



April 24, 2017

Revised: June 26, 2017

Stormwater Management Report

Submittal To:

Medway Zoning Board

Glen Brook Way

Definitive Site Plan “Glen Brook Way”

**#20 West Street
Medway, Massachusetts**

**April 20, 2017
Revised: June 26, 2017**

STORMWATER MANAGEMENT REPORT AND HYDROLOGIC-HYDRAULIC ANALYSIS

Project Summary

The subject property is located on the southwesterly side of West Street approximately ½ mile from the intersection of Hartford Avenue (Rte 126). The property is located within the Agricultural-Residential II (AR-II) district as depicted on the Town of Medway Zoning Map. According to the Medway Assessor’s Maps, the Site is comprised of 3 parcels with frontage along Glen Brook Way which is within the Site Locus. A portion of the rear property line of Lot 3 is defined by the Hopping Brook. The roadway was never constructed and the Applicant plans to eliminate the existing interior lot lines and easements as part of this project. The property consists of a total of 3.16± acres of which 0.54± acres (23,411± s.f.) are wetlands.

The majority of the work associated with this proposal takes place within the front or northeasterly portion of the property with a small amount of alteration (6,590± s.f.) within the Riverfront Area associated with Hopping Brook towards the rear of the property. Access to the site is currently provided from West Street.

The existing Site includes a residential dwelling which according to Assessor’s records was constructed in about 1935 along with an attached garage, shed, bituminous concrete driveway and other associated site amenities. The proposed project includes the demolition of the existing residential structure and shed, etc and the construction of 6 new multi-family residential structures with a total of 48 rental units. Also included in this proposal are the construction of access driveways, children’s play areas, parking areas, landscape features and other site amenities.

Methodology

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

Existing Conditions

Under existing conditions, stormwater runoff from the proposed project area flows from the higher areas of the Lot along West Street towards both Hopping Brook to the southwest and to the adjacent parcel, #31 West Street to the south. No treatment for water quality presently exists for any stormwater on the existing site, it simply flows overland towards one of the two tributary areas. Soil types were obtained from NRCS mapping and were found to be HSG A soils in the front or northeasterly portion of the lot and HSG B/D soils as you drop in elevation and get further into the site towards the river. In order to confirm the soil class and groundwater depth characteristics of these soils, test pits were performed by Merrill Engineers and Land Surveyors in December of 2016. The area where all of the structures and proposed construction will occur is completely located within areas mapped as HSG A soils so this is where all of the soils testing was performed. Based on soil textures encountered at the time of testing, these areas were found to be consistent with an A soil (coarse sand). To be conservative, an exfiltration rate of 2.41in/hr was used in the stormwater calculations for the subsurface infiltration systems.

Proposed Conditions/Stormwater Management

Under the post development condition, a high point will be constructed at the propertyline for both access driveways and runoff from the new driveways and parking areas will follow the existing topography and slope towards the front of buildings 5 and 6 where there are two deep sump hooded catch basin's set at two low points to collect all of the runoff from the impervious driveway and parking areas along with landscaped areas between buildings 1-4. From here, the runoff will be directed into a 49.83' wide x 157.50' long subsurface infiltration system #2 comprised of Cultec R-330XLHD chambers (see attached calculations and plans for more details). Runoff from the roof areas of buildings 1-3 would be considered "clean" runoff and therefore does not require pretreatment. This runoff would be routed directly into a smaller 40.17' long x 31.50' wide subsurface infiltration system #1 using the same chambers. Both of these systems have been designed to infiltrate up to and including the 100 year design storm. An emergency overflow has been designed for the larger infiltration system #2.

Compliance with Stormwater Management Standards

Standard 1 – No New Untreated Discharges

No new stormwater conveyances will discharge untreated pavement runoff into, or cause erosion to downgradient areas. Under existing conditions, a large portion of the site allows untreated stormwater to flow off the property without any treatment whatsoever. As mentioned above, the proposed site design will direct stormwater from all impervious areas on site to the stormwater management system where it will be treated and infiltrated for all design storm events.

Standard 2 – Peak Rate Attenuation

Peak rates of runoff were calculated using the TR-20 methodology developed by the NRCS (refer to Appendices). Since the impervious area on site will be increased from the existing conditions, there will be an increase in runoff rates under the proposed conditions. In order to meet the requirements of Standards #3 & #4 for recharge and water quality requirements, two subsurface infiltration systems will provide treatment, infiltration and storage volume controls. These measures will both detain and infiltrate runoff, mitigating increased rates and volumes of runoff for the 2, 10, 25 and 100 year storms events.

The following is a summary of pre- and post-construction rates of runoff:

RETURN PERIOD	EXISTING CONDITIONS		PROPOSED CONDITIONS	
	TRIB TO #31 WEST ST	TRIB TO HOPPING BROOK	TRIB TO #31 WEST ST	TRIB TO HOPPING BROOK
	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)	RATE (cfs), VOLUME (cf)
2YR	0.00 14	0.09 1,093	0.00 2	0.09 925
10YR	0.05 910	0.84 4,556	0.01 154	0.69 3,445
25YR	0.30 2,424	1.95 8,406	0.05 410	1.46 6,157
100YR	1.64 7,170	4.81 18,351	0.26 1,213	3.41 13,022

Standard 3 – Groundwater Recharge

Runoff will be infiltrated by the subsurface infiltration systems which have both been designed a minimum of two feet above seasonal high groundwater. The hydraulic conductivity was based on soil conditions found on the site via soil testing and DEP SMR Table 2.3.3 1982 Rawls Rates - values developed from Rawls, Brakensiek and Saxton, 1982. The total required groundwater recharge volume was calculated to be 1,854 cubic feet. The proposed subsurface infiltration systems will provide 20,766± cubic feet of recharge below the outlets, well above the requisite recharge volume for this project. Refer to Appendix B for infiltration system calculations and Appendix C for recharge volume calculations and soil testing results.

Standard 4 – Water Quality

A Long Term Source Control/Pollution Prevention Plan will be incorporated into the Operation and Maintenance Plan once the project is funded by HDCD. The water quality

volume was calculated using the ½ inch rule as the site is not within a critical area as defined by the Massachusetts Stormwater Handbook. The total required water quality treatment volume was calculated to be 2,317 cubic feet. The volume below the outlet in the large infiltration system, which will handle all of the runoff from the parking areas, is 17,900± c.f., well above the requisite water quality volume for the proposed site design. Refer to Appendix C for water quality calculations.

In accordance with the guidelines of the Stormwater Management Policy, the Total Suspended Solids (TSS) Removal was calculated to be 89% for the new treatment train which will handle the stormwater runoff from the proposed project area. The treatment trains consist of deep sump hooded catch basins which capture runoff and direct it towards a subsurface infiltration system with a separator row. The separator row essentially functions as a sediment forebay and has been sized to treat 400 c.f. of runoff per impervious acre proposed to achieve the required minimum removal rate of 80% total suspended solids. TSS removal calculations are included in Appendix C.

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

The proposed project does not include land uses with higher potential pollutant loads. Not Applicable.

Standard 6 – Critical Areas

The proposed project does not discharge to any critical areas. Not Applicable.

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

The project site is currently developed and the proposed project consists of the razing of the existing building and the reconstruction of six new buildings with new driveways, parking areas, landscaping, drainage improvements and other associated site improvements. The proposed development could be considered redevelopment as much of the site is altered and has been cleared for the construction of a 3-lot subdivision roadway. In order to provide additional stormwater controls due to the projects proximity to wetland resource area, the project has been designed as if it were new construction and has met the all of the Stormwater Management Standards.

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

Erosion controls barriers will be placed at the limit of work prior to commencement of any construction activity. A Construction Operation and Maintenance Plan and Construction Pollution Prevention Plan have will be provided once the project is funded by DHCD.

Standard 9 – Operation and Maintenance Plan

A Long Term Source Control/Pollution Prevention Plan and Operation and Maintenance Plan will also be provided once the project is funded by DHCD.

Standard 10 – Prohibition of Illicit Discharges

No illicit discharges are anticipated on site. Measures to prevent illicit discharges will be included in the Long-Term Source Control/Pollution Prevention Plan.

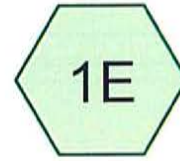
APPENDIX A

Existing Conditions

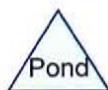
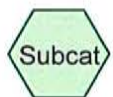
2, 10, 25 and 100 year return storm Summaries



TRIB. TO HOPPING
BROOK



TRIB. TO #31 WEST ST



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Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
37,457	49	50-75% Grass cover, Fair, HSG A (2E)
40,652	39	>75% Grass cover, Good, HSG A (1E)
311	96	Gravel surface, HSG A (1E)
1,888	98	Paved parking, HSG A (1E)
12,624	77	Wetlands (1E, 2E)
21,019	30	Woods, Good, HSG A (1E, 2E)
12,952	55	Woods, Good, HSG B (1E, 2E)
126,903	47	TOTAL AREA

16064 PRE-DEVELOPMENT*Type III 24-hr 2-Year Rainfall=3.22"*

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1E: TRIB. TO #31 WEST ST Runoff Area=53,197 sf 3.55% Impervious Runoff Depth=0.00"
Flow Length=432' Tc=7.6 min CN=40 Runoff=0.00 cfs 14 cf

Subcatchment 2E: TRIB. TO HOPPING Runoff Area=73,706 sf 0.00% Impervious Runoff Depth=0.18"
Flow Length=415' Tc=10.5 min CN=52 Runoff=0.09 cfs 1,093 cf

Total Runoff Area = 126,903 sf Runoff Volume = 1,107 cf Average Runoff Depth = 0.10"
98.51% Pervious = 125,015 sf 1.49% Impervious = 1,888 sf

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Type III 24-hr 2-Year Rainfall=3.22"

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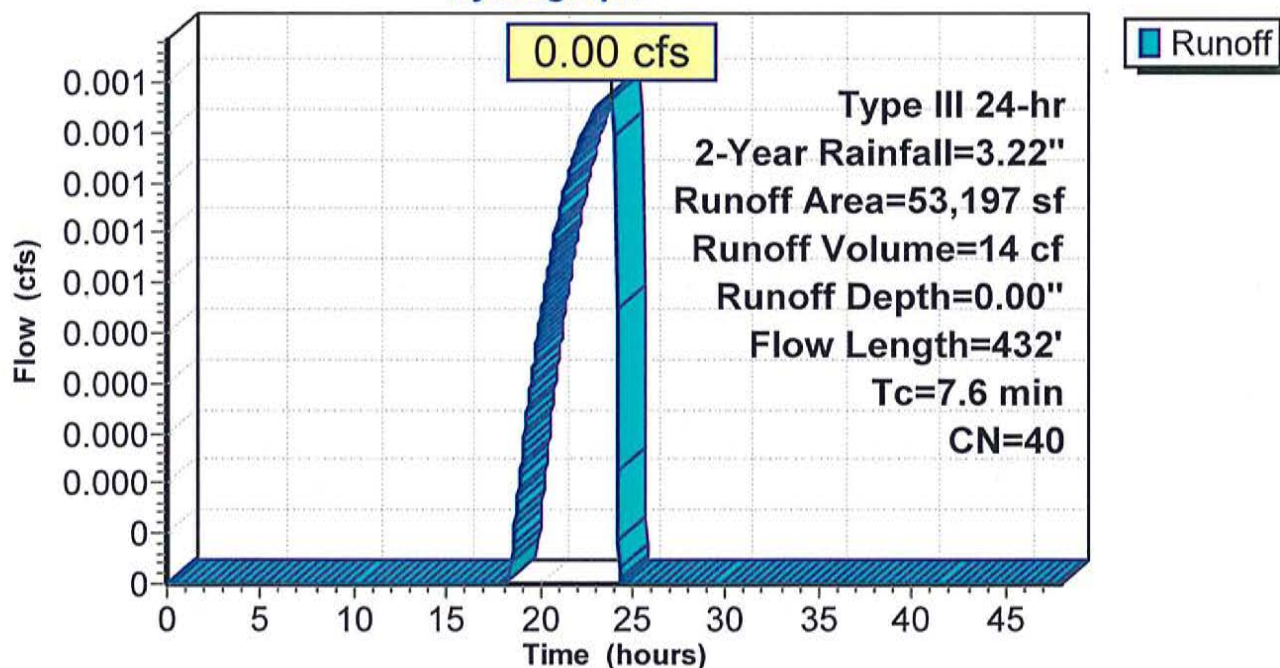
Summary for Subcatchment 1E: TRIB. TO #31 WEST ST

Runoff = 0.00 cfs @ 23.90 hrs, Volume= 14 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
1,888	98	Paved parking, HSG A
40,652	39	>75% Grass cover, Good, HSG A
311	96	Gravel surface, HSG A
9,303	30	Woods, Good, HSG A
584	55	Woods, Good, HSG B
* 459	77	Wetlands
53,197	40	Weighted Average
51,309		96.45% Pervious Area
1,888		3.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.6	432	Total			

Subcatchment 1E: TRIB. TO #31 WEST ST**Hydrograph**

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Type III 24-hr 2-Year Rainfall=3.22"

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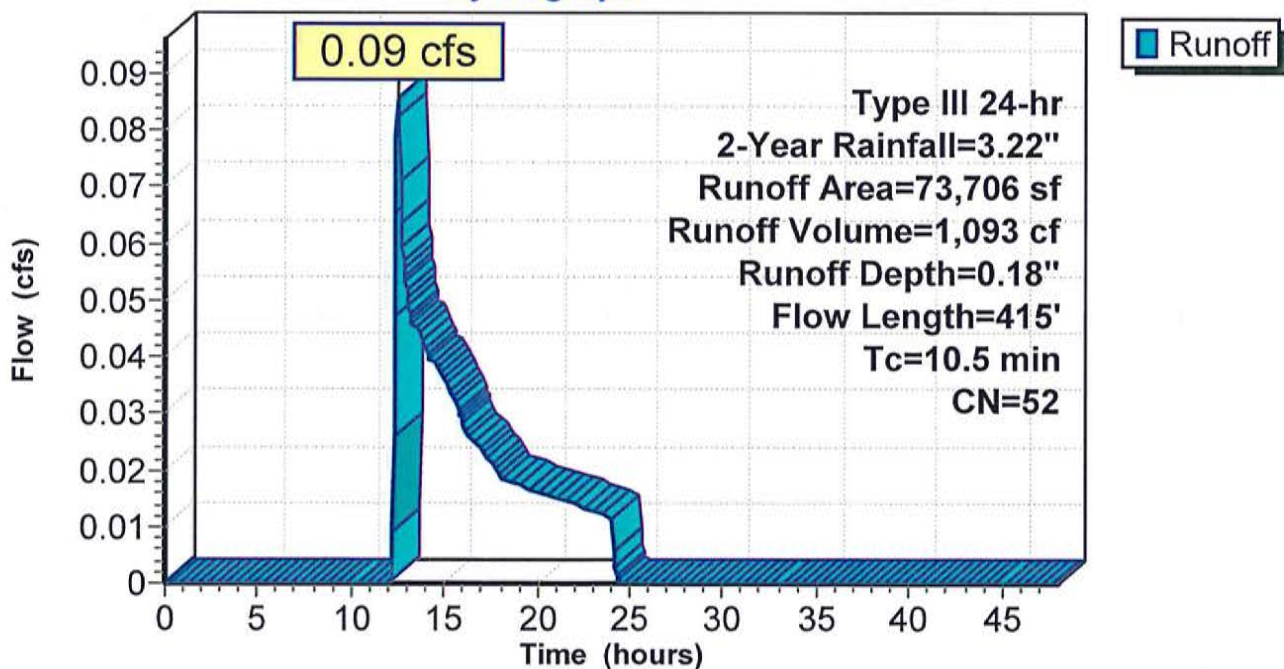
Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 0.09 cfs @ 12.48 hrs, Volume= 1,093 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
37,457	49	50-75% Grass cover, Fair, HSG A
11,716	30	Woods, Good, HSG A
12,368	55	Woods, Good, HSG B
* 12,165	77	Wetlands
73,706	52	Weighted Average
73,706		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	20	0.0360	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.40"
4.2	30	0.0360	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.8	365	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	415	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK**Hydrograph**

16064 PRE-DEVELOPMENT*Type III 24-hr 10-Year Rainfall=4.86"*

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1E: TRIB. TO #31 WEST ST Runoff Area=53,197 sf 3.55% Impervious Runoff Depth=0.21"
Flow Length=432' Tc=7.6 min CN=40 Runoff=0.05 cfs 910 cf

Subcatchment 2E: TRIB. TO HOPPING Runoff Area=73,706 sf 0.00% Impervious Runoff Depth=0.74"
Flow Length=415' Tc=10.5 min CN=52 Runoff=0.84 cfs 4,556 cf

Total Runoff Area = 126,903 sf Runoff Volume = 5,466 cf Average Runoff Depth = 0.52"
98.51% Pervious = 125,015 sf 1.49% Impervious = 1,888 sf

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Type III 24-hr 10-Year Rainfall=4.86"

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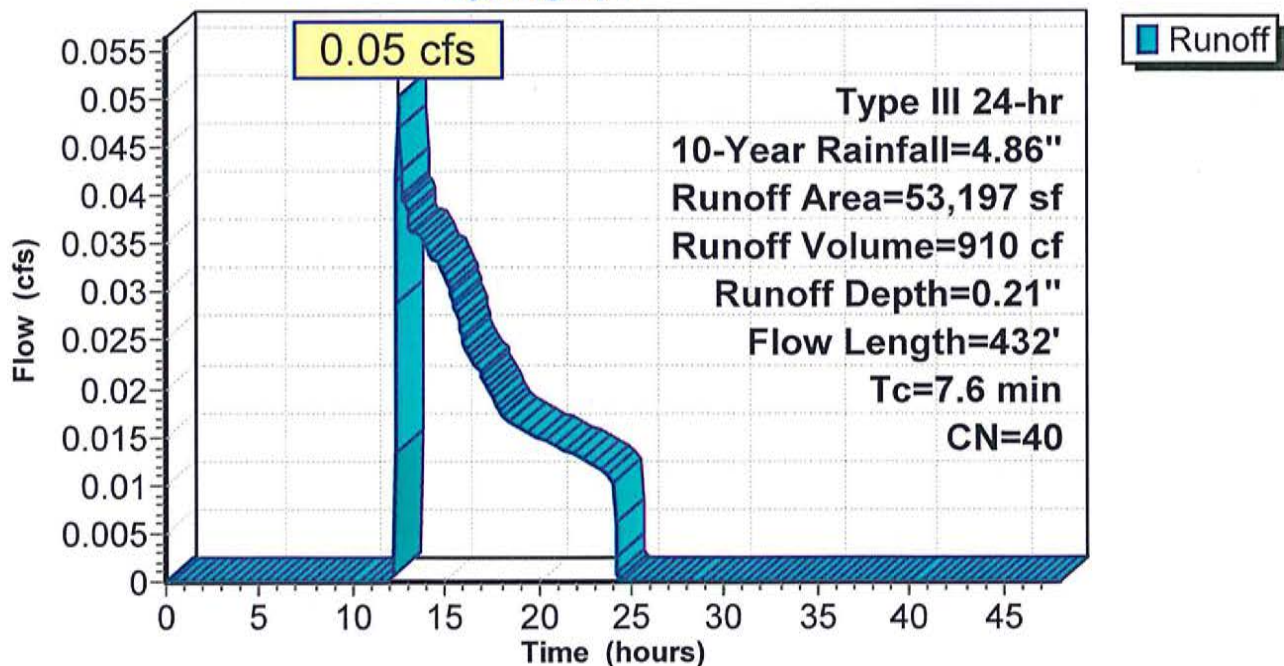
Summary for Subcatchment 1E: TRIB. TO #31 WEST ST

Runoff = 0.05 cfs @ 12.49 hrs, Volume= 910 cf, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
1,888	98	Paved parking, HSG A
40,652	39	>75% Grass cover, Good, HSG A
311	96	Gravel surface, HSG A
9,303	30	Woods, Good, HSG A
584	55	Woods, Good, HSG B
* 459	77	Wetlands
53,197	40	Weighted Average
51,309		96.45% Pervious Area
1,888		3.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.6	432	Total			

Subcatchment 1E: TRIB. TO #31 WEST ST**Hydrograph**

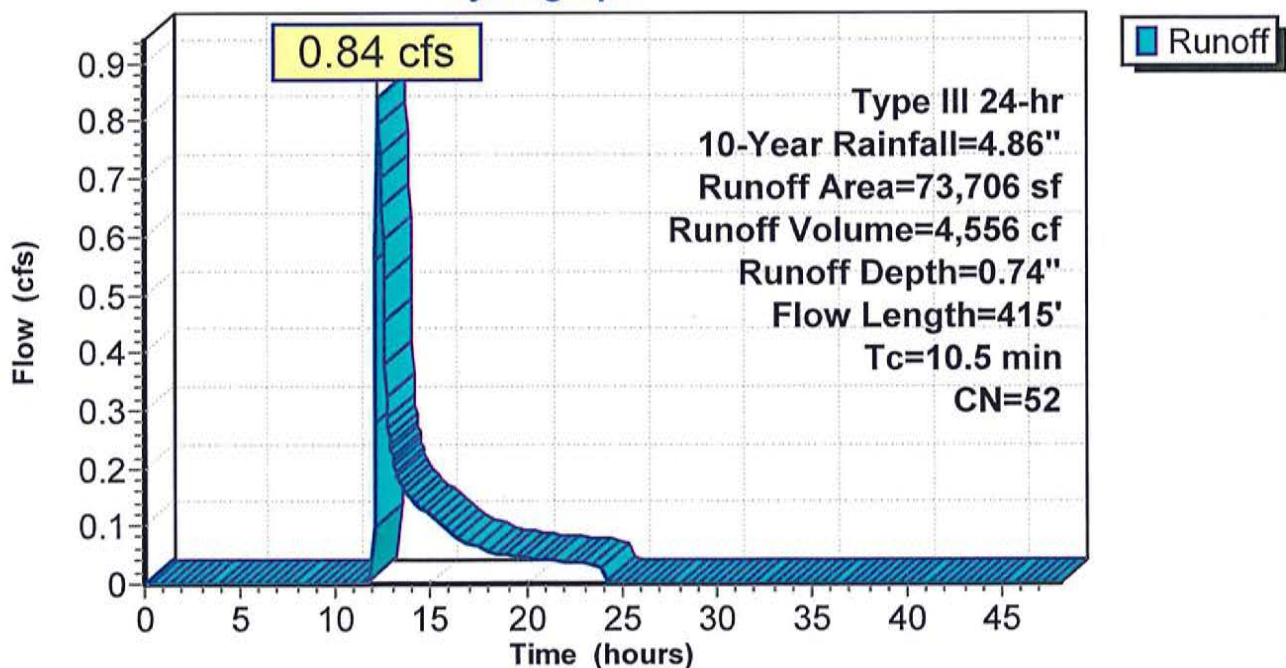
Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 0.84 cfs @ 12.20 hrs, Volume= 4,556 cf, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
37,457	49	50-75% Grass cover, Fair, HSG A
11,716	30	Woods, Good, HSG A
12,368	55	Woods, Good, HSG B
* 12,165	77	Wetlands
73,706	52	Weighted Average
73,706		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	20	0.0360	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.40"
4.2	30	0.0360	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.8	365	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	415	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK**Hydrograph**

