Project Narrative and Drainage Analysis Report

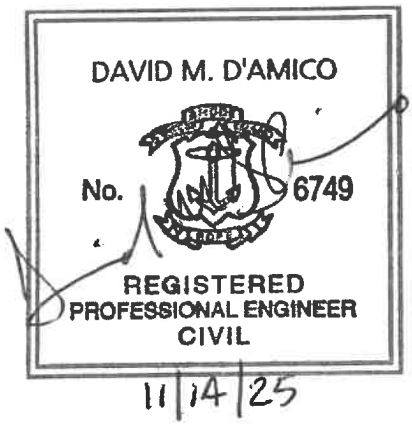
For The

New Lima Stuart PK- 8 School

188 Princeton Avenue
A.P. 44, Lot 552
Providence, Rhode Island

Prepared for:

Providence School Department
717 Westminster Street
Providence, RI 02903



Prepared by:

D'Amico Engineering Technology, Inc.
2080 Mineral Spring Ave.
North Providence, RI 02911

Phone: 401-622-1470
Fax: 401-353-1190
www.dengineeringtec.com

November 12, 2025

TABLE OF CONTENTS

1 INTRODUCTION

D'Amico Engineering Technology, Inc. (DEtec) has prepared the following project narrative and drainage analysis as required to provide information associated with the New Lima Stuart PK-8 School on A.P. 44, Lot 552, located at 188 Princeton Avenue in Providence, RI. DEtec has conducted a review of existing site conditions, site design requirements, and permit requirements with the City and State. DEtec has also visited the site and reviewed available information from the School Department and City records.

The proposed improvements to the property include the demolition of the existing school building, parking lot, walkways and playground area and construction of a new Lima Stuart PK-8 School in its place within the same site. A new 58,048 S,F (footprint only) elementary school building will be constructed primarily within the footprint of the existing structure proper, notwithstanding the different shape. The main entrance to the school will be on the Bucklin Street side with access from both Daboll and Princeton Streets. Numerous playground areas are located on the site strategically located to coordinate with classroom assignments. These playgrounds will be fenced off and landscaping will be installed throughout the school property.

An off-street parking lot is proposed for the northwest side of the building off Princeton Ave., which will service the school for staff parking, dumpster locations and loading for food services. On street parking spaces areas are provided on Bucklin and Daboll Streets which abut the school property. Bus drop off/pickup will be conducted via a dedicated one-way driveway off Princeton Ave. with nine (9) dedicated parking spaces for bus vehicles. Parent drop off/pickup will be conducted along Daboll and Bucklin Streets with thirty-two (32) new on-street parking spaces. The site will include a subsurface drainage system on the northeast side of the building and the new parking lot and bus driveway will be a permeable pavement system. The building will be serviced by all public utilities that are located in the abutting roadways with the primary connections in the Princeton Ave. area. It should be noted that the new school complex will reduce the impervious area over the property by 26%.

2 SITE LOCATION AND PHYSICAL DESCRIPTION

The subject property is located at 188 Princeton Avenue (See Figure 1 – Locus Map) in Providence, RI. The property fronts on Bucklin and Daboll Streets. The school property fronts on three (3) streets as a full block. All roadways are residential streets, with Bucklin having mix use to the north and west of the school and lead to main roadways within the City to travel in all directions. The parcel has been identified on the City's assessors map as A.P. 44, Lot 552. A class I topographic survey has been performed on the parcels and it was determined that the total area of the lot 139,999 s.f. +/- or 3.21 acres.

Figure 1 - Locus Map

2.1 Existing Conditions

The following is a general description of current site conditions and current occupancy of the property. The property is utilized as an elementary school within the City of Providence School system and is at its serviceable life. The lot consists of primarily the school building along with a large parking lot along Daboll Street. The site is currently over 75% impervious area.

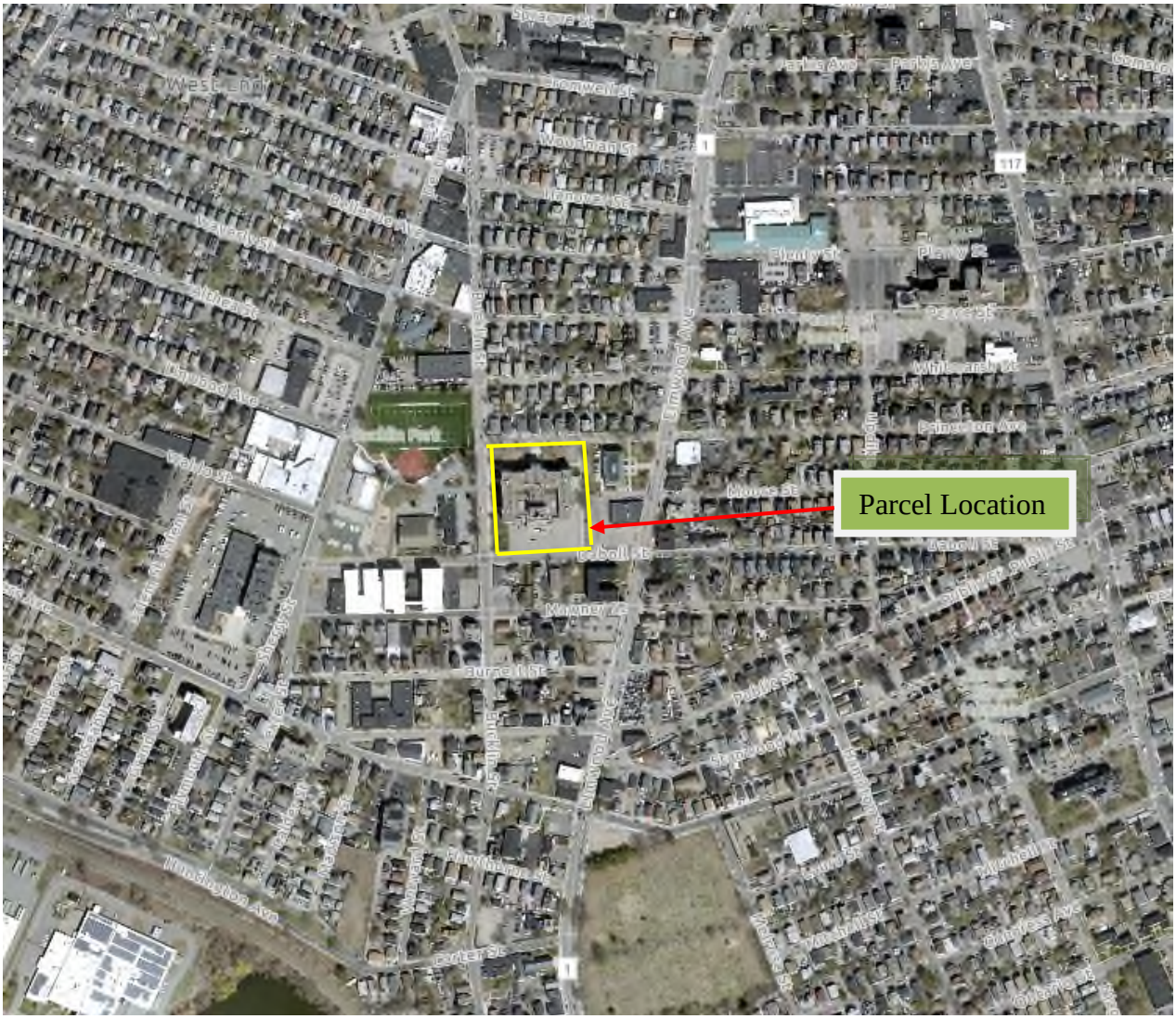


Figure 2 – Aerial photograph

Utilities

2.1.1 Water

The property is serviced by the public water system owned by the Providence Water Supply Board off Bucklin Street.

2.1.2 Sewer

The property is connected to the City's and Narragansett Bay Commission's sewer system within the lots boarders and in Princeton Avenue.

2.1.3 Electric

The electric and communication services are located off Princeton Avenue.

2.1.4 Gas

The property is serviced by a natural gas service main off Princeton Avenue.

2.1.5 Drainage

The existing property has a limited drainage system that collects the runoff from the site's southern parking lot. The frontage of the building is void of drainage and stormwater runoff flows to the combined sewer/drainage system in the surrounding road.

2.2 Zoning

According to the City of Providence zoning maps, the site is currently zoned Public Space District (PS). As defined in the City's Zoning Ordinance, the zoning uses are consistent with the proposed use of the elementary school on the site.

The following are the dimensional requirements for current zoning classification for a PS District (other permitted uses):

Requirement	**PS**
Minimum Lot Area	None
Minimum Lot Frontage	None
Minimum Front Yard	10 Feet
Minimum Interior Side Yard	6 Feet
Minimum Corner Side Yard	10 Feet
Minimum Rear Yard	25 Feet
Maximum Lot Coverage	None
Maximum Structure Height	50 Feet

The project will not require any dimensional variance for the development

2.3 Soil Classification

According to the *Soil Survey of Rhode Island*, prepared by the US Department of Agriculture, Soil Conservation Service, soils in the area of elementary school consist of Merrimac-Urban Land Complex (MU). The Merrimac series consists of very deep, somewhat excessively drained soils formed in outwash. They are nearly level through very steep soils on outwash terraces and plains and other glaciofluvial landforms. Slope ranges from 0 through 35 percent. Saturated hydraulic conductivity is high or very high. The MU is in the hydrologic A group with well drained soils characteristics.

Soil borings were conducted for the building and are included in the appendix. Groundwater depth was found to be 18.5' to 23' via borings and is expected at 15' to 20' for design.

2.4 Wetland Resources

The existing site is fully developed and no freshwater wetlands are present on or in the vicinity of the property.

2.5 Flood Zone Classification

The site is located on the Flood Insurance Rate Map for the City of Providence; Community–Panel Number 44007C0304J dated October 2, 2015. The property lies inside Zone X and outside of any designated flood zones. No base flood elevations or depths are shown.

3 PERMIT REQUIREMENTS

3.1 Local Permit Requirements

3.1.1 Zoning

This project will not require approval from the City's Zoning Commission.

3.1.2 Planning

The project will require Preliminary Plan approval from the City's Planning Commission.

3.1.3 Building Permit

A review and approval from the local building official is required to obtain a Building Permit for the proposed construction. As part of this review process the City Engineer will require a review of the Site Plans pertaining to utility and drainage requirements.

3.2 State Permit Requirements

3.2.1 Rhode Island Department of Environmental Management

The Project will require a General Construction RIPDES permit.

3.2.2 Rhode Island Department of Transportation

This project will not require a RIDOT Physical Alteration Permit Application.

3.2.3 Narragansett Bay Commission

The Project will require a Non-residential Sewer Connection Permit Application.

4 DRAINAGE ANALYSIS

4.1. METHODOLOGY

Hydrological analysis was performed using the Technical Release 20 (TR-20) and the peak runoff rate for the water quality volume (WQv or 3-month), 2, 10, 25 and 100-year storm event was modeled for a 24-hour, Type III storm as required by Narragansett Bay Commission (NBC) stormwater management regulations. The peak runoff rates for the mentioned year storm events and routing of the storm events through the proposed drainage facilities was modeled utilizing the HydroCad® 10.20-7a, 2025 by HydroCad Software Solutions LLC.

Hydrological and Hydraulic analyses were performed in conformance with the current State of Rhode Island, Stormwater Design and Installation Standards Manual Amended 2015.

It should be noted that the project does not increase the impermeable surface by over 10,000 sf, in fact, the project reduces the impervious area of the site by 13% and the project does exceed the 1 ace of full depth disturbance area and requires a RIPDES permit from RIDEM. With the total project pre-construction impermeable surface greater than 10,000 sf the project must follow the above-mentioned stormwater standards along with NBC requirements.

4.2. EXISTING CONDITIONS

The existing watershed for the site consists of two (2) sub-watershed areas and are designated as 1-EW and 2-EW on the watershed map in Appendix C. 1-EW sub-watershed consists of the site runoff a portion of the existing roof and includes stairways, walkways and front landscape area. This sub-watershed flows to Princeton Ave. (DP 1) and the closed combined drainage/sewer system within Princeton Ave. and Bucklin Street. In the 2-EW sub-watershed consists of a portion of the existing building roof runoff and the large parking lot in the south portion of the property and connects to Bucklin Street drain lines (DP 2). The soil type is Merrimac-Urban Land Complex (MU) – course gravely sand series in hydrologic group A. The pre-development peak runoff rates are tabulated below for reference and the calculations can be found in Appendix A.

Pre-Developed Peak Runoff Rates:

Watershed Area ID	*Area (sf)*	*Rainfall (in)*	*2-year (cfs)*	*10-year (cfs)*	*25-year (cfs)*	*100-year (cfs)*	*3-month (cfs)*
1-EW	77,073	3.3/4.8/5.8/8.7/1.2	3.20	5.83	7.64	12.97	0.66
2-EW	75,211	3.3/4.8/5.8/8.7/1.2	3.89	6.56	8.36	13.54	1.09

4.3. PROPOSED CONDITIONS

In the proposed condition the site drainage will collect in five (5) sub-watershed areas as seen on the proposed watershed map in Appendix C. Sub-watershed 4-PW is the new roof runoff area for the entire building. The roof runoff will be collected on the roof and via internal piping system transported to SMS-1 (5-IS). Sub-watershed area 6-PW which collects the runoff in the area of the new bus driveway and butting sidewalks on the east side of the building. This area will be directed to the permeable pavement system (7-PP) within the driveway itself. Sub-watershed area 8-PW which collects the runoff in the area of the new parking lot on the northwest side of the building. This area will be directed to a permeable pavement system (9-PP) within the parking area itself.

Sub-watershed 10-PW consists of landscaping, sidewalk, walkways and playgrounds in the northeast portion of the site. Sub-watershed 11-PW consists of landscaping, sidewalks, walkways and playgrounds in the northeast portion of the site. This sub-watershed flows directly to the street which they abut. It is not practical to collect this runoff because it is primarily made up of pervious surfaces and landscape areas. It is proposed that collecting 65% of the runoff from the sites impervious areas will reduce the runoff to the abutting streets along with providing water quality of the full volume. The post-development runoff rates are shown in the following tables and for reference and the calculations can be found in Appendix A.

Post-Developed Peak Runoff Rates:

Watershed Area ID	*Area (sf)*	*Rainfall (in)*	*2-year (cfs)*	*10-year (cfs)*	*25-year (cfs)*	*100-year (cfs)*	*3-month (cfs)*
4-PW	58,048	3.3/4.8/5.8/8.7/1.2	4.27	6.25	7.57	11.39	2.00
6-PW	19,252	3.3/4.8/5.8/8.7/1.2	0.51	1.09	1.51	2.81	0.04

8-PW	14,023	3.3/4.8/5.8/8.7/1.2	0.30	0.70	0.99	1.91	0.01
10-PW	15,511	3.3/4.8/5.8/8.7/1.2	1.08	1.62	1.98	3.01	0.46
11-PW	42,931	3.3/4.8/5.8/8.7/1.2	0.37	1.30	2.05	4.58	0.00

4.4. OVERBANK FLOOD PROTECTION

The site layout of the proposed conditions strived to reduce the overall impervious surfaces on the school property and was successful by reducing it by 13%. To reduce stormwater runoff to the older combined drainage system, provided water quality and groundwater recharge best management practices (BMP) Subsurface Stormwater Management Systems (SMS-1) and a pervious pavement system have been proposed to collect runoff from the major impervious areas on the site. The roof runoff will collect internal piping system and transported to SMS-1 which is in the northern section of the property. The pervious pavement system will collect the runoff from the new parking area on Princeton Ave. along with the bus driveway along the eastern border of the site. These locations match the pre-construction watershed divide.

The post-development runoff will enter the SMS-1 in the WQv pre-treatment area which is the isolator row type Subsurface Water Quality Volume BMP. A deep sump CB along with wrapped chambers will provide more than the required 25% WQv pre-treatment and the isolator rows will treat 100% of the WQv from the impervious roof as a total (see Section 4.5).

From the pre-treatment and isolator row sections of eleven (11) Cultec 902HD chambers in SMS-1, the treated stormwater runoff will flow into the recharge area. This recharge section of the BMP is made up of one hundred twenty-one (121) Cultec 902HD chambers in SMS-1 embedded in washed crushed stone with filter wrap around the entire system for site recharge and overbank protection.

*Pre verses Post-Development Peak Runoff Rates to The Roadways **(DP 1):***

Development Condition	*2-year (cfs)*	*10-year (cfs)*	*25-year (cfs)*	*100-year (cfs)*	*3-month (cfs)*
Pre Devel (1-EW)	3.20	5.83	7.64	12.97	0.66
Post Devel (10-DP)	1.08	1.62	1.98	3.50	0.46
Total Reduction	-2.21	-4.21	-5.66	-9.47	-0.20
Percent Reduction	66%	72%	74%	73%	30%

*Pre verses Post-Development Peak Runoff Rates to The Roadways **(DP 2):***

Development Condition	*2-year (cfs)*	*10-year (cfs)*	*25-year (cfs)*	*100-year (cfs)*	*3-month (cfs)*
Pre Devel (2-EW)	3.89	6.56	8.36	13.54	1.09
Post Devel (11-PW)	0.37	1.30	2.05	4.58	0.00
Total Reduction	-3.52	-5.26	-6.31	-8.96	-1.09
Percent Reduction	90%	80%	75%	66%	100%

Utilizing the infiltration rate of 8.27 in/hr based on the soil strata the systems will be located in (gravelly sand), the SMS and pervious pavement system will attenuate the proposed peak runoff to much less than the pre-development runoff as shown in the calculations in the Appendix A. It should be noted that portions of the new site layout will be allowed to flow without interception due to the proposed grades and the impracticality of providing surface catchment but these areas are mostly pervious. The subsurface drainage system and previous pavement is designed to offset this action for both runoff and water quality along with removing stormwater from the drainage system. This design approach will provide for additional sustainability for the older combined drainage/sewer system in the area and resiliency for the neighborhood against flooding.

4.5. WATER QUALITY VOLUMES (WQv)

With the configuration of the SMS-1 and pervious pavement system, 100% treatment of the total WQv can be provided in the pre-treatment area or sand filter. This is accomplished by installing the deep sump CB and isolator rows. Only 25% WQv is generally required for these BMP types, but all runoff flow at the WQv flow level will enter the isolator row before infiltrating into the recharge areas and thru the pervious pavement system. In accordance with the Rhode Island Stormwater Design and Installations Standards Manual 2010, Amended 2015, the water quality volume has been calculated using the following equation:

Water Quality Volume (WQv) (4, 6 and 10-PW) = 86,876 sf or 1.99 acres x 43,560 ft^2/acres x 1" x 1'/12" = **7,239.7 ft^3**

25% Pre-treatment of WQv = 7,239.7 ft^3 x 0.25 = **1,809.9** ft^3

WQv pre-treatment will be provided as follows:
SMS-1 Isolator row of eleven (11) Cultec 902HD Chambers w/stone = 11 x 101.69 ft^3 = 1,118 ft^3
WQv provided in pervious pavement system = 11,905 sf x 9" x .33% = 2,946 ft^3
WQv provided in pervious pavement system = 8,954 sf x 9" x .33% = 2,216 ft3
5' dia. CB w/4' sump = πr^2 x h = 3.141 x 2.5^2 x 4'= 78.52 ft^3

Total Pre-treatment provided = **6,358.52 ft^3**

4.6. GROUNDWATER RECHARGE (REv)

The project provides exceptional groundwater recharge by utilizing pervious pavement for all driveways and parking areas on site. This was chosen due to the relative shallow depth of the seasonal high groundwater elevation and the proximity to freshwater wetland resources along the border of the development where surface treatment is not practical.

Required REv = 1" x 0.6 x 1.99 ac/12 = 0.0995 ac-ft.

Provided at the 1.2" Runoff Event (WQv) REv: Pervious Pavement Area (7-PP) = 0.010 ac-ft.
Pervious Pavement Area (9-PP) = 0.001 ac-ft.
SMS-1 = 0.109 ac-ft.

Total = Provided 0.12 ac-ft. > Required 0.0995 ac-ft.

4.7. CONVEYANCE AND NATURAL CHANNEL PROTECTION

The following is a capacity check for the critical pipes that will convey the storm water runoff to and from the storm water management system:

Building to DMH-1 – 15" ADS HDPE Pipe, S=0.022 '/, n=0.011 Q_{100} = 11.39 cfs

Q_{max} = 12.18 cfs > Q_{100}

4.8. DRAINAGE STUDY CONCLUSIONS

This drainage report in combination with the plan set provides a design that conforms to the new State of Rhode Island Stormwater Design and Installation Standards Manual 2010, Amended 2015, as well as the Rhode Island Soil Erosion and Sedimentation Control Handbook. The project has been designed in order to avoid any increase in peak runoff rates. The new design now provides for recharge to the groundwater in two separate areas along with pre-treatment and treatment of 100% of the WQv for the new pavement areas. The proposed new parking area will all be directed to a pervious pavement system and the roof runoff will be directed to a new subsurface storm water management system to provide infiltration and storage for all frequency storms events.

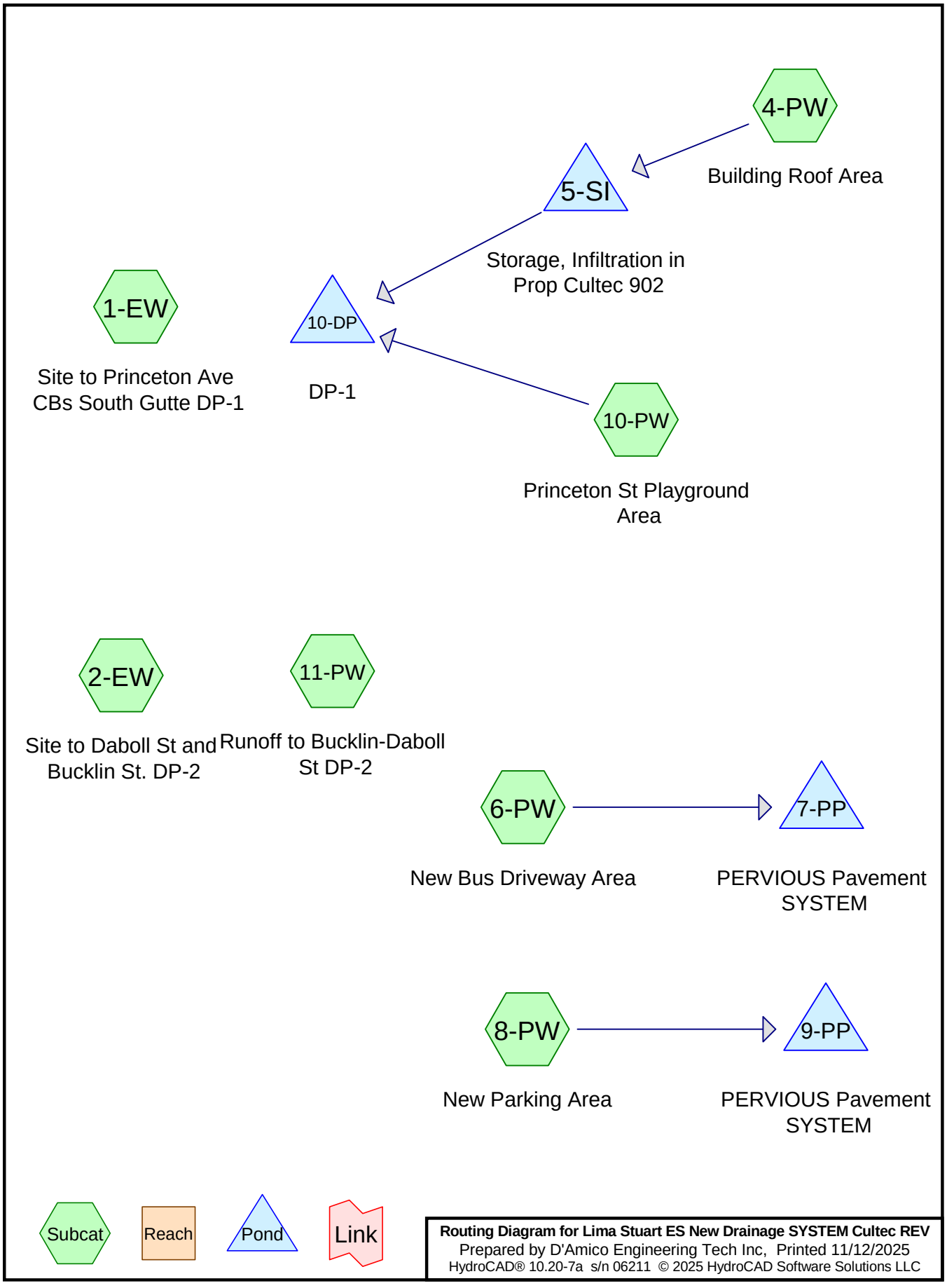
5 SOIL EROSION AND SEDIMENTATION CONTROLS

Soil Erosion and Sedimentation Control Practices will be included to avoid and minimize impacts to water quality. Detailed notes will be included in the plans to ensure effective implementation of erosion and sedimentation controls. The soil erosion and sedimentation control measures will be installed prior to the initiation of construction activities and maintained throughout construction. Silt fence and/or hay bales are proposed along the perimeter of the site. Once established, these measures will be monitored daily until construction activities are complete. All referenced soil erosion and sedimentation controls including materials used and the installation procedures will be performed per the "Rhode Island Erosion and Sedimentation Handbook" Issued 1989 (revised 2014).

6 CONCLUSIONS

As illustrated in the above tables and appendices, the proposed site activities for the new Lima Stuart PK-8 School have been designed in order to avoid any increase in peak runoff rates, incorporate water quality pre-treatment and provide re-charge to the groundwater in the area. The analysis shows that in all practicality runoff from the site will not change the current runoff characteristics of the area and in fact will improve the capacity of the roadway drainage catchment and the perimeter closed drainage system during the required stormwater events. The design provides for additional sustainability for the older drainage system in the area and resiliency for the neighborhood against future flooding events. Final construction of the project is anticipated in the early Spring of 2026.

APPENDIX A



Routing Diagram for Lima Stuart ES New Drainage SYSTEM Cultec REV
Prepared by D'Amico Engineering Tech Inc, Printed 11/12/2025

Summary for Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1

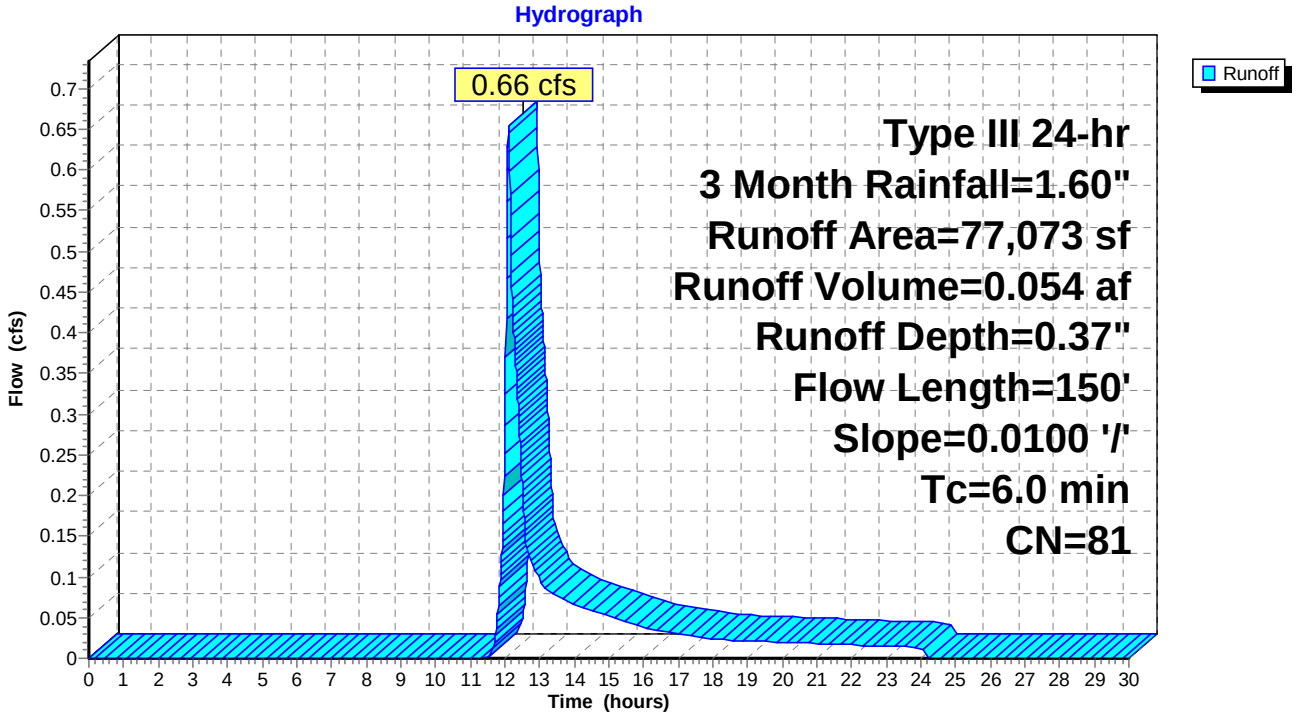
Runoff = 0.66 cfs @ 12.10 hrs, Volume= 0.054 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 3 Month Rainfall=1.60"

Area (sf)	CN	Description
27,718	98	Paved parking, HSG A
21,984	39	>75% Grass cover, Good, HSG A
27,371	98	Roofs, HSG A
77,073	81	Weighted Average
21,984	39	28.52% Pervious Area
55,089	98	71.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	150	0.0100	1.15		**Sheet Flow, East Area Sheet Flow** Smooth surfaces n= 0.011 P2= 3.30"
2.2	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1



Summary for Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2

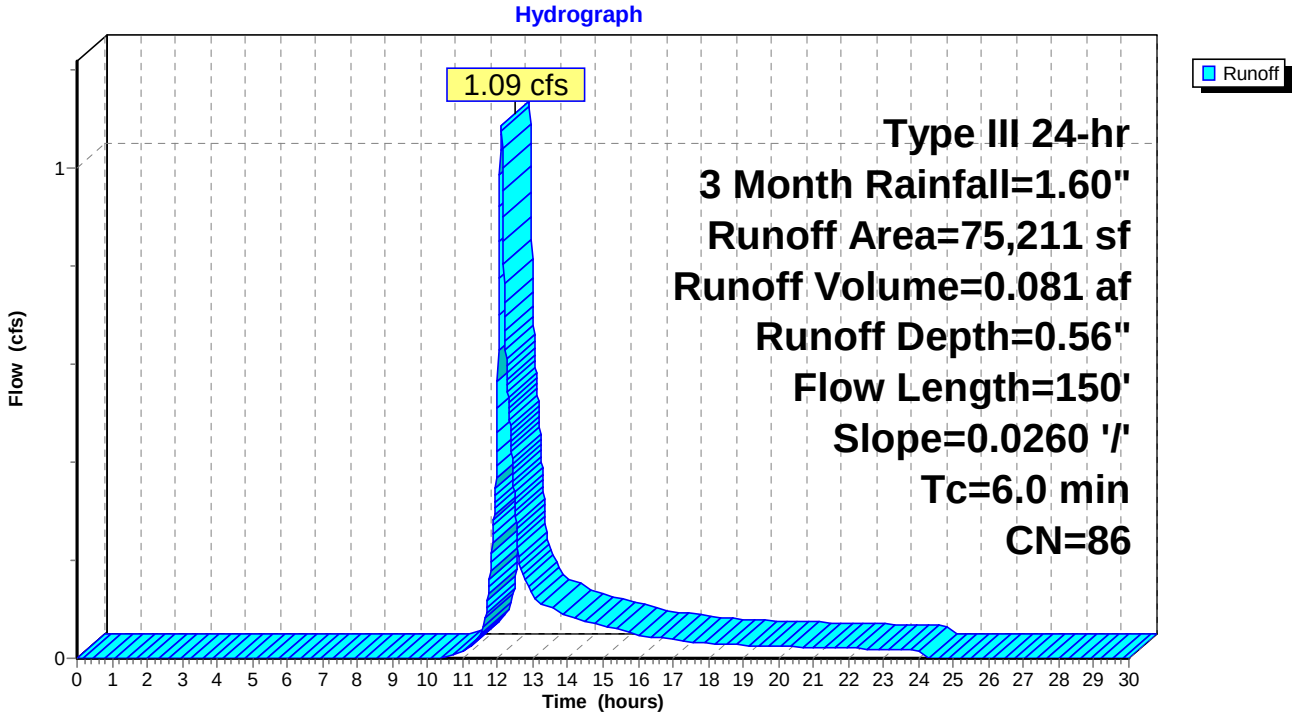
Runoff = 1.09 cfs @ 12.09 hrs, Volume= 0.081 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 3 Month Rainfall=1.60"

Area (sf)	CN	Description
20,607	98	Roofs, HSG A
39,231	98	Paved parking, HSG A
15,373	39	>75% Grass cover, Good, HSG A
75,211	86	Weighted Average
15,373	39	20.44% Pervious Area
59,838	98	79.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	150	0.0260	1.68		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
1.5	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2



Summary for Subcatchment 4-PW: Building Roof Area

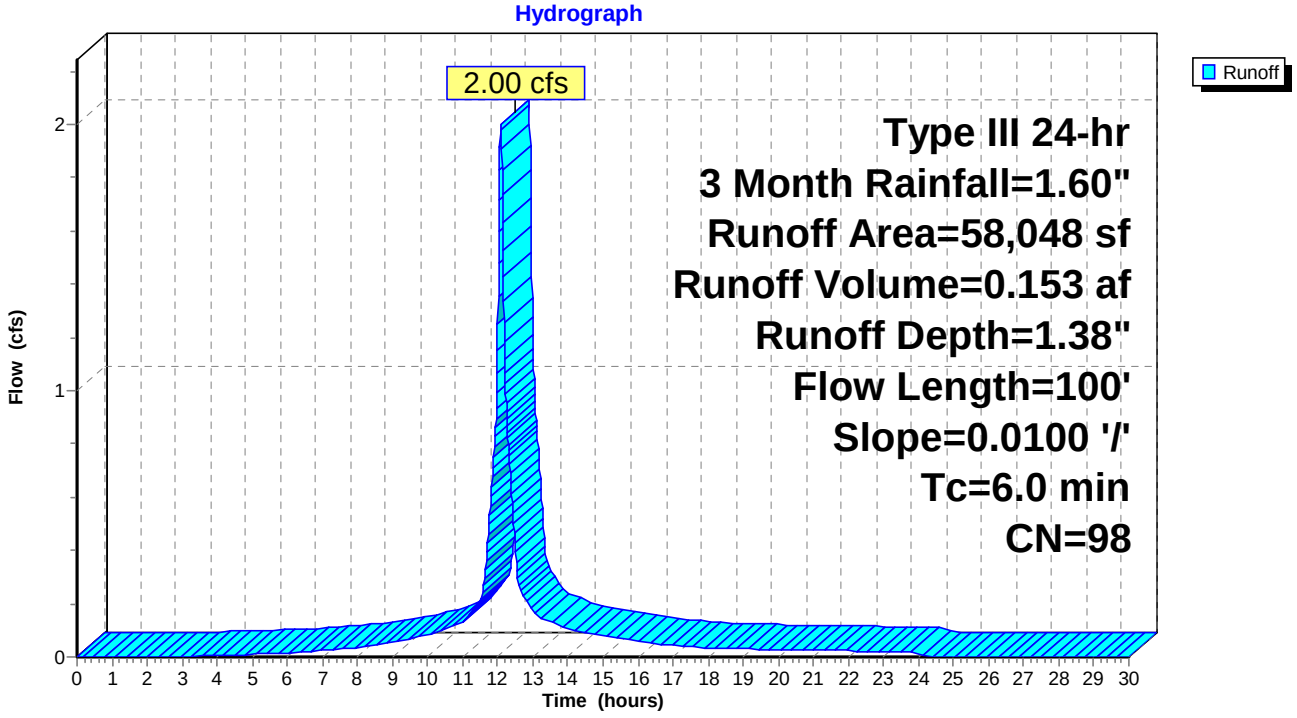
Runoff = 2.00 cfs @ 12.08 hrs, Volume= 0.153 af, Depth= 1.38"
Routed to Pond 5-SI : Storage, Infiltration in Prop Cultec 902

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 3 Month Rainfall=1.60"

Area (sf)	CN	Description
58,048	98	Roofs, HSG A
58,048	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Roof Drain System** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4-PW: Building Roof Area



Summary for Pond 5-SI: Storage, Infiltration in Prop Cultec 902

Inflow Area = 1.333 ac,100.00% Impervious, Inflow Depth = 1.38" for 3 Month event
Inflow = 2.00 cfs @ 12.08 hrs, Volume= 0.153 af
Outflow = 0.73 cfs @ 11.97 hrs, Volume= 0.153 af, Atten= 63%, Lag= 0.0 min
Discarded = 0.73 cfs @ 11.97 hrs, Volume= 0.153 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10-DP : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 62.23' @ 12.33 hrs Surf.Area= 3,827 sf Storage= 925 cf

Plug-Flow detention time= 7.1 min calculated for 0.153 af (100% of inflow)
Center-of-Mass det. time= 7.1 min (780.5 - 773.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	61.50'	4,420 cf	**88.25'W x 43.37'L x 5.75'H Field A** 22,006 cf Overall - 8,611 cf Embedded = 13,395 cf x 33.0% Voids
#2A	62.25'	8,611 cf	**Cultec R-902HD** x 132 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 132 Chambers in 12 Rows Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf
		13,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.50'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'
#2	Primary	64.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.73 cfs @ 11.97 hrs HW=61.62' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.73 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=61.50' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 5-SI: Storage, Infiltration in Prop Cultec 902 - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Superseded by R-902HD V2 for new designs)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

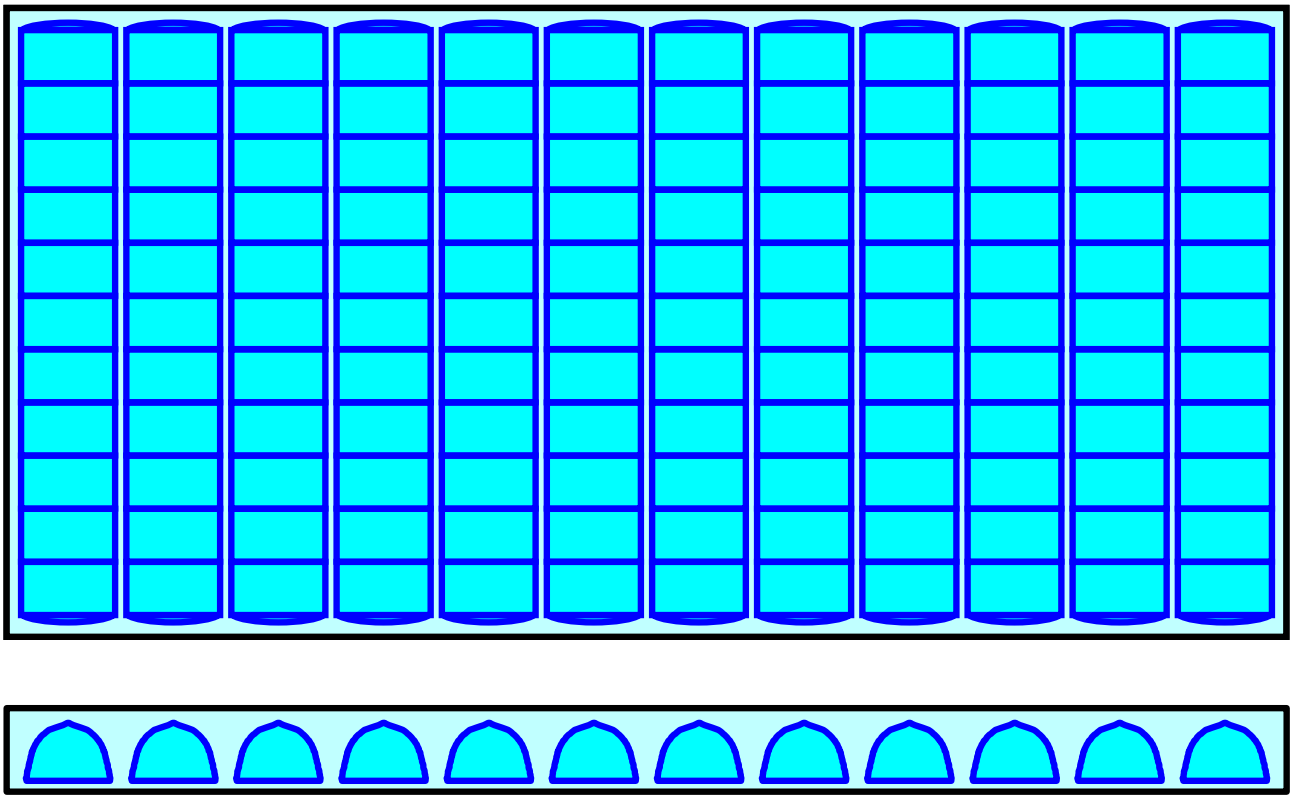
11 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 41.37' Row Length +12.0" End Stone x 2 = 43.37' Base Length
12 Rows x 78.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 88.25' Base Width
9.0" Stone Base + 48.0" Chamber Height + 12.0" Stone Cover = 5.75' Field Height

