Merrill
Engineers and Land Surveyors

December 20, 2023

Stormwater Management Report

Submitted To:
Avon Planning Board

780 West Main Street, Avon, MA

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Section I

PROPOSED PARKING EXPANSION AND DRAINAGE IMPROVEMENTS

Self Help, Inc.
Assessor's Map D3 Block 5 Lot 24
780 West Main Street, Avon, MA
December 20, 2023

STORMWATER MANAGEMENT REPORT AND NARRATIVE TO ACCOMMPANY SITE PLAN SUBMITTAL

Project Summary

The project proponent, *Self Help, Inc.* is a nonprofit Community Action Agency (CAA) created to help low-income families and individuals stabilize and secure their lives through education, strategic assistance, and building on opportunities in their communities. They are currently enduring the process of being evicted from their existing offices in Brockton as the City is taking the property by eminent domain. They serve many elderly and disabled residents in Avon and the surrounding communities. In order to avoid any safety issues with an existing gravel portion of their parking area, they recently paved it, not realizing that a Site Plan Review and Special Permit Application and approval by the Planning Board is required for increases in impervious area within the Water Supply Protection District. This application is being submitted for approval of the paving of the previously gravel parking area and to review the proposed drainage improvements due to the site's proximity to the Interim Wellhead Protection Area.

Methodology

Drainage computations were performed using the Natural Resources Conservation Services (NRCS) TR-20 method and HydroCAD® Drainage Calculation Software. Sketches of the existing and proposed watershed areas, HydroCAD® Report, and copies of the calculation sheets are included as appendices to this report.

Existing Conditions

The subject property is located on the easterly side of West Main Street and is bordered by East Main Street to the east, approximately 250' from the intersection of East Main Street and West main Street. The site is located within the "Residence A" and the "Water Supply Protection" Districts and consists of a total of 1.12± acres, all of which is upland. The property is identified in the Assessors database as Map D3 Block 5 Lot 24. Refer to the Exhibit USGS Locus Map and the 2018 Google Earth Aerial Map for more information on the site location. Additionally, according to the MassMapper Browser, there are no wetland resource areas or their buffer zones on or near the property, and the Natural Heritage database and multiple site

visits revealed that the site does not contain estimated/priority habitats or certified vernal pools. The site is not located within a special flood hazard zone as shown on the current FEMA Flood Insurance Rate Map, Panel No. 25021C0381E with an effective date of July 17, 2012.

Presently, the property has a 5,222± s.f. Office Building that was constructed in or around 1952 according to the Assessor's records, along with an existing paved driveway, parking area, walkways and landscape improvements. The property slopes generally from west to east or from an approximate El=198 at West Main Street down to an El=190 at East Main Street. There are no stormwater improvements on the property currently; runoff from the existing roof and parking areas simply flows overland to a catch basin in East Main Street with no water quality treatment or peak rate controls.

Soil types within the project site were obtained from NRCS mapping and were identified to be 623C Woodbridge-Urban land complex, 3-15% slopes. The Hydrologic Soils group for this soil type is listed under *Interpretive Groups* as HSG C/D for Woodbridge soils. In order to confirm the soil properties, official soils testing was performed by this office on December 6. 2023. At that time, the surface layers of soil were found to be more of a sandy loam, which is consistent with an HSG B soil, rather than a silt loam or sandy clay loam which are typical of HSG C soils. It was also noted that during rain events there was very little runoff from the natural wooded areas and runoff from the newly paved parking area seemed to naturally infiltrate into the wooded area where it currently flows. With this data in mind, the site was determined to be more consistent with hydrologic soil group (HSG) B soils and this hydrologic soil group was used for the cover type in the drainage calculations to be more conservative with recharge requirements. For the stormwater infiltration system calculations, the soils testing revealed that the parent material found within the "C" Layer of the test pits was a Loamy Sand, which has a corresponding infiltration rate of 2.41in/hr which was used in the drainage calculations for the exfiltration rate. Refer to NRCS Soils Map contained in the USDA Soil Reports. This Soil Map Unit typically is moderately well drained and is often found within ground moraines, hills & drumlin landforms.

Ultimately, stormwater from the site currently flows untreated towards an existing catch basin within East Main Street. This tributary area is described below:

Watershed Designation

Existing	*Proposed*	*Discharges to*
1E	SUM	East Main Street

Proposed Conditions/Stormwater Management

The proposed project consists of adding new stormwater controls to treat the stormwater from the site for both water quality and quantity and to bring the site into compliance with the MA Stormwater Handbook. The site as it currently exists consists of the existing building, parking areas, some grass and landscape areas and a wooded area to the north of the parking areas. The paved parking area is divided into two distinct sub-catchments. The original paved parking

area sheds water directly to East Main Street. The newly paved (previously gravel) area directs runoff towards a wooded area which slopes towards East Main Street where the stormwater ultimately flows during larger rain events.

Under the proposed conditions, stormwater from the originally paved parking area will be intercepted by a 23' wide trench drain which will direct the runoff to a First Defense FD 4HC vortex separator stormwater treatment unit (4' dia.). First Defense Product Specifications and confirmation of 50% TSS removal efficiency documentation. As required for BMP's within or near an Interim Wellhead Protection Area, this unit will provide 50% TSS removal, prior to infiltration. After this pretreatment, the stormwater is then directed into a Cultec Recharger® 902HD subsurface infiltration chamber system. The recently paved gravel parking area will direct runoff to a 3' wide stone diaphragm which will pretreat the runoff prior to flowing into a bioretention area. Thie bioretention area will provide 80% TSS removal (>44% pretreatment) prior to directing the runoff to the Cultec subsurface infiltration chamber system. This system has been sized to infiltrate the entirety of the 50-year storm event as required for infiltration facilities within the Water Supply Protection District where greater than 15% of the lot or 2,500 s.f. of area (whichever is greater) is impervious.

Compliance with Stormwater Management Standards

Standard 1 – No New Untreated Discharges

No new stormwater conveyances will discharge untreated runoff from pavement into, or cause erosion to downgradient areas. The original driveway area which discharges runoff to East Main Street, will now direct runoff to a trench drain which will collect the runoff for pretreatment prior to directing it to the subsurface infiltration system. Runoff from the newly paved driveway area will be directed to a bioretention area for pretreatment prior to routing it to the subsurface infiltration system. The stormwater management system will provide substantial increase in recharge volume, water quality treatment and peak rate and volume reduction over the existing conditions.

Standard 2 – Peak Rate Attenuation

Peak rates of runoff were calculated using the TR-20 methodology developed by the NRCS (refer to Appendices). As a result of the proposed project and the newly paved parking area, there will be an increase in runoff rates from the site. The increase in runoff is attenuated by the proposed subsurface infiltration chamber system providing treatment, infiltration, and storage volume controls. These measures will both detain and infiltrate runoff, mitigating increased rates of runoff for the 2, 10, 25, 50 and 100-year storms events. This will result in a decrease in the peak rate of runoff and a more substantial decrease in the volume of runoff directed to the closed drainage system within East Main Street.

The following is a summary of runoff flow rates for proposed and existing conditions:

	PEAK RATES OF RUNOFF	
	Design Point 1 (Trib. To East Main Street)	
	EXISTING (cfs)	PROPOSED (cfs)
2YR	1.29	3,890
0.27	2.88	8,466
0.66	4.26	12,518
1.07	5.58	16,503
1.48	7.21	21,500

2.03

	PEAK VOLUME OF RUNOFF	
	Design Point 1 (Trib. To East Main Street)	
	EXISTING (CF)	PROPOSED (CF)
2YR	3,890	1,223
10YR	8,466	2,858
25YR	12,518	4,431
50YR	16,503	6,052
100YR	21,500	8,981

Standard 3 – Groundwater Recharge

Runoff will be infiltrated by the subsurface infiltration system which has been designed to be a minimum of four feet above seasonal high groundwater. The hydraulic conductivity was based on Soil Testing results for the site and was determined using DEP SMR Table 2.3.3 1982 Rawls Rates - values developed from Rawls, Brakensiek, and Saxton, 1982 for loamy sand, which have a corresponding exfiltration rate of 2.41 in/hr. The total required groundwater recharge

volume for the entire site was calculated to be 640 cubic feet. The proposed subsurface infiltration facilities will provide 7,235 cubic feet of recharge below the minimum outlet elevation. Refer to Appendix A for recharge volume, drawdown calculations and soil testing results.

Standard 4 – Water Quality

A Long-Term Source Control/Pollution Prevention Plan has been incorporated into the Operation and Maintenance Plan. The water quality volume was calculated using the one-inch rule for the total proposed impervious area of 0.50 acres. The total required water quality treatment volume was calculated to be 1,827 cubic feet. The proposed water quality treatment volume provided is 8,859 cubic feet through the subsurface infiltration system, First Defense Unit and bioretention area. Refer to Appendix A for water quality calculations for the treatment stream.

In accordance with the guidelines of the Stormwater Management Policy, the Total Suspended Solids (TSS) Removal was calculated to be 80% or greater for the new treatment trains which will handle the stormwater runoff from the proposed project area. The treatment train consists of a First Defense FD-4HC unit or a bioretention area which both provide pretreatment prior to discharge to the subsurface infiltration system. Together, both treatment trains provide the requisite removal rate of 80% total suspended soils. Additionally, the First Defense FD-4HC unit and the bioretention area both provide greater than 44% TSS removal prior to discharge of stormwater to the infiltration system as required for stormwater discharges within an Interim Wellhead Protection Area. TSS removal calculations are included in Appendix A.

Standard 5 – Land Use with Higher Potential Pollutants Loads (LUHPPL)

The proposed project is not considered a LUHPPL. Not Applicable.

Standard 6 – Critical Areas

The site is upgradient of an Interim Wellhead Protection Area so the Water Quality volumes for stormwater runoff are calculated to meet the 1-inch rule as required.

Standard 7 – Redevelopment and Other Projects Subject to the Standards only to the maximum extent practicable

The project site is considered redevelopment of a previously developed office building. No change in use is proposed and no stormwater BMP's currently exist on the site. For the purpose of stormwater design, the project will provide the requisite recharge volume for the existing impervious driveway and building as well as the new driveway area as required. The treatment train will also provide the required water quality volume and TSS removal exceeding the minimum 80% removal rate.

Standard 8 – Construction Period Pollutions Prevention and Erosion and Sedimentation Control

Silt socks and straw wattles will be placed downgradient of the limit of work as erosion control barriers prior to commencement of any construction activity. A Construction Operation and Maintenance Plan and Construction Pollution Prevention Plan have been provided.

Standard 9 – Operation and Maintenance Plan

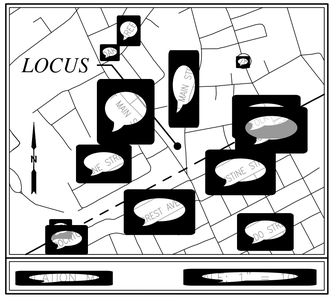
The Long-Term Source Control/Pollution Prevention Plan and Operation and Maintenance Plan is also provided included with this report.

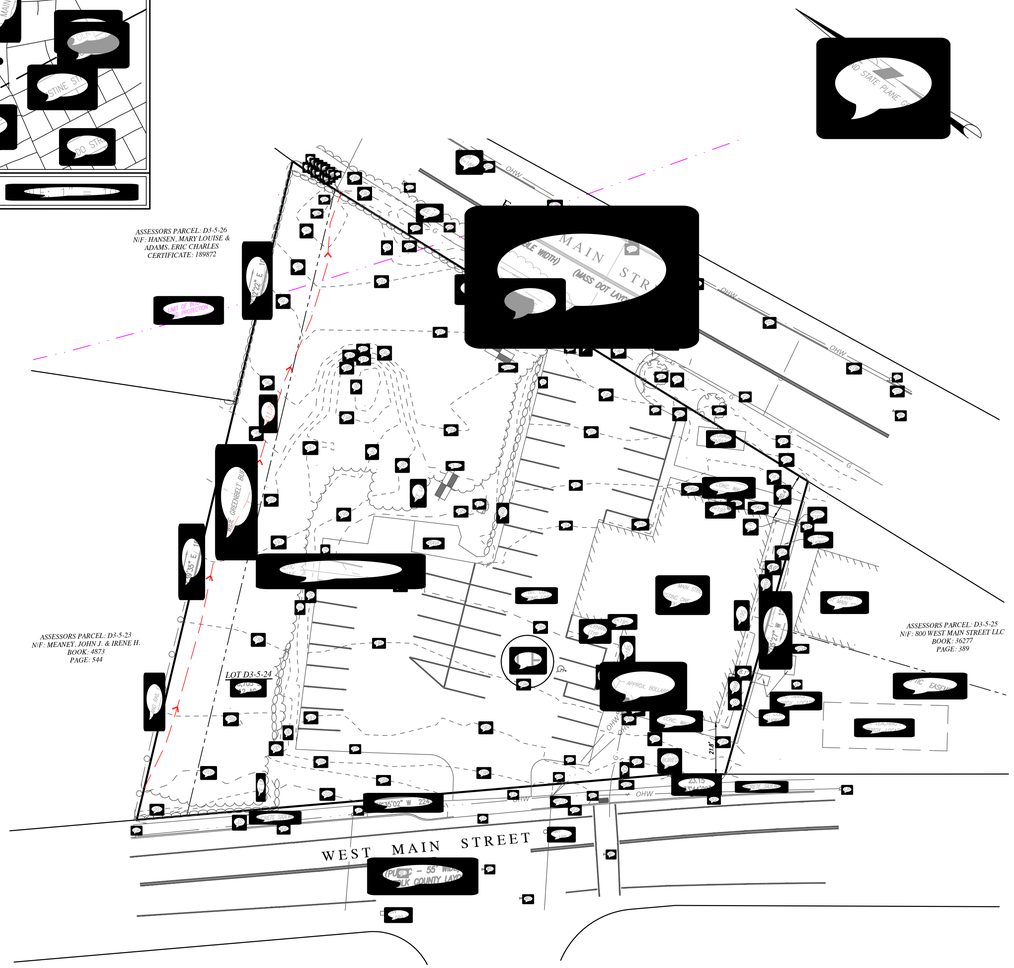
Standard 10 – Prohibition of Illicit Discharges

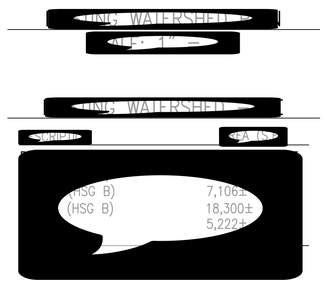
Routine visual inspections are scheduled as part of the Long-Term Source Control/Pollution Prevention Plan and Operation and Maintenance. Measures to prevent illicit discharges will be included in the Long-Term Source Control/Pollution Prevention Plan.

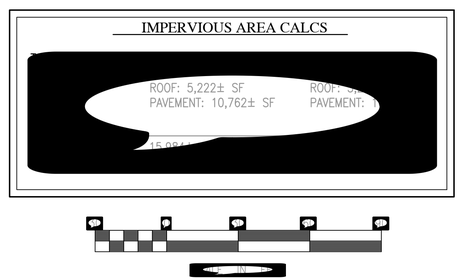
Section II

Existing and Proposed Watersheds Plan(s)









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Engineers and Land Surveyors
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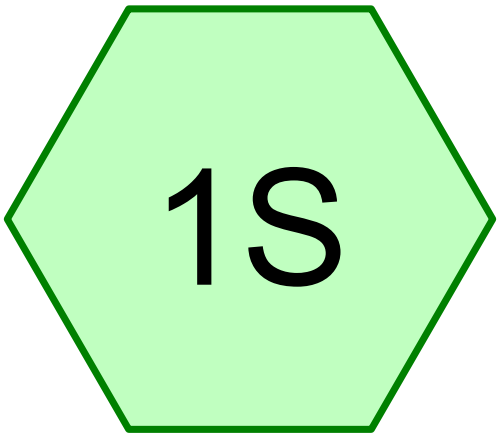
ASSESSOR'S MAP D3, BLO
PEARL STREET

Section III

Hydrocad Existing Conditions Model

2 (3.22”), 10 (4.86”), 25 (6.15”), 50 ()7.35) and 100 (8.80”) year return storms



TRIB TO EAST MAIN STREET

Subcat Reach Pond Link

Routing Diagram for 23-476 EWS
Prepared by Merrill Associates Inc, Printed 12/21/2023

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
7,314	61	>75% Grass cover, Good, HSG B (1S)
7,106	85	Gravel roads, HSG B (1S)
10,762	98	Paved parking, HSG B (1S)
5,222	98	ROOF (1S)
18,300	55	Woods, Good, HSG B (1S)
48,704	**74**	**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TRIB TO EAST MAIN STREET Runoff Area=48,704 sf 32.82% Impervious Runoff Depth>0.96"
Tc=6.0 min CN=74 Runoff=1.29 cfs 3,890 cf

Total Runoff Area = 48,704 sf Runoff Volume = 3,890 cf Average Runoff Depth = 0.96"
67.18% Pervious = 32,720 sf 32.82% Impervious = 15,984 sf

Summary for Subcatchment 1S: TRIB TO EAST MAIN STREET

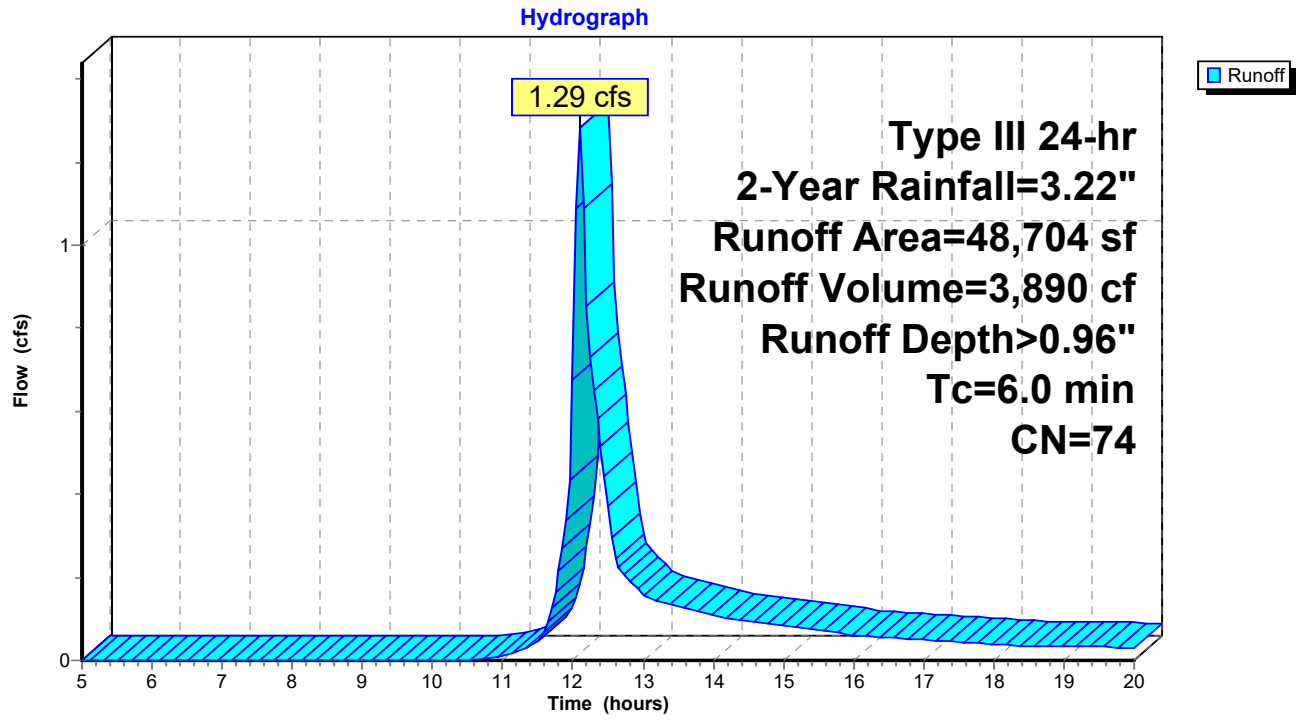
Runoff = 1.29 cfs @ 12.10 hrs, Volume= 3,890 cf, Depth> 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
	10,762	98	Paved parking, HSG B
	7,314	61	>75% Grass cover, Good, HSG B
	7,106	85	Gravel roads, HSG B
	18,300	55	Woods, Good, HSG B
*	5,222	98	ROOF
	48,704	74	Weighted Average
	32,720		67.18% Pervious Area
	15,984		32.82% Impervious Area

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

Subcatchment 1S: TRIB TO EAST MAIN STREET



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TRIB TO EAST MAIN STREET Runoff Area=48,704 sf 32.82% Impervious Runoff Depth>2.09"
Tc=6.0 min CN=74 Runoff=2.88 cfs 8,466 cf

Total Runoff Area = 48,704 sf Runoff Volume = 8,466 cf Average Runoff Depth = 2.09"
67.18% Pervious = 32,720 sf 32.82% Impervious = 15,984 sf

Summary for Subcatchment 1S: TRIB TO EAST MAIN STREET

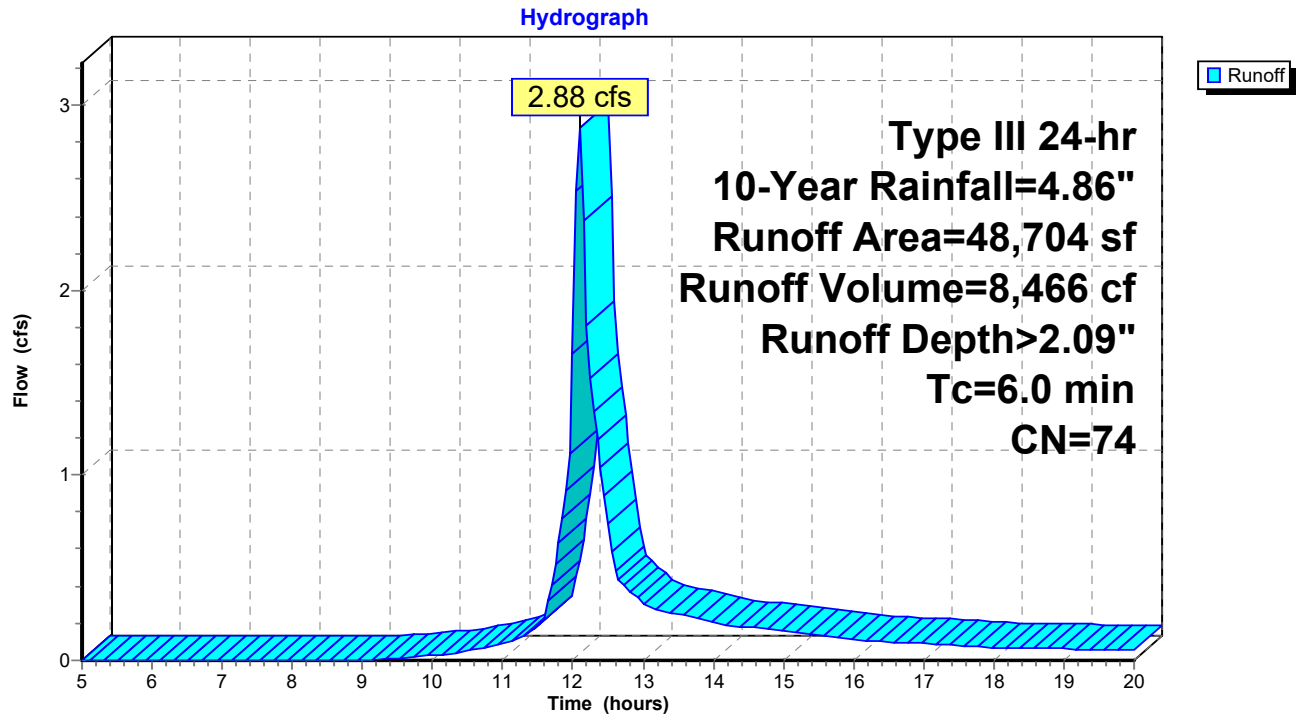
Runoff = 2.88 cfs @ 12.10 hrs, Volume= 8,466 cf, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
	10,762	98	Paved parking, HSG B
	7,314	61	>75% Grass cover, Good, HSG B
	7,106	85	Gravel roads, HSG B
	18,300	55	Woods, Good, HSG B
*	5,222	98	ROOF
	48,704	74	Weighted Average
	32,720		67.18% Pervious Area
	15,984		32.82% Impervious Area

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

Subcatchment 1S: TRIB TO EAST MAIN STREET



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TRIB TO EAST MAIN STREET Runoff Area=48,704 sf 32.82% Impervious Runoff Depth>3.08"
Tc=6.0 min CN=74 Runoff=4.26 cfs 12,518 cf

Total Runoff Area = 48,704 sf Runoff Volume = 12,518 cf Average Runoff Depth = 3.08"
67.18% Pervious = 32,720 sf 32.82% Impervious = 15,984 sf

Summary for Subcatchment 1S: TRIB TO EAST MAIN STREET

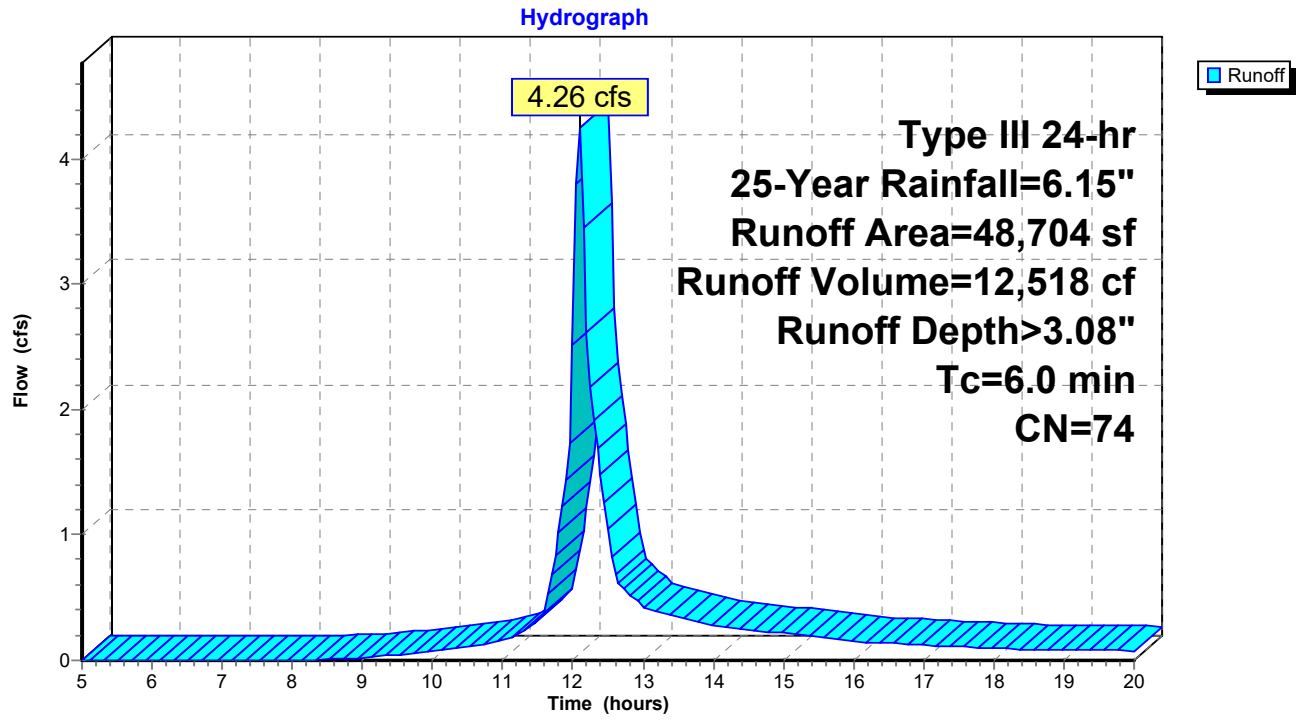
Runoff = 4.26 cfs @ 12.09 hrs, Volume= 12,518 cf, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
	10,762	98	Paved parking, HSG B
	7,314	61	>75% Grass cover, Good, HSG B
	7,106	85	Gravel roads, HSG B
	18,300	55	Woods, Good, HSG B
*	5,222	98	ROOF
	48,704	74	Weighted Average
	32,720		67.18% Pervious Area
	15,984		32.82% Impervious Area

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

Subcatchment 1S: TRIB TO EAST MAIN STREET



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TRIB TO EAST MAIN STREET Runoff Area=48,704 sf 32.82% Impervious Runoff Depth>4.07"
Tc=6.0 min CN=74 Runoff=5.58 cfs 16,503 cf

Total Runoff Area = 48,704 sf Runoff Volume = 16,503 cf Average Runoff Depth = 4.07"
67.18% Pervious = 32,720 sf 32.82% Impervious = 15,984 sf

Summary for Subcatchment 1S: TRIB TO EAST MAIN STREET

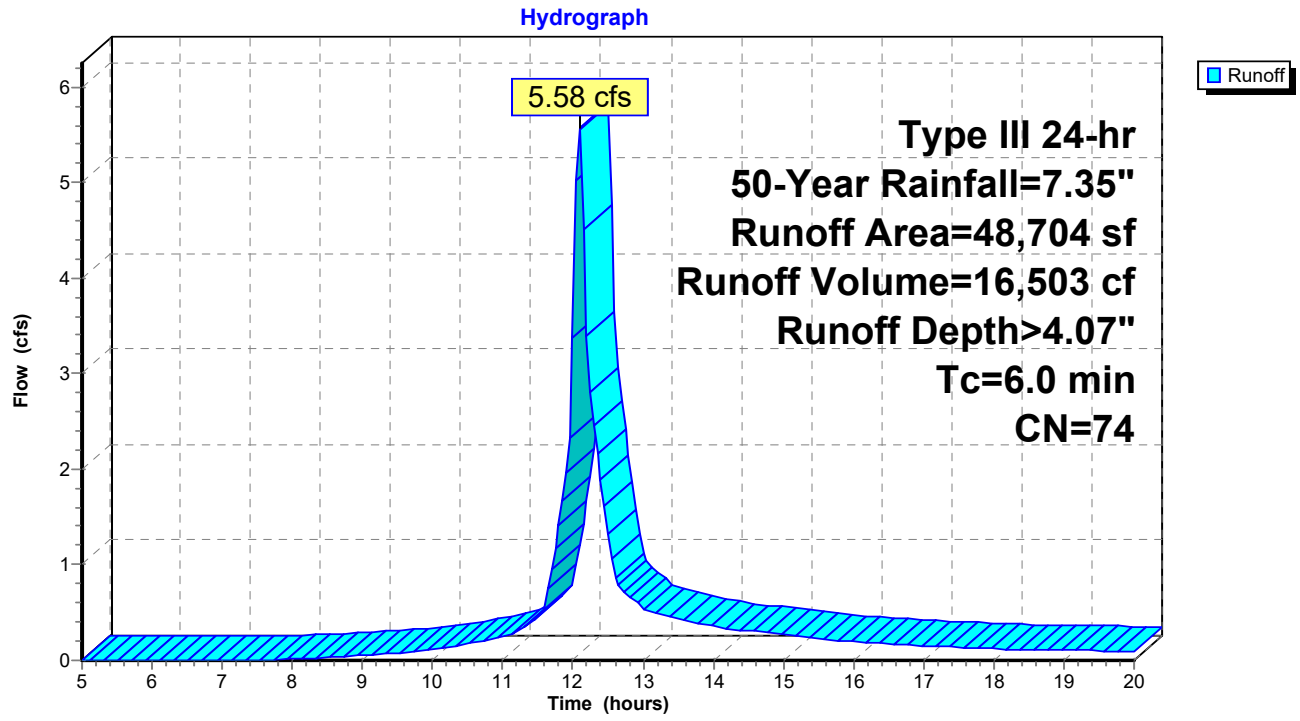
Runoff = 5.58 cfs @ 12.09 hrs, Volume= 16,503 cf, Depth> 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.35"