16064 PRE-DEVELOPMENT*Type III 24-hr 25-Year Rainfall=6.15"*

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1E: TRIB. TO #31 WEST ST Runoff Area=53,197 sf 3.55% Impervious Runoff Depth=0.55"
Flow Length=432' Tc=7.6 min CN=40 Runoff=0.30 cfs 2,424 cf

Subcatchment 2E: TRIB. TO HOPPING Runoff Area=73,706 sf 0.00% Impervious Runoff Depth=1.37"
Flow Length=415' Tc=10.5 min CN=52 Runoff=1.95 cfs 8,406 cf

Total Runoff Area = 126,903 sf Runoff Volume = 10,830 cf Average Runoff Depth = 1.02"
98.51% Pervious = 125,015 sf 1.49% Impervious = 1,888 sf

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Type III 24-hr 25-Year Rainfall=6.15"

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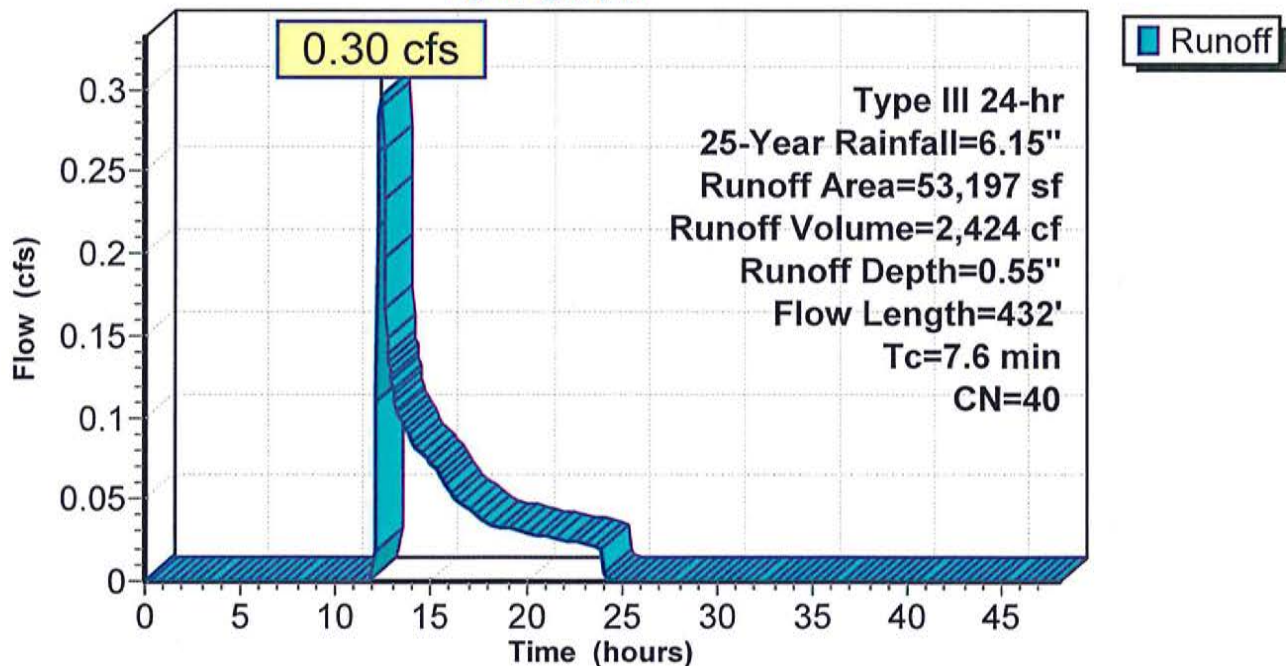
Summary for Subcatchment 1E: TRIB. TO #31 WEST ST

Runoff = 0.30 cfs @ 12.33 hrs, Volume= 2,424 cf, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
1,888	98	Paved parking, HSG A
40,652	39	>75% Grass cover, Good, HSG A
311	96	Gravel surface, HSG A
9,303	30	Woods, Good, HSG A
584	55	Woods, Good, HSG B
* 459	77	Wetlands
53,197	40	Weighted Average
51,309		96.45% Pervious Area
1,888		3.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.6	432	Total			

Subcatchment 1E: TRIB. TO #31 WEST ST**Hydrograph**

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Type III 24-hr 25-Year Rainfall=6.15"

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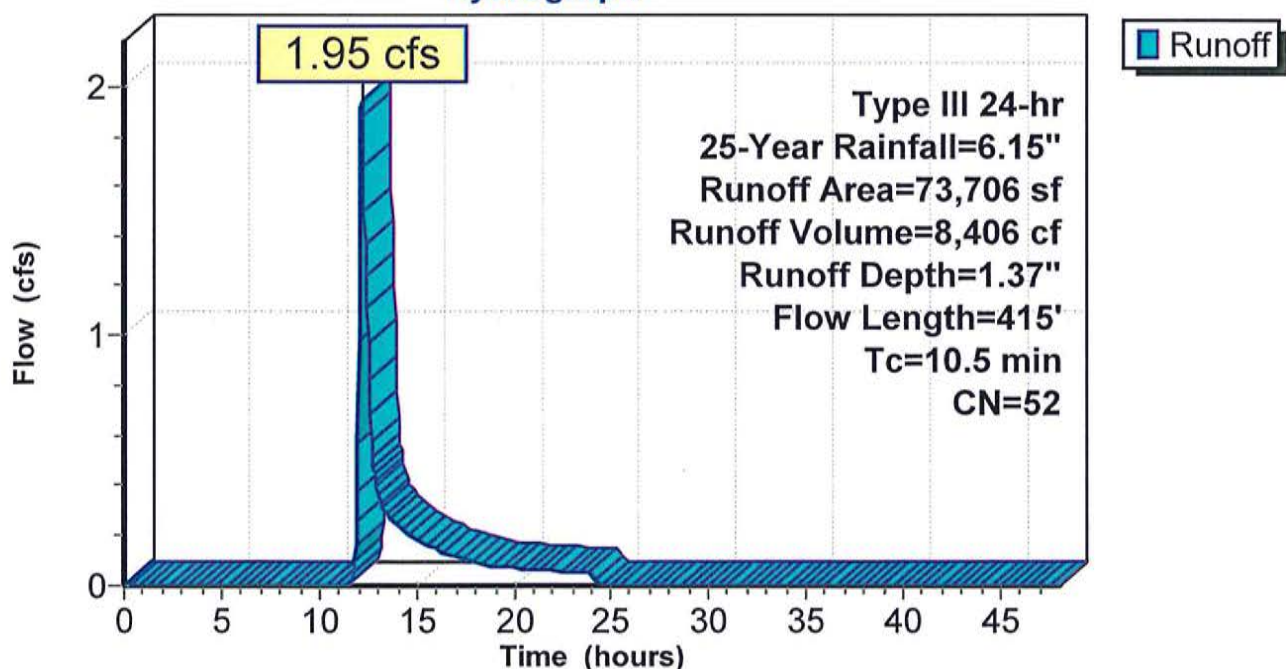
Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 1.95 cfs @ 12.17 hrs, Volume= 8,406 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
37,457	49	50-75% Grass cover, Fair, HSG A
11,716	30	Woods, Good, HSG A
12,368	55	Woods, Good, HSG B
* 12,165	77	Wetlands
73,706	52	Weighted Average
73,706		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	20	0.0360	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.40"
4.2	30	0.0360	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.8	365	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	415	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK**Hydrograph**

16064 PRE-DEVELOPMENT*Type III 24-hr 100-Year Rainfall=8.80"*

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 1E: TRIB. TO #31 WEST ST Runoff Area=53,197 sf 3.55% Impervious Runoff Depth=1.62"
Flow Length=432' Tc=7.6 min CN=40 Runoff=1.64 cfs 7,170 cf

Subcatchment 2E: TRIB. TO HOPPING Runoff Area=73,706 sf 0.00% Impervious Runoff Depth=2.99"
Flow Length=415' Tc=10.5 min CN=52 Runoff=4.81 cfs 18,351 cf

Total Runoff Area = 126,903 sf Runoff Volume = 25,521 cf Average Runoff Depth = 2.41"
98.51% Pervious = 125,015 sf 1.49% Impervious = 1,888 sf

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Type III 24-hr 100-Year Rainfall=8.80"

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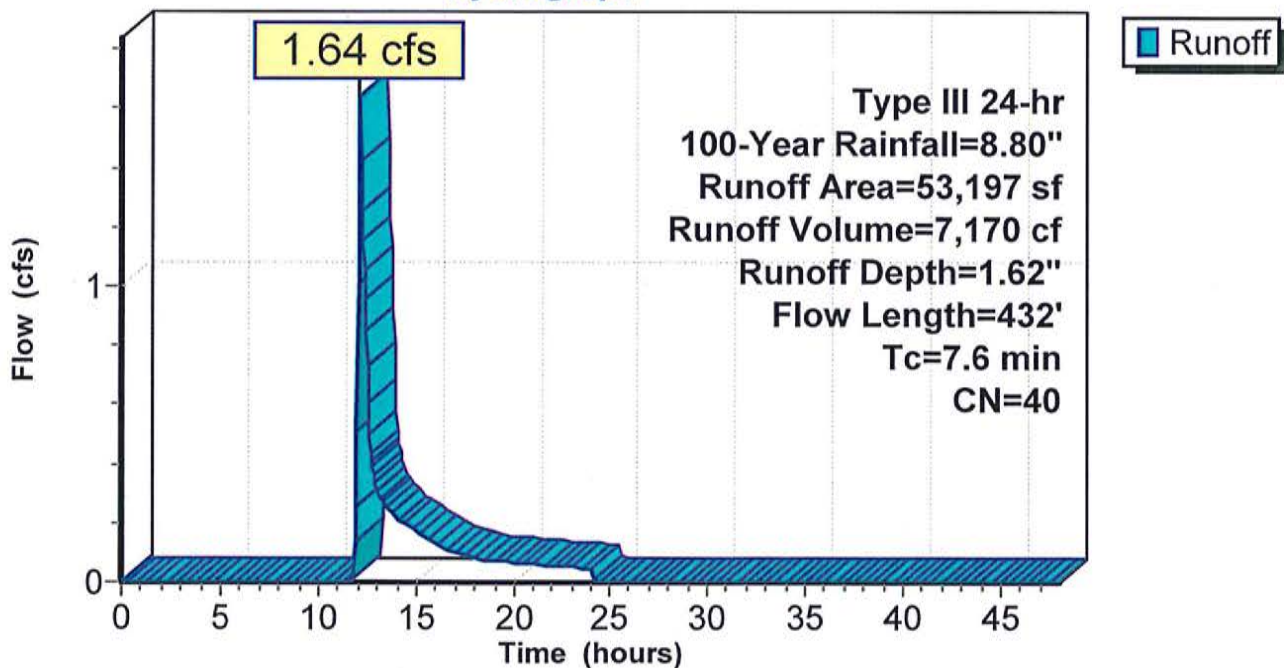
Summary for Subcatchment 1E: TRIB. TO #31 WEST ST

Runoff = 1.64 cfs @ 12.14 hrs, Volume= 7,170 cf, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
1,888	98	Paved parking, HSG A
40,652	39	>75% Grass cover, Good, HSG A
311	96	Gravel surface, HSG A
9,303	30	Woods, Good, HSG A
584	55	Woods, Good, HSG B
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
2.1	382	0.0340	2.97		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.6	432	Total			

Subcatchment 1E: TRIB. TO #31 WEST ST**Hydrograph**

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Type III 24-hr 100-Year Rainfall=8.80"

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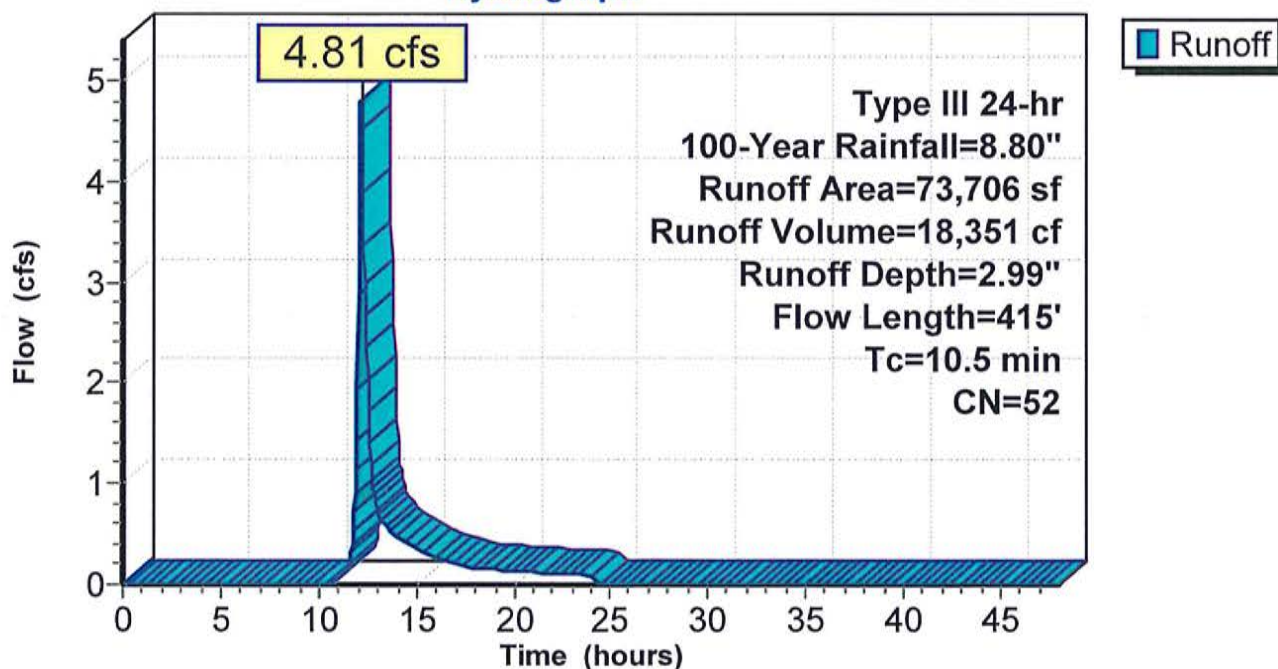
Summary for Subcatchment 2E: TRIB. TO HOPPING BROOK

Runoff = 4.81 cfs @ 12.16 hrs, Volume= 18,351 cf, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
37,457	49	50-75% Grass cover, Fair, HSG A
11,716	30	Woods, Good, HSG A
12,368	55	Woods, Good, HSG B
* 12,165	77	Wetlands
73,706	52	Weighted Average
73,706		100.00% Pervious Area

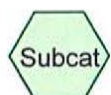
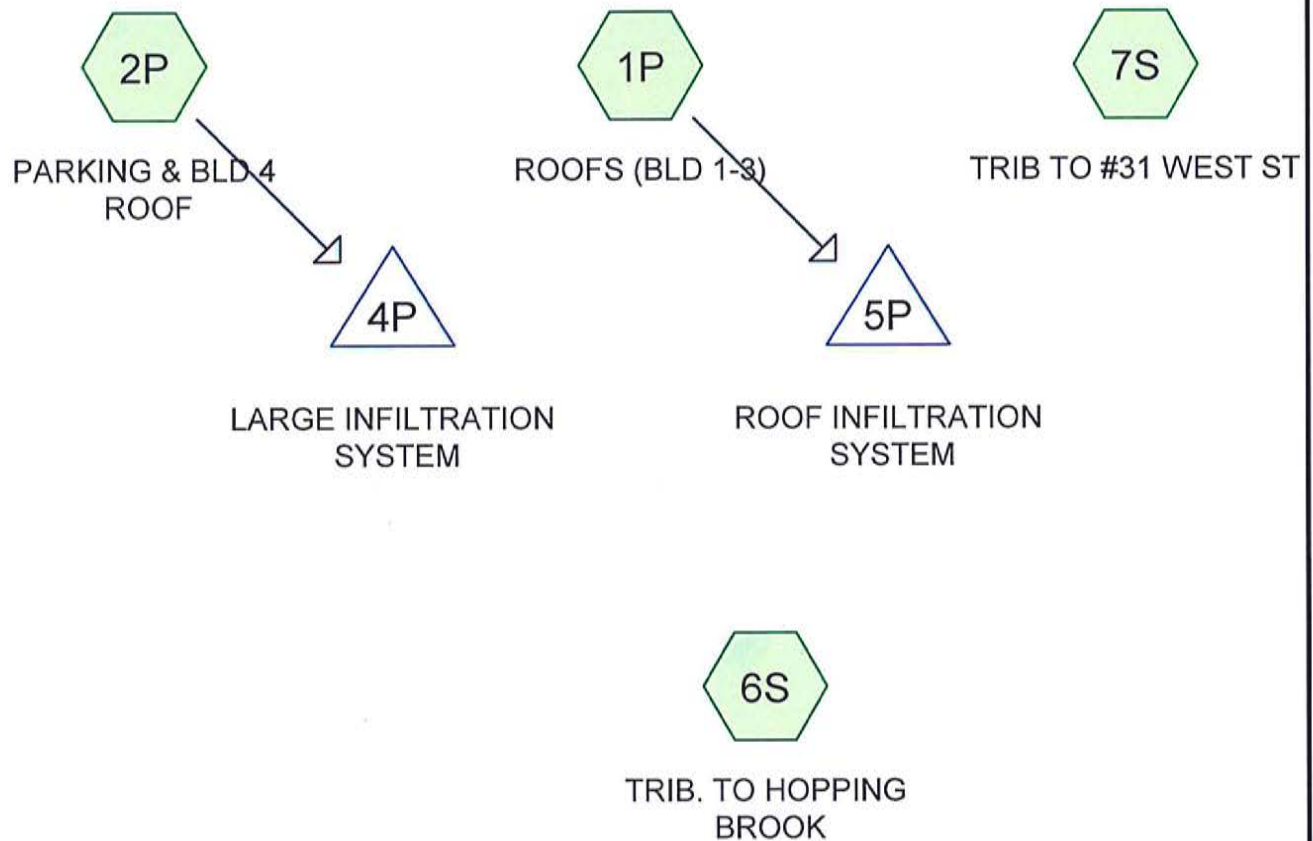
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	20	0.0360	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.40"
4.2	30	0.0360	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
1.8	365	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.5	415	Total			

Subcatchment 2E: TRIB. TO HOPPING BROOK**Hydrograph**

APPENDIX B

Proposed Conditions

2, 10, 25 and 100 year return storm Summaries



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Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
14,662	49	50-75% Grass cover, Fair, HSG A (6S)
19,228	39	>75% Grass cover, Good, HSG A (2P, 6S, 7S)
188	72	Dirt roads, HSG A (7S)
46,983	98	Paved parking, HSG A (2P)
8,622	98	Roofs, HSG A (1P)
12,624	77	Wetlands (6S, 7S)
11,644	30	Woods, Good, HSG A (2P, 6S, 7S)
12,952	55	Woods, Good, HSG B (6S, 7S)
126,903	71	TOTAL AREA

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: ROOFS (BLD 1-3)	Runoff Area=8,622 sf 100.00% Impervious Runoff Depth=2.99" Tc=10.0 min CN=98 Runoff=0.54 cfs 2,146 cf
Subcatchment 2P: PARKING & BLD 4	Runoff Area=60,825 sf 77.24% Impervious Runoff Depth=1.70" Tc=10.0 min CN=84 Runoff=2.40 cfs 8,612 cf
Subcatchment 6S: TRIB. TO HOPPING	Runoff Area=48,453 sf 0.00% Impervious Runoff Depth=0.23" Flow Length=192' Tc=11.0 min CN=54 Runoff=0.09 cfs 925 cf
Subcatchment 7S: TRIB TO #31 WEST ST	Runoff Area=9,003 sf 0.00% Impervious Runoff Depth=0.00" Flow Length=158' Tc=10.0 min CN=40 Runoff=0.00 cfs 2 cf
Pond 4P: LARGE INFILTRATION SYSTEM	Peak Elev=203.14' Storage=2,548 cf Inflow=2.40 cfs 8,612 cf Outflow=0.45 cfs 8,612 cf
Pond 5P: ROOF INFILTRATION SYSTEM	Peak Elev=203.39' Storage=666 cf Inflow=0.54 cfs 2,146 cf Outflow=0.08 cfs 2,146 cf

Total Runoff Area = 126,903 sf Runoff Volume = 11,686 cf Average Runoff Depth = 1.11"
56.18% Pervious = 71,298 sf 43.82% Impervious = 55,605 sf

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Type III 24-hr 2-Year Rainfall=3.22"

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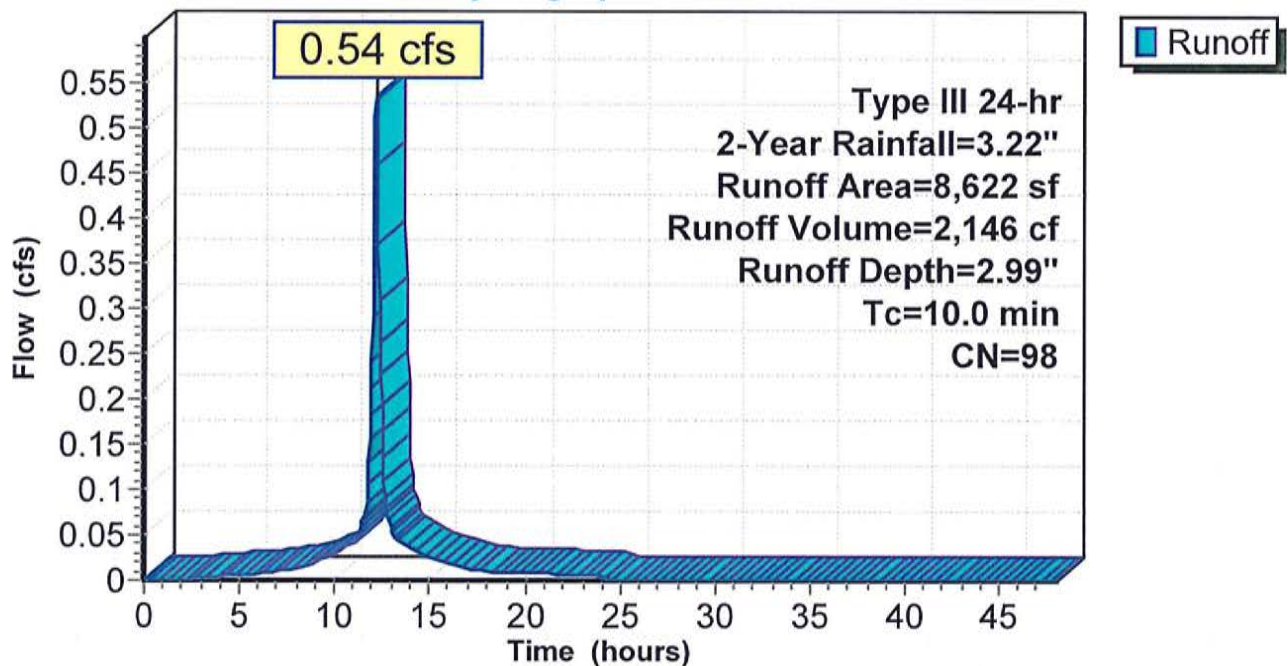
Summary for Subcatchment 1P: ROOFS (BLD 1-3)