132 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 12 Rows = 8,611.3 cf Chamber Storage

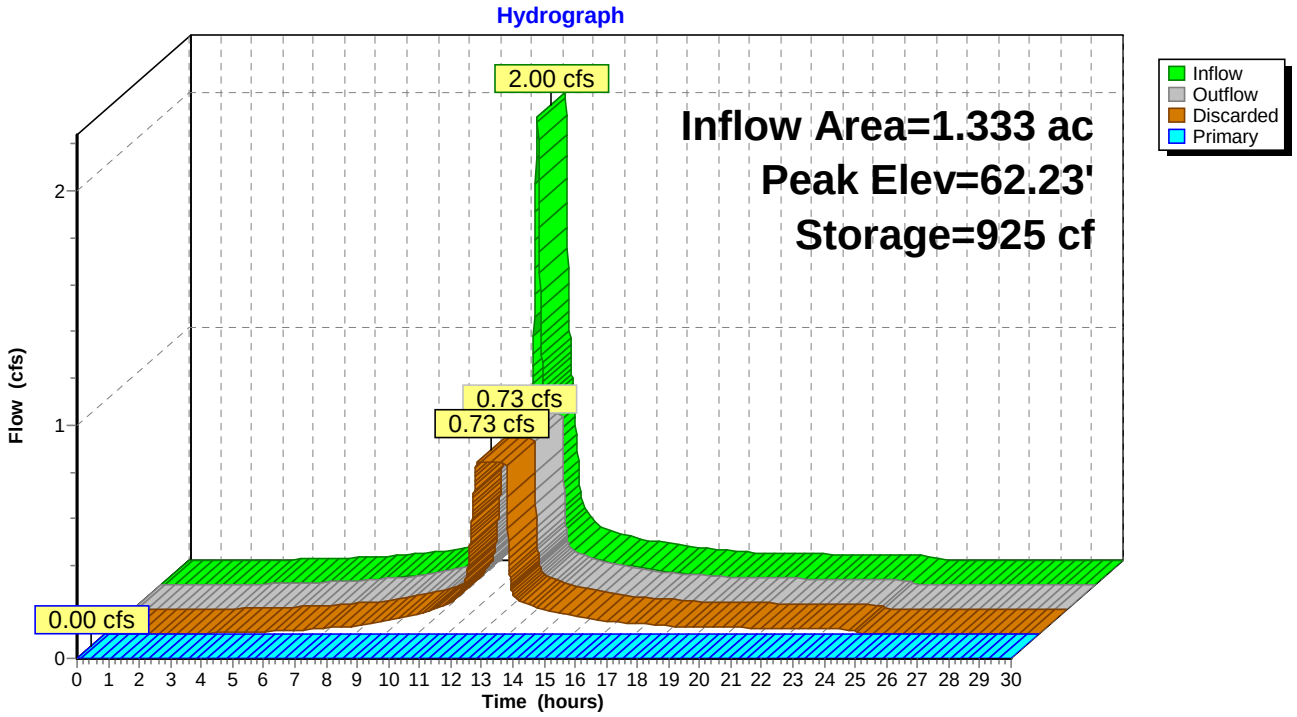
22,005.9 cf Field - 8,611.3 cf Chambers = 13,394.6 cf Stone x 33.0% Voids = 4,420.2 cf Stone Storage

Chamber Storage + Stone Storage = 13,031.5 cf = 0.299 af
Overall Storage Efficiency = 59.2%
Overall System Size = 43.37' x 88.25' x 5.75'

132 Chambers
815.0 cy Field
496.1 cy Stone



Pond 5-SI: Storage, Infiltration in Prop Cultec 902



Summary for Subcatchment 6-PW: New Bus Driveway Area

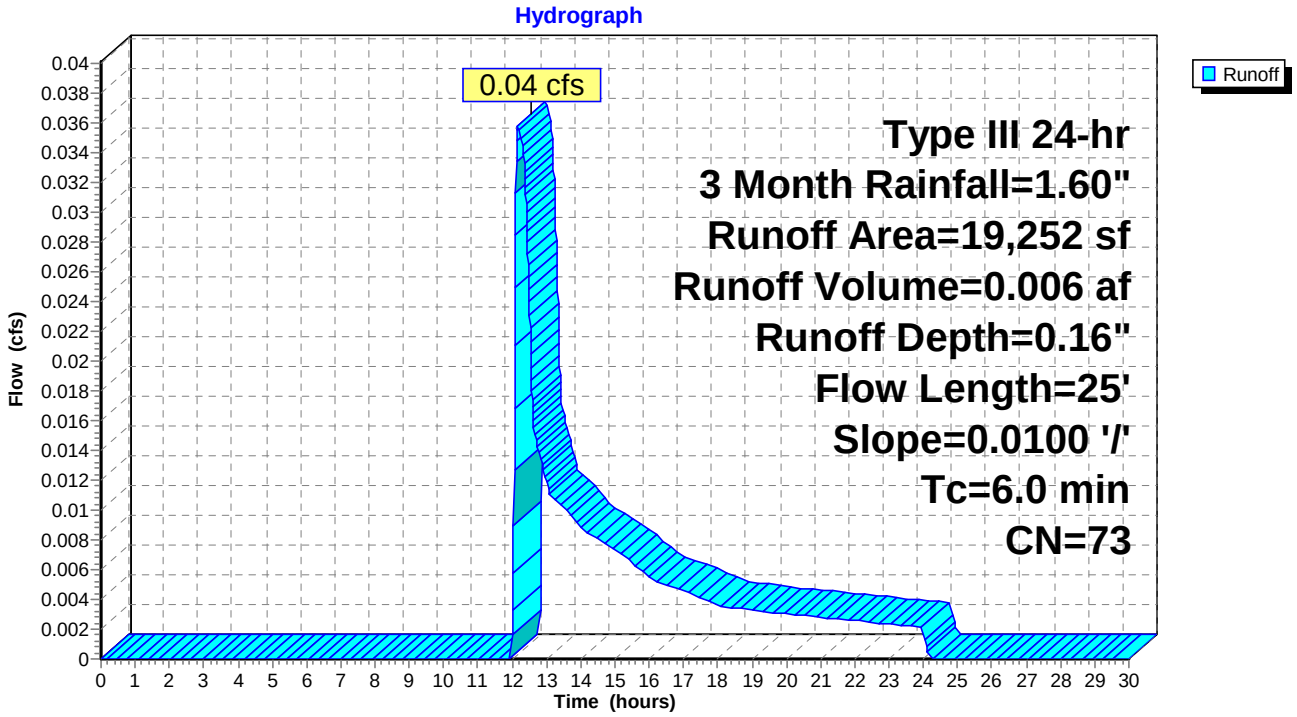
Runoff = 0.04 cfs @ 12.15 hrs, Volume= 0.006 af, Depth= 0.16"
Routed to Pond 7-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 3 Month Rainfall=1.60"

	Area (sf)	CN	Description
*	8,954	76	Pervious Pavement - Table 5-5
	4,874	39	>75% Grass cover, Good, HSG A
	5,424	98	Paved parking, HSG A
	19,252	73	Weighted Average
	13,828	63	71.83% Pervious Area
	5,424	98	28.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.80		**Sheet Flow, Driveway Area** Smooth surfaces n= 0.011 P2= 3.30"
0.5	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6-PW: New Bus Driveway Area



Summary for Pond 7-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.442 ac, 28.17% Impervious, Inflow Depth = 0.16" for 3 Month event
Inflow = 0.04 cfs @ 12.15 hrs, Volume= 0.006 af
Outflow = 0.03 cfs @ 12.27 hrs, Volume= 0.006 af, Atten= 2%, Lag= 7.1 min
Primary = 0.03 cfs @ 12.27 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 69.25' @ 12.27 hrs Surf.Area= 8,942 sf Storage= 3 cf

Plug-Flow detention time= 1.4 min calculated for 0.006 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (937.8 - 936.3)

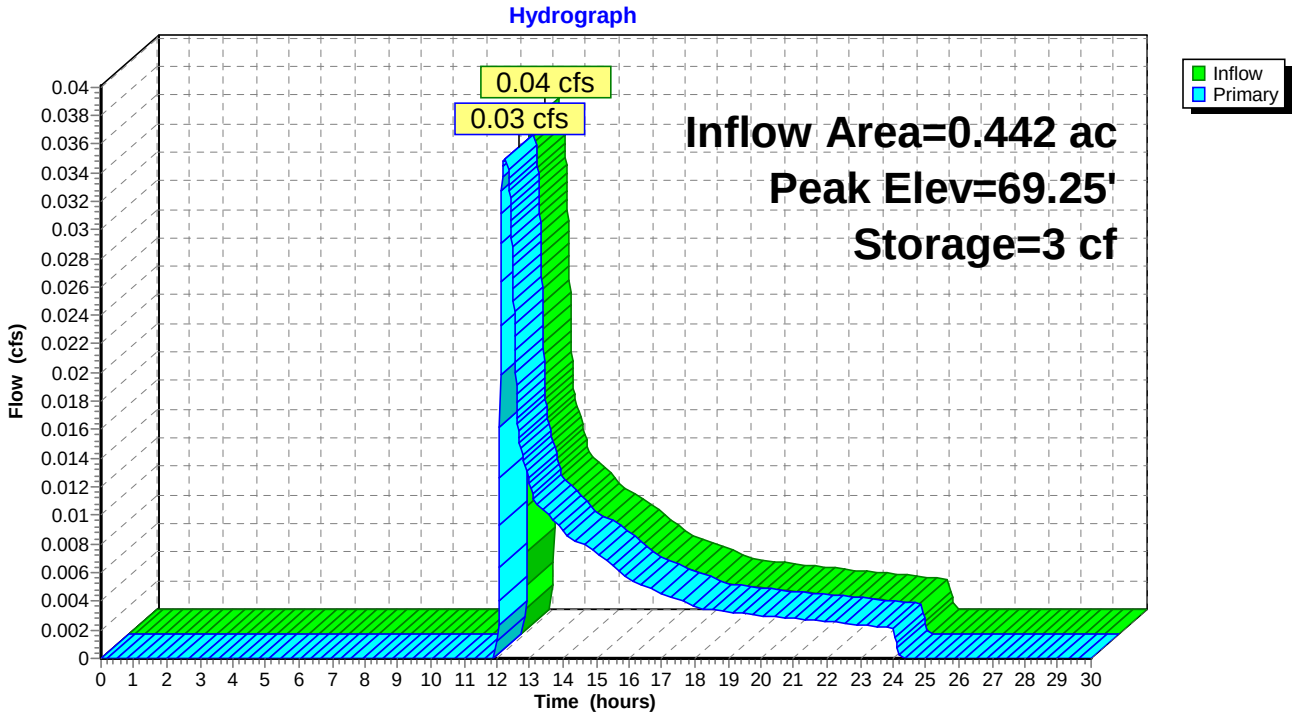
Volume	Invert	Avail.Storage	Storage Description
#1	69.25'	1,108 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 3,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	8,954	0	0
70.00	0	3,358	3,358

Device	Routing	Invert	Outlet Devices
#1	Primary	69.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.03 cfs @ 12.27 hrs HW=69.25' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Pond 7-PP: PERVIOUS Pavement SYSTEM



Summary for Subcatchment 8-PW: New Parking Area

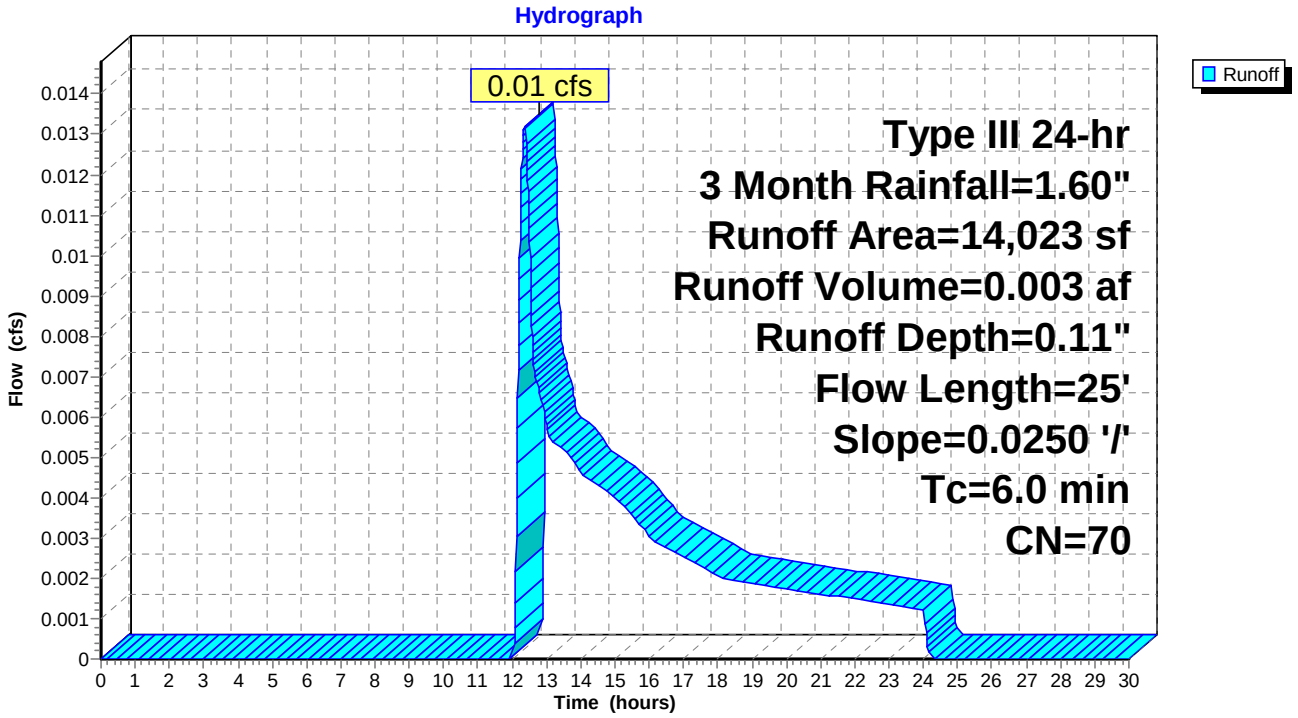
Runoff = 0.01 cfs @ 12.36 hrs, Volume= 0.003 af, Depth= 0.11"
Routed to Pond 9-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 3 Month Rainfall=1.60"

	Area (sf)	CN	Description
*	11,905	76	Pervious Pavement - Table 5-5
	2,118	39	>75% Grass cover, Good, HSG A
	14,023	70	Weighted Average
	14,023	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0250	1.16		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
0.4	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8-PW: New Parking Area



Summary for Pond 9-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.322 ac, 0.00% Impervious, Inflow Depth = 0.11" for 3 Month event
Inflow = 0.01 cfs @ 12.36 hrs, Volume= 0.003 af
Outflow = 0.01 cfs @ 12.38 hrs, Volume= 0.003 af, Atten= 1%, Lag= 1.5 min
Primary = 0.01 cfs @ 12.38 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 67.25' @ 12.38 hrs Surf.Area= 11,900 sf Storage= 1 cf

Plug-Flow detention time= 1.4 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (967.2 - 965.7)

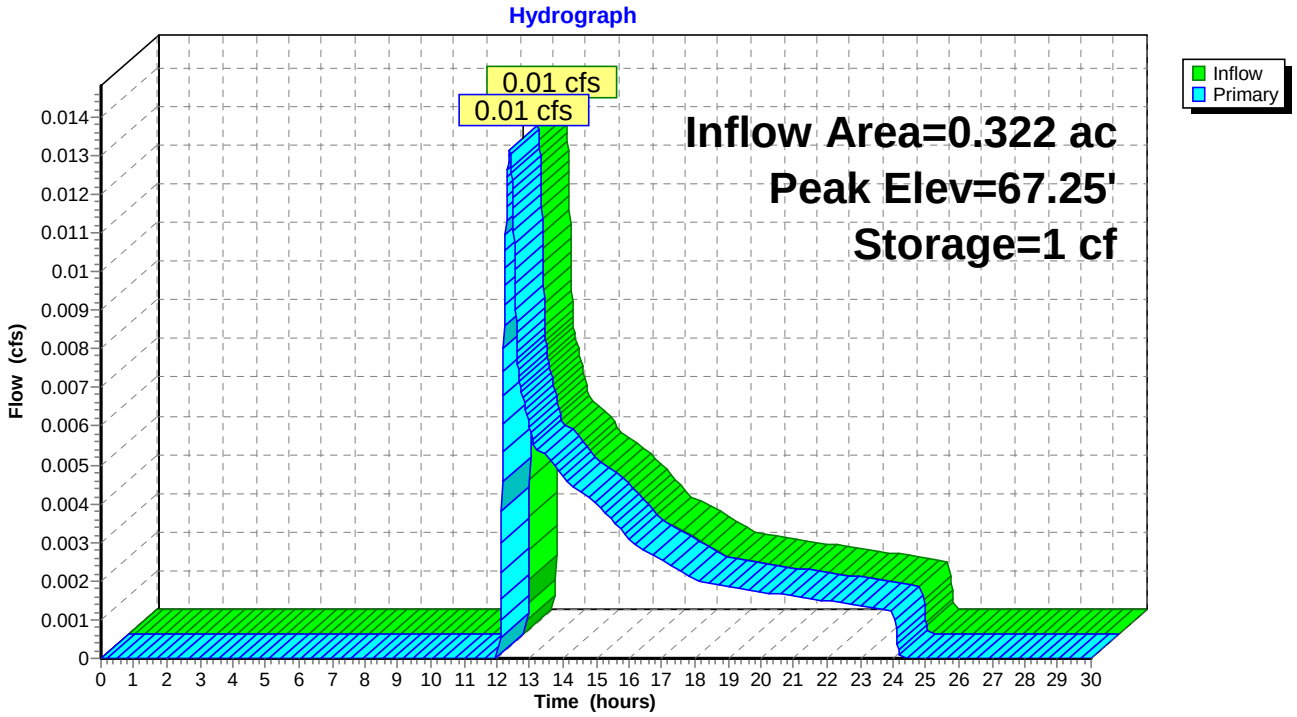
Volume	Invert	Avail.Storage	Storage Description
#1	67.25'	1,473 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 4,464 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.25	11,905	0	0
68.00	0	4,464	4,464

Device	Routing	Invert	Outlet Devices
#1	Primary	67.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.01 cfs @ 12.38 hrs HW=67.25' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Pond 9-PP: PERVIOUS Pavement SYSTEM

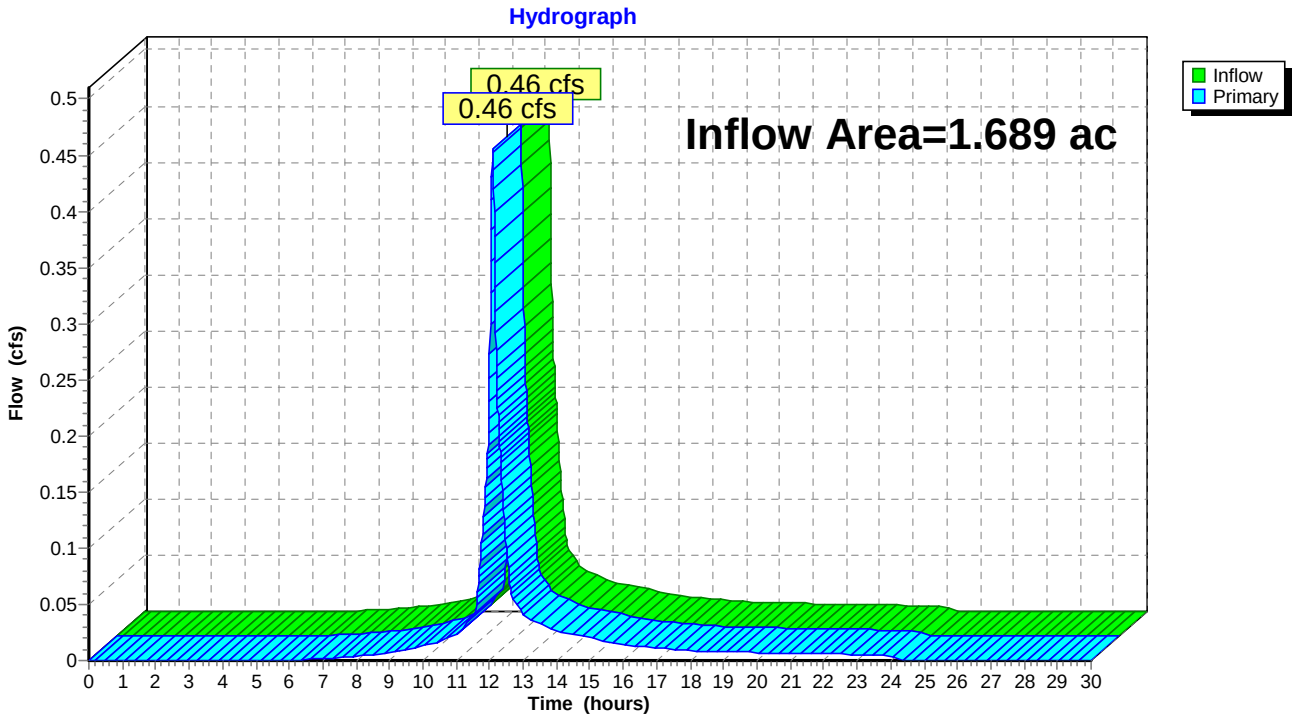


Summary for Pond 10-DP: DP-1

Inflow Area = 1.689 ac, 98.85% Impervious, Inflow Depth = 0.23" for 3 Month event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af
Primary = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2

Pond 10-DP: DP-1



Summary for Subcatchment 10-PW: Princeton St Playground Area

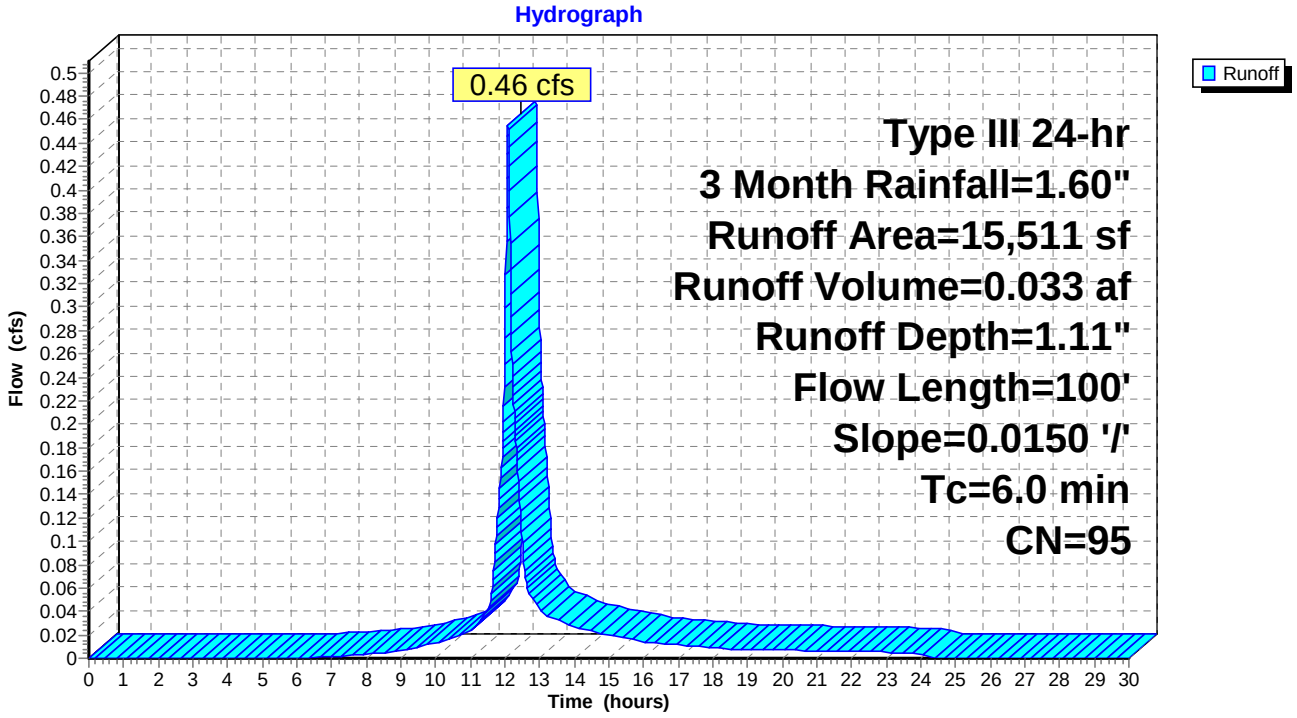
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af, Depth= 1.11"
Routed to Pond 10-DP : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 3 Month Rainfall=1.60"

Area (sf)	CN	Description
14,667	98	Paved parking, HSG A
844	39	>75% Grass cover, Good, HSG A
15,511	95	Weighted Average
844	39	5.44% Pervious Area
14,667	98	94.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0150	1.25		**Sheet Flow, Playground Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.3	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10-PW: Princeton St Playground Area



Summary for Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2

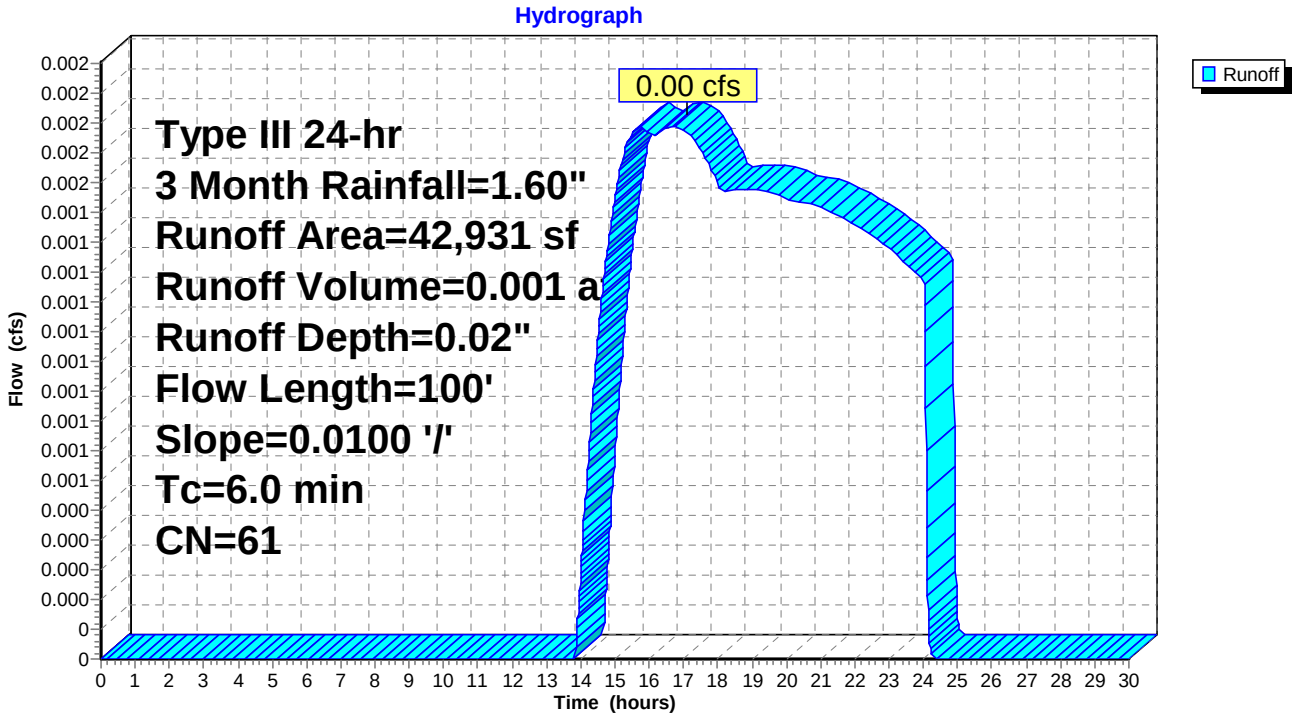
Runoff = 0.00 cfs @ 16.70 hrs, Volume= 0.001 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 3 Month Rainfall=1.60"

Area (sf)	CN	Description
16,249	98	Paved parking, HSG A
26,682	39	>75% Grass cover, Good, HSG A
42,931	61	Weighted Average
26,682	39	62.15% Pervious Area
16,249	98	37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Parking Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2



Summary for Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1

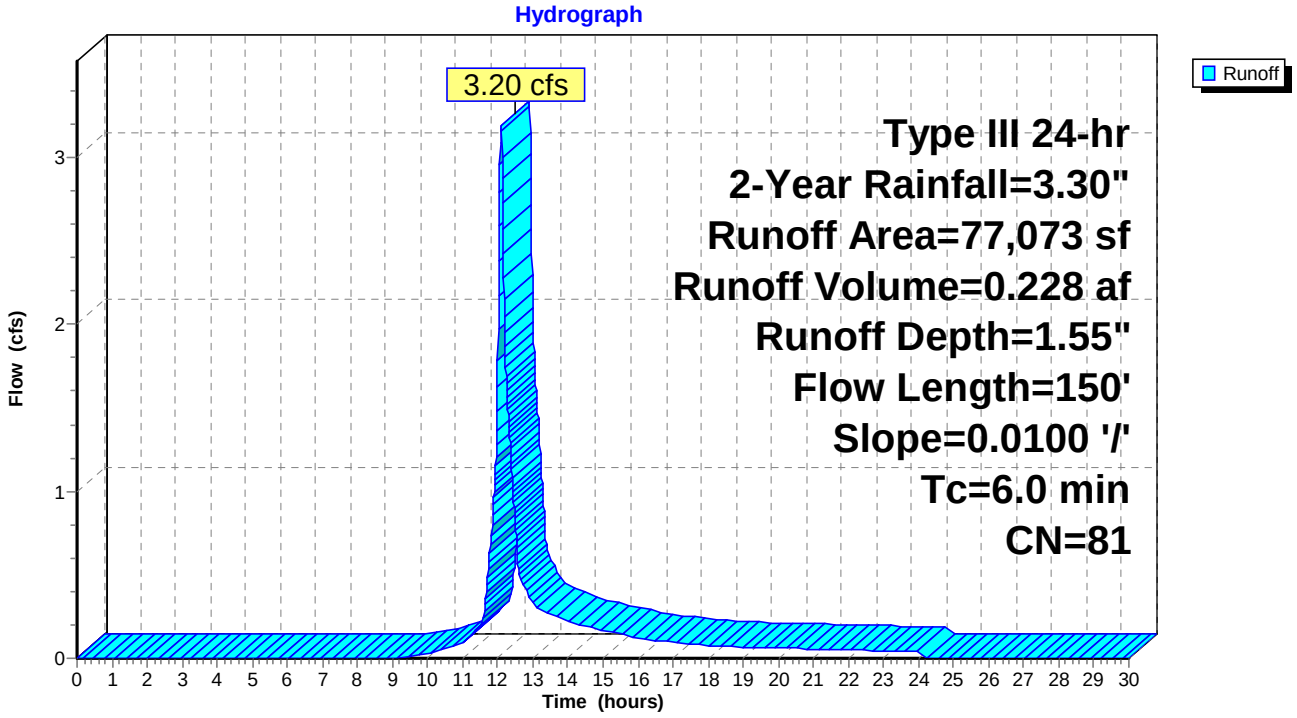
Runoff = 3.20 cfs @ 12.09 hrs, Volume= 0.228 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
27,718	98	Paved parking, HSG A
21,984	39	>75% Grass cover, Good, HSG A
27,371	98	Roofs, HSG A
77,073	81	Weighted Average
21,984	39	28.52% Pervious Area
55,089	98	71.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	150	0.0100	1.15		**Sheet Flow, East Area Sheet Flow** Smooth surfaces n= 0.011 P2= 3.30"
2.2	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1



Summary for Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2

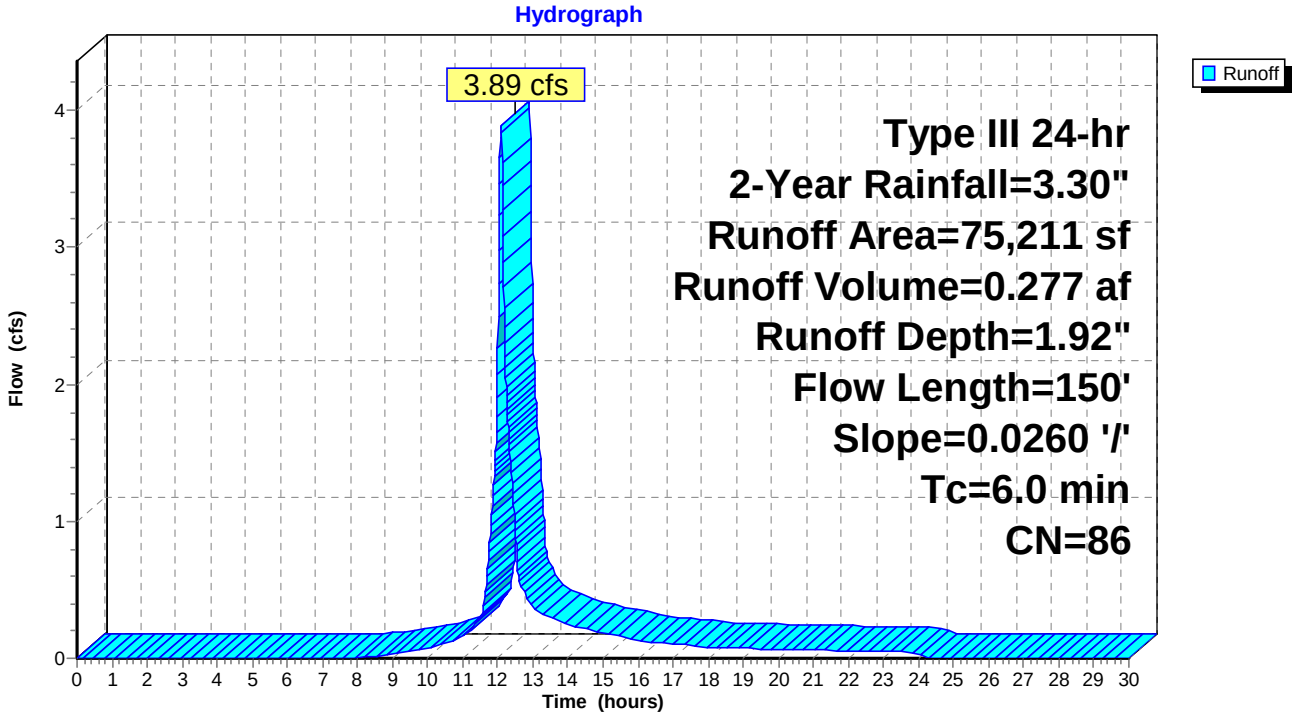
Runoff = 3.89 cfs @ 12.09 hrs, Volume= 0.277 af, Depth= 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
20,607	98	Roofs, HSG A
39,231	98	Paved parking, HSG A
15,373	39	>75% Grass cover, Good, HSG A
75,211	86	Weighted Average
15,373	39	20.44% Pervious Area
59,838	98	79.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	150	0.0260	1.68		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
1.5	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2



Summary for Subcatchment 4-PW: Building Roof Area

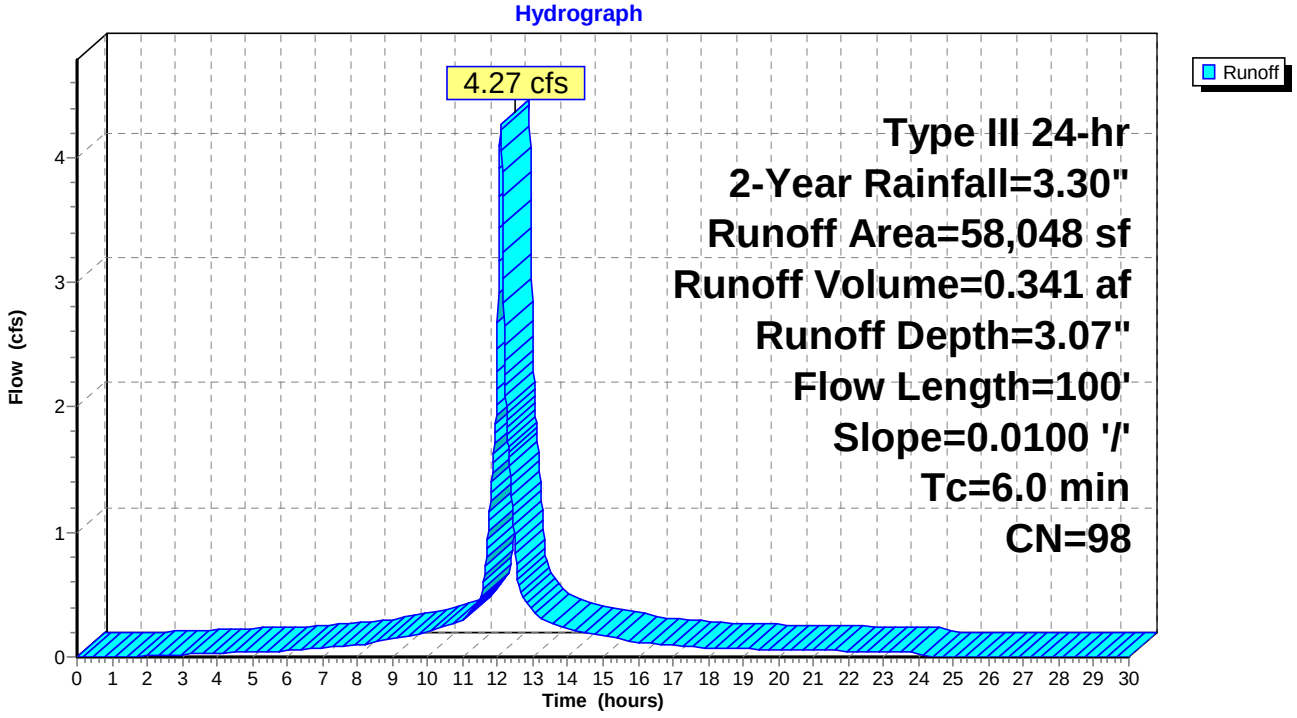
Runoff = 4.27 cfs @ 12.08 hrs, Volume= 0.341 af, Depth= 3.07"
Routed to Pond 5-SI : Storage, Infiltration in Prop Cultec 902

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
58,048	98	Roofs, HSG A
58,048	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Roof Drain System** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4-PW: Building Roof Area



Summary for Pond 5-SI: Storage, Infiltration in Prop Cultec 902

Inflow Area = 1.333 ac,100.00% Impervious, Inflow Depth = 3.07" for 2-Year event
Inflow = 4.27 cfs @ 12.08 hrs, Volume= 0.341 af
Outflow = 0.73 cfs @ 11.72 hrs, Volume= 0.341 af, Atten= 83%, Lag= 0.0 min
Discarded = 0.73 cfs @ 11.72 hrs, Volume= 0.341 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10-DP : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 63.18' @ 12.54 hrs Surf.Area= 3,827 sf Storage= 3,850 cf