	Area (sf)	CN	Description
	10,762	98	Paved parking, HSG B
	7,314	61	>75% Grass cover, Good, HSG B
	7,106	85	Gravel roads, HSG B
	18,300	55	Woods, Good, HSG B
*	5,222	98	ROOF
	48,704	74	Weighted Average
	32,720		67.18% Pervious Area
	15,984		32.82% Impervious Area

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

Subcatchment 1S: TRIB TO EAST MAIN STREET



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: TRIB TO EAST MAIN STREET Runoff Area=48,704 sf 32.82% Impervious Runoff Depth>5.30"
Tc=6.0 min CN=74 Runoff=7.21 cfs 21,500 cf

Total Runoff Area = 48,704 sf Runoff Volume = 21,500 cf Average Runoff Depth = 5.30"
67.18% Pervious = 32,720 sf 32.82% Impervious = 15,984 sf

Summary for Subcatchment 1S: TRIB TO EAST MAIN STREET

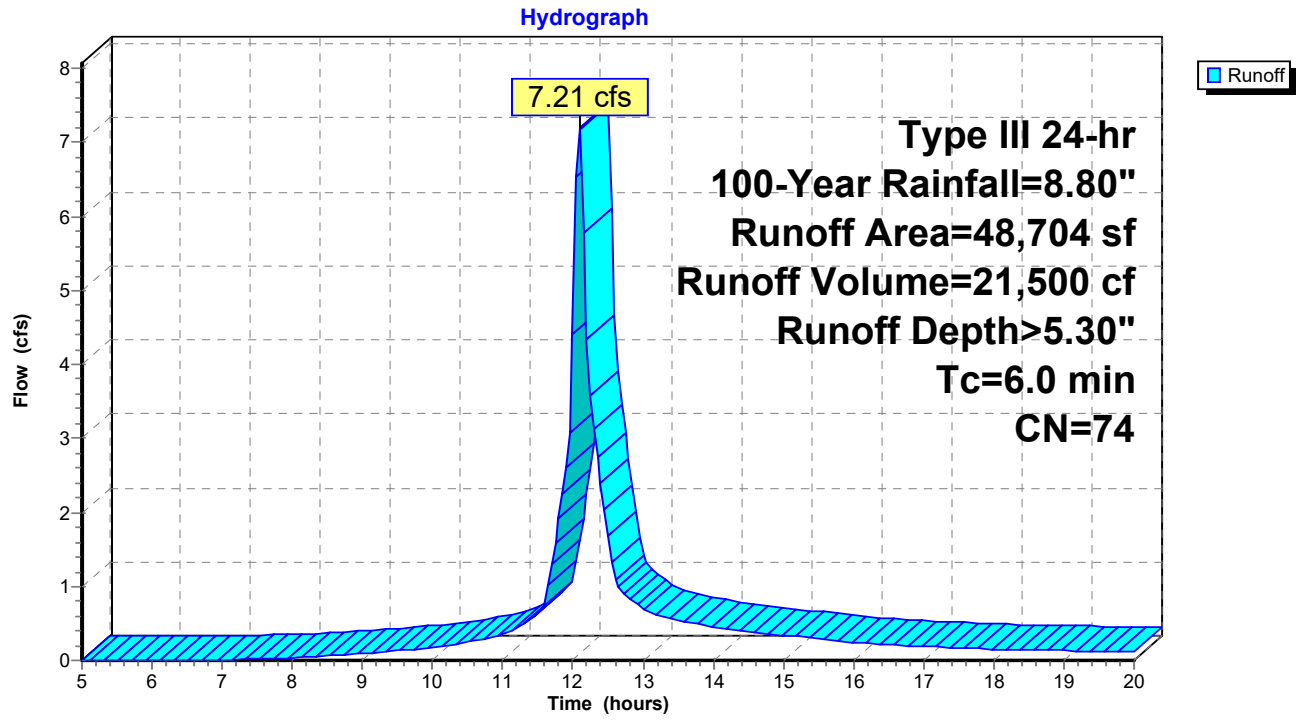
Runoff = 7.21 cfs @ 12.09 hrs, Volume= 21,500 cf, Depth> 5.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
	10,762	98	Paved parking, HSG B
	7,314	61	>75% Grass cover, Good, HSG B
	7,106	85	Gravel roads, HSG B
	18,300	55	Woods, Good, HSG B
*	5,222	98	ROOF
	48,704	74	Weighted Average
	32,720		67.18% Pervious Area
	15,984		32.82% Impervious Area

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

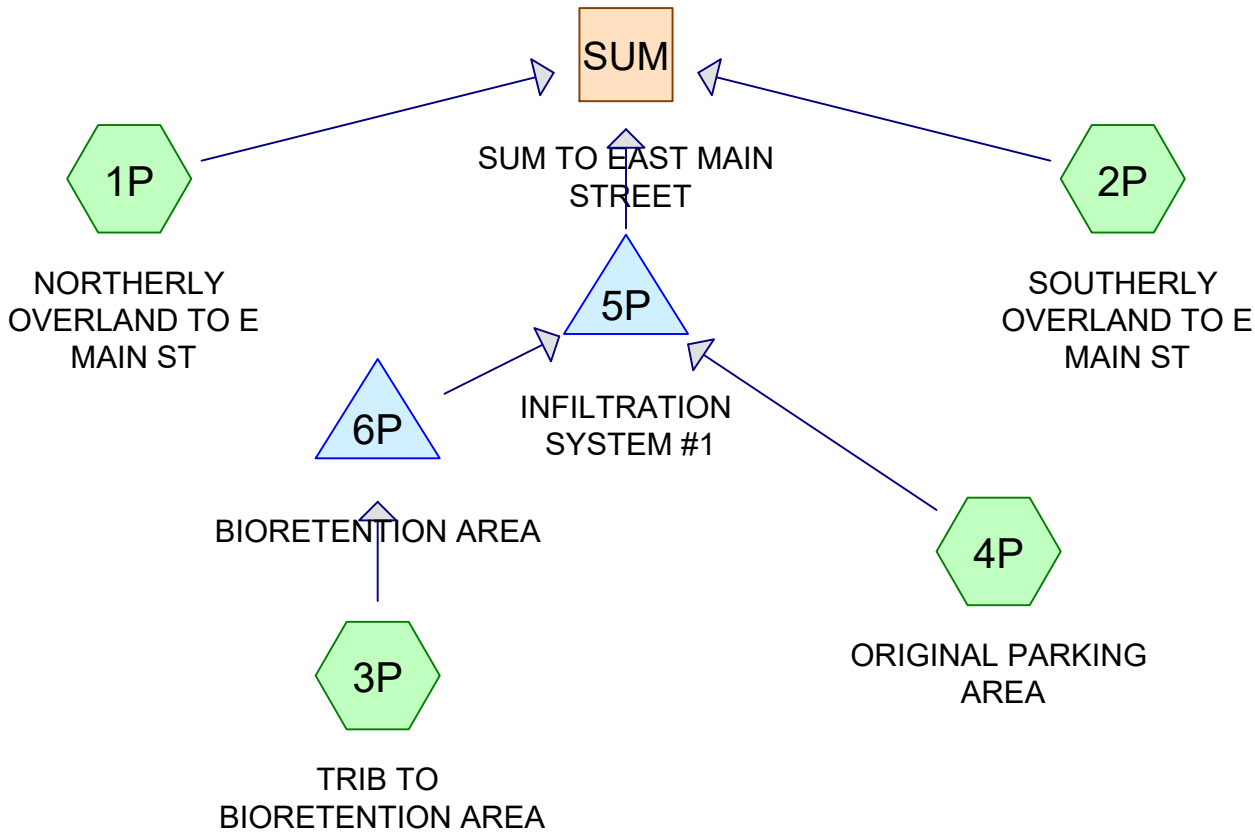
Subcatchment 1S: TRIB TO EAST MAIN STREET



Section IV

Hydrocad Proposed Conditions Model

2 (3.22”), 10 (4.86”), 25 (6.15”), 50 ()7.35) and 100 (8.80”) year return storms



Subcat Reach Pond Link

Routing Diagram for 23-476 PWS
Prepared by Merrill Associates Inc, Printed 12/21/2023

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
7,190	61	>75% Grass cover, Good, HSG B (2P, 3P, 4P)
370	96	Gravel surface, HSG B (2P)
16,705	98	Paved parking, HSG B (2P, 3P, 4P)
5,222	98	Unconnected roofs, HSG B (2P, 3P)
19,217	55	Woods, Good, HSG B (1P, 4P)
48,704	**76**	**TOTAL AREA**

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Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST Runoff Area=18,047 sf 0.00% Impervious Runoff Depth=0.26"
Flow Length=264' Tc=11.7 min CN=55 Runoff=0.04 cfs 386 cf

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST Runoff Area=5,195 sf 64.20% Impervious Runoff Depth=1.93"
Tc=6.0 min CN=87 Runoff=0.26 cfs 837 cf

Subcatchment 3P: TRIB TO BIORETENTION AREA Runoff Area=13,862 sf 92.06% Impervious Runoff Depth=2.66"
Tc=6.0 min CN=95 Runoff=0.92 cfs 3,078 cf

Subcatchment 4P: ORIGINAL PARKING AREA Runoff Area=11,600 sf 50.26% Impervious Runoff Depth=1.35"
Tc=6.0 min CN=79 Runoff=0.41 cfs 1,307 cf

Reach SUM: SUM TO EAST MAIN STREET Inflow=0.27 cfs 1,223 cf
Outflow=0.27 cfs 1,223 cf

Pond 5P: INFILTRATION SYSTEM #1 Peak Elev=184.59' Storage=1,569 cf Inflow=1.25 cfs 2,981 cf
Discarded=0.11 cfs 2,981 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 2,981 cf

Pond 6P: BIORETENTION AREA Peak Elev=193.19' Storage=291 cf Inflow=0.92 cfs 3,078 cf
Discarded=0.03 cfs 1,404 cf Primary=0.85 cfs 1,674 cf Outflow=0.88 cfs 3,078 cf

Total Runoff Area = 48,704 sf Runoff Volume = 5,608 cf Average Runoff Depth = 1.38"
54.98% Pervious = 26,777 sf 45.02% Impervious = 21,927 sf

Summary for Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST

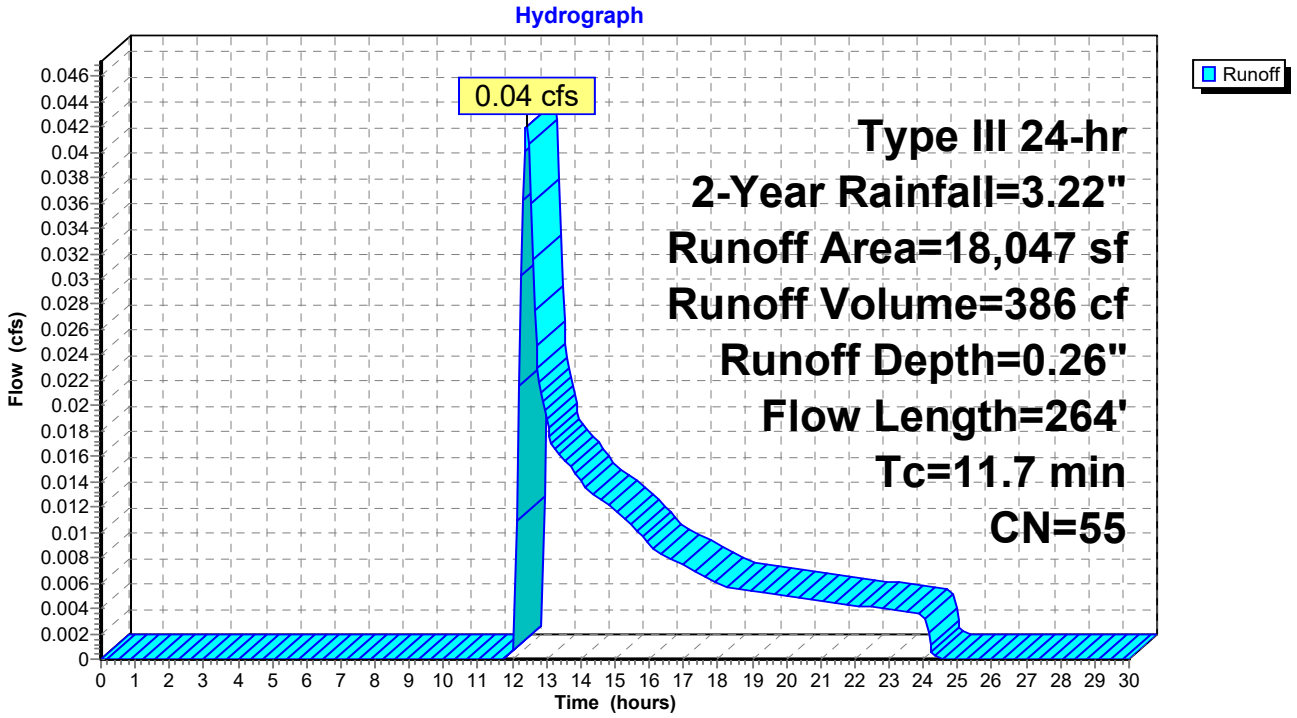
Runoff = 0.04 cfs @ 12.42 hrs, Volume= 386 cf, Depth= 0.26"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
18,047	55	Woods, Good, HSG B
18,047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0290	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
1.1	214	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	264	Total			

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST

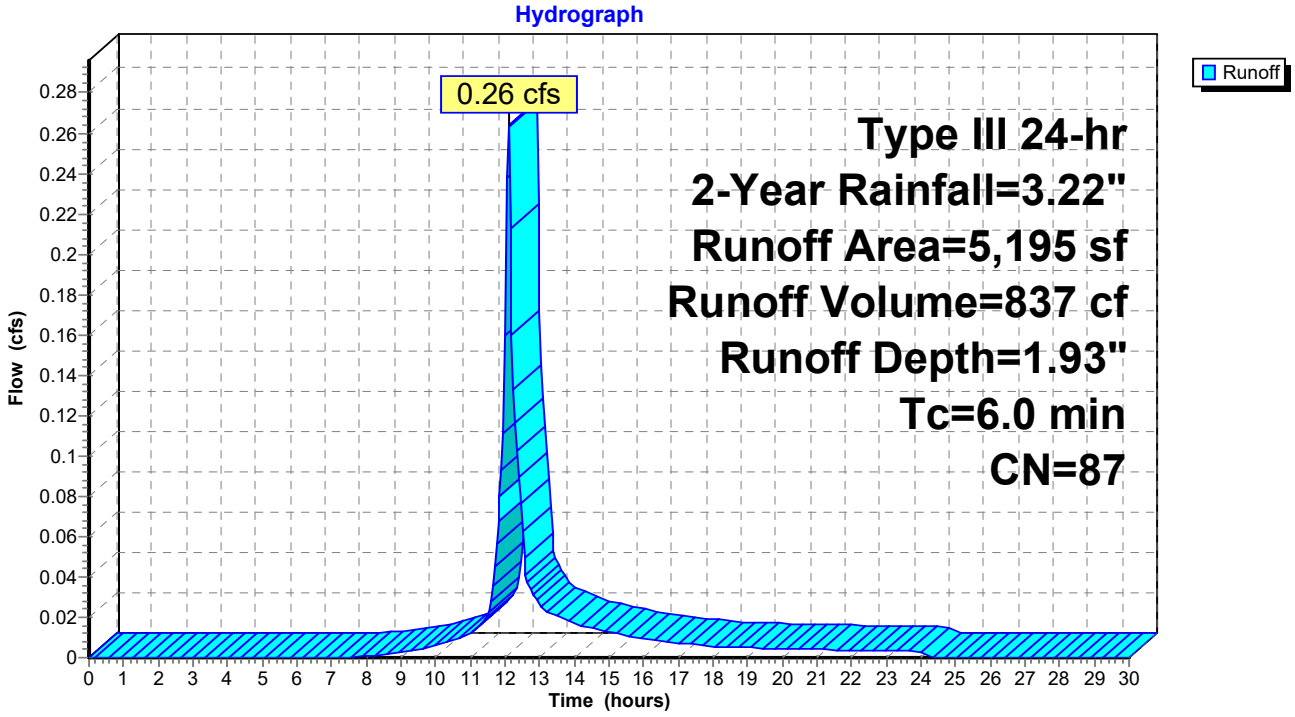
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 837 cf, Depth= 1.93"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
815	98	Paved parking, HSG B
1,490	61	>75% Grass cover, Good, HSG B
370	96	Gravel surface, HSG B
2,520	98	Unconnected roofs, HSG B
5,195	87	Weighted Average
1,860		35.80% Pervious Area
3,335		64.20% Impervious Area
2,520		75.56% Unconnected

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

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 3P: TRIB TO BIORETENTION AREA

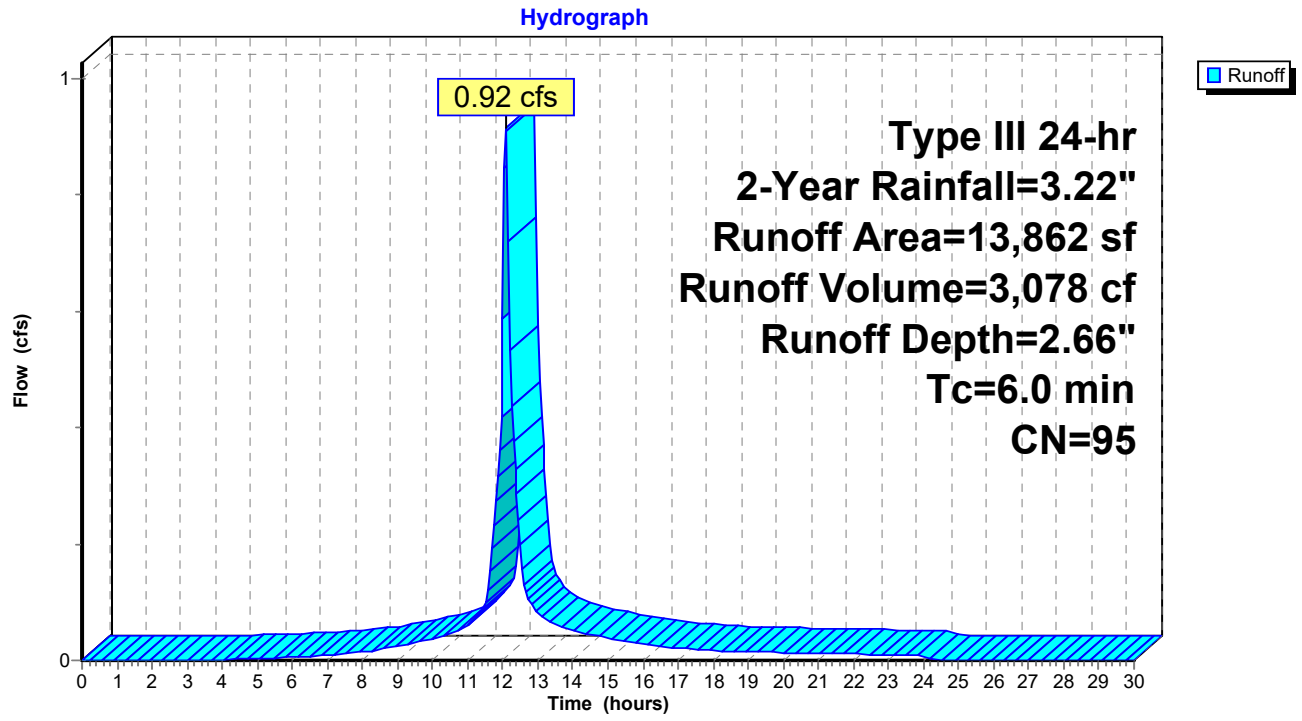
Runoff = 0.92 cfs @ 12.09 hrs, Volume= 3,078 cf, Depth= 2.66"
Routed to Pond 6P : BIORETENTION AREA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
10,060	98	Paved parking, HSG B
1,100	61	>75% Grass cover, Good, HSG B
2,702	98	Unconnected roofs, HSG B
13,862	95	Weighted Average
1,100		7.94% Pervious Area
12,762		92.06% Impervious Area
2,702		21.17% Unconnected

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

Subcatchment 3P: TRIB TO BIORETENTION AREA



Summary for Subcatchment 4P: ORIGINAL PARKING AREA

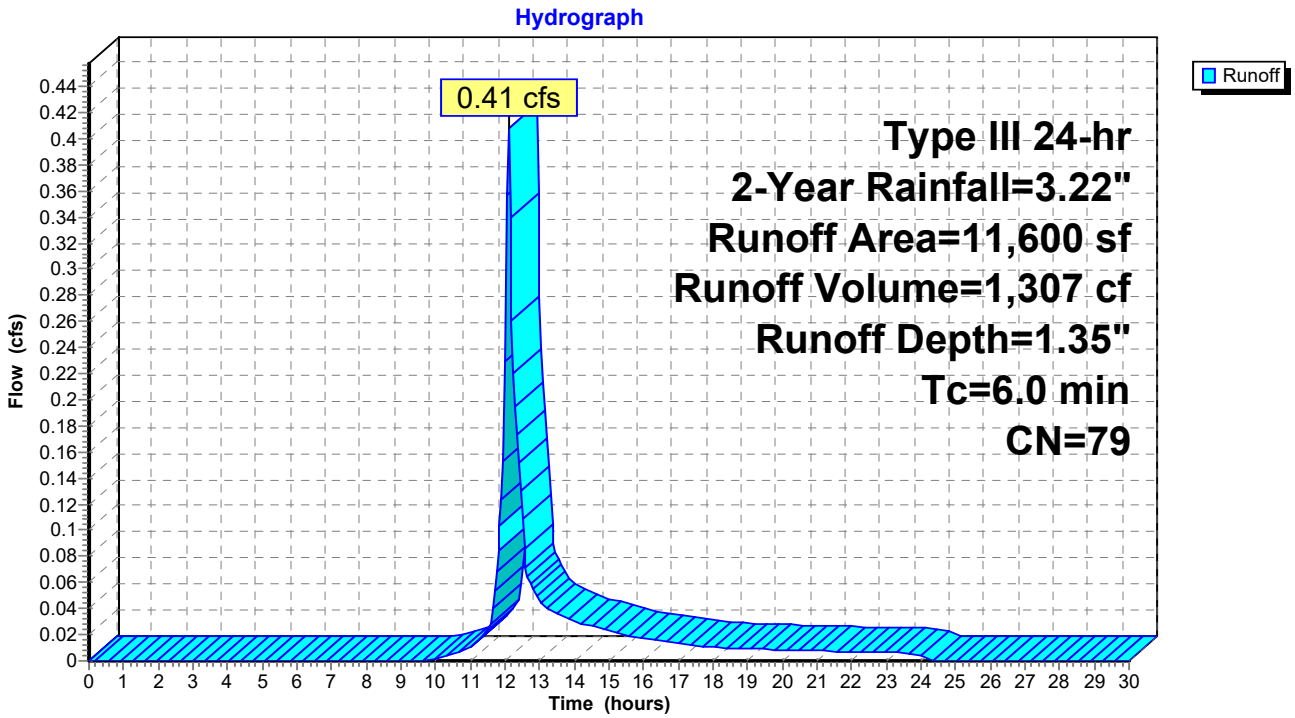
Runoff = 0.41 cfs @ 12.10 hrs, Volume= 1,307 cf, Depth= 1.35"
Routed to Pond 5P : INFILTRATION SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
5,830	98	Paved parking, HSG B
4,600	61	>75% Grass cover, Good, HSG B
1,170	55	Woods, Good, HSG B
11,600	79	Weighted Average
5,770		49.74% Pervious Area
5,830		50.26% Impervious Area

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

Subcatchment 4P: ORIGINAL PARKING AREA

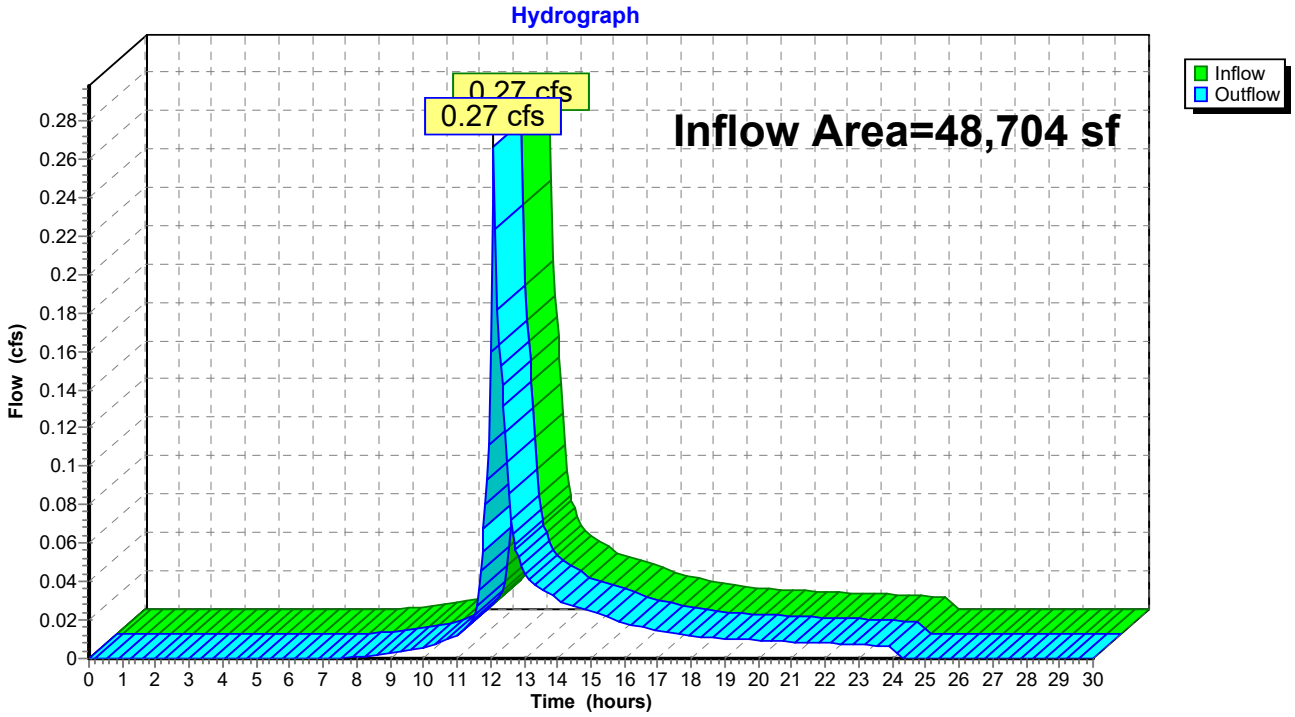


Summary for Reach SUM: SUM TO EAST MAIN STREET

Inflow Area = 48,704 sf, 45.02% Impervious, Inflow Depth = 0.30" for 2-Year event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 1,223 cf
Outflow = 0.27 cfs @ 12.09 hrs, Volume= 1,223 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach SUM: SUM TO EAST MAIN STREET



Summary for Pond 5P: INFILTRATION SYSTEM #1

Inflow Area = 25,462 sf, 73.02% Impervious, Inflow Depth = 1.40" for 2-Year event
Inflow = 1.25 cfs @ 12.10 hrs, Volume= 2,981 cf
Outflow = 0.11 cfs @ 11.75 hrs, Volume= 2,981 cf, Atten= 91%, Lag= 0.0 min
Discarded = 0.11 cfs @ 11.75 hrs, Volume= 2,981 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach SUM : SUM TO EAST MAIN STREET

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 184.59' @ 12.96 hrs Surf.Area= 1,977 sf Storage= 1,569 cf

Plug-Flow detention time= 131.2 min calculated for 2,976 cf (100% of inflow)
Center-of-Mass det. time= 131.1 min (919.9 - 788.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	183.25'	2,778 cf	**30.25'W x 65.37'L x 5.75'H Field A**
			11,370 cf Overall - 4,424 cf Embedded = 6,946 cf x 40.0% Voids
#2A	184.00'	4,424 cf	**Cultec R-902HD** x 68 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
			68 Chambers in 4 Rows
			Cap Storage= 2.8 cf x 2 x 4 rows = 22.1 cf
#3	189.00'	32 cf	**1.00'W x 23.00'L x 1.40'H Prismatoid**
		7,235 cf	Total Available Storage

