hose coverage not exceeding 600' for the building.

Domestic Summary:	
Peak Operating Demand:	26.62 gpm
Water Main:	8" on Meyer Road
Static Pressure:	98 psi (ECWA)
Friction Loss:	0.0 psi
Loss through meter/RPZ:	13.0 psi
Elevation Loss:	0.0 psi
Pressure after RPZ:	85.0 psi

Repairs to all devices will be made during off hours, dual backflow preventers are not required. The site is not located in a 100-year flood plain. Disinfection of the water service following installation will be continuous feed, according to AWWA C-651, latest revision.

Section 3 - Sanitary Sewer Service

An existing 8" public sanitary sewer main which bisects the project site north of the proposed mixed-use building that will be utilized for this project. A new 6" SDR-35 PVC private sanitary sewer lateral @ 1.0% will be installed and connected to this existing sewer.

Design Parameters

1-bedroom unit:	110 gal/day/units x 74 units = 8,140 gpd
2-bedroom unit:	220 gal/day/units x 7 units = 1,540 gpd
	Total = 9,680 gpd

9,680 gpd * 4.25 = 41,115 gpd *use peaking factor of 4.25

The hydraulic loading rate is per "Design Standards for Intermediate Sized Wastewater Treatment Systems" 2014, NYSDEC.

Section 4 - Storm Sewer Service

The existing site currently sheet drains in multiple directions, the southern area in front of the Premier building drains centrally towards and existing underground detention system. This system outlets north to another underground detention system which the northern area of the site drainsg to as well. This system outlets to the Meyer Road storm sewer system via a water quality treatment unit previously installed.

The proposed onsite storm sewer system for the northern area where the proposed redevelopment is located consists of smooth interior HDPE pipes connected by a series of catch basins and yard drains and a bioretention area incorporated with two underground detention basins both to outlet through the existing water quality treatment unit. Stormwater runoff will be collected on site by the structure and pipe network that will drain to the detention basin controlled by the proposed drainage well. The bioretention area located on site is designed to provide 100% of the required Runoff Reduction volume (RRv) for the site. The soils in the vicinity of the bioretention areas are mainly USDA hydrologic group 'D' and therefore the system will be installed with underdrains per NYSDEC requirements. The bioretention area will consist of 6" perforated HDPE underdrains in 8" of drainage gravel, followed by filter fabric and then finally 18" minimum of planting soil.

Chapter 9 of the NYSDEC Stormwater Management Design Manual details design requirements for redevelopment projects, which this project is categorized as. Runoff reduction, water quality and quantity control is not required for the currently developed areas, but the above are required for the areas of the site that are currently undeveloped. Runoff reduction, water quality and volume attenuation for the undeveloped areas are designed in accordance with Chapter 4 of the manual. A bioretention area will be provided as a "green infrastructure" practice to provide runoff reduction and water quality to meet the Chapter 4 requirements for the currently undeveloped areas. Runoff from the site was looked at as a whole for the calculation of volume attenuation requirements. The existing site has a total of 1.45 acres of impervious cover. The amount of impervious cover post development is 1.70 acres, an increase of 0.25 acres in impervious area.

Town of Amherst Requirement:
The Town of Amherst requires that the 25-year proposed storm event be attenuated with detention and that the outlet flowrate be restricted to the 10-year existing storm event. This volume of 6,589 cf is accommodated in the detention basin #1 at elevation 581.94 and 5,652 cf is accommodated in the detention basin #2 at elevation 581.26. At this elevation, the outlet discharge will be restricted to 6.30 cfs, which is less than the existing 10-year peak runoff outflow of 6.80 cfs of the project area which drains to the proposed detention area.

Bioretention: 100% of minimum post-development Runoff Reduction volume (RRv) & Water Quality Volume Treatment (WQv)
Area: 900 sf (total)
Bottom Elevation: 584.00

Detention: Comparison of the existing 1-year vs. the proposed 1-year runoff
Comparison of the existing 10-year vs. the proposed 10-year runoff
Comparison of the existing 10-year vs. the proposed 25-year runoff
Comparison of the existing 100-year vs. the proposed 100-year runoff

Runoff Summary:

Event	Ex. Runoff (cfs)	Pro. Runoff (cfs)	Result (cfs)
1-year	3.74	3.03	-0.71
10-year	6.80	5.22	-1.58
25-year	8.33	6.30	-2.03
100-year	11.26	8.26	-2.99

Appendix A

Sanitary Sewer and Water Demand Calculations

CARMINA WOOD DESIGN
80 SILO CITY ROW, SUITE 100
BUFFALO, NEW YORK, 14203
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Project No.: 25-4116 Date: 9/22/2025
Project Name: Legacy Village Senior Housing
Project Address: 3900 Maple Road Amherst, NY
Subject: Sanitary Sewer & Water Demand Calcs

Sanitary Sewage Demand Calculations:

110	gal/d/unit	x	74	unit	=	8,140	gpd	*use 110 gallons per unit per day (1 bdrm)
220	gal/d/unit	x	7	unit	=	1,540	gpd	*use 220 gallons per unit per day (2 bdrm)

Total Site Sanitary Demand: = 9,680 gpd

Find Peak Sanitary Demand:

Peaking Factor based on Population:

Total demand: 9,680 gpd / 100 gpcd = 97 per capita

Population (P) = 97 people

Peaking Factor : (18 +√P) / (4 + √P) where P is in thousands

Peaking Factor = 4.25

Peak Sanitary Demand = 9,680 x 4.25 = 41,115 gpd
= 0.041 MGD
= 0.064 cfs

Required Infiltration and Inflow Mitigation:

Peak Sanitary Flow = 41,115 gpd = 28.55 gpm

4:1 offset flow per NYSDEC requirements = 28.55 x 4 = 114.21 gpm req'd

Mitigation Credit = $250 / gpm

Mitigation Agreement Amount = $28,552.04

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Sheet: 2 of 2

Water Demand Calculations (domestic):

Proposed Mixed Use

9,680 gpd x 1.1 = 10,648 gpd *use 110% of sewage demand

*use 1.8 peaking factor and assume a 12 hour day

10,648 gpm x 1day/12hr x 1hr/60min = 14.79 gpm

14.79 gpm x 3.0 = 26.62 gpm Q_{peak} *use peaking factor 3 per ECDOH standards

Headlosses:

Q_{peak} = 26.62 gpm
Pipe = 6 inch Ductile Iron C = 140
Length = 120 LF (approx. distance from tap to RPZ)

$$H_L = \frac{10.44\ L\ Q^{1.85}}{C^{1.85}\ D^{4.866}} = \frac{10.44(120)(26.62)^{1.85}}{(140)^{1.85}\ (6)^{4.866}} = 0.01 \text{ ft} = 0.00 \text{ psi}$$

Δ elev = 0 ft = 0.00 psi
Loss through meter = 1 psi
Loss through RPZ = 12 psi
Total Losses = 13.0 psi
Static Pressure = 98 psi (per ECWA)
Residual Pressure Following RPZ = 98 - 13.0 = 85.0 psi (available after rpz & meter)

Residual Pressure 30" above 4th Floor
Δ elev = 44 ft = 19.05 psi
Residual Pressure 30" above 4th Floor = 65.9 psi

Appendix B

Storm Sewer System Drainage Calculations

Existing Runoff

Events for Pond 1P: Det. System B

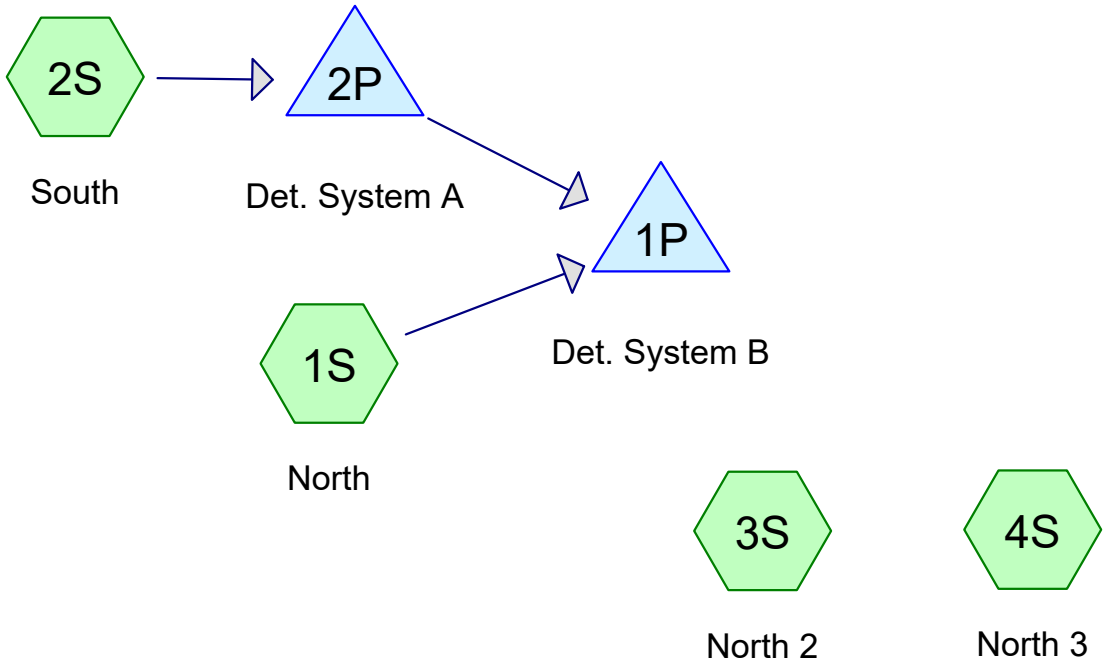
Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
1-Year	4.43	1.51	580.37	3,516
2-Year	5.62	1.81	580.60	4,604
5-Year	7.31	2.22	580.90	6,192
10-Year	8.83	2.53	581.18	7,699
25-Year	11.20	2.95	581.61	10,130
50-Year	13.35	3.30	582.02	12,422
100-Year	**15.87**	**3.70**	**582.55**	**15,157**

Events for Subcatchment 3S: North 2

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
1-Year	1.87	1.06	1,954	1.20
2-Year	2.20	1.32	2,449	1.50
5-Year	2.69	1.69	3,200	1.96
10-Year	3.14	2.03	3,901	2.39
25-Year	3.84	2.56	5,006	3.06
50-Year	4.48	3.04	6,025	3.69
100-Year	**5.23**	**3.60**	**7,226**	**4.42**

Events for Subcatchment 4S: North 3

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
1-Year	1.87	1.17	2,171	1.20
2-Year	2.20	1.45	2,721	1.50
5-Year	2.69	1.86	3,555	1.96
10-Year	3.14	2.24	4,335	2.39
25-Year	3.84	2.82	5,562	3.06
50-Year	4.48	3.35	6,694	3.69
100-Year	**5.23**	**3.96**	**8,029**	**4.42**



Subcat Reach Pond Link

Routing Diagram for 25-4116 existing
Prepared by Carmina Wood Design, Printed 9/21/2025

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type II 24-hr		Default	24.00	1	1.87	2
2	10-Year	Type II 24-hr		Default	24.00	1	3.14	2
3	25-Year	Type II 24-hr		Default	24.00	1	3.84	2
4	100-Year	Type II 24-hr		Default	24.00	1	5.23	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
39,204	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S, 4S)
132,858	98	Paved parking, HSG D (1S, 2S, 3S, 4S)
172,062	**94**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
172,062	HSG D	1S, 2S, 3S, 4S
0	Other	
172,062		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	0	0	39,204	0	39,204	>75% Grass cover, Good	
0	0	0	132,858	0	132,858	Paved parking	
0	**0**	**0**	**172,062**	**0**	**172,062**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	435.0	0.0020	0.013	0.0	24.0	0.0
2	1P	579.28	579.15	52.0	0.0025	0.013	0.0	10.0	0.0
3	2P	580.56	580.39	85.0	0.0020	0.013	0.0	24.0	0.0

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=1.300 ac 59.23% Impervious Runoff Depth=1.05"
Flow Length=510' Tc=3.5 min CN=91 Runoff=2.65 cfs 4,958 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=1.54"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=4.99 cfs 9,528 cf

Subcatchment3S: North 2 Runoff Area=0.450 ac 73.33% Impervious Runoff Depth=1.20"
Flow Length=55' Slope=0.0250 '/' Tc=2.3 min CN=93 Runoff=1.06 cfs 1,954 cf

Subcatchment4S: North 3 Runoff Area=0.500 ac 70.00% Impervious Runoff Depth=1.20"
Flow Length=60' Slope=0.0200 '/' Tc=2.6 min CN=93 Runoff=1.17 cfs 2,171 cf

Pond 1P: Det. System B Peak Elev=580.37' Storage=3,516 cf Inflow=4.43 cfs 14,455 cf
10.0" Round Culvert n=0.013 L=52.0' S=0.0025 '/' Outflow=1.51 cfs 14,390 cf

Pond 2P: Det. System A Peak Elev=581.32' Storage=3,915 cf Inflow=4.99 cfs 9,528 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=1.91 cfs 9,496 cf

Total Runoff Area = 172,062 sf Runoff Volume = 18,611 cf Average Runoff Depth = 1.30"
22.78% Pervious = 39,204 sf 77.22% Impervious = 132,858 sf

Summary for Subcatchment 1S: North

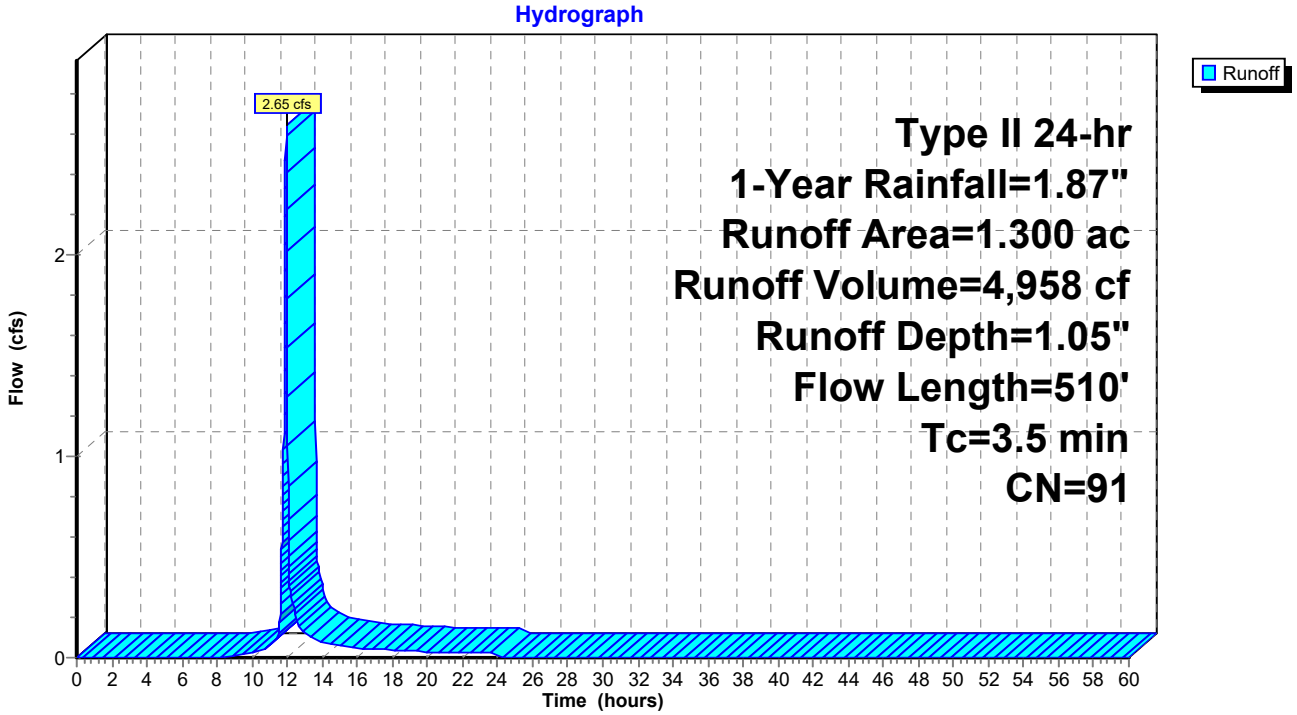
Runoff = 2.65 cfs @ 11.94 hrs, Volume= 4,958 cf, Depth= 1.05"
Routed to Pond 1P : Det. System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.87"

Area (ac)	CN	Description
0.770	98	Paved parking, HSG D
0.530	80	>75% Grass cover, Good, HSG D
1.300	91	Weighted Average
0.530		40.77% Pervious Area
0.770		59.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	75	0.0150	1.02		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
2.3	435	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
3.5	510	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

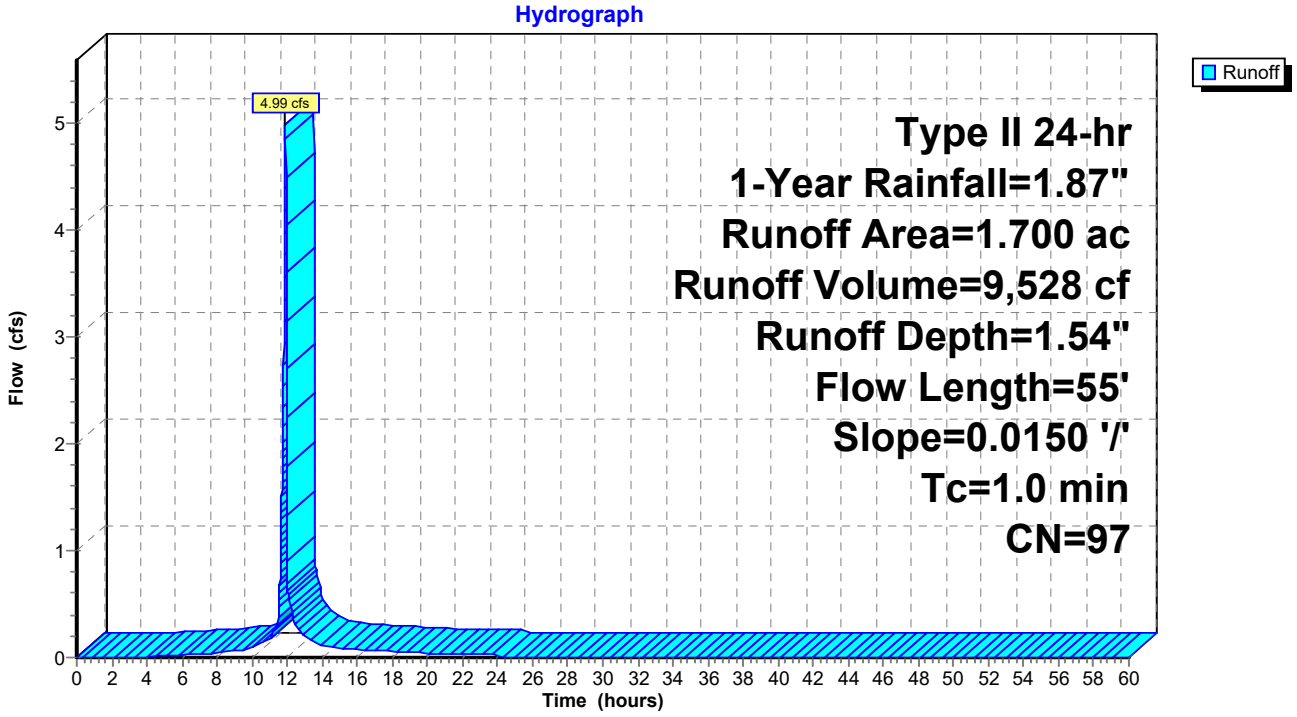
Runoff = 4.99 cfs @ 11.91 hrs, Volume= 9,528 cf, Depth= 1.54"
Routed to Pond 2P : Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.87"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

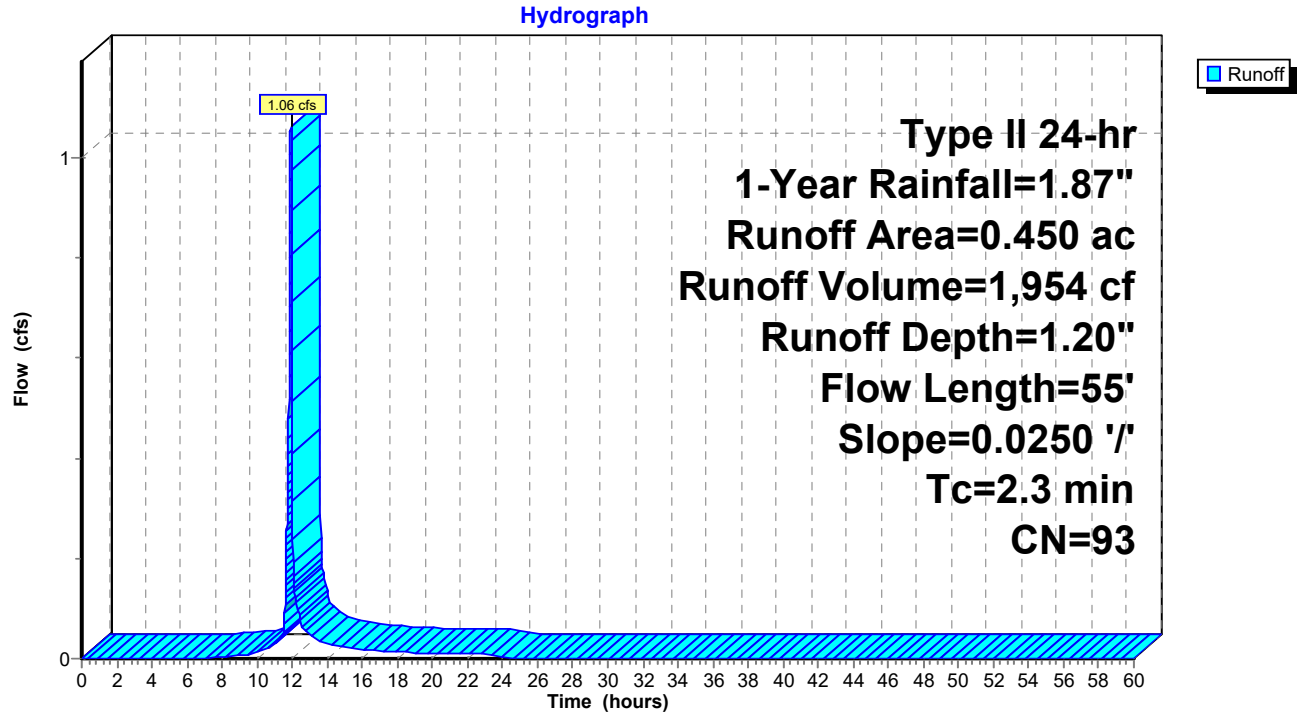
Runoff = 1.06 cfs @ 11.93 hrs, Volume= 1,954 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.87"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG D
0.120	80	>75% Grass cover, Good, HSG D
0.450	93	Weighted Average
0.120		26.67% Pervious Area
0.330		73.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0250	1.13		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.6	10	0.0250	0.10		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.3	55	Total			

Subcatchment 3S: North 2



Summary for Subcatchment 4S: North 3

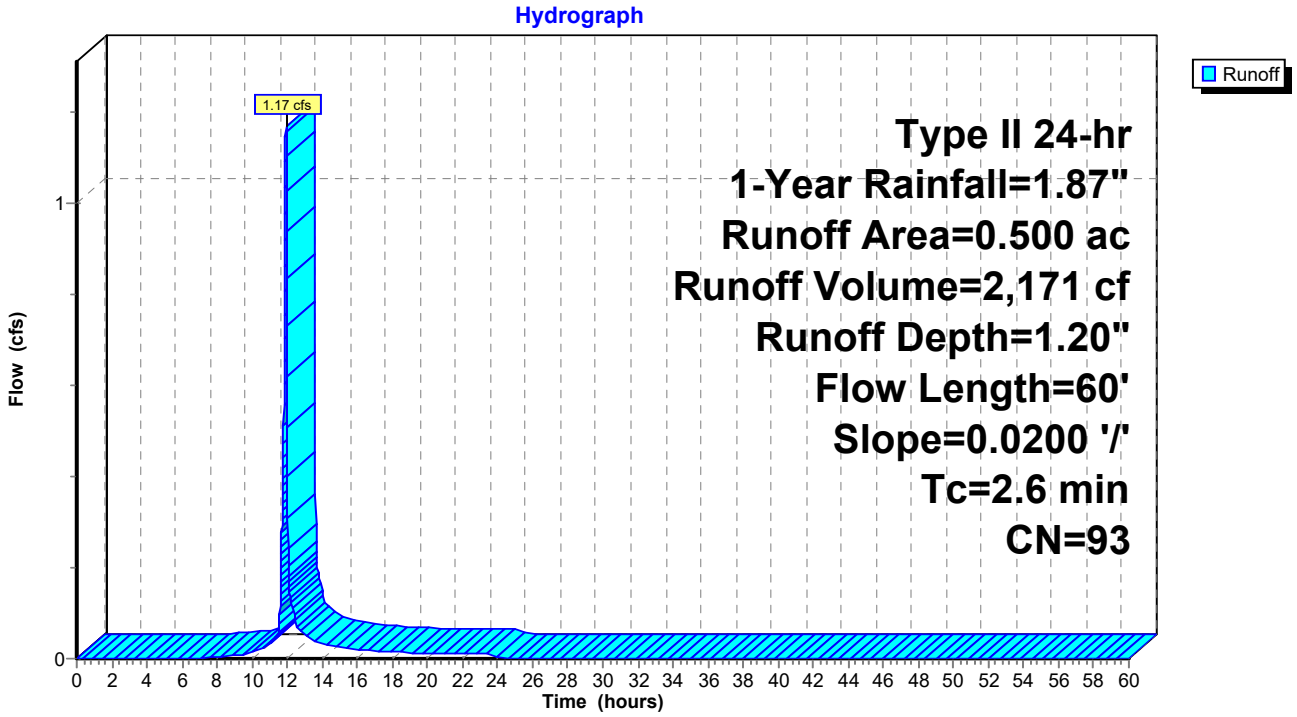
Runoff = 1.17 cfs @ 11.93 hrs, Volume= 2,171 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.87"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.150	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.150		30.00% Pervious Area
0.350		70.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.8	10	0.0200	0.09		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.6	60	Total			

Subcatchment 4S: North 3



Summary for Pond 1P: Det. System B

Inflow Area = 130,680 sf, 79.00% Impervious, Inflow Depth > 1.33" for 1-Year event
Inflow = 4.43 cfs @ 11.95 hrs, Volume= 14,455 cf
Outflow = 1.51 cfs @ 12.14 hrs, Volume= 14,390 cf, Atten= 66%, Lag= 11.5 min
Primary = 1.51 cfs @ 12.14 hrs, Volume= 14,390 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 580.37' @ 12.23 hrs Surf.Area= 7,905 sf Storage= 3,516 cf

Plug-Flow detention time= 83.4 min calculated for 14,387 cf (100% of inflow)
Center-of-Mass det. time= 73.8 min (949.1 - 875.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.28'	9,126 cf	**48.50'W x 163.00'L x 4.50'H Field A** 35,575 cf Overall - 12,760 cf Embedded = 22,815 cf x 40.0% Voids
#2A	579.78'	10,224 cf	**ADS N-12 36"** x 72 Inside #1 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 72 Chambers in 9 Rows
		19,350 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.28'	**10.0" Round 10" pipe** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.28' / 579.15' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.51 cfs @ 12.14 hrs HW=580.36' (Free Discharge)
↑—**1=10" pipe** (Barrel Controls 1.51 cfs @ 2.79 fps)

Pond 1P: Det. System B - Chamber Wizard Field A

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

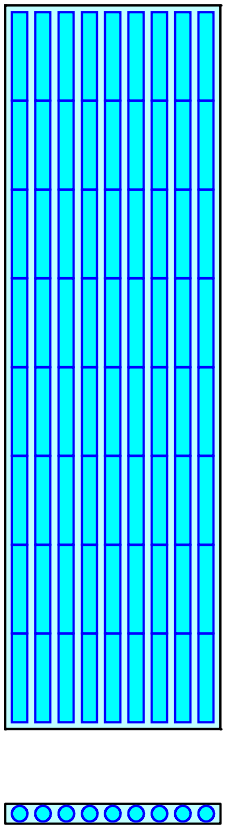
8 Chambers/Row x 20.00' Long = 160.00' Row Length +18.0" End Stone x 2 = 163.00' Base Length
9 Rows x 42.0" Wide + 21.0" Spacing x 8 + 18.0" Side Stone x 2 = 48.50' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