Plug-Flow detention time= 29.3 min calculated for 0.341 af (100% of inflow)
Center-of-Mass det. time= 29.3 min (785.0 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	61.50'	4,420 cf	**88.25'W x 43.37'L x 5.75'H Field A** 22,006 cf Overall - 8,611 cf Embedded = 13,395 cf x 33.0% Voids
#2A	62.25'	8,611 cf	**Cultec R-902HD** x 132 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 132 Chambers in 12 Rows Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf
		13,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.50'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'
#2	Primary	64.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.73 cfs @ 11.72 hrs HW=61.62' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.73 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=61.50' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 5-SI: Storage, Infiltration in Prop Cultec 902 - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Superseded by R-902HD V2 for new designs)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

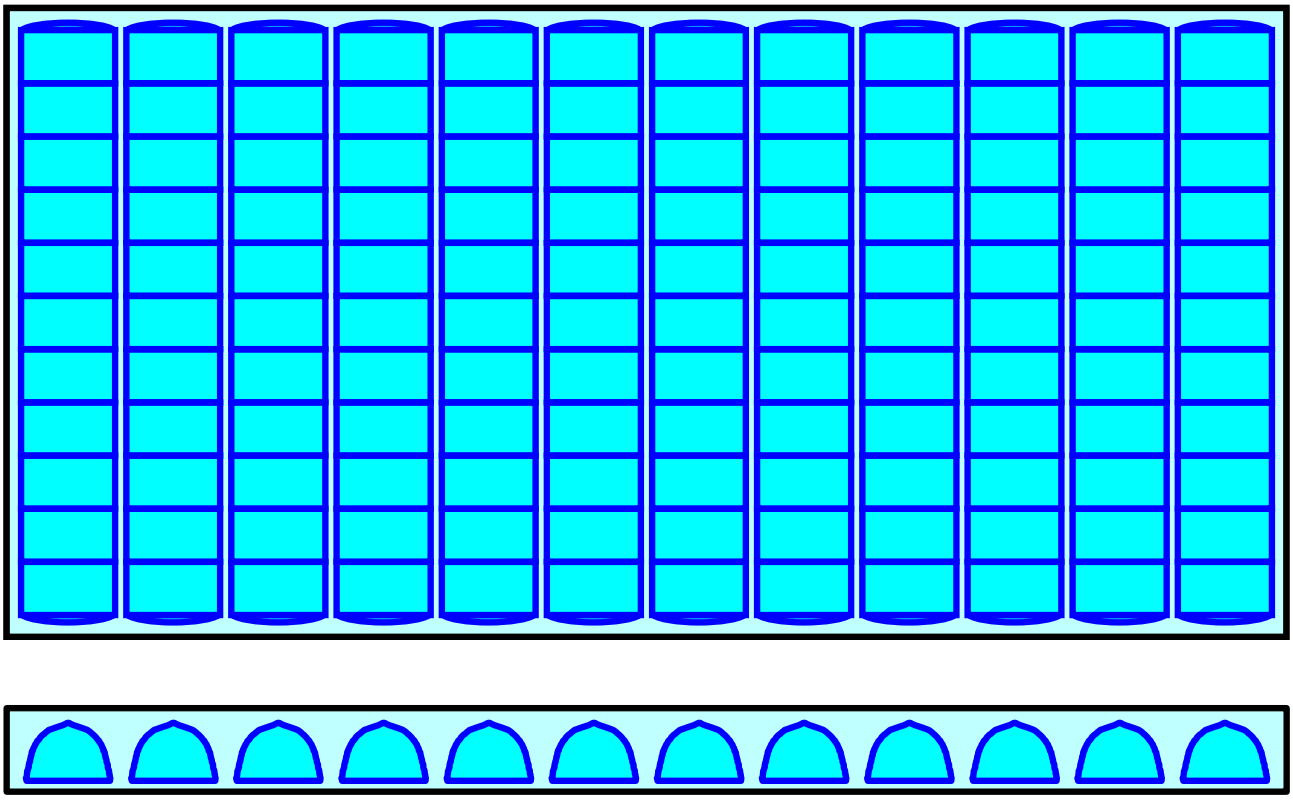
11 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 41.37' Row Length +12.0" End Stone x 2 = 43.37' Base Length
12 Rows x 78.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 88.25' Base Width
9.0" Stone Base + 48.0" Chamber Height + 12.0" Stone Cover = 5.75' Field Height

132 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 12 Rows = 8,611.3 cf Chamber Storage

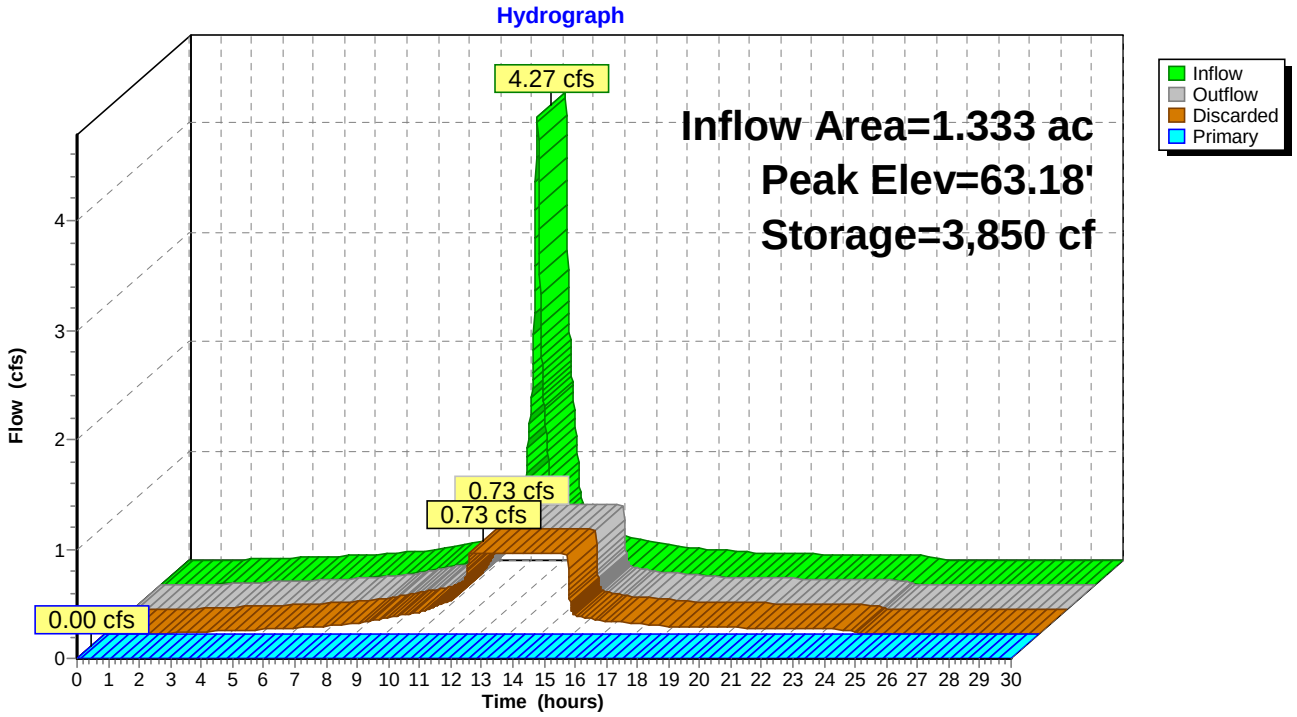
22,005.9 cf Field - 8,611.3 cf Chambers = 13,394.6 cf Stone x 33.0% Voids = 4,420.2 cf Stone Storage

Chamber Storage + Stone Storage = 13,031.5 cf = 0.299 af
Overall Storage Efficiency = 59.2%
Overall System Size = 43.37' x 88.25' x 5.75'

132 Chambers
815.0 cy Field
496.1 cy Stone



Pond 5-SI: Storage, Infiltration in Prop Cultec 902



Summary for Subcatchment 6-PW: New Bus Driveway Area

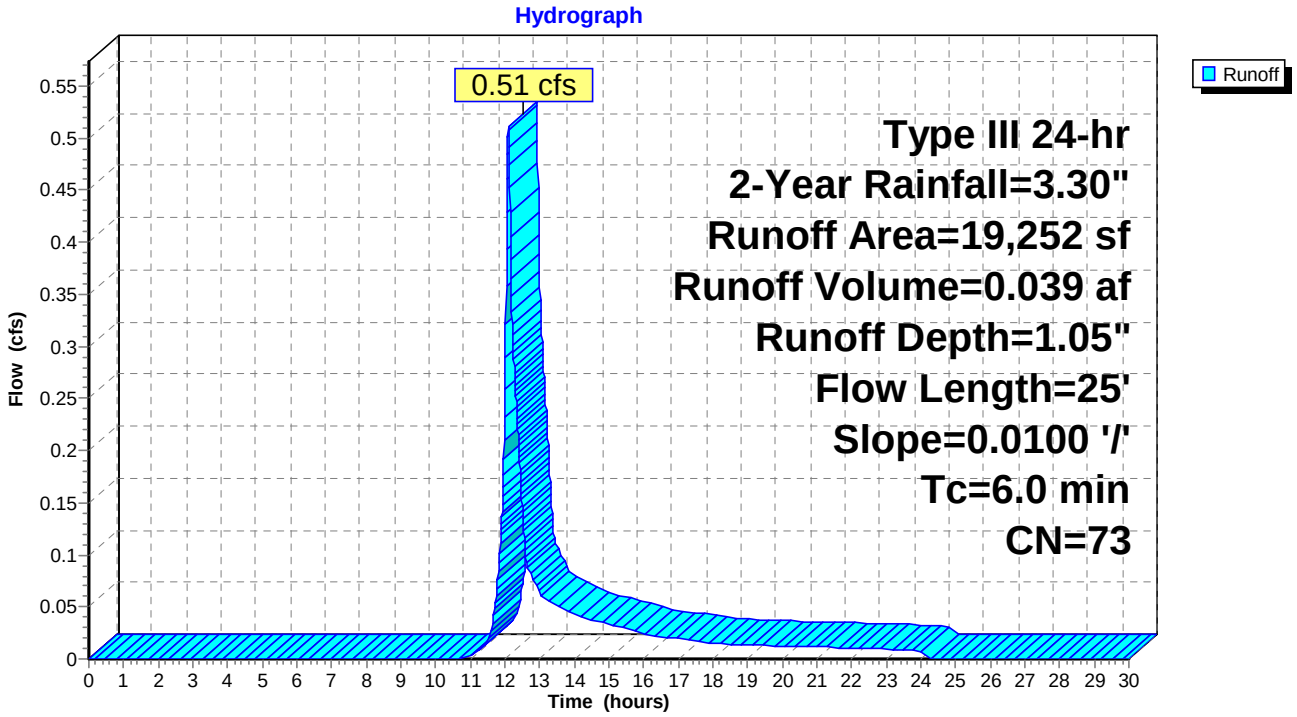
Runoff = 0.51 cfs @ 12.10 hrs, Volume= 0.039 af, Depth= 1.05"
Routed to Pond 7-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.30"

	Area (sf)	CN	Description
*	8,954	76	Pervious Pavement - Table 5-5
	4,874	39	>75% Grass cover, Good, HSG A
	5,424	98	Paved parking, HSG A
	19,252	73	Weighted Average
	13,828	63	71.83% Pervious Area
	5,424	98	28.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.80		**Sheet Flow, Driveway Area** Smooth surfaces n= 0.011 P2= 3.30"
0.5	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6-PW: New Bus Driveway Area



Summary for Pond 7-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.442 ac, 28.17% Impervious, Inflow Depth = 1.05" for 2-Year event
Inflow = 0.51 cfs @ 12.10 hrs, Volume= 0.039 af
Outflow = 0.49 cfs @ 12.12 hrs, Volume= 0.039 af, Atten= 4%, Lag= 1.4 min
Primary = 0.49 cfs @ 12.12 hrs, Volume= 0.039 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 69.26' @ 12.12 hrs Surf.Area= 8,782 sf Storage= 42 cf

Plug-Flow detention time= 1.4 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (864.8 - 863.4)

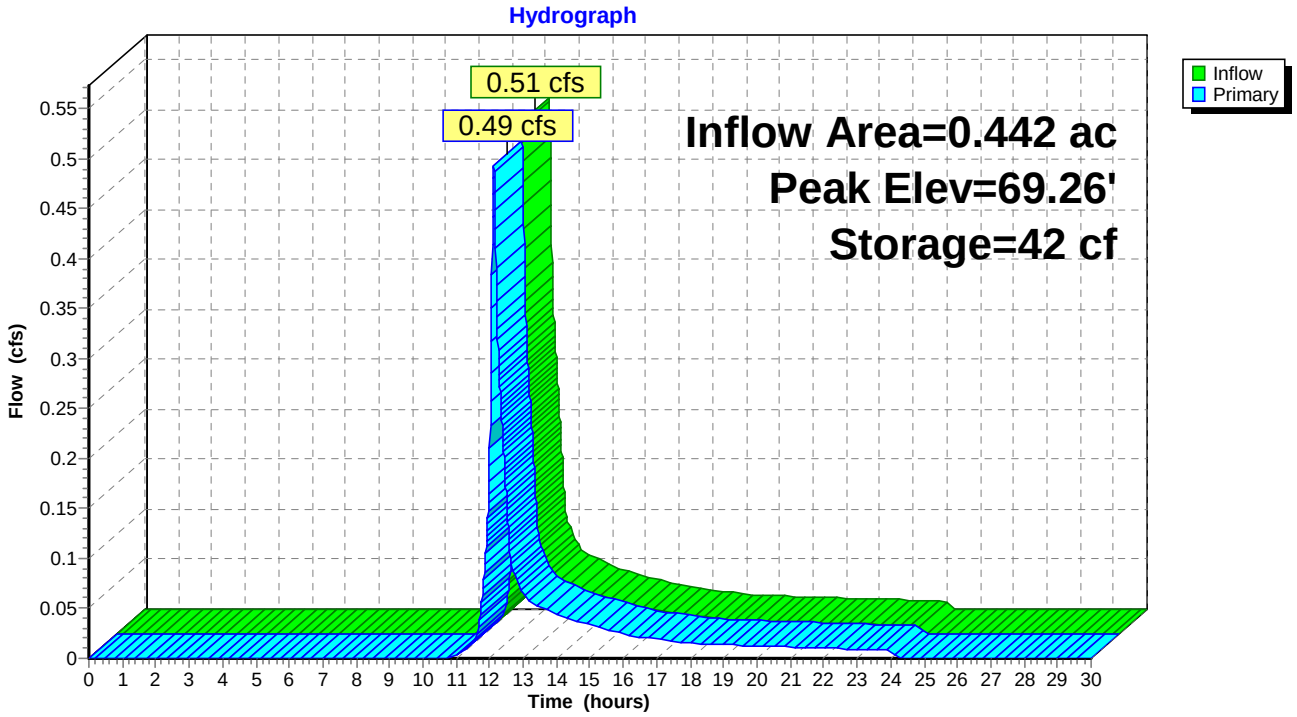
Volume	Invert	Avail.Storage	Storage Description
#1	69.25'	1,108 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 3,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	8,954	0	0
70.00	0	3,358	3,358

Device	Routing	Invert	Outlet Devices
#1	Primary	69.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.49 cfs @ 12.12 hrs HW=69.26' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.49 cfs)

Pond 7-PP: PERVIOUS Pavement SYSTEM



Summary for Subcatchment 8-PW: New Parking Area

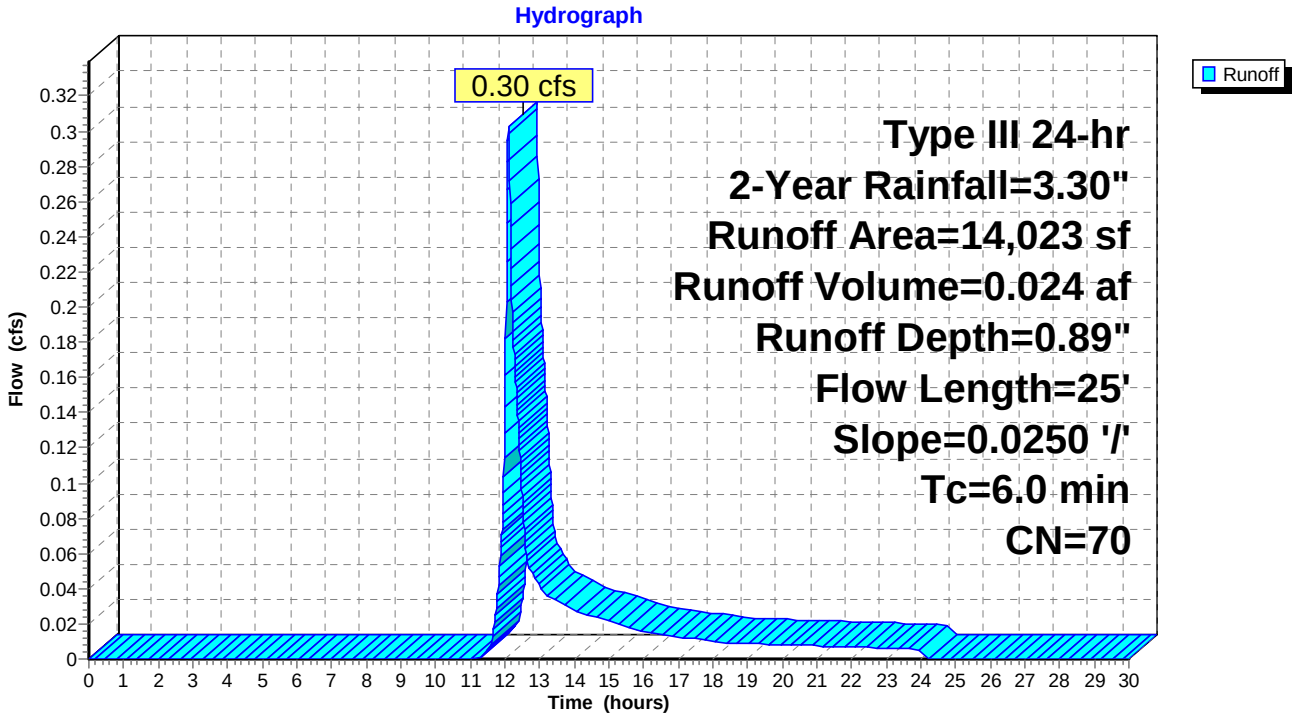
Runoff = 0.30 cfs @ 12.10 hrs, Volume= 0.024 af, Depth= 0.89"
Routed to Pond 9-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.30"

	Area (sf)	CN	Description
*	11,905	76	Pervious Pavement - Table 5-5
	2,118	39	>75% Grass cover, Good, HSG A
	14,023	70	Weighted Average
	14,023	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0250	1.16		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
0.4	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8-PW: New Parking Area



Summary for Pond 9-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.322 ac, 0.00% Impervious, Inflow Depth = 0.89" for 2-Year event
Inflow = 0.30 cfs @ 12.10 hrs, Volume= 0.024 af
Outflow = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 4%, Lag= 1.4 min
Primary = 0.29 cfs @ 12.12 hrs, Volume= 0.024 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 67.26' @ 12.12 hrs Surf.Area= 11,803 sf Storage= 25 cf

Plug-Flow detention time= 1.4 min calculated for 0.024 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (874.9 - 873.5)

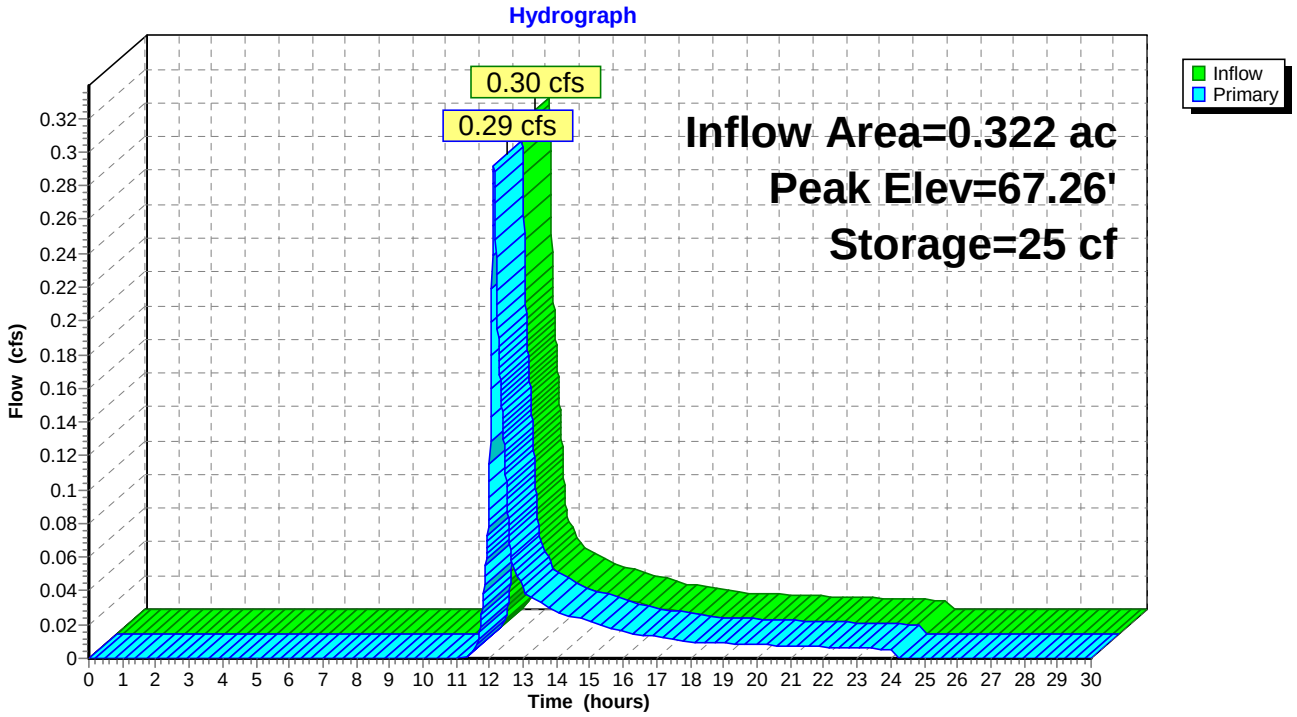
Volume	Invert	Avail.Storage	Storage Description
#1	67.25'	1,473 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 4,464 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.25	11,905	0	0
68.00	0	4,464	4,464

Device	Routing	Invert	Outlet Devices
#1	Primary	67.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.29 cfs @ 12.12 hrs HW=67.26' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Pond 9-PP: PERVIOUS Pavement SYSTEM

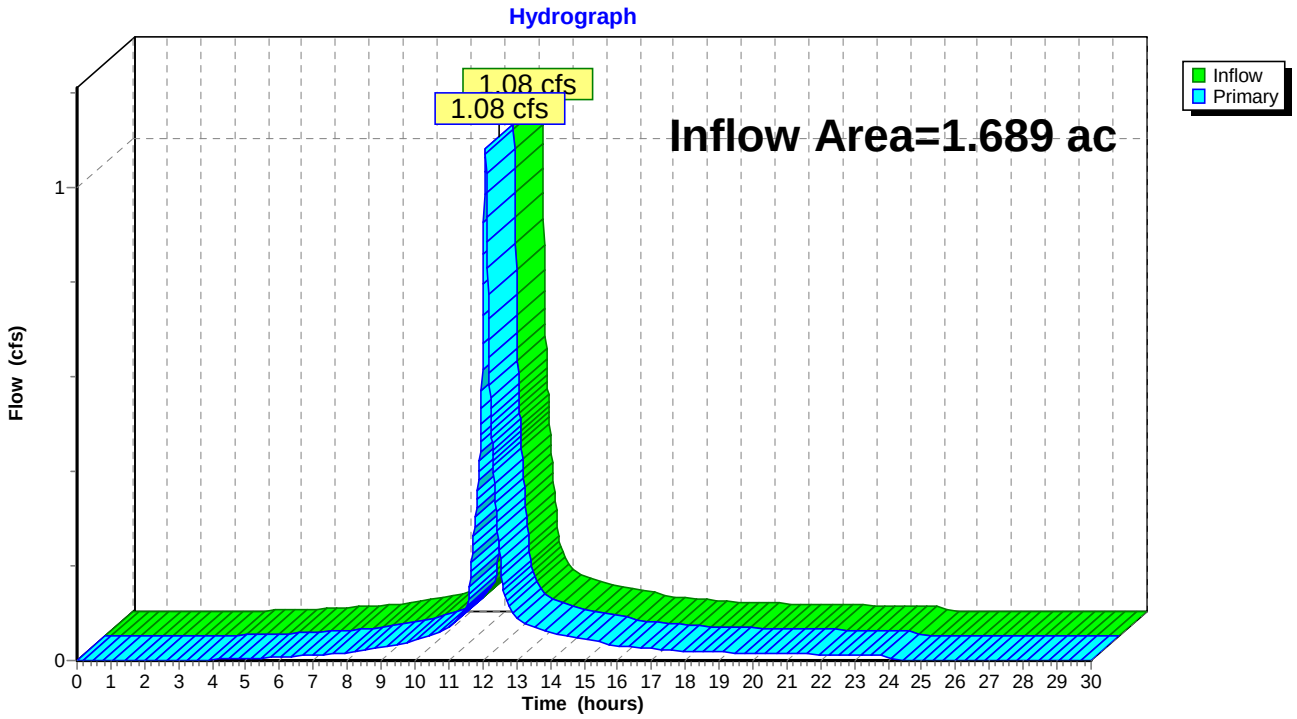


Summary for Pond 10-DP: DP-1

Inflow Area = 1.689 ac, 98.85% Impervious, Inflow Depth = 0.58" for 2-Year event
Inflow = 1.08 cfs @ 12.08 hrs, Volume= 0.081 af
Primary = 1.08 cfs @ 12.08 hrs, Volume= 0.081 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2

Pond 10-DP: DP-1



Summary for Subcatchment 10-PW: Princeton St Playground Area

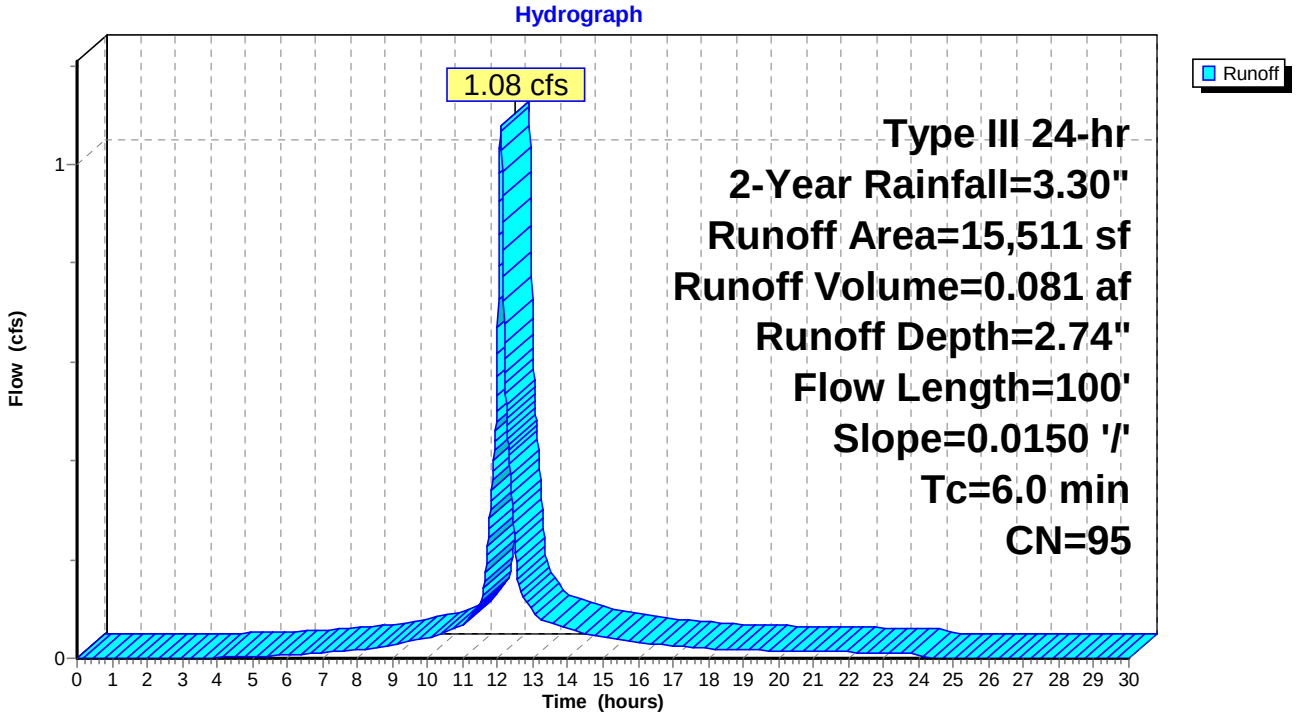
Runoff = 1.08 cfs @ 12.08 hrs, Volume= 0.081 af, Depth= 2.74"
Routed to Pond 10-DP : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
14,667	98	Paved parking, HSG A
844	39	>75% Grass cover, Good, HSG A
15,511	95	Weighted Average
844	39	5.44% Pervious Area
14,667	98	94.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0150	1.25		**Sheet Flow, Playground Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.3	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10-PW: Princeton St Playground Area



Summary for Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2

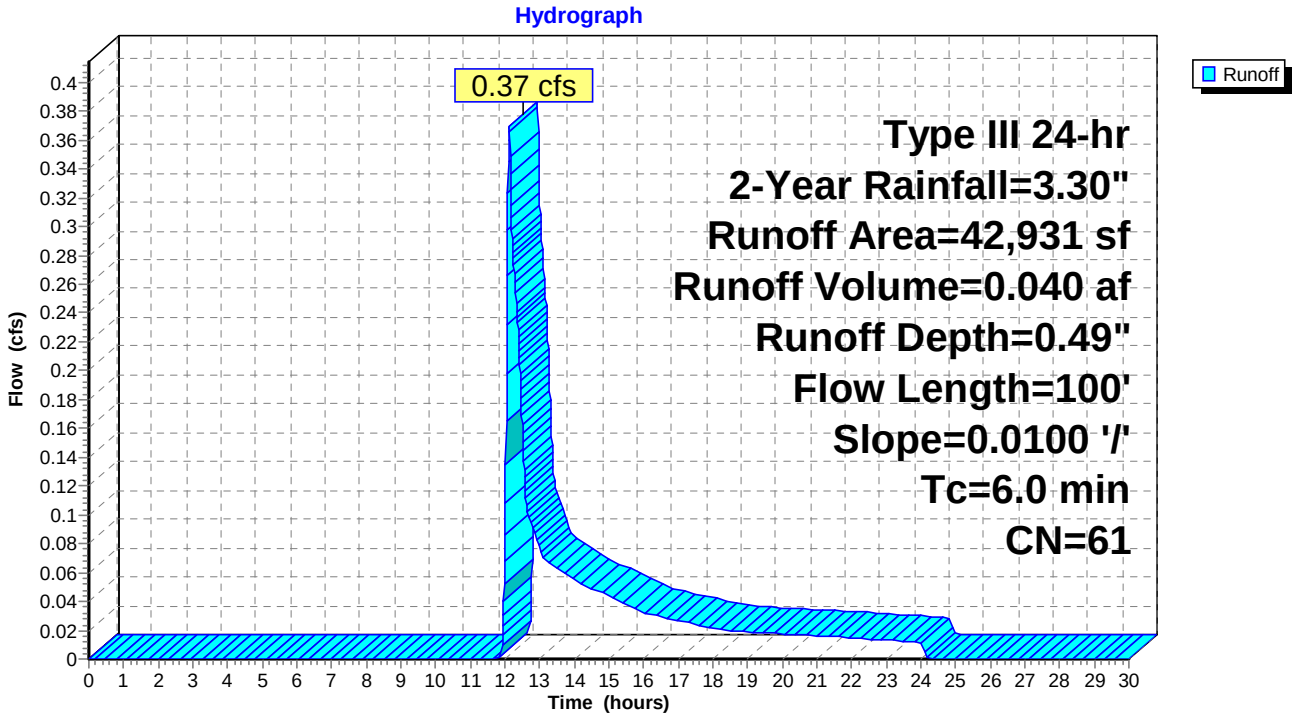
Runoff = 0.37 cfs @ 12.12 hrs, Volume= 0.040 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
16,249	98	Paved parking, HSG A
26,682	39	>75% Grass cover, Good, HSG A
42,931	61	Weighted Average
26,682	39	62.15% Pervious Area
16,249	98	37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Parking Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2



Summary for Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1

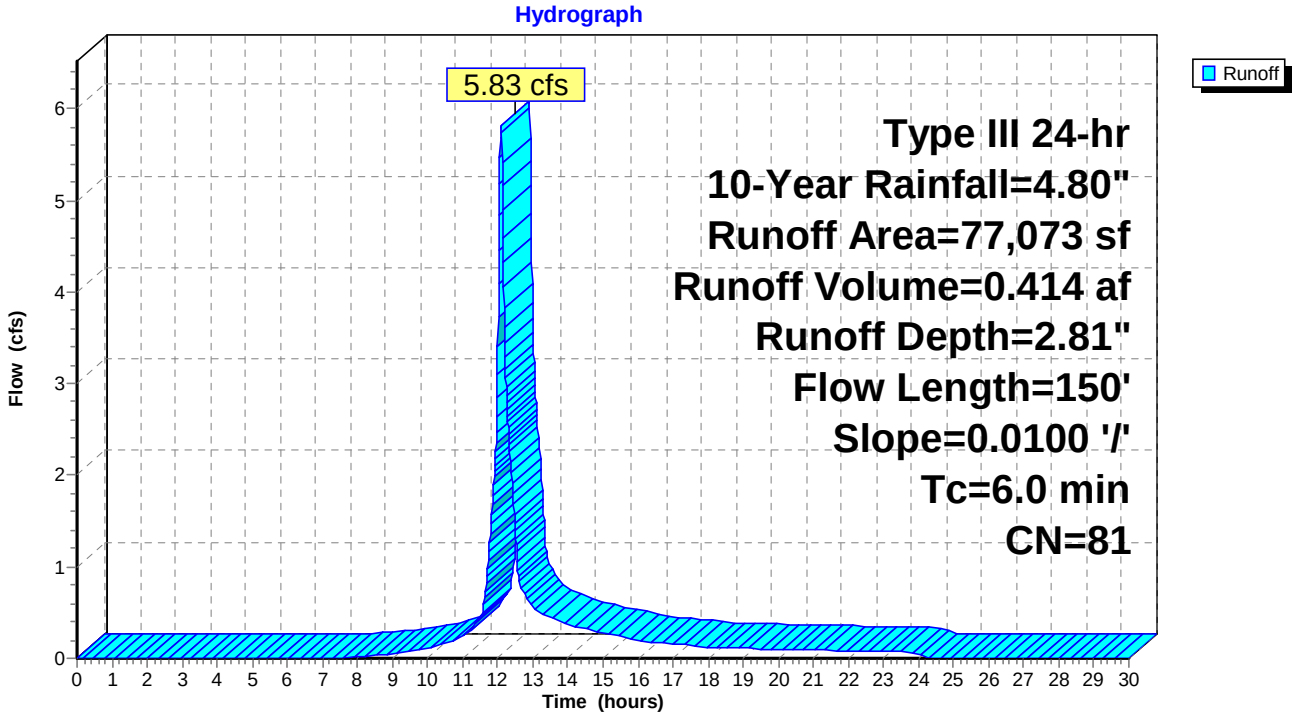
Runoff = 5.83 cfs @ 12.09 hrs, Volume= 0.414 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
27,718	98	Paved parking, HSG A
21,984	39	>75% Grass cover, Good, HSG A
27,371	98	Roofs, HSG A
77,073	81	Weighted Average
21,984	39	28.52% Pervious Area
55,089	98	71.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	150	0.0100	1.15		**Sheet Flow, East Area Sheet Flow** Smooth surfaces n= 0.011 P2= 3.30"
2.2	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1



Summary for Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2

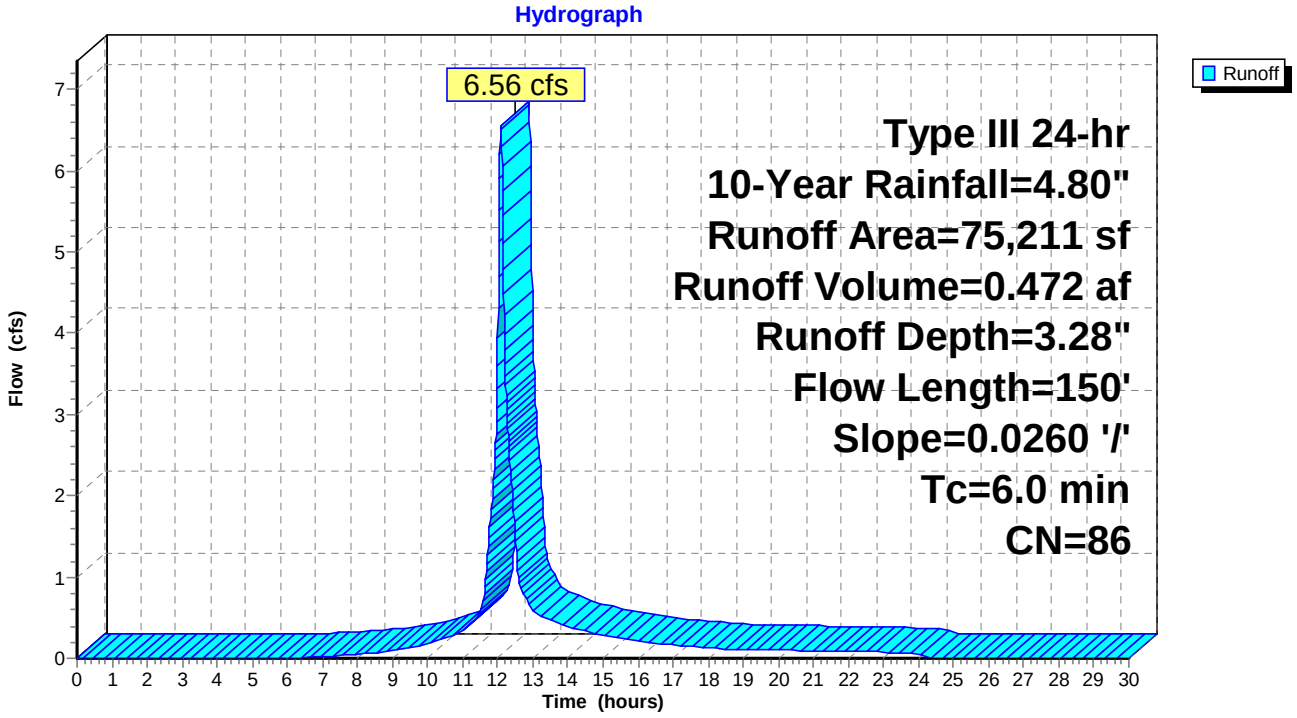
Runoff = 6.56 cfs @ 12.09 hrs, Volume= 0.472 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
20,607	98	Roofs, HSG A
39,231	98	Paved parking, HSG A
15,373	39	>75% Grass cover, Good, HSG A
75,211	86	Weighted Average
15,373	39	20.44% Pervious Area
59,838	98	79.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	150	0.0260	1.68		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
1.5	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2



