Engineering Drainage Calculations
for
821 Massachusetts Avenue
Arlington, Massachusetts

Prepared by

Gala Simon Associates, Inc.
394 Lowell Street, Suite 18
Lexington, MA 02420
781-676-2962

September 6, 2024

Project: 821 Massachusetts Avenue, Arlington, MA

Date: September 6, 2024

Project Narrative:

The project consists of the demolition of an existing building and construction of a new one in its place.

Soils on the site are considered Hydrological Soil Type A per USDA soil maps. On-site soil testing performed by Gala Simon Associates, Inc., on September 5, 2024.

The 24-hour rainfall amounts used in the hydrological calculations were obtained from the NOAA Atlas 14, Volume 10, Version 3.

Summary of Results:

The following table summarizes the peak flows and volumes from the property under Existing and Proposed Conditions.

Summary of Stormwater Runoff and Volume

Storm Event	***Existing Conditions Peak***		***Proposed Conditions Peak***		***Δ***	
	Runoff (cfs)	*Volume (af)*	*Runoff (cfs)*	*Volume (af)*	*Runoff (cfs)*	*Volume (af)*
2-Year (4.04 in)	0.22	0.019	0.21	0.016	-0.01	-0.003
10-Year (6.43 in)	0.68	0.050	0.52	0.037	-0.16	-0.013
50-Year (9.69 in)	1.43	0.104	0.97	0.071	-0.46	-0.033
100-Year (11.50 in)	1.88	0.136	1.23	0.090	-0.65	-0.046

Conclusions:

As analyzed, the peak rates of runoff and volumes will be maintained for the 2, 10, 50 and 100 year storm events.

NOAA Atlas 14, Volume 10, Version 3
Point Precipitation Frequency Estimates
For NOAA 14 Plus Plus
(Upper bound of 90% confidence interval)

NOAA Atlas 14, Volume 10, Version 3
Location name: Arlington, Massachusetts, USA*
Latitude: 42.417°, Longitude: -71.1601°
Elevation: 73 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.304** (0.236-0.386)	**0.373** (0.289-0.474)	**0.485** (0.376-0.619)	**0.578** (0.445-0.742)	**0.705** (0.526-0.953)	**0.800** (0.586-1.11)	**0.901** (0.644-1.30)	**1.02** (0.687-1.50)	**1.20** (0.779-1.84)	**1.36** (0.858-2.11)
10-min	**0.431** (0.335-0.547)	**0.528** (0.410-0.671)	**0.686** (0.531-0.876)	**0.817** (0.629-1.05)	**0.998** (0.746-1.35)	**1.13** (0.830-1.57)	**1.28** (0.913-1.85)	**1.45** (0.974-2.13)	**1.70** (1.10-2.60)	**1.92** (1.22-2.99)
15-min	**0.507** (0.394-0.644)	**0.621** (0.482-0.790)	**0.808** (0.625-1.03)	**0.962** (0.740-1.24)	**1.18** (0.877-1.59)	**1.33** (0.976-1.84)	**1.50** (1.07-2.17)	**1.70** (1.14-2.50)	**2.00** (1.30-3.06)	**2.26** (1.43-3.52)
30-min	**0.694** (0.539-0.881)	**0.851** (0.661-1.08)	**1.11** (0.858-1.41)	**1.32** (1.02-1.70)	**1.62** (1.21-2.19)	**1.84** (1.35-2.55)	**2.07** (1.48-3.00)	**2.35** (1.58-3.46)	**2.78** (1.80-4.25)	**3.15** (1.99-4.91)
60-min	**0.881** (0.685-1.12)	**1.08** (0.840-1.38)	**1.41** (1.09-1.80)	**1.68** (1.30-2.16)	**2.06** (1.54-2.79)	**2.34** (1.72-3.25)	**2.64** (1.89-3.83)	**3.00** (2.02-4.42)	**3.56** (2.31-5.44)	**4.04** (2.56-6.31)
2-hr	**1.15** (0.897-1.45)	**1.41** (1.10-1.78)	**1.84** (1.43-2.33)	**2.20** (1.70-2.80)	**2.68** (2.02-3.62)	**3.04** (2.26-4.21)	**3.44** (2.49-4.98)	**3.94** (2.66-5.75)	**4.71** (3.06-7.14)	**5.39** (3.42-8.33)
3-hr	**1.34** (1.05-1.68)	**1.64** (1.29-2.06)	**2.14** (1.67-2.70)	**2.55** (1.99-3.24)	**3.12** (2.36-4.19)	**3.54** (2.63-4.88)	**4.00** (2.91-5.78)	**4.58** (3.10-6.66)	**5.50** (3.58-8.28)	**6.30** (4.01-9.68)
6-hr	**1.73** (1.37-2.16)	**2.12** (1.68-2.65)	**2.76** (2.17-3.46)	**3.29** (2.57-4.15)	**4.02** (3.06-5.34)	**4.55** (3.40-6.21)	**5.14** (3.75-7.34)	**5.88** (3.99-8.46)	**7.04** (4.59-10.5)	**8.05** (5.13-12.2)
12-hr	**2.20** (1.76-2.73)	**2.70** (2.15-3.35)	**3.51** (2.78-4.36)	**4.18** (3.29-5.23)	**5.10** (3.90-6.72)	**5.78** (4.34-7.81)	**6.52** (4.78-9.22)	**7.44** (5.07-10.6)	**8.86** (5.80-13.1)	**10.1** (6.46-15.2)
24-hr	**2.64** (2.12-3.25)	**3.28** (2.63-4.04)	**4.31** (3.44-5.33)	**5.17** (4.10-6.43)	**6.35** (4.89-8.32)	**7.22** (5.46-9.69)	**8.17** (6.02-11.5)	**9.36** (6.41-13.2)	**11.2** (7.38-16.4)	**12.8** (8.24-19.1)
2-day	**3.01** (2.43-3.68)	**3.80** (3.07-4.65)	**5.10** (4.10-6.26)	**6.17** (4.93-7.62)	**7.65** (5.94-9.98)	**8.73** (6.66-11.7)	**9.93** (7.40-13.9)	**11.5** (7.89-16.1)	**14.0** (9.22-20.3)	**16.2** (10.4-23.9)
3-day	**3.30** (2.68-4.01)	**4.15** (3.37-5.06)	**5.55** (4.48-6.78)	**6.71** (5.38-8.24)	**8.30** (6.47-10.8)	**9.46** (7.24-12.6)	**10.8** (8.05-15.0)	**12.5** (8.57-17.3)	**15.2** (10.0-21.9)	**17.6** (11.4-25.9)
4-day	**3.57** (2.91-4.33)	**4.45** (3.62-5.41)	**5.90** (4.78-7.19)	**7.09** (5.71-8.69)	**8.74** (6.83-11.3)	**9.94** (7.63-13.2)	**11.3** (8.46-15.7)	**13.0** (8.99-18.1)	**15.9** (10.5-22.8)	**18.4** (11.9-26.9)
7-day	**4.33** (3.55-5.23)	**5.25** (4.30-6.34)	**6.75** (5.50-8.18)	**8.00** (6.48-9.74)	**9.71** (7.63-12.5)	**11.0** (8.44-14.4)	**12.4** (9.28-17.0)	**14.2** (9.81-19.5)	**17.1** (11.3-24.3)	**19.6** (12.7-28.4)
10-day	**5.03** (4.14-6.05)	**5.98** (4.91-7.19)	**7.52** (6.15-9.08)	**8.80** (7.15-10.7)	**10.6** (8.31-13.5)	**11.9** (9.14-15.5)	**13.3** (9.96-18.1)	**15.1** (10.5-20.6)	**17.9** (11.9-25.3)	**20.4** (13.2-29.4)
20-day	**7.03** (5.83-8.39)	**8.06** (6.67-9.63)	**9.74** (8.03-11.7)	**11.1** (9.12-13.4)	**13.1** (10.3-16.4)	**14.5** (11.2-18.6)	**16.0** (11.9-21.2)	**17.8** (12.4-24.0)	**20.3** (13.6-28.4)	**22.4** (14.6-31.9)
30-day	**8.69** (7.23-10.3)	**9.78** (8.13-11.6)	**11.6** (9.58-13.8)	**13.1** (10.7-15.7)	**15.1** (11.9-18.8)	**16.7** (12.8-21.1)	**18.2** (13.5-23.8)	**19.9** (14.0-26.8)	**22.2** (14.9-30.9)	**24.0** (15.7-34.1)
45-day	**10.8** (9.01-12.8)	**11.9** (9.97-14.1)	**13.8** (11.5-16.5)	**15.4** (12.7-18.4)	**17.6** (13.9-21.7)	**19.3** (14.9-24.2)	**20.9** (15.5-27.0)	**22.6** (15.9-30.1)	**24.7** (16.6-34.0)	**26.2** (17.1-36.9)
60-day	**12.6** (10.5-14.8)	**13.8** (11.5-16.3)	**15.8** (13.1-18.7)	**17.4** (14.4-20.7)	**19.7** (15.6-24.1)	**21.4** (16.6-26.7)	**23.2** (17.1-29.6)	**24.8** (17.5-32.9)	**26.7** (18.0-36.7)	**28.1** (18.4-39.4)

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

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

Please refer to NOAA Atlas 14 document for more information.

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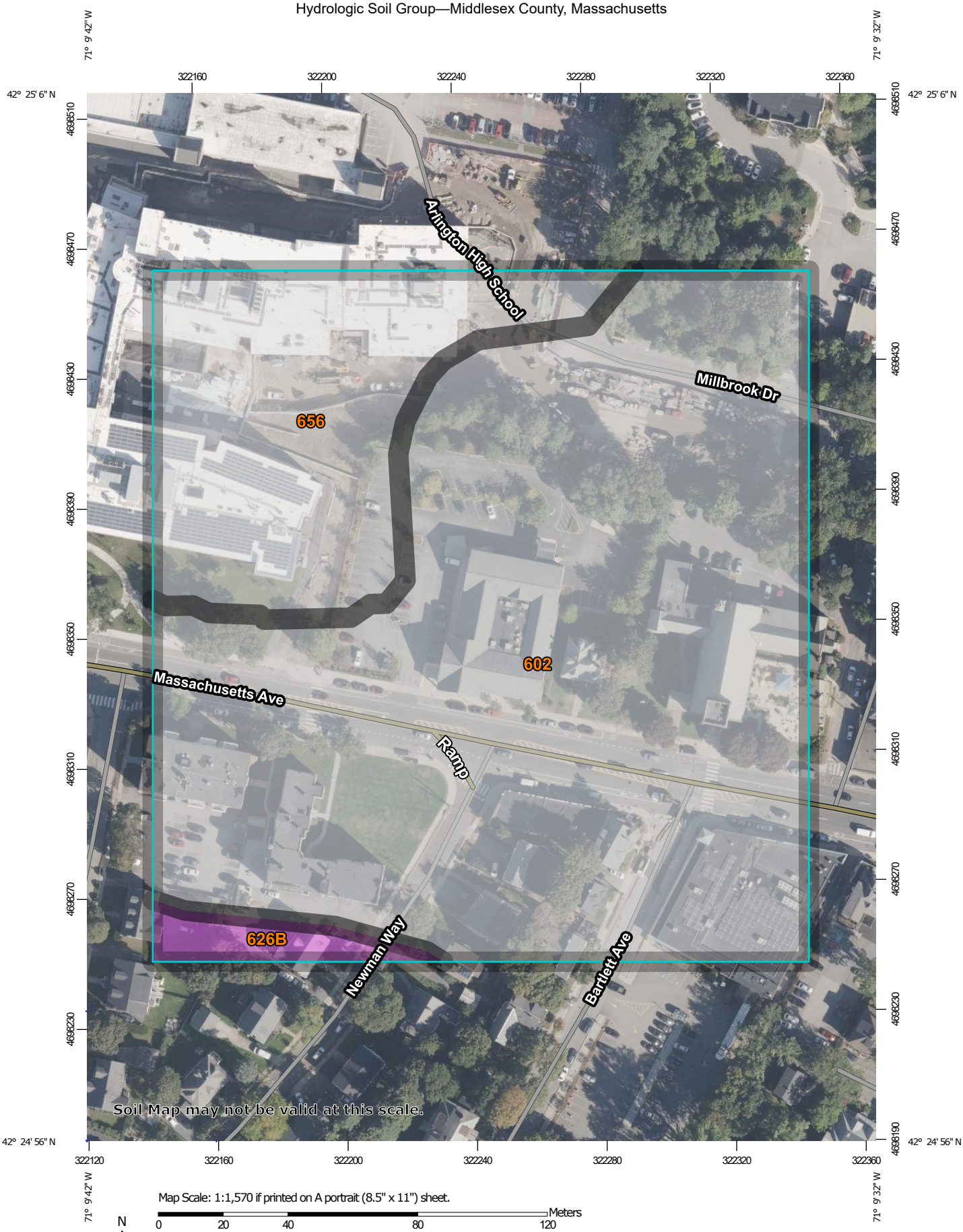
PF graphical

USDA
Soil Mapping



Map Scale: 1:1,570 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 23, Sep 12, 2023

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
602	Urban land		8.1	75.4%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	0.2	2.3%
656	Udorthents-Urban land complex		2.4	22.2%
Totals for Area of Interest			**10.7**	**100.0%**