72 Chambers x 142.0 cf = 10,224.0 cf Chamber Storage
72 Chambers x 177.2 cf = 12,759.9 cf Displacement

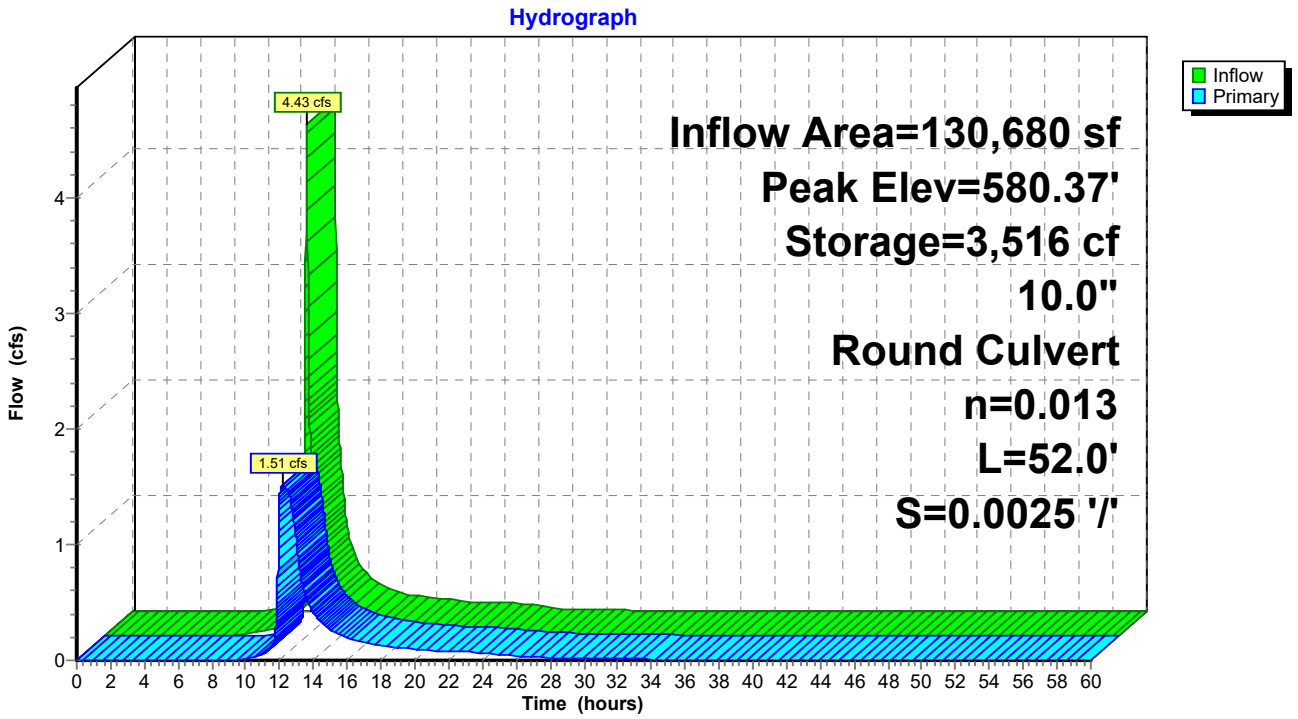
35,574.6 cf Field - 12,759.9 cf Chambers = 22,814.8 cf Stone x 40.0% Voids = 9,125.9 cf Stone Storage

Chamber Storage + Stone Storage = 19,349.9 cf = 0.444 af
Overall Storage Efficiency = 54.4%
Overall System Size = 163.00' x 48.50' x 4.50'

72 Chambers
1,317.6 cy Field
845.0 cy Stone



Pond 1P: Det. System B



Summary for Pond 2P: Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 1.54" for 1-Year event
Inflow = 4.99 cfs @ 11.91 hrs, Volume= 9,528 cf
Outflow = 1.91 cfs @ 11.99 hrs, Volume= 9,496 cf, Atten= 62%, Lag= 4.6 min
Primary = 1.91 cfs @ 11.99 hrs, Volume= 9,496 cf
Routed to Pond 1P : Det. System B

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.32' @ 11.99 hrs Surf.Area= 13,558 sf Storage= 3,915 cf

Plug-Flow detention time= 133.6 min calculated for 9,495 cf (100% of inflow)
Center-of-Mass det. time= 131.8 min (904.9 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.91 cfs @ 11.99 hrs HW=581.31' (Free Discharge)
1=Culvert (Barrel Controls 1.91 cfs @ 2.62 fps)

Pond 2P: Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

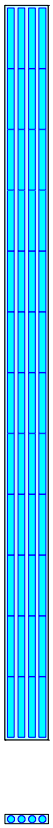
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

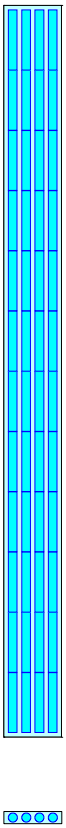
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

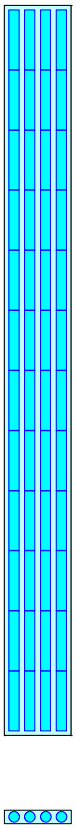
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

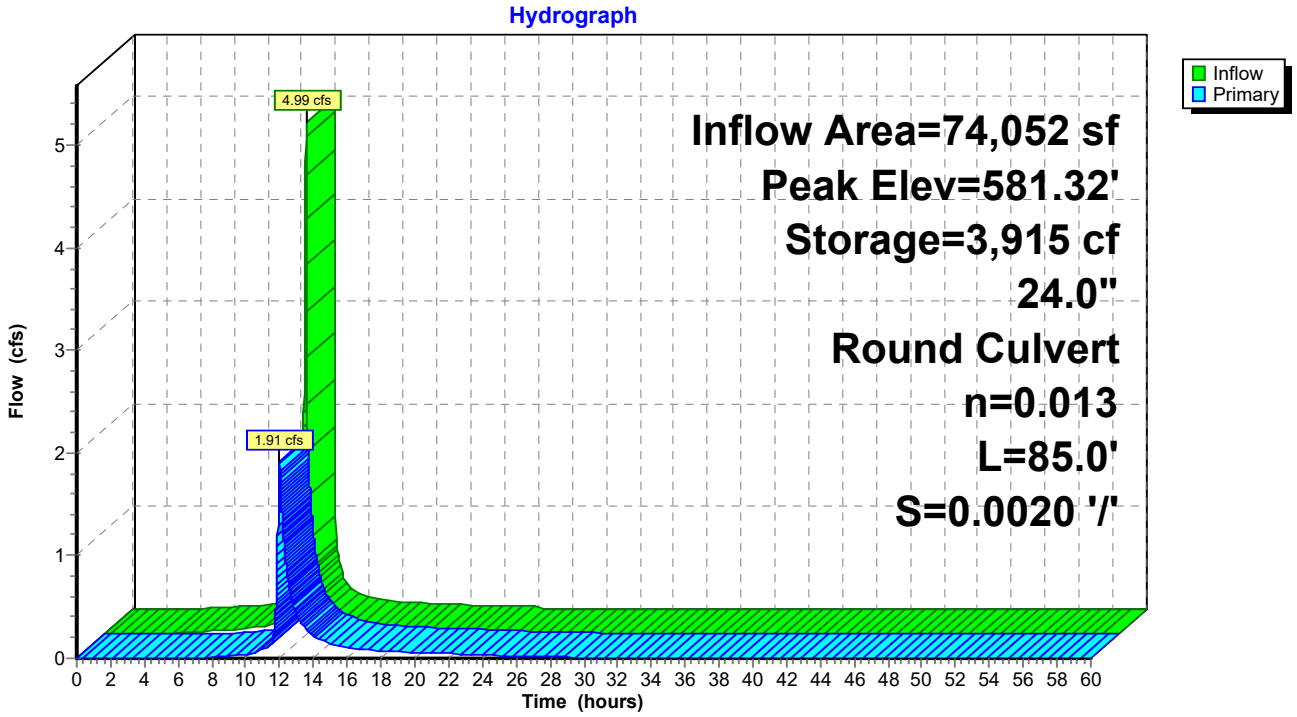
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Det. System A



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=1.300 ac 59.23% Impervious Runoff Depth=2.20"
Flow Length=510' Tc=3.5 min CN=91 Runoff=5.33 cfs 10,391 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=2.80"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=8.67 cfs 17,261 cf

Subcatchment3S: North 2 Runoff Area=0.450 ac 73.33% Impervious Runoff Depth=2.39"
Flow Length=55' Slope=0.0250 '/' Tc=2.3 min CN=93 Runoff=2.03 cfs 3,901 cf

Subcatchment4S: North 3 Runoff Area=0.500 ac 70.00% Impervious Runoff Depth=2.39"
Flow Length=60' Slope=0.0200 '/' Tc=2.6 min CN=93 Runoff=2.24 cfs 4,335 cf

Pond 1P: Det. System B Peak Elev=581.18' Storage=7,699 cf Inflow=8.83 cfs 27,618 cf
10.0" Round Culvert n=0.013 L=52.0' S=0.0025 '/' Outflow=2.53 cfs 27,550 cf

Pond 2P: Det. System A Peak Elev=581.62' Storage=6,069 cf Inflow=8.67 cfs 17,261 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=3.68 cfs 17,227 cf

Total Runoff Area = 172,062 sf Runoff Volume = 35,888 cf Average Runoff Depth = 2.50"
22.78% Pervious = 39,204 sf 77.22% Impervious = 132,858 sf

Summary for Subcatchment 1S: North

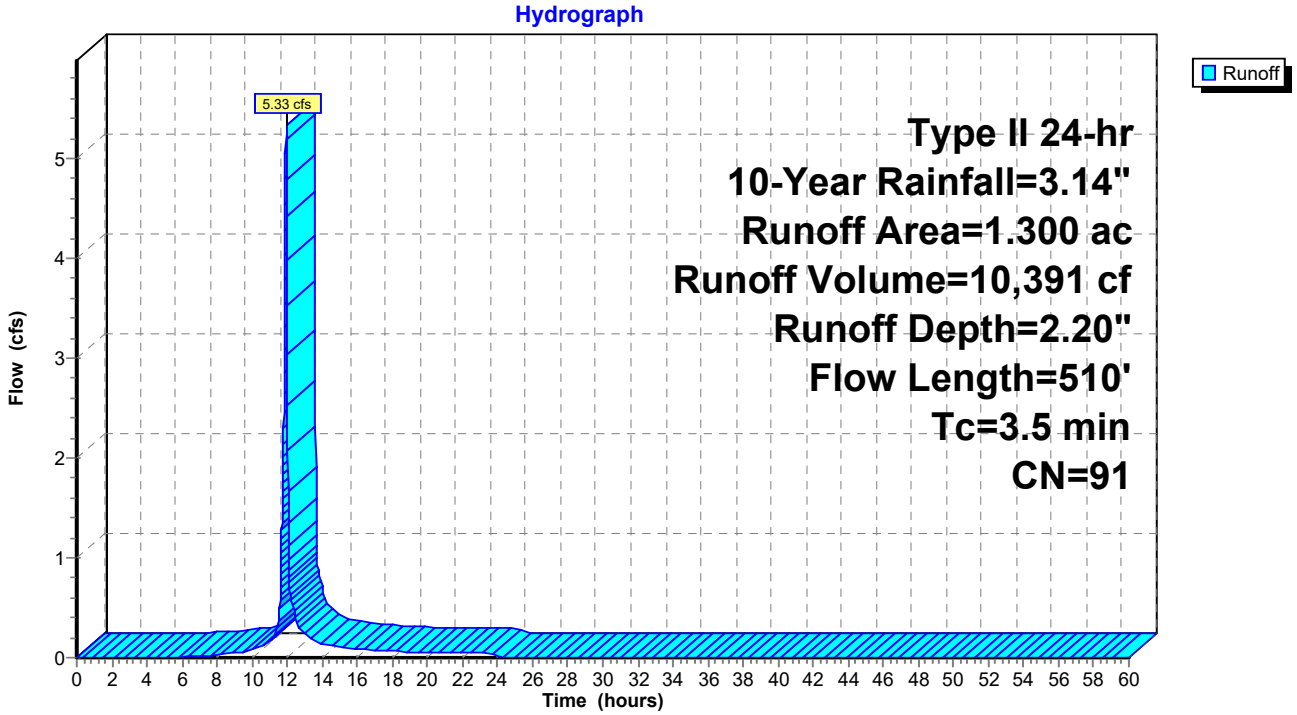
Runoff = 5.33 cfs @ 11.94 hrs, Volume= 10,391 cf, Depth= 2.20"
Routed to Pond 1P : Det. System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.14"

Area (ac)	CN	Description
0.770	98	Paved parking, HSG D
0.530	80	>75% Grass cover, Good, HSG D
1.300	91	Weighted Average
0.530		40.77% Pervious Area
0.770		59.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	75	0.0150	1.02		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
2.3	435	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
3.5	510	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

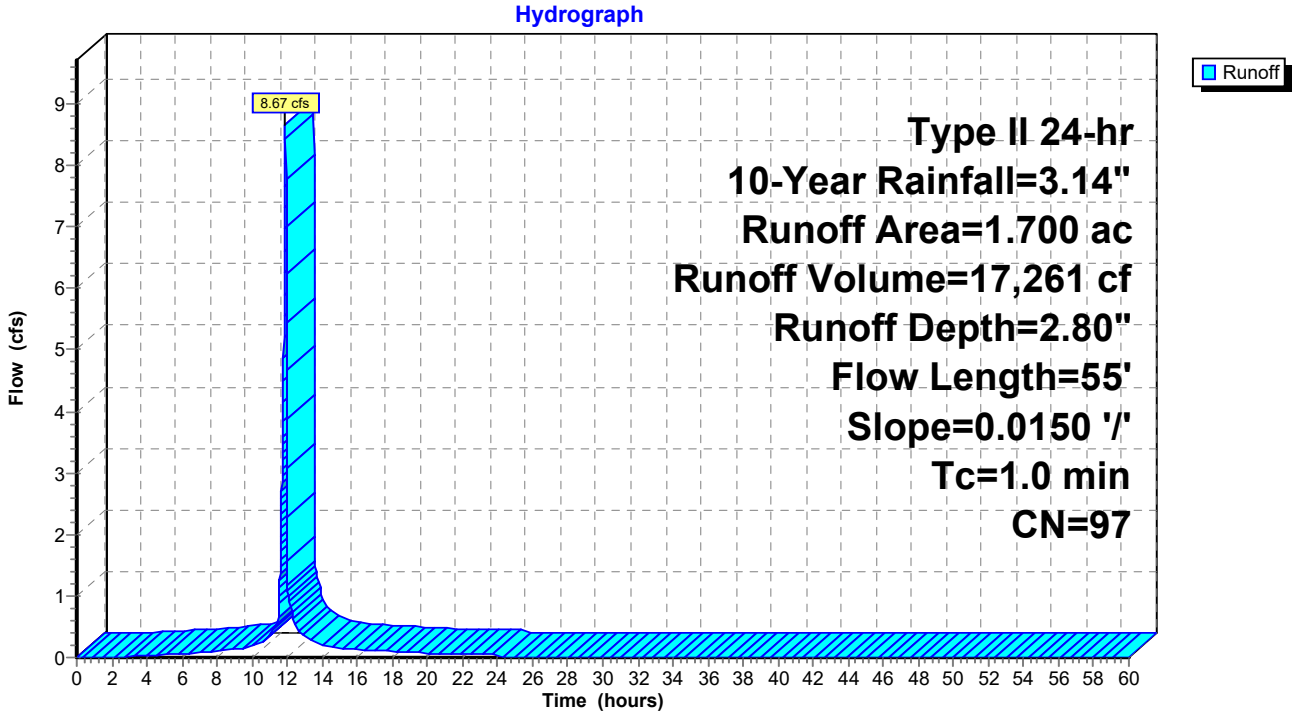
Runoff = 8.67 cfs @ 11.91 hrs, Volume= 17,261 cf, Depth= 2.80"
Routed to Pond 2P : Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.14"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

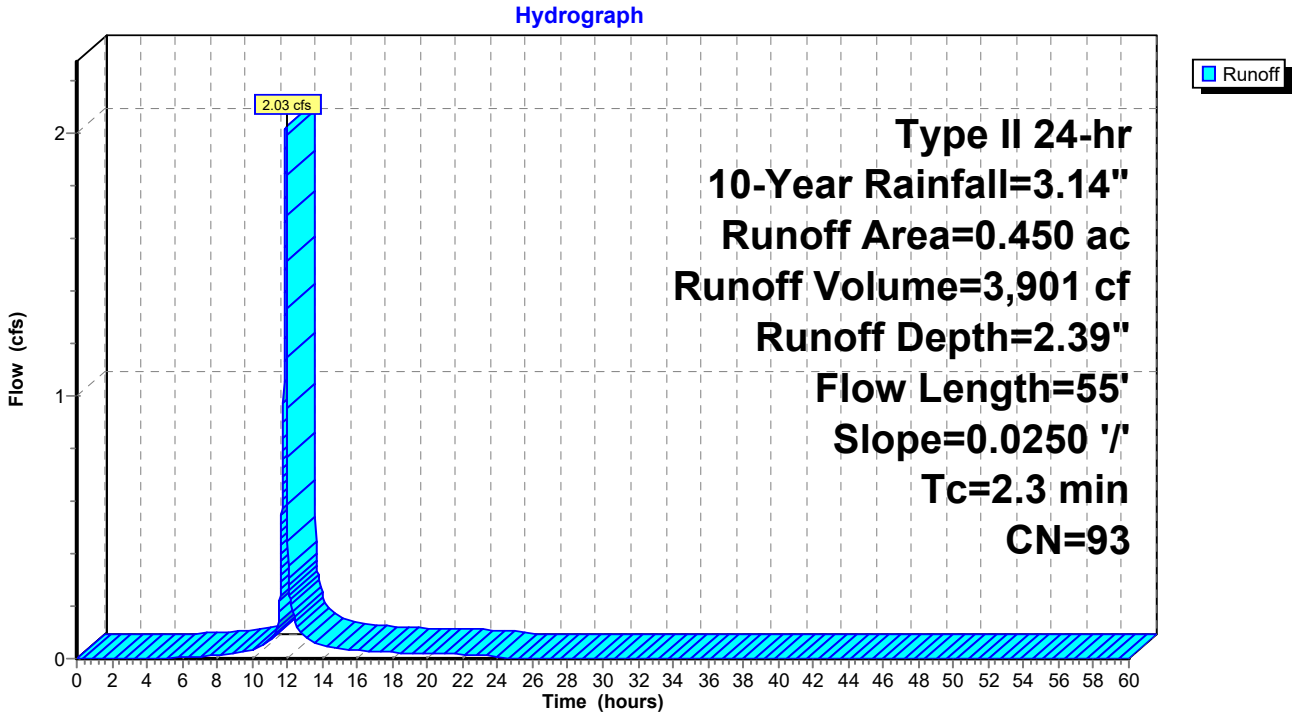
Runoff = 2.03 cfs @ 11.93 hrs, Volume= 3,901 cf, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.14"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG D
0.120	80	>75% Grass cover, Good, HSG D
0.450	93	Weighted Average
0.120		26.67% Pervious Area
0.330		73.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0250	1.13		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.6	10	0.0250	0.10		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.3	55	Total			

Subcatchment 3S: North 2



Summary for Subcatchment 4S: North 3

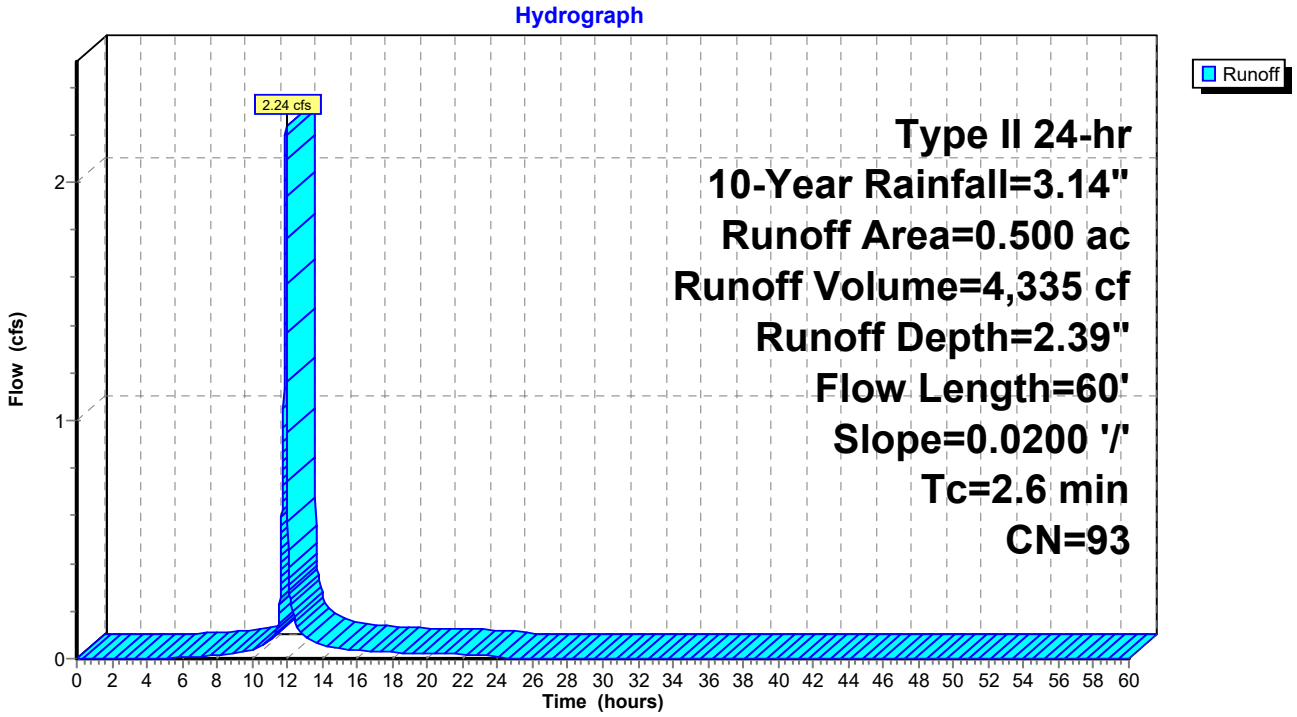
Runoff = 2.24 cfs @ 11.93 hrs, Volume= 4,335 cf, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.14"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.150	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.150		30.00% Pervious Area
0.350		70.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.8	10	0.0200	0.09		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.6	60	Total			

Subcatchment 4S: North 3



Summary for Pond 1P: Det. System B

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 0.62'

Inflow Area = 130,680 sf, 79.00% Impervious, Inflow Depth = 2.54" for 10-Year event
Inflow = 8.83 cfs @ 11.95 hrs, Volume= 27,618 cf
Outflow = 2.53 cfs @ 12.31 hrs, Volume= 27,550 cf, Atten= 71%, Lag= 21.7 min
Primary = 2.53 cfs @ 12.31 hrs, Volume= 27,550 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.18' @ 12.31 hrs Surf.Area= 7,905 sf Storage= 7,699 cf

Plug-Flow detention time= 68.7 min calculated for 27,550 cf (100% of inflow)
Center-of-Mass det. time= 63.2 min (897.1 - 833.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.28'	9,126 cf	**48.50'W x 163.00'L x 4.50'H Field A** 35,575 cf Overall - 12,760 cf Embedded = 22,815 cf x 40.0% Voids
#2A	579.78'	10,224 cf	**ADS N-12 36"** x 72 Inside #1 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 72 Chambers in 9 Rows
		19,350 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.28'	**10.0" Round 10" pipe** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.28' / 579.15' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=2.53 cfs @ 12.31 hrs HW=581.18' (Free Discharge)
1=10" pipe (Barrel Controls 2.53 cfs @ 4.63 fps)

Pond 1P: Det. System B - Chamber Wizard Field A

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

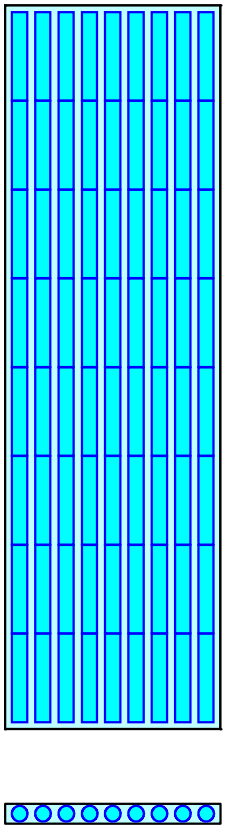
8 Chambers/Row x 20.00' Long = 160.00' Row Length +18.0" End Stone x 2 = 163.00' Base Length
9 Rows x 42.0" Wide + 21.0" Spacing x 8 + 18.0" Side Stone x 2 = 48.50' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

72 Chambers x 142.0 cf = 10,224.0 cf Chamber Storage
72 Chambers x 177.2 cf = 12,759.9 cf Displacement

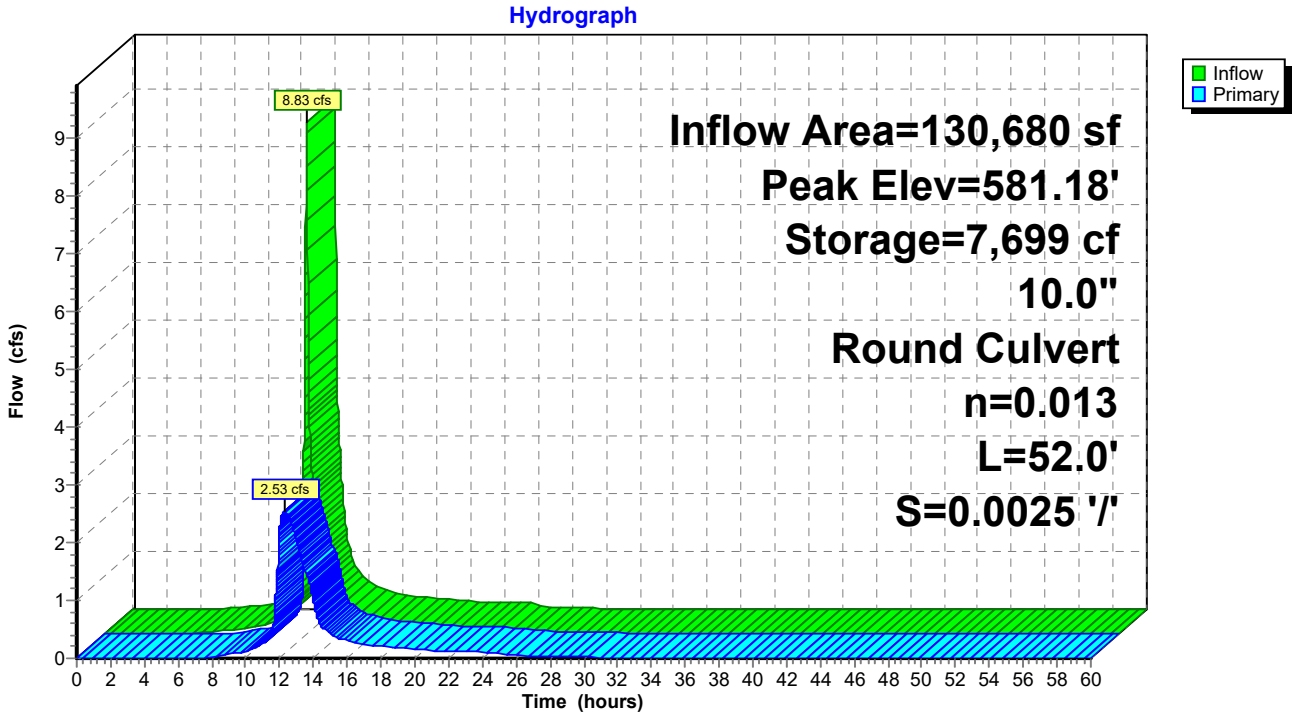
35,574.6 cf Field - 12,759.9 cf Chambers = 22,814.8 cf Stone x 40.0% Voids = 9,125.9 cf Stone Storage

Chamber Storage + Stone Storage = 19,349.9 cf = 0.444 af
Overall Storage Efficiency = 54.4%
Overall System Size = 163.00' x 48.50' x 4.50'

72 Chambers
1,317.6 cy Field
845.0 cy Stone



Pond 1P: Det. System B



Summary for Pond 2P: Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 2.80" for 10-Year event
Inflow = 8.67 cfs @ 11.91 hrs, Volume= 17,261 cf
Outflow = 3.68 cfs @ 11.98 hrs, Volume= 17,227 cf, Atten= 58%, Lag= 4.3 min
Primary = 3.68 cfs @ 11.98 hrs, Volume= 17,227 cf
Routed to Pond 1P : Det. System B

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.62' @ 11.98 hrs Surf.Area= 13,558 sf Storage= 6,069 cf

Plug-Flow detention time= 98.9 min calculated for 17,227 cf (100% of inflow)
Center-of-Mass det. time= 97.6 min (855.8 - 758.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.67 cfs @ 11.98 hrs HW=581.62' (Free Discharge)
1=Culvert (Barrel Controls 3.67 cfs @ 3.16 fps)