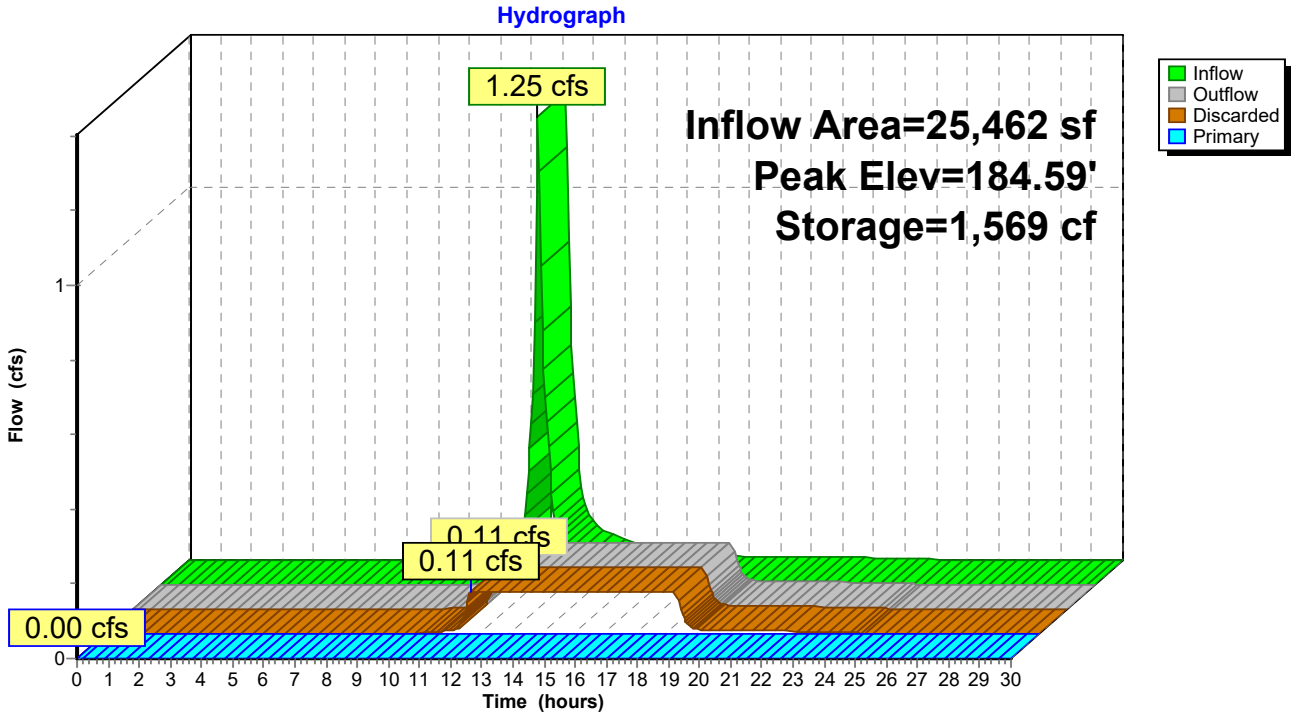
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	190.25'	**23.0' long x 1.40' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
			1.0' Crest Height

Discarded OutFlow Max=0.11 cfs @ 11.75 hrs HW=183.35' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.25' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: INFILTRATION SYSTEM #1



Summary for Pond 6P: BIORETENTION AREA

Inflow Area = 13,862 sf, 92.06% Impervious, Inflow Depth = 2.66" for 2-Year event
Inflow = 0.92 cfs @ 12.09 hrs, Volume= 3,078 cf
Outflow = 0.88 cfs @ 12.11 hrs, Volume= 3,078 cf, Atten= 5%, Lag= 1.2 min
Discarded = 0.03 cfs @ 12.11 hrs, Volume= 1,404 cf
Primary = 0.85 cfs @ 12.11 hrs, Volume= 1,674 cf
Routed to Pond 5P : INFILTRATION SYSTEM #1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 193.19' @ 12.11 hrs Surf.Area= 541 sf Storage= 291 cf

Plug-Flow detention time= 38.4 min calculated for 3,078 cf (100% of inflow)
Center-of-Mass det. time= 38.4 min (819.2 - 780.8)

Volume	Invert	Avail.Storage	Storage Description
#1	192.49'	850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

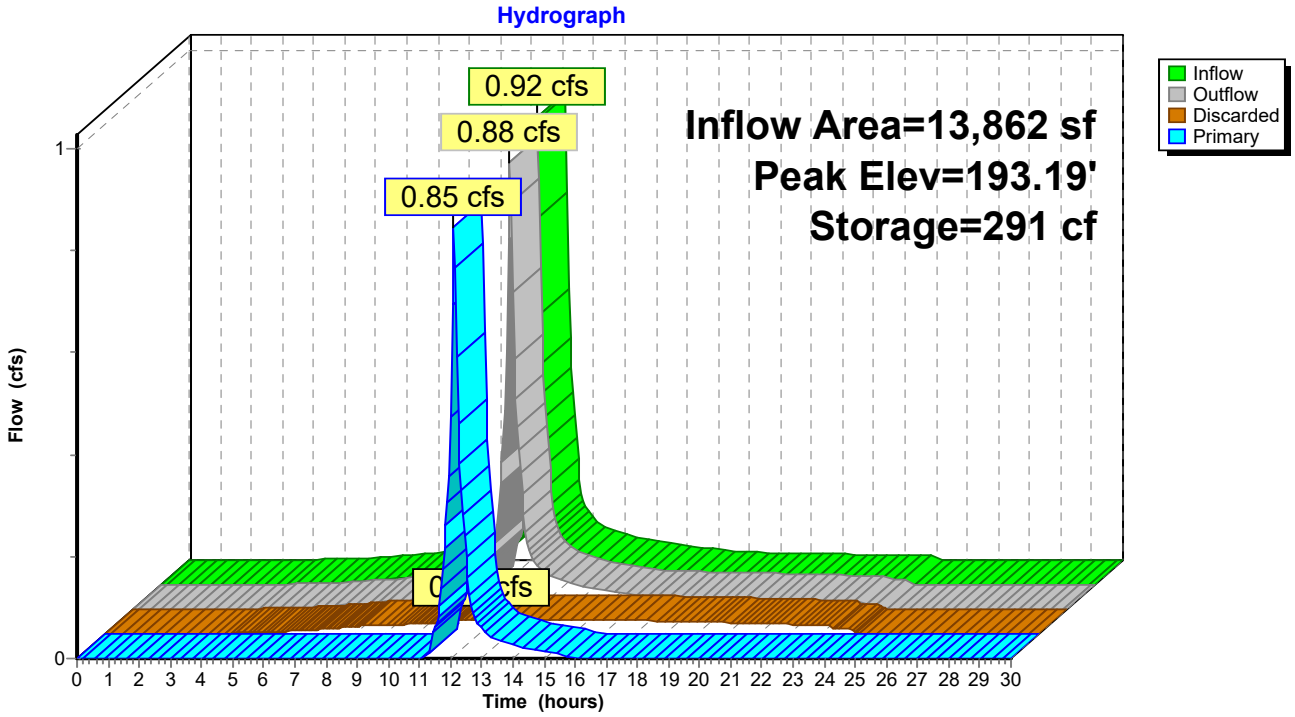
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.49	0	0	0
192.50	300	1	1
193.50	650	475	476
194.00	846	374	850

Device	Routing	Invert	Outlet Devices
#1	Device 3	193.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	192.49'	**2.410 in/hr Exfiltration over Surface area**
#3	Primary	190.50'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 190.50' / 186.65' S= 0.1925 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Primary	193.50'	**4.0' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.11 hrs HW=193.19' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.83 cfs @ 12.11 hrs HW=193.19' (Free Discharge)
├**3=Culvert** (Passes 0.83 cfs of 5.59 cfs potential flow)
│└**1=Orifice/Grate** (Weir Controls 0.83 cfs @ 1.41 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: BIORETENTION AREA



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST Runoff Area=18,047 sf 0.00% Impervious Runoff Depth=0.91"
Flow Length=264' Tc=11.7 min CN=55 Runoff=0.28 cfs 1,370 cf

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST Runoff Area=5,195 sf 64.20% Impervious Runoff Depth=3.44"
Tc=6.0 min CN=87 Runoff=0.46 cfs 1,487 cf

Subcatchment 3P: TRIB TO BIORETENTION AREA Runoff Area=13,862 sf 92.06% Impervious Runoff Depth=4.28"
Tc=6.0 min CN=95 Runoff=1.44 cfs 4,945 cf

Subcatchment 4P: ORIGINAL PARKING AREA Runoff Area=11,600 sf 50.26% Impervious Runoff Depth=2.68"
Tc=6.0 min CN=79 Runoff=0.82 cfs 2,592 cf

Reach SUM: SUM TO EAST MAIN STREET Inflow=0.66 cfs 2,858 cf
Outflow=0.66 cfs 2,858 cf

Pond 5P: INFILTRATION SYSTEM #1 Peak Elev=185.68' Storage=3,318 cf Inflow=2.16 cfs 5,790 cf
Discarded=0.11 cfs 5,790 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 5,790 cf

Pond 6P: BIORETENTION AREA Peak Elev=193.26' Storage=329 cf Inflow=1.44 cfs 4,945 cf
Discarded=0.03 cfs 1,747 cf Primary=1.35 cfs 3,198 cf Outflow=1.38 cfs 4,945 cf

Total Runoff Area = 48,704 sf Runoff Volume = 10,395 cf Average Runoff Depth = 2.56"
54.98% Pervious = 26,777 sf 45.02% Impervious = 21,927 sf

Summary for Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST

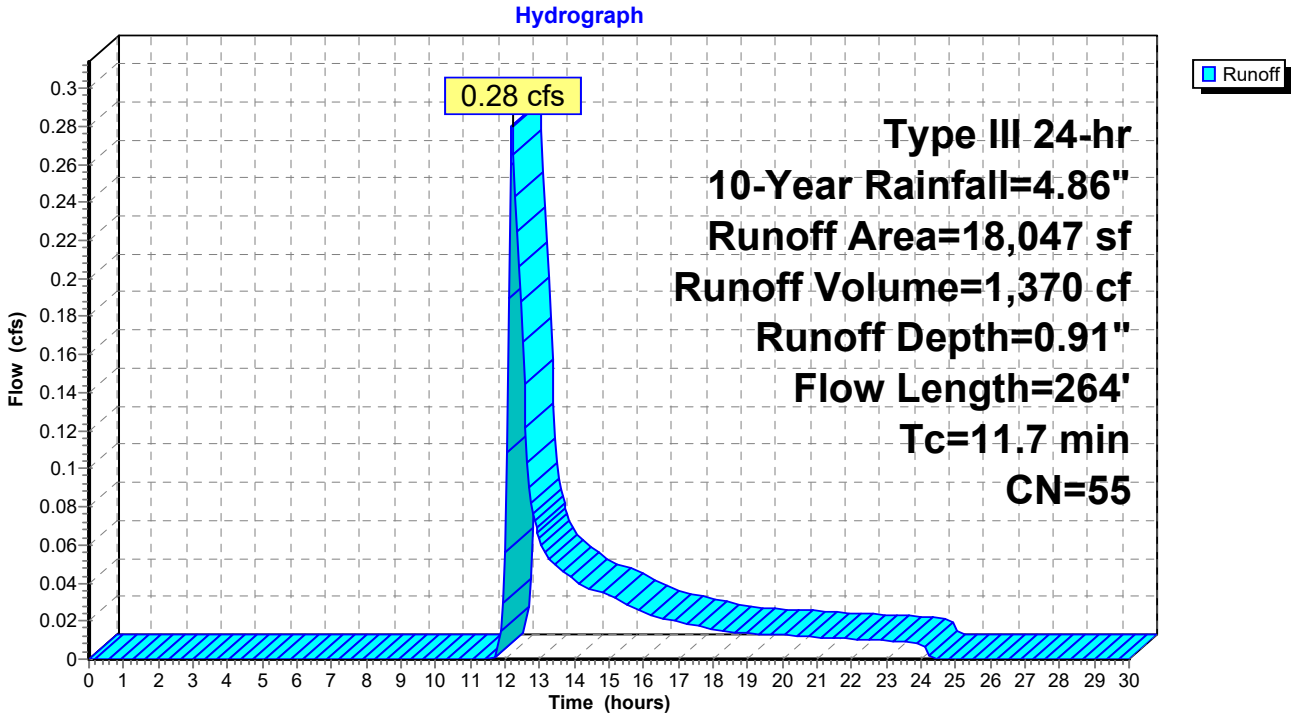
Runoff = 0.28 cfs @ 12.20 hrs, Volume= 1,370 cf, Depth= 0.91"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
18,047	55	Woods, Good, HSG B
18,047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0290	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
1.1	214	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	264	Total			

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST

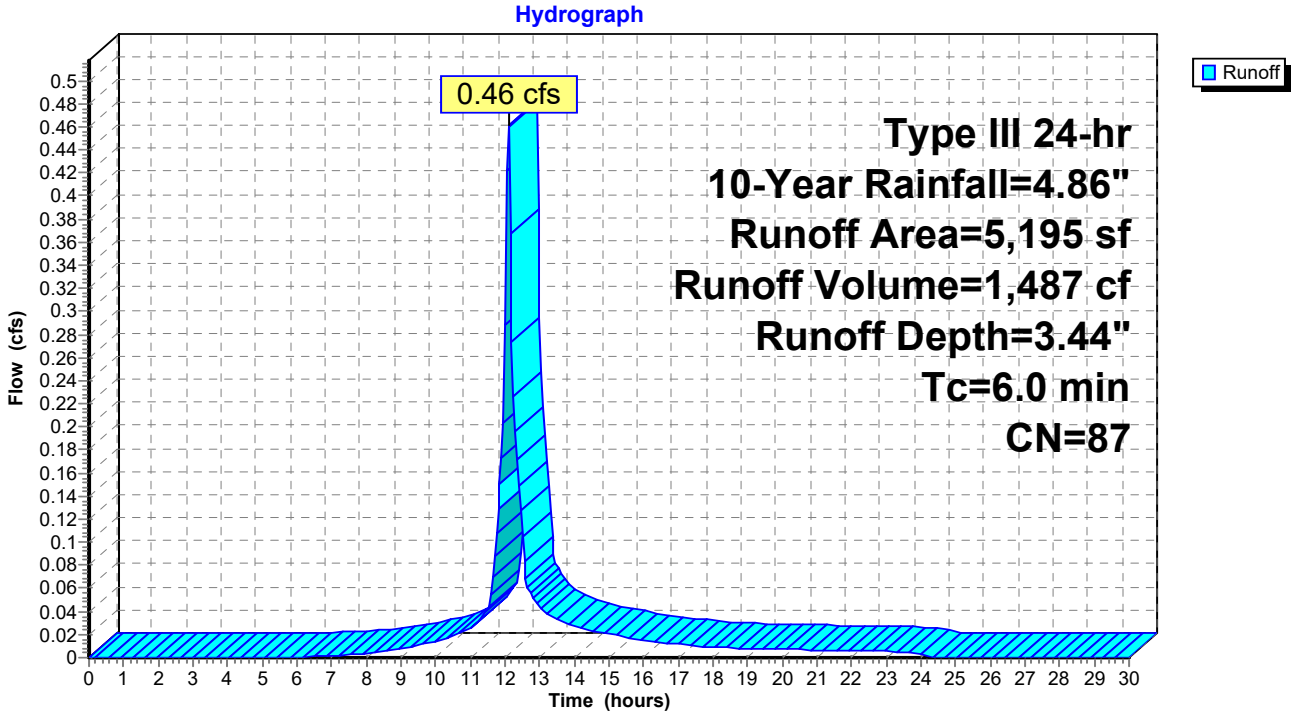
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 1,487 cf, Depth= 3.44"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
815	98	Paved parking, HSG B
1,490	61	>75% Grass cover, Good, HSG B
370	96	Gravel surface, HSG B
2,520	98	Unconnected roofs, HSG B
5,195	87	Weighted Average
1,860		35.80% Pervious Area
3,335		64.20% Impervious Area
2,520		75.56% Unconnected

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

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 3P: TRIB TO BIORETENTION AREA

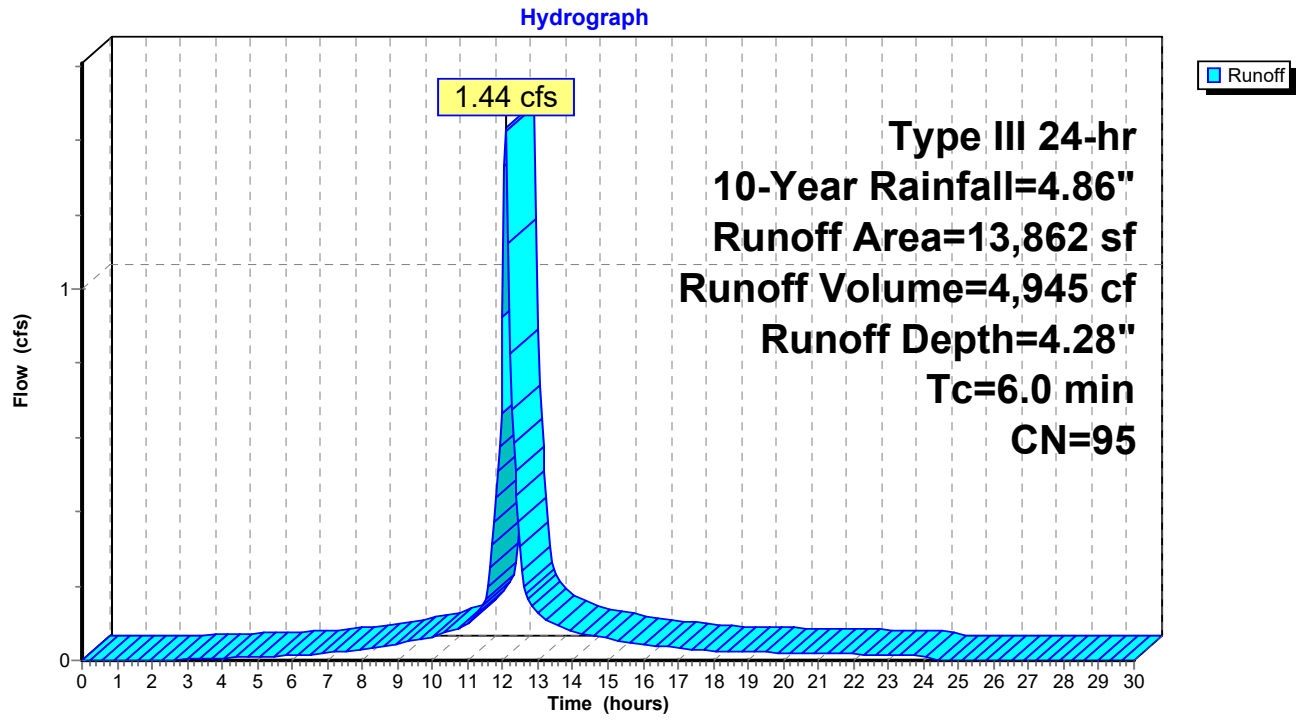
Runoff = 1.44 cfs @ 12.09 hrs, Volume= 4,945 cf, Depth= 4.28"
Routed to Pond 6P : BIORETENTION AREA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
10,060	98	Paved parking, HSG B
1,100	61	>75% Grass cover, Good, HSG B
2,702	98	Unconnected roofs, HSG B
13,862	95	Weighted Average
1,100		7.94% Pervious Area
12,762		92.06% Impervious Area
2,702		21.17% Unconnected

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

Subcatchment 3P: TRIB TO BIORETENTION AREA



Summary for Subcatchment 4P: ORIGINAL PARKING AREA

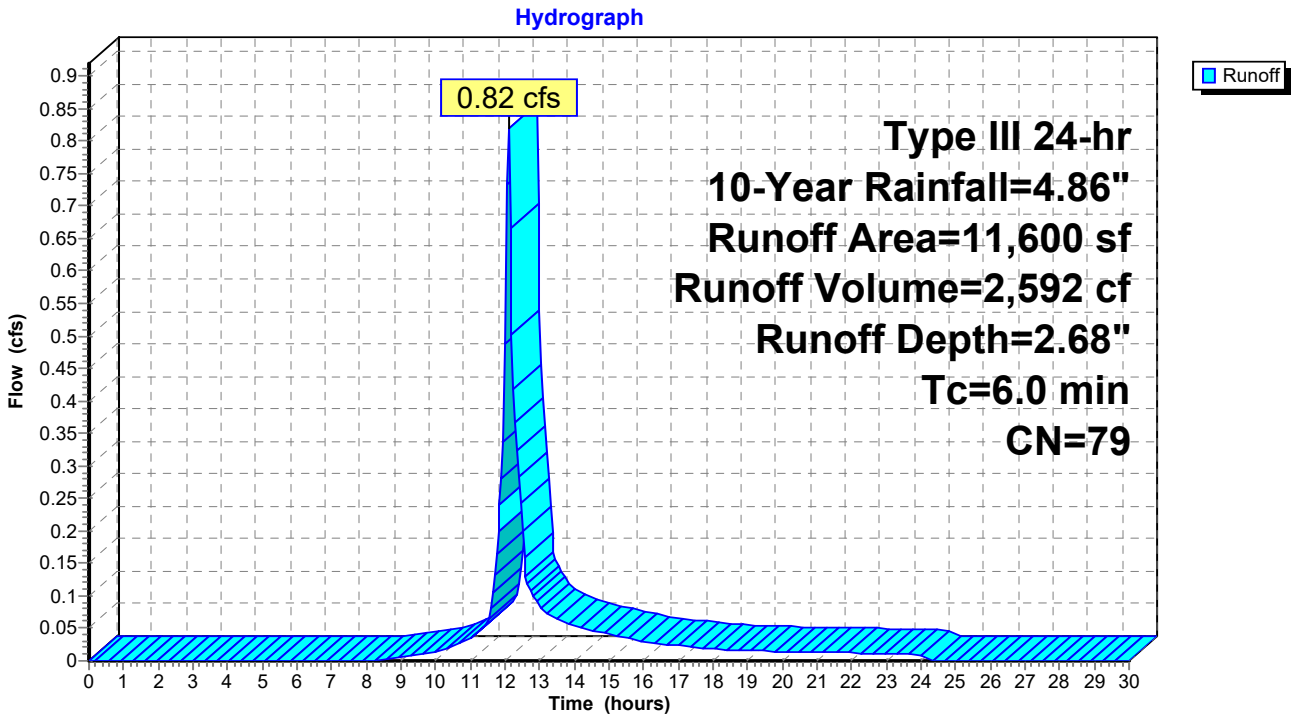
Runoff = 0.82 cfs @ 12.09 hrs, Volume= 2,592 cf, Depth= 2.68"
Routed to Pond 5P : INFILTRATION SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
5,830	98	Paved parking, HSG B
4,600	61	>75% Grass cover, Good, HSG B
1,170	55	Woods, Good, HSG B
11,600	79	Weighted Average
5,770		49.74% Pervious Area
5,830		50.26% Impervious Area

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

Subcatchment 4P: ORIGINAL PARKING AREA

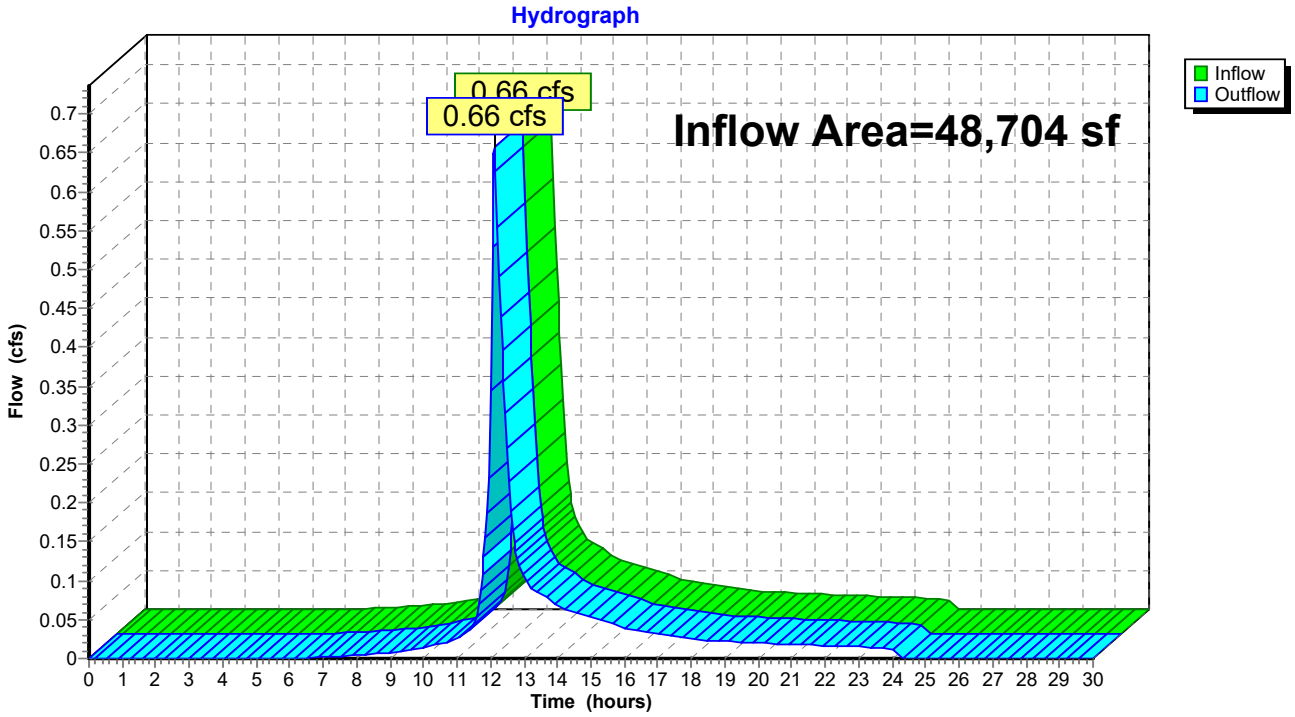


Summary for Reach SUM: SUM TO EAST MAIN STREET

Inflow Area = 48,704 sf, 45.02% Impervious, Inflow Depth = 0.70" for 10-Year event
Inflow = 0.66 cfs @ 12.12 hrs, Volume= 2,858 cf
Outflow = 0.66 cfs @ 12.12 hrs, Volume= 2,858 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach SUM: SUM TO EAST MAIN STREET



Summary for Pond 5P: INFILTRATION SYSTEM #1

Inflow Area = 25,462 sf, 73.02% Impervious, Inflow Depth = 2.73" for 10-Year event
Inflow = 2.16 cfs @ 12.10 hrs, Volume= 5,790 cf
Outflow = 0.11 cfs @ 11.25 hrs, Volume= 5,790 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.11 cfs @ 11.25 hrs, Volume= 5,790 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach SUM : SUM TO EAST MAIN STREET

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 185.68' @ 13.96 hrs Surf.Area= 1,977 sf Storage= 3,318 cf

Plug-Flow detention time= 281.6 min calculated for 5,780 cf (100% of inflow)
Center-of-Mass det. time= 281.3 min (1,062.4 - 781.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	183.25'	2,778 cf	**30.25'W x 65.37'L x 5.75'H Field A** 11,370 cf Overall - 4,424 cf Embedded = 6,946 cf x 40.0% Voids
#2A	184.00'	4,424 cf	**Cultec R-902HD** x 68 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 68 Chambers in 4 Rows Cap Storage= 2.8 cf x 2 x 4 rows = 22.1 cf
#3	189.00'	32 cf	**1.00'W x 23.00'L x 1.40'H Prismatoid**
		7,235 cf	Total Available Storage

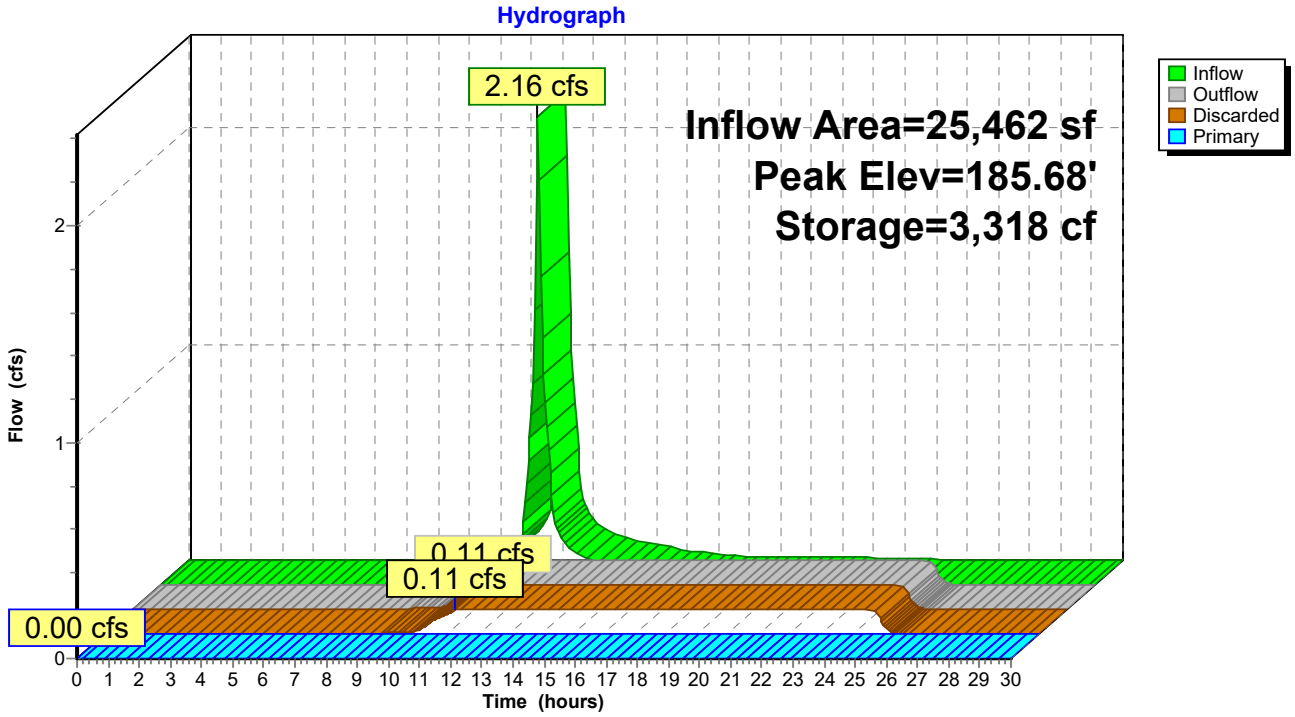
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	190.25'	**23.0' long x 1.40' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.11 cfs @ 11.25 hrs HW=183.34' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.25' (Free Discharge)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: INFILTRATION SYSTEM #1



Summary for Pond 6P: BIORETENTION AREA

Inflow Area = 13,862 sf, 92.06% Impervious, Inflow Depth = 4.28" for 10-Year event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 4,945 cf
Outflow = 1.38 cfs @ 12.11 hrs, Volume= 4,945 cf, Atten= 4%, Lag= 1.1 min
Discarded = 0.03 cfs @ 12.11 hrs, Volume= 1,747 cf
Primary = 1.35 cfs @ 12.11 hrs, Volume= 3,198 cf
Routed to Pond 5P : INFILTRATION SYSTEM #1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 193.26' @ 12.11 hrs Surf.Area= 565 sf Storage= 329 cf

Plug-Flow detention time= 34.3 min calculated for 4,937 cf (100% of inflow)
Center-of-Mass det. time= 34.3 min (803.3 - 769.0)

Volume	Invert	Avail.Storage	Storage Description
#1	192.49'	850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