Description

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

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

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

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

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

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

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

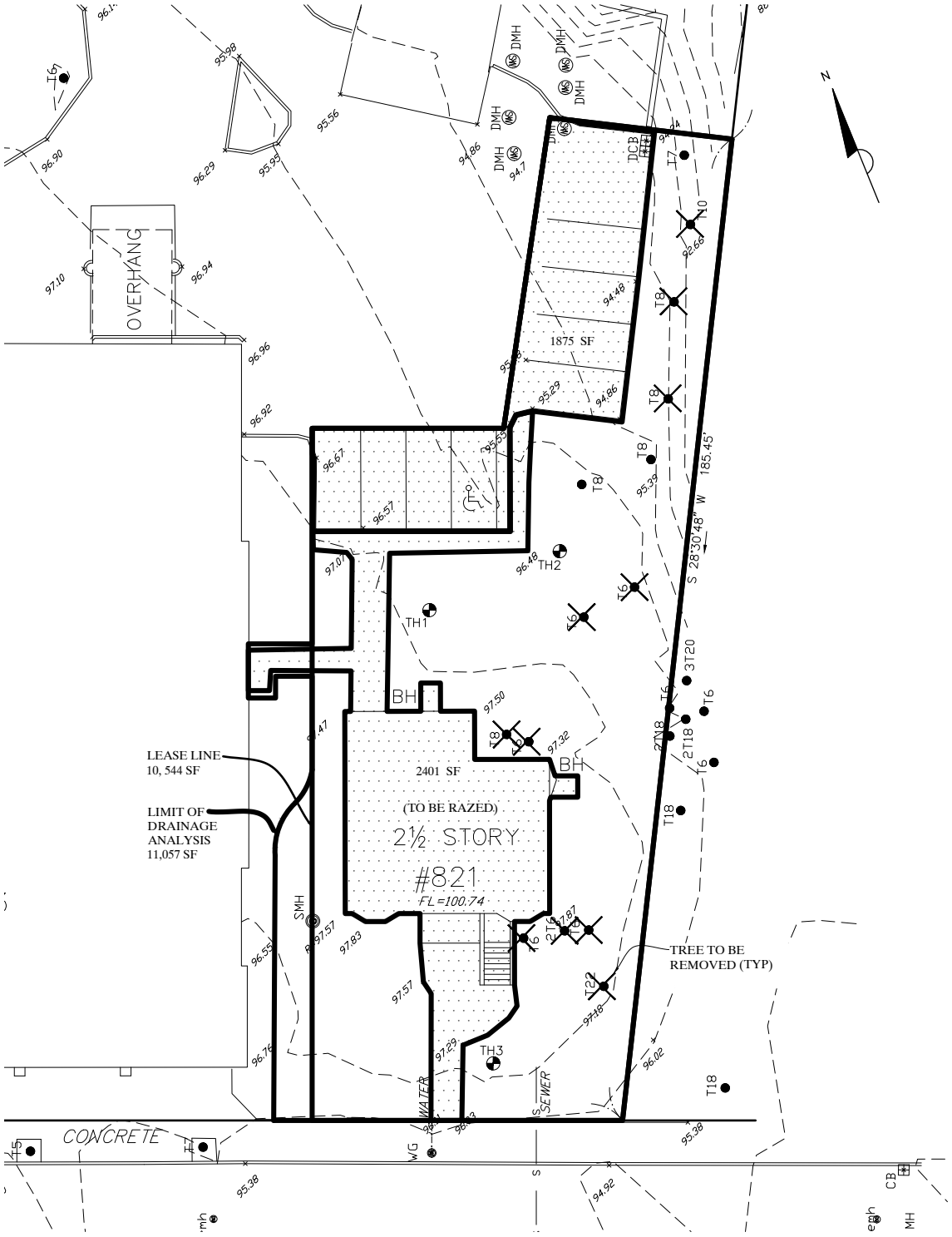
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Drainage Delineation
Plans



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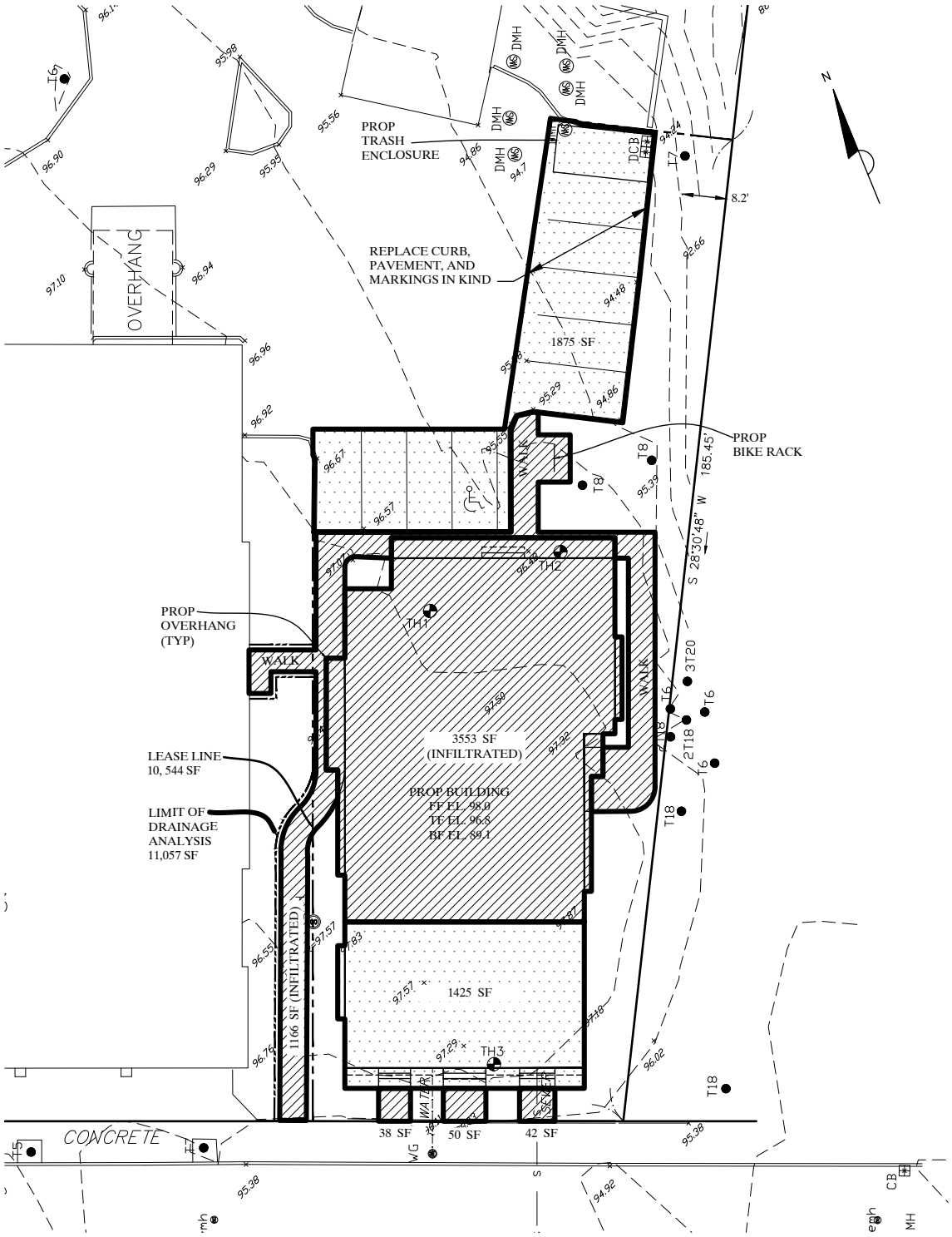
Drainage Delineation
Existing Conditions
821 Massachusetts Avenue – Arlington, MA

Scale: 1"=30'

September 6, 2024

D-1



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GSA

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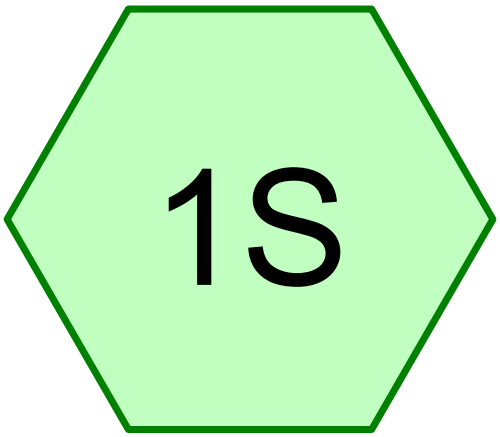
Drainage Delineation
Proposed Conditions
821 Massachusetts Avenue – Arlington, MA

Scale: 1"=30'

September 6, 2024

D-2

Existing Conditions
2, 10, 50 and 100 Year Storm Events



Existing Conditions

Subcat Reach Pond Link

Routing Diagram for [2422] Existing Conditions
Prepared by Gala Simon Associates Inc, Printed 9/6/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.156	39	>75% Grass cover, Good, HSG A (1S)
0.098	98	Paved parking, HSG A (1S)

Summary for Subcatchment 1S: Existing Conditions

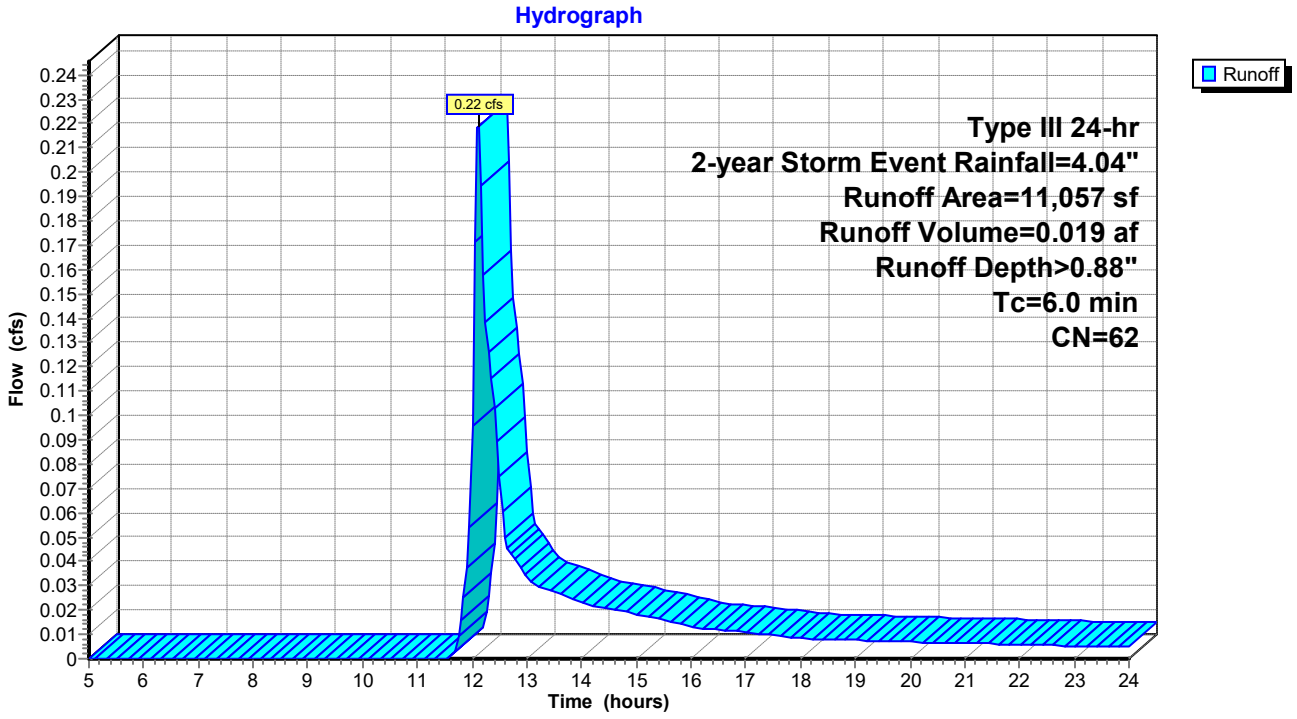
Runoff = 0.22 cfs @ 12.11 hrs, Volume= 0.019 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Storm Event Rainfall=4.04"

Area (sf)	CN	Description
6,781	39	>75% Grass cover, Good, HSG A
4,276	98	Paved parking, HSG A
11,057	62	Weighted Average
6,781		61.33% Pervious Area
4,276		38.67% Impervious Area

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

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

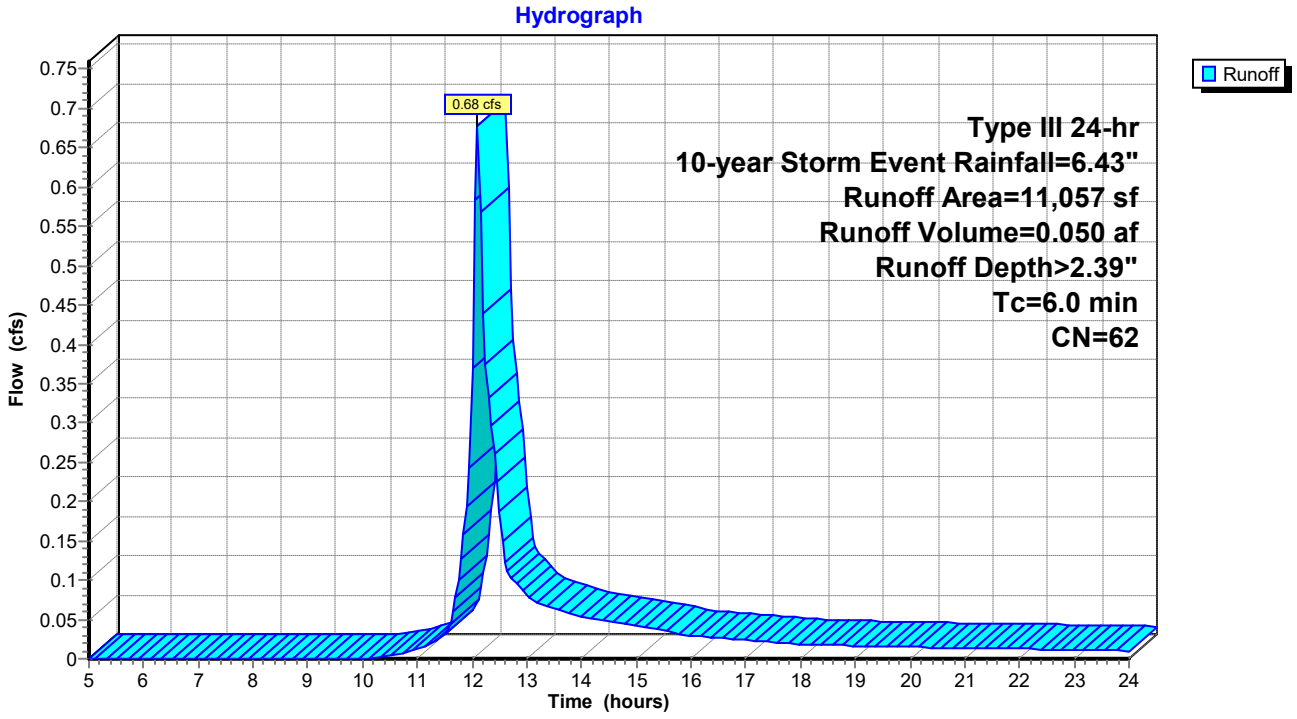
Runoff = 0.68 cfs @ 12.10 hrs, Volume= 0.050 af, Depth> 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Storm Event Rainfall=6.43"

Area (sf)	CN	Description
6,781	39	>75% Grass cover, Good, HSG A
4,276	98	Paved parking, HSG A
11,057	62	Weighted Average
6,781		61.33% Pervious Area
4,276		38.67% Impervious Area