Pond 2P: Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

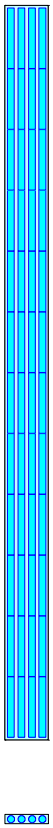
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

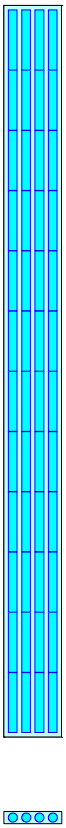
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

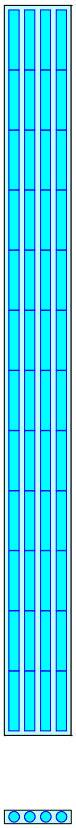
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

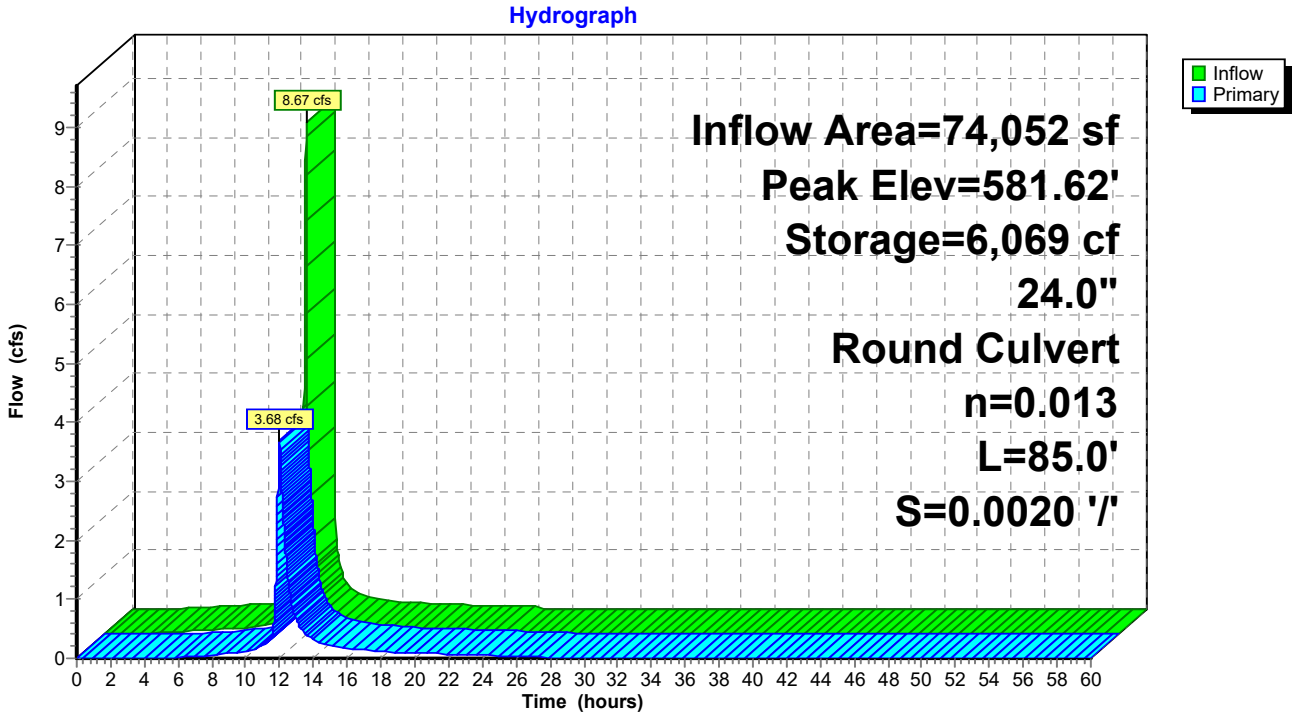
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Det. System A



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=1.300 ac 59.23% Impervious Runoff Depth=2.86"
Flow Length=510' Tc=3.5 min CN=91 Runoff=6.82 cfs 13,517 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=3.49"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=10.68 cfs 21,551 cf

Subcatchment3S: North 2 Runoff Area=0.450 ac 73.33% Impervious Runoff Depth=3.06"
Flow Length=55' Slope=0.0250 '/' Tc=2.3 min CN=93 Runoff=2.56 cfs 5,006 cf

Subcatchment4S: North 3 Runoff Area=0.500 ac 70.00% Impervious Runoff Depth=3.06"
Flow Length=60' Slope=0.0200 '/' Tc=2.6 min CN=93 Runoff=2.82 cfs 5,562 cf

Pond 1P: Det. System B Peak Elev=581.61' Storage=10,130 cf Inflow=11.20 cfs 35,033 cf
10.0" Round Culvert n=0.013 L=52.0' S=0.0025 '/' Outflow=2.95 cfs 34,964 cf

Pond 2P: Det. System A Peak Elev=581.76' Storage=7,192 cf Inflow=10.68 cfs 21,551 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=4.60 cfs 21,516 cf

Total Runoff Area = 172,062 sf Runoff Volume = 45,635 cf Average Runoff Depth = 3.18"
22.78% Pervious = 39,204 sf 77.22% Impervious = 132,858 sf

Summary for Subcatchment 1S: North

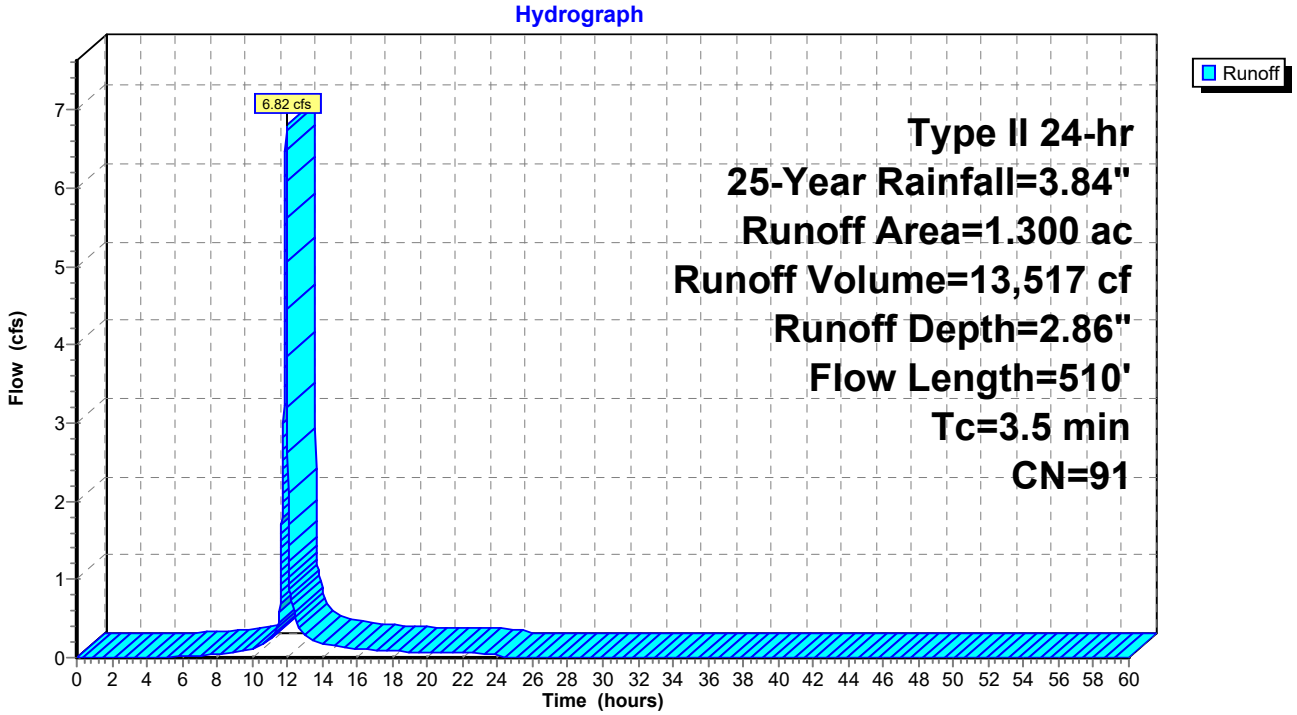
Runoff = 6.82 cfs @ 11.94 hrs, Volume= 13,517 cf, Depth= 2.86"
Routed to Pond 1P : Det. System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.84"

Area (ac)	CN	Description
0.770	98	Paved parking, HSG D
0.530	80	>75% Grass cover, Good, HSG D
1.300	91	Weighted Average
0.530		40.77% Pervious Area
0.770		59.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	75	0.0150	1.02		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
2.3	435	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
3.5	510	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

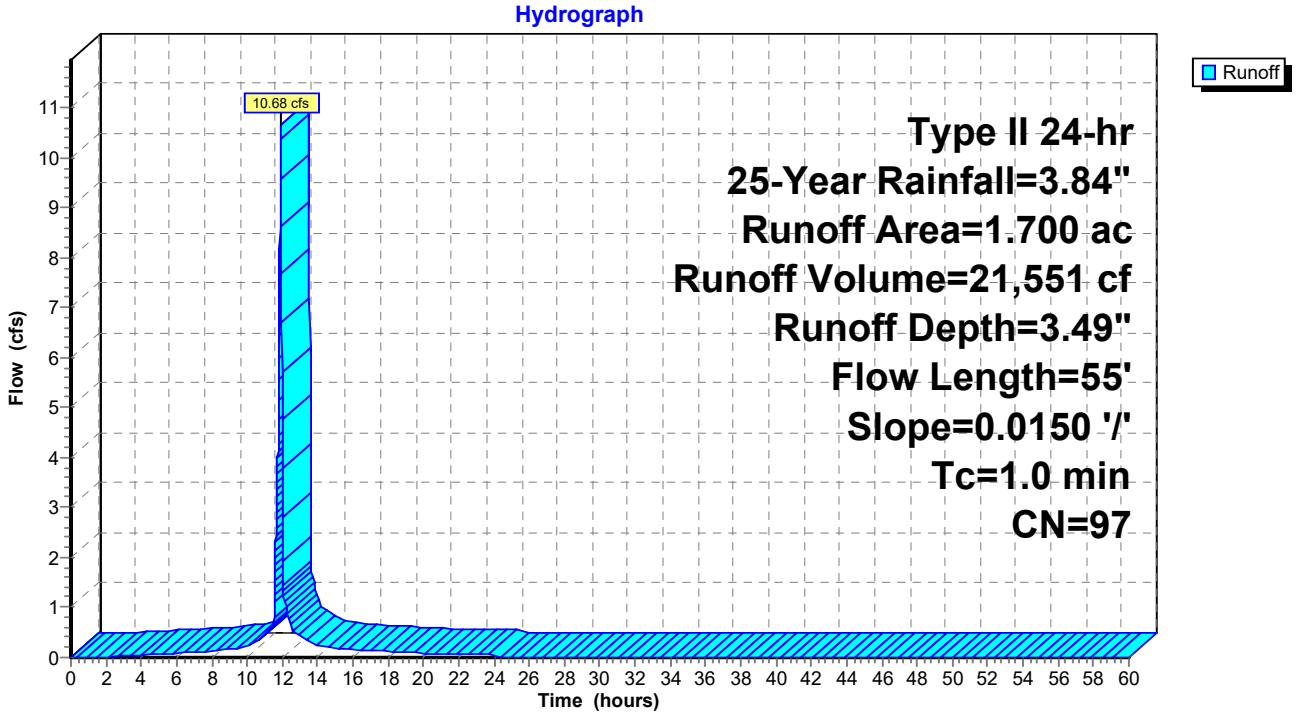
Runoff = 10.68 cfs @ 11.91 hrs, Volume= 21,551 cf, Depth= 3.49"
Routed to Pond 2P : Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.84"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

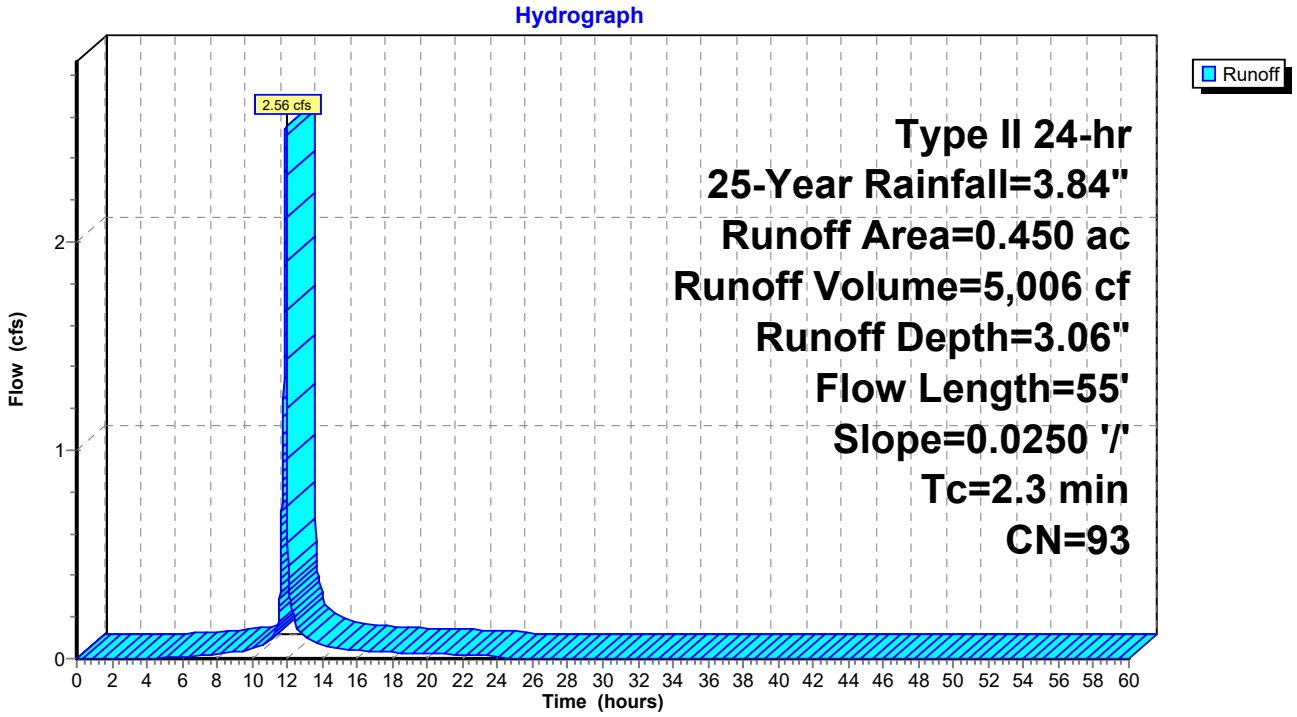
Runoff = 2.56 cfs @ 11.93 hrs, Volume= 5,006 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.84"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG D
0.120	80	>75% Grass cover, Good, HSG D
0.450	93	Weighted Average
0.120		26.67% Pervious Area
0.330		73.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0250	1.13		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.6	10	0.0250	0.10		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.3	55	Total			

Subcatchment 3S: North 2



Summary for Subcatchment 4S: North 3

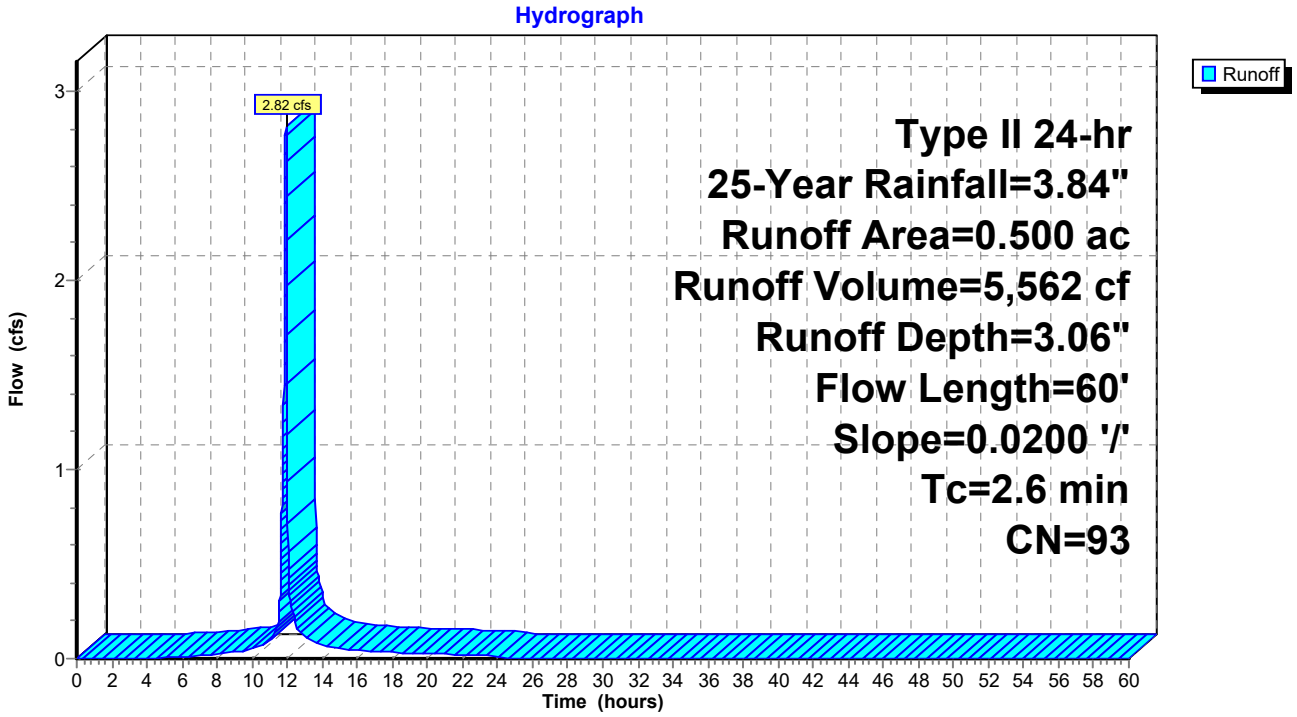
Runoff = 2.82 cfs @ 11.93 hrs, Volume= 5,562 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.84"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.150	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.150		30.00% Pervious Area
0.350		70.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.8	10	0.0200	0.09		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.6	60	Total			

Subcatchment 4S: North 3



Summary for Pond 1P: Det. System B

[81] Warning: Exceeded Pond 2P by 0.32' @ 12.57 hrs

Inflow Area = 130,680 sf, 79.00% Impervious, Inflow Depth = 3.22" for 25-Year event
Inflow = 11.20 cfs @ 11.95 hrs, Volume= 35,033 cf
Outflow = 2.95 cfs @ 12.35 hrs, Volume= 34,964 cf, Atten= 74%, Lag= 24.0 min
Primary = 2.95 cfs @ 12.35 hrs, Volume= 34,964 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.61' @ 12.35 hrs Surf.Area= 7,905 sf Storage= 10,130 cf

Plug-Flow detention time= 66.3 min calculated for 34,964 cf (100% of inflow)
Center-of-Mass det. time= 61.9 min (883.2 - 821.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.28'	9,126 cf	**48.50'W x 163.00'L x 4.50'H Field A** 35,575 cf Overall - 12,760 cf Embedded = 22,815 cf x 40.0% Voids
#2A	579.78'	10,224 cf	**ADS N-12 36"** x 72 Inside #1 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 72 Chambers in 9 Rows
		19,350 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.28'	**10.0" Round 10" pipe** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.28' / 579.15' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=2.95 cfs @ 12.35 hrs HW=581.61' (Free Discharge)
1=10" pipe (Barrel Controls 2.95 cfs @ 5.41 fps)

Pond 1P: Det. System B - Chamber Wizard Field A

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

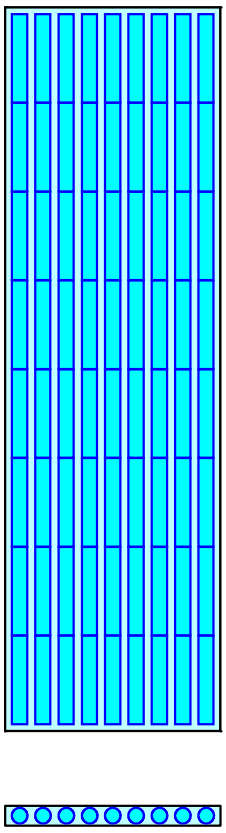
8 Chambers/Row x 20.00' Long = 160.00' Row Length +18.0" End Stone x 2 = 163.00' Base Length
9 Rows x 42.0" Wide + 21.0" Spacing x 8 + 18.0" Side Stone x 2 = 48.50' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

72 Chambers x 142.0 cf = 10,224.0 cf Chamber Storage
72 Chambers x 177.2 cf = 12,759.9 cf Displacement

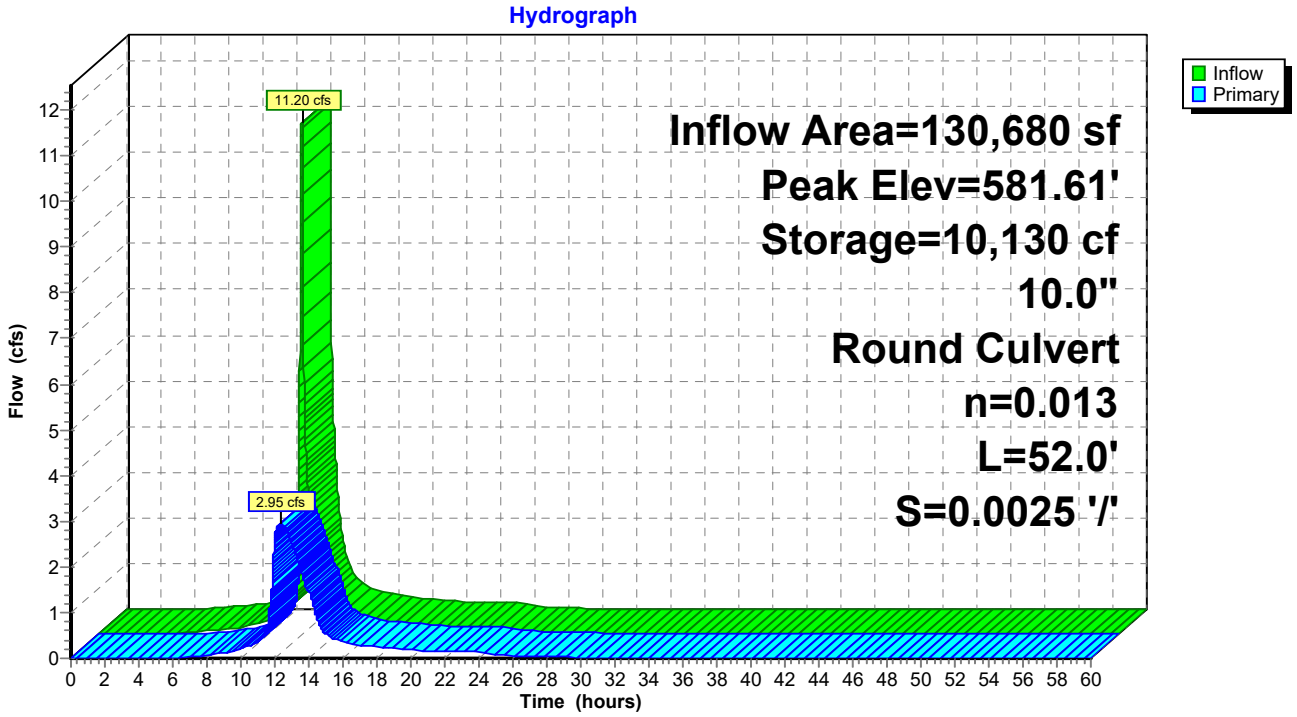
35,574.6 cf Field - 12,759.9 cf Chambers = 22,814.8 cf Stone x 40.0% Voids = 9,125.9 cf Stone Storage

Chamber Storage + Stone Storage = 19,349.9 cf = 0.444 af
Overall Storage Efficiency = 54.4%
Overall System Size = 163.00' x 48.50' x 4.50'

72 Chambers
1,317.6 cy Field
845.0 cy Stone



Pond 1P: Det. System B



Summary for Pond 2P: Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 3.49" for 25-Year event
Inflow = 10.68 cfs @ 11.91 hrs, Volume= 21,551 cf
Outflow = 4.60 cfs @ 11.98 hrs, Volume= 21,516 cf, Atten= 57%, Lag= 4.3 min
Primary = 4.60 cfs @ 11.98 hrs, Volume= 21,516 cf
Routed to Pond 1P : Det. System B

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.76' @ 11.98 hrs Surf.Area= 13,558 sf Storage= 7,192 cf

Plug-Flow detention time= 88.4 min calculated for 21,512 cf (100% of inflow)
Center-of-Mass det. time= 87.6 min (840.8 - 753.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.59 cfs @ 11.98 hrs HW=581.76' (Free Discharge)
1=Culvert (Barrel Controls 4.59 cfs @ 3.37 fps)

Pond 2P: Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

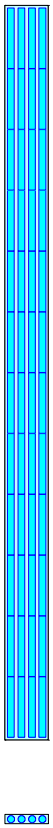
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

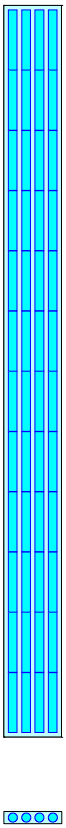
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

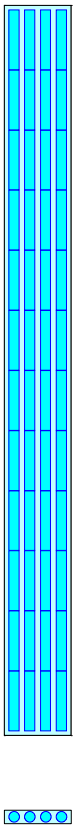
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

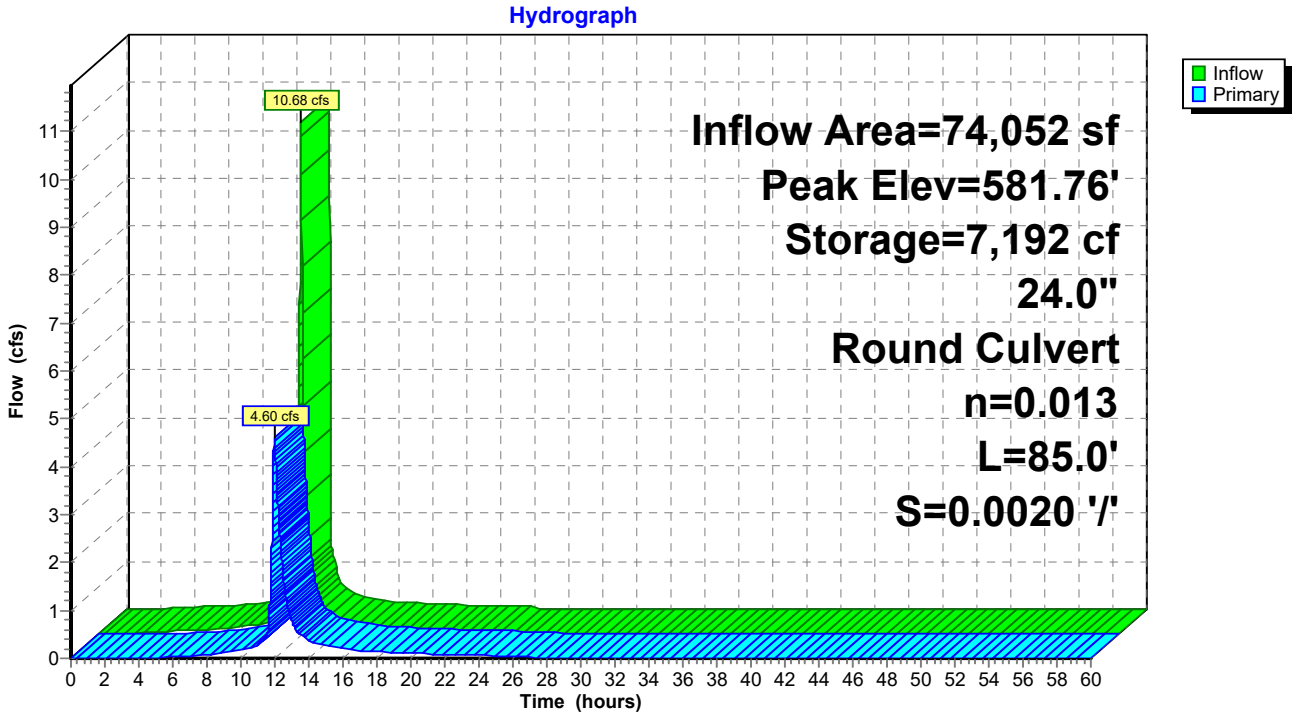
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Det. System A



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=1.300 ac 59.23% Impervious Runoff Depth=4.21"
Flow Length=510' Tc=3.5 min CN=91 Runoff=9.74 cfs 19,846 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=4.88"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=14.65 cfs 30,092 cf

Subcatchment3S: North 2 Runoff Area=0.450 ac 73.33% Impervious Runoff Depth=4.42"
Flow Length=55' Slope=0.0250 '/' Tc=2.3 min CN=93 Runoff=3.60 cfs 7,226 cf