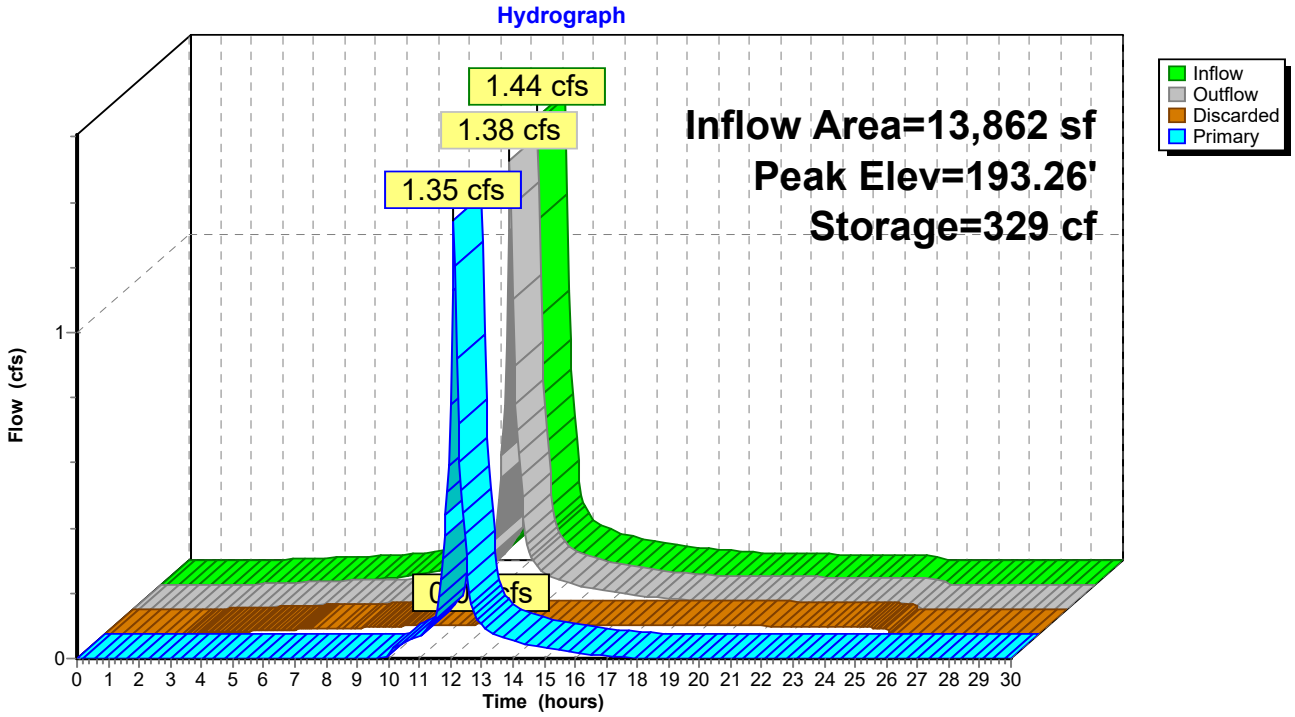
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.49	0	0	0
192.50	300	1	1
193.50	650	475	476
194.00	846	374	850

Device	Routing	Invert	Outlet Devices
#1	Device 3	193.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	192.49'	**2.410 in/hr Exfiltration over Surface area**
#3	Primary	190.50'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 190.50' / 186.65' S= 0.1925 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Primary	193.50'	**4.0' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.11 hrs HW=193.26' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.33 cfs @ 12.11 hrs HW=193.26' (Free Discharge)
├**3=Culvert** (Passes 1.33 cfs of 5.68 cfs potential flow)
│└**1=Orifice/Grate** (Weir Controls 1.33 cfs @ 1.65 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: BIORETENTION AREA



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST Runoff Area=18,047 sf 0.00% Impervious Runoff Depth=1.60"
Flow Length=264' Tc=11.7 min CN=55 Runoff=0.57 cfs 2,413 cf

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST Runoff Area=5,195 sf 64.20% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=87 Runoff=0.62 cfs 2,018 cf

Subcatchment 3P: TRIB TO BIORETENTION AREA Runoff Area=13,862 sf 92.06% Impervious Runoff Depth=5.56"
Tc=6.0 min CN=95 Runoff=1.84 cfs 6,423 cf

Subcatchment 4P: ORIGINAL PARKING AREA Runoff Area=11,600 sf 50.26% Impervious Runoff Depth=3.81"
Tc=6.0 min CN=79 Runoff=1.16 cfs 3,687 cf

Reach SUM: SUM TO EAST MAIN STREET Inflow=1.07 cfs 4,431 cf
Outflow=1.07 cfs 4,431 cf

Pond 5P: INFILTRATION SYSTEM #1 Peak Elev=186.79' Storage=4,982 cf Inflow=2.89 cfs 8,167 cf
Discarded=0.11 cfs 8,095 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 8,095 cf

Pond 6P: BIORETENTION AREA Peak Elev=193.31' Storage=357 cf Inflow=1.84 cfs 6,423 cf
Discarded=0.03 cfs 1,943 cf Primary=1.74 cfs 4,480 cf Outflow=1.77 cfs 6,423 cf

Total Runoff Area = 48,704 sf Runoff Volume = 14,541 cf Average Runoff Depth = 3.58"
54.98% Pervious = 26,777 sf 45.02% Impervious = 21,927 sf

Summary for Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST

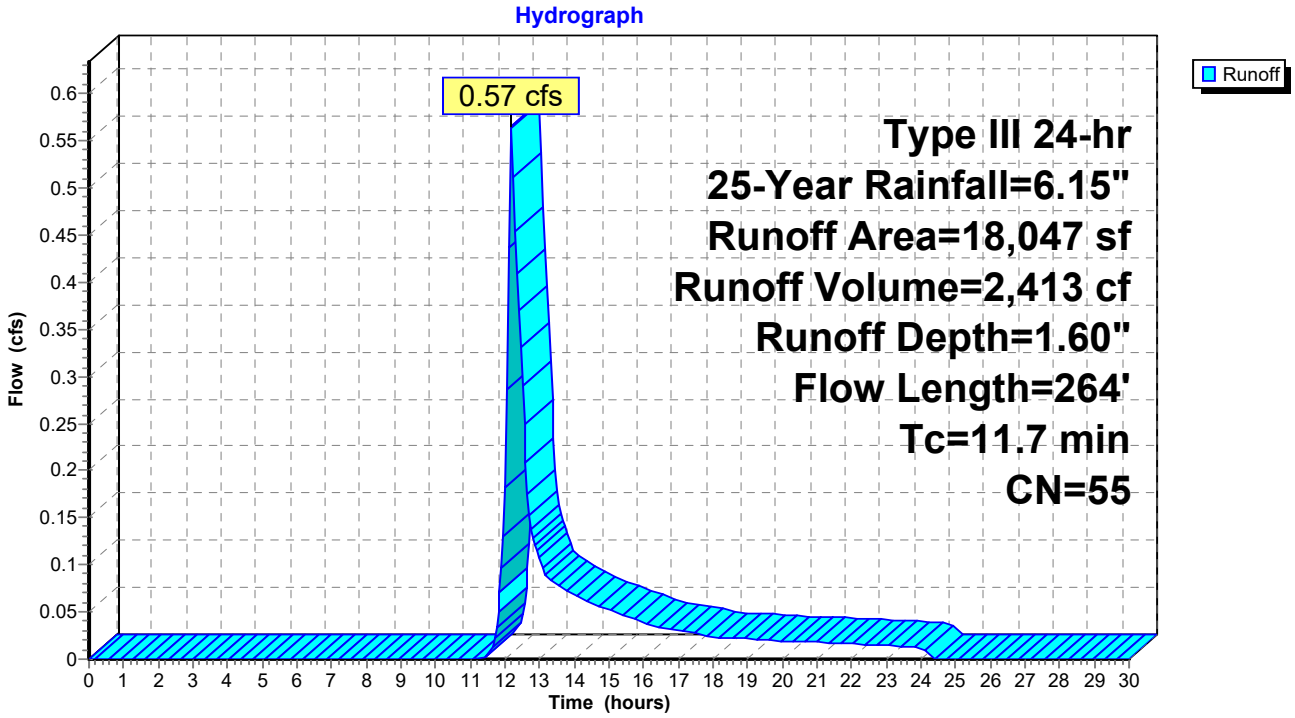
Runoff = 0.57 cfs @ 12.19 hrs, Volume= 2,413 cf, Depth= 1.60"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
18,047	55	Woods, Good, HSG B
18,047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0290	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
1.1	214	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	264	Total			

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST

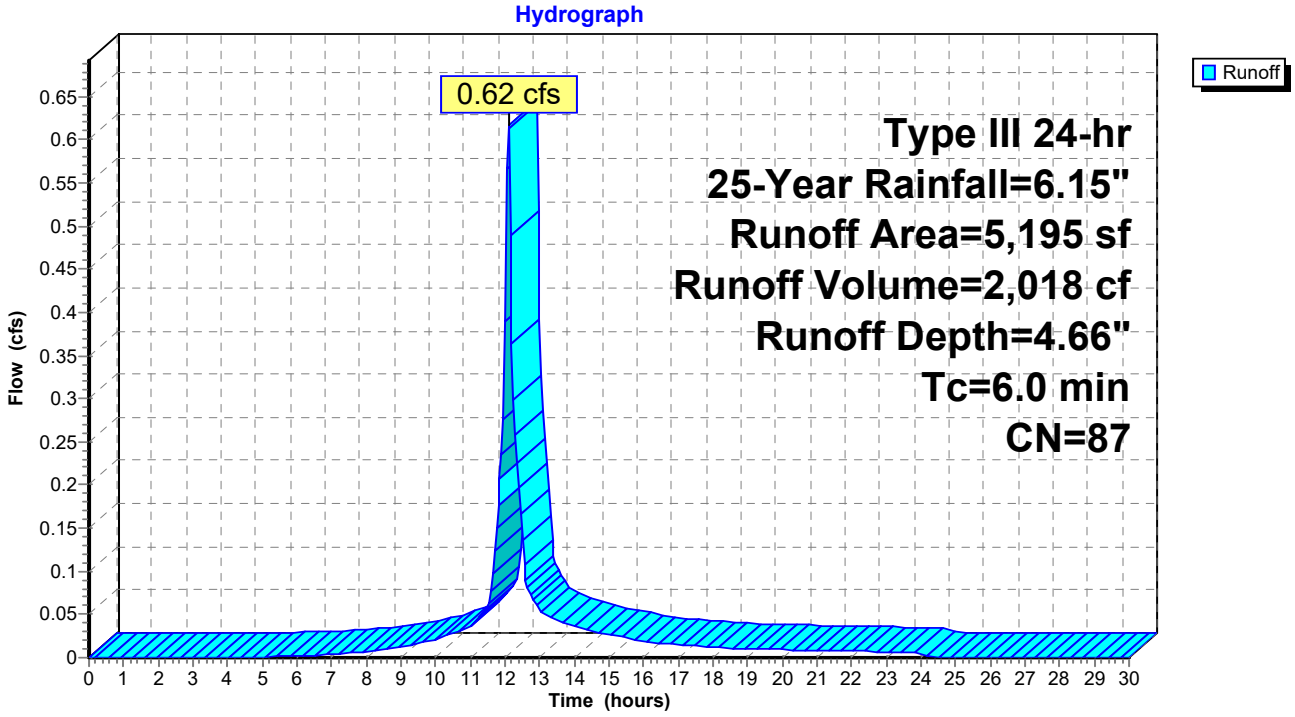
Runoff = 0.62 cfs @ 12.09 hrs, Volume= 2,018 cf, Depth= 4.66"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
815	98	Paved parking, HSG B
1,490	61	>75% Grass cover, Good, HSG B
370	96	Gravel surface, HSG B
2,520	98	Unconnected roofs, HSG B
5,195	87	Weighted Average
1,860		35.80% Pervious Area
3,335		64.20% Impervious Area
2,520		75.56% Unconnected

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

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 3P: TRIB TO BIORETENTION AREA

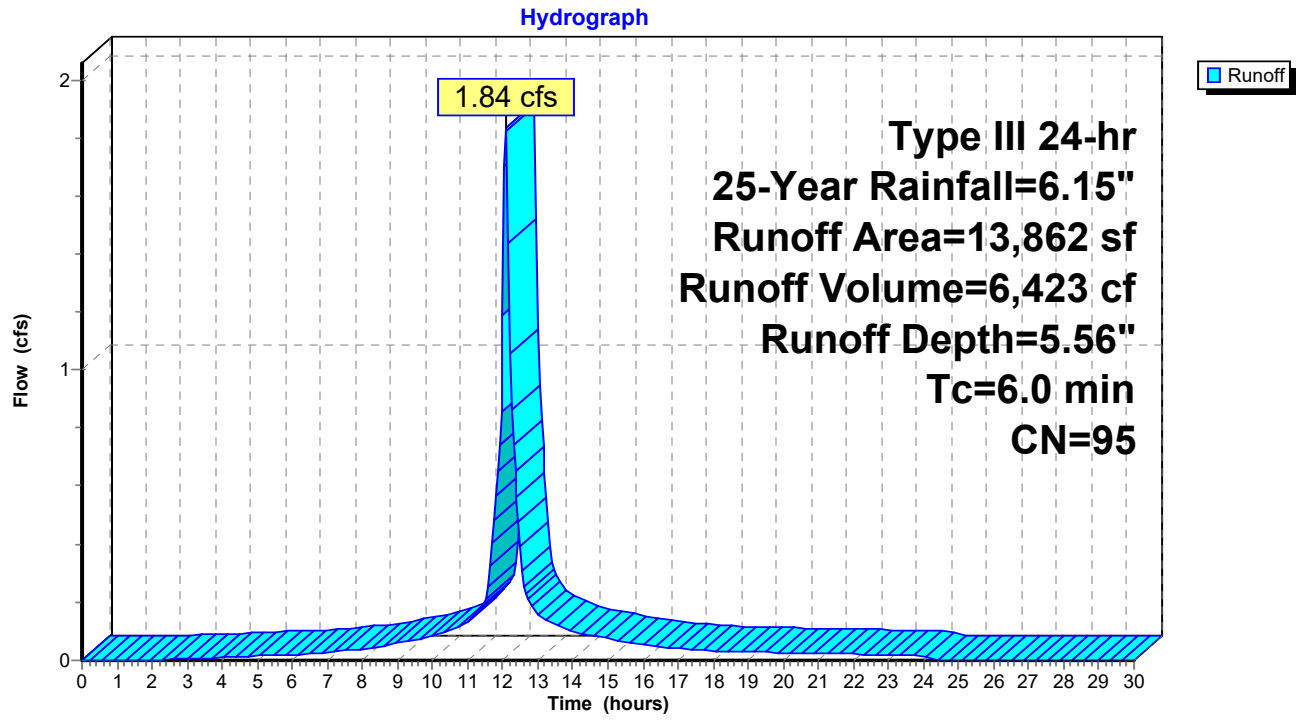
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 6,423 cf, Depth= 5.56"
Routed to Pond 6P : BIORETENTION AREA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
10,060	98	Paved parking, HSG B
1,100	61	>75% Grass cover, Good, HSG B
2,702	98	Unconnected roofs, HSG B
13,862	95	Weighted Average
1,100		7.94% Pervious Area
12,762		92.06% Impervious Area
2,702		21.17% Unconnected

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

Subcatchment 3P: TRIB TO BIORETENTION AREA



Summary for Subcatchment 4P: ORIGINAL PARKING AREA

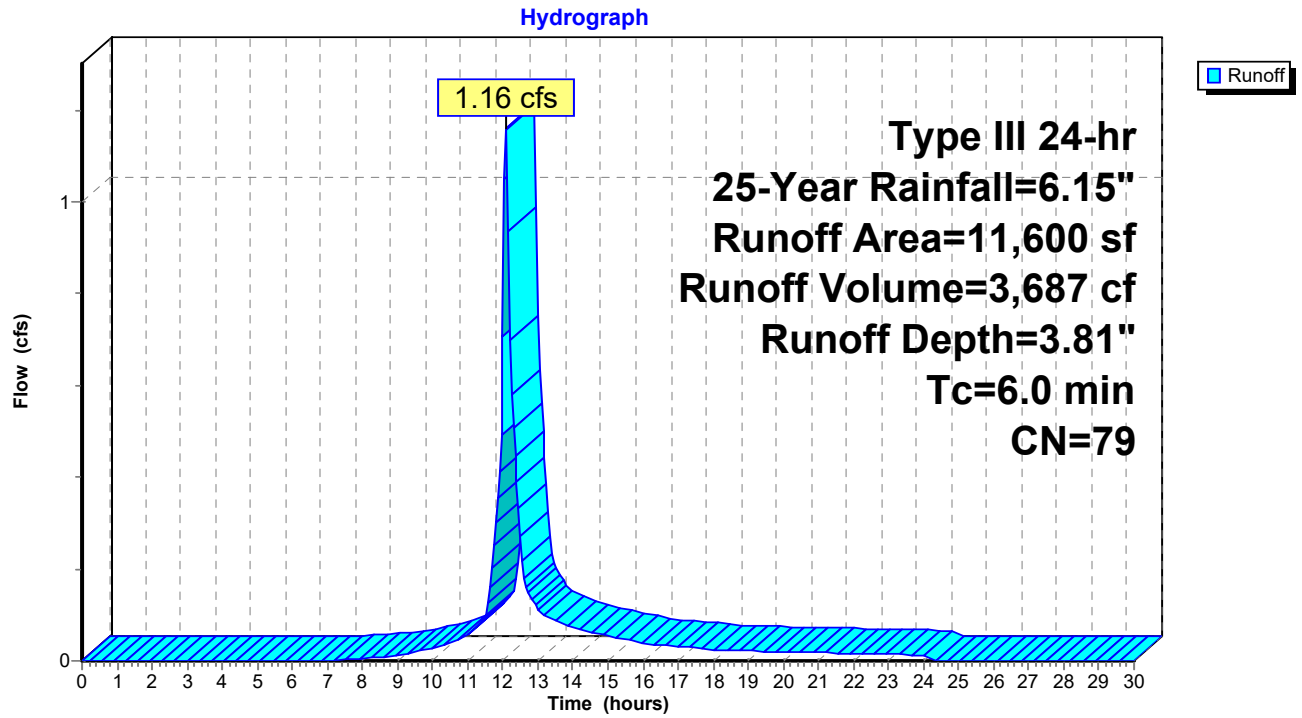
Runoff = 1.16 cfs @ 12.09 hrs, Volume= 3,687 cf, Depth= 3.81"
Routed to Pond 5P : INFILTRATION SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
5,830	98	Paved parking, HSG B
4,600	61	>75% Grass cover, Good, HSG B
1,170	55	Woods, Good, HSG B
11,600	79	Weighted Average
5,770		49.74% Pervious Area
5,830		50.26% Impervious Area

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

Subcatchment 4P: ORIGINAL PARKING AREA

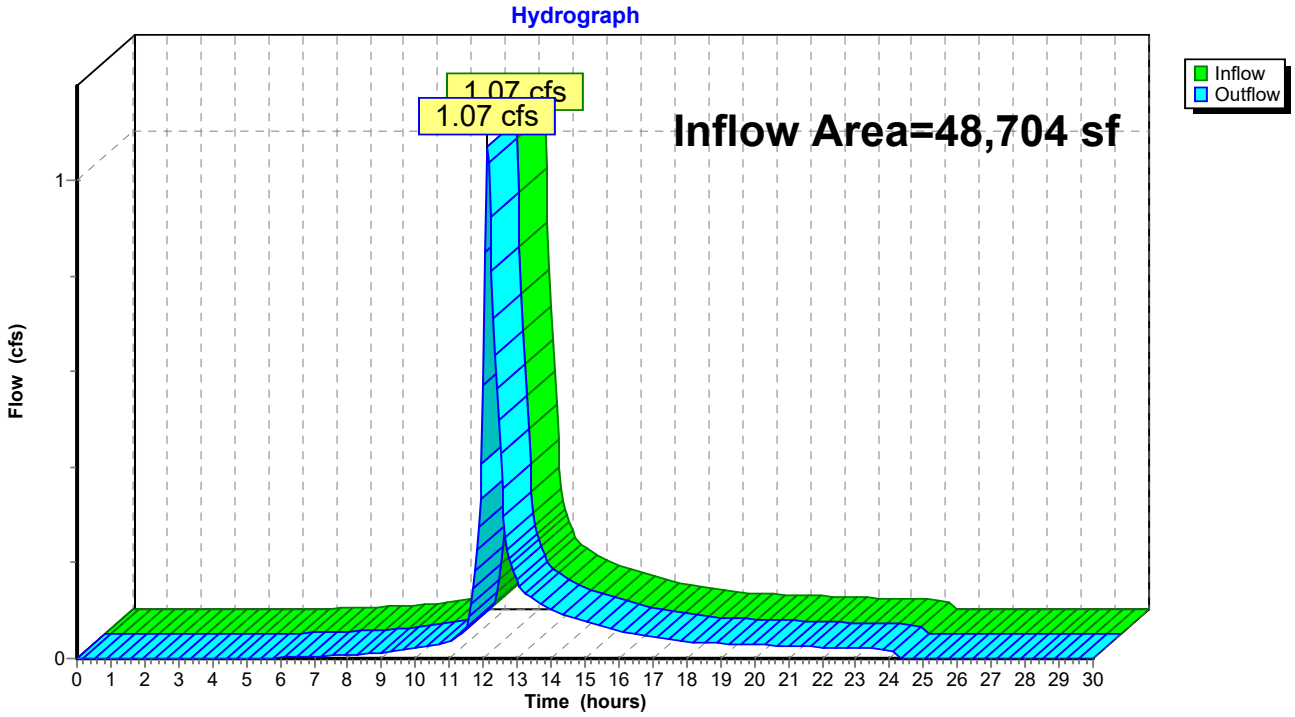


Summary for Reach SUM: SUM TO EAST MAIN STREET

Inflow Area = 48,704 sf, 45.02% Impervious, Inflow Depth = 1.09" for 25-Year event
Inflow = 1.07 cfs @ 12.12 hrs, Volume= 4,431 cf
Outflow = 1.07 cfs @ 12.12 hrs, Volume= 4,431 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach SUM: SUM TO EAST MAIN STREET



Summary for Pond 5P: INFILTRATION SYSTEM #1

Inflow Area = 25,462 sf, 73.02% Impervious, Inflow Depth = 3.85" for 25-Year event
Inflow = 2.89 cfs @ 12.10 hrs, Volume= 8,167 cf
Outflow = 0.11 cfs @ 10.65 hrs, Volume= 8,095 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.11 cfs @ 10.65 hrs, Volume= 8,095 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach SUM : SUM TO EAST MAIN STREET

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 186.79' @ 14.86 hrs Surf.Area= 1,977 sf Storage= 4,982 cf

Plug-Flow detention time= 418.2 min calculated for 8,095 cf (99% of inflow)
Center-of-Mass det. time= 412.6 min (1,189.3 - 776.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	183.25'	2,778 cf	**30.25'W x 65.37'L x 5.75'H Field A**
			11,370 cf Overall - 4,424 cf Embedded = 6,946 cf x 40.0% Voids
#2A	184.00'	4,424 cf	**Cultec R-902HD** x 68 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
			68 Chambers in 4 Rows
			Cap Storage= 2.8 cf x 2 x 4 rows = 22.1 cf
#3	189.00'	32 cf	**1.00'W x 23.00'L x 1.40'H Prismatoid**
		7,235 cf	Total Available Storage

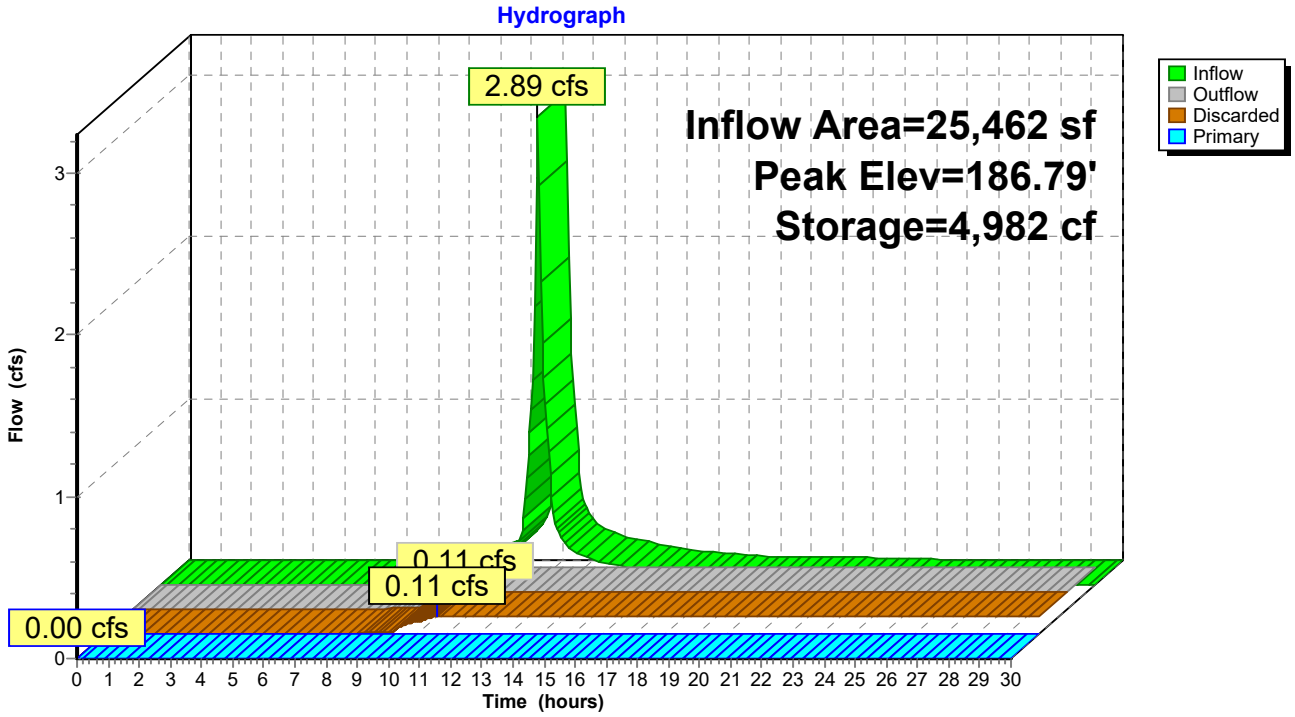
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	190.25'	**23.0' long x 1.40' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
			1.0' Crest Height

Discarded OutFlow Max=0.11 cfs @ 10.65 hrs HW=183.34' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.25' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: INFILTRATION SYSTEM #1



Summary for Pond 6P: BIORETENTION AREA

Inflow Area = 13,862 sf, 92.06% Impervious, Inflow Depth = 5.56" for 25-Year event
Inflow = 1.84 cfs @ 12.09 hrs, Volume= 6,423 cf
Outflow = 1.77 cfs @ 12.10 hrs, Volume= 6,423 cf, Atten= 4%, Lag= 1.0 min
Discarded = 0.03 cfs @ 12.10 hrs, Volume= 1,943 cf
Primary = 1.74 cfs @ 12.10 hrs, Volume= 4,480 cf
Routed to Pond 5P : INFILTRATION SYSTEM #1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 193.31' @ 12.10 hrs Surf.Area= 582 sf Storage= 357 cf

Plug-Flow detention time= 31.1 min calculated for 6,412 cf (100% of inflow)
Center-of-Mass det. time= 31.2 min (794.3 - 763.0)

Volume	Invert	Avail.Storage	Storage Description
#1	192.49'	850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

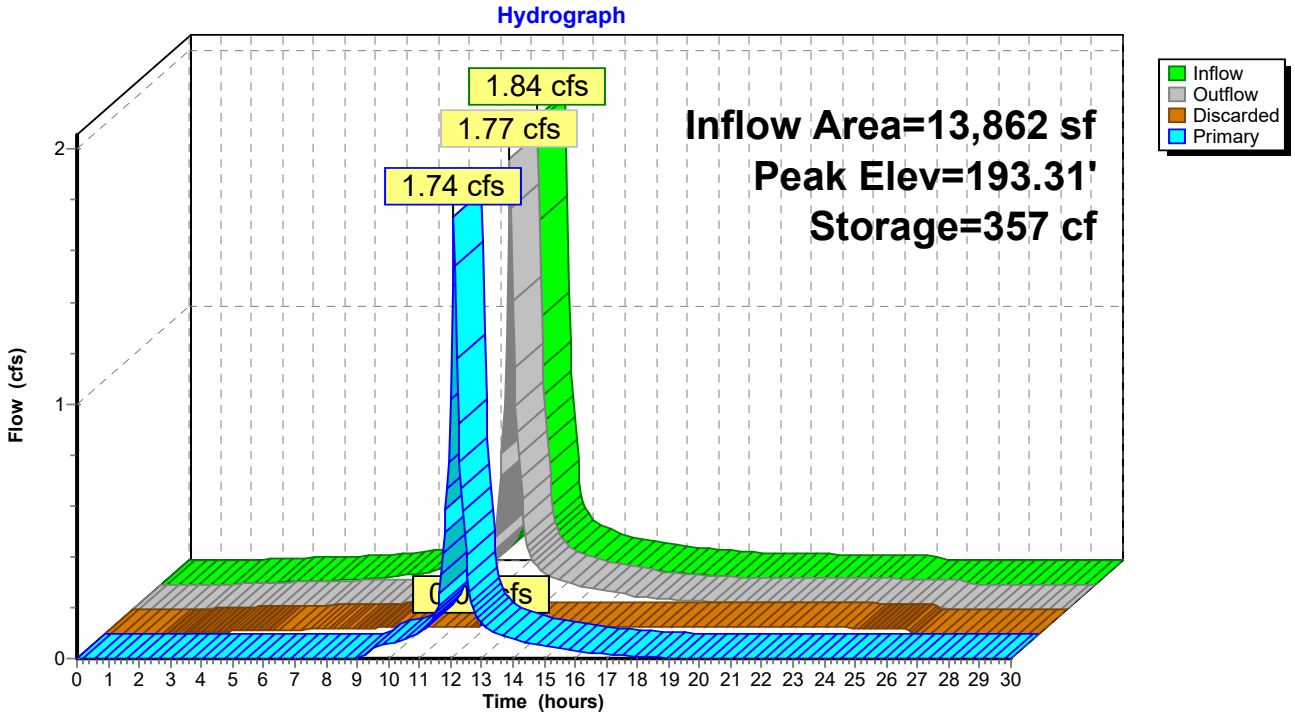
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.49	0	0	0
192.50	300	1	1
193.50	650	475	476
194.00	846	374	850

Device	Routing	Invert	Outlet Devices
#1	Device 3	193.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	192.49'	**2.410 in/hr Exfiltration over Surface area**
#3	Primary	190.50'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 190.50' / 186.65' S= 0.1925 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Primary	193.50'	**4.0' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.10 hrs HW=193.30' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.72 cfs @ 12.10 hrs HW=193.30' (Free Discharge)
├**3=Culvert** (Passes 1.72 cfs of 5.74 cfs potential flow)
│└**1=Orifice/Grate** (Weir Controls 1.72 cfs @ 1.80 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: BIORETENTION AREA



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST Runoff Area=18,047 sf 0.00% Impervious Runoff Depth=2.35"
Flow Length=264' Tc=11.7 min CN=55 Runoff=0.87 cfs 3,533 cf