Runoff = 0.54 cfs @ 12.14 hrs, Volume= 2,146 cf, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
8,622	98	Roofs, HSG A
8,622		100.00% Impervious Area

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

Subcatchment 1P: ROOFS (BLD 1-3)**Hydrograph**

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Type III 24-hr 2-Year Rainfall=3.22"

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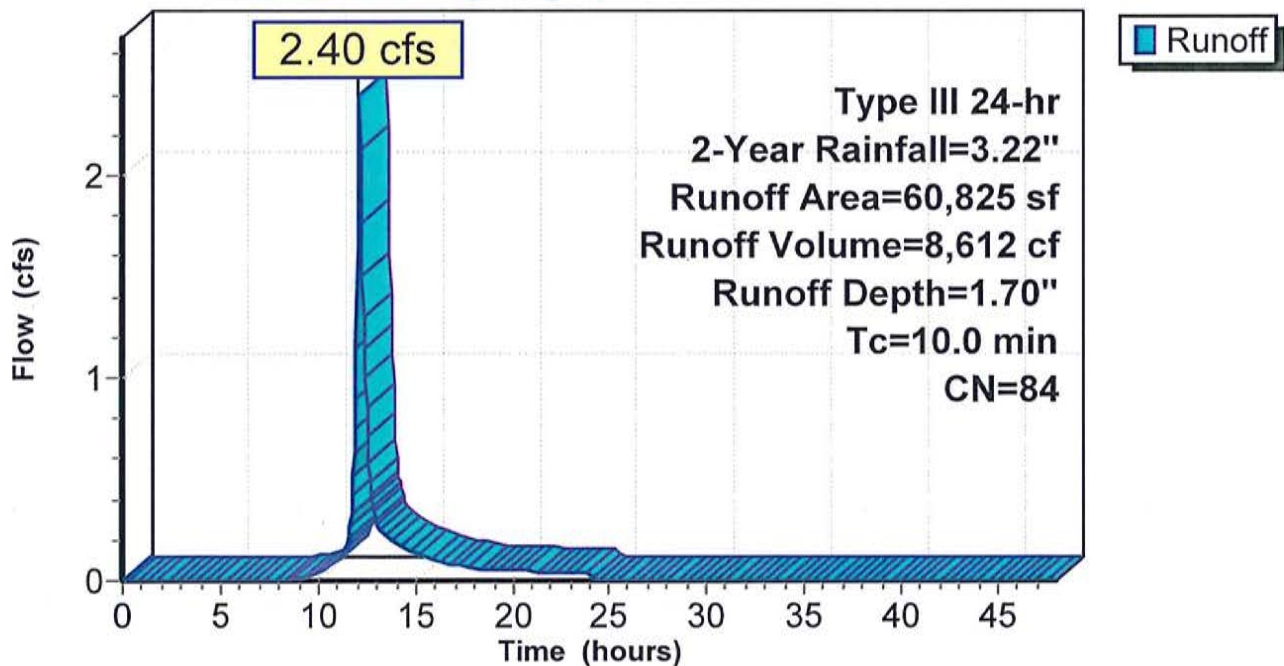
Summary for Subcatchment 2P: PARKING & BLD 4 ROOF

Runoff = 2.40 cfs @ 12.15 hrs, Volume= 8,612 cf, Depth= 1.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
46,983	98	Paved parking, HSG A
12,866	39	>75% Grass cover, Good, HSG A
976	30	Woods, Good, HSG A
60,825	84	Weighted Average
13,842		22.76% Pervious Area
46,983		77.24% Impervious Area

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

Subcatchment 2P: PARKING & BLD 4 ROOF**Hydrograph**

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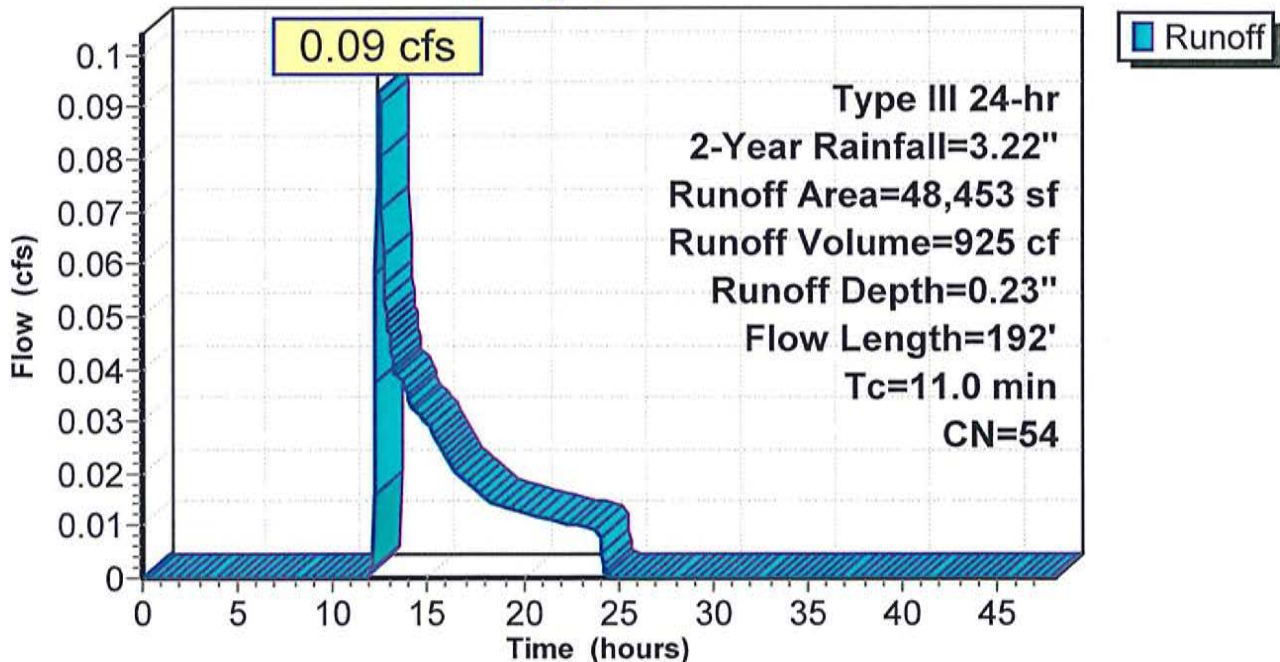
Summary for Subcatchment 6S: TRIB. TO HOPPING BROOK

Runoff = 0.09 cfs @ 12.43 hrs, Volume= 925 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
14,662	49	50-75% Grass cover, Fair, HSG A
8,056	30	Woods, Good, HSG A
12,496	55	Woods, Good, HSG B
* 12,239	77	Wetlands
1,000	39	>75% Grass cover, Good, HSG A
48,453	54	Weighted Average
48,453		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0100	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.5	142	0.0900	4.83		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.0	192	Total			

Subcatchment 6S: TRIB. TO HOPPING BROOK**Hydrograph**

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Type III 24-hr 2-Year Rainfall=3.22"

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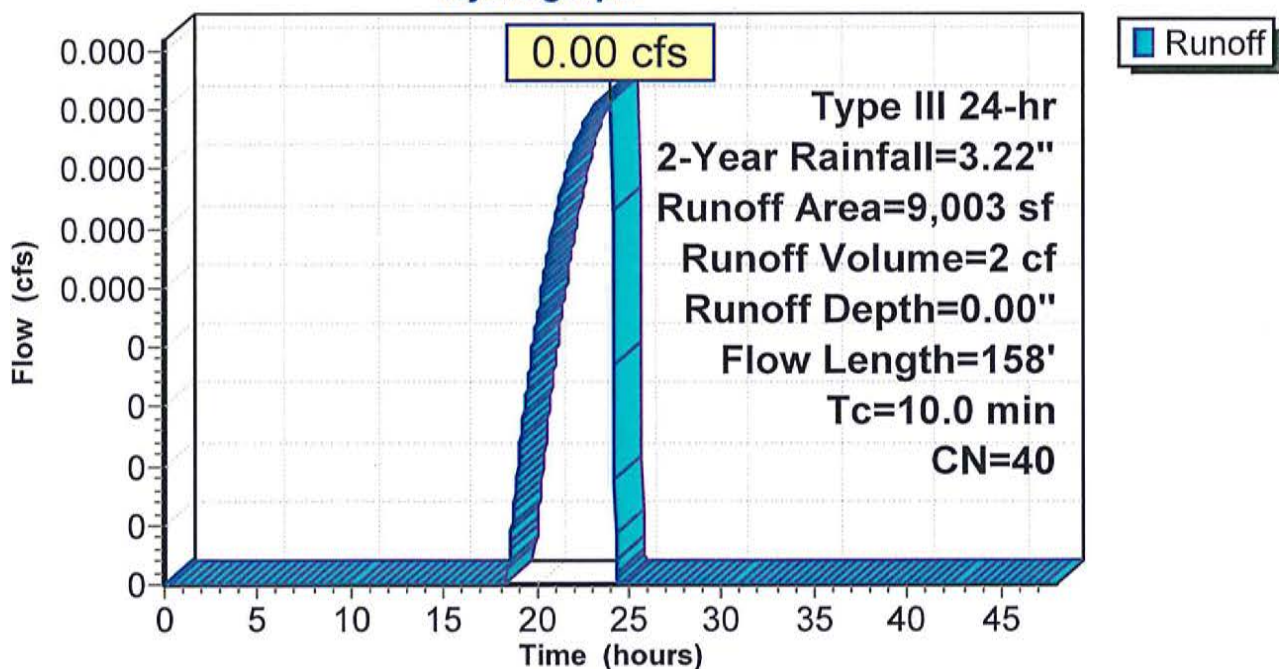
Summary for Subcatchment 7S: TRIB TO #31 WEST ST

Runoff = 0.00 cfs @ 23.92 hrs, Volume= 2 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
5,362	39	>75% Grass cover, Good, HSG A
188	72	Dirt roads, HSG A
2,612	30	Woods, Good, HSG A
456	55	Woods, Good, HSG B
* 385	77	Wetlands
9,003	40	Weighted Average
9,003		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.6	108	0.0370	3.10		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
3.9					Direct Entry,
10.0	158	Total			

Subcatchment 7S: TRIB TO #31 WEST ST**Hydrograph**

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Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Pond 4P: LARGE INFILTRATION SYSTEM

Inflow Area = 60,825 sf, 77.24% Impervious, Inflow Depth = 1.70" for 2-Year event
 Inflow = 2.40 cfs @ 12.15 hrs, Volume= 8,612 cf
 Outflow = 0.45 cfs @ 12.68 hrs, Volume= 8,612 cf, Atten= 81%, Lag= 32.0 min
 Discarded = 0.45 cfs @ 12.68 hrs, Volume= 8,612 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 203.14' @ 12.68 hrs Surf.Area= 7,849 sf Storage= 2,548 cf

Plug-Flow detention time= 39.4 min calculated for 8,603 cf (100% of inflow)
 Center-of-Mass det. time= 39.4 min (872.4 - 833.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	6,485 cf	49.83'W x 157.50'L x 3.54'H Field A 27,798 cf Overall - 11,586 cf Embedded = 16,211 cf x 40.0% Voids
#2A	203.00'	11,586 cf	Cultec R-330XLHD x 220 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 10 rows
		18,071 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.45 cfs @ 12.68 hrs HW=203.14' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.45 cfs)

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Type III 24-hr 2-Year Rainfall=3.22"

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Pond 4P: LARGE INFILTRATION SYSTEM - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 10 rows

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

22 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 155.50' Row Length +12.0" End Stone x 2 =
157.50' Base Length

10 Rows x 52.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

220 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 10 Rows = 11,586.3 cf Chamber Storage

27,797.7 cf Field - 11,586.3 cf Chambers = 16,211.4 cf Stone x 40.0% Voids = 6,484.5 cf Stone Storage

Chamber Storage + Stone Storage = 18,070.8 cf = 0.415 af

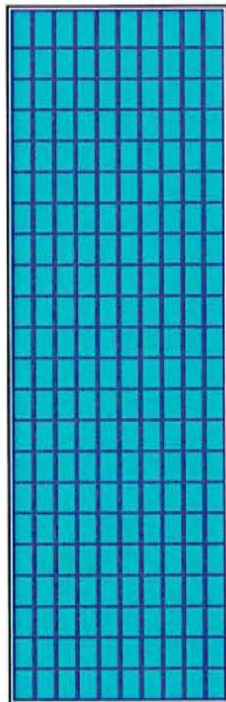
Overall Storage Efficiency = 65.0%

Overall System Size = 157.50' x 49.83' x 3.54'

220 Chambers

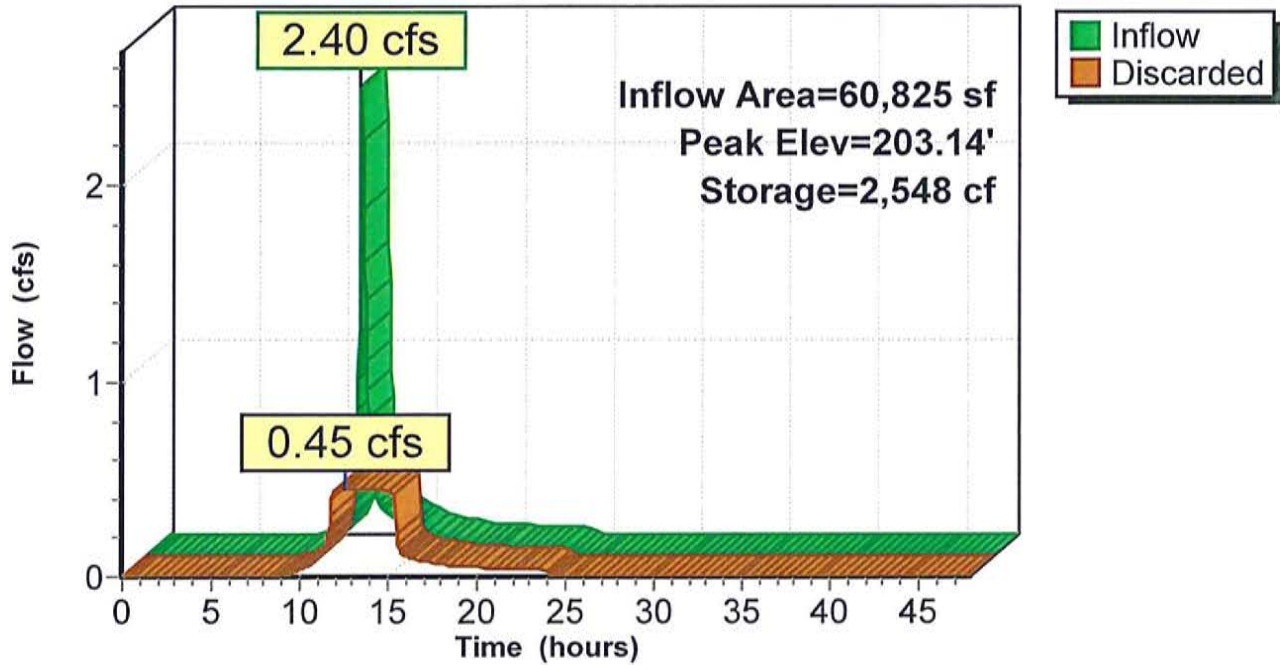
1,029.5 cy Field

600.4 cy Stone



Pond 4P: LARGE INFILTRATION SYSTEM

Hydrograph



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Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Pond 5P: ROOF INFILTRATION SYSTEM

Inflow Area = 8,622 sf, 100.00% Impervious, Inflow Depth = 2.99" for 2-Year event
 Inflow = 0.54 cfs @ 12.14 hrs, Volume= 2,146 cf
 Outflow = 0.08 cfs @ 12.72 hrs, Volume= 2,146 cf, Atten= 85%, Lag= 35.1 min
 Discarded = 0.08 cfs @ 12.72 hrs, Volume= 2,146 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 203.39' @ 12.72 hrs Surf.Area= 1,265 sf Storage= 666 cf

Plug-Flow detention time= 55.8 min calculated for 2,144 cf (100% of inflow)
 Center-of-Mass det. time= 55.8 min (815.7 - 760.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	1,089 cf	40.17'W x 31.50'L x 3.54'H Field A 4,481 cf Overall - 1,758 cf Embedded = 2,723 cf x 40.0% Voids
#2A	203.00'	1,758 cf	Cultec R-330XLHD x 32 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
		2,847 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.08 cfs @ 12.72 hrs HW=203.39' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.08 cfs)

Pond 5P: ROOF INFILTRATION SYSTEM - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

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

4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length

8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 40.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

32 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 1,758.4 cf Chamber Storage

4,481.1 cf Field - 1,758.4 cf Chambers = 2,722.7 cf Stone x 40.0% Voids = 1,089.1 cf Stone Storage

Chamber Storage + Stone Storage = 2,847.5 cf = 0.065 af

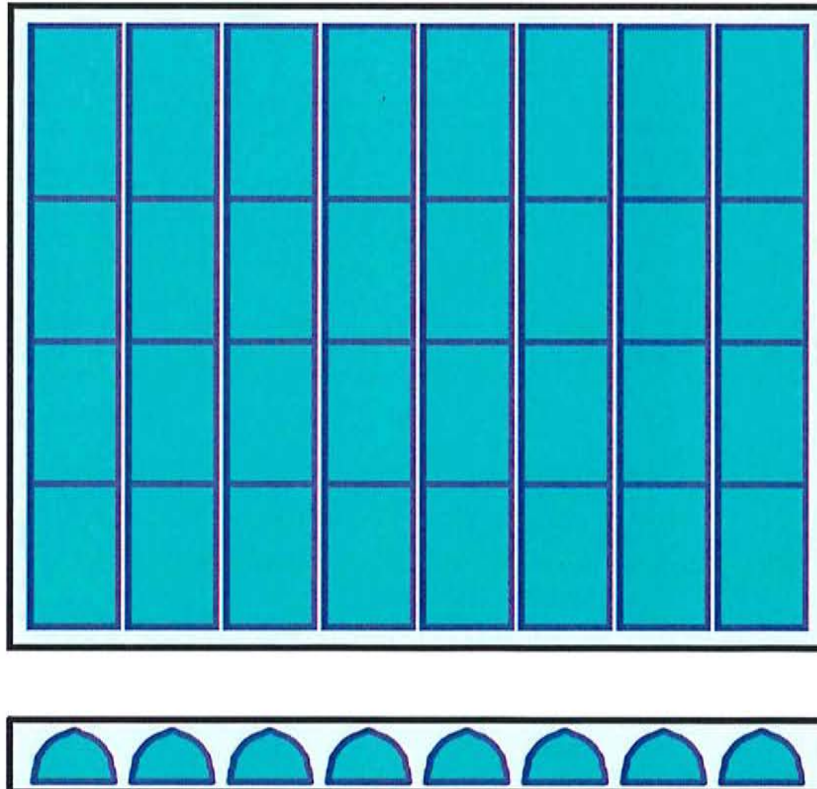
Overall Storage Efficiency = 63.5%

Overall System Size = 31.50' x 40.17' x 3.54'

32 Chambers

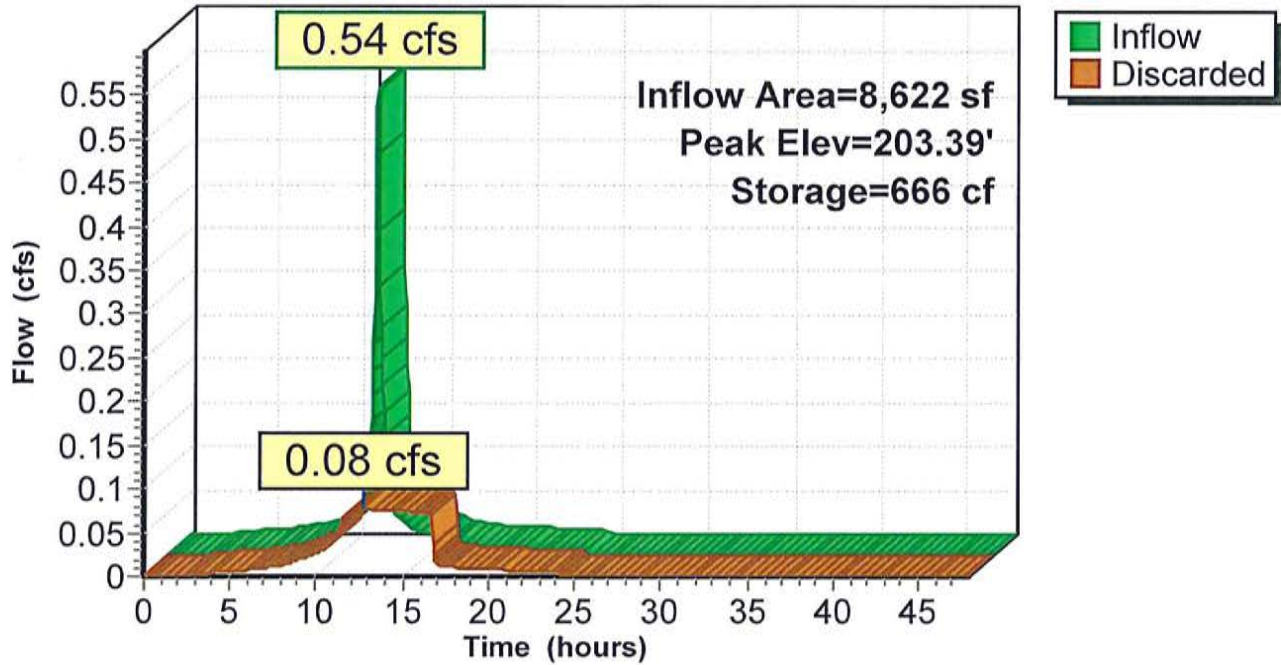
166.0 cy Field

100.8 cy Stone



Pond 5P: ROOF INFILTRATION SYSTEM

Hydrograph



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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: ROOFS (BLD 1-3)	Runoff Area=8,622 sf 100.00% Impervious Runoff Depth=4.62" Tc=10.0 min CN=98 Runoff=0.81 cfs 3,322 cf
Subcatchment 2P: PARKING & BLD 4	Runoff Area=60,825 sf 77.24% Impervious Runoff Depth=3.14" Tc=10.0 min CN=84 Runoff=4.42 cfs 15,929 cf
Subcatchment 6S: TRIB. TO HOPPING	Runoff Area=48,453 sf 0.00% Impervious Runoff Depth=0.85" Flow Length=192' Tc=11.0 min CN=54 Runoff=0.69 cfs 3,445 cf
Subcatchment 7S: TRIB TO #31 WEST ST	Runoff Area=9,003 sf 0.00% Impervious Runoff Depth=0.21" Flow Length=158' Tc=10.0 min CN=40 Runoff=0.01 cfs 154 cf
Pond 4P: LARGE INFILTRATION SYSTEM	Peak Elev=203.68' Storage=6,145 cf Inflow=4.42 cfs 15,929 cf Outflow=0.47 cfs 15,929 cf
Pond 5P: ROOF INFILTRATION SYSTEM	Peak Elev=203.90' Storage=1,198 cf Inflow=0.81 cfs 3,322 cf Outflow=0.08 cfs 3,322 cf

Total Runoff Area = 126,903 sf Runoff Volume = 22,850 cf Average Runoff Depth = 2.16"
56.18% Pervious = 71,298 sf 43.82% Impervious = 55,605 sf

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Type III 24-hr 10-Year Rainfall=4.86"