Subcatchment4S: North 3 Runoff Area=0.500 ac 70.00% Impervious Runoff Depth=4.42"
Flow Length=60' Slope=0.0200 '/' Tc=2.6 min CN=93 Runoff=3.96 cfs 8,029 cf

Pond 1P: Det. System B Peak Elev=582.55' Storage=15,157 cf Inflow=15.87 cfs 49,902 cf
10.0" Round Culvert n=0.013 L=52.0' S=0.0025 '/' Outflow=3.70 cfs 49,832 cf

Pond 2P: Det. System A Peak Elev=582.00' Storage=9,356 cf Inflow=14.65 cfs 30,092 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=6.42 cfs 30,056 cf

Total Runoff Area = 172,062 sf Runoff Volume = 65,194 cf Average Runoff Depth = 4.55"
22.78% Pervious = 39,204 sf 77.22% Impervious = 132,858 sf

Summary for Subcatchment 1S: North

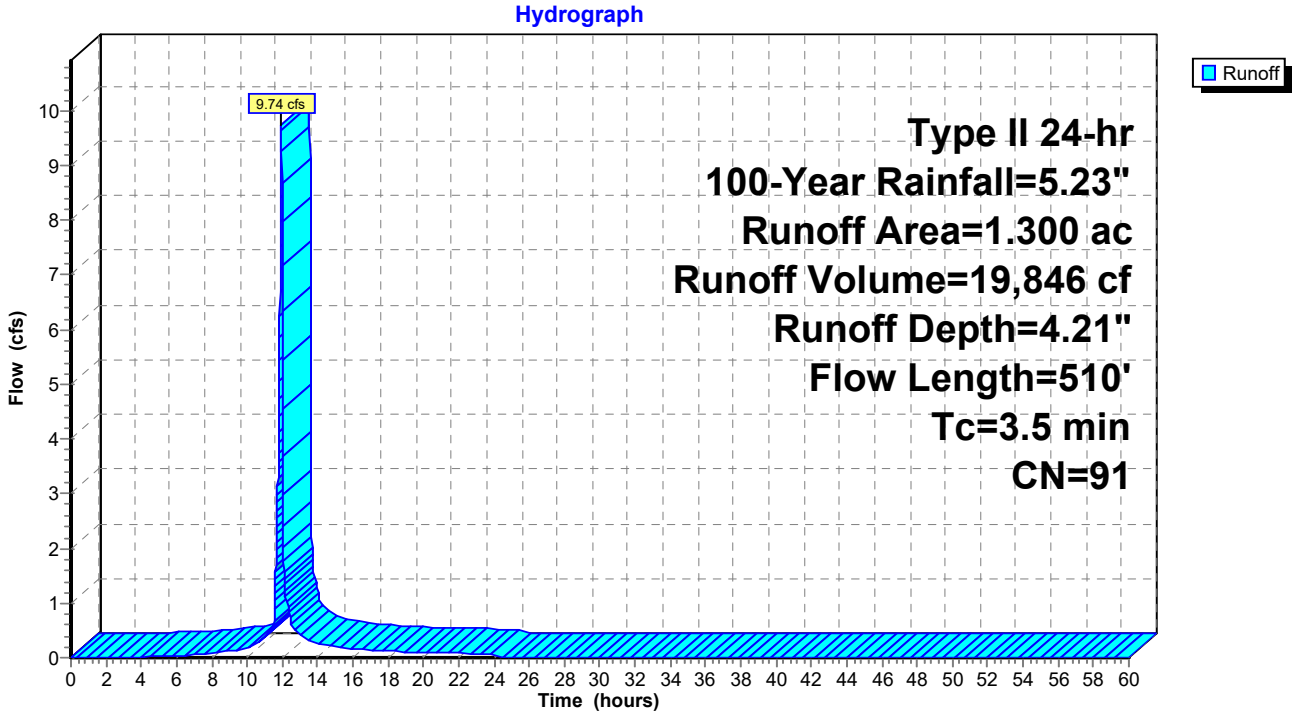
Runoff = 9.74 cfs @ 11.94 hrs, Volume= 19,846 cf, Depth= 4.21"
Routed to Pond 1P : Det. System B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.23"

Area (ac)	CN	Description
0.770	98	Paved parking, HSG D
0.530	80	>75% Grass cover, Good, HSG D
1.300	91	Weighted Average
0.530		40.77% Pervious Area
0.770		59.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	75	0.0150	1.02		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
2.3	435	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
3.5	510	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

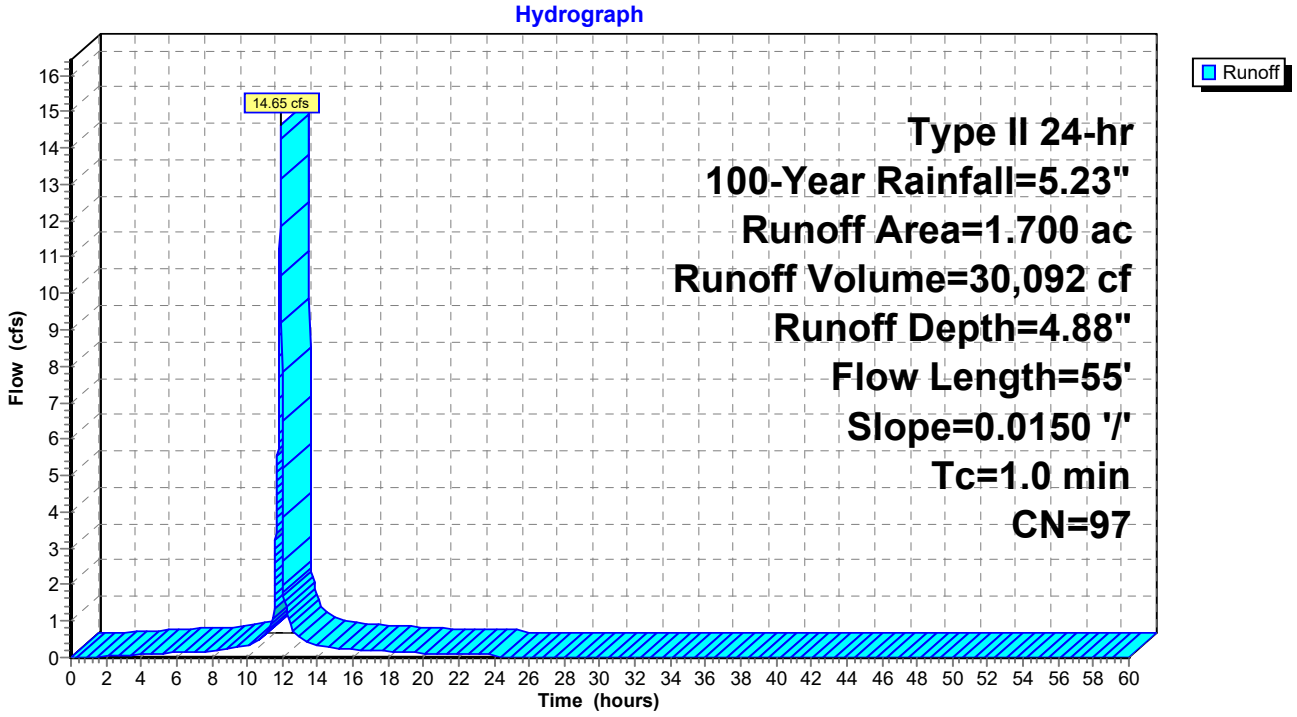
Runoff = 14.65 cfs @ 11.91 hrs, Volume= 30,092 cf, Depth= 4.88"
Routed to Pond 2P : Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.23"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

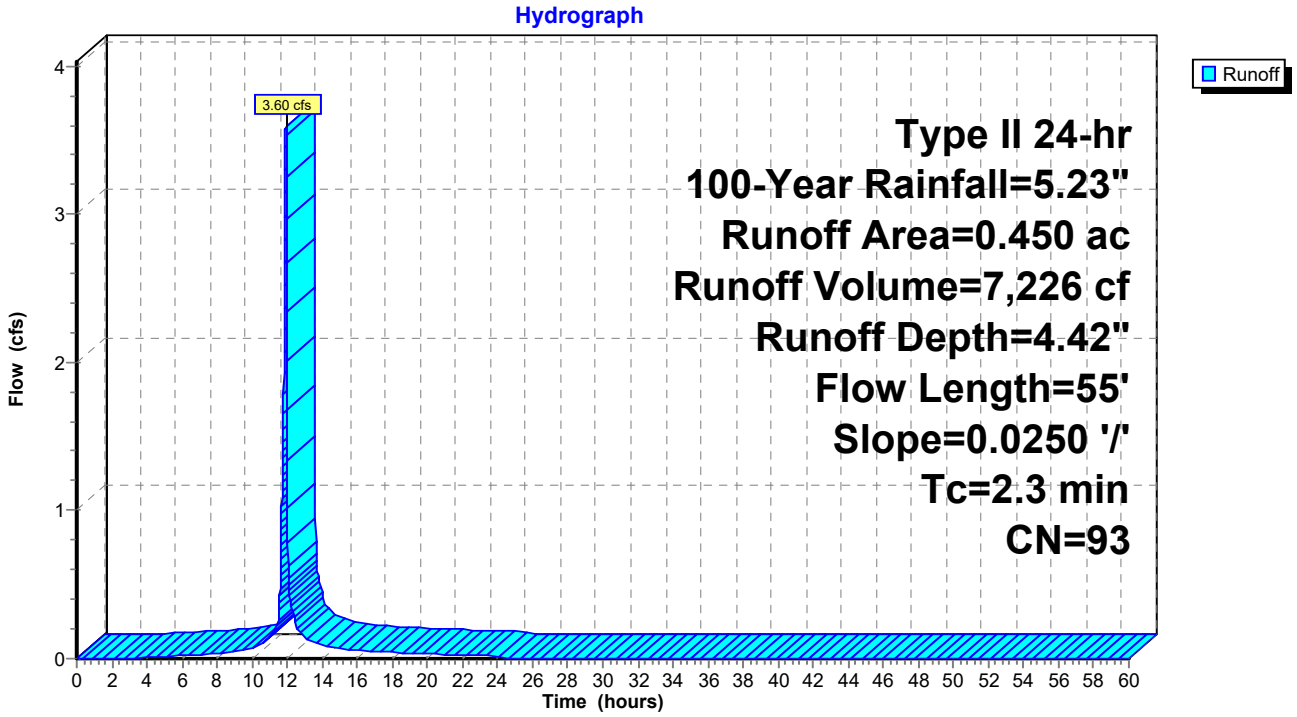
Runoff = 3.60 cfs @ 11.93 hrs, Volume= 7,226 cf, Depth= 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.23"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG D
0.120	80	>75% Grass cover, Good, HSG D
0.450	93	Weighted Average
0.120		26.67% Pervious Area
0.330		73.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	45	0.0250	1.13		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.6	10	0.0250	0.10		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.3	55	Total			

Subcatchment 3S: North 2



Summary for Subcatchment 4S: North 3

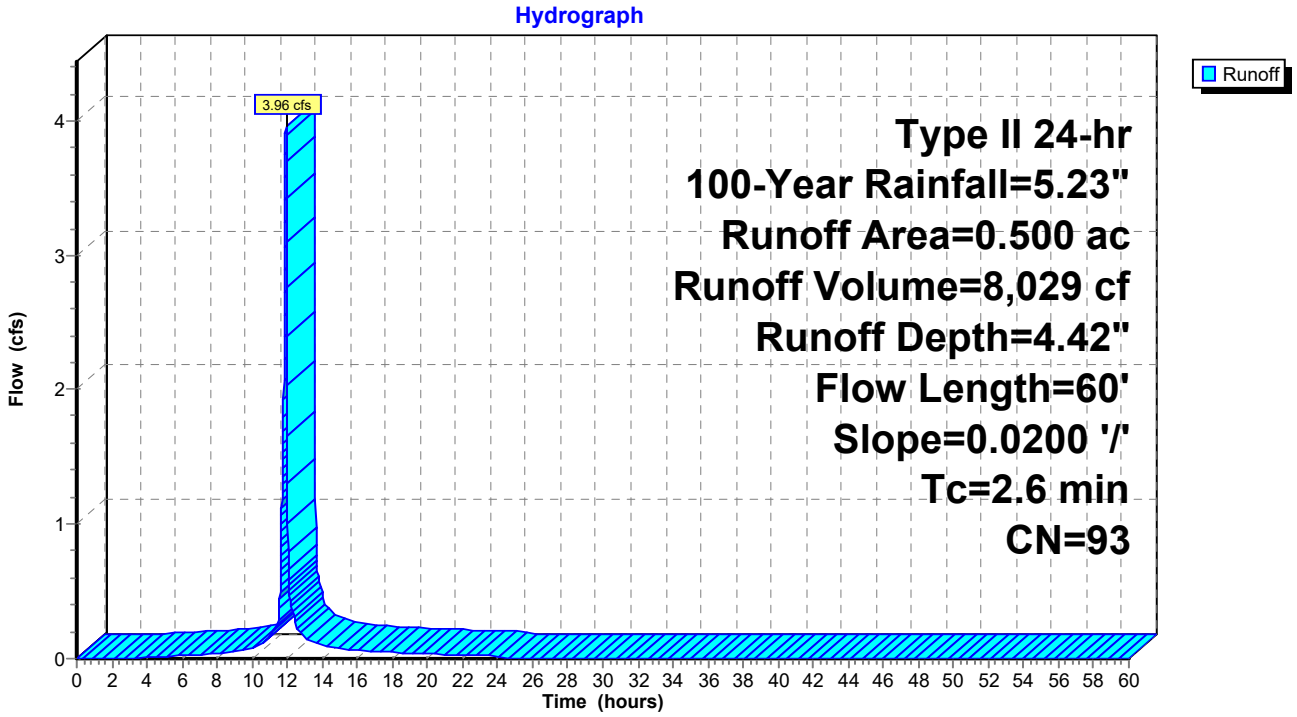
Runoff = 3.96 cfs @ 11.93 hrs, Volume= 8,029 cf, Depth= 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.23"

Area (ac)	CN	Description
0.350	98	Paved parking, HSG D
0.150	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.150		30.00% Pervious Area
0.350		70.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
1.8	10	0.0200	0.09		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
2.6	60	Total			

Subcatchment 4S: North 3



Summary for Pond 1P: Det. System B

[81] Warning: Exceeded Pond 2P by 1.13' @ 12.60 hrs

Inflow Area = 130,680 sf, 79.00% Impervious, Inflow Depth = 4.58" for 100-Year event
Inflow = 15.87 cfs @ 11.95 hrs, Volume= 49,902 cf
Outflow = 3.70 cfs @ 12.40 hrs, Volume= 49,832 cf, Atten= 77%, Lag= 27.1 min
Primary = 3.70 cfs @ 12.40 hrs, Volume= 49,832 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 582.55' @ 12.40 hrs Surf.Area= 7,905 sf Storage= 15,157 cf

Plug-Flow detention time= 65.1 min calculated for 49,832 cf (100% of inflow)
Center-of-Mass det. time= 61.9 min (866.5 - 804.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.28'	9,126 cf	**48.50'W x 163.00'L x 4.50'H Field A** 35,575 cf Overall - 12,760 cf Embedded = 22,815 cf x 40.0% Voids
#2A	579.78'	10,224 cf	**ADS N-12 36"** x 72 Inside #1 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 72 Chambers in 9 Rows
		19,350 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.28'	**10.0" Round 10" pipe** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.28' / 579.15' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=3.70 cfs @ 12.40 hrs HW=582.55' (Free Discharge)
1=10" pipe (Barrel Controls 3.70 cfs @ 6.79 fps)

Pond 1P: Det. System B - Chamber Wizard Field A

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

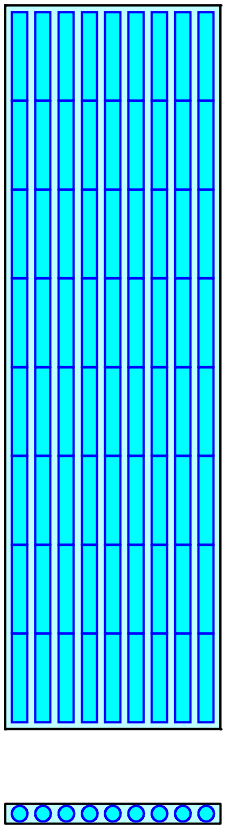
8 Chambers/Row x 20.00' Long = 160.00' Row Length +18.0" End Stone x 2 = 163.00' Base Length
9 Rows x 42.0" Wide + 21.0" Spacing x 8 + 18.0" Side Stone x 2 = 48.50' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

72 Chambers x 142.0 cf = 10,224.0 cf Chamber Storage
72 Chambers x 177.2 cf = 12,759.9 cf Displacement

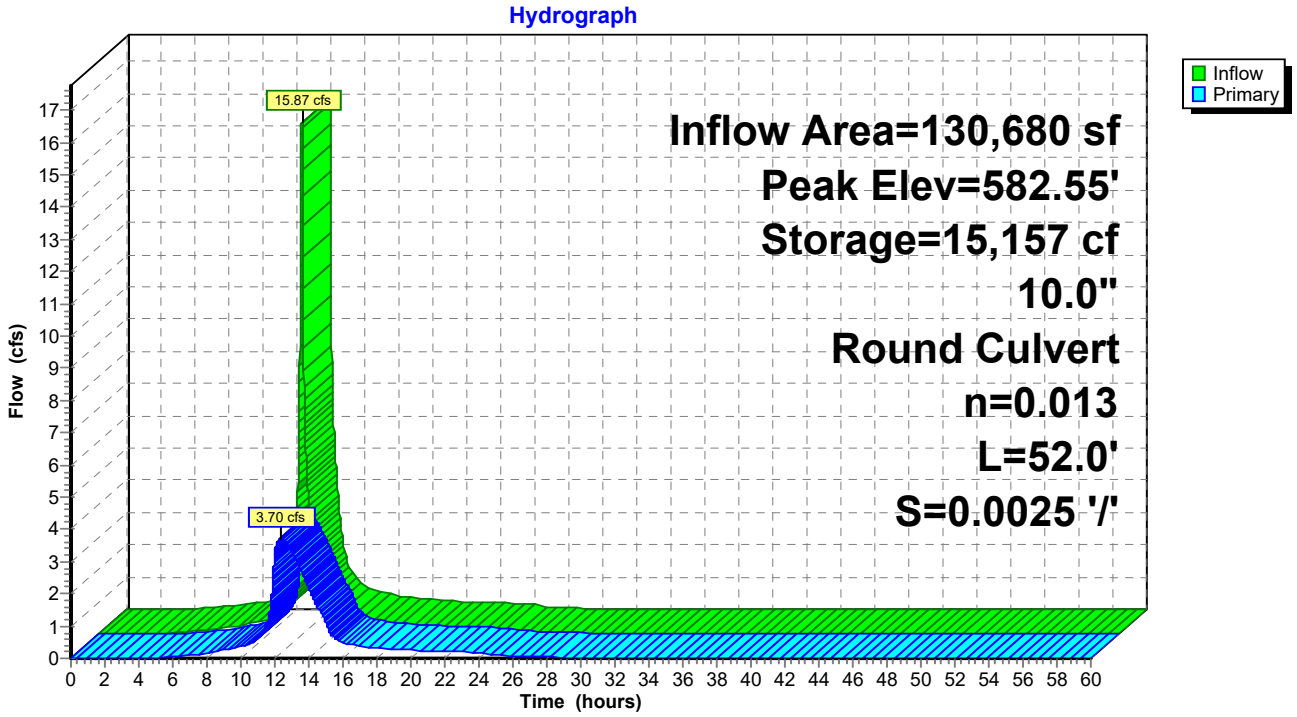
35,574.6 cf Field - 12,759.9 cf Chambers = 22,814.8 cf Stone x 40.0% Voids = 9,125.9 cf Stone Storage

Chamber Storage + Stone Storage = 19,349.9 cf = 0.444 af
Overall Storage Efficiency = 54.4%
Overall System Size = 163.00' x 48.50' x 4.50'

72 Chambers
1,317.6 cy Field
845.0 cy Stone



Pond 1P: Det. System B



Summary for Pond 2P: Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 4.88" for 100-Year event
Inflow = 14.65 cfs @ 11.91 hrs, Volume= 30,092 cf
Outflow = 6.42 cfs @ 11.98 hrs, Volume= 30,056 cf, Atten= 56%, Lag= 4.2 min
Primary = 6.42 cfs @ 11.98 hrs, Volume= 30,056 cf
Routed to Pond 1P : Det. System B

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 582.00' @ 11.98 hrs Surf.Area= 13,558 sf Storage= 9,356 cf

Plug-Flow detention time= 75.2 min calculated for 30,051 cf (100% of inflow)
Center-of-Mass det. time= 74.8 min (821.0 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.42 cfs @ 11.98 hrs HW=582.00' (Free Discharge)
1=Culvert (Barrel Controls 6.42 cfs @ 3.70 fps)

Pond 2P: Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

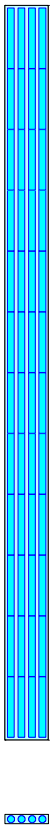
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

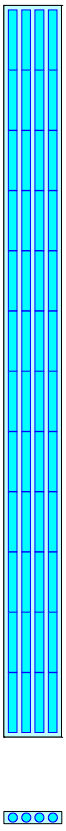
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

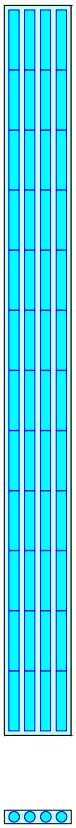
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

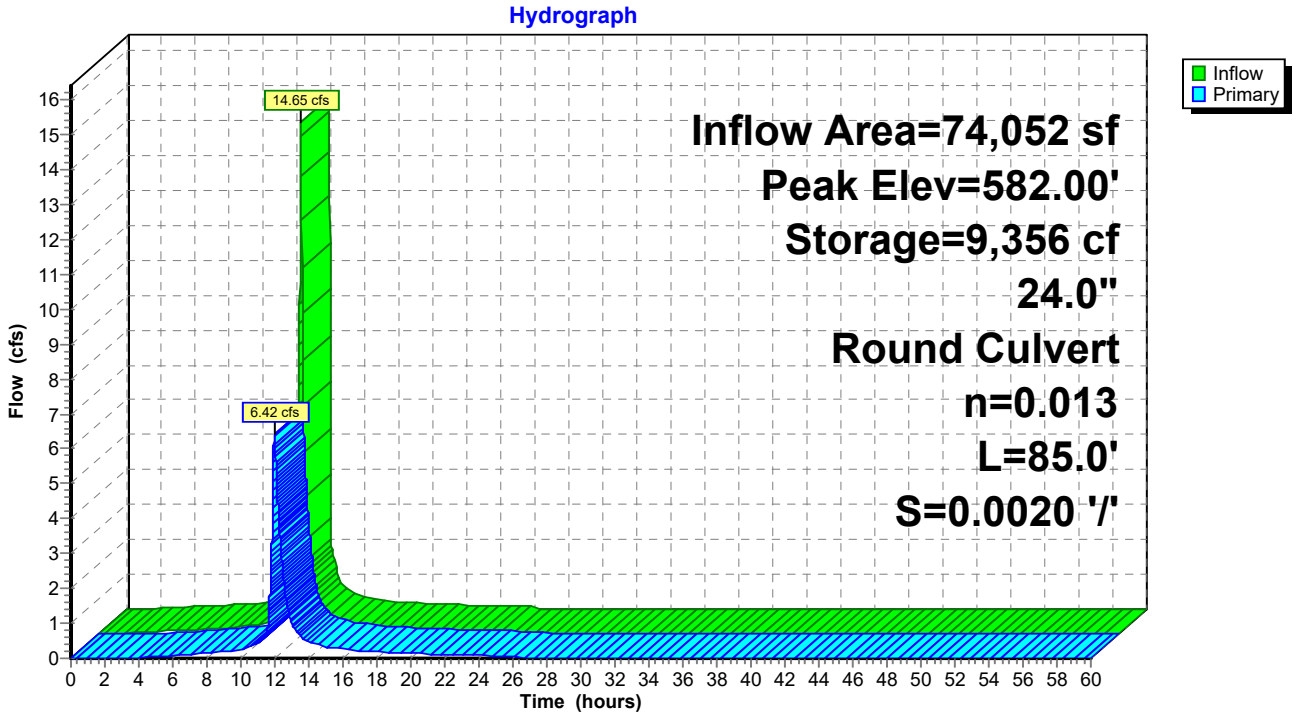
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Det. System A



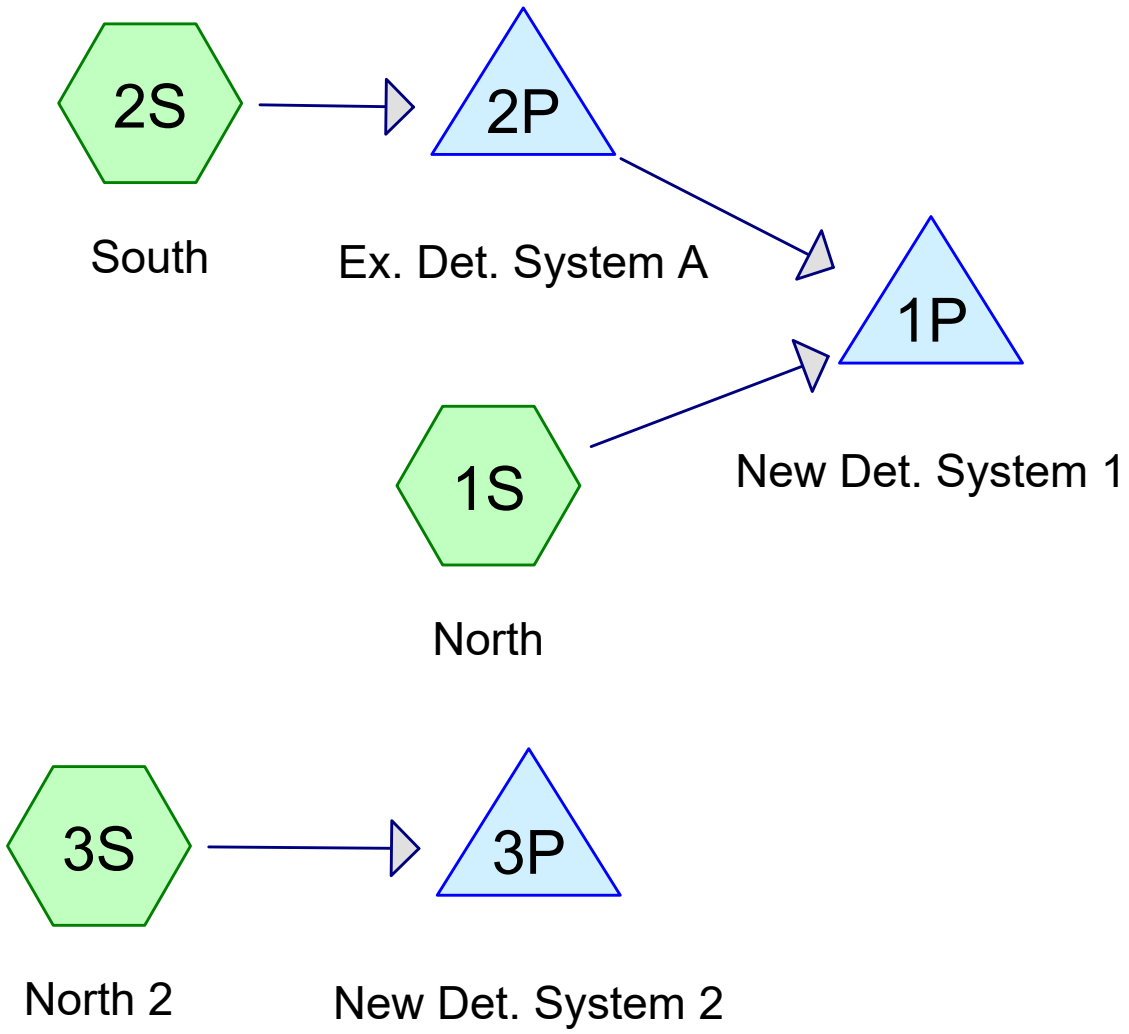
Proposed Runoff

Events for Pond 1P: New Det. System 1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
1-Year	2.83	1.24	580.83	2,353
2-Year	3.62	1.58	580.98	2,957
5-Year	4.66	1.96	581.22	3,887
10-Year	5.59	2.07	581.50	4,993
25-Year	7.02	2.46	581.94	6,589
50-Year	8.31	2.80	582.38	8,058
100-Year	**9.83**	**3.26**	**583.05**	**9,759**