Summary for Subcatchment 4-PW: Building Roof Area

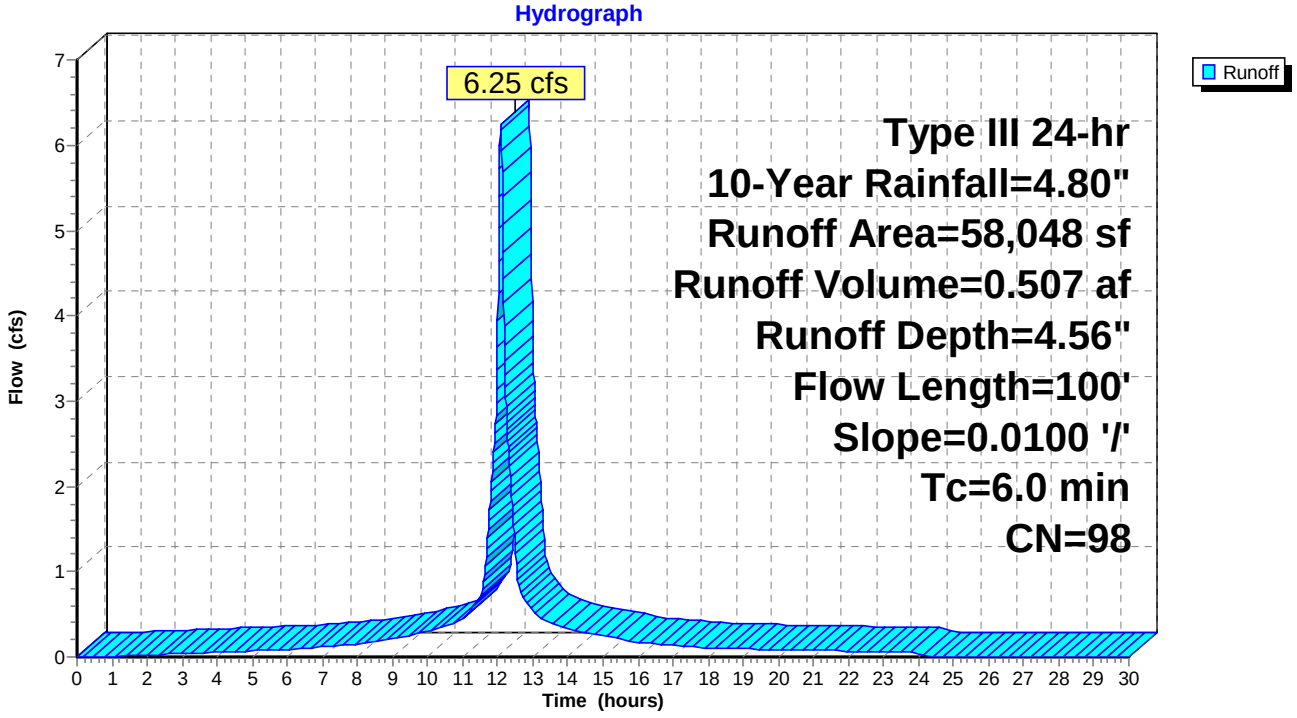
Runoff = 6.25 cfs @ 12.08 hrs, Volume= 0.507 af, Depth= 4.56"
Routed to Pond 5-SI : Storage, Infiltration in Prop Cultec 902

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
58,048	98	Roofs, HSG A
58,048	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Roof Drain System** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4-PW: Building Roof Area



Summary for Pond 5-SI: Storage, Infiltration in Prop Cultec 902

Inflow Area = 1.333 ac,100.00% Impervious, Inflow Depth = 4.56" for 10-Year event
Inflow = 6.25 cfs @ 12.08 hrs, Volume= 0.507 af
Outflow = 0.73 cfs @ 11.62 hrs, Volume= 0.507 af, Atten= 88%, Lag= 0.0 min
Discarded = 0.73 cfs @ 11.62 hrs, Volume= 0.507 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10-DP : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 64.17' @ 12.67 hrs Surf.Area= 3,827 sf Storage= 6,795 cf

Plug-Flow detention time= 58.2 min calculated for 0.507 af (100% of inflow)
Center-of-Mass det. time= 58.1 min (806.8 - 748.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	61.50'	4,420 cf	**88.25'W x 43.37'L x 5.75'H Field A** 22,006 cf Overall - 8,611 cf Embedded = 13,395 cf x 33.0% Voids
#2A	62.25'	8,611 cf	**Cultec R-902HD** x 132 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 132 Chambers in 12 Rows Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf
		13,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.50'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'
#2	Primary	64.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.73 cfs @ 11.62 hrs HW=61.62' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.73 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=61.50' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 5-SI: Storage, Infiltration in Prop Cultec 902 - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Superseded by R-902HD V2 for new designs)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

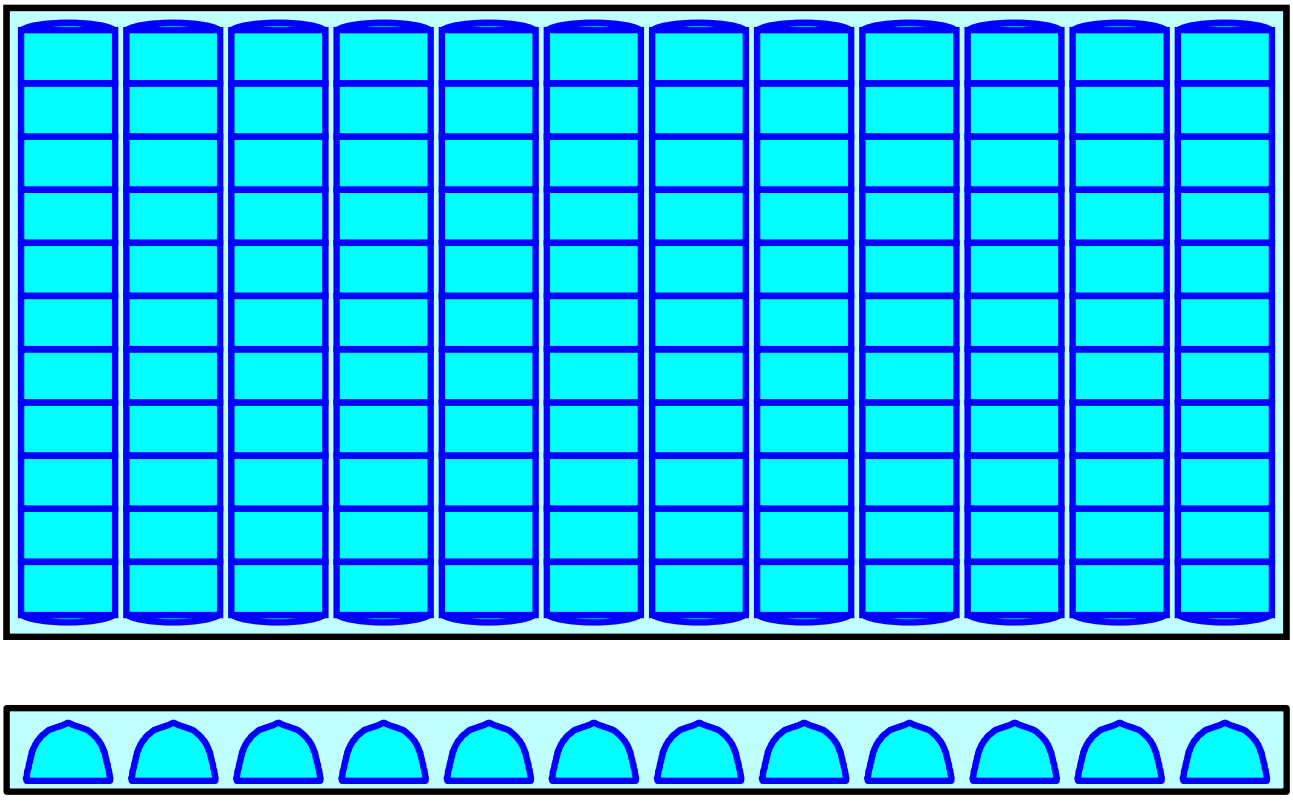
11 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 41.37' Row Length +12.0" End Stone x 2 = 43.37' Base Length
12 Rows x 78.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 88.25' Base Width
9.0" Stone Base + 48.0" Chamber Height + 12.0" Stone Cover = 5.75' Field Height

132 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 12 Rows = 8,611.3 cf Chamber Storage

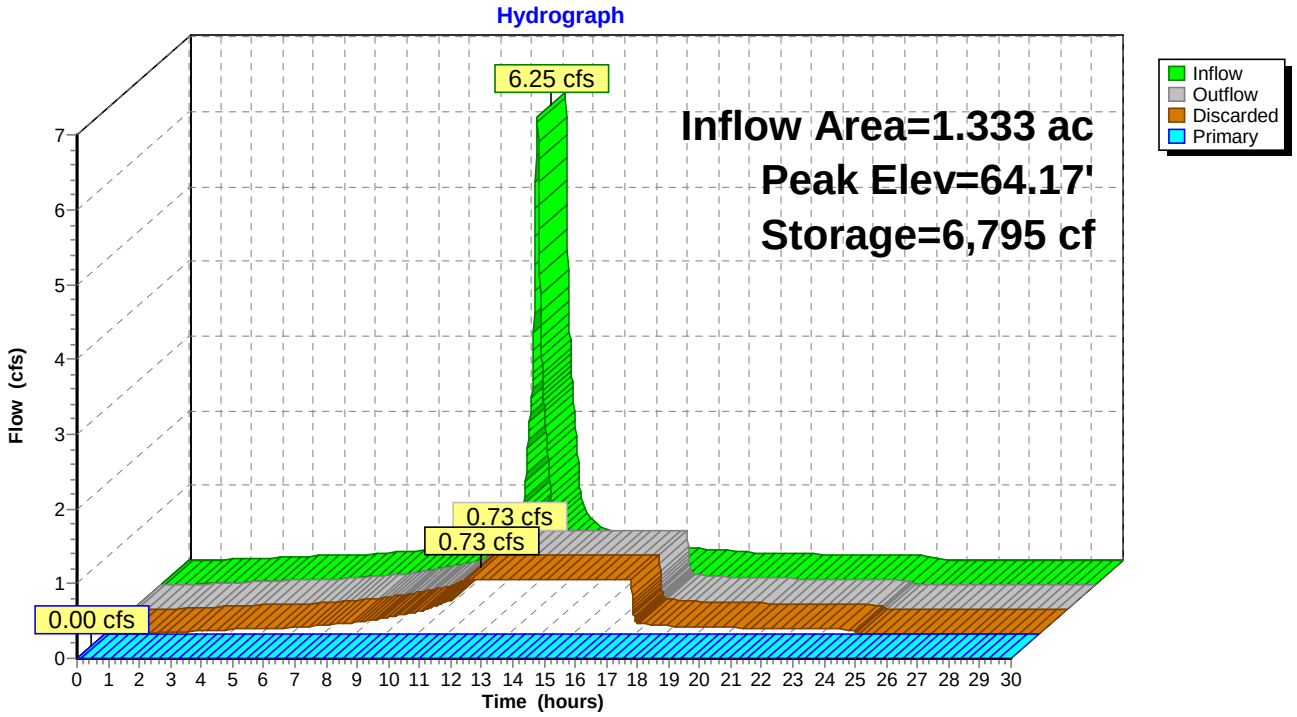
22,005.9 cf Field - 8,611.3 cf Chambers = 13,394.6 cf Stone x 33.0% Voids = 4,420.2 cf Stone Storage

Chamber Storage + Stone Storage = 13,031.5 cf = 0.299 af
Overall Storage Efficiency = 59.2%
Overall System Size = 43.37' x 88.25' x 5.75'

132 Chambers
815.0 cy Field
496.1 cy Stone



Pond 5-SI: Storage, Infiltration in Prop Cultec 902



Summary for Subcatchment 6-PW: New Bus Driveway Area

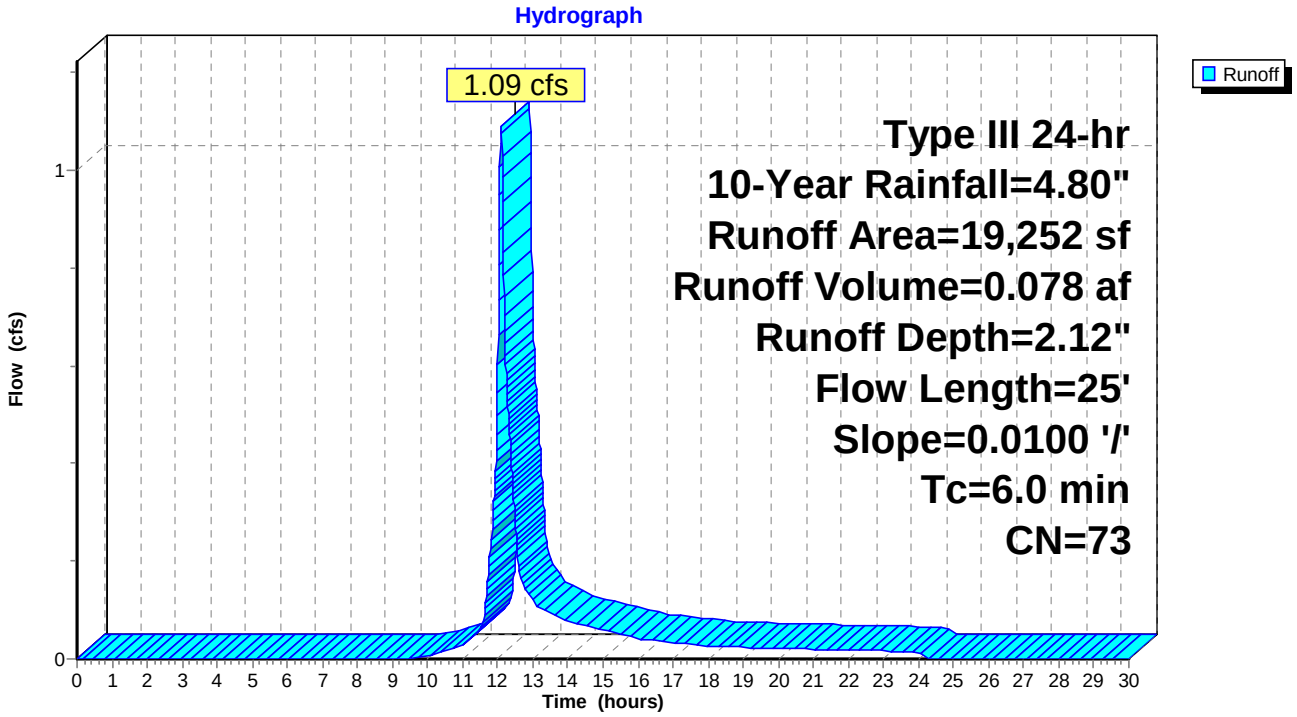
Runoff = 1.09 cfs @ 12.09 hrs, Volume= 0.078 af, Depth= 2.12"
Routed to Pond 7-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	8,954	76	Pervious Pavement - Table 5-5
	4,874	39	>75% Grass cover, Good, HSG A
	5,424	98	Paved parking, HSG A
	19,252	73	Weighted Average
	13,828	63	71.83% Pervious Area
	5,424	98	28.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.80		**Sheet Flow, Driveway Area** Smooth surfaces n= 0.011 P2= 3.30"
0.5	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6-PW: New Bus Driveway Area



Summary for Pond 7-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.442 ac, 28.17% Impervious, Inflow Depth = 2.12" for 10-Year event
Inflow = 1.09 cfs @ 12.09 hrs, Volume= 0.078 af
Outflow = 1.05 cfs @ 12.11 hrs, Volume= 0.078 af, Atten= 4%, Lag= 1.3 min
Primary = 1.05 cfs @ 12.11 hrs, Volume= 0.078 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 69.28' @ 12.11 hrs Surf.Area= 8,587 sf Storage= 89 cf

Plug-Flow detention time= 1.4 min calculated for 0.078 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (843.5 - 842.1)

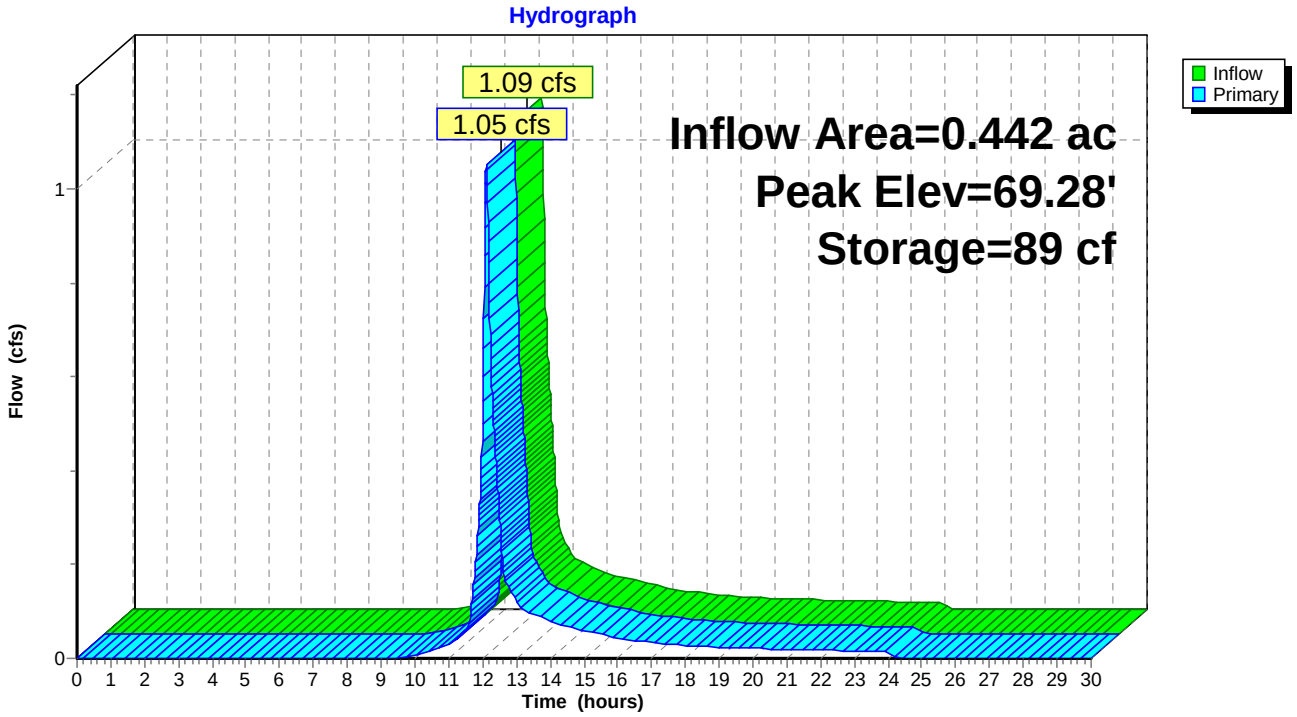
Volume	Invert	Avail.Storage	Storage Description
#1	69.25'	1,108 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 3,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	8,954	0	0
70.00	0	3,358	3,358

Device	Routing	Invert	Outlet Devices
#1	Primary	69.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=1.05 cfs @ 12.11 hrs HW=69.28' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.05 cfs)

Pond 7-PP: PERVIOUS Pavement SYSTEM



Summary for Subcatchment 8-PW: New Parking Area

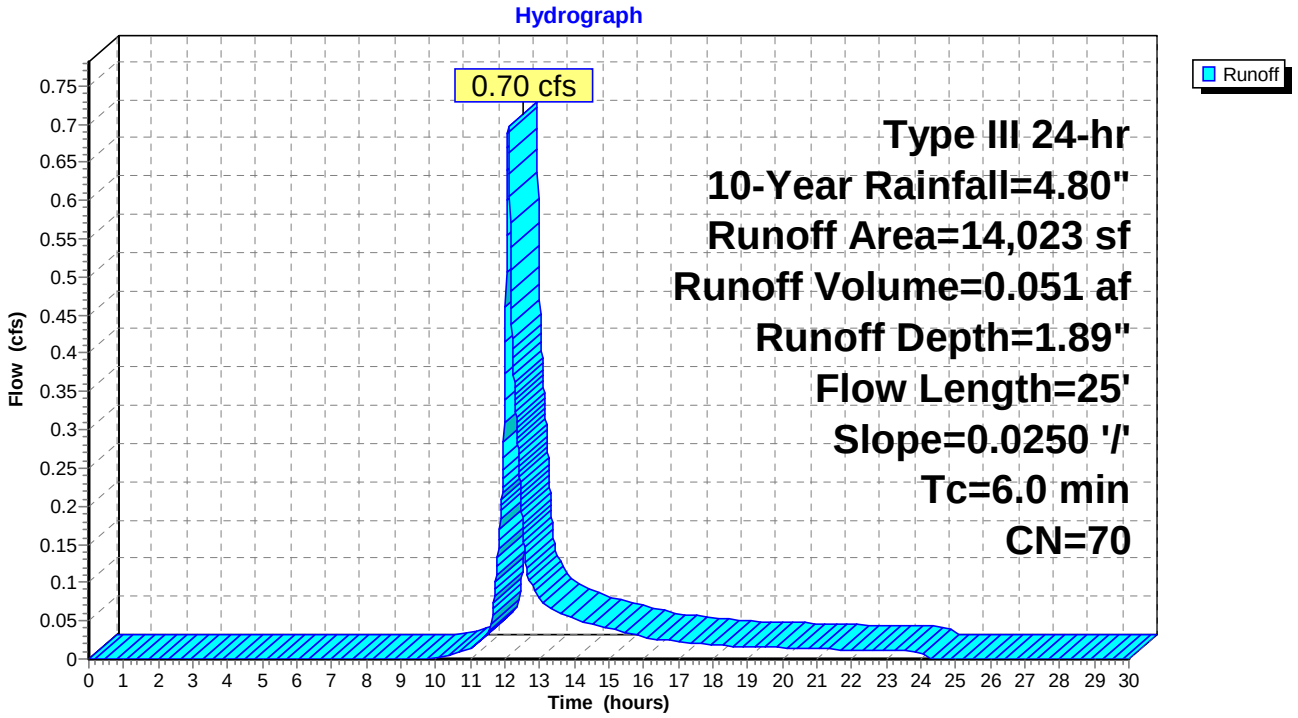
Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 1.89"
Routed to Pond 9-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	11,905	76	Pervious Pavement - Table 5-5
	2,118	39	>75% Grass cover, Good, HSG A
	14,023	70	Weighted Average
	14,023	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0250	1.16		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
0.4	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8-PW: New Parking Area



Summary for Pond 9-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.322 ac, 0.00% Impervious, Inflow Depth = 1.89" for 10-Year event
Inflow = 0.70 cfs @ 12.09 hrs, Volume= 0.051 af
Outflow = 0.67 cfs @ 12.12 hrs, Volume= 0.051 af, Atten= 4%, Lag= 1.4 min
Primary = 0.67 cfs @ 12.12 hrs, Volume= 0.051 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 67.26' @ 12.12 hrs Surf.Area= 11,671 sf Storage= 57 cf

Plug-Flow detention time= 1.4 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (851.3 - 849.9)

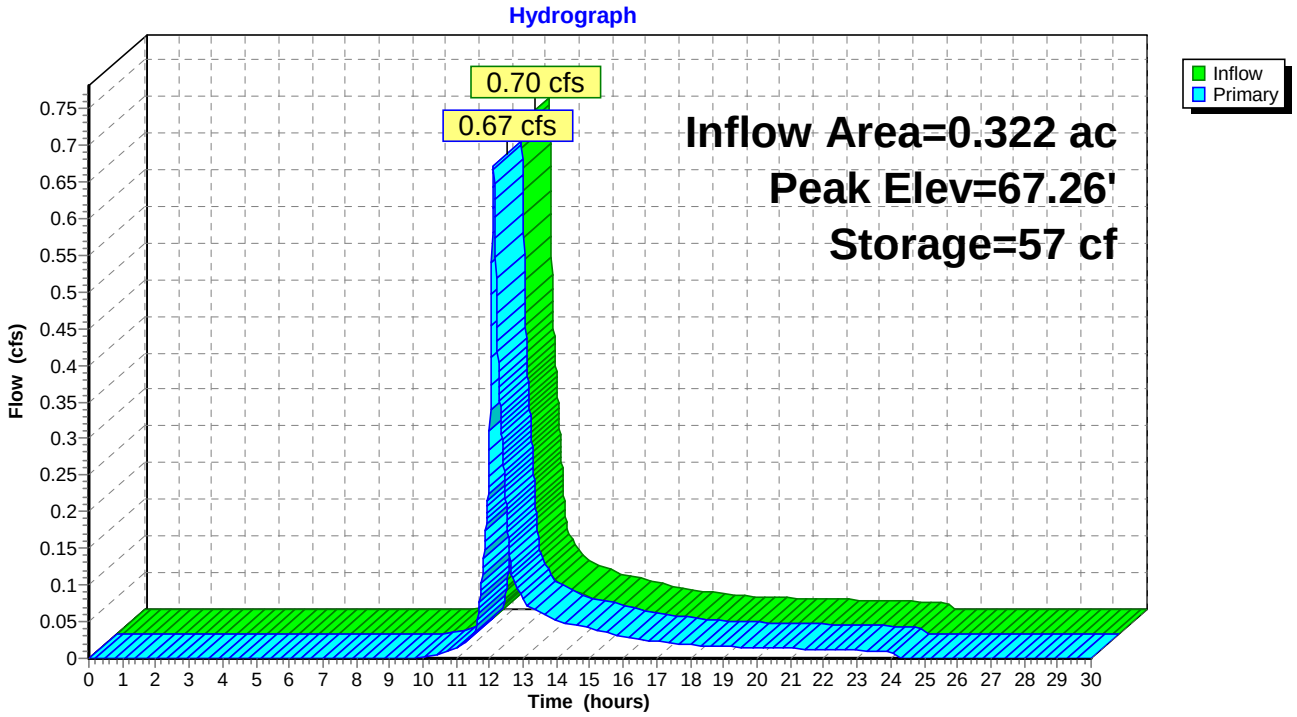
Volume	Invert	Avail.Storage	Storage Description
#1	67.25'	1,473 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 4,464 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.25	11,905	0	0
68.00	0	4,464	4,464

Device	Routing	Invert	Outlet Devices
#1	Primary	67.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.67 cfs @ 12.12 hrs HW=67.26' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.67 cfs)

Pond 9-PP: PERVIOUS Pavement SYSTEM

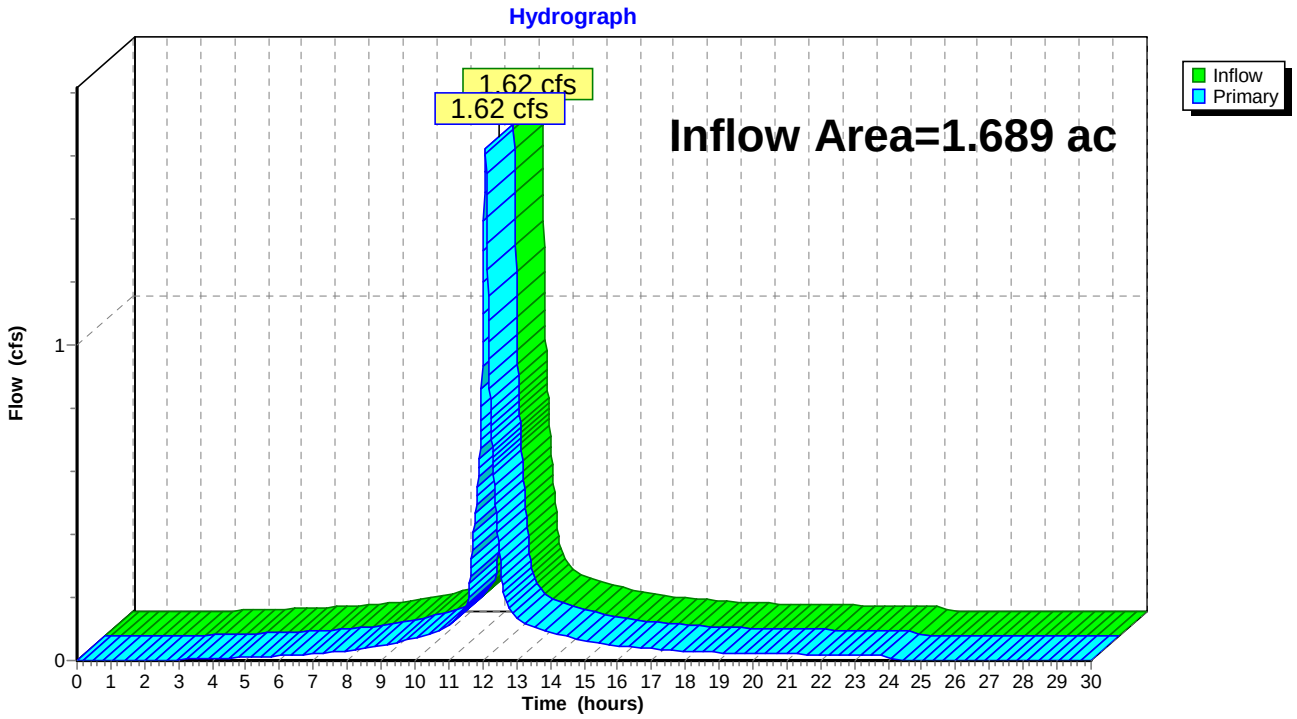


Summary for Pond 10-DP: DP-1

Inflow Area = 1.689 ac, 98.85% Impervious, Inflow Depth = 0.89" for 10-Year event
Inflow = 1.62 cfs @ 12.08 hrs, Volume= 0.125 af
Primary = 1.62 cfs @ 12.08 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2

Pond 10-DP: DP-1



Summary for Subcatchment 10-PW: Princeton St Playground Area

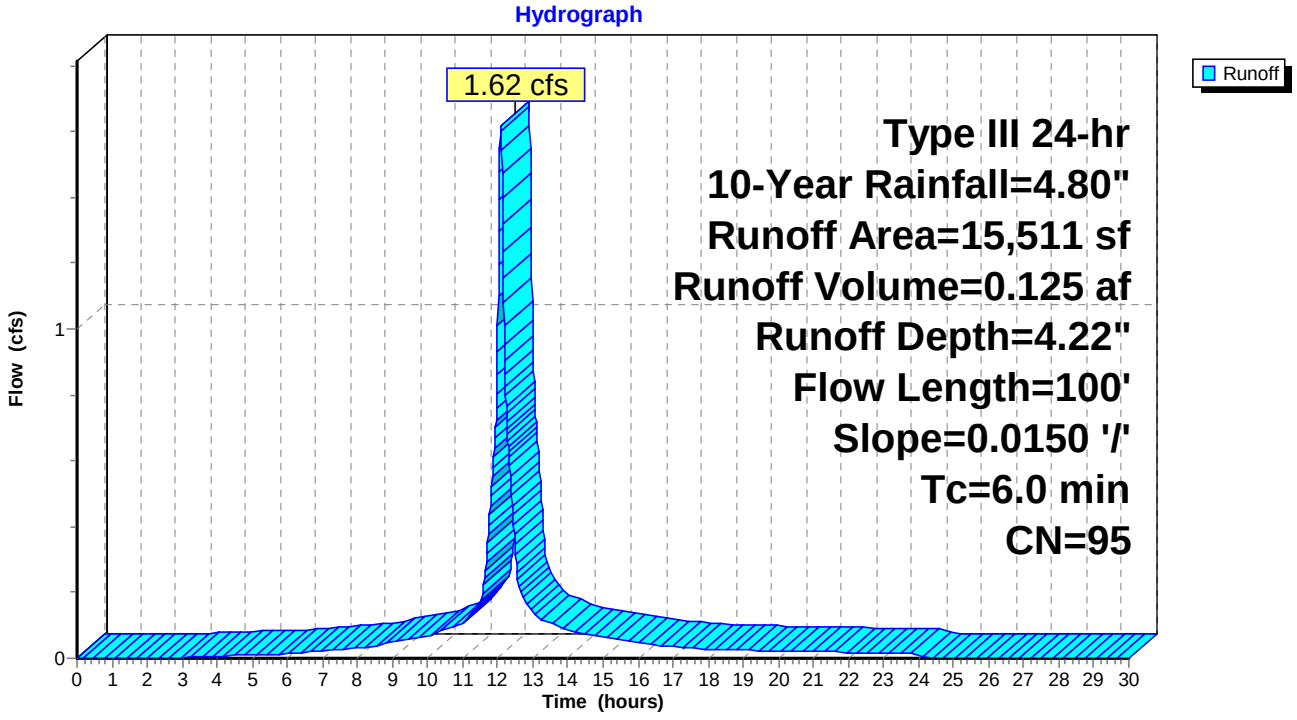
Runoff = 1.62 cfs @ 12.08 hrs, Volume= 0.125 af, Depth= 4.22"
Routed to Pond 10-DP : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
14,667	98	Paved parking, HSG A
844	39	>75% Grass cover, Good, HSG A
15,511	95	Weighted Average
844	39	5.44% Pervious Area
14,667	98	94.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0150	1.25		**Sheet Flow, Playground Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.3	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10-PW: Princeton St Playground Area



Summary for Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2

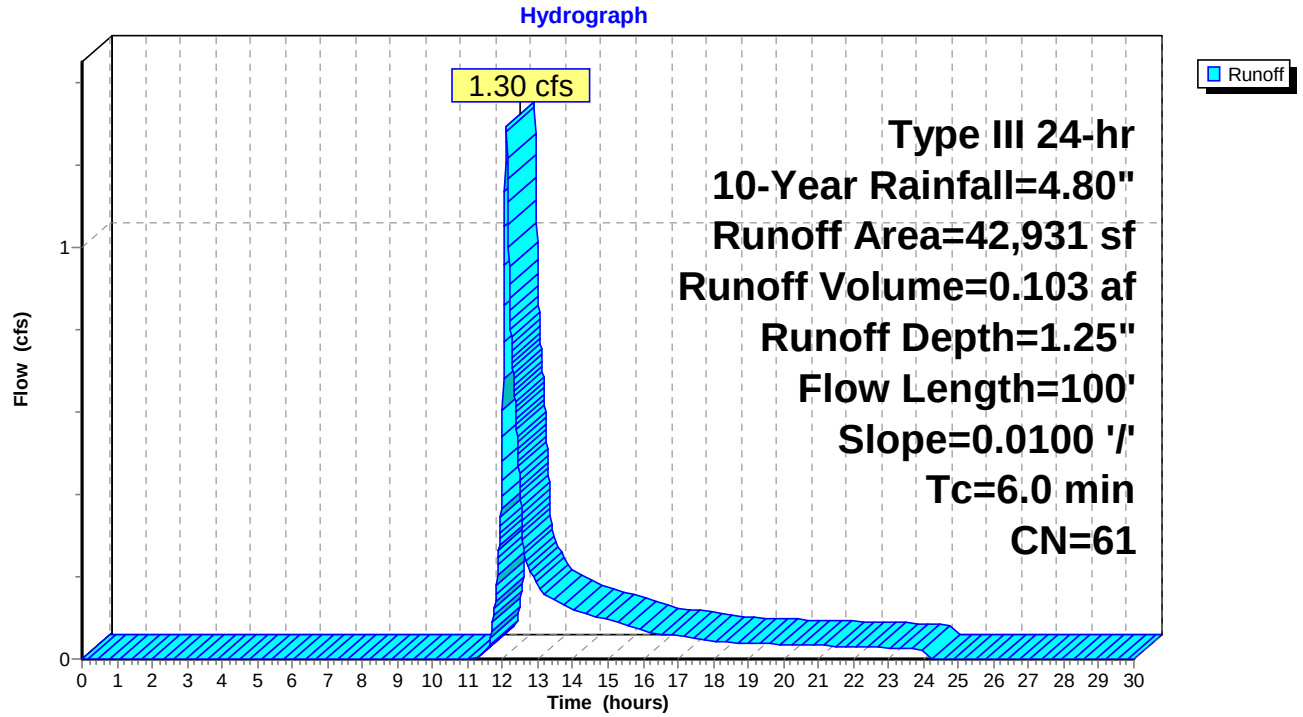
Runoff = 1.30 cfs @ 12.10 hrs, Volume= 0.103 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Description
16,249	98	Paved parking, HSG A
26,682	39	>75% Grass cover, Good, HSG A
42,931	61	Weighted Average
26,682	39	62.15% Pervious Area
16,249	98	37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Parking Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2



Summary for Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1

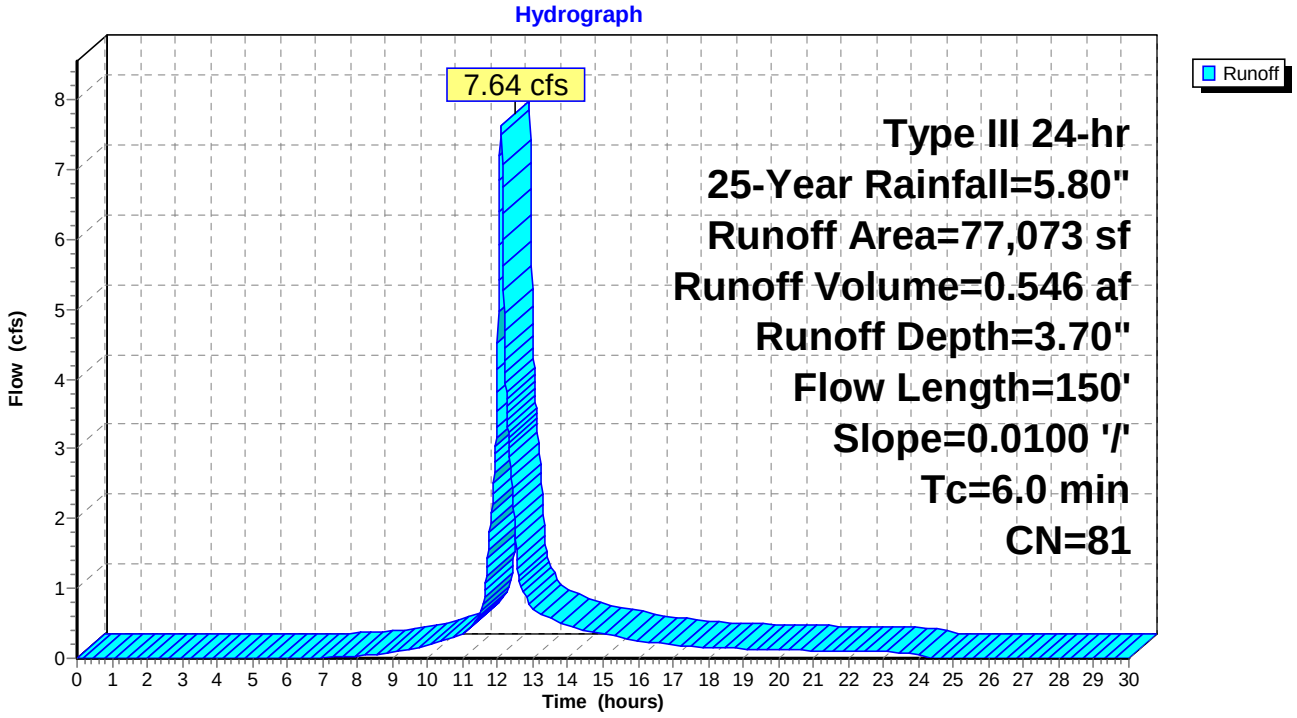
Runoff = 7.64 cfs @ 12.09 hrs, Volume= 0.546 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
27,718	98	Paved parking, HSG A
21,984	39	>75% Grass cover, Good, HSG A
27,371	98	Roofs, HSG A
77,073	81	Weighted Average
21,984	39	28.52% Pervious Area
55,089	98	71.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	150	0.0100	1.15		**Sheet Flow, East Area Sheet Flow** Smooth surfaces n= 0.011 P2= 3.30"
2.2	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1