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST Runoff Area=5,195 sf 64.20% Impervious Runoff Depth=5.82"
Tc=6.0 min CN=87 Runoff=0.76 cfs 2,519 cf

Subcatchment 3P: TRIB TO BIORETENTION AREA Runoff Area=13,862 sf 92.06% Impervious Runoff Depth=6.75"
Tc=6.0 min CN=95 Runoff=2.21 cfs 7,802 cf

Subcatchment 4P: ORIGINAL PARKING AREA Runoff Area=11,600 sf 50.26% Impervious Runoff Depth=4.91"
Tc=6.0 min CN=79 Runoff=1.49 cfs 4,742 cf

Reach SUM: SUM TO EAST MAIN STREET Inflow=1.48 cfs 6,052 cf
Outflow=1.48 cfs 6,052 cf

Pond 5P: INFILTRATION SYSTEM #1 Peak Elev=188.37' Storage=6,707 cf Inflow=3.58 cfs 10,474 cf
Discarded=0.11 cfs 8,354 cf Primary=0.00 cfs 0 cf Outflow=0.11 cfs 8,354 cf

Pond 6P: BIORETENTION AREA Peak Elev=193.35' Storage=381 cf Inflow=2.21 cfs 7,802 cf
Discarded=0.03 cfs 2,070 cf Primary=2.10 cfs 5,732 cf Outflow=2.13 cfs 7,802 cf

Total Runoff Area = 48,704 sf Runoff Volume = 18,596 cf Average Runoff Depth = 4.58"
54.98% Pervious = 26,777 sf 45.02% Impervious = 21,927 sf

Summary for Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST

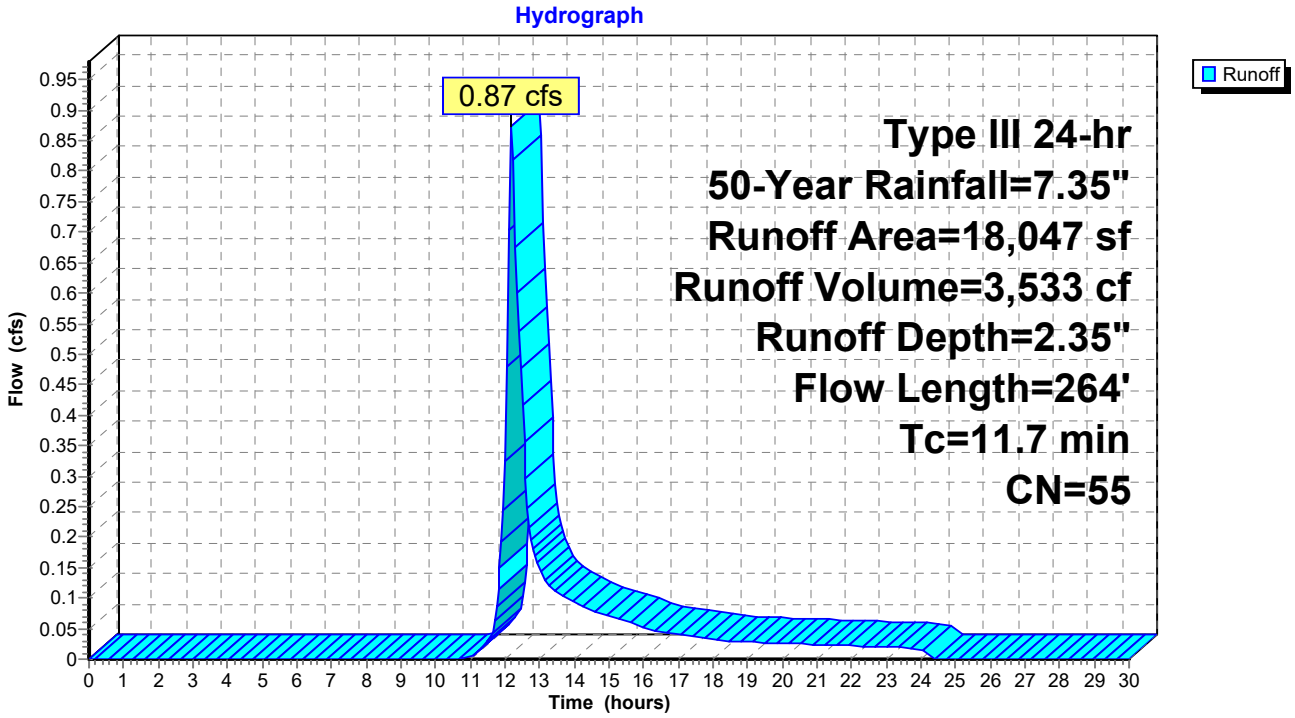
Runoff = 0.87 cfs @ 12.18 hrs, Volume= 3,533 cf, Depth= 2.35"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.35"

Area (sf)	CN	Description
18,047	55	Woods, Good, HSG B
18,047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0290	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
1.1	214	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	264	Total			

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST

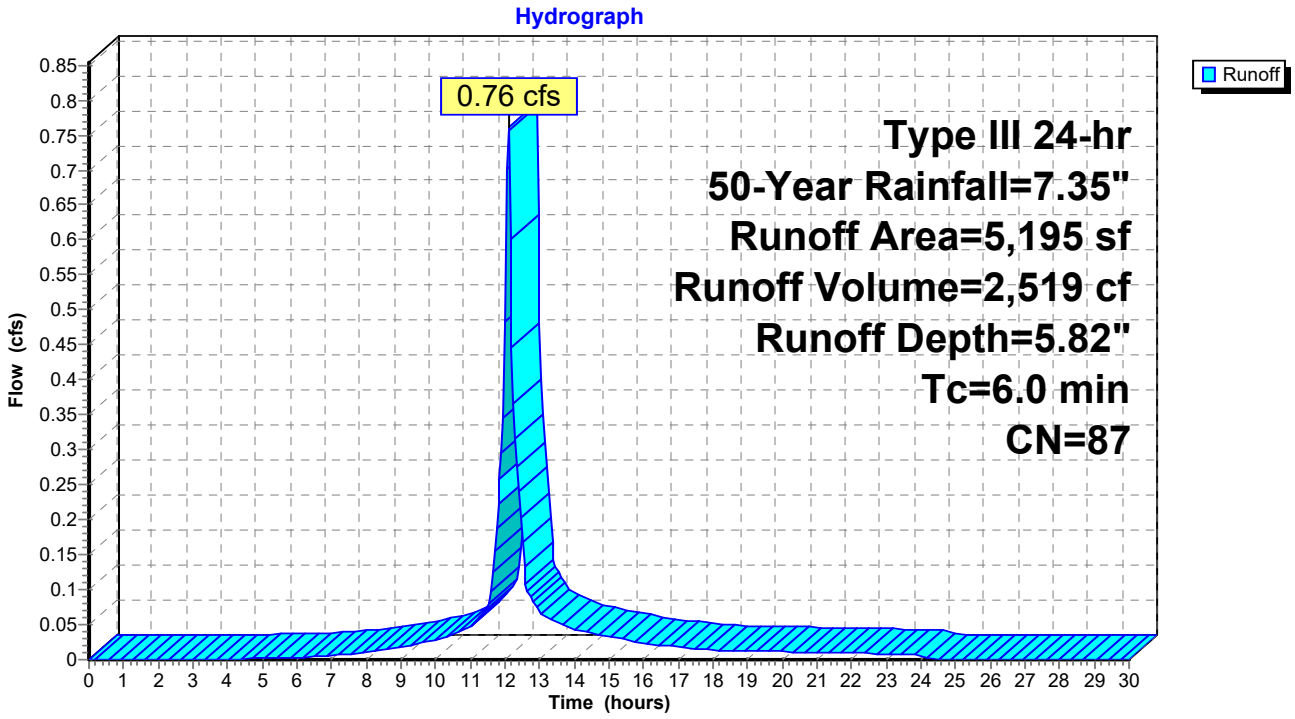
Runoff = 0.76 cfs @ 12.09 hrs, Volume= 2,519 cf, Depth= 5.82"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.35"

Area (sf)	CN	Description
815	98	Paved parking, HSG B
1,490	61	>75% Grass cover, Good, HSG B
370	96	Gravel surface, HSG B
2,520	98	Unconnected roofs, HSG B
5,195	87	Weighted Average
1,860		35.80% Pervious Area
3,335		64.20% Impervious Area
2,520		75.56% Unconnected

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

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 3P: TRIB TO BIORETENTION AREA

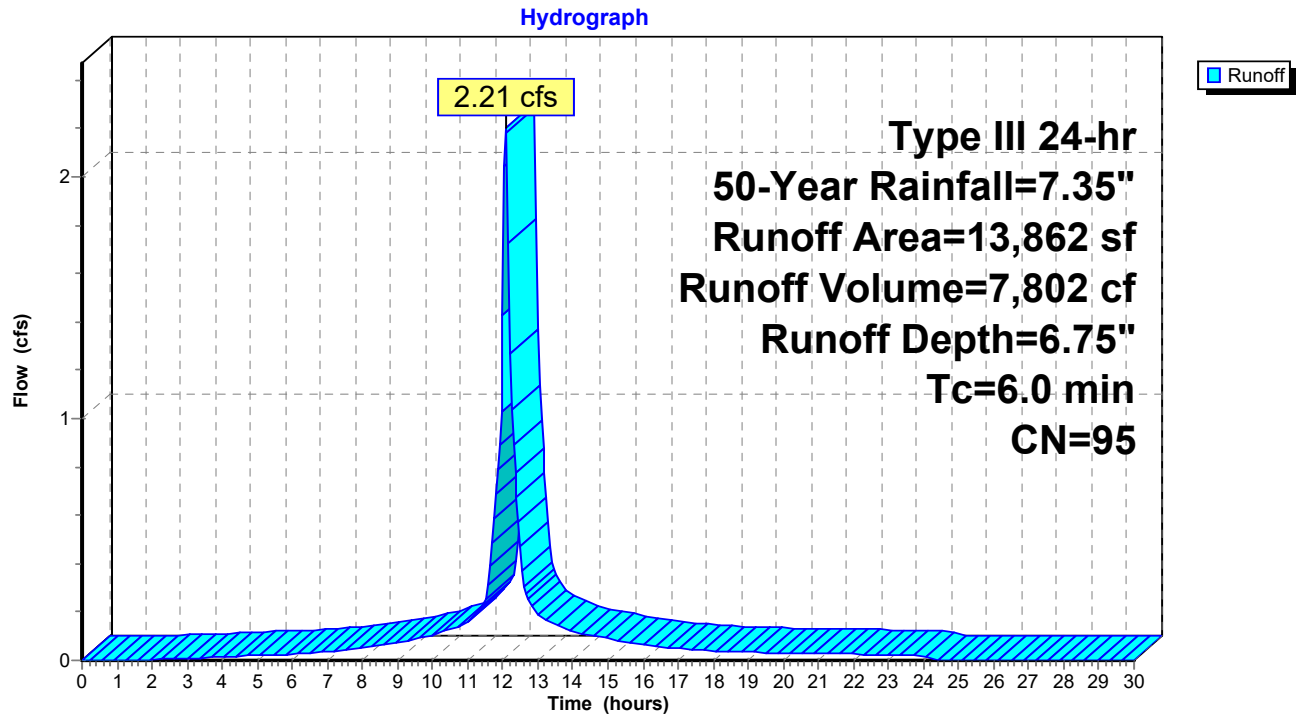
Runoff = 2.21 cfs @ 12.09 hrs, Volume= 7,802 cf, Depth= 6.75"
Routed to Pond 6P : BIORETENTION AREA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.35"

Area (sf)	CN	Description
10,060	98	Paved parking, HSG B
1,100	61	>75% Grass cover, Good, HSG B
2,702	98	Unconnected roofs, HSG B
13,862	95	Weighted Average
1,100		7.94% Pervious Area
12,762		92.06% Impervious Area
2,702		21.17% Unconnected

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

Subcatchment 3P: TRIB TO BIORETENTION AREA



Summary for Subcatchment 4P: ORIGINAL PARKING AREA

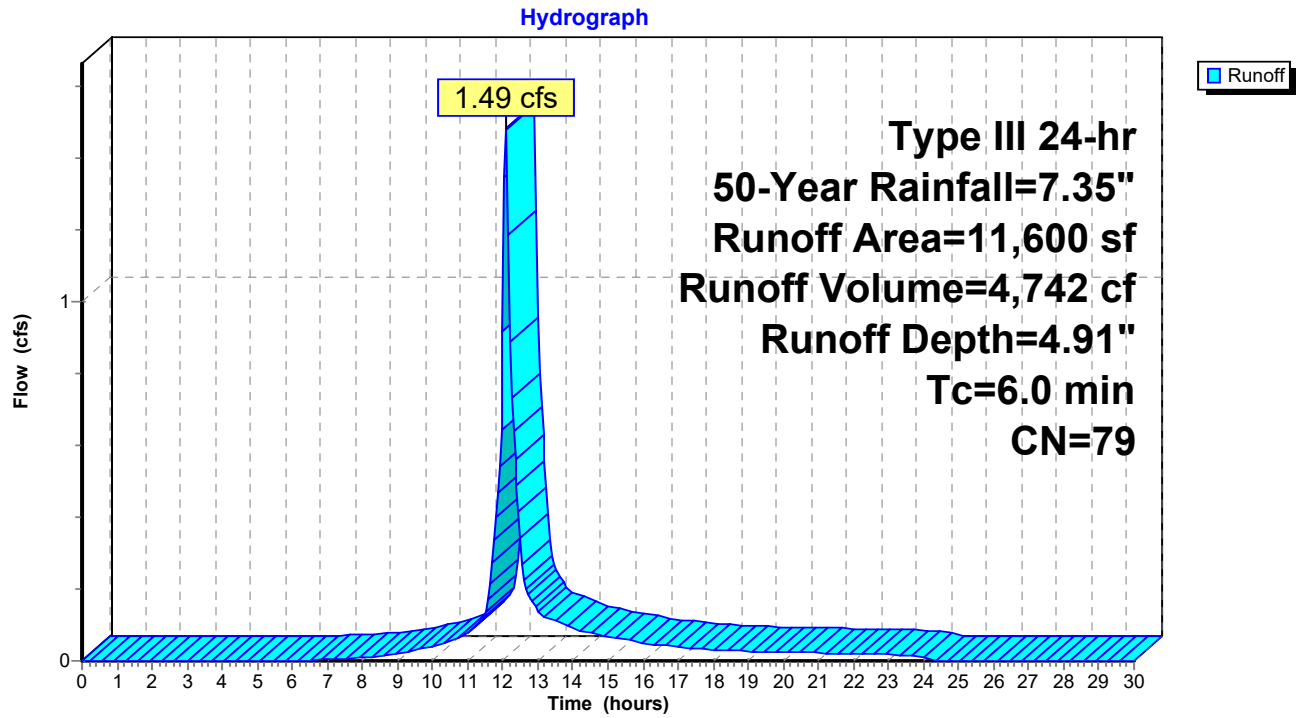
Runoff = 1.49 cfs @ 12.09 hrs, Volume= 4,742 cf, Depth= 4.91"
Routed to Pond 5P : INFILTRATION SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.35"

Area (sf)	CN	Description
5,830	98	Paved parking, HSG B
4,600	61	>75% Grass cover, Good, HSG B
1,170	55	Woods, Good, HSG B
11,600	79	Weighted Average
5,770		49.74% Pervious Area
5,830		50.26% Impervious Area

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

Subcatchment 4P: ORIGINAL PARKING AREA

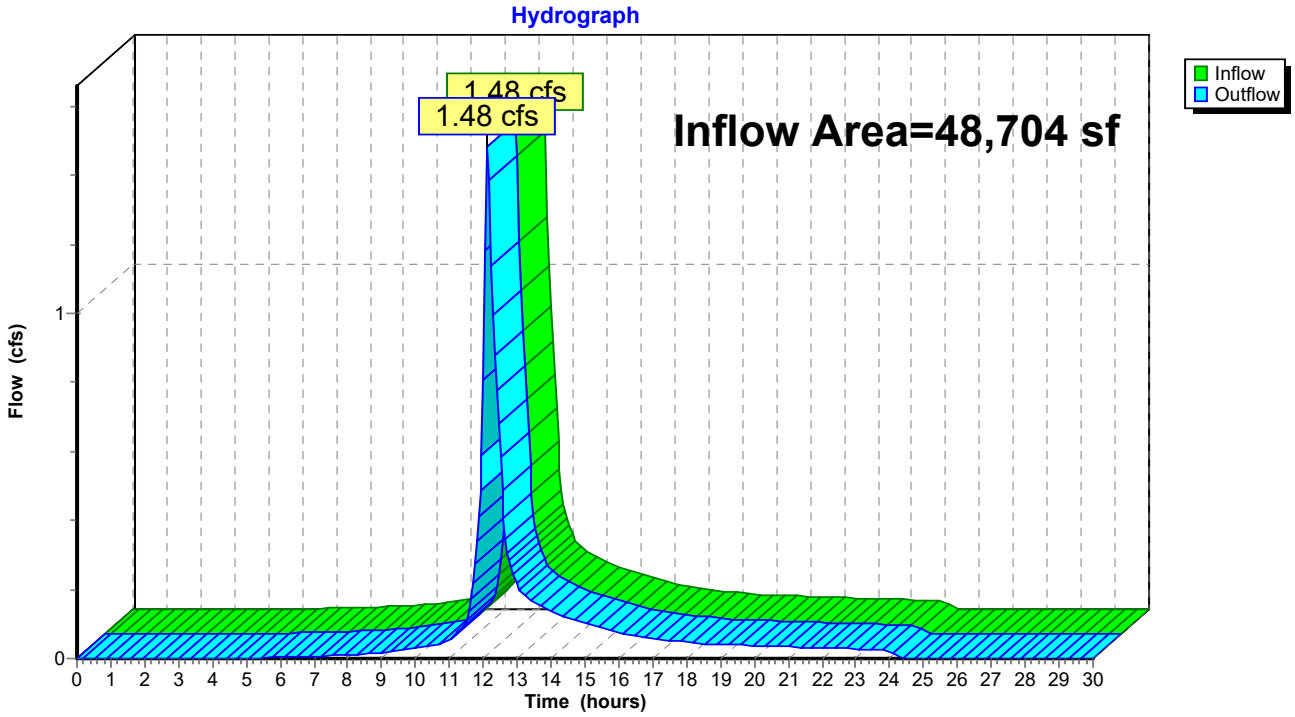


Summary for Reach SUM: SUM TO EAST MAIN STREET

Inflow Area = 48,704 sf, 45.02% Impervious, Inflow Depth = 1.49" for 50-Year event
Inflow = 1.48 cfs @ 12.13 hrs, Volume= 6,052 cf
Outflow = 1.48 cfs @ 12.13 hrs, Volume= 6,052 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach SUM: SUM TO EAST MAIN STREET



Summary for Pond 5P: INFILTRATION SYSTEM #1

Inflow Area = 25,462 sf, 73.02% Impervious, Inflow Depth = 4.94" for 50-Year event
Inflow = 3.58 cfs @ 12.10 hrs, Volume= 10,474 cf
Outflow = 0.11 cfs @ 10.10 hrs, Volume= 8,354 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.11 cfs @ 10.10 hrs, Volume= 8,354 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Reach SUM : SUM TO EAST MAIN STREET

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 188.37' @ 15.49 hrs Surf.Area= 1,977 sf Storage= 6,707 cf

Plug-Flow detention time= 452.5 min calculated for 8,340 cf (80% of inflow)
Center-of-Mass det. time= 395.5 min (1,169.7 - 774.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	183.25'	2,778 cf	**30.25'W x 65.37'L x 5.75'H Field A**
			11,370 cf Overall - 4,424 cf Embedded = 6,946 cf x 40.0% Voids
#2A	184.00'	4,424 cf	**Cultec R-902HD** x 68 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
			68 Chambers in 4 Rows
			Cap Storage= 2.8 cf x 2 x 4 rows = 22.1 cf
#3	189.00'	32 cf	**1.00'W x 23.00'L x 1.40'H Prismatoid**
		7,235 cf	Total Available Storage

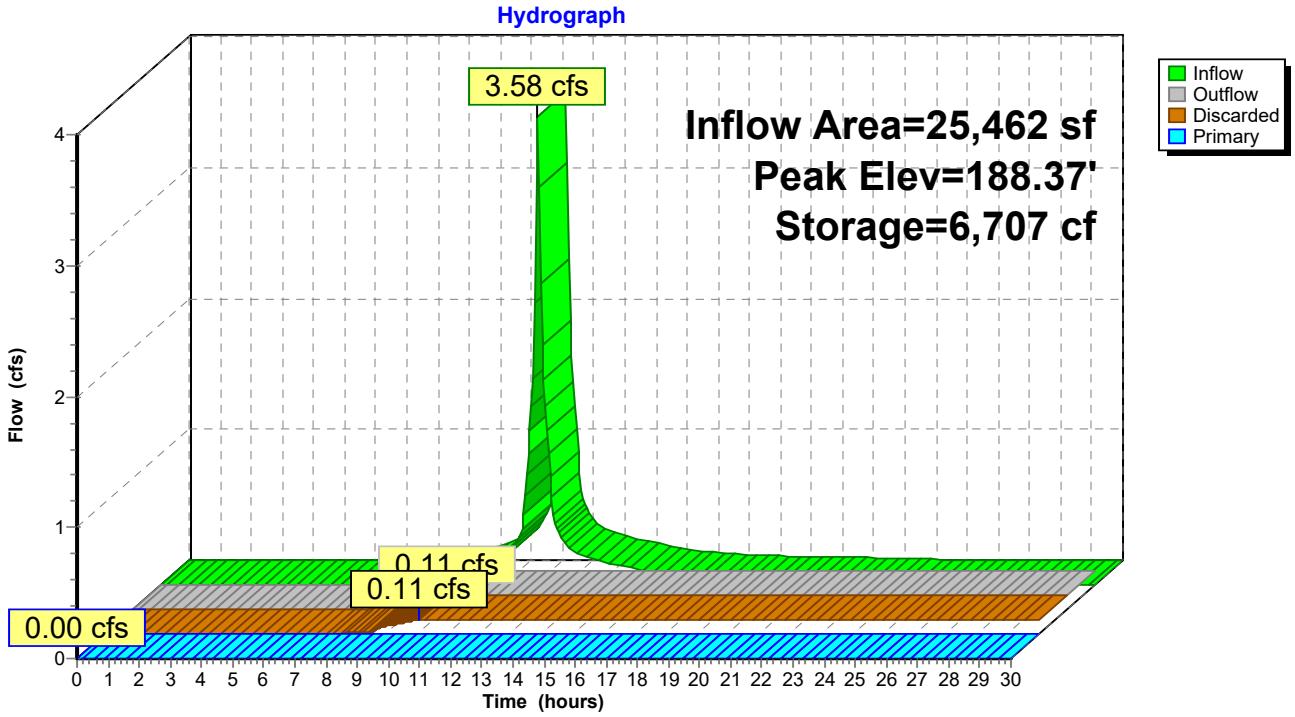
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	190.25'	**23.0' long x 1.40' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
			1.0' Crest Height

Discarded OutFlow Max=0.11 cfs @ 10.10 hrs HW=183.33' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.25' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: INFILTRATION SYSTEM #1



Summary for Pond 6P: BIORETENTION AREA

Inflow Area = 13,862 sf, 92.06% Impervious, Inflow Depth = 6.75" for 50-Year event
Inflow = 2.21 cfs @ 12.09 hrs, Volume= 7,802 cf
Outflow = 2.13 cfs @ 12.10 hrs, Volume= 7,802 cf, Atten= 4%, Lag= 1.0 min
Discarded = 0.03 cfs @ 12.10 hrs, Volume= 2,070 cf
Primary = 2.10 cfs @ 12.10 hrs, Volume= 5,732 cf
Routed to Pond 5P : INFILTRATION SYSTEM #1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 193.35' @ 12.10 hrs Surf.Area= 596 sf Storage= 381 cf

Plug-Flow detention time= 28.3 min calculated for 7,789 cf (100% of inflow)
Center-of-Mass det. time= 28.5 min (787.4 - 758.9)

Volume	Invert	Avail.Storage	Storage Description
#1	192.49'	850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

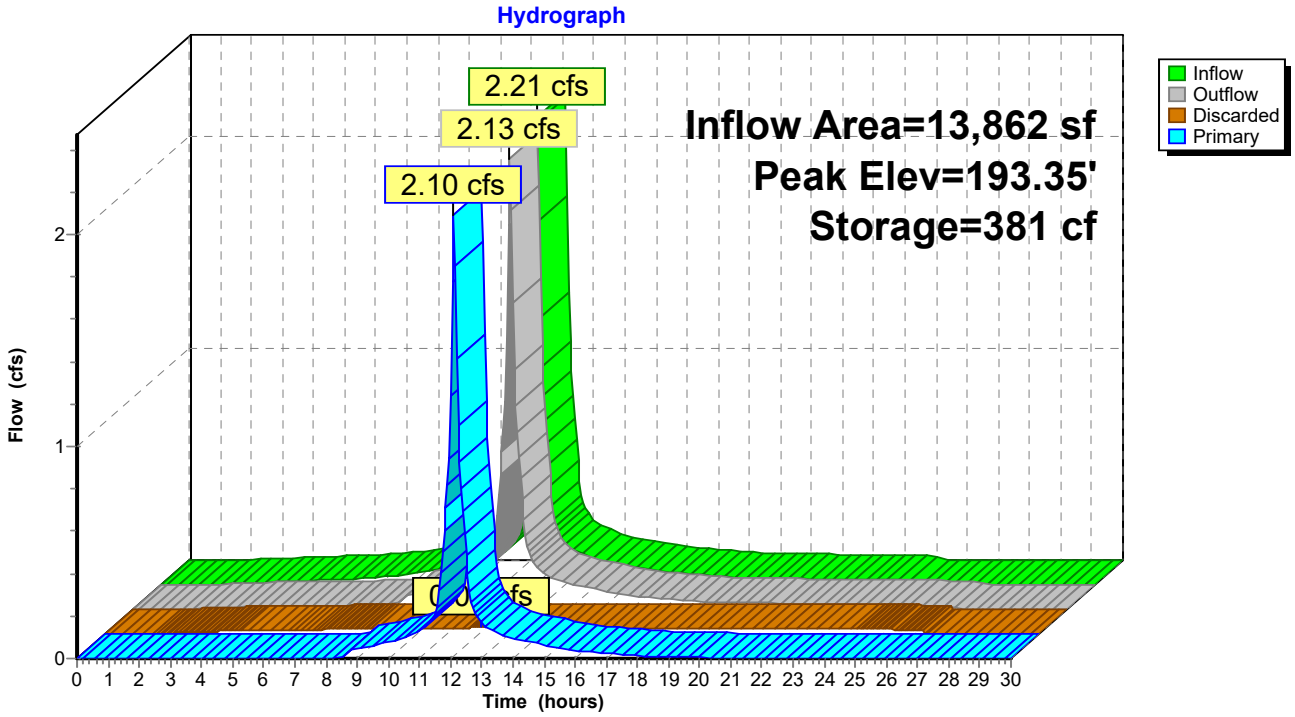
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.49	0	0	0
192.50	300	1	1
193.50	650	475	476
194.00	846	374	850

Device	Routing	Invert	Outlet Devices
#1	Device 3	193.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	192.49'	**2.410 in/hr Exfiltration over Surface area**
#3	Primary	190.50'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 190.50' / 186.65' S= 0.1925 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Primary	193.50'	**4.0' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.10 hrs HW=193.34' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.08 cfs @ 12.10 hrs HW=193.34' (Free Discharge)
└**3=Culvert** (Passes 2.08 cfs of 5.79 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.08 cfs @ 1.92 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: BIORETENTION AREA



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST Runoff Area=18,047 sf 0.00% Impervious Runoff Depth=3.34"
Flow Length=264' Tc=11.7 min CN=55 Runoff=1.30 cfs 5,029 cf

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST Runoff Area=5,195 sf 64.20% Impervious Runoff Depth=7.23"
Tc=6.0 min CN=87 Runoff=0.94 cfs 3,130 cf

Subcatchment 3P: TRIB TO BIORETENTION AREA Runoff Area=13,862 sf 92.06% Impervious Runoff Depth=8.20"
Tc=6.0 min CN=95 Runoff=2.66 cfs 9,471 cf

Subcatchment 4P: ORIGINAL PARKING AREA Runoff Area=11,600 sf 50.26% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=79 Runoff=1.88 cfs 6,048 cf

Reach SUM: SUM TO EAST MAIN STREET Inflow=2.03 cfs 8,981 cf
Outflow=2.03 cfs 8,981 cf

Pond 5P: INFILTRATION SYSTEM #1 Peak Elev=190.26' Storage=7,231 cf Inflow=4.29 cfs 13,350 cf
Discarded=0.11 cfs 8,648 cf Primary=0.12 cfs 821 cf Outflow=0.23 cfs 9,469 cf

Pond 6P: BIORETENTION AREA Peak Elev=193.41' Storage=421 cf Inflow=2.66 cfs 9,471 cf
Discarded=0.03 cfs 2,172 cf Primary=2.44 cfs 7,302 cf Outflow=2.47 cfs 9,474 cf

Total Runoff Area = 48,704 sf Runoff Volume = 23,678 cf Average Runoff Depth = 5.83"
54.98% Pervious = 26,777 sf 45.02% Impervious = 21,927 sf