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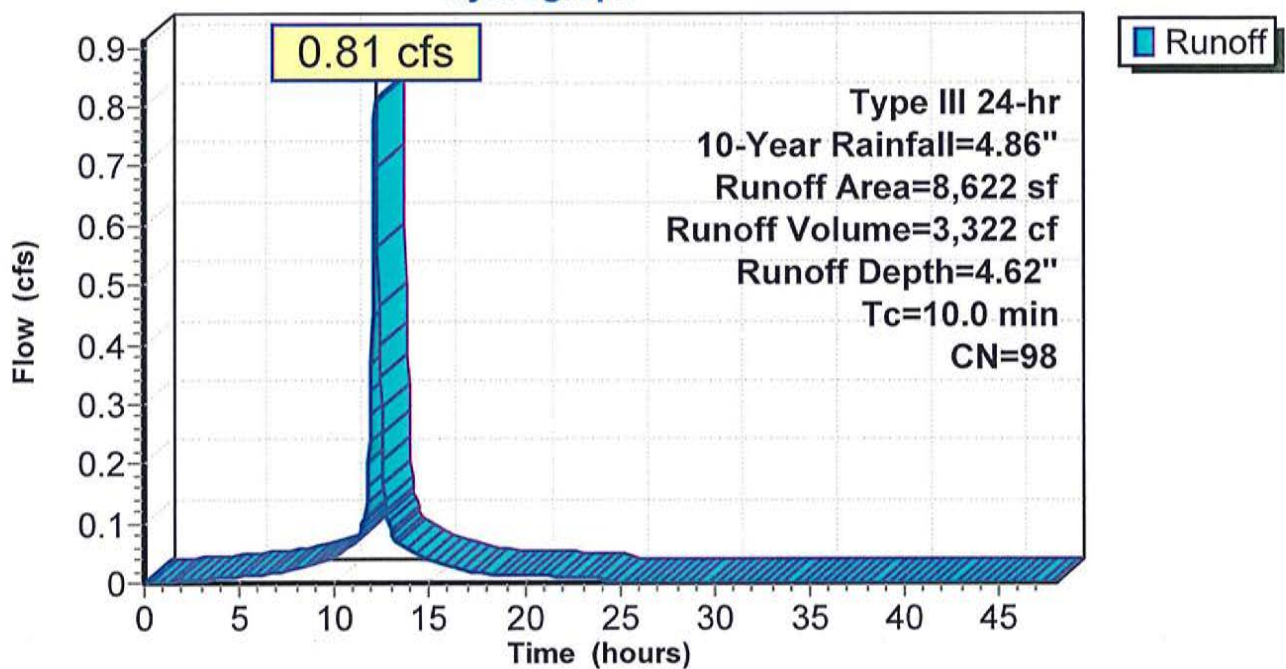
Summary for Subcatchment 1P: ROOFS (BLD 1-3)

Runoff = 0.81 cfs @ 12.14 hrs, Volume= 3,322 cf, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
8,622	98	Roofs, HSG A
8,622		100.00% Impervious Area

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

Subcatchment 1P: ROOFS (BLD 1-3)**Hydrograph**

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Type III 24-hr 10-Year Rainfall=4.86"

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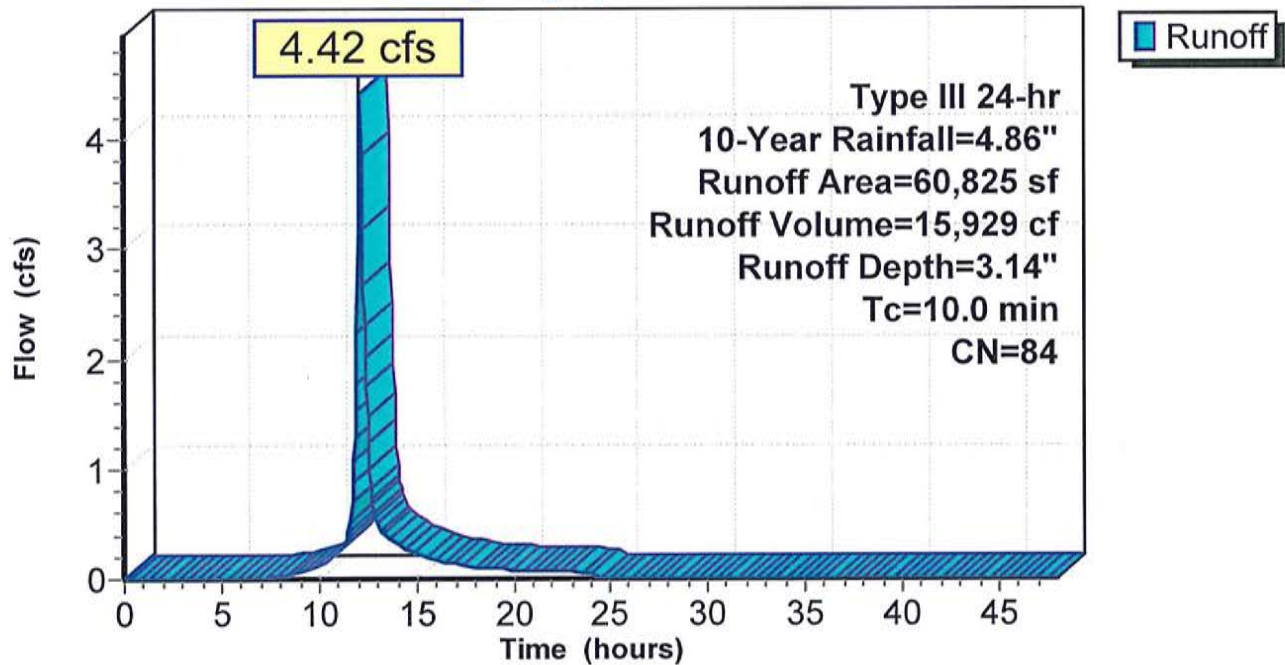
Summary for Subcatchment 2P: PARKING & BLD 4 ROOF

Runoff = 4.42 cfs @ 12.14 hrs, Volume= 15,929 cf, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
46,983	98	Paved parking, HSG A
12,866	39	>75% Grass cover, Good, HSG A
976	30	Woods, Good, HSG A
60,825	84	Weighted Average
13,842		22.76% Pervious Area
46,983		77.24% Impervious Area

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

Subcatchment 2P: PARKING & BLD 4 ROOF**Hydrograph**

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Type III 24-hr 10-Year Rainfall=4.86"

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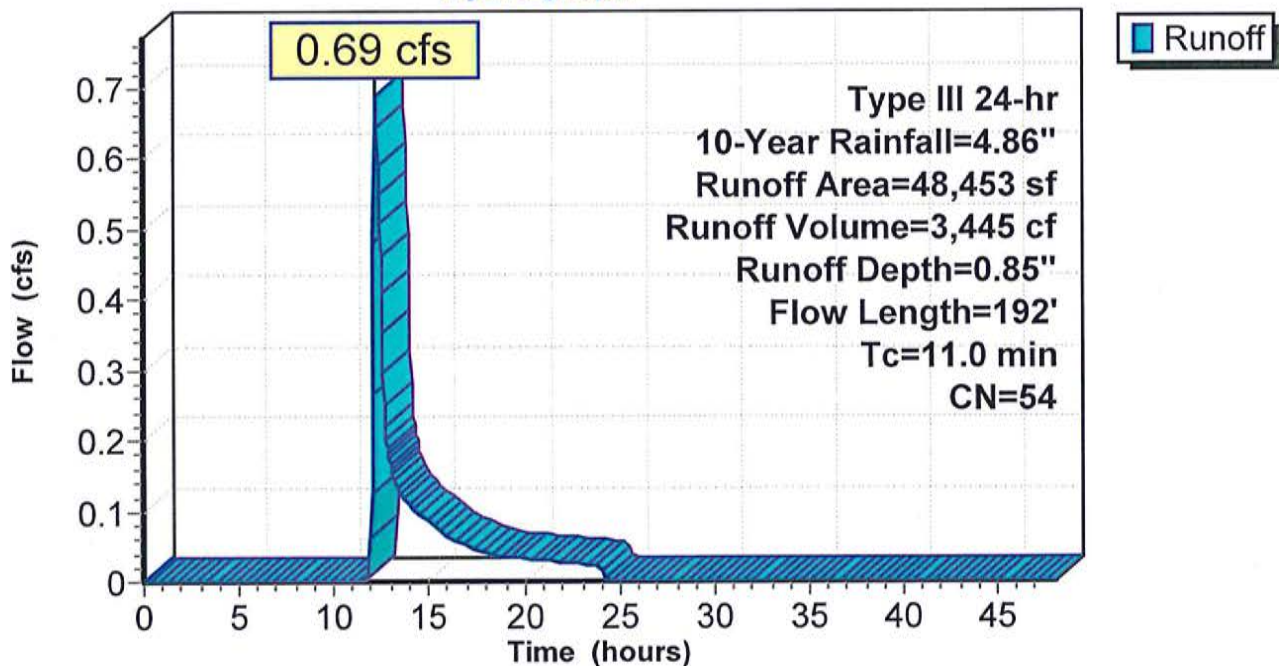
Summary for Subcatchment 6S: TRIB. TO HOPPING BROOK

Runoff = 0.69 cfs @ 12.20 hrs, Volume= 3,445 cf, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
14,662	49	50-75% Grass cover, Fair, HSG A
8,056	30	Woods, Good, HSG A
12,496	55	Woods, Good, HSG B
* 12,239	77	Wetlands
1,000	39	>75% Grass cover, Good, HSG A
48,453	54	Weighted Average
48,453		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0100	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.5	142	0.0900	4.83		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.0	192	Total			

Subcatchment 6S: TRIB. TO HOPPING BROOK**Hydrograph**

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Type III 24-hr 10-Year Rainfall=4.86"

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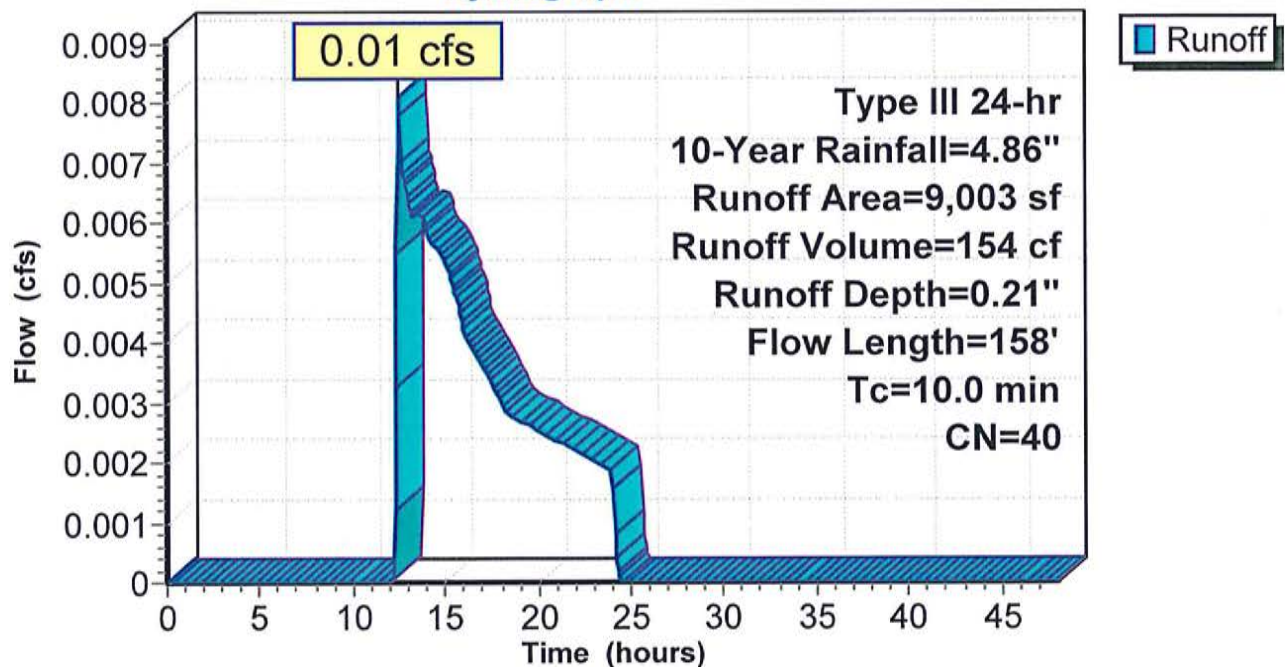
Summary for Subcatchment 7S: TRIB TO #31 WEST ST

Runoff = 0.01 cfs @ 12.53 hrs, Volume= 154 cf, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
5,362	39	>75% Grass cover, Good, HSG A
188	72	Dirt roads, HSG A
2,612	30	Woods, Good, HSG A
456	55	Woods, Good, HSG B
* 385	77	Wetlands
9,003	40	Weighted Average
9,003		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.6	108	0.0370	3.10		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
3.9					Direct Entry,
10.0	158	Total			

Subcatchment 7S: TRIB TO #31 WEST ST**Hydrograph**

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Type III 24-hr 10-Year Rainfall=4.86"

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Summary for Pond 4P: LARGE INFILTRATION SYSTEM

Inflow Area = 60,825 sf, 77.24% Impervious, Inflow Depth = 3.14" for 10-Year event
 Inflow = 4.42 cfs @ 12.14 hrs, Volume= 15,929 cf
 Outflow = 0.47 cfs @ 13.10 hrs, Volume= 15,929 cf, Atten= 89%, Lag= 57.4 min
 Discarded = 0.47 cfs @ 13.10 hrs, Volume= 15,929 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 203.68' @ 13.10 hrs Surf.Area= 7,849 sf Storage= 6,145 cf

Plug-Flow detention time= 110.6 min calculated for 15,913 cf (100% of inflow)
 Center-of-Mass det. time= 110.5 min (925.9 - 815.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	6,485 cf	49.83'W x 157.50'L x 3.54'H Field A 27,798 cf Overall - 11,586 cf Embedded = 16,211 cf x 40.0% Voids
#2A	203.00'	11,586 cf	Cultec R-330XLHD x 220 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 10 rows
		18,071 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.47 cfs @ 13.10 hrs HW=203.68' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.47 cfs)

Pond 4P: LARGE INFILTRATION SYSTEM - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 10 rows

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

22 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 155.50' Row Length +12.0" End Stone x 2 = 157.50' Base Length

10 Rows x 52.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

220 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 10 Rows = 11,586.3 cf Chamber Storage

27,797.7 cf Field - 11,586.3 cf Chambers = 16,211.4 cf Stone x 40.0% Voids = 6,484.5 cf Stone Storage

Chamber Storage + Stone Storage = 18,070.8 cf = 0.415 af

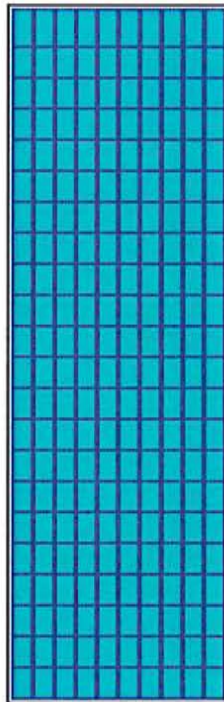
Overall Storage Efficiency = 65.0%

Overall System Size = 157.50' x 49.83' x 3.54'

220 Chambers

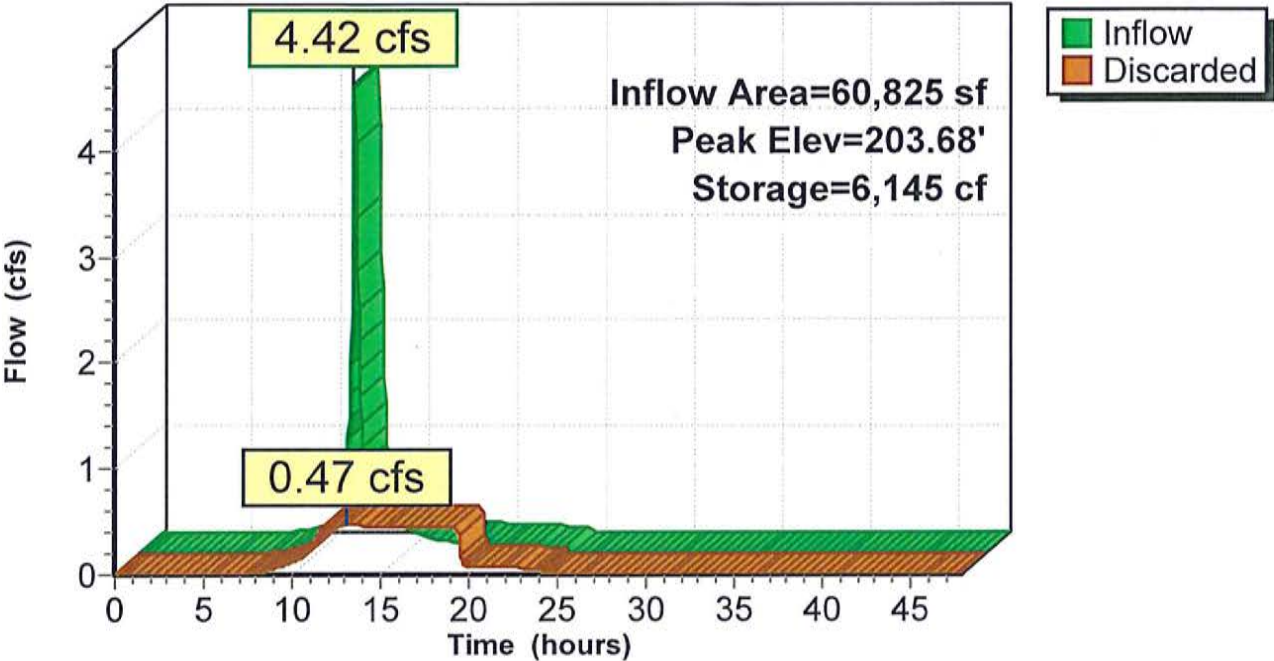
1,029.5 cy Field

600.4 cy Stone



Pond 4P: LARGE INFILTRATION SYSTEM

Hydrograph



16064 POST-DEVELOPMENT

Type III 24-hr 10-Year Rainfall=4.86"

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Summary for Pond 5P: ROOF INFILTRATION SYSTEM

Inflow Area = 8,622 sf, 100.00% Impervious, Inflow Depth = 4.62" for 10-Year event
 Inflow = 0.81 cfs @ 12.14 hrs, Volume= 3,322 cf
 Outflow = 0.08 cfs @ 13.03 hrs, Volume= 3,322 cf, Atten= 90%, Lag= 53.6 min
 Discarded = 0.08 cfs @ 13.03 hrs, Volume= 3,322 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 203.90' @ 13.03 hrs Surf.Area= 1,265 sf Storage= 1,198 cf

Plug-Flow detention time= 107.6 min calculated for 3,318 cf (100% of inflow)
 Center-of-Mass det. time= 107.4 min (859.6 - 752.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	1,089 cf	40.17'W x 31.50'L x 3.54'H Field A 4,481 cf Overall - 1,758 cf Embedded = 2,723 cf x 40.0% Voids
#2A	203.00'	1,758 cf	Cultec R-330XLHD x 32 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
		2,847 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.08 cfs @ 13.03 hrs HW=203.90' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.08 cfs)

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Type III 24-hr 10-Year Rainfall=4.86"

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Pond 5P: ROOF INFILTRATION SYSTEM - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

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

4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length

8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 40.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

32 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 1,758.4 cf Chamber Storage

4,481.1 cf Field - 1,758.4 cf Chambers = 2,722.7 cf Stone x 40.0% Voids = 1,089.1 cf Stone Storage

Chamber Storage + Stone Storage = 2,847.5 cf = 0.065 af

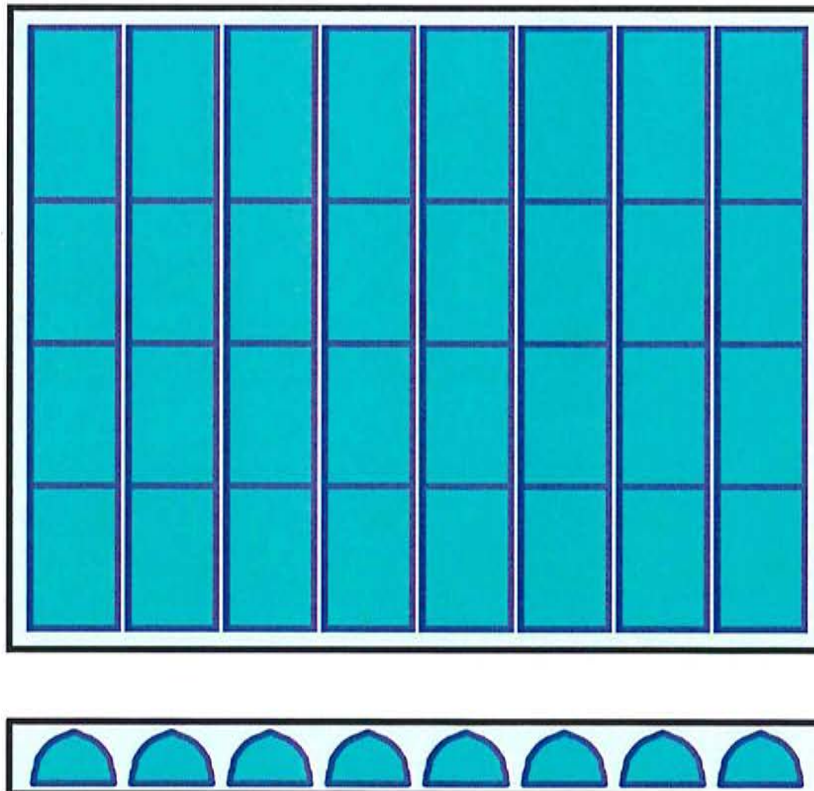
Overall Storage Efficiency = 63.5%

Overall System Size = 31.50' x 40.17' x 3.54'