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

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

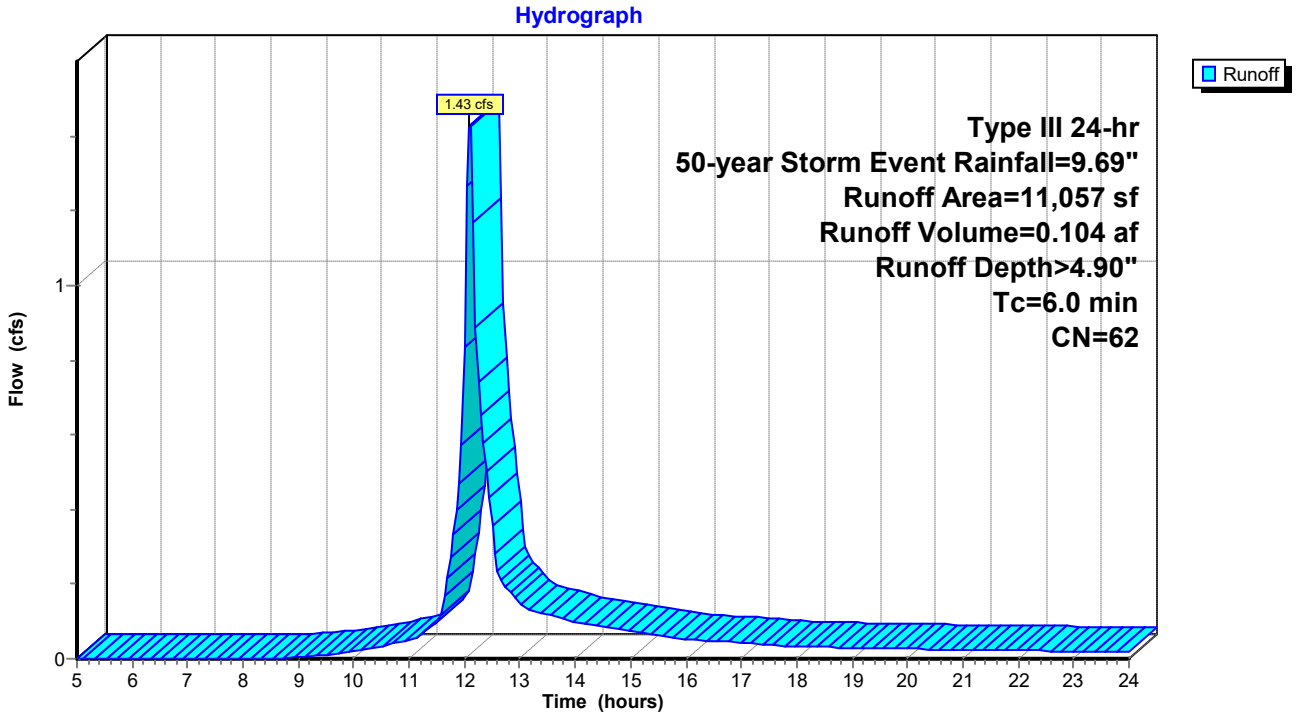
Runoff = 1.43 cfs @ 12.09 hrs, Volume= 0.104 af, Depth> 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Storm Event Rainfall=9.69"

Area (sf)	CN	Description
6,781	39	>75% Grass cover, Good, HSG A
4,276	98	Paved parking, HSG A
11,057	62	Weighted Average
6,781		61.33% Pervious Area
4,276		38.67% Impervious Area

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

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

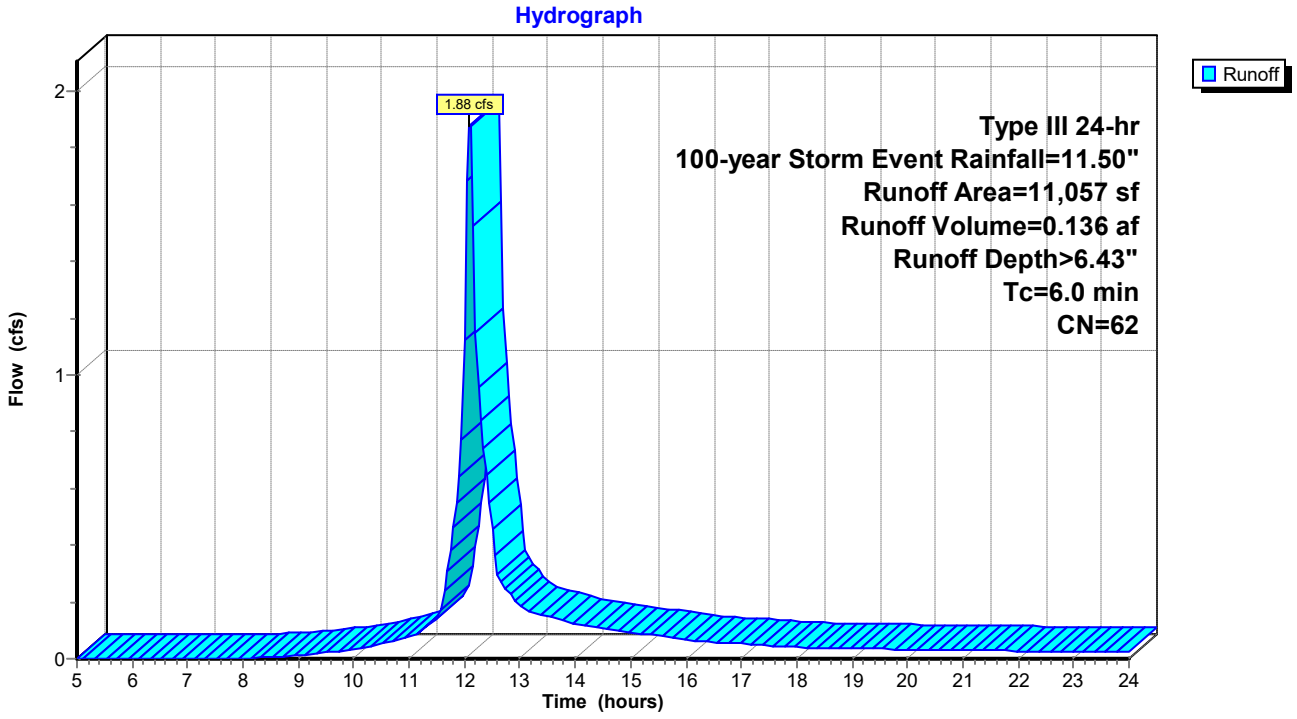
Runoff = 1.88 cfs @ 12.09 hrs, Volume= 0.136 af, Depth> 6.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Storm Event Rainfall=11.50"

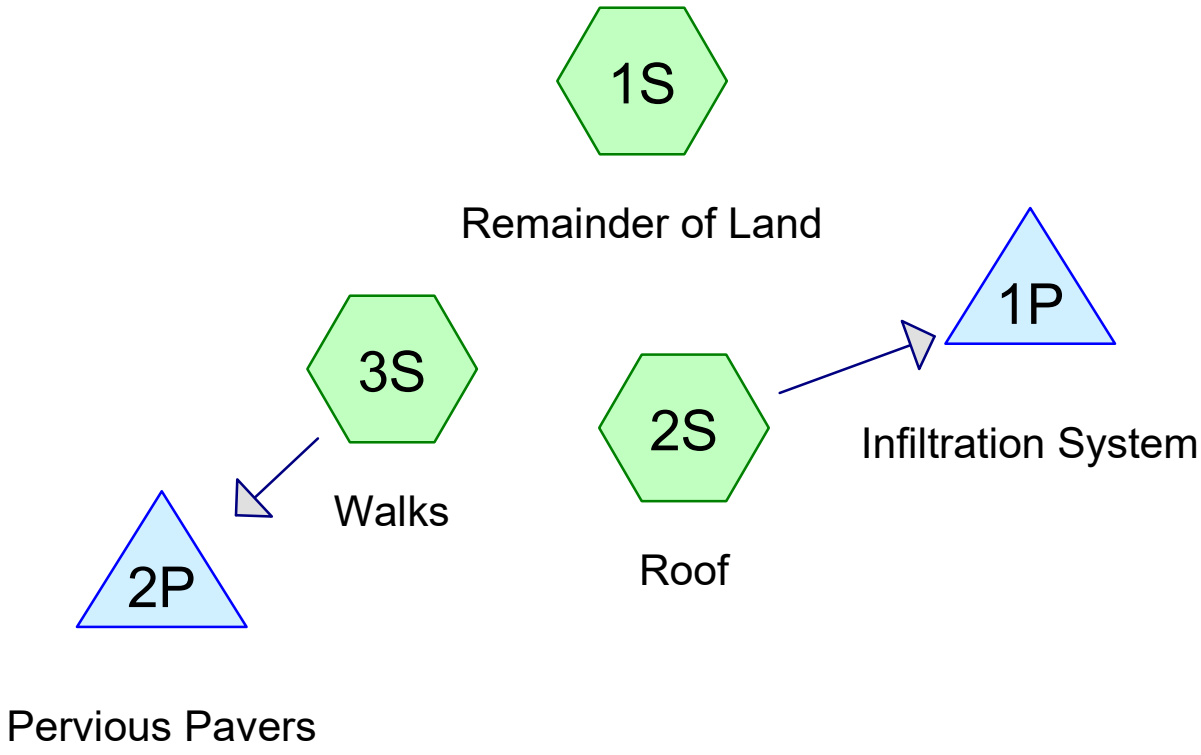
Area (sf)	CN	Description
6,781	39	>75% Grass cover, Good, HSG A
4,276	98	Paved parking, HSG A
11,057	62	Weighted Average
6,781		61.33% Pervious Area
4,276		38.67% Impervious Area

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

Subcatchment 1S: Existing Conditions



Proposed Conditions
2, 10, 50 and 100 Year Storm Events



Subcat Reach Pond Link

Routing Diagram for [2422] Proposed Conditions
Prepared by Gala Simon Associates Inc, Printed 9/6/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.067	39	>75% Grass cover, Good, HSG A (1S)
0.106	98	Paved parking, HSG A (1S, 3S)
0.082	98	Roofs, HSG A (2S)

Summary for Subcatchment 1S: Remainder of Land

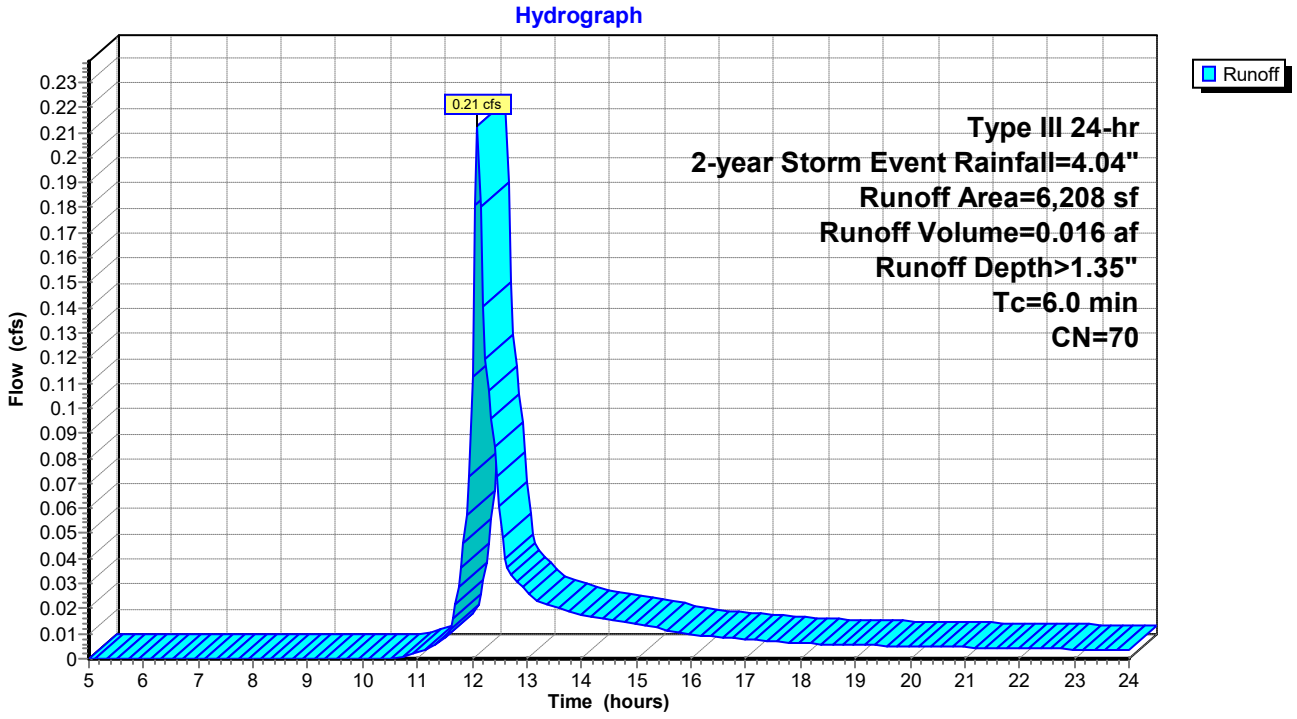
Runoff = 0.21 cfs @ 12.10 hrs, Volume= 0.016 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Storm Event Rainfall=4.04"

Area (sf)	CN	Description
2,908	39	>75% Grass cover, Good, HSG A
3,300	98	Paved parking, HSG A
6,208	70	Weighted Average
2,908		46.84% Pervious Area
3,300		53.16% Impervious Area

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

Subcatchment 1S: Remainder of Land



Summary for Subcatchment 2S: Roof

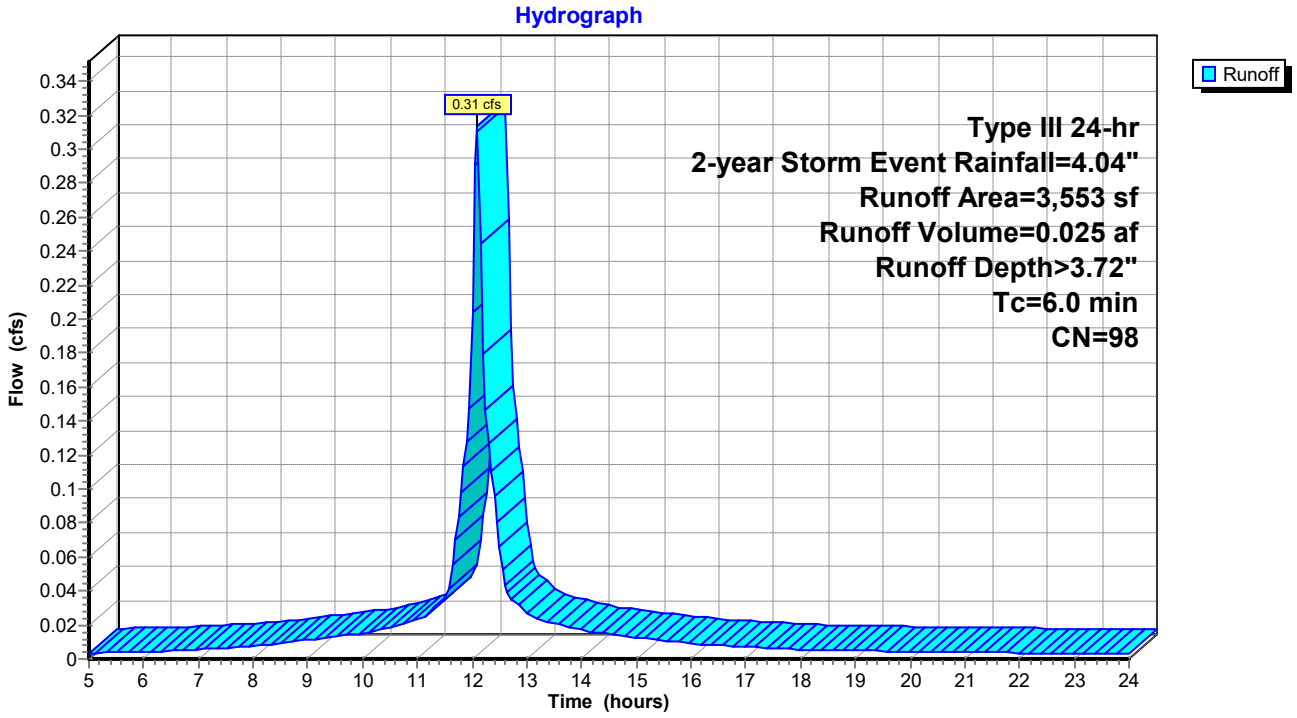
Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.025 af, Depth> 3.72"
Routed to Pond 1P : Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Storm Event Rainfall=4.04"