Summary for Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2

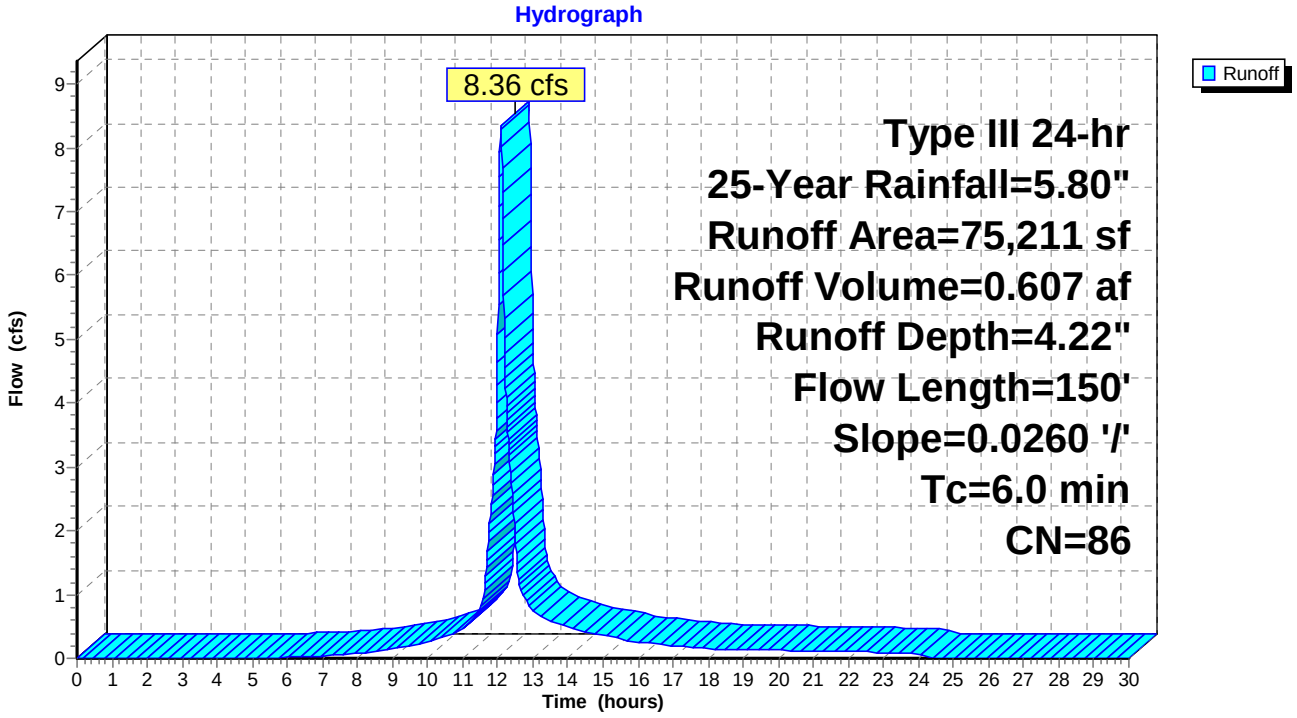
Runoff = 8.36 cfs @ 12.09 hrs, Volume= 0.607 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
20,607	98	Roofs, HSG A
39,231	98	Paved parking, HSG A
15,373	39	>75% Grass cover, Good, HSG A
75,211	86	Weighted Average
15,373	39	20.44% Pervious Area
59,838	98	79.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	150	0.0260	1.68		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
1.5	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2



Summary for Subcatchment 4-PW: Building Roof Area

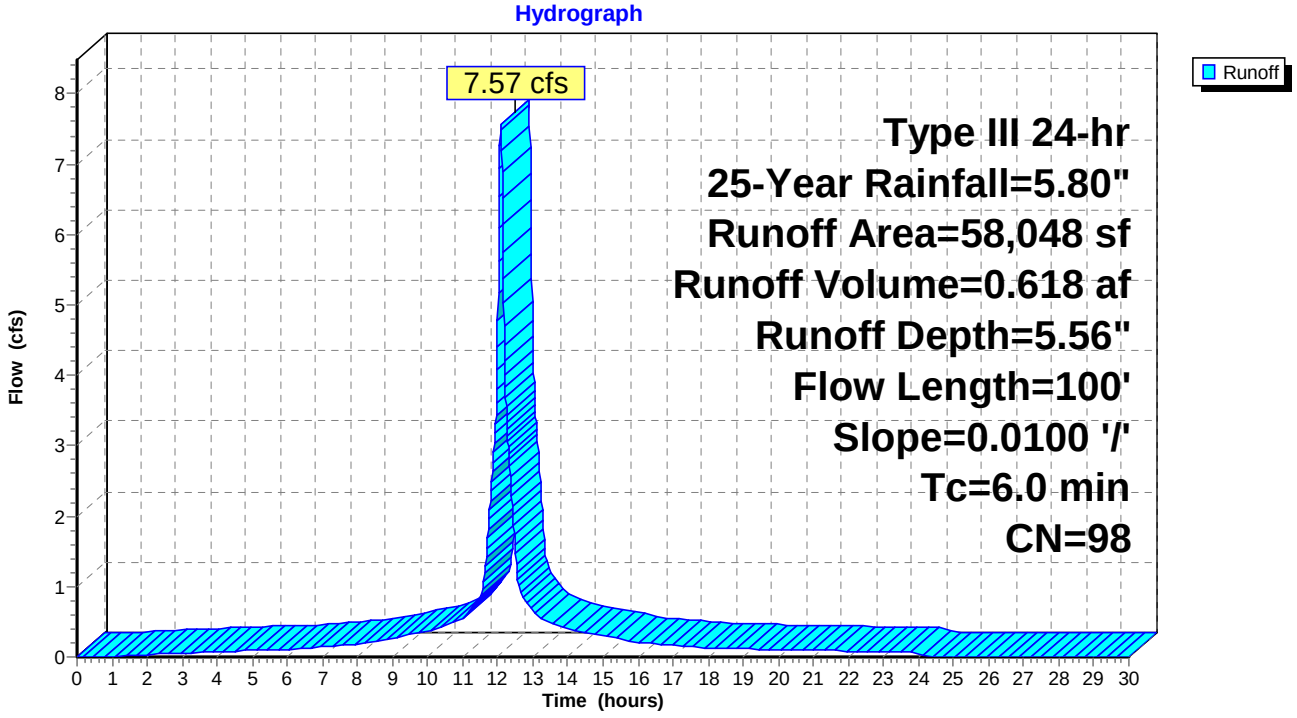
Runoff = 7.57 cfs @ 12.08 hrs, Volume= 0.618 af, Depth= 5.56"
Routed to Pond 5-SI : Storage, Infiltration in Prop Cultec 902

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
58,048	98	Roofs, HSG A
58,048	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Roof Drain System** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4-PW: Building Roof Area



Summary for Pond 5-SI: Storage, Infiltration in Prop Cultec 902

Inflow Area = 1.333 ac,100.00% Impervious, Inflow Depth = 5.56" for 25-Year event
Inflow = 7.57 cfs @ 12.08 hrs, Volume= 0.618 af
Outflow = 1.06 cfs @ 12.58 hrs, Volume= 0.618 af, Atten= 86%, Lag= 30.1 min
Discarded = 0.73 cfs @ 11.47 hrs, Volume= 0.602 af
Primary = 0.33 cfs @ 12.58 hrs, Volume= 0.016 af
Routed to Pond 10-DP : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 64.82' @ 12.58 hrs Surf.Area= 3,827 sf Storage= 8,642 cf

Plug-Flow detention time= 72.9 min calculated for 0.617 af (100% of inflow)
Center-of-Mass det. time= 72.9 min (818.6 - 745.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	61.50'	4,420 cf	**88.25'W x 43.37'L x 5.75'H Field A** 22,006 cf Overall - 8,611 cf Embedded = 13,395 cf x 33.0% Voids
#2A	62.25'	8,611 cf	**Cultec R-902HD** x 132 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 132 Chambers in 12 Rows Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf
		13,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.50'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'
#2	Primary	64.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.73 cfs @ 11.47 hrs HW=61.62' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.73 cfs)

Primary OutFlow Max=0.33 cfs @ 12.58 hrs HW=64.82' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 1.94 fps)

Pond 5-SI: Storage, Infiltration in Prop Cultec 902 - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Superseded by R-902HD V2 for new designs)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

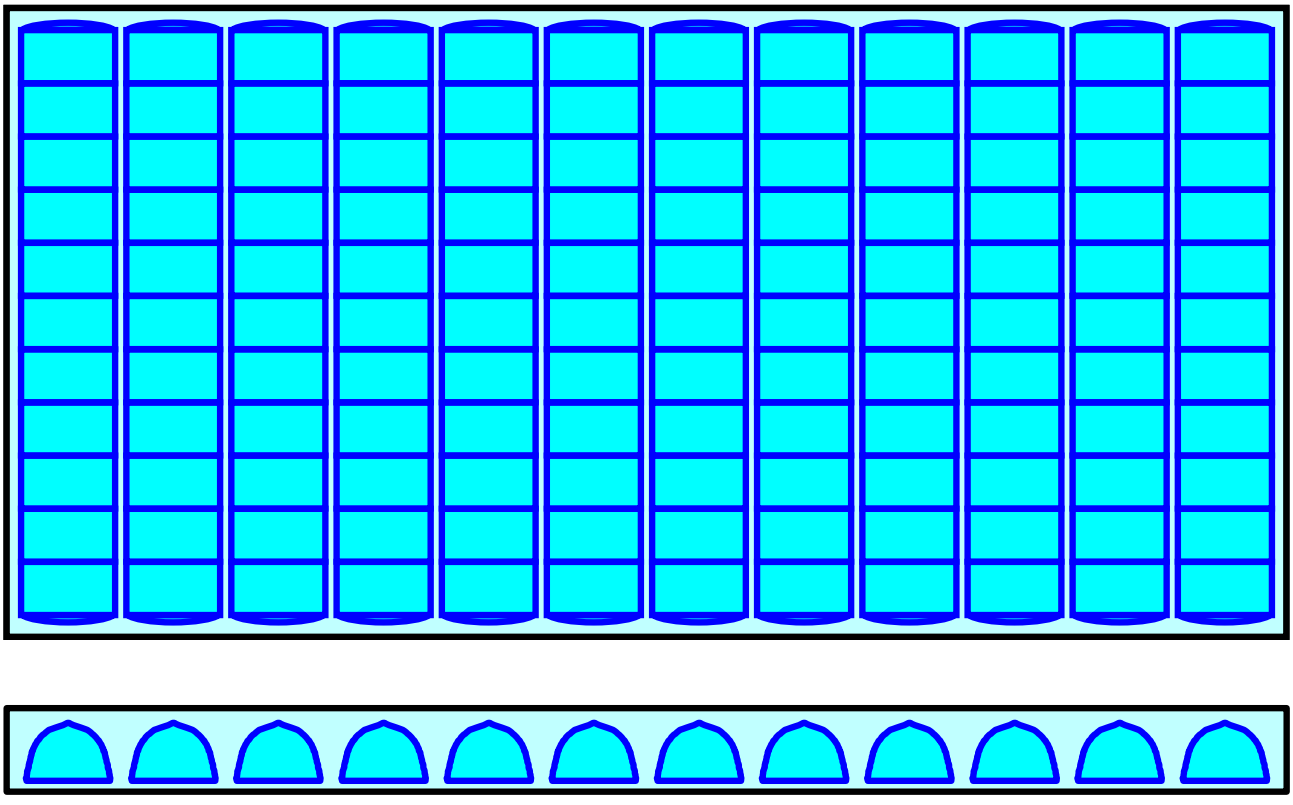
11 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 41.37' Row Length +12.0" End Stone x 2 = 43.37' Base Length
12 Rows x 78.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 88.25' Base Width
9.0" Stone Base + 48.0" Chamber Height + 12.0" Stone Cover = 5.75' Field Height

132 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 12 Rows = 8,611.3 cf Chamber Storage

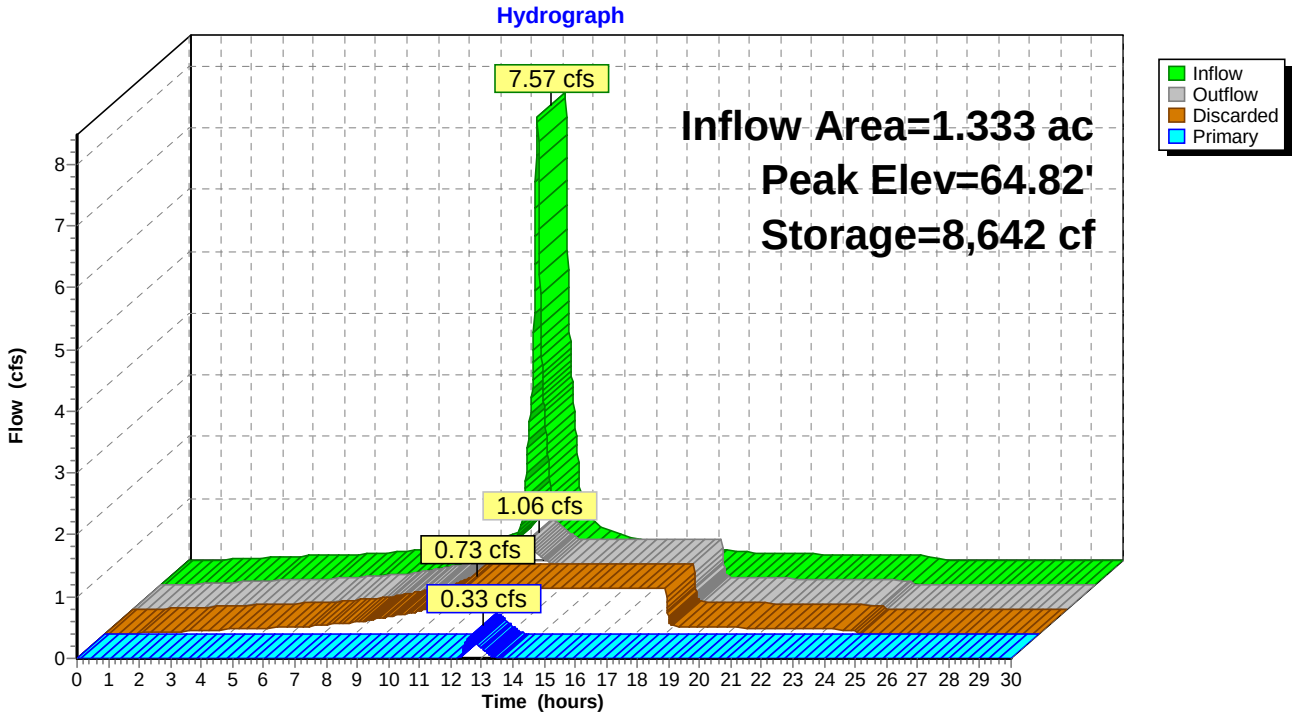
22,005.9 cf Field - 8,611.3 cf Chambers = 13,394.6 cf Stone x 33.0% Voids = 4,420.2 cf Stone Storage

Chamber Storage + Stone Storage = 13,031.5 cf = 0.299 af
Overall Storage Efficiency = 59.2%
Overall System Size = 43.37' x 88.25' x 5.75'

132 Chambers
815.0 cy Field
496.1 cy Stone



Pond 5-SI: Storage, Infiltration in Prop Cultec 902



Summary for Subcatchment 6-PW: New Bus Driveway Area

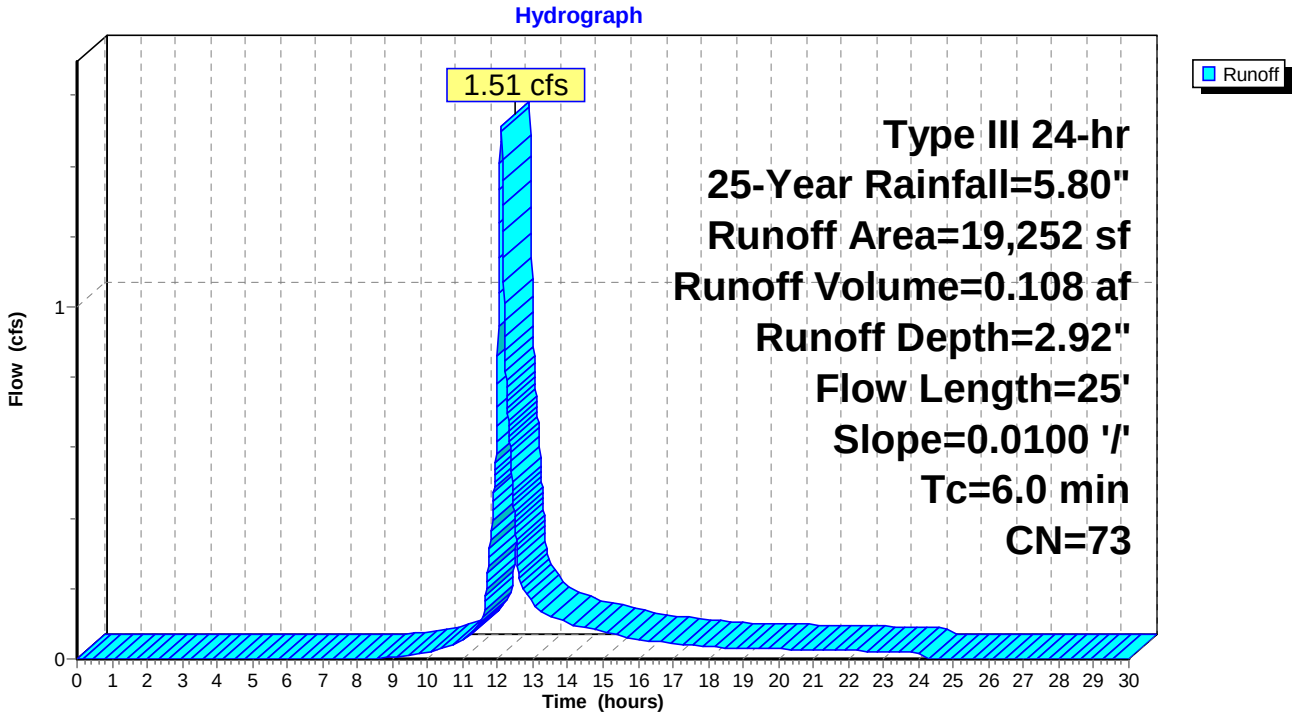
Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 2.92"
Routed to Pond 7-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	8,954	76	Pervious Pavement - Table 5-5
	4,874	39	>75% Grass cover, Good, HSG A
	5,424	98	Paved parking, HSG A
	19,252	73	Weighted Average
	13,828	63	71.83% Pervious Area
	5,424	98	28.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.80		**Sheet Flow, Driveway Area** Smooth surfaces n= 0.011 P2= 3.30"
0.5	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6-PW: New Bus Driveway Area



Summary for Pond 7-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.442 ac, 28.17% Impervious, Inflow Depth = 2.92" for 25-Year event
Inflow = 1.51 cfs @ 12.09 hrs, Volume= 0.108 af
Outflow = 1.46 cfs @ 12.11 hrs, Volume= 0.108 af, Atten= 3%, Lag= 1.3 min
Primary = 1.46 cfs @ 12.11 hrs, Volume= 0.108 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 69.29' @ 12.11 hrs Surf.Area= 8,445 sf Storage= 122 cf

Plug-Flow detention time= 1.4 min calculated for 0.108 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (834.2 - 832.8)

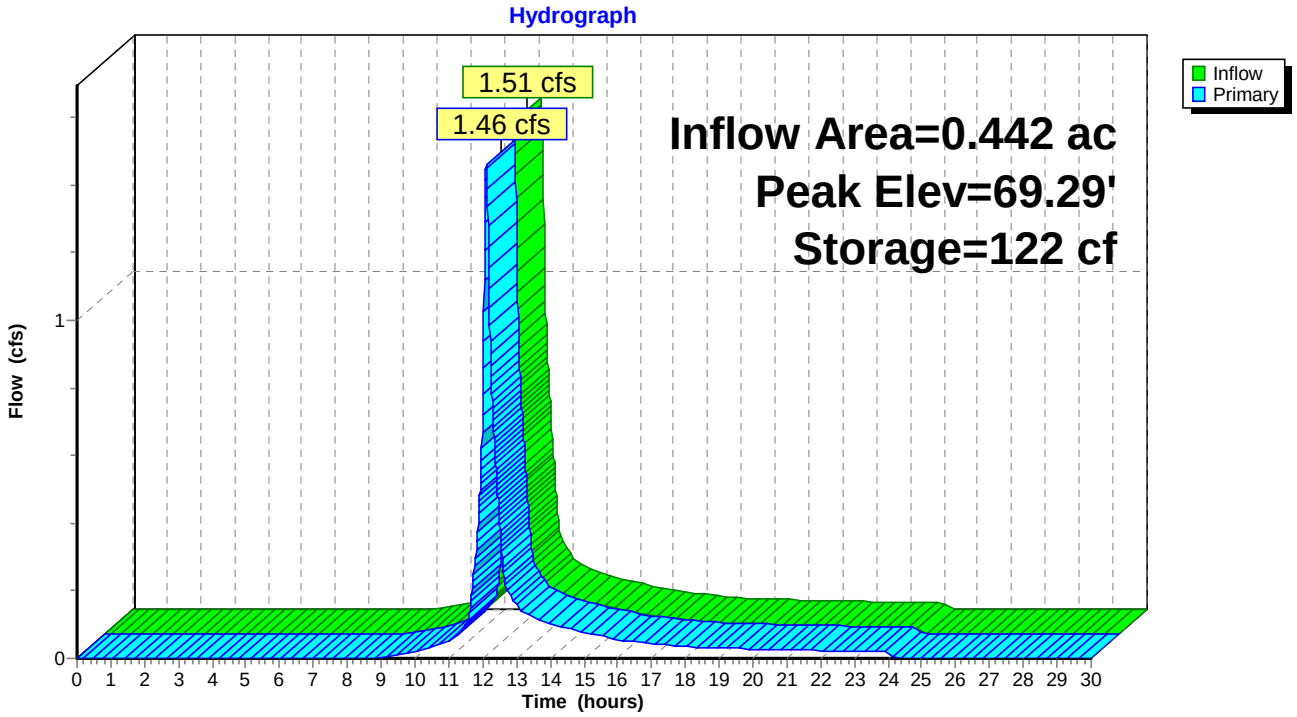
Volume	Invert	Avail.Storage	Storage Description
#1	69.25'	1,108 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 3,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	8,954	0	0
70.00	0	3,358	3,358

Device	Routing	Invert	Outlet Devices
#1	Primary	69.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=1.46 cfs @ 12.11 hrs HW=69.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.46 cfs)

Pond 7-PP: PERVIOUS Pavement SYSTEM



Summary for Subcatchment 8-PW: New Parking Area

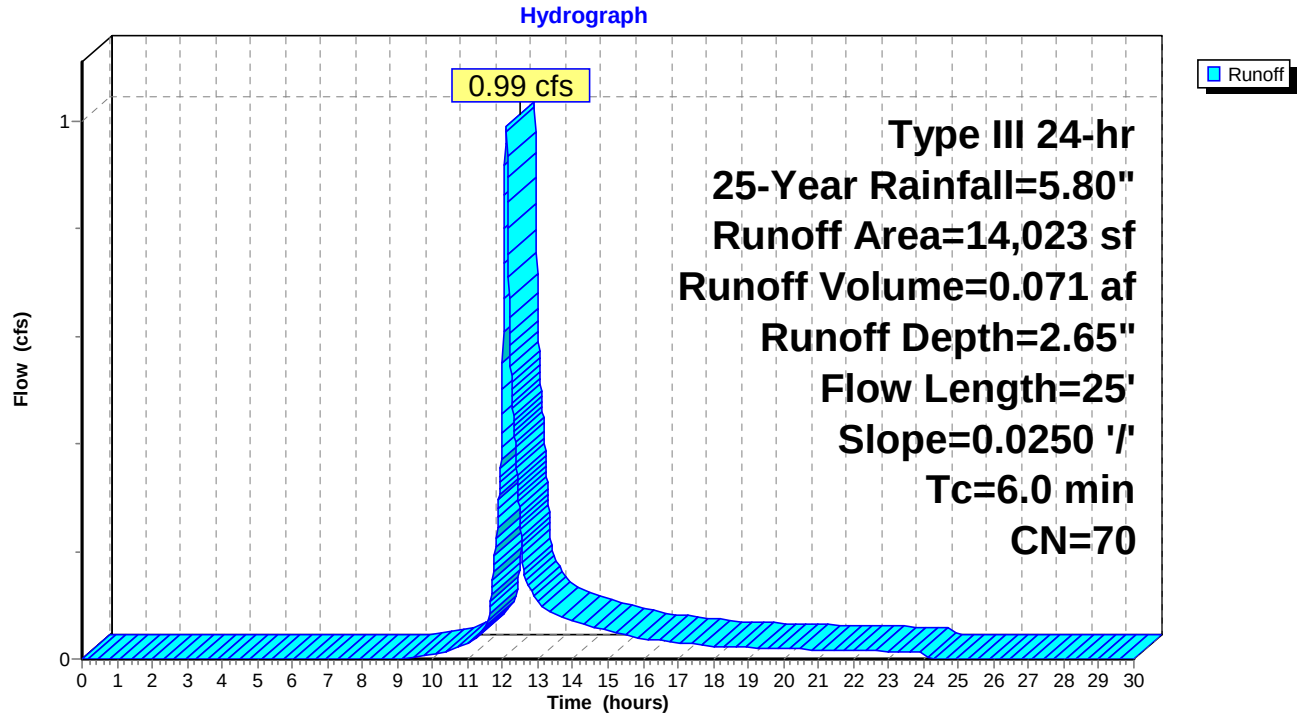
Runoff = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af, Depth= 2.65"
Routed to Pond 9-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	11,905	76	Pervious Pavement - Table 5-5
	2,118	39	>75% Grass cover, Good, HSG A
	14,023	70	Weighted Average
	14,023	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0250	1.16		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
0.4	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8-PW: New Parking Area



Summary for Pond 9-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.322 ac, 0.00% Impervious, Inflow Depth = 2.65" for 25-Year event
Inflow = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af
Outflow = 0.96 cfs @ 12.11 hrs, Volume= 0.071 af, Atten= 4%, Lag= 1.3 min
Primary = 0.96 cfs @ 12.11 hrs, Volume= 0.071 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 67.27' @ 12.11 hrs Surf.Area= 11,572 sf Storage= 81 cf

Plug-Flow detention time= 1.4 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (841.4 - 839.9)

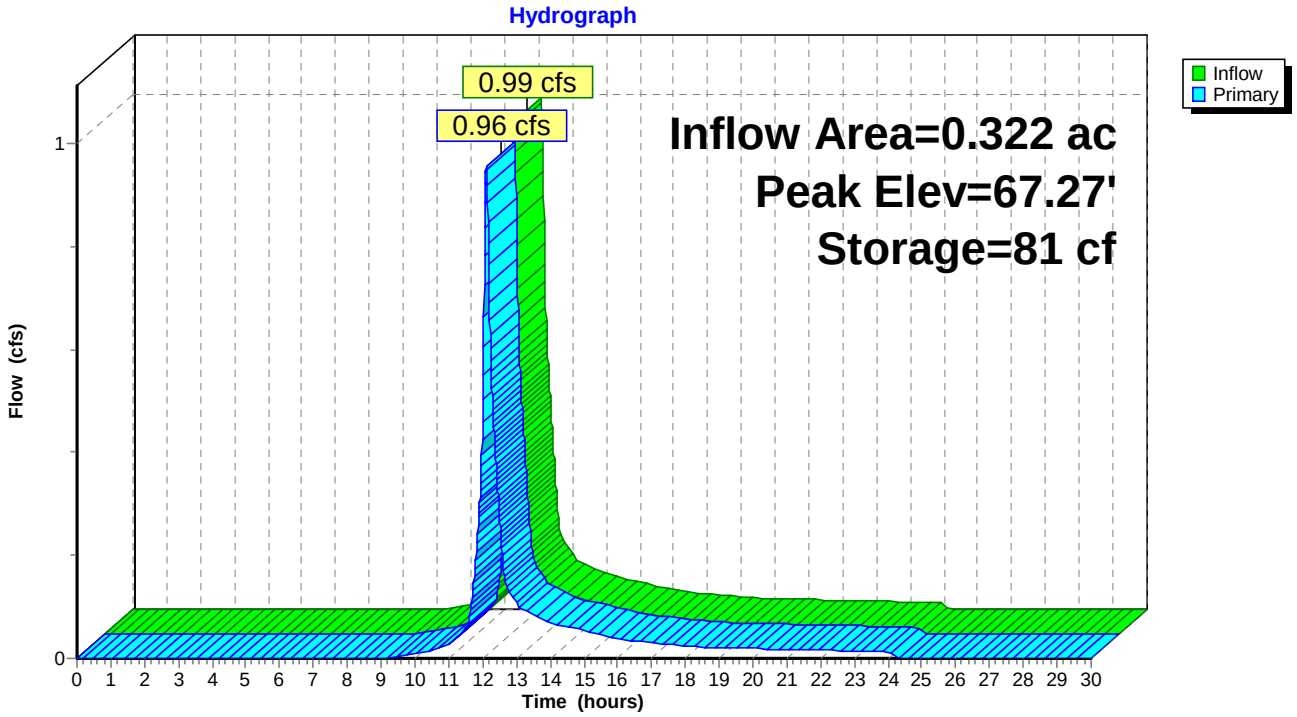
Volume	Invert	Avail.Storage	Storage Description
#1	67.25'	1,473 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 4,464 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.25	11,905	0	0
68.00	0	4,464	4,464

Device	Routing	Invert	Outlet Devices
#1	Primary	67.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.96 cfs @ 12.11 hrs HW=67.27' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.96 cfs)

Pond 9-PP: PERVIOUS Pavement SYSTEM

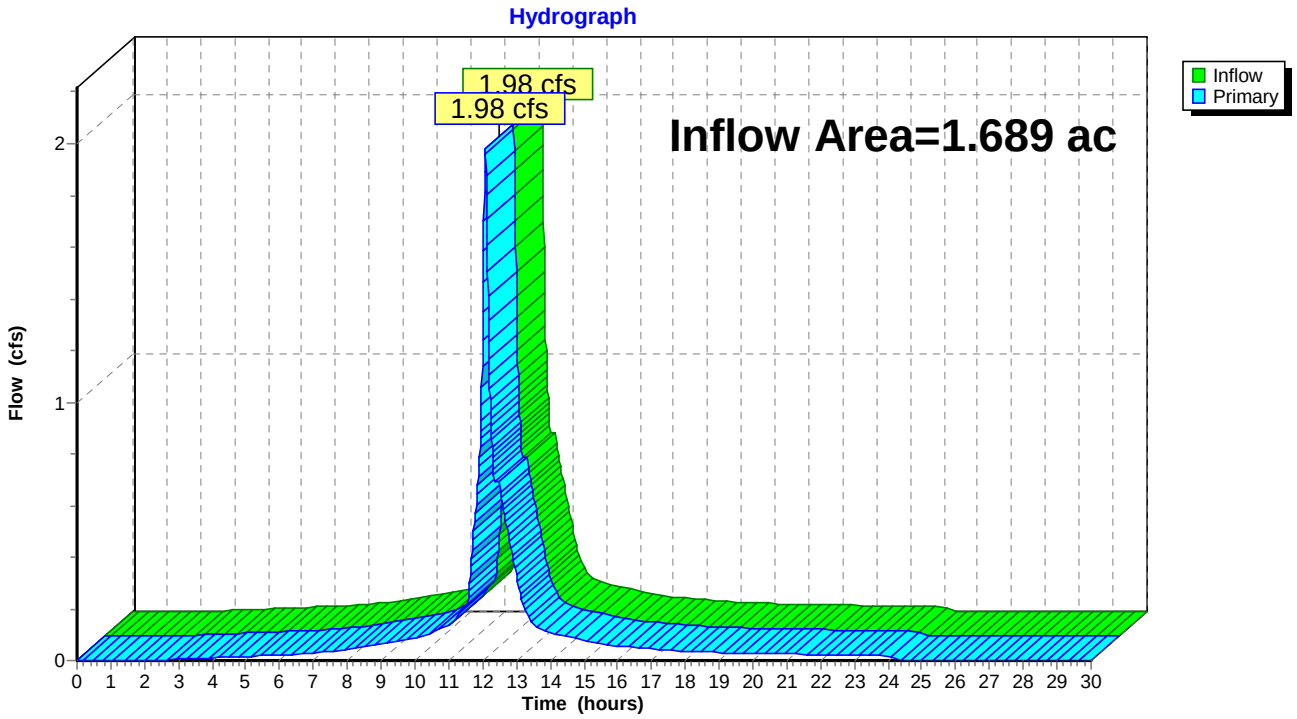


Summary for Pond 10-DP: DP-1

Inflow Area = 1.689 ac, 98.85% Impervious, Inflow Depth = 1.21" for 25-Year event
Inflow = 1.98 cfs @ 12.08 hrs, Volume= 0.170 af
Primary = 1.98 cfs @ 12.08 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2

Pond 10-DP: DP-1



Summary for Subcatchment 10-PW: Princeton St Playground Area

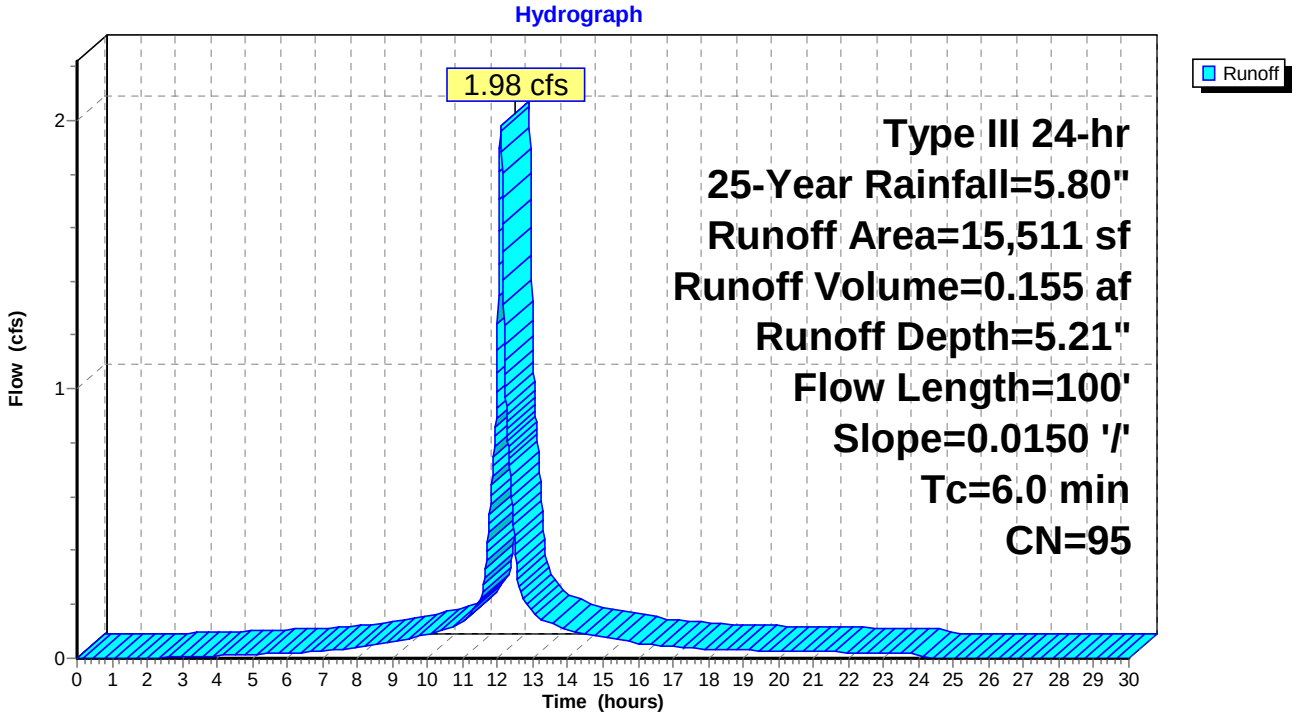
Runoff = 1.98 cfs @ 12.08 hrs, Volume= 0.155 af, Depth= 5.21"
Routed to Pond 10-DP : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
14,667	98	Paved parking, HSG A
844	39	>75% Grass cover, Good, HSG A
15,511	95	Weighted Average
844	39	5.44% Pervious Area
14,667	98	94.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0150	1.25		**Sheet Flow, Playground Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.3	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10-PW: Princeton St Playground Area



Summary for Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2

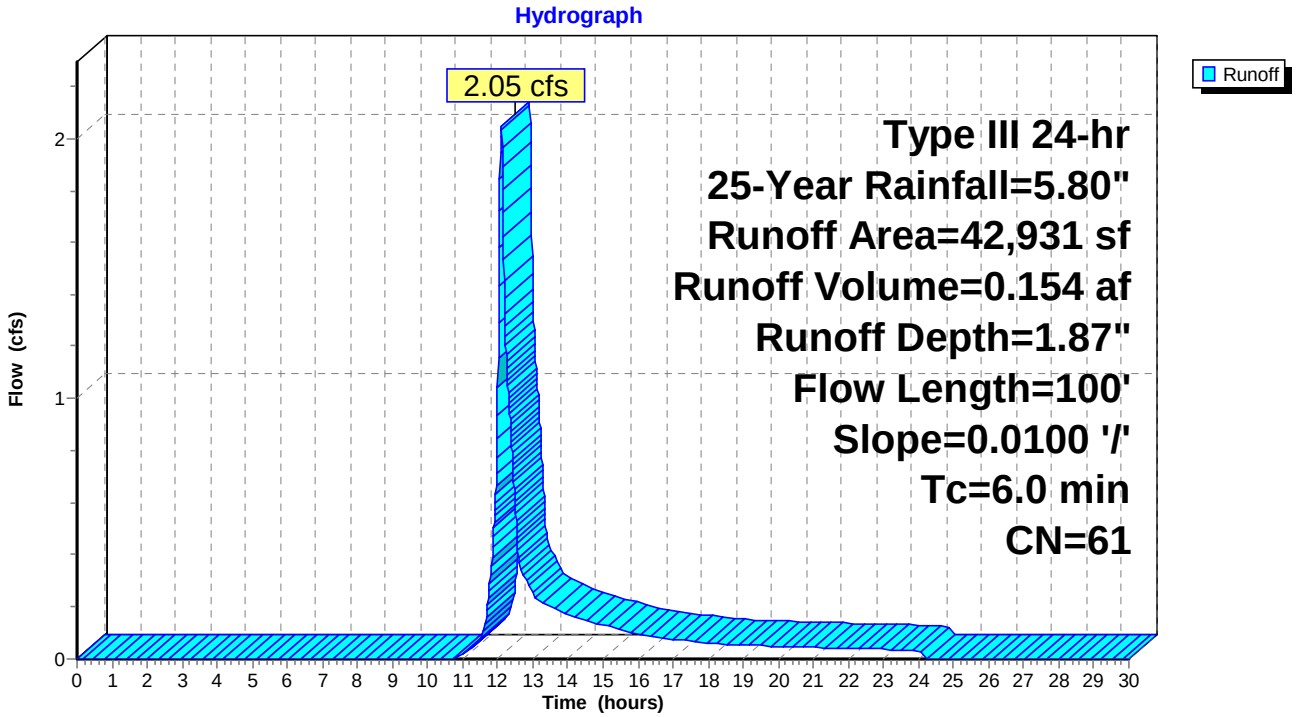
Runoff = 2.05 cfs @ 12.10 hrs, Volume= 0.154 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
16,249	98	Paved parking, HSG A
26,682	39	>75% Grass cover, Good, HSG A
42,931	61	Weighted Average
26,682	39	62.15% Pervious Area
16,249	98	37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Parking Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2