32 Chambers

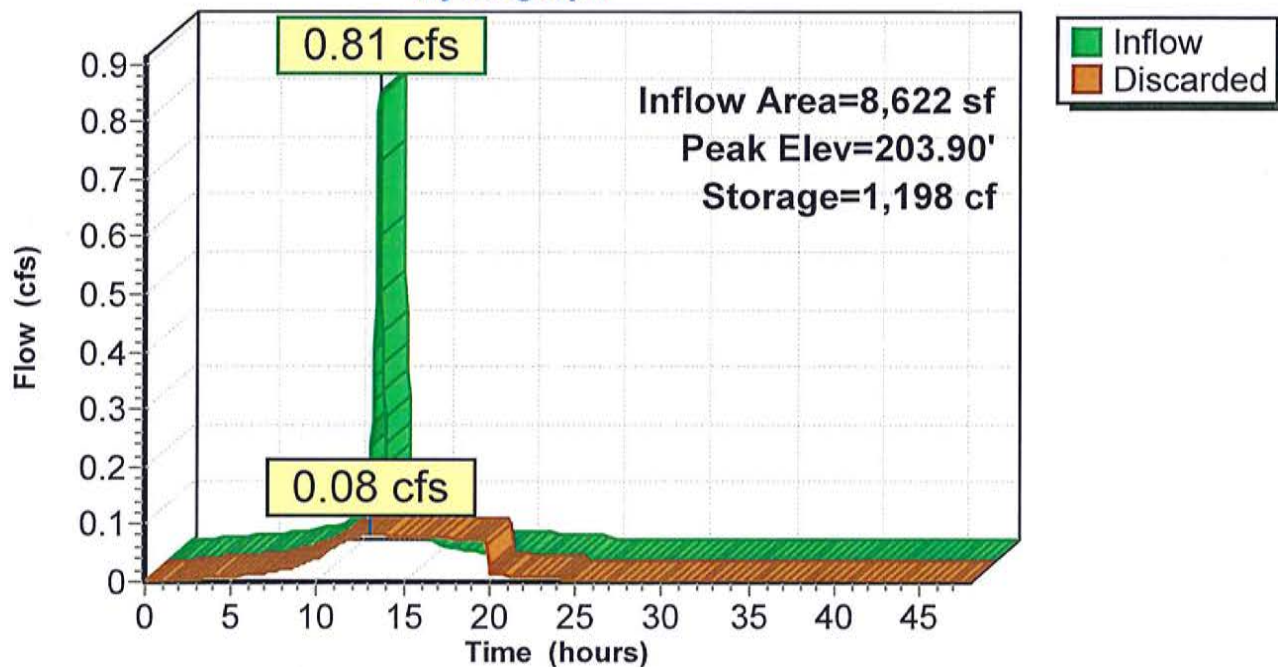
166.0 cy Field

100.8 cy Stone



Pond 5P: ROOF INFILTRATION SYSTEM

Hydrograph



16064 POST-DEVELOPMENT

Type III 24-hr 25-Year Rainfall=6.15"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: ROOFS (BLD 1-3) Runoff Area=8,622 sf 100.00% Impervious Runoff Depth=5.91"
Tc=10.0 min CN=98 Runoff=1.03 cfs 4,248 cf

Subcatchment 2P: PARKING & BLD 4 Runoff Area=60,825 sf 77.24% Impervious Runoff Depth=4.34"
Tc=10.0 min CN=84 Runoff=6.03 cfs 21,984 cf

Subcatchment 6S: TRIB. TO HOPPING Runoff Area=48,453 sf 0.00% Impervious Runoff Depth=1.52"
Flow Length=192' Tc=11.0 min CN=54 Runoff=1.46 cfs 6,157 cf

Subcatchment 7S: TRIB TO #31 WEST ST Runoff Area=9,003 sf 0.00% Impervious Runoff Depth=0.55"
Flow Length=158' Tc=10.0 min CN=40 Runoff=0.05 cfs 410 cf

Pond 4P: LARGE INFILTRATION SYSTEM Peak Elev=204.19' Storage=9,476 cf Inflow=6.03 cfs 21,984 cf
Outflow=0.48 cfs 21,984 cf

Pond 5P: ROOF INFILTRATION SYSTEM Peak Elev=204.37' Storage=1,667 cf Inflow=1.03 cfs 4,248 cf
Outflow=0.09 cfs 4,248 cf

Total Runoff Area = 126,903 sf Runoff Volume = 32,798 cf Average Runoff Depth = 3.10"
56.18% Pervious = 71,298 sf 43.82% Impervious = 55,605 sf

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Type III 24-hr 25-Year Rainfall=6.15"

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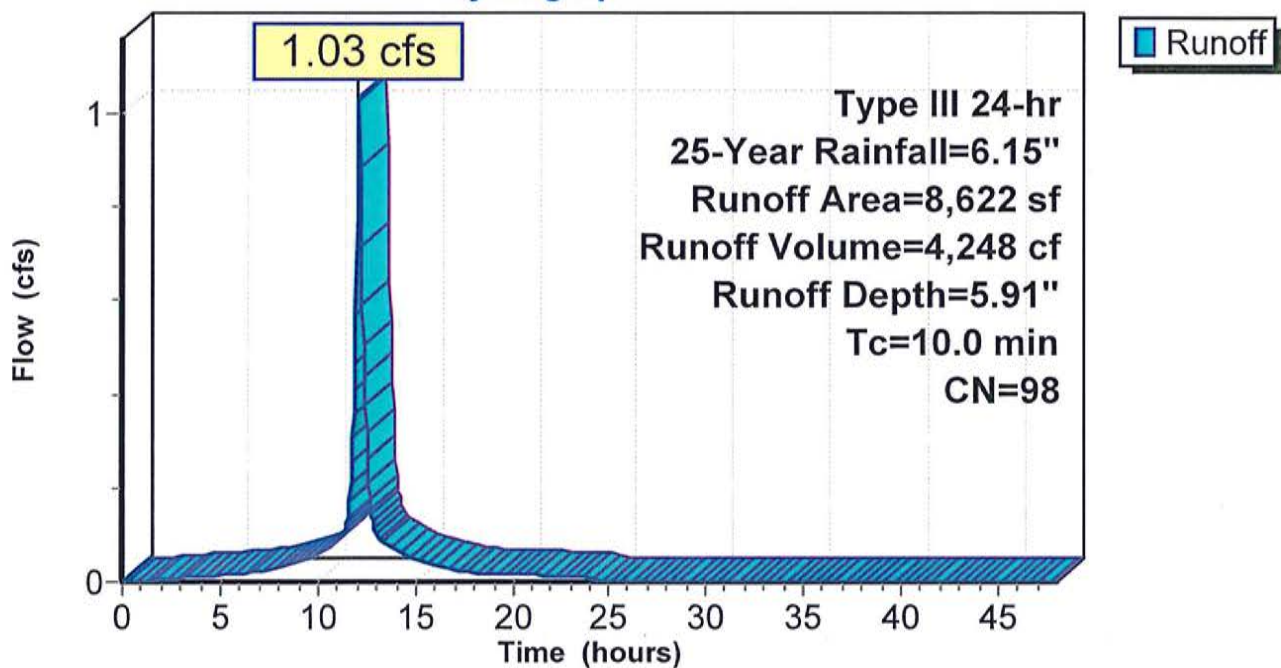
Summary for Subcatchment 1P: ROOFS (BLD 1-3)

Runoff = 1.03 cfs @ 12.14 hrs, Volume= 4,248 cf, Depth= 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
8,622	98	Roofs, HSG A
8,622		100.00% Impervious Area

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

Subcatchment 1P: ROOFS (BLD 1-3)**Hydrograph**

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Type III 24-hr 25-Year Rainfall=6.15"

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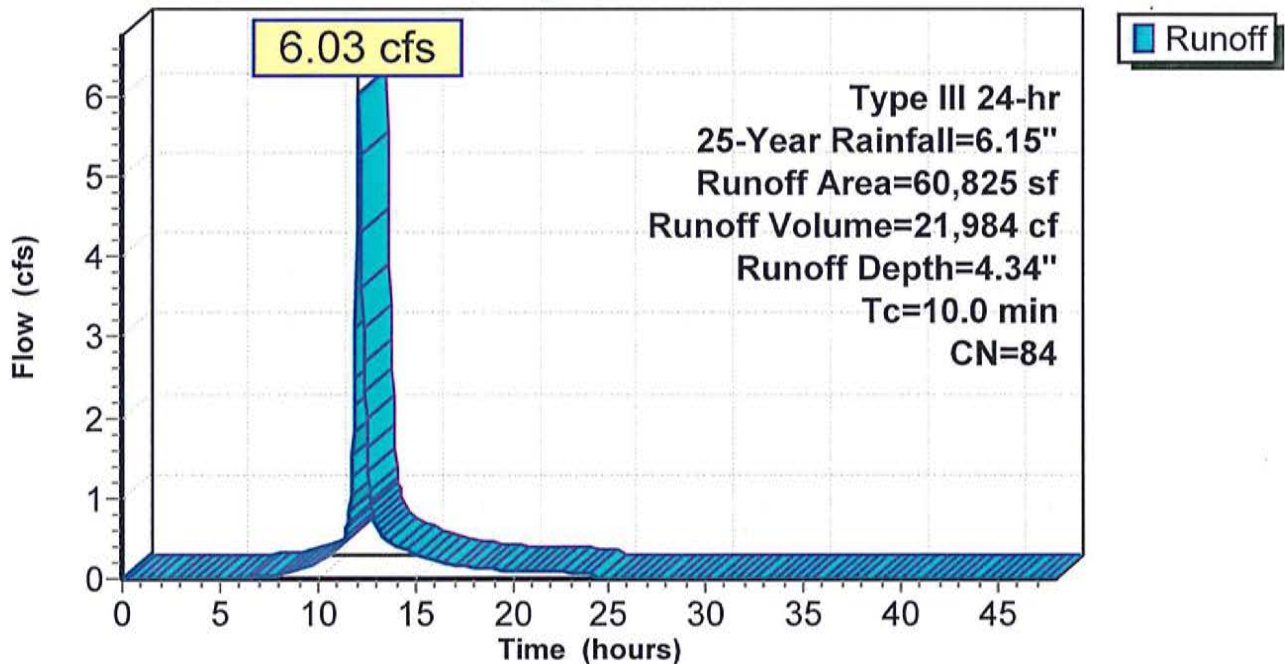
Summary for Subcatchment 2P: PARKING & BLD 4 ROOF

Runoff = 6.03 cfs @ 12.14 hrs, Volume= 21,984 cf, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
46,983	98	Paved parking, HSG A
12,866	39	>75% Grass cover, Good, HSG A
976	30	Woods, Good, HSG A
60,825	84	Weighted Average
13,842		22.76% Pervious Area
46,983		77.24% Impervious Area

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

Subcatchment 2P: PARKING & BLD 4 ROOF**Hydrograph**

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Type III 24-hr 25-Year Rainfall=6.15"

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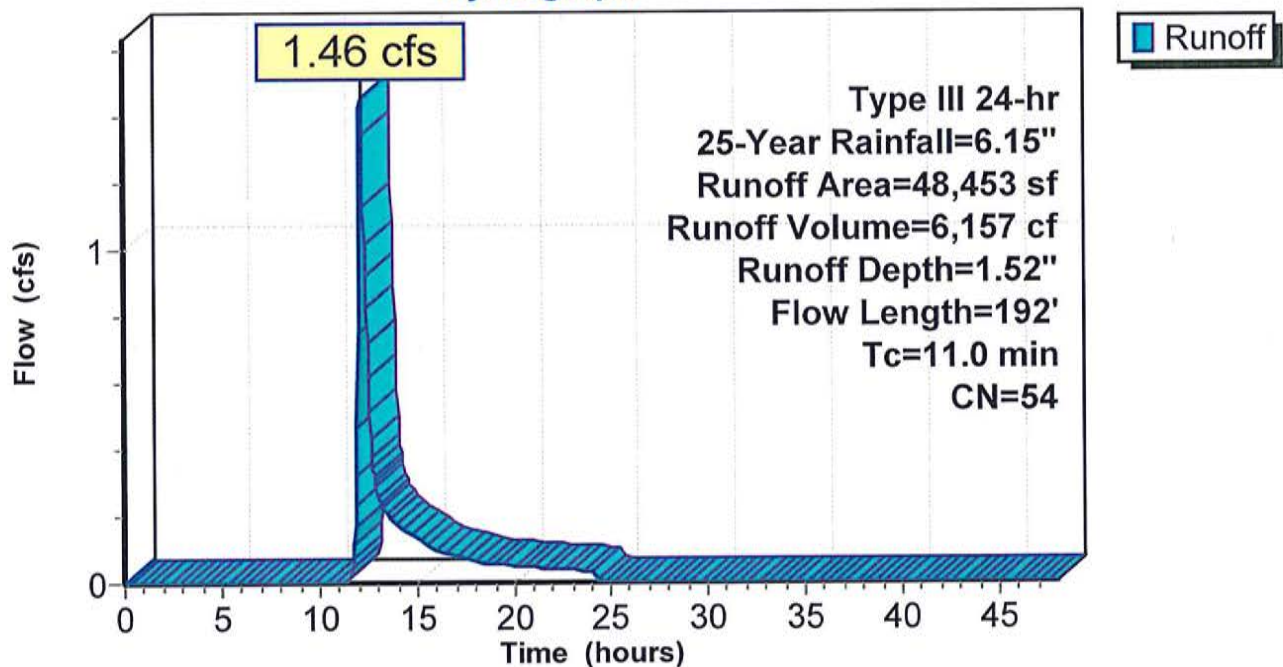
Summary for Subcatchment 6S: TRIB. TO HOPPING BROOK

Runoff = 1.46 cfs @ 12.17 hrs, Volume= 6,157 cf, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
14,662	49	50-75% Grass cover, Fair, HSG A
8,056	30	Woods, Good, HSG A
12,496	55	Woods, Good, HSG B
* 12,239	77	Wetlands
1,000	39	>75% Grass cover, Good, HSG A
48,453	54	Weighted Average
48,453		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0100	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.5	142	0.0900	4.83		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.0	192	Total			

Subcatchment 6S: TRIB. TO HOPPING BROOK**Hydrograph**

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Type III 24-hr 25-Year Rainfall=6.15"

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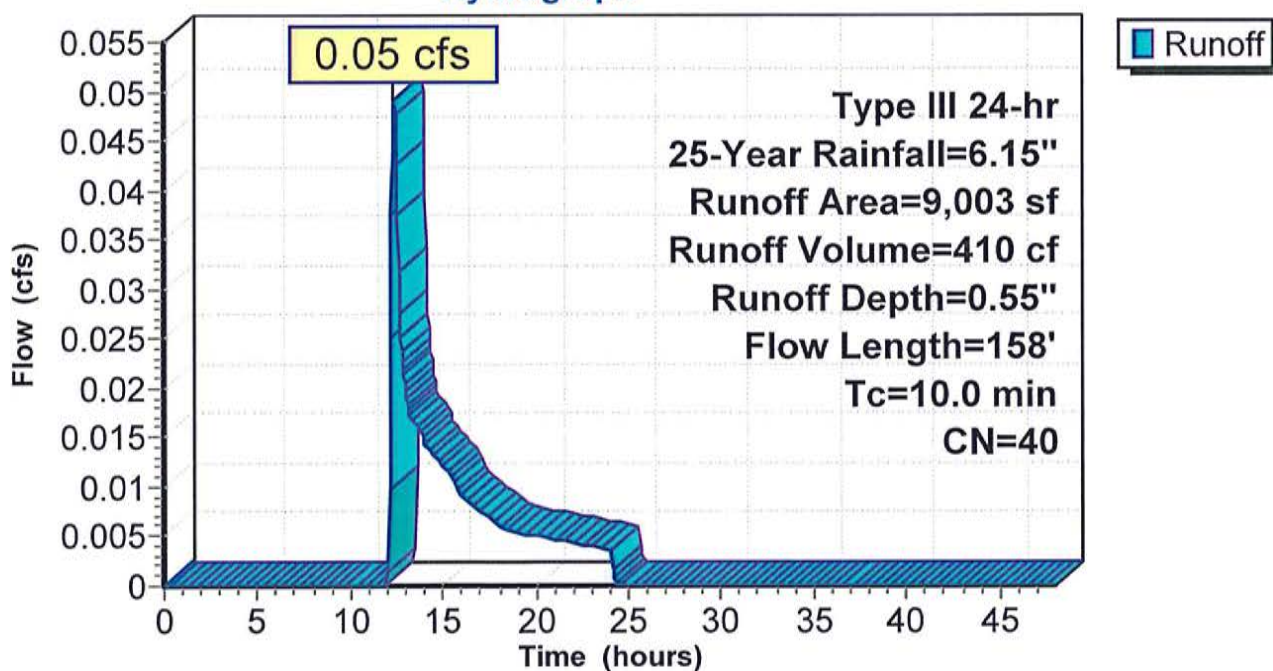
Summary for Subcatchment 7S: TRIB TO #31 WEST ST

Runoff = 0.05 cfs @ 12.37 hrs, Volume= 410 cf, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
5,362	39	>75% Grass cover, Good, HSG A
188	72	Dirt roads, HSG A
2,612	30	Woods, Good, HSG A
456	55	Woods, Good, HSG B
* 385	77	Wetlands
9,003	40	Weighted Average
9,003		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.6	108	0.0370	3.10		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
3.9					Direct Entry,
10.0	158	Total			

Subcatchment 7S: TRIB TO #31 WEST ST**Hydrograph**

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Type III 24-hr 25-Year Rainfall=6.15"

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Summary for Pond 4P: LARGE INFILTRATION SYSTEM

Inflow Area = 60,825 sf, 77.24% Impervious, Inflow Depth = 4.34" for 25-Year event
 Inflow = 6.03 cfs @ 12.14 hrs, Volume= 21,984 cf
 Outflow = 0.48 cfs @ 13.67 hrs, Volume= 21,984 cf, Atten= 92%, Lag= 92.0 min
 Discarded = 0.48 cfs @ 13.67 hrs, Volume= 21,984 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 204.19' @ 13.67 hrs Surf.Area= 7,849 sf Storage= 9,476 cf

Plug-Flow detention time= 177.6 min calculated for 21,961 cf (100% of inflow)
 Center-of-Mass det. time= 177.4 min (983.7 - 806.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	6,485 cf	49.83'W x 157.50'L x 3.54'H Field A 27,798 cf Overall - 11,586 cf Embedded = 16,211 cf x 40.0% Voids
#2A	203.00'	11,586 cf	Cultec R-330XLHD x 220 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 10 rows
		18,071 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.48 cfs @ 13.67 hrs HW=204.19' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.48 cfs)

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Type III 24-hr 25-Year Rainfall=6.15"

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Pond 4P: LARGE INFILTRATION SYSTEM - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 10 rows

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

22 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 155.50' Row Length +12.0" End Stone x 2 =
157.50' Base Length

10 Rows x 52.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

220 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 10 Rows = 11,586.3 cf Chamber Storage

27,797.7 cf Field - 11,586.3 cf Chambers = 16,211.4 cf Stone x 40.0% Voids = 6,484.5 cf Stone Storage

Chamber Storage + Stone Storage = 18,070.8 cf = 0.415 af

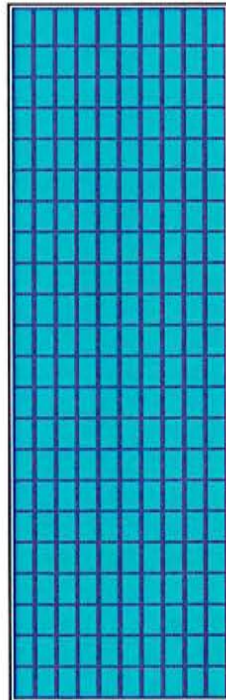
Overall Storage Efficiency = 65.0%

Overall System Size = 157.50' x 49.83' x 3.54'

220 Chambers

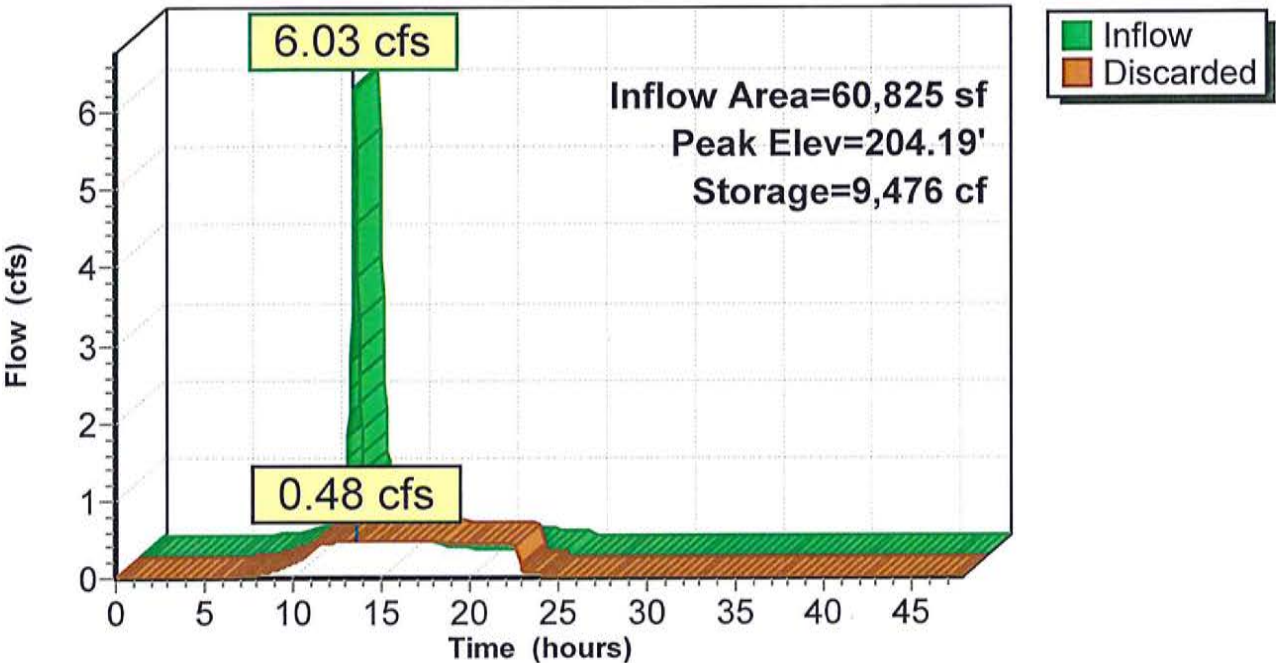
1,029.5 cy Field

600.4 cy Stone



Pond 4P: LARGE INFILTRATION SYSTEM

Hydrograph



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Type III 24-hr 25-Year Rainfall=6.15"

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Summary for Pond 5P: ROOF INFILTRATION SYSTEM

Inflow Area = 8,622 sf, 100.00% Impervious, Inflow Depth = 5.91" for 25-Year event
 Inflow = 1.03 cfs @ 12.14 hrs, Volume= 4,248 cf
 Outflow = 0.09 cfs @ 13.30 hrs, Volume= 4,248 cf, Atten= 92%, Lag= 69.7 min
 Discarded = 0.09 cfs @ 13.30 hrs, Volume= 4,248 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 204.37' @ 13.30 hrs Surf.Area= 1,265 sf Storage= 1,667 cf

Plug-Flow detention time= 153.5 min calculated for 4,243 cf (100% of inflow)
 Center-of-Mass det. time= 153.3 min (901.8 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	1,089 cf	40.17'W x 31.50'L x 3.54'H Field A 4,481 cf Overall - 1,758 cf Embedded = 2,723 cf x 40.0% Voids
#2A	203.00'	1,758 cf	Cultec R-330XLHD x 32 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
		2,847 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.09 cfs @ 13.30 hrs HW=204.37' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.09 cfs)

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Type III 24-hr 25-Year Rainfall=6.15"

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Pond 5P: ROOF INFILTRATION SYSTEM - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

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

4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length

8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 40.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

32 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 1,758.4 cf Chamber Storage

4,481.1 cf Field - 1,758.4 cf Chambers = 2,722.7 cf Stone x 40.0% Voids = 1,089.1 cf Stone Storage