Area (sf)	CN	Description
3,553	98	Roofs, HSG A
3,553		100.00% Impervious Area

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

Subcatchment 2S: Roof



Summary for Subcatchment 3S: Walks

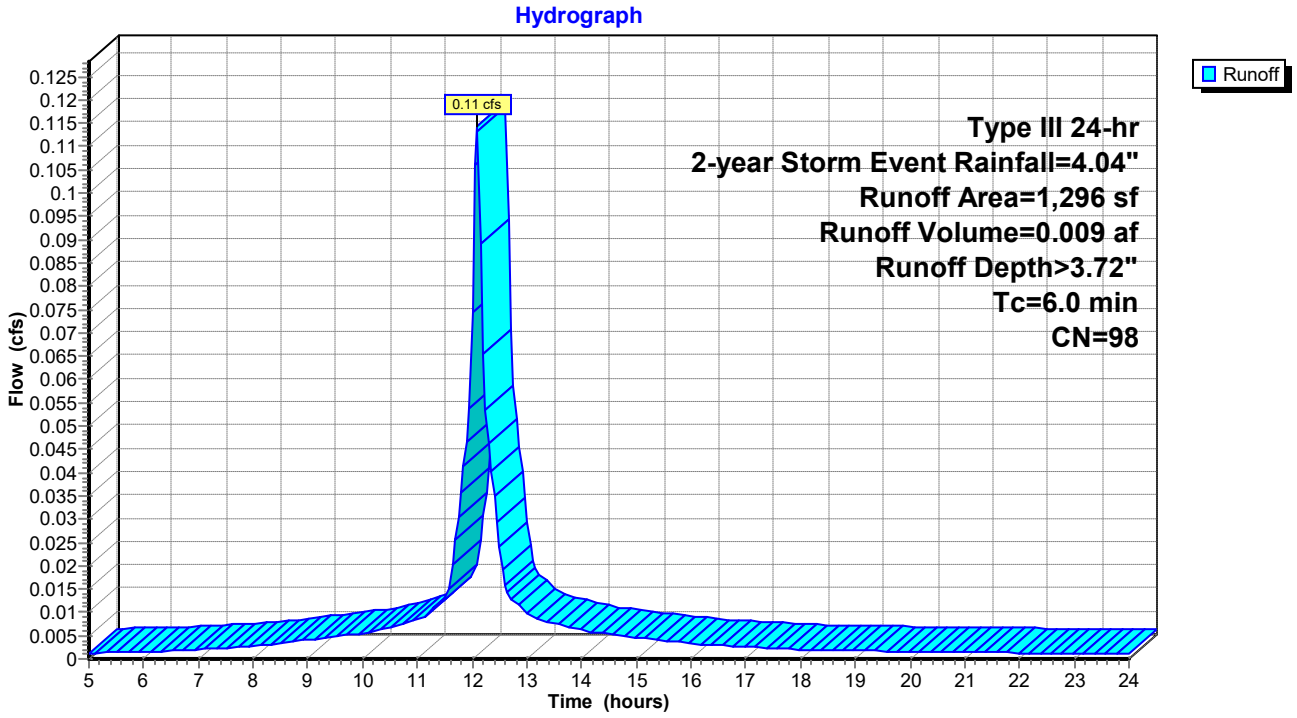
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.009 af, Depth> 3.72"
Routed to Pond 2P : Pervious Pavers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Storm Event Rainfall=4.04"

Area (sf)	CN	Description
1,296	98	Paved parking, HSG A
1,296		100.00% Impervious Area

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

Subcatchment 3S: Walks



Summary for Pond 1P: Infiltration System

Inflow Area = 0.082 ac,100.00% Impervious, Inflow Depth > 3.72" for 2-year Storm Event event
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.04 cfs @ 11.65 hrs, Volume= 0.025 af, Atten= 86%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.65 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 89.00' @ 12.60 hrs Surf.Area= 802 sf Storage= 324 cf

Plug-Flow detention time= 44.6 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 44.0 min (807.6 - 763.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.20'	578 cf	**20.83'W x 38.50'L x 3.54'H Field A** 2,841 cf Overall - 1,088 cf Embedded = 1,753 cf x 33.0% Voids
#2A	88.70'	1,088 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,666 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.65 hrs HW=88.24' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 1P: Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

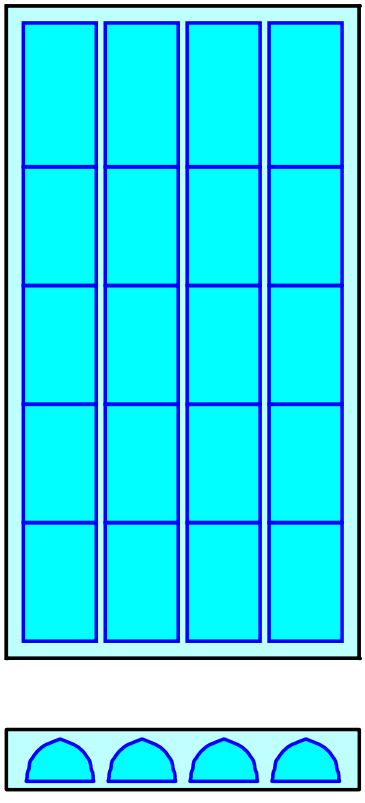
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,087.8 cf Chamber Storage

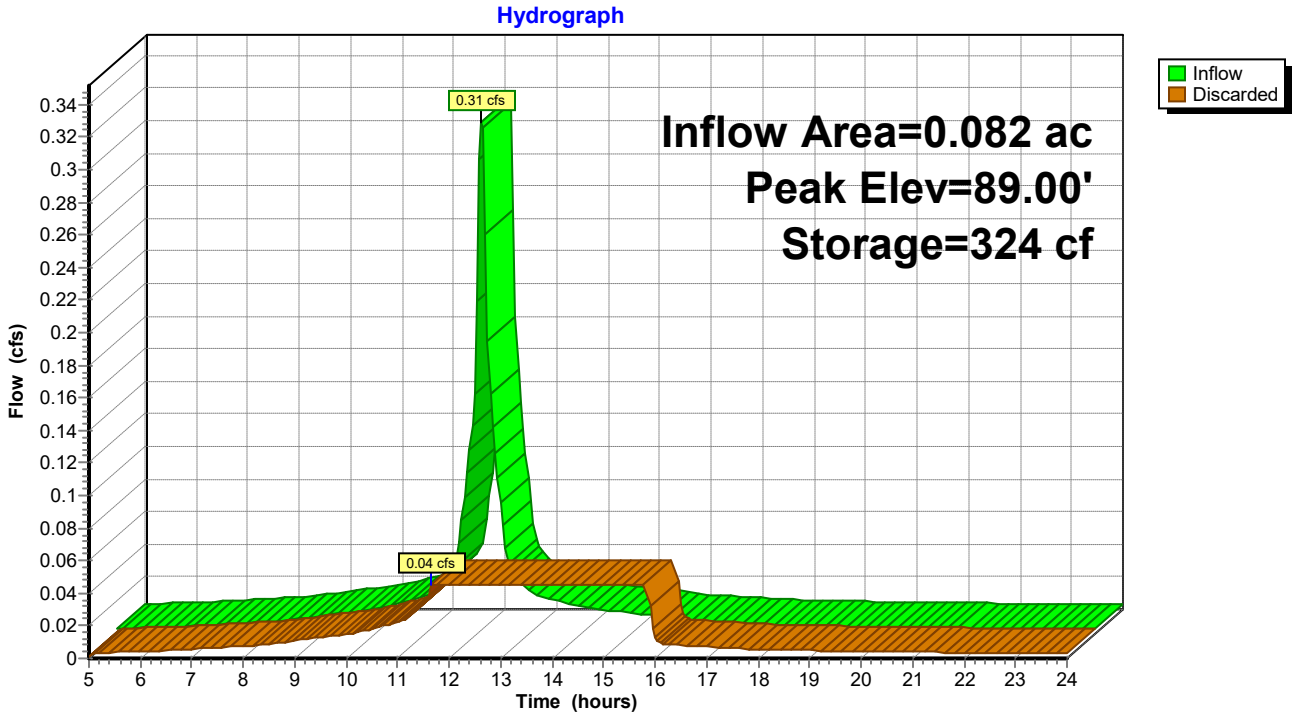
2,840.7 cf Field - 1,087.8 cf Chambers = 1,752.9 cf Stone x 33.0% Voids = 578.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,666.3 cf = 0.038 af
Overall Storage Efficiency = 58.7%
Overall System Size = 38.50' x 20.83' x 3.54'

20 Chambers
105.2 cy Field
64.9 cy Stone



Pond 1P: Infiltration System



Summary for Pond 2P: Pervious Pavers

Inflow Area = 0.030 ac,100.00% Impervious, Inflow Depth > 3.72" for 2-year Storm Event event
Inflow = 0.11 cfs @ 12.09 hrs, Volume= 0.009 af
Outflow = 0.07 cfs @ 12.05 hrs, Volume= 0.009 af, Atten= 37%, Lag= 0.0 min
Discarded = 0.07 cfs @ 12.05 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 88.25' @ 12.19 hrs Surf.Area= 1,296 sf Storage= 21 cf

Plug-Flow detention time= 1.7 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (765.1 - 763.6)

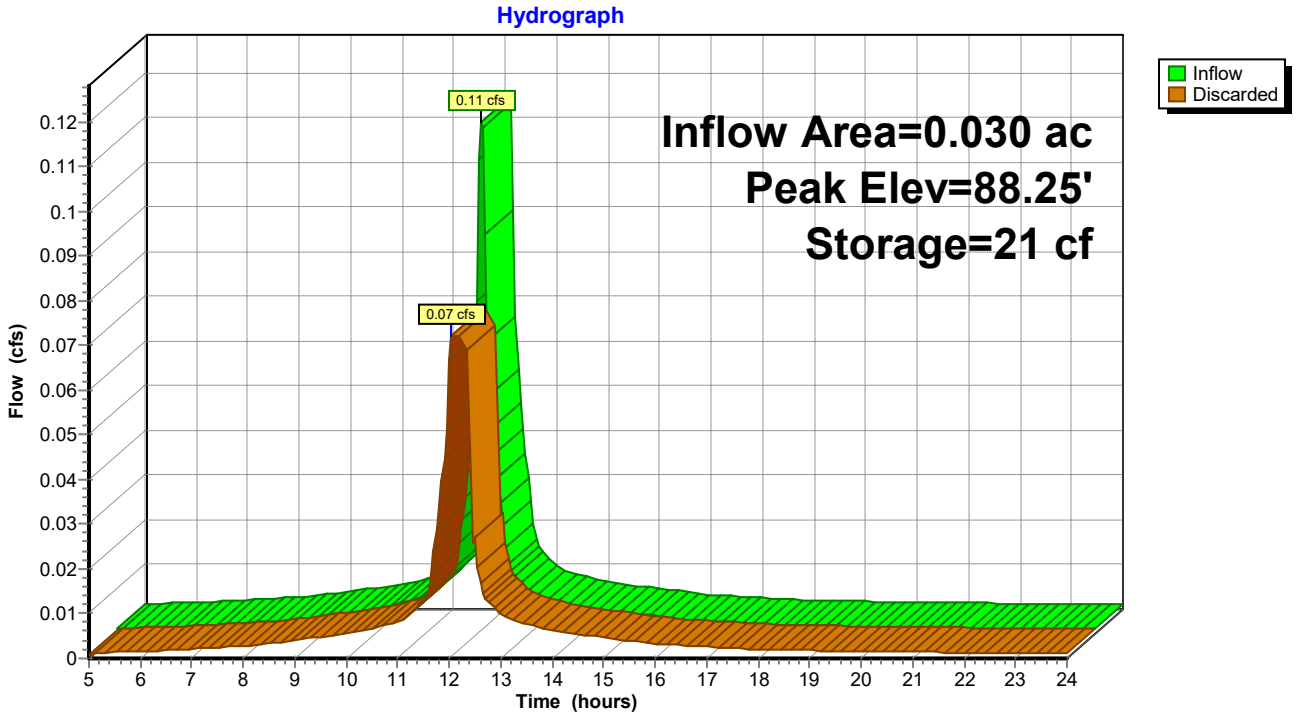
Volume	Invert	Avail.Storage	Storage Description
#1	88.20'	428 cf	**Custom Stage Data (Prismatic)** Listed below 1,296 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
88.20	1,296	0	0
89.20	1,296	1,296	1,296

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 12.05 hrs HW=88.22' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Pond 2P: Pervious Pavers