Summary for Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1

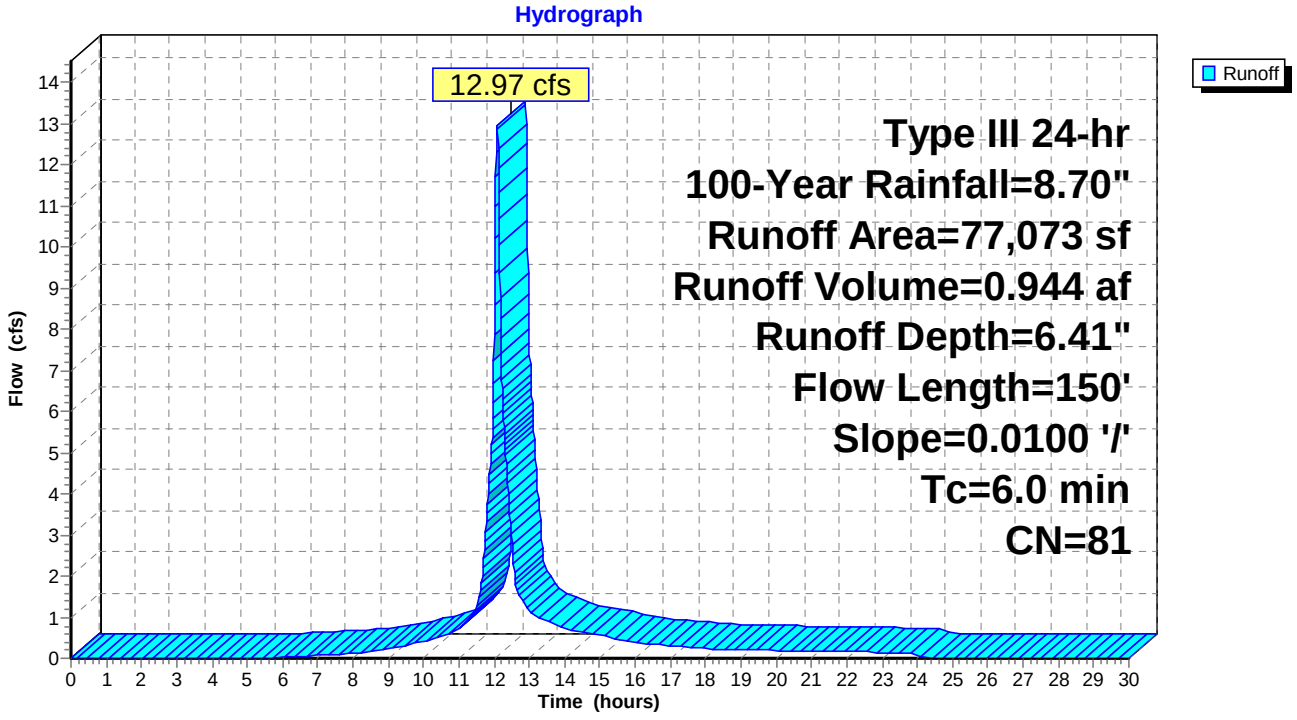
Runoff = 12.97 cfs @ 12.09 hrs, Volume= 0.944 af, Depth= 6.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
27,718	98	Paved parking, HSG A
21,984	39	>75% Grass cover, Good, HSG A
27,371	98	Roofs, HSG A
77,073	81	Weighted Average
21,984	39	28.52% Pervious Area
55,089	98	71.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	150	0.0100	1.15		**Sheet Flow, East Area Sheet Flow** Smooth surfaces n= 0.011 P2= 3.30"
2.2	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1



Summary for Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2

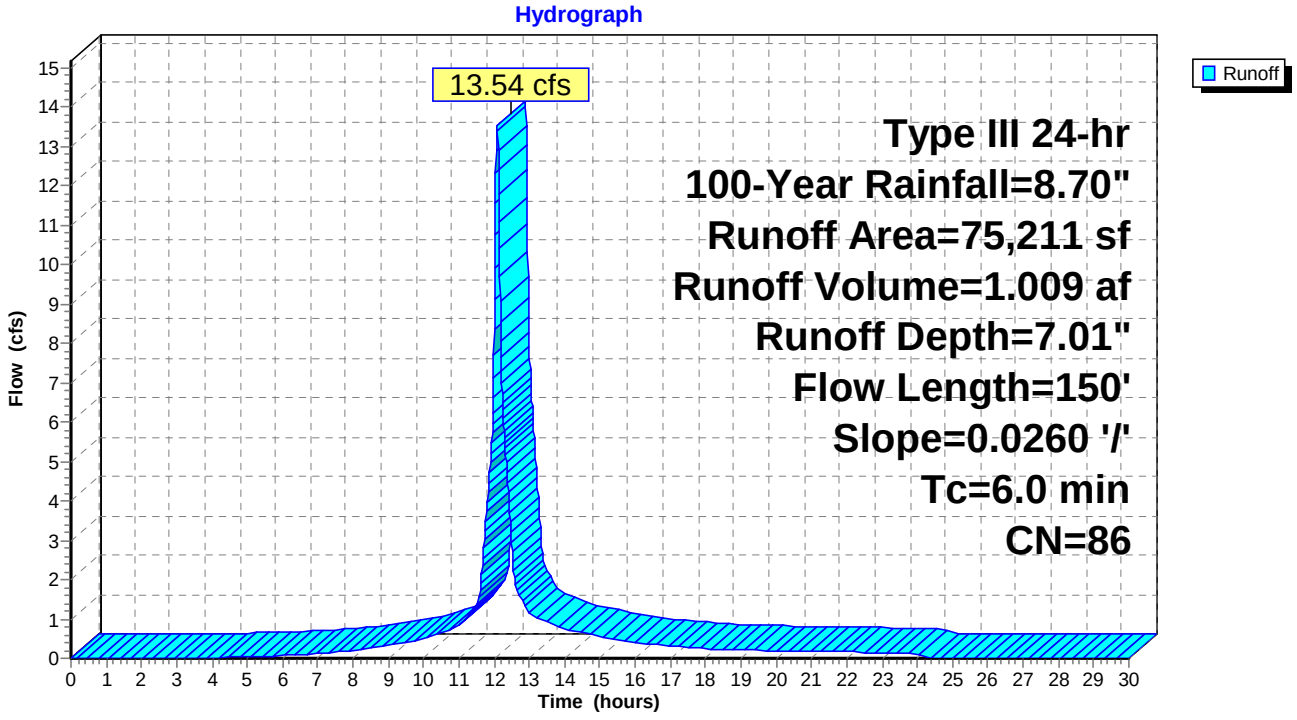
Runoff = 13.54 cfs @ 12.08 hrs, Volume= 1.009 af, Depth= 7.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
20,607	98	Roofs, HSG A
39,231	98	Paved parking, HSG A
15,373	39	>75% Grass cover, Good, HSG A
75,211	86	Weighted Average
15,373	39	20.44% Pervious Area
59,838	98	79.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	150	0.0260	1.68		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
1.5	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2



Summary for Subcatchment 4-PW: Building Roof Area

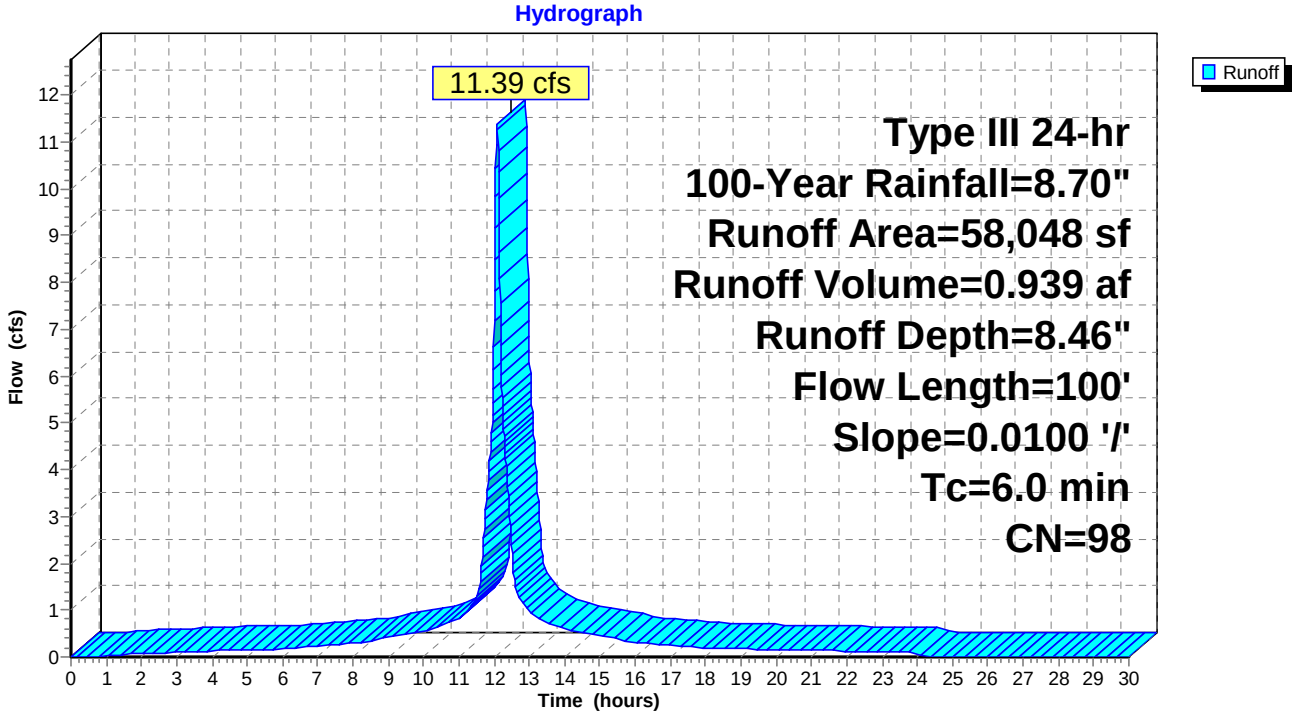
Runoff = 11.39 cfs @ 12.08 hrs, Volume= 0.939 af, Depth= 8.46"
Routed to Pond 5-SI : Storage, Infiltration in Prop Cultec 902

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
58,048	98	Roofs, HSG A
58,048	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Roof Drain System** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4-PW: Building Roof Area



Summary for Pond 5-SI: Storage, Infiltration in Prop Cultec 902

Inflow Area = 1.333 ac,100.00% Impervious, Inflow Depth = 8.46" for 100-Year event
Inflow = 11.39 cfs @ 12.08 hrs, Volume= 0.939 af
Outflow = 2.98 cfs @ 12.44 hrs, Volume= 0.939 af, Atten= 74%, Lag= 21.3 min
Discarded = 0.73 cfs @ 10.89 hrs, Volume= 0.762 af
Primary = 2.25 cfs @ 12.44 hrs, Volume= 0.178 af
Routed to Pond 10-DP : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 66.62' @ 12.44 hrs Surf.Area= 3,827 sf Storage= 12,238 cf

Plug-Flow detention time= 68.7 min calculated for 0.939 af (100% of inflow)
Center-of-Mass det. time= 68.7 min (808.9 - 740.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	61.50'	4,420 cf	**88.25'W x 43.37'L x 5.75'H Field A** 22,006 cf Overall - 8,611 cf Embedded = 13,395 cf x 33.0% Voids
#2A	62.25'	8,611 cf	**Cultec R-902HD** x 132 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 132 Chambers in 12 Rows Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf
		13,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.50'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'
#2	Primary	64.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.73 cfs @ 10.89 hrs HW=61.62' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.73 cfs)

Primary OutFlow Max=2.25 cfs @ 12.44 hrs HW=66.62' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Orifice Controls 2.25 cfs @ 6.44 fps)

Pond 5-SI: Storage, Infiltration in Prop Cultec 902 - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Superseded by R-902HD V2 for new designs)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

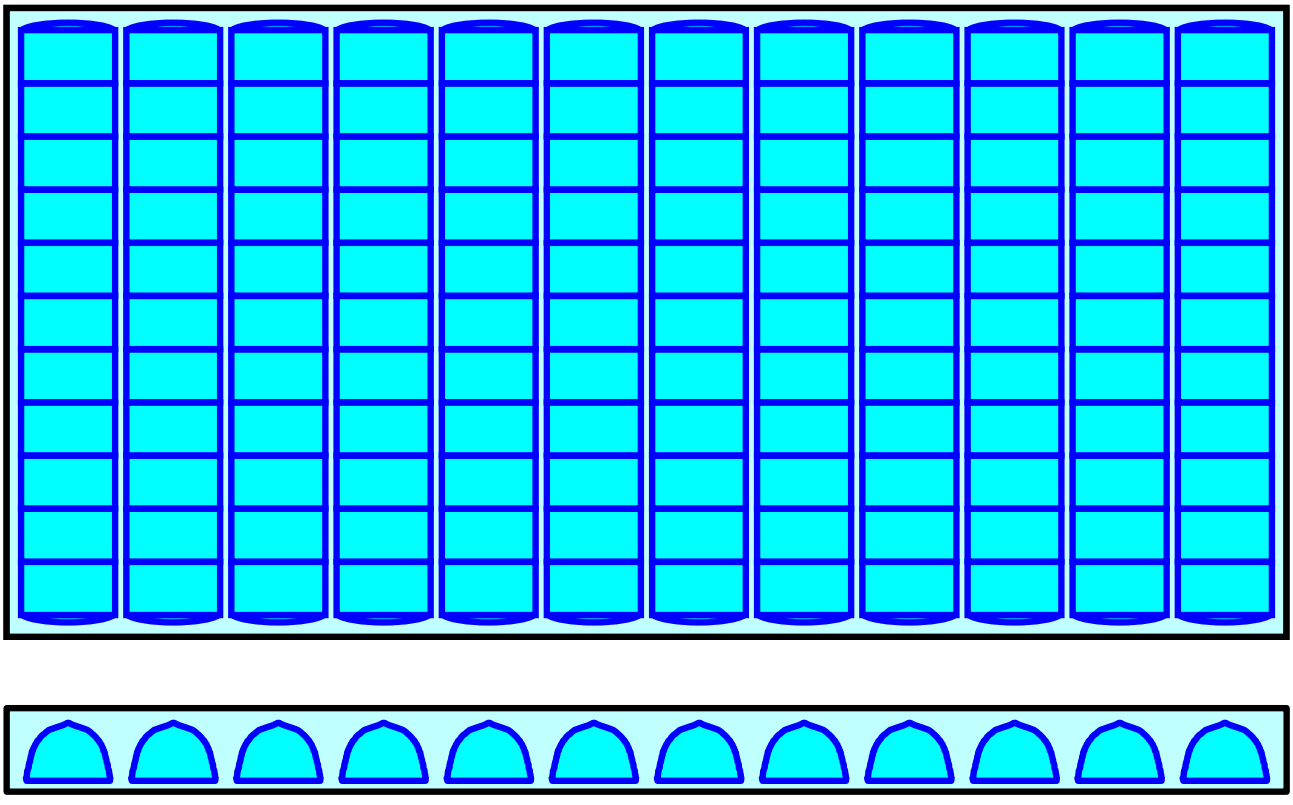
11 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 41.37' Row Length +12.0" End Stone x 2 = 43.37' Base Length
12 Rows x 78.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 88.25' Base Width
9.0" Stone Base + 48.0" Chamber Height + 12.0" Stone Cover = 5.75' Field Height

132 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 12 Rows = 8,611.3 cf Chamber Storage

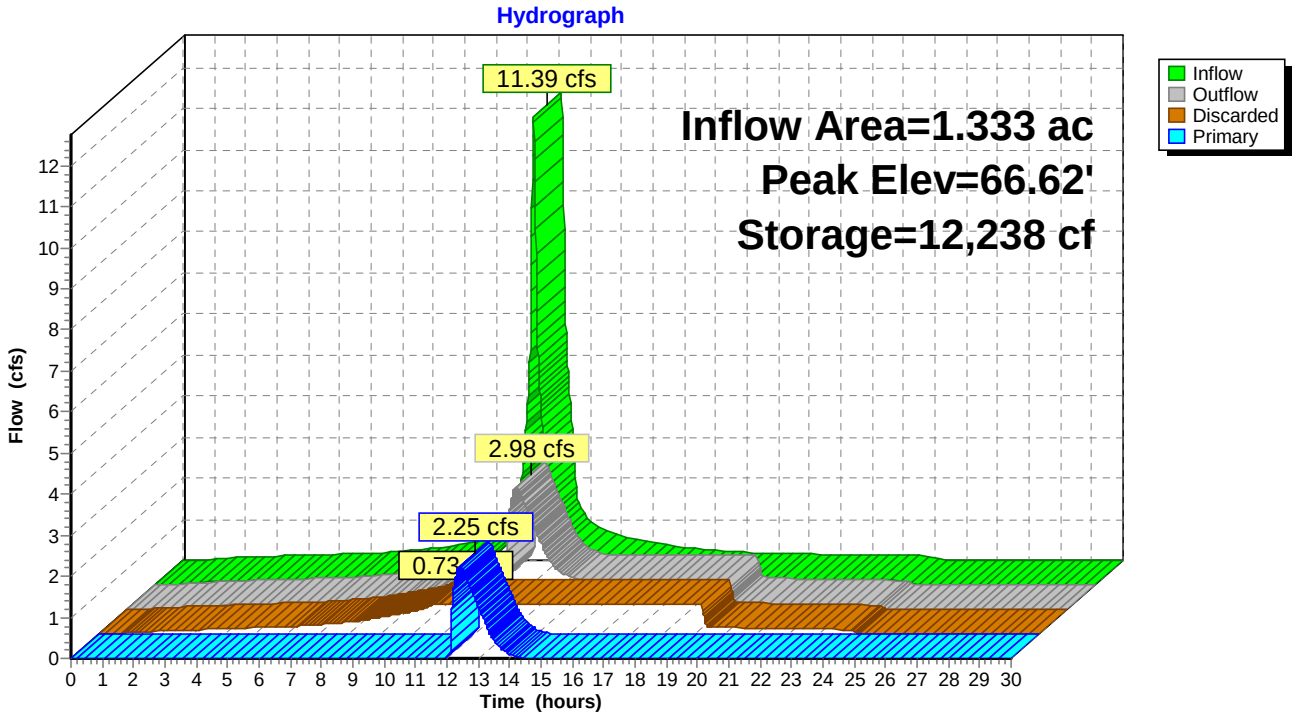
22,005.9 cf Field - 8,611.3 cf Chambers = 13,394.6 cf Stone x 33.0% Voids = 4,420.2 cf Stone Storage

Chamber Storage + Stone Storage = 13,031.5 cf = 0.299 af
Overall Storage Efficiency = 59.2%
Overall System Size = 43.37' x 88.25' x 5.75'

132 Chambers
815.0 cy Field
496.1 cy Stone



Pond 5-SI: Storage, Infiltration in Prop Cultec 902



Summary for Subcatchment 6-PW: New Bus Driveway Area

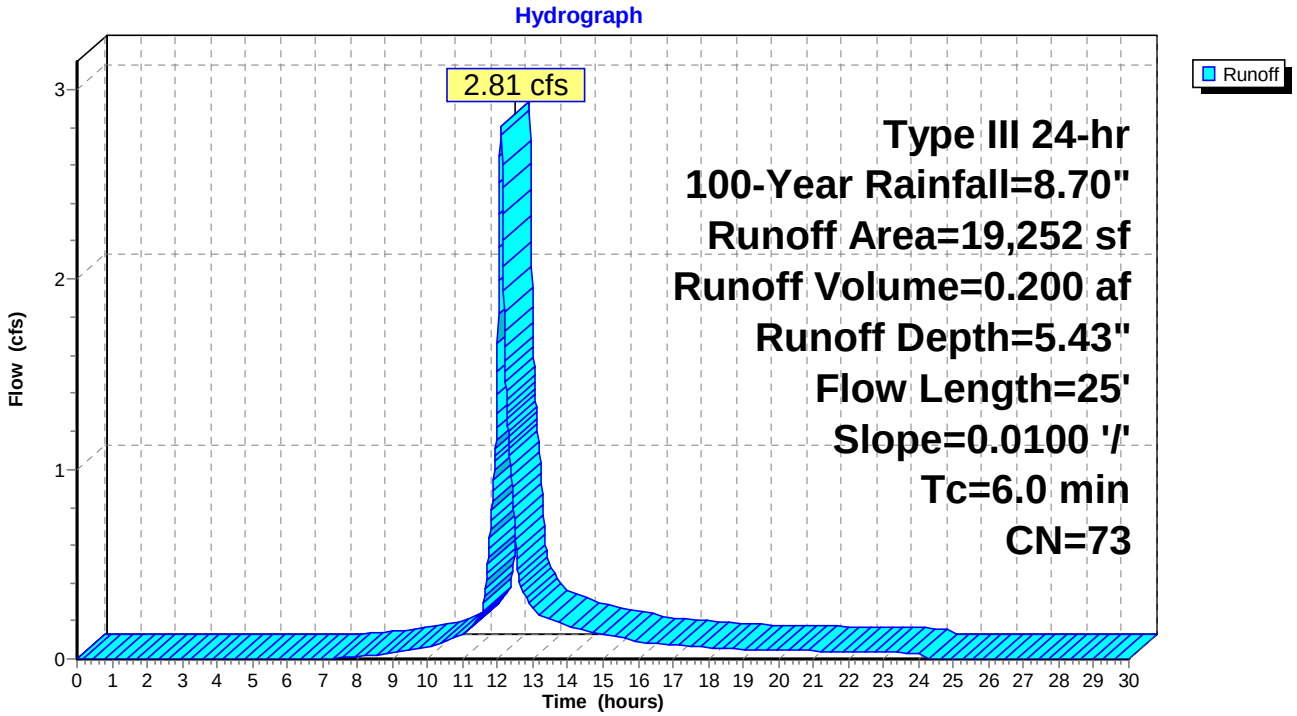
Runoff = 2.81 cfs @ 12.09 hrs, Volume= 0.200 af, Depth= 5.43"
Routed to Pond 7-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (sf)	CN	Description
*	8,954	76	Pervious Pavement - Table 5-5
	4,874	39	>75% Grass cover, Good, HSG A
	5,424	98	Paved parking, HSG A
	19,252	73	Weighted Average
	13,828	63	71.83% Pervious Area
	5,424	98	28.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.80		**Sheet Flow, Driveway Area** Smooth surfaces n= 0.011 P2= 3.30"
0.5	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6-PW: New Bus Driveway Area



Summary for Pond 7-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.442 ac, 28.17% Impervious, Inflow Depth = 5.43" for 100-Year event
Inflow = 2.81 cfs @ 12.09 hrs, Volume= 0.200 af
Outflow = 1.71 cfs @ 12.03 hrs, Volume= 0.200 af, Atten= 39%, Lag= 0.0 min
Primary = 1.71 cfs @ 12.03 hrs, Volume= 0.200 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 69.47' @ 12.19 hrs Surf.Area= 6,299 sf Storage= 560 cf

Plug-Flow detention time= 2.1 min calculated for 0.200 af (100% of inflow)
Center-of-Mass det. time= 2.1 min (817.1 - 815.0)

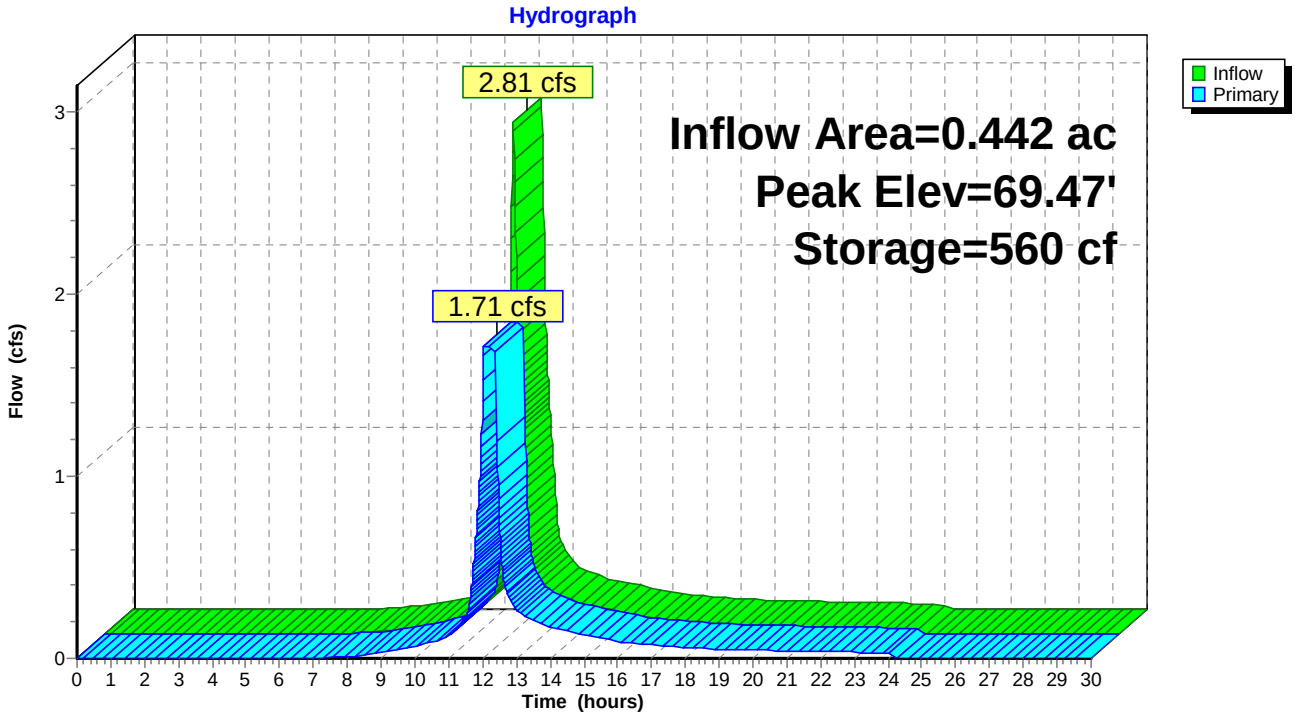
Volume	Invert	Avail.Storage	Storage Description
#1	69.25'	1,108 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 3,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	8,954	0	0
70.00	0	3,358	3,358

Device	Routing	Invert	Outlet Devices
#1	Primary	69.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=1.71 cfs @ 12.03 hrs HW=69.30' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.71 cfs)

Pond 7-PP: PERVIOUS Pavement SYSTEM



Summary for Subcatchment 8-PW: New Parking Area

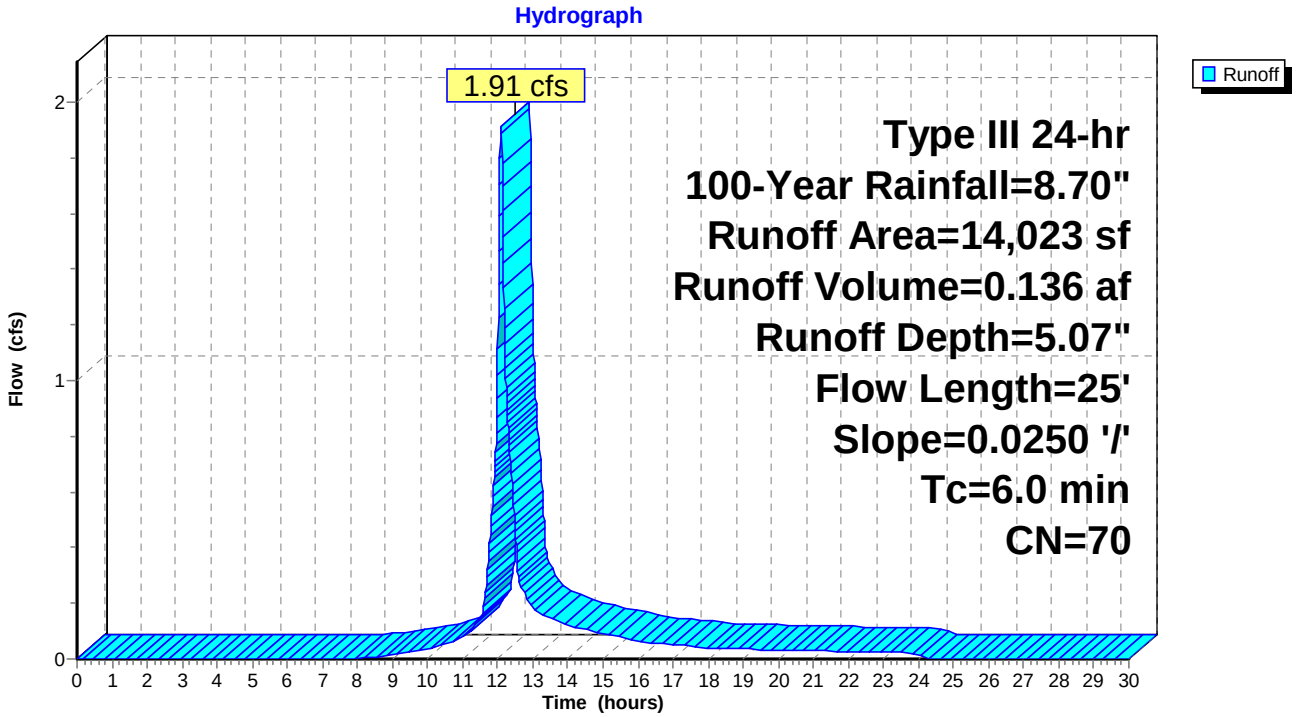
Runoff = 1.91 cfs @ 12.09 hrs, Volume= 0.136 af, Depth= 5.07"
Routed to Pond 9-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

	Area (sf)	CN	Description
*	11,905	76	Pervious Pavement - Table 5-5
	2,118	39	>75% Grass cover, Good, HSG A
	14,023	70	Weighted Average
	14,023	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0250	1.16		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
0.4	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8-PW: New Parking Area



Summary for Pond 9-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.322 ac, 0.00% Impervious, Inflow Depth = 5.07" for 100-Year event
Inflow = 1.91 cfs @ 12.09 hrs, Volume= 0.136 af
Outflow = 1.85 cfs @ 12.11 hrs, Volume= 0.136 af, Atten= 3%, Lag= 1.3 min
Primary = 1.85 cfs @ 12.11 hrs, Volume= 0.136 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 67.29' @ 12.11 hrs Surf.Area= 11,261 sf Storage= 155 cf

Plug-Flow detention time= 1.4 min calculated for 0.136 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (822.6 - 821.1)

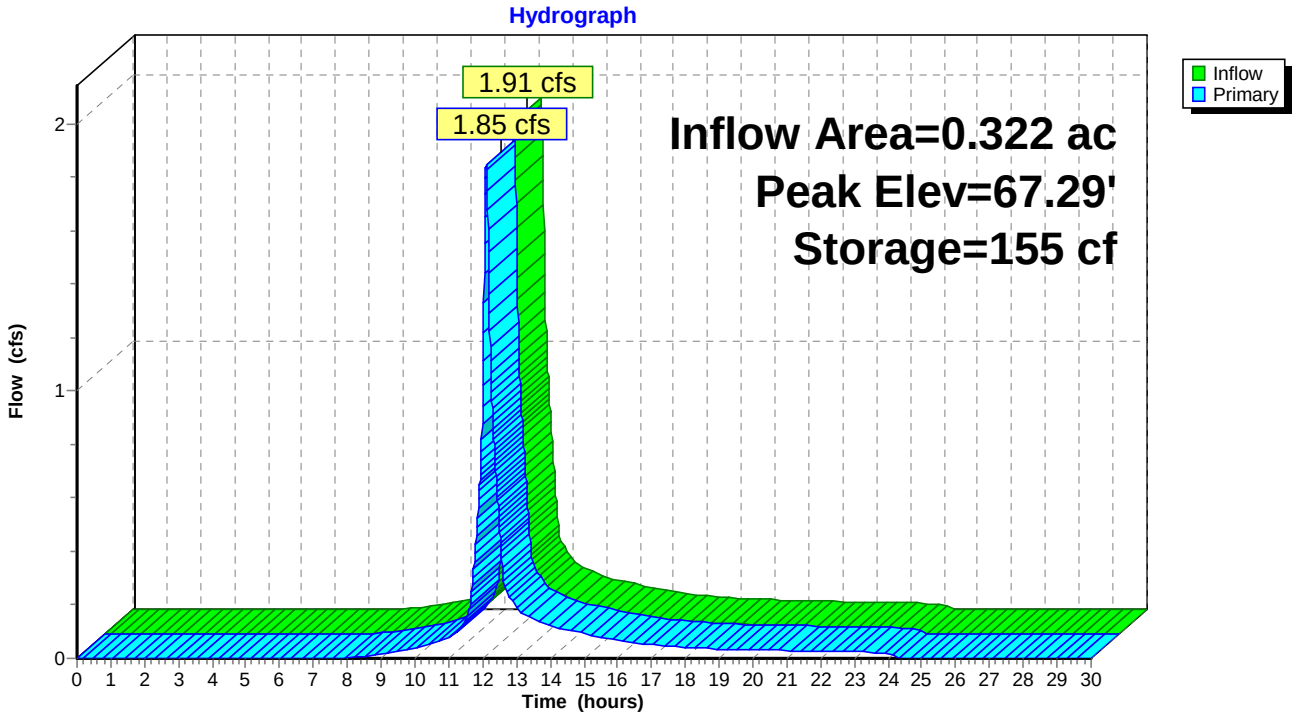
Volume	Invert	Avail.Storage	Storage Description
#1	67.25'	1,473 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 4,464 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.25	11,905	0	0
68.00	0	4,464	4,464

Device	Routing	Invert	Outlet Devices
#1	Primary	67.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=1.85 cfs @ 12.11 hrs HW=67.29' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.85 cfs)

Pond 9-PP: PERVIOUS Pavement SYSTEM

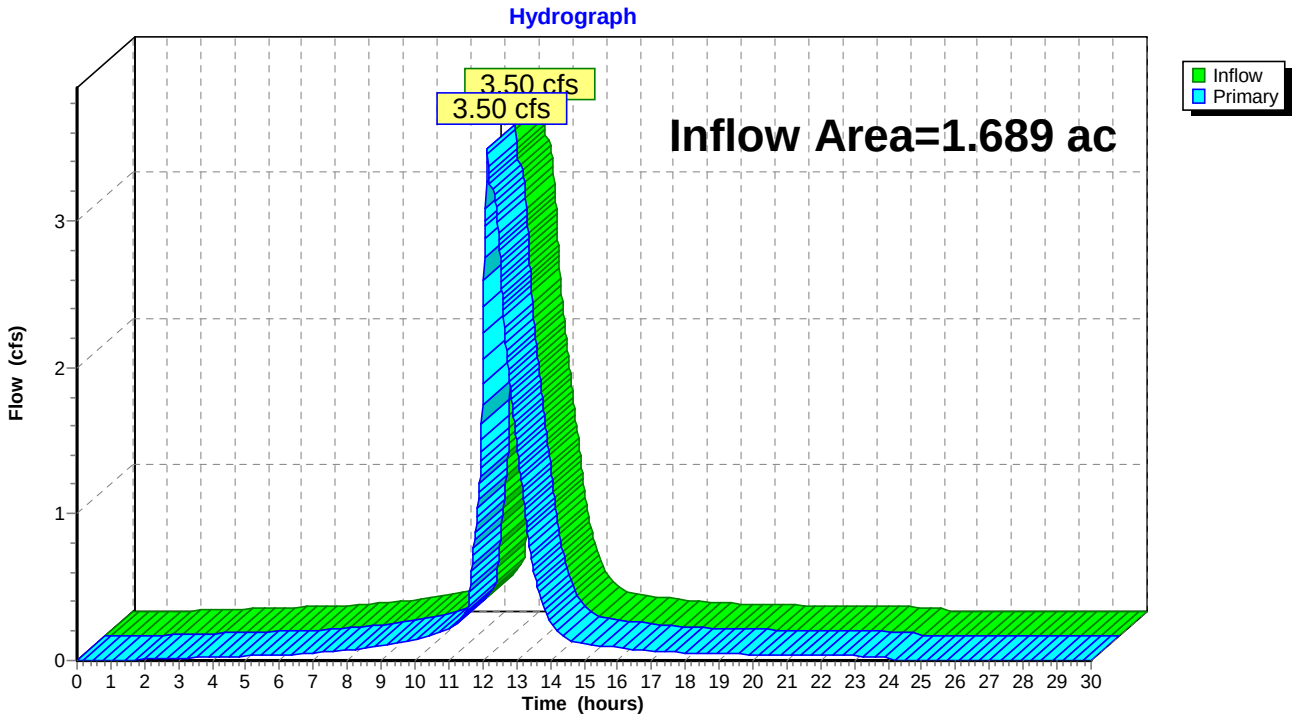


Summary for Pond 10-DP: DP-1

Inflow Area = 1.689 ac, 98.85% Impervious, Inflow Depth = 2.97" for 100-Year event
Inflow = 3.50 cfs @ 12.14 hrs, Volume= 0.418 af
Primary = 3.50 cfs @ 12.14 hrs, Volume= 0.418 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2

Pond 10-DP: DP-1



Summary for Subcatchment 10-PW: Princeton St Playground Area

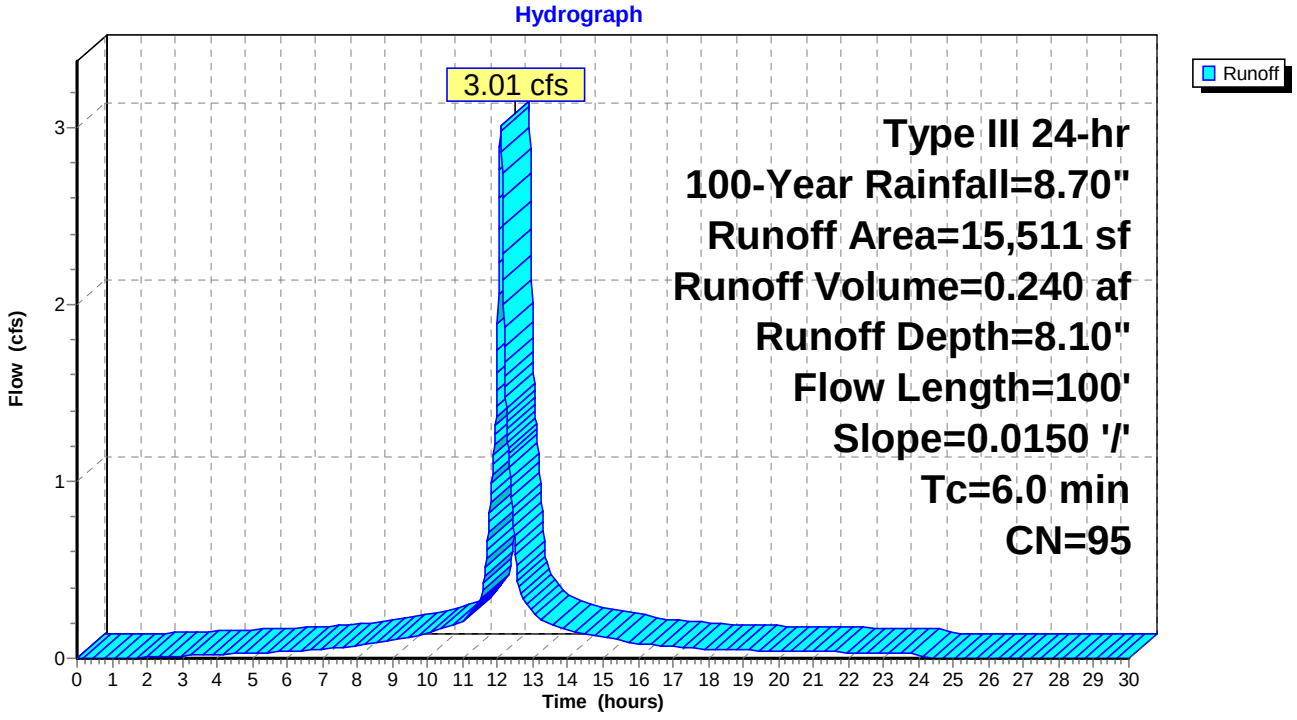
Runoff = 3.01 cfs @ 12.08 hrs, Volume= 0.240 af, Depth= 8.10"
Routed to Pond 10-DP : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
14,667	98	Paved parking, HSG A
844	39	>75% Grass cover, Good, HSG A
15,511	95	Weighted Average
844	39	5.44% Pervious Area
14,667	98	94.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0150	1.25		**Sheet Flow, Playground Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.3	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10-PW: Princeton St Playground Area