Chamber Storage + Stone Storage = 2,847.5 cf = 0.065 af

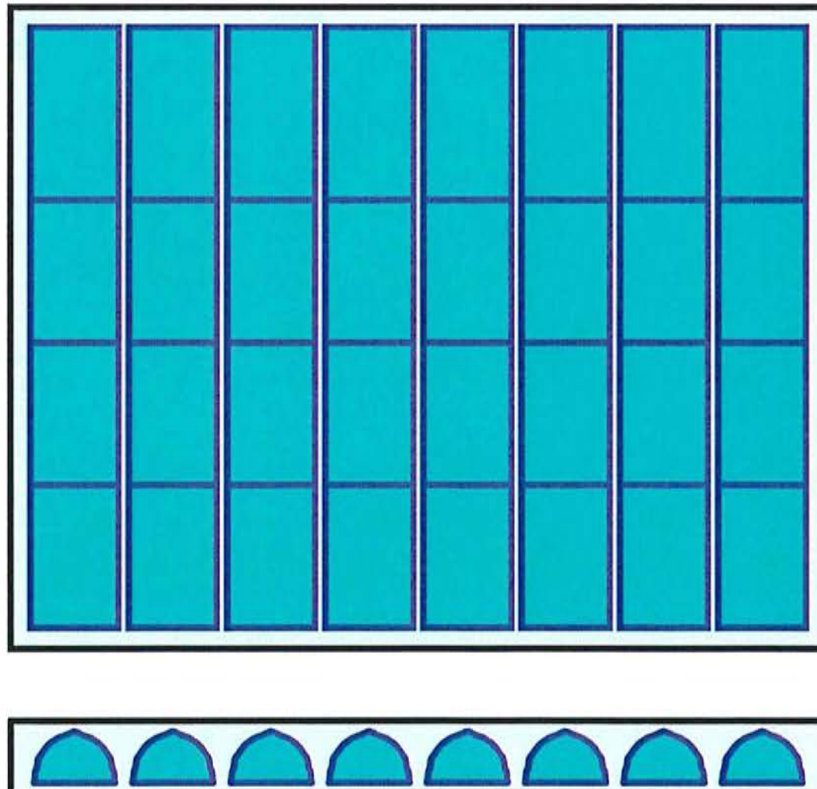
Overall Storage Efficiency = 63.5%

Overall System Size = 31.50' x 40.17' x 3.54'

32 Chambers

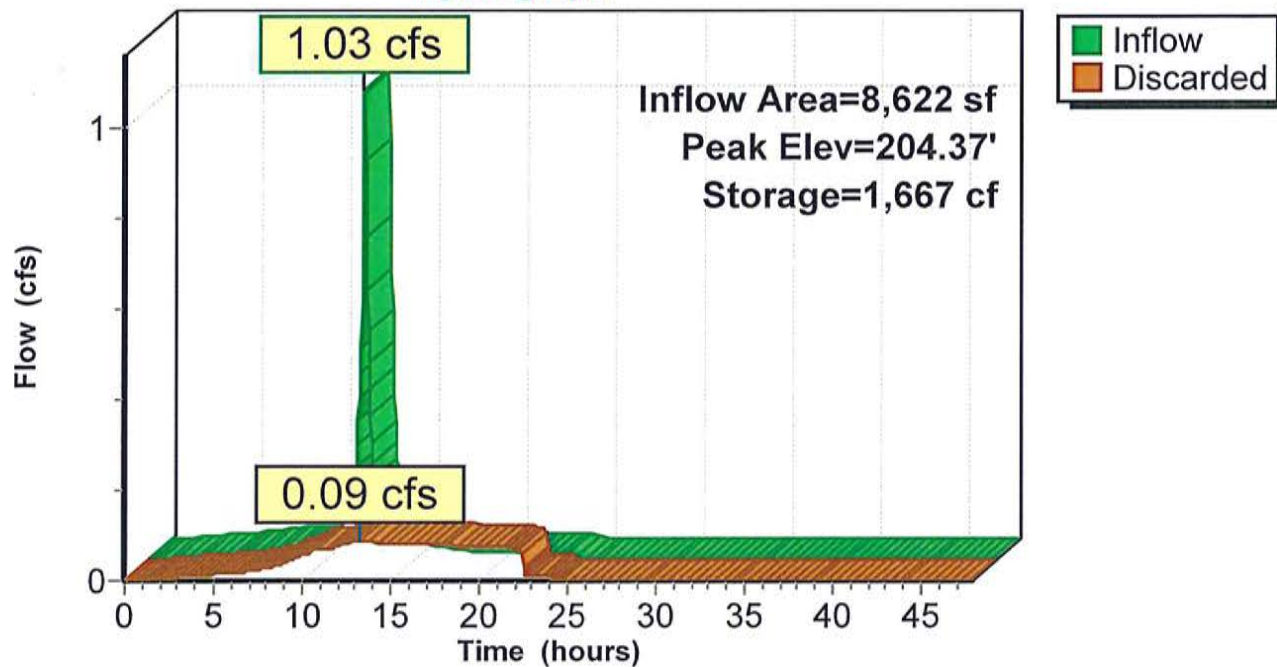
166.0 cy Field

100.8 cy Stone



Pond 5P: ROOF INFILTRATION SYSTEM

Hydrograph



16064 POST-DEVELOPMENT*Type III 24-hr 100-Year Rainfall=8.80"*

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: ROOFS (BLD 1-3)	Runoff Area=8,622 sf 100.00% Impervious Runoff Depth=8.56" Tc=10.0 min CN=98 Runoff=1.48 cfs 6,150 cf
Subcatchment 2P: PARKING & BLD 4	Runoff Area=60,825 sf 77.24% Impervious Runoff Depth=6.87" Tc=10.0 min CN=84 Runoff=9.36 cfs 34,801 cf
Subcatchment 6S: TRIB. TO HOPPING	Runoff Area=48,453 sf 0.00% Impervious Runoff Depth=3.22" Flow Length=192' Tc=11.0 min CN=54 Runoff=3.41 cfs 13,022 cf
Subcatchment 7S: TRIB TO #31 WEST ST	Runoff Area=9,003 sf 0.00% Impervious Runoff Depth=1.62" Flow Length=158' Tc=10.0 min CN=40 Runoff=0.26 cfs 1,213 cf
Pond 4P: LARGE INFILTRATION SYSTEM	Peak Elev=205.84' Storage=17,432 cf Inflow=9.36 cfs 34,801 cf Outflow=0.52 cfs 34,801 cf
Pond 5P: ROOF INFILTRATION SYSTEM	Peak Elev=205.83' Storage=2,743 cf Inflow=1.48 cfs 6,150 cf Outflow=0.10 cfs 6,150 cf

Total Runoff Area = 126,903 sf Runoff Volume = 55,186 cf Average Runoff Depth = 5.22"
56.18% Pervious = 71,298 sf 43.82% Impervious = 55,605 sf

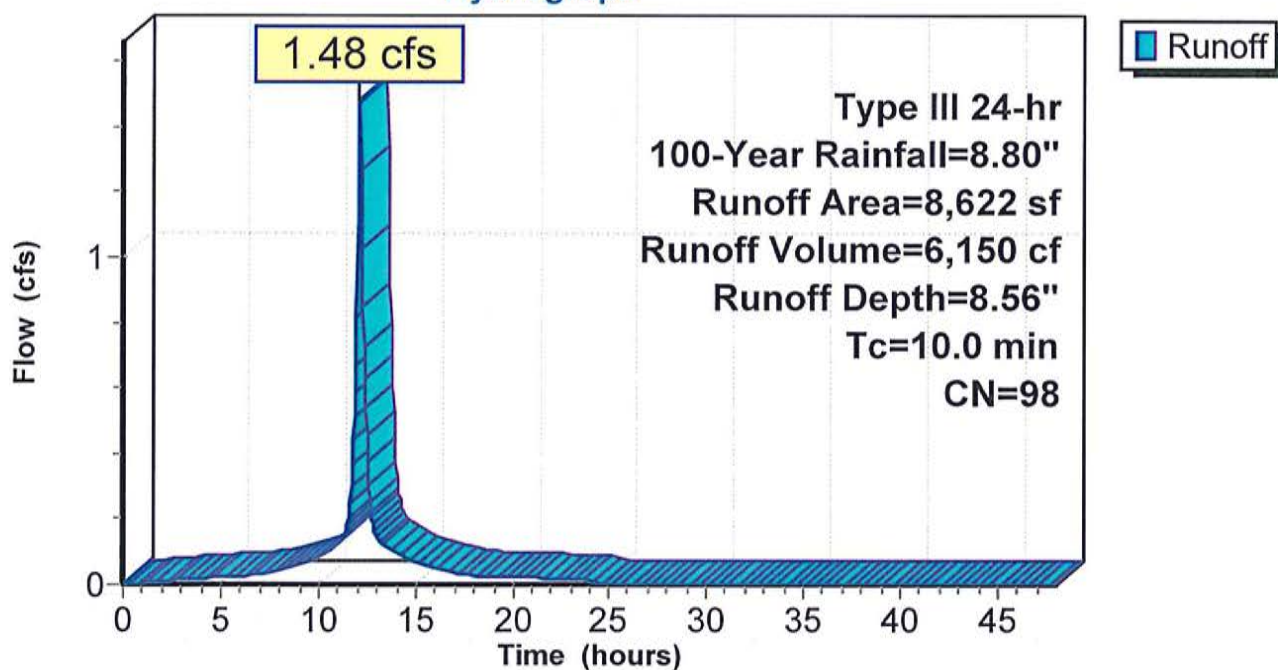
Summary for Subcatchment 1P: ROOFS (BLD 1-3)

Runoff = 1.48 cfs @ 12.14 hrs, Volume= 6,150 cf, Depth= 8.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
8,622	98	Roofs, HSG A
8,622		100.00% Impervious Area

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

Subcatchment 1P: ROOFS (BLD 1-3)**Hydrograph**

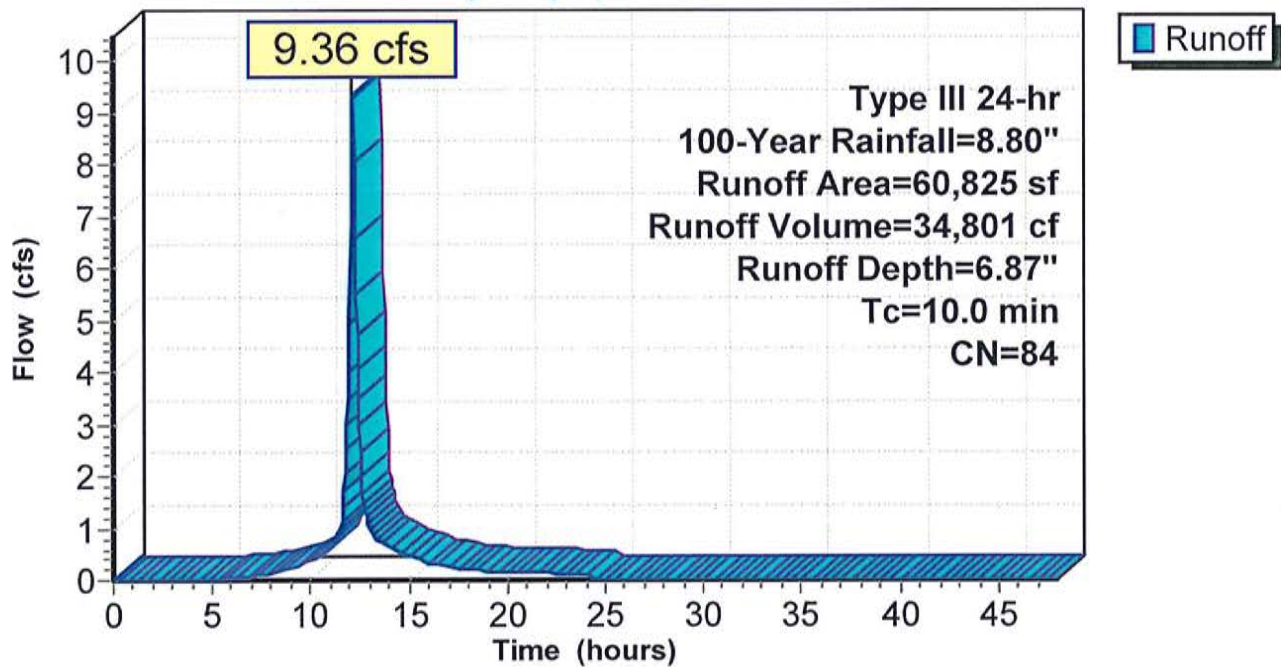
Summary for Subcatchment 2P: PARKING & BLD 4 ROOF

Runoff = 9.36 cfs @ 12.14 hrs, Volume= 34,801 cf, Depth= 6.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
46,983	98	Paved parking, HSG A
12,866	39	>75% Grass cover, Good, HSG A
976	30	Woods, Good, HSG A
60,825	84	Weighted Average
13,842		22.76% Pervious Area
46,983		77.24% Impervious Area

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

Subcatchment 2P: PARKING & BLD 4 ROOF**Hydrograph**

16064 POST-DEVELOPMENT

Prepared by Microsoft

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Type III 24-hr 100-Year Rainfall=8.80"

Printed 4/21/2017

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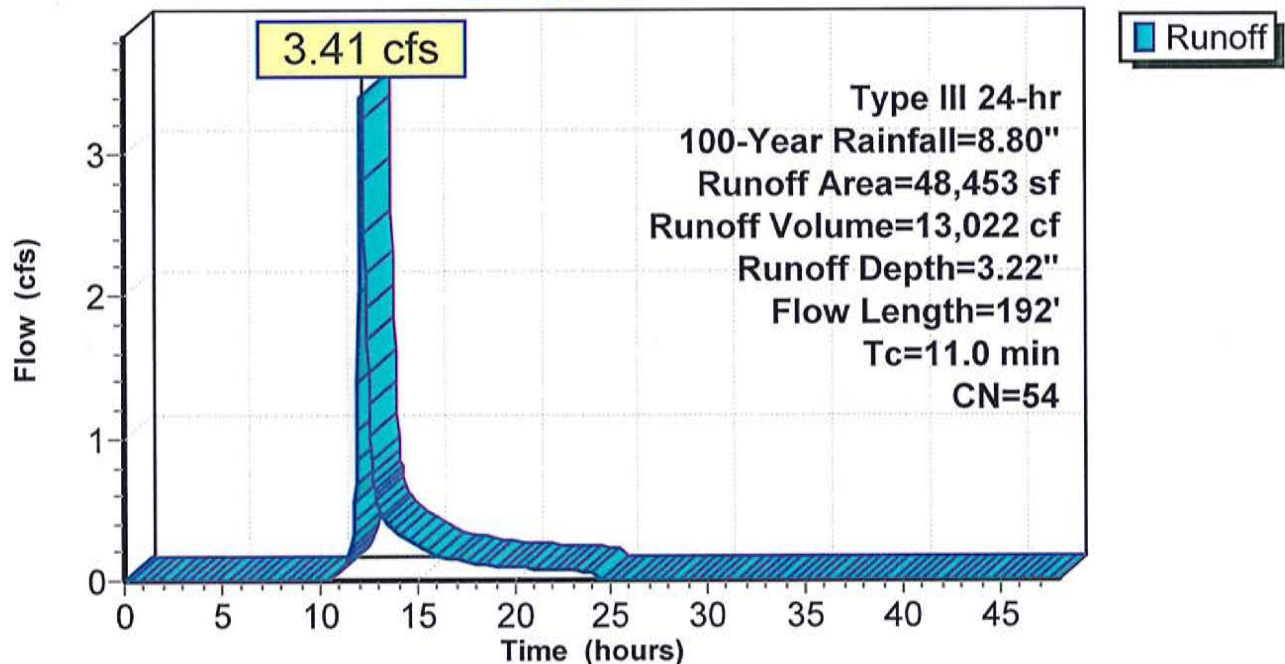
Summary for Subcatchment 6S: TRIB. TO HOPPING BROOK

Runoff = 3.41 cfs @ 12.16 hrs, Volume= 13,022 cf, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
14,662	49	50-75% Grass cover, Fair, HSG A
8,056	30	Woods, Good, HSG A
12,496	55	Woods, Good, HSG B
* 12,239	77	Wetlands
1,000	39	>75% Grass cover, Good, HSG A
48,453	54	Weighted Average
48,453		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0100	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.5	142	0.0900	4.83		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.0	192	Total			

Subcatchment 6S: TRIB. TO HOPPING BROOK**Hydrograph**

16064 POST-DEVELOPMENT

Prepared by Microsoft

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Type III 24-hr 100-Year Rainfall=8.80"

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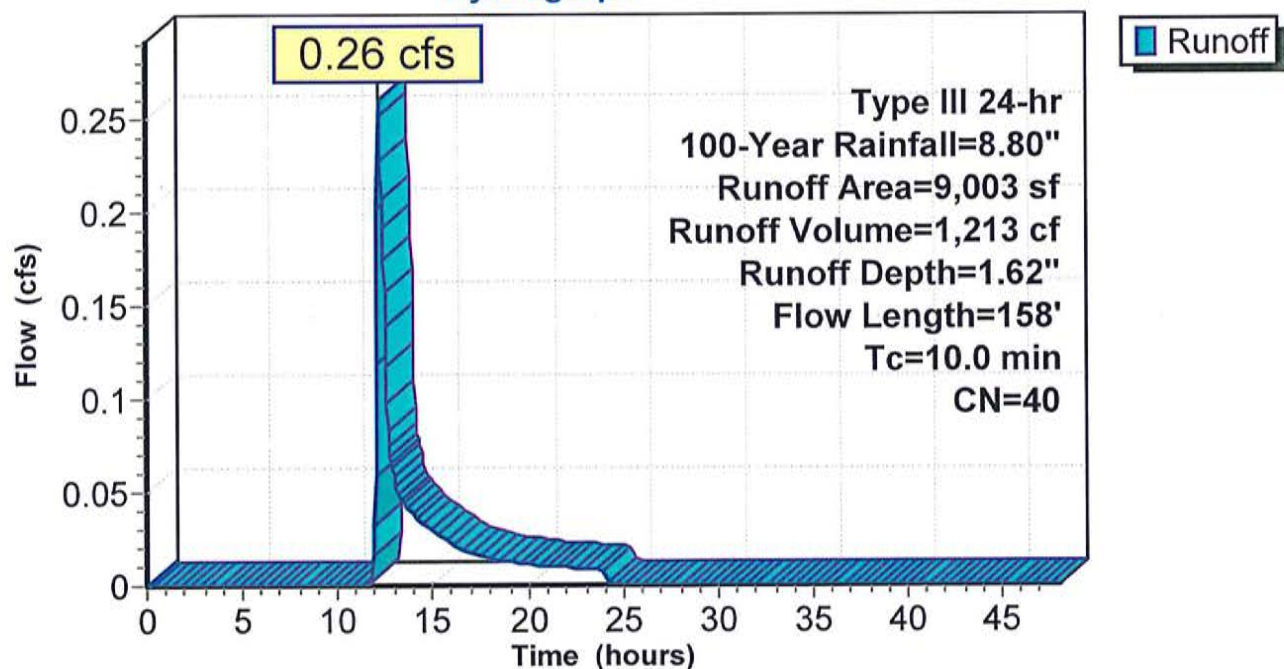
Summary for Subcatchment 7S: TRIB TO #31 WEST ST

Runoff = 0.26 cfs @ 12.17 hrs, Volume= 1,213 cf, Depth= 1.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
5,362	39	>75% Grass cover, Good, HSG A
188	72	Dirt roads, HSG A
2,612	30	Woods, Good, HSG A
456	55	Woods, Good, HSG B
* 385	77	Wetlands
9,003	40	Weighted Average
9,003		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.40"
0.6	108	0.0370	3.10		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
3.9					Direct Entry,
10.0	158	Total			

Subcatchment 7S: TRIB TO #31 WEST ST**Hydrograph**

16064 POST-DEVELOPMENT

Type III 24-hr 100-Year Rainfall=8.80"

Prepared by Microsoft

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Summary for Pond 4P: LARGE INFILTRATION SYSTEM

Inflow Area = 60,825 sf, 77.24% Impervious, Inflow Depth = 6.87" for 100-Year event
 Inflow = 9.36 cfs @ 12.14 hrs, Volume= 34,801 cf
 Outflow = 0.52 cfs @ 14.62 hrs, Volume= 34,801 cf, Atten= 94%, Lag= 149.2 min
 Discarded = 0.52 cfs @ 14.62 hrs, Volume= 34,801 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 205.84' @ 14.62 hrs Surf.Area= 7,849 sf Storage= 17,432 cf

Plug-Flow detention time= 322.8 min calculated for 34,764 cf (100% of inflow)
 Center-of-Mass det. time= 322.8 min (1,116.3 - 793.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	6,485 cf	49.83'W x 157.50'L x 3.54'H Field A 27,798 cf Overall - 11,586 cf Embedded = 16,211 cf x 40.0% Voids
#2A	203.00'	11,586 cf	Cultec R-330XLHD x 220 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 10 rows
		18,071 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.52 cfs @ 14.62 hrs HW=205.84' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.52 cfs)

16064 POST-DEVELOPMENT

Prepared by Microsoft

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Type III 24-hr 100-Year Rainfall=8.80"

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Pond 4P: LARGE INFILTRATION SYSTEM - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 10 rows

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

22 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 155.50' Row Length +12.0" End Stone x 2 = 157.50' Base Length

10 Rows x 52.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

220 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 10 Rows = 11,586.3 cf Chamber Storage

27,797.7 cf Field - 11,586.3 cf Chambers = 16,211.4 cf Stone x 40.0% Voids = 6,484.5 cf Stone Storage

Chamber Storage + Stone Storage = 18,070.8 cf = 0.415 af

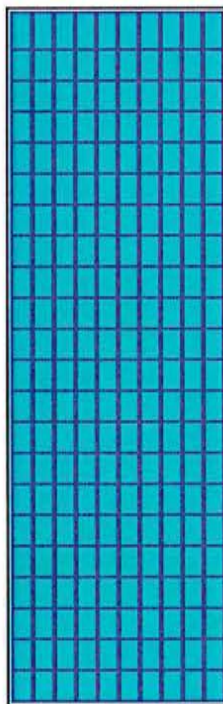
Overall Storage Efficiency = 65.0%

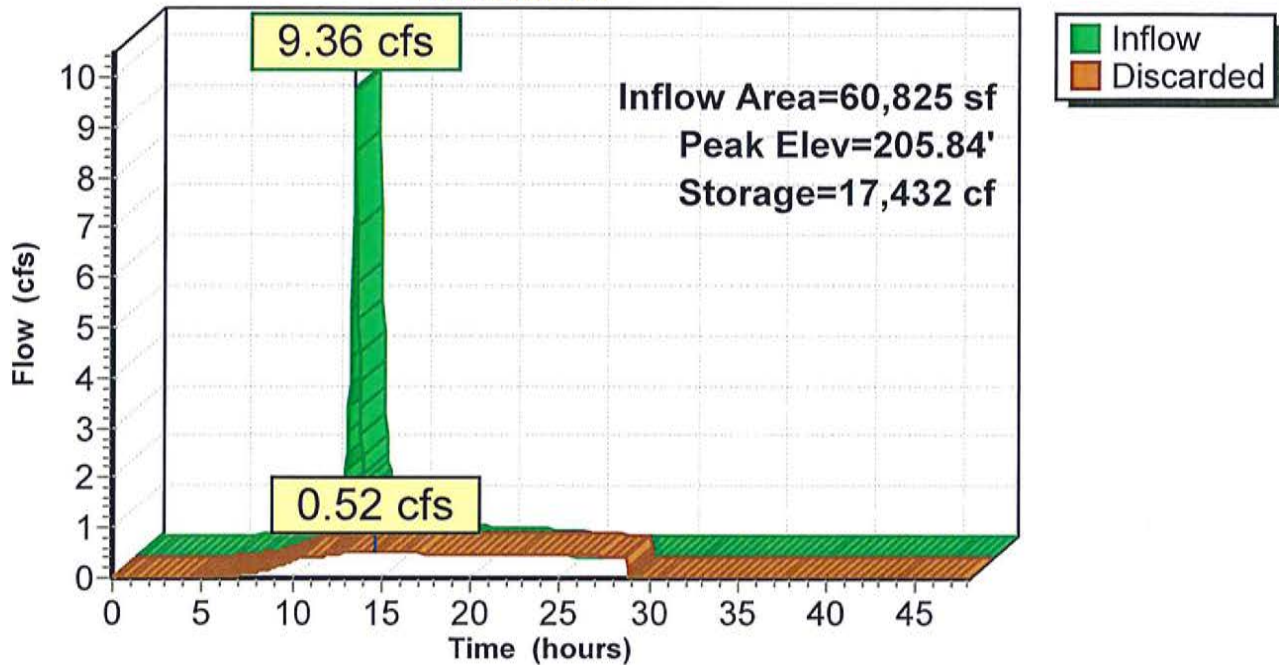
Overall System Size = 157.50' x 49.83' x 3.54'