Summary for Subcatchment 1S: Remainder of Land

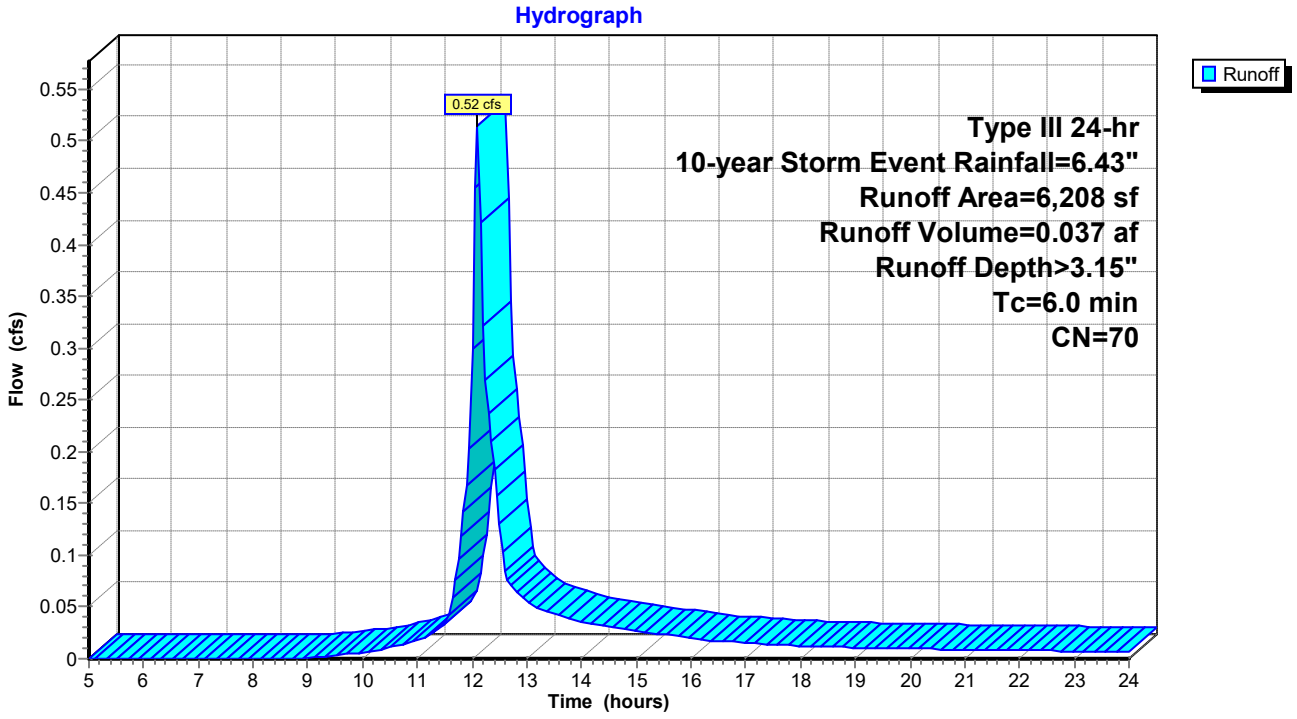
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.037 af, Depth> 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Storm Event Rainfall=6.43"

Area (sf)	CN	Description
2,908	39	>75% Grass cover, Good, HSG A
3,300	98	Paved parking, HSG A
6,208	70	Weighted Average
2,908		46.84% Pervious Area
3,300		53.16% Impervious Area

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

Subcatchment 1S: Remainder of Land



Summary for Subcatchment 2S: Roof

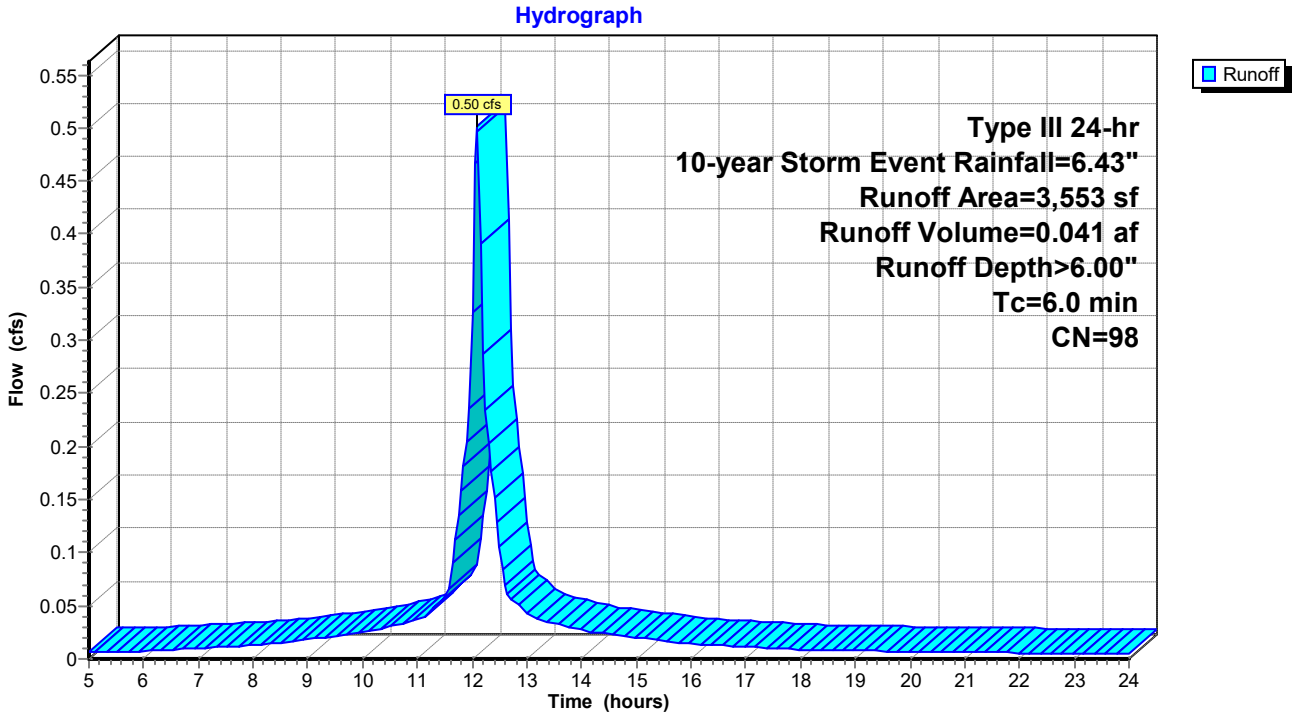
Runoff = 0.50 cfs @ 12.09 hrs, Volume= 0.041 af, Depth> 6.00"
Routed to Pond 1P : Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Storm Event Rainfall=6.43"

Area (sf)	CN	Description
3,553	98	Roofs, HSG A
3,553		100.00% Impervious Area

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

Subcatchment 2S: Roof



Summary for Subcatchment 3S: Walks

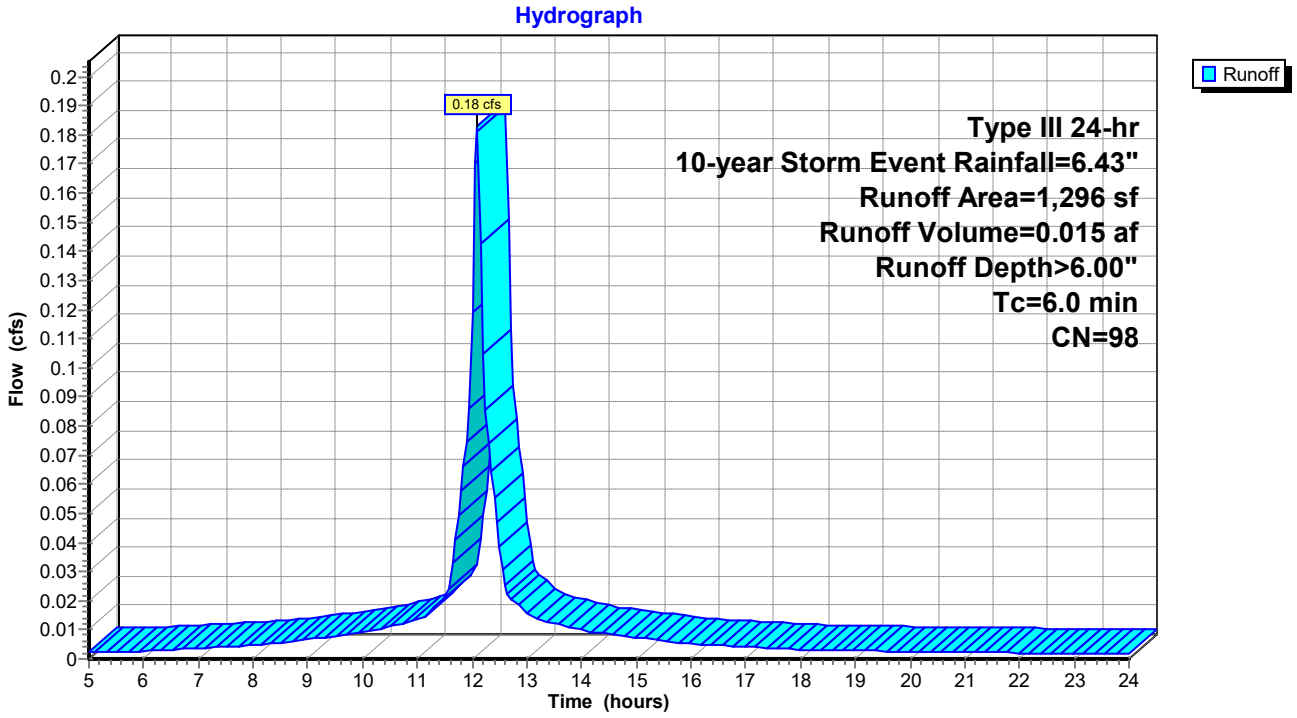
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Depth> 6.00"
Routed to Pond 2P : Pervious Pavers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Storm Event Rainfall=6.43"

Area (sf)	CN	Description
1,296	98	Paved parking, HSG A
1,296		100.00% Impervious Area

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

Subcatchment 3S: Walks



Summary for Pond 1P: Infiltration System

Inflow Area = 0.082 ac,100.00% Impervious, Inflow Depth > 6.00" for 10-year Storm Event event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 0.041 af
Outflow = 0.04 cfs @ 11.30 hrs, Volume= 0.041 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.30 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 89.49' @ 12.96 hrs Surf.Area= 802 sf Storage= 637 cf

Plug-Flow detention time= 101.7 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 101.0 min (861.7 - 760.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.20'	578 cf	**20.83'W x 38.50'L x 3.54'H Field A** 2,841 cf Overall - 1,088 cf Embedded = 1,753 cf x 33.0% Voids
#2A	88.70'	1,088 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,666 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.30 hrs HW=88.24' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 1P: Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

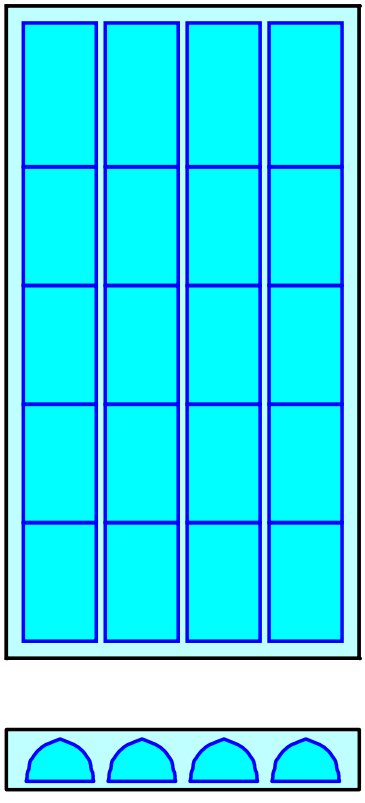
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,087.8 cf Chamber Storage

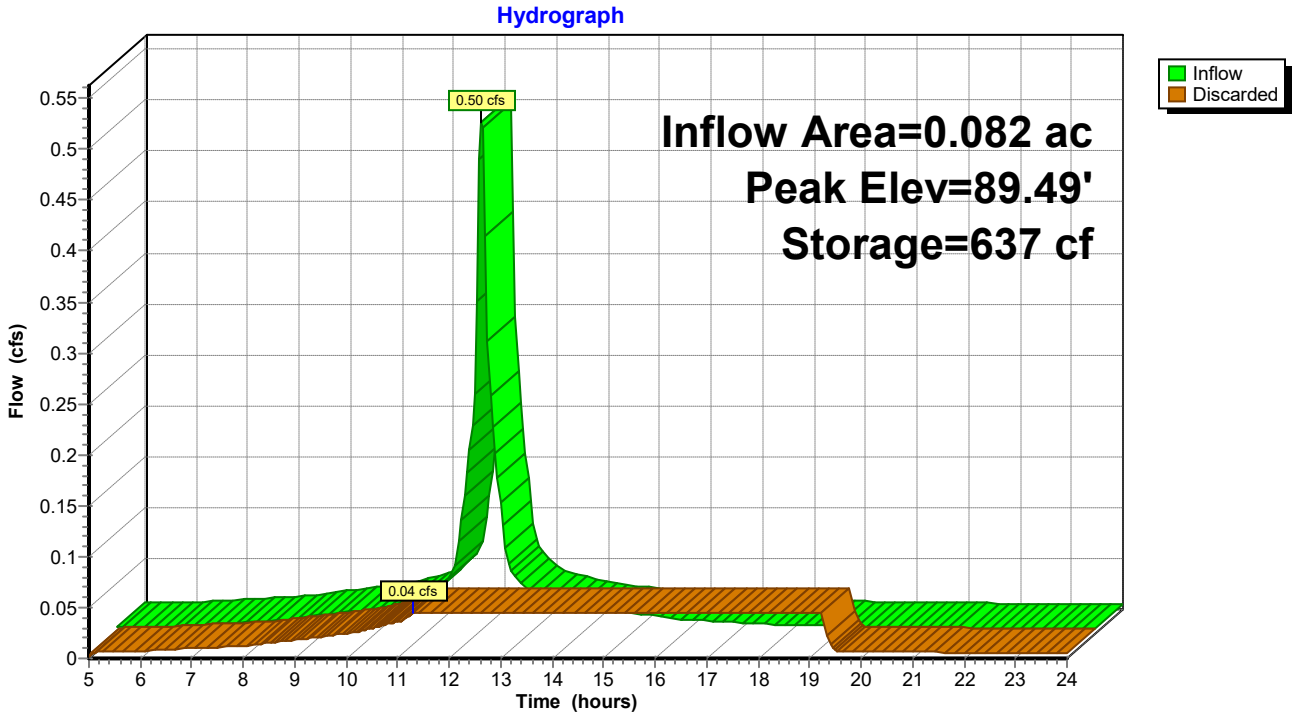
2,840.7 cf Field - 1,087.8 cf Chambers = 1,752.9 cf Stone x 33.0% Voids = 578.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,666.3 cf = 0.038 af
Overall Storage Efficiency = 58.7%
Overall System Size = 38.50' x 20.83' x 3.54'

20 Chambers
105.2 cy Field
64.9 cy Stone



Pond 1P: Infiltration System



Summary for Pond 2P: Pervious Pavers

Inflow Area = 0.030 ac,100.00% Impervious, Inflow Depth > 6.00" for 10-year Storm Event event
Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af
Outflow = 0.07 cfs @ 11.95 hrs, Volume= 0.015 af, Atten= 61%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.95 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 88.37' @ 12.31 hrs Surf.Area= 1,296 sf Storage= 74 cf

Plug-Flow detention time= 4.6 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 4.4 min (765.1 - 760.7)