Events for Pond 3P: New Det. System 2

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
1-Year	3.99	1.79	580.48	2,374
2-Year	4.89	2.20	580.60	2,901
5-Year	6.23	2.79	580.79	3,689
10-Year	7.45	3.18	580.97	4,440
25-Year	9.34	3.84	581.26	5,652
50-Year	11.06	4.44	581.55	6,754
100-Year	**13.06**	**5.00**	**581.92**	**8,090**



Subcat Reach Pond Link

Routing Diagram for 25-4116 proposed
Prepared by Carmina Wood Design, Printed 9/21/2025

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type II 24-hr		Default	24.00	1	1.87	2
2	10-Year	Type II 24-hr		Default	24.00	1	3.14	2
3	25-Year	Type II 24-hr		Default	24.00	1	3.84	2
4	100-Year	Type II 24-hr		Default	24.00	1	5.23	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
28,314	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S)
143,748	98	Paved parking, HSG D (1S, 2S, 3S)
172,062	**95**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
172,062	HSG D	1S, 2S, 3S
0	Other	
172,062		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	0	0	28,314	0	28,314	>75% Grass cover, Good	
0	0	0	143,748	0	143,748	Paved parking	
0	**0**	**0**	**172,062**	**0**	**172,062**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	150.0	0.0020	0.013	0.0	24.0	0.0
2	1P	580.00	579.45	262.0	0.0021	0.013	0.0	12.0	0.0
3	2P	580.56	580.39	85.0	0.0020	0.013	0.0	24.0	0.0
4	3P	579.67	579.45	22.0	0.0100	0.013	0.0	12.0	0.0

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=0.500 ac 74.00% Impervious Runoff Depth=1.20"
Flow Length=193' Tc=1.7 min CN=93 Runoff=1.21 cfs 2,171 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=1.54"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=4.99 cfs 9,528 cf

Subcatchment3S: North 2 Runoff Area=1.750 ac 76.00% Impervious Runoff Depth=1.28"
Flow Length=65' Tc=4.9 min CN=94 Runoff=3.99 cfs 8,101 cf

Pond 1P: New Det. System 1 Peak Elev=580.83' Storage=2,353 cf Inflow=2.83 cfs 11,667 cf
12.0" Round Culvert n=0.013 L=262.0' S=0.0021 '/' Outflow=1.24 cfs 11,625 cf

Pond 2P: Ex. Det. System A Peak Elev=581.32' Storage=3,915 cf Inflow=4.99 cfs 9,528 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=1.91 cfs 9,496 cf

Pond 3P: New Det. System 2 Peak Elev=580.48' Storage=2,374 cf Inflow=3.99 cfs 8,101 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0100 '/' Outflow=1.79 cfs 8,101 cf

Total Runoff Area = 172,062 sf Runoff Volume = 19,800 cf Average Runoff Depth = 1.38"
16.46% Pervious = 28,314 sf 83.54% Impervious = 143,748 sf

Summary for Subcatchment 1S: North

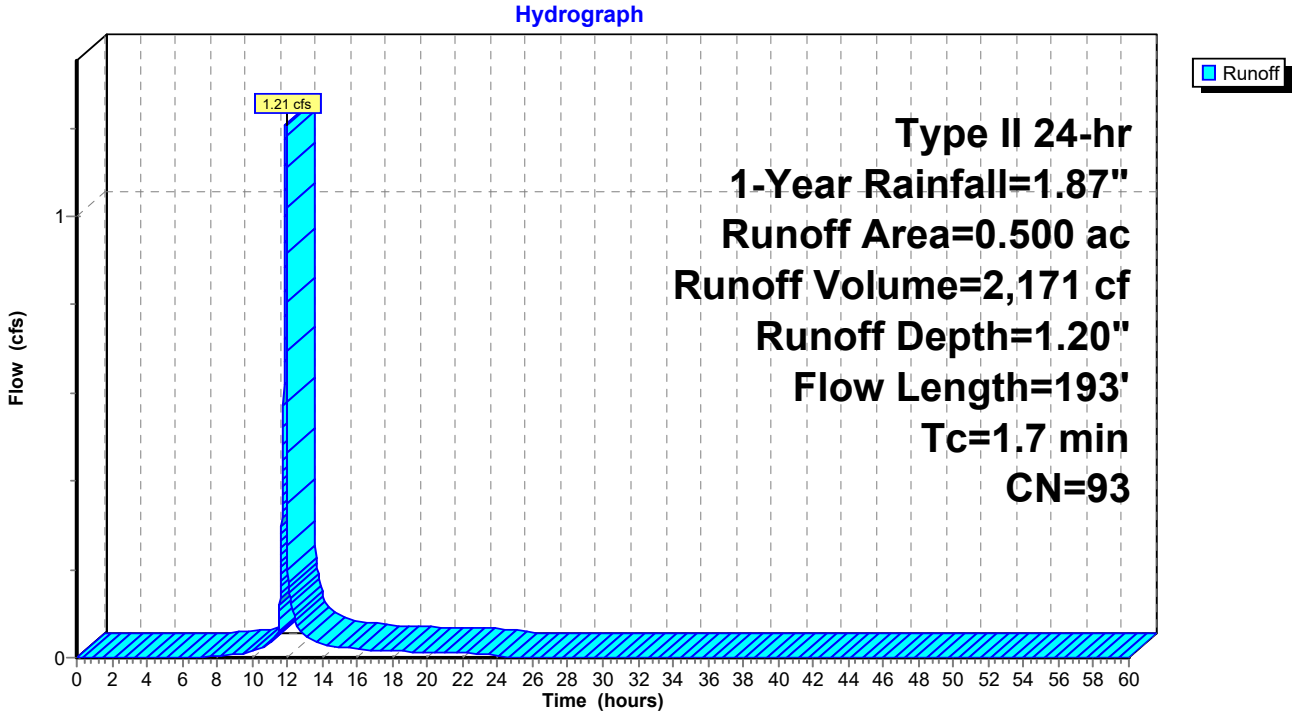
Runoff = 1.21 cfs @ 11.92 hrs, Volume= 2,171 cf, Depth= 1.20"
Routed to Pond 1P : New Det. System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.87"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG D
0.130	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.130		26.00% Pervious Area
0.370		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	43	0.0120	0.84		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
0.8	150	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
1.7	193	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

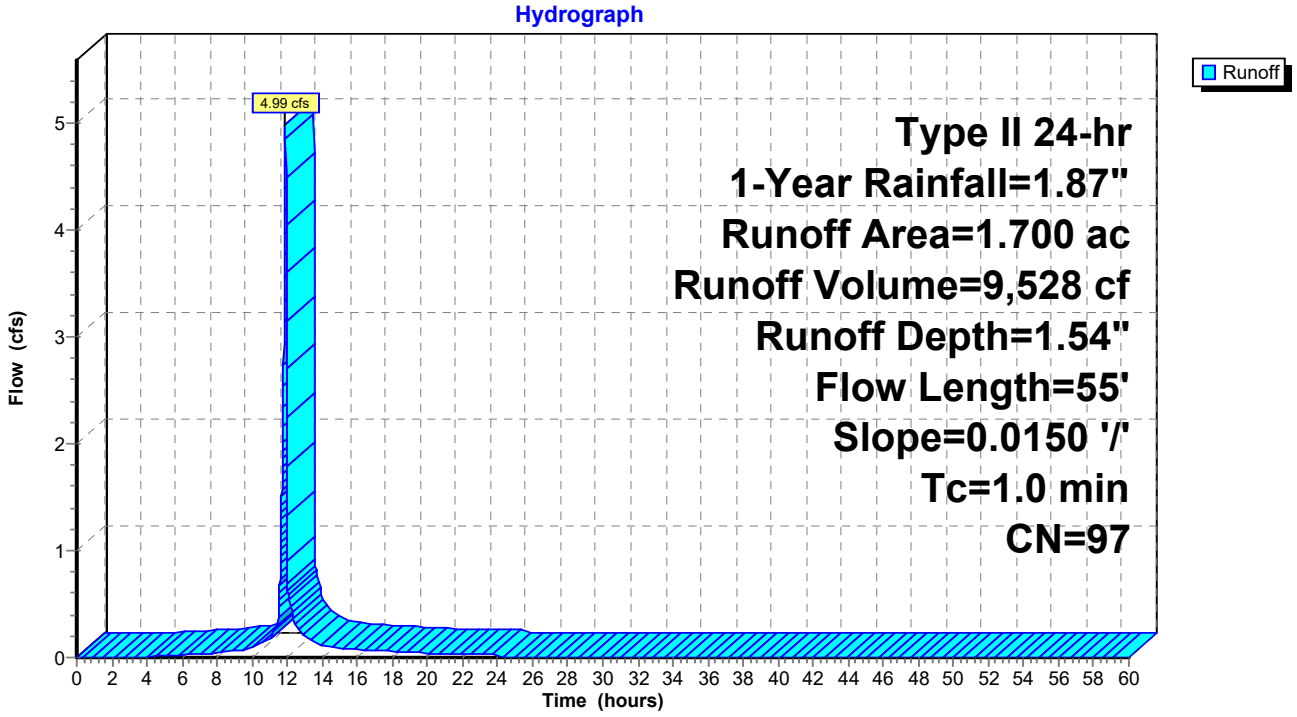
Runoff = 4.99 cfs @ 11.91 hrs, Volume= 9,528 cf, Depth= 1.54"
Routed to Pond 2P : Ex. Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.87"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

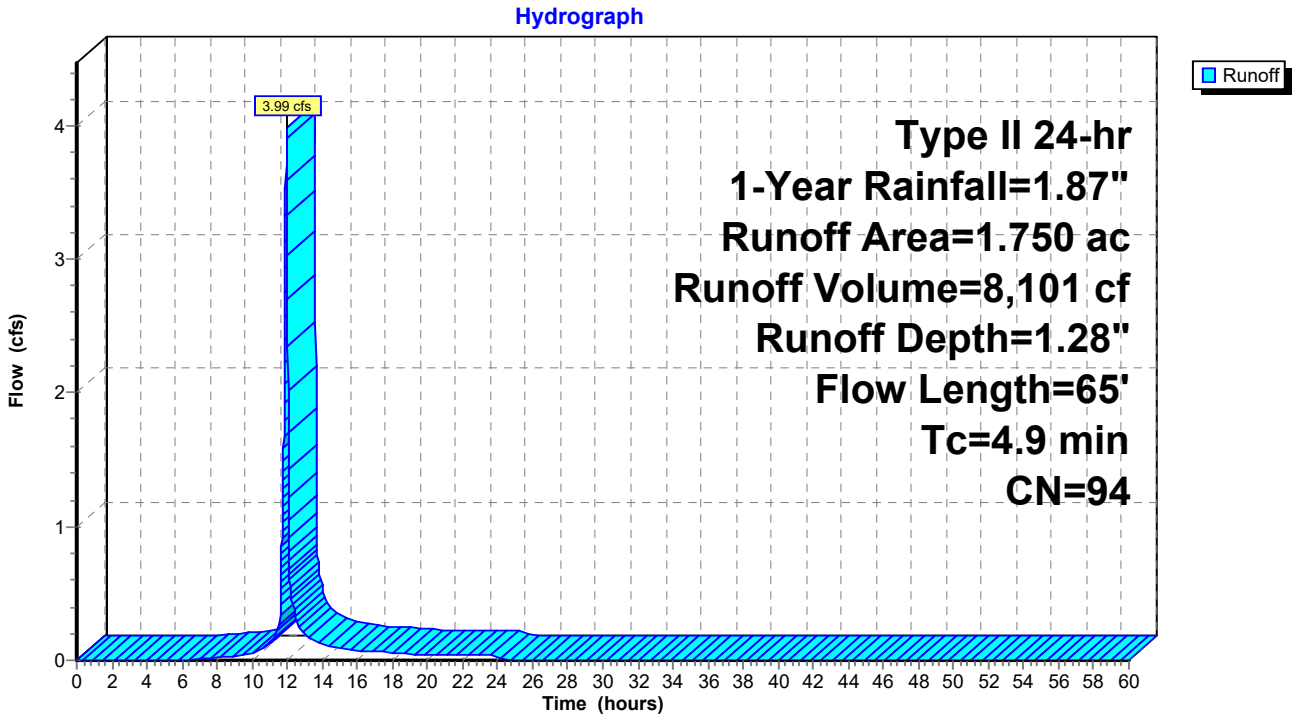
Runoff = 3.99 cfs @ 11.96 hrs, Volume= 8,101 cf, Depth= 1.28"
Routed to Pond 3P : New Det. System 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.87"

Area (ac)	CN	Description
1.330	98	Paved parking, HSG D
0.420	80	>75% Grass cover, Good, HSG D
1.750	94	Weighted Average
0.420		24.00% Pervious Area
1.330		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	15	0.0050	0.06		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
0.7	50	0.0300	1.24		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
4.9	65	Total			

Subcatchment 3S: North 2



Summary for Pond 1P: New Det. System 1

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 0.27'

Inflow Area = 95,832 sf, 89.55% Impervious, Inflow Depth > 1.46" for 1-Year event
Inflow = 2.83 cfs @ 11.94 hrs, Volume= 11,667 cf
Outflow = 1.24 cfs @ 12.26 hrs, Volume= 11,625 cf, Atten= 56%, Lag= 19.4 min
Primary = 1.24 cfs @ 12.26 hrs, Volume= 11,625 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 580.83' @ 12.26 hrs Surf.Area= 4,924 sf Storage= 2,353 cf

Plug-Flow detention time= 62.1 min calculated for 11,623 cf (100% of inflow)
Center-of-Mass det. time= 53.8 min (940.2 - 886.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.00'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	580.50'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.00'	**12.0" Round 12" pipe** L= 262.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.00' / 579.45' S= 0.0021 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.24 cfs @ 12.26 hrs HW=580.83' (Free Discharge)
↑—**1=12" pipe** (Barrel Controls 1.24 cfs @ 2.40 fps)

Pond 1P: New Det. System 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

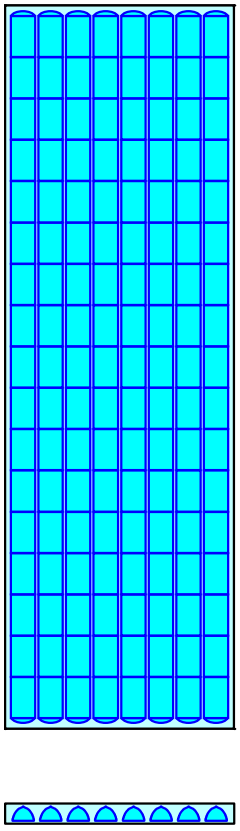
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

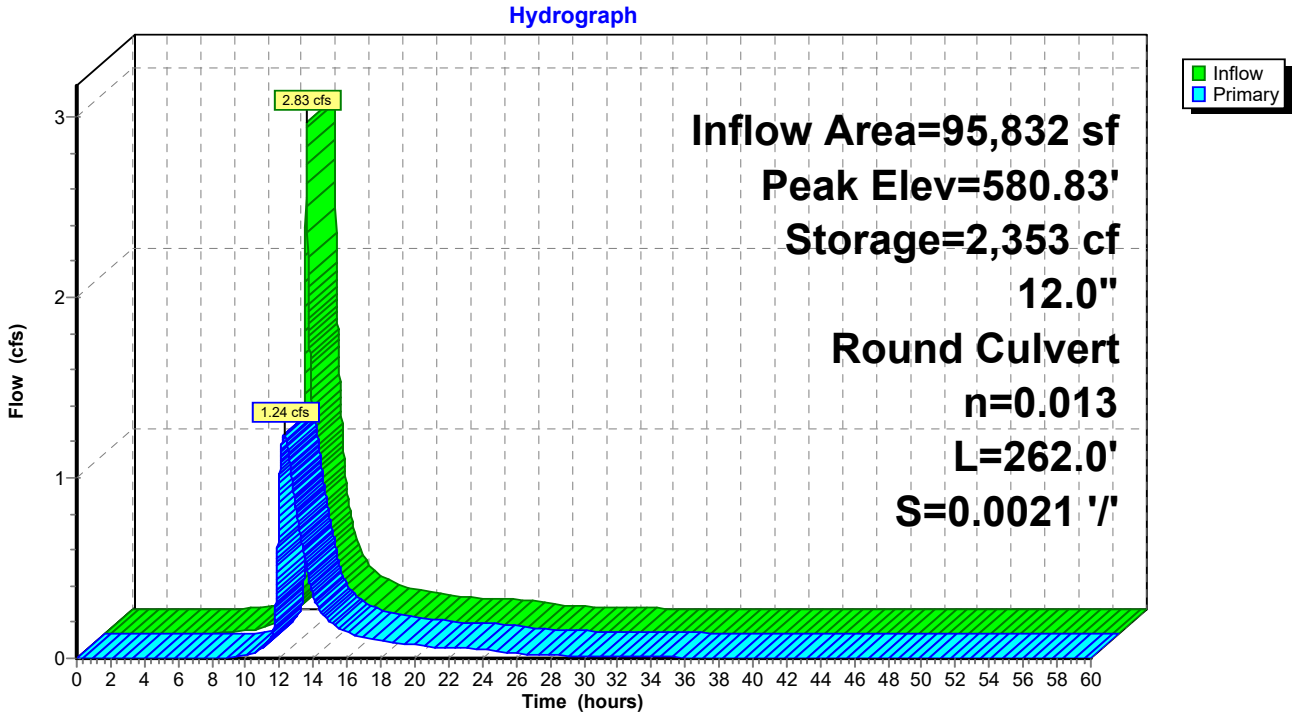
17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone



Pond 1P: New Det. System 1



Summary for Pond 2P: Ex. Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 1.54" for 1-Year event
Inflow = 4.99 cfs @ 11.91 hrs, Volume= 9,528 cf
Outflow = 1.91 cfs @ 11.99 hrs, Volume= 9,496 cf, Atten= 62%, Lag= 4.6 min
Primary = 1.91 cfs @ 11.99 hrs, Volume= 9,496 cf
Routed to Pond 1P : New Det. System 1

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.32' @ 11.99 hrs Surf.Area= 13,558 sf Storage= 3,915 cf

Plug-Flow detention time= 133.6 min calculated for 9,495 cf (100% of inflow)
Center-of-Mass det. time= 131.8 min (904.9 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.91 cfs @ 11.99 hrs HW=581.31' (Free Discharge)
1=Culvert (Barrel Controls 1.91 cfs @ 2.62 fps)

Pond 2P: Ex. Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

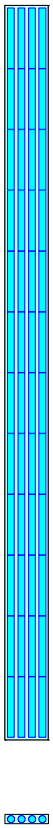
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

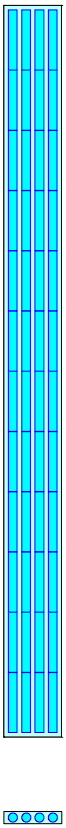
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

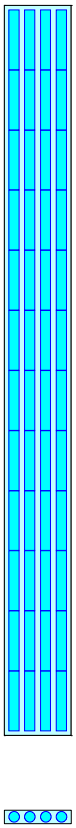
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

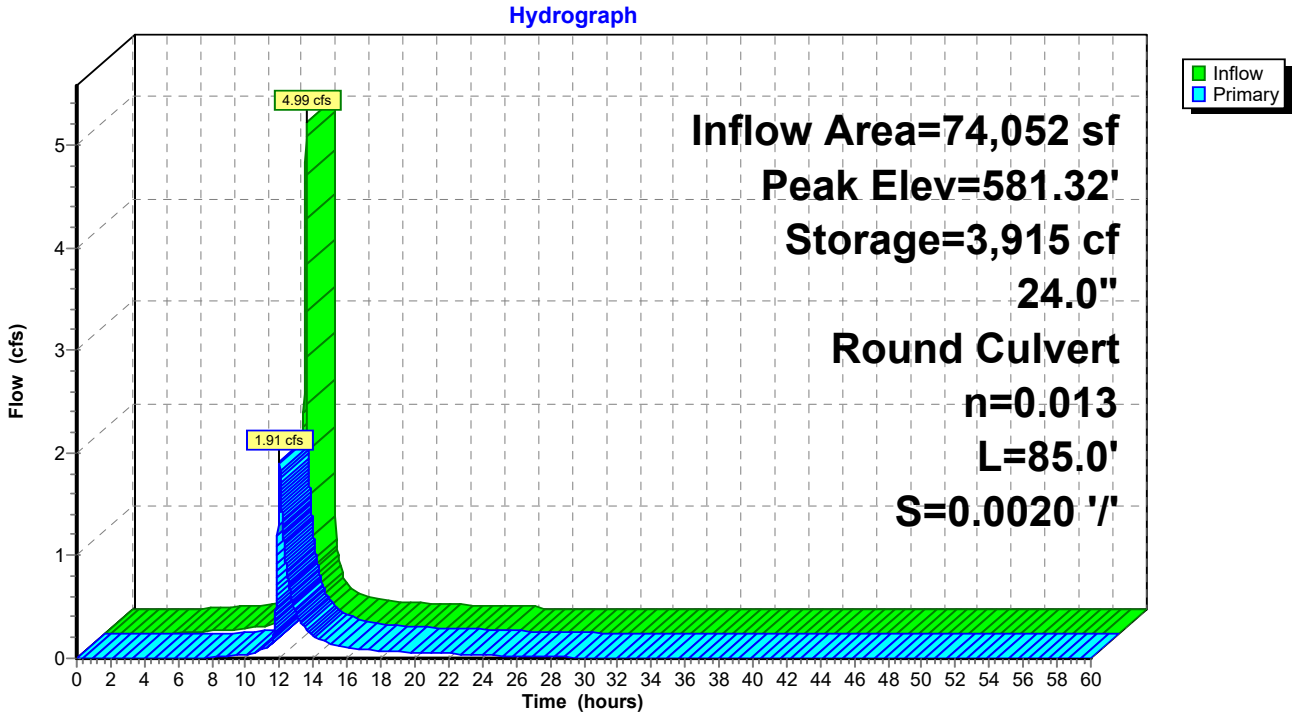
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Ex. Det. System A



Summary for Pond 3P: New Det. System 2

Inflow Area = 76,230 sf, 76.00% Impervious, Inflow Depth = 1.28" for 1-Year event
Inflow = 3.99 cfs @ 11.96 hrs, Volume= 8,101 cf
Outflow = 1.79 cfs @ 12.05 hrs, Volume= 8,101 cf, Atten= 55%, Lag= 5.4 min
Primary = 1.79 cfs @ 12.05 hrs, Volume= 8,101 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 580.48' @ 12.05 hrs Surf.Area= 5,205 sf Storage= 2,374 cf

Plug-Flow detention time= 45.7 min calculated for 8,101 cf (100% of inflow)
Center-of-Mass det. time= 45.7 min (847.8 - 802.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.67'	4,641 cf	**39.50'W x 131.78'L x 3.50'H Field A** 18,218 cf Overall - 6,615 cf Embedded = 11,603 cf x 40.0% Voids
#2A	580.17'	6,615 cf	**ADS_StormTech SC-740 +Cap** x 144 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 144 Chambers in 8 Rows
		11,256 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.67'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.67' / 579.45' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.79 cfs @ 12.05 hrs HW=580.48' (Free Discharge)
1=Culvert (Barrel Controls 1.79 cfs @ 3.60 fps)

Pond 3P: New Det. System 2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

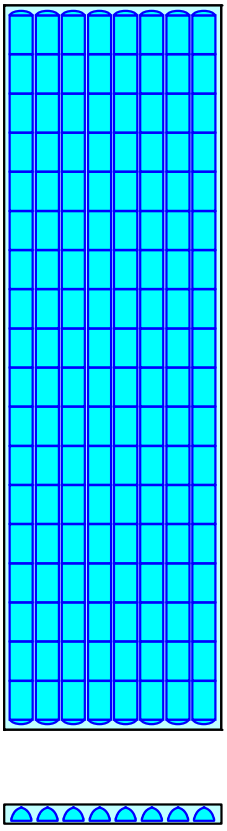
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

144 Chambers x 45.9 cf = 6,615.4 cf Chamber Storage

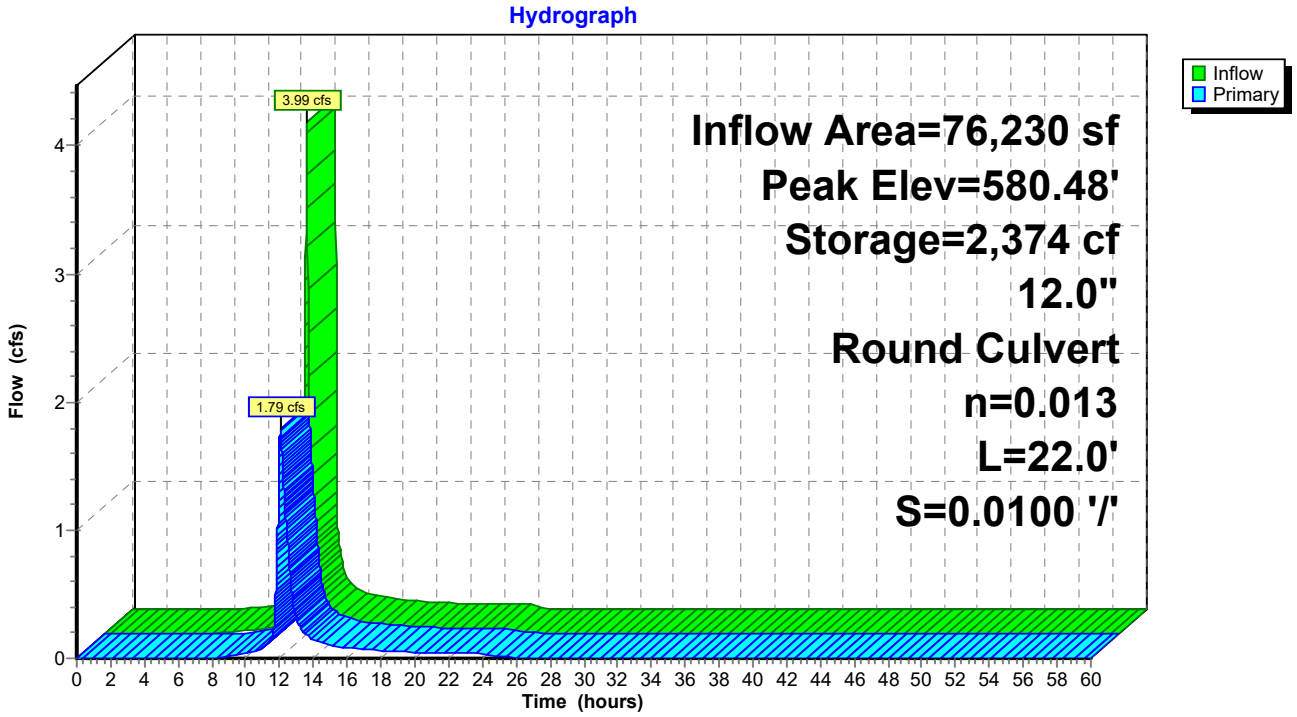
18,218.1 cf Field - 6,615.4 cf Chambers = 11,602.8 cf Stone x 40.0% Voids = 4,641.1 cf Stone Storage

Chamber Storage + Stone Storage = 11,256.5 cf = 0.258 af
Overall Storage Efficiency = 61.8%
Overall System Size = 131.78' x 39.50' x 3.50'

144 Chambers
674.7 cy Field
429.7 cy Stone



Pond 3P: New Det. System 2



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=0.500 ac 74.00% Impervious Runoff Depth=2.39"
Flow Length=193' Tc=1.7 min CN=93 Runoff=2.30 cfs 4,335 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=2.80"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=8.67 cfs 17,261 cf

Subcatchment3S: North 2 Runoff Area=1.750 ac 76.00% Impervious Runoff Depth=2.49"
Flow Length=65' Tc=4.9 min CN=94 Runoff=7.45 cfs 15,790 cf

Pond 1P: New Det. System 1 Peak Elev=581.50' Storage=4,993 cf Inflow=5.59 cfs 21,561 cf
12.0" Round Culvert n=0.013 L=262.0' S=0.0021 '/' Outflow=2.07 cfs 21,517 cf

Pond 2P: Ex. Det. System A Peak Elev=581.62' Storage=6,069 cf Inflow=8.67 cfs 17,261 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=3.68 cfs 17,227 cf

Pond 3P: New Det. System 2 Peak Elev=580.97' Storage=4,440 cf Inflow=7.45 cfs 15,790 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0100 '/' Outflow=3.18 cfs 15,790 cf

Total Runoff Area = 172,062 sf Runoff Volume = 37,386 cf Average Runoff Depth = 2.61"
16.46% Pervious = 28,314 sf 83.54% Impervious = 143,748 sf