Summary for Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST

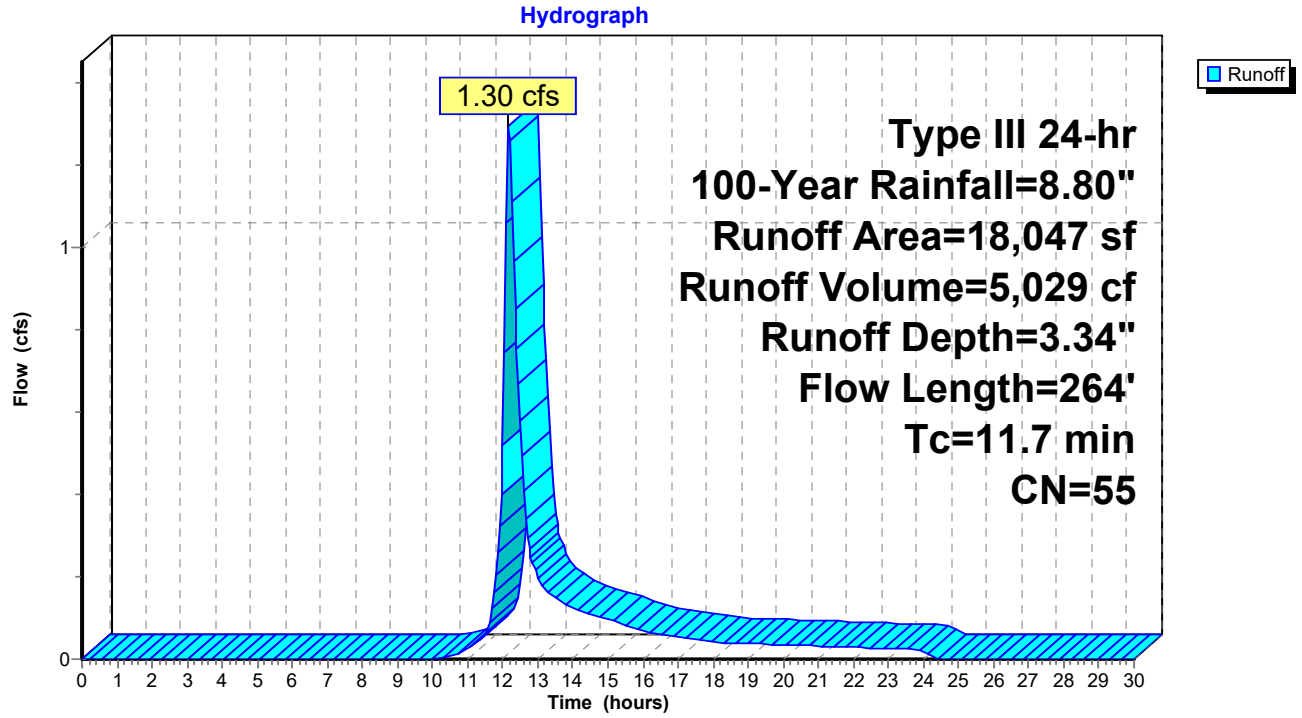
Runoff = 1.30 cfs @ 12.17 hrs, Volume= 5,029 cf, Depth= 3.34"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
18,047	55	Woods, Good, HSG B
18,047		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	50	0.0290	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
1.1	214	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	264	Total			

Subcatchment 1P: NORTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST

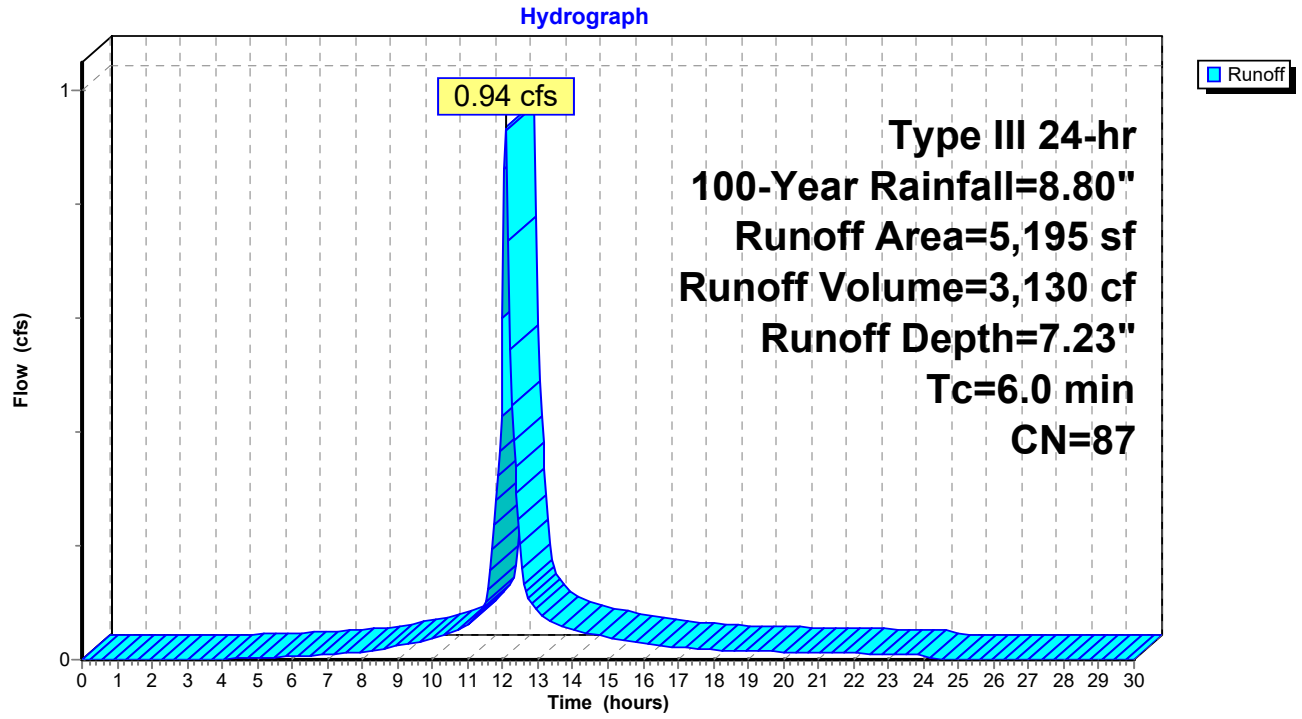
Runoff = 0.94 cfs @ 12.09 hrs, Volume= 3,130 cf, Depth= 7.23"
Routed to Reach SUM : SUM TO EAST MAIN STREET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
815	98	Paved parking, HSG B
1,490	61	>75% Grass cover, Good, HSG B
370	96	Gravel surface, HSG B
2,520	98	Unconnected roofs, HSG B
5,195	87	Weighted Average
1,860		35.80% Pervious Area
3,335		64.20% Impervious Area
2,520		75.56% Unconnected

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

Subcatchment 2P: SOUTHERLY OVERLAND TO E MAIN ST



Summary for Subcatchment 3P: TRIB TO BIORETENTION AREA

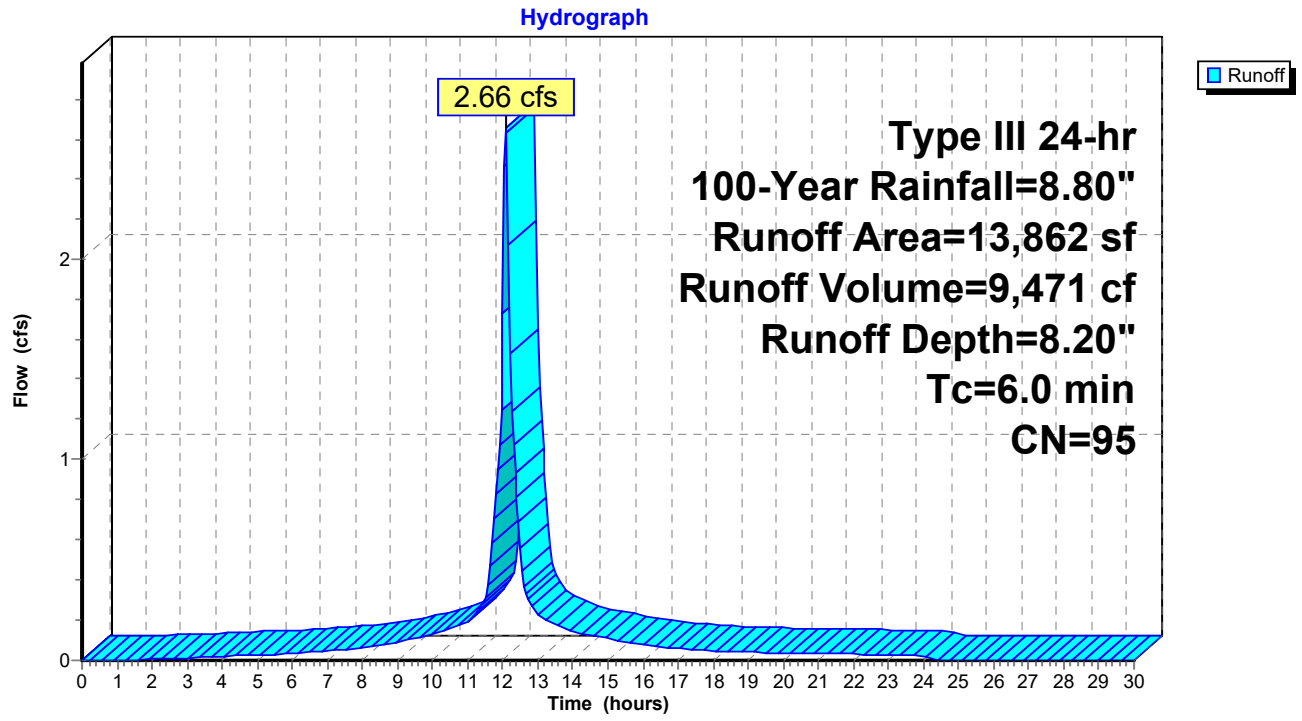
Runoff = 2.66 cfs @ 12.09 hrs, Volume= 9,471 cf, Depth= 8.20"
Routed to Pond 6P : BIORETENTION AREA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
10,060	98	Paved parking, HSG B
1,100	61	>75% Grass cover, Good, HSG B
2,702	98	Unconnected roofs, HSG B
13,862	95	Weighted Average
1,100		7.94% Pervious Area
12,762		92.06% Impervious Area
2,702		21.17% Unconnected

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

Subcatchment 3P: TRIB TO BIORETENTION AREA



Summary for Subcatchment 4P: ORIGINAL PARKING AREA

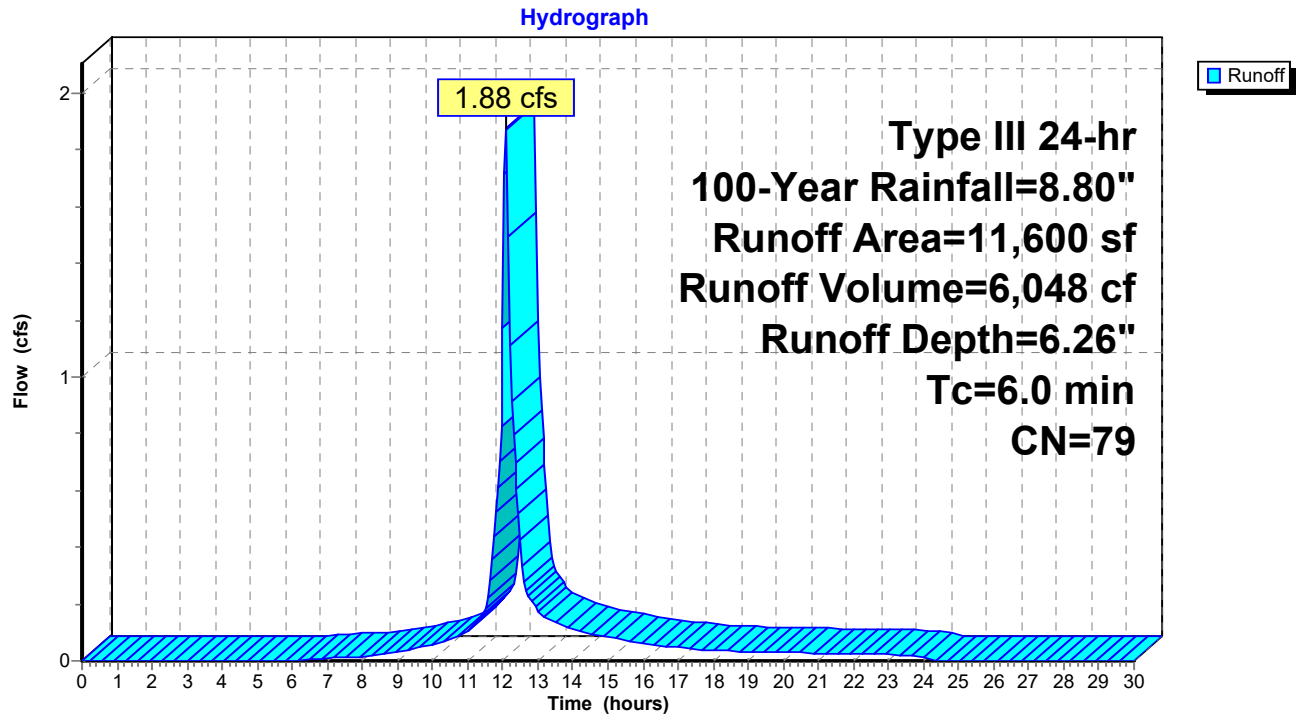
Runoff = 1.88 cfs @ 12.09 hrs, Volume= 6,048 cf, Depth= 6.26"
Routed to Pond 5P : INFILTRATION SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
5,830	98	Paved parking, HSG B
4,600	61	>75% Grass cover, Good, HSG B
1,170	55	Woods, Good, HSG B
11,600	79	Weighted Average
5,770		49.74% Pervious Area
5,830		50.26% Impervious Area

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

Subcatchment 4P: ORIGINAL PARKING AREA

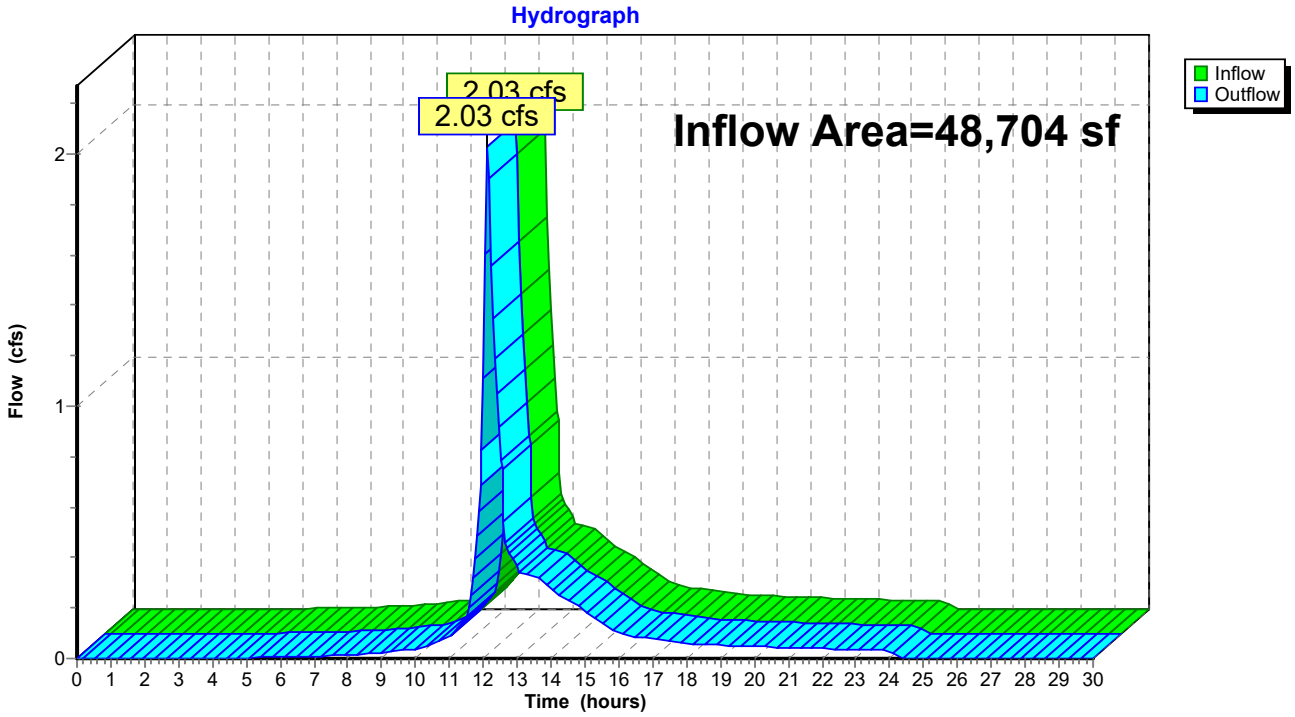


Summary for Reach SUM: SUM TO EAST MAIN STREET

Inflow Area = 48,704 sf, 45.02% Impervious, Inflow Depth = 2.21" for 100-Year event
Inflow = 2.03 cfs @ 12.13 hrs, Volume= 8,981 cf
Outflow = 2.03 cfs @ 12.13 hrs, Volume= 8,981 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach SUM: SUM TO EAST MAIN STREET



Summary for Pond 5P: INFILTRATION SYSTEM #1

Inflow Area = 25,462 sf, 73.02% Impervious, Inflow Depth = 6.29" for 100-Year event
Inflow = 4.29 cfs @ 12.10 hrs, Volume= 13,350 cf
Outflow = 0.23 cfs @ 13.59 hrs, Volume= 9,469 cf, Atten= 95%, Lag= 89.3 min
Discarded = 0.11 cfs @ 12.55 hrs, Volume= 8,648 cf
Primary = 0.12 cfs @ 13.59 hrs, Volume= 821 cf
Routed to Reach SUM : SUM TO EAST MAIN STREET

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 190.26' @ 13.59 hrs Surf.Area= 2,000 sf Storage= 7,231 cf

Plug-Flow detention time= 420.2 min calculated for 9,469 cf (71% of inflow)
Center-of-Mass det. time= 349.2 min (1,121.4 - 772.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	183.25'	2,778 cf	**30.25'W x 65.37'L x 5.75'H Field A**
			11,370 cf Overall - 4,424 cf Embedded = 6,946 cf x 40.0% Voids
#2A	184.00'	4,424 cf	**Cultec R-902HD** x 68 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
			68 Chambers in 4 Rows
			Cap Storage= 2.8 cf x 2 x 4 rows = 22.1 cf
#3	189.00'	32 cf	**1.00'W x 23.00'L x 1.40'H Prismatoid**
		7,235 cf	Total Available Storage

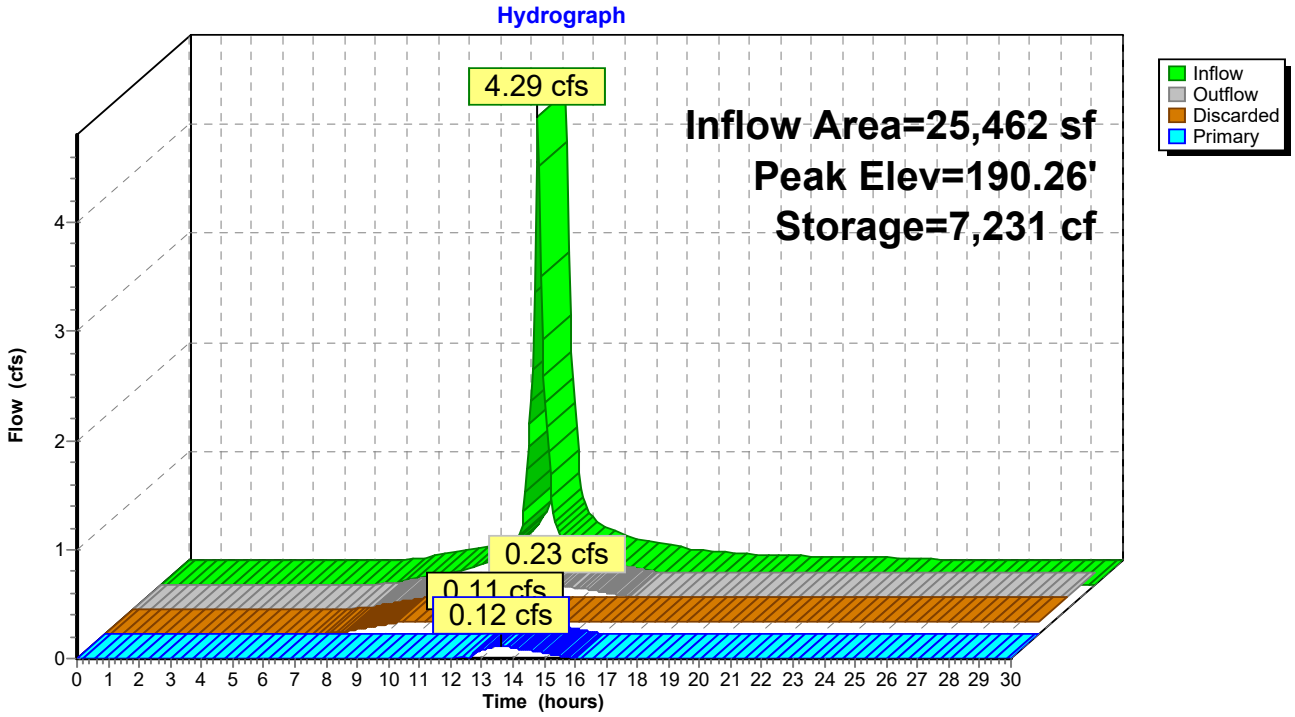
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	183.25'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	190.25'	**23.0' long x 1.40' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s)
			1.0' Crest Height

Discarded OutFlow Max=0.11 cfs @ 12.55 hrs HW=190.26' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.04 cfs @ 13.59 hrs HW=190.26' (Free Discharge)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.04 cfs @ 0.26 fps)

Pond 5P: INFILTRATION SYSTEM #1



Summary for Pond 6P: BIORETENTION AREA

Inflow Area = 13,862 sf, 92.06% Impervious, Inflow Depth = 8.20" for 100-Year event
Inflow = 2.66 cfs @ 12.09 hrs, Volume= 9,471 cf
Outflow = 2.47 cfs @ 12.11 hrs, Volume= 9,474 cf, Atten= 7%, Lag= 1.6 min
Discarded = 0.03 cfs @ 12.11 hrs, Volume= 2,172 cf
Primary = 2.44 cfs @ 12.11 hrs, Volume= 7,302 cf
Routed to Pond 5P : INFILTRATION SYSTEM #1

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 193.41' @ 12.11 hrs Surf.Area= 619 sf Storage= 421 cf

Plug-Flow detention time= 24.9 min calculated for 9,458 cf (100% of inflow)
Center-of-Mass det. time= 25.4 min (780.5 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1	192.49'	850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

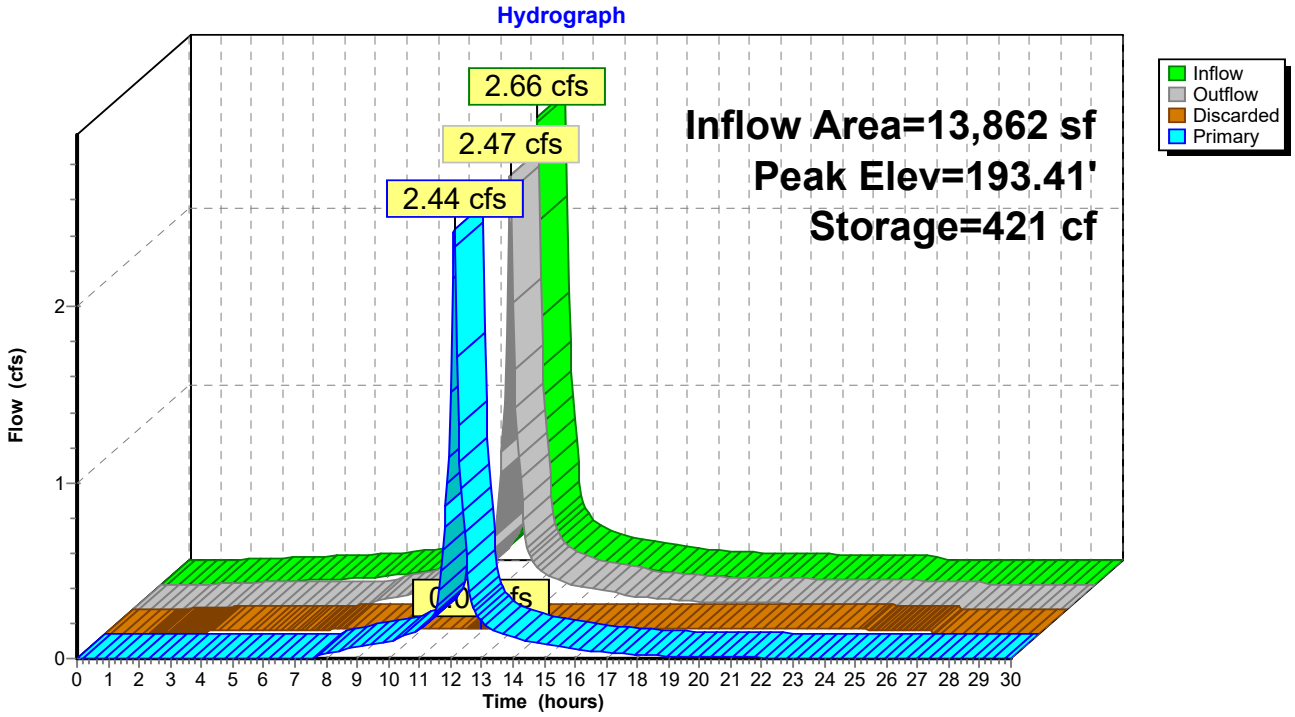
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.49	0	0	0
192.50	300	1	1
193.50	650	475	476
194.00	846	374	850

Device	Routing	Invert	Outlet Devices
#1	Device 3	193.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	192.49'	**2.410 in/hr Exfiltration over Surface area**
#3	Primary	190.50'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 190.50' / 186.65' S= 0.1925 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Primary	193.50'	**4.0' long x 1.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.11 hrs HW=193.41' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.40 cfs @ 12.11 hrs HW=193.40' (Free Discharge)
├**3=Culvert** (Passes 2.40 cfs of 5.86 cfs potential flow)
│└**1=Orifice/Grate** (Orifice Controls 2.40 cfs @ 3.06 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: BIORETENTION AREA



Section V

Operations and Maintenance Plan

CONSTRUCTION OPERATION AND MAINTENANCE PLAN/CONSTRUCTION POLLUTION PREVENTION PLAN

Dated: December 20, 2023

Self Help, Inc.
780 West Street, Avon, MA

Owner:

Self Help, Inc.
800 West Main Street
Avon, MA 02322

Party Responsible for Operation and Maintenance:

Self Help, Inc.
800 West Main Street
Avon, MA 02322

As part of any infrastructure improvement, the system must be maintained to work properly. The following Construction Sequencing guideline and Operation and Maintenance plans are provided to upkeep the existing non-structural and structural best performance practices as outlined in the Massachusetts Department of Environmental Protection's Stormwater Management Policy.

Construction Sequencing:

The following section provides construction details and highlights the construction sequence and timing of earth moving activities.

1. ***Installation of Erosion Controls***

   Erosion and sedimentation controls (i.e., silt sock, construction entrance) will be installed as shown on the Site Plan and inspected at the limits of the work area prior to the commencement of earth moving activities.

2. ***Utility Identification & Clearing***

   All utilities (including stubs) must be identified and marked in the field prior to disturbance. No large boulders or building materials will be buried on the site. All cleared trees and vegetation, apart from any vegetation that may be deemed appropriate to be replanted, will be removed from the project site or mulched and stockpiled for future use on the site.

3. ***Rough Grading***

   During this phase of construction, rough grades will be established for the wall reconstruction within the project site. If suitable topsoil is found, it will be removed and stockpiled in an upland area if possible or offsite at a pre-arranged location. The stockpiled topsoil will be stored until ready for re-use on site.

4. ***Drainage System Excavation***

   The excavation for the drainage system will be carefully excavated to ensure all A and B horizon soils have been removed and the system will be constructed within the parent material.

5. ***Installation of Structures***

   During this phase of construction, the proposed walls and other work on the site will be constructed.

6. ***Installation of Infiltration System and Buried Drainage Pipes***

   The infiltration system, outlet pipe, and roof leader drainage pipes from the structure shall be installed once the structures are constructed. If the contractor prefers to install the infiltration and drainage pipe system before the structures completed, then the area above the buried infiltration system and the drainage pipes should be roped off to avoid heavy equipment load on top of the infiltration and pipe system and to avoid disturbance of the infiltration materials.

7. ***Utility Connection & Installation***

   In this phase of construction, any utilities will be reconnected/ installed.

8. ***Hardscape Installation***

   Once the drainage pipes leading to the infiltration system are installed, the hardscaping, including the paved driveway patching, may be installed. The location of the drainage pipes and other exposed utility lines should be marked to avoid heavy equipment/loading over these pipes and lines that can cause damage.

9. ***Site Stabilization and Landscaping***

   The final phase of the project is the restoration and stabilization of all exposed surfaces. Disturbed areas will be landscaped or seeded as necessary only after all other construction is final. In the event that weather conditions prevent final restoration, temporary erosion and sedimentation measures will be employed until the weather is suitable for final cleanup. Should the final ground stabilization be postponed due to winter conditions, the exposed ground shall be covered with an erosion control blanket to prevent erosion. A final inspection will ensure that the project site is cleared of all project debris and that erosion and sedimentation controls are functioning properly. Erosion and sedimentation controls will not be removed until the site is stabilized, and the final inspection is completed.

Stormwater Operation and Maintenance During Construction:

Sediment and Erosion Control

- Silt socks/straw wattles shall be inspected at least once a week and after each rainfall event. Make any required repairs immediately. Repair damaged areas of the sock at this time to prevent future problems.
- Should the fabric of the silt sock tear, decompose or otherwise become ineffective, replace it within 24 hours of discovery.
- Remove silt deposits once they reach 20 to 30 percent of the height of the silt sock to provide adequate storage volume for the next rain event and to reduce pressure on the fence. Care should be taken to avoid undermining the fence during cleanout process.
- Silt socks are to be removed upon stabilization of the contributing drainage area. Accumulated sediment may be spread to form a surface for turf or other vegetation establishment or disposed of elsewhere. The area should be reshaped to permit natural drainage.
- Any sediment tracked from the construction site onto the street during construction shall be removed immediately.

Infiltration Systems

Per MA DEP Stormwater Guidelines, the following work shall be done to stabilize the site prior to installing the subsurface structures:

- Do not allow runoff from any disturbed areas on the site to flow to the exposed subsurface structures.
- Accomplish any required excavation with equipment placed just outside the area. If the size of the area intended for exfiltration is too large to accommodate this approach, use trucks with low-pressure tires to minimize compaction. Do not allow any other vehicles within the area to be excavated.
- Keep the area above and immediately surrounding the subsurface system roped off to all construction vehicles until the final top surface is installed.
- At no time shall the area for the infiltration system be used as a temporary sediment basin. Stockpiles shall be placed away from the subsurface infiltration system and silt socks shall be placed around the perimeter of the infiltration area to prevent the accumulation of sediment within the native soils.

Dust Control

Sprinkle water as necessary to control dust during construction.

Material Stockpiling

Stockpiles of material must be placed within an area confined by the silt sock. If left overnight, material stockpiling must be protected from the weather.