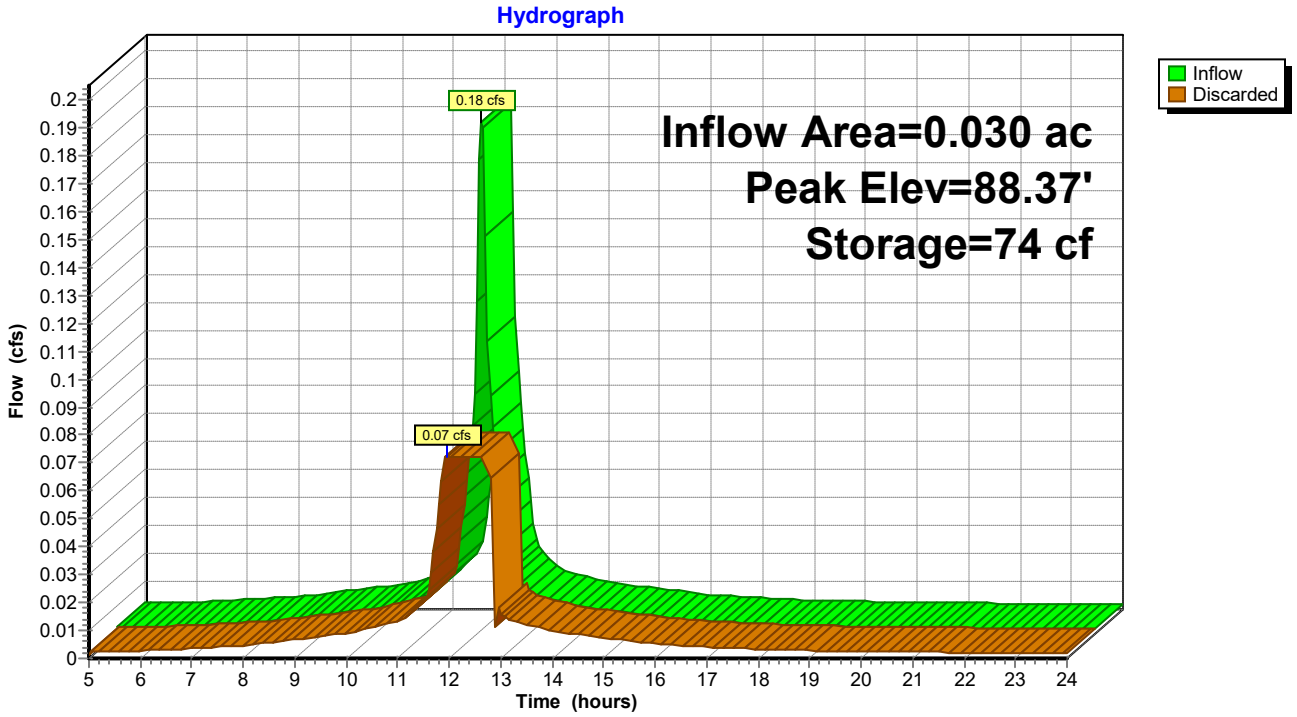
Volume	Invert	Avail.Storage	Storage Description
#1	88.20'	428 cf	**Custom Stage Data (Prismatic)** Listed below 1,296 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
88.20	1,296	0	0
89.20	1,296	1,296	1,296

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 11.95 hrs HW=88.21' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Pond 2P: Pervious Pavers



Summary for Subcatchment 1S: Remainder of Land

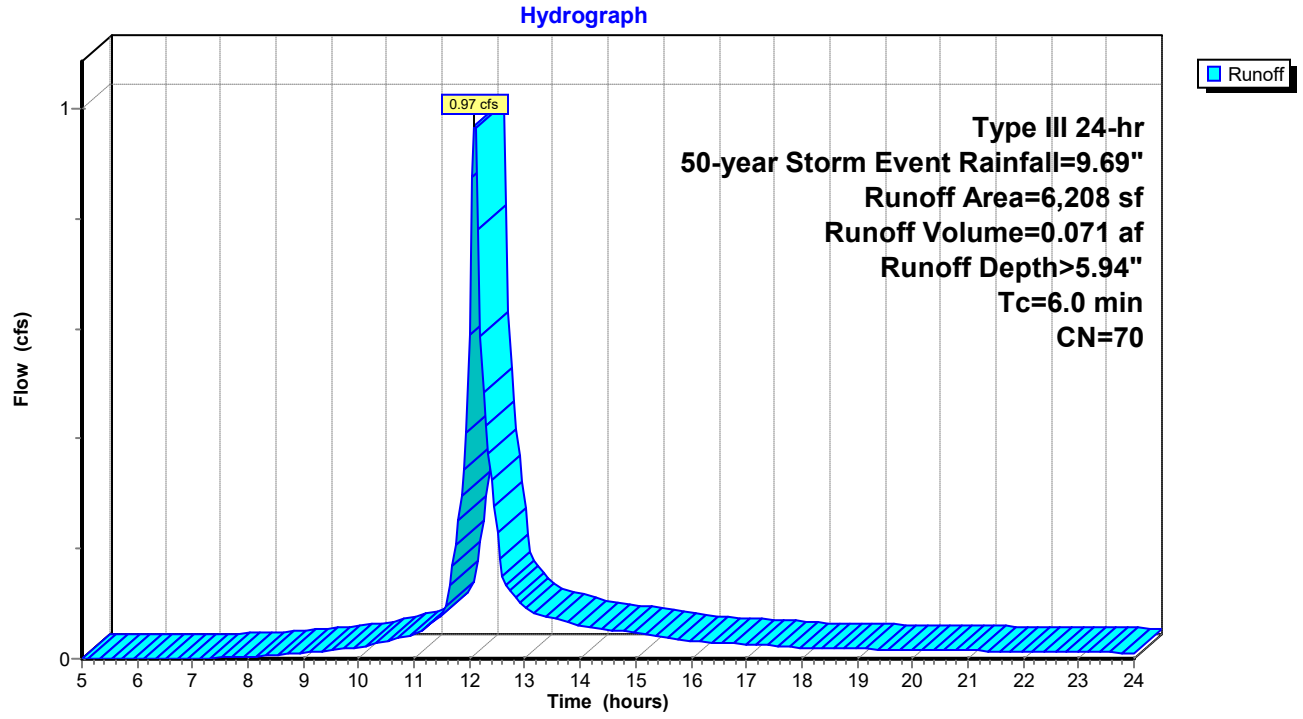
Runoff = 0.97 cfs @ 12.09 hrs, Volume= 0.071 af, Depth> 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Storm Event Rainfall=9.69"

Area (sf)	CN	Description
2,908	39	>75% Grass cover, Good, HSG A
3,300	98	Paved parking, HSG A
6,208	70	Weighted Average
2,908		46.84% Pervious Area
3,300		53.16% Impervious Area

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

Subcatchment 1S: Remainder of Land



Summary for Subcatchment 2S: Roof

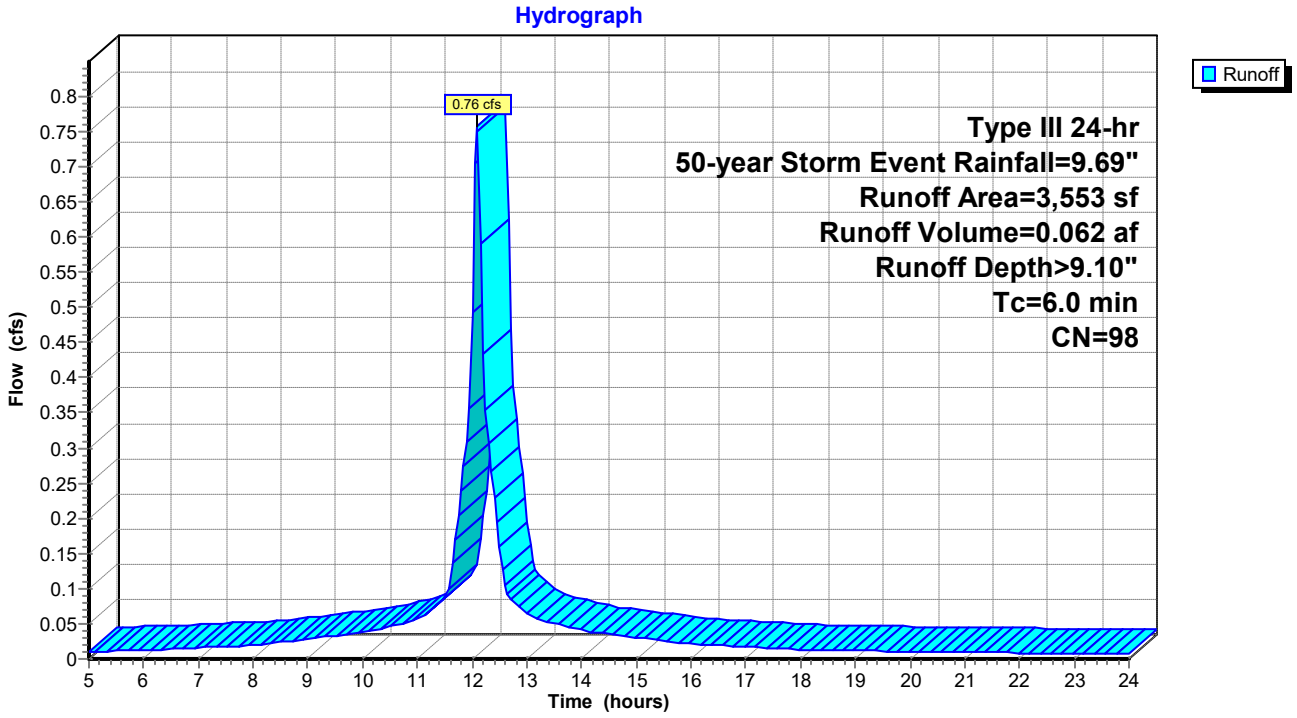
Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 9.10"
Routed to Pond 1P : Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Storm Event Rainfall=9.69"

Area (sf)	CN	Description
3,553	98	Roofs, HSG A
3,553		100.00% Impervious Area

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

Subcatchment 2S: Roof



Summary for Subcatchment 3S: Walks

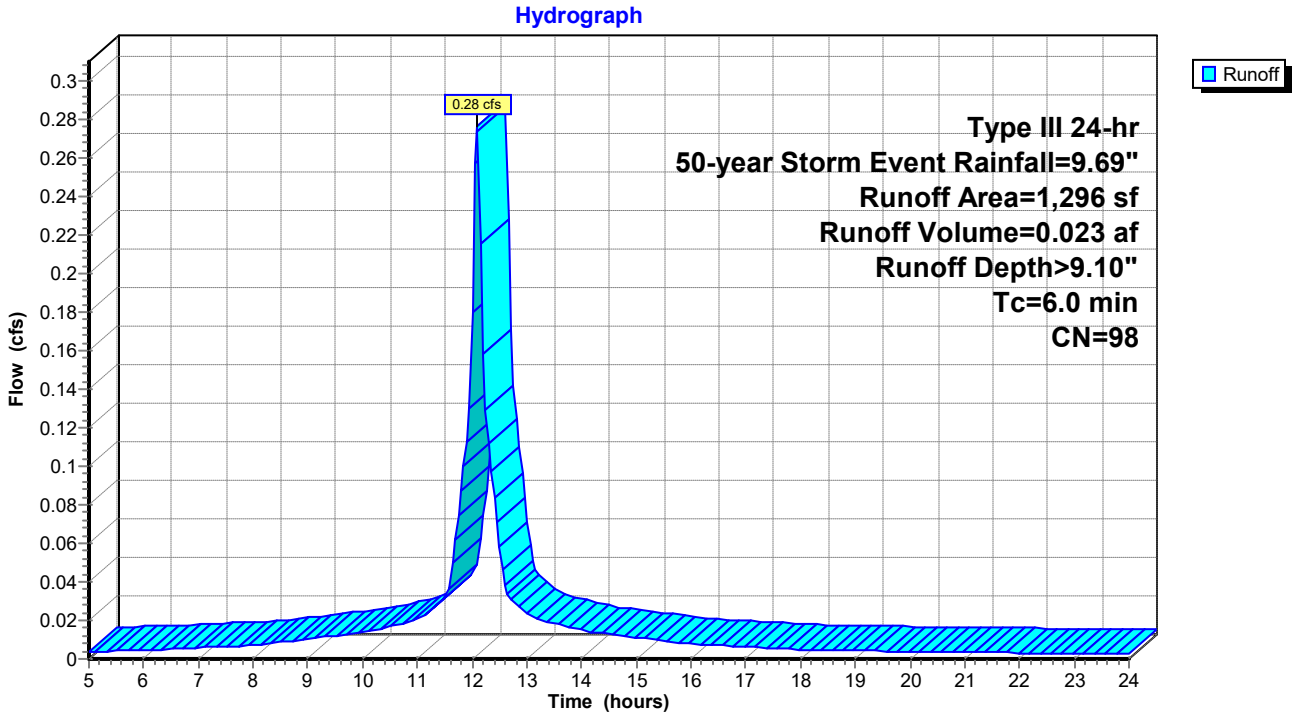
Runoff = 0.28 cfs @ 12.09 hrs, Volume= 0.023 af, Depth> 9.10"
Routed to Pond 2P : Pervious Pavers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Storm Event Rainfall=9.69"

Area (sf)	CN	Description
1,296	98	Paved parking, HSG A
1,296		100.00% Impervious Area

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

Subcatchment 3S: Walks



Summary for Pond 1P: Infiltration System

Inflow Area = 0.082 ac,100.00% Impervious, Inflow Depth > 9.10" for 50-year Storm Event event
Inflow = 0.76 cfs @ 12.09 hrs, Volume= 0.062 af
Outflow = 0.04 cfs @ 10.50 hrs, Volume= 0.060 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.04 cfs @ 10.50 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 90.35' @ 13.79 hrs Surf.Area= 802 sf Storage= 1,151 cf

Plug-Flow detention time= 210.3 min calculated for 0.060 af (96% of inflow)
Center-of-Mass det. time= 190.0 min (949.3 - 759.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.20'	578 cf	**20.83'W x 38.50'L x 3.54'H Field A** 2,841 cf Overall - 1,088 cf Embedded = 1,753 cf x 33.0% Voids
#2A	88.70'	1,088 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,666 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 10.50 hrs HW=88.24' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 1P: Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

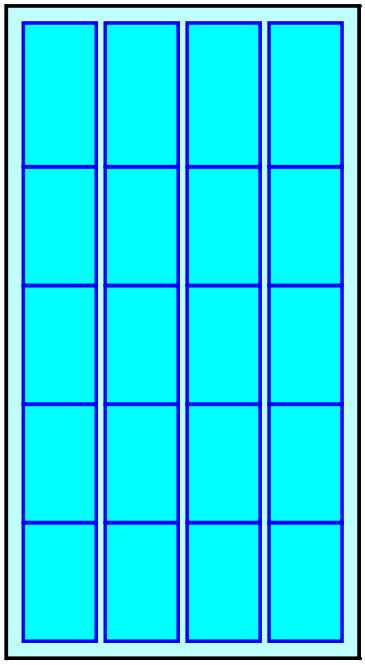
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

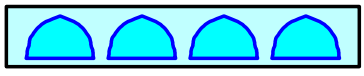
20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,087.8 cf Chamber Storage

2,840.7 cf Field - 1,087.8 cf Chambers = 1,752.9 cf Stone x 33.0% Voids = 578.4 cf Stone Storage