Summary for Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2

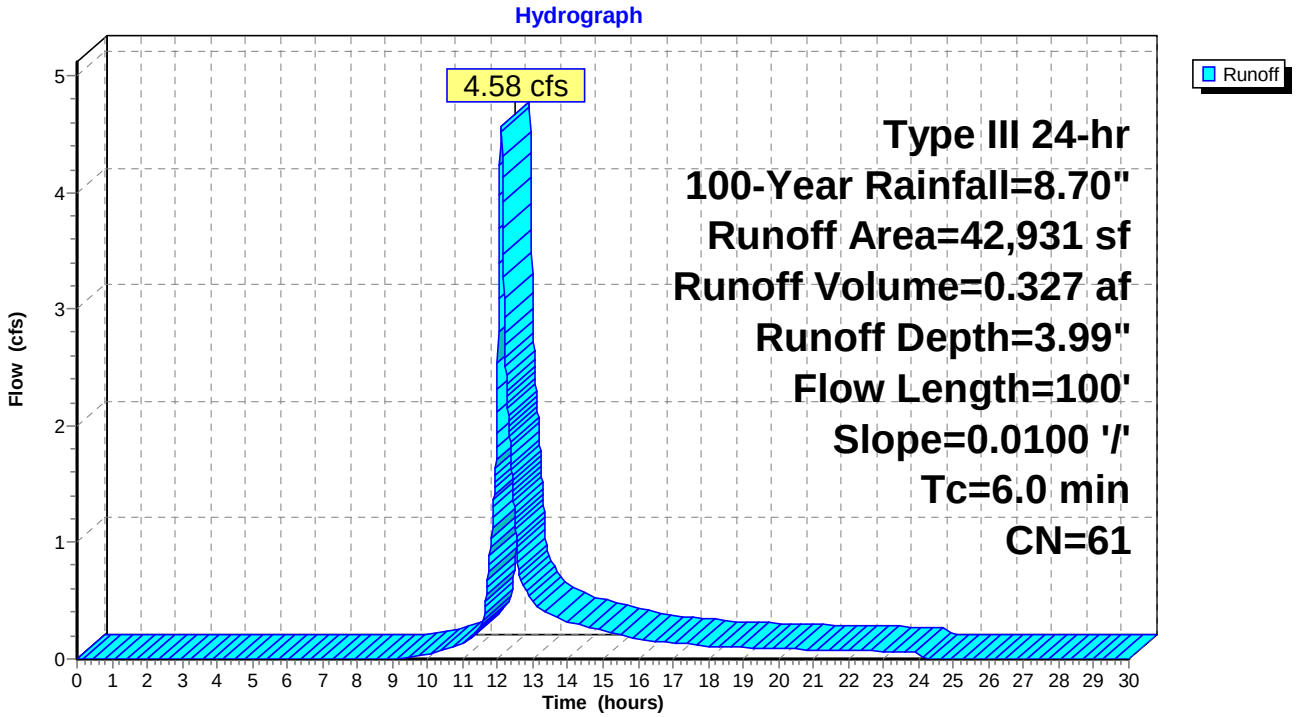
Runoff = 4.58 cfs @ 12.09 hrs, Volume= 0.327 af, Depth= 3.99"

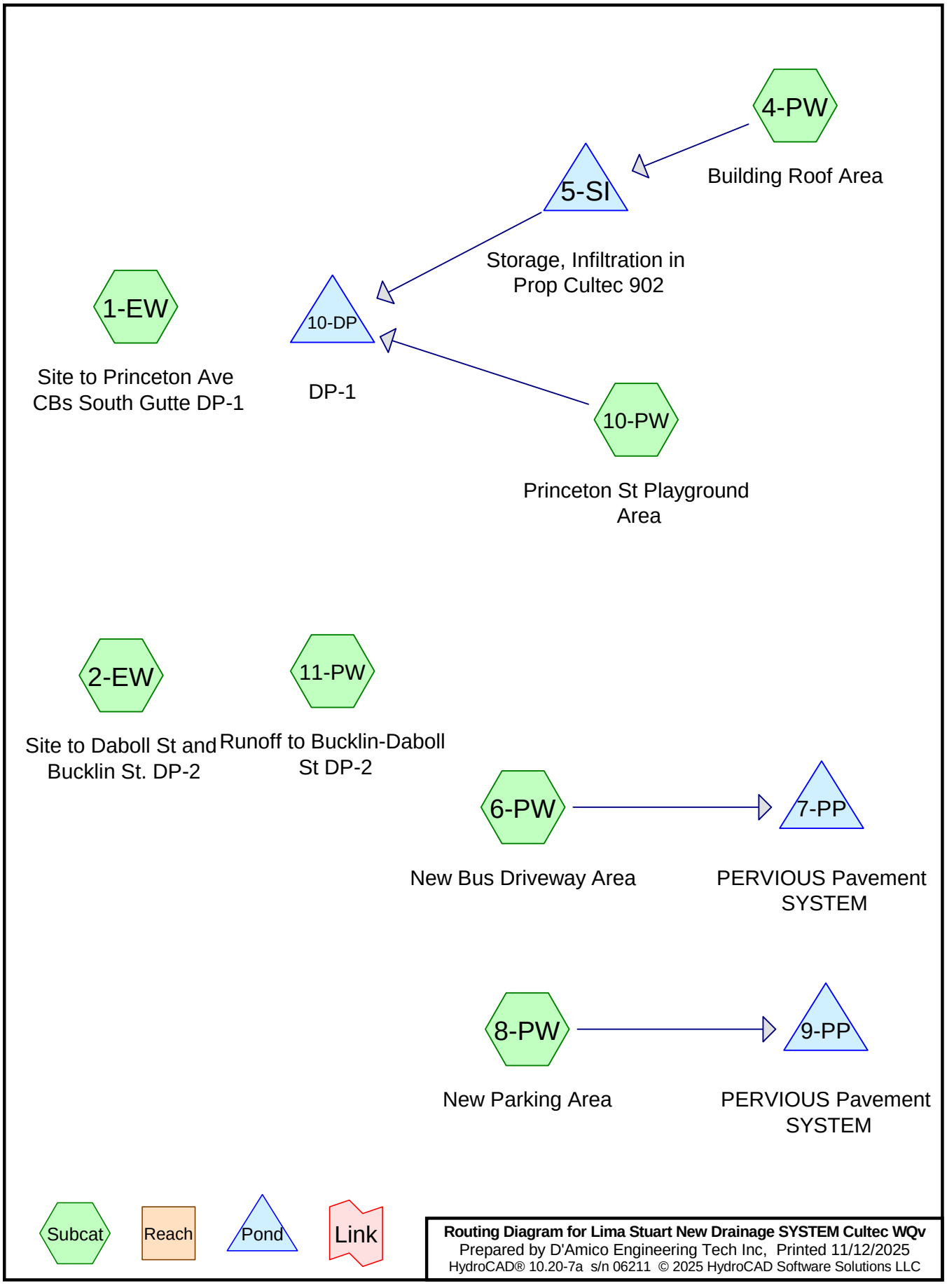
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
16,249	98	Paved parking, HSG A
26,682	39	>75% Grass cover, Good, HSG A
42,931	61	Weighted Average
26,682	39	62.15% Pervious Area
16,249	98	37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Parking Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2





Routing Diagram for Lima Stuart New Drainage SYSTEM Cultec WQv
Prepared by D'Amico Engineering Tech Inc, Printed 11/12/2025

Summary for Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1

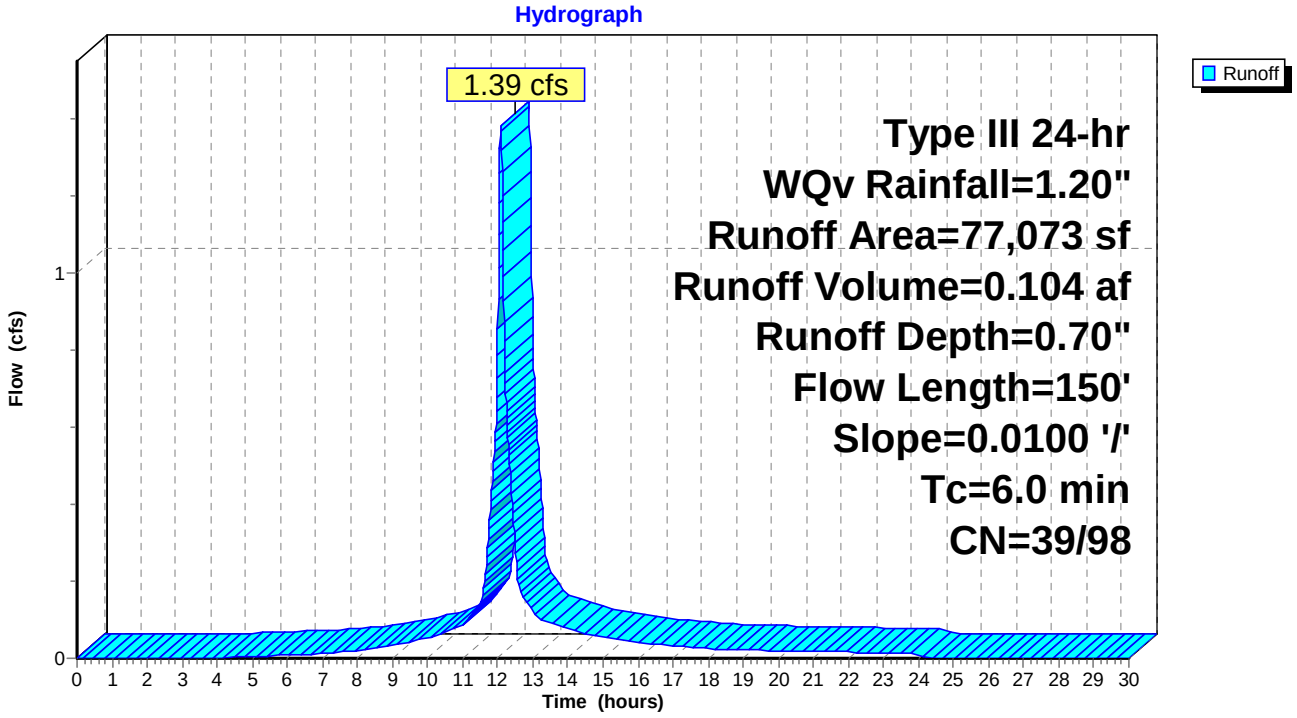
Runoff = 1.39 cfs @ 12.08 hrs, Volume= 0.104 af, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

Area (sf)	CN	Description
27,718	98	Paved parking, HSG A
21,984	39	>75% Grass cover, Good, HSG A
27,371	98	Roofs, HSG A
77,073	81	Weighted Average
21,984	39	28.52% Pervious Area
55,089	98	71.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	150	0.0100	1.15		**Sheet Flow, East Area Sheet Flow** Smooth surfaces n= 0.011 P2= 3.30"
2.2	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1-EW: Site to Princeton Ave CBs South Gutte DP-1



Summary for Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2

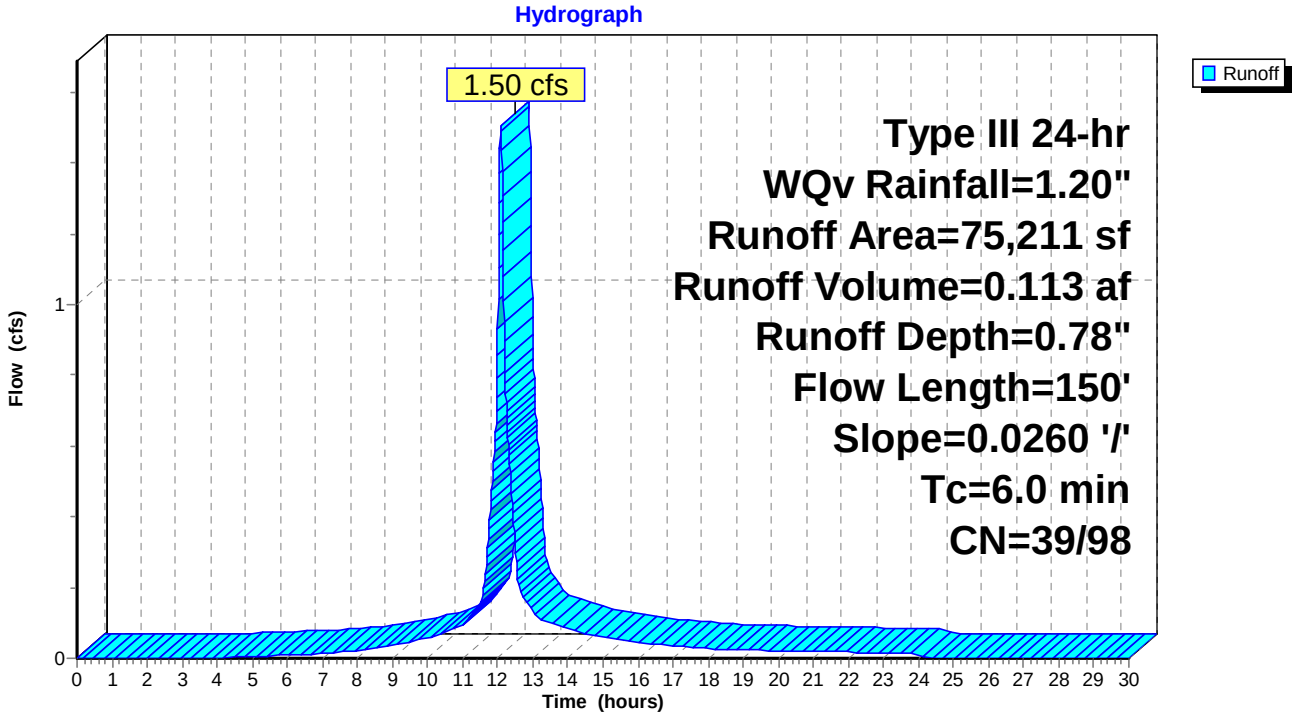
Runoff = 1.50 cfs @ 12.08 hrs, Volume= 0.113 af, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

Area (sf)	CN	Description
20,607	98	Roofs, HSG A
39,231	98	Paved parking, HSG A
15,373	39	>75% Grass cover, Good, HSG A
75,211	86	Weighted Average
15,373	39	20.44% Pervious Area
59,838	98	79.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	150	0.0260	1.68		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
1.5	150	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2-EW: Site to Daboll St and Bucklin St. DP-2



Summary for Subcatchment 4-PW: Building Roof Area

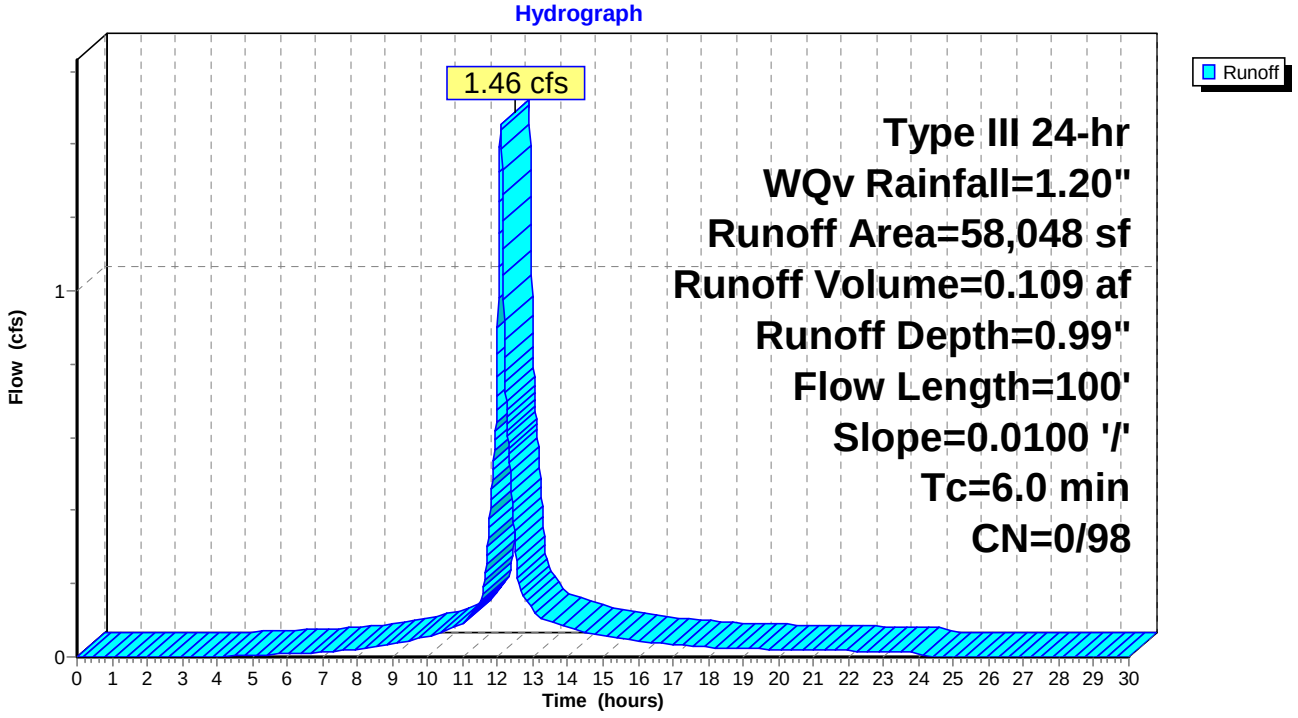
Runoff = 1.46 cfs @ 12.08 hrs, Volume= 0.109 af, Depth= 0.99"
Routed to Pond 5-SI : Storage, Infiltration in Prop Cultec 902

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

Area (sf)	CN	Description
58,048	98	Roofs, HSG A
58,048	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Roof Drain System** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 4-PW: Building Roof Area



Summary for Pond 5-SI: Storage, Infiltration in Prop Cultec 902

Inflow Area = 1.333 ac,100.00% Impervious, Inflow Depth = 0.99" for WQv event
Inflow = 1.46 cfs @ 12.08 hrs, Volume= 0.109 af
Outflow = 0.73 cfs @ 12.03 hrs, Volume= 0.109 af, Atten= 50%, Lag= 0.0 min
Discarded = 0.73 cfs @ 12.03 hrs, Volume= 0.109 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10-DP : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 61.86' @ 12.23 hrs Surf.Area= 3,827 sf Storage= 460 cf

Plug-Flow detention time= 4.3 min calculated for 0.109 af (100% of inflow)
Center-of-Mass det. time= 4.3 min (786.4 - 782.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	61.50'	4,420 cf	**88.25'W x 43.37'L x 5.75'H Field A** 22,006 cf Overall - 8,611 cf Embedded = 13,395 cf x 33.0% Voids
#2A	62.25'	8,611 cf	**Cultec R-902HD** x 132 Inside #1 Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap 132 Chambers in 12 Rows Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf
		13,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.50'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.10'
#2	Primary	64.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.73 cfs @ 12.03 hrs HW=61.62' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.73 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=61.50' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 5-SI: Storage, Infiltration in Prop Cultec 902 - Chamber Wizard Field A

Chamber Model = Cultec R-902HD (Superseded by R-902HD V2 for new designs)
Effective Size= 69.8"W x 48.0"H => 17.65 sf x 3.67'L = 64.7 cf
Overall Size= 78.0"W x 48.0"H x 4.10'L with 0.44' Overlap
Cap Storage= 2.8 cf x 2 x 12 rows = 66.2 cf

78.0" Wide + 9.0" Spacing = 87.0" C-C Row Spacing

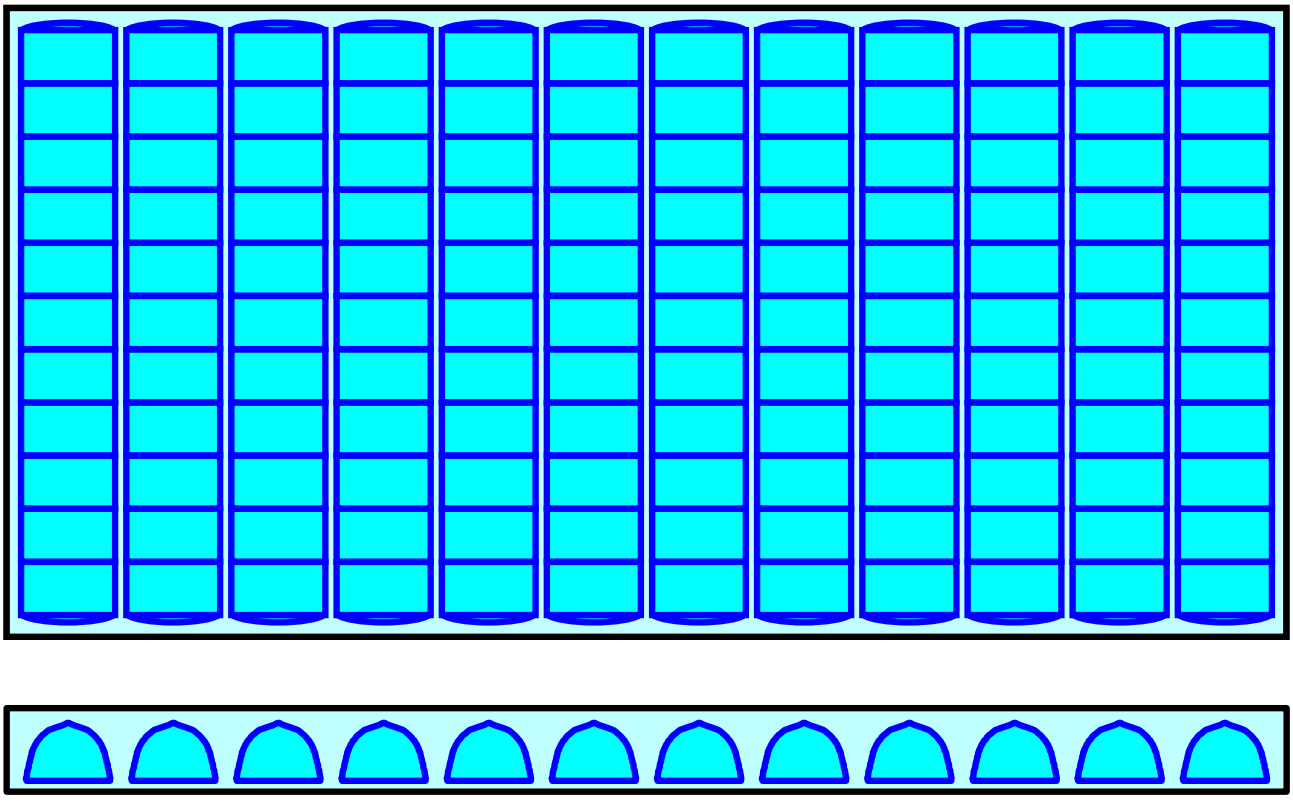
11 Chambers/Row x 3.67' Long +0.52' Cap Length x 2 = 41.37' Row Length +12.0" End Stone x 2 = 43.37' Base Length
12 Rows x 78.0" Wide + 9.0" Spacing x 11 + 12.0" Side Stone x 2 = 88.25' Base Width
9.0" Stone Base + 48.0" Chamber Height + 12.0" Stone Cover = 5.75' Field Height

132 Chambers x 64.7 cf + 2.8 cf Cap Volume x 2 x 12 Rows = 8,611.3 cf Chamber Storage

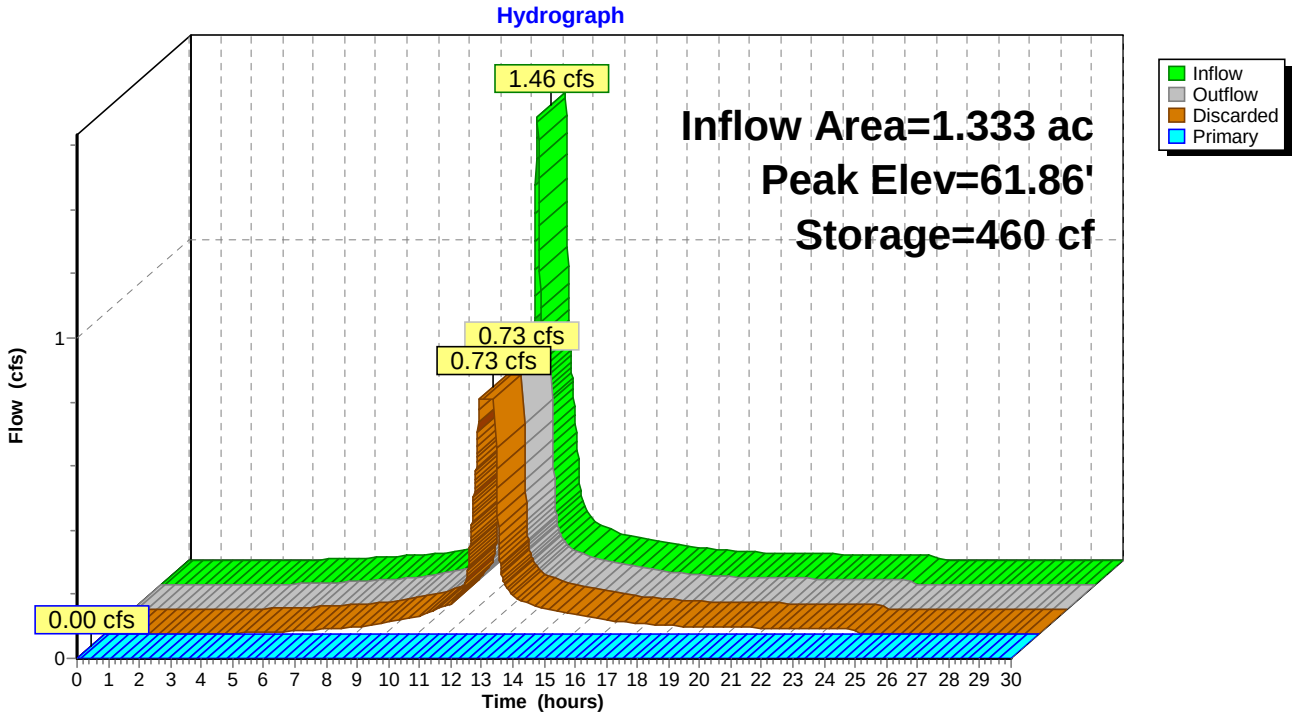
22,005.9 cf Field - 8,611.3 cf Chambers = 13,394.6 cf Stone x 33.0% Voids = 4,420.2 cf Stone Storage

Chamber Storage + Stone Storage = 13,031.5 cf = 0.299 af
Overall Storage Efficiency = 59.2%
Overall System Size = 43.37' x 88.25' x 5.75'

132 Chambers
815.0 cy Field
496.1 cy Stone



Pond 5-SI: Storage, Infiltration in Prop Cultec 902



Summary for Subcatchment 6-PW: New Bus Driveway Area

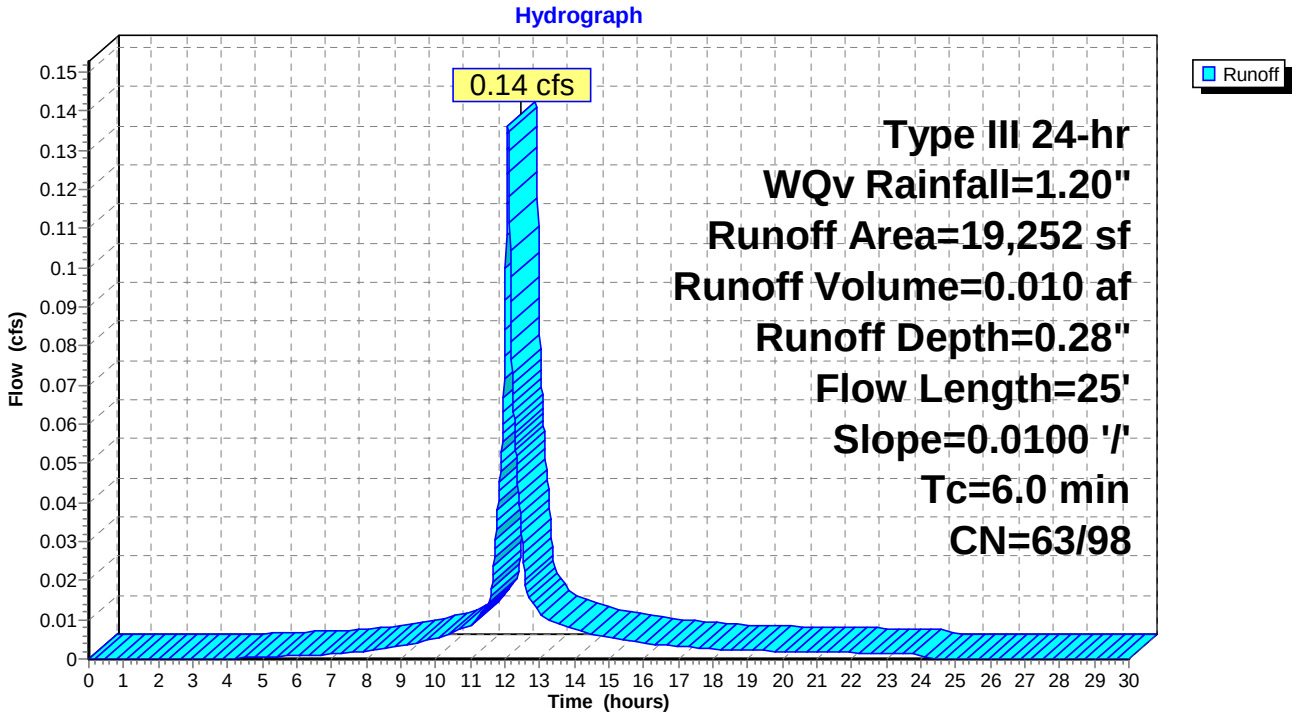
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af, Depth= 0.28"
Routed to Pond 7-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
*	8,954	76	Pervious Pavement - Table 5-5
	4,874	39	>75% Grass cover, Good, HSG A
	5,424	98	Paved parking, HSG A
	19,252	73	Weighted Average
	13,828	63	71.83% Pervious Area
	5,424	98	28.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.80		**Sheet Flow, Driveway Area** Smooth surfaces n= 0.011 P2= 3.30"
0.5	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 6-PW: New Bus Driveway Area



Summary for Pond 7-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.442 ac, 28.17% Impervious, Inflow Depth = 0.28" for WQv event
Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af
Outflow = 0.13 cfs @ 12.11 hrs, Volume= 0.010 af, Atten= 4%, Lag= 1.3 min
Primary = 0.13 cfs @ 12.11 hrs, Volume= 0.010 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 69.25' @ 12.11 hrs Surf.Area= 8,908 sf Storage= 11 cf

Plug-Flow detention time= 1.4 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (783.6 - 782.2)

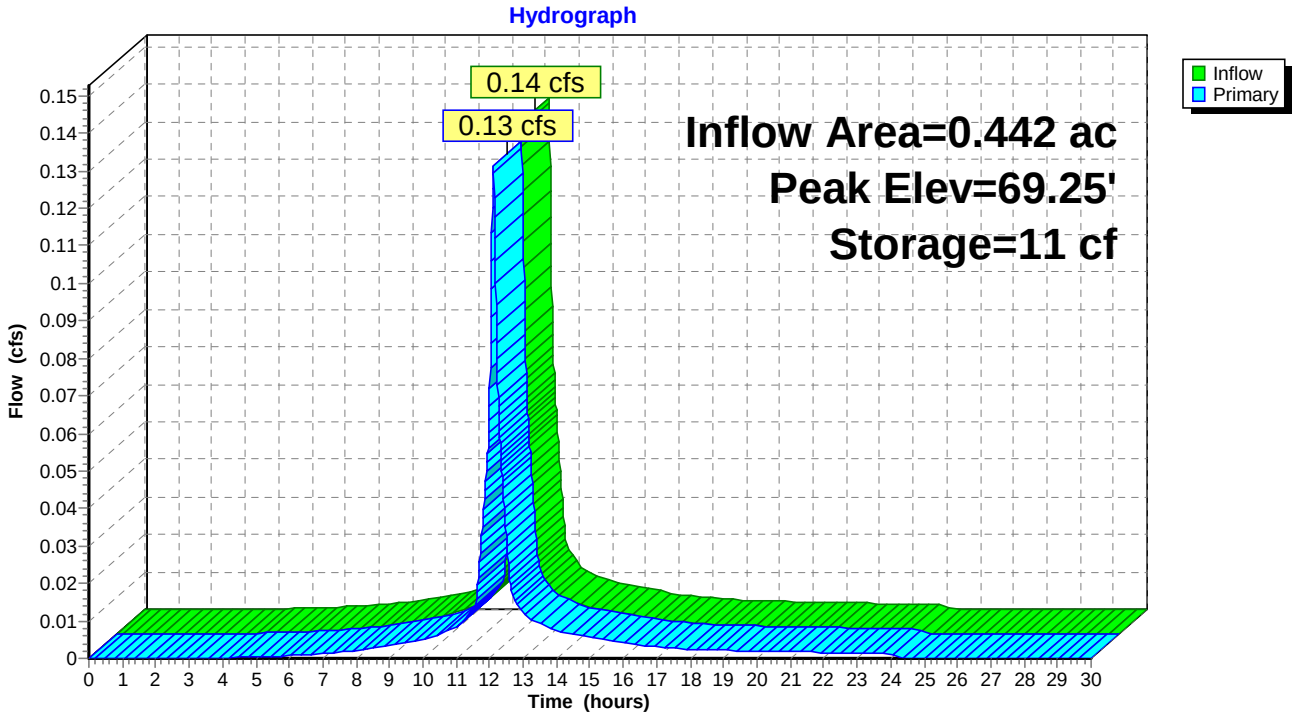
Volume	Invert	Avail.Storage	Storage Description
#1	69.25'	1,108 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 3,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
69.25	8,954	0	0
70.00	0	3,358	3,358

Device	Routing	Invert	Outlet Devices
#1	Primary	69.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.13 cfs @ 12.11 hrs HW=69.25' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.13 cfs)

Pond 7-PP: PERVIOUS Pavement SYSTEM



Summary for Subcatchment 8-PW: New Parking Area

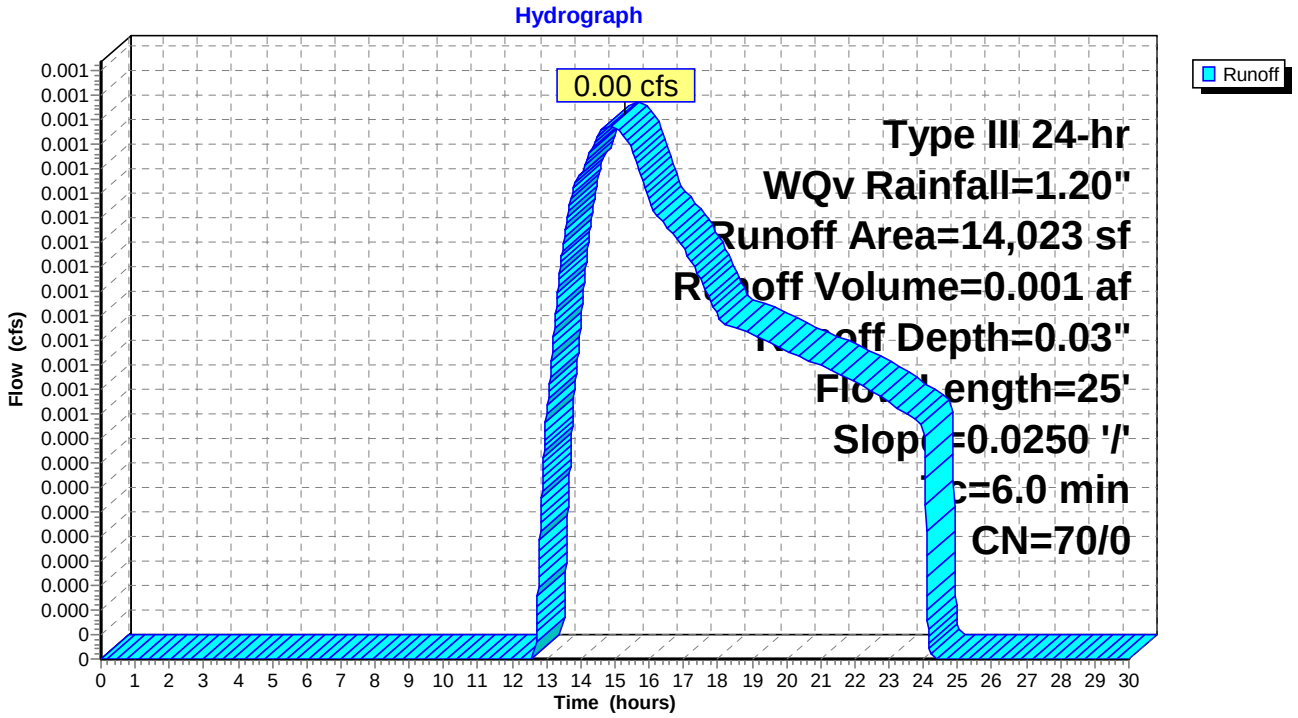
Runoff = 0.00 cfs @ 14.86 hrs, Volume= 0.001 af, Depth= 0.03"
Routed to Pond 9-PP : PERVIOUS Pavement SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

	Area (sf)	CN	Description
*	11,905	76	Pervious Pavement - Table 5-5
	2,118	39	>75% Grass cover, Good, HSG A
	14,023	70	Weighted Average
	14,023	70	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0250	1.16		**Sheet Flow, Parking Area** Smooth surfaces n= 0.011 P2= 3.30"
0.4	25	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 8-PW: New Parking Area



Summary for Pond 9-PP: PERVIOUS Pavement SYSTEM

Inflow Area = 0.322 ac, 0.00% Impervious, Inflow Depth = 0.03" for WQv event
Inflow = 0.00 cfs @ 14.86 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 14.91 hrs, Volume= 0.001 af, Atten= 0%, Lag= 2.8 min
Primary = 0.00 cfs @ 14.91 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 67.25' @ 14.91 hrs Surf.Area= 11,905 sf Storage= 0 cf

Plug-Flow detention time= 1.4 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (1,068.9 - 1,067.5)

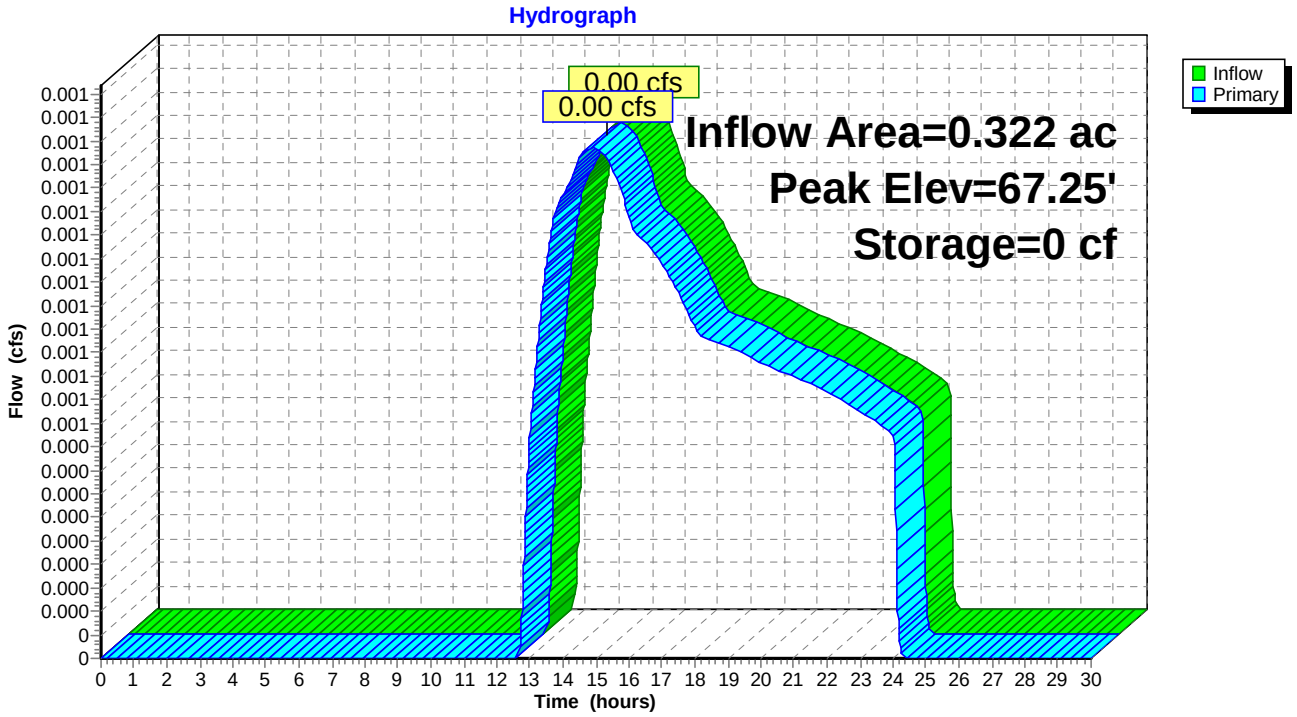
Volume	Invert	Avail.Storage	Storage Description
#1	67.25'	1,473 cf	**Stone Reservior (Prismatic)** Listed below (Recalc) 4,464 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
67.25	11,905	0	0
68.00	0	4,464	4,464

Device	Routing	Invert	Outlet Devices
#1	Primary	67.25'	**8.270 in/hr Exfiltration over Horizontal area** Phase-In= 0.05'

Primary OutFlow Max=0.00 cfs @ 14.91 hrs HW=67.25' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.00 cfs)