Good Housekeeping

The following good housekeeping BMP's will be implemented in order to prevent pollution during construction:

- Petroleum products will be stored in tightly sealed containers which are clearly labeled.
- Any asphalt substances on site will be applied according to the manufacturer's specifications.
- If portable sanitary units are used, sanitary waste will be removed as necessary to avoid overfilling.
- All paint and other hazardous waste materials will be tightly sealed and stored when not in use. Excess material will not be discharged into the public stormwater system but will be properly disposed of according to the manufacturer's specifications.
- If spray guns are used, they will be cleaned on a removable tarp

Section VI

Long-Term Source Control/Pollution Prevention Plan and Operation and Maintenance Plan

LONG TERM SOURCE CONTROL/POLLUTION PREVENTION PLAN
AND OPERTATION AND MAINTENANCE PLAN
Dated: December 20, 2023

Self Help, Inc.
780 West Street, Avon, MA

Owner:

Self Help, Inc.
800 West Main Street
Avon, MA 02322

Party Responsible for Operation and Maintenance:

Self Help, Inc.
800 West Main Street
Avon, MA 02322

Long-Term Operation and Maintenance Plan (After Construction)

Best Management Practices (BMPs) of the Commonwealth of Massachusetts Department of Environmental Protection's (DEP's) Stormwater Management Policy (SMP) have been implemented and utilized for the project. The following information provided is to be used as a guideline for monitoring and maintaining the performance of the drainage facilities and to ensure that the quality of water runoff meets the standards set forth by the SMP. The structural Best Management Practices (BMPs) shall be inspected during rainfall conditions during the first year of operation to verify functionality.

General Conditions

1. The BMP's will be owned and maintained by the property owner.
2. All Stormwater BMP's shall be operated and maintained in accordance with the design plans and the following Long-Term Operations and Maintenance Plan.
3. The Responsible Party shall:
   a. Maintain an Operation and Maintenance Log (see Attached). The Log shall include all BMP inspections, repairs, replacement activities and disposal activities (disposal material and disposal location shall be included in the Log);
   b. Retain inspection and maintenance logs for a period of three years, on an ongoing basis;
   c. Make the logs available to the Town upon request;
   d. Allow members and agents of the DPW to enter the premises and ensure that the Responsible Party has complied with the Operation and Maintenance Plan requirements for each BMP.
4. An inspection and maintenance schedule should be adhered to at a minimum for the first year of service of all BMP's referenced in this document. After the first year of service, a

more accurate inspection/maintenance schedule should be determined based on the level of service for this site.

Operation and Maintenance

1.0 Requirements for Routine Inspections and Maintenance of Stormwater Best Management Practices

Note: The Town shall be notified immediately if a change in ownership or maintenance responsibility occurs at the site.

Drain Lines

After construction, the drain lines shall be inspected after every major storm for the first few months to ensure proper functions. The presence of accumulated sand and silt would indicate more frequent maintenance of the pre-treatment devices is required. Thereafter, the drain lines shall be inspected at least once per year.

Trench Drain

Trench drain grates shall be inspected quarterly including the end of the foliage and snow removal seasons and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. The trench drain shall be inspected and cleaned bi-annually of all accumulated sediments. Any accumulated material shall be removed from trench drain and disposed of in accordance with all applicable regulations.

Pre-treatment Structures – First Defense FD-4HC

The proprietary pretreatment unit shall be inspected and maintained from the surface, without entry into the unit biannually and following heavy rain events defined as a storm event exceeding one inch of rainfall within a twenty-four-hour period to verify that the inlet opening is not clogged by debris.

During the first year of installation, perform inspections regularly, so an accurate maintenance schedule can be established. Remove oil and floatables once per year and immediately in the event of a spill. Oil shall be removed by using a small portable pump and disposed of properly. Perform sediment removal once per year or as needed and following a spill event. Sediment shall be removed from the unit using a vacuum truck. The disposal of accumulated sediments from the unit should be done in compliance with all local, state and federal regulations.

Please refer to the attached manufacturer's maintenance manual for additional details on proper inspection and maintenance of the First Defense unit.

Subsurface Infiltration Chamber System

Proper maintenance of the subsurface infiltration system is essential to the long-term effectiveness of the infiltration function. After construction, the subsurface infiltration chamber systems shall be inspected for proper function after every major storm event until the site is completely developed and stabilized. After the site has been stabilized, the subsurface infiltration chamber system shall be inspected at least twice per year or if

lack of performance is observed and perform necessary corrective measures to maintain infiltration capacity; as required by the Stormwater Management Policy.

The system shall have inspection ports for proper inspections. Inspections shall include checking the water level in the system after a major storm event, and performing necessary corrective action if water is observed 72 hours following the storm. The owner shall retain a qualified stormwater professional to assess the cause of this condition and develop a corrective action plan for restoring the infiltration function. The owner shall immediately implement the corrective action to restore the infiltration function. Documentation of these actions shall be maintained in the inspection and maintenance records.

Inspection and Maintenance Options

A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to deter mine if any sediment has accumulated in the inlet row.

B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.

1. Manhole Access This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment. 4 OPERATIONS AND MAINTENANCE GUIDELINES For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com. © CULTEC, Inc. CLT057 01-20

2. StormFilter Access Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.

B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.

C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

Suggested Maintenance Schedules

A. Minor Maintenance The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

Inspection & Maintenance Steps

Accumulated sediment must be removed from the bottom of the chambers. Material removed from the systems shall be disposed of in accordance with all applicable local, state, and federal regulations.

Roadway Pavement Maintenance

Sediment and debris shall be removed from the driveway and parking area periodically during dry weather to remove excess sediments to reduce the amount of sediments that the drainage system shall have to remove from the runoff. The sweeping/cleaning should be conducted four times per year and will be the responsibility of the property owner.

Salt used for de-icing on the roadway during winter months should be limited as much as possible as this will reduce the need for removal and treatment.

Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

2.0 Inspections

The responsible party shall secure the services of a Licensed Engineer or similar professional (inspector) on an on-going basis. The inspector shall review the project with respect to the following:

- Proper installation and performance of the Stormwater Management System.
- Review of the controls to determine any damaged or ineffective controls.
- Corrective actions.

The inspector shall prepare a report documenting the findings and should request the required maintenance or repair for the pollution prevention controls when the inspector finds that it is necessary for the control to be effective.

If hydrocarbons or any petroleum products are detected in any stormwater structure during an inspection, immediate measures shall be taken to remove and dispose of the material in accordance with all applicable regulations. The inspector shall notify the Owner to make the changes.

The owner shall be responsible for retaining the inspection and maintenance records for a period of three years, on an ongoing basis.

For additional information, refer to Performance, Standards and Guidelines for Stormwater Management in Massachusetts, published by the Department of Environmental Protection.

Pollution Prevention Plan

Good Housekeeping

To develop and implement an operation and maintenance program with the goal of preventing or reducing pollutant runoff by keeping potential pollutants from coming into contact with stormwater or being transported off site without treatment, the following efforts will be made:

- Property Management awareness and training on how to incorporate pollution prevention techniques into maintenance operations.
- Follow appropriate best management practices (BMPs) by proper maintenance and inspection procedures.
- Resident education outreach, including promoting recycling through the Town of Avon DPW.

1.0 Storage and Disposal of Household Waste and Toxics

This management measure involves educating the general public on the management considerations for hazardous materials. Failure to properly store hazardous materials dramatically increases the probability that they will end up in local waterways. Many people have hazardous chemicals stored throughout their homes, especially in garages and storage sheds. Practices such as covering hazardous materials or even storing them properly, can have dramatic impacts. Property owners are encouraged to support the household hazardous product collection events sponsored by the Town.

MADEP has prepared several materials for residents on how to properly use and dispose of household hazardous materials:

http://www.mass.gov/dep/recycle/reduce/househol.htm

For consumer questions on household hazardous waste call the following number:

DEP Household Hazardous Waste Hotline 800-343-3420

The following is a list of management considerations for hazardous materials as outlined by the EPA:

- Ensuring sufficient aisle space to provide access for inspections and to improve the ease of material transport;
- Storing materials well away from high-traffic areas to reduce the likelihood of accidents that might cause spills or damage to drums, bags, or containers.
- Stacking containers in accordance with the manufacturers' directions to avoid damaging the container or the product itself;
- Storing containers on pallets or equivalent structures. This facilitates inspection for leaks and prevents the containers from coming into contact with wet floors, which can cause corrosion. This consideration also reduces the incidence of damage by pests.

The following is a list of commonly used hazardous materials used in the household:

Batteries – automotive and rechargeable
.....nickel cadmium batteries
.....(no alkaline batteries)
Gasoline
Oil-based paints
Fluorescent light bulbs and lamps
Pool chemicals
Propane tanks
Lawn chemicals,
fertilizers and weed killers
Turpentine
Bug sprays
Antifreeze
Paint thinners, strippers, varnishes and .....stains
Arts and crafts chemicals
Charcoal lighter fluid

Disinfectant
Drain clog dissolvers
Driveway sealer
Flea dips, sprays and collars
Houseplant insecticides
Metal polishes
Mothballs
Motor oil and filters
Muriatic acid (concrete cleaner)
Nail polishes and nail polish removers
Oven cleaner
Household pest and rat poisons
Rug and upholstery cleaners
Shoe polish
Windshield wiper fluid

2.0 Vehicle Washing

This management measure involves educating the general public on the water quality impacts of the outdoor washing of automobiles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor car washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain. The following management practices will be encouraged:

- Washing cars on gravel, grass, or other permeable surfaces.
- Blocking off the storm drain during car washing and redirecting wash water onto grass or landscaping to provide filtration.
- Using hoses with nozzles that automatically turn off when left unattended.
- Using only biodegradable soaps.
- Minimize the amounts of soap and water used. Wash cars less frequently.
- Promote use of commercial car wash services.

3.0 Landscape Maintenance

This management measure seeks to control the storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Nutrient loads generated by fertilizer use on suburban lawns can be significant, and recent research has shown that lawns produce more surface runoff than previously thought.

Using proper landscaping techniques can effectively increase the value of a property while benefiting the environment. These practices can benefit the environment by reducing water use; decreasing energy use (because less water pumping and treatment is required); minimizing runoff of storm and irrigation water that transports soils, fertilizers, and pesticides; and creating additional habitat for plants and wildlife. The following lawn and landscaping management practices will be encouraged:

- Mow lawns at the highest recommended height.
- Minimize lawn size and maintain existing native vegetation.
- Collect rainwater for landscaping/gardening needs (rain barrels and cisterns to capture roof runoff).
- Raise public awareness for promoting water efficient maintenance practices by informing users of water efficient irrigation techniques and other innovative approaches to water conservation.
- Abide by water restrictions and other conservation measures implemented by the Town.
- Water only when necessary.
- Use automatic irrigation systems to reduce water use.

4. Integrated Pest Management (IPM)

This management measure seeks to limit the adverse impacts of insecticides and herbicides by providing information on alternative pest control techniques other than chemicals or explaining how to determine the correct dosages needed to manage pests.

The presence of pesticides in stormwater runoff has a direct impact on the health of aquatic organisms and can present a threat to humans through contamination of drinking water supplies. The pesticides of greatest concern are insecticides, such as diazinon and chlorpyrifos, which even at very low levels can be harmful to aquatic life. The major source of pesticides to urban steams is home application of products designed to kill insects and weeds in the lawn and garden.

The following IPM practices will be encouraged:

- Pesticides and herbicides shall be used sparingly. Fertilizers should be restricted to the use of organic fertilizers only.
- Lawn care and landscaping management programs including appropriate pesticide use management as part of program.

5. Pet Waste Management

Pet waste management involves using a combination of pet waste collection programs, pet awareness and education, to alert residents to the proper disposal techniques for pet droppings. The following management practices will be encouraged:

- Raise awareness of residents that are also pet owners that they are encouraged to pick up after their pets and dispose of the waste either in the trash, including on their own lawns and walking trails.
- Provide signage along walking trails.

6. Proper Management of Deicing Chemicals and Snow

The following deicing chemicals and snow storage practices will be encouraged:

- Select effective snow disposal sites adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter into the soil, leaving behind sand and debris, which can be removed in the springtime.
- No roadway deicing materials shall be stockpiled on site unless all storage areas are protected from exposure to rain, snow, snowmelt and runoff.
- Avoid dumping snow into any waterbody, including wetlands, cranberry bogs, detention/infiltration basins, and grassed swales/channels.
- Avoid disposing of snow on top of storm drain catch basins.

7. Illicit Discharge Statement

Illicit discharges are non-stormwater discharges to the storm drain system which typically contain bacteria or other pollutants. All illicit discharges are prohibited. Any illicit discharges should be reported to MassDOT and/or the DPW as applicable to be addressed in accordance with their respective policies.

Allowable Non-Stormwater Discharges

The following non-stormwater discharges are authorized provided it has been determined by the permittee that they are not significant contributors of pollutants to the MS4. If these discharges are identified as significant contributors to the MS4, they must be addressed in the Illicit Discharge Detection and Elimination minimum control measure described in Parts II, III, IV and V.

1. water line flushing,
2. landscape irrigation,
3. diverted stream flows,
4. rising ground waters,
5. uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)),
6. uncontaminated pumped ground water,
7. discharge from potable water sources,
8. foundation drains,
9. air conditioning condensation,
10. irrigation water, springs,
11. water from crawl space pumps,
12. footing drains,
13. lawn watering,
14. flows from riparian habitats and wetlands,
15. dechlorinated swimming pool discharges,
16. street wash water, and
17. discharges or flows from firefighting activities occur during emergency situations. The permittee is not expected to evaluate firefighting discharges with regard to pollutant contributions. Therefore, these discharges are authorized as allowable non-storm water discharges, unless identified, by EPA, as significant sources of pollutants to Waters of the U.S..

Illicit Discharges:

At no time will the owner or any other individual utilize the stormwater management system for any purpose other than its intended use. The stormwater management system as shown on the attached site plan at no time shall receive discharges other than stormwater, this includes "wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, raw materials, toxic pollutants, hazardous substances, oil or grease."

_____ _____

Facilities Manager (Signature) Facilities Manager (Print)

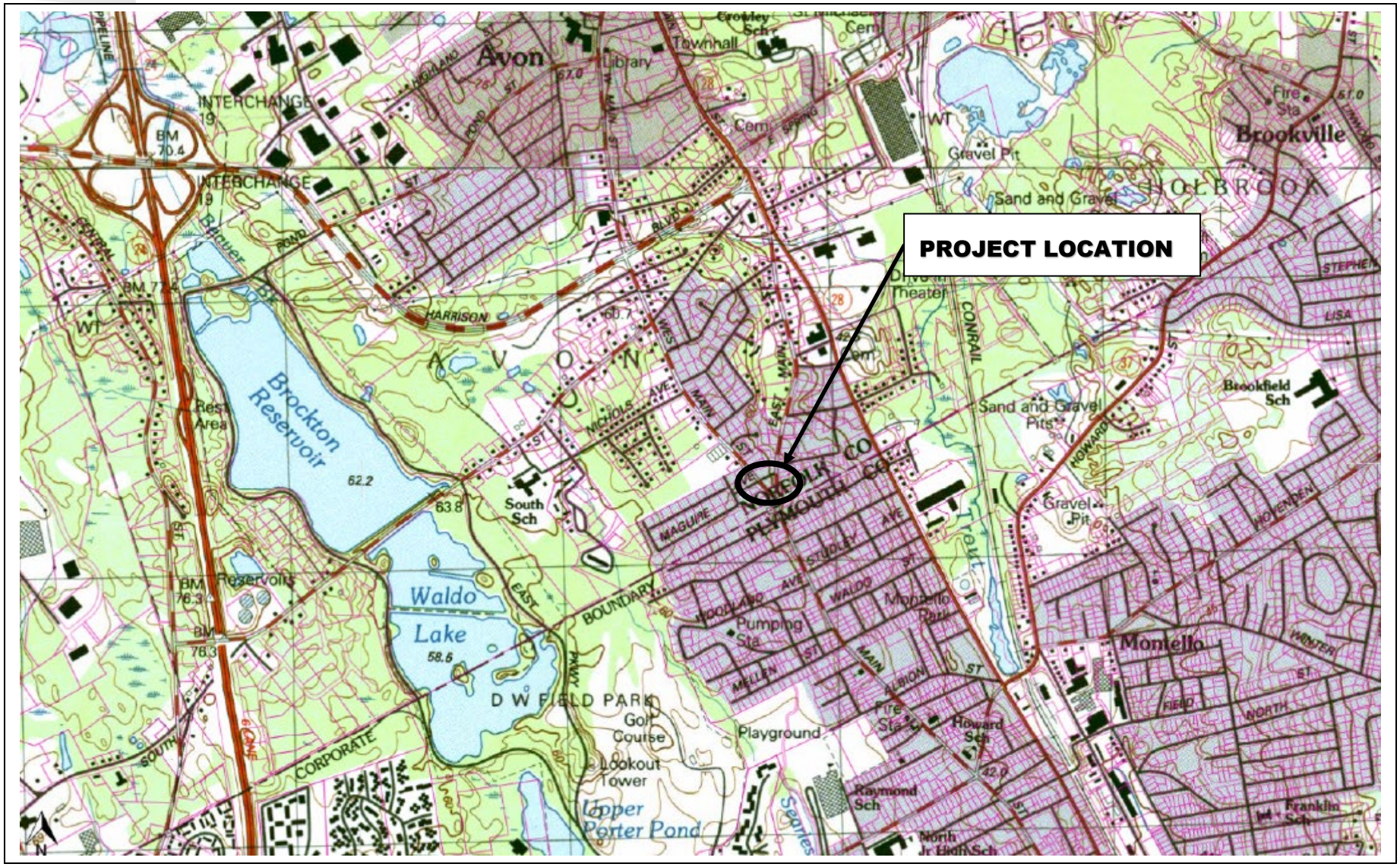
H:\23-476\Documents\Drainage\23-476 Drainage Methodology_12-19-23 ltrhd.docx

Section VII

FIgures:

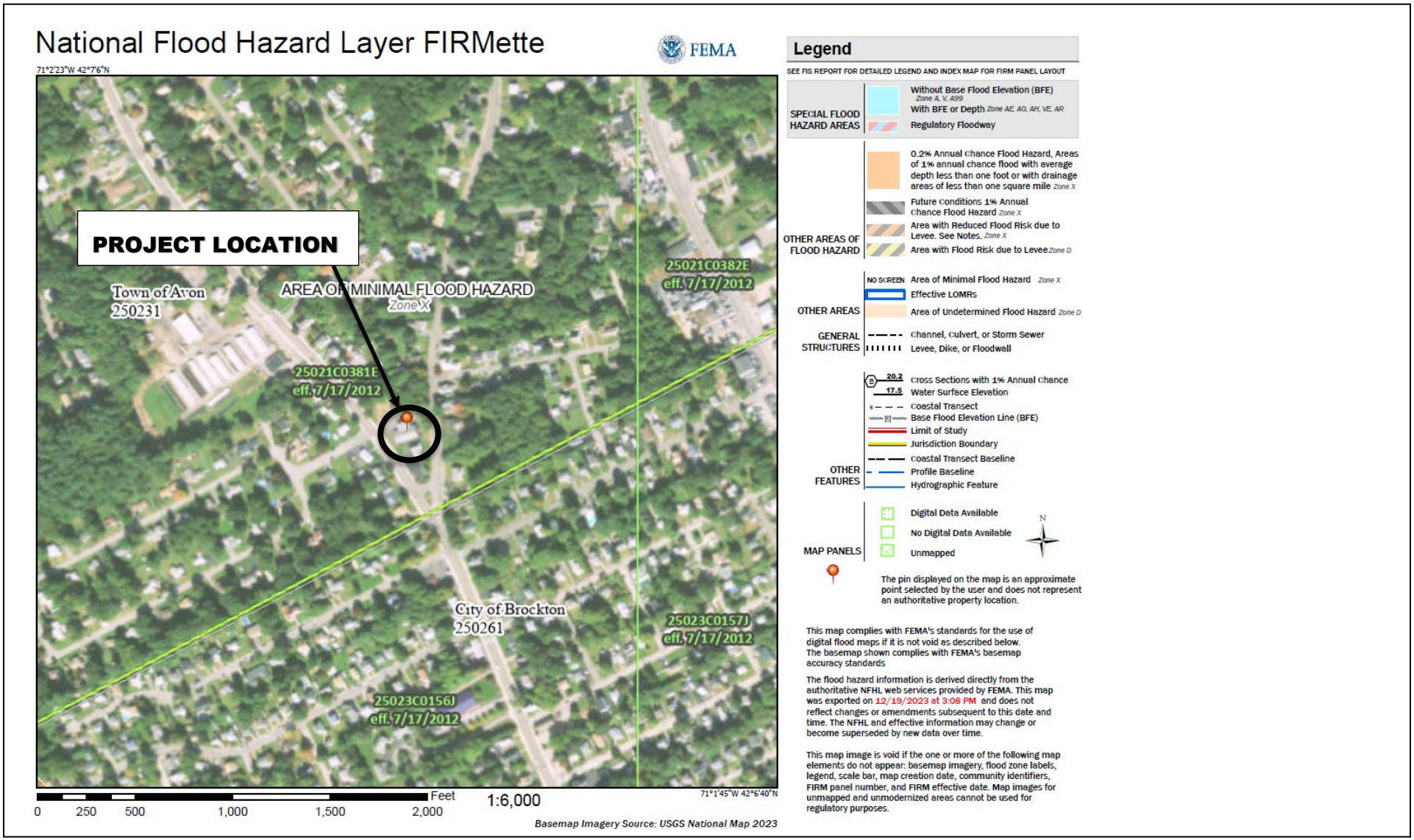
7. **USGS Map**
8. **FEMA Flood Map**
9. **NRCS Soil Survey Map**
10. **MassGIS Wetland Map**
11. **MassGIS NHESP Map**
12. **2018 Google Earth Aerial Map**

USGS Map

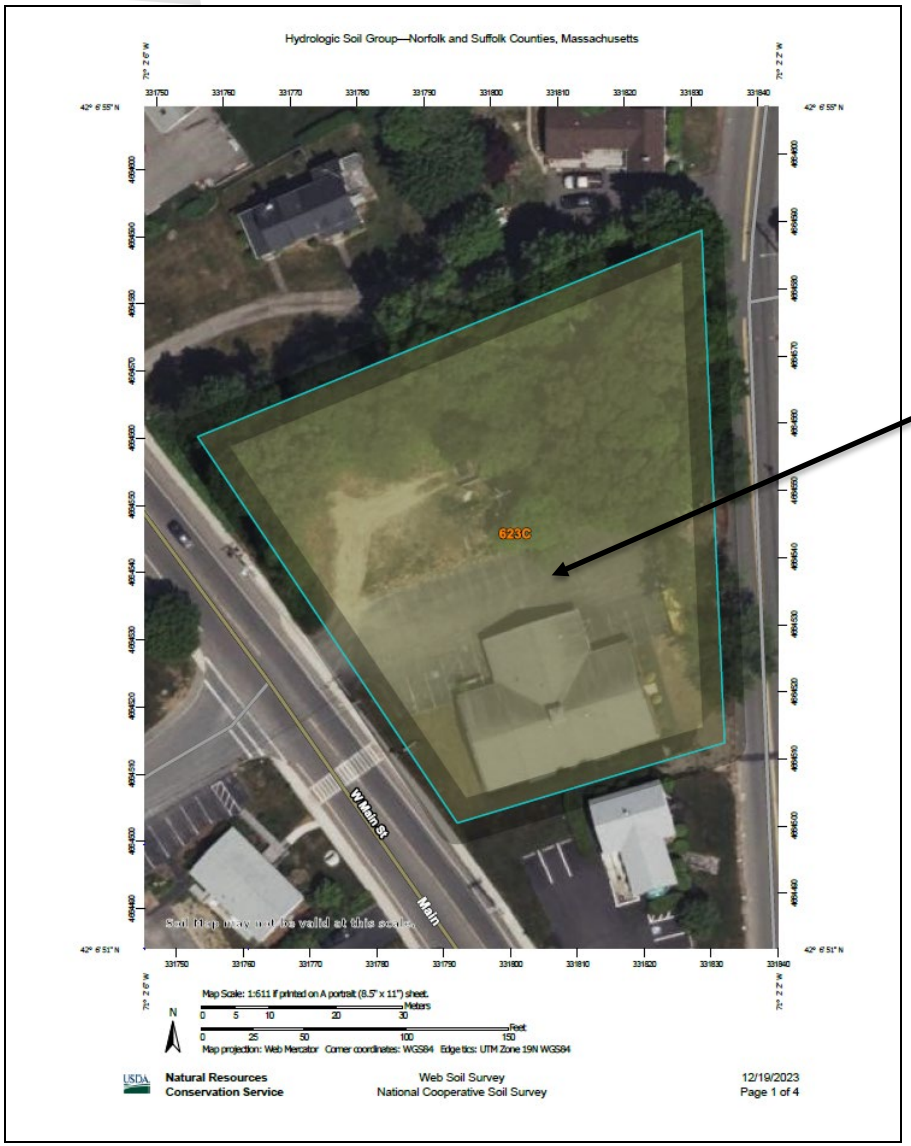


(508) 746-6060 / 26 Union Street, Plymouth, MA 02360
merrillinc.com / (781) 826-9200 / 427 Columbia Road, Hanover, MA 02339

FEMA Flood Map



NRCS Soil Survey Map

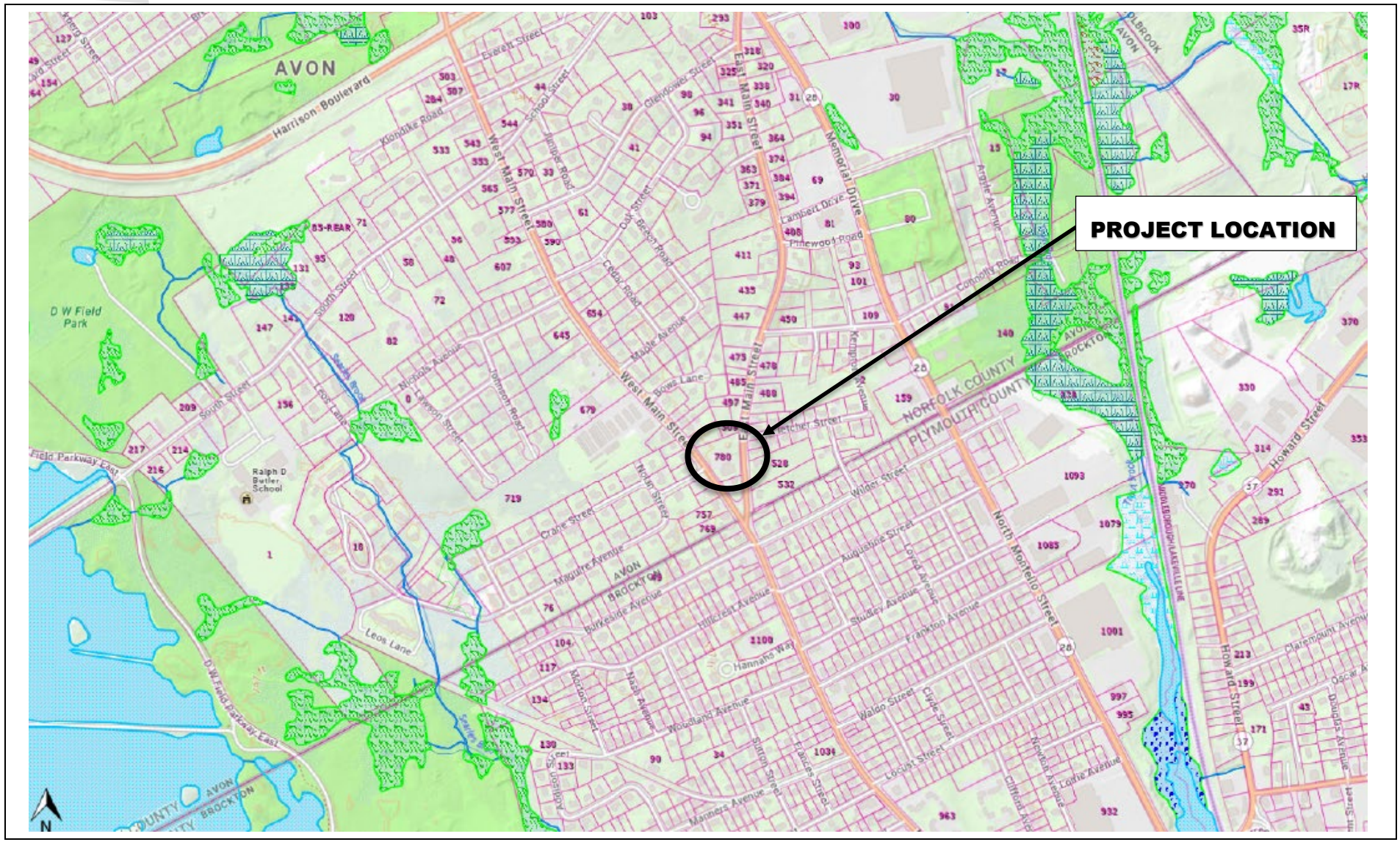


PROJECT LOCATION

Hydrologic Soil Group

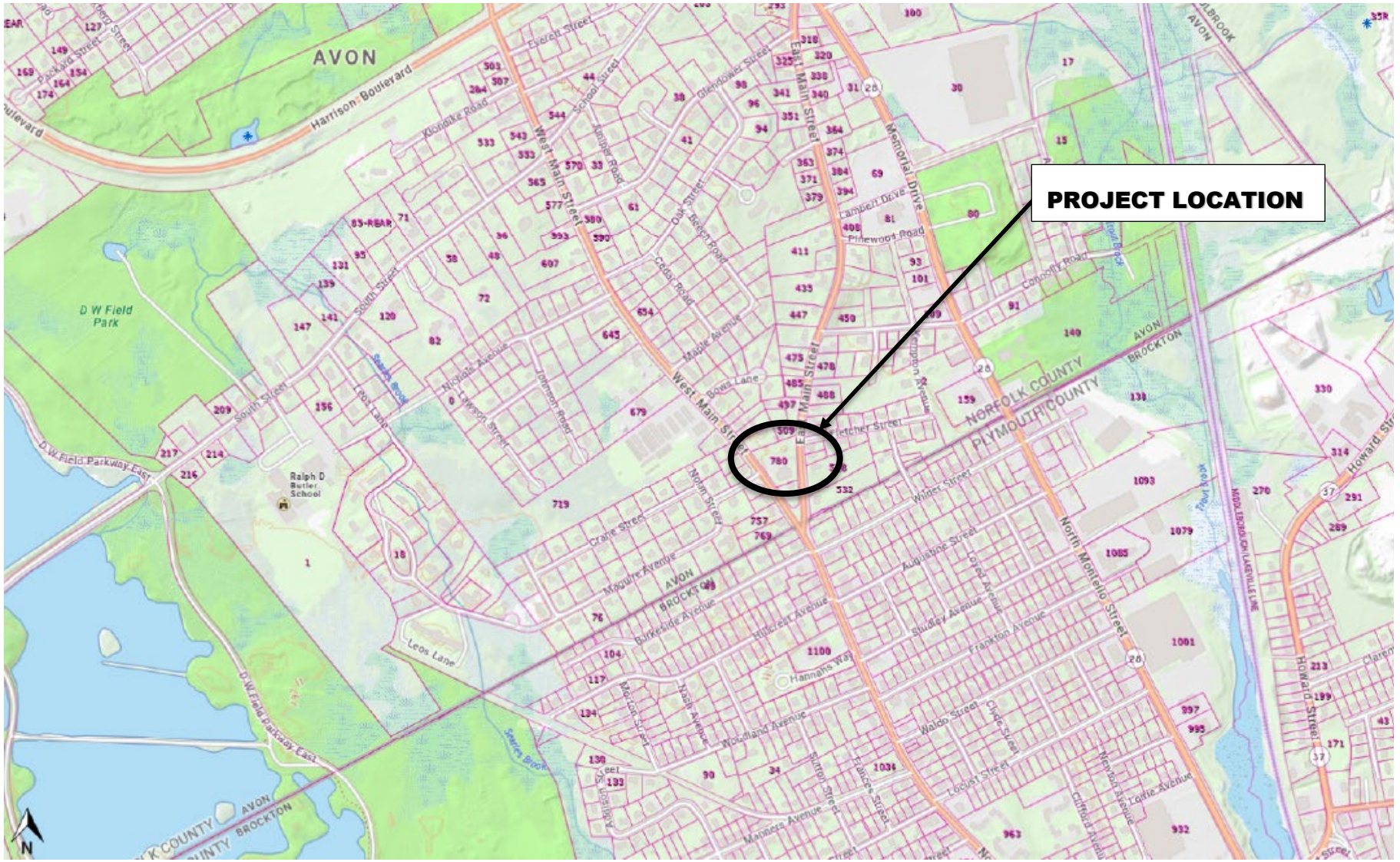
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
623C	Woodbridge-Urban land complex, 3 to 15 percent slopes	C/D	1.1	100.0%
Totals for Area of Interest			1.1	100.0%

MassGIS Wetland Map



(508) 746-6060 / 26 Union Street, Plymouth, MA 02360
merrillinc.com / (781) 826-9200 / 427 Columbia Road, Hanover, MA 02339

MassGIS NHESP Map



2021 Google Earth Aerial Map

Section VIII

Appendix A:

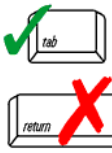
- **Stormwater Management Form and Checklist**
- **Groundwater Recharge Volume Calculation (Standard #3)**
- **Infiltration System Drawdown**
- **Water Quality Volume (Standard #4)**
- **TSS Removal**
- **First Defense Specifications and TSS Removal Assessment**
- **Inspection Schedule and Evaluation Checklist**
- **Soils Suitability Assessment**

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

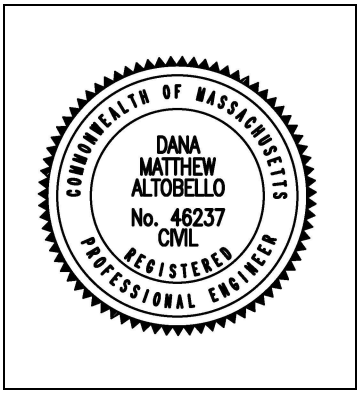
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



12/21/23

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☒ Use of "country drainage" versus curb and gutter conveyance and pipe

☒ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Subsurface Infiltration Chamber System

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☒ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

MERRILL ENGINEERS AND LAND SURVEYORS
427 COLUMBIA ROAD, HANOVER, MA. 02339
TEL. (781) 826-9200

JOB 23-476
SHEET N0. 1 of 1
CALCULATED BY DA
CHECKED BY DK Date: 12/20/23
REV'D:

Location: **Self Help - 780 West Street, Avon**

Recharge Volumes (Standard #3): Re-Development - Parking Expansion

Total Area (Ac.)=	0.50	(Total impervious area)	
Total Impervious Area A Soil (Ac.)=	0.00		
Total Impervious Area B Soil (Ac.)=	0.503	Roofs & Drives	21927 S.F.
Total Impervious Area C Soil (Ac.)=	0.000		
Total Impervious Area D Soil (Ac.)=	0.00		

	Vol. To Recharge (inches per Imp. Acre)	Volume (Imp. Area x inches per Acre)
Recharge Volume (A soil)	0.60	0.00
Recharge Volume (B soil)	0.35	0.18
Recharge Volume (C soil)	0.25	0.00
Recharge Volume (D soil)	0.10	0.00

Total Required Recharge Volume:	0.18	AC-IN
	0.015	AC-FT
	640	C.F.
Subsurface Infiltration Sys:	7,235	C.F.
Recharge volume provided within Infiltration Facilities (subsurface chambers)	**7,235**	C.F. > 640 C.F.