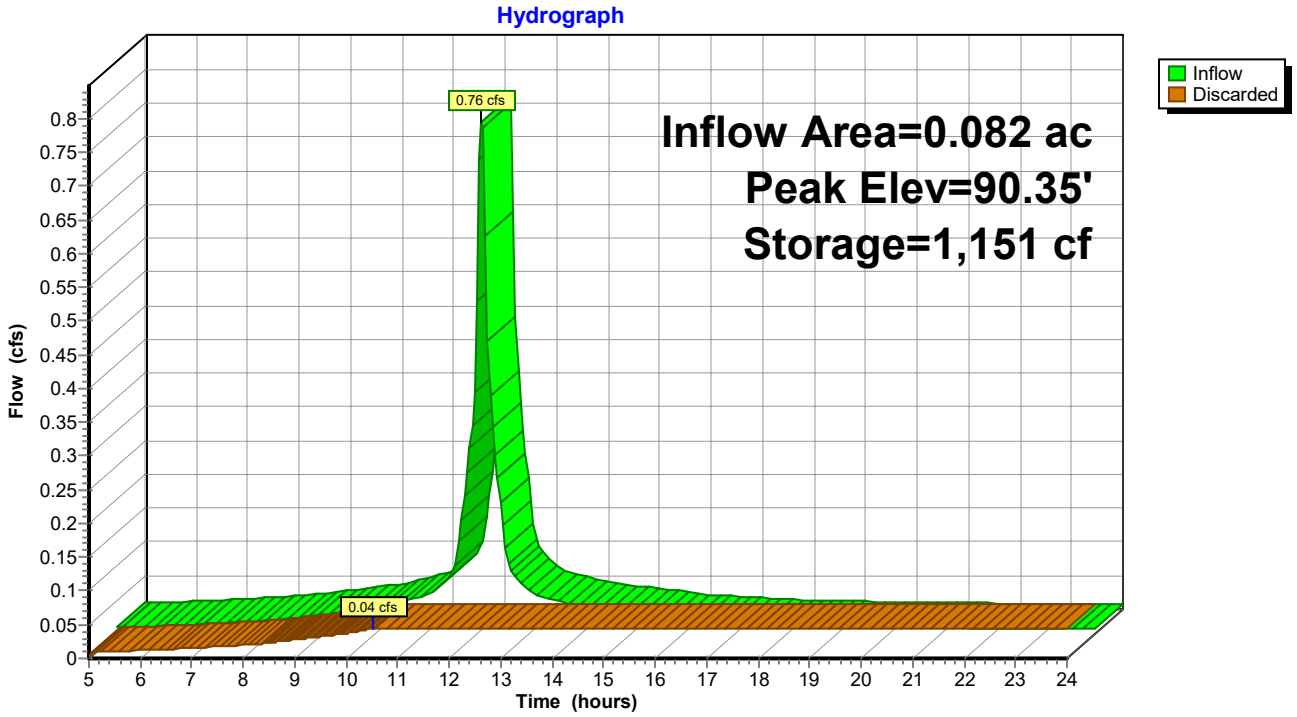
Chamber Storage + Stone Storage = 1,666.3 cf = 0.038 af
Overall Storage Efficiency = 58.7%
Overall System Size = 38.50' x 20.83' x 3.54'

20 Chambers
105.2 cy Field
64.9 cy Stone





Pond 1P: Infiltration System



Summary for Pond 2P: Pervious Pavers

Inflow Area = 0.030 ac,100.00% Impervious, Inflow Depth > 9.10" for 50-year Storm Event event
Inflow = 0.28 cfs @ 12.09 hrs, Volume= 0.023 af
Outflow = 0.07 cfs @ 11.80 hrs, Volume= 0.023 af, Atten= 74%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.80 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 88.63' @ 12.45 hrs Surf.Area= 1,296 sf Storage= 184 cf

Plug-Flow detention time= 12.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 11.7 min (771.0 - 759.3)

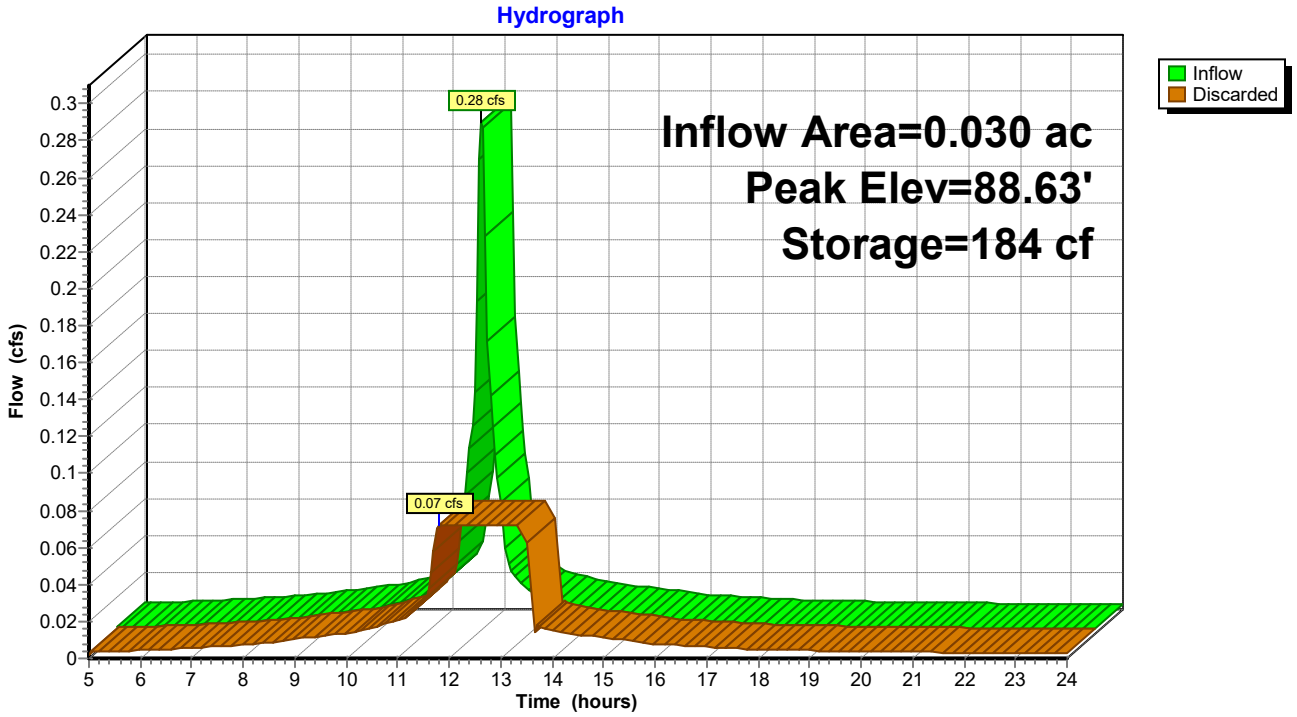
Volume	Invert	Avail.Storage	Storage Description
#1	88.20'	428 cf	**Custom Stage Data (Prismatic)** Listed below 1,296 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
88.20	1,296	0	0
89.20	1,296	1,296	1,296

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 11.80 hrs HW=88.21' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Pond 2P: Pervious Pavers



Summary for Subcatchment 1S: Remainder of Land

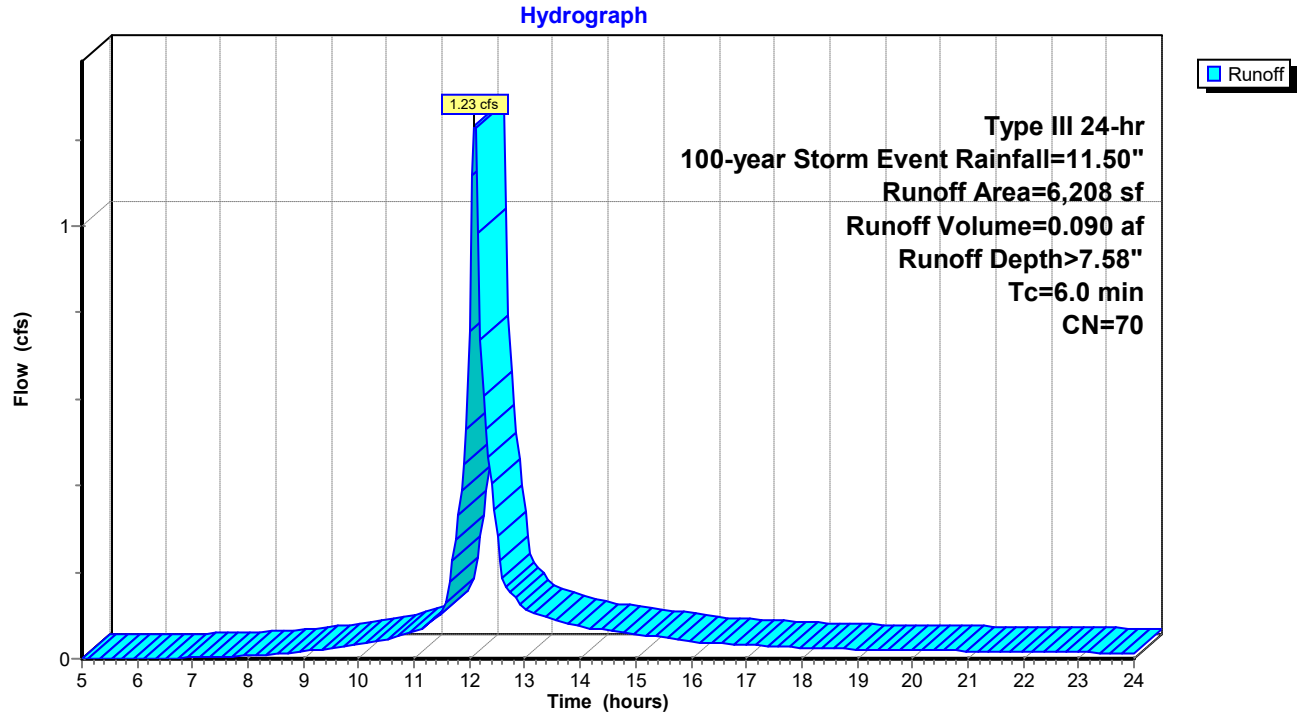
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.090 af, Depth> 7.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Storm Event Rainfall=11.50"

Area (sf)	CN	Description
2,908	39	>75% Grass cover, Good, HSG A
3,300	98	Paved parking, HSG A
6,208	70	Weighted Average
2,908		46.84% Pervious Area
3,300		53.16% Impervious Area

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

Subcatchment 1S: Remainder of Land



Summary for Subcatchment 2S: Roof

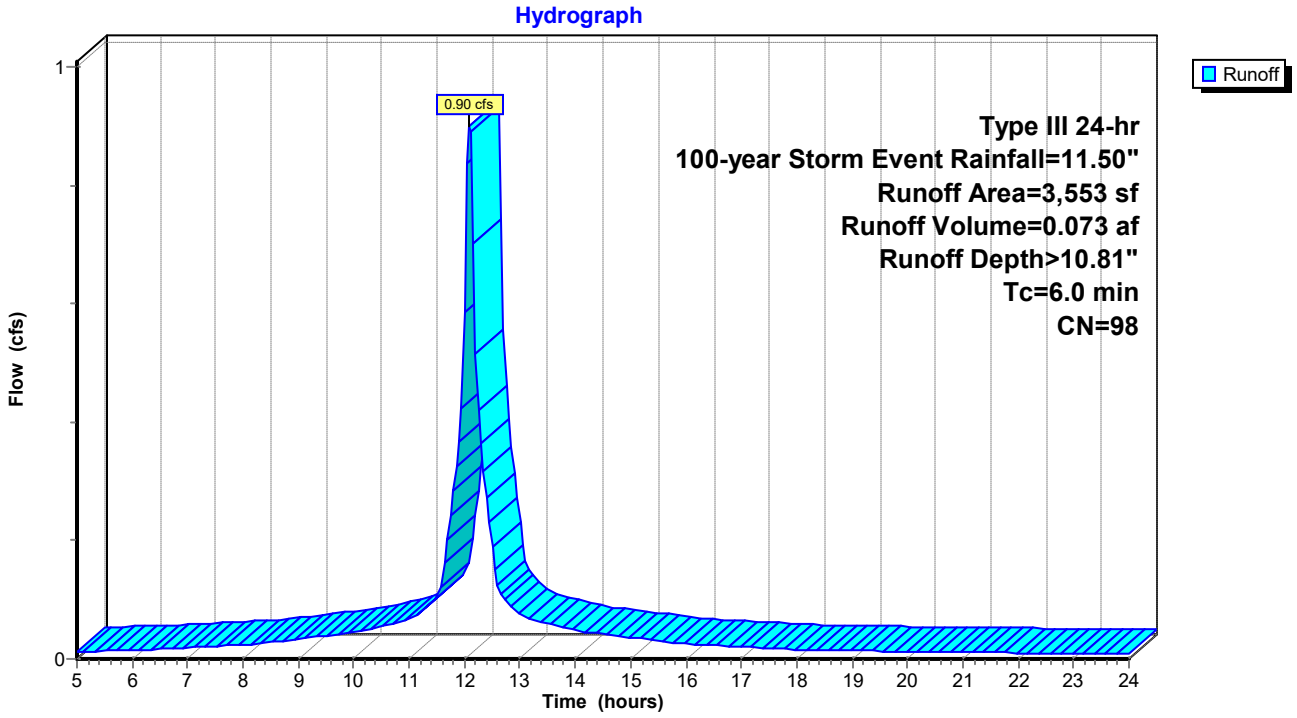
Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af, Depth>10.81"
Routed to Pond 1P : Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Storm Event Rainfall=11.50"