220 Chambers

1,029.5 cy Field

600.4 cy Stone



Pond 4P: LARGE INFILTRATION SYSTEM**Hydrograph**

16064 POST-DEVELOPMENT

Type III 24-hr 100-Year Rainfall=8.80"

Prepared by Microsoft

Printed 4/21/2017

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Summary for Pond 5P: ROOF INFILTRATION SYSTEM

Inflow Area = 8,622 sf, 100.00% Impervious, Inflow Depth = 8.56" for 100-Year event
 Inflow = 1.48 cfs @ 12.14 hrs, Volume= 6,150 cf
 Outflow = 0.10 cfs @ 13.89 hrs, Volume= 6,150 cf, Atten= 93%, Lag= 105.1 min
 Discarded = 0.10 cfs @ 13.89 hrs, Volume= 6,150 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 205.83' @ 13.89 hrs Surf.Area= 1,265 sf Storage= 2,743 cf

Plug-Flow detention time= 249.3 min calculated for 6,144 cf (100% of inflow)
 Center-of-Mass det. time= 249.3 min (993.0 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.50'	1,089 cf	40.17'W x 31.50'L x 3.54'H Field A 4,481 cf Overall - 1,758 cf Embedded = 2,723 cf x 40.0% Voids
#2A	203.00'	1,758 cf	Cultec R-330XLHD x 32 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 8 rows
		2,847 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.50'	2.410 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.10 cfs @ 13.89 hrs HW=205.83' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.10 cfs)

Pond 5P: ROOF INFILTRATION SYSTEM - Chamber Wizard Field A**Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)**

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 8 rows

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

4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length

8 Rows x 52.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 40.17' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

32 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 8 Rows = 1,758.4 cf Chamber Storage

4,481.1 cf Field - 1,758.4 cf Chambers = 2,722.7 cf Stone x 40.0% Voids = 1,089.1 cf Stone Storage

Chamber Storage + Stone Storage = 2,847.5 cf = 0.065 af

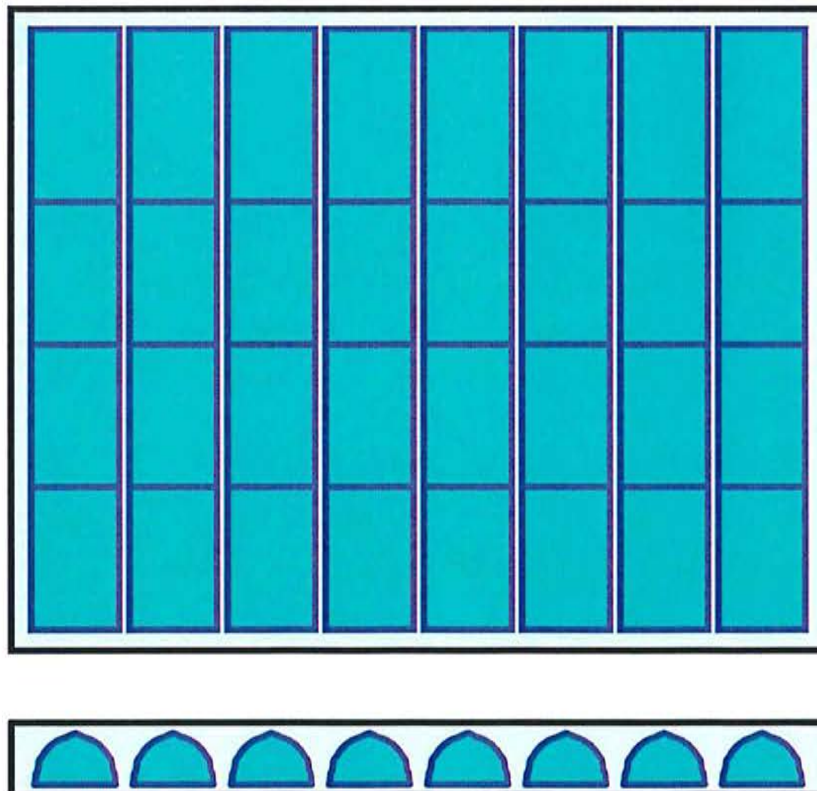
Overall Storage Efficiency = 63.5%

Overall System Size = 31.50' x 40.17' x 3.54'

32 Chambers

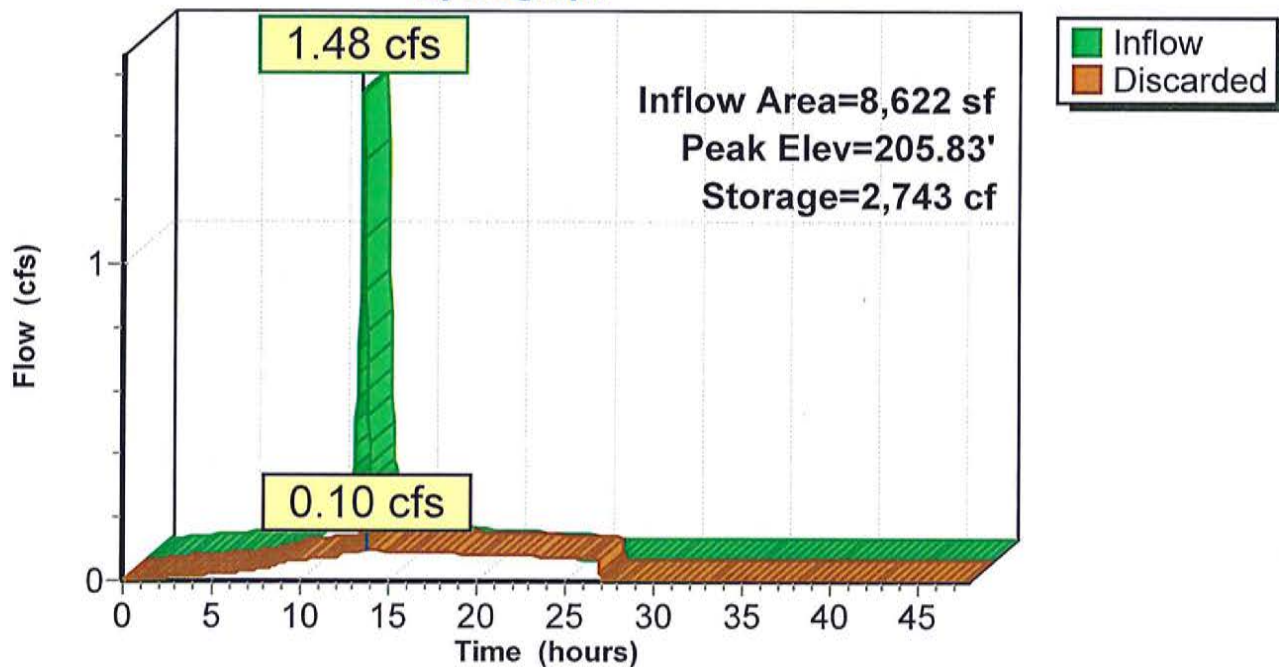
166.0 cy Field

100.8 cy Stone



Pond 5P: ROOF INFILTRATION SYSTEM

Hydrograph



APPENDIX C

Additional Calculations:

- 1. Soils Information (under separate cover)**
- 2. Recharge Volumes Calculation**
- 3. Water Quality Volume**
- 4. TSS Removal Calculations**
- 5. Separator Row sizing calculation**
- 6. 72 Hour Drawdown Calculations for Infiltration Systems**
- 7. Groundwater Mounding Calculation**

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts
(33 West Street, Medway)



Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Norfolk and Suffolk Counties, Massachusetts (MA616)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5	Saco silt loam, 0 to 3 percent slopes	B/D	1.3	34.4%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	2.5	65.6%
Totals for Area of Interest			3.8	100.0%

Description

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

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

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

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

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

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

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

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts
(Glen Brook Way)



Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts
(Glen Brook Way)

MAP LEGEND

Area of Interest (AOI)	 Area of Interest (AOI)	 C
Soils		 C/D
Soil Rating Polygons		 D
 A		 Not rated or not available
 A/D		Water Features
 B		 Streams and Canals
 B/D		Transportation
 C		 Rails
 C/D		 Interstate Highways
 D		 US Routes
 Not rated or not available		 Major Roads
Soil Rating Lines		 Local Roads
 A		Background
 A/D		 Aerial Photography
 B		
 B/D		
 C		
 C/D		
 D		
 Not rated or not available		
Soil Rating Points		
 A		
 A/D		
 B		
 B/D		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 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: <http://websoilsurvey.nrcs.usda.gov>
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 11, Sep 28, 2015

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

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Norfolk and Suffolk Counties, Massachusetts (MA616)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5	Saco silt loam, 0 to 3 percent slopes	B/D	1.1	32.5%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	2.2	67.5%
Totals for Area of Interest			3.3	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

ON-SITE REVIEW

DEEP HOLE #: 16-01 DATE: 12/1/16 TIME: 8:00am WEATHER: Sunny 45°
SITE ADDRESS or MAP/LOT #: Map 66, Lot 1, West Street, Medway MA
OWNER: Summit Home Builders Inc JOB NO.: 16-064
LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: To be determined

LAND USE: Residential SURFACE STONES: Yes: ☒ No: ☐ SLOPE (%): 2-4%

VEGETATION: Gravelly- Field LANDFORM: Kame

DISTANCES FROM:

OPEN WATER BODY: 300+ ft PROPERTY LINE: 40' ft POSSIBLE WET AREA: 200 ft DRAINAGEWAY: 300 ft

DRINKING WATER WELL: - 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)
0-12"	A	Loamy Sand (LS)	10yr3/3		Friable Roots (FR)
12"-22"	B	Loamy Sand (LS)	10yr5/8		Friable Roots (FR)
32"-84"	C1	Sand (S)	10yr5/4	64"	Med-Coarse Sand, Gravel 10% Stone
84"-96"	C2	Sand (S)	10yr5/3	Ox. 10yr5/8	Very Fine to Fine Sand, Ledge 96"
				Depl. 10yr6/2	
				Damp 84"+	

PARENT MATERIAL: Loamy Glacio Deposits (LGD) Unsuitable Material Present? Yes: ☒ No: ☐ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☒

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater:

Standing in Hole: Weeping from Face: Saturating the Face: 84" Mottling: 64"

Estimated Depth to Seasonal High Ground Water : 64"

PERCOLATION TEST

Percolation Hole #:		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/		Test Passed/ Failed/ Discon/	
Discon/ Add. Test Req'd:		Add. Testing Req'd:	

Performed By: Thomas A Pozerski Witnessed By: N/A Mach./Oper.: Trufant
Comments: Drainage Test Pits TH 16-01-05

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 Title 5 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.

ON-SITE REVIEW

DEEP HOLE #: 16-02 DATE: 12/1/16 TIME: 9:00am WEATHER: Sunny 45°
SITE ADDRESS or MAP/LOT #: Map 66, Lot 1, West Street, Medway MA
OWNER: Summit Home Builders Inc JOB NO.: 16-064
LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: To be determined

LAND USE: Residential SURFACE STONES: Yes: ☒ No: ☐ SLOPE (%): 2-4%

VEGETATION: Gravelly-Field LANDFORM: Kame

DISTANCES FROM:

OPEN WATER BODY: 300' ft PROPERTY LINE: 60' ft POSSIBLE WET AREA: 145' ft DRAINAGEWAY: 300' ft

DRINKING WATER WELL: - 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)
0-32"		Clean Fill			Fine to Coarse Sand and Gravel
32"-42"	A	Loamy Sand (LS)	10yr3/3		Friable Roots
42"-60"	B	Loamy Sand (LS)	10yr5/8		Friable Roots
60"-72"	C1	Sand	10yr5/4	60"	M-C Sand, Gravel 10% Stones
72"-96"	C2	Sand	10yr 5/3	Oxid. 10yr5/8 Depl. 10yr6/2 Damp 72"+	Slightly Firm, Very Fine- Fine Sand Ledge 96"

PARENT MATERIAL: Loamy Glacio Deposits (LGD) Unsuitable Material Present? Yes: ☒ No: ☐ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☒ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☒

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater:

Standing in Hole: Weeping from Face: Saturating the Face: 72"+ Mottling: 60"

Estimated Depth to Seasonal High Ground Water : 60"

PERCOLATION TEST

Percolation Hole #:		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/		Test Passed/ Failed/ Discon/	
Discon/ Add. Test Req'd:		Add. Testing Req'd:	

Performed By: Thomas A Pozerski Witnessed By: N/A Mach./Oper.: Trufant

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 Title 5 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.

ON-SITE REVIEW

DEEP HOLE #: 16-03 DATE: 12/1/16 TIME: 10:00am WEATHER: Sunny 50°
SITE ADDRESS or MAP/LOT #: Map 65, Lot 26, West Street, Medway MA
OWNER: Summit Home Builders Inc JOB NO.: 16-064
LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: To be determined

LAND USE: Residential SURFACE STONES: Yes: ☒ No: ☐ SLOPE (%): 2-4%

VEGETATION: Gravelly- Field LANDFORM: Kame

DISTANCES FROM:

OPEN WATER BODY: 280' ft PROPERTY LINE: 20' ft POSSIBLE WET AREA: 150' ft DRAINAGEWAY: 280' ft

DRINKING WATER WELL: - 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)
0-60"		Fill			
60"-96"	C	Loamy Sand (LS)	10yr6/4	60"	Fine to Med Sand with Silt, 10% Stones, Large Boulder at 96".
				Oxid. 10yr6/8	
				Depl. 10yr 6/4	
				Damp 74"+	

PARENT MATERIAL: Loamy Glacio Deposits(LGD) Unsuitable Material Present? Yes: ☒ No: ☐ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater:

Standing in Hole: Weeping from Face: Saturating the Face: 74" Mottling: 60"

Estimated Depth to Seasonal High Ground Water : 60"

PERCOLATION TEST

Percolation Hole #:		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/		Test Passed/ Failed/ Discon/	
Discon/ Add. Test Req'd:		Add. Testing Req'd:	

Performed By: Thomas A Pozerski Witnessed By: N/A Mach./Oper.: Trufant

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 Title 5 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.

ON-SITE REVIEW

DEEP HOLE #: 16-04 DATE: 12/1/16 TIME: 11:00am WEATHER: Sunny 51°
SITE ADDRESS or MAP/LOT #: Map 65, Lot 26, West Street, Medway MA
OWNER: Summit Home Builders Inc JOB NO.: 16-064
LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: To be determined

LAND USE: Residential SURFACE STONES: Yes: ☒ No: ☐ SLOPE (%): 2-4%

VEGETATION: Gravelly- Field LANDFORM: Kame

DISTANCES FROM:

OPEN WATER BODY: 300 ft PROPERTY LINE: 30 ft POSSIBLE WET AREA: 185 ft DRAINAGEWAY: 300 ft

DRINKING WATER WELL: - 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)
0-24"		Fill			Clean Fill M-C Sand and Gravel
24"-132"	C	Sand	10yr6/4	72" Faint	Fine-Coarse Sand and Gravel
				Ox. 10yr5/8	
				Depl. 10yr 6/4	

PARENT MATERIAL: Loamy Glacio Deposits (LGD) Unsuitable Material Present? Yes: ☒ No: ☐ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☒ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater:

Standing in Hole: Weeping from Face: Saturating the Face: 74" Mottling: 72"

Estimated Depth to Seasonal High Ground Water : 72"

PERCOLATION TEST

Percolation Hole #:		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/		Test Passed/ Failed/ Discon/	
Discon/ Add. Test Req'd:		Add. Testing Req'd:	

Performed By: Thomas A Pozerski Witnessed By: N/A Mach./Oper.: Trufant

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 Title 5 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.

ON-SITE REVIEW

DEEP HOLE #: 16-05 DATE: 12/1/16 TIME: 12:00pm WEATHER: Sunny 51°

SITE ADDRESS or MAP/LOT #: Map 65, Lot 25, West Street, Medway MA

OWNER: Summit Home Builders Inc JOB NO.: 16-064

LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: To be determined

LAND USE: Residential SURFACE STONES: Yes: ☒ No: ☐ SLOPE (%): 2-4%

VEGETATION: Gravelly- Field LANDFORM: Kame

DISTANCES FROM:

OPEN WATER BODY: 350 ft PROPERTY LINE: 55 ft POSSIBLE WET AREA: 230 ft DRAINAGEWAY: 350 ft

DRINKING WATER WELL: 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)
0-42"		Fill			
42"-72"	C1	Loamy Sand	10yr6/4	72"	Fine-Coarse Sand, Gravel and 10% Stones
72"-108"	C2	Sand	10yr 5/4	Ox. 10yr5/8	Fine Sand, Ledge 108"
				Depl. 10yr 6/2	

PARENT MATERIAL: Loamy Glacio Deposits(LGD) Unsuitable Material Present? Yes: ☒ No: ☐ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☒ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☒

GROUNDWATER OBSERVED: Yes: ☐ No: ☐ If Yes: What is the depth of Groundwater:

Standing in Hole: Weeping from Face: Saturating the Face: Mottling: 72"

Estimated Depth to Seasonal High Ground Water : 72"

PERCOLATION TEST

Percolation Hole #:		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/		Test Passed/ Failed/ Discon/	
Discon/ Add. Test Req'd:		Add. Testing Req'd:	

Performed By: Thomas A Pozerski Witnessed By: N/A Mach./Oper.: Trufant

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.

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

JOB **16-064**
 SHEET NO. 1 of 1
 CALCULATED BY DA
 CHECKED BY PGP DATE: 6/12/17

Location: **GLEN BROOK WAY**

Recharge Volumes (Standard #3)

Total Area (Ac.)= 3.155
 Total Impervious Area A Soil (Ac.)= 1.277
 Total Impervious Area B Soil (Ac.)= 0
 Total Impervious Area C Soil (Ac.)= 0

	Vol. To Recharge (inches per Imp. Acre)	Volume (Imp. Area x inches per Acre)	
Recharge Volume (A soil)	0.4	0.51	
Recharge Volume (B soil)	0.25	0.00	
Recharge Volume (C soil)	0.1	0.00	
		0.51	AC-IN
Total Required Recharge Volume:		0.04	AC-FT
		1854	C.F.

Recharge volume provided by Infiltration

System:

Volume Provided (below outlet, 4P Lg Syst): 17,940 C.F.
 Volume Provided (below outlet, 5P, Roof Syst.): 2,826 C.F.
 Total Volume: **20,766**

Water Quality Volume

Required Volume = 400 CF/AC x Impervious Area

New Impervious Area onsite 55,605 SF
 1.28 AC 7.48 Gal/CF

Required Volume for Separator Row 510.61 CF = 3819 Gal
Volume Provided 535 CF (below 12" overflow pipe invert)

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

JOB 16-064
SHEET NO. 1 of 1
CALCULATED BY DA
CHECKED BY PGP
DATE: 4/15/2017
REV'D:

WATER QUALITY VOLUME (STANDARD #4)

Location: **GLEN BROOK WAY**

Total New Impervious Area

Parking area

46,983 S.F.

Roof

8,622 S.F.

Total Area:

55,605 S.F.

Water Quality

Volume using: 0.5 or 1.0 inch x Imp. Area (per S.W. Mgmt Policy)

0.5 inch x Imp. Area

2,317 cubic feet

Provided by large Infiltration System #2 (see calcs in Appdx B)

17,900+

c.f. (Below outlet)

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: Glen Brook Way - Pretreatment

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Sediment Forebay	0.25	0.75	0.19	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56
	0.00	0.56	0.00	0.56

Total TSS Removal =

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

44%

16-064

Project:

Prepared By: DA

Date: 6/27/2017

*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: Glen Brook Way

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Sediment Forebay	0.25	0.75	0.19	0.56
Subsurface Infiltration Structure	0.80	0.56	0.45	0.11
	0.00	0.11	0.00	0.11
	0.00	0.11	0.00	0.11

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

89%

Total TSS Removal =

Project:	16-064
Prepared By:	DA
Date:	6/15/2017

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

16064 POST-DEVELOPMENT

Type III 24-hr 100-Year Rainfall=8.80"

Prepared by Merrill Engineers and Land Surveyors

Printed 6/26/2017

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Stage-Area-Storage for Pond 7P: SEPARATOR ROW (Stone not included)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
203.00	0	204.08	636	205.16	1,114
203.02	12	204.10	647	205.18	1,119
203.04	25	204.12	658	205.20	1,124
203.06	37	204.14	669	205.22	1,128
203.08	49	204.16	680	205.24	1,132
203.10	62	204.18	691	205.26	1,136
203.12	74	204.20	702	205.28	1,140
203.14	86	204.22	713	205.30	1,143
203.16	98	204.24	723	205.32	1,146
203.18	111	204.26	734	205.34	1,149
203.20	123	204.28	745	205.36	1,151
203.22	135	204.30	755	205.38	1,153
203.24	147	204.32	766	205.40	1,154
203.26	159	204.34	776	205.42	1,156
203.28	171	204.36	787	205.44	1,157
203.30	183	204.38	797	205.46	1,158
203.32	195	204.40	807	205.48	1,158
203.34	207	204.42	817	205.50	1,159
203.36	219	204.44	827		
203.38	232	204.46	837		
203.40	244	204.48	846		
203.42	256	204.50	856		
203.44	268	204.52	866		
203.46	280	204.54	875		
203.48	292	204.56	885		
203.50	304	204.58	894		
203.52	316	204.60	903		
203.54	328	204.62	912		
203.56	339	204.64	922		
203.58	351	204.66	931		
203.60	363	204.68	939		
203.62	375	204.70	948		
203.64	387	204.72	957		
203.66	398	204.74	965		
203.68	410	204.76	974		
203.70	421	204.78	982		
203.72	433	204.80	991		
203.74	444	204.82	999		
203.76	455	204.84	1,007		
203.78	467	204.86	1,015		
203.80	478	204.88	1,022		
203.82	490	204.90	1,030		
203.84	501	204.92	1,037		
203.86	512	204.94	1,045		
203.88	523	204.96	1,052		
203.90	535	204.98	1,059		
203.92	546	205.00	1,066		
203.94	557	205.02	1,072		
203.96	569	205.04	1,079		
203.98	580	205.06	1,085		
204.00	591	205.08	1,091		
204.02	602	205.10	1,097		
204.04	613	205.12	1,103		
204.06	624	205.14	1,109		

P.W.Q. Vol.
= 511 CF.