(Rv will be total storage volume below lowest outlet elevation)

Redevelopment project - meets standard to the extent practicable.

Drawdown Calculations for Infiltration Systems:
Subsurface Infiltration Chamber #1

Drawdown Time = Rv/(k)(basin bottom area) where Rv will be total storage volume below lowest outlet elevation

Subsurface Infiltration System

Time to Drain(hrs): **18.22** < 72 hrs.

Rv =	7,235	cf
k=	2.41	in/hr (convert to ft)
Bot. Area=	1977.44	sf

MERRILL ENGINEERS AND LAND SURVEYORS
427 COLUMBIA ROAD, HANOVER, MA. 02339
TEL. (781) 826-9200

JOB 23-476
SHEET N0. 1 of 2
CALCULATED BY DA
CHECKED BY DK 12/20/2023

WATER QUALITY VOLUME (STANDARD #4)

Location: **Self Help - 780 West Street, Avon**

Original Parking Area

First Defense Unit :

Impervious area to be treated: 12,762 s.f.

Proprietary Treatment Unit: Q=(qu)(A)(WQV)

qu for Tc of 6 min.	774	(csm/in)	
Impervious Area: AC*0.0015625mi^2/AC	0.0005	mi^2	0.29 AC
WQV Treated:	1.00	in	
Q (Peak flow rate for 1" WQV):	**0.35**	cfs	
Proposed FD-4HC Max. Treated Flow Rate:	**1.5**	cfs	

Max flow rate = 18 cfs

Volume using: 0.5 or 1.0 inch x Imp. Area (per S.W. Mgmt Policy)
1 inch x Imp. Area **1,064** CF (min)

Total Water Quality Volume Provided = **1,064** CF (Proposed)

Subsurface Infiltration System

(Cultec 902HD Field)

WQ Treatment within Infiltration Chamber System &
Recharge Volume Required below outlet = 640 CF (Required)

Total Walter Quality Volume Provided = **7,235** CF (Proposed)

New Parking Area

Bioretention Area Sizing:

New Paved Driveway Area: 6,615 S.F.
Driveway Area to be treated: 6,615 S.F.

Water Quality
Volume using: 0.5 or 1.0 inch x Imp. Area (per S.W. Mgmt Policy)
1 inch x Imp. Area **551** C.F. (min)

Bioretention Area #1: 5%-7% of contributing area minimum

Contributing Impervious Area:	6,615	SF	
Bioretention area provided:	640	SF	(meets minimum
Percentage of Contributing area:	9.67%		requirement of 5% - 7%)

Boiretention Area Soil Media Void Ratio:	0.25		**Bioretention Area Media**
Surface Area of Media:	640	sf	**Volume (Void**
Depth of Media:	3.5	ft	**Ratio=0.25)**
Media Treatment Volume:	**560**	C.F.	> 551 C.F. (min)

Water Quality Volume - Total Site Improvements

Total Impervious Area:

Driveway and Roof Area	21,927	S.F.
Total Area:	21,927	S.F.

Volume using: 0.5 or 1.0 inch x Imp. Area (per S.W. Mgmt Policy)
1 inch x Imp. Area **1,827** C.F. (min)

Total Walter Quality Volume Provided for Site = **8,859** C.F.

TSS Removal Calculation Worksheet

Subsurface Infiltration Chamber Systems
PRETREATMENT
Location: 780 West Main Street, Avon, MA

Proj. No.: 23-476
Date: 12/20/2023
Computed by: DA

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
First Defense FD-4HC Unit	50	1.00	0.5	0.50

Total TSS Removal= **50%** > 44%

Notes:
*Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

TSS Removal Calculation Worksheet

Subsurface Infiltration Chamber Systems

Location: 780 West Main Street, Avon, MA

Proj. No.: 23-476
Date: 12/20/2023
Computed by: DA

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
First Defense FD-4HC Unit	50	1.00	0.5	0.50
Subsurface Infiltration System	80	0.50	0.40	0.10

Total TSS Removal= **90%**

Notes:

*Starting TSS Load for first BMP= 1.00. TSS load for subsequent BMP's is equal to the Remaining Load (E) from the previous BMP.

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 780 West Main Street, Avon, MA - PRETREATMENT

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Bioretention Area	**0.90**	**1.00**	**0.90**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**

Total TSS Removal = **90%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 23-476
Prepared By: DA
Date: 12/20/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 780 West Main Street, Avon, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Bioretention Area	**0.90**	**1.00**	**0.90**	**0.10**
Subsurface Infiltration Structure	**0.80**	**0.10**	**0.08**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**

Total TSS Removal = **98%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 23-476
Prepared By: DA
Date: 12/20/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

First Defense® High Capacity

A Simple Solution for your Trickiest Sites

Product Profile

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (**Table 1**, next page).

Applications

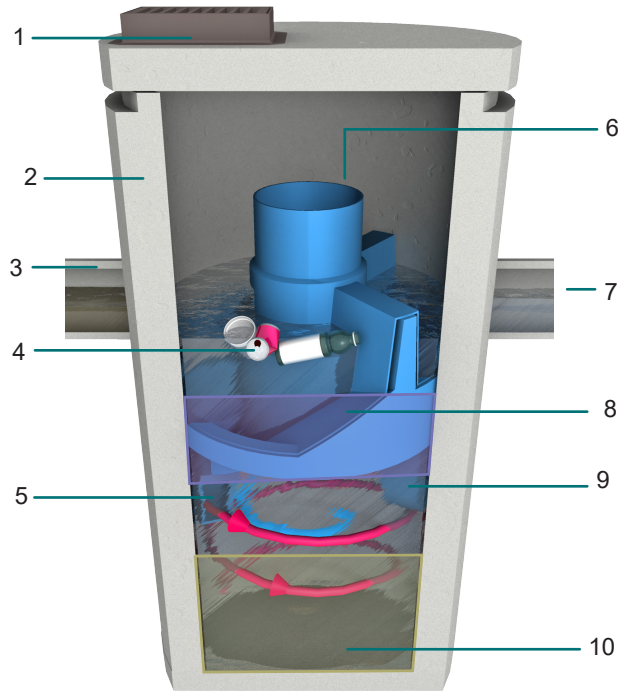
- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 450% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

Verified by NJCAT and NJDEP

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



Components

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

How it Works

The First Defense® High Capacity has internal components designed to remove and retain gross debris, total suspended solids (TSS) and hydrocarbons (**Fig.1**).

Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

First Defense® High Capacity

Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.

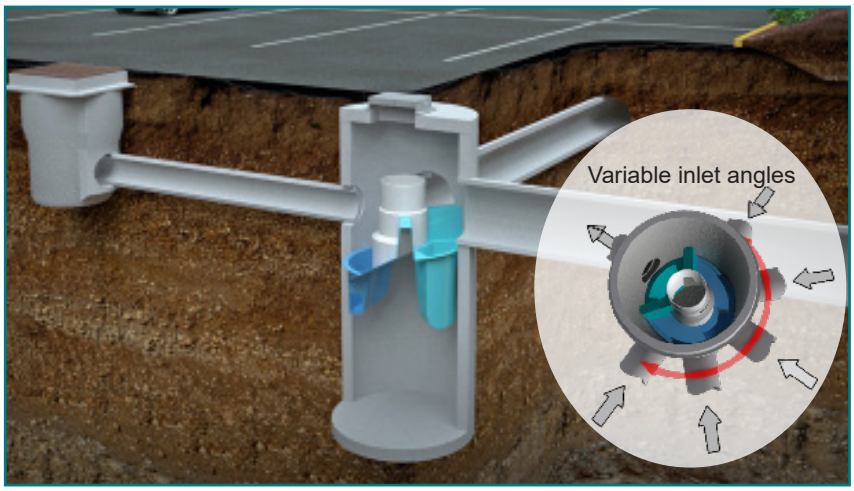


Fig 2. Works with multiple inlet pipes and grates

Inspection and Maintenance

Nobody maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Call **1 (800) 848-2706** to schedule an inspection and cleanout or learn more at **hydro-int.com/service**

Sizing Calculator for Engineers

This simple online tool will recommend the best separatror, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.

Fig 3. Maintenance is done with a vactor truck

Table 1. First Defense® High Capacity Design Criteria.

First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	110µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.06 / 30.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 53.2	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC*	5 / 1.5	2.34 / 66.2	2.94 / 83.2	20 / 566	24 / 600	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.23 / 119.8	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

***Coming soon**
[1]Contact Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

Stormwater Solutions
hydro-int.com/firstdefensehc

Center for Environmental Systems
Stevens Institute of Technology
One Castle Point
Hoboken, NJ 07030-0000

January 9, 2016

Titus Magnanao
NJDEP
Division of Water Quality
Bureau of Non-Point Pollution Control
401-02B
PO Box 420
Trenton, NJ 08625-0420

Dear Mr. Magnanao,

Based on my review, evaluation and assessment of the testing conducted on the First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International and observed by FB Environmental Associates, the test protocol requirements contained in the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" (NJDEP HDS Protocol) were met or exceeded. Specifically:

Test Sediment Feed

The mean PSD of Hydro Internationals test sediments comply with the PSD criteria established by the NJDEP HDS protocol. The Hydro International removal efficiency test sediment PSD analysis was plotted against the NJDEP removal efficiency test PSD specification. The test sediment was shown to be slightly finer than the sediment blend specified by the protocol. The Hydro International scour test sediment PSD analysis was plotted against the NJDEP removal efficiency test PSD specification and shown to be much finer than specified by the protocol.

Removal Efficiency Testing

In accordance with the NJDEP HDS Protocol, removal efficiency testing was executed on the 4-ft. laboratory unit in order to establish the ability of the FDHC to remove the specified test sediment at 25%, 50%, 75%, 100% and 125% of the target MTFR. Prior to the start of testing Hydro International reviewed existing data and decided to utilize a target MTFR of 675 gpm (1.50 cfs). This target was chosen based on the ultimate goal of demonstrating greater than 50% annualized weighted solids removal as defined in the NJDEP HDS Protocol. The flow rates, feed rates and influent concentration all met the NJDEP HDS test protocol's coefficient of variance requirements and the background concentration for all five test runs never exceeded 20 mg/L.

Scour Testing

In order to demonstrate the ability of the FDHC to be used as an online treatment device scour testing was conducted at greater than 200% of MTFR in accordance with the NJDEP HDS Protocol. The average flow rate during the online scour test was 3.24 cfs, which represents 216% of the MTFR (MTFR = 1.50 cfs). Background concentrations were 2 mg/L throughout the scour testing, which complies with the 20 mg/L maximum background concentration specified by the test protocol. Unadjusted effluent concentrations ranged from 2 mg/L to 4 mg/L with a mean of 2.1 mg/L. When adjusted for background concentrations, the effluent concentrations range from 0 to 2 mg/L with a mean of 0.1 mg/L. These results confirm that the 4-ft. FDHC did not scour at 216% MTFR and meets the criteria for online use.

Maintenance Frequency

The predicted maintenance frequency for all models is 44 months.

Sincerely,

Richard S. Magee, Sc.D., P.E., BCEE

Stormwater Solutions

Hydro International

Turning Water Around...®

December 21, 2015

Dr. Richard Magee, Sc.D., P.E., BCEE
Technical Director
New Jersey Corporation for Advanced Technology
c/o Center for Environmental Systems
Stevens Institute of Technology
One Castle Point on Hudson
Hoboken, NJ 07030

Re: Verification of First Defense® HC to NJDEP HDS Laboratory Testing Protocol

Dear Dr. Magee:

Hydro International's First Defense® HC (FDHC) vortex separator for stormwater treatment recently underwent verification testing according to the NJDEP HDS Laboratory Testing Protocol. As required by the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology", this letter serves as Hydro International's statement that all procedures and requirements identified in the aforementioned protocol and process document were met or exceeded. The 4-ft FDHC removal efficiency and scour tests conducted at Hydro International's laboratory facility in Portland, Maine were done so under the direct supervision of FB Environmental Associates. All water quality samples were analyzed by the independent analytical lab, Maine Environmental Laboratory. The removal efficiency particle size distribution was analyzed by the independent analytical laboratory, GeoTesting Express. The scour test particle size distribution was analyzed at Hydro International's facility under the supervision of FB Environmental Associates. Additionally, the preparation of the verification report and the documentation contained therein fulfill the submission requirements of the process document and protocol.

If you have any questions or comments regarding the verification of the FDHC, please do not hesitate to contact us.

Sincerely,

Lisa Lemont, CPSWQ
Business Development Manager

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Statement of Third Party Observer

STATEMENT OF THIRD PARTY OBSERVER

To: Lisa Lemont, Hydro International, Portland, Maine

From: Forrest Bell, FB Environmental Associates

Subject: Third Party Review under *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)[1]

Date: December 31, 2015

cc: Andrew Anastasio, Hydro International; Jeremy Fink, Hydro International
Margaret Burns, FB Environmental Associates

Statement of Third Party Observer

FB Environmental has served as the third-party observer for tests performed by Hydro International in October through December 2015. The tests assessed the First Defense HC Stormwater Treatment Device as a 50% Total Suspended Solids (TSS) removal device under the New Jersey Department of Environmental Protection certification. Tests were performed by Hydro International staff at their laboratory located at 94 Hutchinson Drive in Portland, Maine, to meet the standards described in *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)[1]. On May 10, 2014, we also submitted a statement of qualifications, as required by NJCAT MTD process.

A member of our staff verified compliance with the laboratory test protocol above, and our staff member was physically present to observe the full duration of all laboratory testing. We have also reviewed the data, calculations, and conclusions associated with the removal efficiency testing in the *Verification Testing Report for the First Defense® HC Stormwater Treatment Device* by Hydro International, dated December 29, 2015, and state that they conform to what we saw during our supervision as third-party observer.

Forrest Bell — December 31, 2015

Signed: Date:

[1] Available at http://www.nj.gov/dep/stormwater/treatment.html

Statement of Disclosure

STATEMENT OF DISCLOSURE – THIRD PARTY OBSERVER

To: Lisa Lemont, Hydro International, Portland, Maine

From: Forrest Bell, FB Environmental Associates

Subject: Third Party Observer Statement of Disclosure under *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP, January 25 2013)[1]

Date: December 31, 2015

cc: Andrew Anastasio, Hydro International
Margaret Burns, FB Environmental Associates

Statement of Disclosure – Third Party Observer

FB Environmental has no financial conflict of interest regarding the test results of the stormwater device testing outlined in the *Verification Testing Report for the First Defense ® HC Stormwater Treatment Device* by Hydro International, dated December 29, 2015.

Disclosure Record

FB Environmental has provided the service of third party observer for tests performed by Hydro International in October through December of 2015. The tests assessed the First Defense HC Stormwater Treatment Device as a 50% Total Suspended Solids (TSS) removal device under the New Jersey Department of Environmental Protection certification as outlined in the *Verification Testing Report for the First Defense ® HC Stormwater Treatment Device* by Hydro International, dated December 29, 2015. Beyond this, FB Environmental and Hydro International have no relationships that would constitute a conflict of interest, as outlined in *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP 2013). For example, we have no ownership stake, do not receive commissions, do not have licensing agreements, and do not receive funds or grants beyond those associated with the testing program.

Fort Bell — December 31, 2015

Signed: Date:

[1] Available at http://www.nj.gov/dep/stormwater/treatment.html

1 of 1

STORMWATER MANAGEMENT
BEST MANAGEMENT PRACTICES
INSPECTION SCHEDULE AND EVALUATION CHECKLIST – CONSTRUCTION PHASE

PROJECT LOCATION: **780 West Main Street, Avon, MA** Latest Revision: _____

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/ Repair Needed yes/no List items	Date of Cleaning/Repair	Performed By	Water Level in Infiltration System
Silt Sock	After every major storm event			Check sediment levels and remove when reaches ¼ to ½ the height of Sock				
Catch basins (Existing)	Weekly or after major storm event.			Check silt sack sediment levels				
Stockpiles	After every major storm event			Ensure surrounding erosion control measure are intact				

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (March 1997) for recommendations regarding frequency for inspection and maintenance of specific BMPs.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended. Slow release fertilizer recommended.
Other notes:(Include deviations from: Con Com Order of Conditions, PB Approval, Construction Sequence and Approved Plan)

Stormwater Control Manager: _____ **Stamp**

STORMWATER MANAGEMENT
BEST MANAGEMENT PRACTICES
INSPECTION SCHEDULE AND EVALUATION CHECKLIST – POST CONSTRUCTION PHASE

PROJECT LOCATION: **780 West Main Street, Avon, MA** Latest Revision:_____

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/ Repair Needed yes/no List items	Date of Cleaning/Repair	Performed By	Water Level in Detention System
Drain Lines	Yearly			-Sediment build-up -Trash and debris				
Trench Drain	Quarterly			-Sediment level exceeds 8” -Trach and debris - Floatable oils or hydrocarbon - Grate or outlet blockage				
Pre-Treatment Structure (First Defense Units)	Quarterly			-Sediment not to exceed 18” -Floating contaminates shall be removed by vacuum pump prior to sediment removal -Outlet blockages				
Subsurface Infiltration Chamber Systems	Twice a Year			-Sediment buildup -Standing water greater than 48 hours				
Roadway Pavement Maintenance	Quarterly			Remove sediment and debris as necessary				

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook (2008) for recommendations regarding frequency for inspection and maintenance of specific BMPs.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended. Slow release fertilizer recommended.
Other notes:(Include deviations from: Con Com Order of Conditions, PB Approval, Construction Sequence and Approved Plan)

Stormwater Control Manager: _____ **Stamp**

Merrill Engineers- Land Surveyors
427 Columbia Rd., Hanover, MA. 02339
781-826-9200
26 Union St., Plymouth, MA. 02360
508-746-6060

FORM 11 - SOIL EVALUATOR FORM

Project No. 23-476

Date: 12/6/2023
Revision:

Commonwealth of Massachusetts
Avon , Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By:	Paul Louderback SE#14618	Test Dates:	12/6/2023
Performed By:		Test Dates:	
Witnessed By:	NA - For Drainage	Testhole #:	23-01 & 23-02
Witnessed By:		Testhole #:	

FACILITY INFORMATION

Site Location:

Builder's lot #:	
Street Address:	780 West main St
Town, State, Zip:	Avon MA
Assessor's Map:	D3-5-24

Owner/ Applicant Information:

Name:	Self Help Inc - c/o Dave Wallace
Address:	780 West Main St
Town, State, Zip:	Avon
Telephone no.:	

SITE INFORMATION

Construction Type:

New Construction: [ ] Repair: [ ] Upgrade: [ ] Drainage: [X]

Published Soil Survey Available: No: [ ] Yes: [X]

Year Published: 2023 Publication Scale: 1:12,000 a. Soil Map Unit: **623C** Drainage Class: **C/D**
b. Soil Map Unit: _____ Drainage Class: _____

Soil Name: a. **Woodbridge Uprban Land complex** Soil Limitations: None

Surficial Geologic Report Available: No: [ ] Yes: [X]

Year Published: 2018 Publication Scale: 1:250,000

Geological Material/map unit: **Thin Till** - matrix of sand, some silt and little clay

Landform: Ground moraines, hills, drumlins

Flood Insurance Rate Map:

Above 500 year flood boundary? No: [ ] Yes: [X] Within a velocity zone? No: [X] Yes: [ ]

Within 500 year flood boundary? No: [X] Yes: [ ] Within 100 year flood boundary? No: [X] Yes: [ ]

Wetland Area:

National Wetland Inventory Map: (map unit) n/a Name:

Wetlands Conservancy Program Map: (map unit) n/a Name:

Current Water Resource Conditions (USGS): (Month/year) MA-EBW 30 E. Bridgewater well: Nov 2023

Range: Above Normal: [ ] Normal: [X] Below Normal: [ ]

Other References Reviewed:
Comments:

Merrill Engineers Land Surveyors
427 Columbia Rd., Hanover, MA. 02339
26 Union St., Plymouth, MA. 02360

FORM 11 - SOIL EVALUATOR FORM

Project No.: 23-476

Date: 12/6/23
Revised: _____

***Deep Hole #** _____

Builder's lot #: _____
Street Address: 780 West main St
Town: Avon MA
Assessor's Map: D3-5-24

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Method Used:

- ☐ Depth observed standing in observation hole: A: _____ inches B: _____ inches
- ☐ Depth weeping from side of observation hole: A: _____ inches B: _____ inches
- ☐ Depth to soil mottles: _____ inches
- ☐ Ground water adjustment: _____ feet

Index Well Number: _____ Reading Date: _____ Index well level: _____

Adjustment factor: None Adjustment groundwater level:

DEPTH OF PERVIOUS MATERIAL

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes: ☒ No: ☐

If yes, at what depth was it observed? Upper Boundary (inches): see logs
Lower Boundary (inches): see logs

CERTIFICATION

I certify that I have passed the soil evaluator examination approved by the Department of Environtmental Protection and that the above analysis was performed by me conistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature of Soil Evaluator: _____ Date: December 6, 2023
Typed or Printed Name of Soil Evaluator: Paul Louderback SE#14618
Date of Soil Evaluator Exam: May 2022

Name of Board of Health Witness: NA - For Drainage
Board of Health: _____

*If applicable, only deep hole with shallowest ESHGW listed.

Merrill Engineers- Land Surveyors
427 Columbia Rd., Hanover, MA. 02339
781-826-9200
26 Union St., Plymouth, MA. 02360
508-746-6060

FORMS 11 AND 12
SOIL EVALUATOR FORM

ON-SITE REVIEW

DEEP HOLE #: 23-01 DATE: 12/6/2023 TIME: 8:00 WEATHER: Light snow 35°±
SITE ADDRESS or MAP/LOT #: 780 West Main Street, Avon Avon
OWNER: Self Help Inc. (Dave Wallace) JOB NO.: 23-476
LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: 195.2±

LAND USE: Residential SURFACE STONES: Yes: [ ] No: [X] SLOPE (%): 3-5%

VEGETATION: wooded / small trees LANDFORM: Moraine
DISTANCES FROM:
OPEN WATER BODY: >100 ft PROPERTY LINE: >50 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >100 ft
DRINKING WATER WELL: >100 ft OTHER:
DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders
0-16	Ap	Sandy Loam	10YR 5/4	-	roots & leaf scatter
16-34	Bw	Sandy Loam	10YR 6/6	-	Massive Friable (MF)
34-72	C1	Loamy Sand	2.5 Y 6/2	-	15% gravel - 5% cobbles (MF)
72-120	C2	Loamy Sand	2.5 Y 6/2	-	20% gravel - 5% cobble, very dense in place, loose in hand

PARENT MATERIAL: course loamy lodgement till Unsuitable Material Present? Yes: [ ] No: [X] If Yes:
Disturbed Soil: [ ] Fill Mat'l: [ ] Impervious Layer(s): [ ] Weathered/Fractured Rock: [ ] Bedrock: [ ]

GROUNDWATER OBSERVED: Yes: [ ] No: [X] If Yes: What is the depth of Groundwater:
Standing in Hole: - Weeping from Face: - Saturating the Face: - Mottling: none observed
Estimated Depth to Seasonal High Ground Water : none observed

PERCOLATION TEST

Percolation Hole #:	N/A for drainage		Percolation Hole #:		
Test Date:			Test Date:		
Depth of Perc:			Depth of Perc:		
Start of Presoak:			Start of Presoak:		
End of Presoak:			End of Presoak:		
Time @ 12":			Time @ 12":		
Time @ 9":			Time @ 9":		
Time Elapse:(12"-9")			Time Elapse:(12"-9")		
Time AT 6":			Time AT 6":		
Time Elapse (9"-6"):			Time Elapse (9"-6"):		
Rate: (min/in.)			Rate: (min/in.):		
Test Passed/ Failed/ Discon/ Add. Test Req'd:			Test Passed/ Failed/ Discon/ Add. Testing Req'd:		

Performed By: Paul Louderback Witnessed By: N/A - drainage Mach./Oper.: Avon Septic
Comments:

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

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FORMS 11 AND 12
SOIL EVALUATOR FORM

ON-SITE REVIEW

DEEP HOLE #: 23-02 DATE: 12/6/2023 TIME: 9:00 WEATHER: Light snow 35°±
SITE ADDRESS or MAP/LOT #: 780 West Main Street, Avon Avon
OWNER: Self Help Inc. (Dave Wallace) JOB NO.: 23-476
LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: 193.5±

LAND USE: Residential SURFACE STONES: Yes: [ ] No: [X] SLOPE (%): 3-5%

VEGETATION: wooded / small trees LANDFORM: Moraine
DISTANCES FROM:
OPEN WATER BODY: >100 ft PROPERTY LINE: 20'± ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: 100'± ft
DRINKING WATER WELL: >100 ft OTHER:

DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders
0-28	Ap	Sandy Loam	10YR 5/4	-	massive friable, roots & leaf scatter
28-38	Bw	Sandy Loam	10YR 6/6	-	Massive Friable (MF)
38-72	C1	Loamy Sand	2.5 Y 7/2	-	15% gravel - 5% cobbles (MF)
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End of Presoak:			End of Presoak:		
Time @ 12":			Time @ 12":		
Time @ 9":			Time @ 9":		
Time Elapse:(12"-9")			Time Elapse:(12"-9")		
Time AT 6":			Time AT 6":		
Time Elapse: (9"-6"):			Time Elapse: (9"-6"):		
Rate. (min/in.):			Rate: (min/in.)		
Test Passed/ Failed/ Discon/ Add. Test Req'd:			Test Passed/ Failed/ Discon/ Add. Testing Req'd:		

Performed By: Paul Louderback Witnessed By: N/A - drainage Mach./Oper.: Avon Septic
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Map Scale: 1:904 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 scales ranging from 1:12,000 to 1:25,000.

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: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 19, Sep 10, 2023

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 16, Sep 10, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

MAP LEGEND

MAP INFORMATION

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
623C	Woodbridge-Urban land complex, 3 to 15 percent slopes	1.6	99.3%
Subtotals for Soil Survey Area		**1.6**	**99.3%**
Totals for Area of Interest		**1.6**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
623B	Woodbridge-Scituate-Urban land complex, 0 to 8 percent slopes	0.0	0.7%
Subtotals for Soil Survey Area		**0.0**	**0.7%**
Totals for Area of Interest		**1.6**	**100.0%**

Norfolk and Suffolk Counties, Massachusetts

623C—Woodbridge-Urban land complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w68b
Elevation: 0 to 550 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge and similar soils: 58 percent
Urban land: 28 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Paxton

Percent of map unit: 9 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 5 percent
Landform: Hills, drainageways, drumlins, depressions, ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 19, Sep 10, 2023

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 16, Sep 10, 2023