Area (sf)	CN	Description
3,553	98	Roofs, HSG A
3,553		100.00% Impervious Area

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

Subcatchment 2S: Roof



Summary for Subcatchment 3S: Walks

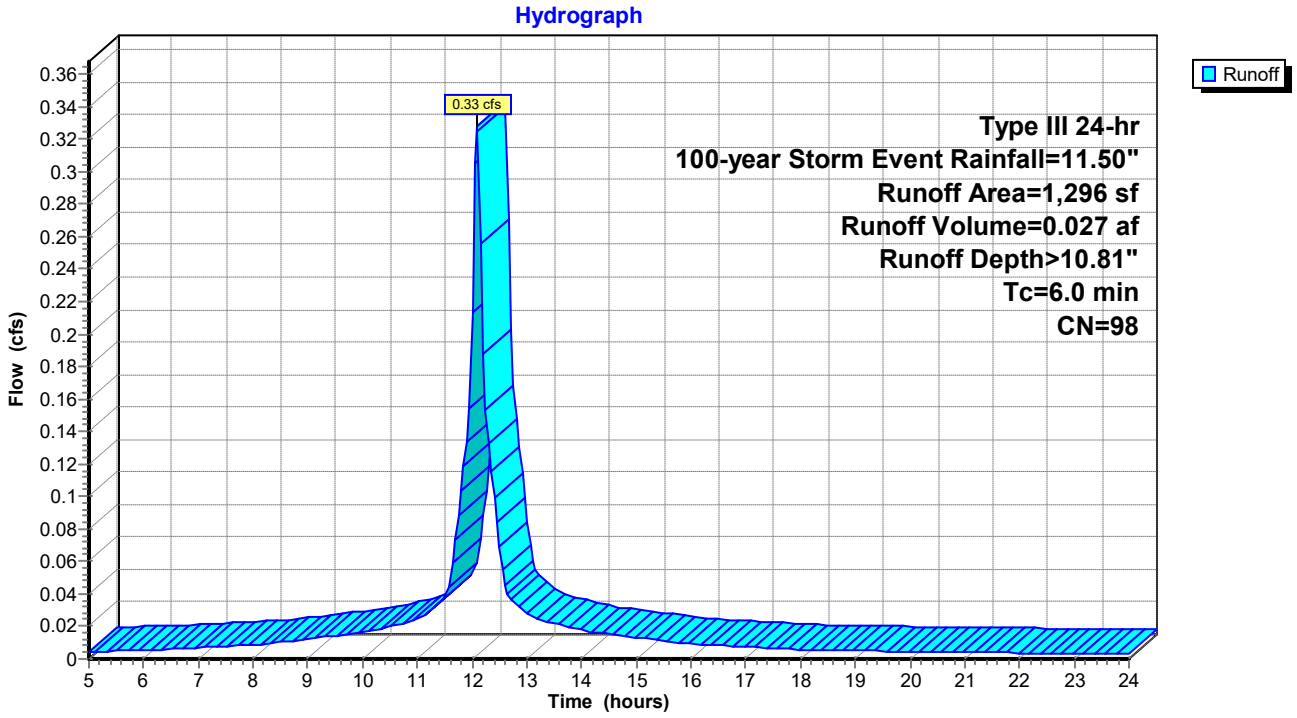
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.027 af, Depth>10.81"
Routed to Pond 2P : Pervious Pavers

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Storm Event Rainfall=11.50"

Area (sf)	CN	Description
1,296	98	Paved parking, HSG A
1,296		100.00% Impervious Area

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

Subcatchment 3S: Walks



Summary for Pond 1P: Infiltration System

Inflow Area = 0.082 ac,100.00% Impervious, Inflow Depth > 10.81" for 100-year Storm Event event
Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.073 af
Outflow = 0.04 cfs @ 10.05 hrs, Volume= 0.062 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.04 cfs @ 10.05 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 91.06' @ 14.24 hrs Surf.Area= 802 sf Storage= 1,480 cf

Plug-Flow detention time= 243.4 min calculated for 0.061 af (83% of inflow)
Center-of-Mass det. time= 177.4 min (936.4 - 758.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.20'	578 cf	**20.83'W x 38.50'L x 3.54'H Field A** 2,841 cf Overall - 1,088 cf Embedded = 1,753 cf x 33.0% Voids
#2A	88.70'	1,088 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,666 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 10.05 hrs HW=88.24' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 1P: Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

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

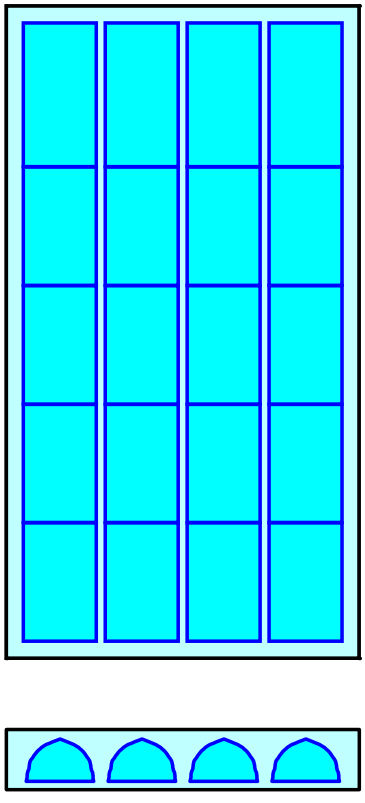
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,087.8 cf Chamber Storage

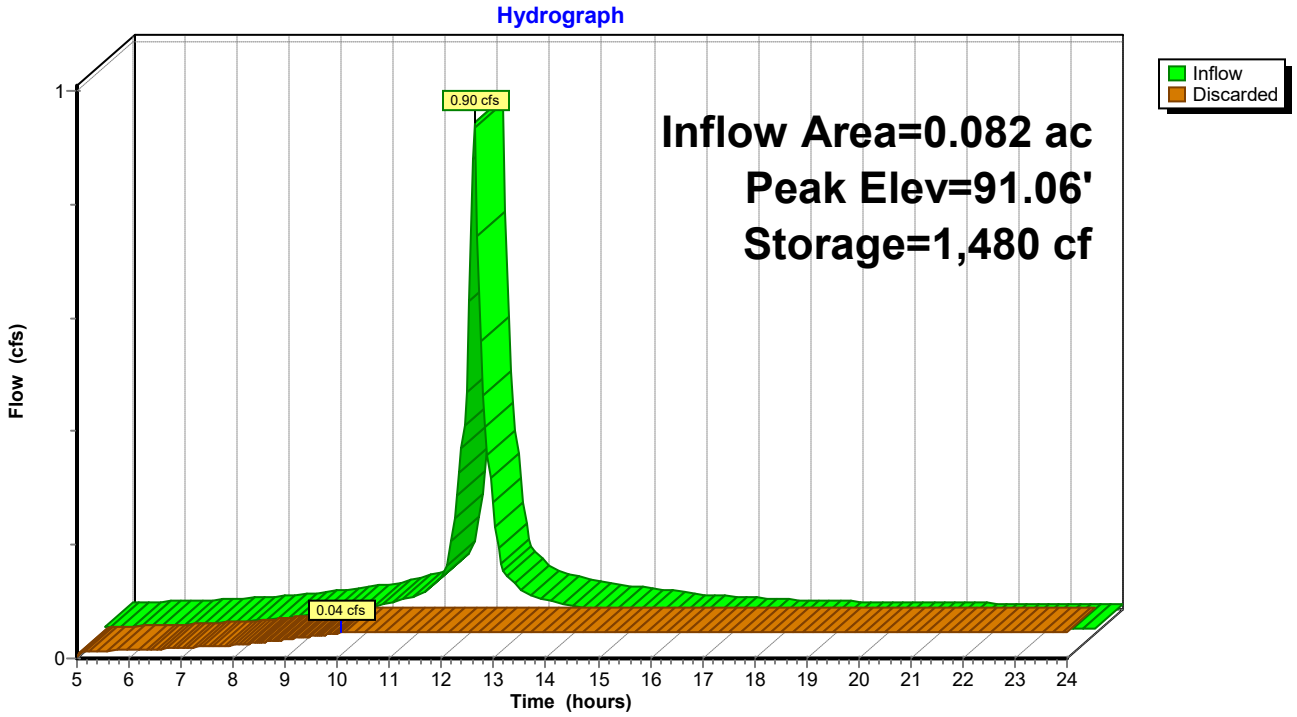
2,840.7 cf Field - 1,087.8 cf Chambers = 1,752.9 cf Stone x 33.0% Voids = 578.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,666.3 cf = 0.038 af
Overall Storage Efficiency = 58.7%
Overall System Size = 38.50' x 20.83' x 3.54'

20 Chambers
105.2 cy Field
64.9 cy Stone



Pond 1P: Infiltration System



Summary for Pond 2P: Pervious Pavers

Inflow Area = 0.030 ac,100.00% Impervious, Inflow Depth > 10.81" for 100-year Storm Event event
Inflow = 0.33 cfs @ 12.09 hrs, Volume= 0.027 af
Outflow = 0.07 cfs @ 11.75 hrs, Volume= 0.027 af, Atten= 78%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.75 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 88.79' @ 12.49 hrs Surf.Area= 1,296 sf Storage= 254 cf

Plug-Flow detention time= 17.4 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 17.1 min (776.1 - 758.9)

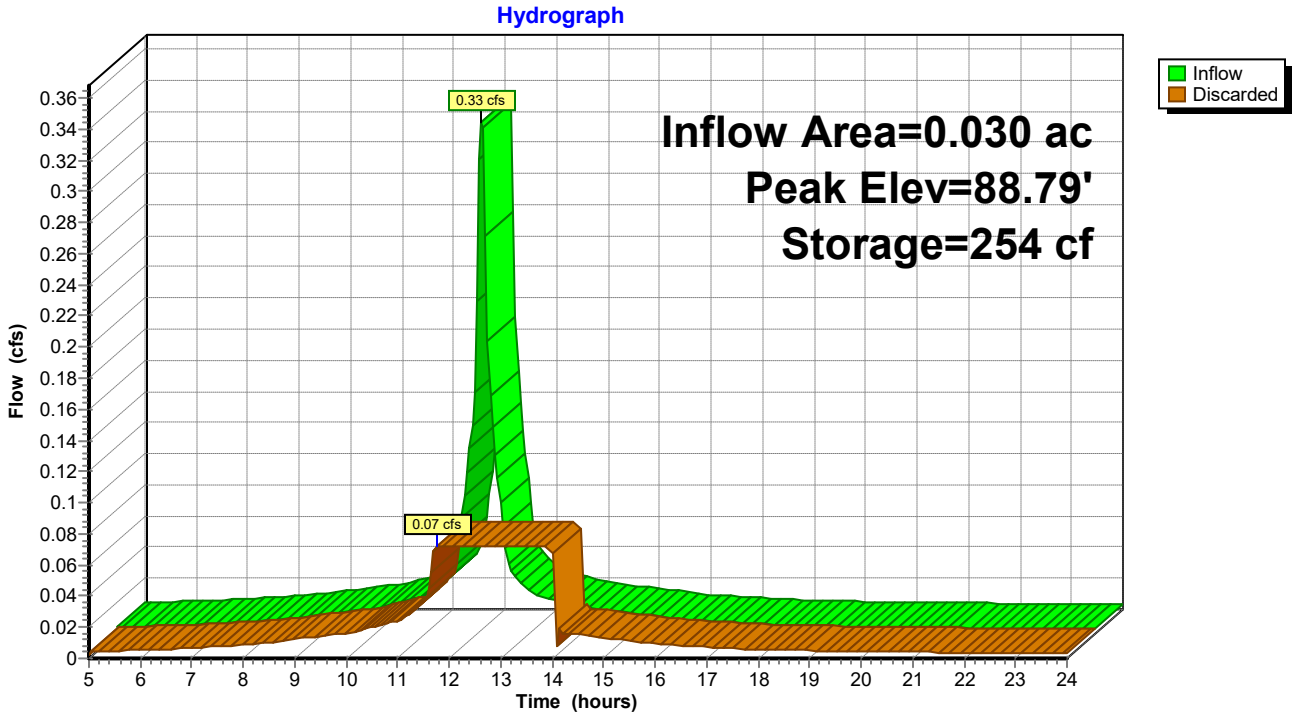
Volume	Invert	Avail.Storage	Storage Description
#1	88.20'	428 cf	**Custom Stage Data (Prismatic)** Listed below 1,296 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
88.20	1,296	0	0
89.20	1,296	1,296	1,296

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.20'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 11.75 hrs HW=88.21' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Pond 2P: Pervious Pavers



Operation and Maintenance of Drainage Systems & Construction Period Erosion and Sediment Control

Operation and Maintenance Plan for Drainage Systems

Project Name: 821 Massachusetts Avenue
Date: September 6, 2024

Site Location: 821 Massachusetts Avenue
Arlington, Massachusetts

Site Operator:
Owner: Geoffrey Noyes
gpnoyes@comcast.net

The following Operation and Maintenance Plan (O & M Plan) has been developed to comply with DEP's Stormwater Management Policy. The responsibilities outlined in the O&M Plan run with ownership of the property.

Subsurface Infiltration Systems

Infiltration systems are to be inspected by the homeowner at least twice per year and after every major storm event. The inspections will occur following the 3.2", 24 hour storm event.
To perform an inspection of the infiltration system, the observation port caps need to be removed. Once the caps are removed, the depth of sediment inside the system is measured and if the depth of sediment exceeds 3" then the system needs to be professionally cleaned. The subsurface system should only be cleaned by a professional drain/sewer company that is equipped with a vacuum type truck.
The typical cleaning process consists of flooding the system with clean water and allowing the deposited sediment to suspend, then pumping the water out via one of the inspection ports back into the vacuum truck.

Ensure proper operation of Subsurface Infiltration System:

- During construction, the contractor is to observe and inspect the drainage system on a weekly basis.
- The homeowner is to note how long water remains standing in drainage structures after storm events and how well the water infiltrates over a period of 48 to 72 hours. If water remains in the system after 72 hours then the system is probably clogged and in need of cleaning. Contact a professional drain cleaner.
- The contractor is to repair items such as upland sediment erosion during the construction process. The homeowner is to maintain the property landscaped.

Semiannually inspection of systems for proper functioning and look for:

- Subsidence
- Cracking of structures
- Depth of sediment inside system

Scheduled Maintenance:

- Remove sediment from subsurface systems at least once every 2 years; The Cultec systems are to be maintained according to manufacturer recommendations.
- Dispose and transport accumulated sediment off-site in accordance with local, state and federal guidelines and regulations; Sediment is typically removed by filling the Cultec Systems with water and then removing it using a vacuum truck. See above for inspection criteria.

Pervious Pavers

- Control of sediment is important to maintain the permeability of the pervious pavers.
- The performance of the driveway shall be verified by the in-field test methodology described in ASTM C-1701 upon completion.

Ensure proper operation of Pervious Pavers

- Keep silt and debris from entering onto the pervious pavers.
- Sand or other abrasives for snow or ice conditions shall not be used as they reduce permeability of the pavers.
- Observe the paver surface for signs of sediment or organic debris accumulation.
- Use high performance, regenerative air vacuum equipment to clean surfaces. Mechanical brooms shall not be used.

Semiannually inspection for proper functioning and look for:

- Standing water on paver surface.

Yearly Scheduled Maintenance:

- Inspect surface of pavers for evidence of sediment deposition, organic debris, staining or ponding. If any sign of ponding are evident, contact a professional paver cleaner for high performance vacuuming.
- Inspect the integrity of the pavers. Replace or repair any areas that show deterioration, such as slumping or cracking.
  Estimated maintenance cost is $1000 for a vacuum service every two years.

Construction Period Erosion and Sediment Control

Prior to start of construction the following measures will need to be in place:

- Stake erosion control barrier on the locations shown on the site plan.
- Install the stabilized construction entrance at the beginning of the driveway to prevent sediment from entering the roadway. Sweep roadway daily during the site construction period and end of day activities. No sediment shall be left on roadway.
- After every major storm event and on a weekly basis, verify erosion control barrier is held in place properly and sediment is retained. Remove accumulated sediment and replace barrier as needed.