16064 POST-DEVELOPMENT

Type III 24-hr 100-Year Rainfall=8.80"

Prepared by Merrill Engineers and Land Surveyors

Printed 6/26/2017

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Hydrograph for Pond 4P: LARGE INFILTRATION SYSTEM

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)	Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0	202.50	0.00	27.00	0.00	2,929	203.20	0.45
0.50	0.00	0	202.50	0.00	27.50	0.00	2,114	203.08	0.45
1.00	0.00	0	202.50	0.00	28.00	0.00	1,305	202.92	0.45
1.50	0.00	0	202.50	0.00	28.50	0.00	505	202.66	0.44
2.00	0.00	0	202.50	0.00	29.00	0.00	3	202.50	0.01
2.50	0.00	0	202.50	0.00	29.50	0.00	0	202.50	0.00
3.00	0.00	0	202.50	0.00	30.00	0.00	0	202.50	0.00
3.50	0.00	0	202.50	0.00	30.50	0.00	0	202.50	0.00
4.00	0.00	0	202.50	0.00	31.00	0.00	0	202.50	0.00
4.50	0.01	1	202.50	0.01	31.50	0.00	0	202.50	0.00
5.00	0.02	4	202.50	0.02	32.00	0.00	0	202.50	0.00
5.50	0.03	7	202.50	0.03	32.50	0.00	0	202.50	0.00
6.00	0.04	10	202.50	0.04	33.00	0.00	0	202.50	0.00
6.50	0.06	14	202.50	0.05	33.50	0.00	0	202.50	0.00
7.00	0.08	19	202.51	0.07	34.00	0.00	0	202.50	0.00
7.50	0.10	25	202.51	0.10	34.50	0.00	0	202.50	0.00
8.00	0.13	32	202.51	0.13	35.00	0.00	0	202.50	0.00
8.50	0.17	42	202.51	0.17	35.50	0.00	0	202.50	0.00
9.00	0.23	56	202.52	0.22	36.00	0.00	0	202.50	0.00
9.50	0.30	73	202.52	0.29	36.50	0.00	0	202.50	0.00
10.00	0.37	90	202.53	0.36	37.00	0.00	0	202.50	0.00
10.50	0.48	121	202.54	0.44	37.50	0.00	0	202.50	0.00
11.00	0.62	320	202.60	0.44	38.00	0.00	0	202.50	0.00
11.50	1.00	927	202.80	0.44	38.50	0.00	0	202.50	0.00
12.00	4.93	4,308	203.40	0.46	39.00	0.00	0	202.50	0.00
12.50	2.98	14,493	205.05	0.50	39.50	0.00	0	202.50	0.00
13.00	1.02	16,394	205.51	0.51	40.00	0.00	0	202.50	0.00
13.50	0.76	17,011	205.70	0.51	40.50	0.00	0	202.50	0.00
14.00	0.62	17,330	205.81	0.51	41.00	0.00	0	202.50	0.00
14.50	0.53	17,428	205.84	0.52	41.50	0.00	0	202.50	0.00
15.00	0.46	17,398	205.83	0.51	42.00	0.00	0	202.50	0.00
15.50	0.40	17,248	205.78	0.51	42.50	0.00	0	202.50	0.00
16.00	0.33	16,980	205.69	0.51	43.00	0.00	0	202.50	0.00
16.50	0.29	16,611	205.58	0.51	43.50	0.00	0	202.50	0.00
17.00	0.26	16,190	205.45	0.51	44.00	0.00	0	202.50	0.00
17.50	0.23	15,721	205.32	0.50	44.50	0.00	0	202.50	0.00
18.00	0.20	15,204	205.20	0.50	45.00	0.00	0	202.50	0.00
18.50	0.18	14,649	205.08	0.50	45.50	0.00	0	202.50	0.00
19.00	0.18	14,079	204.97	0.49	46.00	0.00	0	202.50	0.00
19.50	0.17	13,499	204.86	0.49	46.50	0.00	0	202.50	0.00
20.00	0.16	12,907	204.75	0.49	47.00	0.00	0	202.50	0.00
20.50	0.15	12,304	204.65	0.49	47.50	0.00	0	202.50	0.00
21.00	0.14	11,694	204.55	0.49	48.00	0.00	0	202.50	0.00
21.50	0.14	11,076	204.44	0.48					
22.00	0.13	10,450	204.34	0.48					
22.50	0.12	9,816	204.24	0.48					
23.00	0.12	9,174	204.14	0.48					
23.50	0.11	8,525	204.04	0.47					
24.00	0.10	7,868	203.94	0.47					
24.50	0.00	7,079	203.82	0.47					
25.00	0.00	6,239	203.69	0.47					
25.50	0.00	5,404	203.57	0.46					
26.00	0.00	4,574	203.44	0.46					
26.50	0.00	3,749	203.32	0.46					

RECHARGE SYSTEM
DRAIN TIME
≤ 72 HRS

16064 POST-DEVELOPMENT

Type III 24-hr 100-Year Rainfall=8.80"

Prepared by Merrill Engineers and Land Surveyors

Printed 6/26/2017

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Hydrograph for Pond 5P: ROOF INFILTRATION SYSTEM

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)	Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0	202.50	0.00	27.00	0.00	7	202.51	0.03
0.50	0.00	0	202.50	0.00	27.50	0.00	0	202.50	0.00
1.00	0.00	1	202.50	0.00	28.00	0.00	0	202.50	0.00
1.50	0.01	2	202.50	0.01	28.50	0.00	0	202.50	0.00
2.00	0.01	3	202.51	0.01	29.00	0.00	0	202.50	0.00
2.50	0.01	3	202.51	0.01	29.50	0.00	0	202.50	0.00
3.00	0.02	4	202.51	0.01	30.00	0.00	0	202.50	0.00
3.50	0.02	4	202.51	0.02	30.50	0.00	0	202.50	0.00
4.00	0.02	5	202.51	0.02	31.00	0.00	0	202.50	0.00
4.50	0.02	5	202.51	0.02	31.50	0.00	0	202.50	0.00
5.00	0.02	6	202.51	0.02	32.00	0.00	0	202.50	0.00
5.50	0.02	6	202.51	0.02	32.50	0.00	0	202.50	0.00
6.00	0.03	6	202.51	0.03	33.00	0.00	0	202.50	0.00
6.50	0.03	7	202.51	0.03	33.50	0.00	0	202.50	0.00
7.00	0.03	8	202.52	0.03	34.00	0.00	0	202.50	0.00
7.50	0.04	10	202.52	0.04	34.50	0.00	0	202.50	0.00
8.00	0.04	11	202.52	0.04	35.00	0.00	0	202.50	0.00
8.50	0.05	13	202.52	0.05	35.50	0.00	0	202.50	0.00
9.00	0.06	15	202.53	0.06	36.00	0.00	0	202.50	0.00
9.50	0.07	18	202.54	0.07	36.50	0.00	0	202.50	0.00
10.00	0.08	28	202.56	0.07	37.00	0.00	0	202.50	0.00
10.50	0.10	61	202.62	0.07	37.50	0.00	0	202.50	0.00
11.00	0.12	130	202.76	0.07	38.00	0.00	0	202.50	0.00
11.50	0.18	261	203.01	0.07	38.50	0.00	0	202.50	0.00
12.00	0.81	845	203.56	0.08	39.00	0.00	0	202.50	0.00
12.50	0.45	2,423	205.25	0.09	39.50	0.00	0	202.50	0.00
13.00	0.15	2,676	205.70	0.10	40.00	0.00	0	202.50	0.00
13.50	0.11	2,731	205.81	0.10	40.50	0.00	0	202.50	0.00
14.00	0.09	2,742	205.83	0.10	41.00	0.00	0	202.50	0.00
14.50	0.08	2,720	205.79	0.10	41.50	0.00	0	202.50	0.00
15.00	0.07	2,679	205.71	0.10	42.00	0.00	0	202.50	0.00
15.50	0.06	2,621	205.59	0.10	42.50	0.00	0	202.50	0.00
16.00	0.05	2,548	205.45	0.09	43.00	0.00	0	202.50	0.00
16.50	0.04	2,460	205.30	0.09	43.50	0.00	0	202.50	0.00
17.00	0.04	2,367	205.17	0.09	44.00	0.00	0	202.50	0.00
17.50	0.03	2,267	205.04	0.09	44.50	0.00	0	202.50	0.00
18.00	0.03	2,161	204.91	0.09	45.00	0.00	0	202.50	0.00
18.50	0.03	2,051	204.78	0.09	45.50	0.00	0	202.50	0.00
19.00	0.03	1,940	204.66	0.09	46.00	0.00	0	202.50	0.00
19.50	0.02	1,828	204.54	0.09	46.50	0.00	0	202.50	0.00
20.00	0.02	1,715	204.42	0.09	47.00	0.00	0	202.50	0.00
20.50	0.02	1,602	204.30	0.09	47.50	0.00	0	202.50	0.00
21.00	0.02	1,489	204.19	0.08	48.00	0.00	0	202.50	0.00
21.50	0.02	1,376	204.08	0.08					
22.00	0.02	1,262	203.97	0.08					
22.50	0.02	1,148	203.85	0.08					
23.00	0.02	1,034	203.74	0.08					
23.50	0.02	920	203.63	0.08					
24.00	0.02	806	203.52	0.08					
24.50	0.00	674	203.40	0.08					
25.00	0.00	535	203.26	0.08					
25.50	0.00	398	203.14	0.08					
26.00	0.00	262	203.01	0.07					
26.50	0.00	130	202.76	0.07					

RECHARGE SYSTEM
DRAIN TIME
< 72 Hrs

Groundwater Mound Beneath Rectangular Recharge Area

by Glenn M. Duffield, President, HydroSOLVE, Inc. 

 Share

Hantush (1967) presented the following equations for predicting the maximum height of the [water table](#) beneath a rectangular recharge area:

$$h_m^2 - h_i^2 = Z_m(t) = (2w/K)vtS^*(0.5A/(4vt)^{1/2}, 0.5B/(4vt)^{1/2}) \dots (1)$$

$$v = K\bar{b}/\varepsilon \dots (2)$$

$$\bar{b} = 0.5[h_i(0) + h(t)] \dots (3)$$

where h_m is maximum height of mound above aquifer base (i.e., maximum saturated thickness of aquifer beneath recharge area); h_i is initial height of water table above aquifer base (i.e., initial saturated thickness of aquifer); K and ε are [hydraulic conductivity](#) and [storativity](#) ([specific yield](#)) of aquifer, respectively; w is constant rate of percolation from rectangular recharge area of length A and width B ; $\bar{b}$ is a constant of linearization; and the function S^* is an integral expression (see [Hantush 1967](#)). The aquifer is unconfined and assumed to have infinite extent.

If infiltration ends at time $t=t_0$, Hantush (1967) applied the principle of superposition to compute the decay of the mound as follows:

$$h_m^2 - h_i^2 = Z_m(t) - Z_m(t-t_0) \dots (4)$$

Equation (1) is nonlinear owing to the definition of $\bar{b}$ in Equation (3); however, the solution is readily obtained by successive approximation.

Results of Groundwater Mounding Calculation

Solution by Successive Approximation

Iteration	$\bar{b}$	h_m^*	% Change				
1	695	696.081857147268	0.155662898887554				
2	695.540928573634	696.082060514999	2.92160653891926E-05				
K [L/T]	ϵ	h_i [L]	A [L]	B [L]	w [L/T]	t [T]	h_m [L]
15.0468	.3	695	157.5	49.83	4.43425	1	696.082060514999
maximum water-table rise ($h_m - h_i$) at time t = 1 is 1.08206051499894							

[Return to Groundwater Mounding Calculator](#)

MERRILL ENGINEERS AND LAND SURVEYORS
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JOB 16-064
SHEET NO. 1 of 1
CALCULATED BY DA
CHECKED BY PGP
DATE: 6/12/2017
REV'D:

Hantush (1967) Groundwater Mounding Calculator Data

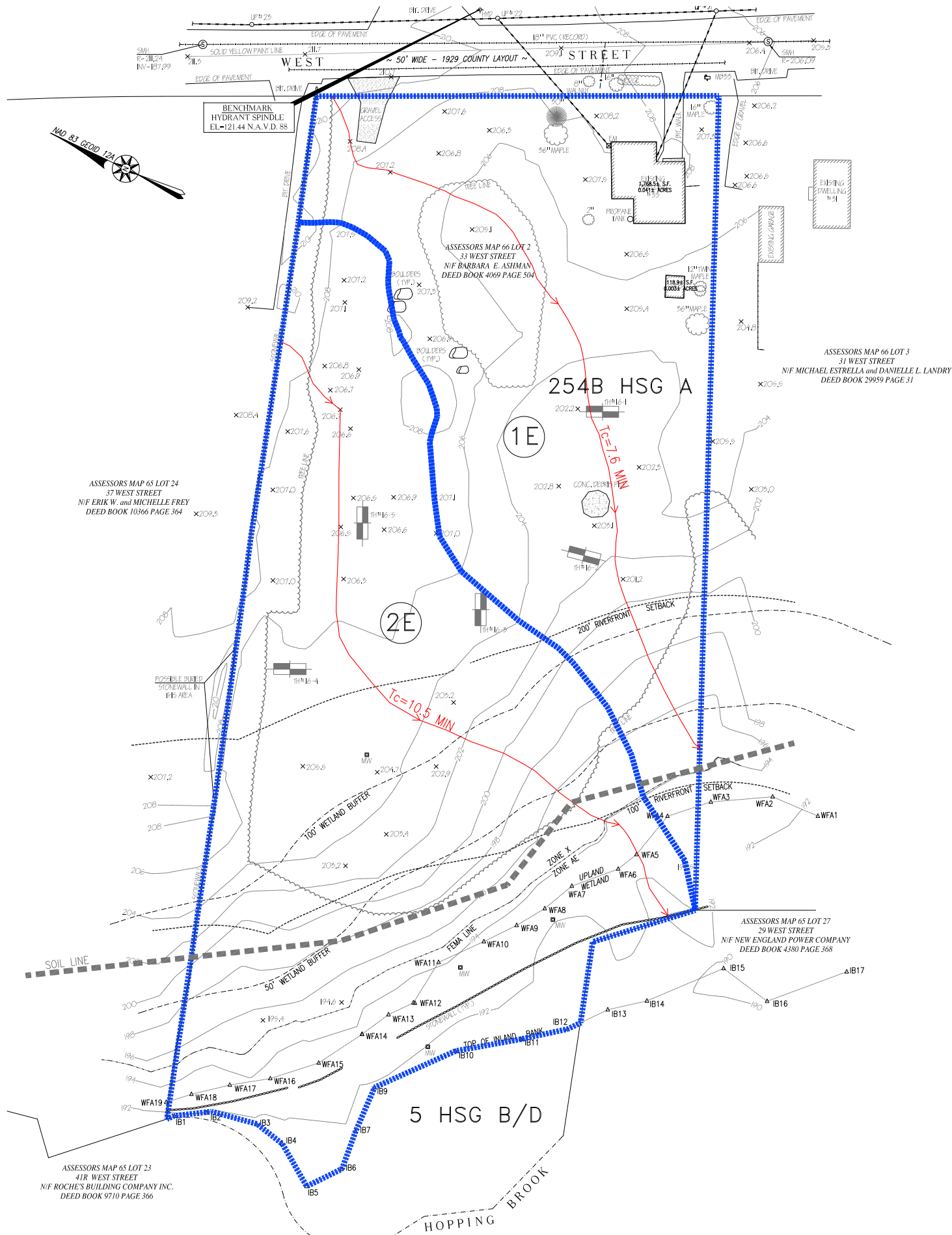
Location: **Glen Brook Way, Medway**

Infiltration System:

1 Perc Rate P.R.):	2 MPI
2 Hydraulic Conductivity (K)	
Rate (ft/day): ((60mph/P.R.)x(24hr/1 day))/(12in./ft)	60 ft/day
K=R/6.03)^1.18=	15.0468 ft/day
3 Specific Yield: Gravelly Sand =	0.30
4 T= (per Brett Rowe & Kermit Studley, MA DEP):	1 days
5 Initial Sat'd Thickness (h _i): (assumed from nearby irrigation well)	695 ft
6 Length of basin:	157.5 ft
7 Width of basin:	49.83 ft
8 Recharge Rate:	
A=L x W =	7848.225 sf
Q= (DDF)	
Flow	34801 C.F. per day (Hydrocad)
Recharge Rate:	4.43425 ft/day

APPENDIX D

Existing and Proposed Watersheds Plan (Insert)



PRE-DEVELOPMENT WATERSHEDS

SUBCATCHMENT 1E		
DESCRIPTION	AREA (S.F.)	
GRASS HSG A	40,652	S.F.
WOODS HSG A	9,303	S.F.
WOODS HSG B	584	S.F.
WETLANDS	459	S.F.
GRAVEL	311	S.F.
IMPERVIOUS AREA	1,888	S.F.
	SUBTOTAL	53,197 S.F.

SUBCATCHMENT 2E		
DESCRIPTION	AREA (S.F.)	
GRASS HSG A	37,457	S.F.
WOODS HSG A	11,716	S.F.
WOODS HSG B	12,368	S.F.
WETLANDS	12,165	S.F.
	SUBTOTAL	73,706 S.F.
	TOTAL AREA	126,903 S.F.

REVISIONS

DRAWN BY: VC

DESIGNED BY: PGP

CHECKED BY: PGP



Merrill

Engineers and Land Surveyors

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26 UNION STREET, PLYMOUTH, MA 02360 / T: (508) 746-6060

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SITE PLAN

WEST STREET

MEDWAY, MASSACHUSETTS

PREPARED FOR: METRO WEST COLLABORATIVE DEVELOPMENT

79-B CHAPEL STREET

NEWTON, MA 02458

APRIL 24, 2017

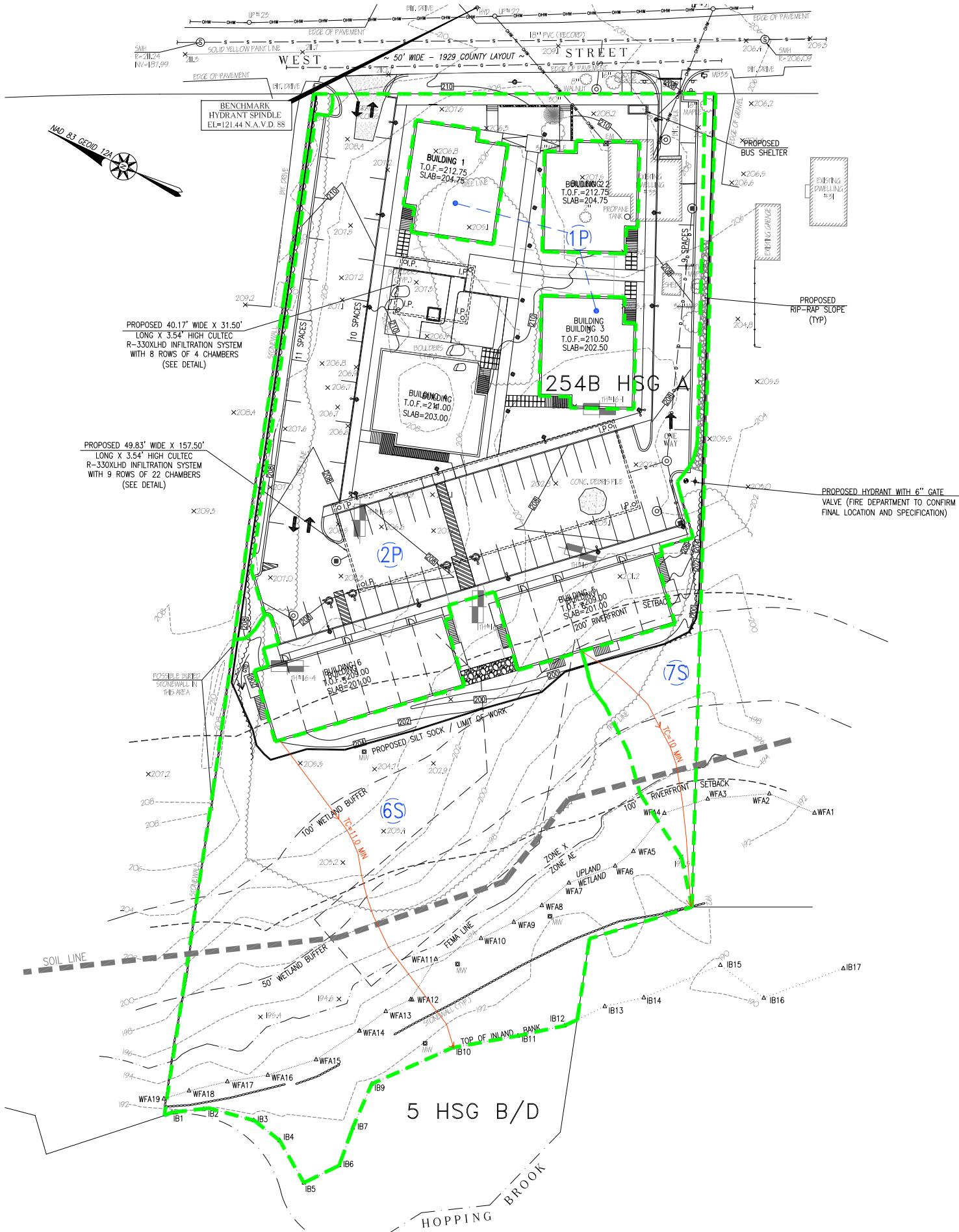
SCALE: AS-NOTED

JOB No. 16-064

LATEST REVISION:

EXISTING WATERSHED PLAN

SHEET 1 OF 1



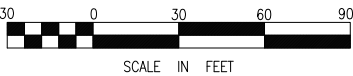
POST DEVELOPMENT WATERSHEDS

SUBCATCHMENT 7S		
DESCRIPTION	AREA (S.F.)	
GRASS COVER, HSG A	5,362	S.F.
DIRT ROADS, HSG A	188	S.F.
WOODS, GOOD, HSG A	2,612	S.F.
WOODS, GOOD, HSG B	456	S.F.
WETLANDS	385	S.F.
SUBTOTAL	9,003	S.F.

SUBCATCHMENT 6S		
DESCRIPTION	AREA (S.F.)	
GRASS COVER, HSG A	14,662	S.F.
WOODS, GOOD, HSG A	8,056	S.F.
WOODS, GOOD, HSG B	12,496	S.F.
WETLANDS	12,239	S.F.
GRASS COVER, GOOD, HSG A	1,000	S.F.
SUBTOTAL	48,453	S.F.

SUBCATCHMENT 1P		
DESCRIPTION	AREA (S.F.)	
IMPERVIOUS, HSG A (ROOFS 1-3)	8,622	S.F.

SUBCATCHMENT 2P		
DESCRIPTION	AREA (S.F.)	
IMPERVIOUS, HSG A	46,983	S.F.
GRASS COVER, GOOD, HSG A	12,866	S.F.
WOODS, HSG A	976	S.F.
SUBTOTAL	60,825	S.F.
TOTAL AREA	126,903	S.F.



REVISIONS

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SITE PLAN
WEST STREET
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APRIL 24, 2017
SCALE: AS-NOTED
JOB No. 16-064
LATEST REVISION:
PROPOSED WATERSHED PLAN
SHEET 1 OF 1