Pond 9-PP: PERVIOUS Pavement SYSTEM

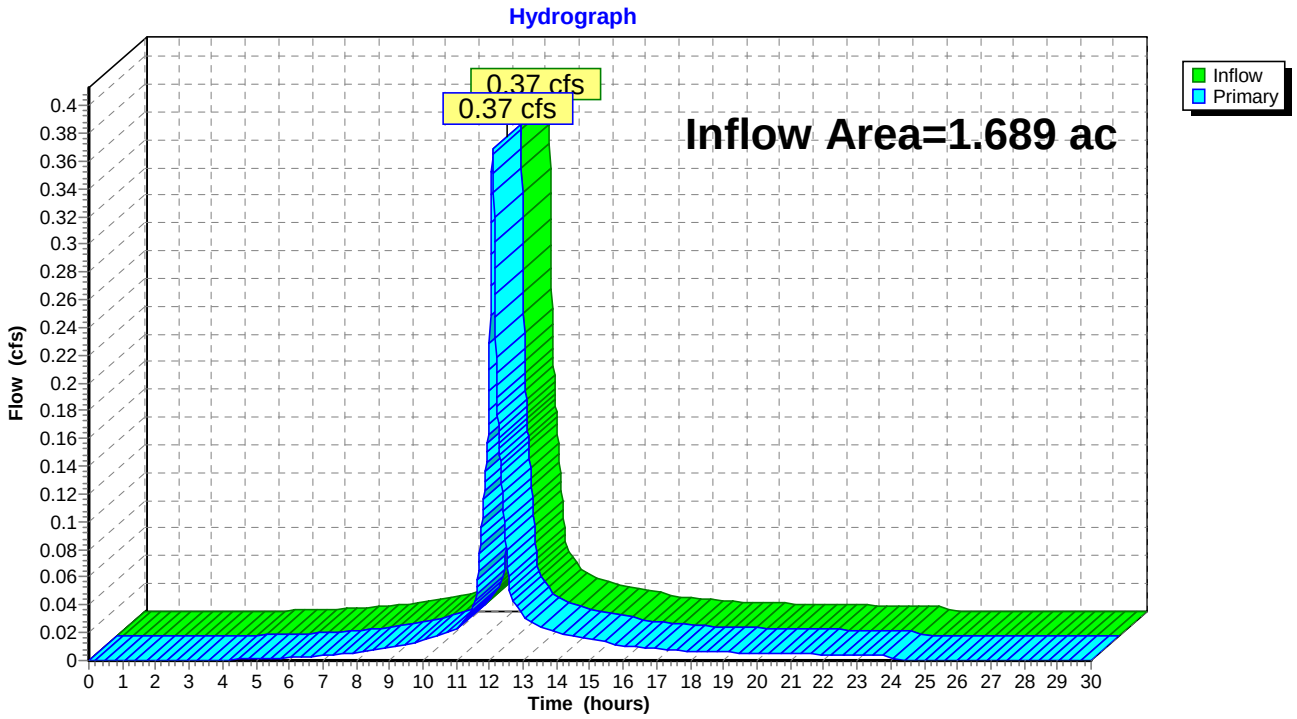


Summary for Pond 10-DP: DP-1

Inflow Area = 1.689 ac, 98.85% Impervious, Inflow Depth = 0.20" for WQv event
Inflow = 0.37 cfs @ 12.08 hrs, Volume= 0.028 af
Primary = 0.37 cfs @ 12.08 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2

Pond 10-DP: DP-1



Summary for Subcatchment 10-PW: Princeton St Playground Area

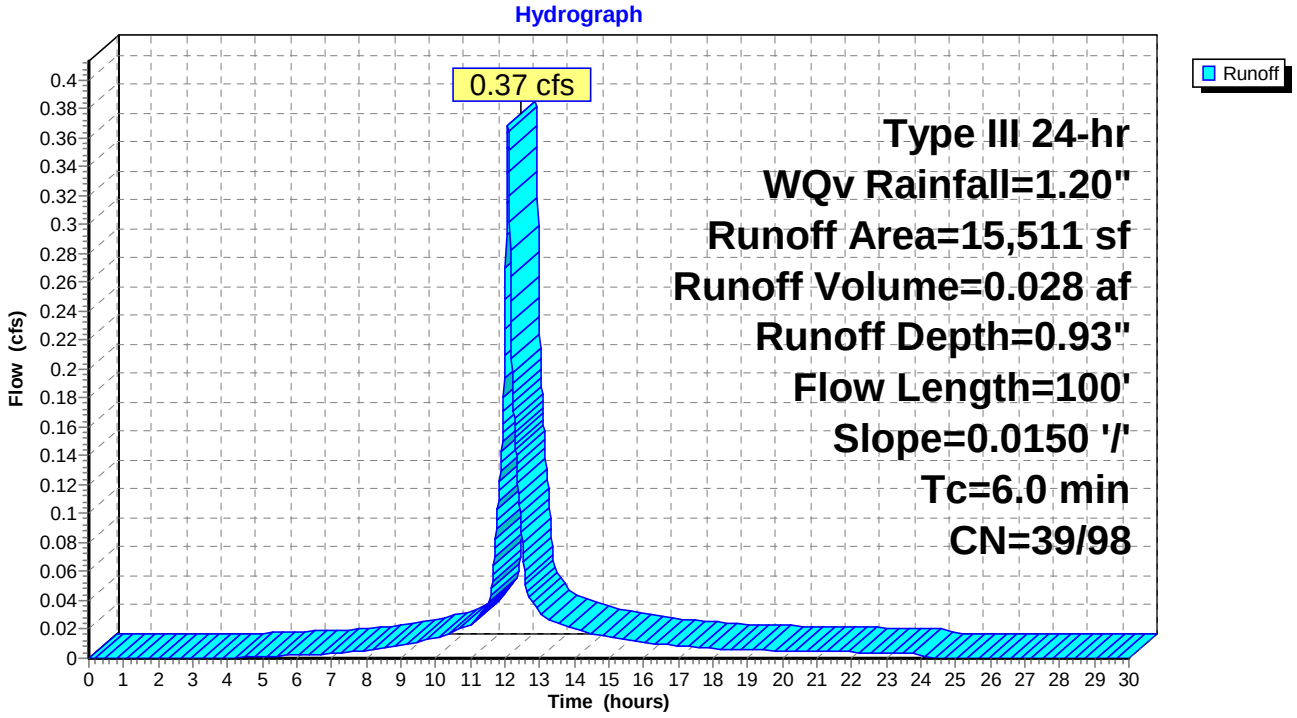
Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.028 af, Depth= 0.93"
Routed to Pond 10-DP : DP-1

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

Area (sf)	CN	Description
14,667	98	Paved parking, HSG A
844	39	>75% Grass cover, Good, HSG A
15,511	95	Weighted Average
844	39	5.44% Pervious Area
14,667	98	94.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0150	1.25		**Sheet Flow, Playground Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.3	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10-PW: Princeton St Playground Area



Summary for Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2

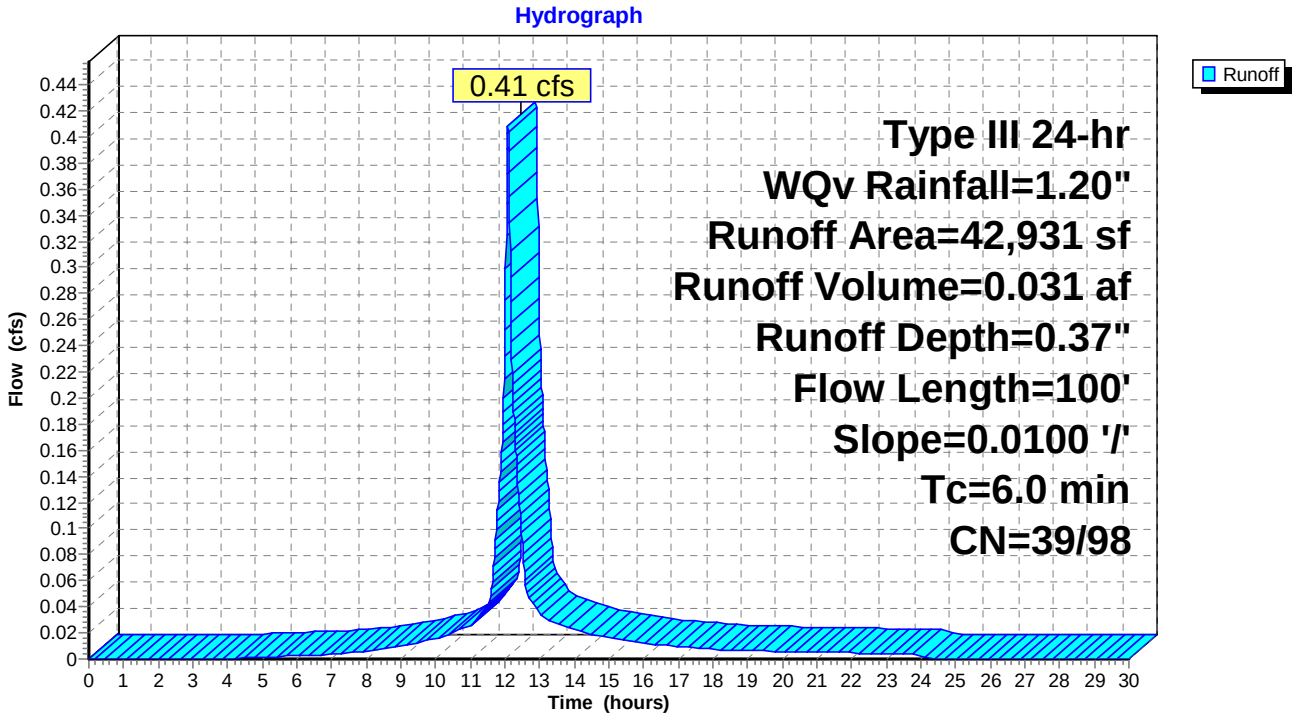
Runoff = 0.41 cfs @ 12.08 hrs, Volume= 0.031 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.20"

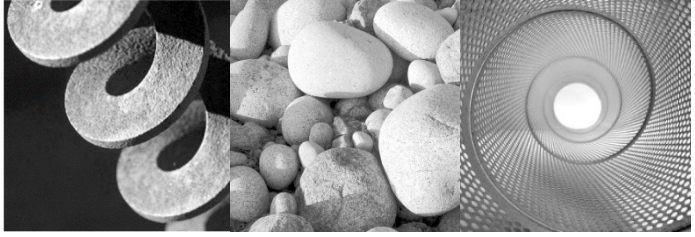
Area (sf)	CN	Description
16,249	98	Paved parking, HSG A
26,682	39	>75% Grass cover, Good, HSG A
42,931	61	Weighted Average
26,682	39	62.15% Pervious Area
16,249	98	37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.06		**Sheet Flow, Parking Area Flow to CBs** Smooth surfaces n= 0.011 P2= 3.30"
1.6	100	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 11-PW: Runoff to Bucklin-Daboll St DP-2



APPENDIX B



GEI Consultants

Consulting
Engineers and
Scientists

Preliminary Geotechnical Report

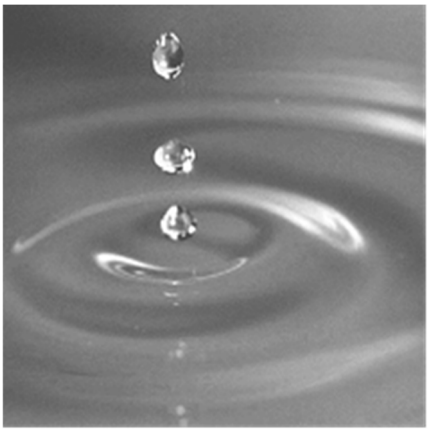
Gilbert Stuart School

188 Princeton Avenue
Providence, Rhode Island

Submitted to:
Garofalo & Associates, Inc.
85 Corliss Street
Providence, RI 02940

Submitted by:
GEI Consultants, Inc.
455 Winding Brook Drive, Suite 201
Glastonbury, CT 06033
860-368-5300

September 15, 2023
Project No. 2303874



Thomas Rezzani, E.I.T.
Geotechnical Professional

Matthew Glunt, P.E.
Senior Geotechnical Engineer

3. Exploration Procedures

3.1 Test Borings

The boring locations were laid out on the site from the provided conceptual plan using handheld GPS with accuracy on the order of 5 to 10 feet. Approximate boring locations are shown on Figure 1.

Six (6) soil test borings were performed at the site on August 22 and August 23, 2023, by Seaboard Drilling, under subcontract to GEI. The appropriate one-call utility locate service (DigSafe) was contacted prior to our arrival. Each boring location was also pre-scanned for utilities or other obstruction using geophysical methods. The borings were advanced to depths of 12 feet to 52 feet each, terminating at planned depth, utilizing hollow-stem augering and drive and rotary wash techniques. Test boring logs are attached in Appendix A.

Standard Penetration Testing (SPT) and split-spoon sampling was performed continuously through the upper 8 to 9 feet of the borings and at 5-foot intervals thereafter using an automatic 140-pound hammer. Representative samples of the soils obtained by the sampler were classified by the on-site GEI representative. The samples were placed in appropriately identified sealed glass jars and transported to our office for storage and laboratory assignment. Borings were backfilled with drill cuttings upon completion and patched with cold patch asphalt where required.

3.2 Laboratory Testing

Laboratory testing was conducted on representative soil samples to confirm field identification of the soils and establish engineering characteristics for design. Tests performed by GeoTesting Express, under subcontract to GEI, included the following:

- Three (3) grain-size analyses with standard sieve set (ASTM D422)
- Three (3) moisture content analyses (ASTM D2216)

Results of the laboratory testing program are attached in Appendix B.

unclear at this time if similar historic fills remain below the current building or if they were removed during its initial construction.

This narrative is consistent with the thickness and character of fill soils encountered in borings B-2, B-3, and B-4 to depths ranging from approximately 9 to 12 feet below current grade. Conditions were variable but generally followed a pattern of predominantly gravelly sand to silty sand with heavier proportions and variability of debris near the base, including brick, asphalt, stone, and ceramics.

Native Sand – Native gravelly sands to fine sands were encountered below the existing fill in borings B-2 through B-4 and near the ground surface at other locations. To a depth of about 25 feet at most locations, recovered samples were generally classified as gray to brown, fine to coarse-grained sand with about 5 percent non-plastic silt fines and 10 to 45 percent gravel. The lower part of this stratum was characterized as fine to coarse-grained sand with increased silt (5 to 10 percent) fines and occasional thin silt seams. All borings were terminated in this stratum at depths of 12 feet to 52 feet.

SPT N-values in these soils generally varied between 7 and 25 blows/foot, consistent with loose to medium-dense conditions, with occasional very loose and dense zones.

4.3 Groundwater Conditions

Groundwater was encountered within the native sand stratum at depths of approximately 18.5 feet to 23 feet below current grade. Depth to groundwater was not measured in boring B-1 as drilling fluids were introduced during advancement.

Groundwater levels are subject to seasonal and weather-related variations. Groundwater measurements made at different times and different locations may be significantly different than the measurements taken as part of this investigation.

For areas expected to be subjected to repeated, heavy traffic loads, such as dumpster pads, we recommend a rigid concrete section as such:

Heavy-Duty Rigid Concrete Section
6.0 inches of 4,000-psi jointed concrete
12.0 inches of processed aggregate base *(RIDOT Standard Specifications for Road and Bridge Construction, March 2018, Section 301 and M.0109, Table I, Column Ia)*

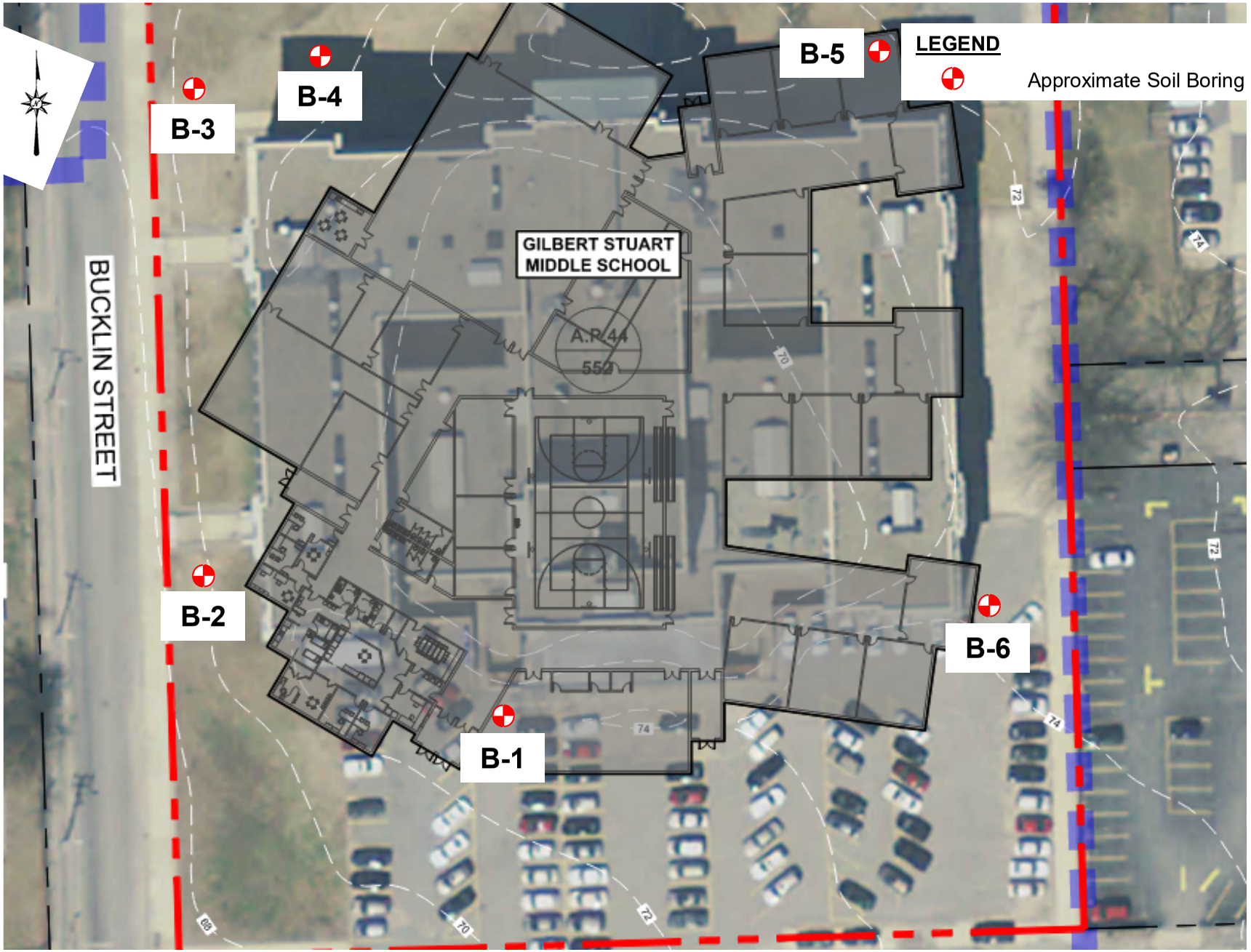
Pavement materials should conform with and be placed in accordance with the most recent edition of the *Rhode Island Department of Transportation (RIDOT) Standard Specifications for Road and Bridge Construction (Blue Book)*. Rigid pavement sections should be designed and constructed in accordance with appropriate American Concrete Institute (ACI) recommendations and with the applicable specifications of the *RIDOT Standard Specifications*.

The recommended pavement sections shown above are generally suitable for a 20-year design life; however, maintenance such as sealing of cracks and localized patching due to normal weathering should be expected within the first 5 to 10 years of life.

5.9 Subsurface Drainage

Site design is currently in the conceptual phase. As required, we would expect stormwater management to consist of underground detention below paved areas, an infiltration basin, or a combination of both. Where founded in native sands, which would be expected over most areas of the site, moderately permeable conditions can be expected with depth to groundwater on the order of 15 to 20 feet below current grade.

From our experience and testing in similar soils, a field-measured infiltration rate on the order of 5 inches/hour may be assumed for preliminary design and costing of stormwater management. Final design of stormwater features must include confirmation infiltration testing at the actual stormwater feature location(s) and bottom depth(s).



Source: Stage II Schematic Design, Garofalo/Studio JAED, 08/07/23.

GEI Consultants

BORING LOCATION PLAN – GILBERT STUART SCHOOL
188 PRINCETON AVENUE
PROVIDENCE, RI

GEI PROJECT NO: **2303610**

FIGURE NO.
1

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): 72 **DATE START/END:** 8/23/2023 - 8/23/2023

VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling

TOTAL DEPTH (ft): 27.0 **DRILLER NAME:** Dale Griffin

LOGGED BY: T. Rezzani **RIG TYPE:** Mobile B-53

BORING

B-4

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 4.25 inch / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): ▽ 23.0

ABBREVIATIONS:
Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length of Sound Cores>4 in / Pen.,%
WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger
Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter
NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140-lb hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		S1	0 to 2	24/16	3-4-3-6		FILL	10 in. TOPSOIL S1: WIDELY GRADED SAND WITH GRAVEL (SW); ~65% F-C sand, ~30% F-C gravel, ~5% NP fines, gray, moist.
70		S2	2 to 4	24/14	4-3-3-2			S2: Similar to S1.
	5	S3	5 to 7	24/19	6-4-3-2			S3: WIDELY GRADED SAND WITH SILT AND GRAVEL (SW-SM); 83.1% F-C sand, 9.6% F-C gravel, 7.3% NP fines, few asphalt fragments, brown to black, dry.
		S4	7 to 9	24/13	2-1-1-2			S4: WIDELY GRADED SAND WITH GRAVEL (SW); ~70% F-C sand,~30% F-C gravel, yellowish brown, moist.
	10	S5	10 to 12	24/13	8-12-3-3			S4: SILTY GRAVEL WITH SAND (GM); ~50% F-C gravel, ~25% NP fines, ~25% F-C sand, frequent brick fragments, some asphalt fragments, cobble fragments, red to black, damp.
60							SAND & GRAVEL	
	15	S6	15 to 17	24/15	5-7-11-15			S5: WIDELY GRADED SAND WITH GRAVEL (SW); ~60% F-C sand, ~35% F-C gravel, ~5% NP fines, yellowish brown, moist.

NOTES:

PROJECT NAME: Gilbert Stuart Middle School

CITY/STATE: Providence, Rhode Island

GEI PROJECT NUMBER: 2303610

GEI Consultants

LOCATION: See plan.
GROUND SURFACE EL. (ft): 72 **DATE START/END:** 8/23/2023 - 8/23/2023
VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling

BORING B-4

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
	20	S7	20 to 22	24/0	8-7-6-6		SAND & GRAVEL	S6: No recovery.
50								
	25	S8	25 to 27	24/24	4-5-7-6			S7: WIDELY GRADED SAND WITH GRAVEL (SW); ~75% F-C sand, ~25% F-C gravel, gray, wet.
								Planned depth. Backfilled with drill cuttings.
	30							
40								
	35							

NOTES:

PROJECT NAME: Gilbert Stuart Middle School
CITY/STATE: Providence, Rhode Island
GEI PROJECT NUMBER: 2303610

GEI Consultants

BORING INFORMATION

LOCATION: See plan.

GROUND SURFACE EL. (ft): 72 **DATE START/END:** 8/23/2023 - 8/23/2023

VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling

TOTAL DEPTH (ft): 27.0 **DRILLER NAME:** Dale Griffin

LOGGED BY: T. Rezzani **RIG TYPE:** Mobile B-53

BORING

B-5

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** NA/ NA **CORE BARREL TYPE:**

AUGER I.D./O.D.: 4.25 inch / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Hollow Stem Auger

WATER LEVEL DEPTHS (ft): ▽ 18.5

ABBREVIATIONS:
Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length of Sound Cores>4 in / Pen.,%
WOR = Weight of Rods
WOH = Weight of Hammer
S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger
Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter
NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140-lb hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
		S1	0 to 2	24/1	2-4-5-11		SAND & GRAVEL	10 in. TOPSOIL S1: Poor recovery.
70		S2	2 to 4	24/15	9-6-7-8			S2: WIDELY GRADED SAND WITH GRAVEL (GM); ~65% F-C sand, ~30% F-C gravel, ~5% NP fines, grayish brown, dry.
	5	S3	5 to 7	24/23	4-6-6-6			S3: Similar to S2.
		S4	7 to 9	24/14	6-4-4-7			S4: WIDELY GRADED SAND WITH GRAVEL (SW); ~75% F-C sand, ~20% F gravel, ~5% NP fines, grayish brown, dry.
	10	S5	10 to 12	24/17	2-5-4-5		FINE SAND	S5: NARROWLY GRADED SAND (SP); ~90% F-M sand, ~5% F-gravel, ~5% NP fines, light-brown, moist.
60								
	15	S6	15 to 17	24/24	5-4-4-6			S6: Similar to S5, grayish brown.

NOTES:

PROJECT NAME: Gilbert Stuart Middle School

CITY/STATE: Providence, Rhode Island

GEI PROJECT NUMBER: 2303610

GEI Consultants

LOCATION: See plan.
GROUND SURFACE EL. (ft): 72 **DATE START/END:** 8/23/2023 - 8/23/2023
VERTICAL DATUM: **DRILLING COMPANY:** Seaboard Drilling

BORING B-5

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
	20	S7	20 to 22	24/24	5-6-12-10		FINE SAND	S7: WIDELY GRADED SAND WITH SILT (SW-SM); ~80% F-C sand, ~10% F gravel, ~10% NP fines, gray with orange, wet.
50								
	25	S8	25 to 27	24/24	4-6-5-5			S8: Similar to S7.
	30							Planned depth. Backfilled with drill cuttings.
40								
	35							

NOTES:

PROJECT NAME: Gilbert Stuart Middle School

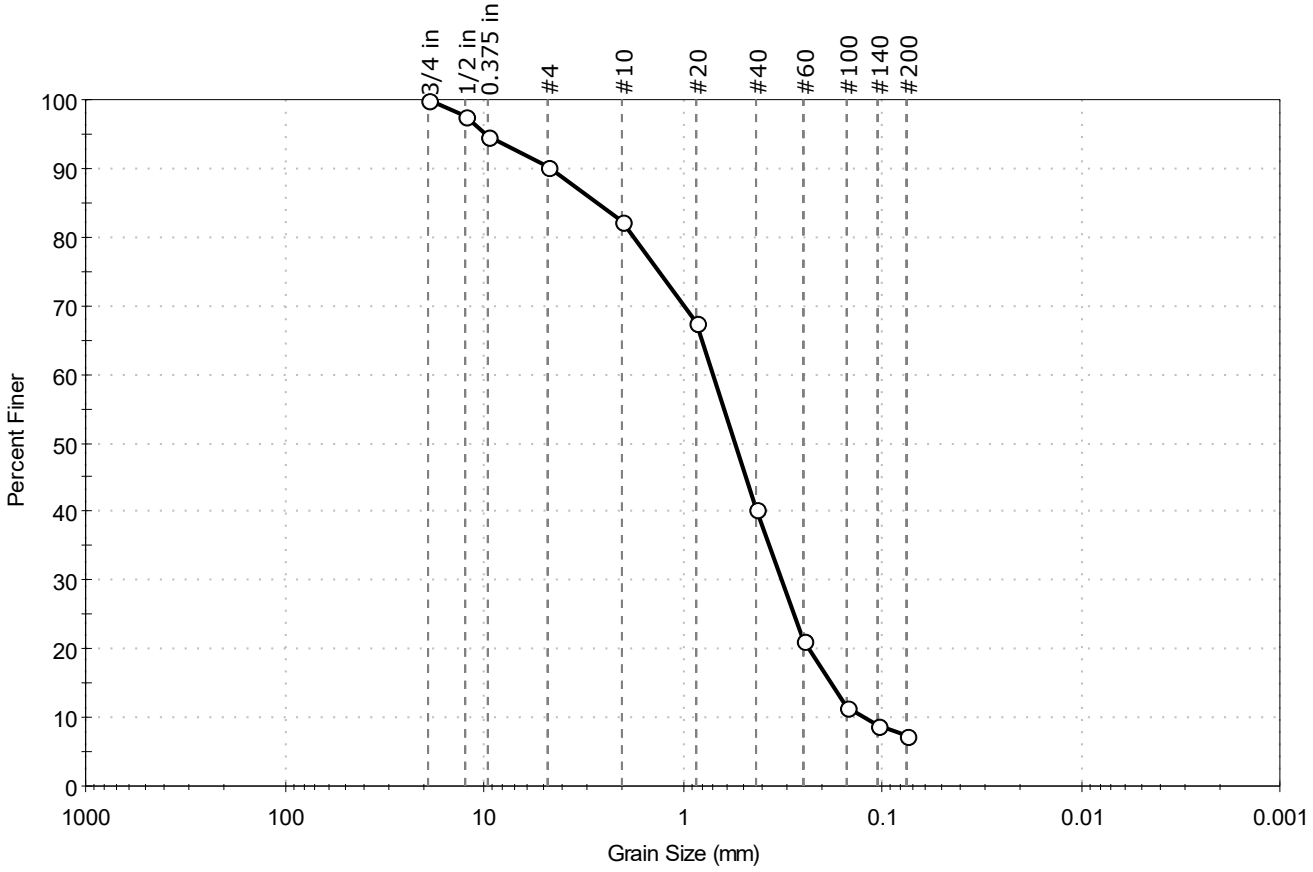
CITY/STATE: Providence, Rhode Island

GEI PROJECT NUMBER: 2303610

GEI Consultants

Client:	GEI Consultants, Inc.				
Project:	Stuart School				
Location:	Providence, RI			Project No:	GTX-317780
Boring ID:	B-4	Sample Type:	jar	Tested By:	ckg
Sample ID:	S3	Test Date:	09/05/23	Checked By:	ank
Depth :	5-7'	Test Id:	732098		
Test Comment:	---				
Visual Description:	Moist, yellowish brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	9.6	83.1	7.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3/4 in	19.00	100		
1/2 in	12.50	98		
0.375 in	9.50	95		
#4	4.75	90		
#10	2.00	82		
#20	0.85	68		
#40	0.42	40		
#60	0.25	21		
#100	0.15	12		
#140	0.11	9		
#200	0.075	7.3		

Coefficients

D_{85} = 2.6509 mm	D_{30} = 0.3185 mm
D_{60} = 0.6992 mm	D_{15} = 0.1802 mm
D_{50} = 0.5419 mm	D_{10} = 0.1238 mm
C_u = 5.648	C_c = 1.172

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

APPENDIX C

LEGEND

EXISTING PROPERTY LINE

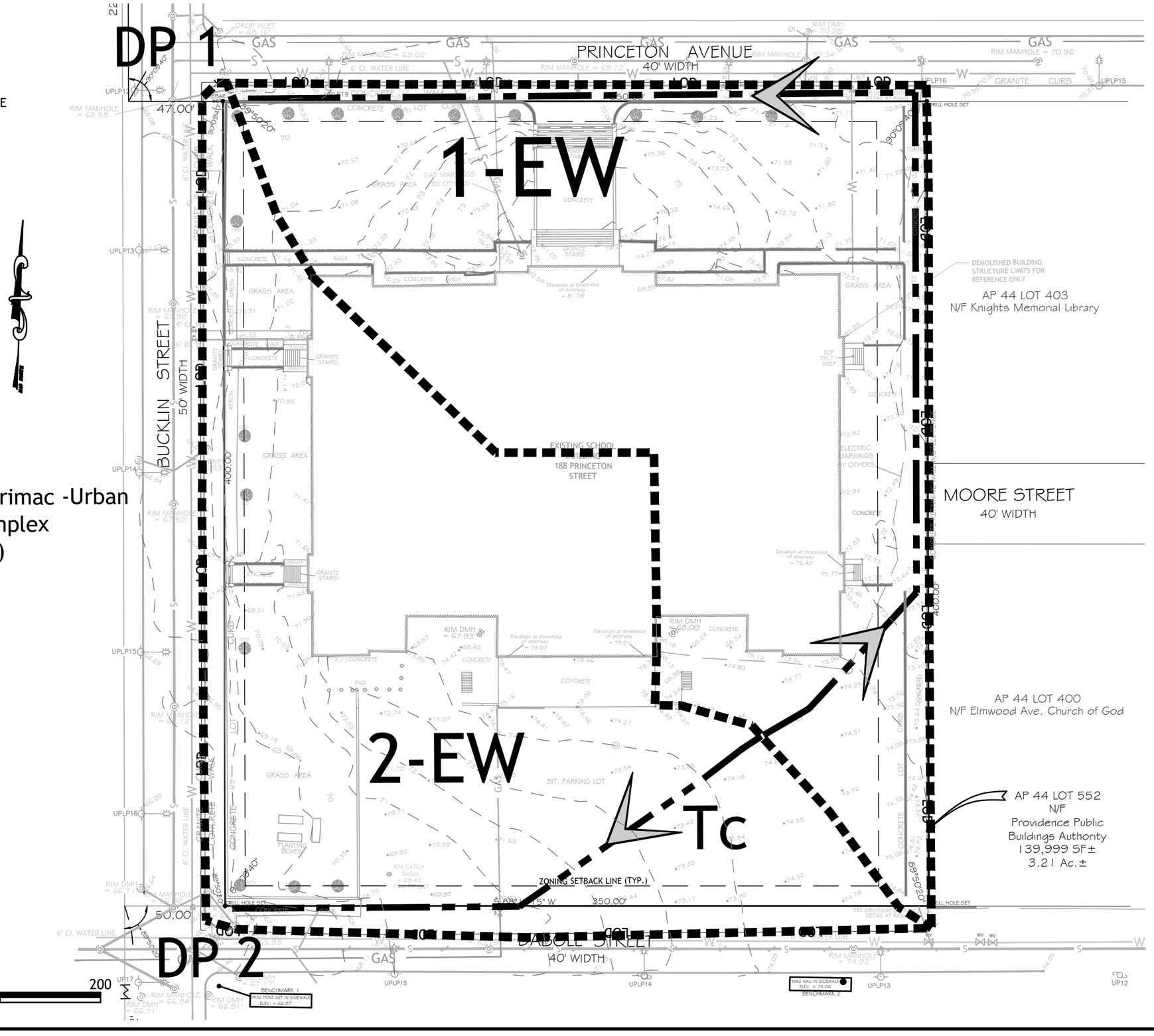
EXISTING WATERSHED AREA

DRAINAGE FLOW PATH

SOIL TYPE DELINEATION LINE

1-EW WATERSHED SUBAREA ID

MU - Merrimac -Urban Land Complex (Group A)



SCALE (FEET)

0 25 50 100 200

1 INCH = 50 FT

D'AMICO ENGINEERING TECHNOLOGY, INC.
Civil • Transportation • Land Use
2080 Mineral Spring Ave. North Providence, RI 02911
(401) 822-1470 (401) 353-1180 fax www.dantengineering.com

PROPOSED ELEMENTARY SCHOOL
LIMA STUART SCHOOL
188 PRINCETON AVE.
PROVIDENCE, RHODE ISLAND
AP 44, LOT 552

REVISIONS:		
NO.	DATE.	DESCRIPTION

DESIGNED BY:	DMD
DRAWN BY:	
CHECKED BY:	DMD
DATE:	NOV., 2025
PROJECT NO:	08-0022-24-03

PERMIT PLAN, NOT FOR CONSTRUCTION

EXISTING WATERSHED MAP

SHEET 1 OF 2

LEGEND

EXISTING PROPERTY LINE

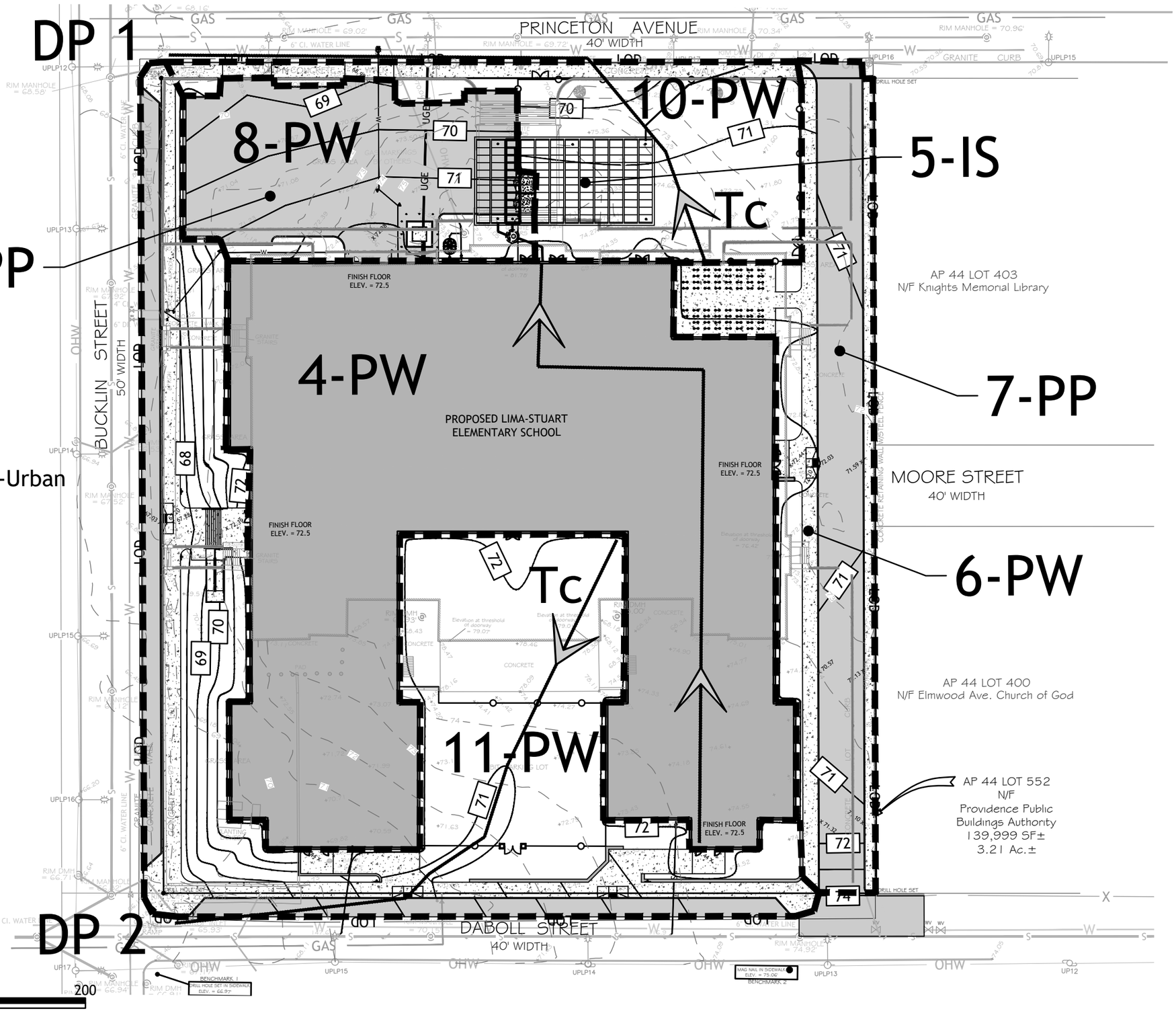
PROPOSED WATERSHED AREA

DRAINAGE FLOW PATH

SOIL TYPE DELINEATION LINE

1-PW WATERSHED SUBAREA ID

MU - Merrimac -Urban Land Complex (Group A)



SCALE (FEET)

0 25 50 100 200

1 INCH = 50 FT

DEtec.
D'AMICO ENGINEERING TECHNOLOGY, INC.
Civil • Transportation • Land Use
2080 Mineral Spring Ave., North Providence, RI 02911
(401) 822-1470 (401) 353-1180 fax www.dengineeringtec.com

PROPOSED ELEMENTARY SCHOOL
LIMA STUART SCHOOL
188 PRINCETON AVE.
PROVIDENCE, RHODE ISLAND
AP 44, LOT 552

REVISIONS:

NO.	DATE.	DESCRIPTION

DESIGNED BY:	DMD
DRAWN BY:	
CHECKED BY:	DMD
DATE:	NOV., 2025
PROJECT NO:	08-0022-24-03

PERMIT PLAN, NOT FOR CONSTRUCTION

PROPOSED WATERSHED MAP

SHEET 2 OF 2