Summary for Subcatchment 1S: North

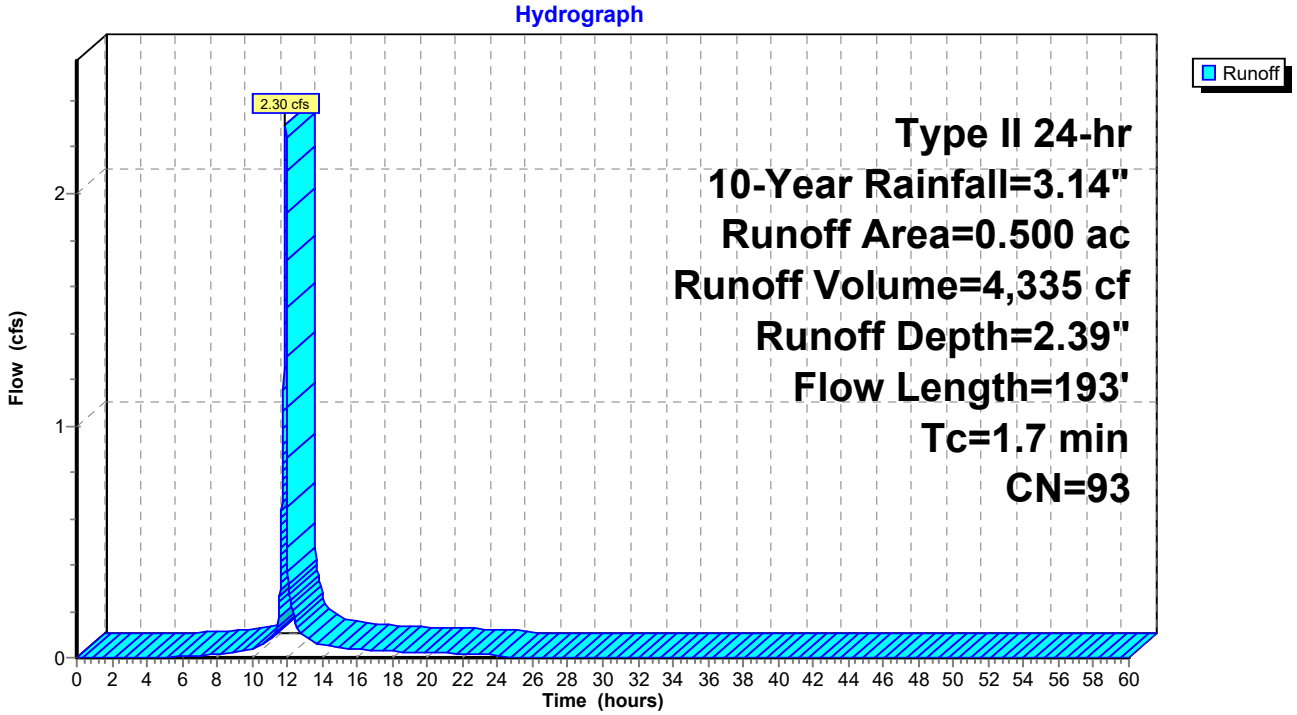
Runoff = 2.30 cfs @ 11.92 hrs, Volume= 4,335 cf, Depth= 2.39"
Routed to Pond 1P : New Det. System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.14"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG D
0.130	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.130		26.00% Pervious Area
0.370		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	43	0.0120	0.84		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
0.8	150	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
1.7	193	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

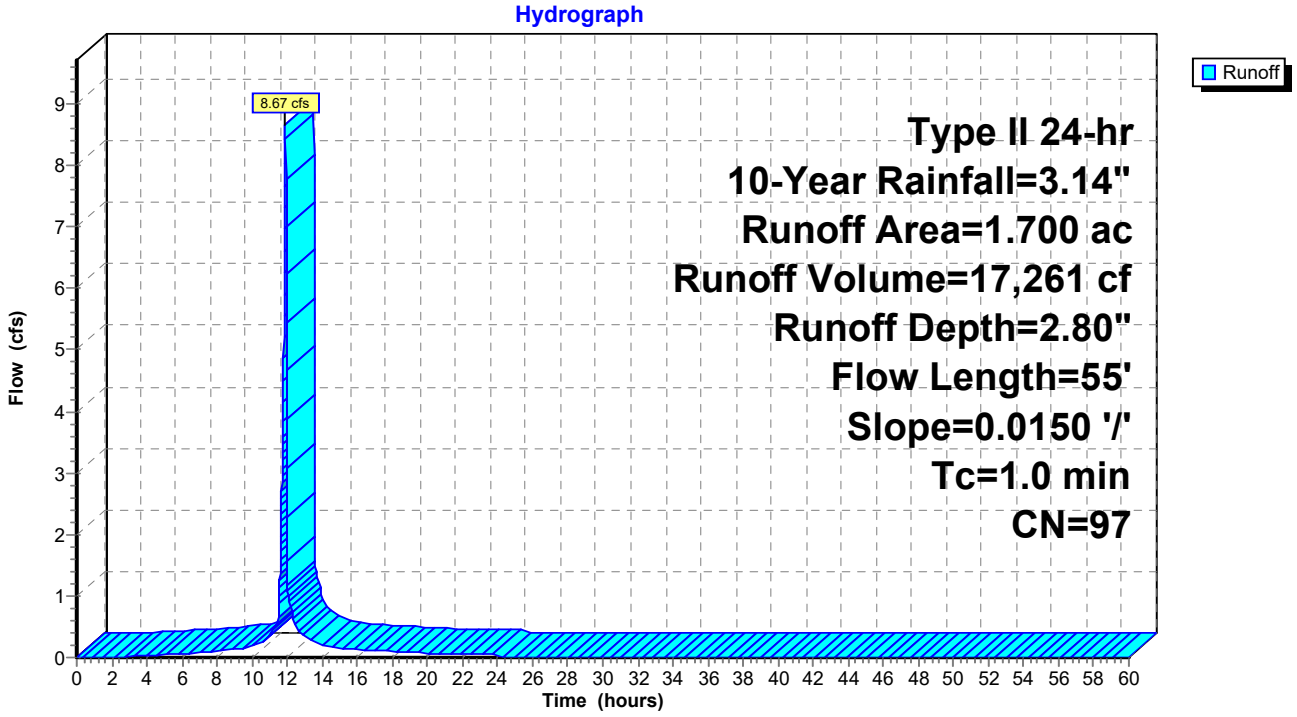
Runoff = 8.67 cfs @ 11.91 hrs, Volume= 17,261 cf, Depth= 2.80"
Routed to Pond 2P : Ex. Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.14"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

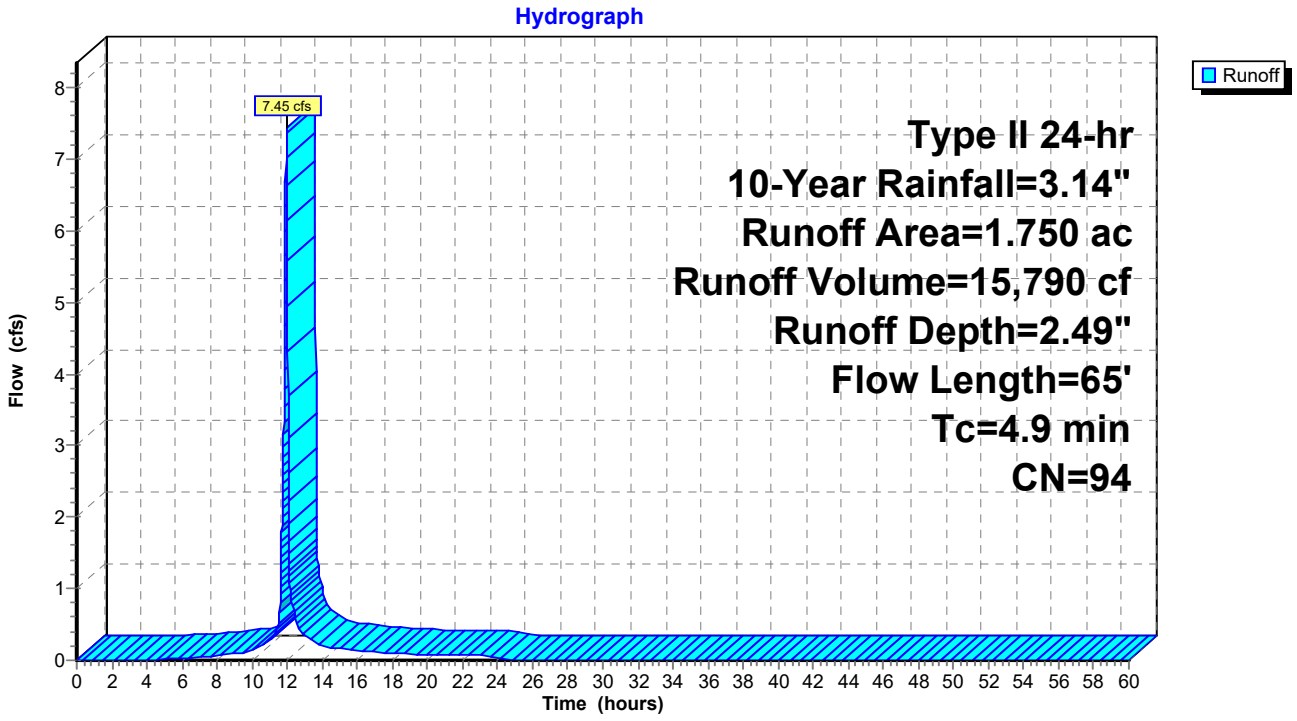
Runoff = 7.45 cfs @ 11.96 hrs, Volume= 15,790 cf, Depth= 2.49"
Routed to Pond 3P : New Det. System 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.14"

Area (ac)	CN	Description
1.330	98	Paved parking, HSG D
0.420	80	>75% Grass cover, Good, HSG D
1.750	94	Weighted Average
0.420		24.00% Pervious Area
1.330		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	15	0.0050	0.06		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
0.7	50	0.0300	1.24		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
4.9	65	Total			

Subcatchment 3S: North 2



Summary for Pond 1P: New Det. System 1

[81] Warning: Exceeded Pond 2P by 0.27' @ 12.53 hrs

Inflow Area = 95,832 sf, 89.55% Impervious, Inflow Depth > 2.70" for 10-Year event
Inflow = 5.59 cfs @ 11.93 hrs, Volume= 21,561 cf
Outflow = 2.07 cfs @ 12.34 hrs, Volume= 21,517 cf, Atten= 63%, Lag= 24.3 min
Primary = 2.07 cfs @ 12.34 hrs, Volume= 21,517 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.50' @ 12.34 hrs Surf.Area= 4,924 sf Storage= 4,993 cf

Plug-Flow detention time= 51.3 min calculated for 21,513 cf (100% of inflow)
Center-of-Mass det. time= 46.6 min (888.4 - 841.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.00'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	580.50'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.00'	**12.0" Round 12" pipe** L= 262.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.00' / 579.45' S= 0.0021 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.07 cfs @ 12.34 hrs HW=581.50' (Free Discharge)
1=12" pipe (Barrel Controls 2.07 cfs @ 2.64 fps)

Pond 1P: New Det. System 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

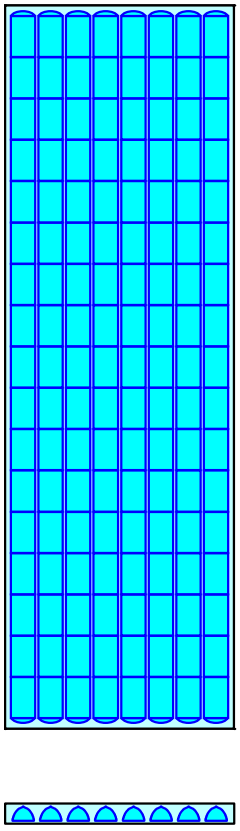
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

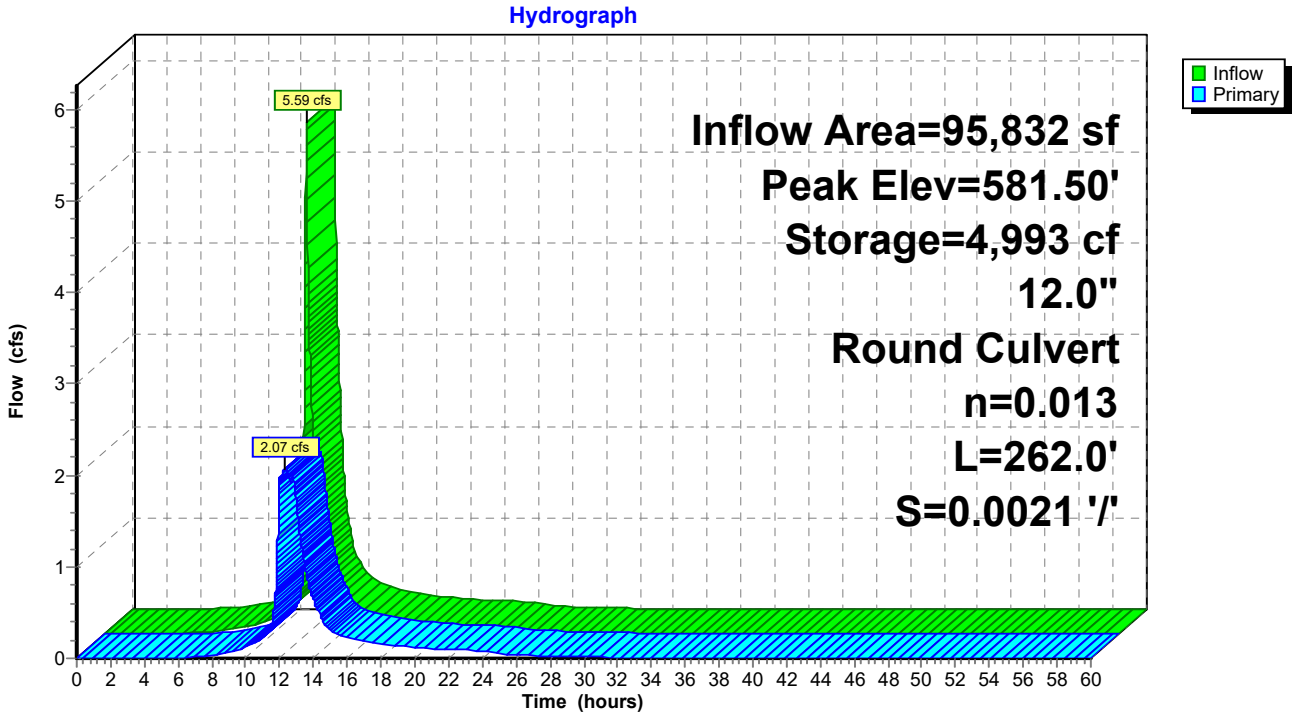
17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone



Pond 1P: New Det. System 1



Summary for Pond 2P: Ex. Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 2.80" for 10-Year event
Inflow = 8.67 cfs @ 11.91 hrs, Volume= 17,261 cf
Outflow = 3.68 cfs @ 11.98 hrs, Volume= 17,227 cf, Atten= 58%, Lag= 4.3 min
Primary = 3.68 cfs @ 11.98 hrs, Volume= 17,227 cf
Routed to Pond 1P : New Det. System 1

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.62' @ 11.98 hrs Surf.Area= 13,558 sf Storage= 6,069 cf

Plug-Flow detention time= 98.9 min calculated for 17,227 cf (100% of inflow)
Center-of-Mass det. time= 97.6 min (855.8 - 758.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.67 cfs @ 11.98 hrs HW=581.62' (Free Discharge)
1=Culvert (Barrel Controls 3.67 cfs @ 3.16 fps)

Pond 2P: Ex. Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

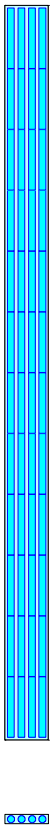
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

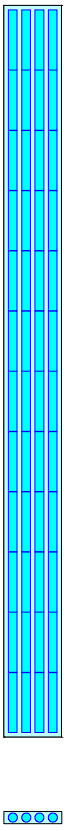
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

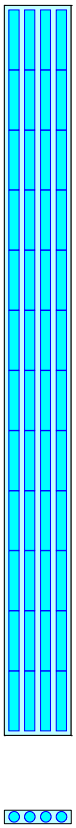
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

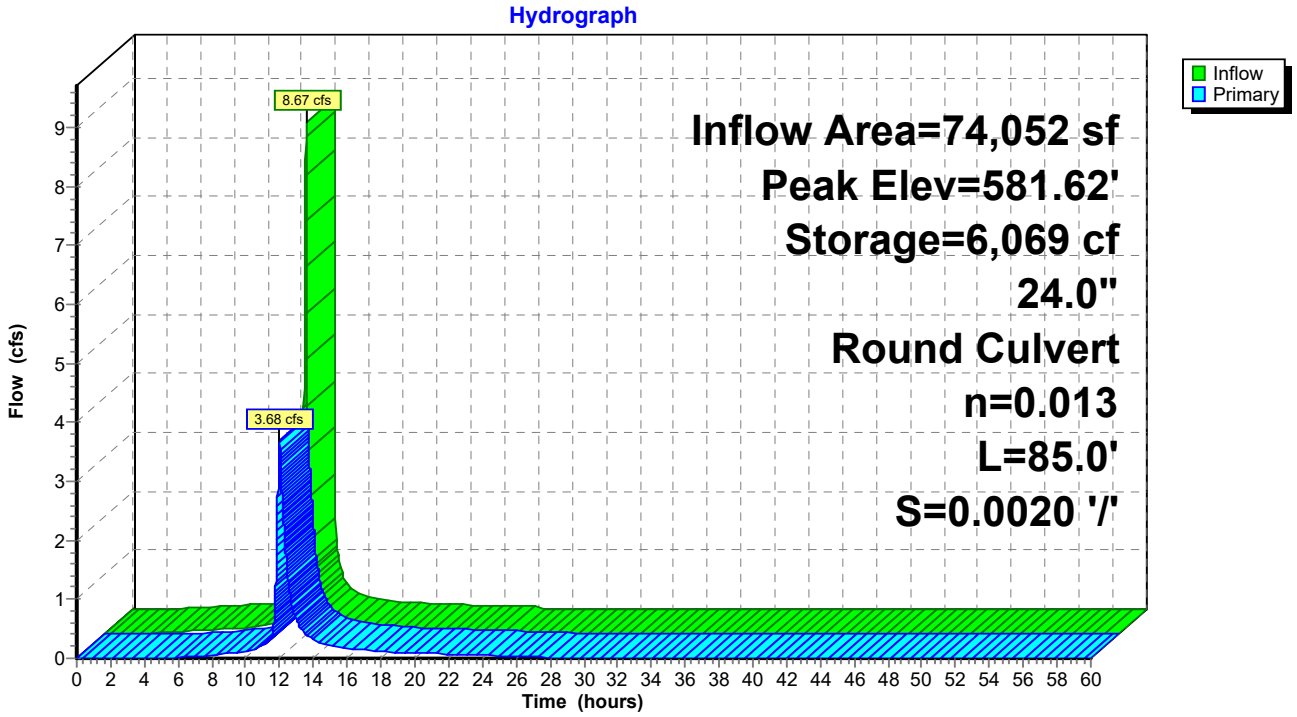
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Ex. Det. System A



Summary for Pond 3P: New Det. System 2

Inflow Area = 76,230 sf, 76.00% Impervious, Inflow Depth = 2.49" for 10-Year event
Inflow = 7.45 cfs @ 11.96 hrs, Volume= 15,790 cf
Outflow = 3.18 cfs @ 12.05 hrs, Volume= 15,790 cf, Atten= 57%, Lag= 5.6 min
Primary = 3.18 cfs @ 12.05 hrs, Volume= 15,790 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 580.97' @ 12.05 hrs Surf.Area= 5,205 sf Storage= 4,440 cf

Plug-Flow detention time= 36.8 min calculated for 15,790 cf (100% of inflow)
Center-of-Mass det. time= 36.7 min (820.2 - 783.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.67'	4,641 cf	**39.50'W x 131.78'L x 3.50'H Field A** 18,218 cf Overall - 6,615 cf Embedded = 11,603 cf x 40.0% Voids
#2A	580.17'	6,615 cf	**ADS_StormTech SC-740 +Cap** x 144 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 144 Chambers in 8 Rows
		11,256 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.67'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.67' / 579.45' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.18 cfs @ 12.05 hrs HW=580.97' (Free Discharge)
1=Culvert (Barrel Controls 3.18 cfs @ 4.08 fps)

Pond 3P: New Det. System 2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

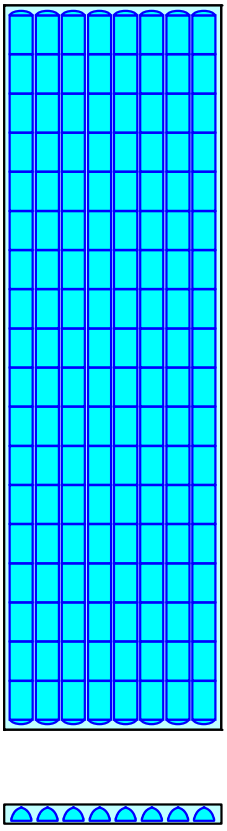
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

144 Chambers x 45.9 cf = 6,615.4 cf Chamber Storage

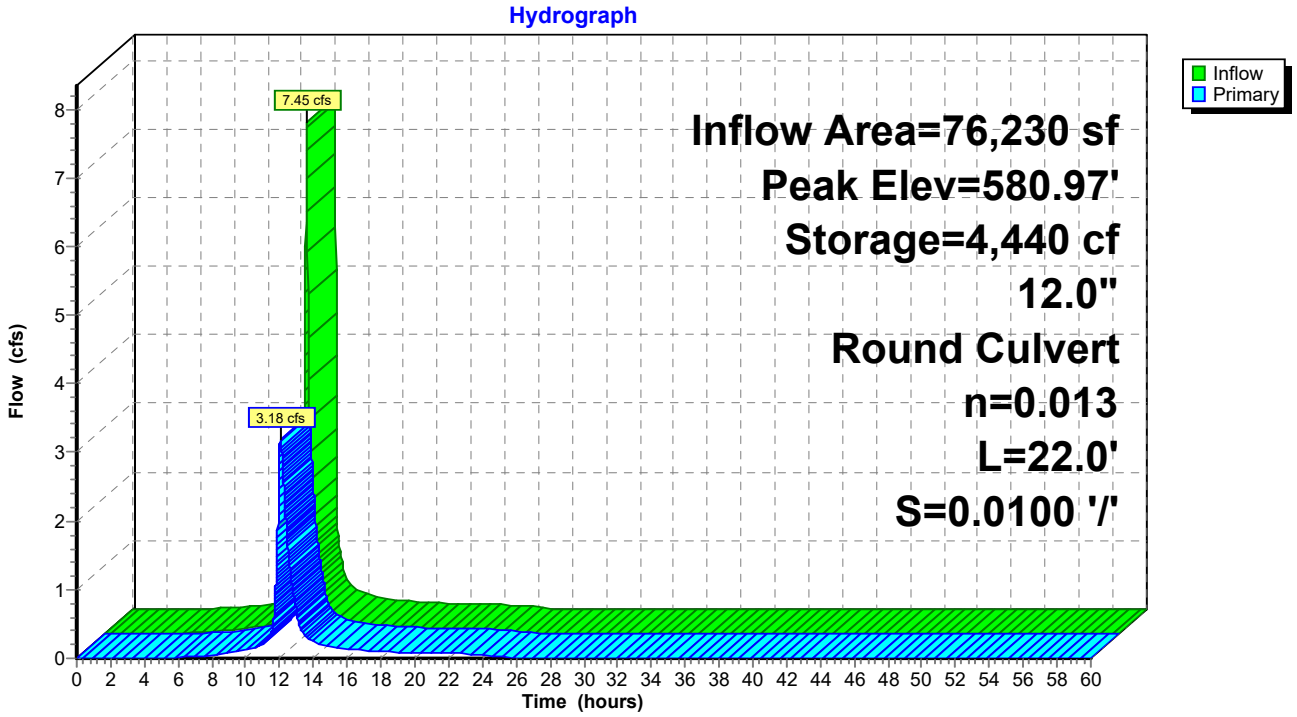
18,218.1 cf Field - 6,615.4 cf Chambers = 11,602.8 cf Stone x 40.0% Voids = 4,641.1 cf Stone Storage

Chamber Storage + Stone Storage = 11,256.5 cf = 0.258 af
Overall Storage Efficiency = 61.8%
Overall System Size = 131.78' x 39.50' x 3.50'

144 Chambers
674.7 cy Field
429.7 cy Stone



Pond 3P: New Det. System 2



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=0.500 ac 74.00% Impervious Runoff Depth=3.06"
Flow Length=193' Tc=1.7 min CN=93 Runoff=2.90 cfs 5,562 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=3.49"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=10.68 cfs 21,551 cf

Subcatchment3S: North 2 Runoff Area=1.750 ac 76.00% Impervious Runoff Depth=3.17"
Flow Length=65' Tc=4.9 min CN=94 Runoff=9.34 cfs 20,123 cf

Pond 1P: New Det. System 1 Peak Elev=581.94' Storage=6,589 cf Inflow=7.02 cfs 27,077 cf
12.0" Round Culvert n=0.013 L=262.0' S=0.0021 '/' Outflow=2.46 cfs 27,033 cf

Pond 2P: Ex. Det. System A Peak Elev=581.76' Storage=7,192 cf Inflow=10.68 cfs 21,551 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=4.60 cfs 21,516 cf

Pond 3P: New Det. System 2 Peak Elev=581.26' Storage=5,652 cf Inflow=9.34 cfs 20,123 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0100 '/' Outflow=3.84 cfs 20,123 cf

Total Runoff Area = 172,062 sf Runoff Volume = 47,235 cf Average Runoff Depth = 3.29"
16.46% Pervious = 28,314 sf 83.54% Impervious = 143,748 sf

Summary for Subcatchment 1S: North

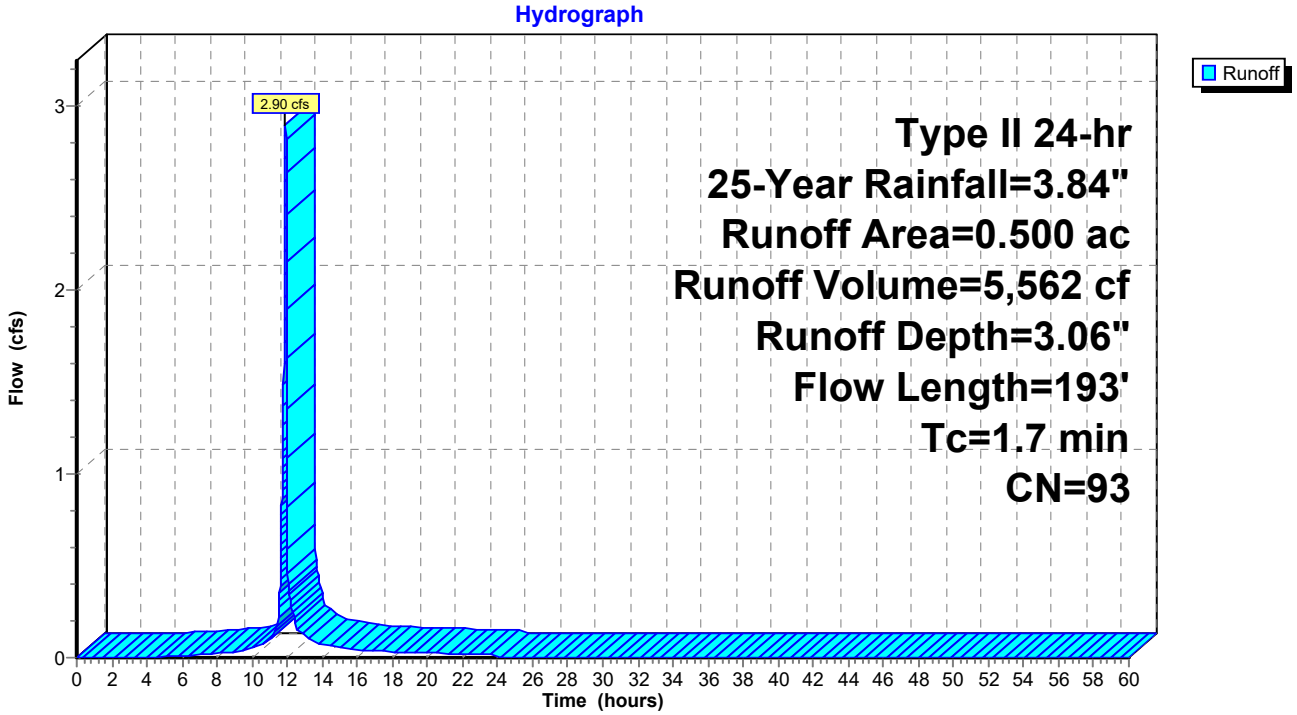
Runoff = 2.90 cfs @ 11.92 hrs, Volume= 5,562 cf, Depth= 3.06"
Routed to Pond 1P : New Det. System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.84"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG D
0.130	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.130		26.00% Pervious Area
0.370		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	43	0.0120	0.84		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
0.8	150	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
1.7	193	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

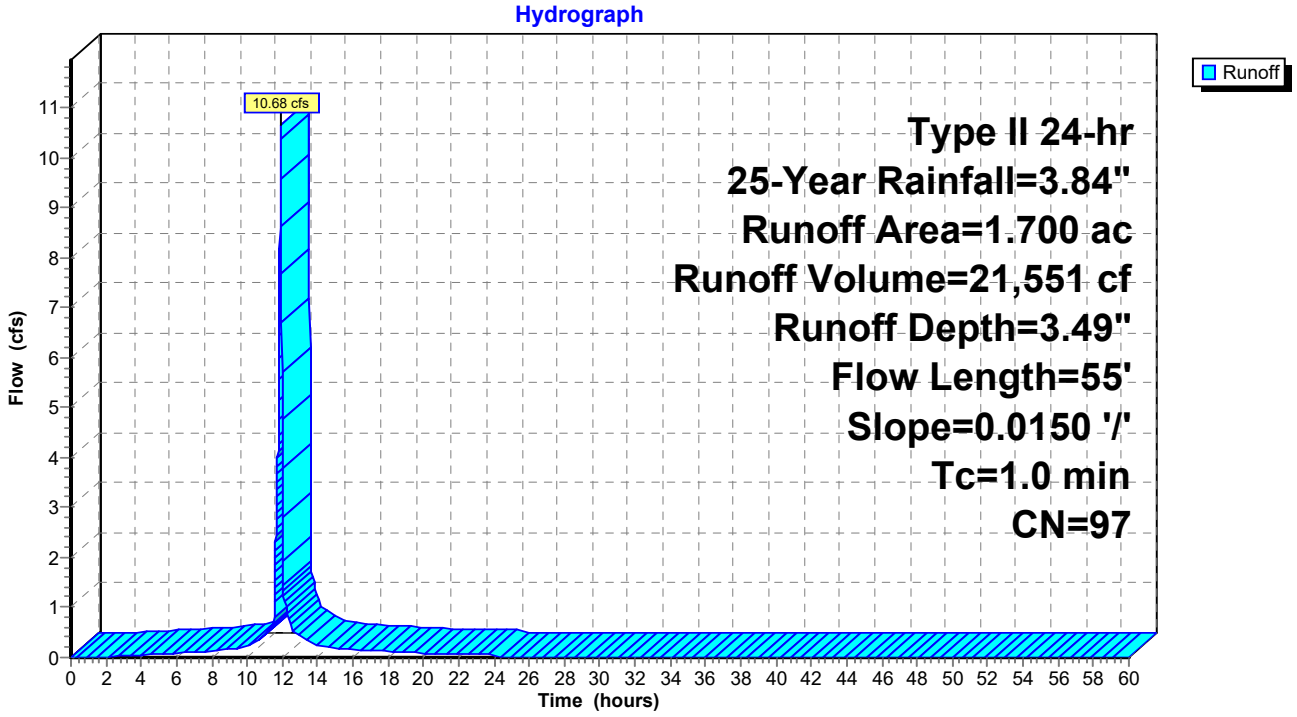
Runoff = 10.68 cfs @ 11.91 hrs, Volume= 21,551 cf, Depth= 3.49"
Routed to Pond 2P : Ex. Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.84"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

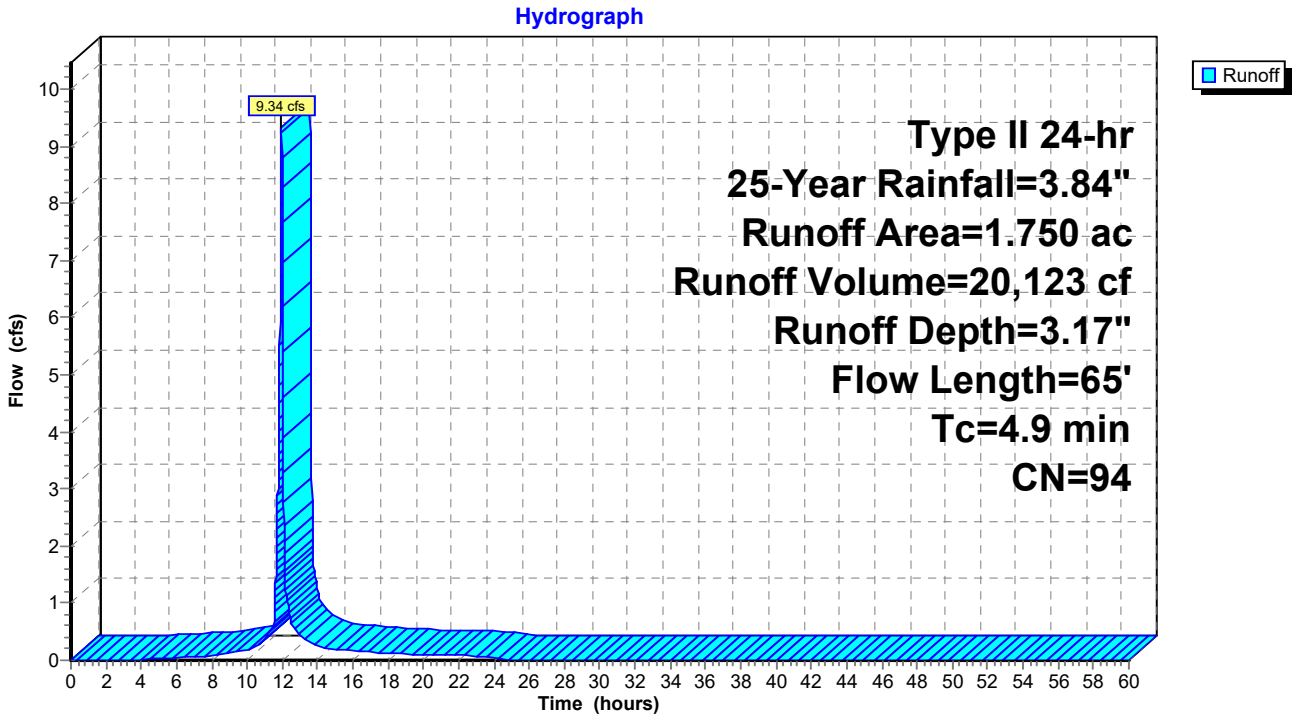
Runoff = 9.34 cfs @ 11.96 hrs, Volume= 20,123 cf, Depth= 3.17"
Routed to Pond 3P : New Det. System 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.84"

Area (ac)	CN	Description
1.330	98	Paved parking, HSG D
0.420	80	>75% Grass cover, Good, HSG D
1.750	94	Weighted Average
0.420		24.00% Pervious Area
1.330		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	15	0.0050	0.06		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
0.7	50	0.0300	1.24		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
4.9	65	Total			

Subcatchment 3S: North 2



Summary for Pond 1P: New Det. System 1

[81] Warning: Exceeded Pond 2P by 0.63' @ 12.54 hrs

Inflow Area = 95,832 sf, 89.55% Impervious, Inflow Depth = 3.39" for 25-Year event
Inflow = 7.02 cfs @ 11.93 hrs, Volume= 27,077 cf
Outflow = 2.46 cfs @ 12.37 hrs, Volume= 27,033 cf, Atten= 65%, Lag= 26.1 min
Primary = 2.46 cfs @ 12.37 hrs, Volume= 27,033 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.94' @ 12.37 hrs Surf.Area= 4,924 sf Storage= 6,589 cf

Plug-Flow detention time= 49.8 min calculated for 27,028 cf (100% of inflow)
Center-of-Mass det. time= 46.0 min (874.2 - 828.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.00'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	580.50'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.00'	**12.0" Round 12" pipe** L= 262.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.00' / 579.45' S= 0.0021 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.46 cfs @ 12.37 hrs HW=581.94' (Free Discharge)
1=12" pipe (Barrel Controls 2.46 cfs @ 3.14 fps)

Pond 1P: New Det. System 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

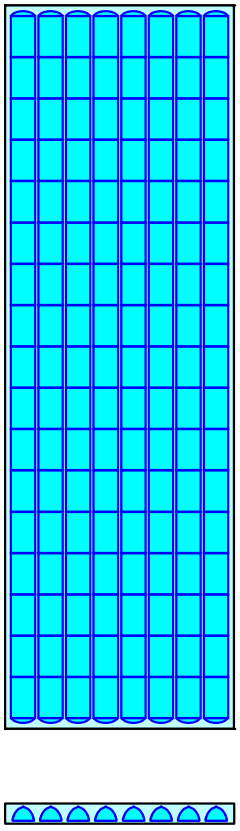
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

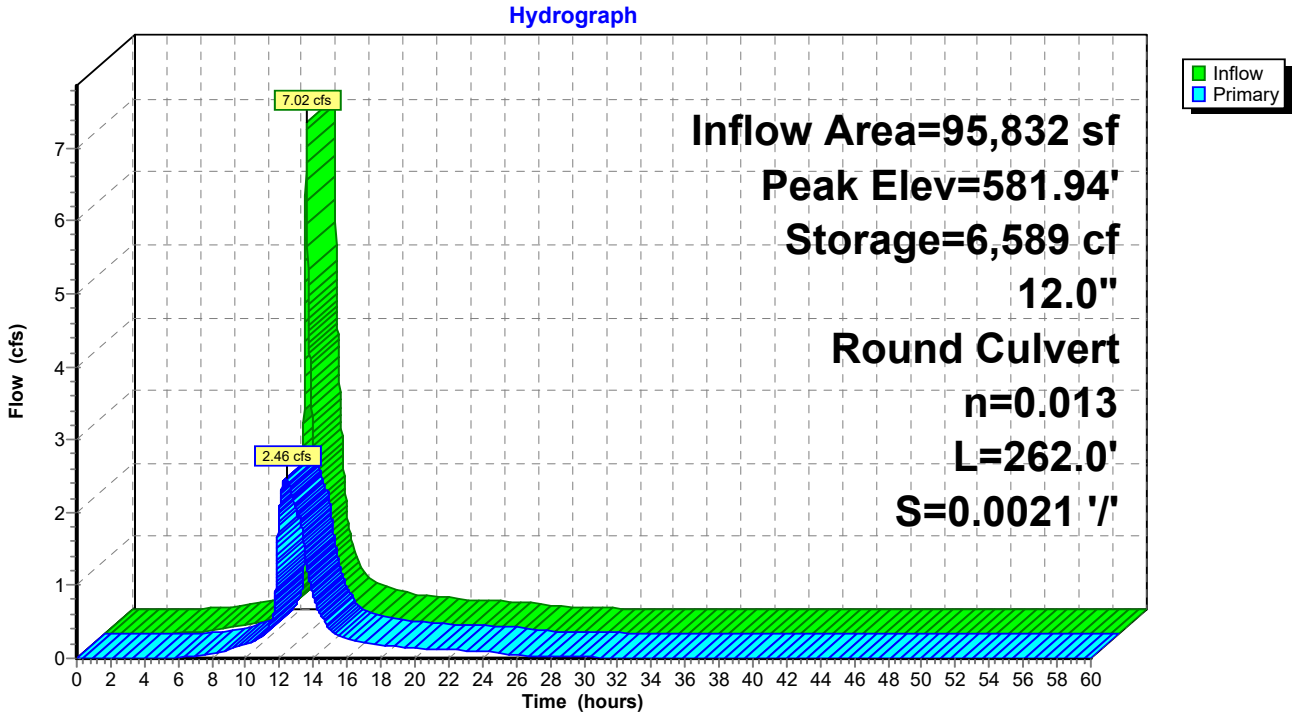
17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone



Pond 1P: New Det. System 1



Summary for Pond 2P: Ex. Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 3.49" for 25-Year event
Inflow = 10.68 cfs @ 11.91 hrs, Volume= 21,551 cf
Outflow = 4.60 cfs @ 11.98 hrs, Volume= 21,516 cf, Atten= 57%, Lag= 4.3 min
Primary = 4.60 cfs @ 11.98 hrs, Volume= 21,516 cf
Routed to Pond 1P : New Det. System 1

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.76' @ 11.98 hrs Surf.Area= 13,558 sf Storage= 7,192 cf

Plug-Flow detention time= 88.4 min calculated for 21,512 cf (100% of inflow)
Center-of-Mass det. time= 87.6 min (840.8 - 753.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.59 cfs @ 11.98 hrs HW=581.76' (Free Discharge)
1=Culvert (Barrel Controls 4.59 cfs @ 3.37 fps)

Pond 2P: Ex. Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

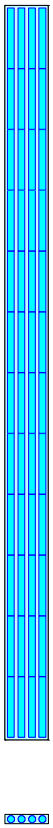
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

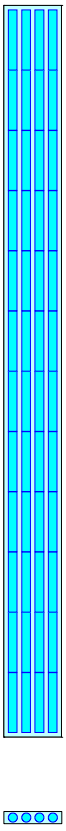
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

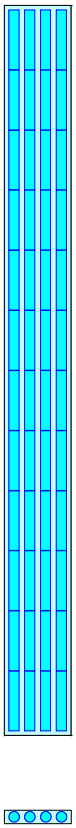
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

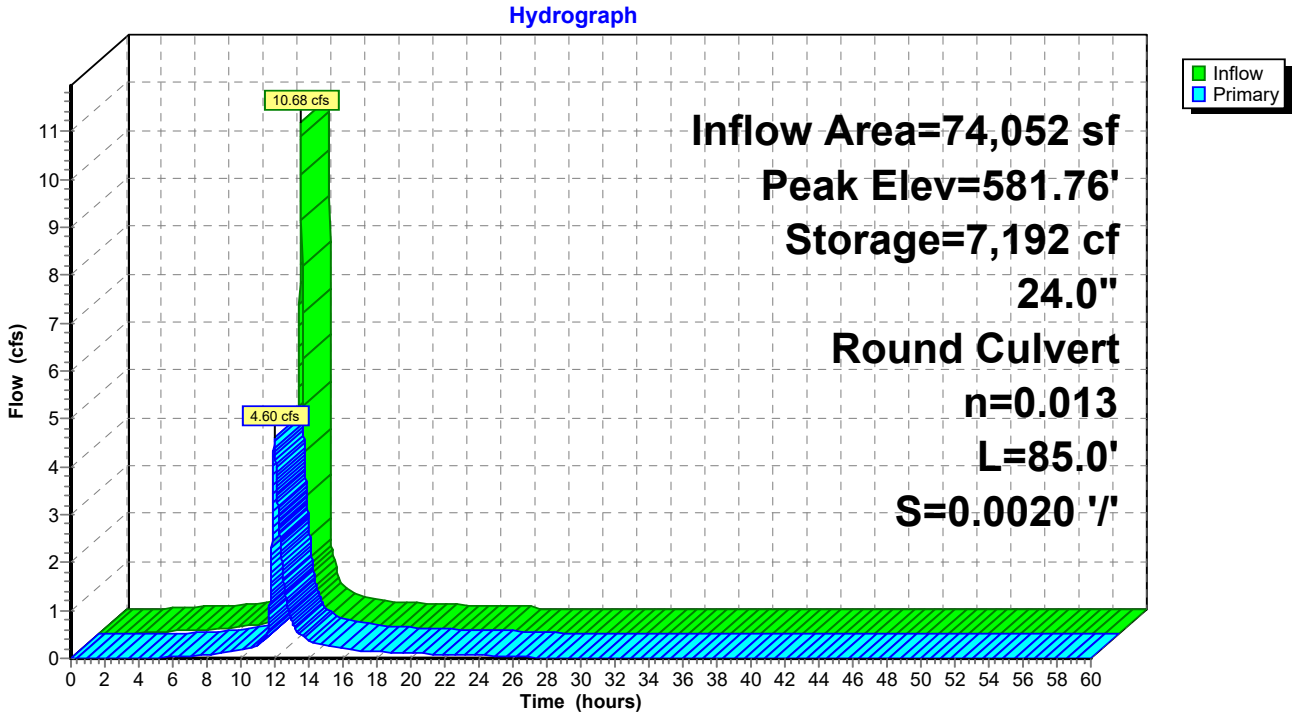
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Ex. Det. System A



Summary for Pond 3P: New Det. System 2

Inflow Area = 76,230 sf, 76.00% Impervious, Inflow Depth = 3.17" for 25-Year event
Inflow = 9.34 cfs @ 11.96 hrs, Volume= 20,123 cf
Outflow = 3.84 cfs @ 12.05 hrs, Volume= 20,123 cf, Atten= 59%, Lag= 5.7 min
Primary = 3.84 cfs @ 12.05 hrs, Volume= 20,123 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.26' @ 12.05 hrs Surf.Area= 5,205 sf Storage= 5,652 cf

Plug-Flow detention time= 34.3 min calculated for 20,119 cf (100% of inflow)
Center-of-Mass det. time= 34.5 min (811.4 - 776.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.67'	4,641 cf	**39.50'W x 131.78'L x 3.50'H Field A** 18,218 cf Overall - 6,615 cf Embedded = 11,603 cf x 40.0% Voids
#2A	580.17'	6,615 cf	**ADS_StormTech SC-740 +Cap** x 144 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 144 Chambers in 8 Rows
		11,256 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.67'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.67' / 579.45' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.84 cfs @ 12.05 hrs HW=581.26' (Free Discharge)
1=Culvert (Barrel Controls 3.84 cfs @ 4.89 fps)

Pond 3P: New Det. System 2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

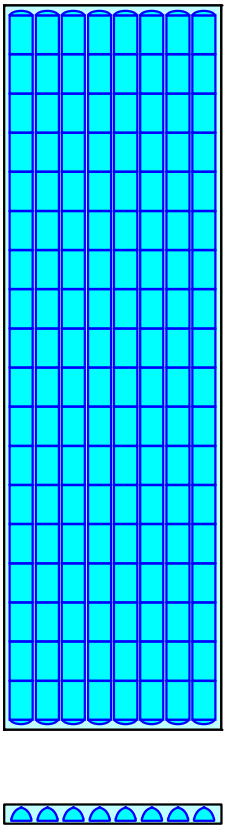
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

144 Chambers x 45.9 cf = 6,615.4 cf Chamber Storage

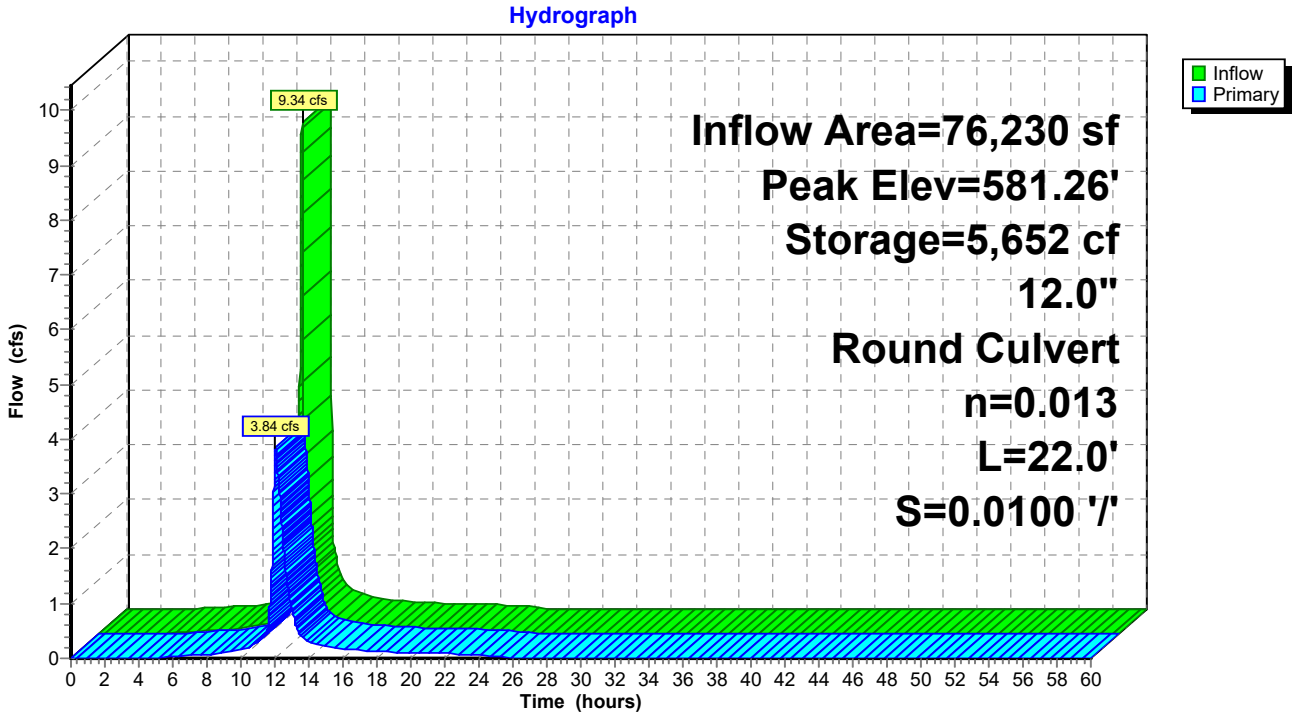
18,218.1 cf Field - 6,615.4 cf Chambers = 11,602.8 cf Stone x 40.0% Voids = 4,641.1 cf Stone Storage

Chamber Storage + Stone Storage = 11,256.5 cf = 0.258 af
Overall Storage Efficiency = 61.8%
Overall System Size = 131.78' x 39.50' x 3.50'

144 Chambers
674.7 cy Field
429.7 cy Stone



Pond 3P: New Det. System 2



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: North Runoff Area=0.500 ac 74.00% Impervious Runoff Depth=4.42"
Flow Length=193' Tc=1.7 min CN=93 Runoff=4.07 cfs 8,029 cf

Subcatchment2S: South Runoff Area=1.700 ac 94.12% Impervious Runoff Depth=4.88"
Flow Length=55' Slope=0.0150 '/' Tc=1.0 min CN=97 Runoff=14.65 cfs 30,092 cf

Subcatchment3S: North 2 Runoff Area=1.750 ac 76.00% Impervious Runoff Depth=4.54"
Flow Length=65' Tc=4.9 min CN=94 Runoff=13.06 cfs 28,809 cf

Pond 1P: New Det. System 1 Peak Elev=583.05' Storage=9,759 cf Inflow=9.83 cfs 38,085 cf
12.0" Round Culvert n=0.013 L=262.0' S=0.0021 '/' Outflow=3.26 cfs 38,039 cf

Pond 2P: Ex. Det. System A Peak Elev=582.00' Storage=9,356 cf Inflow=14.65 cfs 30,092 cf
24.0" Round Culvert n=0.013 L=85.0' S=0.0020 '/' Outflow=6.42 cfs 30,056 cf

Pond 3P: New Det. System 2 Peak Elev=581.92' Storage=8,090 cf Inflow=13.06 cfs 28,809 cf
12.0" Round Culvert n=0.013 L=22.0' S=0.0100 '/' Outflow=5.00 cfs 28,809 cf

Total Runoff Area = 172,062 sf Runoff Volume = 66,930 cf Average Runoff Depth = 4.67"
16.46% Pervious = 28,314 sf 83.54% Impervious = 143,748 sf

Summary for Subcatchment 1S: North

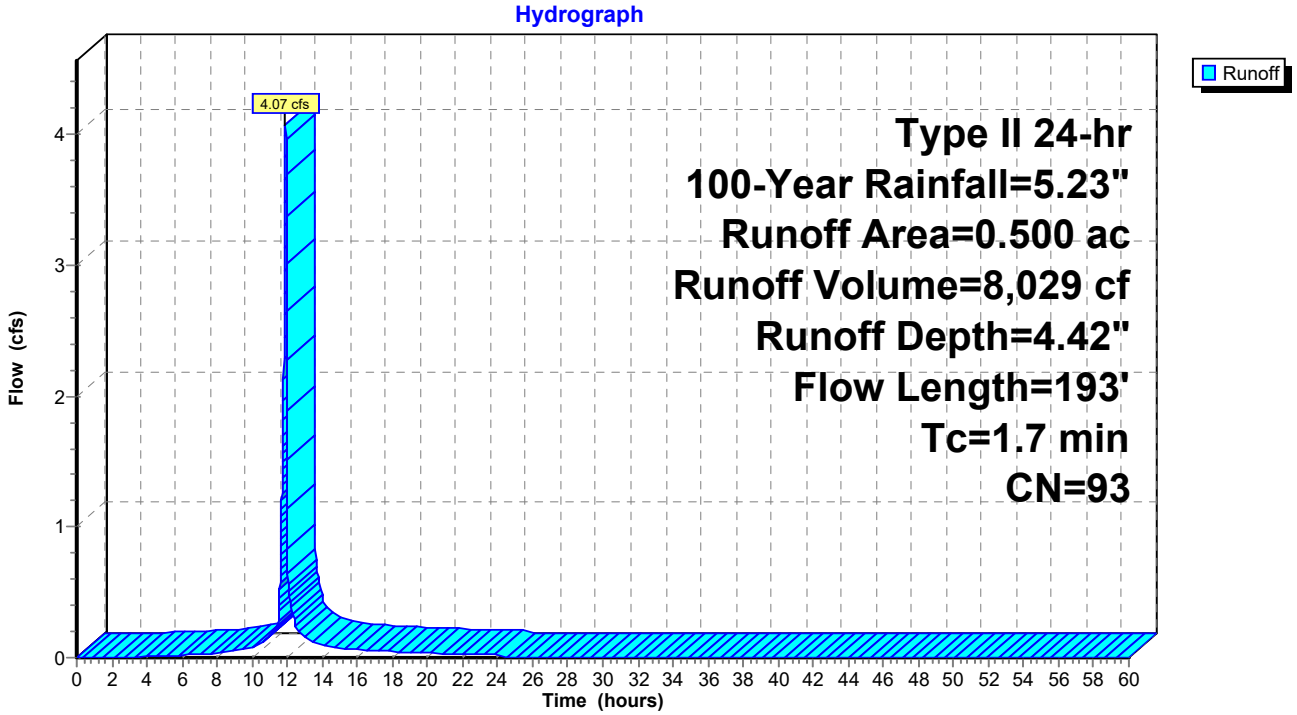
Runoff = 4.07 cfs @ 11.92 hrs, Volume= 8,029 cf, Depth= 4.42"
Routed to Pond 1P : New Det. System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.23"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG D
0.130	80	>75% Grass cover, Good, HSG D
0.500	93	Weighted Average
0.130		26.00% Pervious Area
0.370		74.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	43	0.0120	0.84		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
0.8	150	0.0020	3.22	10.12	**Pipe Channel, 24" pipe** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Corrugated PE, smooth interior
1.7	193	Total			

Subcatchment 1S: North



Summary for Subcatchment 2S: South

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

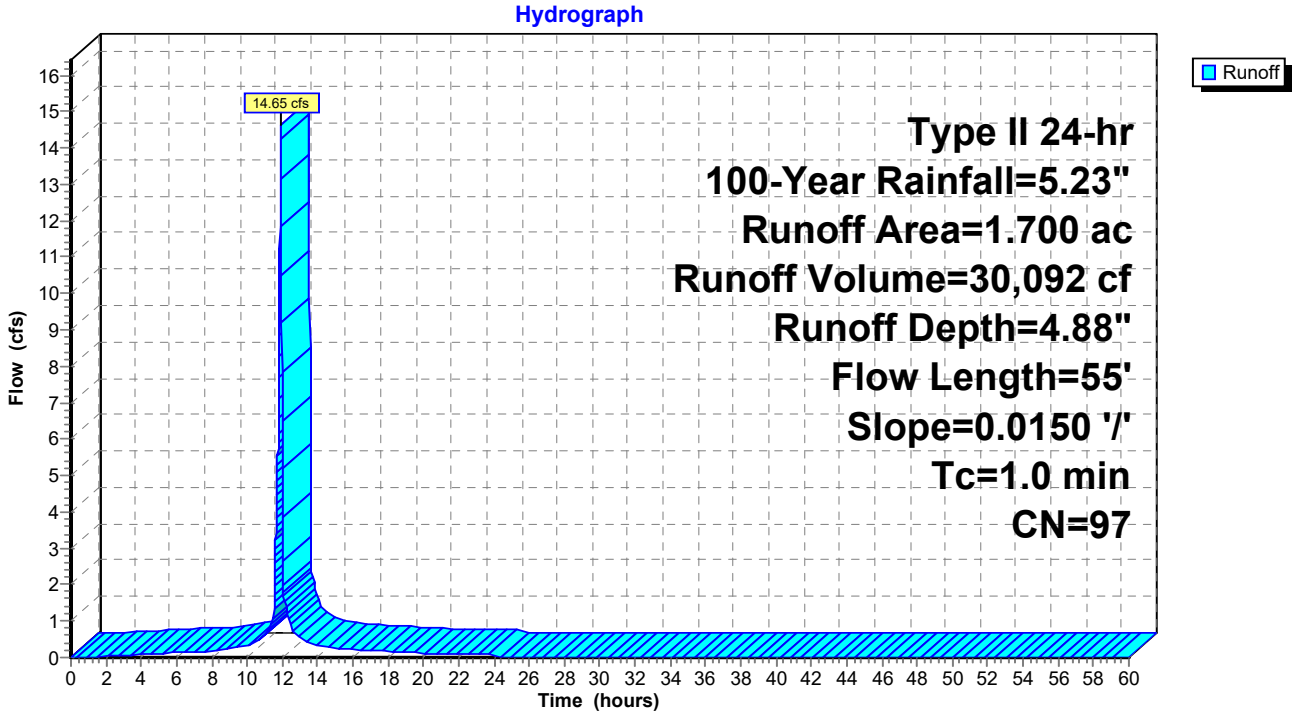
Runoff = 14.65 cfs @ 11.91 hrs, Volume= 30,092 cf, Depth= 4.88"
Routed to Pond 2P : Ex. Det. System A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.23"

Area (ac)	CN	Description
1.600	98	Paved parking, HSG D
0.100	80	>75% Grass cover, Good, HSG D
1.700	97	Weighted Average
0.100		5.88% Pervious Area
1.600		94.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	55	0.0150	0.96		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"

Subcatchment 2S: South



Summary for Subcatchment 3S: North 2

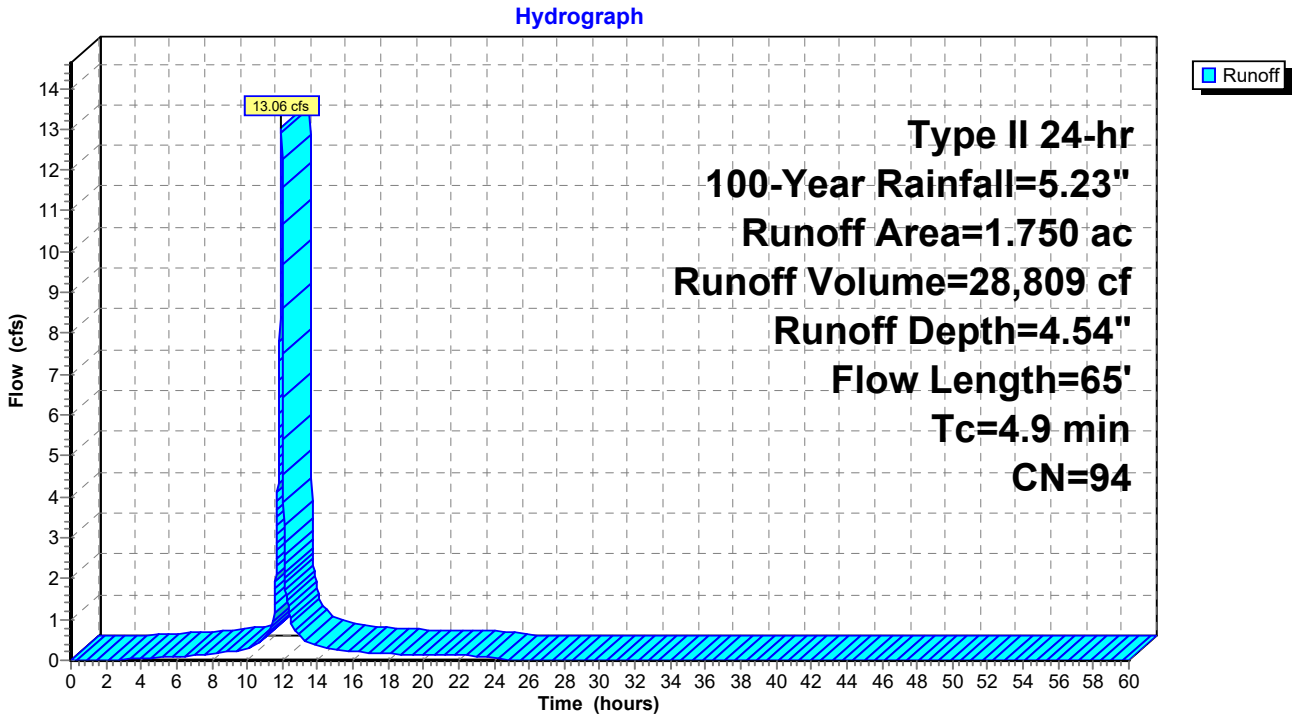
Runoff = 13.06 cfs @ 11.96 hrs, Volume= 28,809 cf, Depth= 4.54"
Routed to Pond 3P : New Det. System 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.23"

Area (ac)	CN	Description
1.330	98	Paved parking, HSG D
0.420	80	>75% Grass cover, Good, HSG D
1.750	94	Weighted Average
0.420		24.00% Pervious Area
1.330		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	15	0.0050	0.06		**Sheet Flow, grass** Grass: Short n= 0.150 P2= 2.50"
0.7	50	0.0300	1.24		**Sheet Flow, pavement** Smooth surfaces n= 0.011 P2= 2.50"
4.9	65	Total			

Subcatchment 3S: North 2



Summary for Pond 1P: New Det. System 1

[81] Warning: Exceeded Pond 2P by 1.59' @ 12.47 hrs

Inflow Area = 95,832 sf, 89.55% Impervious, Inflow Depth = 4.77" for 100-Year event
Inflow = 9.83 cfs @ 11.93 hrs, Volume= 38,085 cf
Outflow = 3.26 cfs @ 12.39 hrs, Volume= 38,039 cf, Atten= 67%, Lag= 27.4 min
Primary = 3.26 cfs @ 12.39 hrs, Volume= 38,039 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 583.05' @ 12.39 hrs Surf.Area= 4,924 sf Storage= 9,759 cf

Plug-Flow detention time= 48.7 min calculated for 38,039 cf (100% of inflow)
Center-of-Mass det. time= 45.8 min (856.0 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.00'	4,394 cf	**39.50'W x 124.66'L x 3.50'H Field A** 17,234 cf Overall - 6,248 cf Embedded = 10,986 cf x 40.0% Voids
#2A	580.50'	6,248 cf	**ADS_StormTech SC-740 +Cap** x 136 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 136 Chambers in 8 Rows
		10,642 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.00'	**12.0" Round 12" pipe** L= 262.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.00' / 579.45' S= 0.0021 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.26 cfs @ 12.39 hrs HW=583.05' (Free Discharge)
↑**1=12" pipe** (Barrel Controls 3.26 cfs @ 4.15 fps)

Pond 1P: New Det. System 1 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

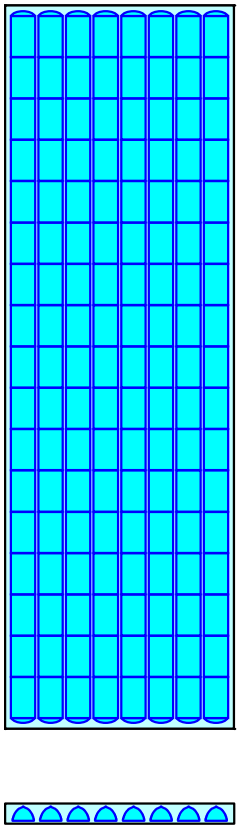
17 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 122.66' Row Length +12.0" End Stone x 2 = 124.66' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

136 Chambers x 45.9 cf = 6,247.8 cf Chamber Storage

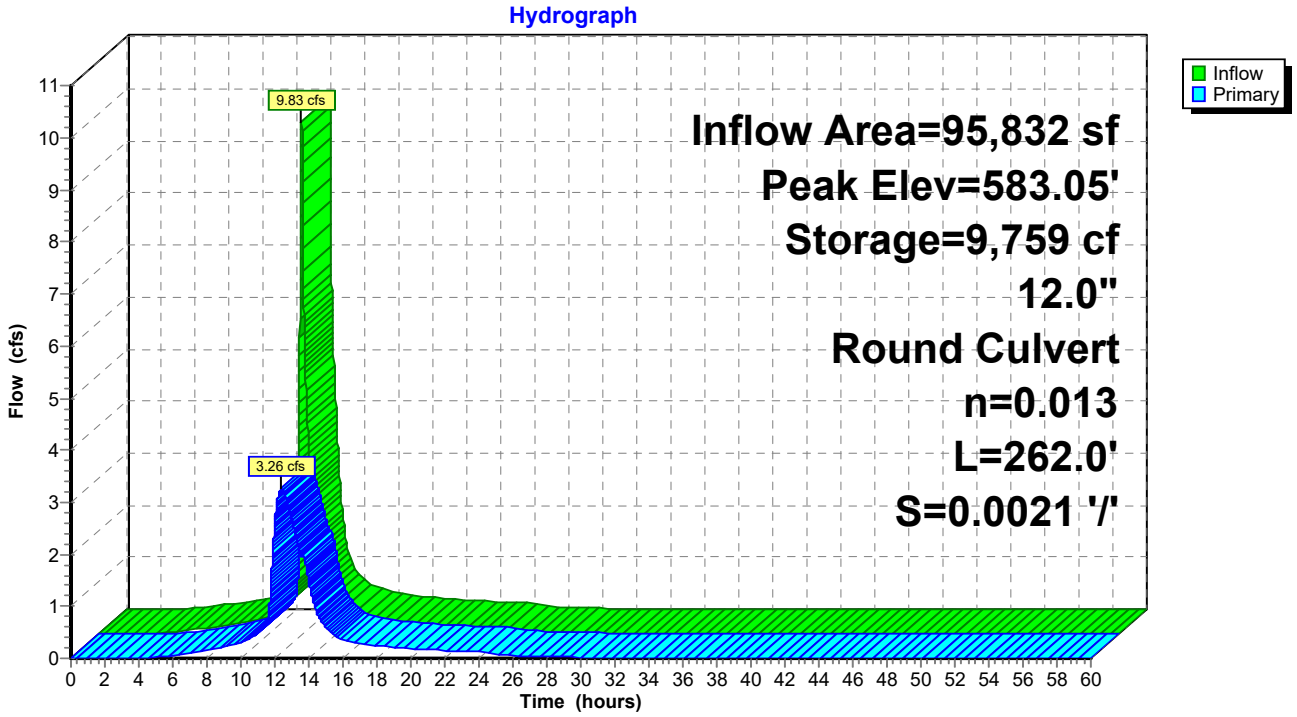
17,233.8 cf Field - 6,247.8 cf Chambers = 10,985.9 cf Stone x 40.0% Voids = 4,394.4 cf Stone Storage

Chamber Storage + Stone Storage = 10,642.2 cf = 0.244 af
Overall Storage Efficiency = 61.8%
Overall System Size = 124.66' x 39.50' x 3.50'

136 Chambers
638.3 cy Field
406.9 cy Stone



Pond 1P: New Det. System 1



Summary for Pond 2P: Ex. Det. System A

Inflow Area = 74,052 sf, 94.12% Impervious, Inflow Depth = 4.88" for 100-Year event
Inflow = 14.65 cfs @ 11.91 hrs, Volume= 30,092 cf
Outflow = 6.42 cfs @ 11.98 hrs, Volume= 30,056 cf, Atten= 56%, Lag= 4.2 min
Primary = 6.42 cfs @ 11.98 hrs, Volume= 30,056 cf
Routed to Pond 1P : New Det. System 1

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 582.00' @ 11.98 hrs Surf.Area= 13,558 sf Storage= 9,356 cf

Plug-Flow detention time= 75.2 min calculated for 30,051 cf (100% of inflow)
Center-of-Mass det. time= 74.8 min (821.0 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	580.56'	2,656 cf	**14.35'W x 241.67'L x 3.00'H Field A** 10,404 cf Overall - 3,764 cf Embedded = 6,640 cf x 40.0% Voids
#2A	580.89'	2,976 cf	**ADS N-12 24"** x 48 Inside #1 Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf 48 Chambers in 4 Rows
#3B	580.56'	5,029 cf	**19.27'W x 243.00'L x 4.00'H Field B** 18,731 cf Overall - 6,159 cf Embedded = 12,571 cf x 40.0% Voids
#4B	581.06'	4,704 cf	**ADS N-12 30"** x 48 Inside #3 Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf 48 Chambers in 4 Rows
#5C	580.56'	6,329 cf	**22.25'W x 243.00'L x 4.50'H Field C** 24,330 cf Overall - 8,507 cf Embedded = 15,824 cf x 40.0% Voids
#6C	581.06'	6,816 cf	**ADS N-12 36"** x 48 Inside #5 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf 48 Chambers in 4 Rows
		28,510 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	580.56'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 580.56' / 580.39' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.42 cfs @ 11.98 hrs HW=582.00' (Free Discharge)
1=Culvert (Barrel Controls 6.42 cfs @ 3.70 fps)

Pond 2P: Ex. Det. System A - Chamber Wizard Field A

Chamber Model = ADS N-12 24" (ADS N-12® Pipe)
Inside= 23.8"W x 23.8"H => 3.10 sf x 20.00'L = 62.0 cf
Outside= 28.0"W x 28.0"H => 3.92 sf x 20.00'L = 78.4 cf

28.0" Wide + 13.4" Spacing = 41.4" C-C Row Spacing

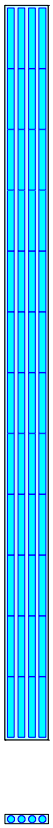
12 Chambers/Row x 20.00' Long = 240.00' Row Length +10.0" End Stone x 2 = 241.67' Base Length
4 Rows x 28.0" Wide + 13.4" Spacing x 3 + 10.0" Side Stone x 2 = 14.35' Base Width
4.0" Stone Base + 28.0" Chamber Height + 4.0" Stone Cover = 3.00' Field Height

48 Chambers x 62.0 cf = 2,976.0 cf Chamber Storage
48 Chambers x 78.4 cf = 3,764.5 cf Displacement

10,404.1 cf Field - 3,764.5 cf Chambers = 6,639.6 cf Stone x 40.0% Voids = 2,655.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,631.8 cf = 0.129 af
Overall Storage Efficiency = 54.1%
Overall System Size = 241.67' x 14.35' x 3.00'

48 Chambers
385.3 cy Field
245.9 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field B

Chamber Model = ADS N-12 30" (ADS N-12® Pipe)
Inside= 30.0"W x 30.0"H => 4.90 sf x 20.00'L = 98.0 cf
Outside= 36.0"W x 36.0"H => 6.42 sf x 20.00'L = 128.3 cf

36.0" Wide + 17.1" Spacing = 53.1" C-C Row Spacing

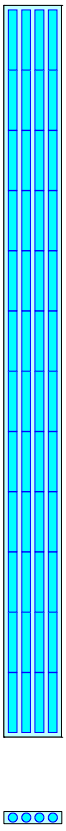
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 36.0" Wide + 17.1" Spacing x 3 + 18.0" Side Stone x 2 = 19.27' Base Width
6.0" Stone Base + 36.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

48 Chambers x 98.0 cf = 4,704.0 cf Chamber Storage
48 Chambers x 128.3 cf = 6,159.2 cf Displacement

18,730.5 cf Field - 6,159.2 cf Chambers = 12,571.3 cf Stone x 40.0% Voids = 5,028.5 cf Stone Storage

Chamber Storage + Stone Storage = 9,732.5 cf = 0.223 af
Overall Storage Efficiency = 52.0%
Overall System Size = 243.00' x 19.27' x 4.00'

48 Chambers
693.7 cy Field
465.6 cy Stone



Pond 2P: Ex. Det. System A - Chamber Wizard Field C

Chamber Model = ADS N-12 36" (ADS N-12® Pipe)
Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf
Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.2 cf

42.0" Wide + 21.0" Spacing = 63.0" C-C Row Spacing

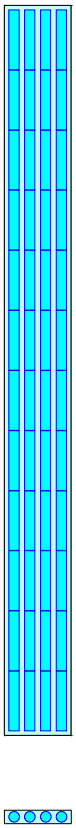
12 Chambers/Row x 20.00' Long = 240.00' Row Length +18.0" End Stone x 2 = 243.00' Base Length
4 Rows x 42.0" Wide + 21.0" Spacing x 3 + 18.0" Side Stone x 2 = 22.25' Base Width
6.0" Stone Base + 42.0" Chamber Height + 6.0" Stone Cover = 4.50' Field Height

48 Chambers x 142.0 cf = 6,816.0 cf Chamber Storage
48 Chambers x 177.2 cf = 8,506.6 cf Displacement

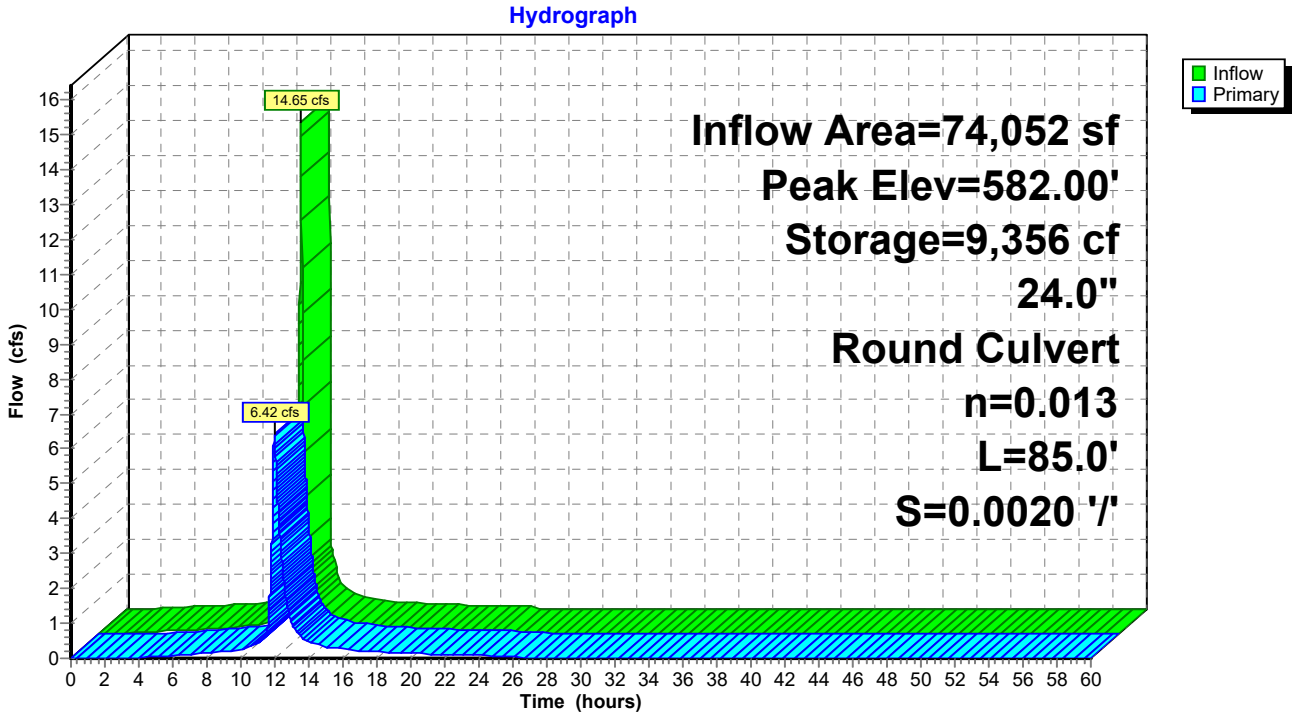
24,330.3 cf Field - 8,506.6 cf Chambers = 15,823.7 cf Stone x 40.0% Voids = 6,329.5 cf Stone Storage

Chamber Storage + Stone Storage = 13,145.5 cf = 0.302 af
Overall Storage Efficiency = 54.0%
Overall System Size = 243.00' x 22.25' x 4.50'

48 Chambers
901.1 cy Field
586.1 cy Stone



Pond 2P: Ex. Det. System A



Summary for Pond 3P: New Det. System 2

Inflow Area = 76,230 sf, 76.00% Impervious, Inflow Depth = 4.54" for 100-Year event
Inflow = 13.06 cfs @ 11.96 hrs, Volume= 28,809 cf
Outflow = 5.00 cfs @ 12.05 hrs, Volume= 28,809 cf, Atten= 62%, Lag= 6.0 min
Primary = 5.00 cfs @ 12.05 hrs, Volume= 28,809 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 581.92' @ 12.05 hrs Surf.Area= 5,205 sf Storage= 8,090 cf

Plug-Flow detention time= 31.7 min calculated for 28,804 cf (100% of inflow)
Center-of-Mass det. time= 31.9 min (799.6 - 767.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	579.67'	4,641 cf	**39.50'W x 131.78'L x 3.50'H Field A** 18,218 cf Overall - 6,615 cf Embedded = 11,603 cf x 40.0% Voids
#2A	580.17'	6,615 cf	**ADS_StormTech SC-740 +Cap** x 144 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 144 Chambers in 8 Rows
		11,256 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	579.67'	**12.0" Round Culvert** L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 579.67' / 579.45' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=5.00 cfs @ 12.05 hrs HW=581.92' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.00 cfs @ 6.36 fps)

Pond 3P: New Det. System 2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

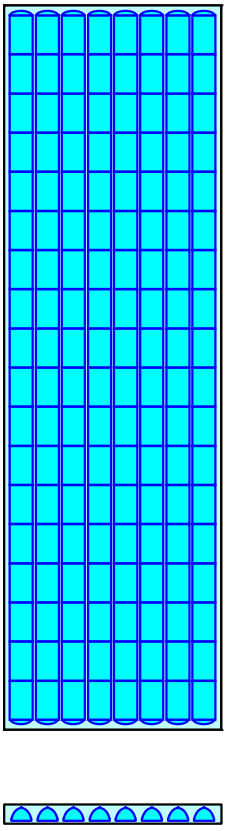
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

144 Chambers x 45.9 cf = 6,615.4 cf Chamber Storage

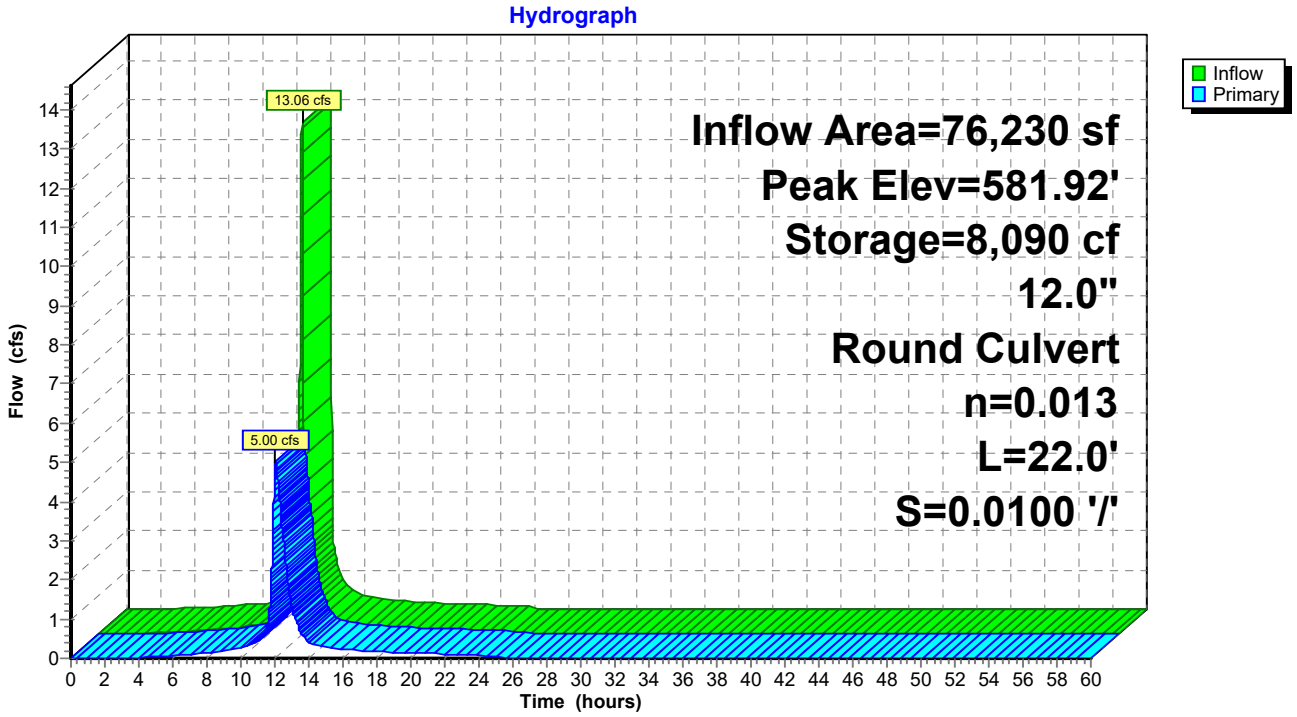
18,218.1 cf Field - 6,615.4 cf Chambers = 11,602.8 cf Stone x 40.0% Voids = 4,641.1 cf Stone Storage

Chamber Storage + Stone Storage = 11,256.5 cf = 0.258 af
Overall Storage Efficiency = 61.8%
Overall System Size = 131.78' x 39.50' x 3.50'

144 Chambers
674.7 cy Field
429.7 cy Stone



Pond 3P: New Det. System 2



Green Infrastructure & Water Quality Calculations

Legacy Village Senior Housing - 3900 Maple Road
Town of Amherst, Erie County, New York

WATER QUALITY REQUIRED FOR PROPOSED DEVELOPMENT AREA Area, Acres = 2.25
(Note: Reference Chap. 9 NYSDEC Stormwater Design Manual)

"Redevelopment Activity", Acres = 1.45 "New development", Acres = 0.80
(existing, disturbed impervious area)

Total proposed impervious, Acres = 1.70 Adjusted impervious, Acres = 0.61
"New" impervious, Acres = 0.25 (25% redevelopment, 100% new development)

Water Quality Volume (WQv) WQv=(P*Rv*A)/12

Where: P=90% Rainfall Event Number P= 1
Rv= 0.05+0.009*(I) Rv= 0.29
IC=Impervious Cover, Acres IC= 0.61
I=Impervious Cover (%) I= 27
A=Runoff Area, Acres A= 2.25

WQv (ac-ft)= 0.055
WQv (cf)= 2,396

RRv PROVIDED FOR PROPOSED DEVELOPMENT AREA (See NYSDEC worksheets)

		WQv, cf	RRv, cf
Min. RRv Req'd, cf = 392	RRv, Bioretention Areas	0	864
Min. RRv Req'd, ac-ft = 0.009	WQv, Treatment Unit	1535	0
	TOTAL, cf	1535	864
	TOTAL, ac-ft	0.035	0.020

WQ & RR SUMMARY (ac-ft):

TOTAL WATER QUALITY PROVIDED FOR PROPOSED DEVELOPMENT AREA 0.055

IS WATER QUALITY VOLUME REQUIREMENT MET? Yes
(WQv provided equal to or greater than WQv required)

IS RUNOFF REDUCTION VOLUME REQUIREMENT MET? Yes
(RRv provided equal to or greater than Min. RRv required)

Revised 08/09/2016

Filtration Bioretention (F-5)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Drainage Area Number	**Contributing Area** (Acres)	**Impervious Area** (Acres)	**Percent Impervious** %	**Rv**	**WQv** (cf)	**Precipitation** (in)	**Description**
1	2.25	0.61	27	0.29	2,161	0.90	0

Design Criteria		
Enter underlying soil infiltration rate (based on geotechnical testing, refer to Appendix D)	0	Underdrains required
Is the contributing area to the practice a stormwater hotspot?	No	
Is the practice the first in series for treatment of a Level 1 (Infiltration Restricted) hotspot?	No	
Is contributing area greater than max. contributing area?	No	
Enter depth to seasonal high water table (ft)		
Enter depth to bedrock (ft)		
Is pretreatment provided, in conformance with Section 6.4.3.1	Yes	
Enter average height of ponding (ft)	0.5	
Enter depth of surface layer (inches)	3	
Enter depth of filter media (ft)	2.5	
Enter depth of drainage layer (inches)	12	
Enter slope of maintenance access (%)	1.5	
Enter width of maintenance access (ft)	24	

Sizing Criteria				
		Value	Units	Notes
Permeability Flow Rate	k	1	ft/day	
Filter Time	tf	2	days	
Required Filter Area	Af	900	sf	
Enter Provided Filter Area	Af	900	sf	
Recalculated Water Quality Volume (based on provided filter area)	WQv calc	2160	cf	

Calculate Runoff Reduction			
RRv Provided	**864**	***cf***	
WQv Treated	1297	cf	This is the portion of the WQv that is not reduced in the practice.

Step 4 - Calcuate Minimum RRv Required

Enter the Soils Data for the site		
Hydrologic Soil Group	Acres	S
A		55%
B		40%
C		30%
D	0.61	20%
Total Area	0.61	

Calculate the Minimum RRv		
S =	**0.20**	
Impervious =	0.61	*acres*
Precipitation	0.90	*inches*
Rv	0.95	
Minimum RRv	**0.009**	***af***
	392	cf